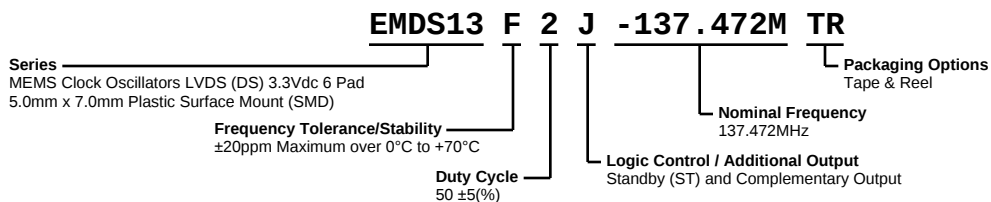


EMDS13F2J-137.472M TR



ELECTRICAL SPECIFICATIONS

Nominal Frequency	137.472MHz
Frequency Tolerance/Stability	± 20 ppm Maximum over 0°C to $+70^{\circ}\text{C}$ (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	± 1 ppm First Year Maximum
Supply Voltage	$+3.3\text{Vdc} \pm 0.3\text{Vdc}$
Input Current	80mA Maximum (Excluding Load Termination Current)
Output Voltage Logic High (Voh)	1.425Vdc Typical
Output Voltage Logic Low (Vol)	1.075Vdc Typical
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)
Differential Output Error (dVod)	50mVdc Maximum
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 μA Maximum (Without Load)
Period Jitter (Deterministic)	0.2pSec Typical
Period Jitter (Random)	2.0pSec Typical
Period Jitter (RMS)	1.8pSec Typical, 2.5pSec Maximum
Period Jitter (pk-pk)	25pSec Typical, 30pSec Maximum
RMS Phase Jitter (Fj = 637kHz to 10MHz; Random)	1.7pSec Typical
RMS Phase Jitter (Fj = 1MHz to 20MHz; Random)	1.2pSec Typical
RMS Phase Jitter (Fj = 1.875MHz to 20MHz; Random)	0.7pSec Typical
Start Up Time	10mSec Maximum
Storage Temperature Range	-55°C to $+125^{\circ}\text{C}$

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
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition K
Resistance to Solvents	MIL-STD-202, Method 215
Solderability	MIL-STD-883, Method 2003 (Six I/O Pads on bottom of package only)
Temperature Cycling	MIL-STD-883, Method 1010, Condition B

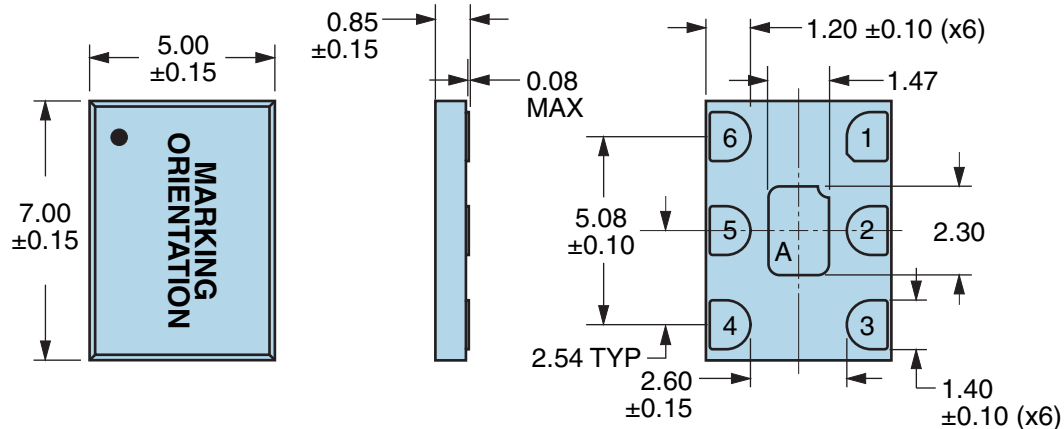
EMDS13F2J-137.472M TR



Thermal Shock	MIL-STD-883, Method 1011, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A, 20G

