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COMPANY PROFILE

CENTUM RAKON INDIA PRIVATE LIMITED (CRIPL) is a name synonymous with the Design & Manufacture of high technology Frequency Control Products in India. This company is a joint Venture of Centum Electronics Ltd, Bangalore and Rakon , New Zealand.

Set up by the visionary Indian promoters in 1994, the Centum Electronics undertook the design and manufacture of Modules / Sub systems, Hybrid Micro Circuits, Frequency Control Products, DC-DC Converters and Resistor Networks for Defense, Aerospace, Telecommunications, Power and Automotive electronics sectors.

Our world class manufacturing facility has a wide range of thick film processes, assembly techniques such as Surface mount, chip and wire, testing and screening capabilities inclusive of Thermo Vacuum tests. Our HMC facility is approved for SPACE applications by ISRO and our products conform to MIL-PRF-38534. We are also approved as an independent test and reliability center by ISRO. Our Hybrid Microcircuit Technology is the perfect solution to the demanding needs of several industrial requirements that dictate high performance in extreme environmental conditions.

We are the Largest Design, Manufacturing and Exporting company for Frequency Controlled Products (Crystals & Crystal Oscillators) in India. CRIPL is into manufacturing Hi-rel products conforming to the most stringent MIL and AEROSPACE requirements (MIL-O-55310). Our products are approved by Regional Centre for Military Airworthiness for usage in Defense applications apart from C-DOT and CACT for telecom applications.

The company is on a six sigma journey as part of its goal of being a world class manufacturer.

Our Defense & Aerospace Customers in India include prestigious Centers of ISRO like ISAC, SAC, VSSC & IISU. Defense Public sector undertakings like Bharath Dynamics Ltd. , Hyderabad, various units of Bharath Electronics Ltd. located at Bangalore, Panchakula, Ghaziabad & Kotdwara, Ordnance Factory - Ambarnath, HAL-Hyderabad, DRDO Labs like ADE, NSTL, DLRL, NPOL, RCI to name a few.

We have successfully indigenized Temperature Compensated Crystal Oscillators (TCXO) for BEL – Bangalore & have received Certification from Regional Centre for Military Airworthiness, Hyderabad for the same. We have also indigenized Hybrid Microcircuits for NSTL, Vishakapatnam for applications relating to the Indian Navy. More indigenization projects are underway with various ISRO Centers.

The some of the Crystal oscillators are qualified by the ISRO for space usage and some are already used for Satellite Launch vehicle applications.

* * * * *

PRODUCTS AND SERVICES

- Largest Design, Manufacturing & exporting company for FREQUENCY CONTROLLED PRODUCTS in India.
- Exporting to the most discerning Telecom companies in the world like ERICSSON, ALCATEL LUCENT, NOKIA ,NORTEL, and MARCONI.
- Hi-rel products conforming to the most stringent MIL and AEROSAPCE requirements (MIL-O-55310D).
- Approval from Regional Centre for Military Airworthiness for usage in MILITARY & AEROSPACE applications.

The state of the art production facility caters to the most stringent modern day needs in Crystals and Oscillators.

- Crystals manufactured in Class 100 clean room conditions exhibit the highest reliability with ageing as low as 3ppm in 10 years (For Stratum applications).
- Oscillators built using proprietary ASIC offer the best temperature stability (± 0.3 ppm in -20 to 70°C), even in extended temperature range (± 1 ppm in -55 to $+125^{\circ}\text{C}$), which are second to none.
- The environmental / reliability testing facility ensures that the FCP are as per MIL-STD-202 and MIL-STD-883 among other telecom standards.

Applications	
Wireless	Optical communication
Fixed line	Microwave communication
Set top box	Data communication
Spacecrafts	Defense electronics
Aircrafts	

Crystal oscillators					
Type	Temperature	SPXO	VCXO	TCXO	OCXO
Commercial	0 to 60°C	< ± 10	>± 30 to >± 200	< ± 0.3	< ± 0.005
Industrial	-20 to 70°C	< ±15		< ± 0.5	< ± 0.01
Military	-40 to 85°C	< ±20		< ± 1.0	< ± 0.03
Aerospace	-55 to 125°C	< ± 30		< ± 3.0	NA
Leaded versions			SMD version		
DIP-8, DIP-14, DIP-16, DIP-24, 20x20, 36x26x10 (Euro)			7X5mm, 14X9mm (J-lead and Pad)		

Crystals		
Type	Temperature	Stability
Commercial	0 to 60°C	< ± 10
Industrial	-20 to 70°C	< ±15
Military	-40 to 85°C	< ±20
Aerospace	-55 to 125°C	< ± 30
Leaded versions		SMD version
HC-49 (4 & 14mm Height), HC-45 or UM-1, HC35 or TO-5, Cylindrical type		49 SMX, 90SMX (Plastic), 12SMX (Ceramic), 7X5mm, 8X8 (Military)

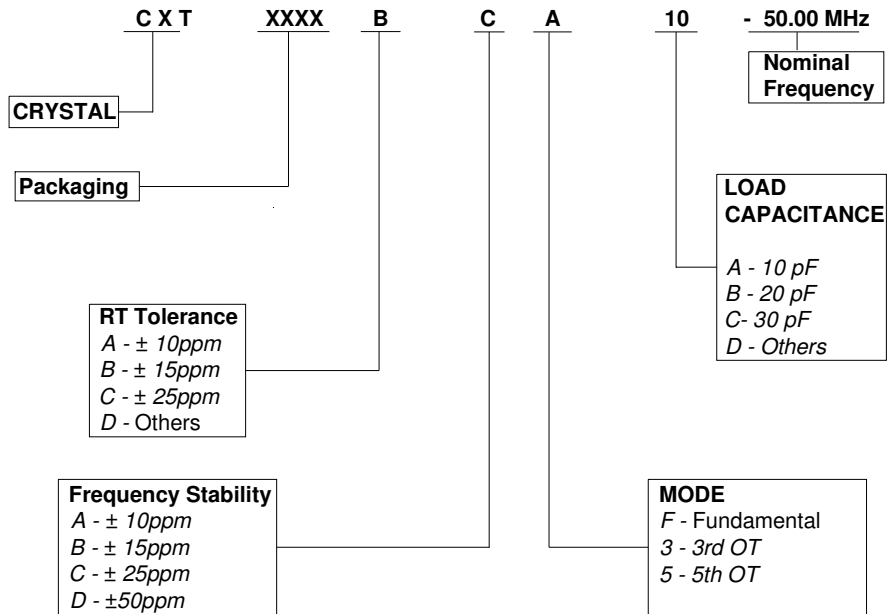
During design of the products we keep in mind the environmental aspects involved in the disposition of the material. End of Life products should be disposed off responsibly. Organization dealing with E-Waste shall be contacted for safe disposal.

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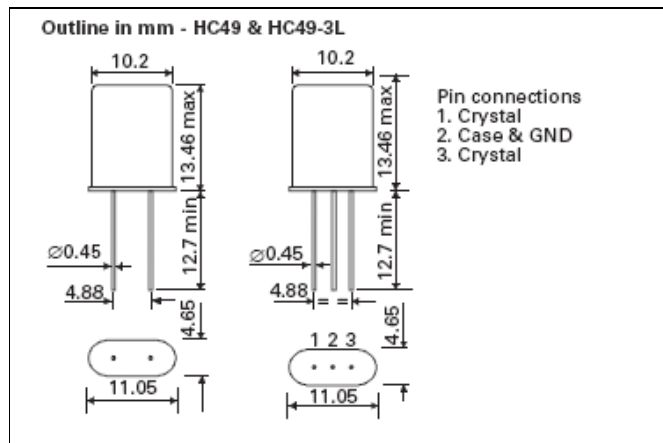
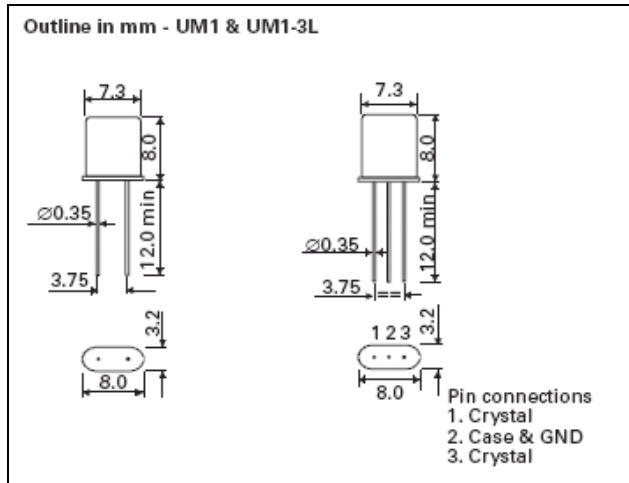
SPECIFICATION SHEET

