

**DUAL FREQUENCY XO (10 MHz TO 1.4 GHz)****Features**

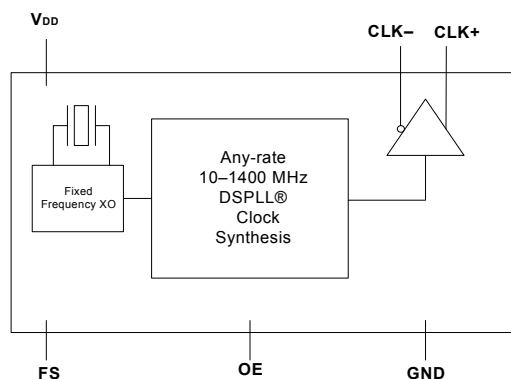
- Available with any-rate output frequencies from 10 to 945 MHz and selected frequencies to 1.4 GHz
- Two selectable output frequencies
- Industry standard 7x5 mm package
- Available CMOS, LVPECL, LVDS & CML outputs
- 3x better frequency stability than SAW based oscillators
- 3rd generation DSPLL<sup>®</sup> with superior jitter performance
- Internal fixed crystal frequency ensures high reliability and low aging
- Lead-free/RoHS-compliant

**Applications**

- SONET/SDH
- xDSL
- 10 GbE LAN/WAN
- Low jitter clock generation
- Optical modules
- Test and measurement

**Description**

The Si532 dual frequency XO utilizes Silicon Laboratories advanced DSPLL<sup>®</sup> circuitry to provide a very low jitter clock for all output frequencies. The Si532 is available with any-rate output frequency from 10 to 945 MHz and selected frequencies to 1400 MHz. Unlike traditional XOs where a different crystal is required for each output frequency, the Si532 uses one fixed crystal frequency to provide a wide range of output frequencies. This IC based approach allows the crystal resonator to be optimized for superior frequency, stability, and reliability. In addition, DSPLL clock synthesis provides superior supply noise rejection, simplifying the task of generating low jitter clocks in noisy environments often found in communication systems. The Si532 IC based XO is factory configurable for a wide variety of user specifications including frequency, supply voltage, and output format. Specific configurations are factory programmed into the Si532 at the time of shipment, thereby eliminating the long lead times associated with custom oscillators.

**Functional Block Diagram****Ordering Information:**

See page 7.

## 1. Electrical Specifications

Table 1. Si532 Electrical Specifications

Parameter	Min	Typ	Max	Units	Notes
<b>Frequency</b>					
Nominal Frequency LVDS/CML/LVPECL CMOS	10 10	— —	945 160	MHz	Specified at time of order by P/N. Also available in bands from 970 to 1134 MHz and 1213 to 1417 MHz.
Initial Accuracy	-1.5	—	1.5	ppm	Measured at +25 °C at time of ship- ping
Temperature Stability	-20 -50	— —	+20 +50	ppm	Selectable option by P/N. See Section 4. "Ordering Information" on page 7.
Aging	—	—	±10	ppm	Frequency drift over projected 15 year life
<b>Outputs</b>					
Symmetry	45	—	55	%	LVPECL: $V_{DD} - 1.3$ V (differential) LVDS: 1.25 V (differential) CMOS: $V_{DD}/2$
RMS Jitter for $F_{OUT} \geq 500$ MHz 12 kHz to 20 MHz 50 kHz to 80 MHz	— —	0.27 0.30	— —	ps	$F_{OUT} \geq 500$ MHz Differential Modes: LVPECL/LVDS/CML
RMS Jitter for $F_{OUT}$ of 125 to 500 MHz 12 kHz to 20 MHz	—	0.5	—	ps	$125 < F_{OUT} < 500$ MHz Differential Modes: LVPECL/LVDS/CML
Period Jitter for $F_{OUT} \leq 160$ MHz Peak-to-Peak RMS	— —	5 1	— —	ps	Any output N = 1000 cycles
LVPECL Output Option mid-level swing (diff) swing (single-ended)	$V_{DD} - 1.42$ 1.1 0.5	— — —	$V_{DD} - 1.25$ 1.9 0.93	V $V_{PP}$ $V_{PP}$	$50 \Omega$ to $V_{DD} - 2.0$ V
LVDS Output Option mid-level swing (diff)	1.125 0.5	1.2 0.7	1.275 0.9	V $V_{PP}$	$R_{term} = 100 \Omega$ (differential)
CML Output Option mid-level swing	— 0.35	$V_{DD} - 0.36$ 0.425	— 0.5	V $V_{PP}$	$R_{term} = 100 \Omega$ (differential)

Table 1. Si532 Electrical Specifications (Continued)

