Mems Oscillator, High Performance Differential Oscillator, LVPECL and LVDS 1.000 MHz to 220.000MHz **IM840 Series**

Features:

- MEMS Technology
- Direct pin to pin drop-in replacement for industry-standard packages
- 0.6 pSec RMS phase jitter (random) over 12 kHz to 20 MHz bandwidth
- LVPECL and LVDS output signaling types
- Industry-standard package 3.2 x 2.5, and 5.0 x 3.2 mm x mm
- Pb-free, RoHS and REACH compliant

Typical Applications:

- Fibre Channel
- Server and Storage
- GPON, EPON
- 100M / 1G /10G Ethernet

Electronic Specifications:

Frequency Range	1.000 MHz to 220.000 MHz	
Frequency Stability	See Part Number Guide	Inclusive of all changes in Operating Temp. Range, Load, and Voltage.
First Year Aging	±2.0 ppm max	+25°C ±2.0°C
10 Years Aging	±5.0 ppm max	+25°C ±2.0°C
Operating Temperature	See Part Number Guide	
Supply Voltage (Vdd) ±10%	See Part Number Guide	
Input Voltage High	70% of Vdd min	Pin 1, OE or $\overline{ST}$
Input Voltage Low	30% of Vdd max	Pin 1, OE or $\overline{ST}$
Input Pull-up Impedance	100 kΩ typ., 250 kΩ max 2.0 MΩ min	Pin 1, OE logic high or logic low, or $\overline{ST}$ logic high Pin 1, $\overline{ST}$ logic low
Start-up Time	6.0 mSec typ., 10.0 mSec max	Measured from the time Vdd reaches its rated minimum values
Resume Time	6.0 mSec typ., 10.0 mSec max	Measured from the time $\overline{ST}$ pin crosses 50% threshold.
Symmetry	45%/55%	
LVPECL, DC and AC Characteristics		
Current Consumption	61 mA typ., 69 mA max	Excluding Load Termination Current, Vdd = +3.3 V or +2.5 V
OE Disable Supply Currrent	35 mA max	OE = Low
Output Disable Leakage Current	1 µA max	OE = Low
Standby Current	100 µA max	$\overline{ST}$ = Low, for all Vdds
Maximum Output Current	30 mA max	Max average current drawn from OUT+ or OUT-
Logic "1"	Vdd -1.1 min / Vdd – 0.7 max	See figure 1(a)
Logic "0"	Vdd -1.9 min / Vdd – 1.5 max	See figure 1(a)
Output Differential Voltage Swing	1.2 V min. 1.6V typ., 2.0 V max	See figure 1(b)
Rise/Fall Time	300 pSec typ, 700 pSec max	20% to 80%, see figure 1(a)
OE Enable/Disable Time	115 nSec max	F = 212.50 MHz – For other frequencies, T_oe = 100nSec + 3 period
RMS Period Jitter	1.2 pSec typ., 1.7 pSec max 1.2 pSec typ., 1.7 pSec max 1.2 pSec typ., 1.7 pSec max	F = 100.00 MHz, Vdd = +3.3 V or +2.5 V F = 156.25 MHz, Vdd = +3.3 V or +2.5 V F = 212.25 MHz, Vdd = +3.3 V or +2.5 V
RMS Phase Jitter (random)	0.60 pSec typ, 0.85 pSec max.	F = 156.25 MHz, Integration Bandwidth = 12 kHz to 20 MHz all Vdds
LVDS, DC and AC Characteristics		
Current Consumption	47 mA typ., 55 mA max	Excluding Load Termination Current, Vdd = +3.3 V or +2.5 V
OE Disable Supply Current	35 mA max	OE = Low
Differential Output Voltage	250mV min, 350mA typ. 450mV max	See Figure 2
Output Disable Leakage Current	1 µA max	OE = Low
Standby Current	100 µA max	$\overline{ST}$ = Low, for all Vdds
VOD Magnitude Change	50 mV max	See Figure 2
Offset Voltage	1.125 mV min, 1.200 mV typ., 1.375 mV max	See Figure 2
VOS Magnitude Change	50 mV max	See Figure 2
Rise/Fall Time	495 pSec typ. 700 pSec max	20% to 80%, See Figure 2
OE Enable Time/Disable Time	115 nSec max	F = 212.25 MHz, For other Frequencies, T_oe=100nSec + 3 period
RMS Period Jitter	1.2 pSec typ, 1.7 pSec max 1.2 pSec typ, 1.7 pSec max 1.2 pSec typ, 1.7 pSec max	F = 100.00 MHz, Vdd = +3.3 V or +2.5 V F = 156.25 MHz, Vdd = +3.3 V or +2.5 V F = 212.25 MHz, Vdd = +3.3 V or +2.5 V
RMS Phase Jitter (random)	0.60pSec typ., 0.85 pSec max	F = 156.25 MHz, Integration Bandwidth = 12 kHz to 20 MHz all Vdds

Notes:

- All min and max limits are specified over temperature and rated operating voltage with 15pF output unless otherwise stated.
- Typical values are at +25ºC and nominal supply voltage.

