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With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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MODEL 581

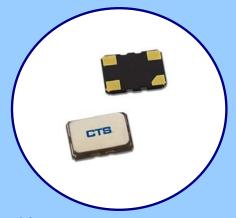


STRATUM 3 PERFORMANCE

TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR

FEATURES

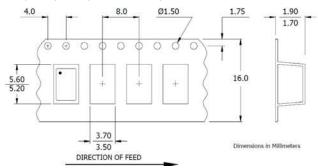
- HCMOS Output
- Optional Voltage Control for Frequency Tuning [VCTCXO]
- 5.0mm x 3.2mm Surface Mount Package
- Frequency Range 5 52 MHz
- Fundamental Crystal Design
- Operating Voltage, +3.3Vdc or +5.0Vdc
- Overall Frequency Stability ±4.6ppm
- Operating Temperature to -40°C to +85°C
- Tape & Reel Packaging Standard, EIA-418
- RoHS/ Green Compliant [6/6]

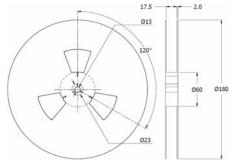


APPLI CATIONS

The Model 581 is a quartz based analog TCXO with a HCMOS output and optional frequency tuning. M581 is suitable for applications requiring Stratum 3 performance such as base stations, small cells, 1588 and Synchronous Ethernet timing, wireless communications, test and measurement.

ORDERING INFORMATION 581 PACKAGING OPTIONS SUPPLY VOLTAGE R = +3.0VdcS = +5.0VdcT - 1k pcs./reel L = +3.3VdcFREQUENCY FREQUENCY TUNING [AFC] T = No AFC [TCXO]Product Frequency Code [3 digits] Refer to document 016-1454-0, Frequency $A = \pm 5ppm - \pm 8ppm [VCTCXO]$ Code Tables. **OPERATING TEMPERATURE RANGE** FREQUENCY STABILITY * $W = 0^{\circ}C \text{ to } +55^{\circ}C$ H = -10°C to +60°C $X5 = \pm 0.05$ ppm ¹ $X2 = \pm 0.28ppm$ C = -20°C to +70°C $01 = \pm 0.10$ ppm² $05 = \pm 0.50$ ppm $D = -30^{\circ}C \text{ to } +85^{\circ}C$ $02 = \pm 0.20$ ppm I = -40°C to +85°C * Frequency vs. Temperature Only 1] Only available with temperature range codes "W" and "H". 2] Only available with temperature range codes "W", "H" and "C". Not all performance combinations and frequencies may be available. Contact your local CTS Representative or CTS Customer Service for availability. PACKAGING INFORMATION [reference] Device quantity is 1k pcs. maximum per 180mm reel. 4.0 8.0 Ø1.50 1.90 1.70



