

Global Solutions Catalog



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Tamura reserves the right to alter or modify the specifications contained herein without notice. Buyer is responsible for determining the suitability of the product for buyer's intended use and assumes all risks and responsibility for loss or damage resulting from the handling or use of the product.

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About Tamura



Tamura is a world-class manufacturer of high quality electronic components for global markets. With 2003 sales greater than 600 Million US Dollars, Tamura Corporation is one of the largest suppliers of magnetic components and power supplies in the world. Publicly traded on the Japan Neiki Exchange, Tamura has proven financial strength, innovation and ability to grow for more than 80 years. Tamura's state-of-the-art manufacturing facilities in Asia and Europe support leading edge technologies for the future's high demand applications.

Design:

Tamura supports its customer base in N. America, Asia, and Europe with Regional Engineering Services, a Technical Engineering Sales Staff as well as a staff of Design and Quality Engineers. Our mission is to provide our customers with a selection of catalog products as well as custom solutions, engineered to meet our Customer's specific performance and cost needs while ensuring the industry's highest level of quality.



Quality:

Tamura Corporation has a long-standing commitment to quality. It is a characteristic held to the highest standard at all Tamura locations from Design to Production. To meet this objective, we strive to produce an environment of continuous improvement to ensure the highest level of service, performance in design, durability in manufacturing, and on time delivery. We are committed to provide our customers with a production partner dedicated to the environment, ISO9000, ISO14000 and safety agency certifications.

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About Tamura

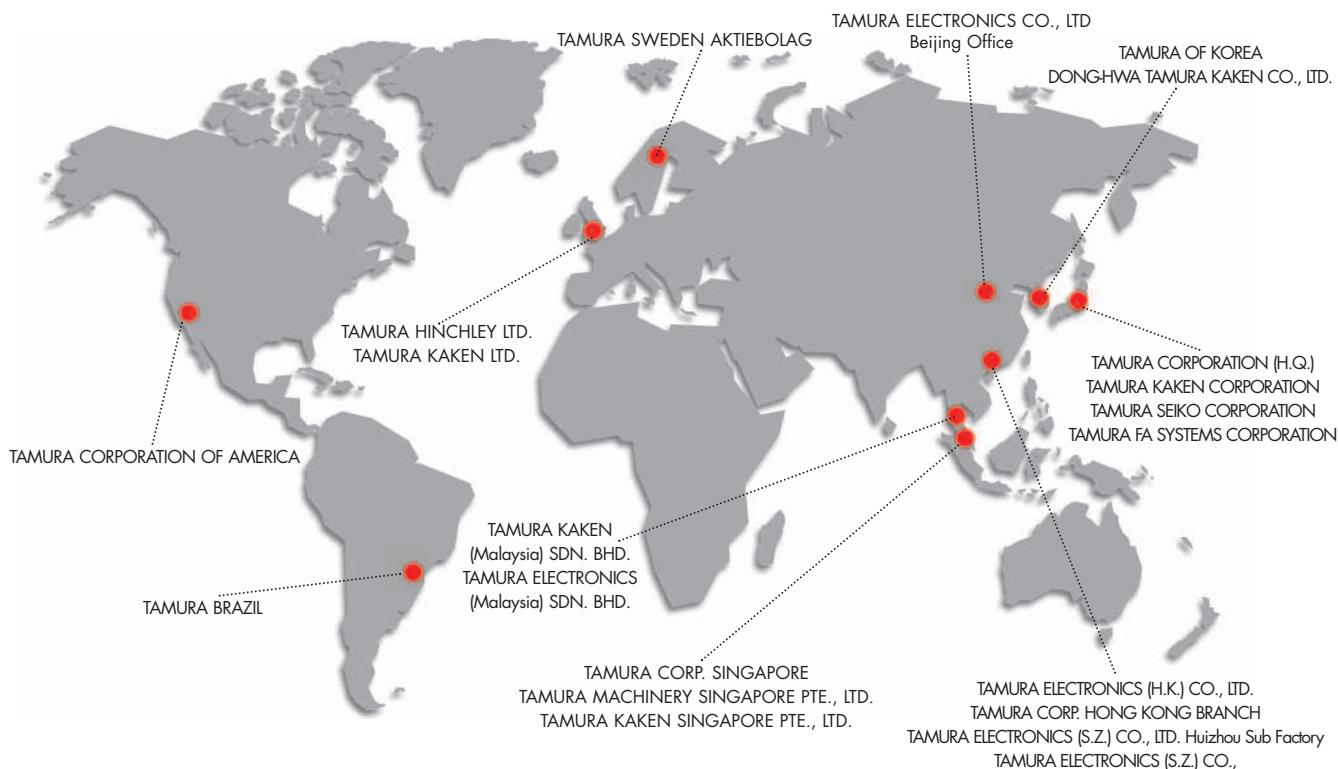
Production:

Tamura has engineered some of the most automated and advanced manufacturing facilities in the business. With production locations in Japan, China, Malaysia, Myanmar, and the Czech Republic, Tamura offers our customers a wide range of capabilities, services, and low cost alternatives to fit their needs. Our production facilities produce over One Million items a day as members of a vertically integrated team supporting each other with products from raw materials to completed assemblies.

Products:

Power Transformers; Telecom Transformers; Ethernet Transformers and Connector Modules; Current Sensors; Adapters and Power Supplies.

For the latest product updates and information, please visit our website at www.tamuracorp.com. We look forward to supporting our customers from design to years after the order.



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Power Transformer Information

Applications & Uses:

Power Transformers range in application from Motor Controls to Consumer Equipment. Power Transformers are the preferred method of producing a low AC voltage from a high AC voltage line.

Recognized: *Insulation System vs. Construction vs. Component*

Using an insulation system, Tamura can use combinations from a variety of approved 130°C materials to quickly produce a product to customer's specifications and still apply the UL mark in production.

In a recognized construction system UL has approved a set of materials used to make a transformer, but have also examined voltage, current, creepage, clearance, and dielectric strength of a specific method of construction. These 'methods' of construction are generally approved for general use applications.

In the situation of a recognized component, UL has approved a specific component for a specific application type and thus the required UL requirements would apply.

Inherently Limited Defined:

An Inherently Limited transformer has designed into it an impedance that limits the current output to a maximum value. This coupled with the correctly sized transformer limits the temperature under a full line voltage and shorted secondary to a safe level.

This can be accomplished in a traditionally non-Inherently limited transformer through the use of a temperature sensitive device to limit the components maximum temperature. Both are UL acceptable methods to produce a safe, reliable power system.

Class II & Class III Defined:

The label of Class II and Class III transformers identifies that particular transformer with UL1585. If the component is not UL1585 approved, it can not be a Class II or Class III transformer. Tamura's 3FS-xxx and 3FD-xxx standard series parts as well as many custom designs fit under the UL classification.

Ask Tamura:

Safety requirements, like nearly everything, change frequently and vary by application and use. Products also have different certifications and ratings that may affect cost and performance. Please contact your appropriate Tamura office below to speak directly with a qualified Design or Sales Engineer for more information or assistance selecting the right product for your application.

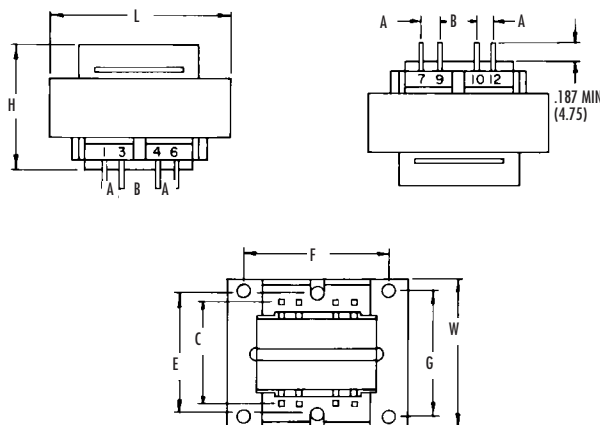
Also visit www.ul.com for more information.

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International Laminated Power Transformers

- 115V/230V Dual Primary
- Class B (130°C) Insulation
- 3500Vrms HiPot (Pri:Sec)
- UL94V-0 Flammability
- UL506 (E79781)
- Non-Inherently Limited
- 2.5VA to 56VA
- TUV (810/89)
- VDE 0551, 0806
- UL1411 (E138028)
- Recognized Insulation System for custom designs.



Dimensions Inches (mm)

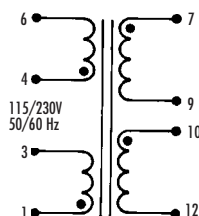
VA (SIZE)	L	W	H	A	B	C	MOUNTING			MTG. SCREWS	PIN SQUARE	LBS (KG.)
							E	F	G			
2.5	1.625 (41.3)	1.313 (17.3)	1.125 (28.6)	.200 (5.1)	.250 (6.4)	1.000 (25.4)	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.25 (.11)
5.0	1.625 (41.3)	1.313 (33.3)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.000 (25.4)	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.37 (.17)
10.0	1.875 (47.6)	1.563 (39.7)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.140 (29.0)	1.250 (31.8)	—	—	2X#4 (2X M3)	.036 (.914)	.53 (.24)
20.0	2.250 (57.1)	1.875 (47.6)	1.625 (41.3)	.400 (10.2)	.400 (10.2)	1.460 (37.1)	1.500 (38.1)	—	—	2X#4 (2X M3)	.036 (.914)	.90 (.41)
30.0	2.625 (66.7)	2.188 (55.6)	1.563 (39.7)	.550 (14.0)	.275 (7.0)	1.680 (42.7)	—	2.19 (55.6)	1.75 (44.5)	4X#4 (4X M3)	.045 (1.14)	1.15 (.52)
56.0	3.000 (76.2)	2.50 (63.5)	1.845 (46.9)	.600 (15.2)	.300 (7.6)	1.900 (48.3)	—	2.50 (63.5)	2.00 (50.8)	4X#6 (4X M5)	.045 (1.14)	1.70 (.77)

Packaging:

Size	Tube	Tray
2.5	10	40
5.0	9	54
10.0	8	40

Size	Tube	Tray
20.0	8	40
30.0	8	20
56.0	8	16

Schematics



PART NO.	VA (SIZE)	SECONDARY			
		PARALLEL CONNECTED		SERIES CONNECTED	
		AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
PL2.5-10-130B	2.5	5.0	0.50	10.0 CT	0.25
PL5.0-10-130B	5.0	5.0	1.00	10.0 CT	0.50
PL10-10-130B	10.0	5.0	2.00	10.0 CT	1.00
PL20-10-130B	20.0	5.0	4.00	10.0 CT	2.00
PL30-10-130B	30.0	5.0	6.00	10.0 CT	3.00
PL56-10-130B	56.0	5.0	11.20	10.0 CT	5.60
PL2.5-12-130B	2.5	6.3	0.40	12.6 CT	0.20
PL5.0-12-130B	5.0	6.3	0.80	12.6 CT	0.40
PL10-12-130B	10.0	6.3	1.60	12.6 CT	0.80
PL20-12-130B	20.0	6.3	3.20	12.6 CT	1.60
PL30-12-130B	30.0	6.3	4.80	12.6 CT	2.40
PL56-12-130B	56.0	6.3	8.80	12.6 CT	4.40
PL2.5-16-130B	2.5	8.0	0.30	16.0 CT	0.15
PL5.0-16-130B	5.0	8.0	0.62	16.0 CT	0.31
PL10-16-130B	10.0	8.0	1.25	16.0 CT	0.62
PL20-16-130B	20.0	8.0	2.50	16.0 CT	1.25
PL30-16-130B	30.0	8.0	3.80	16.0 CT	1.90
PL56-16-130B	56.0	8.0	7.00	16.0 CT	3.50
PL2.5-20-130B	2.5	10.0	0.24	20.0 CT	0.12
PL5.0-20-130B	5.0	10.0	0.50	20.0 CT	0.25
PL10-20-130B	10.0	10.0	1.00	20.0 CT	0.50
PL20-20-130B	20.0	10.0	2.00	20.0 CT	1.00
PL30-20-130B	30.0	10.0	3.00	20.0 CT	1.50
PL56-20-130B	56.0	10.0	5.60	20.0 CT	2.80
PL2.5-24-130B	2.5	12.0	0.20	24.0 CT	0.10
PL5.0-24-130B	5.0	12.0	0.42	24.0 CT	0.21
PL10-24-130B	10.0	12.0	0.84	24.0 CT	0.42
PL20-24-130B	20.0	12.0	1.66	24.0 CT	0.83
PL30-24-130B	30.0	12.0	2.50	24.0 CT	1.25
PL56-24-130B	56.0	12.0	4.66	24.0 CT	2.33
PL2.5-28-130B	2.5	14.0	0.18	28.0 CT	0.09
PL5.0-28-130B	5.0	14.0	0.36	28.0 CT	0.18
PL10-28-130B	10.0	14.0	0.72	28.0 CT	0.36
PL20-28-130B	20.0	14.0	1.44	28.0 CT	0.72
PL30-28-130B	30.0	14.0	2.12	28.0 CT	1.06
PL56-28-130B	56.0	14.0	4.00	28.0 CT	2.00
PL2.5-36-130B	2.5	18.0	0.14	36.0 CT	0.07
PL5.0-36-130B	5.0	18.0	0.28	36.0 CT	0.14
PL10-36-130B	10.0	18.0	0.56	36.0 CT	0.28
PL20-36-130B	20.0	18.0	1.12	36.0 CT	0.56
PL30-36-130B	30.0	18.0	1.64	36.0 CT	0.82
PL56-36-130B	56.0	18.0	3.12	36.0 CT	1.56

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Laminated Power Transformers



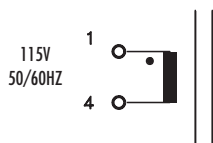
- 115V Single Primary
- 115/230 Dual Primary
- Class B (130°C) Insulation
- 2,500 Vrms Hi-Pot (Pri:Sec)
- 500 & 1KVrms Hi-Pot (Sec:Sec)
- UL94V-0 Flammability
- Recognized Insulation System for custom designs.
- 1.1VA to 12VA
- Inherently and Non-inherently Limited Product
- Class II & III Product
- UL1585 (E96720/E95844)
- UL506 (E79781/E91239)

TAMURA PART NUMBER		SECONDARY RMS RATING				SIZE	CLASS
Single 115V	Dual 115/230V	PARALLEL CONNECTED		SERIES CONNECTED			
		AC	RMS	AC	RMS		
3FS-210	3FD-210	5.0	0.220	10.0 CT	0.110	2	II
3FS-310	3FD-310	5.0	0.500	10.0 CT	0.250	3	II
3FS-410	3FD-410	5.0	1.200	10.0 CT	0.600	4	II
3FS-510	3FD-510	5.0	2.400	10.0 CT	1.200	5	II
3FS-212	3FD-212	6.3	0.180	12.6 CT	0.090	2	II
3FS-312	3FD-312	6.3	0.400	12.6 CT	0.200	3	II
3FS-412	3FD-412	6.3	1.000	12.6 CT	0.500	4	II
3FS-512	3FD-512	6.3	2.000	12.6 CT	1.000	5	II
3FS-216	3FD-216	8.0	0.140	16.0 CT	0.070	2	II
3FS-316	3FD-316	8.0	0.300	16.0 CT	0.150	3	II
3FS-416	3FD-416	8.0	0.800	16.0 CT	0.400	4	II
3FS-516	3FD-516	8.0	1.600	16.0 CT	0.800	5	II
3FS-220	3FD-220	10.0	0.110	20.0 CT	0.055	2	II
3FS-320	3FD-320	10.0	0.240	20.0 CT	0.120	3	II
3FS-420	3FD-420	10.0	0.600	20.0 CT	0.300	4	II
3FS-520	3FD-520	10.0	1.200	20.0 CT	0.600	5	II
3FS-224	3FD-224	12.0	0.090	24.0 CT	0.045	2	II
3FS-324	3FD-324	12.0	0.200	24.0 CT	0.100	3	II
3FS-424	3FD-424	12.0	0.500	24.0 CT	0.250	4	II
3FS-524	3FD-524	12.0	1.000	24.0 CT	0.500	5	II
3FS-228	3FD-228	14.0	0.080	28.0 CT	0.040	2	II
3FS-328	3FD-328	14.0	0.170	28.0 CT	0.085	3	II
3FS-428	3FD-428	14.0	0.400	28.0 CT	0.200	4	II
3FS-528	3FD-528	14.0	0.840	28.0 CT	0.420	5	II
3FS-236	3FD-236	18.0	0.060	36.0 CT	0.030	2	III
3FS-336	3FD-336	18.0	0.130	36.0 CT	0.065	3	III
3FS-436	3FD-436	18.0	0.340	36.0 CT	0.170	4	III
3FS-536	3FD-536	18.0	0.700	36.0 CT	0.350	5	III
3FS-248	3FD-248	24.0	0.046	48.0 CT	0.023	2	III
3FS-348	3FD-348	24.0	0.100	48.0 CT	0.050	3	III
3FS-448	3FD-448	24.0	0.250	48.0 CT	0.125	4	III
3FS-548	3FD-548	24.0	0.500	48.0 CT	0.250	5	III

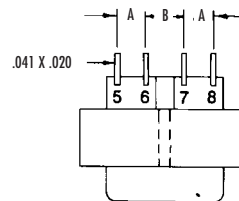
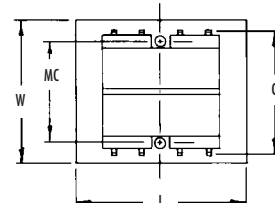
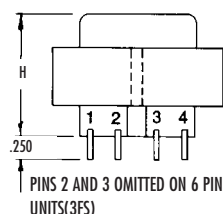
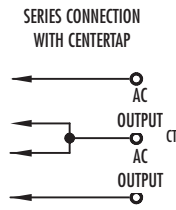
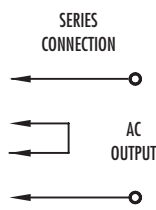
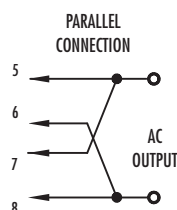
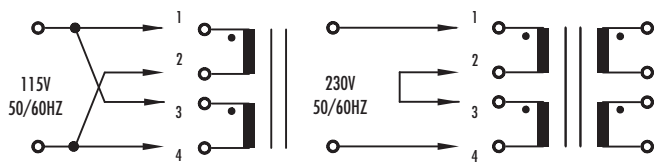
1. -TF suffix for inherently limited product version
2. -1 suffix for 1kV Sec:Sec isolation product version

Schematics

3FS PRIMARY INPUT CONNECTIONS



3FD PRIMARY INPUT CONNECTIONS



Dimensions Inches (mm)

SIZE	VA ²	L	W	H	MC	A	B	C	LB.
2	1.1	1.44 (36.57)	1.23 (31.24)	1.00 (25.40)	—	.250 (6.35)	.250 (6.35)	1.200 (30.48)	0.17
3	2.4	1.44 (36.57)	1.23 (31.24)	1.26 (32.00)	—	.250 (6.35)	.250 (6.35)	1.200 (30.48)	0.25
4	6	6 (152.4)	1.69 (42.93)	1.36 (34.54)	1.0625 ¹ (26.92)	.250 (6.35)	.350 (8.89)	1.280 (32.51)	0.44
5	12	12 (304.8)	1.97 (50.04)	1.63 (41.40)	1.5 ¹ (38.10)	.300 (7.62)	.400 (10.16)	1.41 (35.81)	0.70

Note 1: Clearance hole for 4-40 x 1 3/8" nylon mtg. screws.

Note 2: Ratings based on 115V nominal input.

All dimensions are ± 0.02 (0.50) unless otherwise noted.

Packaging:

Size	Tube	Tray	Size	Tube	Tray
2	10	80	4	10	50
3	10	60	5	10	50

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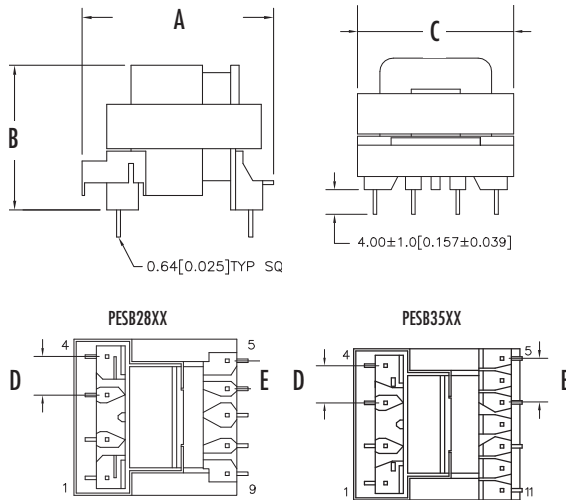
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Low Cost Power Transformers

- 120V Single Primary
- Class A & B Insulation
- 2,500Vrms HiPot (Pri:Sec)
- UL 94 V-0 Flammability
- Recognized Insulation System for custom designs.
- 1.2VA to 3VA
- Inherently and Non-Inherently Limited
- Designed to Meet UL1411, UL60950 and UL1585



Dimensions Inches (mm)

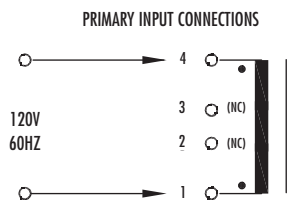
Part #	A	B	C	D	E
SB2812	1.30 (33.0)	1.14 (29.0)	1.12 (28.5)	0.295 (7.50)	0.197 (5.00)
SB2816	1.30 (33.0)	1.30 (33.0)	1.12 (28.5)	0.295 (7.50)	0.197 (5.00)
SB3512	1.38 (35.0)	1.26 (32.0)	1.40 (35.5)	0.295 (7.50)	0.394 (10.0)
SB3516	1.38 (35.0)	1.42 (36.0)	1.40 (35.5)	0.295 (7.50)	0.394 (10.0)

All dimensions are ± 0.02 (0.50) unless otherwise noted.

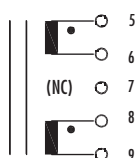
Packaging: Cardboard tray

Part#	Box
SB2812/16	40
SB3512/16	35

Schematics



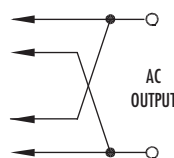
SB2812/16 PRIMARY OUTPUT CONNECTIONS



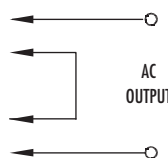
SB3512/16 PRIMARY OUTPUT CONNECTIONS



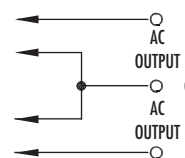
PARALLEL CONNECTIONS



SERIES CONNECTIONS



SERIES CONNECTIONS WITH CENTERTAP



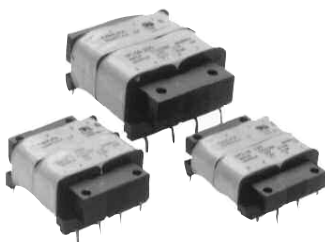
TAMURA PART NUMBER SINGLE 120V 60Hz	SECONDARY RMS RATING					
	PARALLEL CONNECTED		SERIES CONNECTED		SERIES CONNECTED w/CT	
	AC VOLTS	mAmps	AC VOLTS	mAmps	AC VOLTS	mAmps
SB2812-1204	2.0	600	4.0	300	2.0-CT-2.0	300
SB2816-1604	2.0	800	4.0	400	2.0-CT-2.0	400
SB3512-2004	2.0	1000	4.0	500	2.0-CT-2.0	500
SB3516-3004	2.0	1500	4.0	750	2.0-CT-2.0	750
SB2812-1206	3.0	400	6.0	200	3.0-CT-3.0	200
SB2816-1606	3.0	530	6.0	265	3.0-CT-3.0	265
SB3512-2006	3.0	670	6.0	335	3.0-CT-3.0	335
SB3516-3006	3.0	1000	6.0	500	3.0-CT-3.0	500
SB2812-1210	5.0	240	10.0	120	5.0-CT-5.0	120
SB2816-1610	5.0	320	10.0	160	5.0-CT-5.0	160
SB3512-2010	5.0	400	10.0	200	5.0-CT-5.0	200
SB3516-3010	5.0	600	10.0	300	5.0-CT-5.0	300
SB2812-1214	7.0	170	14.0	85	7.0-CT-7.0	85
SB2816-1614	7.0	230	14.0	115	7.0-CT-7.0	115
SB3512-2014	7.0	290	14.0	145	7.0-CT-7.0	145
SB3516-3014	7.0	430	14.0	215	7.0-CT-7.0	215
SB2812-1216	8.0	150	16.0	75	8.0-CT-8.0	75
SB2816-1616	8.0	200	16.0	100	8.0-CT-8.0	100
SB3512-2016	8.0	250	16.0	125	8.0-CT-8.0	125
SB3516-3016	8.0	380	16.0	190	8.0-CT-8.0	190
SB2812-1218	9.0	130	18.0	65	9.0-CT-9.0	65
SB2816-1618	9.0	180	18.0	90	9.0-CT-9.0	90
SB3512-2018	9.0	220	18.0	110	9.0-CT-9.0	110
SB3516-3018	9.0	330	18.0	165	9.0-CT-9.0	165
SB2812-1222	11.0	110	22.0	55	11.0-CT-11.0	55
SB2816-1622	11.0	150	22.0	75	11.0-CT-11.0	75
SB3512-2022	11.0	180	22.0	90	11.0-CT-11.0	90
SB3516-3022	11.0	270	22.0	135	11.0-CT-11.0	135
SB2812-1224	12.0	100	24.0	50	12.0-CT-12.0	50
SB2816-1624	12.0	130	24.0	65	12.0-CT-12.0	65
SB3512-2024	12.0	170	24.0	85	12.0-CT-12.0	85
SB3516-3024	12.0	250	24.0	125	12.0-CT-12.0	125
SB2812-1226	13.0	90	26.0	45	13.0-CT-13.0	45
SB2816-1626	13.0	120	26.0	60	13.0-CT-13.0	60
SB3512-2026	13.0	150	26.0	75	13.0-CT-13.0	75
SB3516-3026	13.0	230	26.0	115	13.0-CT-13.0	115
SB2812-1230	15.0	80	30.0	40	15.0-CT-15.0	40
SB2816-1630	15.0	110	30.0	55	15.0-CT-15.0	55
SB3512-2030	15.0	130	30.0	65	15.0-CT-15.0	65
SB3516-3030	15.0	200	30.0	100	15.0-CT-15.0	100

1. -TF suffix for inherently limited product version.

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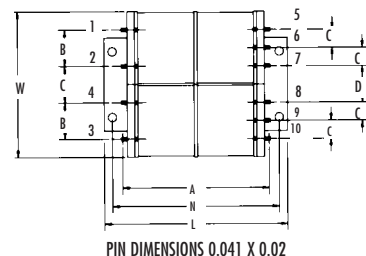
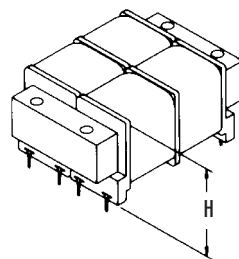
Low Profile Laminated Power Transformers



- 115/230V Dual Primary
- Class B (130°C) Insulation
- 2,500Vrms HiPot (Pri:Sec)
- UL 94V-0 Flammability (E92957)
- Recognized Insulation System for custom designs.
- 2.5VA to 24VA
- UL 506 (E145619)
- CSA (LR61383-7)

TAMURA PART NO.	VA (SIZE)	SECONDARY			
		PARALLEL CONNECTED		SERIES CONNECTED	
		AC VOLTS	AMPS	AC VOLTS	AMPS
3FL10-250	2.5	5.0	.500	10.0 CT	.250
3FL10-600	6.0	5.0	1.200	10.0 CT	.600
3FL10-1200	12.0	5.0	2.400	10.0 CT	1.200
PF24-10	24.0	5.0	4.800	10.0 CT	2.400
3FL12-200	2.5	6.3	.400	12.6 CT	.200
3FL12-475	6.0	6.3	.900	12.6 CT	.450
3FL12-950	12.0	6.3	1.900	12.6 CT	.950
PF24-12	24.0	6.3	3.800	12.6 CT	1.900
3FL16-150	2.5	8.0	.300	16.0 CT	.150
3FL16-350	6.0	8.0	.700	16.0 CT	.350
3FL16-700	12.0	8.0	1.500	16.0 CT	.750
PF24-16	24.0	8.0	3.000	16.0 CT	1.500
3FL20-125	2.5	10.0	.250	20.0 CT	.125
3FL20-300	6.0	10.0	.600	20.0 CT	.300
3FL20-600	12.0	10.0	1.200	20.0 CT	.600
PF24-20	24.0	10.0	2.400	20.0 CT	1.200
3FL24-100	2.5	12.0	.200	24.0 CT	.100
3FL24-250	6.0	12.0	.500	24.0 CT	.250
3FL24-500	12.0	12.0	1.000	24.0 CT	.500
PF24-24	24.0	12.0	2.000	24.0 CT	1.000
3FL30-85	2.5	15.0	.170	30.0 CT	.085
3FL30-200	6.0	15.0	.400	30.0 CT	.200
3FL30-400	12.0	15.0	.800	30.0 CT	.400
PF24-30	24.0	15.0	1.600	30.0 CT	.800
3FL34-75	2.5	17.0	.150	34.0 CT	.075
3FL34-170	6.0	17.0	.340	34.0 CT	.170
3FL34-340	12.0	17.0	.700	34.0 CT	.350
PF24-34	24.0	17.0	1.400	34.0 CT	.700
3FL40-60	2.5	20.0	.120	40.0 CT	.060
3FL40-150	6.0	20.0	.300	40.0 CT	.150
3FL40-300	12.0	20.0	.600	40.0 CT	.300
3FL56-45	2.5	28.0	.090	56.0 CT	.045
3FL56-100	6.0	28.0	.200	56.0 CT	.100
3FL56-200	12.0	28.0	.420	56.0 CT	.210
PF24-56	24.0	28.0	.850	56.0 CT	.430
3FL88-28	2.5	44.0	.056	88.0 CT	.028
3FL88-65	6.0	44.0	.130	88.0 CT	.065
3FL88-130	12.0	44.0	.260	88.0 CT	.130
3FL120-20	2.5	60.0	.040	120.0 CT	.020
3FL120-50	6.0	60.0	.100	120.0 CT	.050
3FL120-100	12.0	60.0	.200	120.0 CT	.100
3FL230-10	2.5	115.0	.020	230.0 CT	.010
3FL230-25	6.0	115.0	.050	230.0 CT	.025
3FL230-50	12.0	115.0	.100	230.0 CT	.050

Note: Inherently limited: secondary fuse required see application notes on website



Dimensions Inches (mm)

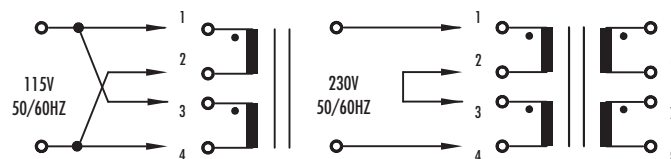
VA (SIZE)	A	B	C	D	L	W	H	WT (oz)
2.5	1.60 (40.64)	0.375 (9.53)	0.187 (4.75)	0.375 (9.53)	1.87 (47.50)	1.56 (39.62)	0.650 (16.51)	5
6.0	1.60 (40.64)	0.375 (9.53)	0.187 (4.75)	0.375 (9.53)	1.87 (47.50)	1.56 (39.62)	0.850 (21.59)	7
12.0	2.00 (50.8)	0.500 (12.7)	0.250 (6.35)	0.500 (12.7)	2.50 (63.5)	2.00 (50.8)	1.065 (27.05)	11
24.0	1.90 (48.26)	0.600 (15.24)	0.300 (7.62)	0.530 (13.46)	2.87 (72.9)	2.25 (57.15)	1.25 (31.75)	15

All dimensions are ± 0.02 (0.50) unless otherwise noted.

Schematics

Primaries
115/230V
50/60Hz

3FL PRIMARY INPUT CONNECTIONS



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Custom Linear Power Transformers

- 120V Single Primary
- 120/240 Dual Primary
- Class B (130°C) Insulation
- 2,500Vrms Hi-Pot
- UL94V-O Flammability
- 1VA to 28kVA
- Inherently and Non-Inherently Limited Product
- UL1411 Recognized insulation systems



Low to Mid Power Linear Power Transformer Platform

TAMURA PART NUMBER SERIES	0.5	1	2	3	4	6	8	15	20	30	50	60	70	80	90	100	150	180	250	300	BOARD MOUNT/CHASSIS MOUNT	SHIELDING
PESB28			1.2VA - 1.6VA																		BOARD MOUNT	N
PESB35			2VA - 3VA																		BOARD MOUNT	N
PEPF(35-66)					3VA - 14.5VA																BOARD MOUNT	N
PEE(41-66)					4.5VA - 55VA																CHASSIS MOUNT	AVAILABLE

Note: Inherently limited versions available. Please specify.

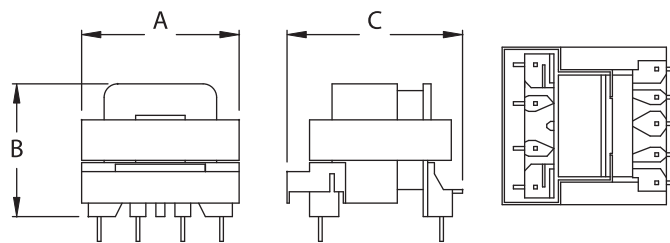
High Power Linear Power Transformer Platform

TAMURA PART NUMBER SERIES	300	500	700	1k	2k	3k	4k	5k	6k	7k	8k	9k	10k	12k	15k	20k	25k	30k	BOARD MOUNT/CHASSIS MOUNT	SHIELDING
PEBO (150)		300VA - 1kVA																	CHASSIS MOUNT	AVAILABLE
GAT (1T-35T) ¹					850VA - 28kVA														CHASSIS MOUNT	AVAILABLE
GAT (3.3S-11S)					2.8kVA - 8.8kVA														CHASSIS MOUNT	AVAILABLE

¹ - Three Phase Transformers

PESB28 Dimensions and Information (mm)

TAMURA PART	TYPICAL VA	A	B	C	WEIGHT (kg) Approx	Number of Pins	
						PRI	SEC
PESB28-12	1.2	28.5	29	33	0.07	4	5
PESB28-14	1.4	28.5	31	33	0.08	4	5
PESB28-16	1.6	28.5	33	33	0.09	4	5

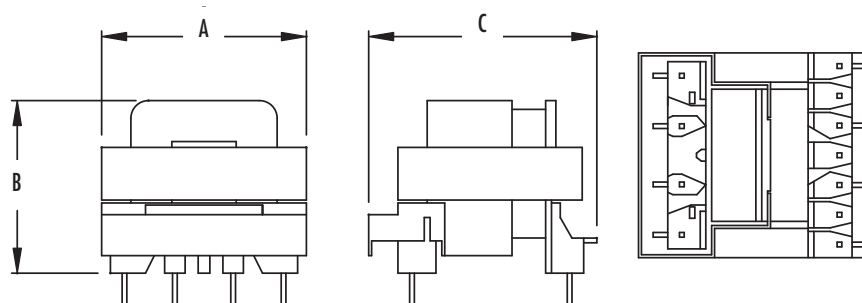


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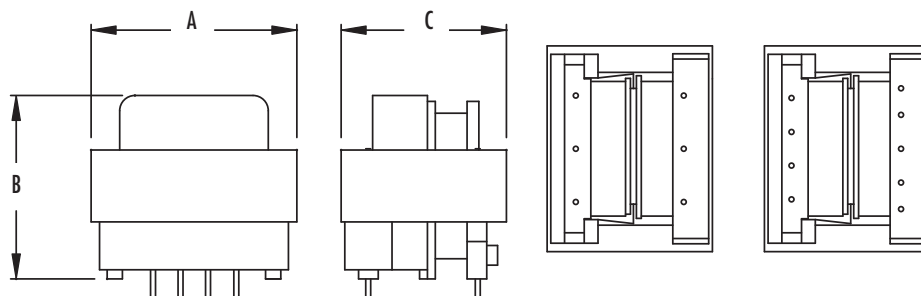
PESB35 Dimensions and Information (mm)

TAMURA PART	TYPICAL VA	A	B	C	WEIGHT (kg) Approx	Number of Pins	
						PRI	SEC
PESB35-12	2	35.5	32	35	0.10	4	7
PESB35-14	2.5	35.5	34	35	0.12	4	7
PESB35-16	3	35.5	36	35	0.14	4	7



PEPF (35-66) Dimensions and Information (mm)

TAMURA PART	TYPICAL VA	A	B	C	WEIGHT (kg) Approx	Number of Pins	
						PRI	SEC
PEPF35-20	3.5	36	41.5	30	0.17	4	3
PEPF41-14	3.5	41	37	33.5	0.15	4	5
PEPF41-16	4.5	41	39	33.5	0.20	4	5
PEPF41-21	6	34	45	33.5	0.24	4	5
PEPF41-23	6.5	34	46.5	33.5	0.27	4	5
PEPF48-13	4.5	49	29.5	40.5	0.18	5	5
PEPF48-15	7.5	42.5	35	40.5	0.25	5	5
PEPF48-18	8	46	44	40.5	0.30	5	5
PEPF48-23	10.5	38	48.5	40.5	0.36	5	7
PEPF48-28	14.5	46	54	40.5	0.46	5	7
PEPF66-10	6	55	30	55.5	0.34	5	5



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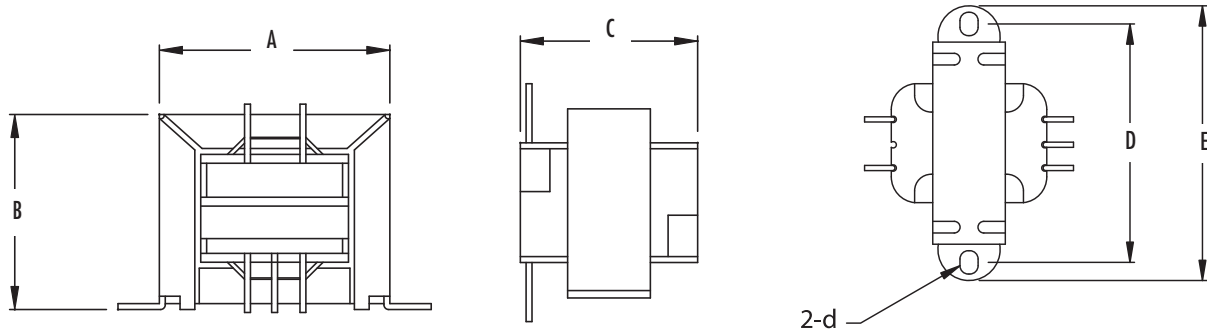
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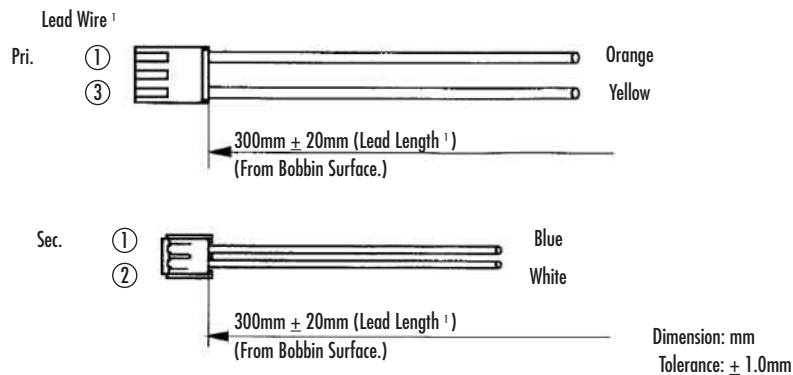
PEE (41-66) Dimensions and Information (mm)

