

3.3V LVDS Ultra Low Jitter with True SMT pads Voltage Controlled Crystal Oscillator (VCXO)



Actual Size = 9 x 14mm



Product Features

- Frequencies available between 65 and 168 MHz
- High frequency fundamental-mode crystal
- No internal PLL or frequency multiplication
- Less than 0.5 ps RMS jitter
- LVDS compatible output
- Commercial and industrial operation
- ±20 ppM stability (or as specified)
- ±50 ppM absolute (net) pull range
- 9x14mm true SMT design

Product Description

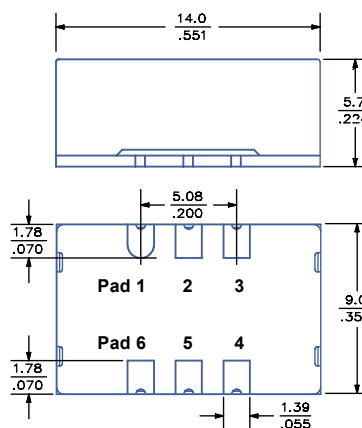
The S1589 is a voltage controlled crystal oscillator that achieves superb jitter and temperature stability over a broad range of operating conditions and frequencies. The device is constructed with a hermetically sealed, fundamental-mode quartz crystal resonator exhibiting a high-Q for exceptional phase noise performance. The device, available on tape and reel, is contained in a 9x14mm FR4 package.

Applications

The S1589 Series VCXO is an ideal component in phase locked loop circuits that perform clock smoothing, clock/data recovery, or frequency translation and card synchronization functions, supporting jitter-sensitive applications such as:

- SMPTE-compliant Video networking
- SONET/SDH/DWDM/E4 timing control & line cards
- 1 & 10 Gigabit Ethernet and FibreChannel
- Satellite, microwave and cellular base stations
- Server & Storage platforms

Package Outline



Pin Functions

| Pad | Function |
|-----|-----------------------|
| 1 | Control voltage |
| 2 | Output Enable/Disable |
| 3 | Ground |
| 4 | Q Output |
| 5 | \bar{Q} Output |
| 6 | Supply voltage |

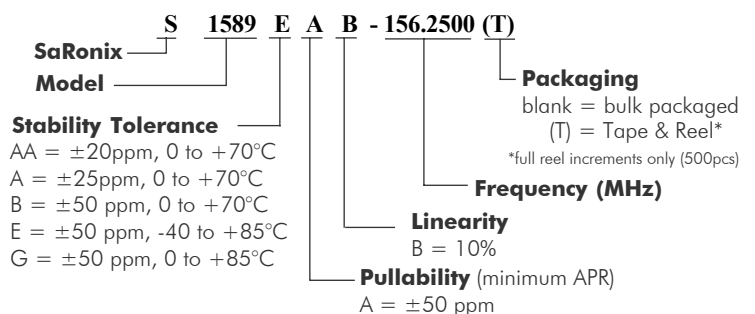
Full Mechanical Drawings page 7.
Dimensions are in mm/inches.

Common Frequencies

| | | |
|----------|----------|----------|
| 65.0000 | 65.5360 | 70.6560 |
| 74.1758 | 74.2500 | 75.0000 |
| 77.7600 | 106.2500 | 108.0000 |
| 125.0000 | 139.2640 | 155.5200 |
| 156.2500 | 161.1328 | 167.3316 |

Contact SaRonix for additional frequencies

Ordering Information



Electrical Performance

| Parameter | Min. | Typ. | Max. | Units | Notes |
|-------------------------------|-------------------|------|------|--------------|-----------------------------------|
| Output frequency (F_N) | 65 | | 168 | MHz | As specified |
| Supply voltage | 2.97 | 3.3 | 3.63 | V | |
| Supply current | | | 70 | mA | |
| Frequency stability | ±20 | | ±50 | ppM | See Note 1 below |
| Operating temperature | -40 | | +85 | °C | As specified |
| Output Amplitude Differential | 500 | | 950 | mV | Peak-Peak |
| Output load | 100Ω and 5pF LVDS | | | | See test and applicaiton circiuts |
| Duty cycle | 45 | | 55 | % | measured 50% of waveform |
| Rise and fall time | | 0.3 | 0.4 | ns | measured 20/80% of waveform |
| Jitter, phase | | | 1 | ps RMS (1-σ) | 12kHz to 40MHz frequency band |
| Jitter, accumulated | | | 3 | ps RMS (1-σ) | 20,000 adjacent periods |
| Jitter, total | | | 20 | ps pk-pk | 100,000 random periods |

Notes:

- As specified. Stability includes all combinations of operating temperature, load changes, rated input (supply) voltage changes, aging (5 years at 40°C average effective ambient temperature), shock and vibration.

