

HIGH PRECISION DIFFERENTIAL LP TC & VCTCXO SERIES „HFDTCVCTO“ HIGH PRECISION 220–625 MHz

FEATURES

- + 100% pin-to-pin drop-in replacement to quartz and MEMS based XO
- + Ultra Performance Oscillator for Low Cost
- + TCXO function possible by Pin1 options
- + Low Power Consumption
- + Excellent long time reliability
- + Extremely low RMS jitter
- + LVPECL and LVDS output signals
- + Very tight frequency stability as low as ± 2.5 ppm
- + Outstanding long term aging
- + Industry-standard packages: 3.2x2.5; 5.0x3.2; 7.0x5.0 mm
- + Pb-free, RoHS and REACH compliant / MSL1@260°C

APPLICATIONS

- + SATA, SAS, 10GB Ethernet, Fibre Channel, PCI-Express
- + Networking, broadband, instrumentation,
- + etc.

GENERAL DATA

PARAMETER AND CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
LVPECL AND LVDS, COMMON ELECTRICAL CHARACTERISTICS						
Supply Voltage	V _{DD}	2.97	3.3	3.63	V	
		2.25	2.5	2.75	V	
		2.25	-	3.63	V	Termination schemes in Figures 1 and 2 - XX ordering code
Output Frequency Range	f	220	-	625	MHz	
Initial Tolerance	F _{init}	-2	-	2	PPM	At 25°C after two reflows
Stability Over Temperature	F _{stab}	-5	-	+5	PPM	Over operating temperature range at rated nominal power supply voltage and load. Contact PETERMANN-TECHNIK for tighter stability options.
Supply Voltage	F _{VDD}	-	50	-	PPB	$\pm 10\%$ V _{DD} ($\pm 5\%$ for V _{DD} = 1.8V)
Output Load	F _{load}	-	0.1	-	PPM	15 pF $\pm 10\%$ of load
First Year Aging	F _{aging1}	-2.5	-	+2.5	PPM	25°C
10-year Aging	F _{aging10}	-5	-	+5	PPM	25°C
Operating Temperature Range	T _{use}	-40	-	+85	°C	Industrial
		-20	-	+70	°C	Extended Commercial
Storage Temperature Range	T _{stor}	-65	-	+150	°C	
Pull Range	PR		$\pm 12.5, \pm 25, \pm 50$		PPM	
Upper Control Voltage	VC _U	V _{DD} -0.1	-	-	V	All V _{DD} s. Voltage at which maximum deviation is guaranteed.
Control Voltage Range	VC _L	-	-	0.1	V	
Control Voltage Input Impedance	Z _{vc}	100	-	-	k Ω	
Frequency Change Polarity	-		Positive slope		-	
Control Voltage -3dB Bandwidth	V _{BW}	-	-	8	kHz	
Input Voltage High	V _{IH}	70%	-	-	V _{DD}	Pin 1, OE or ST
Input Voltage Low	V _{IL}	-	-	30%	V _{DD}	Pin 1, OE or ST
Input Pull-up Impedance	Z _{in}	-	100	250	k Ω	Pin 1, OE logic high or logic low, or ST logic high
		2	-	-	M Ω	Pin 1, ST logic low
Start-up Time	T _{start}	-	6	10	ms	Measured from the time V _{DD} reaches its rated minimum value.
Resume Time	T _{resume}	-	6	10	ms	In Standby mode, measured from the time ST pin crosses 50% threshold.
Duty Cycle	DC	45	-	55	%	Contact PETERMANN-TECHNIK for tighter duty cycle

GENERAL DATA (continued)

