



MEMS Oscillator, Ultra Performance, High Freq., LVCMOS/ HCMOS Compatible, 80.0 MHz to 220.0MHz IM811 Series

Features:

- MEMS Technology
- Direct pin to pin drop-in replacement for industry-standard packages
- Ultra-low phase jitter: 0.5 pSec (12 kHz to 20 MHz)
- LVCMOS/HCMOS Compatible Output
- Industry-standard package 2.5 x 2.0, 3.2 x 2.5, and 5.0 x 3.2 mm x mm
- Pb-free, RoHS and REACH compliant
- Fast delivery times

Typical Applications:

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

Electrical Specifications:

Frequency Range	80.000 MHz to 220.000MHz	
Frequency Stability	See Part Number Guide	Inclusive of Initial Tolerance, Operating Temperature Range, Load, and Voltage
Operating Temperature	See Part Number Guide	
Supply Voltage (Vdd) ±10%	See Part Number Guide	
Current Consumption	34 mA typ./ 36 mA max 30 mA typ./ 33 mA max	No load condition, f = 100 MHz, Vdd = +2.5 V, +2.8 V or +3.3 V No load condition, f = 100 MHz, Vdd = +1.8V
OE Disable Current	31 mA max 30 mA max	Vdd = +2.5 V, +2.8 V or +3.3 V, OE = GND Vdd = +1.8 V, OE = GND
Standby Current	70 µA max 10 µA max	Vdd = +2.5 V, +2.8 V or +3.3 V, \overline{ST} = GND Vdd = +1.8 V, \overline{ST} = GND
Waveform Output	LVCMOS/HCMOS	
Symmetry	45%/55% 40%/60%	F = less than 165 MHz all Vdds F = greater than 165 MHz all Vdds
Rise / Fall Time	1.2 nSec typ./ 2.0 nSec max	15 pF Load, 10% to 90% of Vdd
Logic "1"	90% of Vdd min	
Logic "0"	10% of Vdd max	
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
Startup Time	7 mSec typ./ 10 mSec max	Measured from the time Vdd reaches its rated minimum values
OE Enable/Disable Time	115 nSec max	F = 80 MHz, For other frequencies, T _{oe} = 100 nSec = 3 cycles
Resume Time	10 mSec max	In standby mode, measured from the time \overline{ST} pin crosses 50% threshold.
RMS Period Jitter	1.5 pSec typ./ 2.0 pSec max 2.0 pSec typ./ 3.0 pSec max	F = 156.25 MHz, Vdd = +2.5 V, +2.8 V or +3.3 V F = 156.25 MHz, Vdd = +1.8 V
RMS Phase Jitter (random)	0.5 pSec typ./ 1.0 pSec max	F = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz
First year Aging	±1.5 ppm	At +25°C ±2°C
10-years Aging	±5.0 ppm	At +25°C ±2°C

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.

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

Ordering Information:

Part Number Guide						
Packages	Input Voltage	Operating Temperature	Output Drive Strength	Stability (ppm)	Select Function	Frequency
IM811B – 5.0 x 3.2 IM811C – 3.2 x 2.5 IM811D – 2.5 x 2.0	1 = +1.8 V 6 = +2.5 V 2 = +2.7 V 7 = +3.0 V 3 = +3.3 V	1 = 0°C to +70°C 2 = -40°C to +85°C 3 = -20°C to +70°C	- = Default	E = ±10 F = ±20 A = ±25 B = ±50	H = Tri-state S = Standby	- Frequency

Sample Part Number: **IM811C-31-FS-100.0000MHz**

This 100.0000 MHz oscillator in a 3.2 x 2.5 package with stability ±20 ppm from 0°C to +70°C using a supply voltage of +3.3 V. With Pin 1 function as Standby. Output Drive Strength is only set to the default level.

Sample Part Number: **IM811D-13-AH-125.0000MHz**

This 125.0000 MHz oscillator in a 2.5 x 2.0 package with stability ±25 ppm from -20°C to +70°C using a supply voltage of +1.8 V. With Pin 1 function as Tri-state. Output Drive Strength is only set to the default level.

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.

