

## Low Jitter Crystal Oscillator

### Features

- Output Frequency 2.5 MHz to 850 MHz
- Phase Noise as Low as 150 fs at  
F0 = 156.25 MHz, Integration Bandwidth  
12 kHz - 20 MHz, LVPECL Output
- Ultra Low Spurs (-113 dBc Typical)
- $\pm 50$  ppm Overvoltage and Temperature
- Supports CMOS, LVPECL, LVDS, and HCSL  
Outputs
- Supply Voltage ( $V_{IN}$ ) +2.375V to +3.63V
- Output Enable Option; Can Be Ordered on Pin 1  
or Pin 2
- Industry-Standard and Space-Saving  
5.0 mm x 3.2 mm 6-pin package (MX55) and  
5.0 mm x 7.0 mm (MX57)
- $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  Operating Temperature Range
- Pb-Free and RoHS Compliant
- Short Production Lead Time

### Applications

- 10/40/100G Ethernet
- Optical Communications
- PCIe Gen 1/2/3/4
- Fibre Channel/SAS
- CPRI/OBSAI, XAUI and Backplane SERDES

### General Description

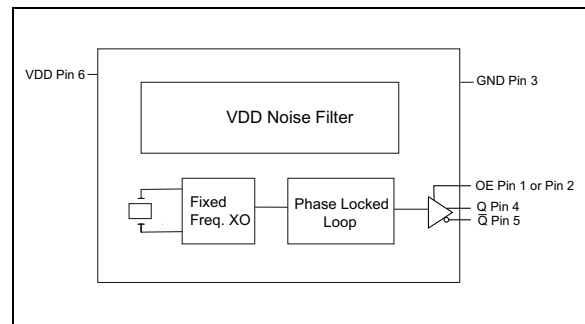
The MX55/MX57 product line is an ultra-low jitter family of industry standard crystal oscillators (XO) designed to maximize performance in networking, storage, server, and telecommunications equipment.

The MX55 employs a space-saving 3.2 mm x 5 mm package, while the MX57 is in a 5 mm x 7 mm package. These devices meet  $\pm 50$  ppm total stability across  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operating temperature range, using proven high reliability assembly methods that improve long term reliability and minimize aging drift compared to traditional XO assembly processes.

With programmable output format and OE options, these XOs can be configured to be footprint compatible with any standard 6-pin XO available today. Standard options and frequencies are also available.

Please visit <http://clockworks.microchip.com/timing> to select a combination of options to customize your product, print a specific data sheet, and order samples.

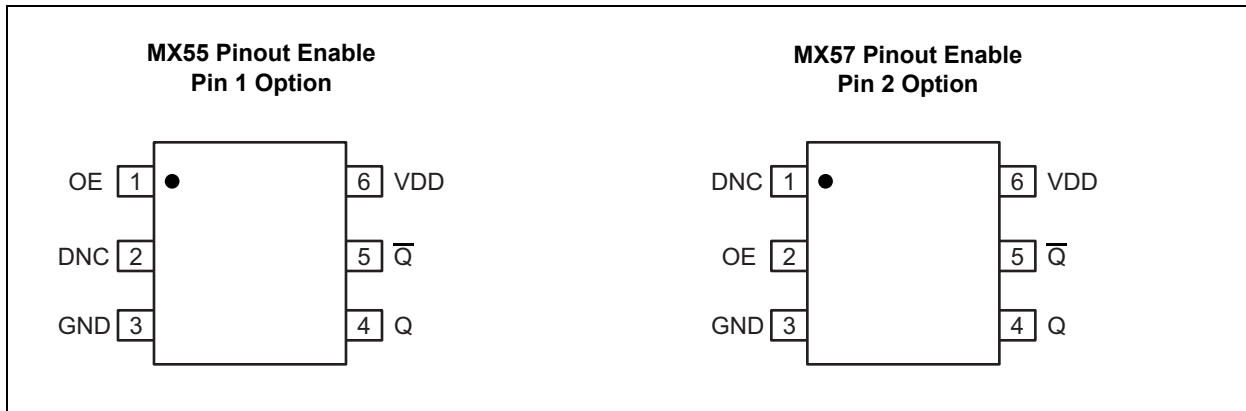
### Block Diagram



# MX55/57

---

## Package Types



## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings †

Input Voltage, (V <sub>IN</sub> ) .....	-0.3V to V <sub>DD</sub> +0.3V
Supply Voltage .....	-0.3V to + 4.0V
ESD Protection (HBM) .....	2 kV
ESD Protection (MM) .....	200V
ESD Protection (CDM) .....	1.5 kV

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

**TABLE 1-1: ELECTRICAL CHARACTERISTICS**

Electrical Characteristics: V <sub>DD</sub> = 2.375V to 3.63V, T <sub>A</sub> = -40°C to +85°C.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Supply Voltage (Note 1)	V <sub>DD</sub>	2.375	—	3.63	V	—
Supply Current	I <sub>DD</sub>	—	85	95	mA	Output enabled LVCMOS (no load).
		—	105	120		LVPECL
		—	80	90		LVDS
		—	85	95		HCSL
		—	68	—		Output disabled (Tri-state)
Frequency Stability	Δf	—	—	±50	ppm	Inclusive of initial accuracy, temperature drift, aging, shock and vibration.
Start-up Time	t <sub>SU</sub>	—	—	20	ms	From 90% V <sub>DD</sub> to valid clock output, T = +25°C
Input Logic Levels	V <sub>IH</sub>	2	—	V <sub>DD</sub> +0.3	V	Input logic-high
	V <sub>IL</sub>	-0.3	—	0.8		Input logic-low
Enable Active High Option (Note 2)	—	—	50	—	kΩ	Pull-up resistor on Pin 1 or 2
Enable Active Low Option (Note 3)	—	—	50	—	kΩ	Pull-down resistor on Pin 1 or 2
<b>LVCMOS</b>						
Frequency	f <sub>0</sub>	2.5	—	250	MHz	—
Integrated Phase Noise (Random)	φ <sub>j</sub>	—	131	—	f <sub>S</sub> RMS	12 kHz to 5 MHz @ 25 MHz
		—	77	—		1.875 MHz to 5 MHz @ 25 MHz
Output High Voltage	V <sub>OH</sub>	V <sub>DD</sub> -0.8	—	—	V	R <sub>L</sub> = 50Ω termination from Q to V <sub>DD</sub> -2
Output Low Voltage	V <sub>OL</sub>	—	—	0.6	V	
Output Rise/Fall Time	T <sub>r</sub> /T <sub>f</sub>	100	—	500	ps	—
Duty Cycle	SYM	45	—	55	%	—
<b>LVPECL</b>						
Frequency	f <sub>0</sub>	2.5	—	850	MHz	—
Integrated Phase Noise (Random)	φ <sub>j</sub>	—	130	—	f <sub>S</sub> RMS	12 kHz to 20 MHz @ 200 MHz
		—	96	—		1.875 MHz to 20 MHz @ 200 MHz

# MX55/57

**TABLE 1-1: ELECTRICAL CHARACTERISTICS (CONTINUED)**

Electrical Characteristics: $V_{DD} = 2.375V$ to $3.63V$ , $T_A = -40^{\circ}C$ to $+85^{\circ}C$ .						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output High Voltage	$V_{OH}$	$V_{DD}-1.35$	$V_{DD}-1.01$	$V_{DD}-0.8$	V	$R_L = 50\Omega$ termination at Q and $\bar{Q}$ , both to $V_{DD}-2$
Output Low Voltage	$V_{OL}$	$V_{DD}-2.0$	$V_{DD}-1.78$	$V_{DD}-1.6$	mV	
Output Differential Voltage	$V_{OD}$	0.65	0.77	0.95	mV	—
Output Rise/Fall Time	$T_r/T_f$	85	—	350	ps	—
Duty Cycle	SYM	45	—	55	%	—
<b>LVDS</b>						
Frequency	$f_0$	2.5	—	850	MHz	—
Integrated Phase Noise (Random)	$\phi_j$	—	140	—	$f_{SRMS}$	12 kHz to 20 MHz @ 200 MHz
		—	94	—		1.875 MHz to 20 MHz @ 200 MHz
Output High Voltage	$V_{OH}$	1.248	1.375	1.602	V	$R_L = 100\Omega$ termination from Q to $\bar{Q}$
Output Low Voltage	$V_{OL}$	0.898	1.025	1.252	V	
Output Differential Voltage	$V_{OD}$	247	350	454	mV	—
Common Mode Output Voltage	$V_{CM}$	1.125	1.2	1.375	V	—
Output Rise/Fall Time	$T_r/T_f$	100	—	400	ps	—
Duty Cycle	SYM	45	—	55	%	—
<b>HCSL</b>						
Frequency	$f_0$	2.5	—	850	MHz	—
Integrated Phase Noise (Random)	$\phi_j$	—	166	—	$f_{SRMS}$	12 kHz to 20 MHz @ 100 MHz
		—	97	—		1.875 MHz to 20 MHz @ 100 MHz
Output High Voltage	$V_{OH}$	660	700	850	V	$R_L = 50\Omega$ termination at Q and $\bar{Q}$ to GND
Output Low Voltage	$V_{OL}$	-150	0	27	mV	
Output Differential Voltage	$V_{OD}$	—	200	250	mV	20% to 80%
		—	250	300		—
Common Mode Output Voltage	$V_{CM}$	48	—	52	mV	Differential
Output Rise/Fall Time	$T_r/T_f$	150	300	450	ps	—
Duty Cycle	SYM	48	—	52	%	—