PARAMETER AND CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
LVPECL, DC AND AC CHARACTERISTICS						
Current Consumption	I _{dd}	-	61	69	mA	Excluding Load Termination Current, V _{DD} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	-	-	35	mA	OE = Low
Output Disable Leakage Current	I _{leak}	-	-	1	µA	OE = Low
Standby Current	I _{std}	-	-	100	µA	ST = Low, for all V _{DDs}
Maximum Output Current	I _{driver}	-	-	30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	V _{OH}	V _{DD} -1.1	-	V _{DD} -0.7	V	See Figure 1(a)
Output Low Voltage	V _{OL}	V _{DD} -1.9	-	V _{DD} -1.5	V	See Figure 1(a)
Output Differential Voltage Swing	V _{Swing}	1.2	1.6	2	V	See Figure 1(b)
Rise/Fall Time	T _r , T _f	-	300	500	ps	20% to 80%, see Figure 1(a)
OE Enable/Disable Time	T _{oe}	-	-	115	ns	f = 220 MHz - For other frequencies, T _{oe} = 100ns + 3 period
RMS Period Jitter	T _{jitt}	-	1.2	1.7	ps	f = 266 MHz, V _{DD} = 3.3V or 2.5V
		-	1.2	1.7	ps	f = 312.5 MHz, V _{DD} = 3.3V or 2.5V
		-	1.2	1.7	ps	f = 622.08 MHz, V _{DD} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	-	0.6	0.85	ps	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all

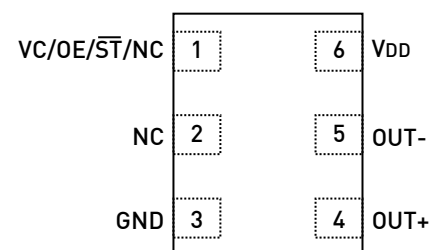
LVDS, DC AND AC CHARACTERISTICS						
Current Consumption	I _{dd}	-	47	55	mA	Excluding Load Termination Current, V _{DD} = 3.3V or 2.5V
OE Disable Supply Current	I _{OE}	-	-	35	mA	OE = Low
Differential Output Voltage	V _{OD}	250	350	450	mV	See Figure 2
Output Disable Leakage Current	I _{leak}	-	-	1	µA	OE = Low
Standby Current	I _{std}	-	-	100	µA	ST = Low, for all V _{DDs}
VOD Magnitude Change	ΔV _{OD}	-	-	50	mV	See Figure 2
Offset Voltage	V _{OS}	1.125	1.2	1.375	V	See Figure 2
VOS Magnitude Change	ΔV _{OS}	-	-	50	mV	See Figure 2
Rise/Fall Time	T _r , T _f	-	495	600	ps	20% to 80%, see Figure 2
OE Enable/Disable Time	T _{oe}	-	-	115	ns	f = 220 MHz - For other frequencies, T _{oe} = 100ns + 3 period
RMS Period Jitter	T _{jitt}	-	1.4	1.7	ps	f = 266 MHz, V _{DD} = 3.3V or 2.5V
		-	1.4	1.7	ps	f = 312.5 MHz, V _{DD} = 3.3V or 2.5V
		-	1.2	1.7	ps	f = 622.08 MHz, V _{DD} = 3.3V or 2.5V
RMS Phase Jitter (random)	T _{phj}	-	0.6	0.85	ps	f = 312.5 MHz, Integration bandwidth = 12 kHz to 20 MHz, all

EXCELLENT RELIABILITY DATA		EXCELLENT RELIABILITY DATA	
MTBF			500 million hours
Shock Resistance:			10.000 g
Vibration Resistance:			70 g

PIN DESCRIPTION

PIN	SYMBOL	FUNCTIONALITY
1	VC	V control Voltage control
	OE	Input H or Open: specified frequency output L: output is high impedance
	ST	Input H or Open: specified frequency output L: Device goes to sleep mode. Supply current reduces to I _{std} .
2	NC	NA No Connect; Leave it floating or connect to GND for better heat dissipation
3	GND	Power V _{DD} Power Supply Ground
4	OUT+	Output Oscillator output
5	OUT-	Output Complementary oscillator output
6	V _{DD}	Power Power supply voltage

