



frequency control solutions

texo

## T32

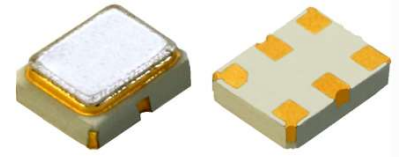
WIDE TEMPERATURE RANGE  
LOW ACCELERATION SENSITIVITY  
HIGH SHOCK SURVIVABILITY

### Product Description

Greenray Industries' T32 Series TCXO has been developed in an ultra-small 3.2 x 2.5 mm package. It can survive extremely high pyrotechnic shocks while providing very low acceleration sensitivity. The T32 operating temperature covers the full MIL range of -55°C to +125°C while holding a frequency stability of only  $\pm 1.0$  ppm.

### Features

- Wide temperature range -55 °C to +125 °C
- Small and rugged 3.2 x 2.5 mm package
- Tight temperature stability as low as  $\pm 1$  ppm over -55 °C to +125°C
- Acceleration sensitivity as low as 0.2 ppb/g
- Shock survivability up to 75,000 g
- Low power consumption
- CMOS or Clipped Sine output
- Fundamental frequency; no PLL artifacts
- Testing per MIL-PRF-55310 product level B available



### Applications

- Telecommunications
- High-shock electronics
- Mobile radio
- Mobile instrumentation
- Airborne communications
- Wireless communications
- Microwave receivers

REV: A6



Greenray Industries, Inc., 840 West Church Road, Mechanicsburg, PA 17055  
TEL: 717-766-0223 FAX: 717-790-9509 e-mail: sales@greenrayindustries.com  
www.greenrayindustries.com

Greenray Proprietary Greenray Industries, Inc. disclaims all liability arising from this information and its use. No licenses are conveyed, implicitly or otherwise, to any Greenray intellectual property rights. ©2025 Greenray Industries, Inc. All rights reserved. Reproduction in whole or in part is prohibited.



frequency control solutions

**T32 SERIES**  
10 MHz to 52 MHz



| Electrical Characteristics |                                    |                  |               |                  |        |               |
|----------------------------|------------------------------------|------------------|---------------|------------------|--------|---------------|
| Parameter                  | Conditions                         | Min              | Nominal       | Max              | Units  | Ordering Code |
| Nominal Frequency          | +25°C                              | 10               |               | 52               | MHz    |               |
| Frequency Stability        | -40°C to +85°C                     |                  | ± 0.5         | ± 1              | ppm    | T57           |
|                            | -45°C to +105°C                    |                  | ± 0.5         | ± 1              | ppm    | J57           |
|                            | -55°C to +105°C                    |                  | ± 1.0         | ± 2              | ppm    | W16           |
|                            | -55°C to +125°C                    |                  | ± 1.0         | ± 2              | ppm    | X16           |
| Aging                      | 1 <sup>st</sup> year               |                  |               | ± 1              | ppm    |               |
| Acceleration Sensitivity   | Worst axis tested @<br>90 Hz, 10 g |                  |               | 1                | ppb/g  | SD            |
|                            |                                    |                  | 0.2           | 0.5              | ppb/g  | LG            |
| Frequency vs Reflow        | After 24 hrs recovery              |                  |               | 1.0              | ppm    |               |
| Frequency vs Voltage       | ± 5%                               |                  |               | 0.2              | ppm    |               |
| Frequency vs Load          | ± 10%                              |                  |               | 0.1              | ppm    |               |
| Voltage Control            | Available upon request             |                  |               |                  |        |               |
| Start-up Time              |                                    |                  | 10            |                  | ms     |               |
| Phase Noise Performance    |                                    |                  |               |                  |        |               |
| Parameter                  | Frequency Offset (Hz)              | Min              | Typical       | Max              | Units  |               |
| Static @ 40 MHz .          | 10                                 |                  | -75           |                  | dBc/Hz |               |
|                            | 100                                |                  | -110          |                  | dBc/Hz |               |
|                            | 1 k                                |                  | -132          |                  | dBc/Hz |               |
|                            | 10 k                               |                  | -148          |                  | dBc/Hz |               |
|                            | 100 k                              |                  | -150          |                  | dBc/Hz |               |
|                            | RMS Jitter                         |                  |               | 570              |        | fSec          |
| DC Supply                  |                                    |                  |               |                  |        |               |
| Parameter                  | Conditions                         | Min              | Typical       | Max              | Units  | Ordering Code |
| Supply Voltage             |                                    | 3.0              | 3.3           | 3.6              | Vdc    | B             |
| Supply Current             | CMOS                               |                  |               | 6                | mA     |               |
|                            | Clipped Sine                       |                  |               | 3                | mA     |               |
| RF Output                  |                                    |                  |               |                  |        |               |
| Parameter                  | Conditions                         | Min              | Typical       | Max              | Units  | Ordering Code |
| CMOS                       |                                    |                  |               |                  |        | C             |
| Load                       |                                    |                  | 15            |                  | pF     |               |
| Level                      | Supply Voltage=3.3 V               | 80%<br>"1" Level |               | 20%<br>"0" Level |        |               |
| Symmetry                   |                                    | 40               | 50            | 60               | %      |               |
| Clipped Sine               |                                    |                  |               |                  |        | CS            |
| Load                       |                                    |                  | 10 pF// 10 kΩ |                  |        |               |
| Output Level               |                                    | + 0.8            | + 1.9         | + 3.0            | V p-p  |               |