Ordering Information:

Part Number Guide						
Packages	Input Voltage	Operating Temperature	Stability (ppm)	Output	Select Function	Frequency
IM840B – 5.0 x 3.2 IM840C – 3.2 x 2.5	1 = +1.8 V* 6 = +2.5 V 3 = +3.3 V (see Notes)	1 = 0ºC to +70ºC 2 = -40ºC to +85ºC 3 = -20ºC to +70ºC	E = ±10 F = ±20 A = ±25 Z = ±30 B = ±50	8 = LVDS 9 = LVPECL	H = Tri-state S = Standby	- Frequency
Notes: • +1.8 V Supply Voltage (option 1) is for LVDS outputs only						

Sample Part Number: **IM840C-62F9S-100.0000MHz**

This 100.0000 MHz oscillator in a 3.2 x 2.5 package with stability ±20 ppm from -40ºC to +85ºC using a supply voltage of +2.5 V. With an output waveform of LCPECL and Pin 1 functioning as Standby

Sample Part Number: **IM840B-13Z8H-150.0000MHz**

This 150.0000 MHz oscillator in a 5.0 x 3.2 package with stability ±30 ppm from -20ºC to +70ºC using a supply voltage of +1.8 V. . With an output waveform of LVDS and Pin 1 functioning as Tri-state.

Notes:

- Not all options are available at all frequencies and temperatures ranges.
- Please consult with sales department for any other parameters or options.
- Oscillator specification subject to change without notice.

Absolute Maximum Limits	
Storage Temperature	-65ºC to +150ºC
Supply Voltage (Vdd)	-0.5 VDC to 4.0 VDC
Electrostatic Discharge	2000 V max
Solder Temperature (follow standard Pb free soldering guidelines)	260ºC max
Junction Temperature	150ºC max

Waveform Diagrams:

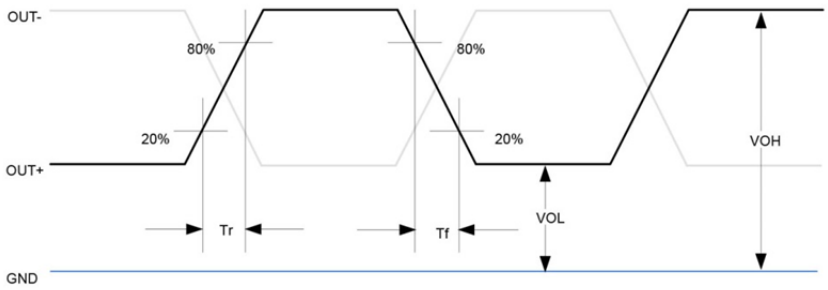


Figure 1(a): LVPECL Voltage Levels per Differential Pin (OUT+/OUT-)

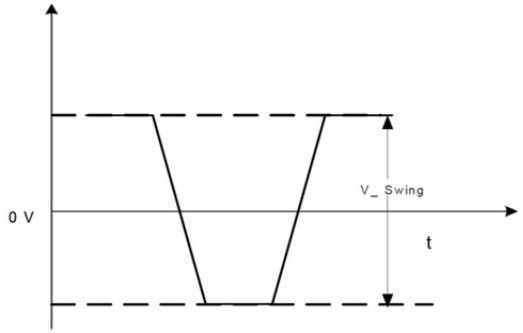


Figure 1(b): LVPECL Voltage Levels Across Differential Pair

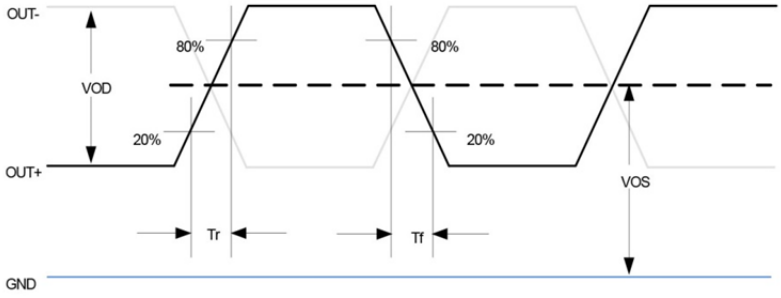


Figure 2: LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

Termination Diagrams – LVPECL:

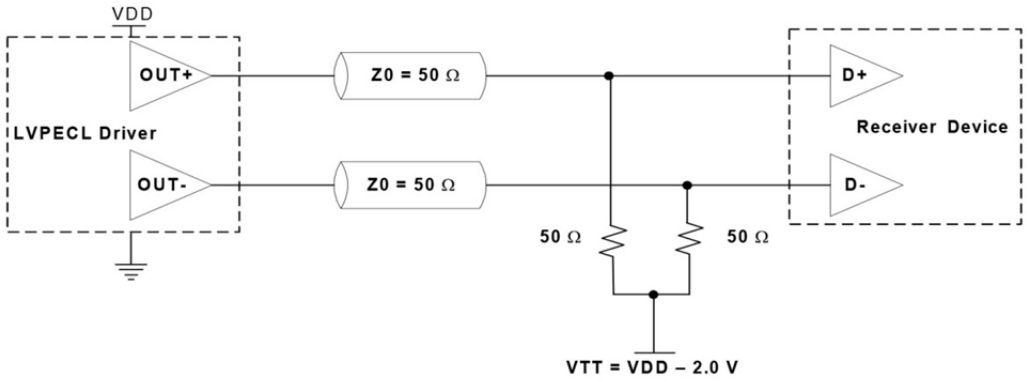


Figure 3: LVPECL Typical Termination

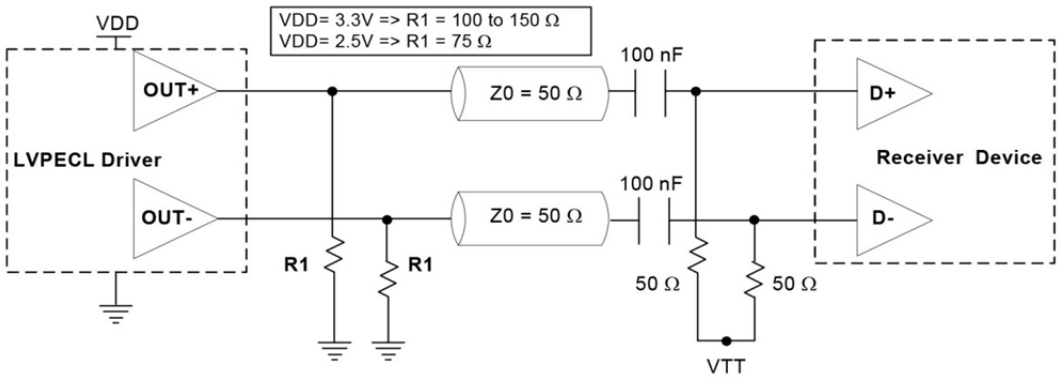


Figure 4: LVPECL AC Coupled Termination

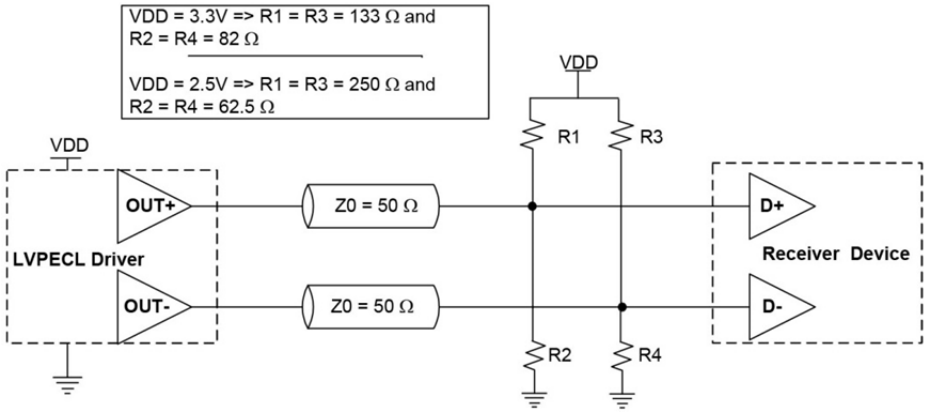


Figure 5: LVPECL with Thevenin Typical Termination

Termination Diagram – LVDS:

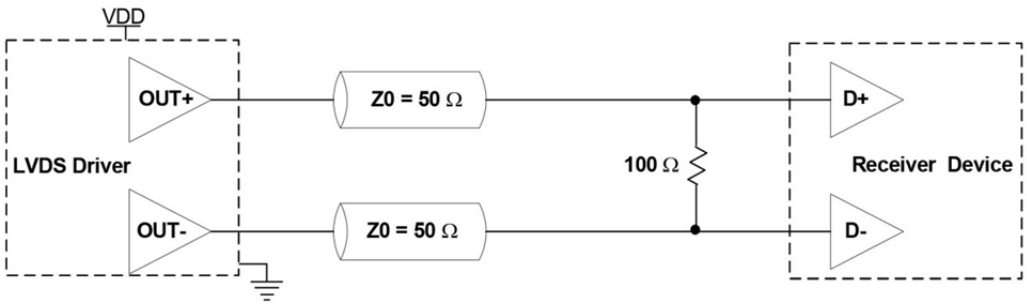
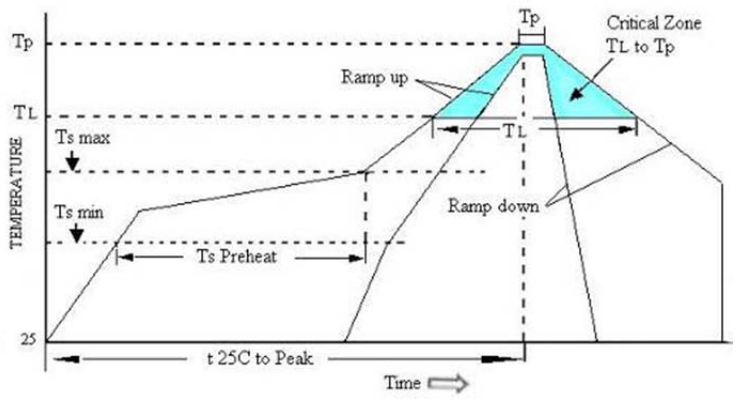


Figure 6: LVDS Single Termination (Load Terminated)

Environmental Specifications:

Environmental Compliance	
Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002
Mechanical Vibration	MIL-STD-883F, Method 2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method 2003
Moisture Sensitivity Level	MSL Level 1 at +260ºC