Frequency Modulation Function

| Parameter | Min. | Typ. | Max. | Units | Notes |
|---------------------------|------|------|------|-----------------|--------------------------|
| Absolute pull range (APR) | ±50 | | | ppM | See #1 below |
| Control voltage range | 0.3 | | 3.0 | V _{DC} | As rated |
| Center control voltage | 1.32 | 1.65 | 1.98 | V | For RMT center frequency |
| Monotonic linearity | | | 10 | % | Positive transfer slope |
| Input impedance | 50 | | | kΩ | Control voltage pin |
| Modulation bandwidth | 10 | | | kHz | -3dB |

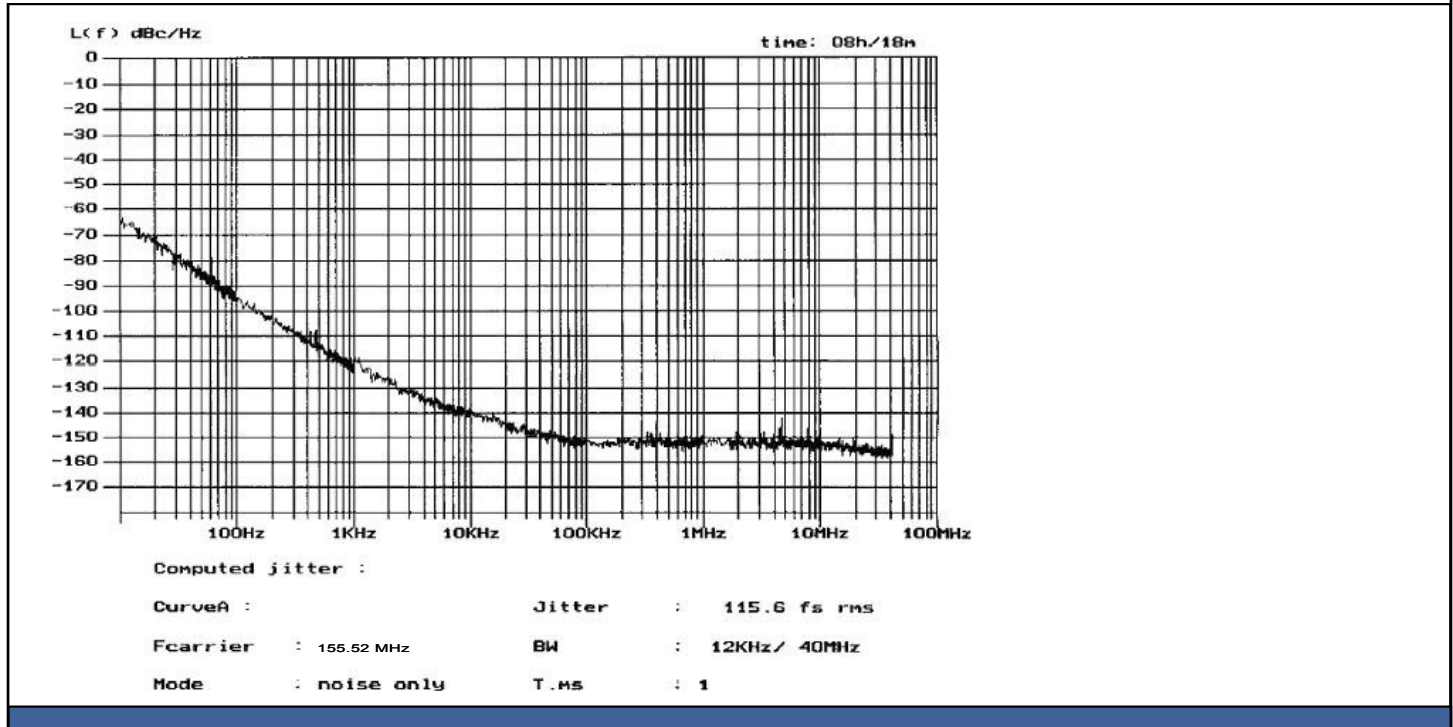
Notes:

- APR is relative to the nominal output frequency F_N (as specified); APR is inclusive (net) of frequency deviation due to stability.

