IT2200K

1.0 Specification References

Parameter	Description
a. Rakon part number	516715
b. Description	IVT2205KE 19.200 MHz
c. Document ID	IT2200K – 1118

2.0 Absolute Maximum Rating [1]

Parameter	Min.	Max.	Unit
a. Power supply	-0.6	+4.6	V
b. Storage temperature	-40	85	°C

3.0 Frequency Characteristics

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Nominal frequency		19.200		MHz	
b. Frequency calibration			±1	ppm	Offset from nominal frequency measured at 25°C ±2°C
c. Reflow shift			±1	ppm	Two consecutive reflows as per attached profile after 2 hours relaxation at 25°C
d. Temperature range	-30		85	°C	The operating temperature range over which the frequency stability is measured
e. Frequency stability over temperature			±0.5	ppm	Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range. Control voltage set to midpoint of control voltage [2]
f. Frequency slope			0.05	ppm/°C	Minimum of 1 frequency reading every 2°C over -10°C to 60°C. Control voltage set to midpoint of control voltage [2]
g. Frequency slope			0.1	ppm/°C	Minimum of 1 frequency reading every 2°C over the operating temperature range. Control voltage set to midpoint of control voltage [2]
h. Frequency drift			1.6	ppb/s	Calculated from frequency slope with temperature varied at a maximum of 1.92°C/min (0.032°C/s) over -10°C to 60°C [3]
i. Frequency drift			1.6	ppb/s	Calculated from frequency slope with temperature varied at a maximum of 0.96°C/min (0.016°C/s) over -30°C to 85°C [3]
j. Frequency shift from temperature step			10	ppb	Frequency delta from a step change in temperature; minimum of 0.5°C to maximum of 1°C, measured at +25°C, beyond the ppm/°C known characteristic.
k. Static temperature hysteresis			0.6	ppm	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C

[1] Operating beyond this limit may result in change or permanent damage to the device. The maximum operational and storage temperature to guarantee 10 years retention of temperature compensation data is +85°C. Continuous operation or storage at +105°C reduces the guaranteed retention time to 1.79 years.
[2] Parts should be shielded from drafts causing unexpected thermal gradients. Temperature changes due to ambient air currents on the oscillator can lead to short term frequency drift.
[3] Frequency drift rate is calculated from the equation ppb/s=°C/s x ppb/°C.

l. Sensitivity to supply voltage variations			±0.1	ppm	Supply voltage varied ±5% at 25°C
m. Sensitivity to load variations			±0.2	ppm	±10% load change at 25°C [4]
n. Long term stability			±0.7	ppm	Frequency drift over 1 year at 25°C

4.0 Power Supply

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Supply voltage (V_{DD})	2.7	2.85	3.0	V	
b. Supply current			1.5	mA	At maximum V_{DD}, 10k//10pF load [5]
c. Supply current			2.0	mA	At maximum V_{DD}, 5k//40pF load [5]

5.0 Control Voltage (VCO)

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Control voltage range	0.4		2.4	V	The nominal VCO value is midway between the minimum and maximum.
b. Frequency tuning	15.6		24	ppm	Frequency shift from minimum to maximum VCO
c. Linearity			20	%	Deviation from a straight line curve fit
d. Control voltage input resistance	600			kΩ	Measured between VCO and GND pin

6.0 Oscillator Output

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Output waveform					DC coupled clipped sine wave [5]
b. Output voltage level	0.8			V	At minimum supply voltage [5]
c. Output load		10		kΩ/pF	10kΩ //10pF ±10%
d. Start-up time (amplitude)			0.5	ms	Within 90% of the minimum specified output level
e. Start-up time (frequency)			2	ms	Within ±0.5ppm of steady state frequency

7.0 SSB Phase Noise (19.2 MHz, at 25°C)

Parameter	Typ.	Max.	Unit.	Test Condition / Description
a. 1Hz offset	-63	-57	dBc/Hz	
b. 10Hz offset	-91	-86	dBc/Hz	
c. 100Hz offset	-116	-111	dBc/Hz	
d. 1kHz offset	-137	-134	dBc/Hz	
e. 10kHz offset	-149	-144	dBc/Hz	
f. 100kHz offset	-151	-148	dBc/Hz	

[4] Specified for load stated in oscillator output section at 25°C.
[5] External AC-Coupling capacitor required. 1nF or greater recommended.

