

# EMDS12F2J-5.000M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Jan 28, 2017)


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## ITEM DESCRIPTION

MEMS Clock Oscillators LVDS (DS) 2.5Vdc 6 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD) 5.000MHz  $\pm 20$ ppm over 0°C to +70°C

## ELECTRICAL SPECIFICATIONS

Nominal Frequency	5.000MHz
Frequency Tolerance/Stability	$\pm 20$ ppm Maximum over 0°C to +70°C (Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at 25°C, Reflow, Shock, and Vibration)
Aging at 25°C	$\pm 1$ ppm Maximum First Year
Supply Voltage	2.5Vdc $\pm 5\%$
Input Current	75mA Maximum (Excluding Load Termination Current)
Output Voltage Logic High (Voh)	1.425Vdc Typical
Output Voltage Logic Low (Vol)	1.075Vdc Typical
Differential Output Error (dVod)	50mVdc Maximum
Differential Output Voltage (Vod)	247mVdc Minimum, 350mVdc Typical, 454mVdc Maximum
Offset Voltage (Vos)	1.125V Minimum, 1.250V Typical, 1.375V Maximum
Rise/Fall Time	225pSec Typical, 325pSec Maximum (Measured over 20% to 80% of waveform)
Duty Cycle	50 $\pm 5$ (%) (Measured at 50% of waveform)
Offset Error (dVos)	50mVdc Maximum
Load Drive Capability	100 Ohms Between Output and Complementary Output
Output Logic Type	LVDS
Logic Control / Additional Output	Standby (ST) and Complementary Output
Output Control Input Voltage	Vih of 70% of Vdd Minimum or No Connect to Enable Output and Complementary Output, Vil of 30% of Vdd Maximum to Disable Output and Complementary Output (High Impedance)
Standby Current	30 $\mu$ A Maximum (Without Load)
Period Jitter (Deterministic)	0.2pSec Typical
Period Jitter (Random)	2.0pSec Typical
Period Jitter (RMS)	2.5pSec Typical, 3.5pSec Maximum
Period Jitter (pk-pk)	25pSec Typical, 30pSec Maximum
RMS Phase Jitter (Fj = 637kHz to 10MHz; Random)	2.1pSec Typical
RMS Phase Jitter (Fj = 1MHz to 20MHz; Random)	1.7pSec Typical
RMS Phase Jitter (Fj = 1.875MHz to 20MHz; Random)	1.5pSec Typical
Start Up Time	10mSec Maximum
Storage Temperature Range	-55°C to +125°C

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

ESD Susceptibility	MIL-STD-883, Method 3015, Class 2, HBM 2000V
Flammability	UL94-V0
Mechanical Shock	MIL-STD-883, Method 2002, Condition G, 30,000G
Moisture Resistance	MIL-STD-883, Method 1004
Moisture Sensitivity Level	J-STD-020, MSL 1

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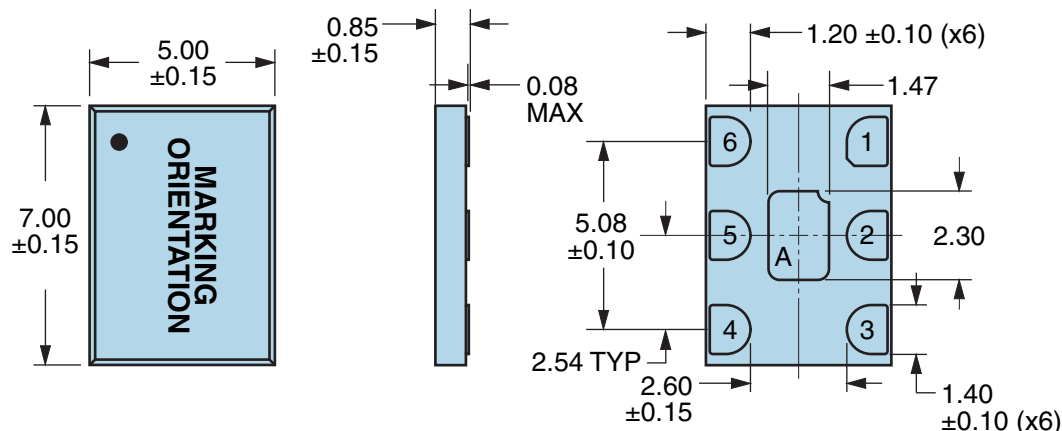
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## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS CONTINUED