**Note 1:** VDD Pin should be filtered with a 0.1  $\mu F$  capacitor.

**2:** Output is enabled if pad floated (not connected) or pulled high; output tri-stated if pulled low.

**3:** Output is enabled if pad floated (not connected) or pulled low; output tri-stated if pulled high.

## TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
<b>Temperature Ranges</b>						
Operating Temperature Range	$T_A$	-40	—	85	°C	Ordering Option I
Junction Operating Temperature	$T_J$	—	—	125	°C	—
Storage Temperature Range	$T_S$	-65	—	150	°C	—
Soldering Temperature	—	—	—	260	°C	10 sec. max.
<b>Package Thermal Resistance</b>						
Thermal Resistance from Junction to Ambient	$\theta_{JA}$		—	53	°C/W	5 mm x 7 mm
			—	58		5 mm x 3.2 mm

**Note 1:** The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e.,  $T_A$ ,  $T_J$ ,  $\theta_{JA}$ ). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.

# MX55/57

---

## 2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#) and [Table 2-2](#).

**TABLE 2-1: PIN FUNCTION TABLE (ENABLE PIN 1 OPTION)**

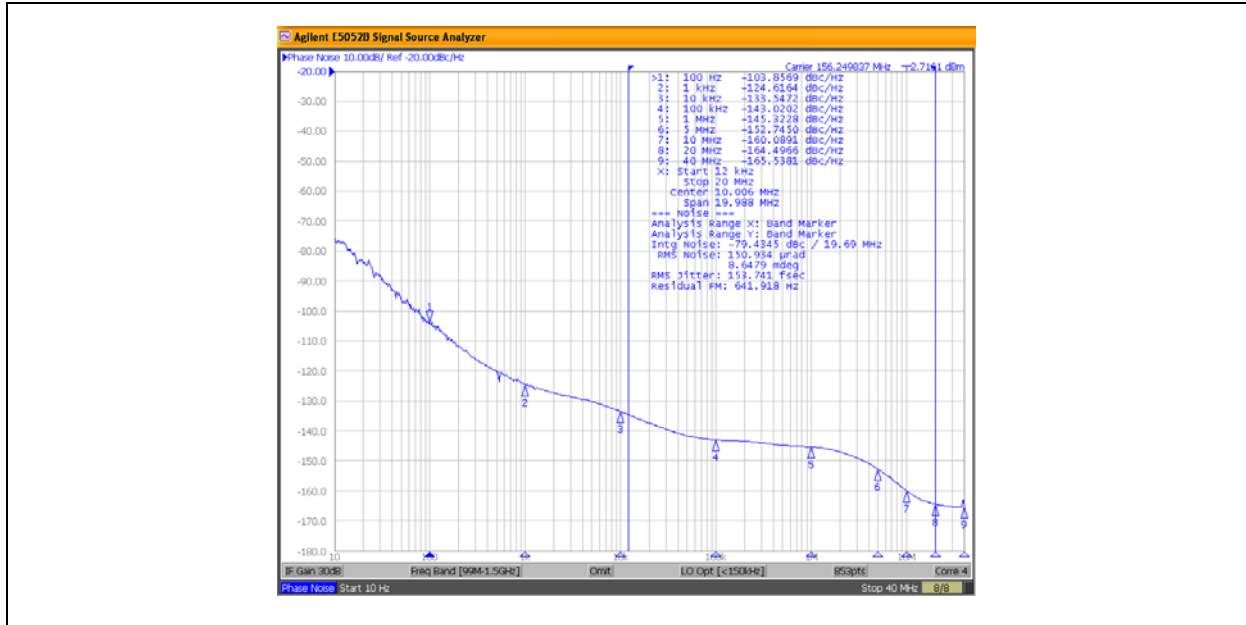
Pin Number	Pin Name	Pin Type	Description
1	OE	I	Output Enable. Active-High and Active-Low Options.
2	DNC	NC	Do not connect, Leave Floating.
3	GND	Power	Power Supply Ground.
4	Q	O	Clock Output + or Output for CMOS.
5	$\overline{Q}$	O	Clock Output – or Do Not Connect for CMOS.
6	VDD	Power	Power Supply.

**TABLE 2-2: PIN FUNCTION TABLE (ENABLE PIN 2 OPTION)**

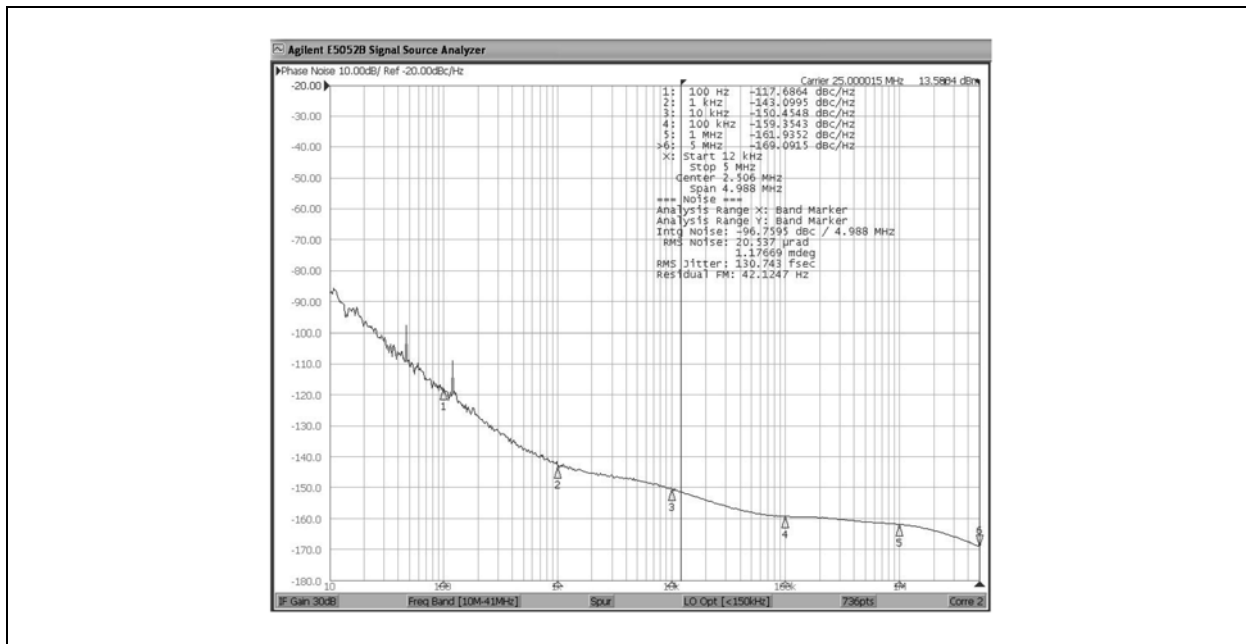
Pin Number	Pin Name	Pin Type	Description
1	DNC	NC	Do not connect, Leave Floating.
2	OE	I	Output Enable. Active-High and Active-Low Options.
3	GND	Power	Power Supply Ground.
4	Q	O	Clock Output + or Output for CMOS.
5	$\overline{Q}$	O	Clock Output – or Do Not Connect for CMOS.
6	VDD	Power	Power Supply.

