

# Sensors

Quarter 3, 2006  
SG1010Q32006 Rev 0



## ACCELERATION SENSORS

### Low g Consumer Acceleration Sensors

Product	Sensing Range (g)	Sensing Axis	Sensitivity (mV/g)	I <sub>DD</sub> (Typ) (mA)	Sleep Mode (Typ) I <sub>DD</sub> (μA)	Sleep Mode Response Time (Typ) (ms)	Start Up Response Time (Typ) (ms)	Rolloff Frequency (Hz)	V <sub>DD</sub> Supply Voltage (V)	Zero g Output (Typ) (V)	Packaging
MMA7260QT	1.5/2/4/6	XYZ	800/600/300/200	0.5	3.0	0.5	1.0	350 (XY)/150 (Z)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA7261QT	2.5/3.3/6.7/10	XYZ	480/360/180/120	0.5	3.0	0.5	1.0	350 (XY)/150 (Z)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA6280QT	1.5/2/4/6	XZ	800/600/300/200	0.5	3.0	0.5	1.0	350 (X)/150 (Z)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA6281QT	2.5/3.3/6.7/10	XZ	480/360/180/120	0.5	3.0	0.5	1.0	350 (X)/150 (Z)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA6270QT	1.5/2/4/6	XY	800/600/300/200	0.5	3.0	0.5	1.0	350 (XY)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA6271QT	2.5/3.3/6.7/10	XY	480/360/180/120	0.5	3.0	0.5	1.0	350 (XY)	2.2 – 3.6	1.65	6 x 6 x 1.45 mm QFN
MMA6260QT	1.5	XY	800	1.2	N/A	N/A	14	50 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN
MMA6261QT	1.5	XY	800	1.2	N/A	N/A	2.0	300 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN
MMA6262QT	1.5	XY	800	2.2	N/A	N/A	4.0	150 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN
MMA6263QT	1.5	XY	800	2.2	N/A	N/A	0.7	900 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN
MMA6231QT	10	XY	120	1.2	N/A	N/A	2.0	300 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN
MMA6233QT	10	XY	120	2.2	N/A	N/A	0.7	900 (XY)	2.7 – 3.6	1.65	6 x 6 x 1.98 mm QFN

### Low g Industrial Acceleration Sensors

Product	Sensing Range (g)	Sensing Axis	Sensitivity (mV/g)	Rolloff Frequency (Hz)	V <sub>DD</sub> Supply Voltage (Typ) (V)	Zero g Output (Typ) (V)	Packaging
MMA2260EG	1.5	X	1200	50	5.0	2.5	16-pin SOIC
MMA1260EG	1.5	Z	1200	50	5.0	2.5	16-pin SOIC
MMA1270EG	2.5	Z	750	50	5.0	2.5	16-pin SOIC
MMA1250EG	5.0	Z	400	50	5.0	2.5	16-pin SOIC
MMA1220EG	8.0	Z	250	250	5.0	2.5	16-pin SOIC

### Medium g Acceleration Sensors

Product	Sensing Range (g)	Sensing Axis	Sensitivity (mV/g)	Rolloff Frequency (Hz)	V <sub>DD</sub> Supply Voltage (Typ) (V)	Zero g Output (Typ) (V)	Packaging
MMA3201EG	40/40	XY	50/50	400	5.0	2.5	20-pin SOIC
MMA2201EG	40	X	50	400	5.0	2.5	16-pin SOIC
MMA2202EG	50	X	40	400	5.0	2.5	16-pin SOIC
MMA3204EG	100/30	XY	20/66.67	400	5.0	2.5	20-pin SOIC
MMA3202EG	100/50	XY	50/100	400	5.0	2.5	20-pin SOIC
MMA2204EG	100	X	20	400	5.0	2.5	16-pin SOIC
MMA1213EG	50	Z	40	400	5.0	2.5	16-pin SOIC
MMA1210EG	100	Z	20	400	5.0	2.5	16-pin SOIC

### High g Acceleration Sensors

Product	Sensing Range (g)	Sensing Axis	Sensitivity (mV/g)	Rolloff Frequency (Hz)	V <sub>DD</sub> Supply Voltage (Typ) (V)	Zero g Output (Typ) (V)	Packaging
MMA1211EG	150	Z	13	400	5.0	2.5	16-pin SOIC
MMA2301EG	200	X	10	400	5.0	2.5	16-pin SOIC
MMA1212EG	200	Z	10	400	5.0	2.5	16-pin SOIC
MMA2300EG	250	X	8.0	400	5.0	2.5	16-pin SOIC
MMA1200EG	250	Z	8.0	400	5.0	2.5	16-pin SOIC

