MX85xxxx Family

Complete Clocking Solution with Integrated Crystal, Synthesizer, and Fanout

ClockWorks™ Fusion

General Description

Micrel's MX85xxxx family of parts are ultra-low phase noise clocking solutions that integrate the crystal, synthesizer, and fanout buffers, providing up to two frequencies from a single 5mm × 7mm LGA package.

Integrating the entire clock chain means that 162fs jitter performance includes fanout and crosstalk. The MX85xxxx family offers a series of crystal frequency options that generate commonly-required Ethernet, storage, telecommunications, and computing clock frequencies up to 840MHz. Configuring the MX85xxxx parts using OTP options, a variety of output frequencies are available.

Optimized for applications that require performance, reliability, and high integration, the MX85xxxx family delivers the complete clocking chain from crystal to fanout buffer.

Data sheets and support documentation can be found on Micrel's web site at: www.micrel.com.

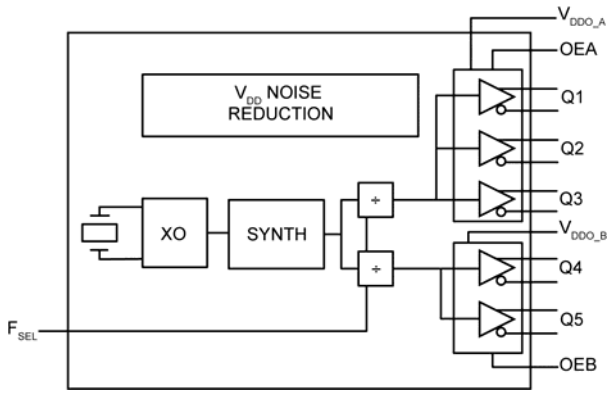
Features

- Complete ultra-low jitter clocking solution
- Highly integrated, includes crystal and fanout buffers
- Ultra-low 162fs jitter, including fanout buffer (156MHz output frequency, 12kHz to 20MHz integration bandwidth, including crosstalk)
- Two output frequencies up to 840MHz
- Supports LVPECL, LVDS, HCSL, and CMOS outputs
- Integrated power supply noise reduction and frequency select
- Independent OE and V_{DDO} per output bank
- ±50ppm total stability option (includes aging)
- –40°C to +85°C temperature range option
- Available in compact 5mm × 7mm LGA package

Applications

- 10/40/100 Gigabit Ethernet
- Fibre Channel, SAS/SATA
- Networking, computing, servers, PCI Express 2.0/3.0
- Telecom
- Wireless infrastructure

Functional Block Diagram



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Ordering Information

Part Number[1]	Shipping	Package
MX85xxxxxxTA	Tube	38-Pin 5mm × 7mm LGA
MX85xxxxxxRA	Tape and Reel	38-Pin 5mm × 7mm LGA

Note:

1. Insert custom code into “xxxxxx”. Contact Micrel for details regarding exact configurations, options, and part numbers available.

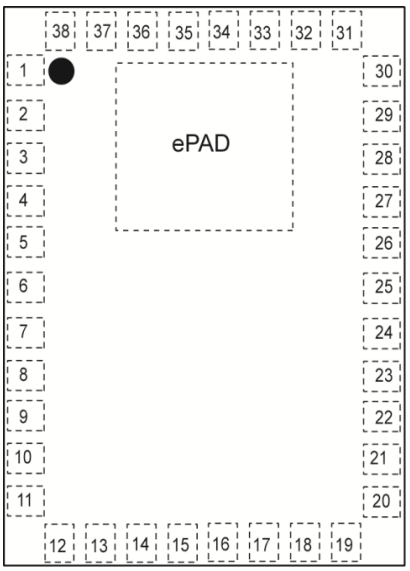
Standard Frequencies[2]