**Greenray Industries, Inc., 840 West Church Road, Mechanicsburg, PA 17055**  
**TEL: 717-766-0223 FAX: 717-790-9509 e-mail: sales@greenrayindustries.com**  
**www.greenrayindustries.com**

Greenray Proprietary Greenray Industries, Inc. disclaims all liability arising from this information and its use. No licenses are conveyed, implicitly or otherwise, to any Greenray intellectual property rights. ©2025 Greenray Industries, Inc. All rights reserved. Reproduction in whole or in part is prohibited.



frequency control solutions

**T32 SERIES**  
10 MHz to 52 MHz



| Environmental and Mechanical Specifications |              |                                   |                                    |
|---|--------------|-----------------------------------|------------------------------------|
| Test  | Standard     | Method, Condition                 | Description                        |
| Vibration                                   | MIL-STD-202G | 204, D                            | 20 g, 20 Hz to 2000 Hz, swept sine |
| Shock Survival                              | STD:         | 5,000 g, 0.5 ms, half sine        |                                    |
|   | HG:          | Up to 75,000 g, 0.5 ms, half sine | (Specify required Level)           |

| Recommendations and General Information |   |
|---|---|
| Parameter                               | Notes   |
| Operating Temperature                   | -55°C to +125°C                                 |
| Storage Temperature                     | -60°C to +125°C                                 |
| Terminal Finish                         | Au plated STD., SnPb 63/37 (non-RoHS) available |
| Package Weight                          | <0.1 gram                                       |
| Soldering Instruction                   | Reflow  |
| Shipping                                | Tray Pack, Tape & Reel                          |

**Ordering Example**

**T32 - X 56 - CS - B - SD - 10.0 MHz - E**

| Model | Temp. Range   | Stability   | Output                      | Supply Voltage | G-Sensitivity        | Freq. (MHz) | Term. Finish                              |
|-------|---|---|-----------------------------|----------------|----------------------|-------------|---|
|       | J: -45 to +105°C<br>T: -40 to +85°C<br>W: -55 to +105°C<br>X: -55 to +125°C | 57: ±0.5ppm<br>16: ±1ppm<br>26: ±2ppm<br>36: ±3ppm<br>56: ±5ppm | C: CMOS<br>CS: Clipped Sine | B: 3.3V        | SD: STD<br>LG: Low G | 10 – 52 MHz | E: Au (RoHS)<br>PB: SnPb 63/37 (non-RoHS) |

The Order ID (T32-X56-CS-B-SG-10.0 MHz-E) is only used to issue the preliminary quote. The Part Number (T32-X) for the quoted Electrical Characteristics, Screenings, and other options, will be provided with the Greenray Sales Order.