EMDS13F2J-137.472M TR

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

EMDS13F2J-137.472M TR

OUTPUT WAVEFORM & TIMING DIAGRAM



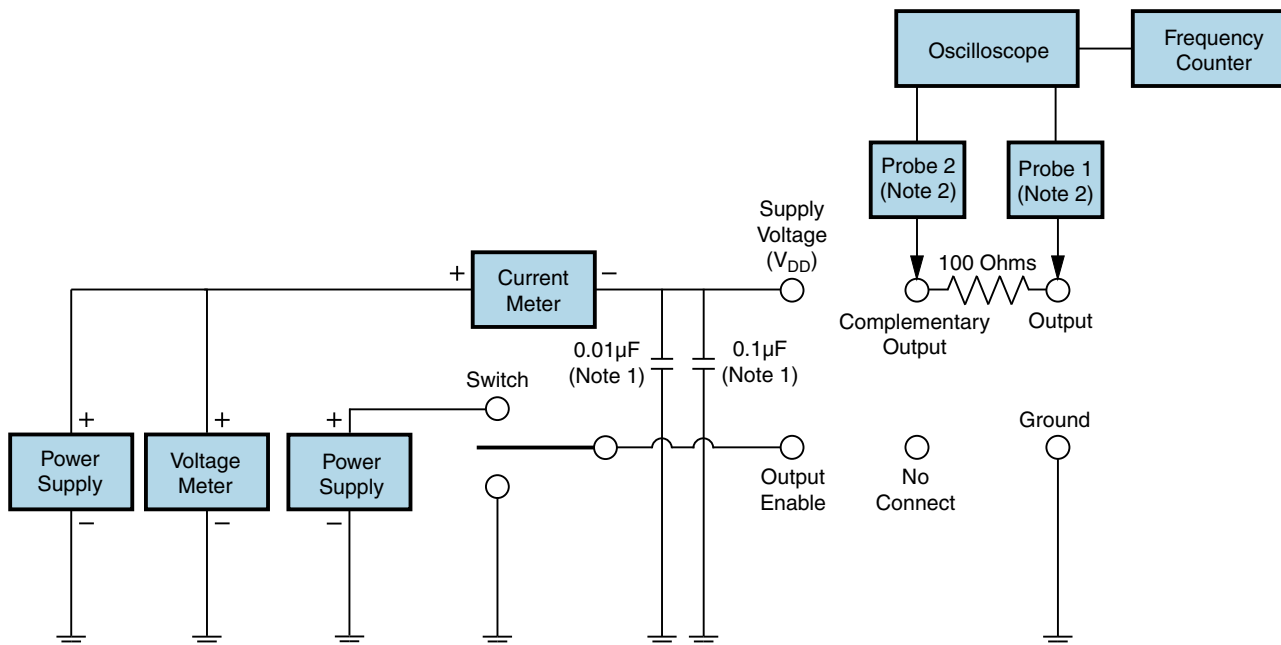
EMDS13F2J-137.472M TR

OUTPUT WAVEFORM & TIMING DIAGRAM



EMDS13F2J-137.472M TR

Test Circuit for Output Enable and Complementary Output



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

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

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

EMDS13F2J-137.472M TR

Test Circuit for Standby and Complementary Output



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

Note 2: A low capacitance (<12pF), 10X attenuation factor, high impedance (>10Mohms), and high bandwidth (>500MHz) 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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Technical drawing of a film strip frame, showing dimensions and features. The drawing includes a top view and a side view.

Top View Dimensions:

- Overall width: 16.00 ± 0.30
- Overall height: 7.50 ± 0.10
- Distance between top holes: 4.00 ± 0.10
- Distance between bottom holes: 8.00 ± 0.10
- Distance between top and bottom hole rows: 2.00 ± 0.10
- Distance from top edge to top hole row: 1.75 ± 0.10
- Distance from bottom edge to bottom hole row: 1.50 MIN
- Distance from right edge to rightmost hole: 0.60 MAX
- Distance from right edge to rightmost hole (inner): 0.10 MAX
- Distance from right edge to rightmost hole (inner): 1.75 ± 0.10
- Distance from right edge to rightmost hole (inner): $B0$
- Distance from right edge to rightmost hole (inner): $A0$
- Distance from right edge to rightmost hole (inner): $K0$

Top View Features:

- Top edge: 4.00 ± 0.10
- Bottom edge: 8.00 ± 0.10
- Right edge: 0.60 MAX
- Right edge (inner): 0.10 MAX
- Right edge (inner): 1.75 ± 0.10
- Right edge (inner): $B0$
- Right edge (inner): $A0$
- Right edge (inner): $K0$

Side View Dimensions:

- Overall height: 16.00 ± 0.30
- Distance from top edge to top hole row: 7.50 ± 0.10
- Distance from bottom edge to bottom hole row: 1.50 MIN
- Distance from top edge to top hole row: 1.75 ± 0.10
- Distance from bottom edge to bottom hole row: 1.50 MIN
- Distance from top edge to top hole row: 1.75 ± 0.10
- Distance from bottom edge to bottom hole row: 1.50 MIN

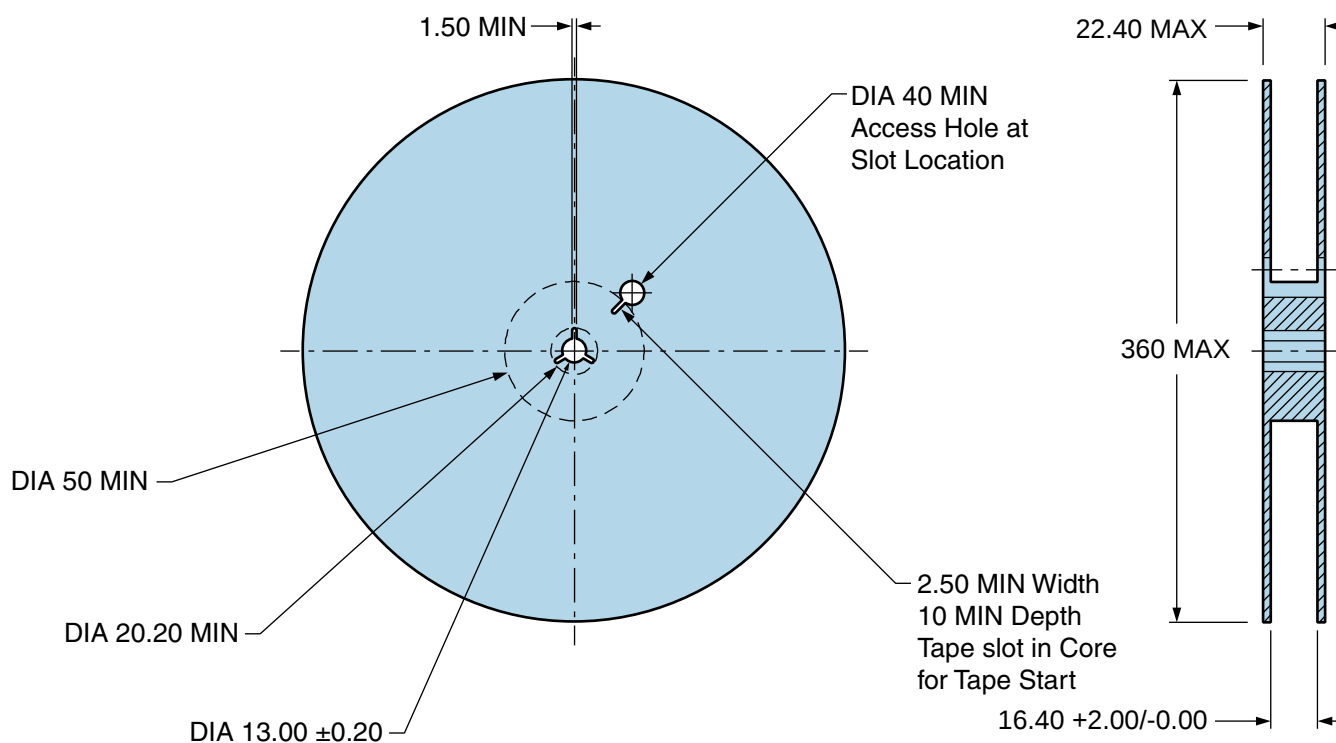
Side View Features:

- Top edge: 4.00 ± 0.10
- Bottom edge: 8.00 ± 0.10
- Right edge: 0.60 MAX
- Right edge (inner): 0.10 MAX
- Right edge (inner): 1.75 ± 0.10
- Right edge (inner): $B0$
- Right edge (inner): $A0$
- Right edge (inner): $K0$

Other Features:

- Top edge: 4.00 ± 0.10
- Bottom edge: 8.00 ± 0.10
- Right edge: 0.60 MAX
- Right edge (inner): 0.10 MAX
- Right edge (inner): 1.75 ± 0.10
- Right edge (inner): $B0$
- Right edge (inner): $A0$
- Right edge (inner): $K0$

Direction of Unreeling: Indicated by an arrow pointing right.