CRYSTALS						
No	Characteristic	Symbol	Limits		Unit	Remarks
			Min.	Max.		
1	Resonance frequency	F_0	4 to 180-Fundamental 12 to 220-Overtone			MHz
2	Holder style		Refer drawings below			
3	Resonance condition	Series or parallel				For parallel please specify the load capacitor value in pF
4	Reference Temperature	T_0	23	25	°C	
5	Frequency Adjustment Tolerance	$\Delta f/f$	± 5	± 50	ppm	At T_0 °C
6	Resonance resistance	R_r or R_L	10	150	Ω	At T_0 °C
7	Fundamental / Overtone		Fundamental / 3 rd OT / 5 th OT			
8	Rated Drive Level	P_0	20	1000	μW	
9	Shunt capacitance	C_0		7	pF	
10	Motional inductance	L_1	Please specify if required		mH	
11	Motional Capacitance	C_1	0.5 to 25		fF	
12	Load capacitance	C_L	5	30	pF	
13	Q Factor	Q	Please specify if required		10e6	
14	Operating Temperature Ranges	T_{op}	0 to 60, -20 to 70, -40 to 85, -55 to 125, others please specify		°C	
15	Frequency Variation over Temperature, T_{op}	$\Delta f/f$	± 5	± 100	ppm	Frequency measured at T_0 °C
16	Storage temperature Range T_{stg}	T_{stg}	-55	125	°C	
17	Intended application		Please specify if required			
18	Package outline		Refer Annexure A for details			

ORDERING INFORMATION

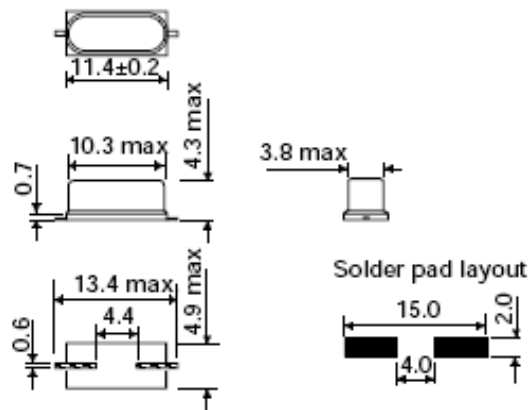


CRYSTAL PACKAGES

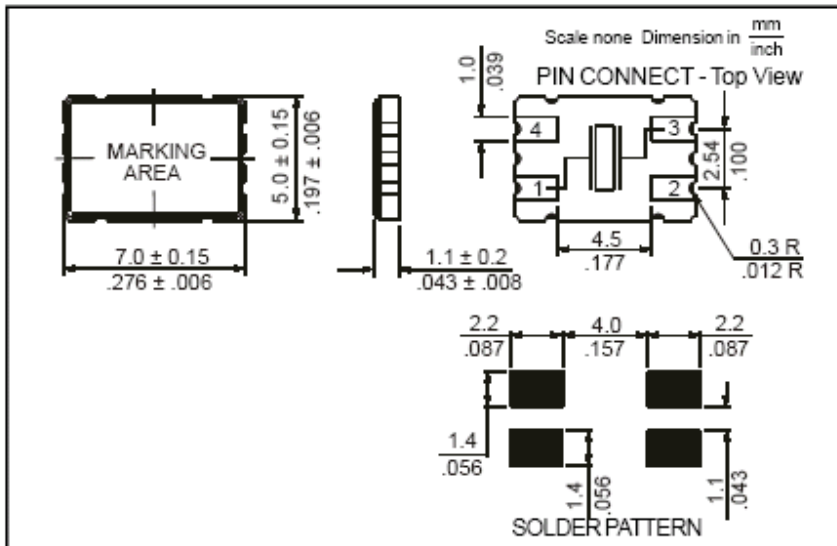


HC49/4H

Outline in mm



5 x 7 mm - CRYSTAL PACKAGE

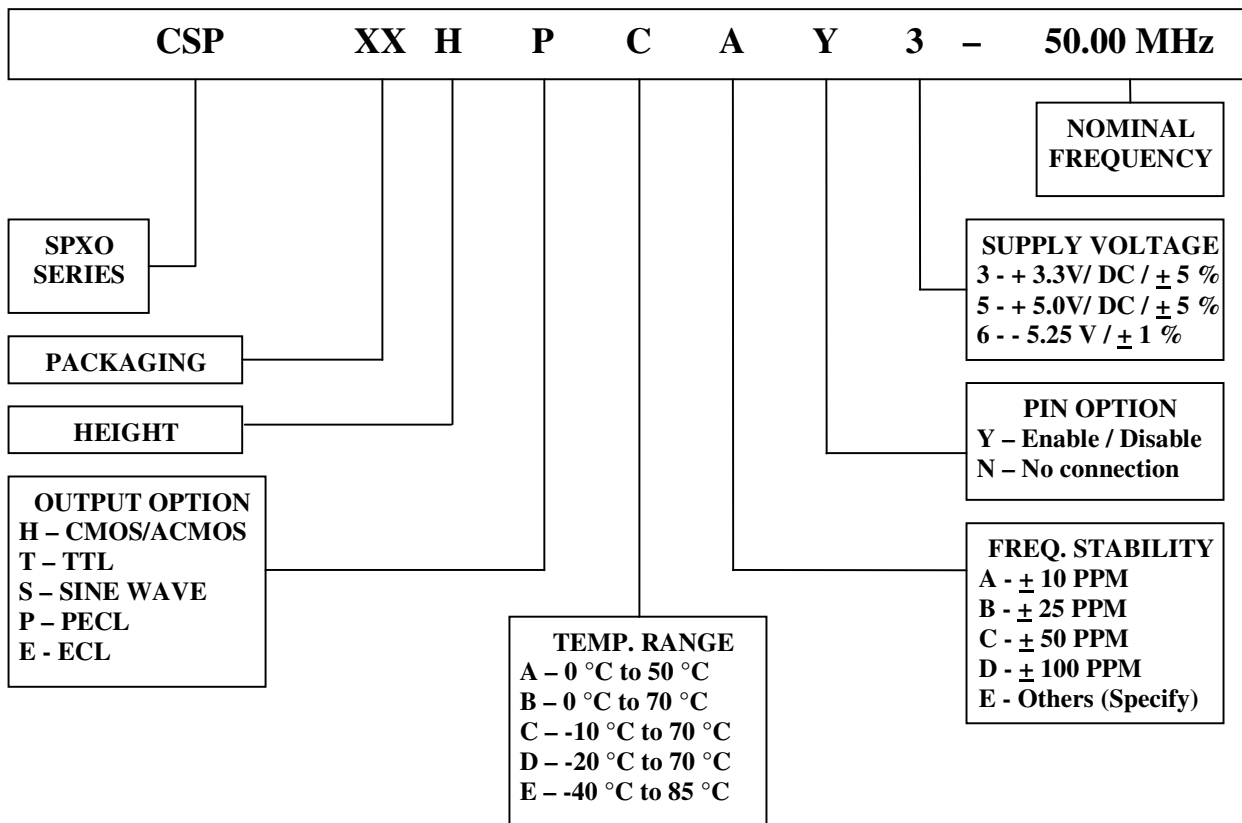


SIMPLE PACKAGE CRYSTAL OSCILLATOR - SPXO

SPECIFICATION SHEET

SIMPLE PACKAGE CRYSTAL OSCILLATOR (SPXO)				
NO	PARAMETERS		RANGE	UNIT
1	Frequency range		0.160 to 1000	MHz
2	Output Type		TTL/CMOS/Sine/PECL/LVDS	
3	Rise/Fall time (Square Wave)		0.5 to 15	nsec
4	Duty Cycle (Square Wave)		40/60, 45/55	%
5	Supply voltage		3.3, 5.0, upto 15	Vdc
6	Supply current		10 to 150	mA
7	Frequency Tolerance @ 25°C		±10 to ±100	±ppm
8	Operating Temperature Range		0 to 60, 0 to 70, -10 to 70, -20 to 70, -40 to 85, others please specify	°C
9	Frequency stability	Vs. supply voltage change	±0.5 to ±5	ppm
		Vs. Load change	±1 to ±5	ppm
		Vs. operating Temperature	±10 to ±50	ppm
10.	Phase Noise at 27 MHz	10Hz	-75	dBc/Hz
		100Hz	-100	dBc/Hz
		1000Hz	-125	dBc/Hz
		10KHz	-140	dBc/Hz
11	Ageing		±1 to ±5	ppm / year
12	Tri-state option		Please specify if required	
13	Package	Outline	*	Refer Annexure A for details, Custom package available
		Connection		
		Marking		
14	Additional notes:		Frequency adjustment by Trimmer available	