Part Number	Frequencies (MHz)
MX852Axxxxx	26.041666, 52.08333, 78.125, 104.1666, 130.20833, 156.25, 208.33333, 260.41666, 312.5, 390.625, 520.83333, 625, 781.25
MX852Exxxxx	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 725, 750, 775, 800, 825
MX852Cxxxxx	26.5625, 53.125, 106.25, 132.81250, 159.375, 212.5, 318.75, 425, 531.25

Note:

2. Optimal frequencies. Additional output frequencies are available. Contact Micrel for more frequency options.

Pin Configuration



38-Pin 5mm × 7mm LGA
Top View

Absolute Maximum Ratings[1]

Supply Voltage (V_{DDA}, V_{DD}, V_{DDO}) ..... +4.6V
Input Voltage (V_{IN}) ..... –0.50V to V_{DD}+0.5V
Lead Temperature (soldering, 20s) ..... 260°C
Storage Temperature (T_s) ..... –65°C to +150°C

Operating Ratings[2]

Supply Voltage (V_{DDOX}, V_{DD}, V_{DDA}) ..... +2.375V to +3.465V
Ambient Temperature (T_A) ..... –40°C to +85°C

Electrical Characteristics[4]

V_{DD} = V_{DDO_A} = V_{DDO_B} = 3.3V ±5%, or 2.5V ±5%
V_{DD} = 3.3V ±5%, V_{DDO_A} = V_{DDO_B} = 3.3V ±5%, or 2.5V ±5%
T_A = –40°C to +85°C, unless noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{DDX}	2.5V Operating Voltage		2.375	2.5	2.625	V
	3.3V Operating Voltage		3.135	3.3	3.465	V
I_{DD}	Core Supply Current	Outputs not loaded		90		mA
F_0	Frequency Range	V_{DDO_A} output bank	12		840	MHz
		V_{DDO_B} output bank				
$F_{STABILITY}$	Frequency Stability[5]	Frequency stability over temperature			±20	ppm
		Total stability			±50	
t_{START}	Start-Up Time				20	ms
t_{SKEW}	Output-to-Output Skew[6]				45	ps
$t_{JIT}(\phi)$	RMS Phase Jitter Including Crosstalk All outputs active, LVPECL	156.25MHz (12kHz to 20MHz)		162		fs
		156.25MHz (1.875MHz to 20MHz)		73		
		312.5MHz (12kHz to 20MHz)		227		

Notes:

1. Permanent device damage may occur if absolute maximum ratings are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.
3. Package thermal resistance assumes exposed pad is soldered (or equivalent) to the devices most negative potential on the PCB.
4. The circuit is designed to meet the DC specifications shown in the above table after thermal equilibrium has been established (configuration dependent). Contact Micrel for details.
5. Inclusive of temperature drift, aging, initial accuracy, shock, and vibration. Operating temperature range dependent on part number configuration.
6. Skew between output buffers. Measured at the output differential crossing points. Applies to outputs at the same supply voltage using same output format.