## 3.0 PERFORMANCE CHARACTERISTICS

**Note:** The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.



**FIGURE 3-1:** LVPECL Output 156.25 MHz 12 kHz - 20 MHz 153 fs.



**FIGURE 3-2:** LVCMOS Output 25 MHz 12 kHz - 5 MHz 131 fs.

# MX55/57

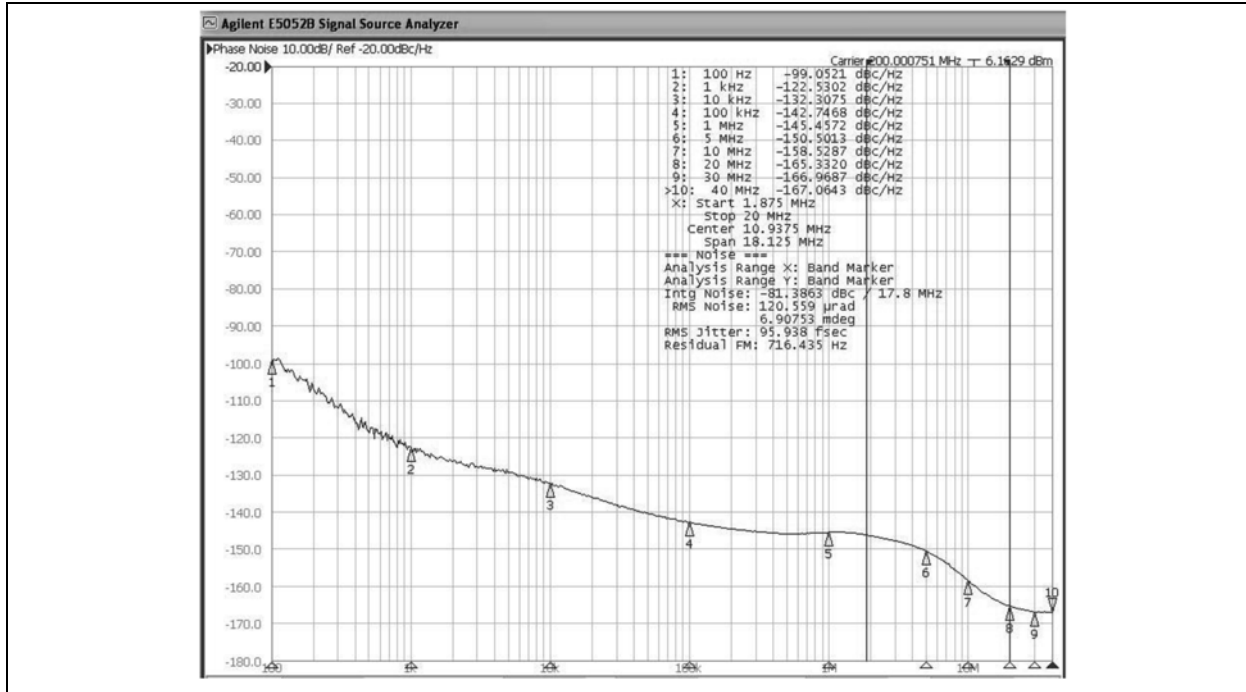


FIGURE 3-3: LVPECL Output 200 MHz 1.875 MHz - 20 MHz 96 fs.

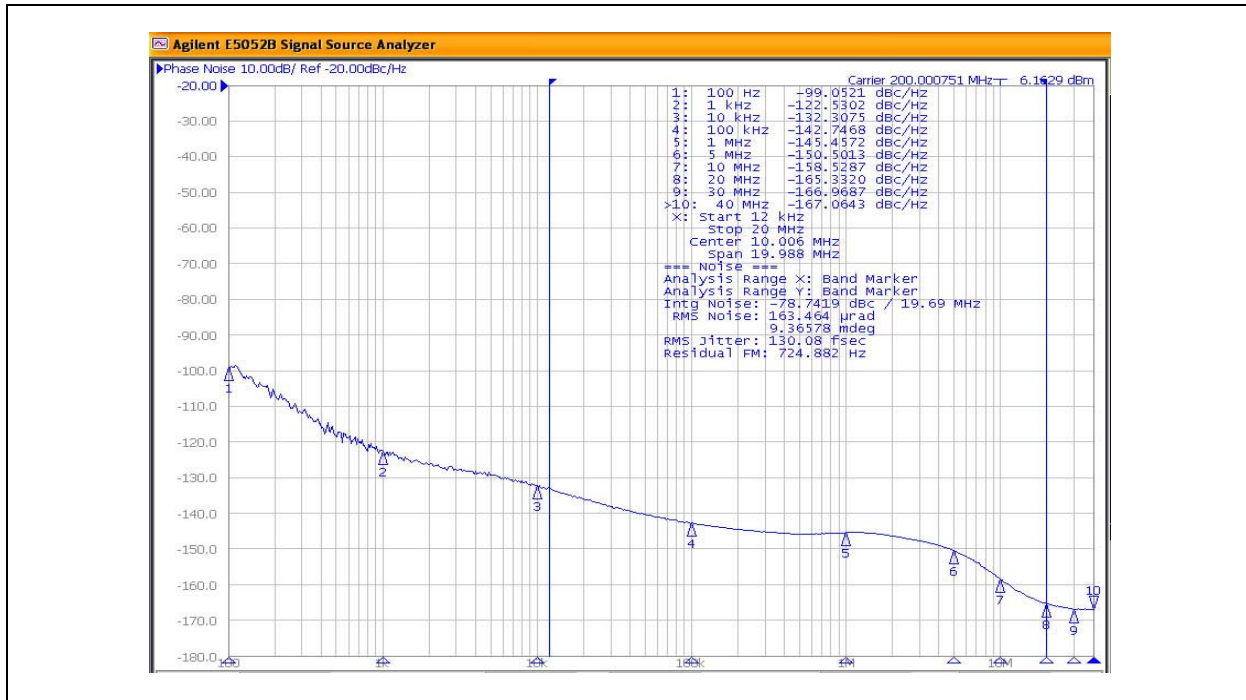
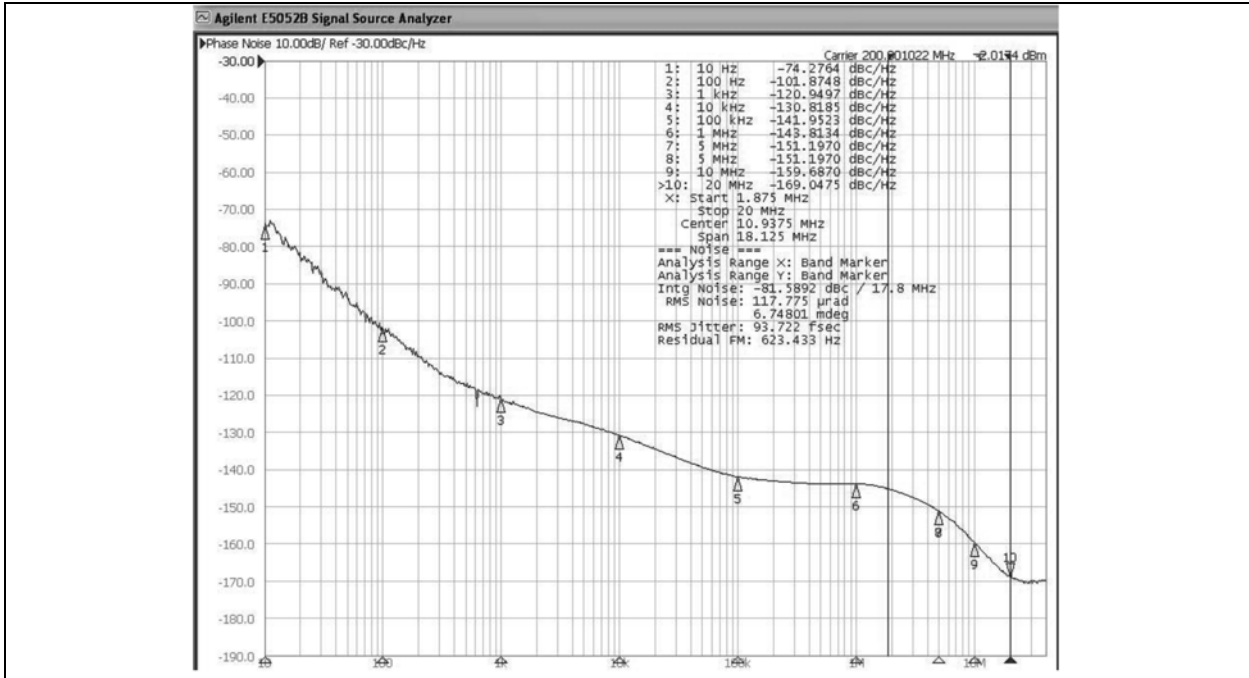
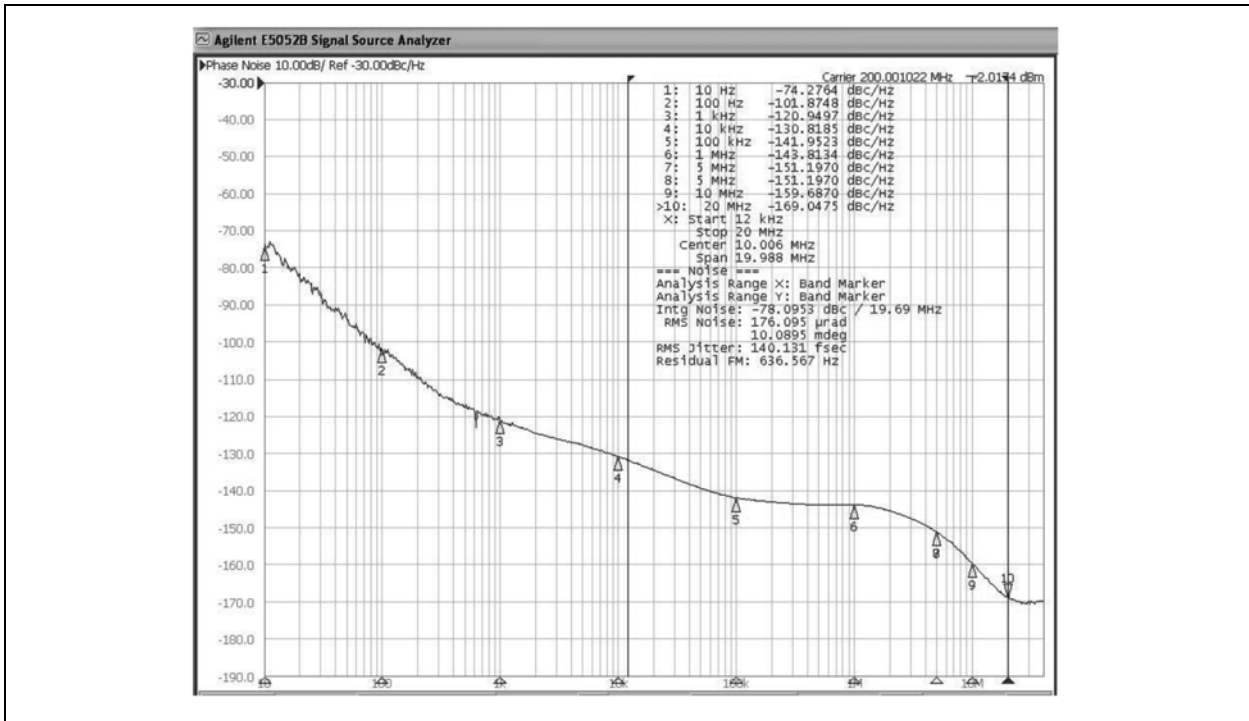