Phase Noise:

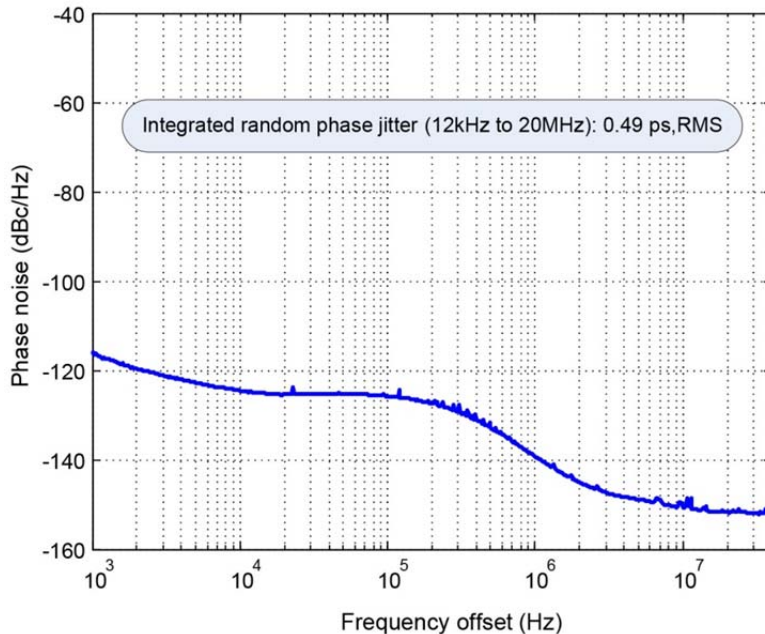


Figure 1: Phase Noise, 156.25 MHz, +3.3 V LVC MOS Output

Performance Plots

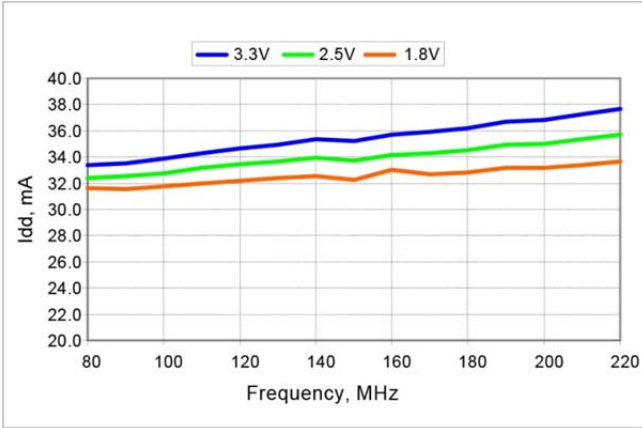


Figure 2: Idd vs Frequency

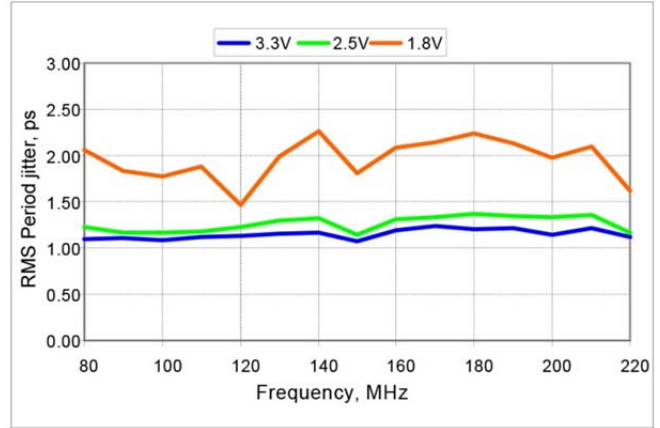


Figure 3: RMS Period vs Frequency

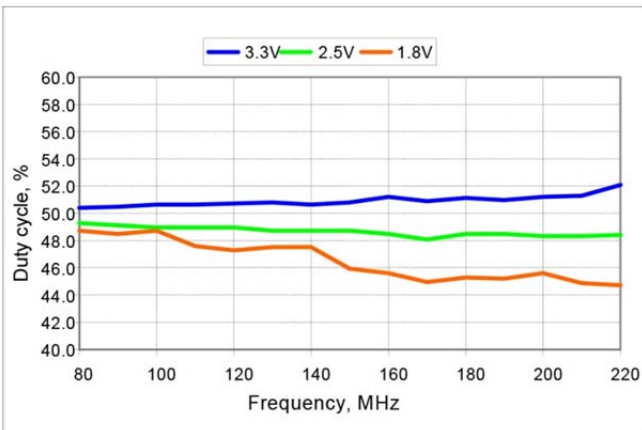


Figure 4: Duty Cycle vs Frequency

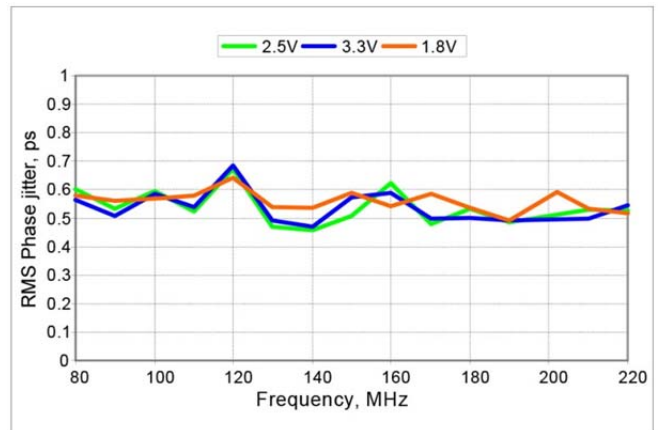