<b>Resistance to Soldering Heat</b>	MIL-STD-202, Method 210, Condition K
<b>Resistance to Solvents</b>	MIL-STD-202, Method 215
<b>Solderability</b>	MIL-STD-883, Method 2003 (Six I/O Pads on bottom of package only)
<b>Temperature Cycling</b>	MIL-STD-883, Method 1010, Condition B
<b>Thermal Shock</b>	MIL-STD-883, Method 1011, Condition B
<b>Vibration</b>	MIL-STD-883, Method 2007, Condition A, 20G

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## MECHANICAL DIMENSIONS (all dimensions in millimeters)



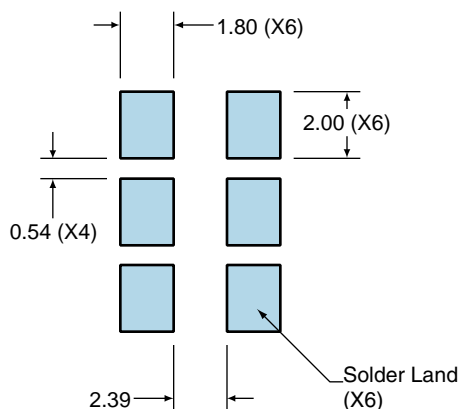
PIN	CONNECTION
1	Standby (ST)
2	No Connect
3	Case Ground
4	Output
5	Complementary Output
6	Supply Voltage

LINE	MARKING
1	XXXX or XXXXX XXXX or XXXXX=Ecliptek Manufacturing Identifier

Note A: Center paddle is connected internally to oscillator ground (Pad 3).