TAMURA PART	TYPICAL VA	A	B	C (Max)	D	2-d	E	WEIGHT (kg)	Number of Connections*	
									PRI	SEC
PEE41-16.5	4.5	43.5	36	40	52	3.5_4.5	60	0.15	1	1-3
PEE41-20.5	5.5	43.5	36	44	52	3.5_4.5	60	0.2	1	1-3
PEE41-24.5	7	43.5	36	50	52	3.5_4.5	60	0.25	1	1-3
PEE48-18.5	8	50.5	43	43	59	4.5_6.5	69	0.3	1	1-3
PEE48-20	9	50.5	43	46	59	4.5_6.5	69	0.34	1	1-3
PEE48-23.5	10.5	50.5	43	50	59	4.5_6.5	69	0.37	1	1-3
PEE48-25	12.5	50.5	43	55	59	4.5_6.5	69	0.40	1	1-3
PEE54-25	16	56.5	48	54	69	4.5_6.5	80	0.59	1	1-3
PEE57-24.5	18	59.5	50.5	54	72	4.5_6.5	83	0.65	1	1-3
PEE57-30	24	59.5	50.5	62	72	4.5_6.5	83	0.70	1	1-3
PEE57-35	30	59.5	50.5	69	72	4.5_6.5	83	0.80	1	1-3
PEE60-30	25	62.5	54.5	63	75	4.5x6.5	86	0.80	1	1-3
PEE66-28	25	68.5	58.5	62	81	4.5x6.5	92	1.00	1	1-3
PEE66-36	41	68.5	58.5	72	81	4.5_6.5	92	1.10	1	1-3
PEE66-40	50	68.5	58.5	78	81	4.5x6.5	92	1.20	1	1-3
PEE66-45	55	68.5	58.5	83	81	4.5x6.5	92	1.30	1	1-3

* Wire lead with specified connector



STANDARD CONNECTOR SPECIFICATIONS

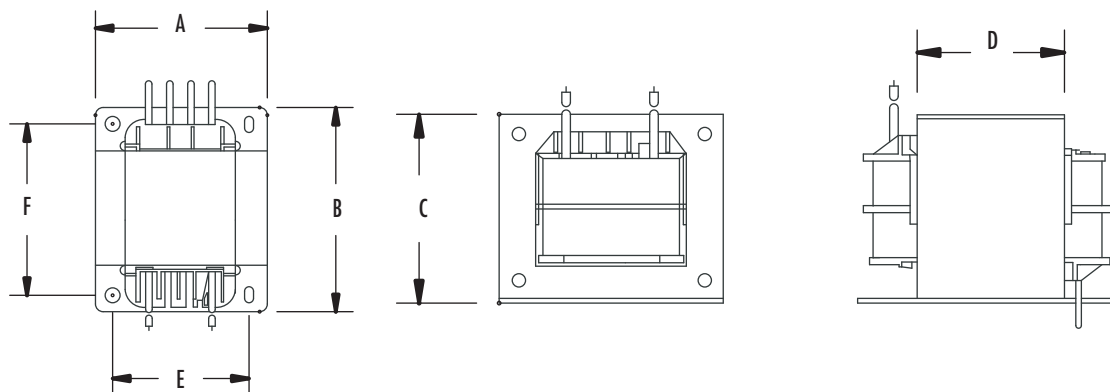


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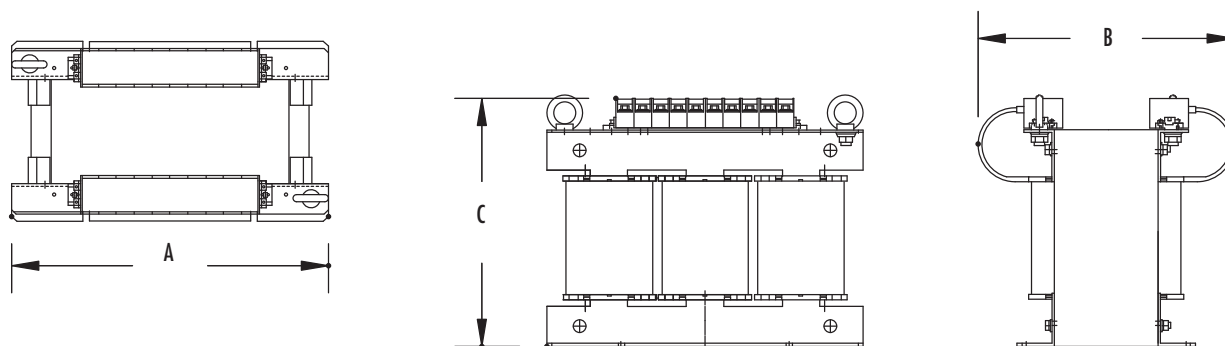
PEBO150 Dimensions and Information (mm)

Size Reference	Typical VA	A	B	C	D	E	F	Weight (kg.) approx.
PEB00150-30	300	150	100	130	30	100	75	4.5
PEB0150-50	500	150	120	130	50	100	95	7
PEB0150-70	700	150	140	130	70	100	115	10
PEB0150-100	1000	150	180	130	100	100	150	14



GAT(1T-35T) Dimensions and Information (mm)

Size Reference	Typical kVA		A	B	C	Weight (kg.) approx.
	Class B	Class H				
GAT-1T	0.85	1	240	170	208	12
GAT-3T	2.4	3	240	265	208	34
GAT-5T	4.2	5	420	205	343	45
GAT-7.5T	6	7.5	420	225	343	61
GAT-8.3T	6.6	8.3	420	230	343	70
GAT-10T	8	10	420	240	343	74
GAT-12T	9.5	12	420	265	343	98
GAT-15T	12	15	420	295	343	112
GAT-20T	16	20	550	420	430	145
GAT-25T	20	25	550	450	430	182
GAT-35T	28	35	550	500	430	260



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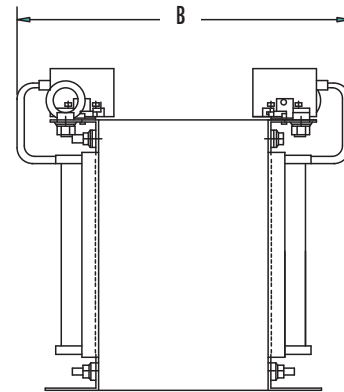
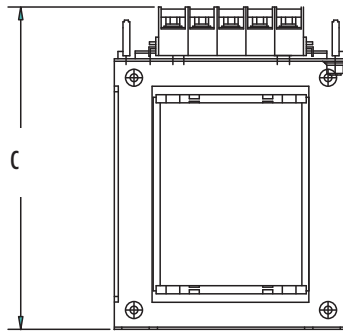
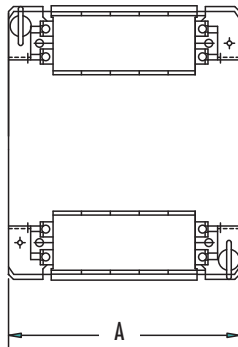
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GAT(1T-35T) Dimensions and Information (mm)

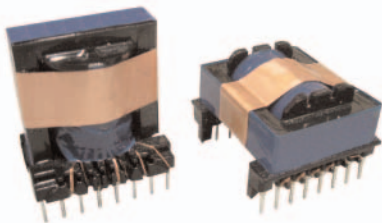
Size Reference	Typical kVA		A	B	C	Weight (kg.) approx.
	Class B	Class H				
GAT-3.3S	2.8k	3.3	196	225	280	31
GAT-5S	4	5	196	280	280	46
GAT-8S	7	8	250	300	350	75
GAT-11S	8.8	11	250	355	350	96



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Custom Switch Mode Power Transformers



Note: Chart represents ESTIMATED power handling. Transformer packages may vary based on safety requirements, switching frequency, duty cycle, inductance requirements, and temperature rise performance. Tamura Design Staff should be contacted for complete designs on these "Tamura Preferred" low cost packages. Mechanical dimensions are typical.

Low Power Transformer Selection Guide

Power Estimated @ 130kHz Switching Frequency

TAMURA PART NUMBER SERIES	1 W	2 (W)	3 (W)	4 (W)	6 (W)	8 (W)	15 (W)	20 (W)	30 (W)	50 (W)	60 (W)	70 (W)	80 (W)	90 (W)	100 (W)	150 (W)	180 (W)	250 (W)	300 (W)	THT MOUNTING/ SMT MOUNTING	POTTED
EF12.6	1 Watts - 3 Watts																			THT	N
EF16				4 Watts - 6Watts																THT	N

Mid to High Power Transformer Selection Guide

Power Estimated in Flyback Topology @ 50kHz Switching Frequency

TAMURA PART NUMBER SERIES	1 W	2 (W)	4 (W)	6 (W)	8 (W)	12 (W)	20 (W)	30 (W)	40 (W)	50 (W)	60 (W)	80 (W)	90 (W)	100 (W)	120 (W)	190 (W)	200 (W)	300 (W)	THT MOUNTING/ SMT MOUNTING	POTTED
EE2219				7 Watts - 11 Watts															THT	N
EK2820AT/DT							20 Watts - 30 Watts												THT	N
ER2923AT/DT							24 Watts - 36 Watts												THT	N
ER2834F/T								40 Watts - 60 Watts											THT	N
ER2828F							24 Watts - 36 Watts												THT	N
EK2929T							32 Watts - 48 Watts												THT	N
ER3541T										66 Watts - 96 Watts									THT	N
ER3944T											80 Watts - 120 Watts								THT	N
ER4045T											80 Watts to 120 Watts								THT	N
ER4245T														128 Watts - 192 Watts					THT	N
ER4954T															180 Watts - 300 Watts				THT	N

Mid to High Power Transformer Selection Guide

Power Estimated in Forward Topology @ 100kHz Switching Frequency

TAMURA PART NUMBER SERIES	1 W	2 (W)	3 (W)	4 (W)	6 (W)	8 (W)	15 (W)	20 (W)	30 (W)	50 (W)	60 (W)	70 (W)	80 (W)	90 (W)	100 (W)	150 (W)	180 (W)	250 (W)	360 (W)	THT MOUNTING/ SMT MOUNTING	POTTED
EE2219						12 Watts to 28 Watts														THT	N
EK2820AT/DT								32 Watts to 48 Watts												THT	N
EK2923AT/DT									40 Watts to 60 Watts											THT	N
ER2834F/T									56 Watts to 84 Watts											THT	N
ER2828F									40 Watts to 60 Watts											THT	N
ER2929T									48 Watts to 82 Watts											THT	N
ER3541T													96 Watts to 144 Watts							THT	N
ER3944T													128 Watts to 192 Watts							THT	N
ER4045T													128 Watts to 192 Watts							THT	N
ER4245T														160 Watts to 240 Watts						THT	N
ER4954T															240 Watts to 360 Watts					THT	N

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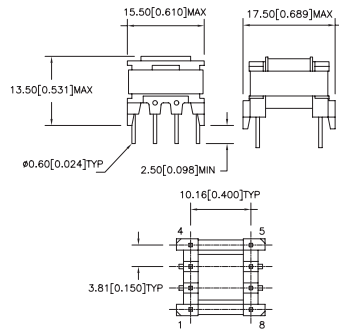
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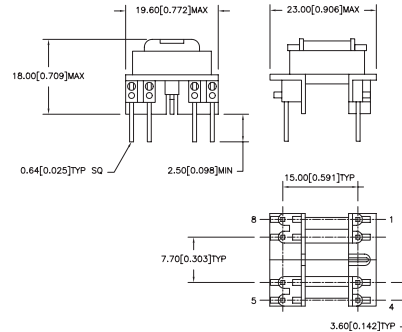
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Hong Kong

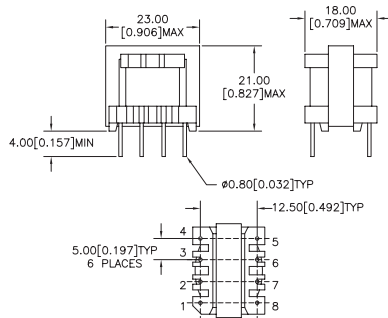
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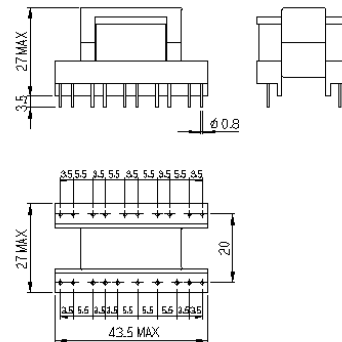
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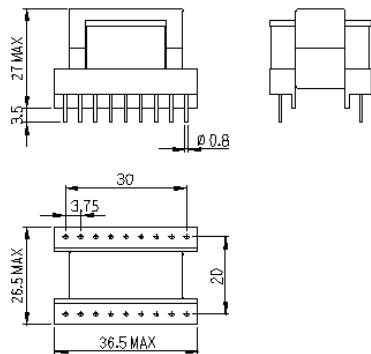
EF16



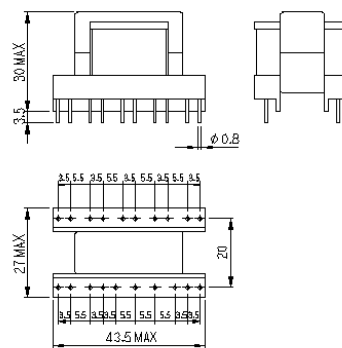
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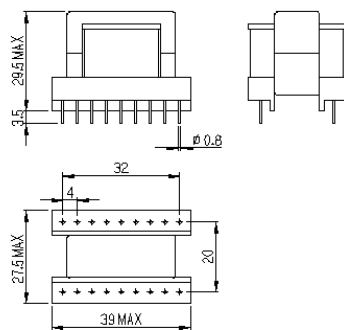
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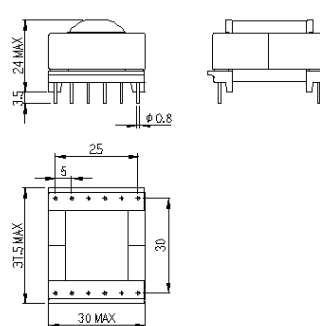
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EK2923AT



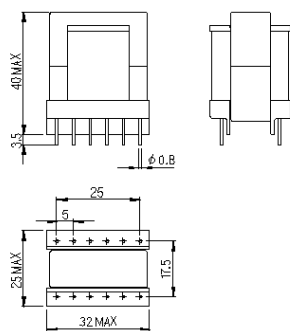
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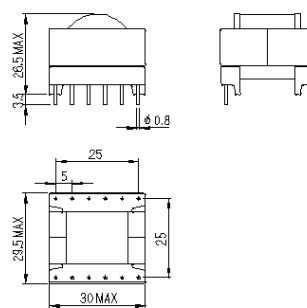
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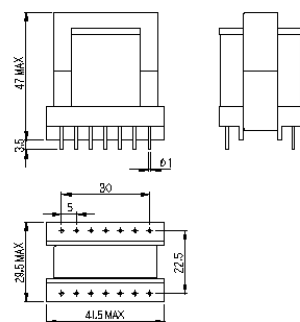
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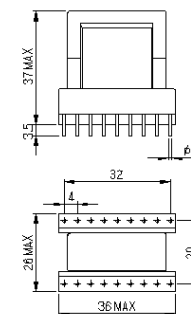
ER2834T



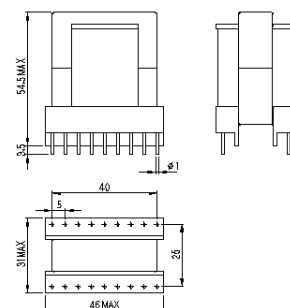
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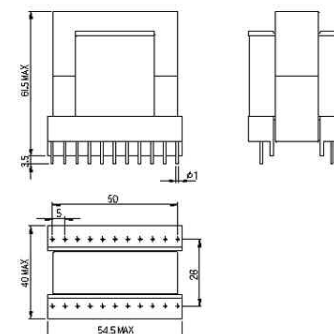
ER3541T



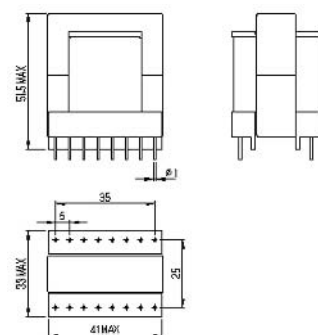
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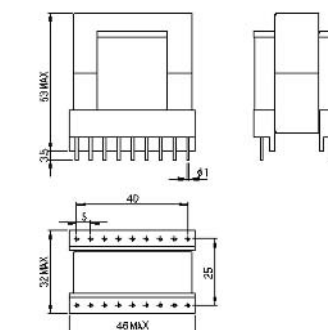
ER3944T



ER4954T



ER4045T



ER4245T

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Switching Transformer Design Request

Company _____ TEL _____
 Name _____ FAX _____
 Title _____ E-Mail _____
 Quote _____ / Lot _____ / EAU _____ Prod. Location _____
 Sample _____ Prod. Time PP _____ MP _____

Topology	Flyback • Forward • Other _____			
Primary Inductance	_____ mH			
Switching Frequency	_____ KHz			
Duty Cycle	_____ MAX(% or µsec)			
Input Voltage	AC/DC	Vmin	~	Vmax
Output Condition	Out 1	V	A	Diode drop V
	Out 2	V	A	Diode drop V
	Out 3	V	A	Diode drop V
	Out 4	V	A	Diode drop V
	Auxiliary winding	V		A
Safety	No.			
	Creepage	Clearance		
Ambient Temperature	Operating			
	Storage			
Temperature Rise (Ref. Only)				
Insulation Class				
Requirement Max Size	TAMURA Part No.			
	Size	W:	L:	H:
IC No. & Manufacturer				
Application				
Target Price				

Others (Please attach additional sheet if you need)

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Voice/Modem Line Transformers

V.29, V.32, V.34, V.90, & V.92 Applications

- Highest Density Package Available
- Approved to UL1950 3rd Edition
- Approved to UL60950 & EN60950
- Surface Mount
- Vacuum Encapsulated
- Pri:Sec Hi-Pot=1500Vrms and Higher
- Surge Voltage



Electrical Specification @ Ta=25°C

Part #	Impedance PRI:SEC (Ω)	DC Unbalance (mA)	Insertion Loss (dB MAX.)	Total Harmonic Distortion (dB Typ.)	Long. Balance (dB MIN.)	Return Loss @ 1KHz (dB Typ)
TTC-5023¹	600:600	0	2.0	-79	80	16
TTC-5024	600:330	0	3.0	-85	80	27
TTC-5025	600:430	0	3.5	-79	80	20
TTC-5032	600:470	0	2.5	-79	80	27
TTC-5035	600:346	0	3.0	-84	80	27
TTC-5036	600:287	0	4.0	-90	80	27
TTC-5037	600:560	0	2.0	-77	80	23

¹ 3000 Vrms Pri:Sec Hi-Pot

High Impedance Applications

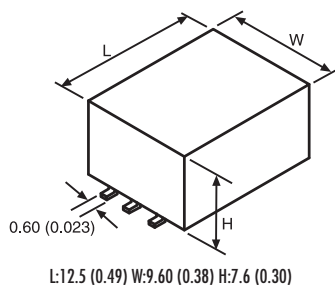
Part #	Impedance PRI:SEC (Ω)	DC Unbalance (mA)	Inductance Lp @ 200Hz 10mVrms (H MIN)	Shunt Loss Rp @ 200Hz 10mVrms (Ω MIN)
TTC-5027	30k:30k	0	30.0	110
TTC-5033	10k:10k	0	6.5	22
TTC-5034	20k:20k	0	18.0	60

Package Information

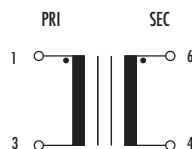
QTY/Tray	Tape/Reel
50	400

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics



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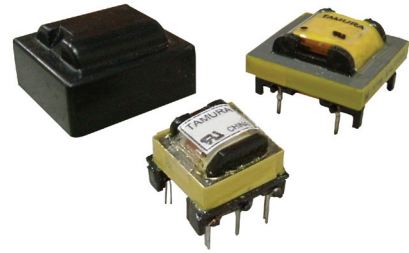
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Voice/Modem Line Transformers

V.29, V.32 & V.34 Applications

- Approved to UL1950 3rd Edition
- Approved to UL60950 & EN60950
- Hi-Pot 1500Vrms Pri:Sec



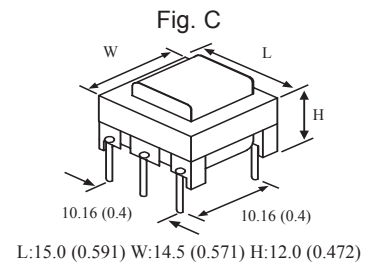
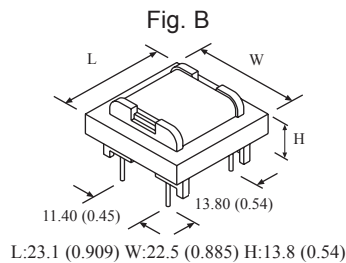
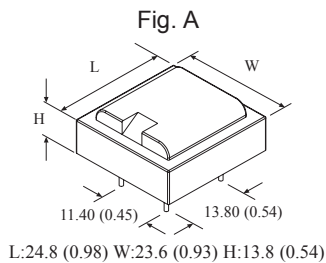
Electrical Specification @ Ta=25°C

Part #	Impedance PRI: SEC (Ω)	DC Unbalance (mA)	Insertion Loss (dB MAX)	Total Harmonic Distortion (dB Typ)	Long. Balance (dB MIN)	Return Loss @ 1 KHz (dB Typ)	Mounting	Package Fig.	Schematic Fig.
TTC-5019	600:260	50	4.0	-60	60	-	THD	B	1
TTC-5010 ¹	600:301	65	3.75	-50	60	-	THD (CASE)	A	2
TTC-5020	600:301	65	3.75	-50	60	-	THD	B	2
TTC-264M ¹	600:470	100	2.5	-50	60	-	THD (CASE)	A	1
TTC-5028	600:470	100	2.5	-50	60	-	THD	B	1

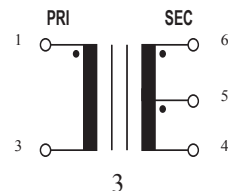
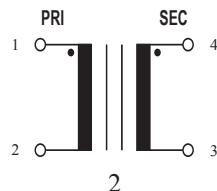
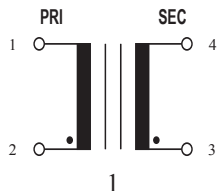
¹ 3000 Vrms Pri:Sec Hi-Pot

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics



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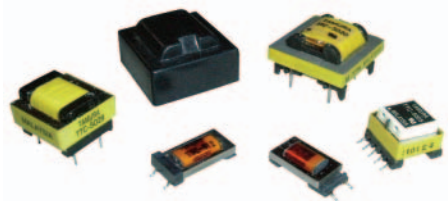
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V.90, V.92 Applications

- Optimized for High Speed Modem Applications
- Frequency Range 300Hz to 4kHz
- 1500 Vrms Hi-Pot (Pri:Sec)
- Approved to UL1950 3rd Edition
- PCMCIA Packages
- Approved to UL60950 & EN60950

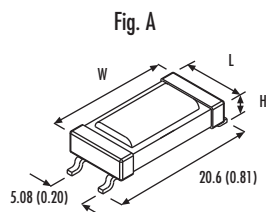
Electrical Specification @ Ta=25°C

Part #	Impedance PRI:SEC (Ω)	DC Unbalance (mA)	Insertion Loss (dB MAX.)	Total Harmonic Distortion (dB Typ.)	Long. Balance (dB MIN.)	Return Loss @ 1 KHz (dB Typ)	Mounting	Package Fig.	Schematic Fig.
TTC-511	600:287	0	3.85	-82	60	35	SMD	A	1
TTC-5021	600:287	0	3.85	-82	60	33	SMD	F	1
TTC-5000	600:301	0	3.25	-92	60	26	THD	D	4
TTC-5001¹	600:301	0	3.25	-92	60	26	THD (CASE)	C	4
TTC-5013	600:301	65	4.00	-89	60	15	THD	D	4
TTC-5003	600:320	0	3.20	-92	60	29	SMD	I	6
TTC-5014	600:348	0	3.25	-88	60	30	THD	H	5
TTC-5006¹	600:374	0	2.5	-90	60	29	THD (CASE)	C	4
TTC-5008	600:374	0	2.5	-90	60	29	THD	D	4
TTC-5022	600:374	0	2.3	-89	60	30	THD	E	1
TTC-5004	600:392	0	2.2	-89	60	33	SMD	I	6
TTC-5015	600:442	0	2.0	-85	60	35	THD	H	5
TTC-5026	600:490	0	1.5	-80	60	28	SMD	I	3
TTC-512	600:510	0	1.50	-75	60	30	SMD	B	2
TTC-5005	600:525	0	1.6	-86	60	27	SMD	I	6
TTC-5007¹	600:530	0	1.0	-83	60	32	THD (CASE)	C	4
TTC-5009	600:530	0	1.0	-83	60	32	THD	D	4
TTC-5016	600:560	0	1.5	-82	60	23	THD	H	5
TTC-5012¹	600:600	0	1.0	-76	60	31	THD (CASE)	C	4
TTC-5017	600:600	0	1.5	-82	60	23	THD	H	4
TTC-5018	600:600	0	1.0	-76	60	31	THD	D	4
TTC-5029	600:600	0	1.0	-88	60	25	THD	G	5

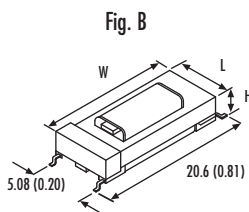
¹ 3000 Vrms Pri:Sec Hi-Pot

Mechanical Dimensions mm (inches)

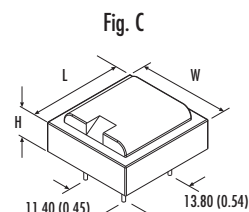
All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



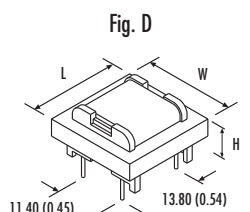
L: 9.9 (0.39) W: 17.8 (0.70) H: 4.9 (0.19)



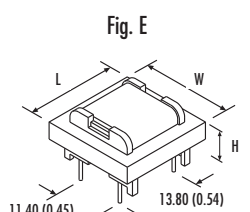
L: 9.9 (0.39) W: 16.9 (0.66) H: 4.9 (0.19)



L: 24.8 (0.98) W: 23.6 (0.93) H: 13.80 (0.54)



L: 23.1 (0.9) W: 22.5 (0.89) H: 13.8 (0.54)



L: 24.0 (0.94) W: 26.0 (1.02) H: 13.8 (0.54)

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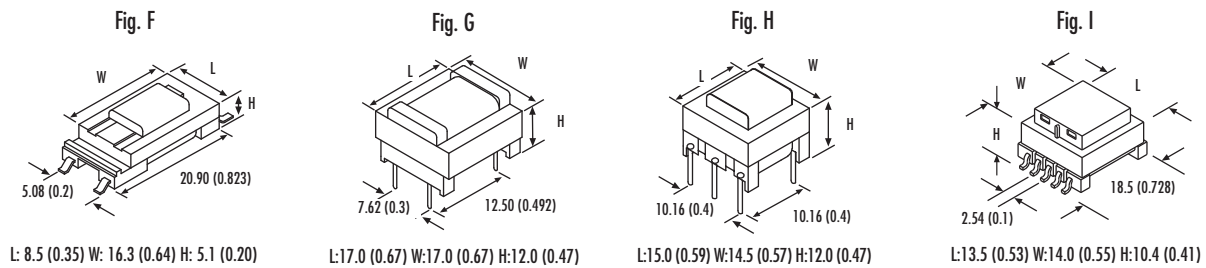
Tel: 44 (0) 1380 731 700
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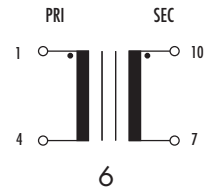
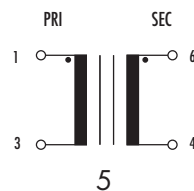
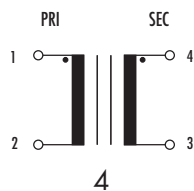
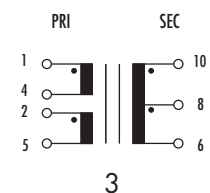
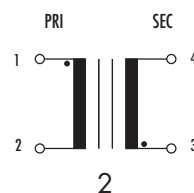
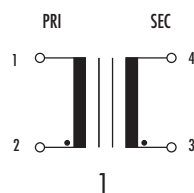
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Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



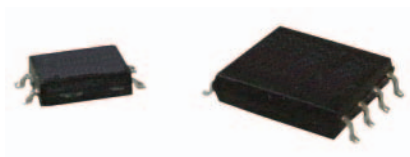
Schematics



TAMURA CORPORATION

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DAA Modem Line Transformers



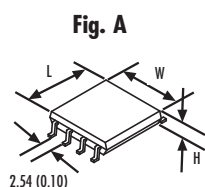
- Highest Density Packages Available
- IC Grade Transfer Molding
- PCMCIA Height Packages
- Surge Voltage
- Approved to UL1950 3rd Edition
- High Reliability

Electrical Specification @ Ta=25°C

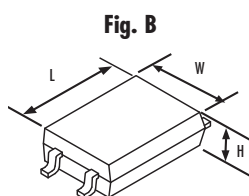
TAMURA Part	Turns Ratio	OCL (μ H) Min PRI	DCR (Ω) Min PRI	HiPot (Vrms)	Mounting	Package Fig.	Schematic Fig.
TTC-313	1:2.6	2.3	0.15	2500	8 Pin PCMCIA	A	2
TTC-317	1:2.4	40	0.275	2500	8 Pin PCMCIA	A	2
TTC-319	1:1.5	30	0.225	3000	4 PIN PCMCIA	B	1
TTC-320	1:2.6	40	0.15	1300	8 Pin PCMCIA	A	2
TTC-323	1:2	30	0.225	1650	4 Pin PCMCIA	B	1
TTC-338	1:1.67	40	0.15	3750	4 Pin PCMCIA	C	2
TTC-331	1:1.67	30	0.225	3000	4 Pin PCMCIA	B	1

Mechanical Dimensions mm (inches)

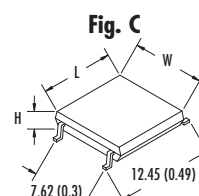
All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



L:9.91 (0.39) W:9.91 (0.39) H:2.49 (0.098)

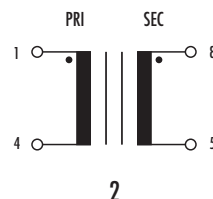
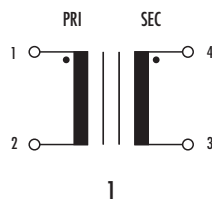


L:6.9 (0.272) W:4.7 (0.185) H:2.05 (0.081)



L:9.91 (0.38) W:9.91 (0.39) H:2.49 (0.098)

Schematics

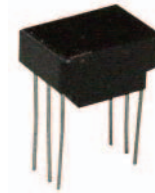


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Pulse Transformers

- Encapsulated Isolation Transformer
- Suitable for Data Interface
- Operating Temp 0°C to 70°C

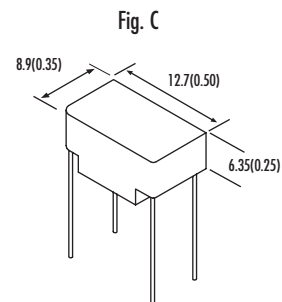
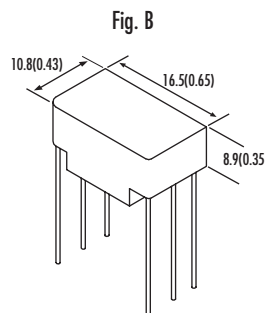
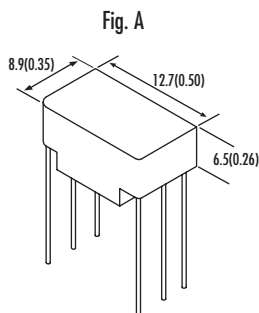


Electrical Specification @ Ta=25°C

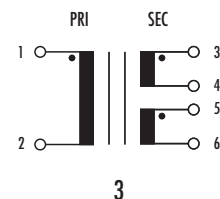
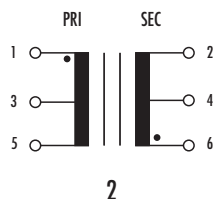
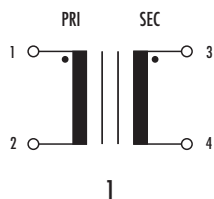
Part No.	Primary OCL mH	Turns Ratio	Interwinding Capacitance pF	Leakage Inductance μ H	DCR (Ω)	FIG	SCH
G511	2.00	1:1	25	8.0	1:1	C	1
G516	0.50	1:1.3	32	0.7	1.35:1.35	A	1
G510	0.05	1CT:1CT	18	0.5	1.3:1.3	A	2
G509	0.50	1CT:1CT	32	0.4	1.3:1.3	A	2
G508	2.00	1CT:1CT	37	0.8	2.5:2.5	A	2
G517	1.00	1CT:1.41CT	32	1.5	1.5:1.5	A	2
G515	0.20	2CT:1CT	8	0.8	0.9:0.5	A	2
G512	2.00	2CT:1CT	19	1.8	2.5:1.4	A	2
G503	0.20	1:1:1	18	0.3	0.9:0.9:0.9	A	3
G553	0.20	1:1:1	16	0.5	1.1:1.1:1.1	A	3
G502	0.50	1:1:1	32	0.4	1.3:1.3:1.3	A	3
G513	1.20	1:1:1	25	0.5	0.7:0.7:0.7	A	3
G514	1.20	1:1:1	30	0.7	0.7:0.7:0.7	A	3
G501	2.00	1:1:1	37	0.8	2.5:2.5:2.5	A	3
G500	5.00	1:1:1	60	1.3	3.9:3.9:3.9	A	3
G700	4.00	1:1:1	77	2.2	5.3:5.3:5.3	B	3
G701	10.00	1:1:1	127	3.0	8.9:8.9:8.9	B	3
G557	0.20	2:1:1	10	2.5	1.0:0.7:0.7	A	3
G507	0.50	2:1:1	11	1.1	1.3:0.7:0.7	A	3
G506	2.00	2:1:1	19	1.8	2.5:1.4:1.4	A	3
G505	5.0	2:1:1	33	3.6	3.9:2.0:2.0	A	3

Mechanical Dimensions Inches (mm)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics

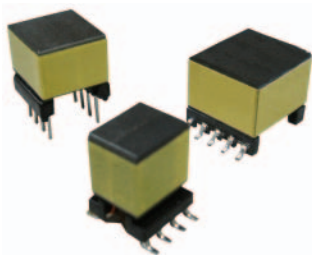


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ADSL PRODUCT SELECTION GUIDE

See www.tamuracorp.com for detail specifications

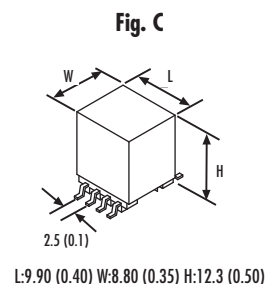
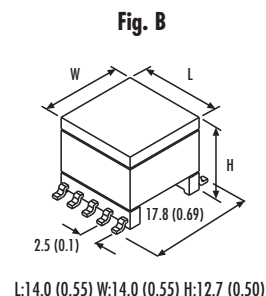
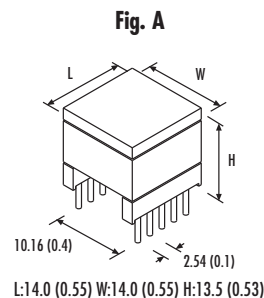


- Designed for lowest THD
- 1500Vrms Hi-Pot
- UL1950, UL60950 and EN609540 approvals
- Extended Temperature Designs
- Call Tamura for Professional Custom Designs

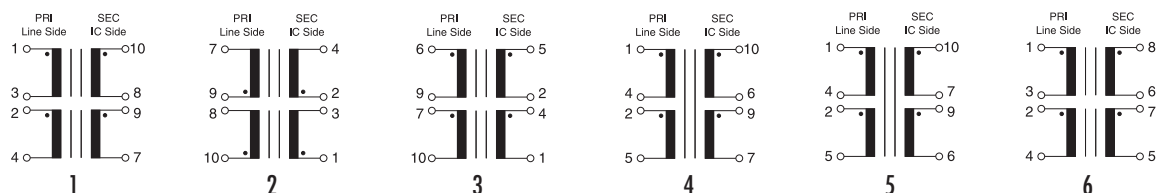
Electrical Specification @ Ta=25°C

Mechanical Dimensions

IC Manufacturer	IC Number	Part #	Application	Mounting	Turns Ratio CHIP:LINE	Inductance @ 10kHz, 0.1V	DCR (Ω MAX.)		Leakage Inductance (μH)	Package Fig.	Schematic Fig.
							LINE	CHIP			
ALCATEL	MTK-20140	TTC-432	CPE	THD	1:1	480μH	1	1	10	A	1
	MTK-20141	TTC-432SL	CPE	SMD	1:1	480μH	1	1	10	B	1
	MTK-20140	TTC-433	CO	THD	1:2	410μH	0.6	0.3	6.5	A	1
		TTC-433SL	CO	SMD	1:2	410μH	0.6	0.3	6.5	B	1
	MTK-20156 MTK-20164	TTC-4082	CPE	SMD	1:2	409.5μH	1.4	0.7	6.5	B	5
ANALOG DEVICE	MTK-20450	TTC-4113	CO	SMT	1:1.41	450μH	1.4	1.4	8	B	1
	AD20MSP910	TTC-4014	CO/CPE	THD	1:1	5mH	3	3	16	A	1
	AD20MSP918	TTC-4015	CO/CPE	SMD	1:1	5mH	3	3	16	B	1
	AD20MSP930	TTC-435	CO/CPE	THD	1:1.1	1.8mH	2	2	7.5	A	2
		TTC-435SL	CO/CPE	SMD	1:1.1	1.8mH	2	2	7.5	B	2
		TTC-7005	ADSL over ISDN	SMD	1:1	100μH	1	1	4	B	1
		TTC-7006	ADSL over ISDN	SMD	1:1.2	120μH	1	1	4	B	1
	EAGLE ANALOG RECEIVE	TTC-4134	CPE	SMT	1.4:1	400μH	0.99	1.38	10	B	2
	EAGLE ANALOG TRANSMIT	TTC-4135	CPE	SMT	1:3	1.22mH	1	0.35	14	B	2
	CT-L21SC04	TTC-4048	CO	SMD	1:1	440μH	1	1	5	B	1
CENTILLIUM	CT-L22SU15	TTC-4049	CPE	SMD	1:1	5mH	3	3	18	B	1
		TTC-4802	CPE	THD	1:1	5mH	3	3	18	A	1
	CT-L41SC08	TTC-4801	CO	THD	1:1	441.5μH	0.8	0.6	5	A	1
		TTC-4803	CO	SMD	1:1	441.5μH	0.8	0.6	5	B	1
	CT-L50SC04	TTC-4050	CO	SMD	1:1.8	450μH	1.0	0.6	5.5	B	1
	CT-L52DU81	TTC-4814	CPE	THD	1:2.125	5mH	0.75	3.5	12	A	1
		TTC-4058	CPE	SMD	1:2.125	5mH	0.75	3.5	12	B	1
	CT-L53SC08 CT-L76SC08	TTC-4088	CO	SMD	1:1	850μH	2.2	3.0	6.0	C	6
	CT-L21DT01 CT-L10AT01	TTC-4099	CPE	THD	1:1	455μH	0.8	0.6	5.0	A	1
	CT-L73SC08	TTC-4103	CO	SMD	1:2	1.0mH	1.6	0.55	5.5	B	1
	PALLADIA 200/210/22	TTC-4117	CPE	SMT	1:2.5	5mH	3.8	1	15	B	2
	PALLADIA 200/210/22	TTC-4118	CPE	SMT	1:1	5mH	3.2	3.6	15	B	2
CONEXANT	20441	TTC-4016	CO/CPE 3000Vrms	THD	1:2	0.8mH	1.48	0.77	10	A	3
	CN9001	TTC-4017	CO/CPE	SMD	1:2	0.8mH	1.48	0.77	10	B	4



Schematics



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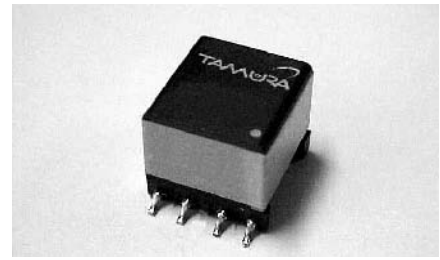
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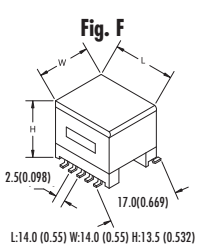
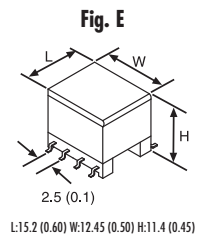
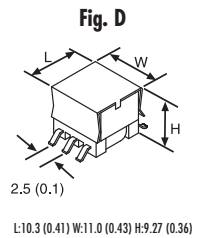
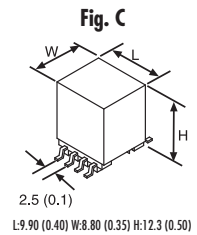
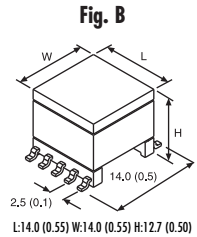
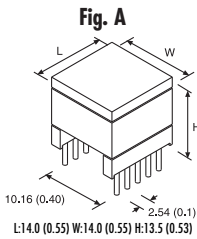
ADSL PRODUCT SELECTION GUIDE