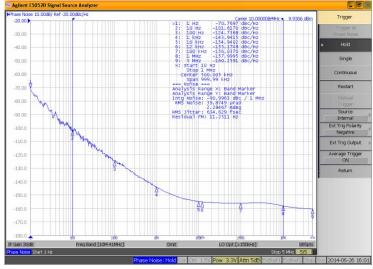


ELECTRI CAL CHARACTERI STI CS

Maximum Control Voltage V _C - -0.5 - V _{CC} V _C V _C Storage Temperature T _{STG} - -40 - +100 °C V _C Operating Temperature Order Code 'C' T _A - -20 +25 +70 °C -40 +25 +85 V _C Order Code 'I' -40 +25 +85 V _C Order Code 'I' -40 +25 +85 V _C - -20 -20 +25 +70 °C -20		PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Storage Temperature T _{STG} - -40 - +100 °C Operating Temperature Order Code 'C' T _A - -20 +25 +70 °C Order Code 'I' -40 +25 +85 Frequency Range f _O - 5 -52 MF Supply Voltage Order Code 'R' V _{CC} ±5% 2.85 3.0 3.15 V Order Code 'S' 3.14 3.3 3.47 V Order Code 'S' 4.75 5.0 5.25 Supply Current I _{CC}		Maximum Supply Voltage	V_{CC}	-	-0.6	-	6.0	V	
Operating Temperature		Maximum Control Voltage	V_{C}	-	-0.5	í	V_{CC}	V	
Order Code 'C'		Storage Temperature	T_{STG}	-	-40	ı	+100	°C	
Order Code '1' -40 +25 +85 -40 +25 +85 -40 +85 -40 +85 -40 +85 -40 -40 +85 -40 +85 -40 -40 +85 -40 -40 +85 -40		Operating Temperature							
Order Code 'I' Frequency Range f ₀		Order Code 'C'	T_A	-	-20	. 25	+70	°C	
Supply Voltage Order Code 'R' V _{CC} ±5% 2.85 3.0 3.15 3.14 3.3 3.47 V _{CC} Order Code 'L' Order Code 'S' 3.14 3.3 3.47 4.75 5.0 5.25 Supply Current I _{CC}		Order Code 'I'			-40	+23	+85		
Order Code 'R' Order Code 'R' Order Code 'L' Order Code 'L' Order Code 'S' Supply Current I _{CC} Reference to f _O , Including 20 years aging - 0.0 m/		Frequency Range	f_0	-	5	-	52	MHz	
Order Code 'L' Order Code 'S' Supply Current I _{CC} Reference to f _O , Including 20 years aging 0.0 mode - 0.20		Supply Voltage							
Order Code 'L' Order Code 'S' Supply Current I _{CC}		Order Code 'R'	V	+50%	2.85	3.0	3.15	V	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Order Code 'L'	V CC	±3%	3.14	3.3	3.47	l 'I	
Frequency Stability Overall Frequency Stability Vs. Initial Calibration Vs. Operating Temperature 1 Vs. Supply Voltage Vs. Load Vs. Aging Holdover Control Voltage Vc. Input Impedance Output Waveform Output Voltage Levels Logic '1' Level Logic '0' Level Vs. Initial Calibration $\Delta f/f_0$ Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 4.60 Reference to f_0 , Including 20 years aging 0.28 **Effection in the properties of the		Order Code 'S'			4.75	5.0	5.25		
$ \begin{array}{ c c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	w	Supply Current	I_{CC}		-	ı	6.0	mA	
$ \begin{array}{ c c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	E	Frequency Stability							
$ \begin{array}{ c c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	텔	Overall Frequency Stability	۸f/f	Reference to f ₀ , Including 20 years aging	-	-	4.60		
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	M.	vs. Initial Calibration	Δ1/10	@ +25°C, at time of shipment	-	-	1.00		
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	₽	vs. Operating Temperature ¹		[Fmax Fmin.]/2, over -40°C to +85°C	-	-	0.28	± ppm	
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	4	vs. Supply Voltage	Λf/f	±5% change @ +25°C	-	-	0.20		
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	2	vs. Load	Δi/125	±5% change	-	-	0.20		
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	빒	vs. Aging		20 years @ +40°C	-	-	3.00		
$ \begin{array}{ c c c c c c c } \hline Control \ Voltage & V_C & - & 0.5 & 1.5 & 2.5 & V \\ \hline Frequency \ Tuning \ [VCTCXO \ Only] & - & V_C = 1.5V \pm 1.0V, \ monotonic \ positive & 5 - 8 & \pm p \ V_C \ Input \ Impedance & ZV_C & - & 100 & - & kOh \ \hline Output \ Waveform & HCMOS & & & & & \\ \hline Output \ Voltage \ Levels & & & & & & & & \\ Logic \ '1' \ Level & V_{OH} & HCMOS \ Load & 0.9*V_{CC} & - & - & \\ \hline Logic \ '0' \ Level & V_{OL} & HCMOS \ Load & - & - & 0.1*V_{CC} \ \end{array} $	֟֟֟֟֟֟֟֝֟֟ ֚	Holdover	$\Delta f/f_O$	[Fmax Fmin.]/2, over 24 hours	-	-	0.40		
V _C Input Impedance ZV _C - 100 - - kOh Output Waveform HCMOS - - - - kOh Output Voltage Levels Logic '1' Level V _{OH} HCMOS Load 0.9*V _{CC} - - - - Logic '0' Level V _{OL} HCMOS Load - - 0.1*V _{CC} V	ш	Control Voltage	V_{C}	-	0.5	1.5	2.5	V	
Output Waveform HCMOS Output Voltage Levels Logic '1' Level V _{OH} HCMOS Load 0.9*V _{CC} Logic '0' Level V _{OL} HCMOS Load 0.1*V _{CC}		Frequency Tuning [VCTCXO Only]	-	$V_C = 1.5V \pm 1.0V$, monotonic positive		5 - 8		± ppm	
Output Voltage Levels Logic '1' Level V_{OH} HCMOS Load $0.9*V_{CC}$ Logic '0' Level V_{OL} HCMOS Load - $0.1*V_{CC}$ V_{OL}		V _C Input Impedance	ZV_C	-	100	-	-	kOhm	
Logic '1' Level V_{OH} HCMOS Load $0.9*V_{CC}$ $0.1*V_{CC}$ V V_{OL} HCMOS Load V_{OL} HCMOS Load V_{OL} HCMOS Load V_{OL} Logic '0' Level V_{OL} HCMOS Load		Output Waveform		HCMOS					
Logic '0' Level V _{OL} HCMOS Load 0.1*V _{CC} V		Output Voltage Levels							
Logic '0' Level V_{OL} HCMOS Load $0.1*V_{CC}$		Logic '1' Level	V_{OH}	HCMOS Load	0.9*V _{CC}	-	-	V	
Output load C - 15 ns		Logic '0' Level	V_{OL}	HCMOS Load	-	-	0.1*V _{CC}	v	
Output 2000 9		Output Load	C_L	-	-	-	15	pF	
Rise and Fall Time		Rise and Fall Time	T_R , T_F	@ 20% - 80% Levels	-	3.0	6.0	ns	
Output Duty Cycle SYM @ 50% Level 45 - 55 %		Output Duty Cycle	SYM	@ 50% Level	45	-	55	%	
Start Up Time T _S - - - 2 ms		Start Up Time	T _S	·	-	2	ms		
Phase Noise ² dBc/		Phase Noise ²	-	-				dBc/Hz	

