PETERMANN TECHNIK
your clocking experts

PETERMANN-TECHNIK GmbH
Lechwiesenstr. 13 • D-86899 • Landsberg am Lech
Tel: +49/8191/305395 • Fax: +49/8191/305397
info@petermann-technik.com • www.petermann-technik.com

DIFFERENTIAL LOW POWER TC & VCTCXO MHz

SERIES „DTCVCTO“ 1.0—220 MHz

FEATURES

+ 100% pin-to-pin drop-in replacement to quartz and MEMS based XO
+ Ultra Performance Oscillator for Low Cost
+ TCXO function activated when Pin 1 is not connected
+ Excellent long time reliability—outperforms quartz-based XO
+ Excellent jitter performance
+ 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
+ Telecom
+ etc.

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	1	–	220	MHz	
Initial Tolerance	F_init	-2	–	2	PPM	At 25°C
Stability Over Temperature	F_stab	-2.5	–	+2.5	PPM	Over operating temperature range at rated nominal power supply voltage and load.
		-5	–	+5	PPM	
Supply Voltage	F_V_{DD}	–	50	–	PPB	±10% V_{DD} (±5% for V_{DD} = 1.8V)
Output Load	F_load	–	0.1	–	PPM	15 pF ±10% of load
First Year Aging	F_aging1	-2	–	+2	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		±12.5, ±25, ±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	–	–	kΩ	
Frequency Change Polarity	–		Positive slope		–	
Control Voltage -3dB Bandwidth	V_BW	–	–	8	kHz	
Input Voltage High	VIH	70%	–	–	V_{DD}	Pin 1, OE or ST
Input Voltage Low	VIL	–	–	30%	V_{DD}	Pin 1, OE or ST
Input Pull-up Impedance	Z_in	–	100	250	kΩ	Pin 1, OE logic high or logic low, or ST logic high
		2	–	–	MΩ	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

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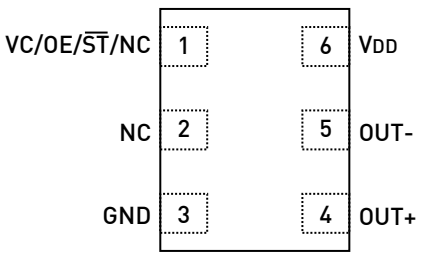
GENERAL DATA (continued)

PARAMETER AND CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
LVPECL, DC AND AC CHARACTERISTICS						
Current Consumption	IDD	–	61	69	mA	Excluding Load Termination Current, VDD = 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 VDDs
Maximum Output Current	I_driver	–	–	30	mA	Maximum average current drawn from OUT+ or OUT-
Output High Voltage	VOH	VDD-1.1	–	VDD-0.7	V	See Figure 1(a)
Output Low Voltage	VOL	VDD-1.9	–	VDD-1.5	V	See Figure 1(a)
Output Differential Voltage Swing	V_Swing	1.2	1.6	2.0	V	See Figure 1(b)
Rise/Fall Time	Tr, Tf	–	300	500	ps	20% to 80%, see Figure 1(a)
OE Enable/Disable Time	T_oe	–	–	115	ns	f = 212.5 MHz - For other frequencies, T_oe = 100ns + 3 period
RMS Period Jitter	T_jitt	–	1.2	1.7	ps	f = 100 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj	–	0.6	0.85	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all VDDs
LVDS, DC AND AC CHARACTERISTICS						
Current Consumption	IDD	–	47	55	mA	Excluding Load Termination Current, VDD = 3.3V or 2.5V
OE Disable Supply Current	I_OE	–	–	35	mA	OE = Low
Differential Output Voltage	VOD	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 VDDs
VOD Magnitude Change	ΔVOD	–	–	50	mV	See Figure 2
Offset Voltage	VOS	1.125	1.2	1.375	V	See Figure 2
VOS Magnitude Change	ΔVOS	–	–	50	mV	See Figure 2
Rise/Fall Time	Tr, Tf	–	495	600	ps	20% to 80%, see Figure 2
OE Enable/Disable Time	T_oe	–	–	115	ns	f = 212.5 MHz - For other frequencies, T_oe = 100ns + 3 period
RMS Period Jitter	T_jitt	–	1.2	1.7	ps	f = 100 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 156.25 MHz, VDD = 3.3V or 2.5V
		–	1.2	1.7	ps	f = 212.5 MHz, VDD = 3.3V or 2.5V
RMS Phase Jitter (random)	T_phj	–	0.6	0.85	ps	f = 156.25 MHz, Integration bandwidth = 12 kHz to 20 MHz, all VDDs
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	VDD Power Supply Ground
4	OUT+	Output	Oscillator output
5	OUT-	Output	Complementary oscillator output
6	VDD	Power	Power supply voltage