See www.tamuracorp.com for detail specifications

- Designed for lowest THD
- 1500Vrms Hi-Pot
- UL1950, UL60950 and EN609540 approvals
- Extended Temperature Designs
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Mechanical Dimensions



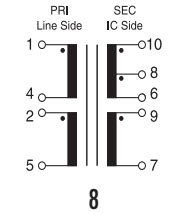
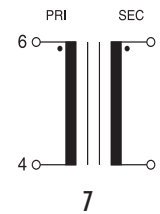
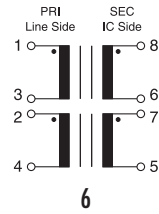
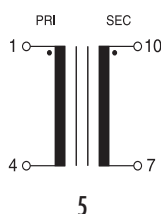
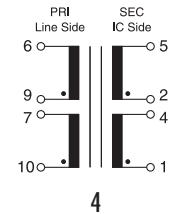
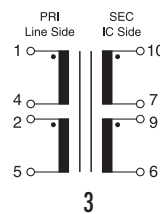
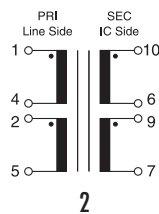
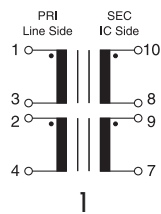
Electrical Specification @ Ta=25°C

IC Manufacturer	IC Number	Part #	Application	Mounting	Turns Ratio	Inductance @ 10kHz, 0.1V	DCR (Ω MAX.)		Leakage Inductance (μH)	Package Fig.	Schematic Fig.
							LINE	CHIP			
GLOBESPAN	G7000	TTC-4059	CPE	SMD	1:1	430 μH	0.9	0.7	10	B	3
	G7266	TTC-4060	CO	SMD	1:1.4	441 μH	1.0	0.8	10	B	4
	EL1501	TTC-4064	CPE	THD	1:1	407.5 μH	1.4	1.2	10	A	1
	G7070	TTC-4081	CPE	SMD	1:2	100 μH	1.0	0.5	12	B	2
		TTC-4085	CO	SMD	1:1.41	475 μH	2.9	2.9	15	C	6
		TTC-4105	CPE	SMD	1:2	440 μH	1.6	0.8	10	B	4
		TTC-4109	CO	SMD	1:2	530 μH	1.5	0.4	15	D	7
ATEX	APOLLO 2	TTC-4116	CPE	SMT	1:1.6	440μH	2.3	1.5	11	B	4
		TTC-4051	CPE	THD	1:1	440μH	1.0	1.0	10	A	1
		TTC-4052	CPE	SMD	1:1	440 μH	1.0	1.0	10	B	1
SILICON	SI-3101	TTC-4138		SMT	1:4.25 1:2.5	3mH	2.64	0.19/0.83	15	F	8
	SI-3101	TTC-4139		THT	1:4.25 1:2.5	3mH	2.64	0.19/0.83	15	A	8
TI	TNETD2000R	TTC-4054	CPE	THD	1:1.42	1.5mH	4.0	0.7	18	A	5
	TNETD3000P	TTC-4055	CPE	SMD	1:1.42	1.5mH	4.0	0.7	18	B	5
	TNETD4000R										
	TNETD4000C	TTC-4053	CO	THD	1:2	75μH	2.0	0.55	12	A	5
		TTC-4071	CPE	SMD	1:2	75μH	2.0	0.55	12	B	5
	TNETD5000P	TTC-4069	CPE	THD	1:1.95	1.5mH	2.0	0.55	15	A	5
	AC5	TTC-4101	CO	SMD	1:1.9	400μH	1.0	1.0	7.5	E	6
		TTC-4124	CO	SMT	1:1.9	400μH	1.0	1.0	5	E	6

¹ Designed to meet UL1459

² Approvals Pending

Schematics



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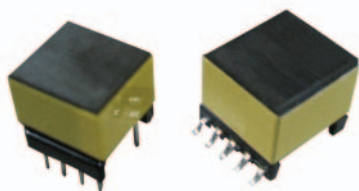
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HDSL / HDSL2 / SDSL / G.SHDSL

See www.tamuracorp.com for detail specifications

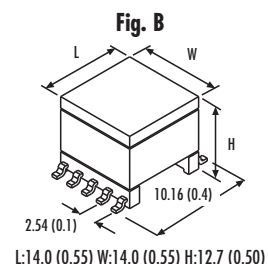
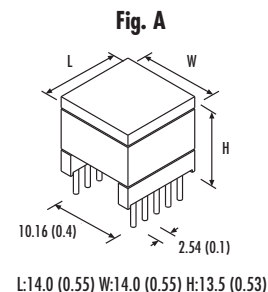
- HiPot 1500Vrms
- Operating Temp -40 to +85°C
- Approved to UL1950 3rd Edition, EN60950 / IEC950



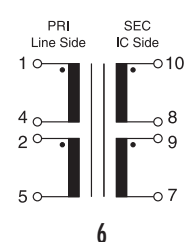
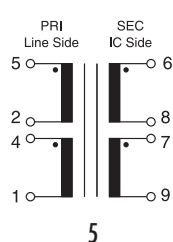
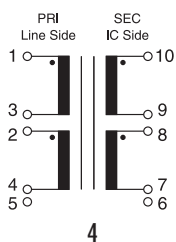
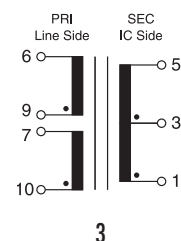
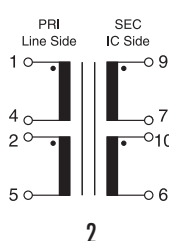
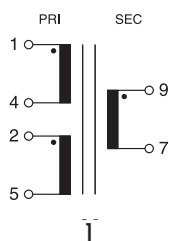
Electrical Specification @ Ta=25°C

IC Manufacturer	IC Number	Part #	Application	Mounting	Turns Ratio	CHIP:LINE	Inductance @ 10KHz, 0.1V (mH)	DCR (Ω MAX.)		Leakage Inductance (μH)	Package Fig.	Schematic Fig.
								LINE	CHIP			
CONEXANT	BT8970	TTC-4018	2320Kbps	THD	1:1:1	1	1	1.9	0.85	11	A	1
		TTC-4019	2320Kbps	SMD	1:1:1	1	1	1.9	0.95	11	B	1
	RS8973	TTC-4062	ALL	SMD	1:1:1	2	3.2	1.15	6.5	6.5	B	1
	CN8980	TTC-4056	ALL	THD	1:5	2	0.57	0.25	0.5	0.5	A	1
	RS8973	TTC-4093	HDSL	THD	1:2	2	3.2	1.2	6.5	6.5	A	1
GLOBESPAN		TTC-4063	ALL	SMD	1:2.2	3	2.5	1.1	10	10	B	3
		TTC-4074	G.SHDSL	SMD	1:4	2	2.5	1.0	11	11	B	1
		TTC-4083	G.SHDSL	SMD	1:5.4	3	2.2	0.2	12	12	B	1
	G2237		SHDSL	SMT								
		TTC-4115	HDSL2	SMT	1:5.4	3mH	4.2	0.35	15	15	B	1
INFINEON	PEB22622	TTC-4070	ALL	SMD	1:1:3.2	3	4.5	2.1	33	33	B	4
	PEB22622											
	PEF22623	TTC-4123	SHDSL	SMT	1:3.2	3mH	4.3	2	25	25	B	2
	PEF24622											
LEVEL ONE	SK70704/07	TTC-4036	1168Kbps	SMD	1:1.8CTS	0.6	7	3.17	20	20	B	1
	SK70706/21		784Kbps									
			400Kbps									
	SK70740/41/42	TTC-4084	HDSL2	SMD	1:2.3	2	3.8	0.9	35	35	B	5
		TTC-4089	HDSL	SMD	1:2	2.0	2.5	1.4	10	10	B	6

Mechanical Dimensions



Schematics



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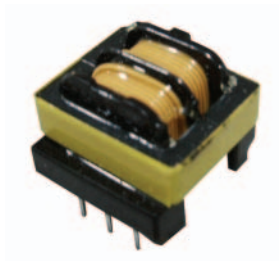
Hong Kong

Tel: 852-2389-4321
Fax: 852-2341-9689

Power Line Control Transformers

For use with Echelon's PLT-22 Transceiver

- Designed to Meet UL60950
- HiPot = 3000Vrms (Pri:Sec)

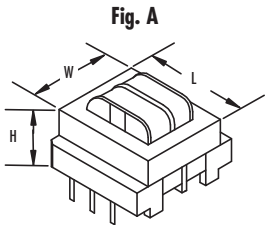


Electrical Specification @ Ta=25°C

TAMURA Part #	Turns Ratio (PRI:SEC)	Primary Inductance (mH) @ 100kHz		Leakage Inductance (μH) @ 100kHz	Interwinding Capacitance (pF) @ 100kHz	DCR (Ω)		Package Fig.	Schematic Fig.
		DRY	WET (15mADC)			PRI (3-1)	SEC (4-6)		
PLP011	1:1	1.0	0.75	12	30	0.2	0.2	A	1
PLOPUE	1:1	1.0	0.75	12	30	0.2	0.2	A	1

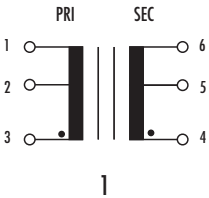
¹ Designed to Meet UL 1950

Mechanical Dimensions



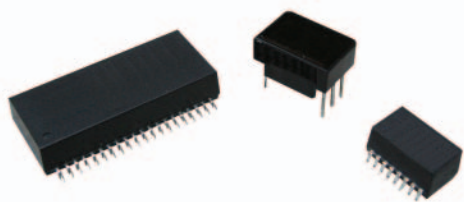
L: 20.0 (0.787) W: 21.0 (0.827) H: 16.5 (0.649)

Schematics



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- Compiles with UL60950 for Basic Insulation
- IC Grade transfermolded packaging
- Operating Temp 0°C to 70°C (-40°C to +85°C Available)
- Half, Single and Quad port packages available
- Matched to leading transceiver ICs

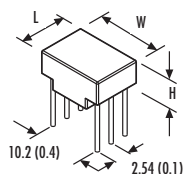
Electrical Specification @ Ta=25°C

Part #	Mounting	Turns Ratio		Inductance (mH Min.)	DCR (Ω) Pri-Sec	Leakage Inductance (μH)	Capacitance (pF MAX.)	Isolation/ Hipot	Package Fig.	Schematic Fig.
		1ST	2ND							
TTC-295	T-PAK	1: 1.14CT	1CT:2CT	1.2	0.7 - 0.8	0.8	35	1500V	A	1
TTC-296	T-PAK	1:1.26	1CT:2CT	1.5	0.7 - 0.9	0.4	40	1500V	A	2
TTC-297	T-PAK	2CT:1CT	1CT:2CT	2.0	0.7 - 0.4	1.5	30	1500V	A	3
TTC-299	T-PAK	1CT:1CT	1CT:2CT	1.2	1.0 - 1.0	0.8	40	3000V	A	3
TTC-312	16PIN SOIC	2CT:1CT	1CT:2CT	1.2	0.7-1.4	0.6	30	1500V	B	4
TTC-6017	16PIN SOIC	1CT:1CT	1CT:2CT	1.2	0.7-1.2	0.6	30	1500V	C	4
TTC-6018	16PIN SOIC	1.15CT:1	1CT:2CT	1.2	0.7-1.2	0.6	30	1500V	C	5
TTC-6019	T-PAK	1CT:2CT		1.2	0.7-1.2	0.5	30	1500V	A	3
TTC-6020	16PIN SOIC	2.3CT:1	1CT:1CT	1.2	0.7	0.4	30	1500V	C	5
TTC-6021	40PIN SOIC	1CT:2	1:2CT	1.5 typ	0.8	0.5	35	1500V	D	6
TTC-6022	40PIN SOIC	1:2.4	1:1	1.0	0.6-1.0	0.5	35	1500V	D	7
TTC-6023	40PIN SOIC	1:2CT	1:2CT	1.5 typ	0.8	0.5	35	1500V	D	8
TTC-6024	16PIN SOIC	1.26:1	1.26:1	1.2	0.7	0.5	25	1500V	C	9
TTC-6025	16PIN SOIC	1:2.4	1:1	1.2	0.7	0.4	30	1500V	C	4

Mechanical Dimensions mm (inches)

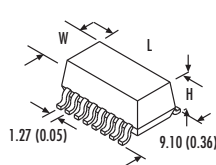
All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

Fig. A



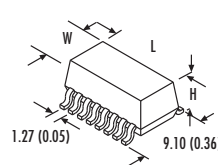
L:8.9 (0.35) W:12.7 (0.50) H:6.35 (0.25)

Fig. B



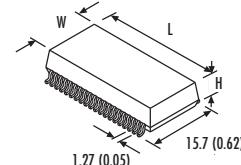
L:11.6 (0.46) W:6.91 (0.27) H:5.6 (0.22)

Fig. C



L:12.7 (0.50) W:6.91 (0.27) H:8.13 (0.32)

Fig. D



L:28.0 (1.10) W:12.2 (0.48) H:6.0 (0.24)

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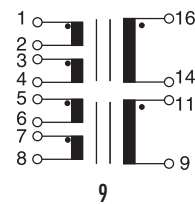
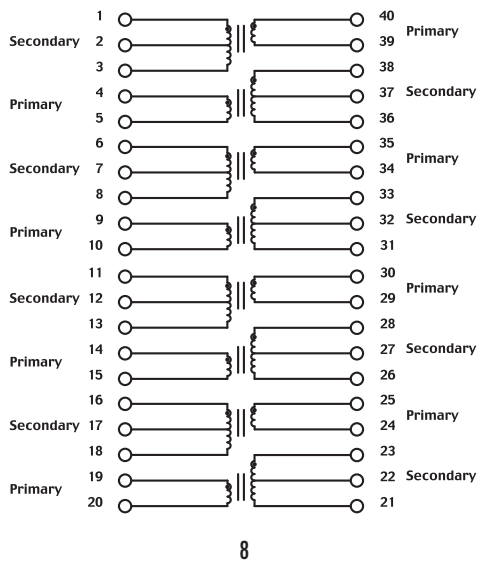
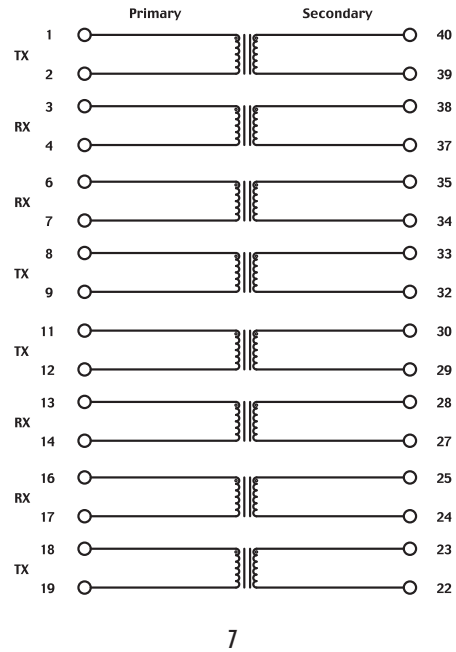
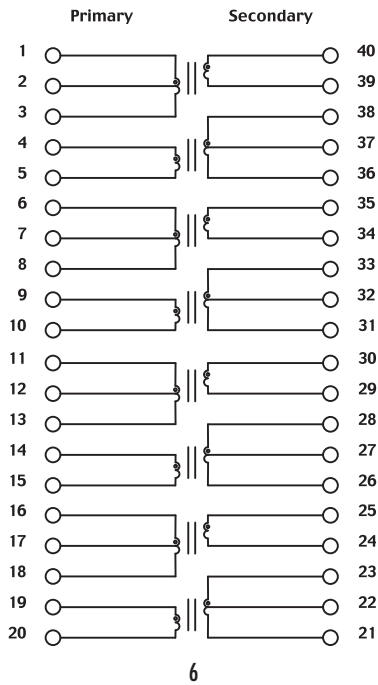
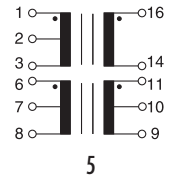
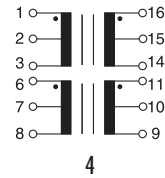
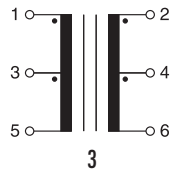
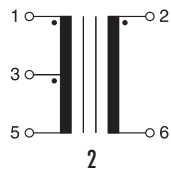
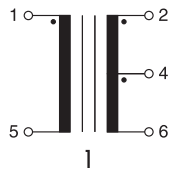
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Hong Kong

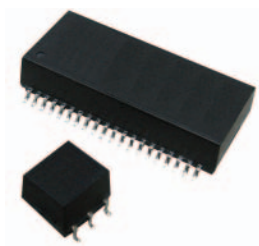
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Schematics



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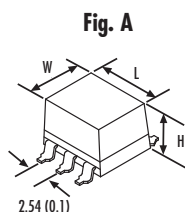
- Complies with UL60950 for Basic Insulation
- IC Grade transform molded packaging
- Extended Operating Temp -40°C to +85°C
- Designed for Optimal Return Loss Performance for Annex 3 and G.703
- Matched to leading transceiver ICs

Electrical Specification @ Ta=25°C

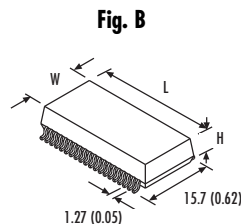
Part #	Turns Ratio		Inductance (mH Min.)	Return Loss		Insertion Loss (dB Max.)		Crosstalk (dB)		Package	Schematic
	Tx	Rx		dB Min	MHz	dB Max	MHz	dB Typ.	MHz		
TTC-339	1:2	1:1	100	-15	0.8-60	-1	0.8-60	-30	1-100	B	3
TTC-302	1:1	-	100	-15	1-100	-1	1-100	-	-	A	1
TTC-326	1:2CT	-	40	-15	1-100	-1	1-100	-	-	A	2

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

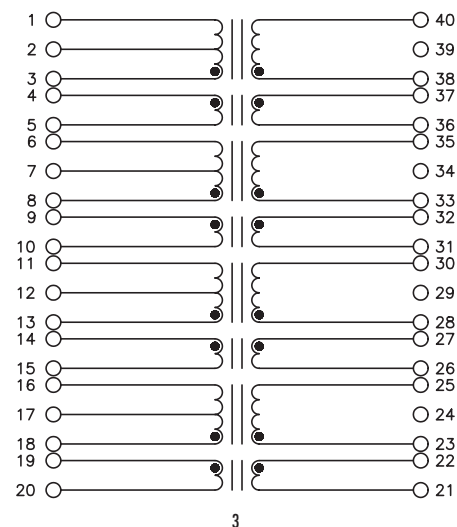
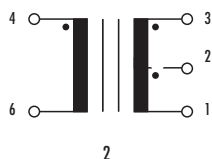
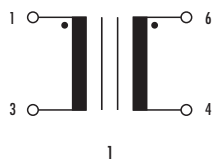


L:7.62 (0.30) W:6.86 (0.27) H:6.10 (0.24)



L:28.0 (1.10) W:12.2 (0.48) H:6.0 (0.24)

Schematics



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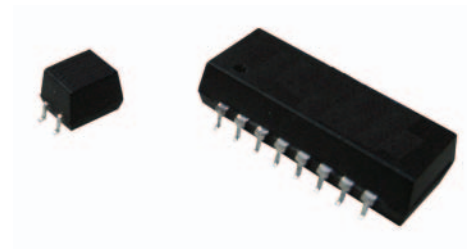
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- IC Grade Transfer Molded Packaging
- High Reliability
- Optimized Toroidal Designs
- 1500 Vrms Hi-Pot
- Approved to UL1950 3rd Edition
- Approved to UL60950 & EN60950



Pulse Transformers for PNA

Toroidal design for optimized performance

Withstands IR Reflow process

Part #	Mounting	Turns Ratio	Inductance (μH)	DCR (Pri Ω)	DCR (Sec Ω)	Leakage Inductance (μH)	Capacitance (pF)	Isolation	Package Fig.	Schematic Fig.
TTC-2000	16 PIN SMD	1:1	140	0.25	0.25	2.0	12	1500 V	A	1
TTC-2002	4 PIN SMD	1:1	250	0.5	0.5	2.0	12	1500 V	B	2
TTC-2003	4 PIN SMD	1:1	8	0.1	0.1	0.5	12	1500 V	B	2

Home Run Bandpass Filter

Complies with UL1950 3rd Edition

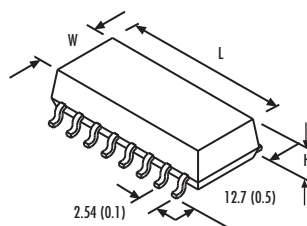
Operating temperature: -40°C to +85°C

TAMURA Part	Insertion Loss (dB Max) 6-9MHz	Return Loss (dB Min), 100Ω 6-9MHz	Attenuation (dB) Min		HiPot (Vrms) 60sec	Package Fig.	Schematic Fig.
			1MHz	27MHz			
TTC-2012	-3.5	-12	-60	-50	1500	A	3

Mechanical Dimensions mm (inches)

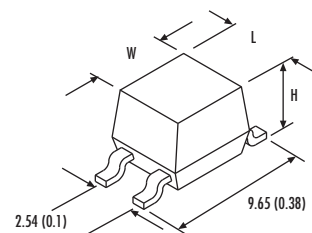
All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

Fig. A



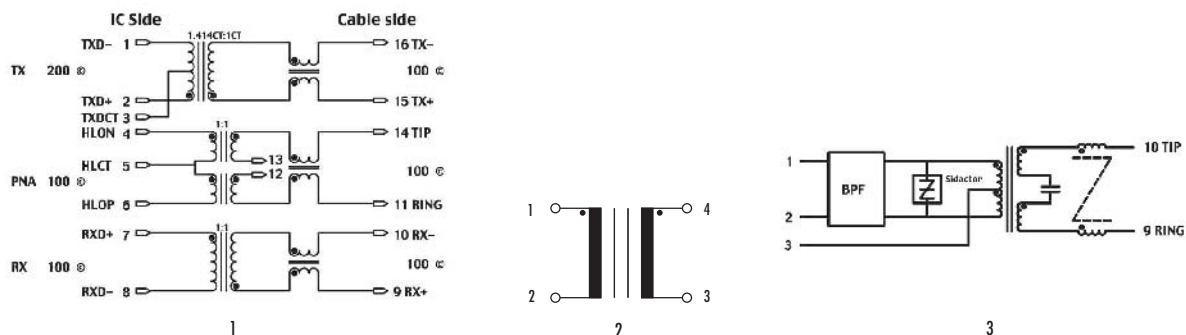
L:25.4 (0.23) W:10.0 (0.39) H:6.20 (0.24)

Fig. B



L:5.84 (0.23) W:6.86 (0.27) H:5.33 (0.21)

Schematics



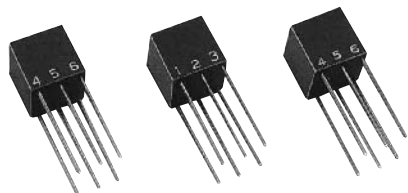
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 Fax: 909-676-9482 | Fax: 81 (0)3 3923-0230 | Fax: 44 (0) 1380 731 702 | Fax: 852-2341-9689

Ultra Wideband Audio Transformers

Operation Temperature of -55C° to 130° for Demanding Applications

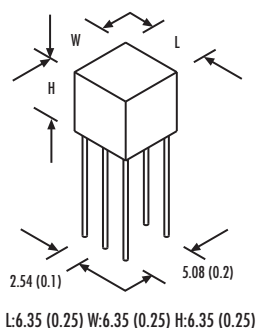
- Highest Density Package Available
- Optimized for Audio Impedance Matching Applications
- Frequency Range = 400Hz - 250kHz
- HiPot = 150Vrms (Pri:Sec)



ID Part #	Rated Power @ 1KHz (mW)	Impedance Primary (Pri. Ω)	Impedance Secondary (Sec. Ω)	Turns Ratio	UnBalance Current (mA)	Distortion (% MAX.)	Freq. Response (dB)	DCR (Pri Ω)	DCR (Sec Ω)	Schematic Fig.
MX-52	40	10 K CT	10 K CT	1CT:1CT	0.25	7	+/- 2	1150	1220	1
MX-58	50	600 CT	600 CT	1CT:1CT	1	7	+/- 2	78	93	1
MX-59	50	500 CT	50	1CT: 0.316	1	7	+/- 2	62	5	1
MX-61	50	600 CT	8	8.66CT:1	1	7	+/- 2	90	1.5	2

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics



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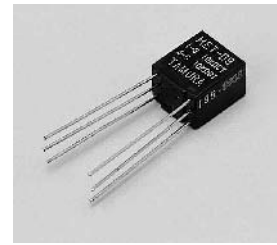
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Fax: 44 (0) 1380 731 702

Hong Kong

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Fax: 852-2341-9689

Ultra Wideband Audio Transformers

- Highest Density Package Available
- Optimized for Audio Impedance
- Frequency Range = 100Hz - 100kHz
- HiPot = 1000Vrms (Pri:Sec)

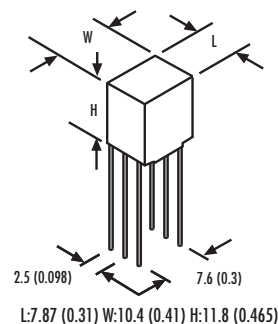


Tamura Part #	Impedance (Pri. Ω)	Impedance (Sec. Ω)	Turns Ratio (Pri:Sec)	UnBalance Current (mA)	Max. Pwr. Level (mW)	Freq. Response (dB)	DCR (Pri. Ω)	DCR (Sec. Ω)	Schematic Fig.
MET-01	200k	1k	14.1CT:1CT	0.0	10.0	+/-3	5300	120	1
MET-05	25k	1k	5CT:1CT	0.5	30.0	+/-3	1600	95	1
MET-09	10 K CT	10 K CT	1CT:1CT	1	40.0	+/- 3	1000	1300	1
MET-11	10k	2k	2.23CT:1CT	1.0	40.0	+/-3	1000	300	1
MET-17	10K	500	4.47CT:1CT	1.0	40.0	+/-3	1000	80	1
MET-23	1.6k	3.2	22.3CT:1	2.5	50.0	+/-3	186	0.8	3
MET-24	1.5K CT	600	1.58CT:1	3	50.0	+/- 3	160	95	3
MET-28	1K	50	4.47:1	3.0	50.0	+/-3	110	8	4
MET-31¹	600 CT	600 CT	1CT:1CT	3	50.0	+/- 3	70	95	1
MET-32	600	150/150	2:1:1	3	50.0	+/- 3	70	95	2
MET-35	600 CT	8	8.66CT:1	4.5	50.0	+/- 3	60	1.5	3
MET-39	500	50	3.16:1	3.0	50.0	+/-3	55	8	4
MET-42	150	12	3.54:1	10.0	50.0	+/-3	20	2.5	4
MET-46¹	600	600	1:1	3	50.0	+/- 3	72	93	4
MET-50	10k	125	8.62:1	0.0	10.0	+/-3	1100	280	4
MET-59	600	600	1:1 CT	3.0	50.0	+/-3	70	95	2
MET-60	135	135 CT	1:1 CT	10	50.0	+/- 3	10	10	5
METC-99	MU Metal Shield								

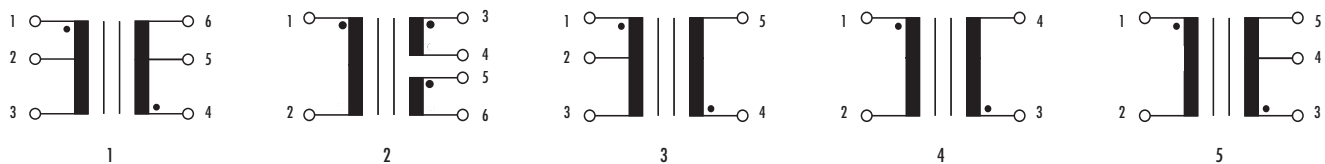
¹ Meets FCC Parts 68

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics



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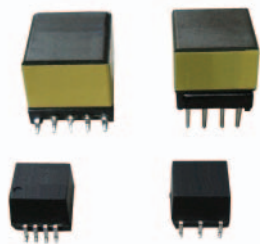
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Common Mode Chokes & Coupled Inductors

For use in xDSL Applications and all General Signal Applications

- Reduce Common Mode Noise
- Operating Temp -40°C to +85°C
- Multiple Lines Per Part
- IR Reflow Capable Product

Call Tamura Sales Engineering for detailed specifications or for new products not listed below.



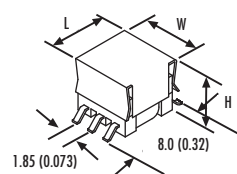
Part #	Size	Mounting	Turns Ratio WDG:WDG	Inductance @ 10KHz, 0.1V	DC Current (mA)	WDG DCR (Ω)	Package Fig.	Schematic Fig.
TTC-4072	EP13	THT	--	95μH	100	0.2	B	1
TTC-4078	EE5	SMD	1:1	348.5μH	0	5.45	A	2
TTC-4079	EE5	SMD	1:1	205μH	0	3.5	A	2
TTC-4090	EP13	THT	1:1	3.0mH	150	2.5	B	4
TTC-4091	EP13	THT	1:1	5.0mH	150	5.5	B	4
TTC-4095	EP13	THT	1:1	7.0mH	100	7.5	B	4
TTC-4096	EP10	THT	1:1	5.0mH	100	7.5	D	7
TTC-4104	EE5	SMD	1:1	300μH	0	5.2	A	2
TTC-4106	EP7	EP7	1:1	90μH	100	1.0	F	3
TTC-4110	EP13	SMD	1:1	4.0mH	100	4.5	C	5
TTC-4111	EP13	SMD	1:1	5.0mH	100	5.0	C	5

Application	Part #	OCL (mH) Min	DCR (Ω) Max	HiPot (Vrms)	CM Attenuation (dB) Typ.			Mounting	Package Fig.	Schematic Fig.
					0.1MHz	1MHz	10MHz			
ADSL	TTC-314	6.3	1	1500	-30	-45	-25	8 Pin SMD	E	6

Mechanical Dimensions mm (inches)

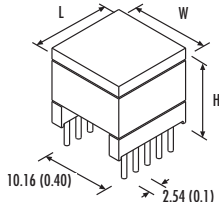
All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

Fig. A



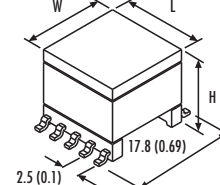
L:12.0 (0.48) W:12.5 (0.49) H:11.5 (0.45)

Fig. B



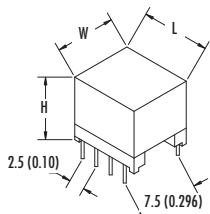
L:14.0 (0.55) W:14.0 (0.55) H:13.5 (0.53)

Fig. C



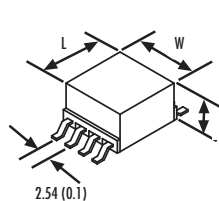
L:14.0 (0.55) W:14.0 (0.55) H:12.7 (0.50)

Fig. D



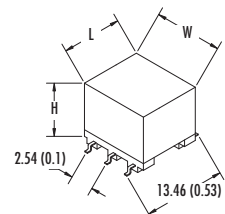
L:12.0 (0.48) W:12.5 (0.49) H:11.5 (0.45)

Fig. E



L:8.0 (0.31) W:6.6 (0.26) H:6.35 (0.25)

Fig. F



L:8.0 (0.31) W:6.6 (0.26) H:6.35 (0.25)

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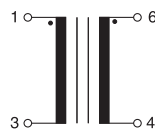
Schematics



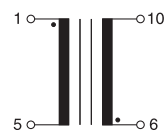
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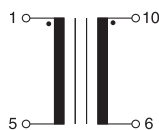
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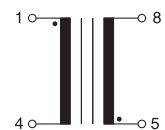
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IC Cross Reference Guide

10/100 Base T Ethernet

IC Manufacturer	IC Part Number	# Of Ports	Tamura Part Number, Discrete Module			Tamura Part Number, RJ45 Connector Modules				
			16 Pin SOIC	16 Pin SMD	40 Pin SOIC	1x1	2x1	1x4	2x4	2x8
3-Com	3C917	Single Port Applications	TTC-8100 TTC-8133 TTC-8139	TTC-8103 TTC-8130		See Page for Selection of 1x1 Connectors				
ADHOC	AH101									
Broadcom	BCM5201									
Crystal Semi.	CS8952									
Davicom	DM9101									
Integrated Circuit	ICS1890, ICS1892									
Intel	82555, 82558									
Level One	LXT970									
Lucent	LUC3X54									
Marconix	MX98727									
Microlinear	ML6671, 6673									
Myson	MTD917, 972									
National Semi	DP83223A DP83840 DP83843									
Realtek	RTL8129									
TDK	78Q2120, 2121									
TI	TNETE2101									
Winbond	W89C812	Quad Port Applications			TTC-8114 TTC-8115 TTC-8116 TTC-8117			See Page xx for Selection of 1x4 Connectors		
ADHOC	AH104									
Broadcom	BCM5203 BCM5205 BCM5208 BCM5209									

Gigabit Ethernet

IC Manufacturer	IC Part Number	# Of Ports	Tamura Part Number, Discrete Module			Tamura Part Number, RJ45 Connector Modules				
			16 Pin SOIC	16 Pin SMD	40 Pin SOIC	1x1	2x1	1x4	2x4	2x8
Broadcom	BCM5400	Single Port	TTC-8135 TTC-8136 TTC-8137 TTC-8138			TTC-1041-11 TTC-1048-11 TTC-1047-11	See Page xx for Selection of 2x1 Connectors			
	BCM5411									
	BCM5421									
	BCM5421S	1 gigabit per system								
	BCM5402	Dual Port		TTC-8156 TTC-8173	TTC-8172		See Page xx for Selection of 2x1 Connectors	TTC-1057-14 TTC-1059-14	TTC-1056-24 TTC-1073-24	
		8 gigabits per system								
	BCM5404 BCM5414 BCM5424 BCM5434 BCM5464	Quad Port		TTC-8156 TTC-8173	TTC-8172			TTC-1057-14 TTC-1059-14	TTC-1056-24 TTC-1073-24	Consult the factory
		16 gigabits per system								
	BCM5464S	Quad Port					See Page xx for Selection of 2x1 Connectors	TTC-1057-14 TTC-1059-14		
		4 gigabits per system								
Intel (Level One)	LXT1000	Single Port	TTC-8135 TTC-8136 TTC-8137 TTC-8138		TTC-1041-11 TTC-1048-11 TTC-1047-11		See Page xx for Selection of 2x1 Connectors	Consult the factory		

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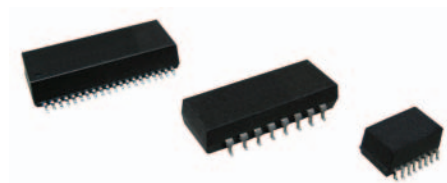
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LAN 10Base-T Transformers

- Complies with IEEE 802.3 Standards
- Extended Temp versions
- Hi-Pot 1500Vrms (pri:sec)
- Designed to work with a variety of IC's



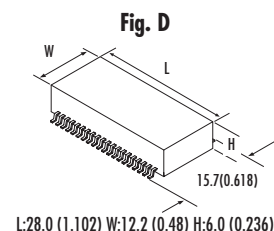
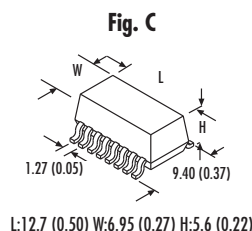
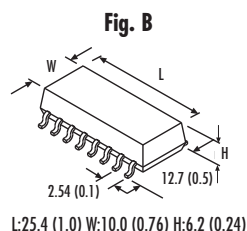
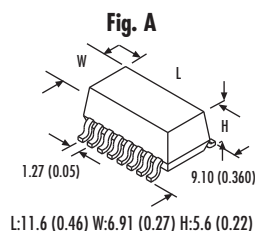
Electrical Specification @ Ta=25°C

Part #	Number of Ports	Turns Ratio		Inductance (μH)	LL Max (μH)	DCR (Ω)	Cw (pF)	Extended	Mounting	Package Fig.	Schematic Fig.
		Rx	Tx								
TTC-8121	1	1:1:1	-	100	0.2	0.2	10	AUI	SMT	A	1
TTC-8150	4	1:1	1CT:1CT	150	0.3	0.5 ¹	10	Quad Xfmr w/CMC	SMT	D	5
TTC-8163	1	1CT:1CT	1CT:2.5CT	200	0.5	0.4	15	Xfmr w/CMC	SMT	C	3
TTC-8123	1	1CT:1CT	1CT:1.41CT	200	0.5	0.3	20	Xfmr w/(2)CMC	SMT	A	4
TTC-8124	1	1CT:1CT	1CT:1.41CT	200	0.5	0.3	20	Xfmr w/(2)CMC	SMT	A	3
TTC-8142	1	1CT:1CT	1CT:2CT	140	0.4	0.3	15	Xfmr w/CMC	SMT	C	4
TTC-8154	1	1CT:1CT	2CT:1CT	80	0.3	0.3	20	Xfmr	SMT	A	2

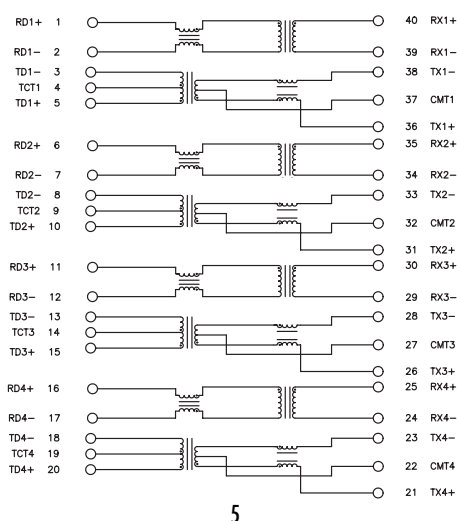
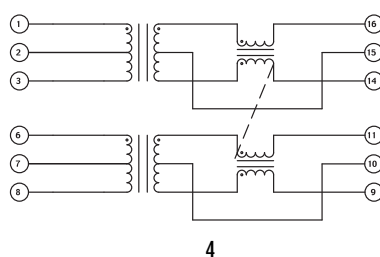
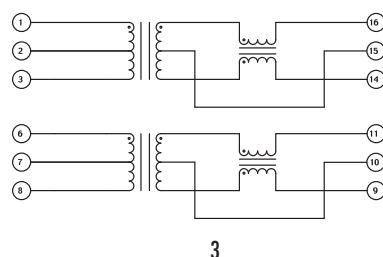
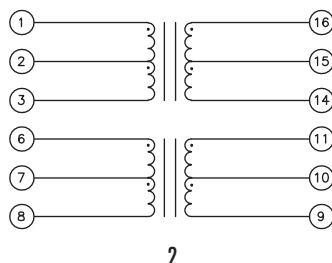
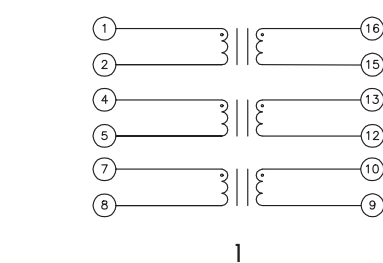
¹ Specification is a typical value

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



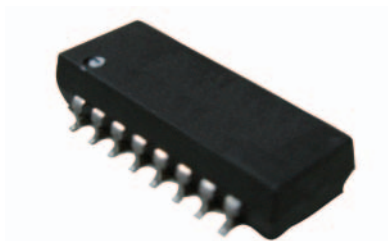
Schematics



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LAN 10Base-T Filter Modules



- Complies with IEEE 802.3 Standards
- Extended Temp versions
- Hi-Pot 1500Vrms (pri:sec)
- Designed to work with a variety of IC's