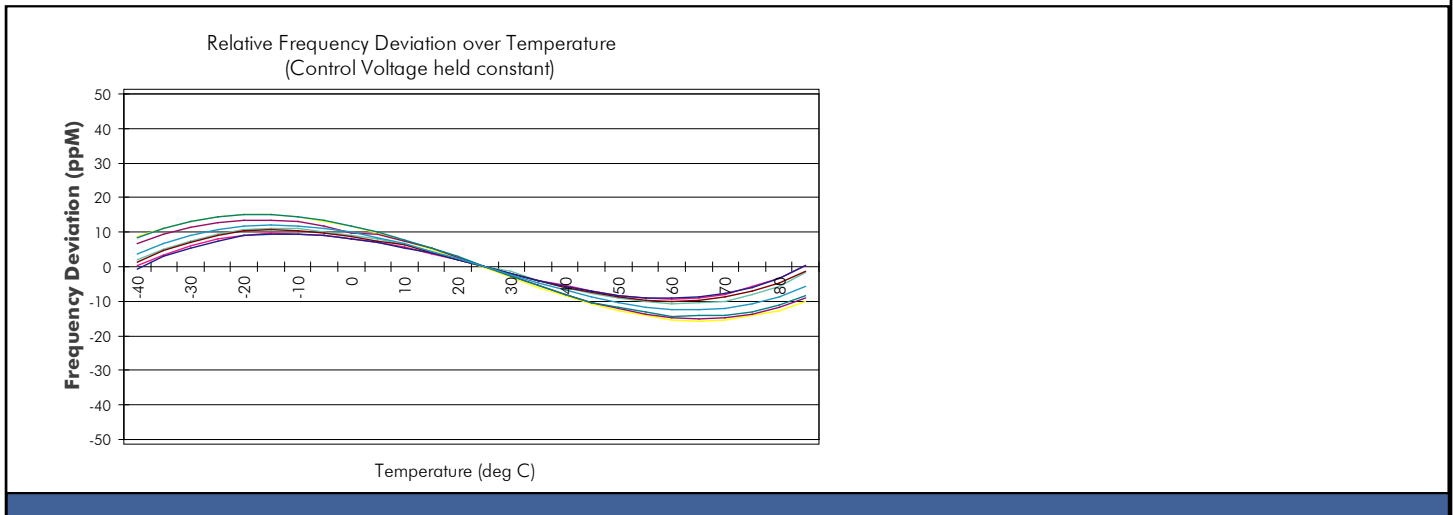
Output Enable / Disable Function

| Parameter | Min. | Typ. | Max. | Units | Notes |
|--------------------------------------|--------------------------|------|------------------------|-------|---|
| Input voltage, Output Enable (pin 2) | | | V _{CC} -1.645 | V | or Open |
| Input voltage, Output Disable (pin2) | V _{CC} - 1.165V | | | V | Q Output disabled to a fixed High level |