Notes

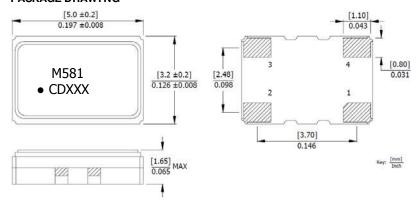
- 1. See Ordering Information for stability options.
- 2. Phase Noise performance may vary based on output frequency. See example plot at 10MHz below.



MODEL 581 STRATUM 3 TCXO/VC-TCXO - HCMOS

MECHANI CAL SPECIFICATIONS

PACKAGE DRAWING



D.U.T. PI N ASSI GNMENTS

PIN	SYMBOL	DESCRI PTI ON
1	Vc	Control Voltage – VCTCXO
1	v _C	NC - TCXO
2	GND	Circuit & Package Ground
3	Output	HCMOS Output
4	Vcc	Supply Voltage

MARKING INFORMATION

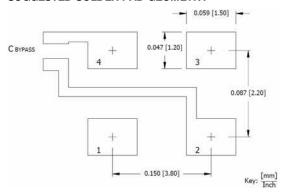
- 1. M581 CTS Model Series.
- 2. − Pin 1 identifier.
- 3. C CTS identifier.4.
- 4. D Date code. See Table II for codes.
- 5. xxx Frequency Code.

Refer to document 016-1454-0, Frequency Code Tables.

NOTES

- DO NOT make connections to non-labeled pins. Castellation pins may have internal connections used in the manufacturing process.
- 2. Termination pads (e4); barrier plating is nickel [Ni] with gold [Au] flash plate.
- 3. Reflow conditions per JEDEC J-STD-020, 260°C maximum.
- 4. MSL = 1.

SUGGESTED SOLDER PAD GEOMETRY



TEST CIRCUIT - HCMOS LOAD

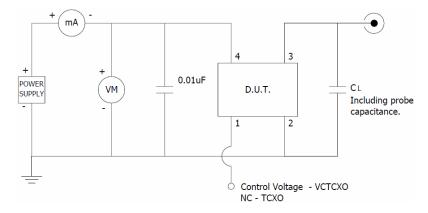


TABLE II - DATE CODE

	MONTH			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ост	NOV	DEC	
	YEAR				OAN	125	WAIT	ALI	WAI	JON	001	AOG	5	001	NOV	
2001	2005	2009	2013	2017	Α	В	С	D	Е	F	G	Н	J	K	L	М
2002	2006	2010	2014	2018	N	Р	Q	R	S	Т	U	٧	W	Χ	Υ	Z
2003	2007	2011	2015	2019	а	b	С	d	е	f	g	h	j	k	1	m
2004	2008	2012	2016	2020	n	р	q	r	S	t	u	٧	W	Х	У	Z