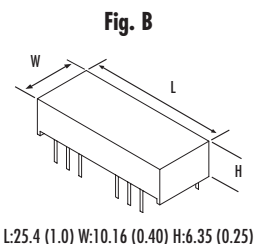
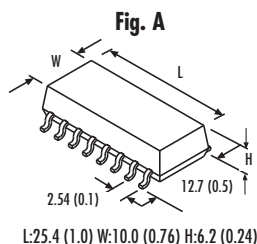
Electrical Specification @ Ta=25°C

Part #	Turns Ratio		Insertion Loss 1-10MHz (dB)	Return Loss 5-10 MHz (dB)	Common Mode Rejection (dB)	Cross Talk (dB MIN.)	Extended Description	Mounting	Package Fig.	Schematic Fig.
	Pri	Sec								
TTC-8166	1d:1d	1d:1d	-1.0	-18	-30	-35	LAN-Xfmr- Fltr(2)-CMC	THT	B	2
TTC-8164¹	1d:1d	1d:1d	-1.0	-18	-30	-35	LAN-Xfmr- Fltr(2)-CMC	SMD	A	1
TTC-8128	1d:1d	1d:1d	-1.0	-15	-30	-35	LAN-Xfmr- Fltr(2)-CMC	SMD	A	1
TTC-8145	1:1	1:1	-1.0	-15	-30	-30	LAN-Xfmr- Fltr(2)-CMC	SMD	A	3
TTC-8157	1:1.41	1:1	-1.0	-15	-30	-35	LAN-Xfmr- Fltr(2)-CMC	SMD	A	4

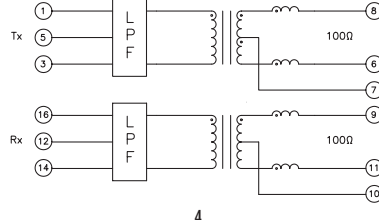
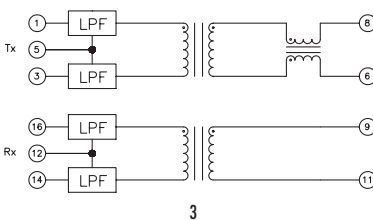
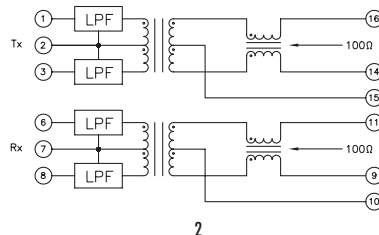
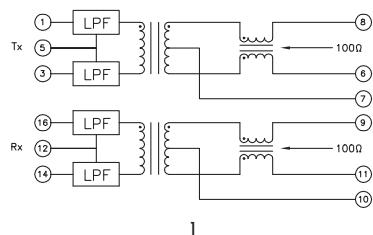
¹ Extended Operating temperature: -40°C to +85°C

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



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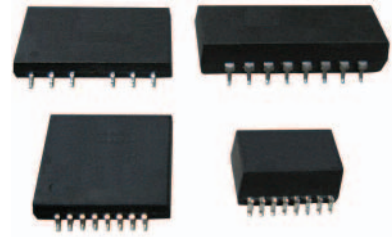
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10/100 Base-T Transformers

Surface Mount Single Port Transformer Modules

- Complies with IEEE 802.3 Standards
- Inductance of 350 μ H Min. at 8mA Bias
- Extended Temperature Versions
- Hi-Pot 1500Vrms (Pri:Sec)
- Designed to work with a variety of IC's



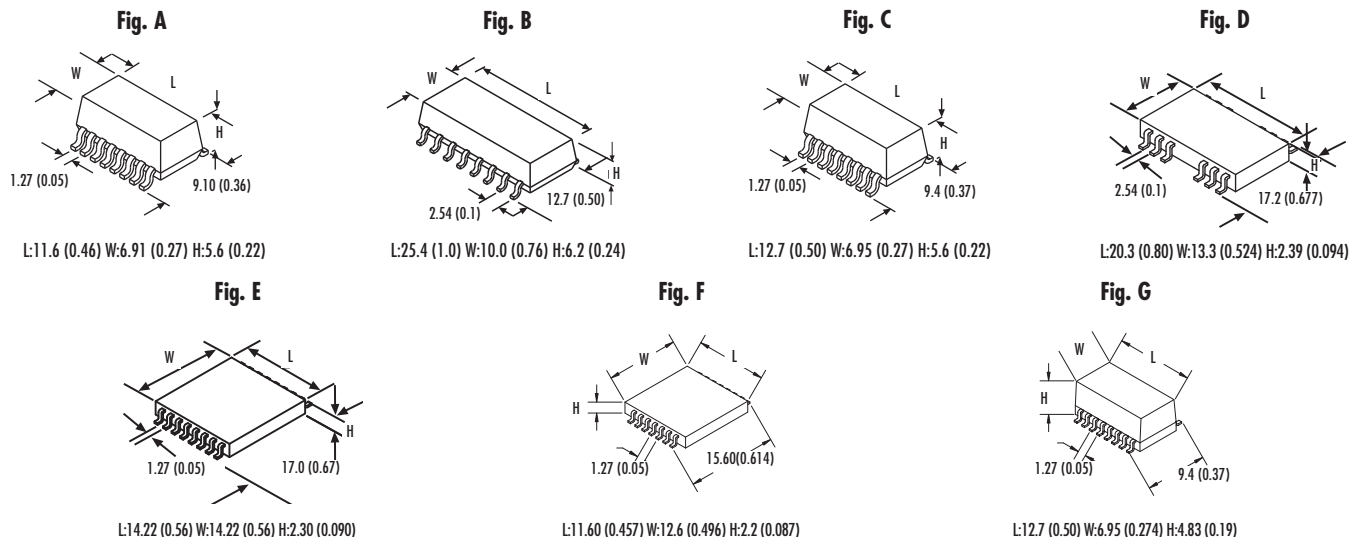
Electrical Specification @ Ta=25°C

Part #	Turns Ratio		Insertion Loss (0.1-100 MHz) (dB MAX.)	Return Loss (@ 80 MHz) (dB MAX.)	Common Mode Rejection (0.1 -100 MHz) (dB MIN.)	Cross Talk (0.1 -100 MHz) (dB MIN.)	Mounting	Package Fig.	Schematic Fig.
	Rx	Tx							
TTC-8100	1ct:1ct	1ct:1ct	-1.0	-12	-35	-35	16 Pin SOIC	A	1
TTC-8103	1ct:1ct	1ct:1ct	-1.0	-12	-35	-35	16 Pin SMD	B	3
TTC-8106	2ct:1ct	1ct:1ct	-1.1	-12	-35	-35	16 Pin SMD	B	5
TTC-8130	1ct:1ct	1ct:1ct	-1.0	-12	-35	-35	16 Pin SMD	B	4
TTC-8139	1ct:1ct	1ct:1ct	-1.0	-12	-40	-40	16 Pin SOIC	C	6
TTC-8143	1ct:1ct	1ct:1ct	-1.1	-11	-30	-35	14 Pin PCMCIA	D	7
TTC-8144	1ct:1ct	1ct:1ct	-1.1	-11	-30	-35	16 Pin PCMCIA	E	8
TTC-8146	2ct:1ct	1ct:1ct	-1.1	-12	-35	-35	16 Pin SMD	B	9
TTC-8147¹	1ct:1ct	1ct:1ct	-1.1	-12	-40	-40	16 Pin SOIC	G	2
TTC-8152¹	1ct:1ct	1ct:1ct	-1.1	-12	-35	-35	16 Pin SOIC	G	10
TTC-8161	1ct:1	1ct:1ct	-1.0	-12	-35	-35	16 Pin SMD	B	11
TTC-8168¹	1ct:1ct	1ct:1	-1.0	-12	-35	-35	16 Pin SMD	B	3
TTC-8171	1ct:1ct	1ct:1ct	-1.0	-12	-30	-35	16 Pin PCMCIA	F	12

¹ Extended Operating Temperature: -40°C to + 85°C

Mechanical Dimensions

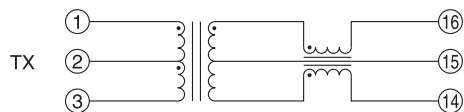
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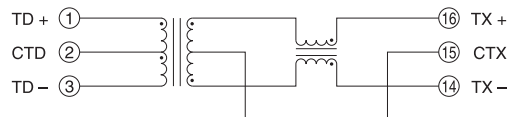
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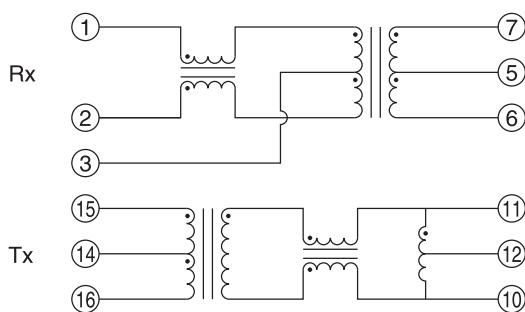
Schematics



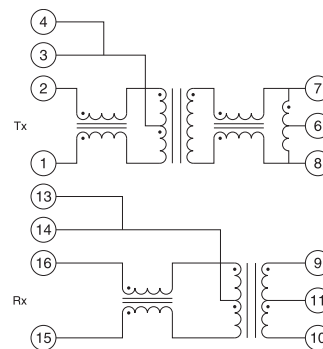
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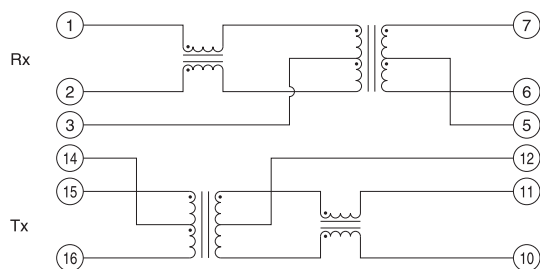
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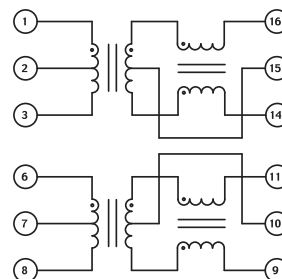
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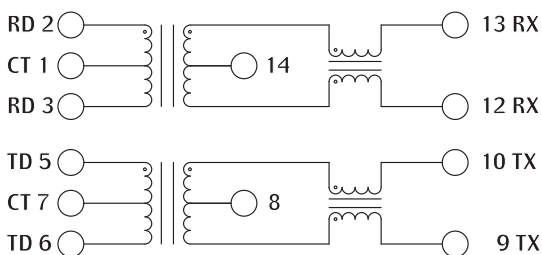
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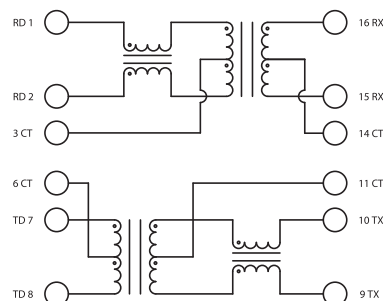
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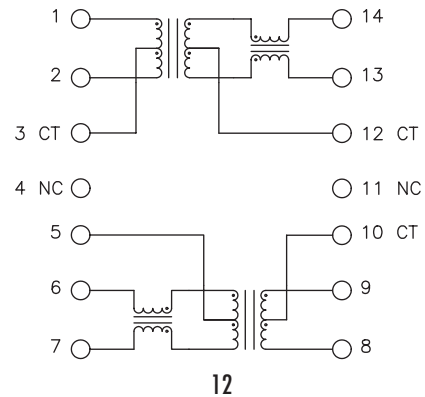
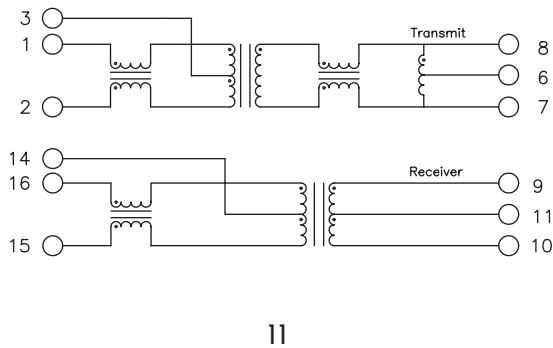
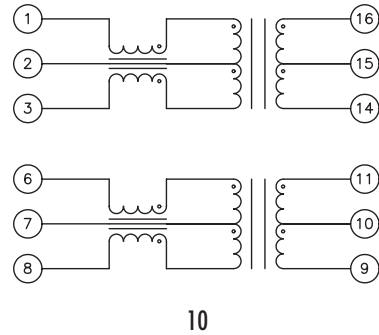
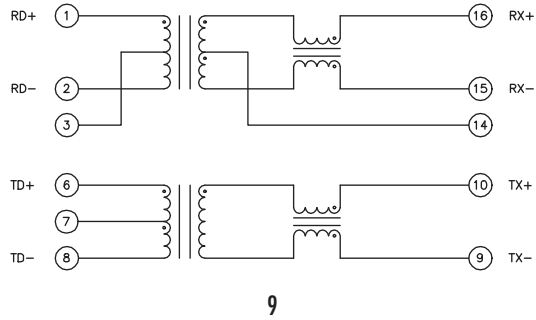
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10/100 Base-T Transformers



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10/100 Base-T Transformers

Surface Mount Dual/Quad Port Transformer Modules



- Complies with IEEE 802.3 Standards
- Inductance of 350µH Min. at 8mA Bias
- Hi-Pot 1500Vrms (Pri:Sec)
- Designed to work with a variety of IC's

Electrical Specification @ Ta=25°C

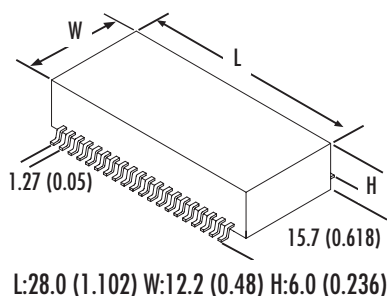
Part #	Turns Ratio		Insertion Loss (0.1-100 MHz) (dB MAX.)	Return Loss (@ 80 MHz) (dB MAX.)	Common Mode Rejection (0.1 -100 MHz) (dB MIN.)	Cross Talk (0.1 -100 MHz) (dB MIN.)	Mounting	Package Fig.	Schematic Fig.
	Tx	Rx							
TTC-8169¹	1CT:1CT	1CT:1CT	-1	-12	-30	-30	SMT	A	1
TTC-8153	1CT:1CT	1:1	-1	-12	-35	-30	SMT	A	2
TTC-8158	1CT:1CT	1:1	-1	-12	-35	-30	SMT	A	3

¹ Dual Port Module

Mechanical Dimensions mm (inches)

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

Fig. A



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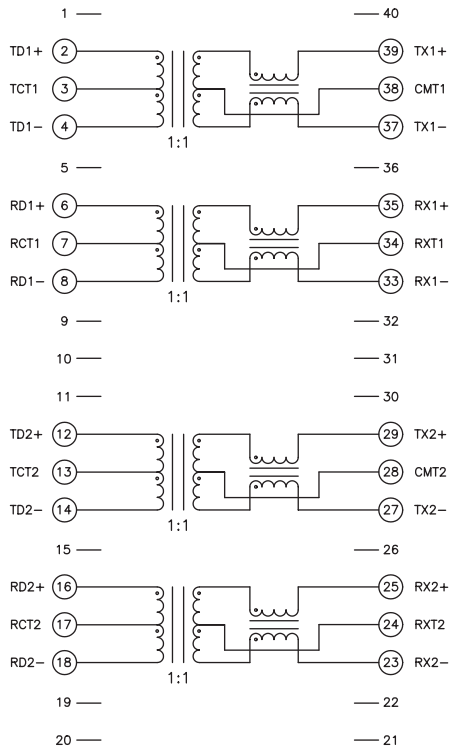
United Kingdom

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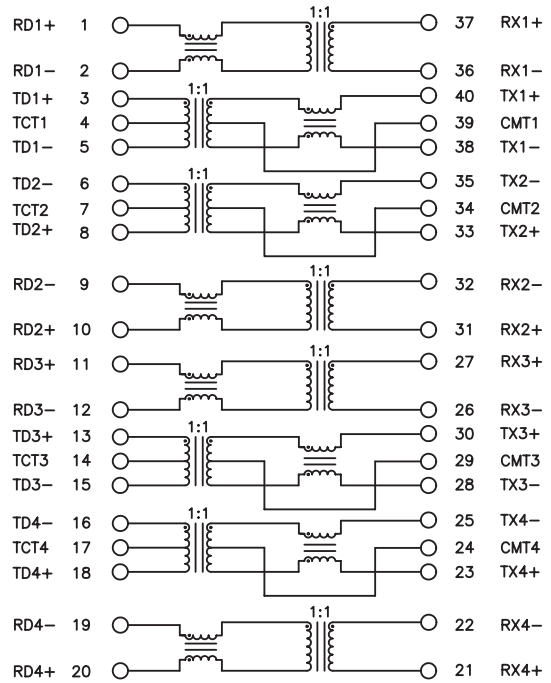
Hong Kong

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Fax: 852-2341-9689

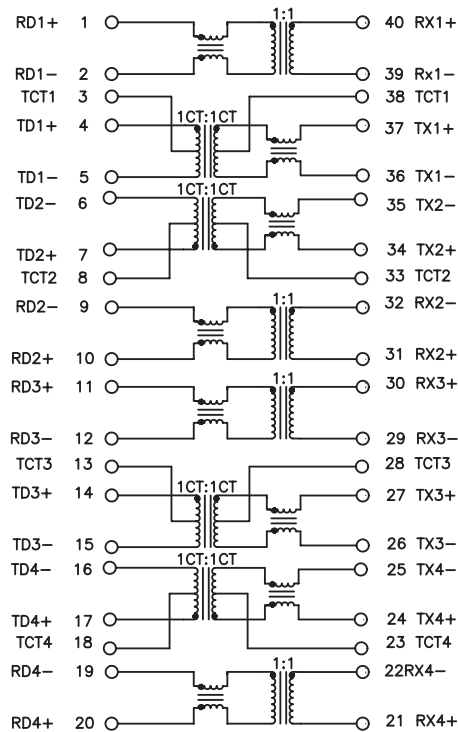
Schematics



1



2



3

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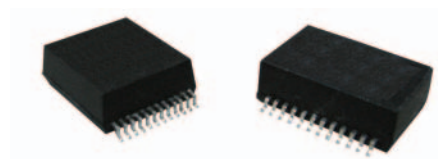
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10/100/1000 Base-T Transformers

Surface Mount Single Port Transformer Modules



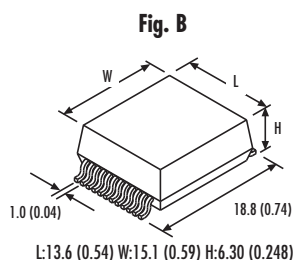
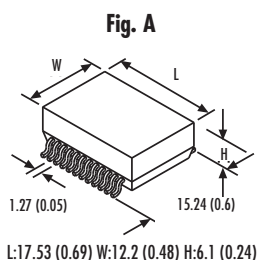
- Complies with IEEE 802.3 Standards
- Inductance of 350 μ H min at 8mA Bias
- Hi-Pot 1500Vrms (Pri:Sec)
- Designed to work with a variety IC's
- Enhanced Common Mode attenuation

Electrical Specification @ Ta=25°C

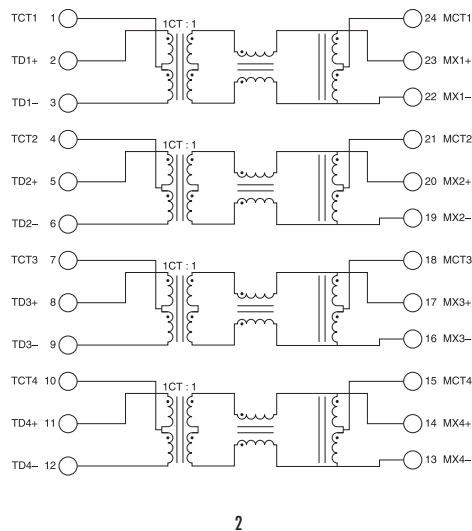
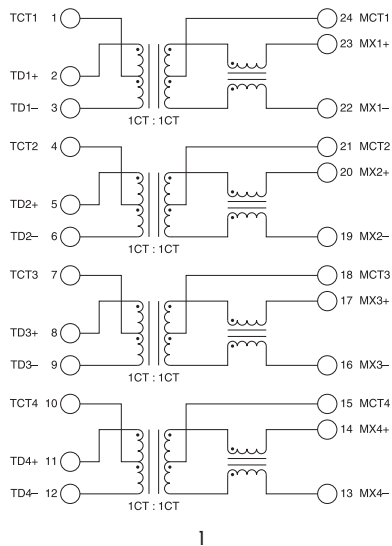
Part #	Turns Ratio		Insertion Loss (0.1-100 MHz) (dB MAX.)	Return Loss (@ 80 MHz) (dB MAX.)	Common Mode Rejection (0.1 - 100 MHz) (dB MIN.)	Cross Talk (0.1 - 100 MHz) (dB MIN.)	Extended Description	Mounting	Package Fig.	Schematic Fig.
	Rx	Tx								
TTC-8135	1 ϕ :1 ϕ	1 ϕ :1 ϕ	-1.00	-10	-30	-35	4 Channel Tx/Rx	24 Pin SOIC	A	1
TTC-8136	1 ϕ :1 ϕ	1 ϕ :1 ϕ	-1.00	-10	-30	-35	4 Channel Tx/Rx x/AutoXfmr	24 Pin SOIC	A	2
TTC-8137	1 ϕ :1 ϕ	1 ϕ :1 ϕ	-1.00	-10	-30	-35	4 Channel Tx/Rx x/AutoXfmr	24 Pin 1mm	B	2
TTC-8138	1 ϕ :1 ϕ	1 ϕ :1 ϕ	-1.00	-10	-30	-35	4 Channel Tx/Rx	24 Pin 1mm	B	1

Mechanical Dimensions

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics



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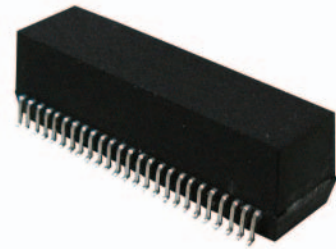
Hong Kong

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10/100/1000 Base-T Transformers

Surface Mount Dual Port Transformer Modules

- Complies with IEEE 802.3 Standards
- Inductance of 350 μ H min at 8mA Bias
- Hi-Pot 1500Vrms (Pri:Sec)
- Auto MDI/MDIX Compatible
- Enhanced Common Mode attenuation
- Designed to work with a variety IC's

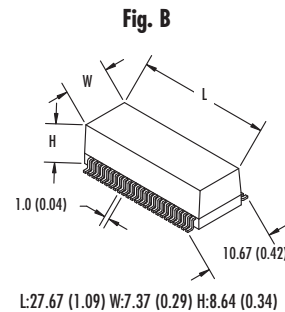
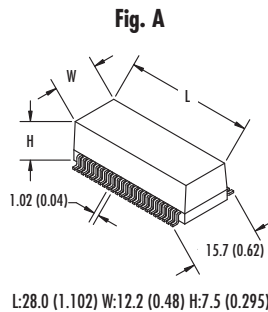


Electrical Specification @ Ta=25°C

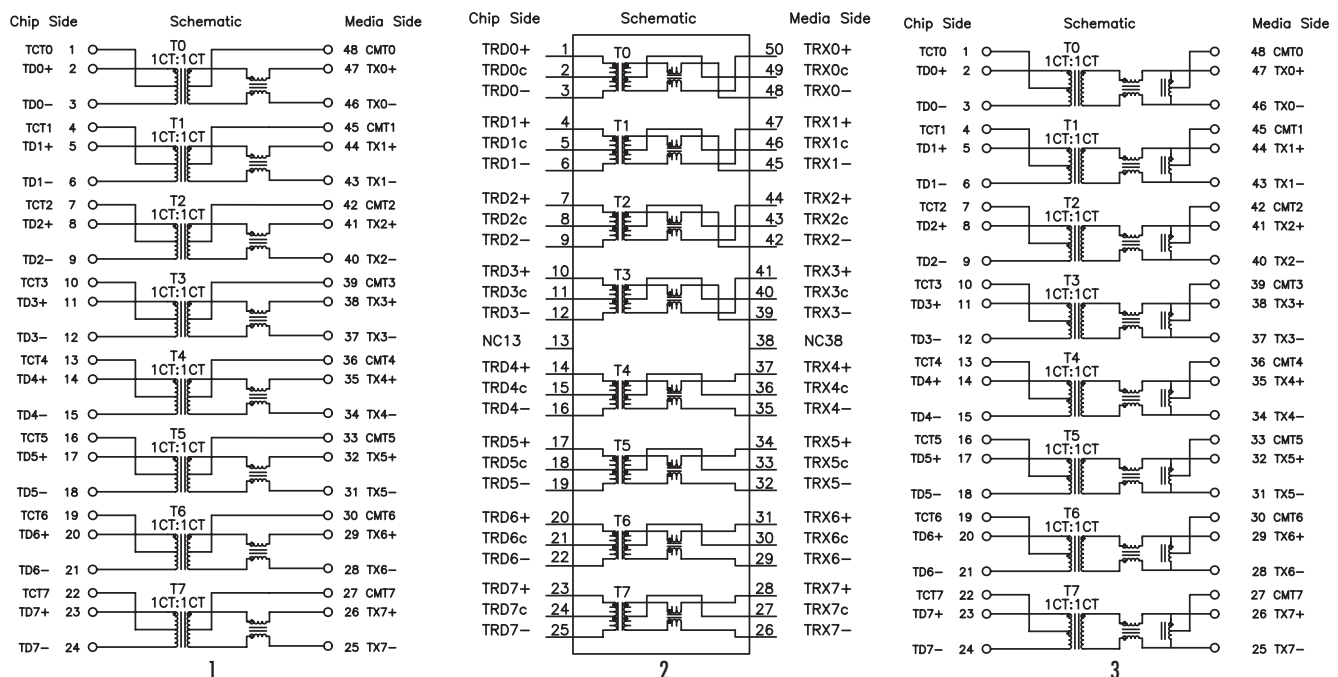
Part #	Turns Ratio		Insertion Loss (0.1-100 MHz) (dB MAX.)	Return Loss (dB MAX.)		Common Mode Rejection (0.1 - 100 MHz) (dB MIN.)	Cross Talk (0.1 - 100 MHz) (dB MIN.)	Package Fig.	Schematic Fig.
	Tx	Rx		1-30MHz	80MHz				
TTC-8156	1CT:1CT	1CT:1CT	-1	-18	-12	-30	-30	A	1
TTC-8172	1CT:1CT	1CT:1CT	-1	-18	-12	-30	-30	B	2
TTC-8173	1CT:1CT	1CT:1CT	-1	-18	-12	-30	-30	A	3

Mechanical Dimensions

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



Schematics

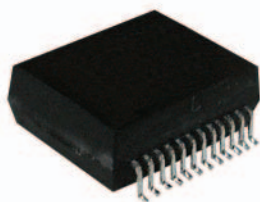


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Power Over Ethernet Transformers

Designed for IP Phone and Auto MDIX Applications



- Complies with IEEE 802.3af and ANSI x3.263
- Inductance of 350 μ H min. at 8mA Bias
- HiPot 1500Vrms (pri:sec)
- Meets Profile requirements for IR Reflow

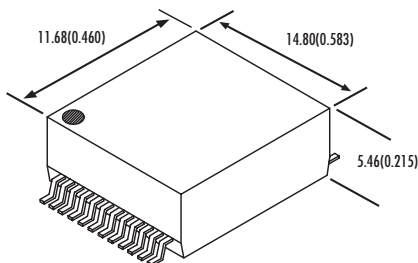
Electrical Specification @ Ta=25°C

Part #	Turns Ratio		Insertion Loss (dB Max) 0.1 - 100MHz	Return Loss (dB Min)		Differential Mode Rejection (dB Min) 30 - 100MHz	Cross Talk (dB Min) 1 - 100MHz	Package Fig.	Schematic Fig.
	Tx	Rx		1-30MHz	80MHz				
TTC-8170	1CT:1CT	1CT:1CT	-1	-16	-12	-33	-30	A	1

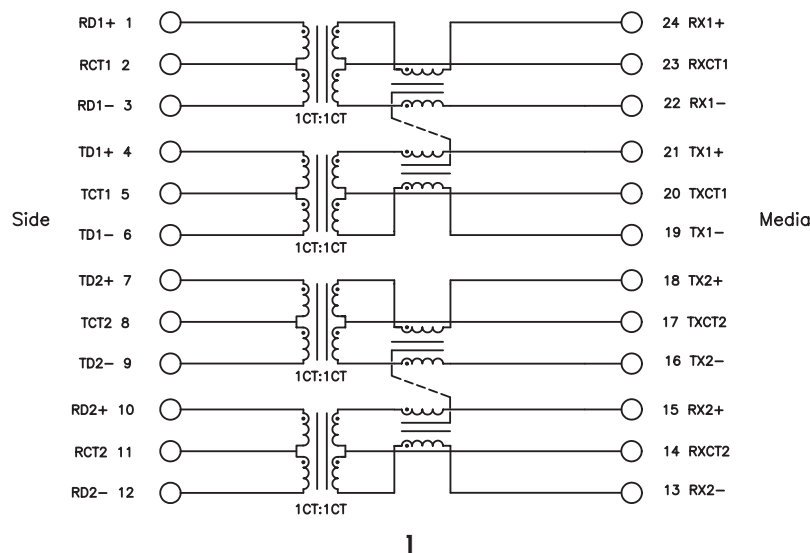
Mechanical Dimensions

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.

Fig. A



Schematics



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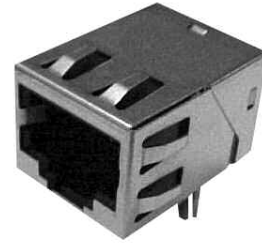
Hong Kong

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RJ45 Integrated Connector

1X1 Common Mode Choke Module

- Complies with IEEE 802.3 Standards
- Operating Temp -20°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed to reduce Radiated and Conducted EMI



All Electrical Data Specified at Ta=-20° to +85°C for all parts in this Series

OCL (μH Min) 0.1V @ 10kHz	DCR (Ω Max) Each Winding	Common Mode Attenuation (dB Typ)					
		1MHz	5MHz	20MHz	70MHz	200MHz	500MHz
65	0.5	8	17	23	25	22	11

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-1066-11	NA	NA	C	C	DOWN	NO	1	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1068-11	NA	NA	C	C	DOWN	YES	2	B	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)

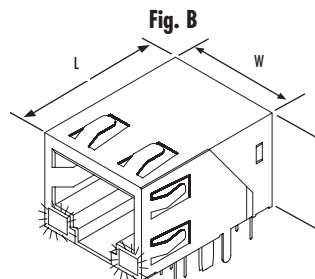
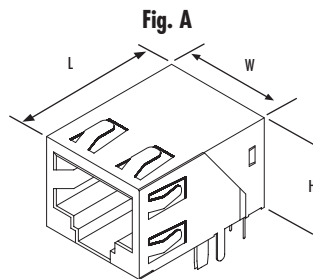
¹ C-Choke; T-Transformer; A-Auto Transformer

Package & Weight Information

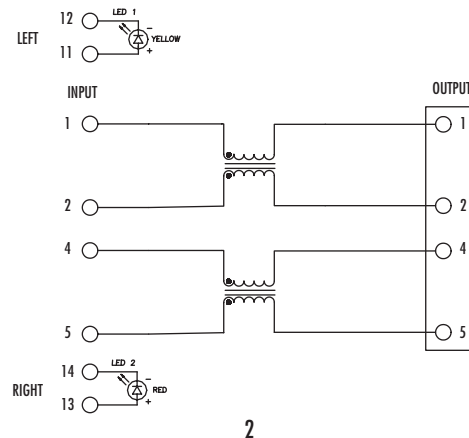
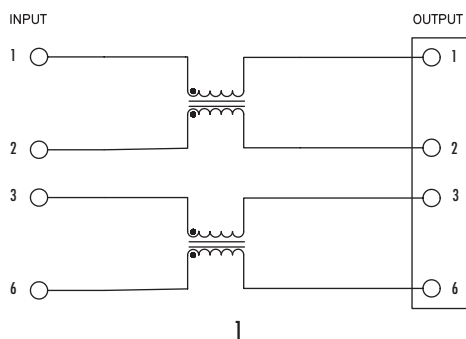
QTY/Tray	QTY/Box	QTY/Cartoon	Weight/each(g)
60	420	1680	6.3

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



Schematics



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RJ45 Integrated Connector

1X1 10/100 Base-T LAN Modules



- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350µH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25°C for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (µH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-30	-30	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-1042-11	1CT:1CT	1CT:1CT	C,T	C,T	UP	YES	1	A	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-1062-11	1CT:1CT	1CT:1CT	C,T	C,T	UP	YES	2	A	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-1063-11	1CT:√2CT	1CT:1CT	C,T	C,T	UP	YES	3	A	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-1067-11²	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	YES	4	B	21.60 (0.850)	15.88 (0.625)	13.45 (0.530)
TIC-1069-11	1CT:1CT	1CT:1CT	C,T	C,T	UP	YES	5	A	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)

¹ C-Choke; T-Transformer; A-Auto Transformer

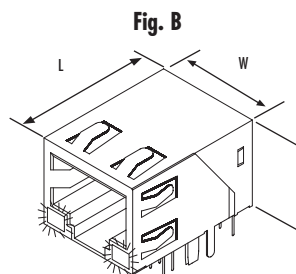
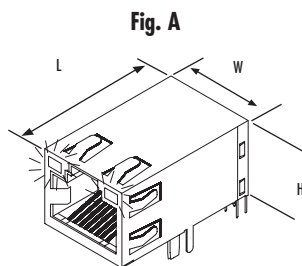
² Packaging Differences: see package and weight information

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
50	250	7.2
60 ²	420 ²	6.7 ²

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



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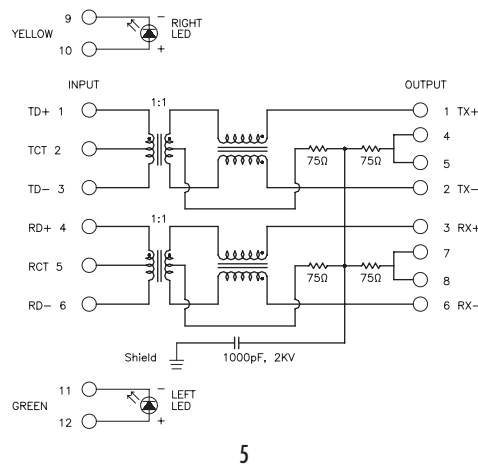
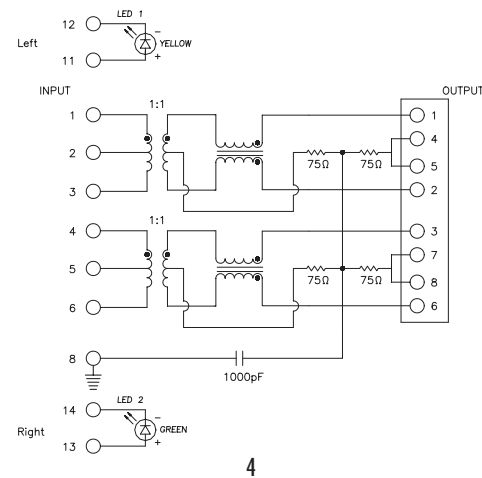
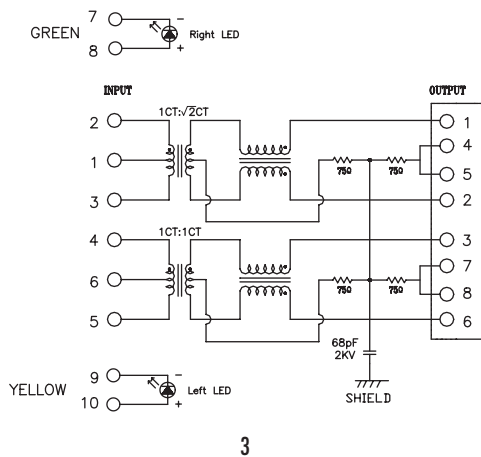
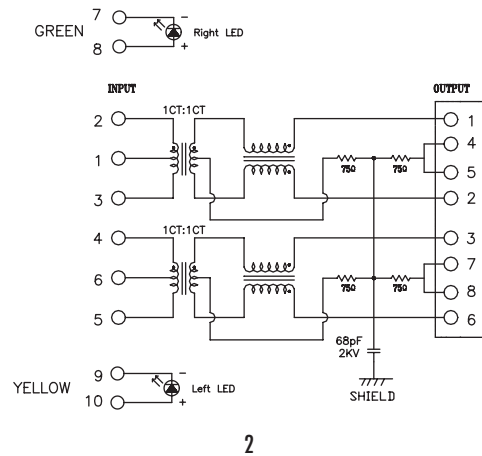
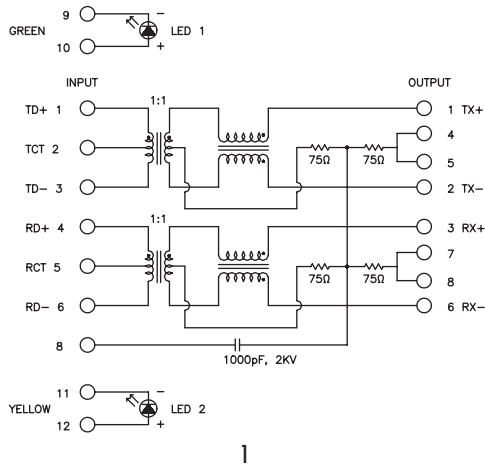
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Schematics



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RJ45 Integrated Connector

1X1 10/100 Base-T LAN Modules with LED's



- Enhanced Crosstalk Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350µH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (µH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-30	-35	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-L033-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	D	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L034-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	E	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L035-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	A	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L036-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	2	C	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-L037-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	3	C	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L038-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	4	B	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L039-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	5	B	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L040-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	4	C	25.53 (1.005)	16.80 (0.661)	13.50 (0.531)
TIC-L058-11²	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	YES	6	F	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-L075-11²	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	YES	7	G	21.69 (0.854)	15.85 (0.624)	13.45 (0.530)

¹ C-Choke; T-Transformer; A-Auto Transformer

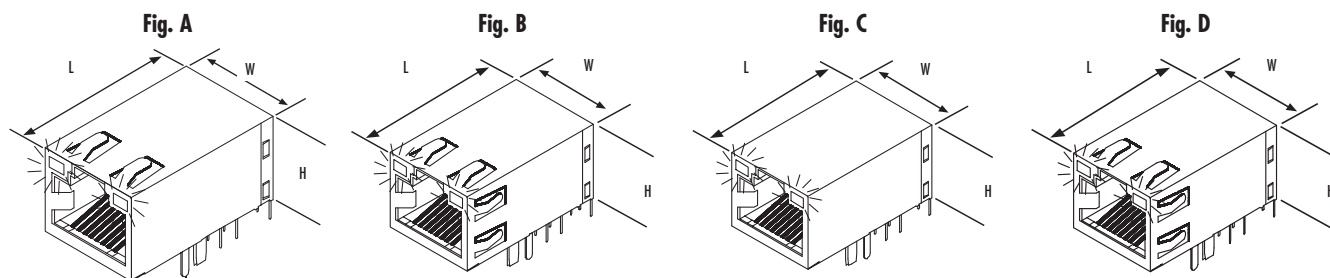
² Packaging Differences: see package and weight information

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
50	1000	7.2
100 ²	1000 ²	6.3 ²