Other specification options are available, please contact the factory for more information regarding your specific requirements.



**Greenray Industries, Inc., 840 West Church Road, Mechanicsburg, PA 17055**  
**TEL: 717-766-0223 FAX: 717-790-9509 e-mail: sales@greenrayindustries.com**  
**www.greenrayindustries.com**

Greenray Proprietary Greenray Industries, Inc. disclaims all liability arising from this information and its use. No licenses are conveyed, implicitly or otherwise, to any Greenray intellectual property rights. ©2025 Greenray Industries, Inc. All rights reserved. Reproduction in whole or in part is prohibited.

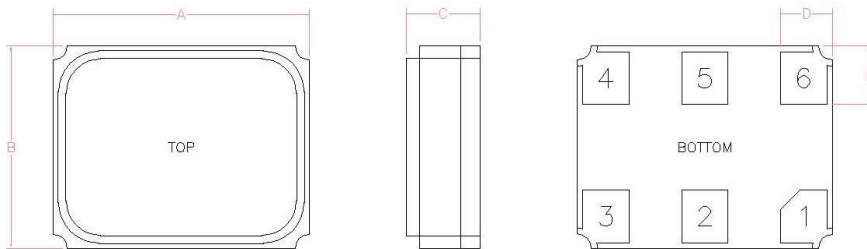


frequency control solutions

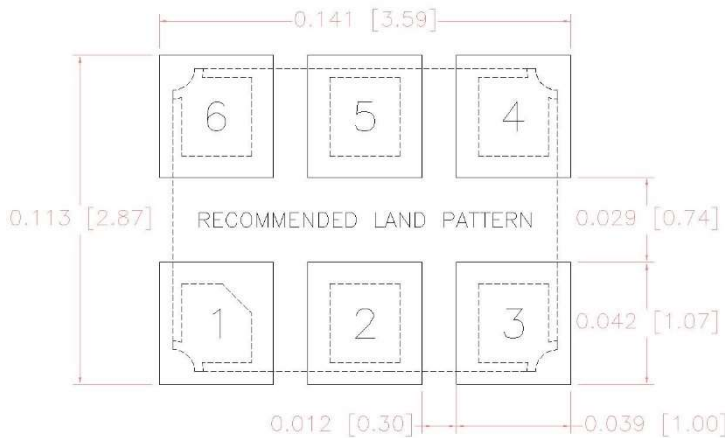
**T32 SERIES**  
10 MHz to 52 MHz



**Package Information**



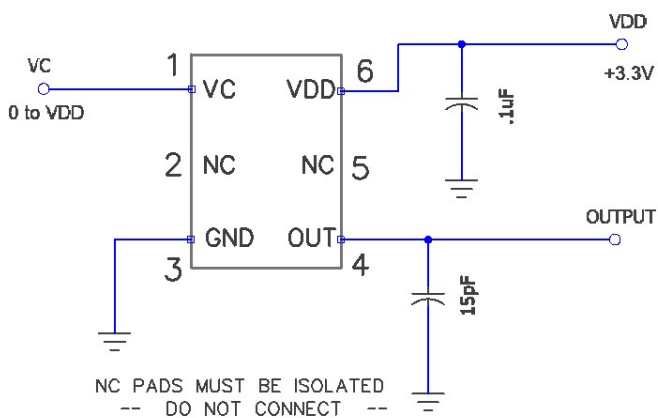
| Part Dimensions |         |      |        |      |
|-----------------|---------|------|--------|------|
| DIM             | Typical |      | MAX    |      |
|                 | Inches  | MM   | Inches | MM   |
| A               | 0.132   | 3.35 | 0.137  | 3.48 |
| B               | 0.104   | 2.64 | 0.107  | 2.73 |
| C               | 0.038   | 0.97 | 0.054  | 1.37 |
| D               | 0.027   | 0.69 | 0.029  | 0.74 |
| E               | 0.030   | 0.76 | 0.035  | 0.89 |