8.0 Marking

Parameter	Test Condition / Description
a. Type	Engraved
b. Line 1	[R], [XXXX] = Frequency in MHz (e.g.: 8A00 = 8MHz, 19A2 = 19.2MHz, 100A = 100MHz) [6]
c. Line 2	[o] = Pin 1, [XXX] = Internal code, and [XX] = Date code

9.0 Manufacturing Information

Parameter	Test Condition / Description
a. Reflow	Solder reflow processes as per profile attached
b. Packaging description	Tape and reel. Standard packing quantity is 3000 units per reel

10.0 Environmental Specification

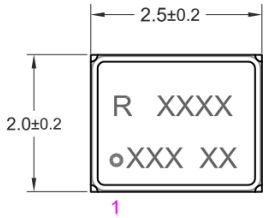
Parameter	Test Condition / Description
a. RoHS compliant	Yes
b. Shock	[MIL-STD-202 M213]. Half sine-wave acceleration of 3000g peak amplitude. Duration: 0.3ms, Velocity: 12.3ft/s [8]
c. Moisture resistance	[MIL-STD-202 M106g]. 1000 hours at 85°C, 85% relative humidity. Biased [7]
d. Thermal cycling	[JESD22 METHOD JA-104C]. 1000 temperature cycles, where each cycle consists of a 25 minutes soak time at -40°C followed by a 25 minute soak time at 85°C, with a 60 second maximum transition time between temperatures. Air to air transition [8]
e. Vibration	[JESD22-B103-B]. 10*g* peak acceleration for 4 minutes per sweep. 4 sweeps in each of the 3 orientations. Swept from 20-2000Hz [8]

[6] Frequency marking is only represented by the first three significant digits. For example, on an IT2200K TCXO at 16.368MHz, its frequency code marking will be 16A3.

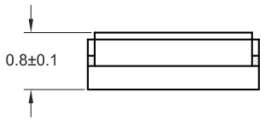
[7] Frequency shift ≤1ppm after environmental conditions.

11.0 Model Outline: IT2200K

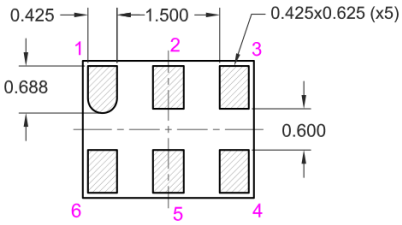
MODEL OUTLINE



TOP VIEW



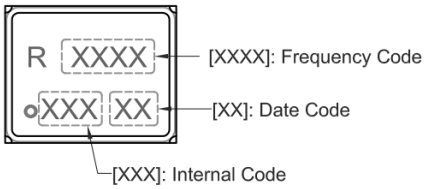
FRONT VIEW



BOTTOM VIEW

LID MARKING *

* Marking information is detailed in the specification.

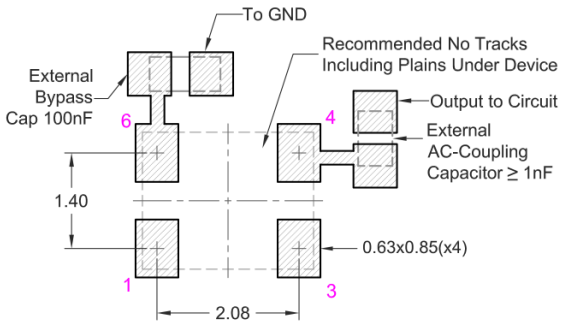


PIN CONNECTIONS

Pin	IT22..K	IVT22..K	IT22..KP	IT22..KQ
1	NC / GND	VCO	Enable / $\overline{\text{Disable}}$**	NC / GND
2	NC / GND	NC / GND	NC / GND	Enable / $\overline{\text{Disable}}$**
3	GND	GND	GND	GND
4	OUTPUT	OUTPUT	OUTPUT	OUTPUT
5	NC / GND	NC / GND	NC / GND	NC / GND
6	V_{DD}	V_{DD}	V_{DD}	V_{DD}

** Connect to V_{DD} or floating to enable TCXO.

RECOMMENDED PAD LAYOUT - TOP VIEW



TITLE: I(V)T2200K MODEL	FILENAME: CAT762	TOLERANCES:
RELATED DRAWINGS:	REVISION: C	XX =
	DATE: 23-Apr-14	X.X = ±0.2
	SCALE: 10 : 1	X.XX = ±0.10
	Millimetres	X.XXX = ±0.05
		X° =
		Hole =