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



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Fig. E

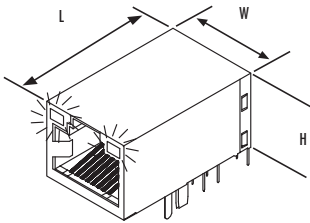


Fig. F

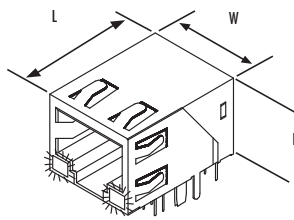
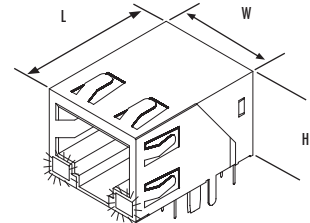
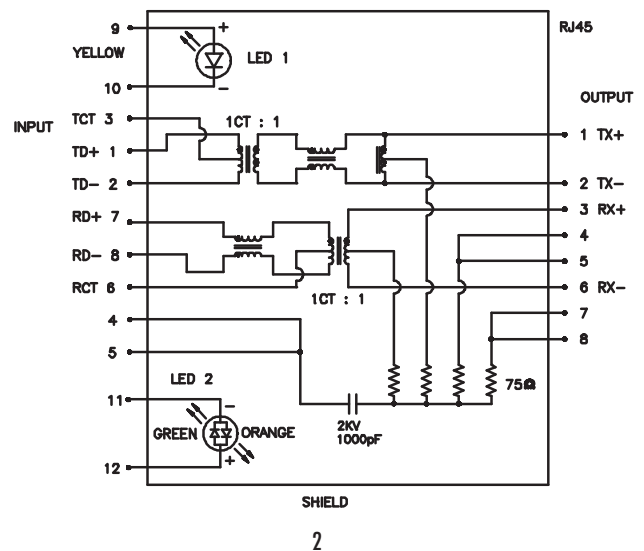
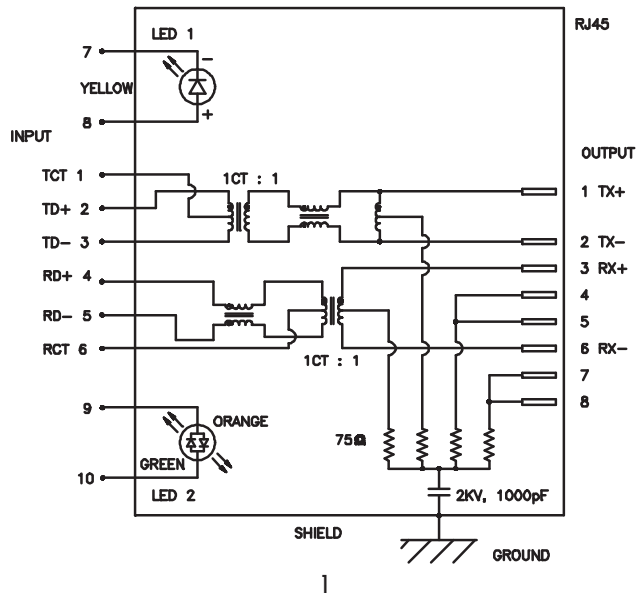


Fig. G

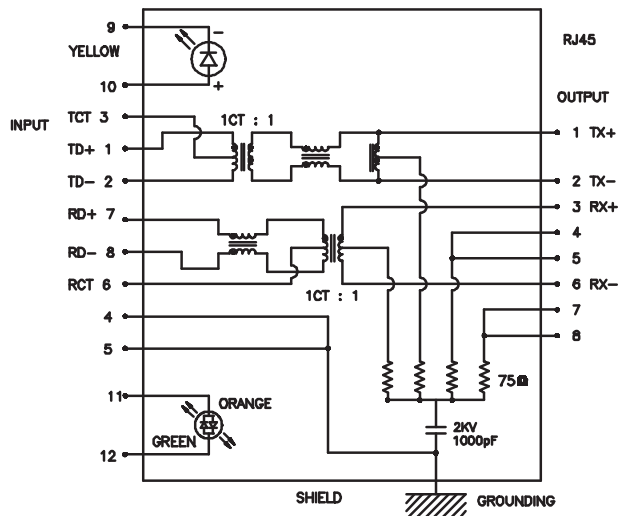


Schematics

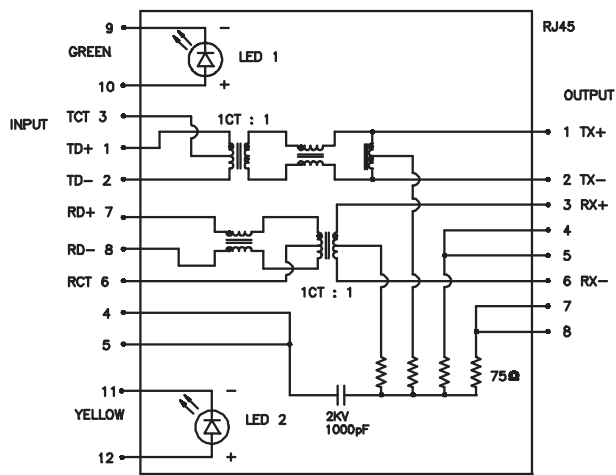


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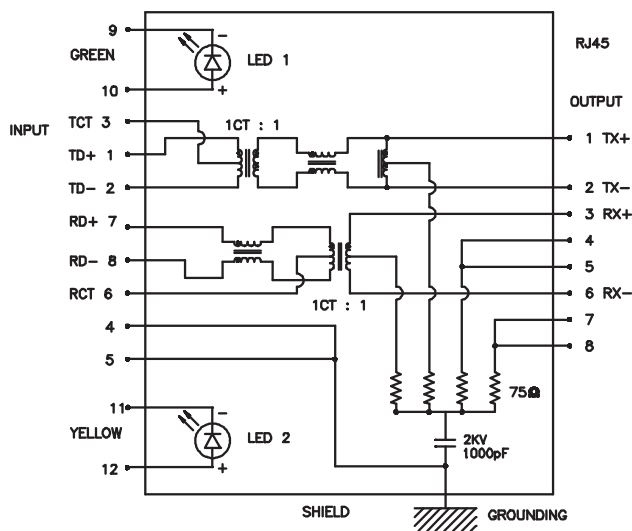
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Fax: 909-676-9482	Fax: 81 (0)3 3923-0230	Fax: 44 (0) 1380 731 702	Fax: 852-2341-9689



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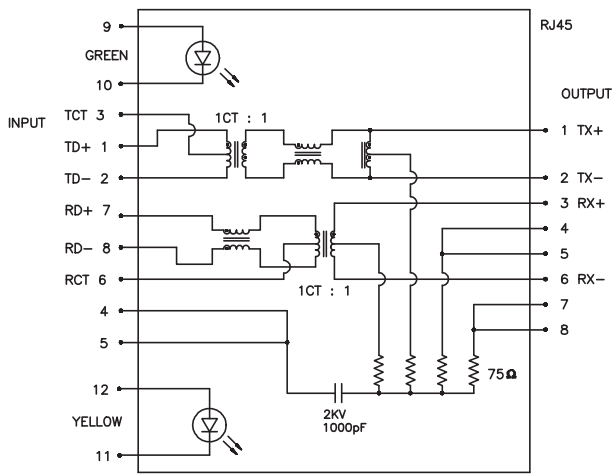
United Kingdom

Tel: 44 (0) 1380 731 700
Fax: 44 (0) 1380 731 702

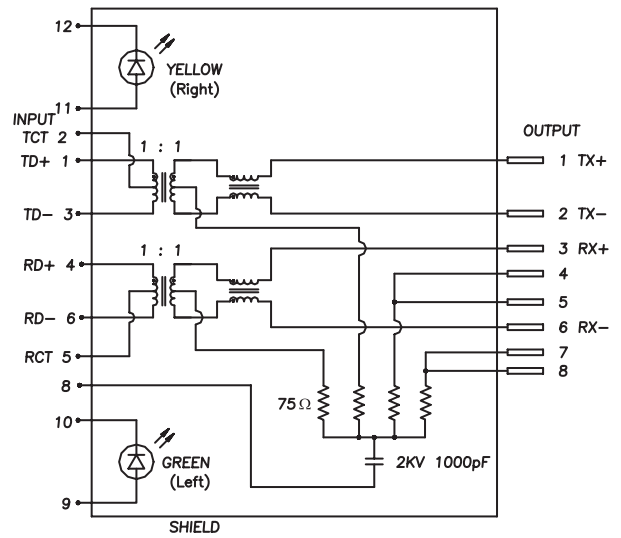
Hong Kong

Tel: 852-2389-4321
Fax: 852-2341-9689

RJ45 Integrated Connector



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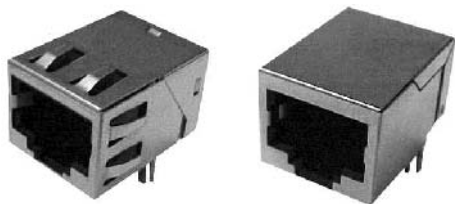
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RJ45 Integrated Connector

1X1 10/100 Base-T LAN Modules



- Enhanced Crosstalk Performance
- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350µH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (µH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-35	-35	350	1500	100

Product Selector

Part #	Turns Ratio (1C:1LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-1001-11	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	7	C	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1002-11	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	5	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1003-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	1	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1004-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	6	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1006-11	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	2	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1007-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	1	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1008-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	3	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1009-11	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	2	B	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1010-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	4	B	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1011-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	1	C	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1012-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	4	C	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1013-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	1	D	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1014-11	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	4	D	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)
TIC-1015-11	1CT:2.5CT	1CT:1CT	C,T	C,T	DOWN	NO	8	A	21.6 (0.850)	15.8 (0.625)	13.45 (0.530)

¹ C-Choke; T-Transformer; A-Auto Transformer

² Packaging Differences: see package and weight information

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
100	1000	6.3

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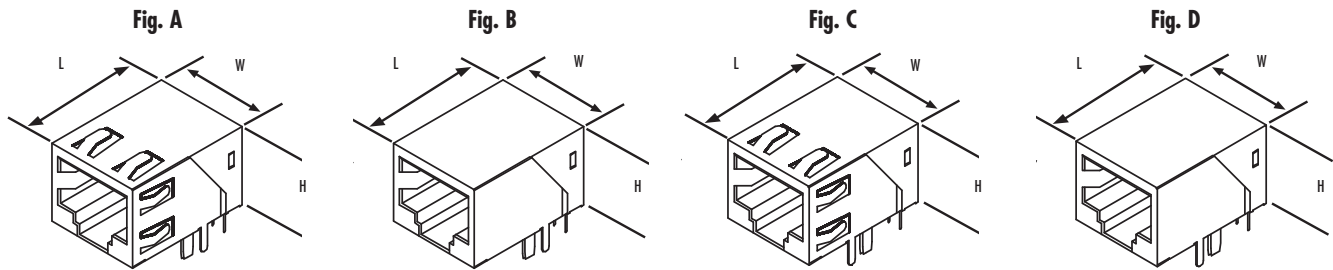
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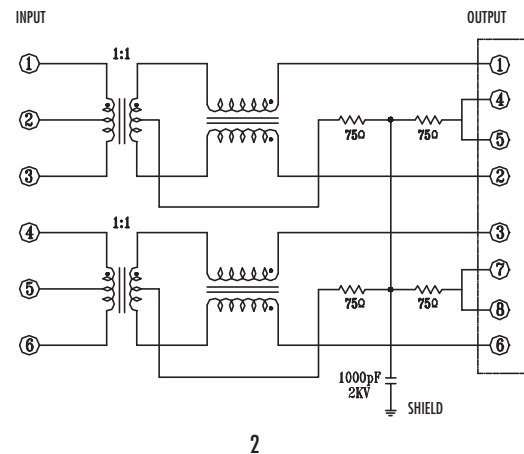
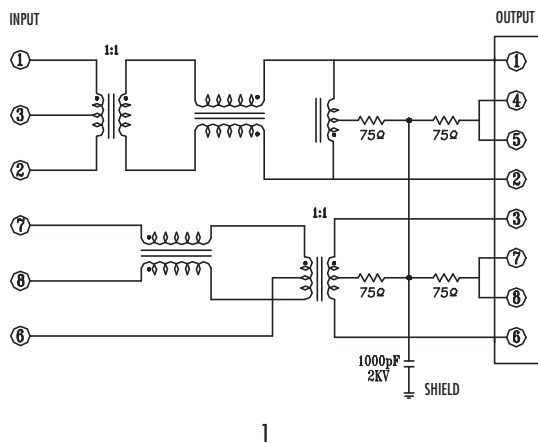
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Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.

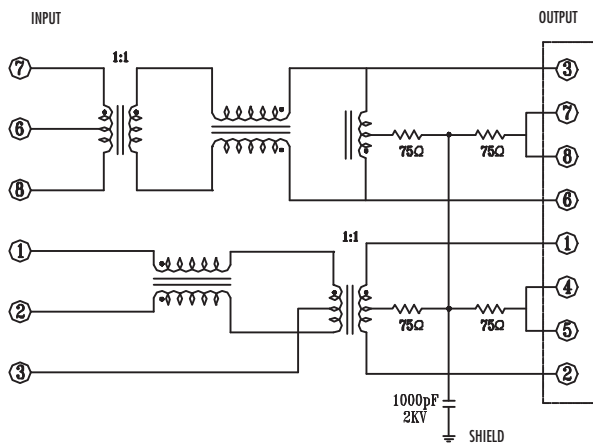


Schematics

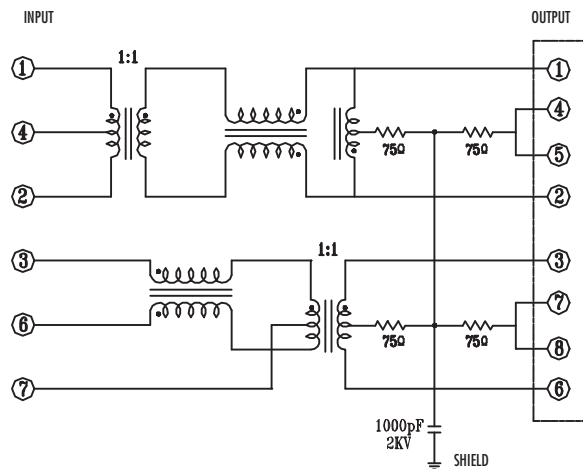


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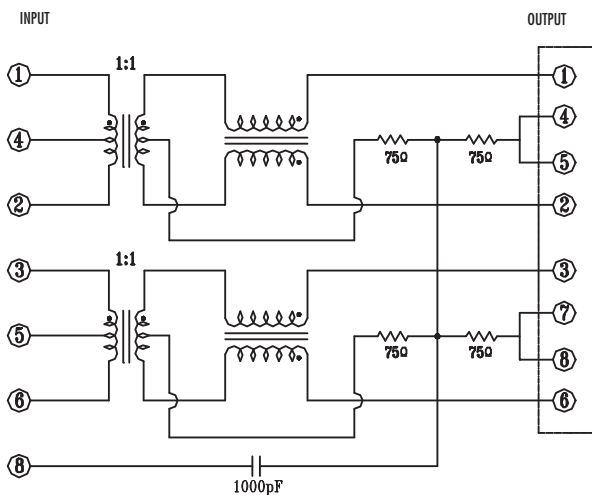
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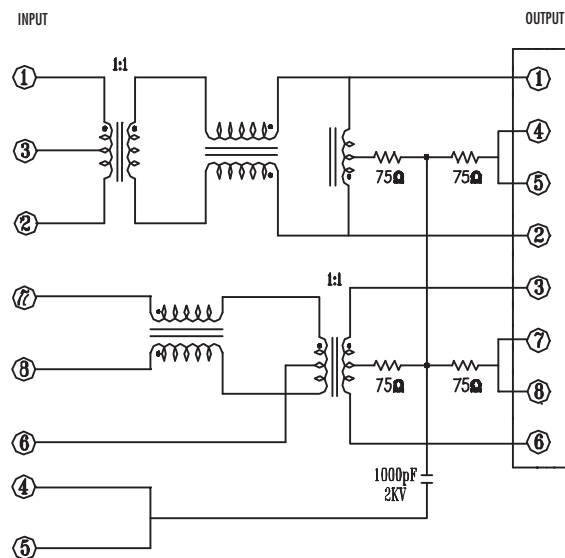
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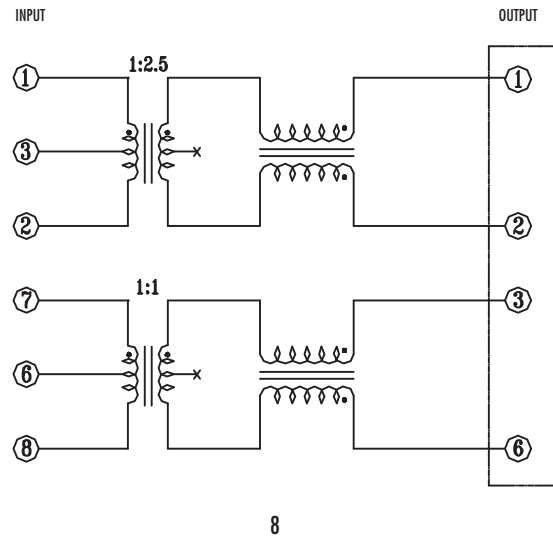
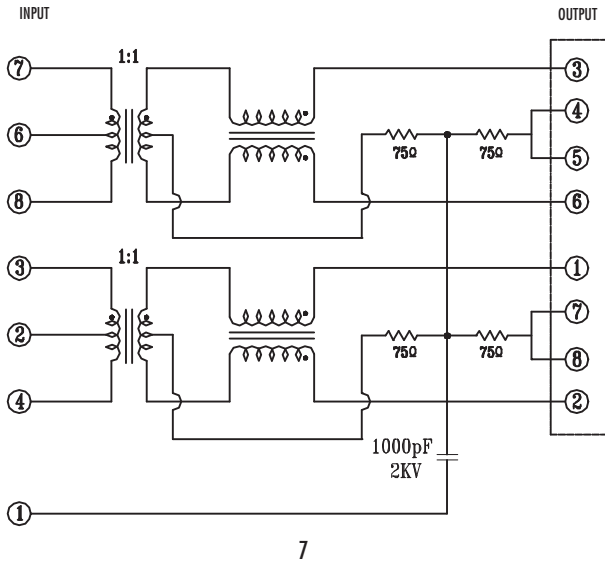
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RJ45 Integrated Connector

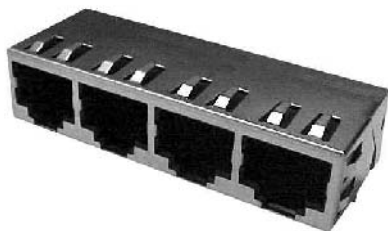


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RJ45 Integrated Connector

1X4 10/100 Base-T LAN Modules



- Enhanced Crosstalk Performance
- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350pH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (pH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-35	-35	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-L005-14	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	1	A	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)
TIC-L016-14	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	2	A	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)
TIC-L017-14	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	3	A	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)
TIC-L018-14	1:1	1CT:1CT	T,C	C,T	DOWN	NO	4	A	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)
TIC-L044-14^{2,3}	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	YES	5	B	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)
TIC-L050-14^{2,3}	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	YES	6	B	21.6 (0.850)	57.88 (2.279)	13.45 (0.530)

¹ C-Choke; T-Transformer; A-Auto Transformer

² Minimum CMRR of -30dB from 1-100MHz

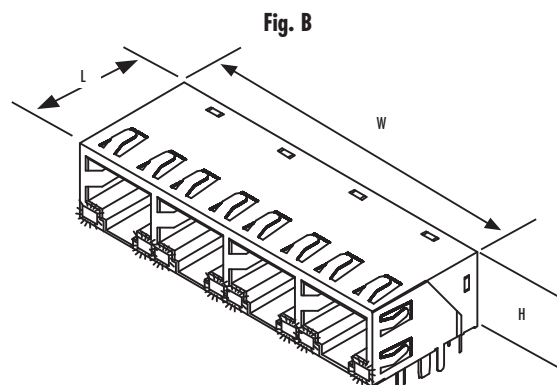
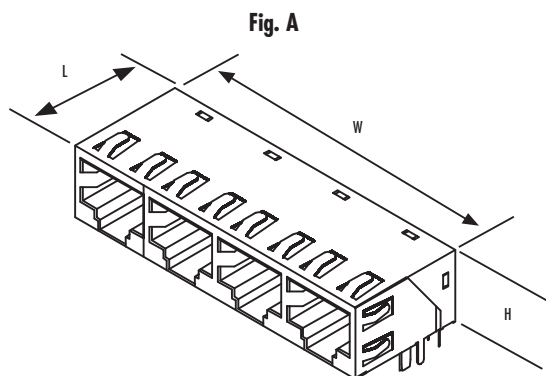
³ Weight information per below

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
25	100	18.3 (23.4)

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



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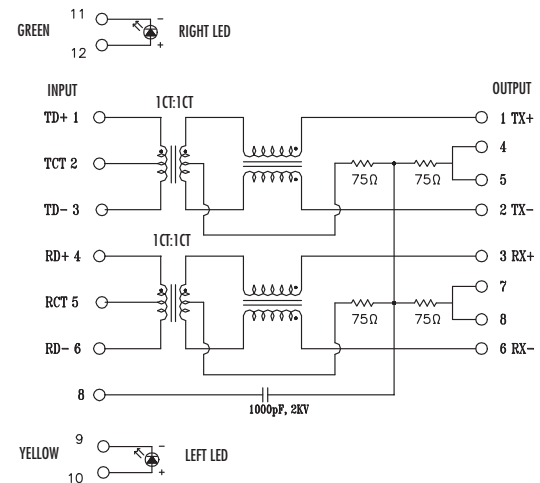
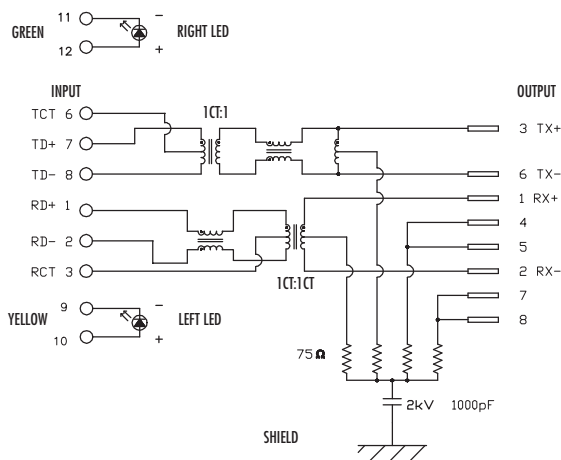
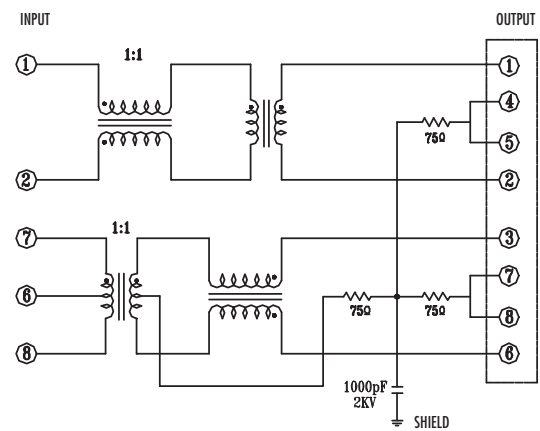
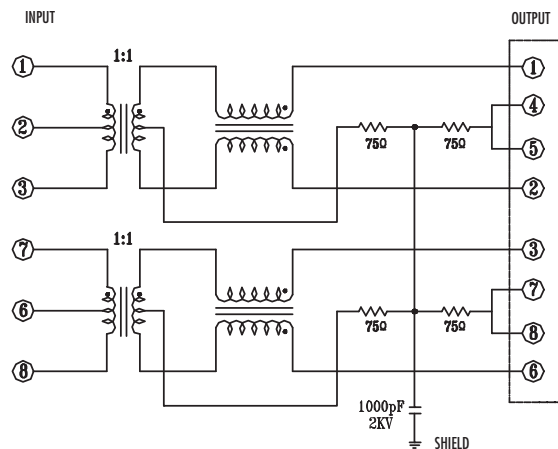
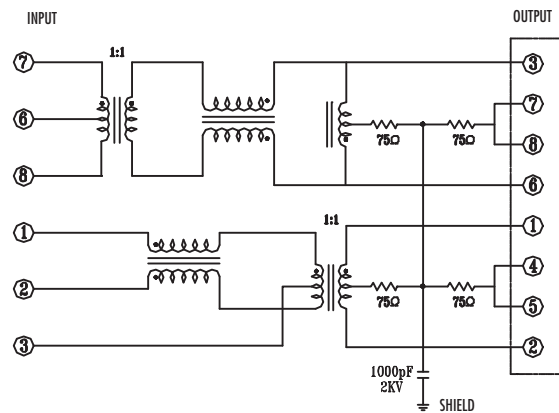
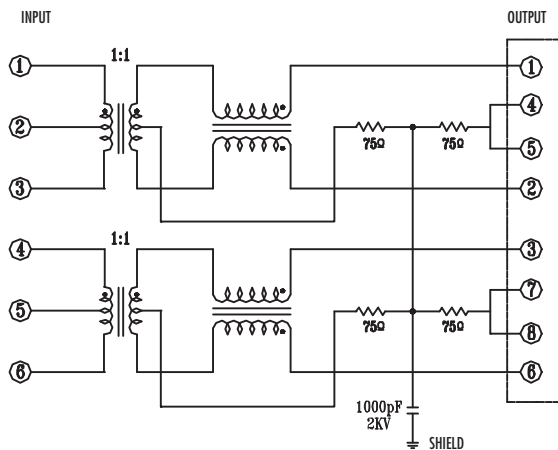
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Schematics



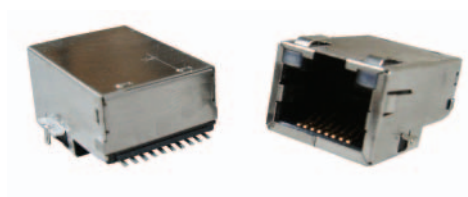
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RJ45 SMT Integrated Connector

1X1 Surface Mount 10/100 Base-T LAN Modules

- IR Reflow Capable
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350µH Min OCL with 8mA Bias Current



All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (µH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-35	-35	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H ²
TSC-L060-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	A	22.5 (0.886)	15.28 (0.612)	8.80 (0.346)
TSC-L070-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	B	22.5 (0.886)	15.28 (0.612)	8.80 (0.346)
TSC-L071-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	2	A	22.5 (0.886)	15.28 (0.612)	8.80 (0.346)
TSC-L072-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	C	22.5 (0.886)	15.28 (0.612)	8.80 (0.346)

¹ C-Choke; T-Transformer; A-Auto Transformer

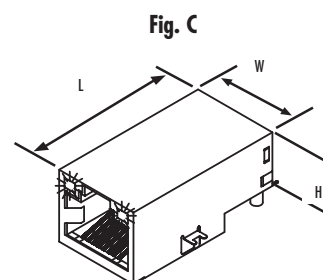
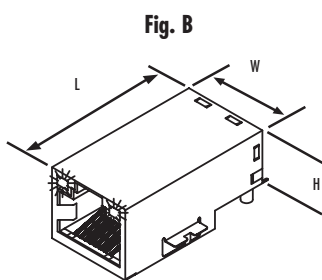
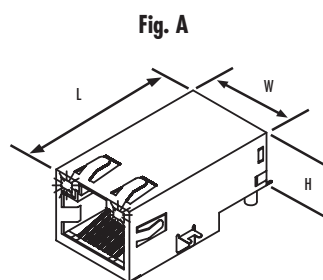
² Height measured from top of PCB - actual part height is larger see detailed spec sheet

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
50	1200	5.5

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



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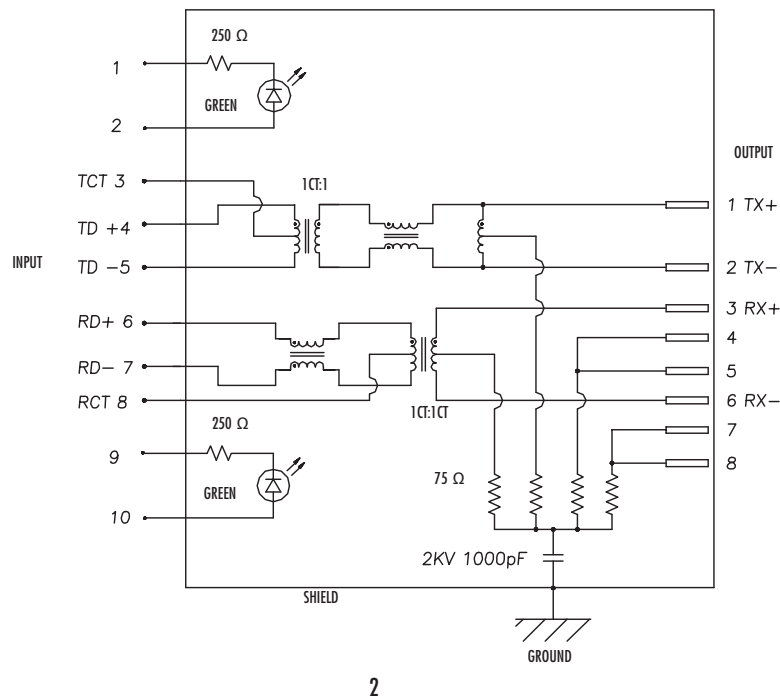
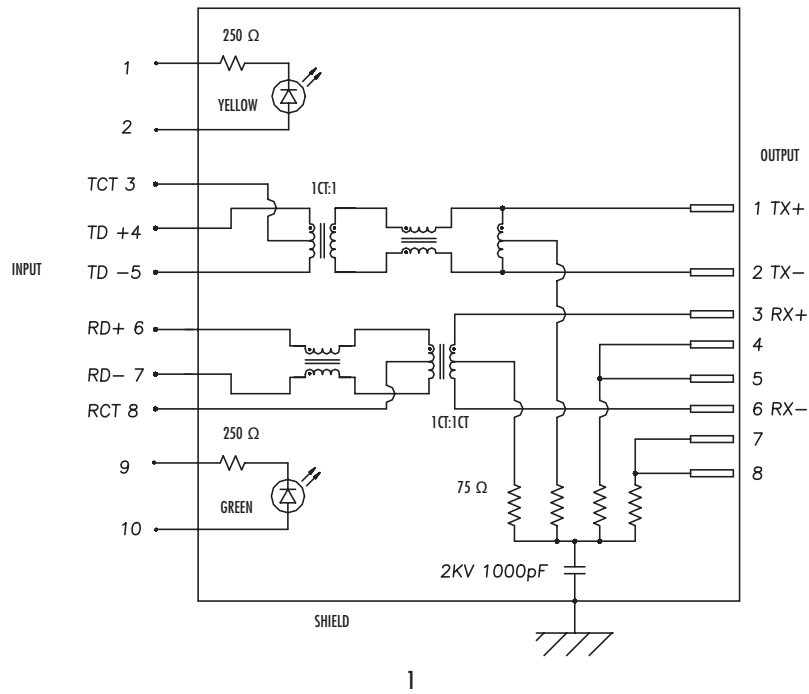
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Fax: 909-676-9482 | Fax: 81 (0)3 3923-0230 | Fax: 44 (0) 1380 731 702 | Fax: 852-2341-9689

Schematics



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RJ45-USB Integrated Connector

1X1 w/USB 10/100 Base-T LAN Modules



- Enhanced Crosstalk Performance
- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350µH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (µH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-35	-35	350	1500	100

Product Selector

Part #	Turns Ratio (1C:1LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-1025-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	D	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1026-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	D	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1027-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	2	D	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1028-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	1	E	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1029-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	2	A	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1030-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	NO	3	B	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1031-11	1CT:1	1CT:1CT	A,C,T	T,C	UP	NO	3	C	25.53 (1.005)	16.81 (0.662)	28.91 (1.138)
TIC-1032-11²	1CT:1	1CT:1CT	A,C,T	T,C	UP	YES	4	F	27.3 (1.075)	18.85 (0.742)	31.0 (1.220)

¹ C-Choke; T-Transformer; A-Auto Transformer

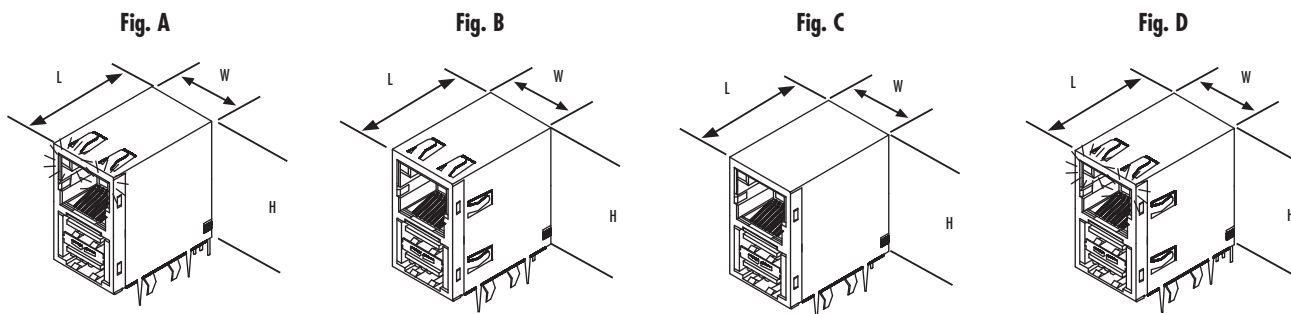
² Package and Weight information modifications below

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
50	200	17.2
40 ²	200 ²	20.8 ²

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.



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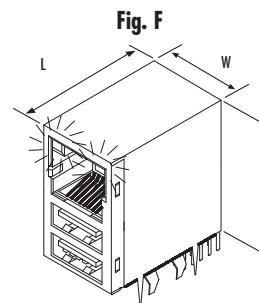
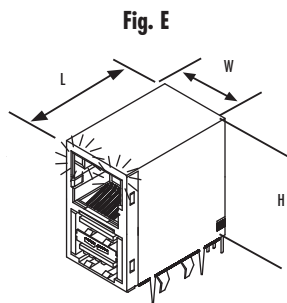
United Kingdom

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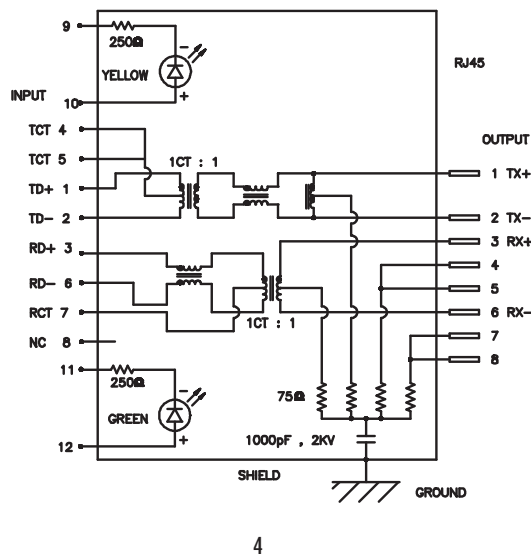
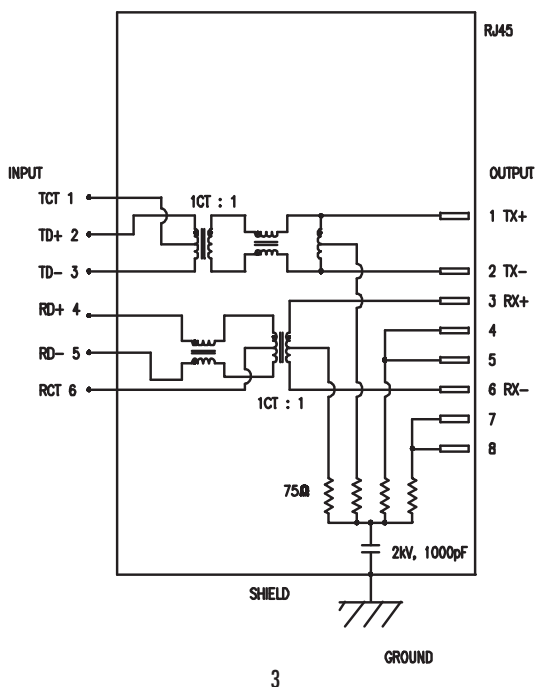
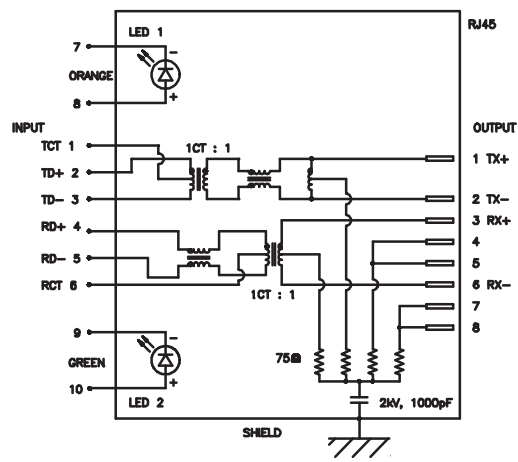
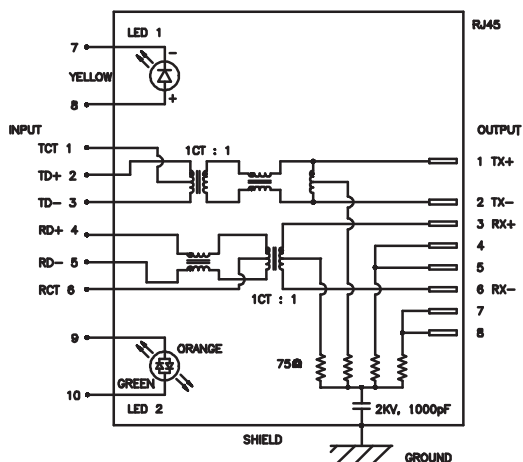
Hong Kong

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RJ45-USB Integrated Connector



Schematics

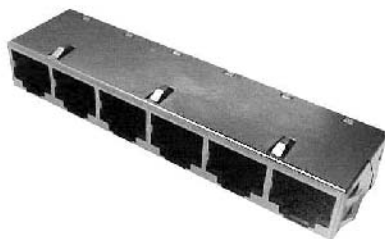


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RJ45 Integrated Connector

1X6 10/100 Base-T LAN Modules



- Enhanced Crosstalk Performance
- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350μH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25°C for all parts in this Series

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (μH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-30	-30	350	1500	100

Product Selector

Part #	Turns Ratio (1C:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx					L	W	H
TIC-1019-16	1CT:1	1CT:1CT	A,C,T	T,C	DOWN	NO	1	A	21.6 (0.850)	85.88 (3.38)	13.45 (0.530)
TIC-1065-16	1CT:1CT	1CT:1CT	C,T	C,T	DOWN	NO	2	A	21.6 (0.850)	85.88 (3.38)	13.45 (0.530)

¹ C-Choke; T-Transformer; A-Auto Transformer

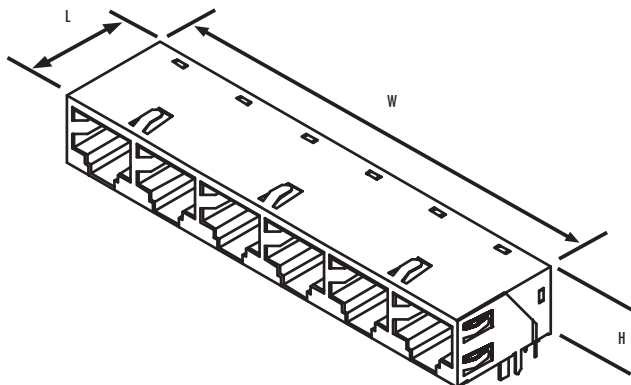
Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
21	315	28.15

Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.