ORDERING INFORMATION



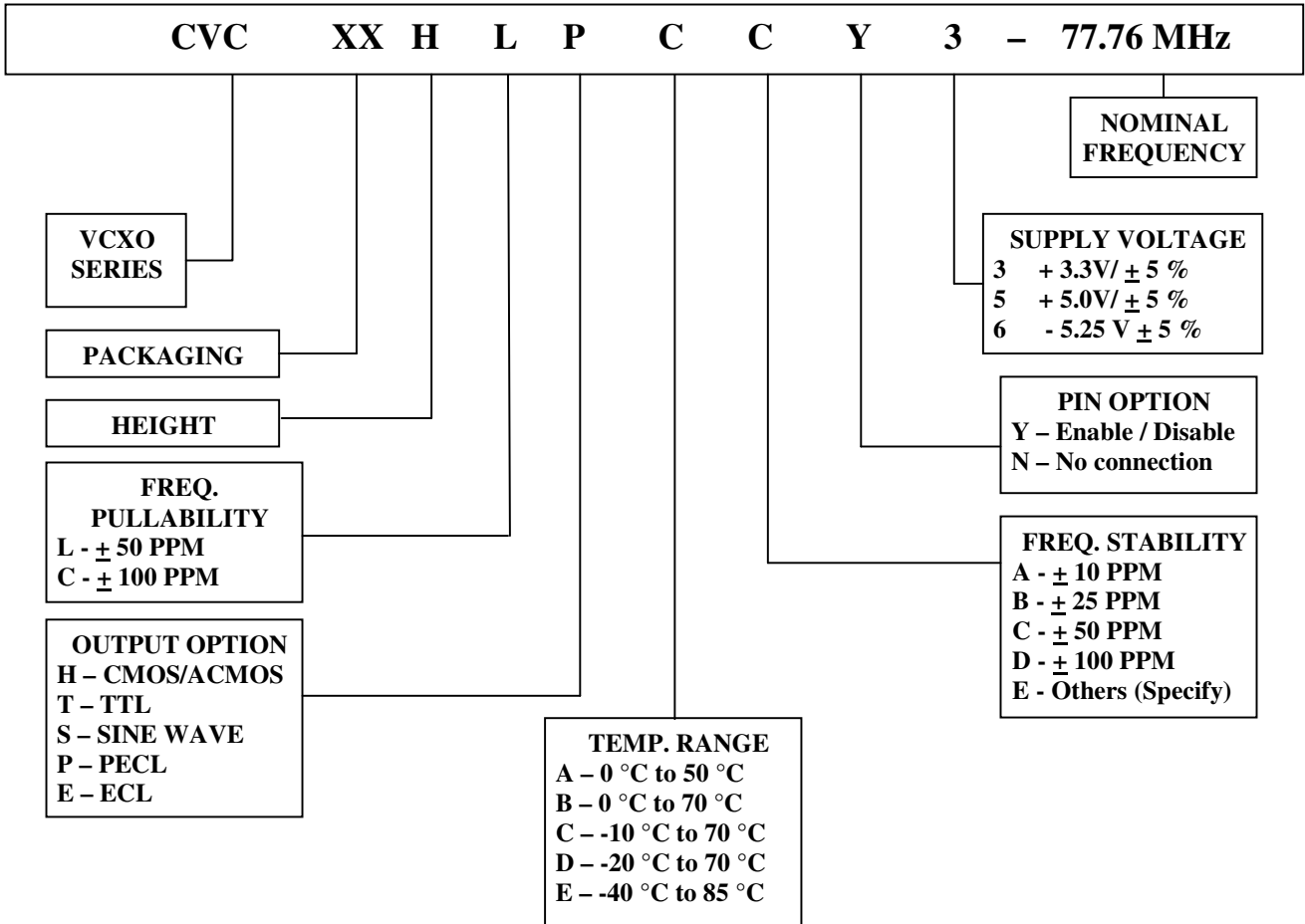
VOLTAGE CONTROL CRYSTAL OSCILLATOR (VCXO)

SPECIFICATION SHEET

VOLTAGE CONTROL CRYSTAL OSCILLATOR (VCXO)				
NO	PARAMETERS		RANGE	UNIT
1	Frequency range		* 0.160 to 800	MHz
2	Output Type		TTL/CMOS/Sine/PECL/LVDS	
3	Rise/Fall time		0.5 to 15	nsec
4	Duty Cycle		40/60, 45/55	%
5	Supply voltage, Vcc		* 3.3, 5.0, upto 15	Vdc
6	Supply current		10 to 150	mA
7	Frequency Tolerance @ 25°C		±10 to ±36	±ppm
8	Operating Temperature Range		* 0 to 60, 0 to 70, -10 to 70, -20 to 70, -40 to 85, others please specify	°C
9	Frequency stability	Vs. supply voltage change	±0.5 to ±5	ppm
		Vs. load change	±1 to ±5	ppm
		Vs. operating temperature	* ±5 to ±50	ppm
10.	Phase Noise at 155.52MHz	10 Hz	-70	dBc/Hz
		100 Hz	-95	dBc/Hz
		1000 Hz	-125	dBc/Hz
		10 KHz	-140	dBc/Hz
11	Ageing		±1 to ±5	Ppm / year
12	Voltage control	Centre control voltage	* Vcc/2	Vdc
		Control voltage range	* 0.1vcc to 0.9 Vcc	Vdc
		Linearity	20 max.	%
		Slope	* Positive / Negative	+/-
13	Frequency pullability /APR		* ± 30 to ± 250	ppm
14	Tri-state		Please specify if required	
15	Package	Outline	*	Refer ANNEXURE A for details, Custom package also available
		Connection		
		Marking		
16	Additional notes:		Frequency adjustment by Trimmer available	

* Note: Minimum specification information required

ORDERING INFORMATION

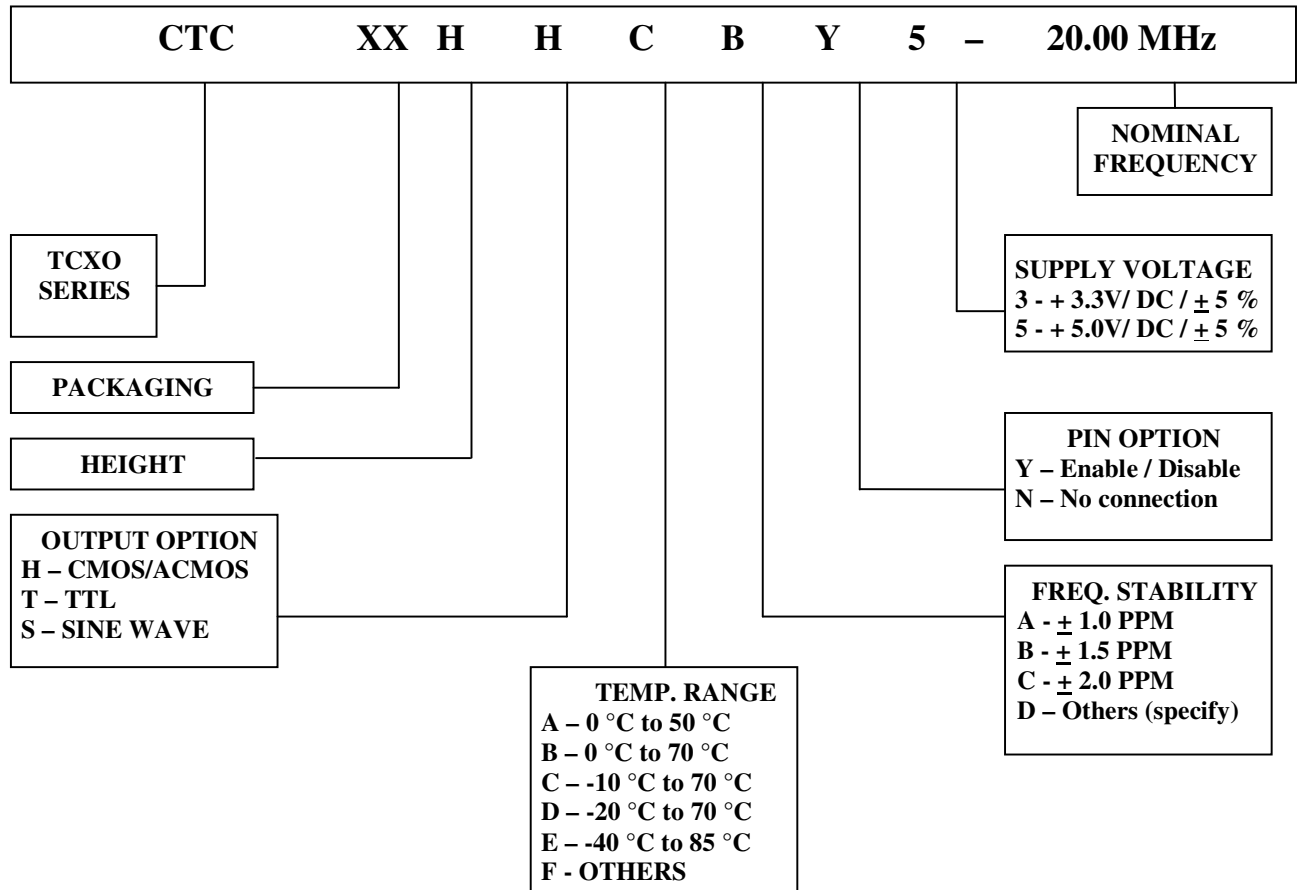


TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (TCXO)