Phase Noise Plots

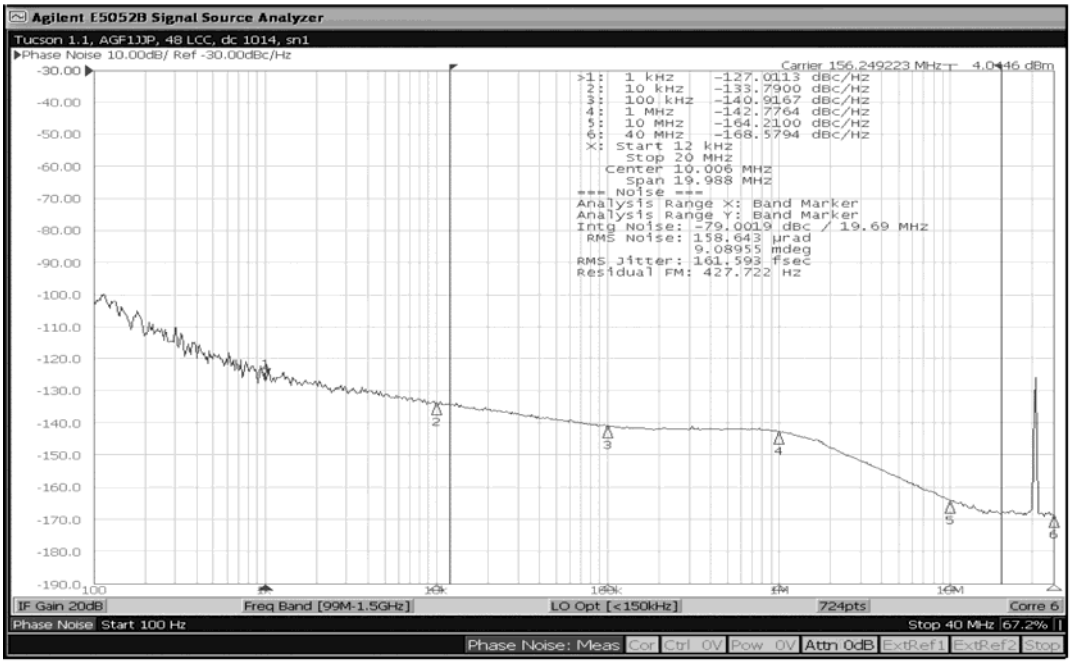


Figure 1. LVPECL Output (156.25MHz), 12kHz–20MHz Integration Bandwidth, 162fs Jitter, All Outputs Active

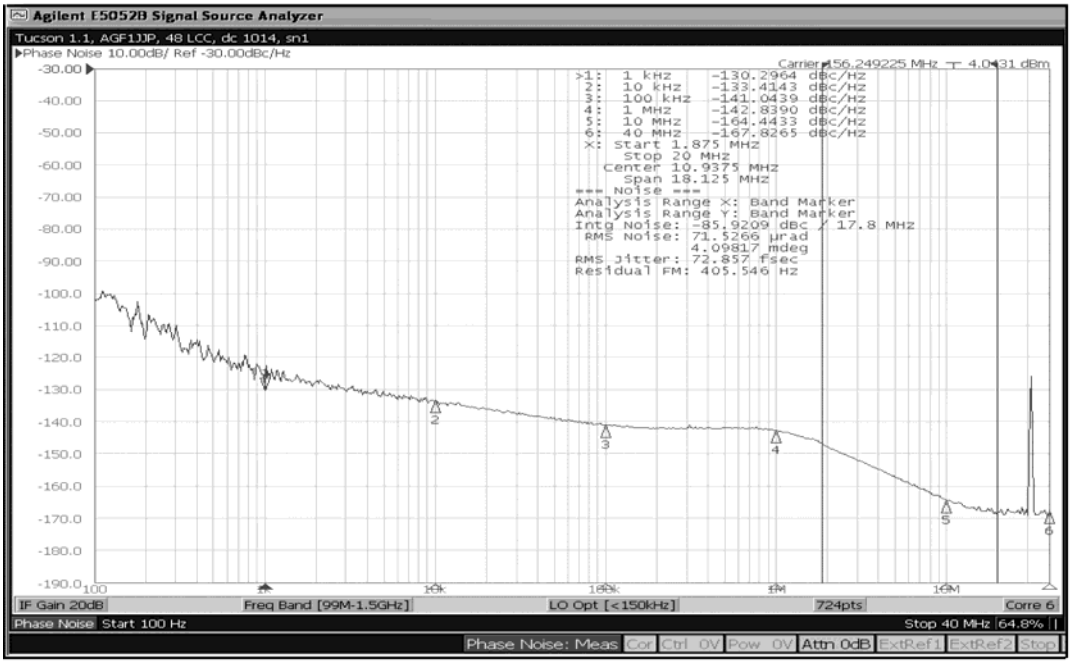


Figure 2. LVPECL Output (156.25MHz), 1.875MHz–20MHz Integration Bandwidth, 73fs Jitter, All Outputs Active

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Phase Noise Plots (Continued)