Fig. A



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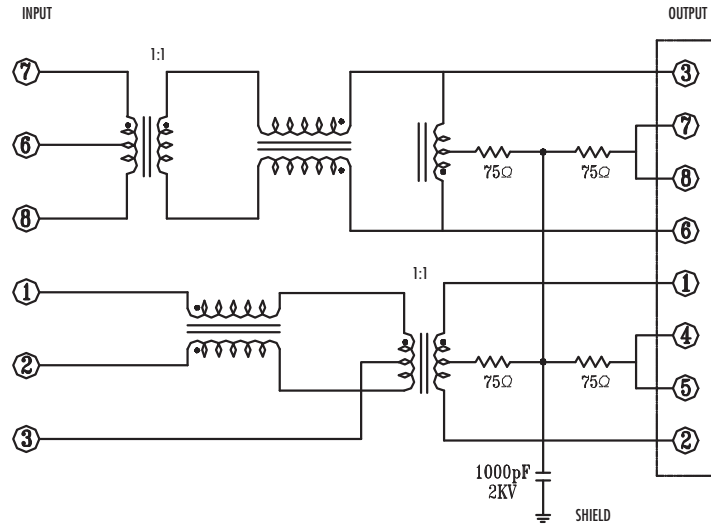
United Kingdom

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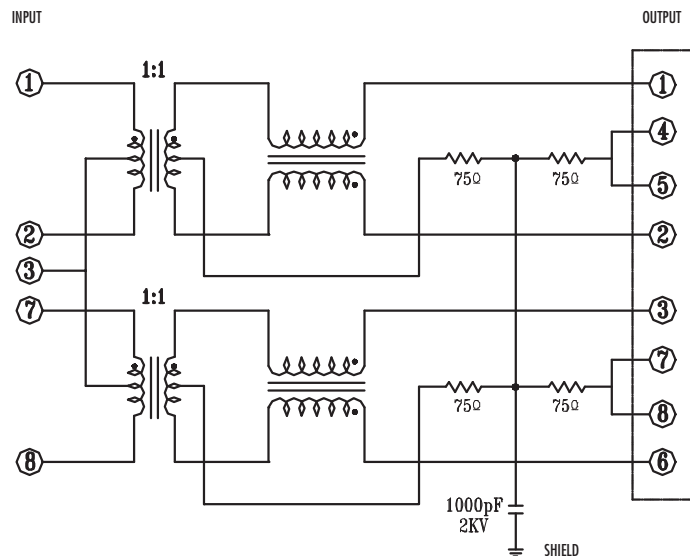
Hong Kong

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Schematics



1



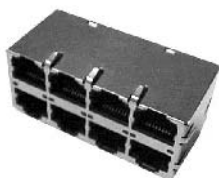
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RJ45 Integrated Connector

2X4 10/100 Base-T LAN Modules



- Enhanced Crosstalk Performance
- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350μH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)			CMRR (dB Min)	Crosstalk (dB Min)	OCL (μH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-35	-35	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab		LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx	Top	Bottom				L	W	H
TIC-L020-24	1CT:1	1CT:1CT	A,C,T	T,C	UP	DOWN	YES	1	B	28.4 (1.118)	59.18 (2.33)	24.93 (0.981)
TIC-L021-24	1CT:1	1CT:1CT	A,C,T	T,C	UP	DOWN	NO	2	A	28.4 (1.118)	59.18 (2.33)	24.93 (0.981)
TIC-L022-24	1CT:1	1CT:1CT	A,C,T	T,C	UP	DOWN	NO	3	A	28.4 (1.118)	59.18 (2.33)	24.93 (0.981)
TIC-L023-24	1CT:1CT	1CT:1CT	C,T	C,T	UP	DOWN	NO	4	A	28.4 (1.118)	59.18 (2.33)	24.93 (0.981)
TIC-L024-24	1.25CT:1CT	1CT:1CT	C,T	C,T	UP	DOWN	NO	5	A	28.4 (1.118)	59.18 (2.33)	24.93 (0.981)

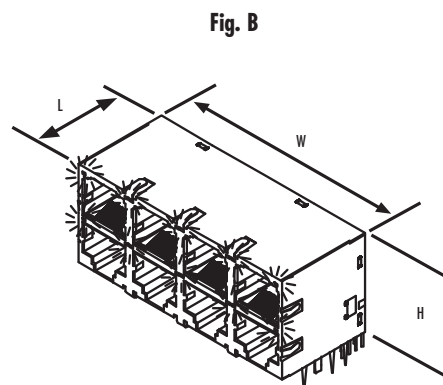
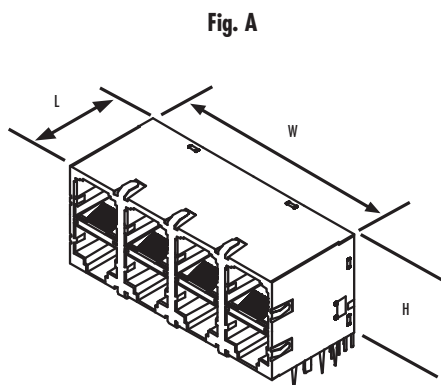
¹ C-Choke; T-Transformer; A-Auto Transformer

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
20	80	46.8

Mechanical Dimensions

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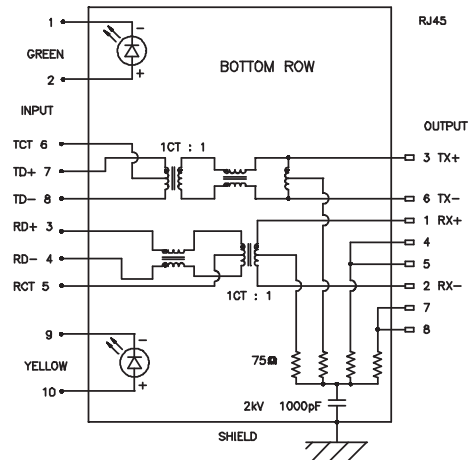
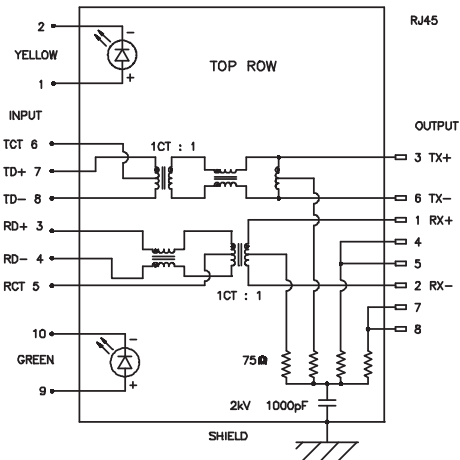
United Kingdom

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Fax: 44 (0) 1380 731 702

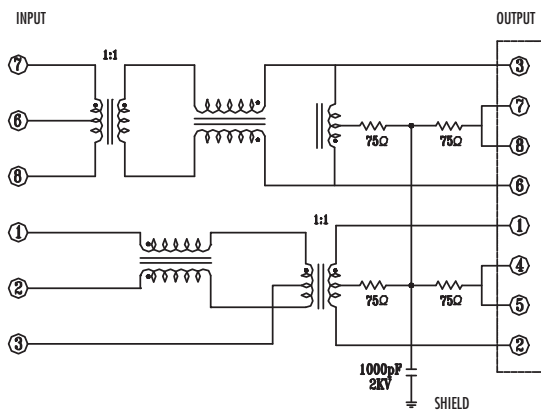
Hong Kong

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Fax: 852-2341-9689

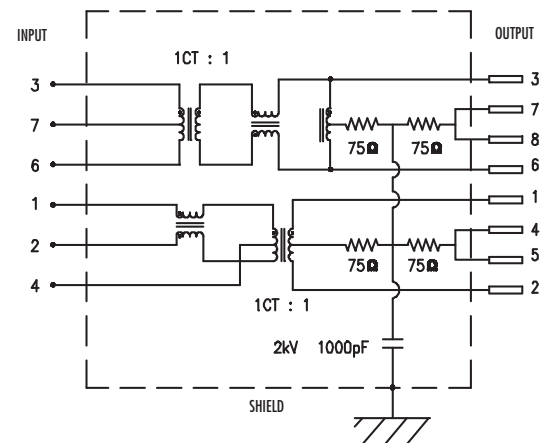
Schematics



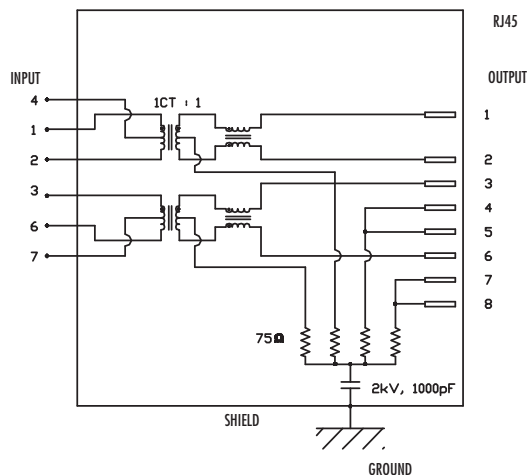
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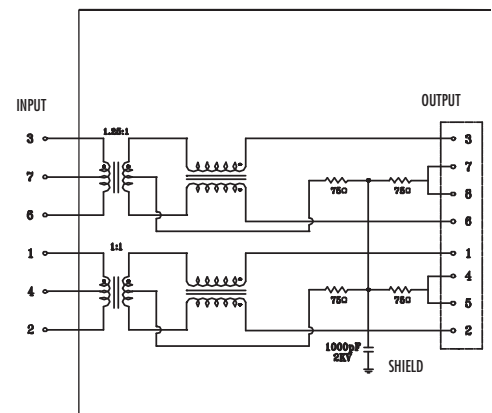
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3



4



5

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RJ45 Integrated Connector

1X1 Gigabit LAN Modules



- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp -0°C to +70°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350μH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)				CMRR (dB Min)	Crosstalk (dB Min)	OCL (μH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-10	-30	-30	350	1500	100

Product Selector

Part #	Turns Ratio (IC:LINE)		Configuration ¹		Latch/Tab	LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx	Top				L	W	H
TIC-L041-11	1CT:1CT	1CT:1CT	C,T	T,C	UP	NO	1	A	25.53 (1.005)	16.8 (0.661)	13.5 (0.531)
TIC-L047-11³	1CT:1	1CT:1	A,C,T	A,C,T	UP	YES	2	B	32.9 (1.295)	16.69 (0.657)	13.73 (0.541)
TIC-L048-11	1CT:1	1CT:1	A,C,T	A,C,T	DOWN	YES	3	C	21.6 (1.295)	15.88 (0.625)	13.45 (0.530)

¹ C-Choke; T-Transformer; A-Auto Transformer

² Package and Weight information modifications below

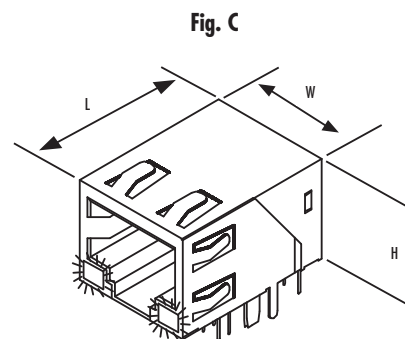
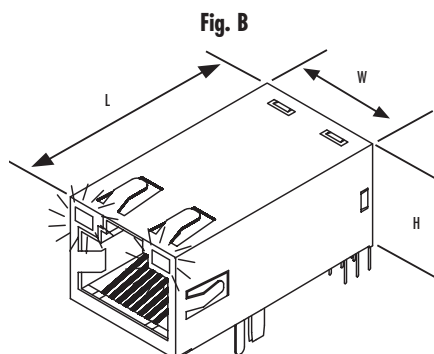
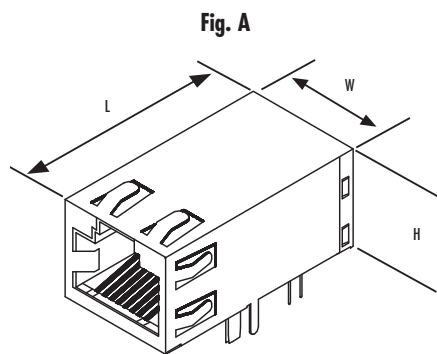
³ Minimum Crosstalk of -25dB from 1-100MHz

Package & Weight Information

Part #	QTY/Tray	QTY/Carlot	Weight/each(g)
TIC-L041-11	50	250	7.2
TIC-L047-11 ³	40	240	10.6
TIC-L048-11	100	1000	6.3

Mechanical Dimensions

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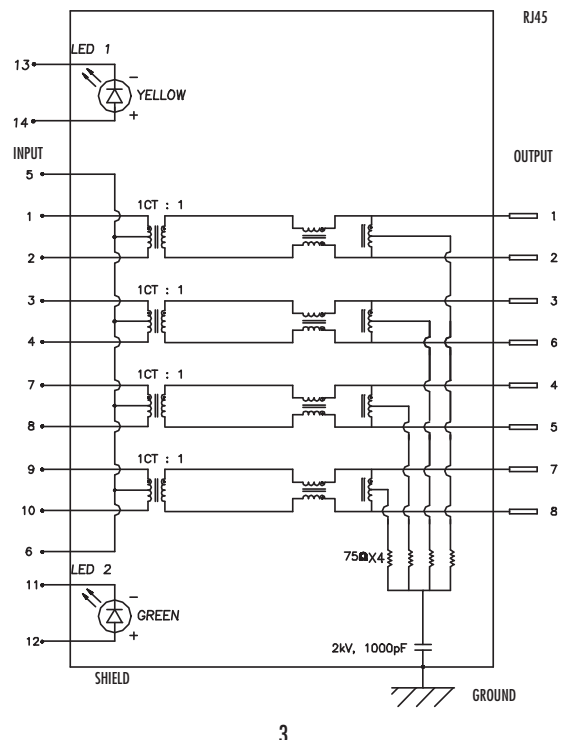
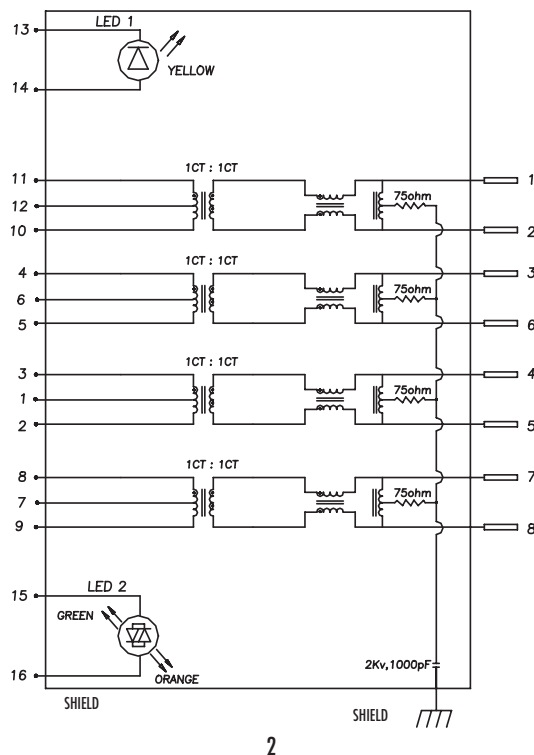
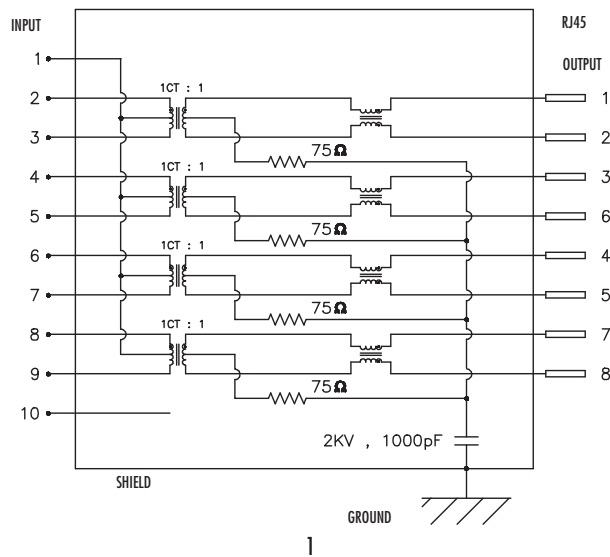
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Schematics



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RJ45 Integrated Connector

2X1 Gigabit LAN Modules



- Enhanced Common Mode Rejection Performance
- Complies with IEEE 802.3 Standards and ANSI X3.263
- Operating Temp 0°C to +85°C
- HiPot 1500Vrms (pri:sec)
- Designed for 350μH Min OCL with 8mA Bias Current

All Electrical Data Specified at Ta=-25° for all parts in this Series

Insertion Loss (dB Max)	Return Loss (dB Min)				CMRR (dB Min)	Crosstalk (dB Min)	OCL (μH Min)	HiPot (Vrms)	Impedance (Ω)
1-100MHz	1-30MHz	60MHz	80MHz	80MHz	1-100MHz	1-100MHz	8mA DC Bias	1 Minute	
-1	-18	-16	-12	-10	-30	-25	350	1500	100

Product Selector

Part #	Turns Ratio (1C:1LINE)		Configuration ¹		Latch/Tab		LED Options	Schematic Diagram	Package Style	Package Dimensions mm(inches) Typ		
	Tx	Rx	Tx	Rx	Top	Bottom				L	W	H
TIC-G001-21	1CT:1CT	1CT:1CT	C,T	C,T	UP	DOWN	YES	2	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G002-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G003-21	1CT:1CT	1CT:1CT	C,T	C,T	UP	DOWN	YES	3	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G004-21³	1CT:1	1CT:1CT	A,C,T	A,C,T	UP	DOWN	YES	1,5	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G005-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G006-21	1CT:1CT	1CT:1CT	C,T,C	C,T,C	UP	DOWN	YES	6	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G007-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	B	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G008-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G009-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G010-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G011-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G012-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	B	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G013-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G014-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	B	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G015-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	NO	7	C	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G016-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	A	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G017-21	1CT:1	1CT:1	A,C,T	A,C,T	UP	DOWN	YES	1	B	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)
TIC-G018-21	1CT:1CT	1CT:1CT	C,T	C,T	UP	DOWN	NO	4	C	28.8 (1.118)	17.27 (0.680)	25.78 (1.015)

¹ C-Choke; T-Transformer; A-Auto Transformer

² Package and Weight information modifications below

³ Contains one port of 10/100 Base-T and one port Gigabit

Package & Weight Information

QTY/Tray	QTY/Box	Weight/each(g)
TBD	TBD	TBD

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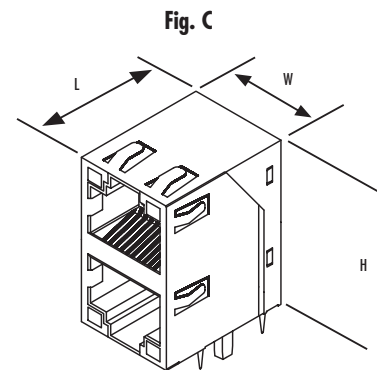
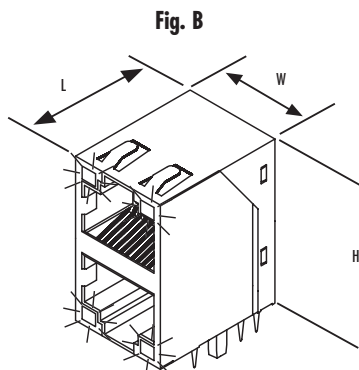
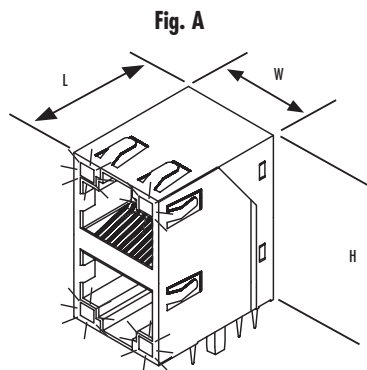
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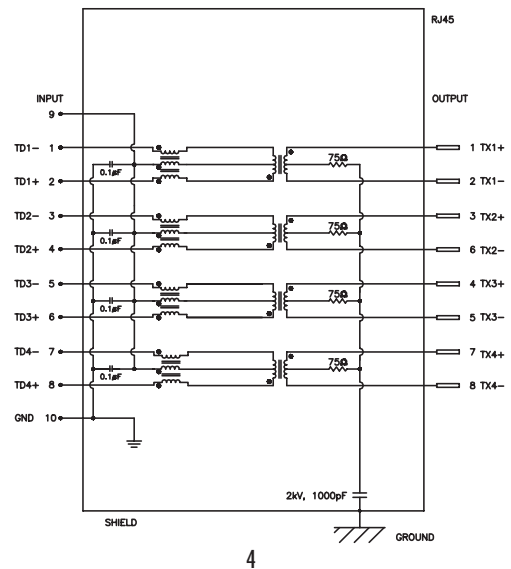
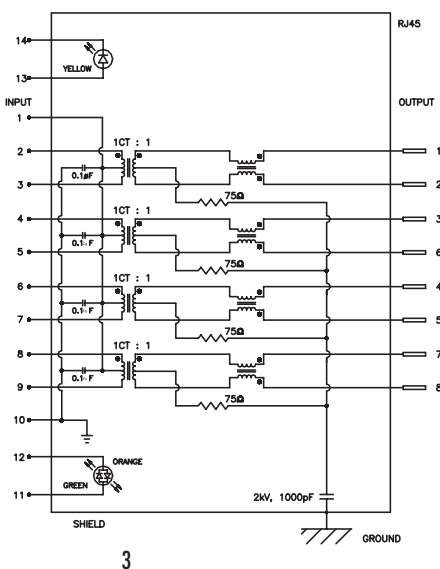
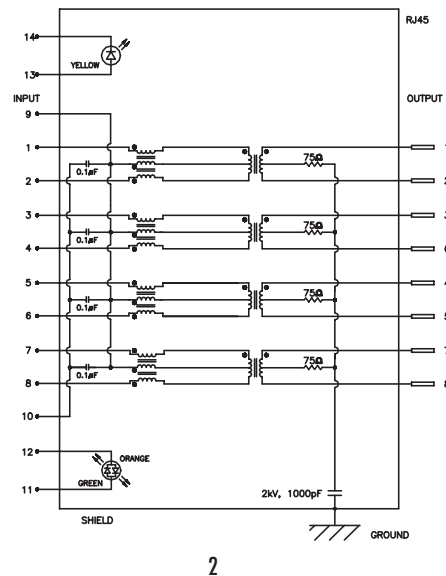
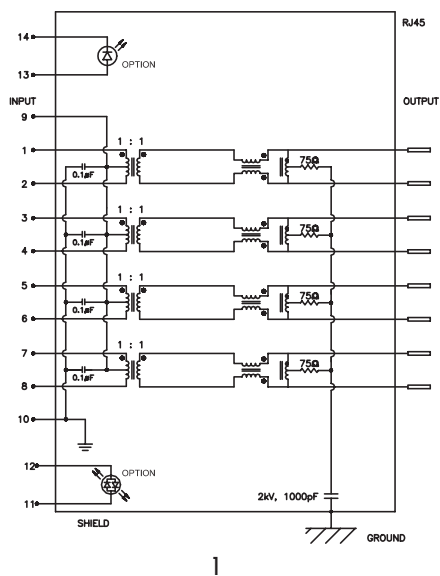
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Mechanical Dimensions

Please contact Tamura for tolerances and suggested layout information.

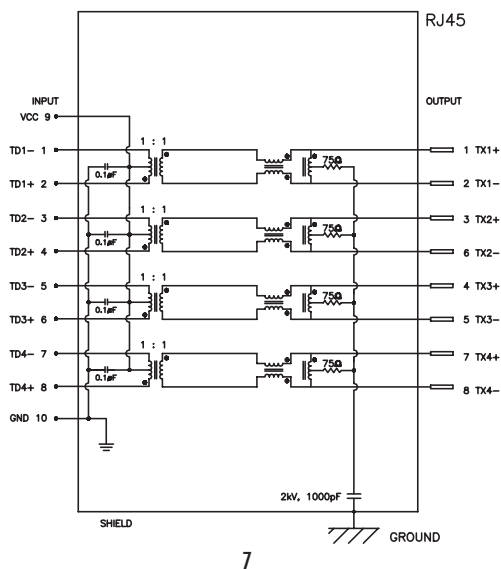
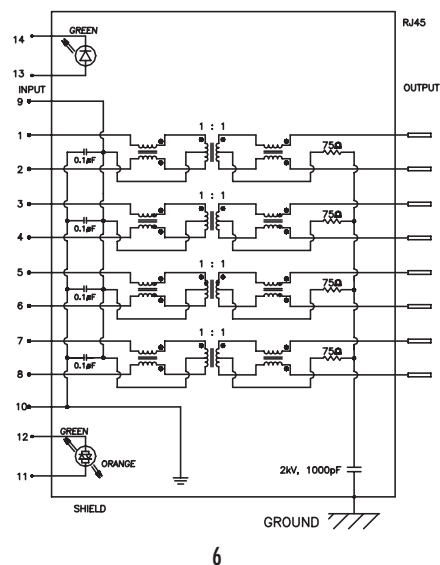
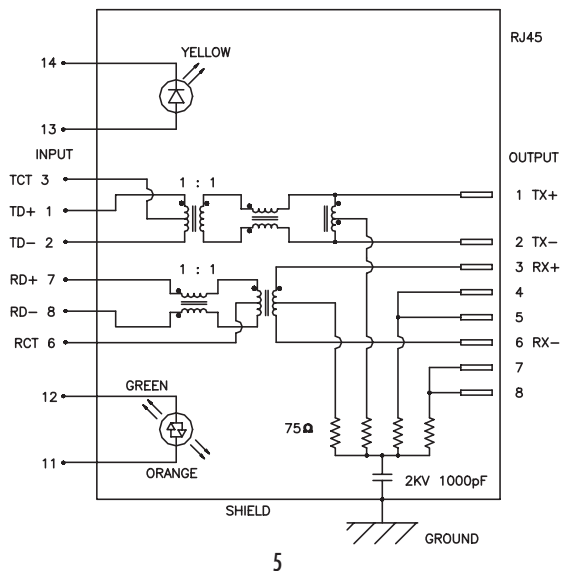


Schematics



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Fax: 909-676-9482	Fax: 81 (0)3 3923-0230	Fax: 44 (0) 1380 731 702	Fax: 852-2341-9689



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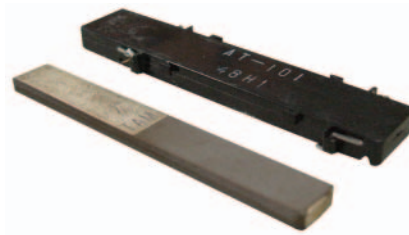
Tel: 852-2389-4321
Fax: 852-2341-9689

Piezo Applications & Features:

- LCD Backlighting
- Dust Collectors
- Copy Machines
- Ionizers
- High efficiency
- High reliability
- Low Profile

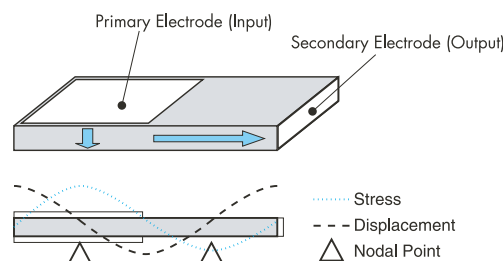
Transducer Applications & Features:

- Medical Probes
- Sonar Equipment
- Fish Finders
- Ultrasonic Cleaners
- Very high quality Piezo Ceramic material
- Stable over high range of temperatures



The basics of Piezoelectric Transformers

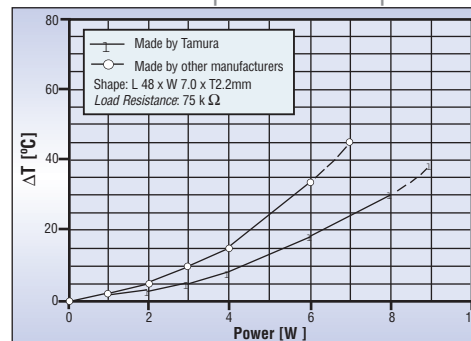
Piezoelectric ceramics are used to convert electric energy to mechanical energy and vice versa and have wide applications in various industries. Piezoelectric transformer (SOLIDFORMER®) can generate a high voltage by a low voltage input through the utilization of a resonance phenomenon of the piezoelectric transducer. The piezoelectric transformer has primary and secondary electrodes on the piezoelectric ceramic. The primary side is polarized in the thickness direction and the secondary side in the length direction. (Arrow mark shows polarization direction). When a voltage having a resonance frequency (F_r), determined by the length dimension, is input on the primary side, a strong mechanical oscillation is generated by inverse piezoelectric effect, and a high voltage (V_o) is output from the secondary side, matching its oscillation by direct piezoelectric effect. TAMURA is engaged in extensive development and manufacturing, from composition to processing of piezoelectric ceramics materials, which are used mainly for high power application products. TAMURA's ceramics possess various features such as high strength, wide amplitude characteristic, fit for fine processing, and a low aging rate. Applications include piezoelectric transformers, ultrasonic transducers, fish finder equipment, ultrasonic probes, and various types of sensors.



The Piezo and Transducer Ceramic Material

Tamura's goal is to build piezoelectric transformers that are failure free. By doing detailed studies on composition development and the grinding and firing processes, Tamura has been able to develop a unique ceramic (SS material) that can withstand heavy pressure, has low power loss and has high efficiency. Tamura has the technology to produce all the wiring and bonding elements necessary for the transformers. With all these materials readily available, Tamura can produce and ensure top quality products. The chart to the right compares performance between Tamura's piezoelectric transformers and other manufacturer's transformers of the same shape and size.

Transformer Temperature Comparisons

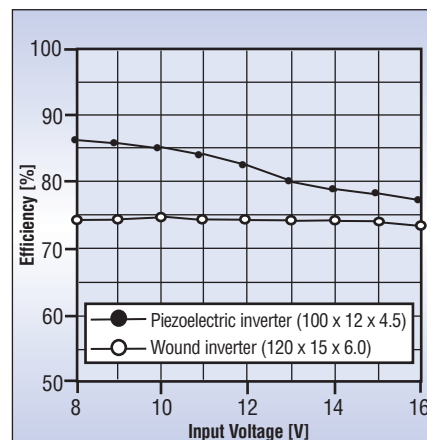


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The Piezoelectric Transformer Advantage

Piezoelectric inverters have a higher conversion efficiency (they are over 85% efficient) while the wire-wound is approximately 74% efficient. Piezoelectric inverters are thinner, more reliable, and they have less chance of burning out. Wire-wound inverters have a constant output of 1200 Vrms which means the cold-cathode tube's voltage is controlled by a ballast condenser. Whereas the piezoelectric inverter's output is controlled by its load impedance which means adjustments are not necessary. Cold-cathode tubes last longer and are quieter when they use piezoelectric inverters because of their sine wave output. Piezoelectric inverters have a wider input range without using DC-DC converters.



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-

Part #	Input Voltage (V)	Output Current (mArms)	Output Power (w)	Driver Frequency (kHz)	Open-end Voltage (Vrms)	Light Regulation Method	Operating Temp Range (°C)	Preserving Temp Range (°C)
HBL-0268	3.0~5.5	1.4	0.5	160	900 Min.	PWM Dimming	0~+50	-20~+70
HBL-0269	3.0~5.5	1.4	0.5	100	1100 Min.	PWM Dimming	0~+50	-20~+70
HBL-0270	3.0~5.5	2.0	0.65	160	900 Min.	PWM Dimming	0~+50	-20~+70
HBL-0244	4.5~5.5	6.0	2.2	100	1000 Min.	Current Dimming	0~+50	-20~+70
HBL-0293	4.5~5.5	5.0	2.9	57	1300 Min.	Burst Dimming	0~+50	-20~+70

High Voltage Power Supply



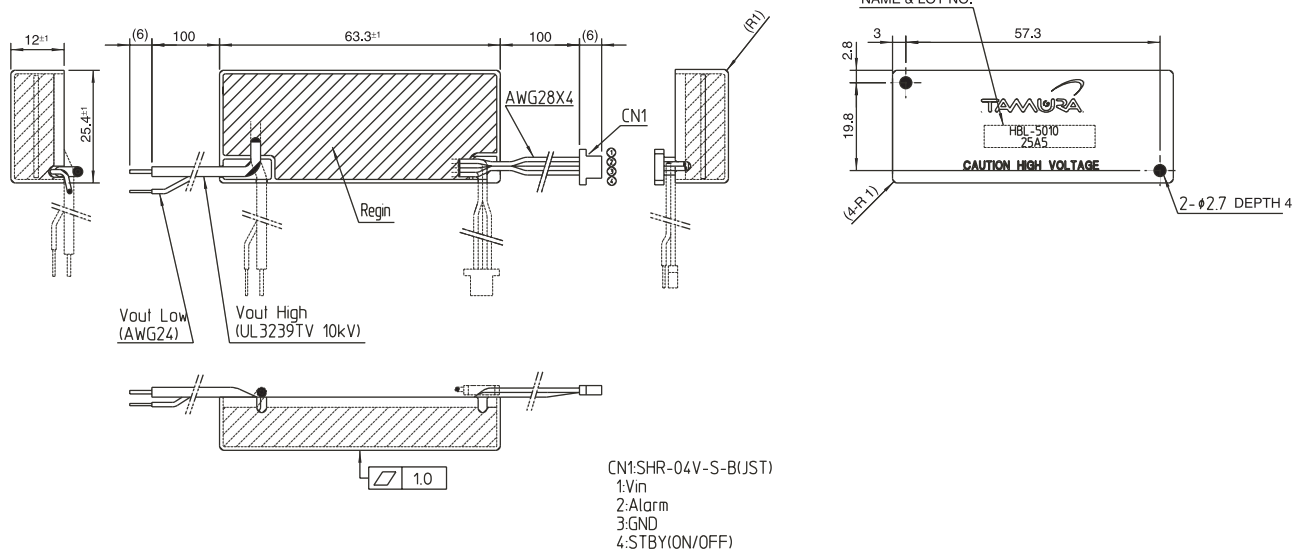
- High Reliability through use of Piezoelectric Transformer
- Thin Design
- Low Output Voltage warning terminal
- ON/OFF Terminal

Contact Tamura for Custom Designs

Part #	Shape	Input Voltage	Output Voltage	Abnormal Output Monitor	ON/OFF Voltage	Operating Temperature Range	Preserving Temperature Range
HBL-5010	Horizontal type	DC12V±10% (Full mold type)	Output Voltage: DC -5.5kV± (lin=100mA) The fuse for protection is not built into.	Signals will be put out if 15%(10GΩ=no load) Drooping Characteristic: -5.5kV (no load) > 2.75kV (about 5.5μA, load)	ON:ON/OFF terminal output voltage becomes lower than about -2kV. > Low output with open drain (sink current 20mA MAX) *Connector 1 pin #2 (Open drain): accept over 4.5V	0~50°C HIGH (2.0V~Vin) OFF : ON/OFF terminal signal LOW (0~0.8V) Until Vin voltage reaches the spec voltage, it does not change ON/OFF function from LOW to HIGH	-10~60°C

Mechanical Dimensions

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



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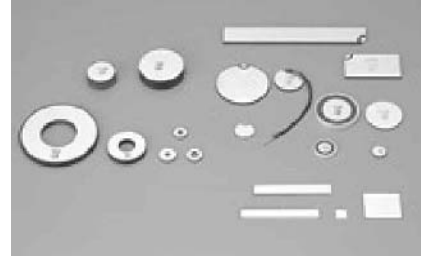
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For High Power Applications

- High Reliability through use of Tamura's Piezo Material Technology
- Thin Design
- Low Output Voltage warning terminal
- ON/OFF Terminal

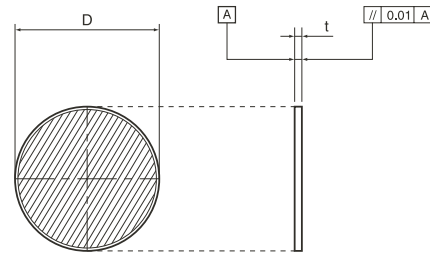
Contact Tamura for Custom Designs



Electrical Data

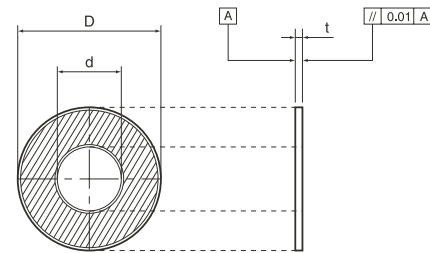
Part #	Diameter (mm)	Thickness (mm)	Frequency1 (kHz)	kp(%)	Frequency2 (kHz)	kt(%)	Capacitance (pF)
TDSE20	20.0	2.05	111.0	49	1010	45	1800
TDSE25	25.0	2.05	87.5	49	1010	45	2800
TDSE28	28.0	2.05	79.0	49	1010	45	3400
TDSE40	40.7	2.05	54.0	60	1010	45	7100
	40.7	2.55	54.0	60	800	40	5600
TDSE43	42.7	2.05	50.5	62	1010	45	7800
	42.7	11.2	50.5	68	200	31	1500
TDSE70	71.5	20.5	31.0	62	1010	45	22000

Mechanical Dimensions



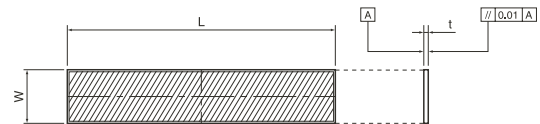
※ "t" means the thickness and "A" means the parallel tolerance of ceramic before silver electrode is printed.

Part #	Outside Diameter (mm)	Inside Diameter (mm)	Thickness (mm)	Frequency (kHz)	Coupling Coefficient	Capacitance (pF)
TBLE1507	15.2	6.6	2.00	100	42	840
TBLE3015	30.0	14.7	5.00	48	42	1300
TBLE3515	35.0	14.7	5.30	44	42	1850
TBLE5023	50.0	23.0	6.00	30	41	3000
TBLE6030	60.0	30.0	6.30	25	42	3900
TBLE7032	70.0	32.0	6.50	21.5	44	5400



※ "t" means the thickness and "A" means the parallel tolerance of ceramic before silver electrode is printed.

Part #	Length (mm)	Width (mm)	Thickness (mm)	Coupling	Frequency (kHz)	Capacitance (pF)
TPE17535	175.0	35.0	2.55	40	800	27.5
TPE20025	200.0	25.0	2.55	40	800	22.5
TPE8080	80.0	80.0	2.55	40	800	29.0



※ "t" means the thickness and "A" means the parallel tolerance of ceramic before silver electrode is printed.

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Bolt-Clamped Langevin Transducers

For Pressure Sensor type applications

TAMURA's bolt-clamped langevin type (BLT) transducers are capable of generating stabilized ultrasonic waves against the fluctuations of temperature, input power and load fluctuation, using high strength and large amplitude piezoelectric ceramic material.



Items	TBL4535D-28HB ☐ TBL4535D-28HN ☐	TBL6035D-28HN ☐	TBL4535D-40HB ☐ TBL4535D-40HN ☐
Dimensions(mm) Specifications			
Resonance frequency (kHz)	28		40
Resonance impedance (Ω)	below 30		below 40
Static capacitance (pF)	3500 or 3800		
Allowable input power (W)	70(Using one BLT only) / 50(Using two BLT's and more)		
Allowable operating temperature ($^{\circ}\text{C}$)	below 120		

※ In case with the bolts, groove processing is not provided.

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Hall-Effect Current Sensor Features:

- Measure: DC, AC, and Pulsed waveforms
- Galvanic Isolation
- Zero Insertion Loss
- Fast Response
- Cost Effective

Current Transformer Features:

- Measures AC only
- No Power Supply
- Electrical Isolation
- Lower Cost

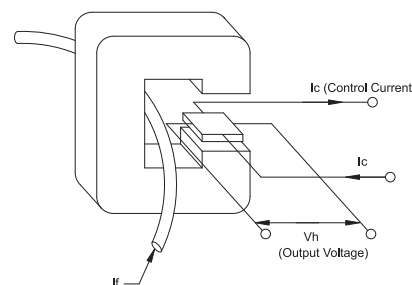
The Basic Principle

Open Loop Operating Principle

In a hall effect-based current sensor, the magnetic flux, proportional to the primary current, is concentrated in gapped magnetic core containing the hall effect device (Fig. 1). The primary current is measured without electrical contact with the primary circuit providing galvanic isolation.

From Figure 1, the magnetic flux, concentrated in the gap of the magnetic core, induces a potential difference, V_h , the Hall voltage, given by the $V_h = k \cdot I_c \cdot B$. The output signal of the Hall device, V_h , is then further amplified by additional internal signal conditioning circuitry to provide an output voltage proportional to the primary current.

Figure 1

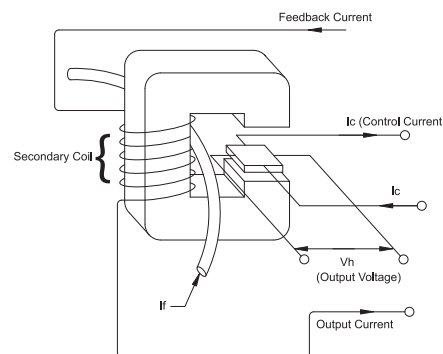


Closed Loop Operating Principle

In a closed loop current sensor the same principles apply with the addition of a secondary coil and feedback circuitry. The closed loop or 'zero-flux' hall effect sensor feeds back an opposing current into a secondary coil wound on the magnetic core to zero the flux produced in the magnetic core by the primary current. The output current of a closed loop current sensor is an exact representation of the primary current scaled by the number of turns in the secondary coil. As with the open loop design the closed loop design provides galvanic isolation.