Figure 5: RMS Phase Jitter vs Frequency

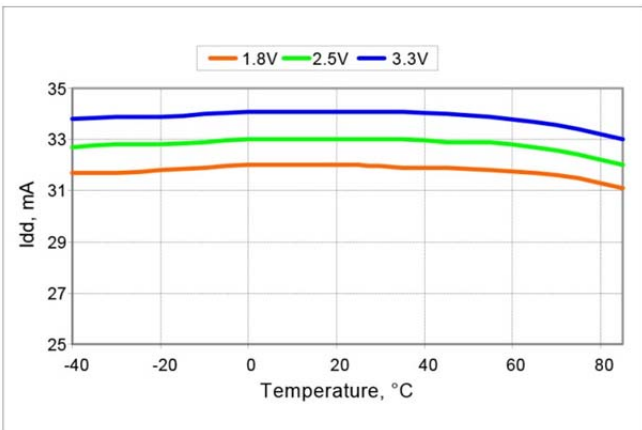


Figure 6: Idd vs Temperature, 100 MHz Output

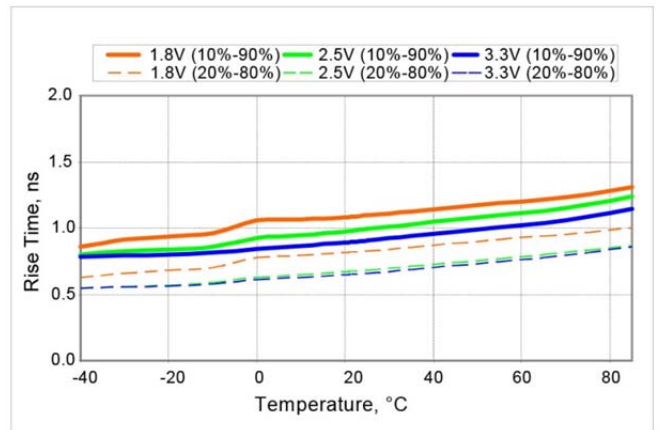
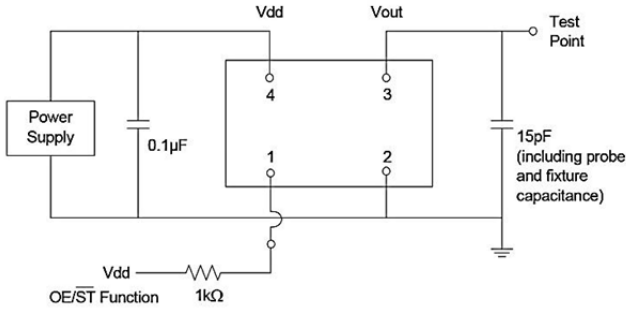


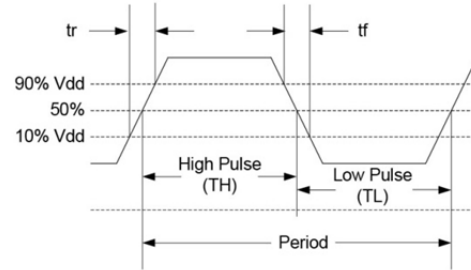
Figure 7: Rise Time vs Temperature, 100 MHz Output

Note:
All plots are measured with 15pF load at room temperature, unless otherwise stated.