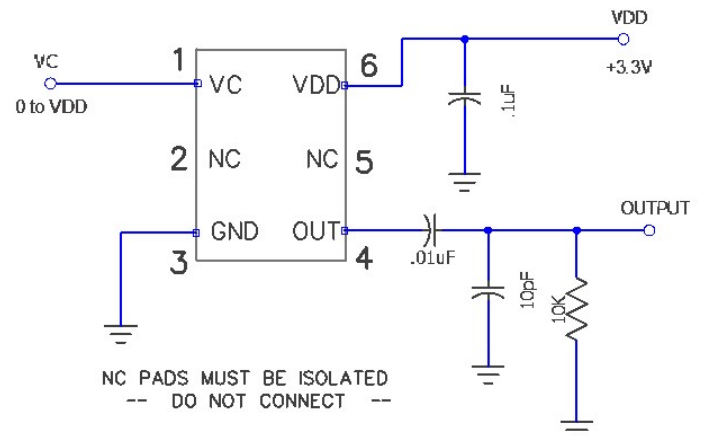
| PAD CONNECTIONS |                 |
|-----------------|-----------------|
| 1               | CONTROL VOLTAGE |
| 2               | NC (NO CONNECT) |
| 3               | GROUND          |
| 4               | OUTPUT          |
| 5               | NC (NO CONNECT) |
| 6               | Vdd             |

(NC Pads may have internal connections and should be isolated)

**T32 CMOS OUTPUT CONFIGURATION**



**T32 CLIPPED SINE CONFIGURATION**



**Greenray Industries, Inc., 840 West Church Road, Mechanicsburg, PA 17055**  
**TEL: 717-766-0223 FAX: 717-790-9509 e-mail: sales@greenrayindustries.com**  
**www.greenrayindustries.com**

Greenray Proprietary Greenray Industries, Inc. disclaims all liability arising from this information and its use. No licenses are conveyed, implicitly or otherwise, to any Greenray intellectual property rights. ©2025 Greenray Industries, Inc. All rights reserved. Reproduction in whole or in part is prohibited.