# PRESSURE SENSORS

## Integrated Pressure Sensors

Product Family <sup>1</sup>	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H <sub>2</sub> O)	Pressure Rating Maximum (cm H <sub>2</sub> O)	Pressure Rating Maximum (mm Hg)	Full Scale Span (Typ) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0°C to 85°C (% of VFSS)	Pressure Type <sup>2</sup>			
									A	D	G	V
MPX4080	11.6	80	321	815	600	4.3	54	±3.0				
MPX4100	15.2	105	422	1070	788	4.6	54	±1.8	•	•		
MPX4101	14.8	102	410	1040	765	4.6	54	±1.8	•			
MPXH6101	14.8	102	410	1040	765	4.6	54	±1.8	•			
MPX4105	15.2	105	422	1070	788	4.6	51	±1.8	•			
MPX4115	16.7	115	462	1174	863	4.6	46	±1.5	•			
	16.7	115	462	1174	863	4.0	38	±1.5				•
MPX6115	16.7	115	462	1174	863	4.6	46	±1.5	•			
MPX4200	29	200	803	2040	1500	4.6	26	±1.5	•			
MPX4250	36	250	1000	2550	1880	4.7	20	±1.5	•			
	36	250	1000	2550	1880	4.7	19	±1.4		•	•	
MPXH6250	36	250	1000	2550	1880	4.7	19	±1.5	•			
MPXV4006	0.87	6.0	24	61	45	4.6	766	±5.0		•		•
MPXV5004	0.57	4.0	16	40	29	3.9	1000	±2.5		•		•
MPX5010	1.45	10	40	102	75	4.5	450	±5.0		•		•
MPX5050	7.25	50	201	510	375	4.5	90	±2.5		•	•	•
MPX5100	14.5	100	401	1020	750	4.5	45	±2.5	•	•	•	
	16.7	115	462	1174	863	4.5	45	±2.5				
MPX5500	72.5	500	2000	5100	3750	4.5	9.0	±2.5		•	•	
MPX5700	102	700	2810	7140	5250	4.5	6.0	±2.5	•	•	•	
MPX5999	150	1000	4150	10546	7757	4.5	5.0	±2.5		•		
MPXH6300	44	300	1200	3060	2250	4.7	16	±1.8	•			
MPXH6400	60	400	1600	4000	3000	4.7	12	±1.5	•			
MPXV7002	±0.3	±2	±8	±20	±15.2	4.5	1000	±2.5				
MPXV7007	±1.0	±7	±28	±70	±53	4.0	286	±5.0			•	•
MPXV7025	±3.5	±25	±100	±254	±190	4.5	90	±5.0			•	•

## Compensated Pressure Sensors

Product Family <sup>1</sup>	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H <sub>2</sub> O)	Pressure Rating Maximum (cm H <sub>2</sub> O)	Pressure Rating Maximum (mm Hg)	Offset (mV)	Full Scale Span (Typ) (mV)	Sensitivity (mV/kPa)	Linearity Minimum (% of VFSS)	Linearity Maximum (% of VFSS)	Pressure Type <sup>2</sup>			
											A	D	G	V
MPX2010	1.45	10	40	102	75	±1.0	25	2.5	-1.0	1.0		•	•	
MPX2053	7.0	50	201	510	375	±1.0	40	0.8	-0.6	0.4		•		•
MPX2102	14.5	100	400	1020	750	±2.0	40	0.4	-1.0	1.0	•	•		•
	14.5	100	400	1020	750	±1.0	40	0.4	-0.6	0.4				
MPX2202	29	200	800	2040	1500	±1.0	40	0.2	-1.0	1.0	•	•		•
	29	200	800	2040	1500	±1.0	40	0.2	-0.6	0.4				
MPX2050	7.0	50	201	510	375	±1.0	40	0.8	-0.3	-0.3		•	•	
MPX2100	14.5	100	400	1020	750	±2.0	40	0.4	-1.0	-1.0	•	•		•
	14.5	100	400	1020	750	±1.0	40	0.4	-0.3	-0.3				
MPX2200	29	200	800	2040	1500	±1.0	40	0.2	-1.0	-1.0	•	•		•
	29	200	800	2040	1500	±1.0	40	0.2	-0.3	-0.3				