TOP VIEW



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WAVE FORM DIAGRAMS

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

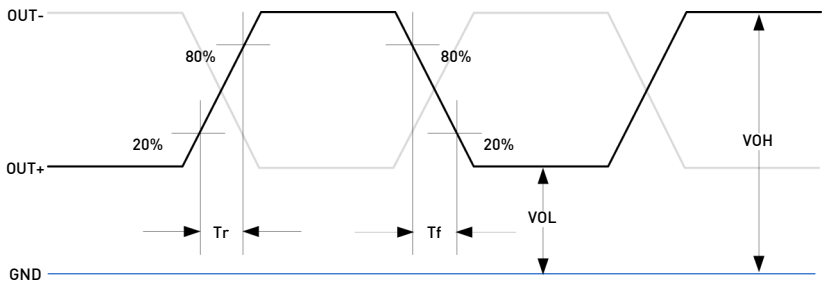


FIGURE 1(B). LVPECL VOLTAGE LEVELS ACROSS DIFFERENTIAL PAIR

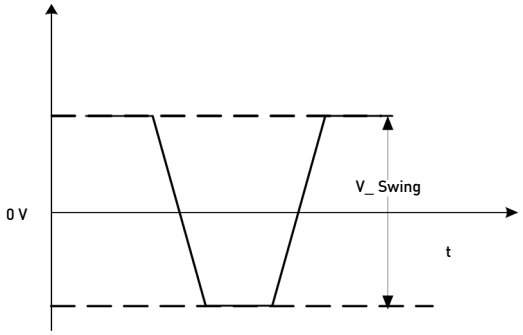
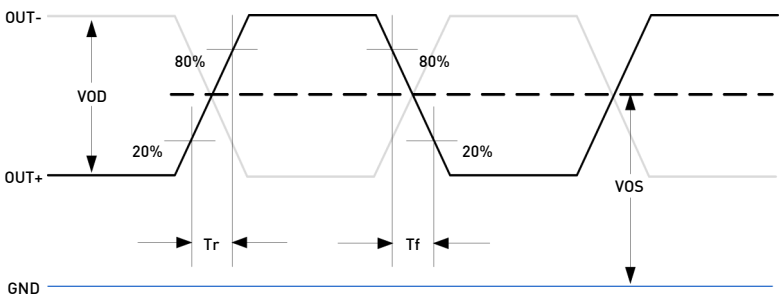


FIGURE 2. LVDS VOLTAGE LEVELS PER DIFFERENTIAL PIN (OUT+/OUT-)



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TERMINATION DIAGRAMS

LVPECL:

FIGURE 3. LVPECL TYPICAL TERMINATION

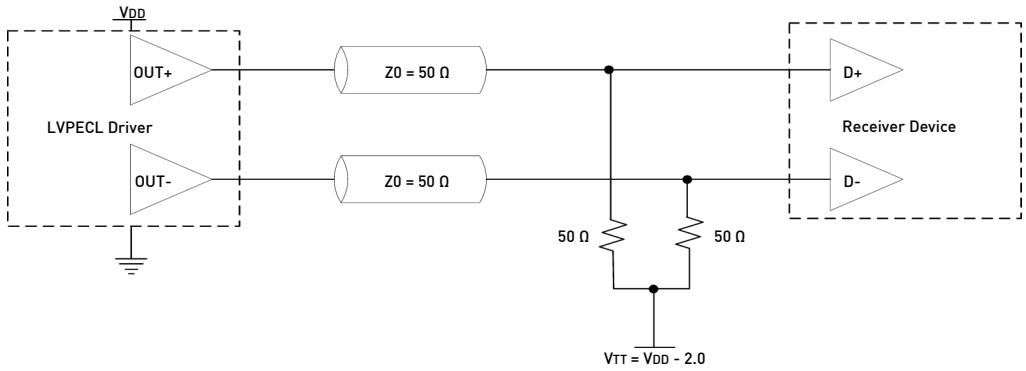


FIGURE 4. LVPECL AC COUPLED TERMINATION

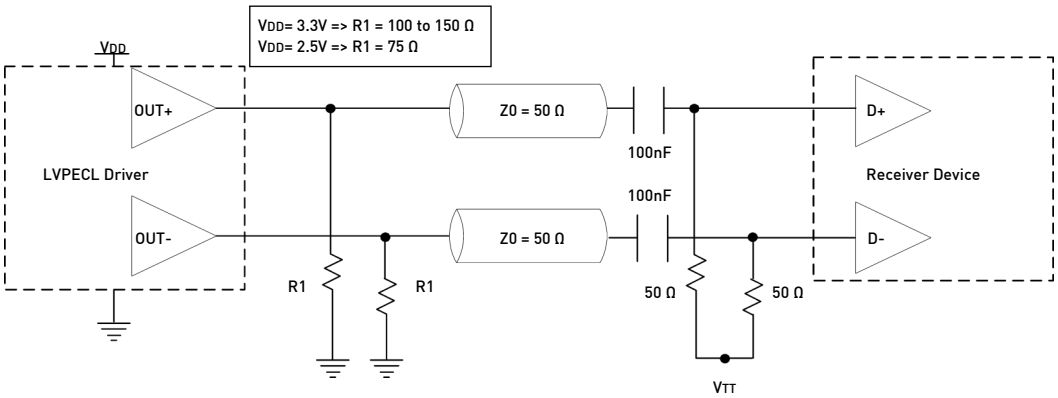
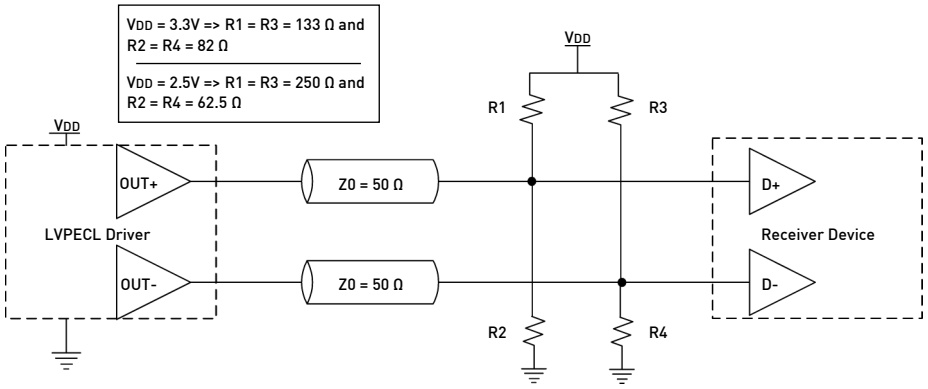


FIGURE 5. LVPECL WITH THEVENIN TYPICAL TERMINATION



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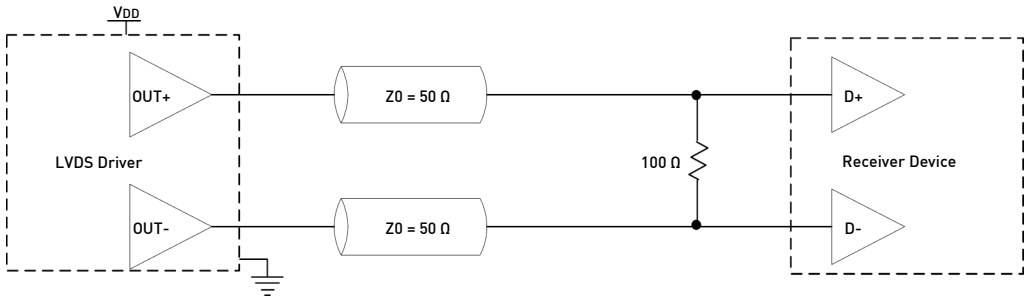
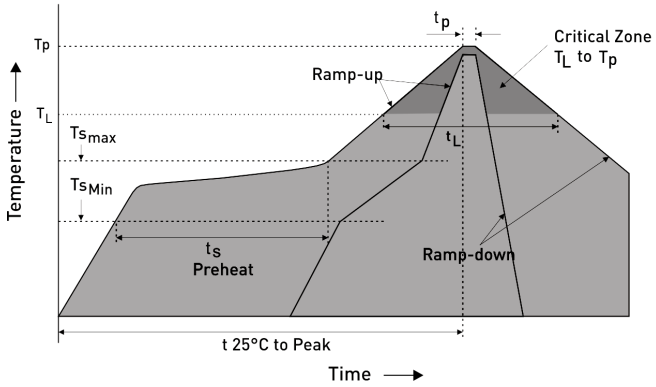
TERMINATION DIAGRAMS

