

**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:**

<b>Frequency Range</b>	1.000 MHz to 220.000 MHz	
<b>Frequency Stability</b>	See Part Number Guide	Inclusive of all changes in Operating Temp. Range, Load, and Voltage.
<b>First Year Aging</b>	±2.0 ppm max	+25°C ±2.0°C
<b>10 Years Aging</b>	±5.0 ppm max	+25°C ±2.0°C
<b>Operating Temperature</b>	See Part Number Guide	
<b>Supply Voltage (Vdd) ±10%</b>	See Part Number Guide	
<b>Input Voltage High</b>	70% of Vdd min	Pin 1, OE or $\overline{ST}$
<b>Input Voltage Low</b>	30% of Vdd max	Pin 1, OE or $\overline{ST}$
<b>Input Pull-up Impedance</b>	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
<b>Start-up Time</b>	6.0 mSec typ., 10.0 mSec max	Measured from the time Vdd reaches its rated minimum values
<b>Resume Time</b>	6.0 mSec typ., 10.0 mSec max	Measured from the time $\overline{ST}$ pin crosses 50% threshold.
<b>Symmetry</b>	45%/55%	

**LVPECL, DC and AC Characteristics**

<b>Current Consumption</b>	61 mA typ., 69 mA max	Excluding Load Termination Current, Vdd = +3.3 V or +2.5 V
<b>OE Disable Supply Current</b>	35 mA max	OE = Low
<b>Output Disable Leakage Current</b>	1 µA max	OE = Low
<b>Standby Current</b>	100 µA max	$\overline{ST}$ = Low, for all Vdds
<b>Maximum Output Current</b>	30 mA max	Max average current drawn from OUT+ or OUT-
<b>Logic "1"</b>	Vdd -1.1 min / Vdd - 0.7 max	See figure 1(a)
<b>Logic "0"</b>	Vdd -1.9 min / Vdd - 1.5 max	See figure 1(a)
<b>Output Differential Voltage Swing</b>	1.2 V min. 1.6V typ., 2.0 V max	See figure 1(b)
<b>Rise/Fall Time</b>	300 pSec typ, 700 pSec max	20% to 80%, see figure 1(a)
<b>OE Enable/Disable Time</b>	115 nSec max	F = 212.50 MHz – For other frequencies, T <sub>oe</sub> = 100nSec + 3 period
<b>RMS Period Jitter</b>	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
<b>RMS Phase Jitter (random)</b>	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**

<b>Current Consumption</b>	47 mA typ., 55 mA max	Excluding Load Termination Current, Vdd = +3.3 V or +2.5 V
<b>OE Disable Supply Current</b>	35 mA max	OE = Low
<b>Differential Output Voltage</b>	250mV min, 350mA typ. 450mV max	See Figure 2
<b>Output Disable Leakage Current</b>	1 µA max	OE = Low
<b>Standby Current</b>	100 µA max	$\overline{ST}$ = Low, for all Vdds
<b>VOD Magnitude Change</b>	50 mV max	See Figure 2
<b>Offset Voltage</b>	1.125 mV min, 1.200 mV typ., 1.375 mV max	See Figure 2
<b>VOS Magnitude Change</b>	50 mV max	See Figure 2
<b>Rise/Fall Time</b>	495 pSec typ. 700 pSec max	20% to 80%, See Figure 2
<b>OE Enable Time/Disable Time</b>	115 nSec max	F = 212.25 MHz, For other Frequencies, T <sub>oe</sub> =100nSec + 3 period
<b>RMS Period Jitter</b>	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
<b>RMS Phase Jitter (random)</b>	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 +25°C and nominal supply voltage.



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

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 = 0°C to +70°C 2 = -40°C to +85°C 3 = -20°C to +70°C	E = ±10 F = ±20 A = ±25 Z = ±30 B = ±50	8 = LVDS 9 = LVPECL	H = Tri-state S = Standby	- Frequency
<b>Notes:</b>						
• +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 -40°C to +85°C 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 -20°C to +70°C 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	-65°C to +150°C
Supply Voltage (Vdd)	-0.5 VDC to 4.0 VDC
Electrostatic Discharge	2000 V max
Solder Temperature (follow standard Pb free soldering guidelines)	260°C max
Junction Temperature	150°C max

Waveform Diagrams:

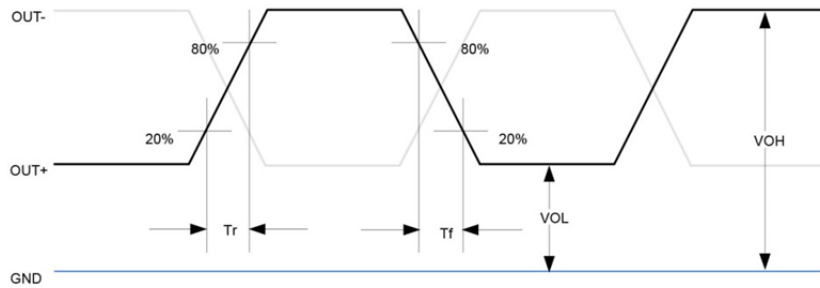


Figure 1(a): LVPECL Voltage Levels per Differential Pin (OUT+/OUT-)

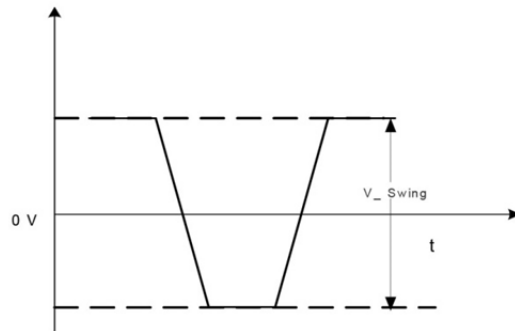


Figure 1(b): LVPECL Voltage Levels Across Differential Pair

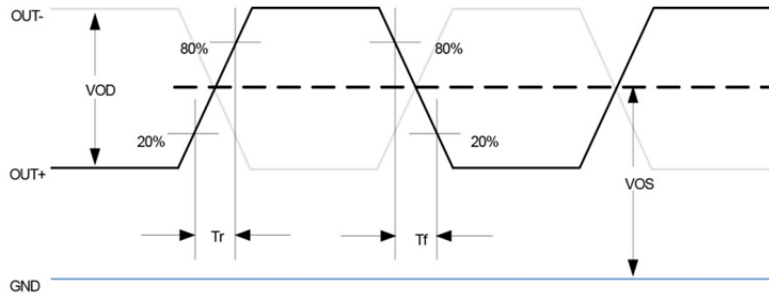


Figure 2: LVDS Voltage Levels per Differential Pin (OUT+/OUT-)

Termination Diagrams – LVPECL:

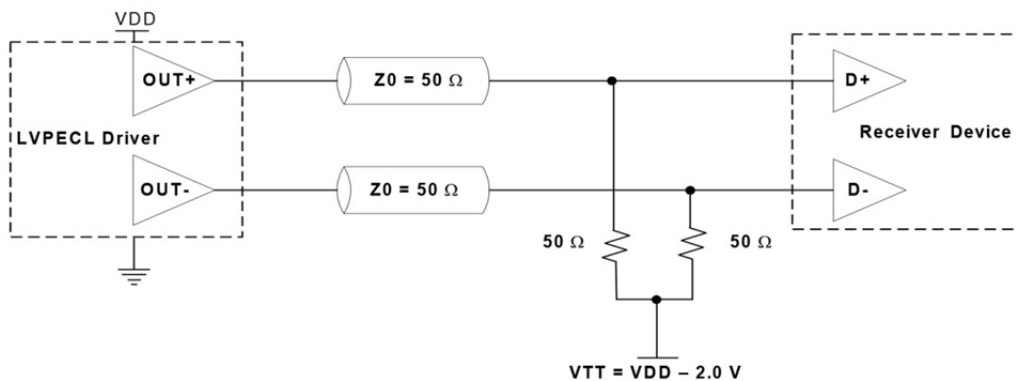


Figure 3: LVPECL Typical Termination

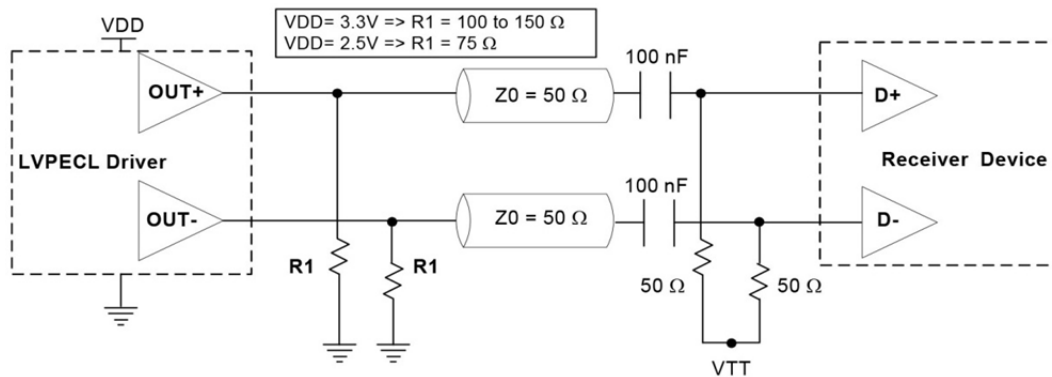


Figure 4: LVPECL AC Coupled Termination

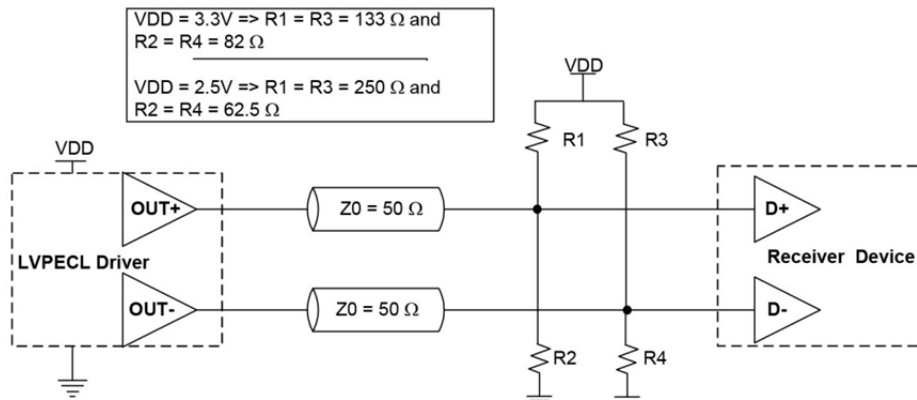


Figure 5: LVPECL with Thevenin Typical Termination

**Termination Diagram – LVDS:**

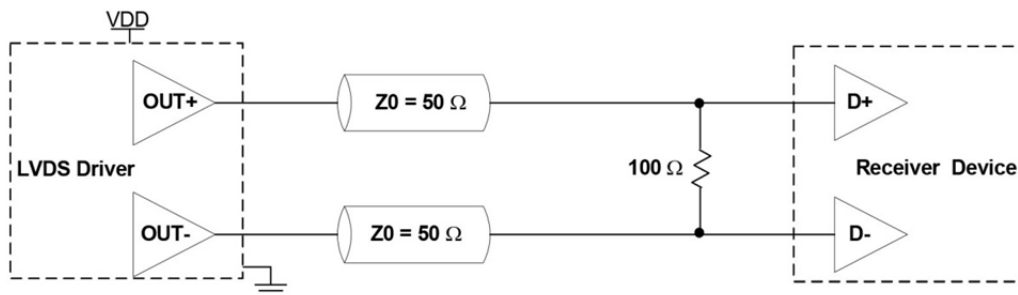
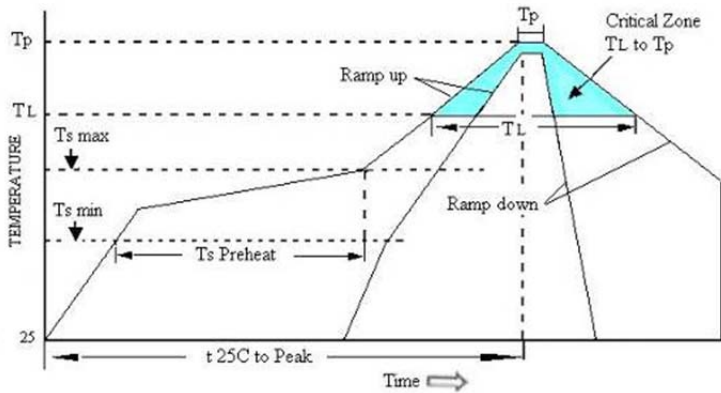


Figure 6: LVDS Single Termination (Load Terminated)