## Compensated Medical Grade Pressure Sensors

Product Family <sup>1</sup>	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H <sub>2</sub> O)	Pressure Rating Maximum (cm H <sub>2</sub> O)	Pressure Rating Maximum (mm Hg)	Supply Voltage (Typ) (Vdc)	Offset Maximum (mV)	Sensitivity (mV/kPa)	Linearity Minimum (% of VFSS)	Linearity Maximum (% of VFSS)	Pressure Type <sup>2</sup>			
											A	D	G	V
MPXC2011	1.45	10	40	102	75	10.0	1.0	2.5	-1.0	1.0				
MPX2300	5.8	40	161	408	300	6.0	0.75	5.0	-2.0	2.0			•	

## Uncompensated Pressure Sensors

Product Family	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H <sub>2</sub> O)	Pressure Rating Maximum (cm H <sub>2</sub> O)	Pressure Rating Maximum (mm Hg)	Offset (Typ) (mV)	Full Scale Span (Typ) (mV)	Sensitivity (mV/kPa)	Linearity Minimum (% of VFSS)	Linearity Maximum (% of VFSS)	Pressure Type <sup>2</sup>			
											A	D	G	V
MPX10	1.45	10	40	102	75	20	35	3.5	-1.0	1.0		•	•	
MPX12	1.45	10	40	102	75	20	55	3.5	-1.0	1.0		•	•	
MPX53	7.0	50	200	510	375	20	60	1.2	-0.6	0.4		•	•	

<sup>1</sup> The primary core pressure sensor families are listed above. For orderable parts, please see page 7 or [www.freescale.com/sensors](http://www.freescale.com/sensors)

<sup>2</sup> A = Absolute, D = Differential, G = Gauge, V = Vacuum, • = Available

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## ELECTRIC FIELD SENSING

Product	Description	Main Characteristics	No. of Channels	5 V Reg. Current Limit (mA)	Max Voltage (V)	Operating Temp Range (°C)	Communications	Packaging	Status
MC33794DWBR2	Electric Field Imaging Device	120 kHz generator, shield driver, 9 electrodes + 2 V <sub>REF</sub> outputs, 5 V regulator, MCU support	11	75	40	-40 – 85	ISO-9141	54-pin SOICW	EVB Available
MC33941EGR2	Electric Field Imaging Device	Selectable from 60 kHz to 240 kHz generator, shield driver, 7 electrodes, 5 V regulator	7	75	40	0 – 110	N/A	24-pin SOICW	EVB Available
MC34940EGR2	Electric Field Imaging Device	Selectable from 60 kHz to 240 kHz generator, shield driver, 7 electrodes	7	N/A	40	0 – 90	N/A	24-pin SOICW	EVB Available

## ZIGBEE™-COMPLIANT PLATFORM

### Zigbee-Compliant and Proprietary RF Transceivers

Product	Data Rate (kbps)	Operating Voltage (V)	Band (MHz)	MCU Interface	Packaging	Status	Additional Information
MC13193FCR2	250 (max)	2.0 to 3.4	2.4 -2.5 GHz	SPI	32-pin QFN 5x5	Available	2.4 GHz RF transceiver data modem for ZigBee™ applications (tape and reel)
MC13192FCR2	250 (max)	2.4 to 3.4	2.4 GHz	SPI	32-pin QFN 5x5	Available	2.4 GHz RF transceiver data modem for ZigBee™ applications
MC13191FCR2	250 (max)	2.4 to 3.4	2.4 GHz	SPI	32-pin QFN 5x5	Available	2.4 GHz Proprietary RF transceiver data modem for Point-to-Point and Star applications

## SAFETY AND ALARM INTEGRATED CIRCUITS

### Smoke Ion

Product	Operating Voltage (V)	Horn Tone	Interconnectable	Primary Power Source	Ordering Suffix <sup>Note</sup>
MC14467	6 to 12	Continuous - Old Tone - 4/6	No	DC	P1
MC14468	6 to 12	Continuous - Old Tone - 4/6	Yes	AC/DC	P
MC14568	6 to 12	Continuous - Old Tone - 4/6	Yes	AC/DC	P
MC145017	6 to 12	Temporal - New Tone - NFPA Tone	No	DC	P
MC145018	6 to 12	Temporal - New Tone - NFPA Tone	Yes	AC/DC	P