Parameter	Min	Typ	Max	Units	Notes
CMOS Output Option V <sub>OH</sub> V <sub>OL</sub>	0.8xV <sub>DD</sub> —	— —	V <sub>DD</sub> 0.4	V	C <sub>L</sub> = 15 pF
Rise/Fall time	— — —	— — —	350 2 8	ps ns ns	CML/LVPECL/LVDS at 20% / 80% CMOS with V <sub>DD</sub> = 1.8 V & CL = 15 pF CMOS with V <sub>DD</sub> = 3.3 V & CL = 15 pF
<b>Inputs</b>					
Voltage (V <sub>DD</sub> ) 3.3 V option 2.5 V option 1.8 V option	2.97 2.25 1.71	3.3 2.5 1.8	3.63 2.75 1.89	V	Optional parameter specified by P/N
Current Output enabled TriState mode	— —	90 60	— —	mA	
Frequency Select [1:0] V <sub>IH</sub> V <sub>IL</sub>	0.75 x V <sub>DD</sub> 0	— —	V <sub>DD</sub> 0.5	V	"0" selects F1 "1" selects F2
Output Enable V <sub>IH</sub> V <sub>IL</sub>	0.75 x V <sub>DD</sub> —	— —	V <sub>DD</sub> 0.5	V	

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Supply Voltage	V <sub>DD</sub>	-0.5 to +3.8	V
Storage Temperature	T <sub>S</sub>	-55 to +125	°C

**Table 3. Environmental Conditions**

Parameter	Conditions/Test Method
Operating Temperature	-40 to +85 °C
Mechanical Shock	MIL-STD-883F, Method 2002.3 B
Mechanical Vibration	MIL-STD-883F, Method 2007.3 A
Solderability	MIL-STD-883F, Method 203.8
Gross & Fine Leak	MIL-STD-883F, Method 1014.7
Resistance to Solvents	MIL-STD-883F, Method 2016

**Table 4. Pinout**

Pin	Symbol	Function
1	FS	Frequency Select
2	OE	Output Enable
3	GND	Ground
4	CLK+	Oscillator Output
5	CLK- (N/A for CMOS)	Complementary Output (N/C for CMOS)
6	V <sub>DD</sub>	Power Supply Voltage

## 2. Outline Diagram and Suggested Pad Layout

Figure 1 illustrates the package details for the Si532. Table 5 lists the values for the dimensions shown in the illustration.