TOP VIEW



WAVE FORM DIAGRAMS

FIGURE 1(A). LVPECL VOLTAGE LEVELS PER DIFFERENTIAL PIN (OUT+/OUT-)

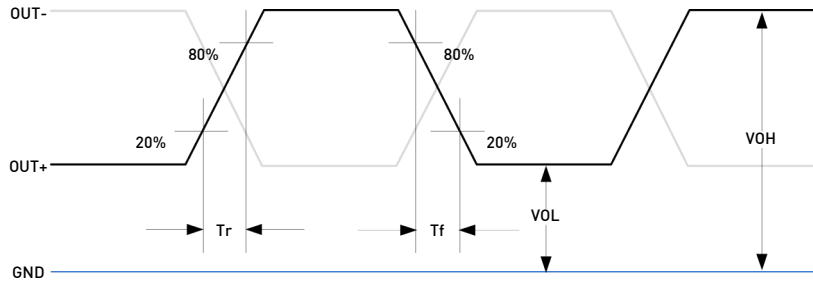


FIGURE 1(B). LVPECL VOLTAGE LEVELS ACROSS DIFFERENTIAL PAIR

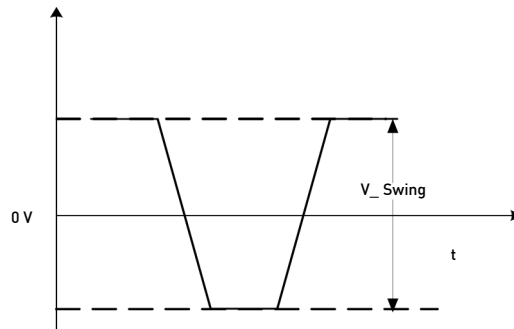
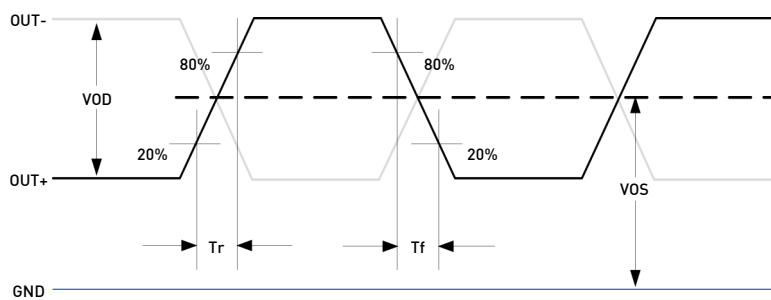


FIGURE 2. LVDS VOLTAGE LEVELS PER DIFFERENTIAL PIN (OUT+/OUT-)



TERMINATION DIAGRAMS

LVPECL:

FIGURE 3. LVPECL TYPICAL TERMINATION

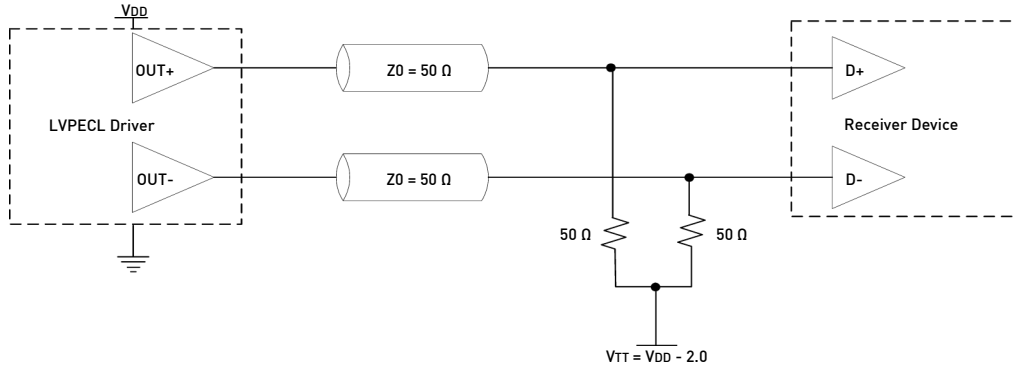


FIGURE 4. LVPECL AC COUPLED TERMINATION

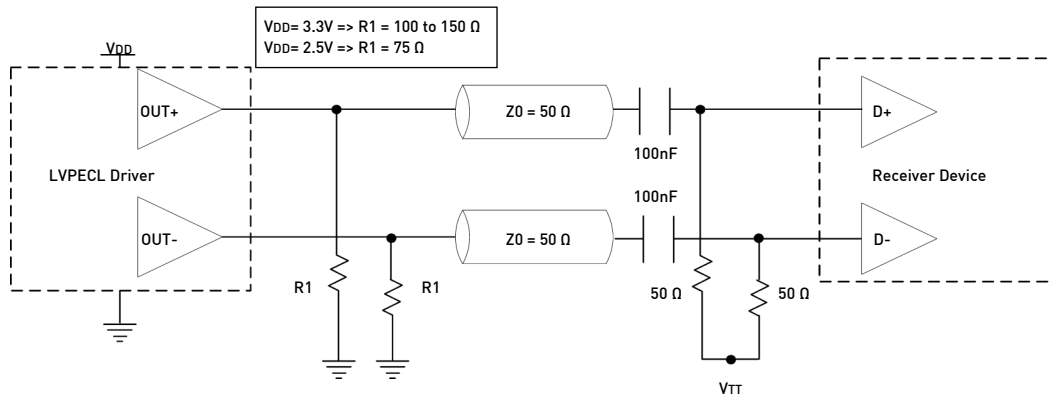
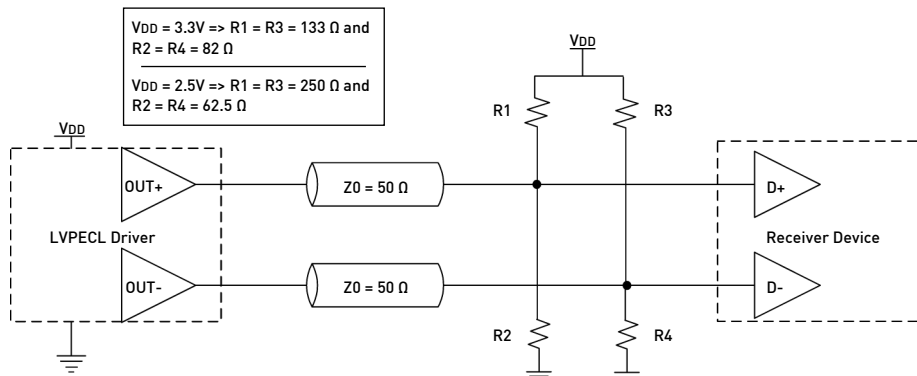