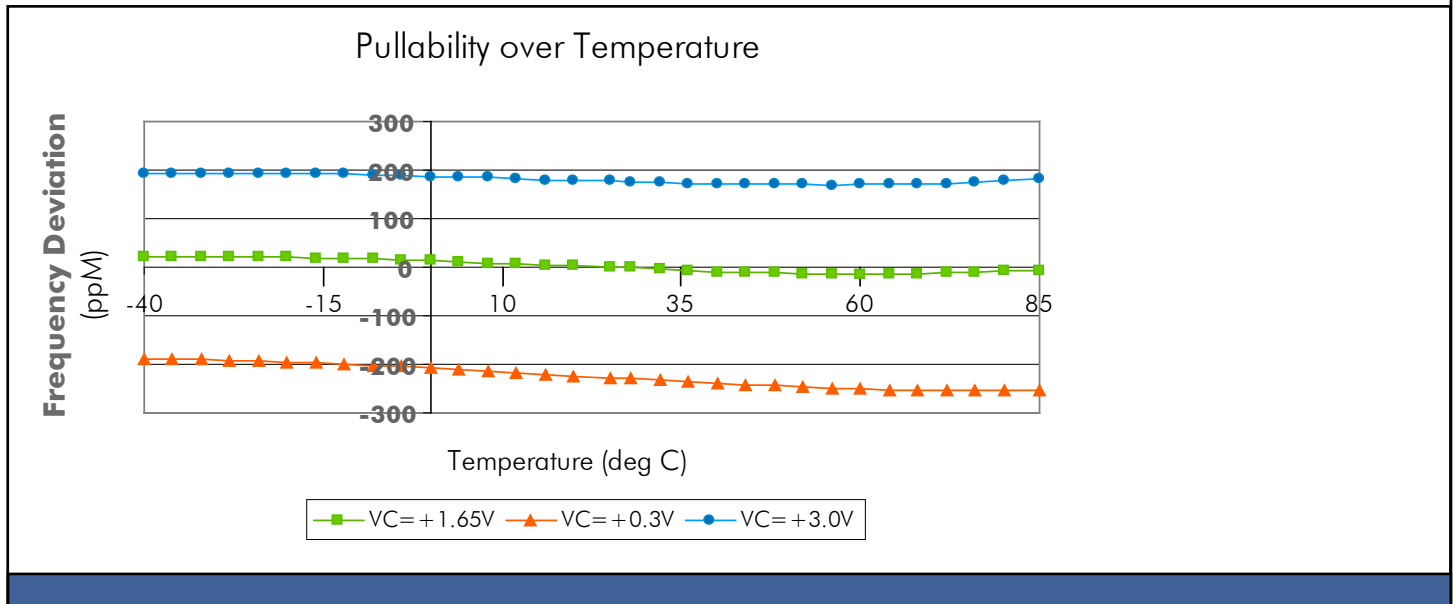
Typical Phase Noise



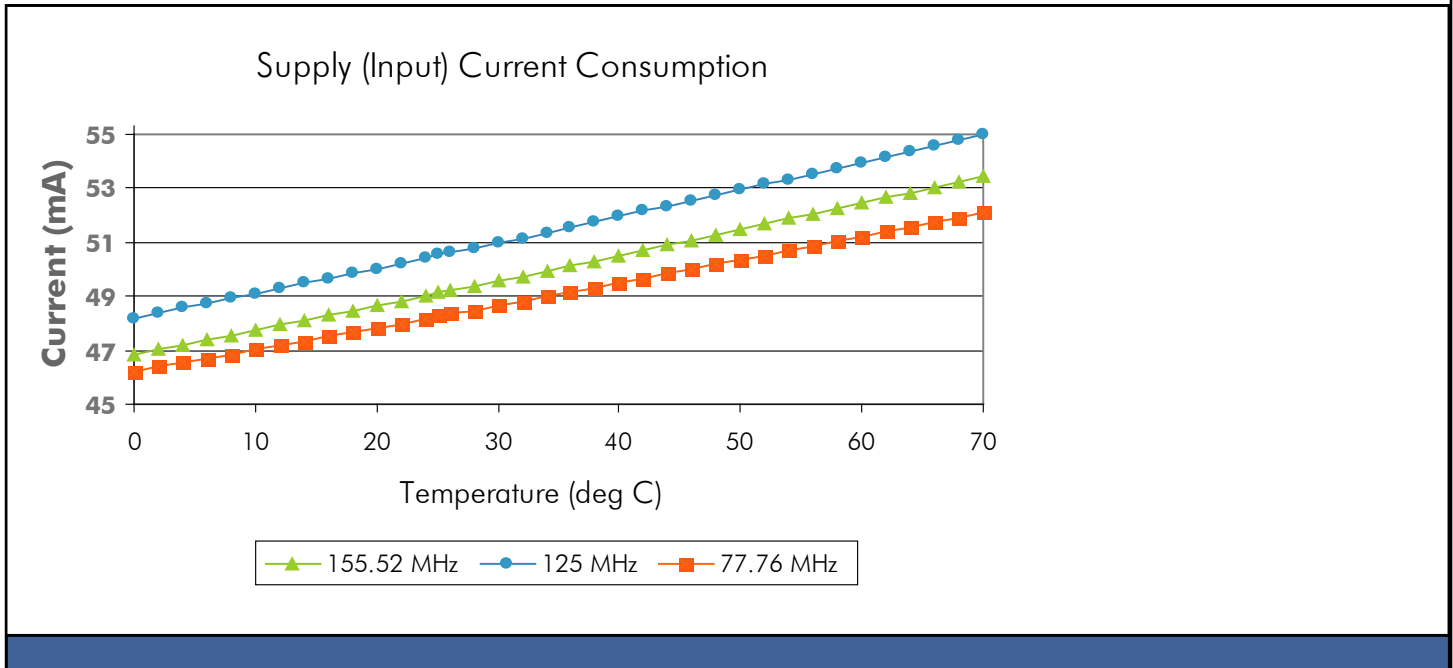
Typical Stability Characteristics



Typical Pull Characteristics