SPECIFICATION SHEET

TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (TCXO)				
NO	PARAMETERS		RANGE	UNIT
1.	Frequency		0.100 to 450	MHz
2.	Output waveform		CMOS/TTL /SINE	
4.	Rise/Fall time		0.5 to 15	nsec
5.	Duty Cycle		40/60, 45/55	%
6.	Supply Voltage		3.3, 5, upto 15	Vdc
7.	Supply Current		10 to 100	mA
8.	Frequency tolerance @ 25 °C		± 0.5 to ±5.0	ppm
9.	Operating temperature range		0 to 60, 0 to 70, -10 to 70, -20 to 70, -40 to 85, others please specify	°C
10.	Harmonics/Sub-harmonics		Customer to specify	dBc
11.	Frequency Stability	Vs. input Voltage change	± 1.0 to ± 5.0	ppm
		Vs. load change	± 1.0 to ± 5.0	ppm
		Vs. operating temperature	± 0.5 to ±5.0	ppm
	Phase Noise for 50MHZ	10 Hz	-60	dBc/Hz
		100 Hz	-90	dBc/Hz
		1000 Hz	-115	dBc/Hz
		10 KHz	-135	dBc/Hz
13.	Ageing		± 1 to ± 3	Per year
14.	Frequency Adjust	Mechanical (Internal) Range	± 3 to ± 5	ppm
		Electrical (External) Range	± 5 to ± 40	ppm
		Control voltage range		0 to Vcc
15.	Tri-state Option		Option available	
16.	Package	Outline	Refer ANNEXURE A for details, Custom package available	
		Connecting		
		Marking		
17.	Additional notes: For non-standard options such as different temperature ranges, negative slope etc. Please contact our sales.			

*** Note: Minimum specification information required
ORDERING INFORMATION**



VOLTAGE CONTROL TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (VCTCXO)

SPECIFICATION SHEET

VOLTAGE CONTROL TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (VCTCXO)				
NO	PARAMETERS		RANGE	UNIT
1.	Frequency		0.100 to 450	MHz
2.	Output waveform		CMOS/TTL /SINE	
4.	Rise/Fall time		0.5 to 15	nsec
5.	Duty Cycle		40/60, 45/55	%
6.	Supply Voltage		3.3, 5, upto 15	Vdc
7.	Supply Current		10 to 100	mA
8.	Frequency tolerance @ 25 °C		± 0.5 to ±5.0	ppm
9.	Operating temperature range		0 to 60, 0 to 70, -10 to 70, -20 to 70, -40 to 85, others please specify	°C
10.	Harmonics/Sub-harmonics		Customer to specify	dBc
11.	Frequency Stability	Vs. input Voltage change	± 1.0 to ± 5.0	ppm
		Vs. load change	± 1.0 to ± 5.0	ppm
		Vs. operating temperature	± 0.5 to ±5.0	ppm
Phase Noise for 50MHZ	10 Hz		-60	dBc/Hz
	100 Hz		-90	dBc/Hz
	1000 Hz		-115	dBc/Hz
	10 KHz		-135	dBc/Hz
13.	Ageing		± 1 to ± 3	Per year
14.	Frequency Adjust	Mechanical (Internal) Range	± 3 to ± 5	ppm
		Electrical (External) Range	± 5 to ± 40	ppm
		Control voltage range		0 to Vcc
15.	Tri-state Option		Option available	
16.	Package	Outline	*	Refer ANNEXURE A for details, Custom package available
		Connecting		
		Marking		
17.	Additional notes: For non-standard options such as different temperature ranges, negative slope etc. Please contact our sales.			

* Note: Minimum specification information required

OVEN CONTROLLED CRYSTAL OSCILLATOR (OCXO)

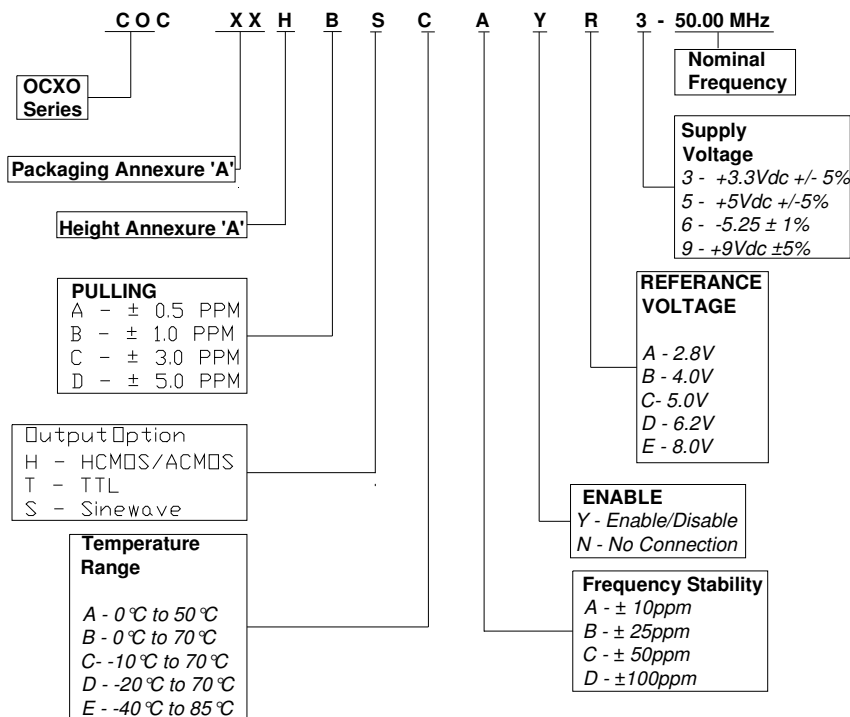
SPECIFICATION SHEET

OVEN CONTROLLED CRYSTAL OSCILLATOR (OCXO)						
No	Parameters			Range	Unit	
1.	Frequency		*	5 to 250 for Sine 1.0 to 125 for HCMOS	MHz	
2.	Output waveform		*	TTL/HCMOS/SINE		
3.	Output level/load		*	TTL/CMOS/Sine Sine 13 dbm max		
4.	Rise/Fall time			0.5 to 15	nsec	
5.	Duty Cycle			40/60, 45/55	%	
6.	Supply Voltage		*	3.3,5,9,12,15,24,28	Vdc	
7.	Supply Power	During Warm-Up		8 max.	Watts	
		Stabilized at 25°C		4 max.	Watts	
8.	Warm Up @ 25°C to within $\pm 1 \times 10^{-7}$			5max	Minutes	
9.	Operating temperature range		*	0 to 60, -10 to 70, -20 to 70, -40 to 85	°C	
10.	Harmonics/Sub-harmonics			-45 max	dBc	
11.	Phase Noise at 10MHZ	10 Hz		-125	dBc/Hz	
		100 Hz		-145	dBc/Hz	
		1000 Hz		-155	dBc/Hz	
		10 KHz		-158	dBc/Hz	
12.	Short term stability			Please specify if required		
13.	Frequency Stability	Vs. supply Voltage change and Vs. load change		5×10^{-11}	ppm	
		Vs. operating temperature	*	2×10^{-10}	ppm	
15.	Ageing	After 7 days of continuous power ON	*	1×10^{-10}	per day	
				3×10^{-9}	per month	
				2.5×10^{-8}	per year	
16.	Frequency Adjust	Electrical	Range	*	$> \pm 1$ (10 K pot)	ppm
			Linearity		20 max.	%
			Slope	*	Positive / Negative	
		Control voltage range		Please specify if required	Vdc	
17.	Package		*	Refer ANNEXURE A for details, Custom		
18.	Connections			package available		

19.	Marking	
12.	Special Instructions	Please specify if required for the following requirements: 1) Enable /Disable option 2) Voltage reference Voltage option 3) Alarm option
21.	Additional notes: For non-standard options such as different temperature ranges, negative slope etc. Please contact our sales.	