### Smoke Photo

Product	Operating Voltage (V)	Horn Tone	Interconnectable	Primary Power Source	Ordering Suffix <sup>Note</sup>
MC145010	6 to 12	Continuous - Old Tone - 4/6	Yes	AC/DC	P, DW, DWR2
MC145011	6 to 12	Continuous - Old Tone - 4/6	Yes	AC	P, DW, DWR2
MC145012	6 to 12	Temporal - New Tone - NFPA Tone	Yes	AC/DC	P, DW, DWR2

### Comparator

Product	Description	Operating Voltage (V)	Horn Modulation	Primary Power Source	Ordering Suffix <sup>Note</sup>
MC14578	Micro-Power Comparator Plus Voltage Follower	3.5 to 14	No Horn Driver	AC/DC	P
MC14568	Low Power CMOS Ionization Smoke Detector with Interconnect and Timer	6.0-12	Continuous	AC/DC	ED

Note: ED, P or P1 = 16-pin DIP, DW = SOIC 16-pin, DWR2 = SOIC 16-pin tape & reel

## SENSORS DEVELOPMENT TOOLS



### ***RD1979MPXM2102A: Altimeter Barometer Reference Design***

The Altimeter Barometer Reference Design is used for directly measuring the barometric pressure, determining altitude and making simple weather predictions. The barometer pressure readings are achieved using the compensated MPX2102A pressure sensor, a HCXX series of Flash microcontroller unit (MCU), and an LCD display.



### ***RD1950MPXM2010GS: Water Level Reference Design***

Continuously monitors water level and water flow using the temperature compensated MPXM2010GS pressure sensor, a dual op-amp, and the MC68HC908QT4, 8-pin microcontroller. Competes with a mechanical switch for water level detection but also offers additional applications, such as monitoring water flow for leak detection, for smart washing machines.



### ***KIT3109MMA7260Q: XYZ-axis Evaluation Board***

Used for evaluating the MMA7260Q low g three-axes acceleration sensor, this evaluation board can interface to a 3.3 volt power source or battery.



### ***DEMO1985MC34940E: MC34940 Electric-Field Sensing IC Evaluation Board***

This demonstration kit features the MC34940 e-field sensing device that is intended for applications where non-contact sensing of objects is desired. The connector offers access to all electrodes, enabling you to connect your own touch pad design or any other electrode arrangement of your choosing.



### ***RD3112MMA7260Q: Sensing Triple Axis Reference Design (STAR)***

Built to combine many of the demos available for accelerometer applications, this reference design enables multiple detection situations that can be grouped into 6 sensing functions – fall, tilt, motion, positioning, shock and vibration.