Pb Free Solder Reflow Profile

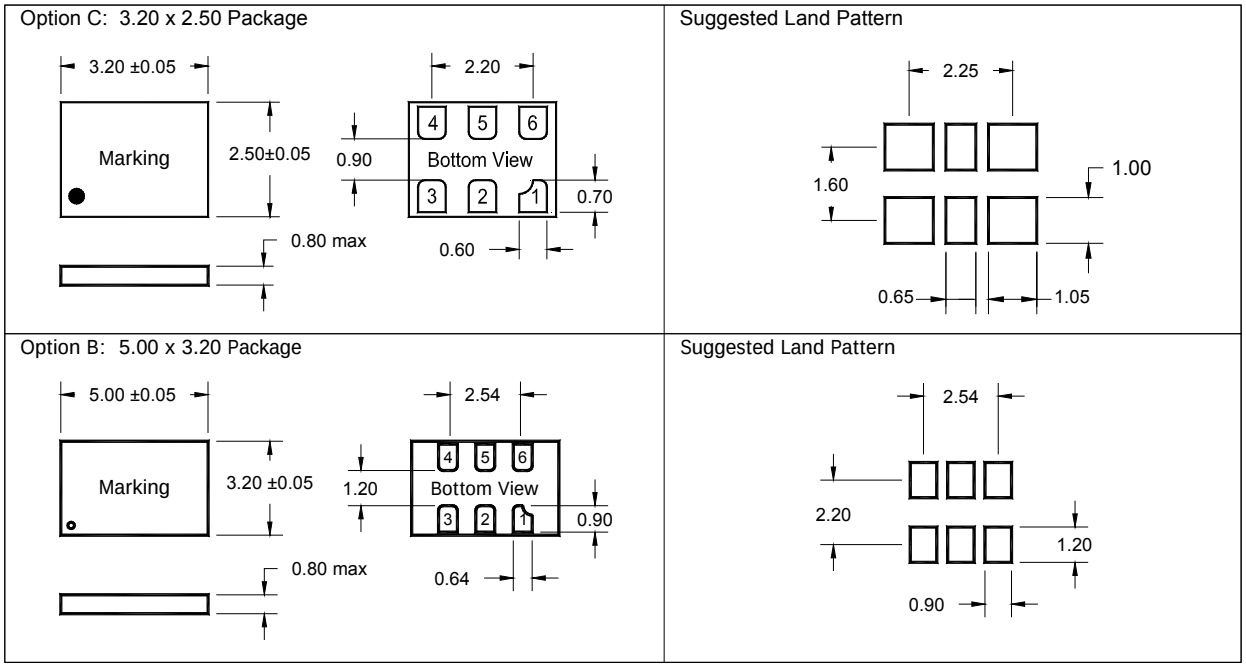


Units are backward compatible with +240ºC reflow processes

Ts max to T_L (Ramp-up Rate)	3ºC / second max
Preheat Temperature min (Ts min) Temperature typ (Ts typ) Temperature max (Ts max) Time (Ts)	 150ºC 175ºC 200ºC 60 to180 seconds
Ramp-up Tate (T_L to Tp	3ºC / second max
Time Maintained Above Temperature (T_L) Time ($T_{L)}$	 217ºC 60 to 150 seconds
Peak Temperature (Tp)	260ºC max for seconds
Time within 5ºC to Peak Temperature (Tp)	20 to 40 seconds
Ramp-down Rate	6ºC / second max
Tune 25ºC to Peak Temperature	8 minute max
Moisture Sensitivity Level (MSL)	Level 1

Mechanical Details:

Package Dimensions and Suggested Land Pattern



Marking

Line 1 = XXXXX (Lot code)
Dot to denote Pin 1 location

Package Information

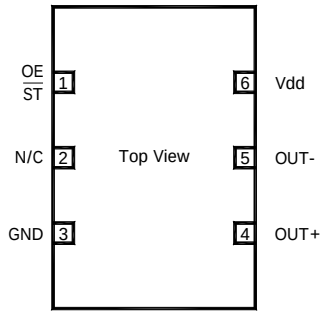
Leadframe: C194
Plating: NiPdAu

Pin Functionally:

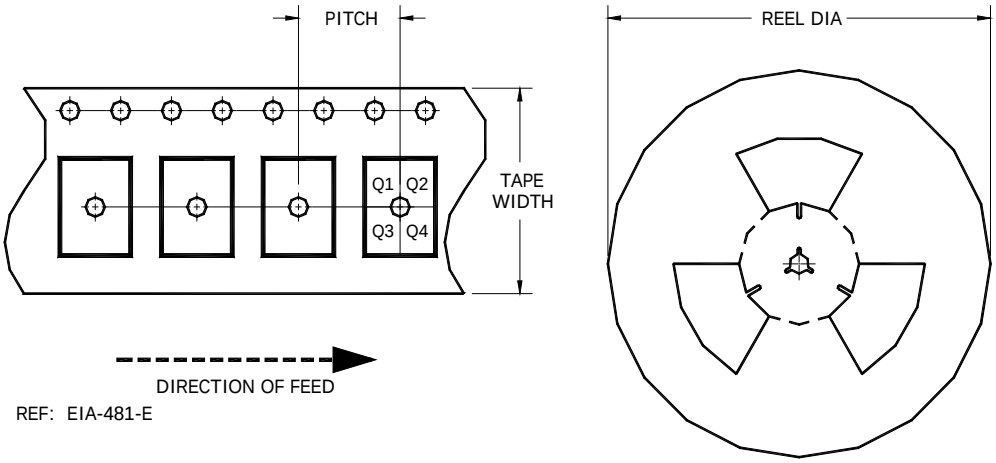
Pin	Symbol	Functionality	
1	OE	Tri-state	High or Open = specified frequency output Low = Output is high impedance, only output is disabled.
	$\overline{ST}$	Standby	High or Open = specified frequency output. Low = Output is low (weak pull down). Device goes to sleep mode. Supply current reduces to standby current.
2	NC	NA	No Connection: Leave it floating or connected to GND for better head dissipation
3	GND	Power	Vdd – Power Supply Ground
4	Out+	Output	Oscillator output
5	Out-	Output	Complementary Oscillator output
6	Vcc	Power	Power supply voltage

Notes:
1. In OE or $\overline{ST}$ mode, a pull-up resistor of 10.0 kΩ or less is recommended if Pin 1 is not externally driven. If Pin 1 needs to be left floating, use the NC option.
2. A capacitor of value 0.1 µF or higher between Pin 4 (Vcc) and Pin 1 (GND) is required.

Pin Assignments



Tape and Reel Dimensions



REF: EIA-481-E

Part Number	Size	Pitch	Tape Width	Pin Orient.	Reel Dia.	Count
IM840B	5.0 x 3.2	4.0 ± 0.1	8.3 max	Q1	180 Dia	3000
IM840C	3.2 x 2.5	4.0 ± 0.1	8.3 max	Q1	180 Dia	3000

Notes:`
- All dimensions are in mm.
- Do not scale drawings.

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