*** Note: Minimum specification information required**

ORDERING INFORMATION



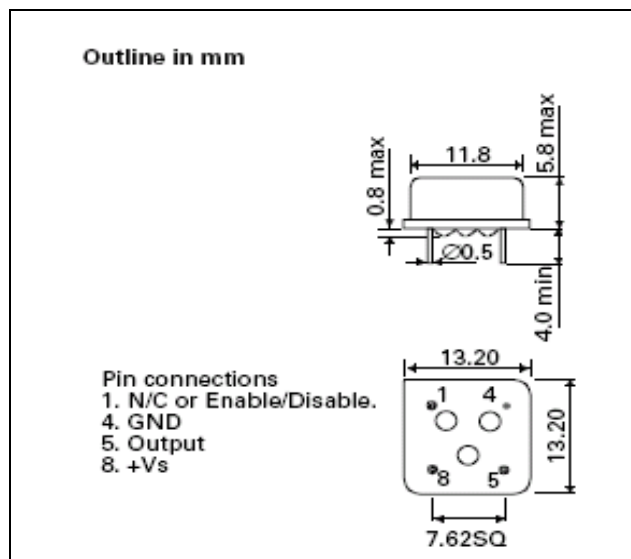
ANNEXURE – A

1. PACKAGE INFORMATION FOR SPXO, TCXO, VCXO , TCVCXO& OCXOs

XX - PACKAGING		H - HEIGHT (mm)
CODE	DESCRIPTION	
01	4 PIN HALF DIP	A = 5 mm; B = 6.5 mm; C = 7.2 mm; D = 8.3 mm, E = 10.8 mm; F = 12 mm
02	4 PIN DIP	A = 5 mm; B = 6.5 mm; C = 7.2 mm; D = 8.3 mm, E = 10.8 mm; F = 12 mm
03	14 PIN DIP (WITH ALL PINS)	A = 5 mm; B = 6.5 mm; C = 7.2 mm; D = 8.3 mm, E = 10.8 mm; F = 12 mm
04	16 PIN DDIP	
05	5 PIN DIP	
06	24 PIN DDIP	
07	26.5x36(EUROPEAN)	A=12.7mm, B=19mm
08	20x20(5 PIN)	A= 10.5
09	51x51 PACKAGE	A=10,B=12, C=15,D=25, E=38
10	25.4x25.4	A=12.7
11	20.7x20.7	A=10.5
12	25x22	A=11.5, B=14
12	40x30	A=20
13	51x41	A=25
SMD		
21	14 x 9; 4 PAD	A = 4 mm, B = 5 mm, C = 6.1 mm
22	14 x 9; 6 PAD	A = 4 mm, B = 5 mm, C = 6.1 mm
23	20 mm x 13 mm	A = 5.7 mm, B = 7.9 mm
24		
25	24.9X18.8 mm	A = 6 mm
26	5 x 7 mm; 4 PAD	A = 2 mm (max)
27	5 x 7 mm; 6 PAD	A = 2 mm (max)
28	5 x 3.2 mm, 4 PAD	A = 2 mm (max)
29	5 x 7 mm; 10 PAD	A = 2 mm (max)

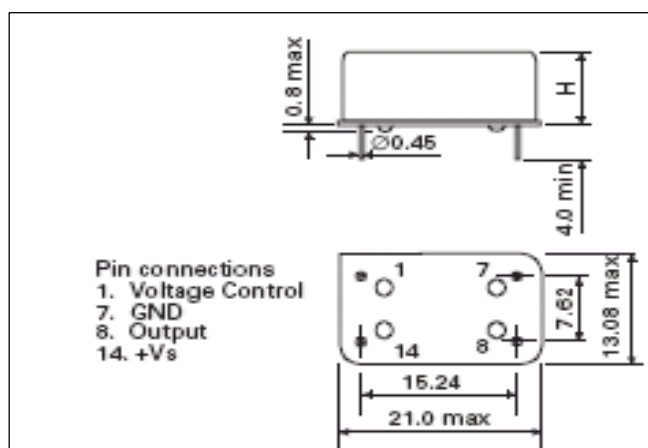
2 . PACKAGE OUTLINE :

4 PIN HALF DIP

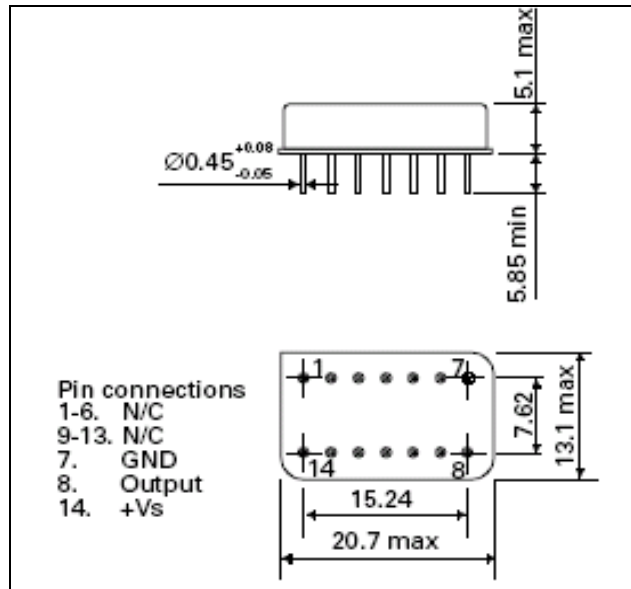


[[BACK TO ANNEXURE A](#)]

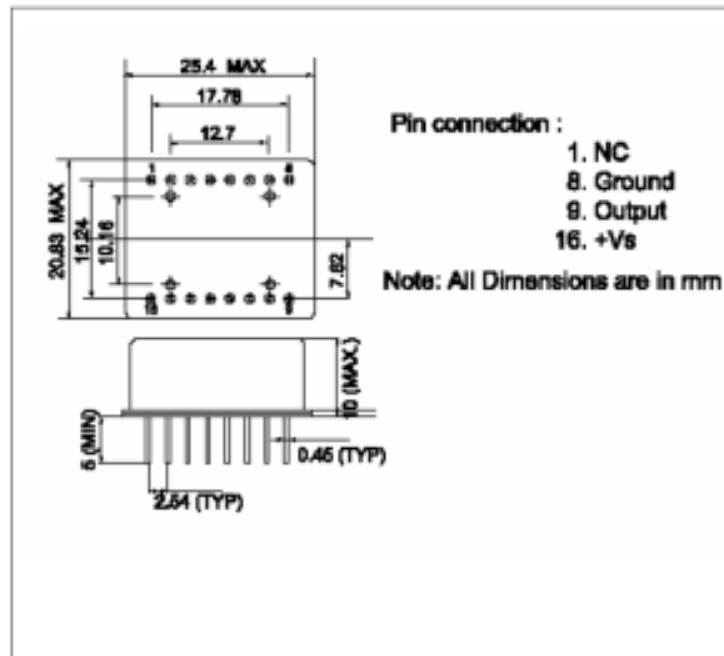
4 PIN DIP



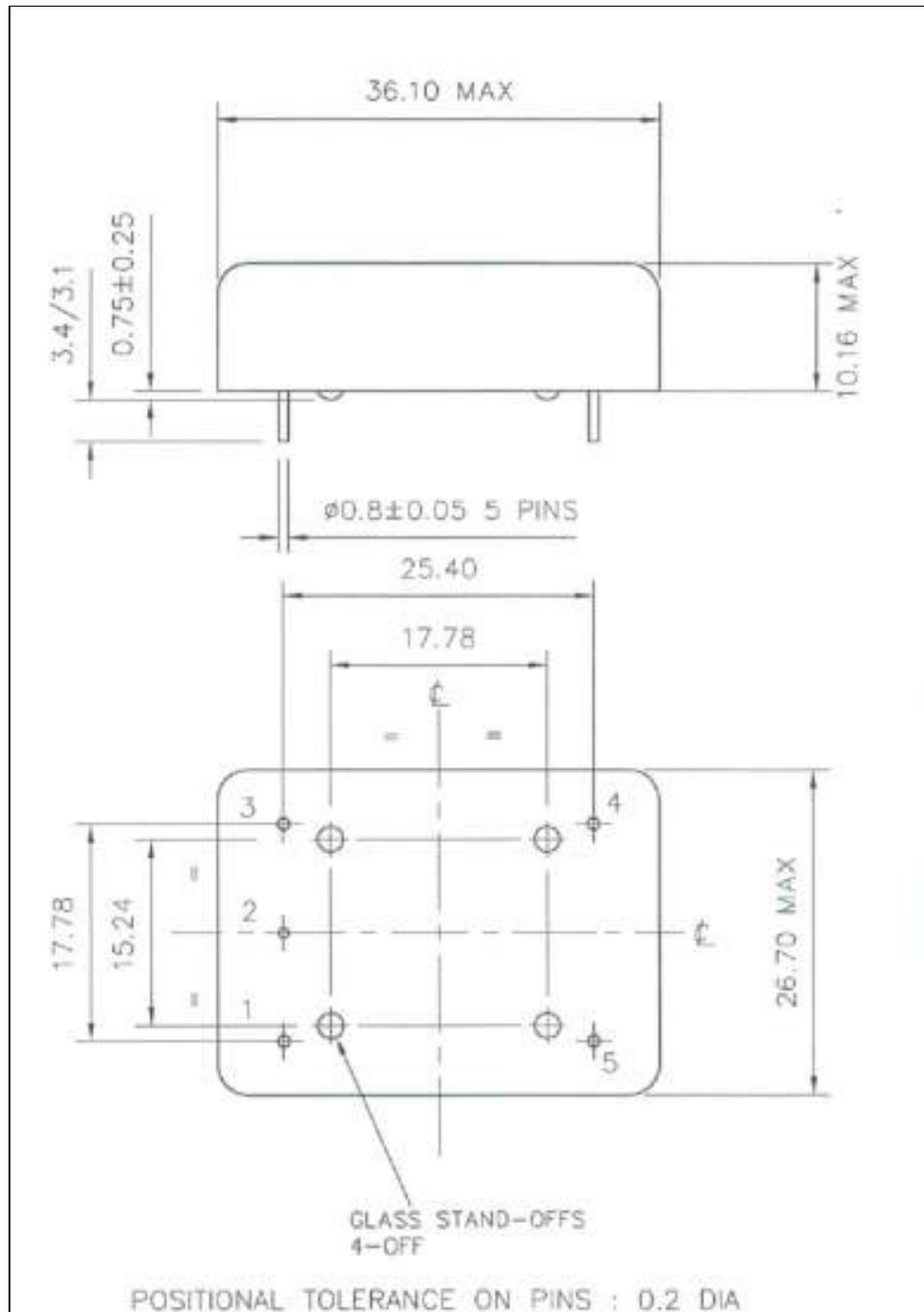
14 PIN DIP (WITH ALL PINS)