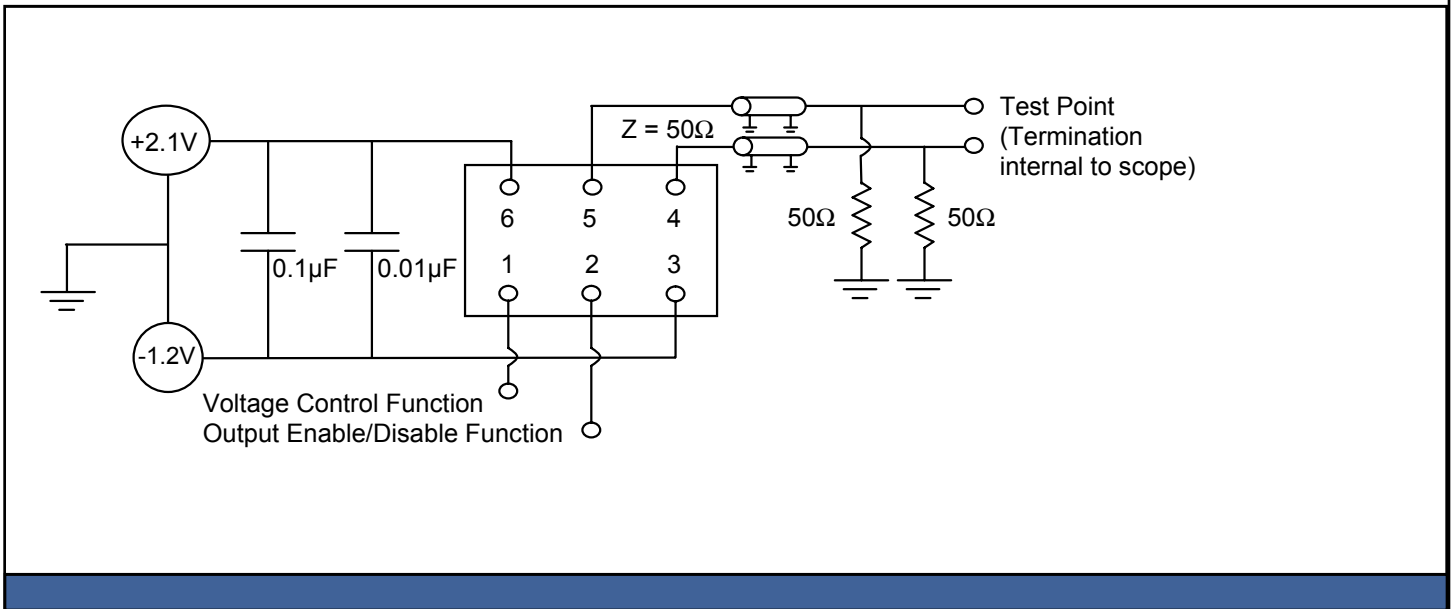
Typical Supply Current



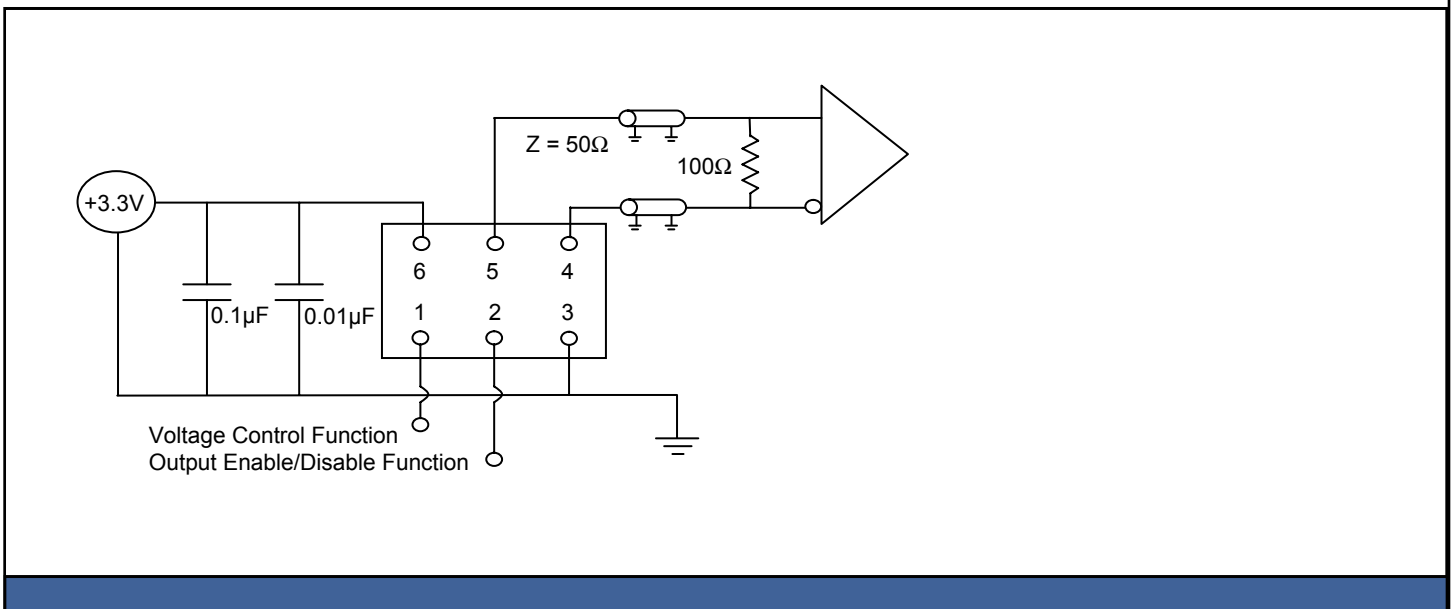
Absolute Maximum Ratings

| Parameter | Min. | Typ. | Max. | Units | Notes |
|-----------------------|------|------|-----------------|-------|-------|
| Storage temperature | -55 | | +125 | °C | |
| Control voltage range | 0 | | V _{CC} | V | |