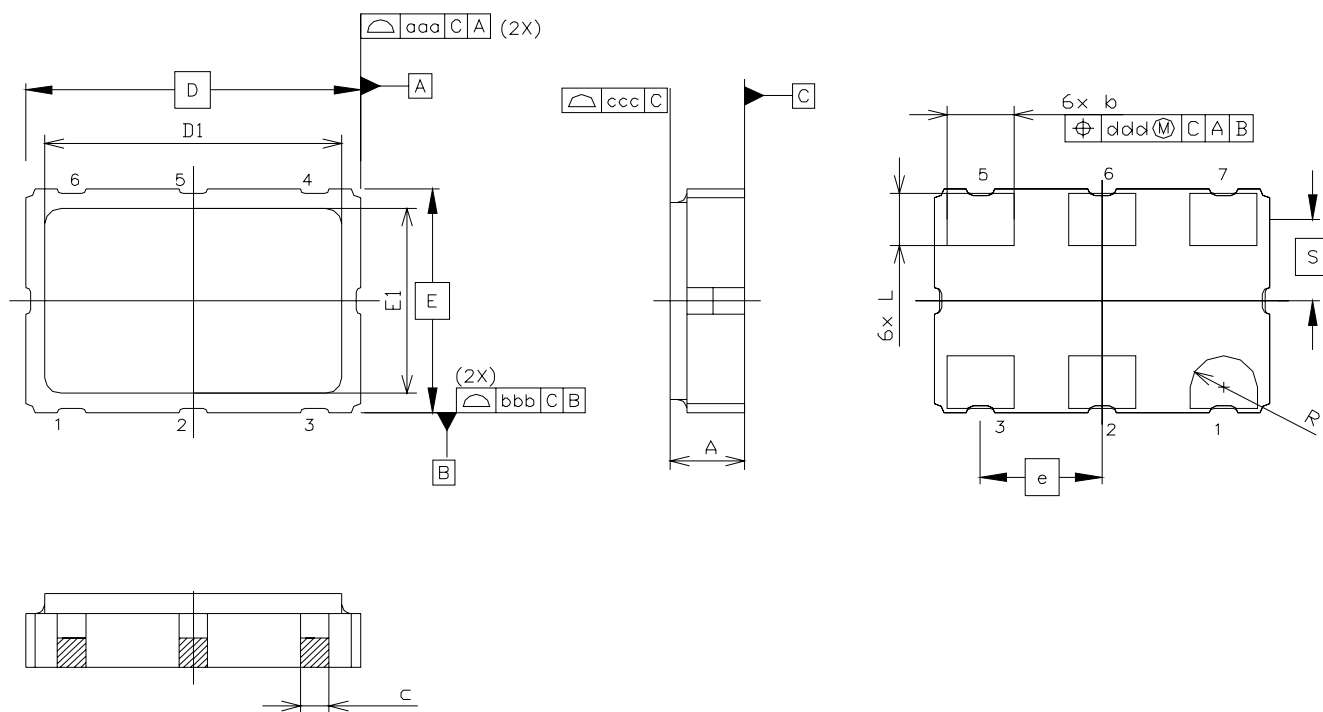


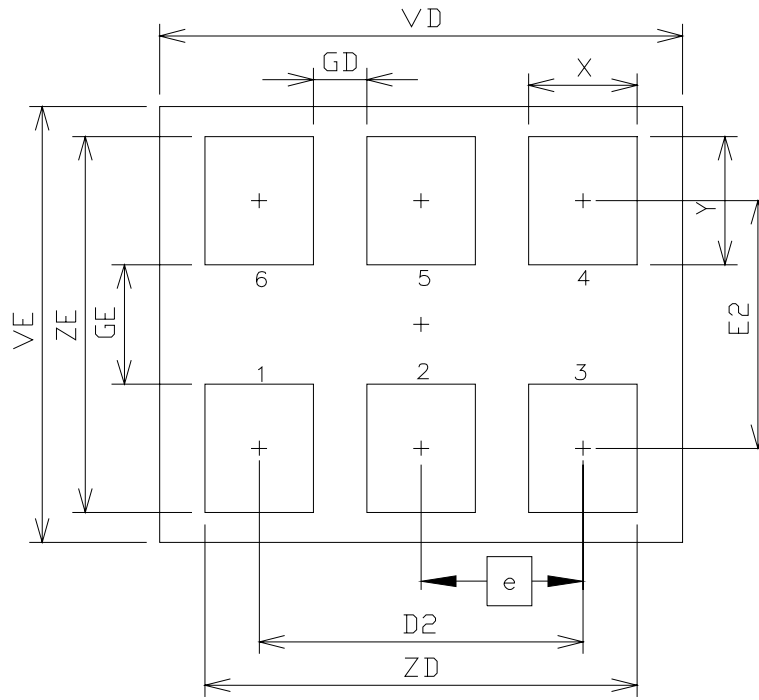
Figure 1. Si532 Outline Diagram

Table 5. Package Diagram Dimensions (mm)

Dimension	Min	Nom	Max
A	1.45	1.65	1.85
b	1.2	1.4	1.6
c	0.60 TYP.		
D	7.00 BSC.		
D1	6.10	6.2	6.30
e	2.54 BSC.		
E	5.00 BSC.		
E1	4.30	4.40	4.50
L	1.07	1.27	1.47
S	1.815 BSC.		
R	0.7 REF.		
aaa	—	—	0.15
bbb	—	—	0.15
ccc	—	—	0.10
ddd	—	—	0.10

## 3. 6-Pin PCB Land Pattern

Figure 2 illustrates the 6-pin PCB land pattern for the Si532. Table 6 lists the values for the dimensions shown in the illustration.



**Figure 2. Si532 PCB Land Pattern**

**Table 6. PCB Land Pattern Dimensions (mm)**

Dimension	Min	Max
D2		5.08 REF
e		2.54 BSC
E2		4.15 REF
GD	0.84	—
GE	2.00	—
VD		8.20 REF
VE		7.30 REF
X		1.70 TYP
Y		2.15 REF
ZD	—	6.78
ZE	—	6.30