Test Circuit



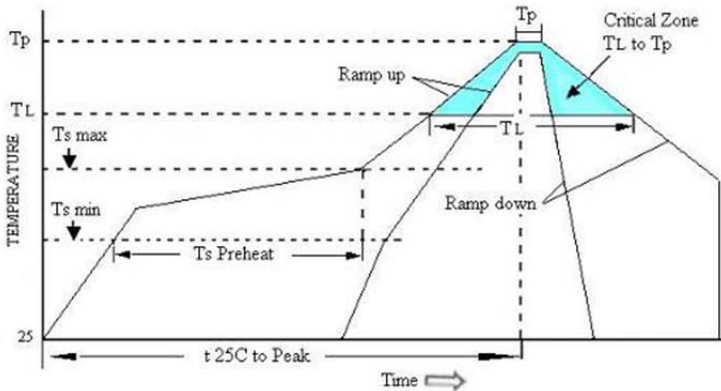
Waveform



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

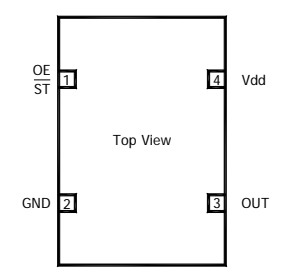
Pb Free Solder Reflow Profile



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

Pin Functionally

Pin Description				Pin Assignments
Pin	Symbol		Functionality	
1	OE	Tri-state	High or Open = specified frequency output Low = Output is high impedance, only output is disabled.	 <p>Top View</p> <p>Pin 1: OE, ST; Pin 2: GND; Pin 3: OUT; Pin 4: Vdd</p>
	\overline{ST}	Standby	High or Open = specified frequency output. Low = Output is low. Device goes to sleep mode. Supply current reduces to standby current.	
2	GND	Power	Electrical ground	
3	Out	Output	Oscillator output	
4	Vdd	Power	Power supply voltage	

Notes:

- In OE or \overline{ST} mode, a pull-up resistor of 10.0 k Ω or less is recommended if Pin 1 is not externally driven
- A capacitor of value 0.1 μ F or higher between Pin 4 (Vdd) and Pin 1 (GND) is required.

Timing Diagrams:

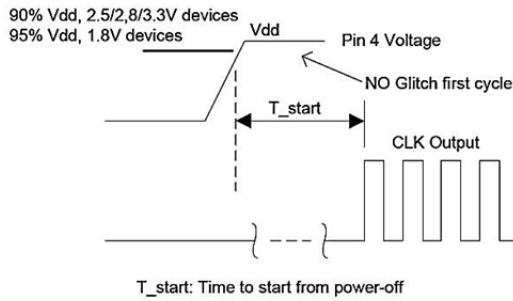


Figure 8: Startup Timing (OE/ \overline{ST} Mode)

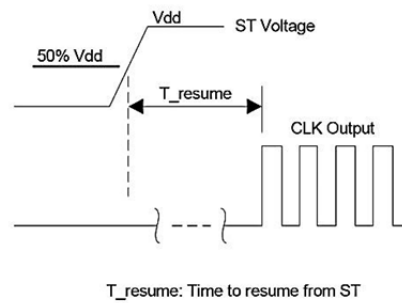


Figure 9: Standby Resume Timing (\overline{ST} Mode Only)

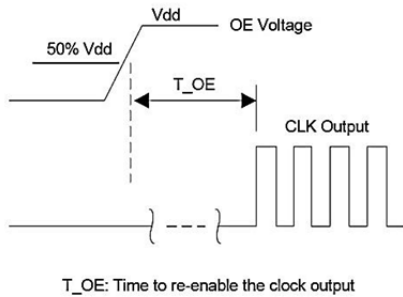


Figure 10: OE Enable Timing (OE Mode Only)

