

Sensors

Quarter 1, 2007
SG1010Q12007 Rev 0

ACCELERATION SENSORS

Low g Consumer Acceleration Sensors

Product	Sensing Range (g)	Sensing Axis	Sensitivity (mV/g)	I _{DD} (Typ) (mA)	Sleep Mode I _{DD} (μA)	Sleep Mode Response Time (Typ) (ms)	Start Up Response Time (Typ) (ms)	Rolloff Frequency (Hz)	V _{DD} 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
MMA6270Q	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
MMA6271Q	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
MMA6260Q	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
MMA6261Q	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
MMA6262Q	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
MMA6263Q	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
MMA6231Q	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
MMA6233Q	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 _{DD} 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 _{DD} 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 _{DD} 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 ¹	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H ₂ O)	Pressure Rating Maximum (cm H ₂ O)	Pressure Rating Maximum (mm Hg)	Full Scale Span (Typ) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0°C to 85°C (% of VFSS)	Pressure Type ²			
									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 ¹	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H ₂ O)	Pressure Rating Maximum (cm H ₂ 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 ²			
											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		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		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		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		1500	±1.0	40	0.2	-0.3	-0.3				

Compensated Medical Grade Pressure Sensors

Product Family ¹	Pressure Rating Maximum (PSI)	Pressure Rating Maximum (kPa)	Pressure Rating Maximum (in H ₂ O)	Pressure Rating Maximum (cm H ₂ 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 ²			
											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 ₂ O)	Pressure Rating Maximum (cm H ₂ 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 ²			
											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		•	•	

¹ The primary core pressure sensor families are listed above. For orderable parts, please see page 7 or www.freescale.com/sensors

² A = Absolute, D = Differential, G = Gauge, V = Vacuum, • = Available

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
MC33794EGR2	Electric Field Imaging Device	120 kHz generator, shield driver, 9 electrodes + 2 V _{REF} 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 ^{Note}
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 ^{Note}
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 ^{Note}
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

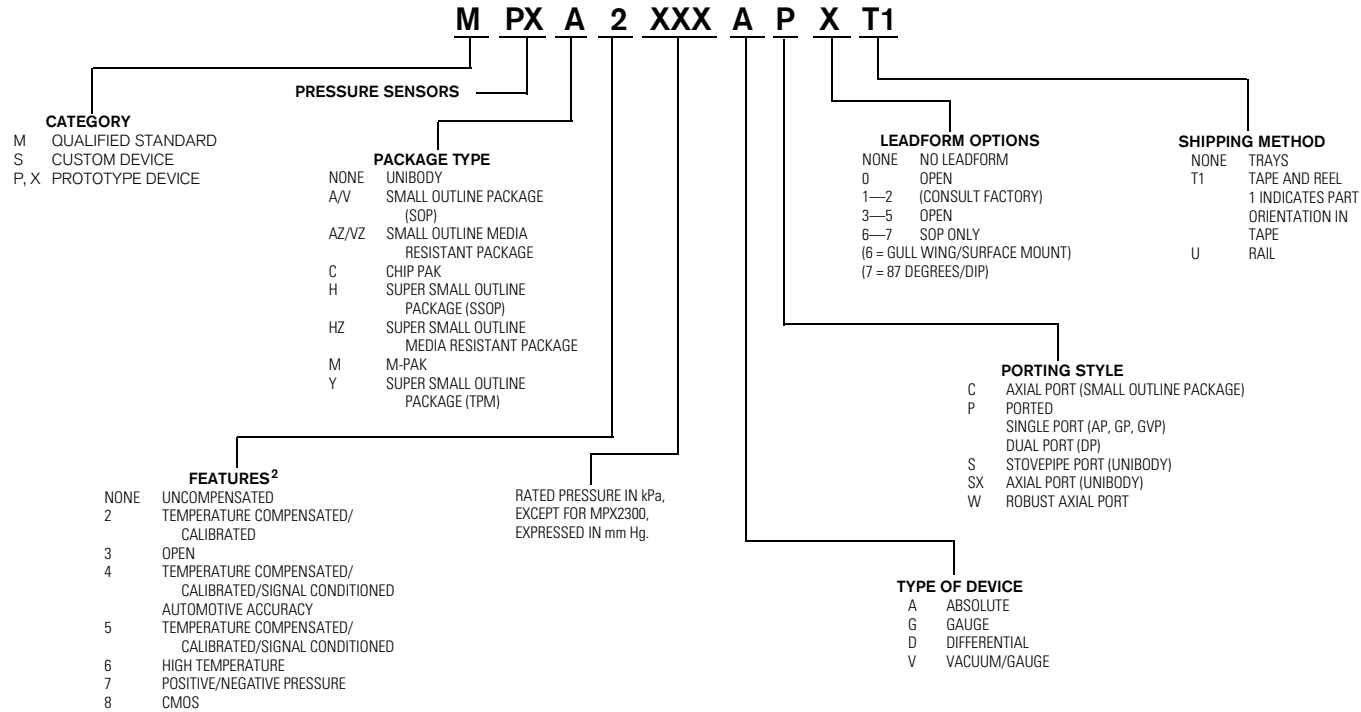
This scalable solution provides wireless network functionality from simple proprietary applications through robust ZigBee applications. Users can demonstrate and develop sensor wireless solutions that support simple point-to-point, star and complex mesh networks.



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 SENSORS¹



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

²Only 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
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MPXM2102GS
MPXM2102GST1
MPXV2102GP
MPXV2102DP
MPX2102A
MPX2102AP
MPX2102ASX
MPXM2102A
MPXM2102AT1
MPXM2102AS
MPXM2102AST1
MPX2100D
MPX2100GP
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MPX2100GVP
MPX2100A
MPX2100AP
MPX2100ASX
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MPXV5010GC6U
MPXV5010GC7U

MPXV5010G6U
MPXV5010G7U
MPXV5010GP
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MPXV7025DP
MPXV7025GP
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MPXV7025GC6T1
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MPXV5100GC6U
MPXV5100GC7U
MPXV5100DP
MPX4080D
MPX4100A
MPX4100AP
MPX4100AS
MPXA4100AC6U
MPXA4100A6T1
MPXA4100A6U
MPXAZ4100AC6U
MPXAZ4100A6U
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MPXV41115V6T1
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MPXA41115A6U
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MPXAZ41115A6T1
MPXAZ41115A6U
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MPXA61115AC6U
MPXA61115A6U
MPXH61115A6T1
MPXH61115A6U
MPXH61115AC6U
MPXHZ61115A6T1
MPXHZ61115A6U
MPXV61115VC6U
MPXV61115VC6T1
MPXHZ6130A6U

MPXHZ6130AC6U
MPX4200A
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MPX4250A
MPX4250AP
MPXA4250AC6T1
MPXA4250AC6U
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MPXHZ6250AC6T1
MPXH6300ACGU
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MPXH6400AC6U
MPXH6400AC6T1
MPXHZ6400AC6T1
MPX5700A
MPX5700AP
MPX5700AS
MPX5700ASX
MPX5700D
MPX5700DP
MPX5700GP
MPX5700GP1
MPX5700GS
MPX5999D

Legend

Uncompensated
Compensated
Integrated

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