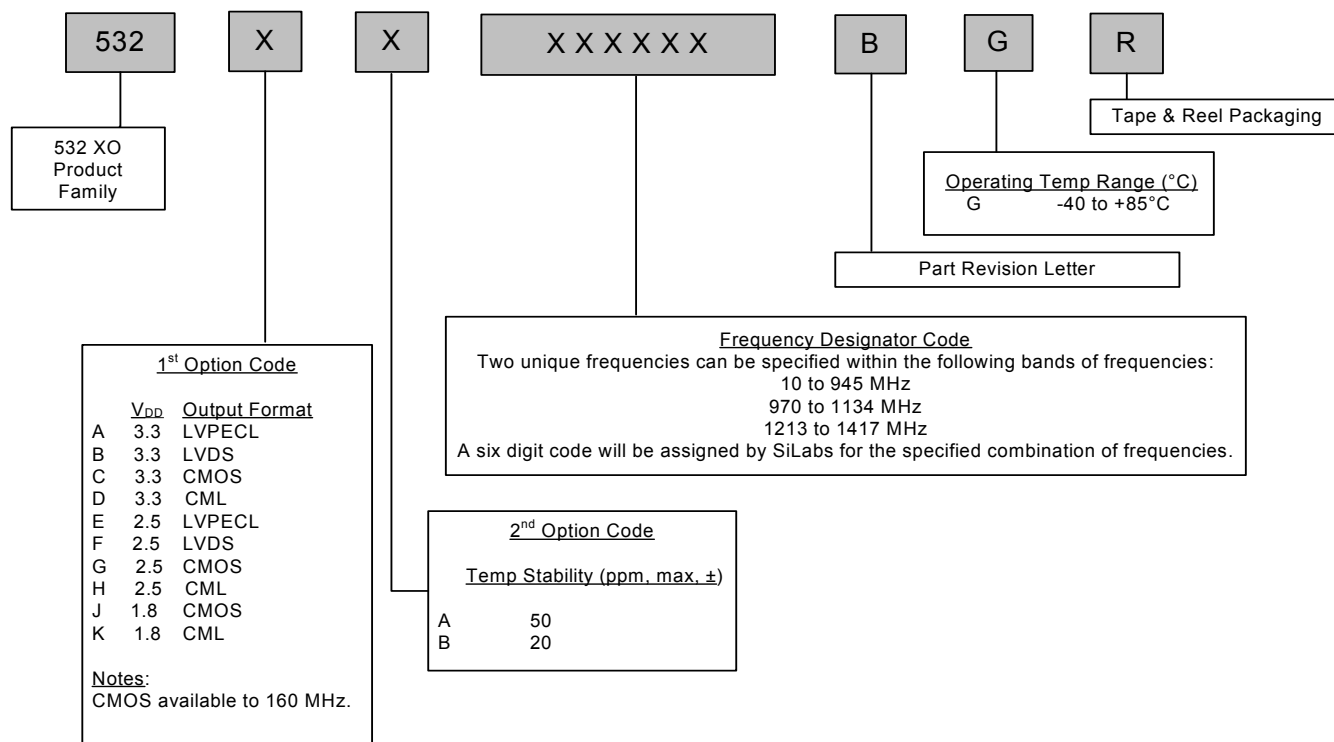
**Notes:**

1. Dimensioning and tolerancing per the ANSI Y14.5M-1994 specification.
2. Land pattern design based on IPC-7351 guidelines.
3. All dimensions shown are at maximum material condition (MMC).
4. Controlling dimension is in millimeters (mm).

## 4. Ordering Information

The Si532 was designed to support a variety of options including frequency, tuning slope, output format, and  $V_{DD}$ . Specific device configurations are programmed into the Si532 at time of shipment. A unique part number associated with these options and frequencies will be assigned. The Si532 XO series is supplied in an industry-standard, 7x5 mm package.

Part numbers for the Si532 Dual Frequency XO are determined by following configuration tables. Silicon Labs provides a Windows-based part number configuration tool to simplify this process. Refer to [www.silabs.com/VCXO](http://www.silabs.com/VCXO) to access this tool and for further ordering instructions.



## CONTACT INFORMATION

### Silicon Laboratories Inc.

4635 Boston Lane

Austin, TX 78735

Tel: 1+(512) 416-8500

Fax: 1+(512) 416-9669

Toll Free: 1+(877) 444-3032

Email: [VCXOinfo@silabs.com](mailto:VCXOinfo@silabs.com)

Internet: [www.silabs.com](http://www.silabs.com)

The information in this document is believed to be accurate in all respects at the time of publication but is subject to change without notice. Silicon Laboratories assumes no responsibility for errors and omissions, and disclaims responsibility for any consequences resulting from the use of information included herein. Additionally, Silicon Laboratories assumes no responsibility for the functioning of undescribed features or parameters. Silicon Laboratories reserves the right to make changes without further notice. Silicon Laboratories makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Silicon Laboratories assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Silicon Laboratories products are not designed, intended, or authorized for use in applications intended to support or sustain life, or for any other application in which the failure of the Silicon Laboratories product could create a situation where personal injury or death may occur. Should Buyer purchase or use Silicon Laboratories products for any such unintended or unauthorized application, Buyer shall indemnify and hold Silicon Laboratories harmless against all claims and damages.

Silicon Laboratories, Silicon Labs, and DSPLL are trademarks of Silicon Laboratories Inc.

Other products or brandnames mentioned herein are trademarks or registered trademarks of their respective holders.