FIGURE 3-4: LVPECL Output 200 MHz 12 kHz - 20 MHz 130 fs.

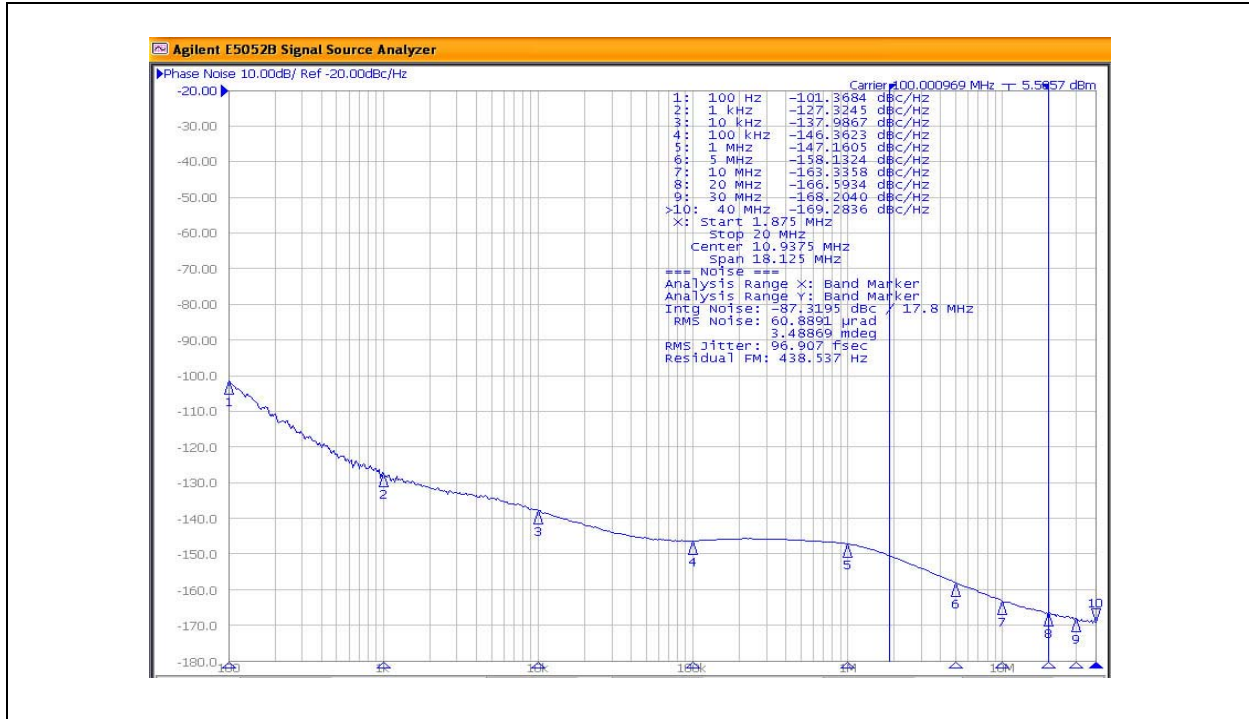




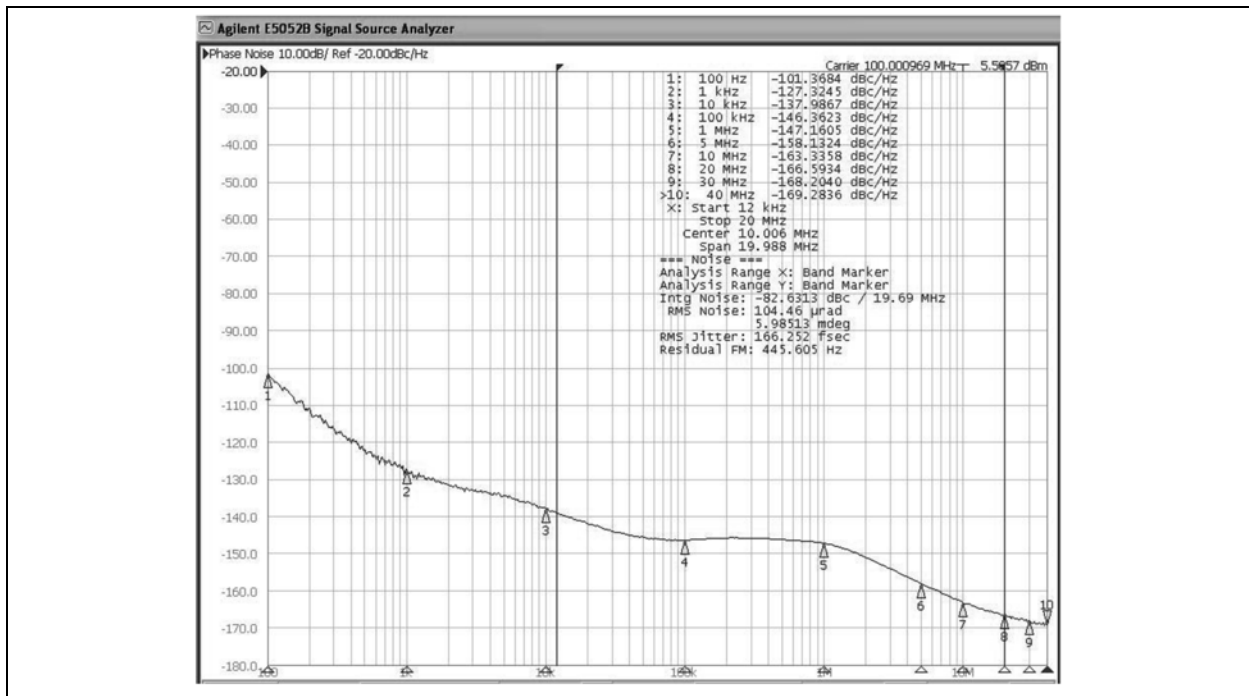
**FIGURE 3-5:** LVDS Output 200 MHz 1.875 MHz - 20 MHz 94 fs.