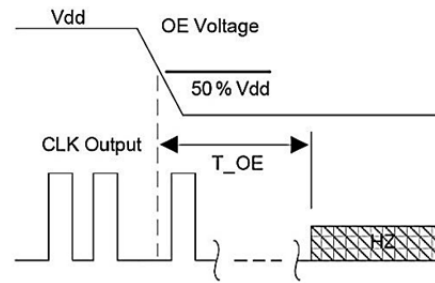
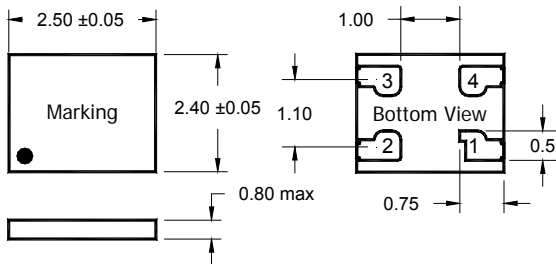
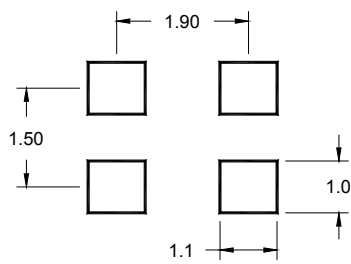
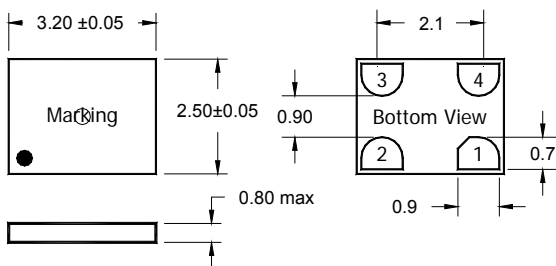
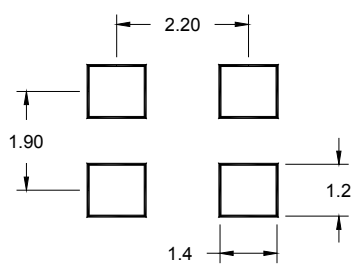
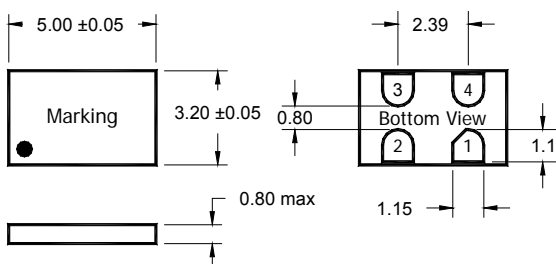
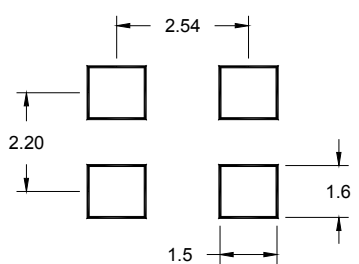


Figure 11: OE Disable Timing (OE Mode Only)

Mechanical Details:

Package Dimensions and Suggest Land Pattern

<p>Option D: 2.70 x 2.40 Package (100% compatible with 2.50 x 2.00)</p> 	<p>Suggested Land Pattern</p> 
<p>Option C: 3.20 x 2.50 Package</p> 	<p>Suggested Land Pattern</p> 
<p>Option B: 5.00 x 3.20 Package</p> 	<p>Suggested Land Pattern</p> 

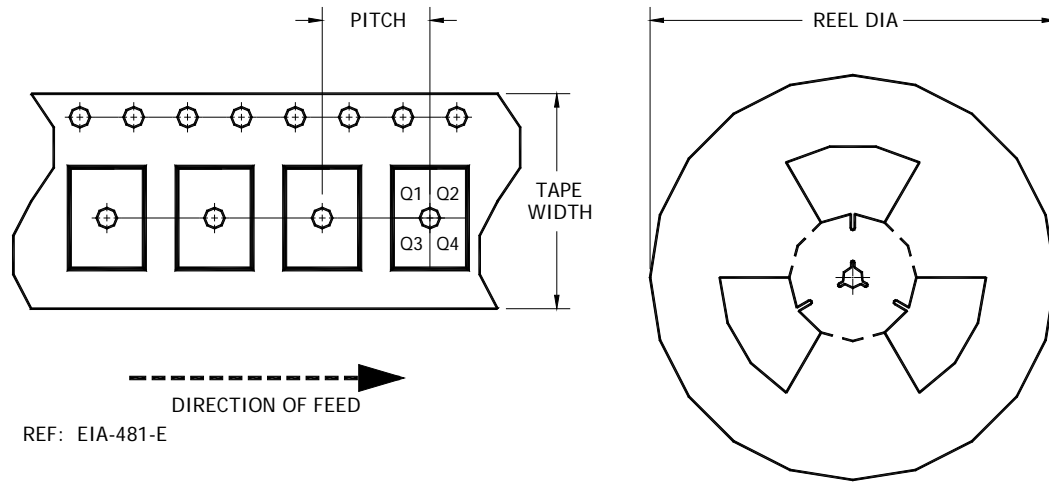
Marking

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

Package Information

Leadframe: C194
Plating: NiPdAu

Tape and Reel Dimensions



Part Number	Size	Pitch	Tape Width	Pin Orient.	Reel Dia.	Count
IM811B	5.0 x 3.2	8.0 ± 0.1	12.3 max	Q1	180	1000
					330	3000
IM811C	3.2 x 2.5	4.0 ± 0.1	8.3 max	Q1	180	3000
IM811D	2.5 x 2.0	4.0 ± 0.1	8.3 max	Q1	180	3000

Notes:

- All dimensions are in mm.
- Do not scale drawings.

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