## Suggested Solder Pad Layout

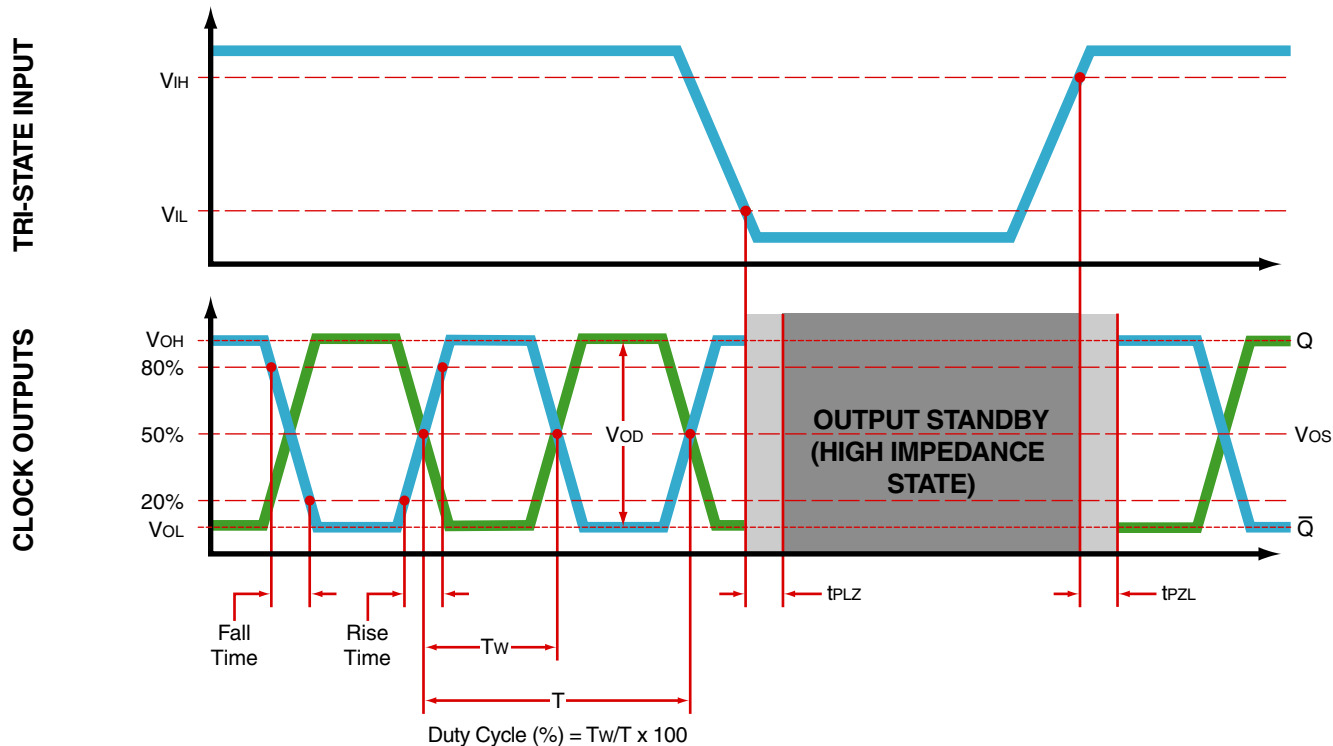
All Dimensions in Millimeters

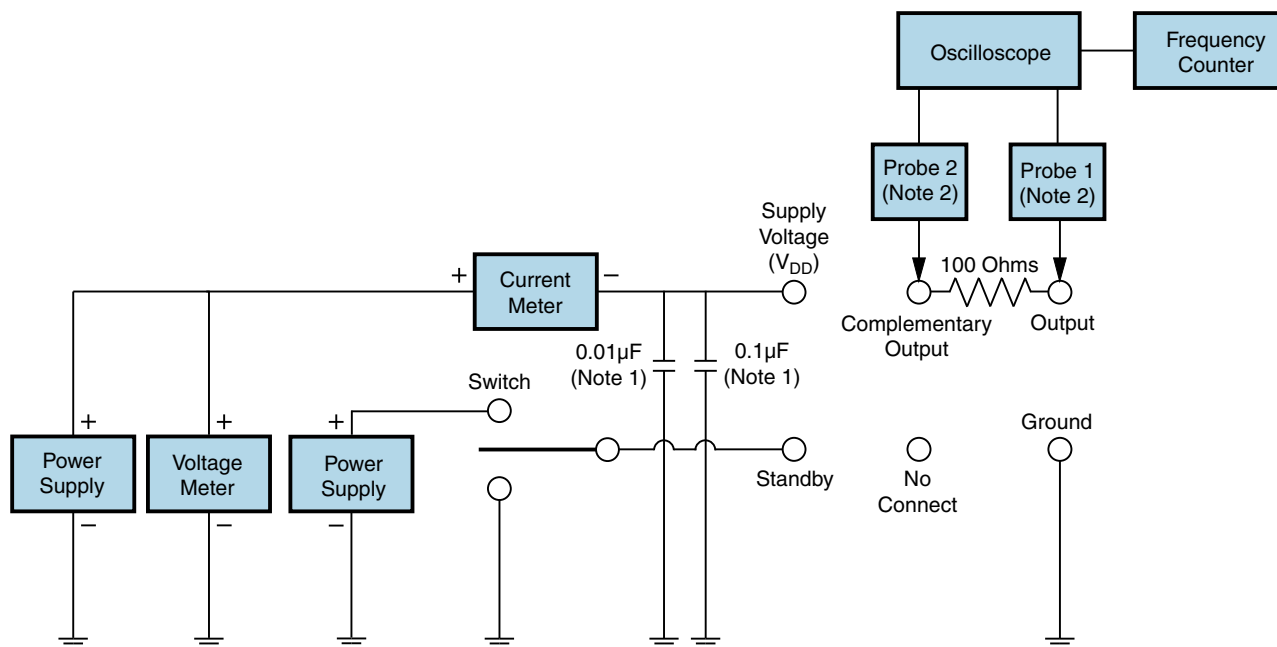


All Tolerances are ±0.1

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## OUTPUT WAVEFORM & TIMING DIAGRAM