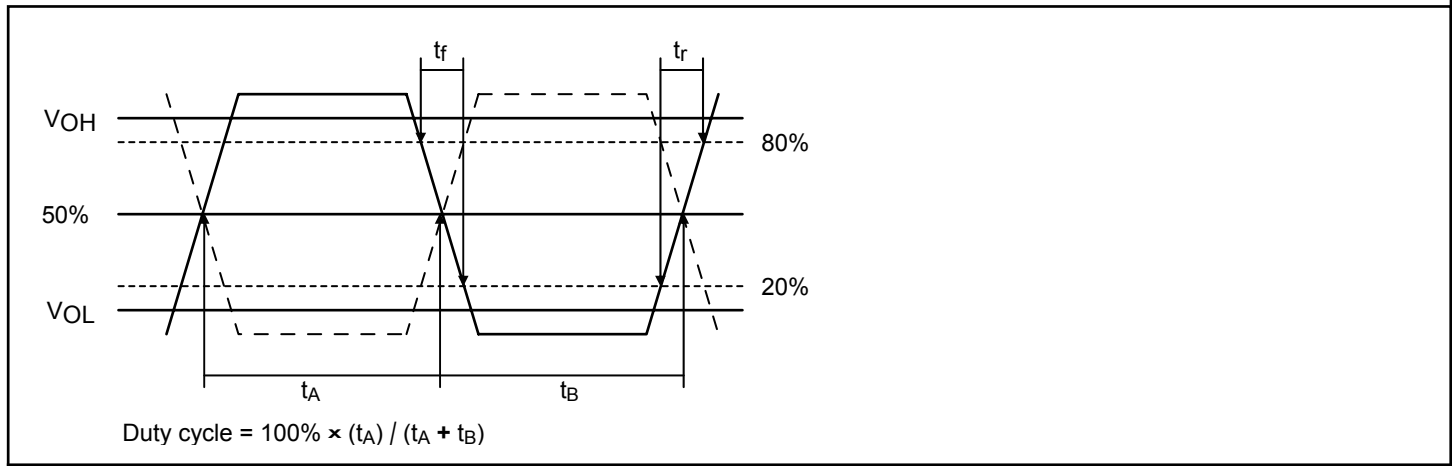
Test Circuit



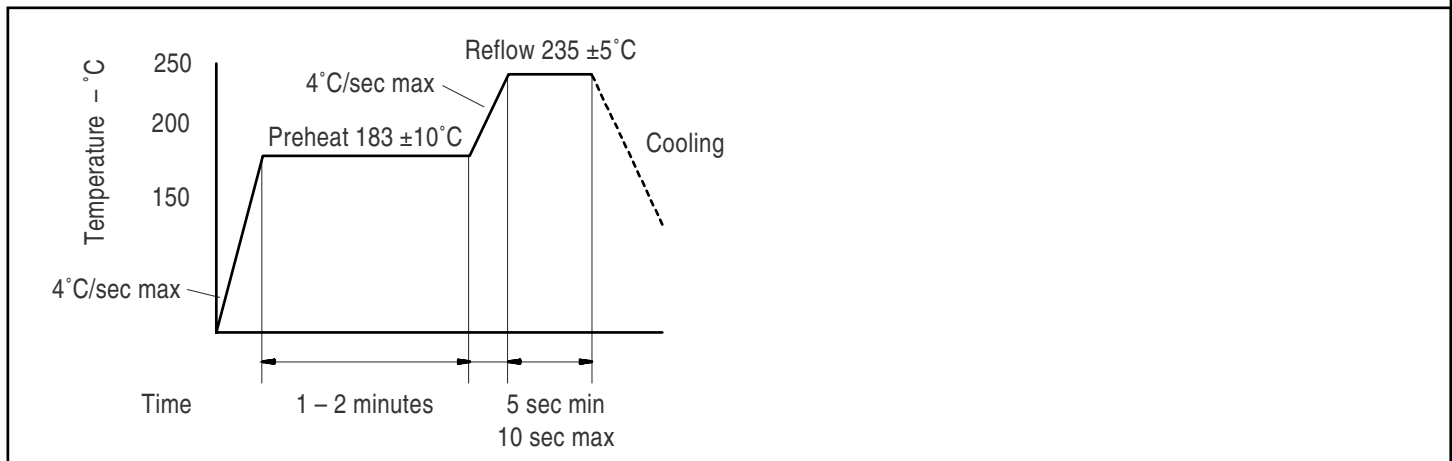
Application Circuit



Output Waveform



Solder Reflow Guide

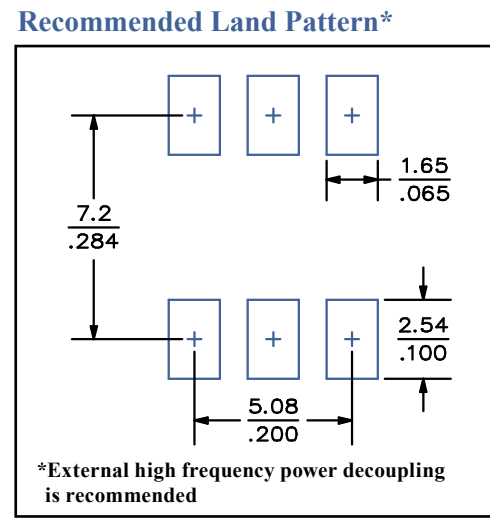
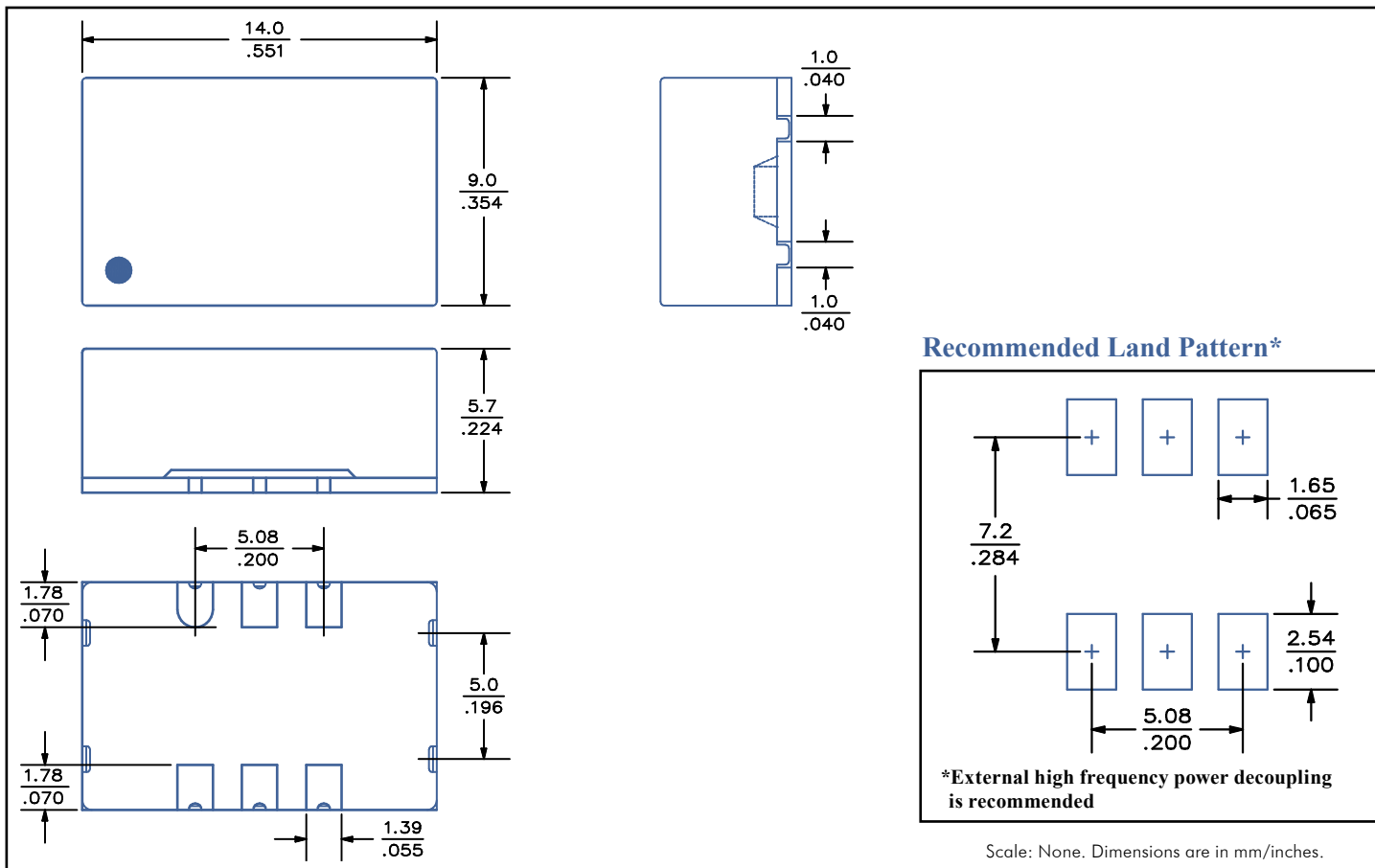


Reliability Test Ratings

This product is rated under the following test conditions:

| Type | Parameter | Test Condition |
|---------------|------------------------------|---|
| Mechanical | Shock | MIL-STD-883, Method 2002, Condition B |
| Mechanical | Solderability | MIL-STD-883, Method 2003 |
| Mechanical | Terminal strength | MIL-STD-883, Method 2004, Condition D |
| Mechanical | Solvent resistance | MIL-STD-202, Method 215 |
| Environmental | Thermal shock | MIL-STD-883, Method 1011, Condition A |
| Environmental | Moisture resistance | MIL-STD-883, Method 1004 |
| Environmental | Vibration | MIL-STD-883, Method 2007, Condition A |
| Environmental | Resistance to soldering heat | MIL-STD-202, Method 210, Condition I or J |

Mechanical Drawings



Scale: None. Dimensions are in mm/inches.

| | | |
|------------------------|------------------------|-----------------------------|
| Marking LINE 1: | SARONIX YY WW X | (Year, Week, Origin) |
| Marking LINE 2: | Frequency | (Frequency) |
| Marking LINE 3: | • S1589xxx | (Pin 1, Part Number) |

**** Exact location of markings may vary**

Ordering Information