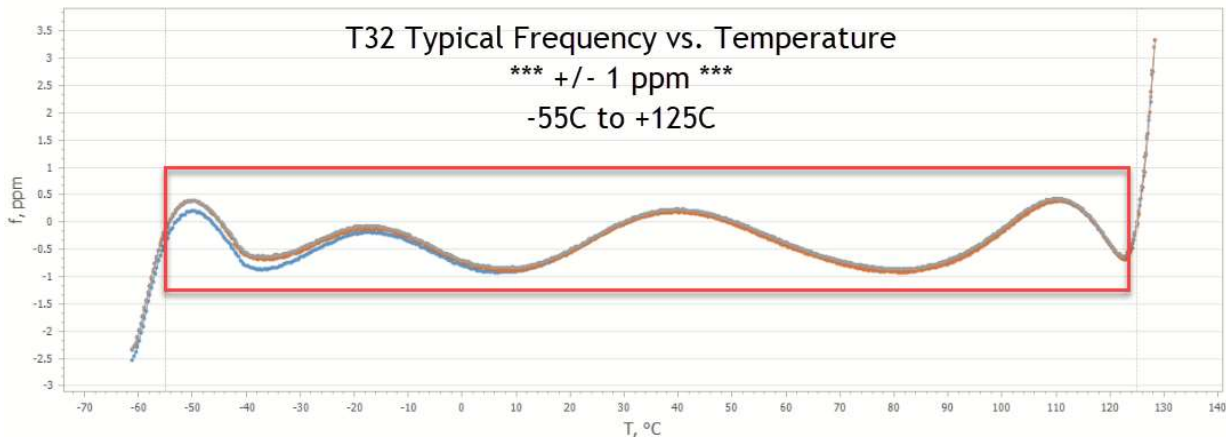
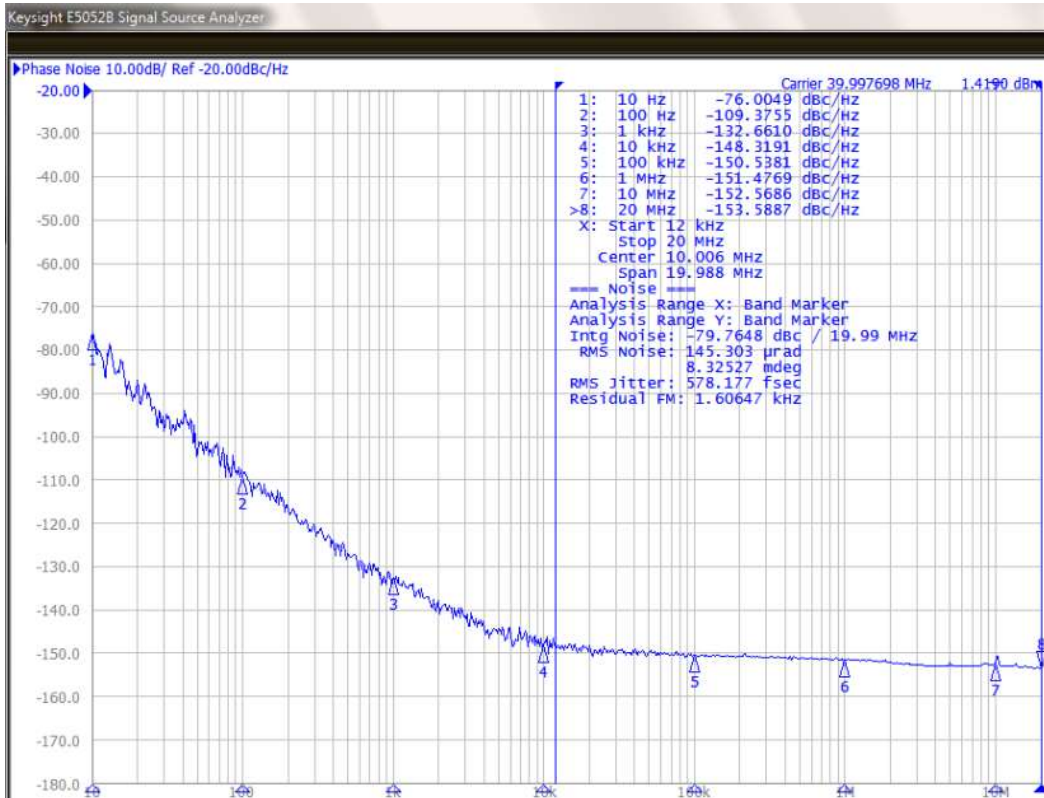


frequency control solutions

**T32 SERIES**  
10 MHz to 52 MHz



### PHASE NOISE AND JITTER PERFORMANCE



**Greenray Industries, Inc., 840 West Church Road, Mechanicsburg, PA 17055**  
**TEL: 717-766-0223 FAX: 717-790-9509 e-mail: sales@greenrayindustries.com**  
**www.greenrayindustries.com**

Greenray Proprietary Greenray Industries, Inc. disclaims all liability arising from this information and its use. No licenses are conveyed, implicitly or otherwise, to any Greenray intellectual property rights. ©2025 Greenray Industries, Inc. All rights reserved. Reproduction in whole or in part is prohibited.