**Test Circuit for Standby (Pad 1) and Complementary Output**

Note 1: An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

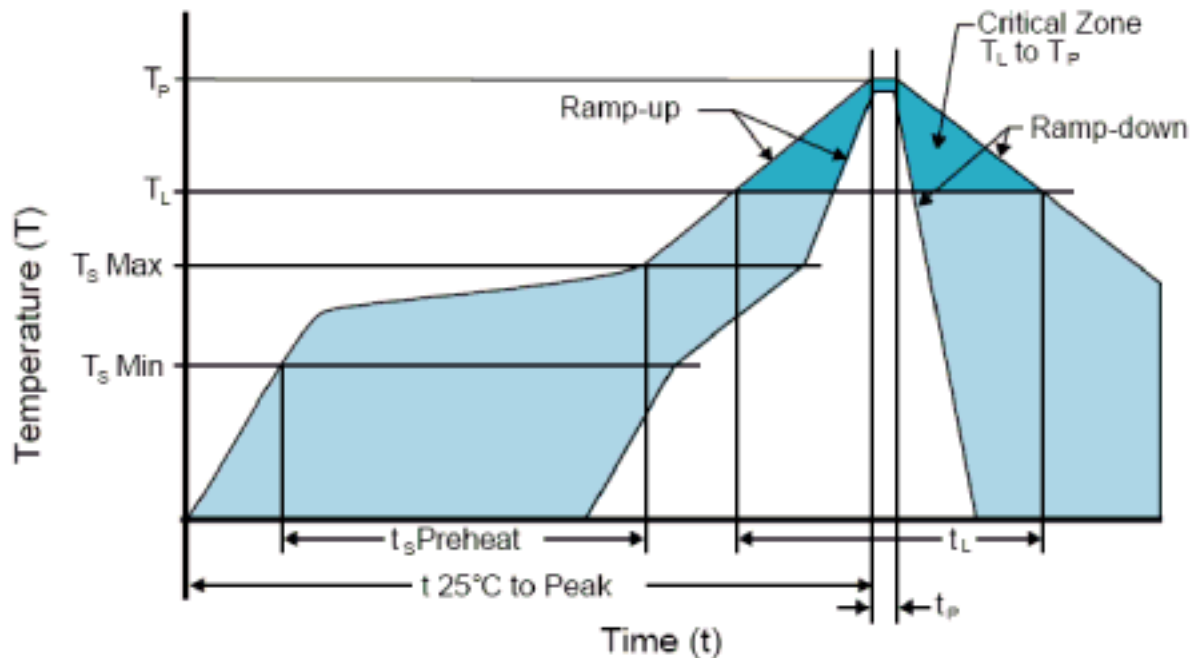
Note 2: A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>500\text{MHz}$ ) passive probe is recommended.

Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

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## Recommended Solder Reflow Methods



### High Temperature Infrared/Convection

$T_s$ MAX to $T_L$ (Ramp-up Rate)	3°C/Second Maximum
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#### Preheat

- Temperature Minimum ( $T_s$ MIN)	150°C
- Temperature Typical ( $T_s$ TYP)	175°C
- Temperature Maximum ( $T_s$ MAX)	200°C
- Time ( $t_s$ MIN)	60 - 180 Seconds

Ramp-up Rate ( $T_L$ to $T_P$ )	3°C/Second Maximum
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#### Time Maintained Above:

- Temperature ( $T_L$ )	217°C
- Time ( $t_L$ )	60 - 150 Seconds

Peak Temperature ( $T_P$ )	260°C Maximum for 10 Seconds Maximum
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Target Peak Temperature ( $T_P$ Target)	250°C +0/-5°C
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Time within 5°C of actual peak ( $t_p$ )	20 - 40 Seconds
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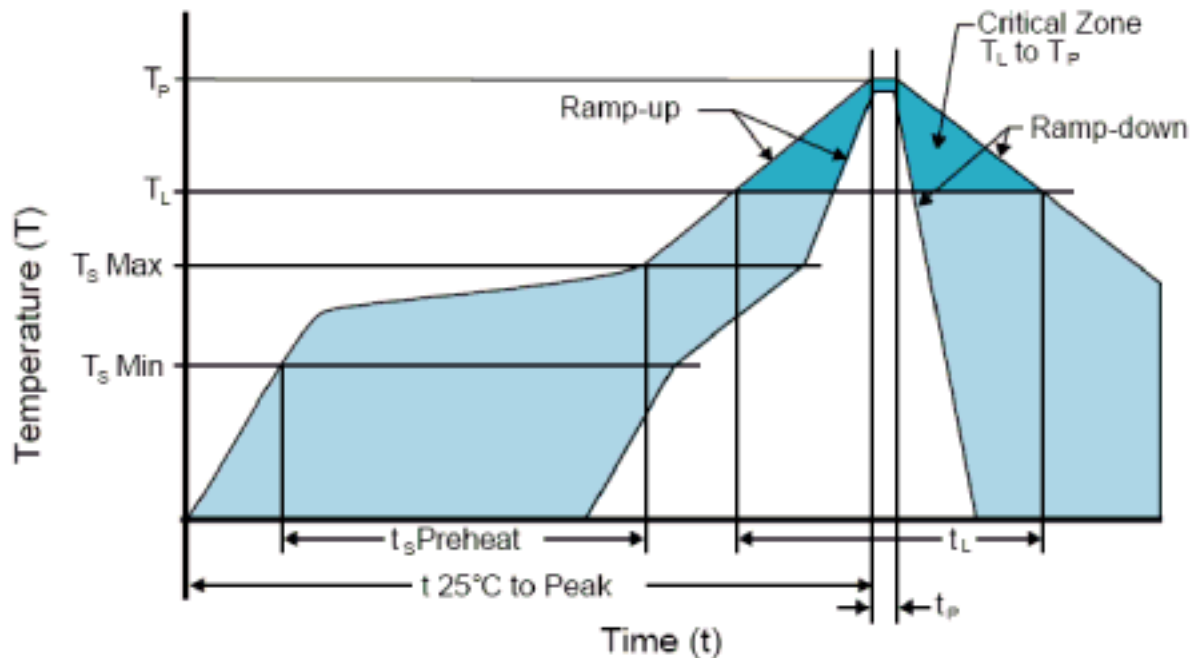
Ramp-down Rate	6°C/Second Maximum
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Time 25°C to Peak Temperature (t)	8 Minutes Maximum
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Moisture Sensitivity Level	Level 1
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## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection $240^\circ\text{C}$

$T_s$ MAX to $T_L$ (Ramp-up Rate)	$5^\circ\text{C}/\text{Second}$ Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s$ MIN)	N/A
- Temperature Typical ( $T_s$ TYP)	$150^\circ\text{C}$
- Temperature Maximum ( $T_s$ MAX)	N/A
- Time ( $t_s$ MIN)	60 - 120 Seconds
Ramp-up Rate ( $T_L$ to $T_P$ )	$5^\circ\text{C}/\text{Second}$ Maximum
<b>Time Maintained Above:</b>	
- Temperature ( $T_L$ )	$150^\circ\text{C}$
- Time ( $t_L$ )	200 Seconds Maximum
Peak Temperature ( $T_P$ )	$240^\circ\text{C}$ Maximum
Target Peak Temperature ( $T_P$ Target)	$240^\circ\text{C}$ Maximum 2 Times / $230^\circ\text{C}$ Maximum 1 Time
Time within $5^\circ\text{C}$ of actual peak ( $t_p$ )	10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time
Ramp-down Rate	$5^\circ\text{C}/\text{Second}$ Maximum
Time $25^\circ\text{C}$ to Peak Temperature (t)	N/A
Moisture Sensitivity Level	Level 1

### Low Temperature Manual Soldering

$185^\circ\text{C}$  Maximum for 10 Seconds Maximum, 2 times Maximum.

### High Temperature Manual Soldering

$260^\circ\text{C}$  Maximum for 5 Seconds Maximum, 2 times Maximum.