### ***13193EVK: MC13193 Evaluation Kit***

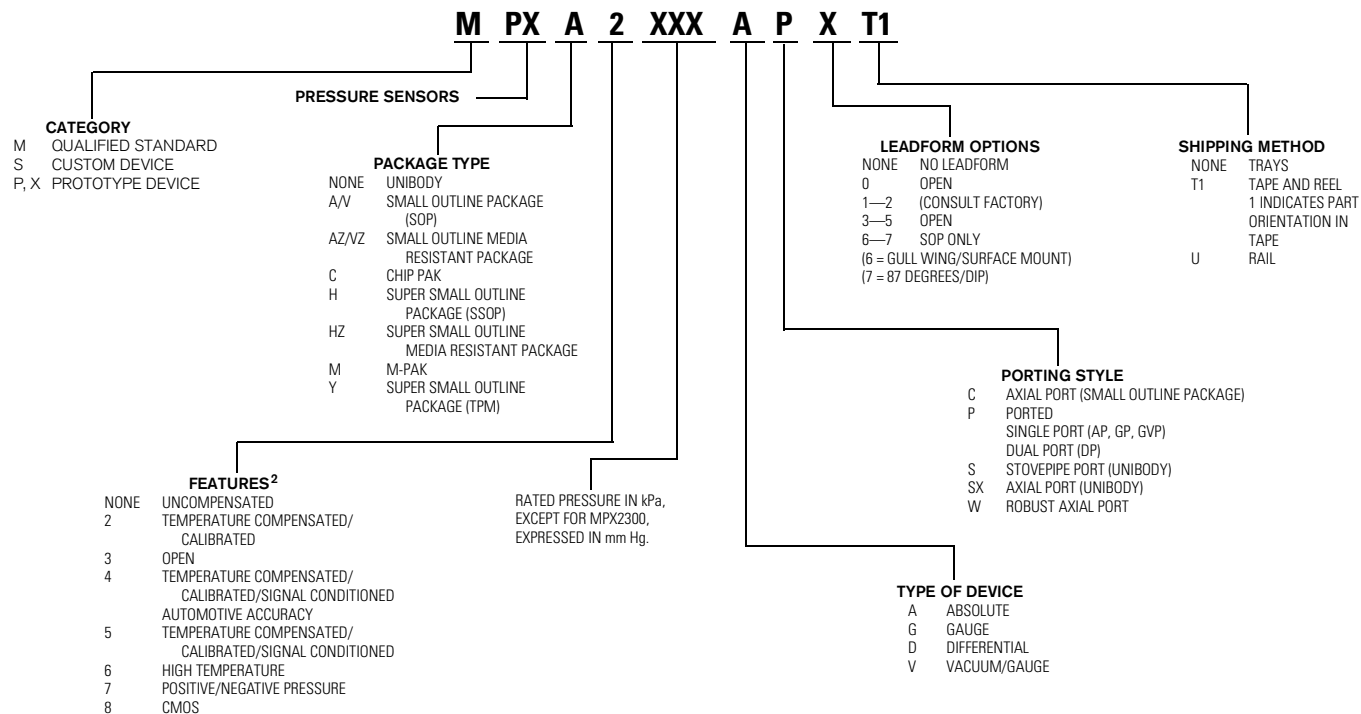
This scalable solution provides wireless network functionality from simple proprietary applications through robust ZigBee applications. Users can demonstrate and develop sensor wireless solutions that support simple point-to-point, star and complex mesh networks.



### ***RD3152MMA7260Q: Wireless Sensing Triple Axis Reference Design (ZSTAR)***

The ZSTAR demo board was designed to demonstrate Freescale's latest innovations in sensors, wireless connectivity and embedded flash microcontrollers.

# PRODUCT NUMBERING SYSTEM FOR PRESSURE SENSORS<sup>1</sup>



<sup>1</sup>Actual product marking may be abbreviated due to space constraints but packaging label will reflect full part number.

<sup>2</sup>Only applies to qualified and prototype products. This does not apply to custom products.

Examples:

MPX10DP 10 kPa uncompensated, differential device in minibody package, ported, no leadform, shipped in trays.

MPXA4115A6T1 115 kPa automotive temperature compensated and calibrated device with signal conditioning, SOP surface mount with gull wing leadform, shipped in tape and reel.

## PRESSURE SENSOR ORDERABLE PART NUMBERS

### Uncompensated

MPX10D
MPX10DP
MPX10GP
MPX10GS
MPXV10GC6U
MPXV10GC7U
MPX12D
MPX12DP
MPX12GP
MPX53D
MPX53DP
MPX53GP
MPXM53GS
MPXM53GST1
MPXV53GC6U
MPXV53GC7U

### Compensated

MPX2300DT1
MPX2301DT1
MPX2010D
MPX2010GP
MPX2010DP
MPX2010GS
MPX2010GSX
MPXM2010D
MPXM2010DT1
MPXM2010GS
MPXM2010GST1
MPXC2011DT1
MPXC2012DT1
MPXV2010GP
MPXV2010DP
MPXM2051GS
MPXM2051GST1
MPX2053D
MPX2053GP

MPX2053DP
MPX2053GVP
MPXM2053D
MPXM2053DT1
MPXM2053GS
MPXM2053GST1
MPXV2053GP
MPXV2053DP
MPX2050D
MPX2050GP
MPX2050DP
MPX2050GSX
MPX2102D
MPX2102GP
MPX2102DP
MPX2102GVP
MPXM2102D
MPXM2102DT1
MPXM2102GS
MPXM2102GST1
MPXV2102GP
MPXV2102DP
MPX2102A
MPX2102AP
MPX2102ASX
MPXM2102A
MPXM2102AT1
MPXM2102AS
MPXM2102AST1
MPX2100D
MPX2100GP
MPX2100DP
MPX2100GVP
MPX2100A
MPX2100AP
MPX2100ASX
MPX2202D