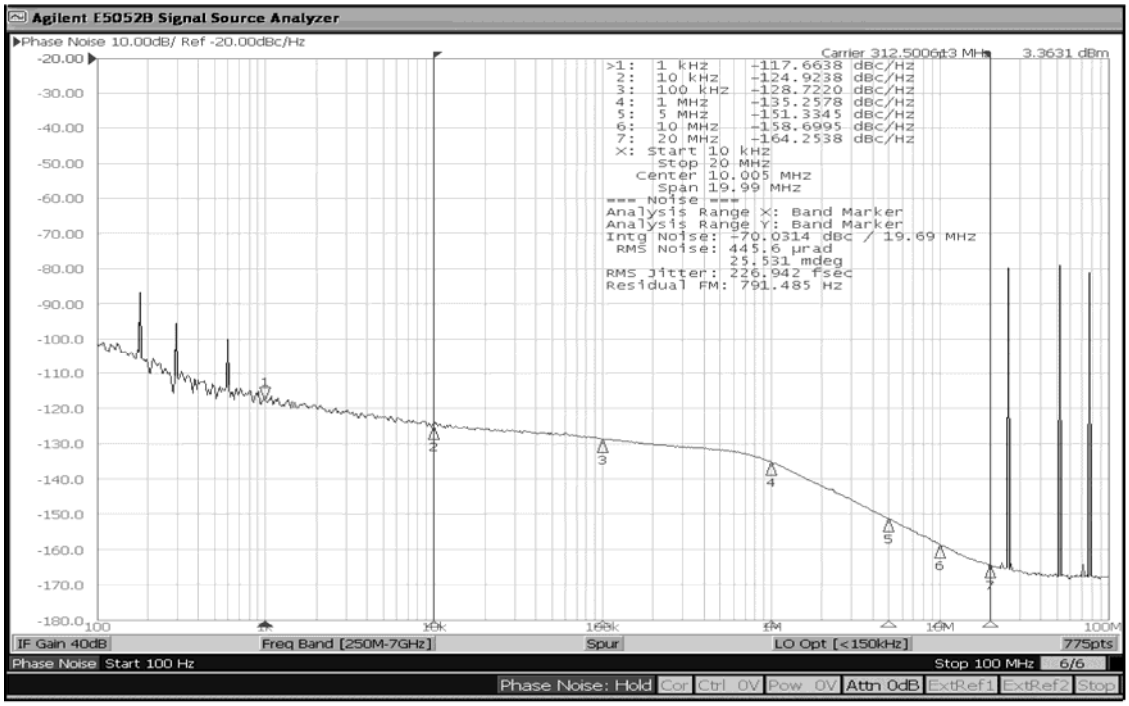
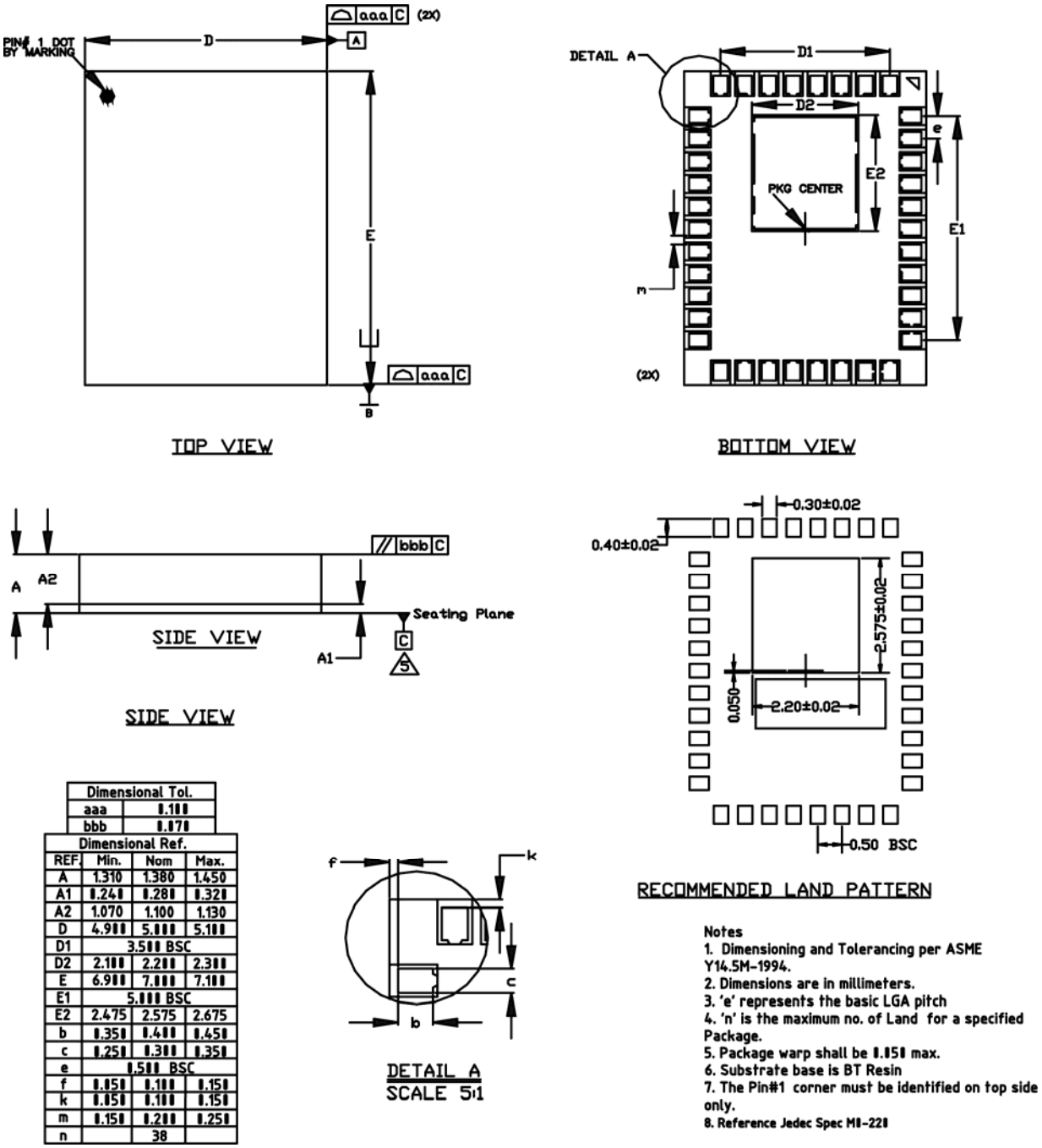