The output of a closed loop current sensor can be scaled with the addition of a burden resistor, R_m^1 , to produce a voltage level output proportional to the primary current.

Figure 2



¹ Within limits - Consult Tamura Engineering

Application notes & tips:

1. Insure power supply polarity is respected to prevent damage to internal circuitry.
2. Non-linearity due to magnetic core saturation can occur at primary currents in excess of 2X the nominal rated current.
3. Hall effect based current sensors are affected by static and dynamic electric and magnetic field; use twisted and/or shielded cables to mitigate these affects.
4. Frequency bandwidth in open loop current sensors is limited at high frequency due to magnetic core losses and eddy current induced temperature rise.
5. The Primary conductor should pass straight through the aperture or, in the case of multiple primary turns, wound around the body of the current sensor.
6. Care in placement and orientation of the current sensors in presence of high electromagnetic fields can lessen EMF effect on the current sensor.

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Hall Effect Current Sensors

3 to 30 Amp Applications — Open Loop



- Compact PCB Mount Design
- Voltage Output type
- Withstanding Voltage of 2500 Vrms
- Very High Linearity
- $\pm 15V$ Supply Voltage
- CE EN50178 (pending)

Specifications Measured at 25°C, RL=10K Ω , Vcc= $\pm 15V$

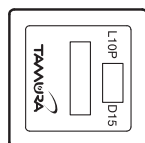
Specification		L10P003D15	L10P005D15	L10P010D15	L10P015D15	L10P020D15	L10P025D15	L10P030D15
Nominal Primary DC Current	(If)	3A	5A	10A	15A	20A	25A	30A
Maximum Current	If(max)	9A	15A	30A	45A	60A	75A	90A
Output Voltage @ If	V _{OUT}	4V						
Offset Voltage	V _{OE}	< $\pm 40mV$						
Accuracy @ If ²	X	< $\pm 1\%$ of If						
Output Linearity ² (0..If Max)	E _L	< $\pm 1\%$ of If						
Power Supply	Vcc	$\pm 15V \pm 5\%$						
Response Time	T _r	< 5 μs						
Current Consumption	Ic	12mA typ						
Output Temperature Characteristic	TCE _G	< $\pm 0.1\%$ / °C						
Offset Temperature Characteristic	V _{OT}	$\pm 1.2mV$ / °C typ						
Hysteresis Allowance @ If=0	V _{OH}	$\leq \pm 25mV$						
Withstand Voltage (50/60Hz)	V _d	2,000VACrms for 1 minute (Sensing Current 0.5mA)						
Insulation Resistance @ 500VDC	R _{IS}	$\geq 500M\Omega$						
Operating Bandwidth ¹ (-3dB)	f	DC - 50kHz						
Operating Temperature	T _A	-10 - +80°C						
Storage Temperature	T _S	-20 - +85°C						

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

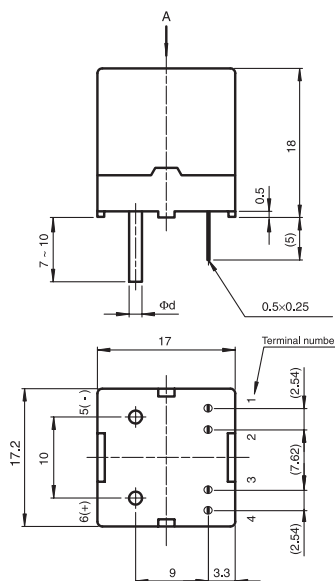
² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
100	10



View A



Types	Rated current	ϕ d
L10P003D15	3A	$\phi 0.5$
L10P005D15	5A	$\phi 0.6$
L10P010D15	10A	$\phi 0.8$
L10P015D15	15A	$\phi 1.2$
L10P020D15	20A	$\phi 1.6$
L10P025D15	25A	$\phi 1.6$
L10P030D15	30A	$\phi 1.6$

Terminal number	
1	OUT
2	+15V
3	-15V
4	GND
5	-IN
6	+IN

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Hall Effect Current Sensors

3 to 30 Amp Applications — Open Loop

- Compact PCB Mount Design
- Voltage Output type
- Withstanding Voltage of 2500 Vrms
- Very High Linearity
- 5V Supply Voltage
- CE EN50178 (pending)



Specifications Measured at 25°C, RL=10KΩ, Vcc=+5V Vref = Vcc/2

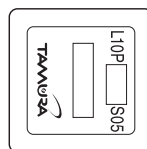
Specification		L10P003S05	L10P005S05	L10P010S05	L10P015S05	L10P020S05	L10P025S05	L10P030S05
Nominal Primary DC Current	(If)	3A	5A	10A	15A	20A	25A	30A
Maximum Current	If(max)	3.75A	6.25A	12.5A	18.75A	25A	31.25A	37.5A
Output Voltage @ If	V _{OUT}	V _{ref} ± 1.5V						
Offset Voltage	V _{OE}	2.5V ± 35mV						
Accuracy @ If ²	X	< ± 1% of If						
Output Linearity ² (0..If MAX)	E _L	± 1% of If						
Power Supply	Vcc	5V ± 2%						
Response Time	t _r	< 5μs						
Current Consumption	Ic	15mA typ						
Output Temperature Characteristic	TCE _G	< ± 2mV / °C						
Offset Temperature Characteristic	V _{OT}	± 1.2mV / °C typ						
Hysteresis Allowance @ If=0	V _{OH}	8mV Max						
Withstand Voltage (50/60Hz)	V _d	2,000VACrms for 1 minute (Sensing Current 0.5mA)						
Insulation Resistance @ 500VDC	R _{IS}	≥ 500MΩ						
Operating Bandwidth ¹ (-3dB)	f	DC - 50kHz						
Operating Temperature	T _A	-10 - +80°C						
Storage Temperature	T _S	-15 - +85°C						

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

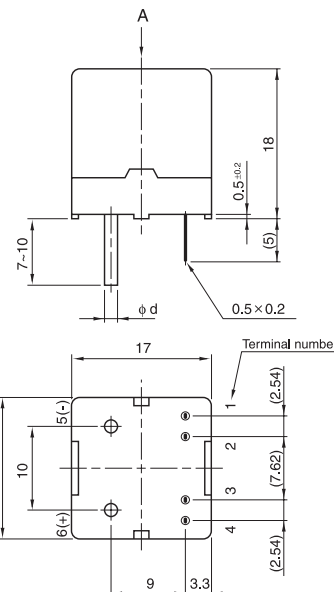
² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
100	10



A View



Note 1. Unless otherwise specified, tolerances shall be ±0.5

Types	Rated Current	φ d
L10P003S05	3A	φ 0.5
L10P005S05	5A	φ 0.6
L10P010S05	10A	φ 0.8
L10P015S05	15A	φ 1.2
L10P020S05	20A	φ 1.6
L10P025S05	25A	φ 1.6
L10P030S05	30A	φ 1.6

Terminal number	
1	OUT
2	+Vc
3	GND
4	GND
5	-IN
6	+IN

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Hall Effect Current Sensors

3 to 30 Amp Applications — Open Loop



- Compact PCB Mount Design
- Voltage Output type
- Withstanding Voltage of 2500 Vrms
- Very High Linearity
- 12V Supply Voltage
- CE EN50178 (pending)

Specifications Measured at 25°C, RL=10KΩ, Vcc=+12V Vref = 2.5V

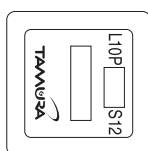
Specification		L10P003S12	L10P005S12	L10P010S12	L10P015S12	L10P020S12	L10P025S12	L10P030S12
Nominal Primary DC Current	(If)	3A	5A	10A	15A	20A	25A	30A
Maximum Current	If(max)	3.75A	6.25A	12.5A	18.75A	25A	31.25A	37.5A
Output Voltage @ If	V _{OUT}	Vref ± 1.5V						
Offset Voltage	V _{OE}	2.5V ± 35mV						
Accuracy @ If ²	X	<± 1% of If						
Output Linearity ² (0..If MAX)	E _L	± 1% of If						
Power Supply	Vcc	12V ± 5%						
Response Time	t _r	<5μs						
Current Consumption	Ic	<20mA						
Output Temperature Characteristic	TCE _G	± 2mV / °C max						
Offset Temperature Characteristic	V _{OT}	± 1.2mV / °C typ						
Hysteresis Allowance @ If=0	V _{OH}	8mV max						
Withstand Voltage (50/60Hz)	V _d	2,000VACrms for 1 minute (faradic current 0.5mA)						
Insulation Resistance @ 500VDC	R _{IS}	≥ 500MΩ						
Operating Bandwidth ¹ (-3dB)	f	DC - 50kHz						
Operating Temperature	T _A	-10 - +80°C						
Storage Temperature	T _s	-15 - +85°C						

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

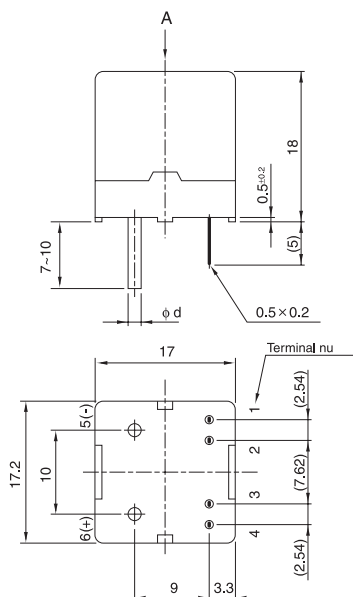
² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
100	10



A View



Note 1. Unless otherwise specified, tolerances shall be ±0.5

Types	Rated Current	φ d
L10P003S12	3A	φ 0.5
L10P005S12	5A	φ 0.6
L10P010S12	10A	φ 0.8
L10P015S12	15A	φ 1.2
L10P020S12	20A	φ 1.6
L10P025S12	25A	φ 1.6
L10P030S12	30A	φ 1.6

Terminal number	
1	OUT
2	+Vc
3	GND
4	GND
5	-IN
6	+IN

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Hall Effect Current Sensors

3 to 25 Amp Applications — Open Loop

- Compact PCB Mount Design
- Voltage Output type
- Very High Linearity
- 15V Supply Voltage
- CE EN50178 (pending)



Specifications Measured at 25°C, RL=10KΩ, Vcc=±15V

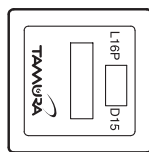
Specification		L16P003D15	L16P005D15	L16P010D15	L16P015D15	L16P020D15	L16P025D15
Nominal Primary DC Current (If)		3A	5A	10A	15A	20A	25A
Maximum Current	If(max)	±9	±15	±30	±45	±60	±75
Output Voltage @ If	V _{OUT}	4V					
Offset Voltage	V _{OE}	< ±40mV					
Accuracy @ If ²	X	< ± 1% of If					
Output Linearity ² (0..If MAX)	E _L	< ± 1% of If					
Power Supply	V _{CC}	±15V ±5%					
Response Time	t _r	<5μs					
Current Consumption	I _c	±12mA typ					
Output Temperature Characteristic	TCE _G	<±0.1% / °C					
Offset Temperature Characteristic	V _{OT}	± 1.2mV / °C typ					
Hysteresis Allowance @ If=0	V _{OH}	<±25mV					
Withstand Voltage (50/60Hz)	V _d	2,000VACrms for 1 minute (Sensing Current 0.5mA)					
Insulation Resistance @ 500VDC	R _{IS}	≥ 500MΩ					
Operating Bandwidth ¹ (-3dB)	f	DC - 35kHz					
Operating Temperature	T _A	-10 - +80°C					
Storage Temperature	T _s	-20 - +85°C					

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

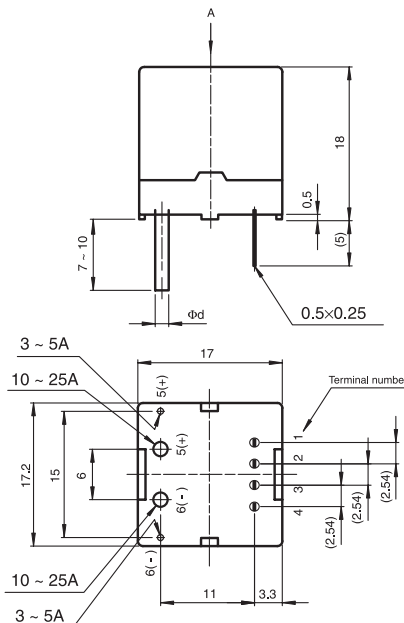
² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
100	10



View A



Types	Rated current	φ d
L16P003D15	3A	φ 0.5
L16P005D15	5A	φ 0.6
L16P010D15	10A	φ 0.8
L16P015D15	15A	φ 1.2
L16P020D15	20A	φ 1.4
L16P025D15	25A	φ 1.4

Terminal number	
1	- 15V
2	0V
3	+15V
4	OUT
5	+IN
6	- IN

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Hall Effect Current Sensors

50 to 200 Amp Applications — Open Loop



- Compact PCB Mount Design
- Voltage Output type
- CE EN50178 (pending)

Specifications Measured at 25°C, RL=10KΩ, V_{CC}=±15V

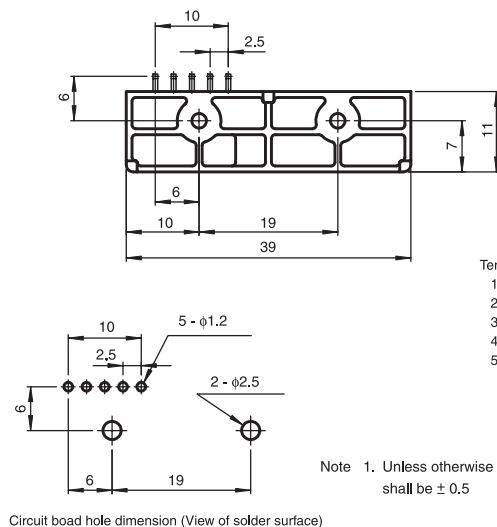
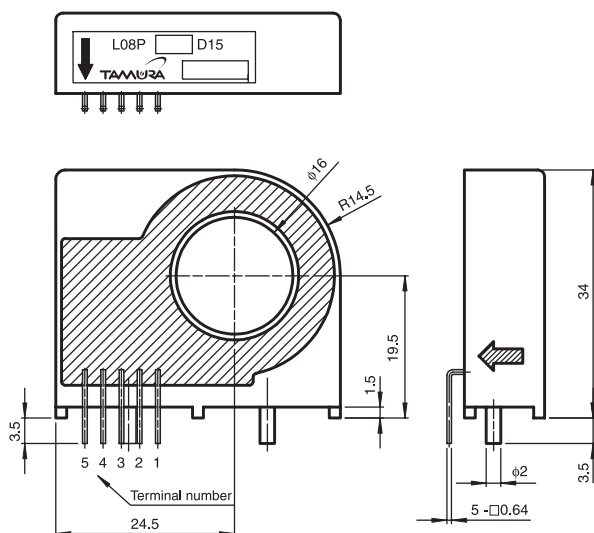
Specification		L08P050D15	L08P100D15	L08P150D15	L08P200D15
Nominal Primary DC Current	(If)	50AT	100AT	150AT	200AT
Maximum Current	If _(max)	±150AT	±300AT	±350AT	±350AT
Output Voltage @ If	V _{OUT}	4V			
Offset Voltage	V _{OE}	<±40mV			
Accuracy @ If ²	X	±1% of If			
Output Linearity ² (0..If MAX)	E _L	≤±1% of If			
Power Supply	V _{CC}	±15V±5%			
Response Time	t _r	<10µ Sec			
Current Consumption	I _C	12mA typ			
Output Temperature Characteristic	TCE _G	<±0.1% / °C	<±0.05% / °C		
Offset Temperature Characteristic	V _{OT}	<±2mV / °C	<±1mV / °C		
Hysteresis Allowance @ If=0	V _{OH}	< ±30mV	<± 20mV		
Withstand Voltage (50/60Hz)	V _d	2,500VACrms for 1 minute (Sensing Current 0.5mA)			
Insulation Resistance @ 500VDC	R _{IS}	≥500MΩ			
Operating Bandwidth ¹ (-3dB)	f	DC - 50kHz			
Operating Temperature	T _A	-10 - +80°C			
Storage Temperature	T _s	-20 - +85°C			

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
50	25



Terminal number
1 +15V
2 - 15V
3 OUT
4 GND
5 NC(No connection)

Note 1. Unless otherwise specified, tolerances shall be ± 0.5

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Hall Effect Current Sensors

50 to 600 Amp Applications — Open Loop

- Compact PCB Mount Design
- Voltage Output type
- Very High Linearity
- 15V Supply Voltage
- CE EN50178 (pending)



Specifications Measured at 25°C, RL=10KΩ, V_{CC}=±15V

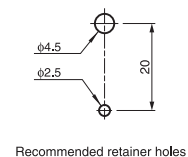
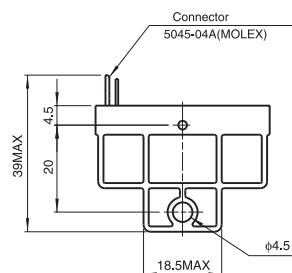
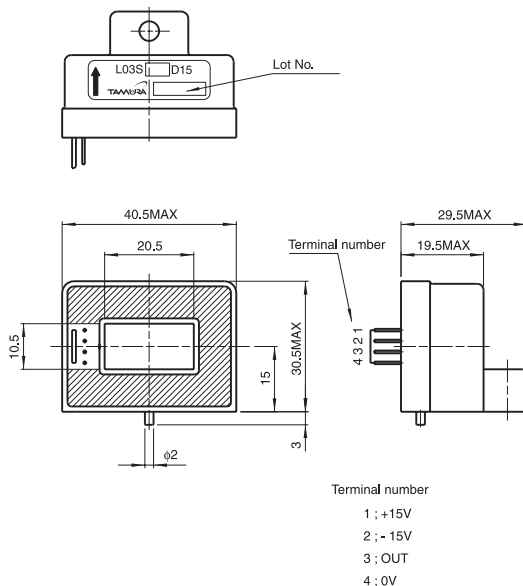
Specification		L03S050D15	L03S100D15	L03S200D15	L03S300D15	L03S400D15	L03S500D15	L03S600D15
Nominal Primary DC Current	(If)	50AT	100AT	200AT	300AT	400AT	500AT	600AT
Maximum Current	If(max)	±150AT	±300AT	±600AT	±700AT	±700AT	±700AT	±700AT
Output Voltage @ If	VOUT	4V						
Offset Voltage	VOE	<± 40mV	<±30mV					
Accuracy @ If²	X	±1% of If						
Output Linearity² (0..If MAX)	EL	±1% of If						
Power Supply	VCC	±15V±5%						
Response Time	tr	≤5μ Sec						
Current Consumption	Ic	12mA typ						
Output Temperature Characteristic	TCEG	<±0.1% / °C						
Offset Temperature Characteristic	VOt	<±2mV / °C	<±1mV / °C					
Hysteresis Allowance @ If=0	VOH	±30mV			±20mV		±10mV	
Withstand Voltage (50/60Hz)	Vd	2,500VACrms for 1 minute (sensing current 0.5mA)						
Insulation Resistance @ 500VDC	RIS	≥500MΩ						
Operating Bandwidth¹ (-3dB)	f	DC - 50kHz						
Operating Temperature	TA	-10 - +80°C						
Storage Temperature	TS	-15 - +90°C						

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
20	50



Note 1. Unless otherwise specified, tolerances shall be ±0.5

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Hall Effect Current Sensors

50 to 600 Amp Applications — Open Loop



- Compact PCB Mount Design
- Voltage Output type
- Very High Linearity
- 5V Supply Voltage
- CE EN50178 (pending)

Specifications Measured at 25°C, RL=10KΩ, Vcc=+ 5V; Vref = $\frac{V_{CC}}{2}$

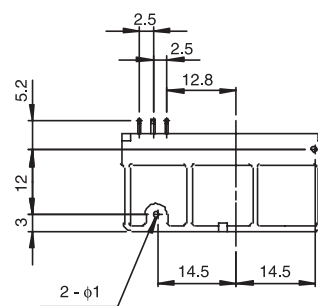
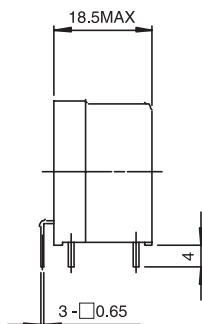
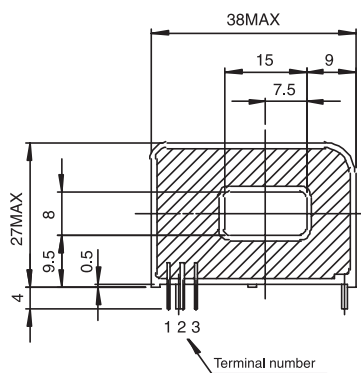
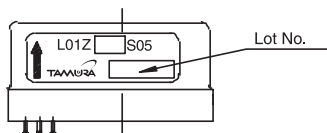
Specification		L01Z050S05	L01Z100S05	L01Z150S05	L01Z200S05	L01Z300S05	L01Z400S05	L01Z500S05	L01Z600S05
Nominal Primary DC Current (If)		50AT	100AT	150AT	200AT	300AT	400AT	500AT	600AT
Maximum Current If(max)		±62.5AT	±125AT	±187.5AT	±250AT	±375AT	±500AT	±625AT	±750AT
Output Voltage @ If	V _{OUT}	Vref±1.5V				Vref±1.5V			
Offset Voltage	V _{OE}	2.5V±0.035V				2.5V±0.030V			
Accuracy @ If ²	X	<±1% of If				<±1% of If			
Output Linearity ² (0..If MAX)	E _L				±1% of If				
Power Supply	Vcc				5V ±2.0%				
Response Time	t _r				<5μs				
Current Consumption	Ic				<15mA				
Output Temperature Characteristic	TCE _G	<±2mV / °C			<±1.5mV / °C				
Offset Temperature Characteristic	V _{OT}	<±2mV / °C			<±1mV / °C				
Hysteresis Allowance @ If=0	V _{OH}		±8mV		±4mV			±6mV	
Withstand Voltage (50/60Hz)	V _d				2,500VACrms for 1 minute (sensing current 0.5mA)				
Insulation Resistance @ 500VDC	R _{IS}				≥500MΩ				
Operating Bandwidth ¹ (-3dB)	f				DC - 50kHz				
Operating Temperature	T _A				-10 - +80°C				
Storage Temperature	T _S				-15 - +85°C				

¹ Small signal only; derating needed to avoid excessive core heating at high frequency

² Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
50	45



Terminal number
1 OUT
2 OV
3 5V

Note 1. Unless otherwise specified, tolerances shall be ±0.5

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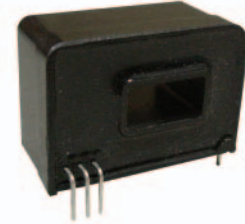
Hong Kong

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Fax: 852-2341-9689

Hall Effect Current Sensors

100 to 300 Amp Applications — Closed Loop

- PCB Mount Design
- Current Output type
- Very High Linearity
- $\pm 15V$ Supply Voltage
- CE EN50178 (pending)



Specifications Measured at 25°C, RL=10K Ω , VCC= $\pm 15V$

Specification		S21Z100D15	S21Z150D15	S21Z200D15	S21Z300D15
Nominal Primary DC Current	(If)	100A	150A	200A	300A
Maximum Current	If(max)	150A	225A	300A	450A
Output Current @ If	I _{OUT}	50mA	75mA	100mA	150mA
Conversion Ratio	K _n	1:2000	1:2000	1:2000	1:2000
Accuracy	X	$\pm 1\%$ of If			
Offset Current (If=0) ¹	I _o	$\pm 0.5mA$			
Output Linearity ¹ (0..If)	E _L	$\pm 0.25\%$ of If			
Power Supply	V _{CC}	$\pm 15V \pm 5\%^2$			
Response Time	t _r	$\leq 1\mu s$			
Current Consumption	I _c	$\pm 16mA^3$			
Output Temperature Characteristic	TC _{OUT}	$\pm 0.025\% / ^\circ C$ @ If=0 (Ta=-5 to +70°C)			
Offset Temperature Characteristic	I _{OT}	$\pm 0.025mA / ^\circ C$ @ If=0 (Ta=-5 to +70°C)			
Hysteresis Allowance If=0 - Ifmax)	I _{OH}	$\leq 0.3mA$			
Withstand Voltage (50/60Hz)	V _d	2,500VACrms for 1 minute (sensing current 0.5mA)			
Insulation Resistance @ 500VDC	R _{IS}	500M Ω			
Frequency Bandwidth (-3dB)	f	DC - 150kHz			
Operating Temperature	T _A	-10 - +70°C			
Storage Temperature	T _S	-20 - +85°C			
Secondary Coil Resistance	R _s	TBD Ohms @ Ta = 70°C (Contact Tamura for additional info)			

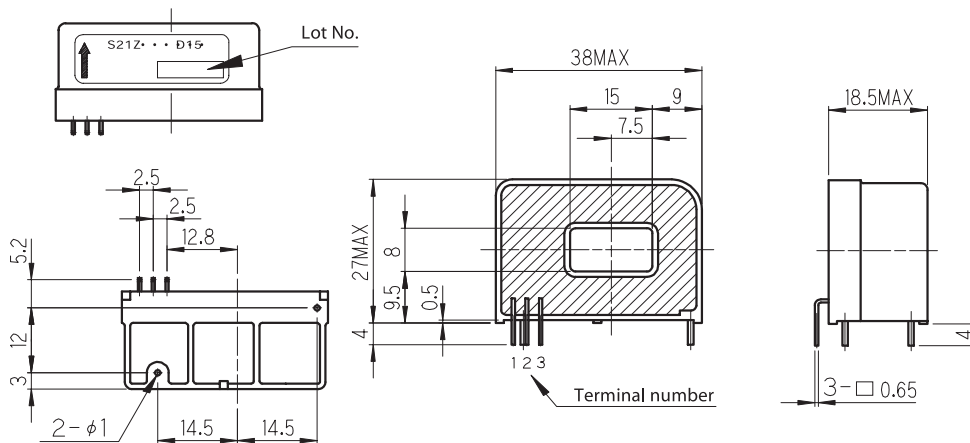
¹ Without Offset

² Ifmax is Restricted by V_{CC}

³ Output Current not included

Package & Weight Information

QTY/Box	Weight/each(g)
50	25



Note 1. Unless otherwise specified, tolerances shall be ± 0.5

Terminal number
1.OUT
2.-15V
3.+15V

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Hall Effect Current Sensors

50 to 300 Amp Applications — Closed Loop



- Panel Mount Design
- Current Output type
- Very High Linearity
- $\pm 12V$ or $\pm 15V$ Supply Voltage
- CE EN50178 (pending)

Specifications Measured at 25°C, $R_L \pm 15K\Omega$, $V_{CC} = \pm 12V$

Specification		S20S050A	S20S100A	S20S150A	S20S200A	S20S300A
Nominal Primary DC Current	(If)	50A	100A	150A	200A	300A
Maximum Current	$I_{F(max)}$	75A	150A	225A	300A	450A
Output Current @ If	I_{OUT}	50mA	100mA	150mA	100mA	150mA
Conversion Ratio	K_H	1:1000	1:1000	1:1000	1:2000	1:2000
Offset Current (If=0)	I_o	$\pm 0.5mA$				
Accuracy ¹	X	$< \pm 1\%$ of If				
Output Linearity ⁴ (0..MAX)	E_L	$\pm 0.25\%$				
Power Supply	V_{CC}	$12V$ or $\pm 15V \pm 5\%$ ²				
Response Time @ $di/dt=50A/\mu Sec$	t_r	$\leq 1\mu s$				
Current Consumption	I_c	$\pm 16mA$ ³				
Output Temperature Characteristic	TCI_{OUT}	$\pm 0.02\% / ^\circ C$ @ If (Ta=-5 to +70°C)				
Offset Temperature Characteristic	I_{OT}	$\pm 0.025mA / ^\circ C$ @ If=0 (Ta=-5 to +70°C)				
Hysteresis Allowance	I_{OH}	$\leq 0.5mA$				
Withstand Voltage (50/60Hz)	V_d	2,500VACrms for 1 minute (sensing current 0.5mA)				
Insulation Resistance @ 500VDC	R_{IS}	$\geq 500M\Omega$				
Frequency Bandwidth (-3dB)	f	DC - 150kHz				
Operating Temperature	T_A	$-10 - +70^\circ C$				
Storage Temperature	T_S	$-20 - +85^\circ C$				
Secondary Coil Resistance	R_S	¹ Ohms @ 70°C (Contact Tamura Tech Support)				

¹ TBD

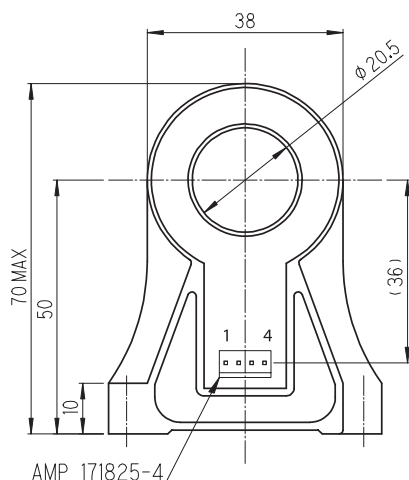
² Ifmax is Restricted by Vcc

³ Output Current not included

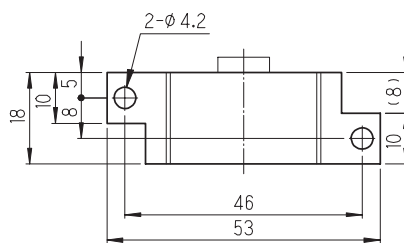
⁴ Without offset

Package & Weight Information

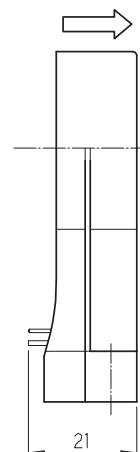
QTY/Box	Weight/each(g)
TBD	46



AMP 171825-4



Note Unless otherwise specified, tolerances shall be ± 0.5



Terminal Pin
1+15V
2- 15V
3.OUT
4.NC

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Hall Effect Current Sensors

6 to 25 Amp Applications — Closed Loop

- Multirange Current Sensor
- Voltage Output
- Compact PCB Mount
- Single Supply ($\pm 5V$)
- CE EN50178 (pending)



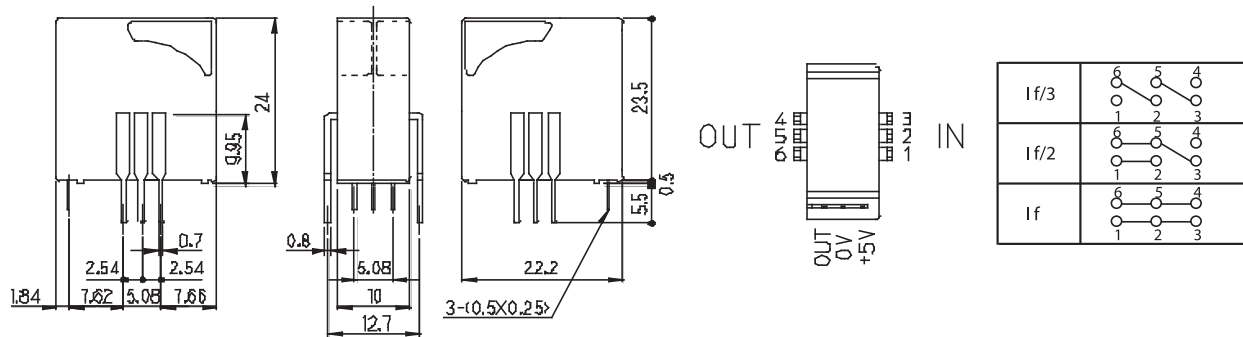
Specifications Measured at 25°C, RL-10K Ω , V_{CC}=+5V

Specification	S22P006S05	S22P015S05	S22P025S05
Nominal Primary r.m.s. Current (I _f)	$\pm 6A$	$\pm 15A$	$\pm 25A$
Maximum Current I _{f(max)}	$\pm 18A$	$\pm 45A$	$\pm 75A$
Offset Voltage (I _f =0) V _{REF}	2.5V $\pm 30mV$	2.5V $\pm 20mV$	2.5V $\pm 15mV$
Output Voltage V _{OUT}	V _{REF} $\pm$ 0.625V		
Output Voltage Accuracy ¹ @ I _f	0.625V $\pm$ 10mV		
Output Linearity (0 to I _f) E _L	$\pm 0.25\%$		
Power Supply V _{CC}	$\pm 5V \pm 5\%$		
Response Time t _r	$\leq 1\mu s$		
Current Consumption I _C	12.5mA Typ		
Output Temperature Characteristic ICEG	$\pm 0.05mV/^{\circ}C$		
Offset Temperature Characteristic TC _{VOUT}	1.25mV/ $^{\circ}C$	1.25mV/ $^{\circ}C$	1.25mV/ $^{\circ}C$
Hysteresis Allowance (I _f =0 to I _{fmax}) V _{OH}	$\leq 0.25mV$		
Withstand Voltage (50/60Hz) V _d	3,000VACrms for 1 minute (sensing current 0.5mA)		
Insulation Resistance @ 500VDC R _{IS}	$\geq 500M\Omega$		
Operating Bandwidth (1dB) f	DC - 200kHz		
Operating Temperature T _A	-10 - +85 $^{\circ}C$		
Storage Temperature T _S	-25 - +100 $^{\circ}C$		

¹ Without offset

Package & Weight Information

QTY/Box	Weight/each(g)
100	8



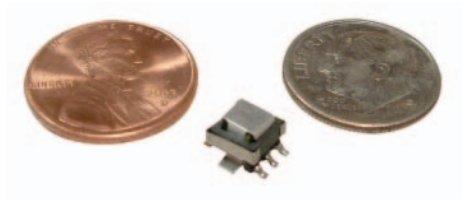
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Current Sense Transformers

Up to 6 Amp Primary Current for High Frequency Applications

- Surface mount and low profile design.
- Pick and place compatible.
- Designed to operate at 250kHz and above.
- Hipot 500Vrms between primary and secondary.
- Operating temperature: -40°C to +85°C.



Specifications Measured at 25°C

Part #	Turns Ratio Pri:Sec	Inductance (μH) MIN @ 10kHz, 0.1V Secondary	DCR		Terminating Resistor (Ω) MAX Secondary
			Primary mΩ MAX	Secondary mΩ MAX	
TCS-01	1:20	80	6	0.55	20
TCS-02	1:30	180	6	0.87	30
TCS-03	1:40	320	6	1.14	40
TCS-04	1:50	500	6	1.50	50
TCS-05	1:60	720	6	1.75	60
TCS-06	1:70	980	6	4.75	70
TCS-07	1:100	2000	6	5.90	100
TCS-08	1:125	3000	6	7.70	125

¹ Above Terminating Resistor Calculation based on 1 Volt/Ampere

² To calculate terminating resistor (R_L)

$$R_L = (V \cdot N) / I$$

Where V - Output Voltage

I - Input Current

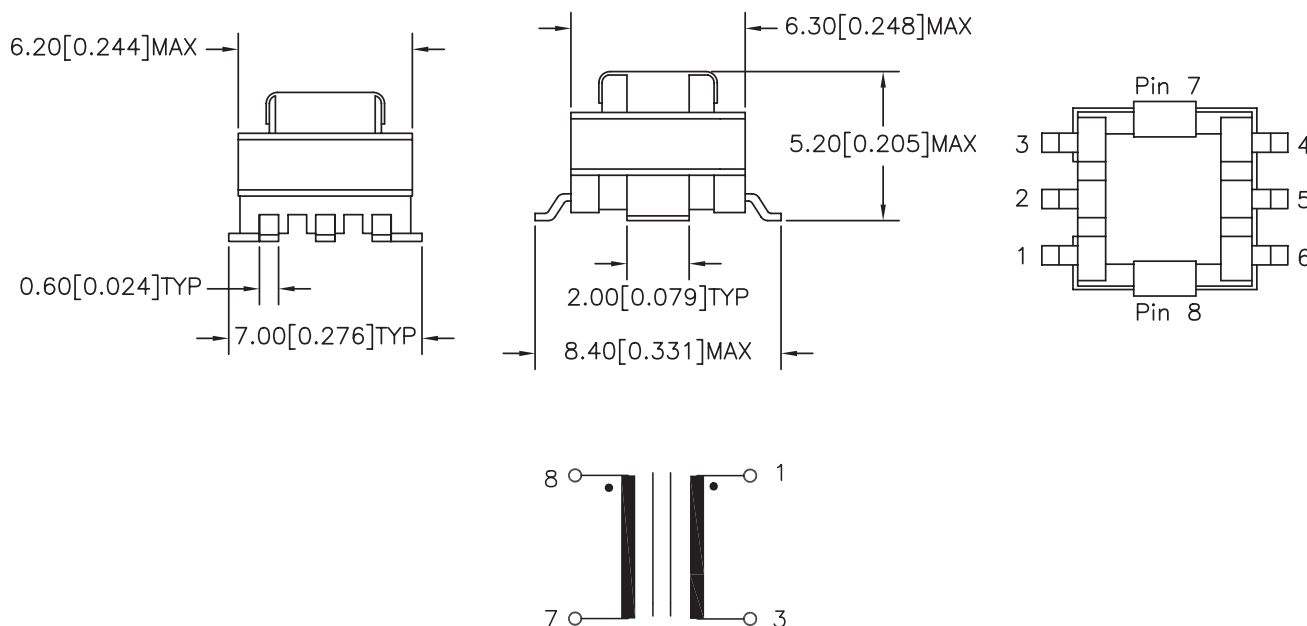
N - Number of Secondary turns

Package & Weight Information

QTY/Tape & Reel	Weight/each(g)
CALL	CALL

Mechanical Dimensions

All dimensions are typical, please contact Tamura for tolerances and suggested layout information.