**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 +260°C

**Pb Free Solder Reflow Profile**

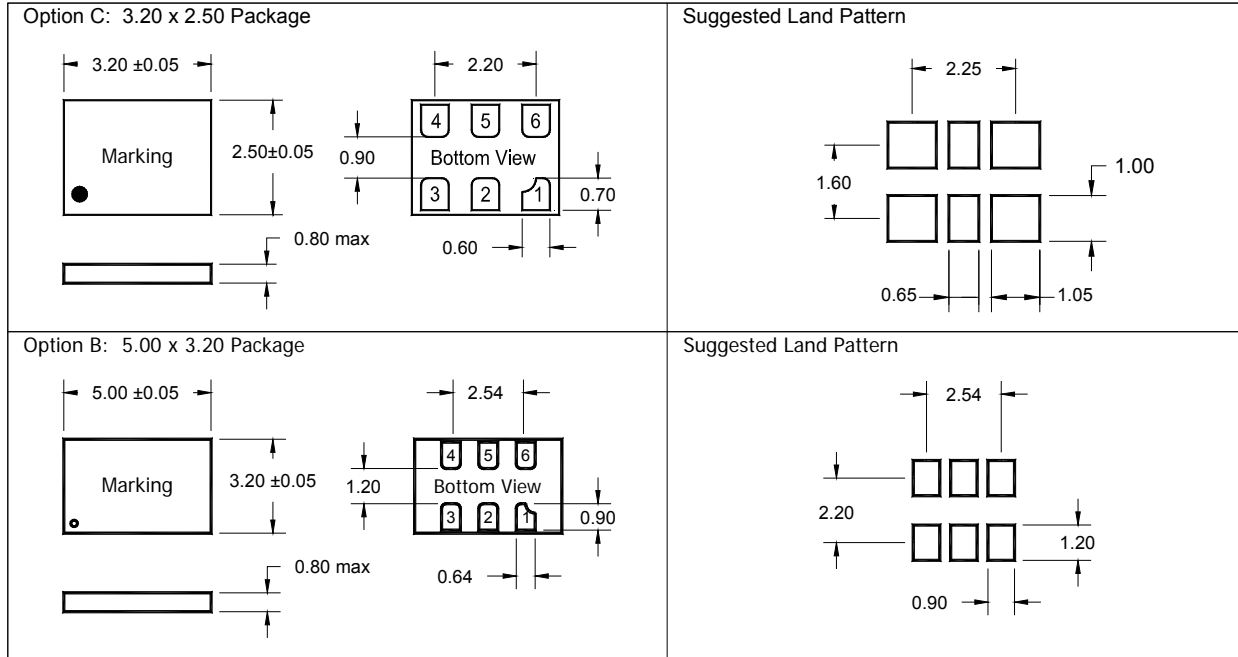


Units are backward compatible with +240°C reflow processes

Ts max to TL (Ramp-up Rate)	3°C / second max
Preheat	
Temperature min (Ts min)	150°C
Temperature typ (Ts typ)	175°C
Temperature max (Ts max)	200°C
Time (Ts)	60 to 180 seconds
Ramp-up Rate (TL to Tp)	3°C / second max
Time Maintained Above Temperature (TL)	217°C
Time (TL)	60 to 150 seconds
Peak Temperature (Tp)	260°C max for seconds
Time within 5°C to Peak Temperature (Tp)	20 to 40 seconds
Ramp-down Rate	6°C / second max
Time 25°C to Peak Temperature	8 minute max
Moisture Sensitivity Level (MSL)	Level 1

**Mechanical Details:**

**Package Dimensions and Suggested Land Pattern**



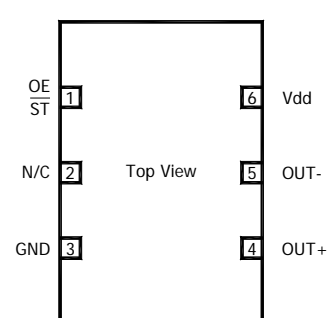
**Marking**

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

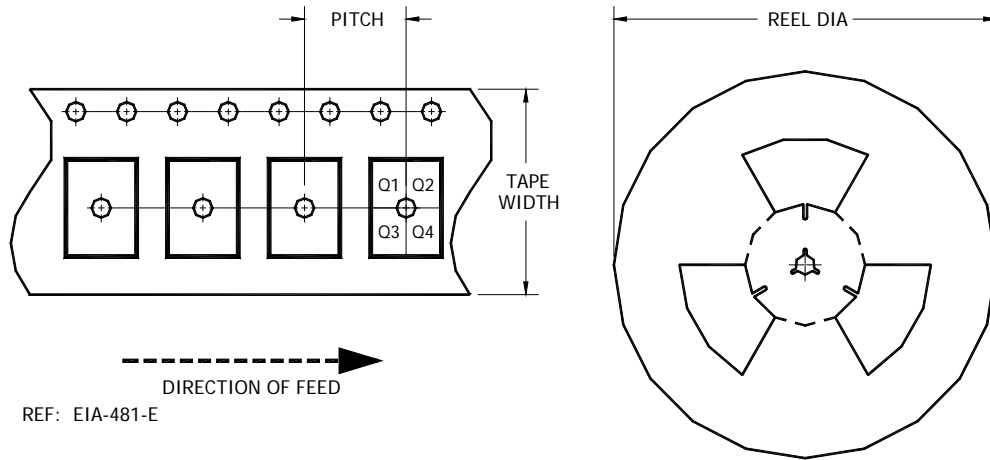
**Package Information**

Leadframe: C194  
Plating: NiPdAu

**Pin Functionally:**

Pin	Symbol	Functionality	Pin Assignments
1	OE	Tri-state	
	$\overline{ST}$	Standby	
2	NC	NA	
3	GND	Power	
4	Out+	Output	
5	Out-	Output	
6	Vcc	Power	Power supply voltage
<b>Notes:</b>			
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.			

**Tape and Reel Dimensions**



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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