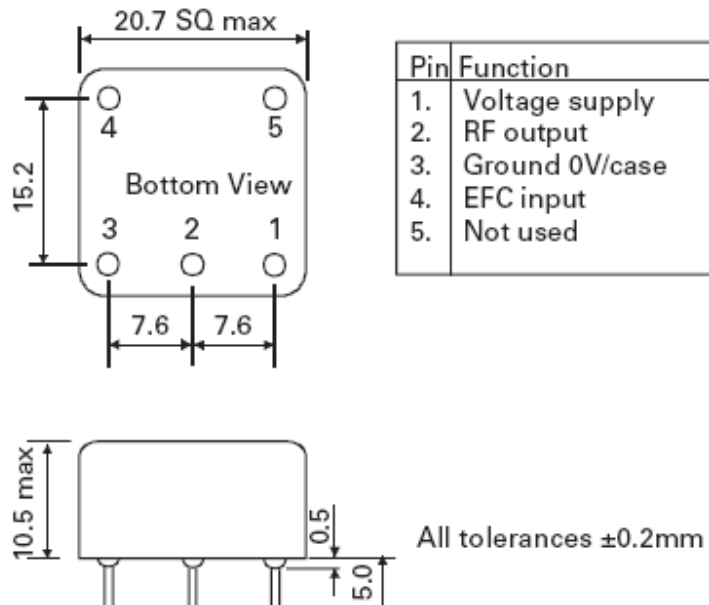
16 PIN DDIP - (25.4 x 20.84 mm)



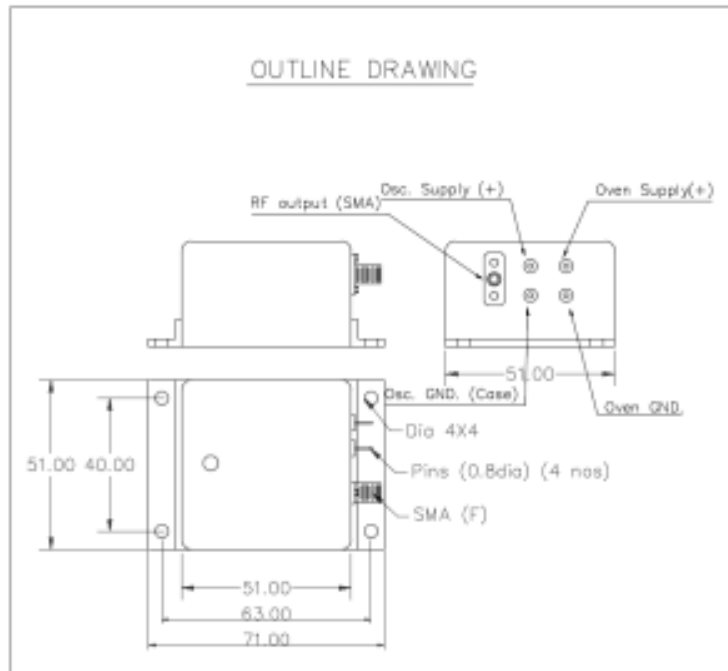
EUROPEAN PACKAGE - 26.7 X 36.1 mm



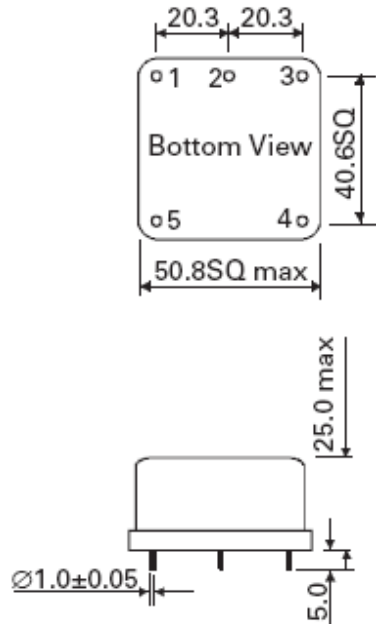
20 x 20 - 5 PIN PACKAGE



51 x 51 mm PACKAGE



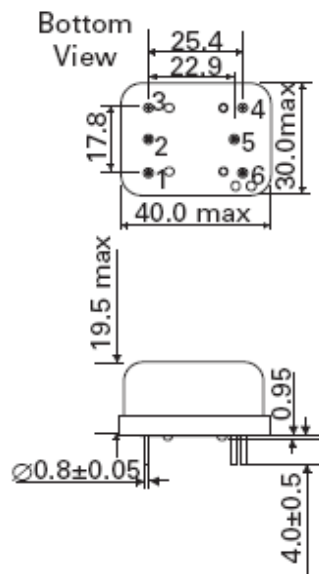
5 PIN DIP; 50.8 x 40.6 mm PACKAGE



Pin	Function
1.	Input frequency control
2.	Output ref. voltage
3.	Output signal
4.	Mechanical GND and (-) supply
5.	Input supply (+)

All tolerances $\pm 0.2\text{mm}$

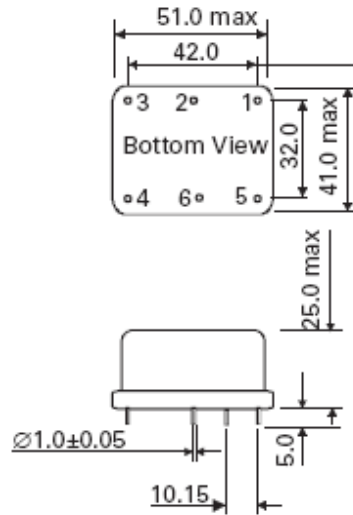
5 PIN DIP; 40 x 30 mm PACKAGE



Pin	Function
1.	Input frequency control
2.	Output reference voltage
3.	Input supply (+)
4.	Output signal
5.	Mechanical GND and (-) supply

All tolerances $\pm 0.2\text{mm}$

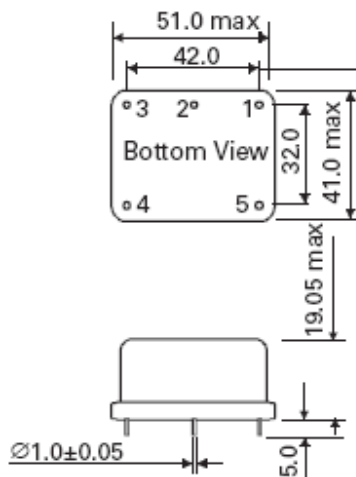
6 PIN DIP; 51 x 41 mm PACKAGE



Pin	Function
1.	Mechanical GND and supply
2.	Frequency control input
3.	Ref. voltage output
4.	Supply Input
5.	Signal output
6.	Oven Alarm

All tolerances $\pm 0.2\text{mm}$

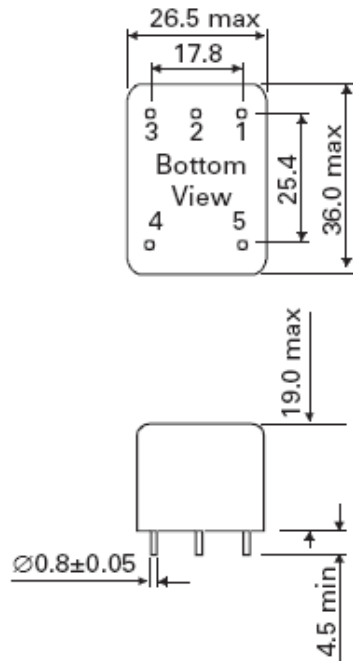
5 PIN DIP; 51 x 41 mm PACKAGE



Pin	Function
1.	Mechanical GND and supply
2.	Frequency control input
3.	Ref. voltage output
4.	Supply input
5.	Signal output

All tolerances $\pm 0.2\text{mm}$

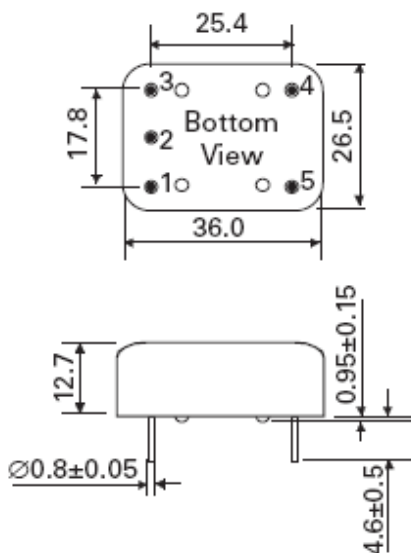
5 PIN DIP; 26.5x36 mm PACKAGE



Pin	Function
1.	Input supply (+)
2.	Output reference voltage
3.	N/C
4.	Mechanical ground and (-) supply
5.	Output signal