MPX2202GP
MPX2202DP
MPXV2202GC6T1
MPXV2202GC6U
MPXM2202D
MPXM2202DT1
MPXM2202GS
MPXM2202GST1
MPXV2202GP
MPXV2202DP
MPX2202A
MPX2202AP
MPXM2202A
MPXM2202AT1
MPXM2202AS
MPXM2202AST1
MPX2200D
MPX2200GP
MPX2200DP
MPX2200GSX
MPX2200A
MPX2200AP
<b>Integrated</b>
MPXV7002DP
MPXV7002DPT1
MPVZ5004GW6U
MPVZ5004GW7U
MPVZ5004G6U
MPVZ5004G6T1
MPVZ5004G7U
MPXV5004GC6T1
MPXV5004GC6U
MPXV5004GC7U
MPXV5004G6U
MPXV5004G7U
MPXV5004GP
MPXV5004GP1

MPXV5004DP
MPXV5004GVP
MPVZ4006GW6U
MPVZ4006G6U
MPVZ4006G6T1
MPVZ4006G7U
MPVZ4006GW7U
MPXV4006GC6T1
MPXV4006GC6U
MPXV4006GC7U
MPXV4006G6U
MPXV4006G7U
MPXV4006GP
MPXV4006DP
MPX7002GP
MPX7002GC6U
MPX7002GC6T1
MPXV7007DP
MPXV7007GP
MPXV7007G6T1
MPXV7007G6U
MPXV7007GC6U
MPXV7007GC6T1
MPVZ5010GW6U
MPVZ5010G6U
MPVZ5010G6T1
MPVZ5010G7U
MPVZ5010GW7U
MPX5010D
MPX5010DP
MPX5010DP1
MPX5010GP
MPX5010GS
MPX5010GSX
MPXV5010GC6T1
MPXV5010GC6U
MPXV5010GC7U

MPXV5010G6U
MPXV5010G7U
MPXV5010GP
MPXV5010DP
MPXV7025DP
MPXV7025GP
MPXV7025GC6U
MPXV7025GC6T1
MPX5500D
MPX5500DP
MPX5050D
MPX5050DP
MPX5050GP1
MPX5050GP
MPXV5050GP
MPXV5050DP
MPXV5050VC6T1
MPX5100A
MPX5100AP
MPX5100D
MPX5100GP
MPX5100GSX
MPXV5100GC6U
MPXV5100GC7U
MPXV5100DP
MPX4080D
MPX4100A
MPX4100AP
MPX4100AS
MPXA4100AC6U
MPXA4100A6T1
MPXA4100A6U
MPXAZ4100AC6U
MPXAZ4100A6U
MPX4101A
MPXA4101AC6U

MPXH6101A6T1
MPXH6101A6U
MPXH6101AC6T1
MPXH6101AC6U
MPX4105A
MPXV4115VC6U
MPXV4115V6T1
MPXV4115V6U
MPX4115A
MPX4115AP
MPX4115AS
MPXA4115AC6U
MPXA4115A6T1
MPXA4115A6U
MPXA4115AP
MPXAZ4115AC6U
MPXAZ4115A6T1
MPXAZ4115A6U
MPXAZ6115A6U
MPXAZ6115APT1
MP3H6115A6T1
MP3H6115A6U
MP3H6115AC6T1
MP3H6115AC6U
MPXAZ6115AC6U
MPXA6115AC6U
MPX6115A6U
MPXH6115A6T1
MPXH6115A6U
MPXH6115AC6T1
MPXH6115AC6U
MPXHZ6115A6T1
MPXHZ6115A6U
MPXV6115VC6U
MPXV6115VC6T1
MPXHZ6130A6U

MPXHZ6130AC6U
MPX4200A
MPX4250D
MPX4250DP
MPX4250GP
MPX4250A
MPX4250AP
MPXA4250AC6T1
MPXA4250AC6U
MPXA4250A6T1
MPXA4250A6U
MPXAZ4250AC6T1
MPXH6250A6U
MPXH6250A6T1
MPXHZ6250AC6T1
MPXH6300ACGU
MPXH6300AC6T1
MPXH6300A6U
MPXH6300A6T1
MPXH6400A6U
MPXH6400A6T1
MPXH6400AC6U
MPXH6400AC6T1
MPXHZ6400AC6T1
MPX5700A
MPX5700AP
MPX5700AS
MPX5700ASX
MPX5700D
MPX5700DP
MPX5700GP
MPX5700GP1
MPX5700GS
MPX5999D
<b>Legend</b>
Uncompensated
Compensated
Integrated

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