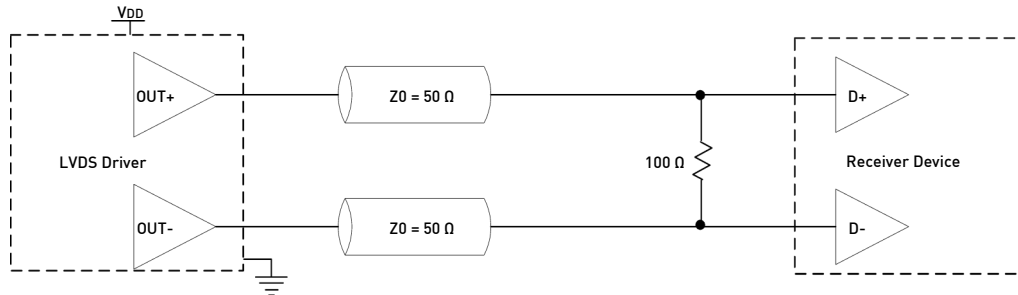
FIGURE 5. LVPECL WITH THEVENIN TYPICAL TERMINATION



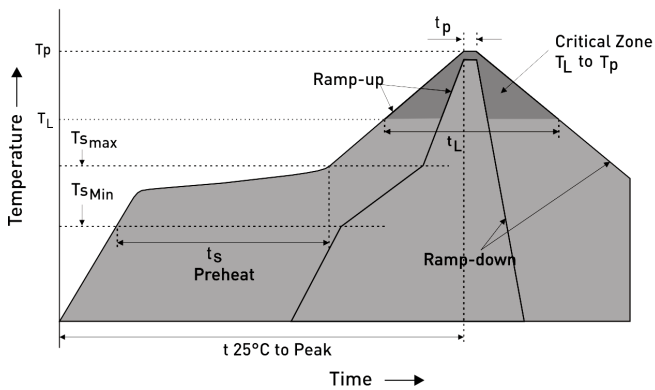
TERMINATION DIAGRAMS

LVDS:

FIGURE 6. LVDS SINGLE TERMINATION (LOAD TERMINATED)



REFLOW SOLDER PROFILE

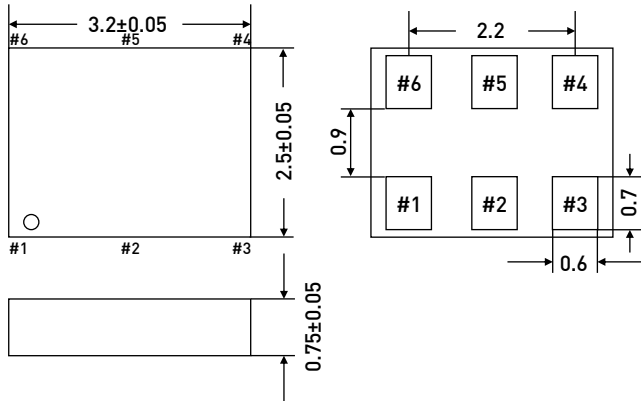


IPC/JEDEC Standard	IPC/JEDEC J-STD-020
Moisture Sensitivity Level	Level 1
TS MAX to TL (Ramp-up Rate)	3°C/second Maximum
Preheat	
- Temperature Minimum (TS MIN)	150°C
- Temperature Typical (TS TYP)	175°C
- Temperature Typical (TS MAX)	200°C
- Time (tS)	60 - 180 Seconds
Ramp-up Rate (TL to TP)	3°C/second Maximum
Time Maintained Above:	
- Temperature (TL)	217°C
- Time (TL)	60 - 150 Seconds
Peak Temperature (TP)	260°C Maximum
Target Peak Temperature (TP Target)	255°C
Time within 5°C of actual peak (tP)	20 -40 Seconds
Max. Number of Reflow Cycles	3
Ramp-down Rate	6°C/second Maximum
Time 25°C to Peak Temperature (t)	8 minutes Maximum

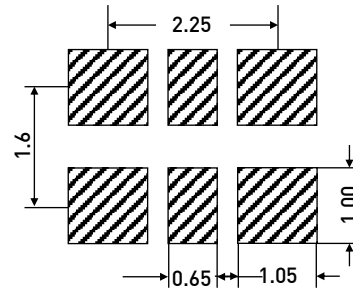
DIMENSIONS AND PATTERNS

PACKAGE SIZE – DIMENSIONS (UNIT:MM)