All tolerances $\pm 0.2\text{mm}$

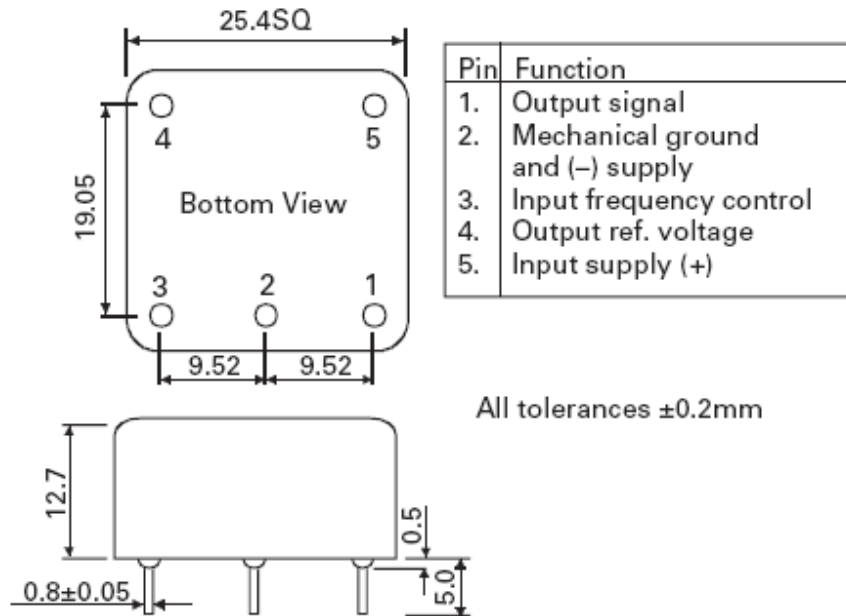
5 PIN DIP; 36 x 26.5 mm PACKAGE



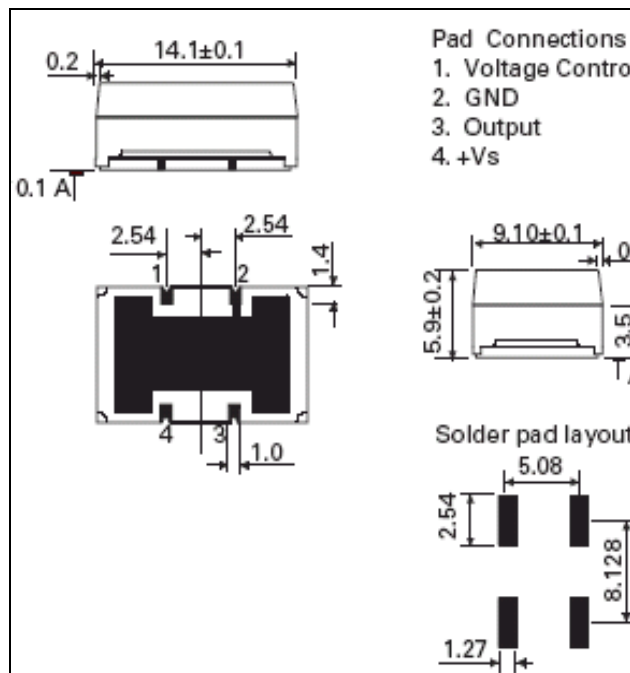
Pin	Function
1.	Input frequency control
2.	Output reference voltage
3.	Input supply (+)
4.	Output signal
5.	Mechanical GND and (-) supply

All tolerances $\pm 0.2\text{mm}$

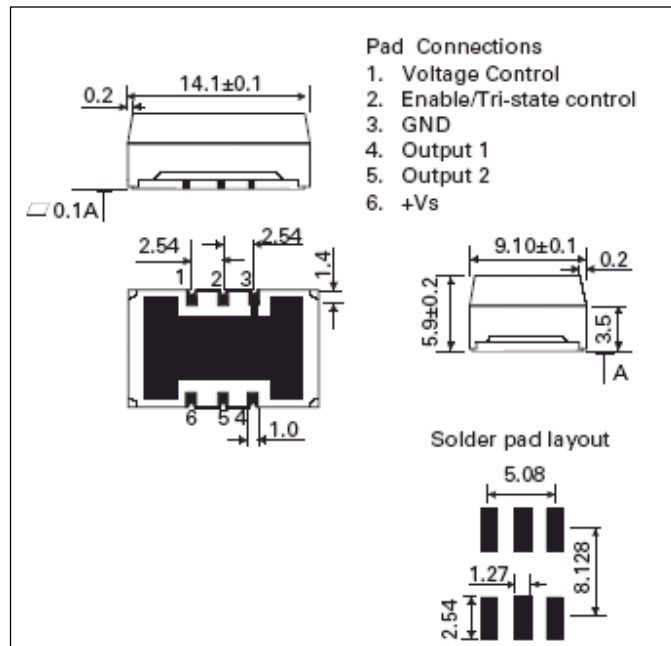
25.4 x 25.4 mm, 5 PIN DIP PACKAGE



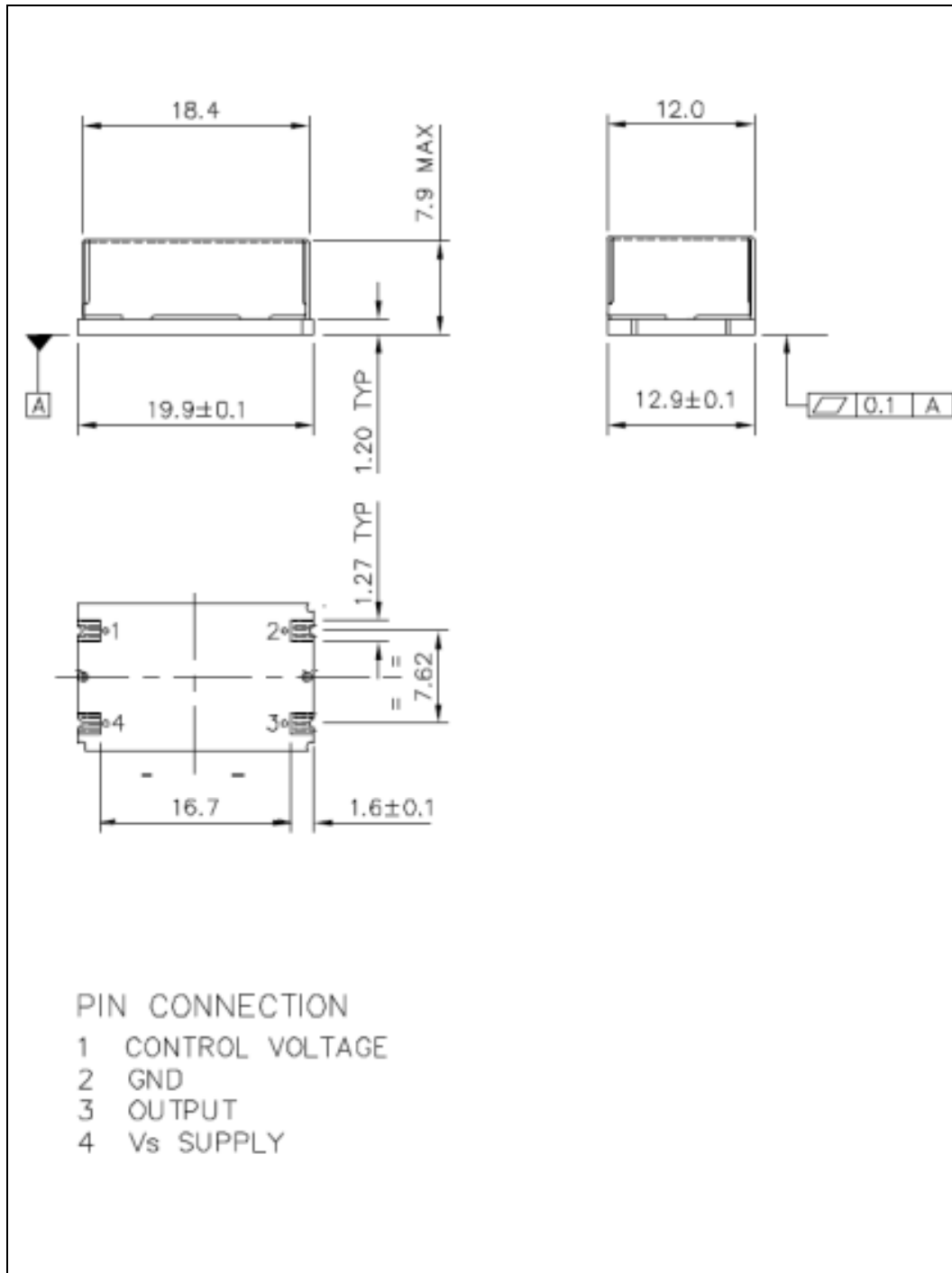
SMD - 14 x 9 mm; HEIGHT = 6.1 mm(Max); 4 PAD