Figure 3. LVPECL Output (312.5MHz), 12kHz–20MHz Integration Bandwidth, 227fs Jitter, All Outputs Active

Package Information(1)



Dimensional Tol.	
aaa	0.100
bbb	0.070

Dimensional Ref.			
REF.	Min.	Nom	Max.
A	1.310	1.380	1.450
A1	0.240	0.280	0.320
A2	1.070	1.100	1.130
D	4.900	5.000	5.100
D1	3.500 BSC		
D2	2.100	2.200	2.300
E	6.900	7.000	7.100
E1	5.000 BSC		
E2	2.475	2.575	2.675
b	0.350	0.400	0.450
c	0.250	0.300	0.350
e	0.500 BSC		
f	0.050	0.100	0.150
k	0.050	0.100	0.150
m	0.150	0.200	0.250
n		38	

Notes
1. Dimensioning and Tolerancing per ASME Y14.5M-1994.
2. Dimensions are in millimeters.
3. 'e' represents the basic LGA pitch
4. 'n' is the maximum no. of Land for a specified Package.
5. Package warp shall be 0.050 max.
6. Substrate base is BT Resin
7. The Pin#1 corner must be identified on top side only.
8. Reference Jedec Spec MO-220

38-Pin 5mm × 7mm LGA (MM)

Note:

1. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

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