**FIGURE 3-6:** LVDS Output 200 MHz 12 kHz - 20 MHz 140 fs.

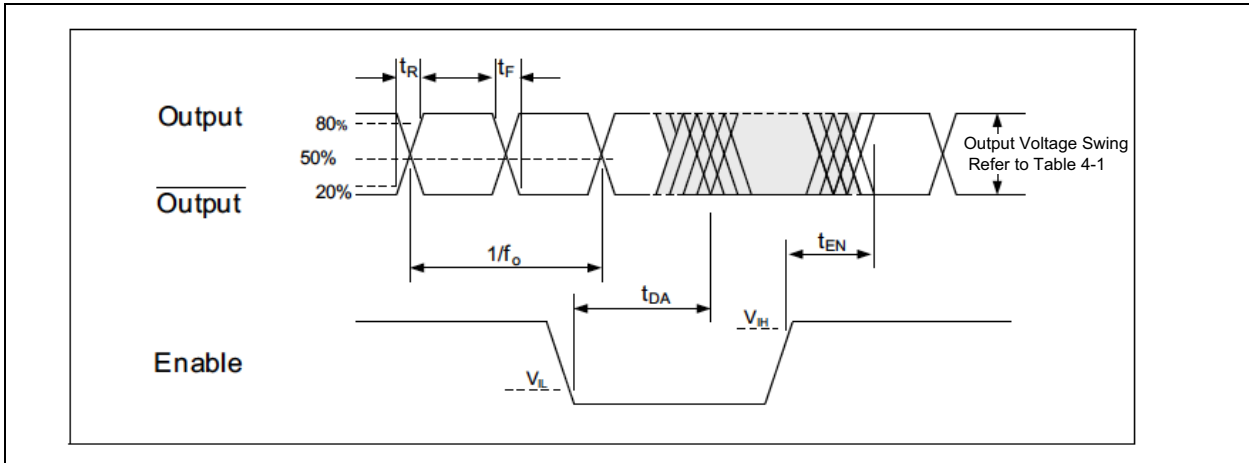


**FIGURE 3-7:** HCSL Output 100 MHz 1.875 MHz - 20 MHz 97 fs.



**FIGURE 3-8:** HCSL Output 100 MHz 12 kHz - 20 MHz 166 fs.

## 4.0 OUTPUT WAVEFORM



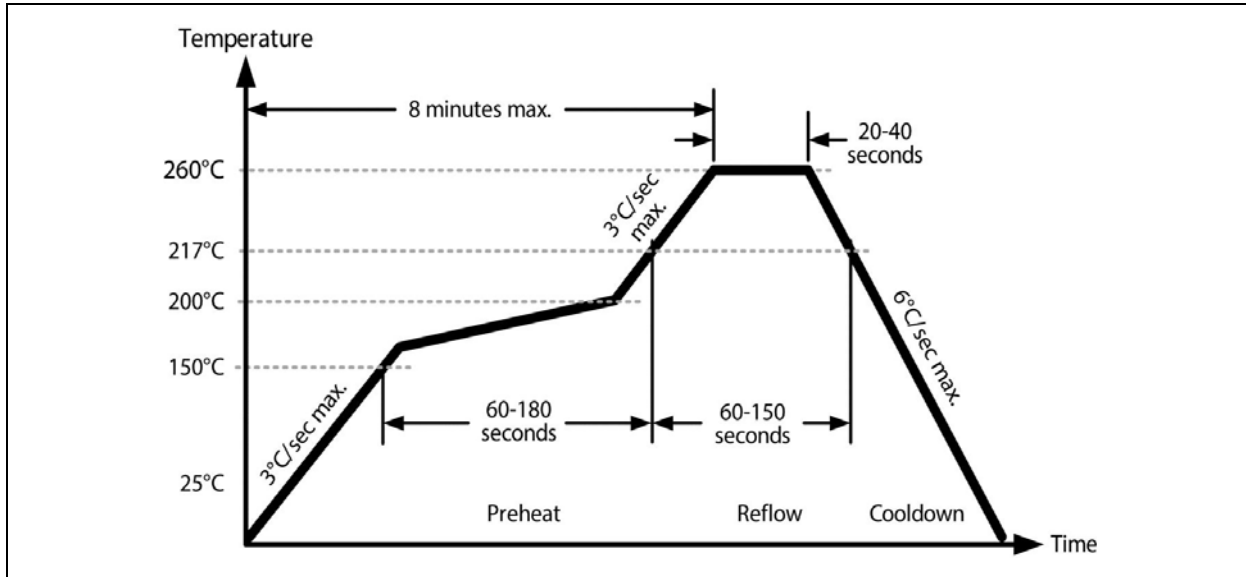
**FIGURE 4-1:** Output Waveform: LVPECL, LVDS, HCSL, LVCMOS.

**TABLE 4-1: OUTPUT VOLTAGE SWING**

Output Logic Protocol	Output Swing (mV Peak-Peak, Typical)
LVCMOS	$V_{OH}, V_{OL}$
LVPECL	770 mV
LVDS	350 mV
HCSL	700 mV

# MX55/57

## 5.0 SOLDER REFLOW PROFILE



**FIGURE 5-1:** Solder Reflow Profile.

**TABLE 5-1: SOLDER REFLOW**

Refer to JSTD-020C	
Ramp-Up Rate (200°C to Peak Temp.)	3°C/sec. max.
Preheat Time 150°C to 200°C	60 to 180 sec.
Time Maintained above 217°C	60 to 150 sec.
Peak Temperature	255°C to 260°C
Time within 5°C of Actual Peak	20 to 40 sec.
Ramp-Down Rate	6°C/sec. max.
Time 25°C to Peak Temperature	8 minutes max.

**6.0 ENVIRONMENTAL SPECIFICATIONS****TABLE 6-1: ENVIRONMENTAL SPECIFICATIONS**

<b>Parameter</b>	<b>Specification</b>
Thermal Shock	MIL-STD-883, Method 1011, Condition A
Moisture Resistance	MIL-STD-883, Method 1004
Mechanical Shock	MIL-STD-883, Method 2022, Condition C
Mechanical Vibration	MIL-STD-883, Method 2007, Condition B
Resistance to Soldering Heat	J-STD-020C, Table 5-2 Pb-free Devices (Except 2 Cycles Max)
Hazardous Substance	Pb-Free/RoHS/Green Compliant
Solderability	JESD22-B102-D Method 2 (Preconditioning E)
Terminal Strength	MIL-STD-883, Method 2004, Test Condition D
Gross Leak	MIL-STD-883, Method 1014, Condition C
Fine Leak	MIL-STD-883, Method 1014, Condition A2, R1 = $2 \times 10^{-8}$ ATM CC/S
Solvent Resistance	MIL-STD-202, Method 215

# MX55/57

## 7.0 PACKAGING INFORMATION

### 7.1 Package Marking Information

6-Pin LGA\*  
5 mm x 7 mm

XXXXXXXX  
WNNN  
XXXXXXXXXX

Example

MX575AB  
1958  
F100M000

6-Pin LGA\*  
3.2 mm x 5 mm

XXXXXX  
WNNN  
XXXXXX

Example

MX555A  
1817  
BF1000

**Legend:** XX...X Product code, customer-specific information, or frequency in MHz without printed decimal point  
Y Year code (last digit of calendar year)  
YY Year code (last 2 digits of calendar year)  
WW Week code (week of January 1 is week '01')  
NNN Alphanumeric traceability code  
(e3) Pb-free JEDEC® designator for Matte Tin (Sn)  
\* This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.  
●, ▲, ▼ Pin one index is identified by a dot, delta up, or delta down (triangle mark).