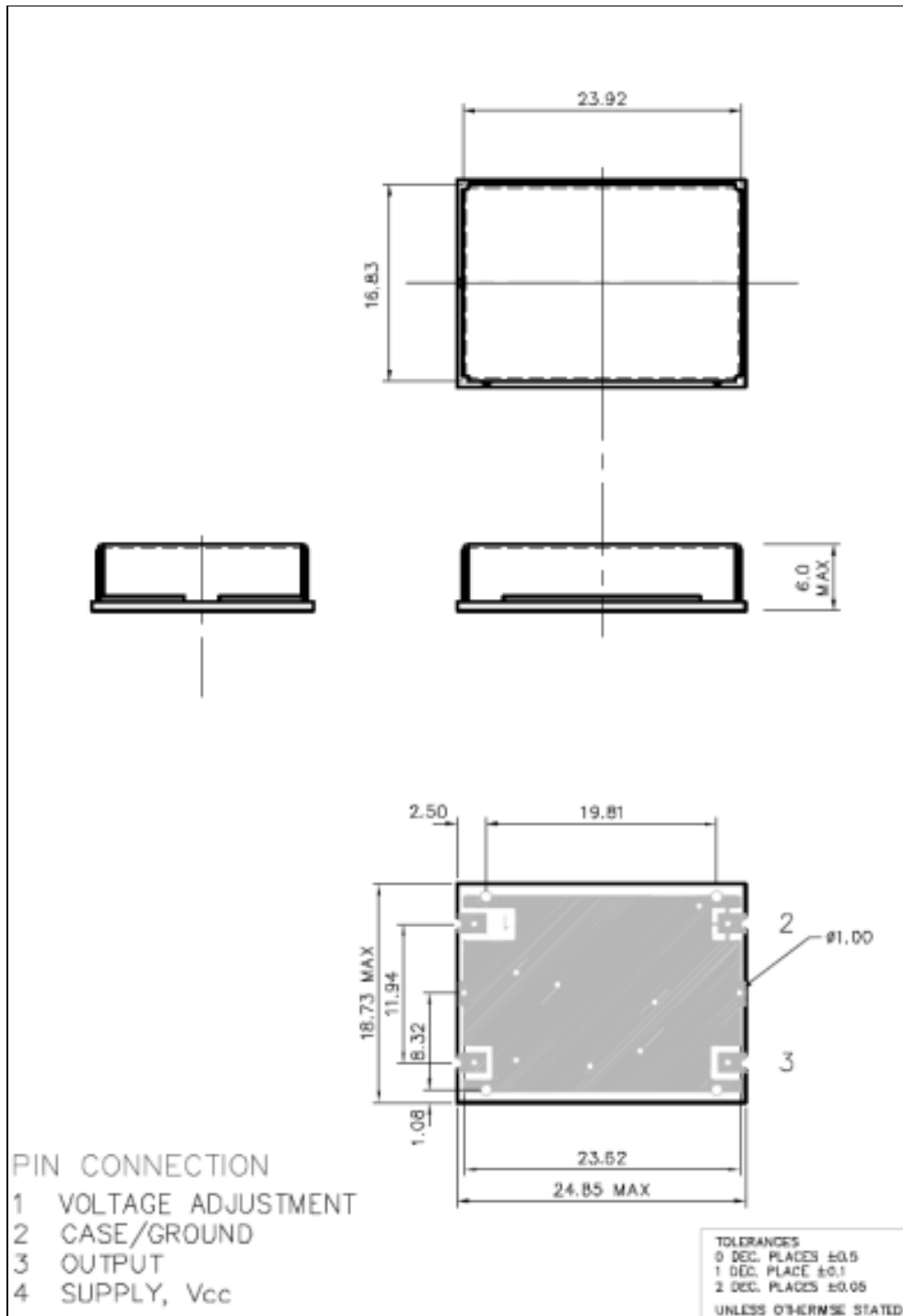
SMD - 14 x 9 mm; HEIGHT = 6.1 mm(Max); 6 PAD



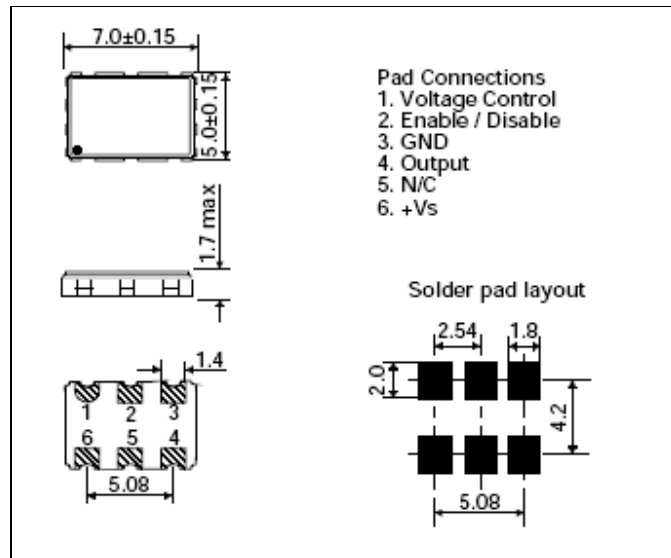
SMD – 20.0 x 13.0 mm, HEIGHT – 7.9 mm (MAX)



SMD - 24.9 x 18.8 mm, HEIGHT - 6 mm

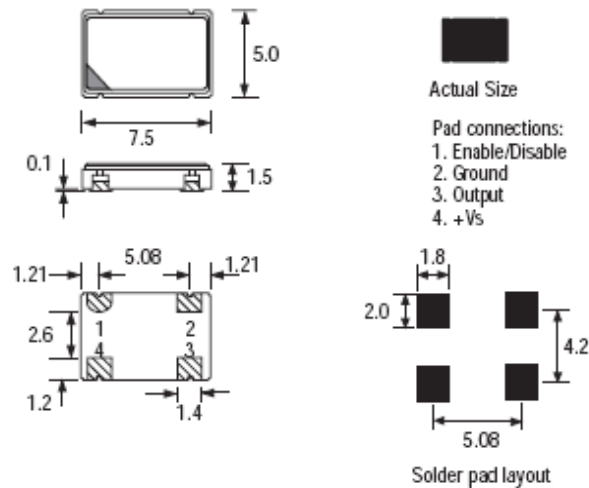


SMD - 5 X 7 mm; HEIGHT = 2 mm; 6 PAD

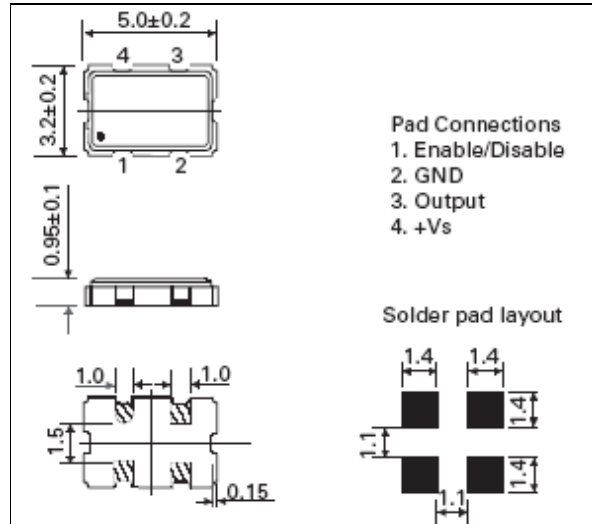


5 x 7 mm; 4 PAD

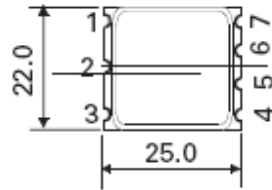
Outline in mm - (scale 2:1)



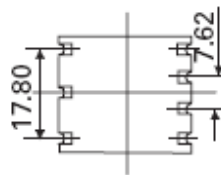
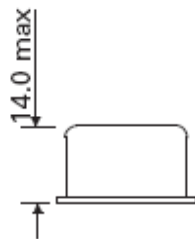
SMD - 5 X 3.2 mm; HEIGHT = 2 mm; 4 PAD



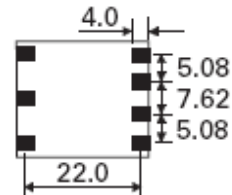
SMD 25mm x 22mm x 14 mm



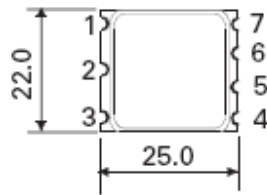
Pad	connections
1.	Frequency control
2.	Ref. voltage
3.	+Vs
4.	RF output
5.	Oven alarm
6.	N/C
7.	GND



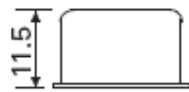
Solder pad layout



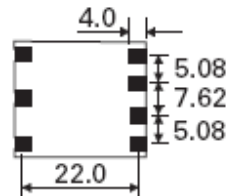
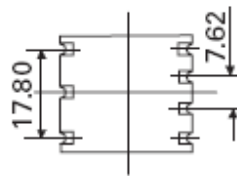
All tolerance $\pm 0.2\text{mm}$



Pad	connections
1.	Frequency control
2.	Ref. voltage
3.	+Vs
4.	RF output
5.	Oven alarm
6.	N/C
7.	GND



Solder pad layout



All tolerance $\pm 0.2\text{mm}$