3.2X 2.5 X 0.75 MM

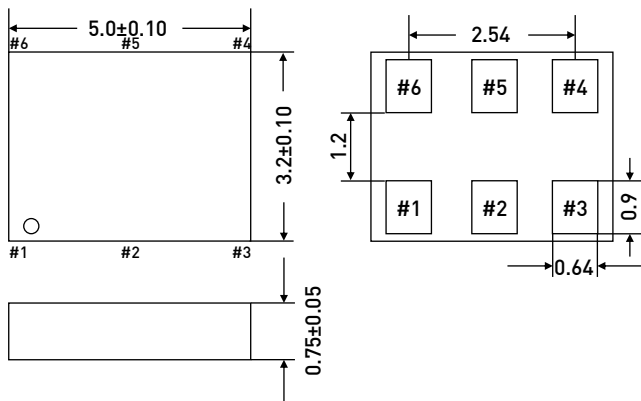


RECOMMENDED LAND PATTERN (UNIT:MM)^[1]

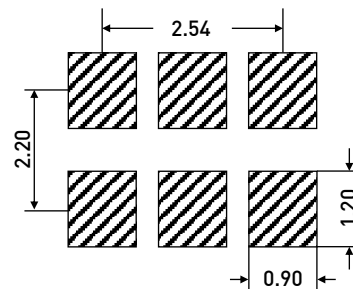


PACKAGE SIZE – DIMENSIONS (UNIT:MM)

5.0X 3.2 X 0.75 MM

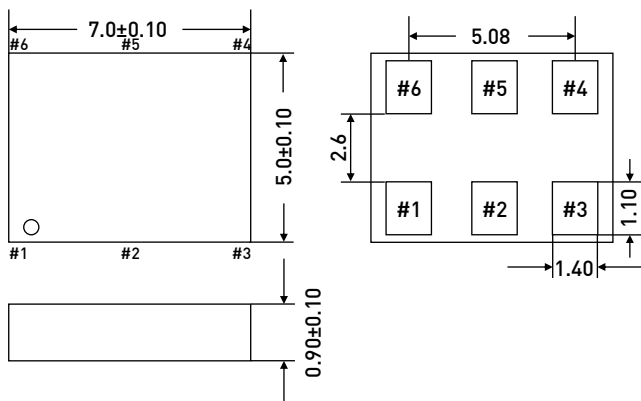


RECOMMENDED LAND PATTERN (UNIT:MM)^[1]

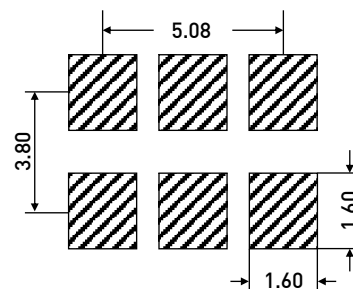


PACKAGE SIZE – DIMENSIONS (UNIT:MM)