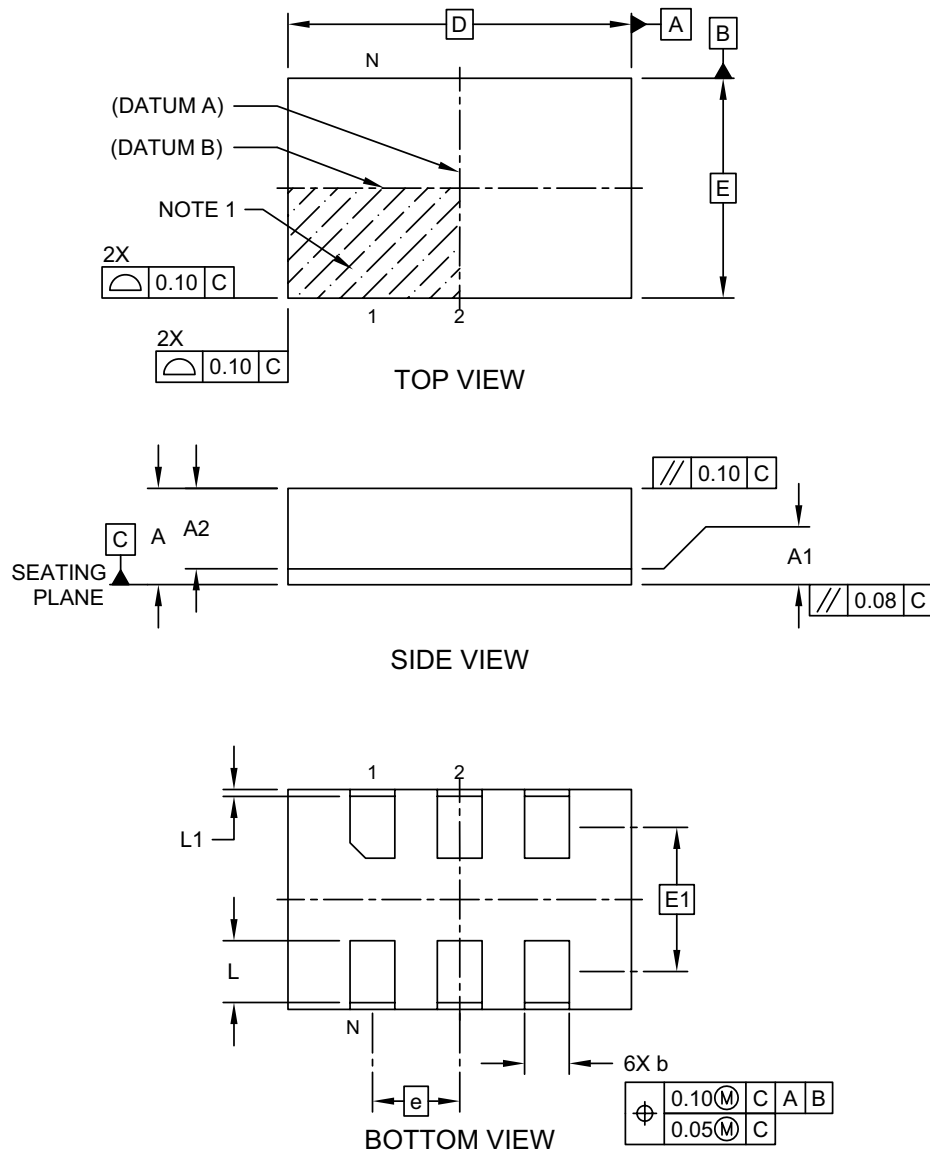
**Note:** In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar ( \_ ) and/or Overbar ( ¯ ) symbol may not be to scale.

## 6-Lead Low 5.0 mm x 3.2 mm LGA Package Outline and Recommended Land Pattern

### 6-Lead Low Profile Land Grid Array (ANA) - 5.0x3.2 mm Body [LLGA]

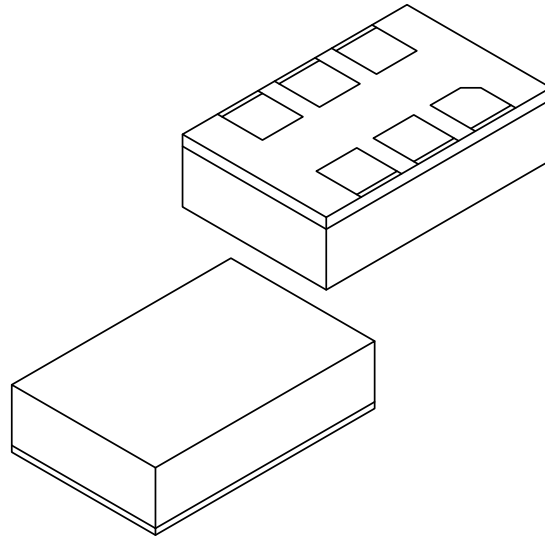
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1068A Sheet 1 of 2

## 6-Lead Low Profile Land Grid Array (ANA) - 5.0x3.2 mm Body [LLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Terminals	N	6		
Pitch	e	1.27 BSC		
Overall Height	A	1.26	1.33	1.40
Substrate Thickness	A1	0.19	0.23	0.27
Mold Cap Height	A2	1.07	1.10	1.13
Overall Length	D	5.00 BSC		
Overall Width	E	3.20 BSC		
Terminal Pitch	E1	2.10 BSC		
Terminal Width	b	0.85	0.90	0.95
Terminal Length	L	0.85	0.90	0.95
Terminal Pullback	L1	0.05	0.10	0.15

**Notes:**

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

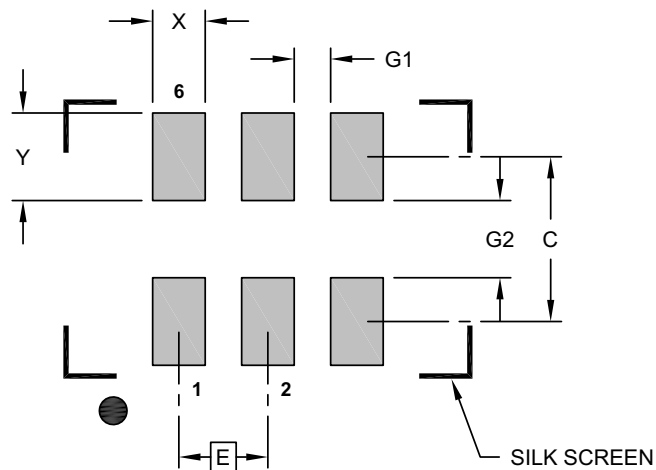
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1068A Sheet 2 of 2



## 6-Lead Low Profile Land Grid Array (ANA) - 5.0x3.2 mm Body [LLGA]

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



### RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		2.35	
Contact Pad Width (X6)	X			0.75
Contact Pad Length (X6)	Y			1.25
Spacing Between Pads (X4)	G1	0.52		
Spacing Between Pads (X3)	G2	1.10		

**Notes:**

- Dimensioning and tolerancing per ASME Y14.5M  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
- For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