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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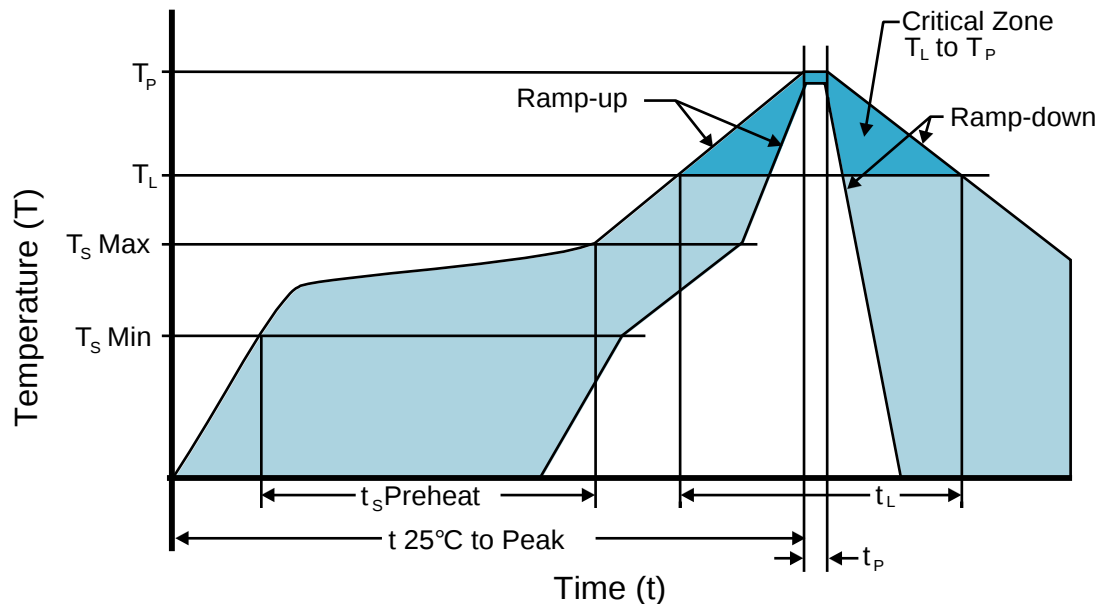
Time within 5°C of actual peak (t _p)	20 - 40 seconds
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Ramp-down Rate	6°C/second Maximum
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Time 25°C to Peak Temperature (t)	8 minutes Maximum
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Moisture Sensitivity Level	Level 1
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Recommended Solder Reflow Methods



Low Temperature Infrared/Convection 240°C

T_S MAX to T_L (Ramp-up Rate) 5°C/second Maximum

Preheat

- Temperature Minimum (T_S MIN) N/A
 - Temperature Typical (T_S TYP) 150°C
 - Temperature Maximum (T_S MAX) N/A
 - Time (t_s MIN) 60 - 120 Seconds

Ramp-up Rate (T_L to T_P) 5°C/second Maximum

Time Maintained Above:

- Temperature (T_L) 150°C
 - Time (t_L) 200 Seconds Maximum

Peak Temperature (T_P) 240°C Maximum

Target Peak Temperature (T_P Target) 240°C Maximum 2 Times / 230°C Maximum 1 Time

Time within 5°C of actual peak (t_P) 10 seconds Maximum 2 Times / 80 seconds Maximum 1 Time

Ramp-down Rate 5°C/second Maximum

Time 25°C to Peak Temperature (t) N/A

Moisture Sensitivity Level Level 1

Low Temperature Manual Soldering

185°C Maximum for 10 seconds Maximum, 2 times Maximum.

High Temperature Manual Soldering

260°C Maximum for 5 seconds Maximum, 2 times Maximum.