7.0X 5.0 X 0.90 MM



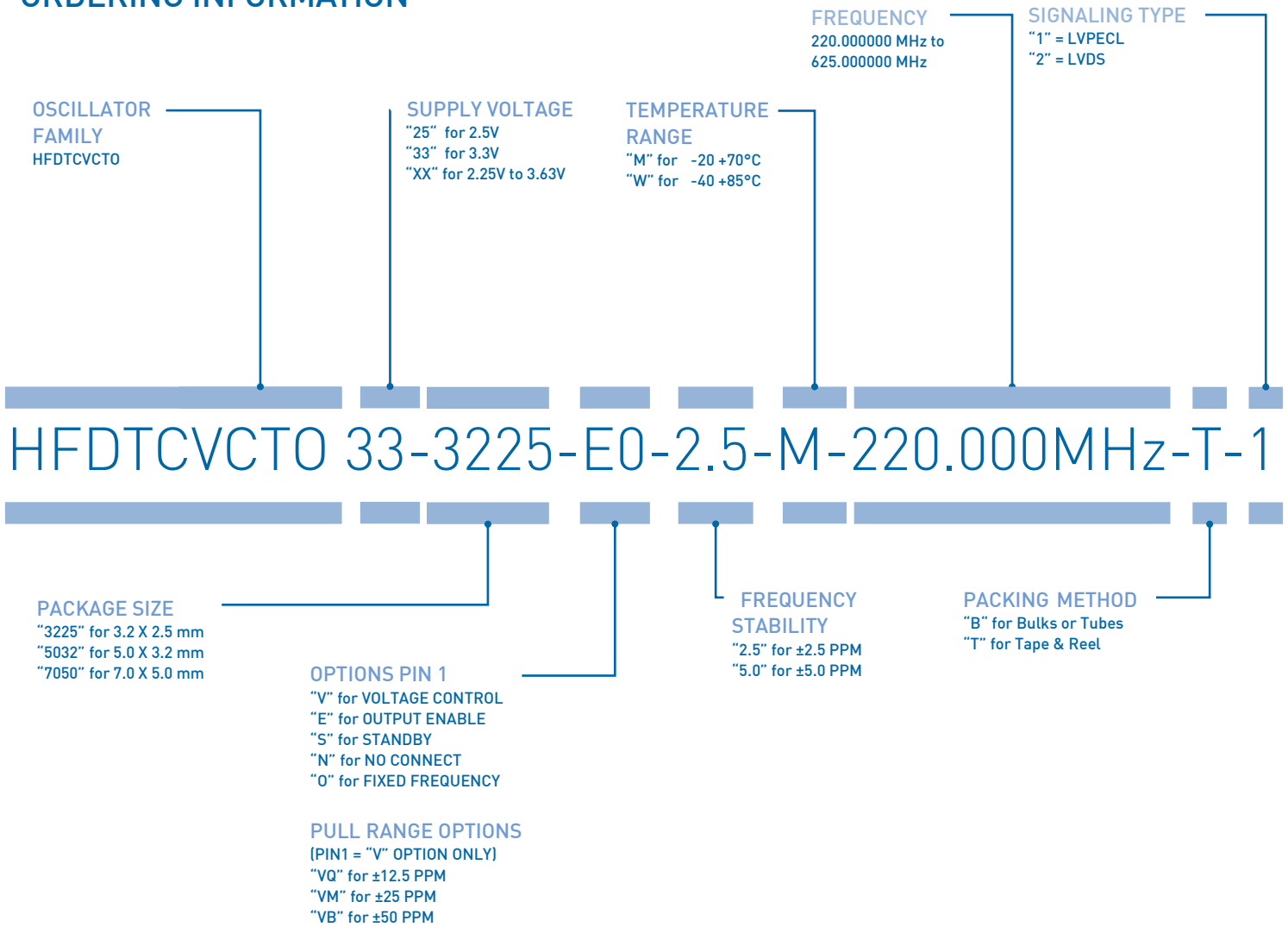
RECOMMENDED LAND PATTERN (UNIT:MM)^[1]



Note:

1. A capacitor value of 0.1 μ F between VDD and GND is recommended.

ORDERING INFORMATION



EXAMPLE: HFDTCVCT033-3225-E0-2.5-M-220.000MHz-T-1

[PLEASE CLICK HERE TO CREATE YOUR OWN ORDERING CODE](#)

REVISION HISTORY ²

VERSION	RELEASE DATE	AMENDMENTS SUMMARY
0.1	11/18/15	+ Revised stability over temperature and first year aging values in the electrical characteristics table + Revised frequency stability option

Notes:

2. Based on Datasheet version from November 2014/SPEC 01/REV.00

SAMPLES ARE AVAILABLE WITHIN A SHORT DELIVERY PERIOD!



PREMIUM QUALITY BY PETERMANN-TECHNIK



OUR COMPANY IS CERTIFIED ACCORDING TO ISO 9001:2015 IN OCTOBER 2016 BY THE DMSZ CERTIFIKATION GMBH.

THIS IS FOR YOU TO ENSURE THAT THE PRINCIPLES OF QUALITY MANAGEMENT ARE FULLY IMPLEMENTED IN OUR QUALITY MANAGEMENT SYSTEM AND QUALITY CONTROL METHODS ALSO DOMINATE OUR QUALITY STANDARDS.