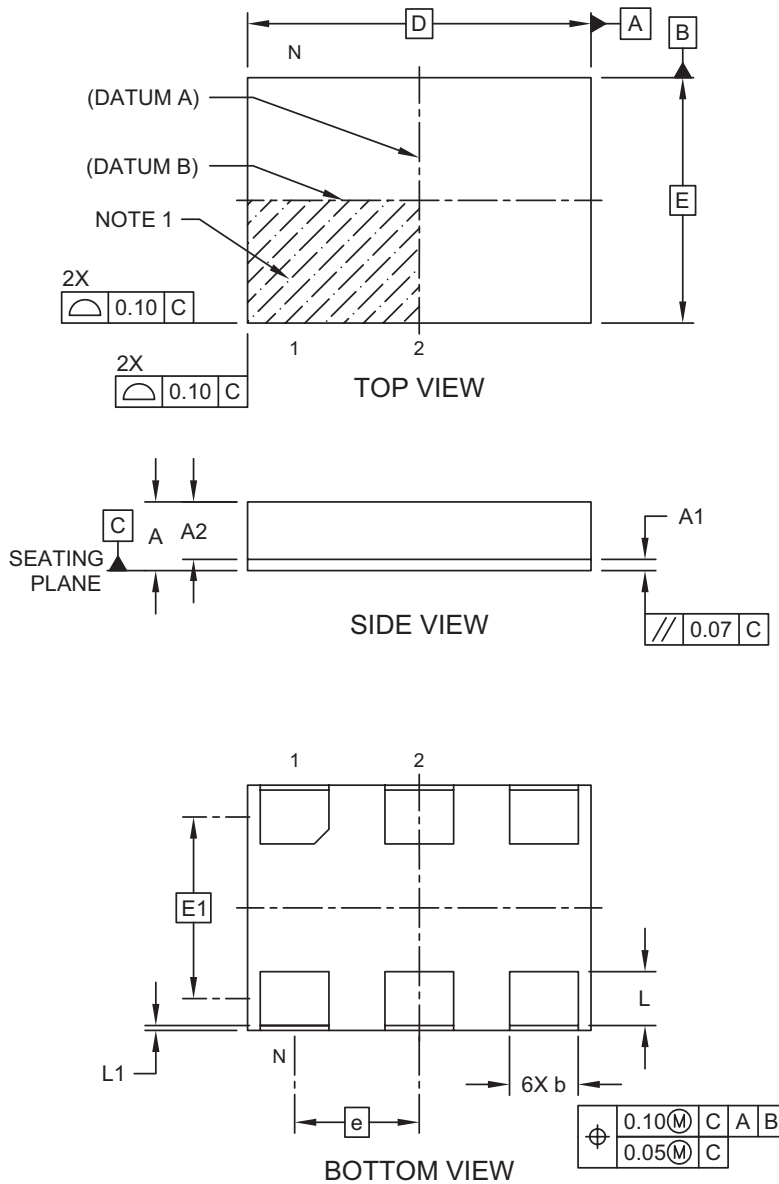
Microchip Technology Drawing C04-3068A

# MX55/57

## 6-Lead Low 7 mm x 5 mm LGA Package Outline and Recommended Land Pattern

### 6-Lead Low Profile Land Grid Array [APA] - 7x5 mm Body (LLGA)

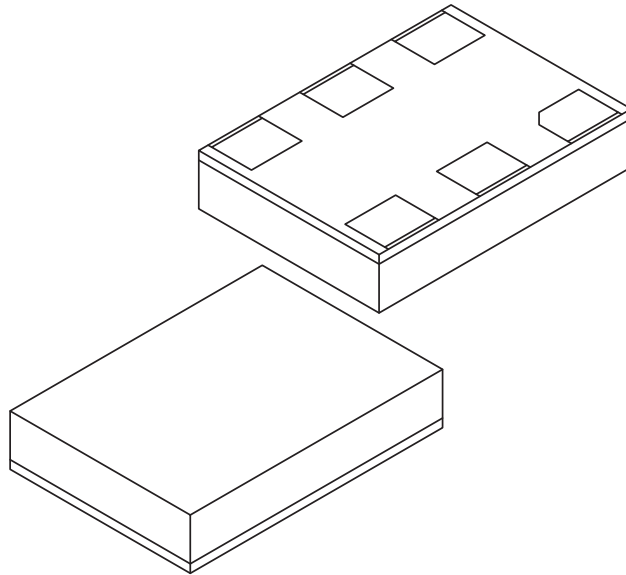
**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1071A Sheet 1 of 2

## 6-Lead Low Profile Land Grid Array [APA] - 7x5 mm Body (LLGA)

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Terminals	N	6		
Pitch	e	2.54 BSC		
Overall Height	A	1.26	1.33	1.40
Substrate Thickness	A1	0.19	0.23	0.27
Mold Cap Thickness	A2	1.07	1.10	1.13
Overall Length	D	7.00 BSC		
Pitch	E1	3.70 BSC		
Overall Width	E	5.00 BSC		
Terminal Width	b	1.35	1.40	1.45
Terminal Length	L	1.05	1.10	1.15
Pullback	L1	0.05	0.10	0.15

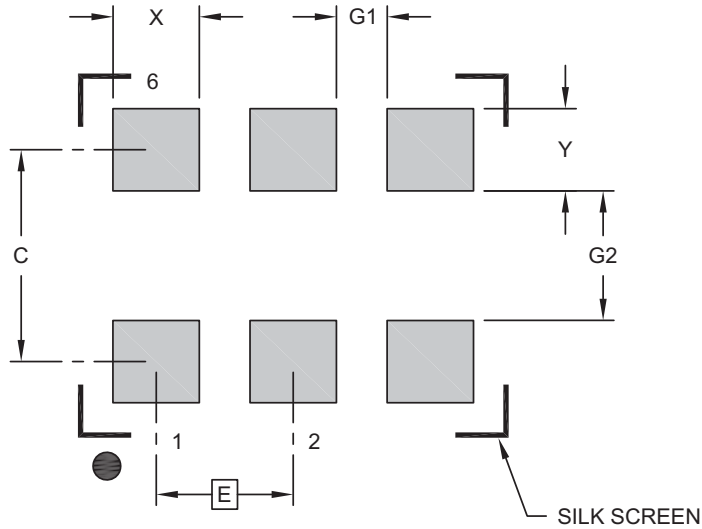
**Notes:**

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Dimensioning and tolerancing per ASME Y14.5M  
 BSC: Basic Dimension. Theoretically exact value shown without tolerances.  
 REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1071A Sheet 2 of 2

## 6-Lead Low Profile Land Grid Array [APA] - 7x5 mm Body (LLGA)

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		2.54 BSC	
Contact Pad Spacing	C		3.93	
Contact Pad Width (X6)	X			1.60
Contact Pad Length (X6)	Y			1.53
Contact to Contact (X4)	G1	0.94		
Contact to Contact (X3)	G2	2.40		

**Notes:**

1. Dimensioning and tolerancing per ASME Y14.5M  
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-3071A

NOTES:



## APPENDIX A: REVISION HISTORY

### Revision A (March 2018)

- Initial creation of MX55/57 Microchip data sheet DS20005972A.

# MX55/57

---

NOTES:



## PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	XX	X	X	XXXMXXX	XX
Device	Crystal Frequency	Enable Pin Option	Output Logic Type	Output Frequency	Shipping
<b>Device:</b>	MX55:	Low Jitter Crystal Oscillator in 6-Pin 5 mm × 3.2 mm			
	MX57:	Low Jitter Crystal Oscillator in 6-Pin 7 mm × 5 mm			
<b>Crystal Frequency:</b>	5A (Example Only) = Option selected by ClockWorks Configurator for Manufacturing				
<b>Enable Pin Option:</b>	B	=	Pin 1		
	N	=	Pin 2		
<b>Output Logic Type: (For Enable Pin 1)</b>	A	=	PECL (Active High)		
	B	=	LVDS (Active High)		
	C	=	CMOS (Active High)		
	D	=	HCSL (Active High)		
	F	=	PECL (Active Low)		
	G	=	LVDS (Active Low)		
	H	=	CMOS (Active Low)		
	J	=	HCSL (Active Low)		
<b>Output Logic Type: (For Enable Pin 2)</b>	R	=	PECL (Active High)		
	S	=	LVDS (Active High)		
	T	=	CMOS (Active High)		
	U	=	HCSL (Active High)		
	L	=	PECL (Active Low)		
	M	=	LVDS (Active Low)		
	N	=	CMOS (Active Low)		
	P	=	HCSL (Active Low)		
<b>Output Frequency:</b>	xxxMxxx	=	2.5 MHz to 850 MHz		
<b>Shipping</b>	TA	=	Tube		
	RA	=	Tape & Reel		
Please visit <a href="http://clockworks.microchip.com/timing">http://clockworks.microchip.com/timing</a> to select a combination of options to customize your product, print a specific data sheet and order samples.					
<b>Examples:</b>					
a) MX555ABF 100M000TA Low Jitter Crystal Oscillator in 6-Pin 5 mm × 3.2 mm, Pin 1 PECL Active Low, 100 MHz, Tube					
b) MX575ABF 100M000RA Low Jitter Crystal Oscillator in 6-Pin 5 mm × 7 mm, Pin 1 PECL Active Low, 100 MHz, Reel					
c) MX555ANU 100M000TA Low Jitter Crystal Oscillator in 6-Pin 5 mm × 3.2 mm, Pin 2 PECL Active Low, 250 MHz, Tube					
d) MX575ANN 100M000RA Low Jitter Crystal Oscillator in 6-Pin 5 mm × 7 mm, Pin 2 CMOS Active Low, 150 MHz, Reel					
<b>Note 1:</b> Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.					