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

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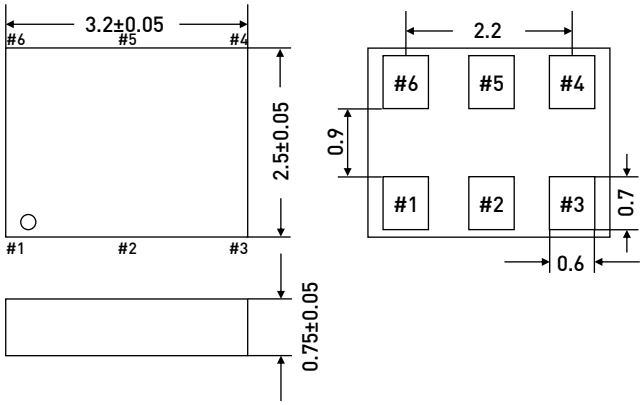
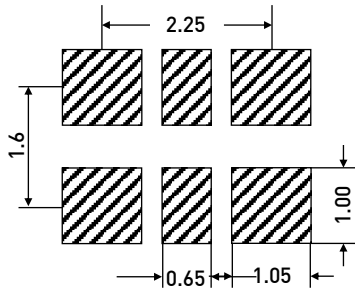
DIMENSIONS AND PATTERNS

PACKAGE SIZE – DIMENSIONS (UNIT:MM)

3.2X 2.5 X 0.75 MM

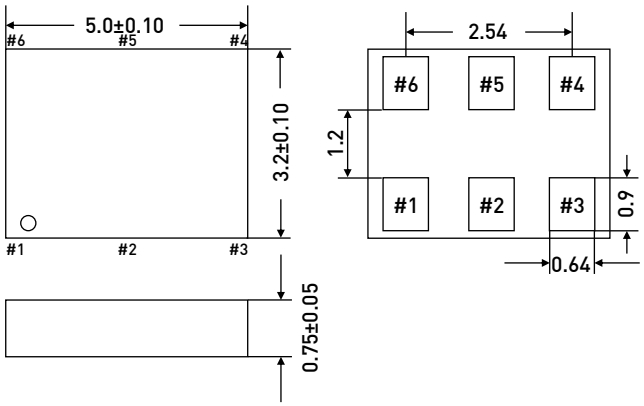


RECOMMENDED LAND PATTERN (UNIT:MM) [1]

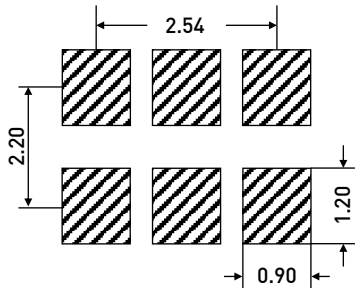


PACKAGE SIZE – DIMENSIONS (UNIT:MM)

5.0X 3.2 X 0.75 MM

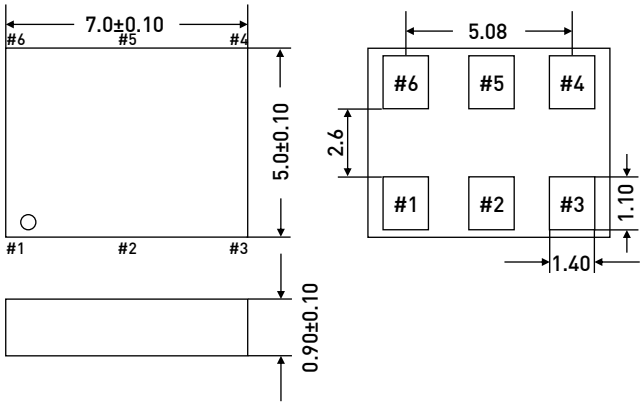


RECOMMENDED LAND PATTERN (UNIT:MM) [1]

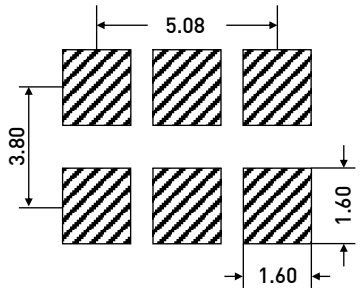


PACKAGE SIZE – DIMENSIONS (UNIT:MM)

7.0X 5.0 X 0.90 MM



RECOMMENDED LAND PATTERN (UNIT:MM) [1]



Note:

1. A capacitor value of 0.1 µF between V_{DD} and GND is recommended.

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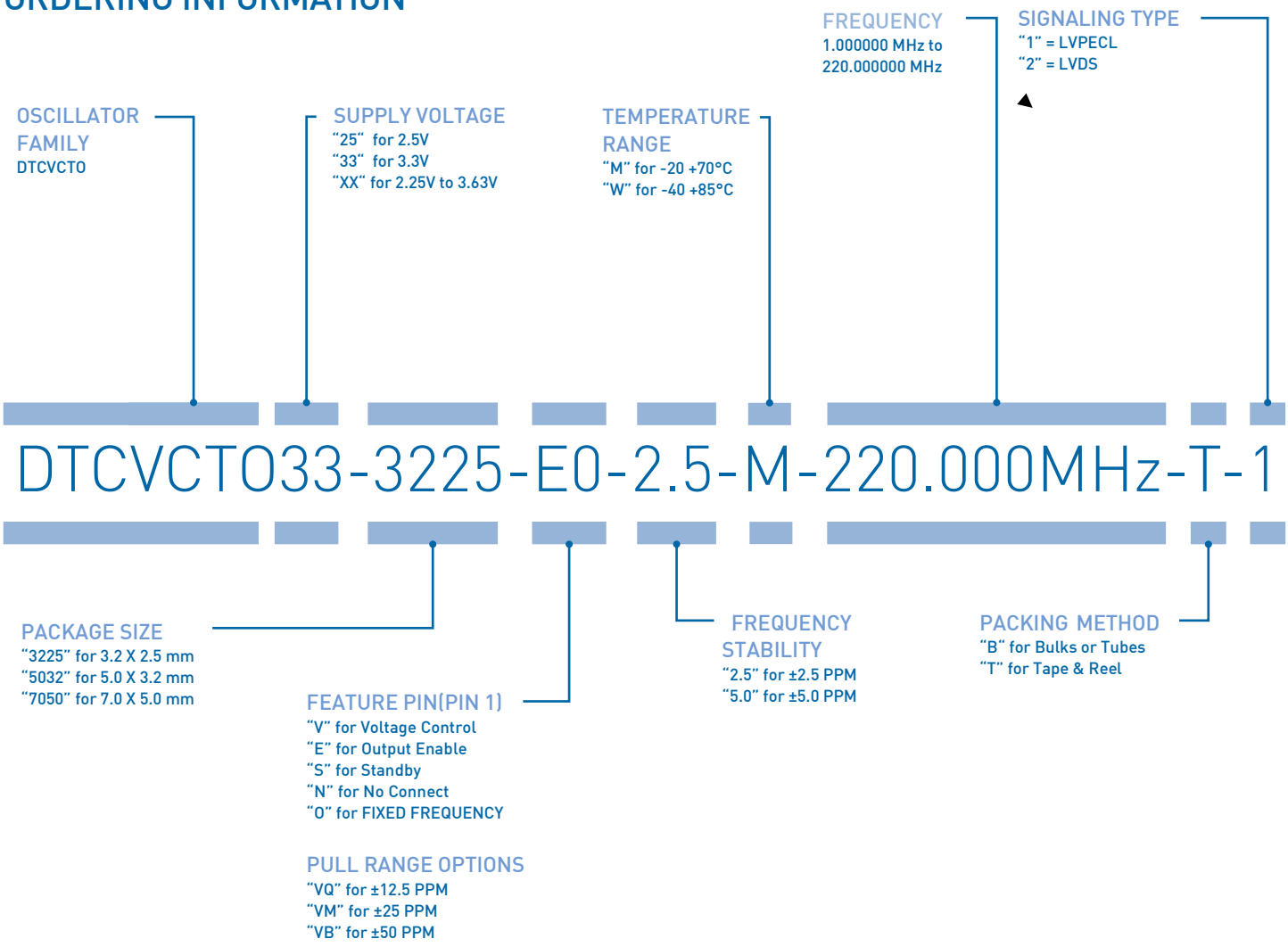
ORDERING INFORMATION



EXAMPLE: DTCVCTO33-3225-E0-2.5-M-220.000MHz-T-1

PLEASE CLICK HERE TO CREATE YOUR OWN ORDERING CODE

SAMPLES ARE AVAILABLE WITHIN A SHORT DELIVERY PERIOD!

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PREMIUM QUALITY BY PETERMANN-TECHNIK

DMSZ certified according to ISO 9001 QM 00886

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.