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'In-Line' Switching Power Supplies

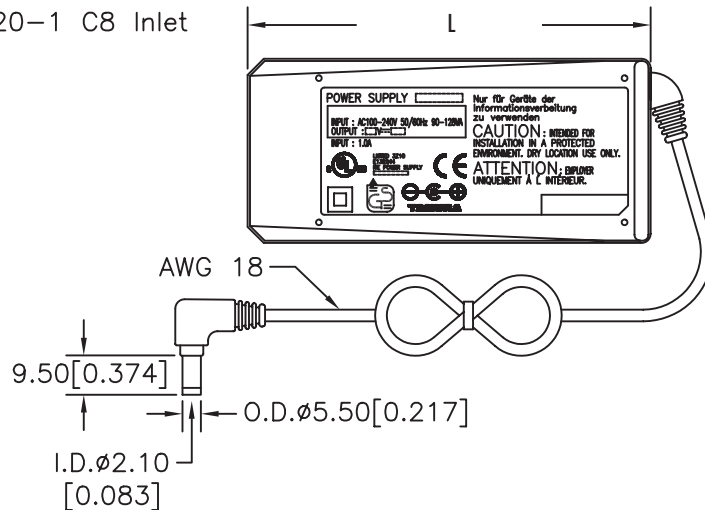
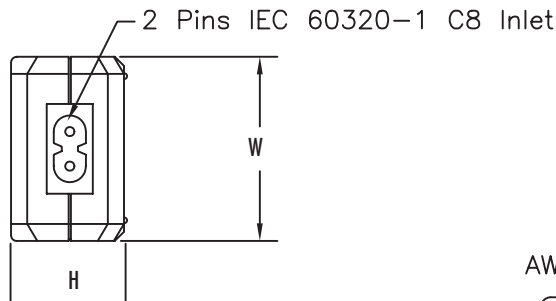
- Universal Input (90-264V) SMPS
- Approved to UL/CSA, Excellent Thermal Management
- Over Voltage and Thermal Protection
- Highly Reliable Design
- High Efficiency Design
- Compact Packaging
- Withstand Voltage of 3kV (input to output)
- Very Low Standby Power (<0.8W)
- FCC Class B Designs



Part #	Output Ratings		Efficiency ¹ (%)	Minimum Load (A)	Output Regulation (%)	Cooling Method	Package Dimensions mm(inches) Typ		
	VDC	Amps					L	W	H
PAA1228N7²	12	2.8	84	0	±5	Convection	90.00 (3.543)	43.50 (1.713)	26.50 (1.043)
PCW1240N7²	12	4.0	85	0	±5	Convection	110.00 (4.331)	45.00 (1.772)	29.00 (1.142)
PAA1628N7²	16	2.8	84	0	±5	Convection	90.00 (3.543)	43.50 (1.713)	26.50 (1.043)
PCW1637N7²	16	3.8	85	0	±5	Convection	110.00 (4.331)	45.00 (1.772)	29.00 (1.142)
PAA1923N7²	19	2.4	85	0	±5	Convection	90.00 (3.543)	43.50 (1.713)	26.50 (1.043)
PCW1931N7²	19	3.2	85	0	±5	Convection	110.00 (4.331)	45.00 (1.772)	29.00 (1.142)
PLW1947N7²	19	4.8	83	0	±5	Convection	133.00 (5.236)	58.00 (2.283)	31.15 (1.226)
PAA2418N7²	24	1.9	85	0	±5	Convection	90.00 (3.543)	43.50 (1.713)	26.50 (1.043)
PCW2425N7²	24	2.5	85	0	±5	Convection	110.00 (4.331)	45.00 (1.772)	29.00 (1.142)

¹ Efficiency including cord loss

² Last number specifies OPC. Contact Tamura for OPC Options



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Fax: 909-676-9482 | Fax: 81 (0)3 3923-0230 | Fax: 44 (0) 1380 731 702 | Fax: 852-2341-9689

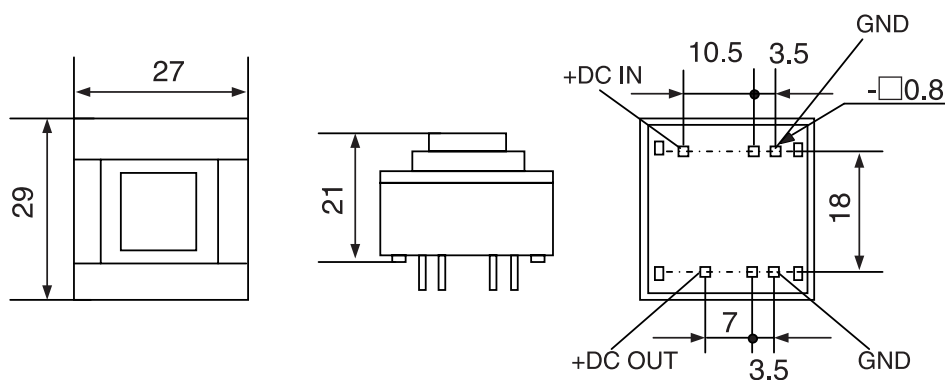
Micro Power Module

For Standby, Inverter Control & DC/DC Power Supplies

- Approved to UL/CSA
- Excellent Thermal Management
- Vacuum Potted Design for Reliability and Durability
- Short Circuit and Thermal Protection
- Compact Space Saving Design
- Reinforced Insulation = 3.5kV (Pri:Sec)



Part #	Input Voltage (VDC)	Output Ratings		Output Frequency (kHz)	Fig.
		VDC	mAmps		
uRM0520	120-375	5	400	44	A
uRM0530	120-375	5	600	130	A
uRM0550	120-375	5	1000	130	B
uRM0620	120-375	6	340	44	A
uRM0630	120-375	6	500	130	A
uRM0650	120-375	6	840	130	B
uRM1230	120-375	12	250	130	B
uRM1250	120-375	12	420	130	B
uRM1530	120-375	15	200	130	B
uRM1550	120-375	15	340	130	B
uRM151276-1	120 - 170	12 & 15	450 & 150	130	B
uRM151276-2	220 - 390	12 & 15	450 & 150	130	B
uRM151567-W	170 - 390	15 & 15	150 & 300	130	B



A

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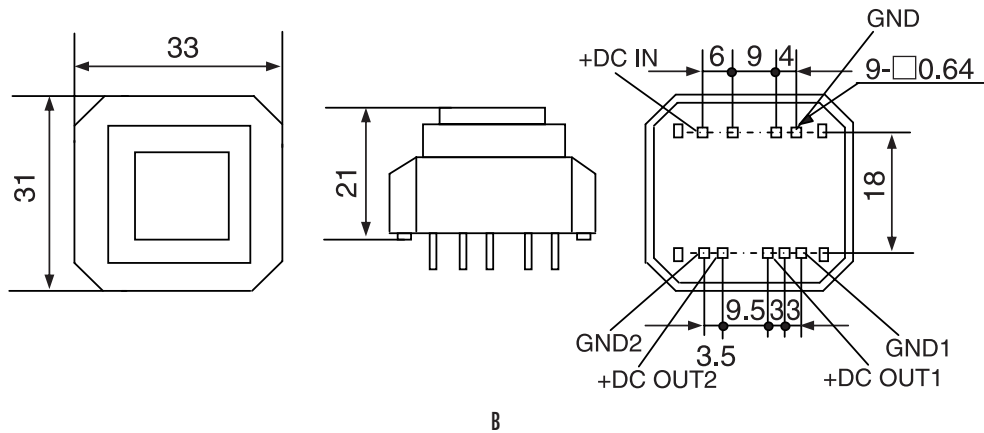
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Fax: 81 (0)3 3923-0230

United Kingdom

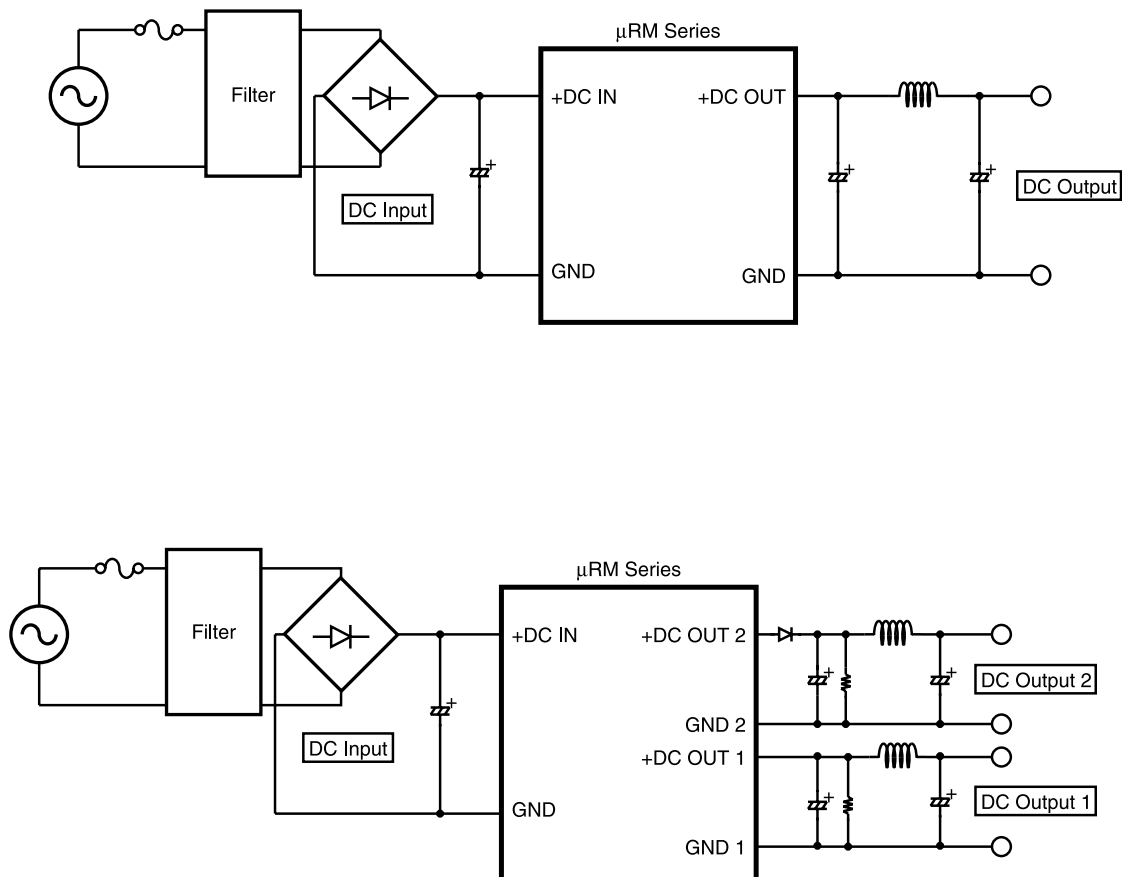
Tel: 44 (0) 1380 731 700
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Hong Kong

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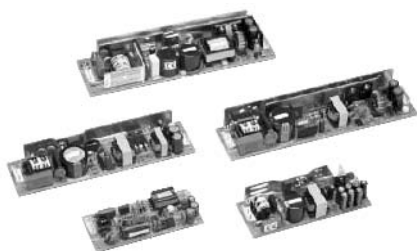
Example Circuit



TAMURA CORPORATION

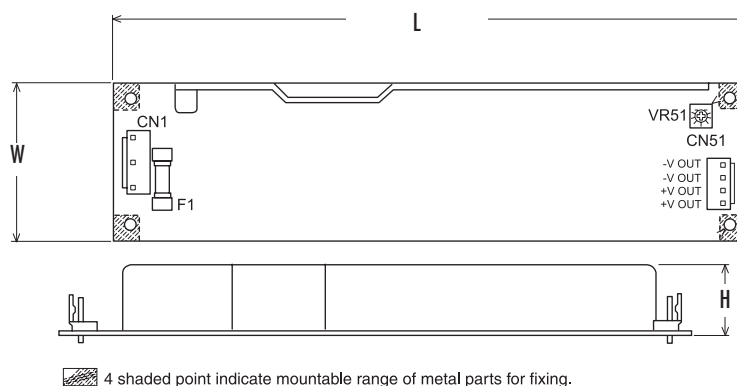
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Chassis Mount Power Supplies



- Input Voltage (85-132V)
- Approved to UL/CSA, Excellent Thermal Management
- Operating Temp = -10°C to 50°C
- Highly Reliable Design
- High Efficiency Design
- Low Profile Designs
- Withstand Voltage of 2kV (input to output)
- FCC Class B Compliant

Part #	Output Ratings		Efficiency (%)	Leakage Current (mA)	Cooling Method	Remote ON/OFF	Package Dimensions mm(inches) Typ		
	VDC	Amps					L	W	H
EBS15-5	5	3.0	74	0.5	Convection	NO	115.0 (4.528)	50.0 (1.968)	16.0 (0.630)
EBS30-5	5	6.0	77	0.5	Convection	NO	132.5 (5.216)	50.0 (1.968)	24.0 (0.944)
EBS50-5	5	10.0	80	0.5	Convection	NO	195.0 (7.677)	50.0 (1.968)	24.0 (0.944)
EBS75-5	5	15.0	81	0.5	Convection	NO	222.0 (8.740)	50.0 (1.968)	31.0 (1.220)
EBS100-5	5	20.0	76	0.5	Convection	NO	222.0 (8.740)	62.0 (2.441)	33.0 (1.299)
EBS15-12	12	1.3	78	0.5	Convection	NO	115.0 (4.528)	50.0 (1.968)	16.0 (0.630)
EBS30-12	12	2.5	80	0.5	Convection	NO	132.5 (5.216)	50.0 (1.968)	24.0 (0.944)
EBS50-12	12	4.3	82	0.5	Convection	NO	195.0 (7.677)	50.0 (1.968)	24.0 (0.944)
EBS75-12	12	6.3	83	0.5	Convection	NO	222.0 (8.740)	50.0 (1.968)	31.0 (1.220)
EBS100-12	12	9.0	82	0.5	Convection	NO	222.0 (8.740)	62.0 (2.441)	33.0 (1.299)
EBS15-15	15	1.0	79	0.5	Convection	NO	115.0 (4.528)	50.0 (1.968)	16.0 (0.630)
EBS30-15	15	2.0	82	0.5	Convection	NO	132.5 (5.216)	50.0 (1.968)	24.0 (0.944)
EBS50-15	15	3.5	83	0.5	Convection	NO	195.0 (7.677)	50.0 (1.968)	24.0 (0.944)
EBS75-15	15	5.0	84	0.5	Convection	NO	222.0 (8.740)	50.0 (1.968)	31.0 (1.220)
EBS100-15	15	7.0	84	0.5	Convection	NO	222.0 (8.740)	62.0 (2.441)	33.0 (1.299)
EBS15-24	24	0.7	80	0.5	Convection	NO	115.0 (4.528)	50.0 (1.968)	16.0 (0.630)
EBS30-24	24	1.3	84	0.5	Convection	NO	132.5 (5.216)	50.0 (1.968)	24.0 (0.944)
EBS50-24	24	2.5	84	0.5	Convection	NO	195.0 (7.677)	50.0 (1.968)	24.0 (0.944)
EBS75-24	24	3.5	85	0.5	Convection	NO	222.0 (8.740)	50.0 (1.968)	31.0 (1.220)
EBS100-24	24	5.0	87	0.5	Convection	NO	222.0 (8.740)	62.0 (2.441)	33.0 (1.299)



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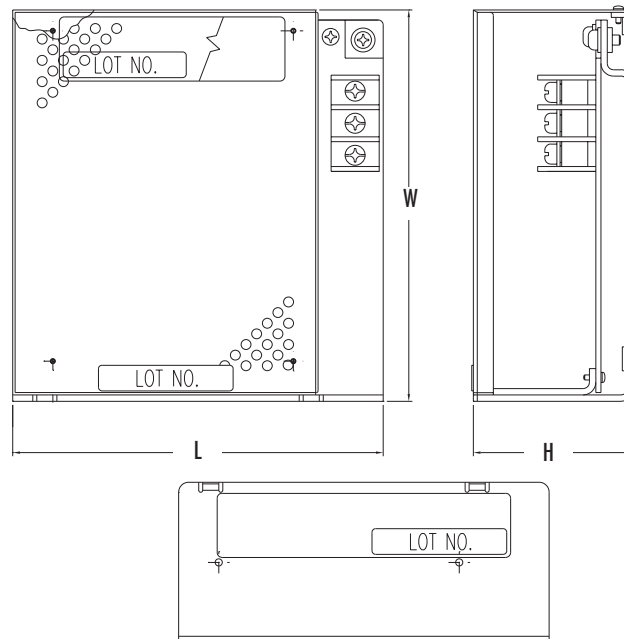
Tel: 852-2389-4321
Fax: 852-2341-9689

Chassis Mount Power Supplies

- Universal Input (90-264V) SMPS
- Approved to UL/CSA, MITI and TUV
- Excellent Thermal Management
- Robust, Fault Tolerant Design
- Highly Reliable Design
- No overshoot during ON/OFF
- Meets IEEE587 C62.41 Test
- Withstand Voltage of 3kV (input to output)
- Withstand Voltage of 1.5kV (output to chassis ground)



Part #	Output Ratings		Efficiency Min (%)	Leakage Current (mA)	Minimum Load (A)	Cooling Method	Remote ON/OFF Control	Package Dimensions mm(inches) Typ		
	VDC	Amps						H	W	L
QVS-5E-UC	5	10.0	70	0.75	0	Convection	NO	50.8 (2.00)	124.0 (4.88)	117.3 (4.62)
QVS-5F-UC	5	20.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	180.3 (7.10)
QVS-5G-UC	5	30.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	218.4 (8.60)
QVS-5H-UC	5	45.0	70	0.75	0	Convection	YES	66.0 (2.60)	124.0 (4.88)	269.2 (10.60)
QVS-5J-UC	5	60.0	70	0.75	0	Convection	YES	69.9 (2.75)	124.0 (4.88)	304.8 (12.00)
QVS-12E-UC	12	5.0	70	0.75	0	Convection	NO	50.8 (2.00)	124.0 (4.88)	117.3 (4.62)
QVS-12F-UC	12	10.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	180.3 (7.10)
QVS-12G-UC	12	15.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	218.4 (8.60)
QVS-12H-UC	12	22.0	70	0.75	0	Convection	YES	66.0 (2.60)	124.0 (4.88)	269.2 (10.60)
QVS-12J-UC	12	30.0	70	0.75	0	Convection	YES	69.9 (2.75)	124.0 (4.88)	304.8 (12.00)
QVS-24E-UC	24	2.5	70	0.75	0	Convection	NO	50.8 (2.00)	124.0 (4.88)	117.3 (4.62)
QVS-24F-UC	24	5.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	180.3 (7.10)
QVS-24G-UC	24	8.0	70	0.75	0	Convection	YES	60.2 (2.37)	124.0 (4.88)	218.4 (8.60)
QVS-24H-UC	24	12.0	70	0.75	0	Convection	YES	66.0 (2.60)	124.0 (4.88)	269.2 (10.60)
QVS-24J-UC	24	16.0	70	0.75	0	Convection	YES	69.9 (2.75)	124.0 (4.88)	304.8 (12.00)



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Cell Power Supplies

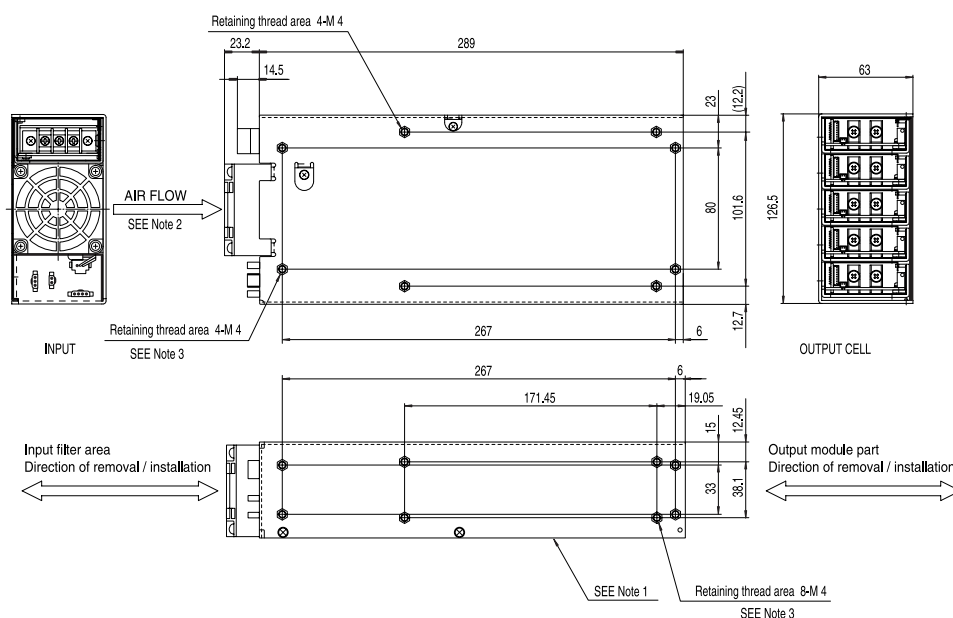


- Universal Input (85-264V)
- Designed to Meet EN60950
- Complies with EN55022-B, FCC-B
- Input Filter and PFC Included
- Operating Temp. = 0°C to 60°C
- Easy Maintenance
- Remote ON/OFF
- Adjustable Output Voltage
- Maximum 600 Watts

Part #	Max. Input Current (A)		Max. Inrush Current (A)	Efficiency Typ. (%)	Leakage Current (mA)	Cooling Method	Remote ON/OFF Control
	115V	240V					
MRS600	10	5	35	78	0.95	FAN	YES

Modular Output (Cell) Units

Part #	Output Ratings		Output Ripple (mV)	Line Regulation (%)	Load Regulation (%)	Total Regulation (%)	Remote Sensing	Output Failure Detection	Remote ON/OFF Control
	VDC	Amps (Max)							
MFS120-3	3.0 - 3.6	24	100	±1	±2	±5	YES	YES	YES
MFS120-5	4.5 - 5.5	24	100	±1	±2	±5	YES	YES	YES
MVS120-12	5.0 - 15.0	10	240	±1	±2	±5	YES	YES	YES
MVS120-24	18.0 - 30.0	5	480	±1	±2	±5	YES	YES	YES
MVD50-12D	5.0 - 15.0	4.2	240	±1	±2	±5	NO	NO	NO
	5.0 - 15.0	4.2	240	±1	±2	±5	NO	NO	NO
MVD50-122	5.0 - 15.0	4.2	240	±1	±2	±5	NO	NO	NO
	18.0 - 30.0	2.1	480	±1	±2	±5	NO	NO	NO
MVD50-24D	18.0 - 30.0	2.1	480	±1	±2	±5	NO	NO	NO
	18.0 - 30.0	2.1	480	±1	±2	±5	NO	NO	NO



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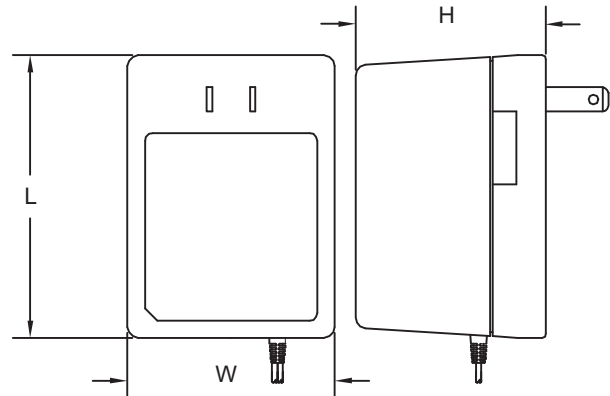
Linear Wall Plug Adapters

AC and DC Output Versions with Output Cord

- Approved to UL1310 & cUL
- Operating Temp = -10°C to +40°C
- Withstand Voltage = 1,500V (input to output)
- High Quality Robust Designs
- Class II Transformer



Part #	Rated Output at 100% Load		Output Type (AC/DC)
	Volts	mA	
212AS03032	3.0	320	DC
318AS03100	3.0	1000	DC
830AS03175	3.0	1750	DC
212AS04025	4.5	250	DC
318AS04070	4.5	700	DC
420AS04100	4.5	1000	DC
830AS04150	4.5	1500	DC
212AS06020	6.0	200	DC
318AS06050	6.0	500	DC
420AS06090	6.0	900	DC
830AS06125	6.0	1250	DC
212AS09012	9.0	125	DC
318AS09035	9.0	350	DC
420AS09060	9.0	600	DC
830AS09100	9.0	1000	DC
835AS09140	9.0	1400	DC
212AS12010	12.0	100	DC
318AS12030	12.0	300	DC
420AS12050	12.0	500	DC
830AS12080	12.0	800	DC
835AS12100	12.0	1000	DC
212AS15007	15.0	75	DC
318AS15025	15.0	250	DC
420AS15040	15.0	400	DC
830AS15070	15.0	700	DC
835AS15080	15.0	800	DC
212AS18006	18.0	60	DC
318AS18020	18.0	200	DC
420AS18035	18.0	350	DC
830AS18060	18.0	600	DC
835AS18070	18.0	700	DC
212AS24005	24.0	50	DC
318AS24015	24.0	150	DC
420AS24025	24.0	250	DC
830AS24045	24.0	450	DC
835AS24050	24.0	500	DC
212AS12012	12.0	125	AC
318AS12037	12.0	375	AC
420AS12075	12.0	750	AC
830AS12100	12.0	1000	AC
835AS12150	12.0	1500	AC
212AS16010	16.0	100	AC
318AS16030	16.0	300	AC
420AS16056	16.0	560	AC
830AS16090	16.0	900	AC
835AS16112	16.0	1125	AC
212AS20007	20.0	75	AC
318AS20022	20.0	225	AC
420AS20045	20.0	450	AC
830AS20080	20.0	800	AC
835AS20090	20.0	900	AC
212AS24006	24.0	60	AC
318AS24020	24.0	200	AC
420AS24037	24.0	375	AC
830AS24070	24.0	700	AC
835AS24075	24.0	750	AC

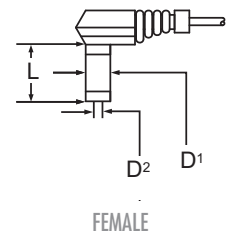


Mechanical Dimension Table

SERIES PREFIX	LENGTH(L) MM(INCH)	WIDTH(W) MM (INCH)	HEIGHT(H) MM(INCH)
212AS	64 (2.51)	40 (1.57)	36 (1.42)
318AS	70 (2.75)	46 (1.81)	43 (1.69)
420AS	72 (2.83)	52 (2.54)	47 (1.85)
830AS	91 (3.58)	58 (2.28)	52 (2.07)
835AS	103 (4.05)	62 (2.44)	62 (2.44)

OUTPUT PLUG DIMENSIONS

PLUG TYPE	D1 (mm)	D2 (mm)	L (mm)	GENDER
D	5.5	2.10	12.5	FEMALE



Polarity $\ominus$ $\oplus$
BARREL TIP

Notes

- 1 Typical output voltage for % load (FL) and line (VAC) indicated.
- 2 UL: UL1310 LISTE DUL*: UL1310 LISTING WITH UL1411
C: UL Approved for battery charger ckts
(contact battery mfr for recommended volt.)
- 3 Complies (C) with or is listed (L) to CSA C22.2, No. 223.66
- 4 CUL : UL1310 listed for use in Canada

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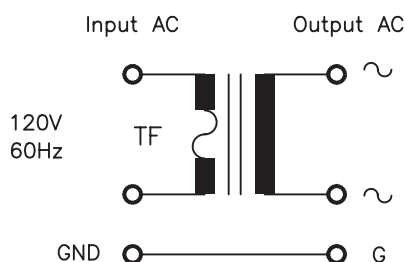
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Linear Wall Plug Adapters



AC Output with Screw Terminal Connections

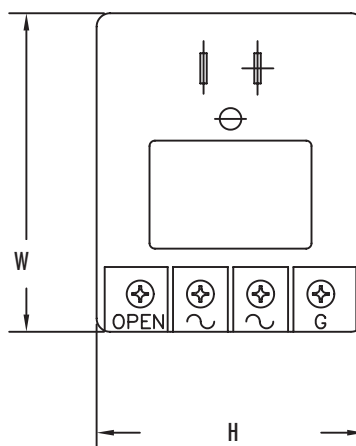
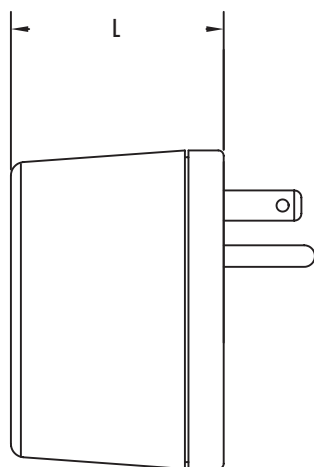
- Approved to UL1310 & CSA
- Operating Temp = 0°C to +40°C
- Withstand Voltage = 1,500V (input to output)
- High Quality Robust Design
- Class II Transformer
- Inherently Limited Design



Mechanical Dimension Table

SERIES PREFIX	LENGTH(L) MM(INCH)	WIDTH(W) MM (INCH)	HEIGHT(H) MM(INCH)
820A-03	75 (2.95)	63 (2.48)	50 (1.97)
830A-03	75 (2.95)	63 (2.48)	50 (1.97)

Part #	Rated Output at 100% Load		Output Type (AC/DC)
	Volts	mA	
820A0060-03	10	1200	AC
820A0061-03	12	1000	AC
820A0062-03	14	850	AC
820A0063-03	16	750	AC
820A0064-03	18	650	AC
820A0065-03	20	600	AC
820A0066-03	22	550	AC
820A0067-03	24	500	AC
830A0060-03	10	2000	AC
830A0061-03	12	1600	AC
830A0062-03	14	1430	AC
830A0063-03	16	1250	AC
830A0064-03	18	1110	AC
830A0065-03	20	1000	AC
830A0066-03	22	900	AC
830A0067-03	24	830	AC



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LonWorks® Linear Wall Plug Adapters

Euro, N. America, and Japan Plugs with Control Signal Feed Through

- Approved to Appropriate Agency
- Operating Temp = 0°C to +40°C
- Inherently Limited Designs
- High Quality Robust Design

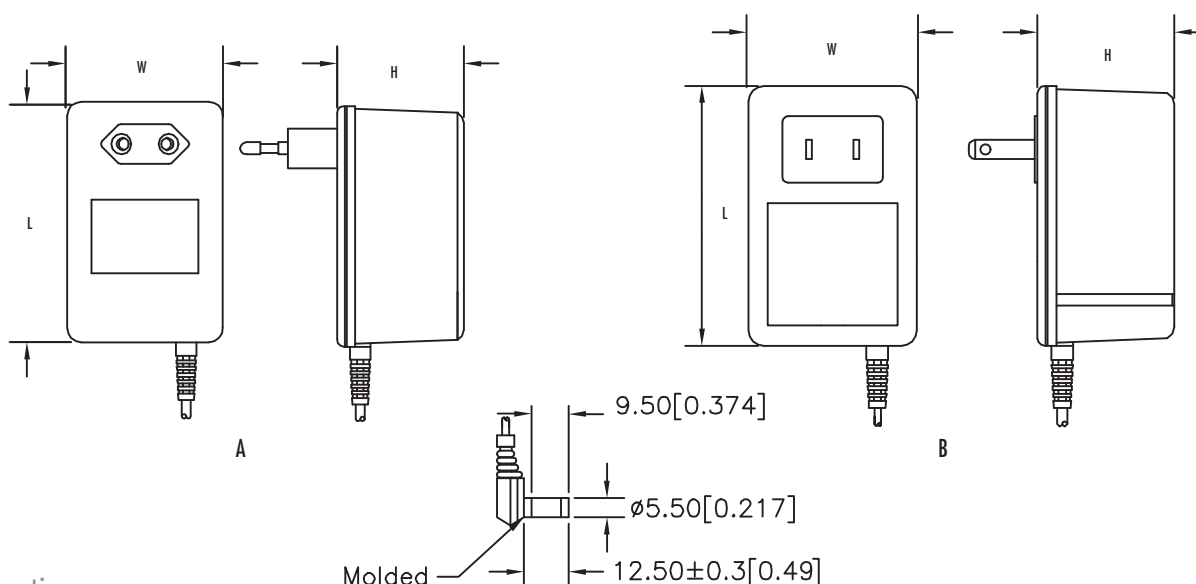


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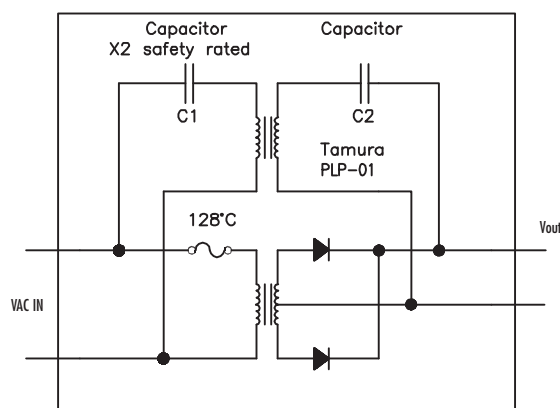
Part #	Rated Output at 100% Load		Output Type (AC/DC)	AC Input	Case and Input Plug Fig.	Dimensions		
	Volts	mA				H	W	L
420A12150P	12.5	150	DC	117V@60Hz	B	50.0 (1.969)	52.0 (2.047)	83.0 (3.268)
420F12150P	12.5	150	DC	230V@50Hz	A	46.0 (1.811)	58.0 (2.285)	88.0 (3.465)
425A12400P	12.5	400	DC	120V@60Hz	B	43.50 (1.713)	58.0 (2.285)	88.0 (3.465)
425F12400P	12.5	400	DC	230V@50/60Hz	A	46.0 (1.811)	58.0 (2.285)	88.0 (3.465)
425J12400P	12.5	400	DC	120V@50/60Hz	B	43.50 (1.713)	58.0 (2.285)	88.0 (3.465)

Mechanical Dimensions

Please contact Tamura for tolerances information.



Schematics



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212AS03032	94	3FD-328	3	3FL24-100	5	3FS-420	3
212AS04025	94	3FD-336	3	3FL24-250	5	3FS-424	3
212AS06020	94	3FD-348	3	3FL24-500	5	3FS-428	3
212AS09012	94	3FD-410	3	3FL30-200	5	3FS-436	3
212AS12010	94	3FD-412	3	3FL30-400	5	3FS-448	3
212AS12012	94	3FD-416	3	3FL30-85	5	3FS-510	3
212AS15007	94	3FD-420	3	3FL34-170	5	3FS-512	3
212AS16010	94	3FD-424	3	3FL34-340	5	3FS-516	3
212AS18006	94	3FD-428	3	3FL34-75	5	3FS-520	3
212AS20007	94	3FD-436	3	3FL40-150	5	3FS-524	3
212AS24005	94	3FD-448	3	3FL40-300	5	3FS-528	3
212AS24006	94	3FD-510	3	3FL40-60	5	3FS-536	3
318AS03100	94	3FD-512	3	3FL56-100	5	3FS-548	3
318AS04070	94	3FD-516	3	3FL56-200	5	420A1215P	96
318AS06050	94	3FD-520	3	3FL56-45	5	420AS04100	94
318AS09035	94	3FD-524	3	3FL88-130	5	420AS06090	94
318AS12030	94	3FD-528	3	3FL88-28	5	420AS09060	94
318AS12037	94	3FD-536	3	3FL88-65	5	420AS12050	94
318AS15025	94	3FD-548	3	3FS-210	3	420AS12075	94
318AS16030	94	3FL10-1200	5	3FS-212	3	420AS15040	94
318AS18020	94	3FL10-250	5	3FS-216	3	420AS16056	94
318AS20022	94	3FL10-600	5	3FS-220	3	420AS18035	94
318AS24015	94	3FL120-100	5	3FS-224	3	420AS20045	94
318AS24020	94	3FL120-20	5	3FS-228	3	420AS24025	94
3FD-210	3	3FL120-50	5	3FS-236	3	420AS24037	94
3FD-212	3	3FL12-200	5	3FS-248	3	420F12150P	96
3FD-216	3	3FL12-475	5	3FS-310	3	425A12400P	96
3FD-220	3	3FL12-950	5	3FS-312	3	425F12400P	96
3FD-224	3	3FL16-150	5	3FS-316	3	425J12400P	96
3FD-228	3	3FL16-350	5	3FS-320	3	820A0060-03	95
3FD-236	3	3FL16-700	5	3FS-324	3	820A0061-03	95
3FD-248	3	3FL20-125	5	3FS-328	3	820A0062-03	95
3FD-310	3	3FL20-300	5	3FS-336	3	820A0063-03	95
3FD-312	3	3FL20-600	5	3FS-348	3	820A0064-03	95
3FD-316	3	3FL230-10	5	3FS-410	3	820A0065-03	95
3FD-320	3	3FL230-25	5	3FS-412	3	820A0066-03	95
3FD-324	3	3FL230-50	5	3FS-416	3	820A0067-03	95

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830A0060-0395	EBS30-1291	HBL-029372	L10P025S0578
830A0061-0395	EBS30-1591	HBL-051073	L10P025S1279
830A0062-0395	EBS30-2491	L01Z050S0583	L10P030D1577
830A0063-0395	EBS30-591	L01Z100S0583	L10P030S0578
830A0064-0395	EBS50-1291	L01Z150S0583	L10P030S1279
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830A0066-0395	EBS50-2491	L01Z300S0583	L16P005D1580
830A0067-0395	EBS50-591	L01Z400S0583	L16P010D1580
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830AS0612594	EBS75-2491	L03S050D1582	L16P025D1580
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830AS1609094	G50320	L03S500D1582	MET-1730
830AS1806094	G50520	L03S600D1582	MET-2330
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835AS0914094	G50920	L08P200D1581	MET-3230
835AS1210094	G51020	L10P003D1577	MET-3530
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EBS100-1591	G55720	L10P015D1577	MFS120-593
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EBS15-2491	HBL-026972	L10P020S1279	MVS120-1293
EBS15-591	HBL-027072	L10P025D1577	MVS120-2493

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MX-5229	PL10-12-130B2	PL56-20-130B2	SB2816-16304
MX-5829	PL10-16-130B2	PL56-24-130B2	SB3512-20044
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PCW2425N788	PL30-36-130B2	SB2812-12264	TBLE150774
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PF24-205	PL5.0-20-130B2	SB2816-16104	TBLE603074
PF24-245	PL5.0-24-130B2	SB2816-16144	TBLE703274
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PF24-565	PL56-10-130B2	SB2816-16224	TCS-0387
PLOPUE24	PL56-12-130B2	SB2816-16244	TCS-0487
PL10-10-130B2	PL56-16-130B2	SB2816-16264	TCS-0587

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TCS-06	87	TIC-L011-11	51	TIC-L062-11	45	TTC-4014	21
TCS-07	87	TIC-L012-11	51	TIC-L063-11	45	TTC-4015	21
TCS-08	87	TIC-L013-11	51	TIC-L065-16	61	TTC-4016	21
TDSE20	74	TIC-L014-11	51	TIC-L066-11	44	TTC-4017	21
TDSE25	74	TIC-L015-11	51	TIC-L067-11	45	TTC-4018	23
TDSE28	74	TIC-L016-14	55	TIC-L068-11	44	TTC-4019	23
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TIC-G017-21	67	TIC-L036-11	47	TTC-302	27	TTC-4072	31
TIC-G018-21	67	TIC-L037-11	47	TTC-312	25	TTC-4074	23
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TIC-L006-11	51	TIC-L044-14	55	TTC-323	19	TTC-4084	23
TIC-L007-11	51	TIC-L047-11	65	TTC-326	27	TTC-4085	22
TIC-L008-11	51	TIC-L048-11	65	TTC-331	19	TTC-4088	21
TIC-L009-11	51	TIC-L050-14	55	TTC-338	19	TTC-4089	23
TIC-L010-11	51	TIC-L058-11	47	TTC-339	27	TTC-4090	31

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TTC-4091	.31	TTC-5004	.17	TTC-6021	.25	TTC-8168	.36
TTC-4093	.23	TTC-5005	.17	TTC-6022	.25	TTC-8169	.39
TTC-4095	.31	TTC-5006	.17	TTC-6023	.25	TTC-8170	.43
TTC-4096	.31	TTC-5007	.17	TTC-6024	.25	TTC-8171	.36
TTC-4099	.21	TTC-5008	.17	TTC-6025	.25	TTC-8172	.42
TTC-4101	.22	TTC-5009	.17	TTC-7005	.21	TTC-8173	.42
TTC-4103	.21	TTC-5010	.16	TTC-7006	.21	uRM0520	.89
TTC-4104	.31	TTC-5012	.17	TTC-8100	.36	uRM0530	.89
TTC-4105	.22	TTC-5013	.17	TTC-8103	.36	uRM0550	.89
TTC-4106	.31	TTC-5014	.17	TTC-8106	.36	uRM0620	.89
TTC-4109	.22	TTC-5015	.17	TTC-8121	.34	uRM0630	.89
TTC-4110	.31	TTC-5016	.17	TTC-8123	.34	uRM0650	.89
TTC-4111	.31	TTC-5017	.17	TTC-8124	.34	uRM1230	.89
TTC-4113	.21	TTC-5018	.17	TTC-8128	.35	uRM1250	.89
TTC-4115	.23	TTC-5019	.16	TTC-8130	.36	uRM151276-1	.89
TTC-4116	.22	TTC-5020	.16	TTC-8135	.41	uRM151276-2	.89
TTC-4117	.21	TTC-5021	.17	TTC-8136	.41	uRM151567-W	.89
TTC-4118	.21	TTC-5022	.17	TTC-8137	.41	uRM1530	.89
TTC-4123	.23	TTC-5023	.15	TTC-8138	.41	uRM1550	.89
TTC-4124	.22	TTC-5024	.15	TTC-8139	.36		
TTC-4134	.21	TTC-5025	.15	TTC-8142	.34		
TTC-4135	.21	TTC-5026	.17	TTC-8143	.36		
TTC-4138	.22	TTC-5027	.15	TTC-8144	.36		
TTC-4139	.22	TTC-5028	.16	TTC-8145	.35		
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TTC-432SL	.21	TTC-5032	.15	TTC-8147	.36		
TTC-433	.21	TTC-5033	.15	TTC-8150	.34		
TTC-433SL	.21	TTC-5034	.15	TTC-8152	.36		
TTC-435	.21	TTC-5035	.15	TTC-8153	.39		
TTC-435SL	.21	TTC-5036	.15	TTC-8154	.34		
TTC-4801	.21	TTC-5037	.15	TTC-8156	.42		
TTC-4802	.21	TTC-511	.17	TTC-8157	.35		
TTC-4803	.21	TTC-512	.17	TTC-8158	.39		
TTC-4814	.21	TTC-6017	.25	TTC-8161	.36		
TTC-5000	.17	TTC-6018	.25	TTC-8163	.34		
TTC-5001	.17	TTC-6019	.25	TTC-8164	.35		
TTC-5003	.17	TTC-6020	.25	TTC-8166	.35		

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