# MX55/57

---

NOTES:

---

---

**Note the following details of the code protection feature on Microchip devices:**

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

---

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

*Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELoQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.*

**QUALITY MANAGEMENT SYSTEM  
CERTIFIED BY DNV  
= ISO/TS 16949 =**

### Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BeaconThings, BitCloud, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Helder, JukeBlox, KEELoQ, KEELoQ logo, Klear, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, RightTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, CryptoAuthentication, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICTail, PureSilicon, QMatrix, RightTouch logo, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2018, Microchip Technology Incorporated, All Rights Reserved.  
ISBN: 978-1-5224-2830-5



# MICROCHIP

## Worldwide Sales and Service

### AMERICAS

**Corporate Office**  
2355 West Chandler Blvd.  
Chandler, AZ 85224-6199  
Tel: 480-792-7200  
Fax: 480-792-7277  
Technical Support:  
<http://www.microchip.com/support>  
Web Address:  
[www.microchip.com](http://www.microchip.com)

#### Atlanta

Duluth, GA  
Tel: 678-957-9614  
Fax: 678-957-1455

#### Austin, TX

Tel: 512-257-3370

#### Boston

Westborough, MA  
Tel: 774-760-0087  
Fax: 774-760-0088

#### Chicago

Itasca, IL  
Tel: 630-285-0071  
Fax: 630-285-0075

#### Dallas

Addison, TX  
Tel: 972-818-7423  
Fax: 972-818-2924

#### Detroit

Novi, MI  
Tel: 248-848-4000

#### Houston, TX

Tel: 281-894-5983

#### Indianapolis

Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453  
Tel: 317-536-2380

#### Los Angeles

Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608  
Tel: 951-273-7800

#### Raleigh, NC

Tel: 919-844-7510

#### New York, NY

Tel: 631-435-6000

#### San Jose, CA

Tel: 408-735-9110  
Tel: 408-436-4270

#### Canada - Toronto

Tel: 905-695-1980  
Fax: 905-695-2078

### ASIA/PACIFIC

**Australia - Sydney**  
Tel: 61-2-9868-6733

**China - Beijing**  
Tel: 86-10-8569-7000

**China - Chengdu**  
Tel: 86-28-8665-5511

**China - Chongqing**  
Tel: 86-23-8980-9588

**China - Dongguan**  
Tel: 86-769-8702-9880

**China - Guangzhou**  
Tel: 86-20-8755-8029

**China - Hangzhou**  
Tel: 86-571-8792-8115

**China - Hong Kong SAR**  
Tel: 852-2943-5100

**China - Nanjing**  
Tel: 86-25-8473-2460

**China - Qingdao**  
Tel: 86-532-8502-7355

**China - Shanghai**  
Tel: 86-21-3326-8000

**China - Shenyang**  
Tel: 86-24-2334-2829

**China - Shenzhen**  
Tel: 86-755-8864-2200

**China - Suzhou**  
Tel: 86-186-6233-1526

**China - Wuhan**  
Tel: 86-27-5980-5300

**China - Xian**  
Tel: 86-29-8833-7252

**China - Xiamen**  
Tel: 86-592-2388138

**China - Zhuhai**  
Tel: 86-756-3210040

### ASIA/PACIFIC

**India - Bangalore**  
Tel: 91-80-3090-4444

**India - New Delhi**  
Tel: 91-11-4160-8631

**India - Pune**  
Tel: 91-20-4121-0141

**Japan - Osaka**  
Tel: 81-6-6152-7160

**Japan - Tokyo**  
Tel: 81-3-6880-3770

**Korea - Daegu**  
Tel: 82-53-744-4301

**Korea - Seoul**  
Tel: 82-2-554-7200

**Malaysia - Kuala Lumpur**  
Tel: 60-3-7651-7906

**Malaysia - Penang**  
Tel: 60-4-227-8870

**Philippines - Manila**  
Tel: 63-2-634-9065

**Singapore**  
Tel: 65-6334-8870

**Taiwan - Hsin Chu**  
Tel: 886-3-577-8366

**Taiwan - Kaohsiung**  
Tel: 886-7-213-7830

**Taiwan - Taipei**  
Tel: 886-2-2508-8600

**Thailand - Bangkok**  
Tel: 66-2-694-1351

**Vietnam - Ho Chi Minh**  
Tel: 84-28-5448-2100

### EUROPE

**Austria - Wels**  
Tel: 43-7242-2244-39  
Fax: 43-7242-2244-393

**Denmark - Copenhagen**  
Tel: 45-4450-2828  
Fax: 45-4485-2829

**Finland - Espoo**  
Tel: 358-9-4520-820

**France - Paris**  
Tel: 33-1-69-53-63-20  
Fax: 33-1-69-30-90-79

**Germany - Garching**  
Tel: 49-8931-9700

**Germany - Haan**  
Tel: 49-2129-3766400

**Germany - Heilbronn**  
Tel: 49-7131-67-3636

**Germany - Karlsruhe**  
Tel: 49-721-625370

**Germany - Munich**  
Tel: 49-89-627-144-0  
Fax: 49-89-627-144-44

**Germany - Rosenheim**  
Tel: 49-8031-354-560

**Israel - Ra'anana**  
Tel: 972-9-744-7705

**Italy - Milan**  
Tel: 39-0331-742611  
Fax: 39-0331-466781

**Italy - Padova**  
Tel: 39-049-7625286

**Netherlands - Drunen**  
Tel: 31-416-690399  
Fax: 31-416-690340

**Norway - Trondheim**  
Tel: 47-7289-7561

**Poland - Warsaw**  
Tel: 48-22-3325737

**Romania - Bucharest**  
Tel: 40-21-407-87-50

**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**Sweden - Gothenberg**  
Tel: 46-31-704-60-40

**Sweden - Stockholm**  
Tel: 46-8-5090-4654

**UK - Wokingham**  
Tel: 44-118-921-5800  
Fax: 44-118-921-5820

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Microchip:

[MX553ABB212M500 TR](#) [MX575ABA100M000 TR](#) [MX573ABA212M500](#) [MX553ABB212M500](#) [MX575ABC125M000 TR](#) [MX575ABC125M000](#) [MX573BBB156M250](#) [MX573BBA312M500 TR](#) [MX573BBB156M250 TR](#) [MX573ABA212M500 TR](#) [MX573BBA156M250](#) [MX573BBA156M250 TR](#) [MX575ABA100M000](#) [MX573BBA312M500](#) [MX575ABC125M000-TR](#) [MX573ABA212M500-TR](#) [MX573BBA156M250-TR](#) [MX575ABA100M000-TR](#) [MX573BBA312M500-TR](#) [MX553ABB212M500-TR](#) [MX573BBB156M250-TR](#) [MX553BBA156M250](#) [MX555ABH25M0000](#) [MX574BBD322M265](#) [MX553BBA312M500-TR](#) [MX553BBA312M500](#) [MX553BNR156M250-TR](#) [MX573NBA622M080](#) [MX573NBA622M080-TR](#) [MX573NBD311M040](#) [MX573NBD311M040-TR](#) [MX573NBB311M040](#) [MX573NBB311M040-TR](#) [MX575ABC70M0000](#) [MX575ABC70M0000-TR](#) [MX555ABJ100M000](#) [MX555ABJ100M000-TR](#) [MX555ABA750M000](#) [MX555ABA750M000-TR](#) [MX553BBB156M250-TR](#) [MX555ABA800M000](#) [MX555ABA800M000-TR](#) [MX555ABD800M000](#) [MX555ABD800M000-TR](#) [MX554EBA680M000](#) [MX554EBA680M000-TR](#) [MX555ANU100M000](#) [MX555ANU100M000-TR](#) [MX553EBB125M000](#) [MX553EBB125M000-TR](#) [MX554BBB322M265](#) [MX554BBB322M265-TR](#) [MX575ABD800M000](#) [MX575ABD800M000-TR](#) [MX555ABG750M000-TR](#) [MX555ABG750M000](#) [MX554ENL120M000](#) [MX575ANR200M000-TR](#) [MX555ABG300M000-TR](#) [MX555ABA133M333-TR](#) [MX575ABD100M000-TR](#) [MX574BBA805M664](#) [MX555ABD100M000](#) [MX555ABA15M0000-TR](#) [MX574EBA840M000](#) [MX575ABH250M000](#) [MX573BNR156M250-TR](#) [MX574BBF644M531](#) [MX575ABB25M0000](#) [MX573DNN16M6666-TR](#) [MX575ABB200M000-TR](#) [MX555ABA150M000](#) [MX575ANL15M0000](#) [MX575ABC100M000-TR](#) [MX575ABC25M0000-TR](#) [MX553NBF155M520](#) [MX574BNR805M664](#) [MX573EBB125M000](#) [MX575ABD100M000](#) [MX575ANS500M000](#) [MX553SBB148M351-TR](#) [MX574EBJ440M000-TR](#) [MX553LM00000000](#) [MX575ABF100M000](#) [MX555ABB850M000](#) [MX555ABB200M000](#) [MX574EBC20M0000-TR](#) [MX553BBD156M250](#) [MX573BNR156M250](#) [MX575ABH15M0000](#) [MX553DBG166M666](#) [MX554ENT20M0000-TR](#) [MX553LN00000000](#) [MX573DNR16M6666](#) [MX573LBB148M500](#) [MX553ENL125M000](#) [MX553BBD156M250-TR](#) [MX573EBH125M000](#) [MX574BBJ322M265-TR](#) [MX554EBB120M000-TR](#)