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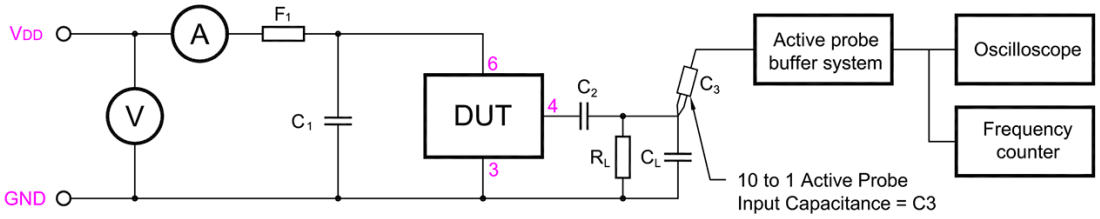
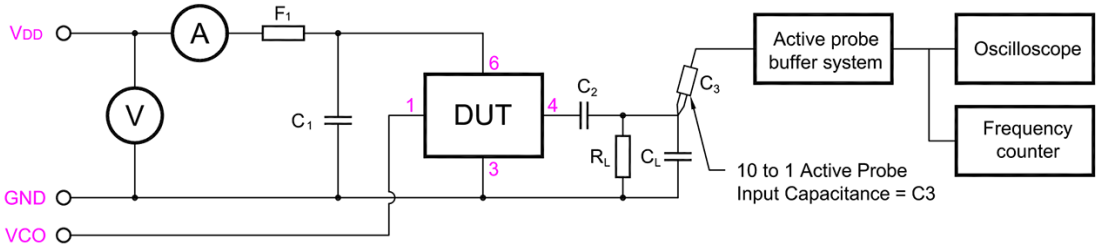
12.0 Test Circuit: IT2200K

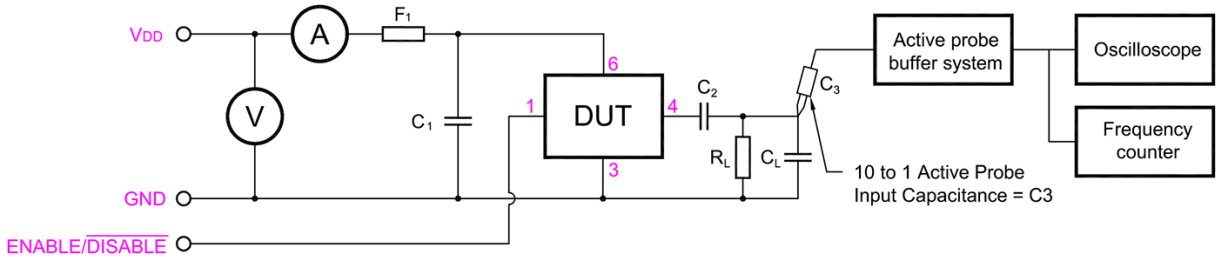
IT22..K TEST CIRCUIT:



IVT22..K TEST CIRCUIT:



IT22..KP TEST CIRCUIT:



C_1: 100nF C_2: ≥1nF R_L: 10K	$C_T = C_L + C_3$ (C_3 - Oscilloscope probe capacitance) C_T as stated in OSCILLATOR OUTPUT section F_1: A ferrite bead or a resistor between 22Ω ~ 47Ω recommended.

TITLE: I(V)T2200K SERIES TEST CIRCUIT	FILENAME: CAT763
RELATED DRAWINGS:	REVISION: B
	DATE: 29-Jul-13
	SCALE: NTS
	Millimetres

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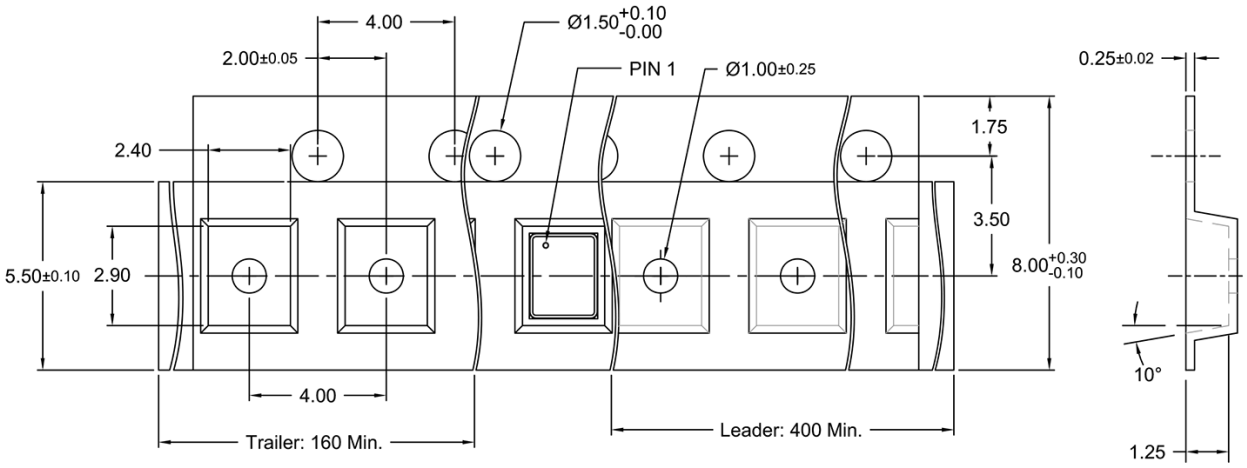
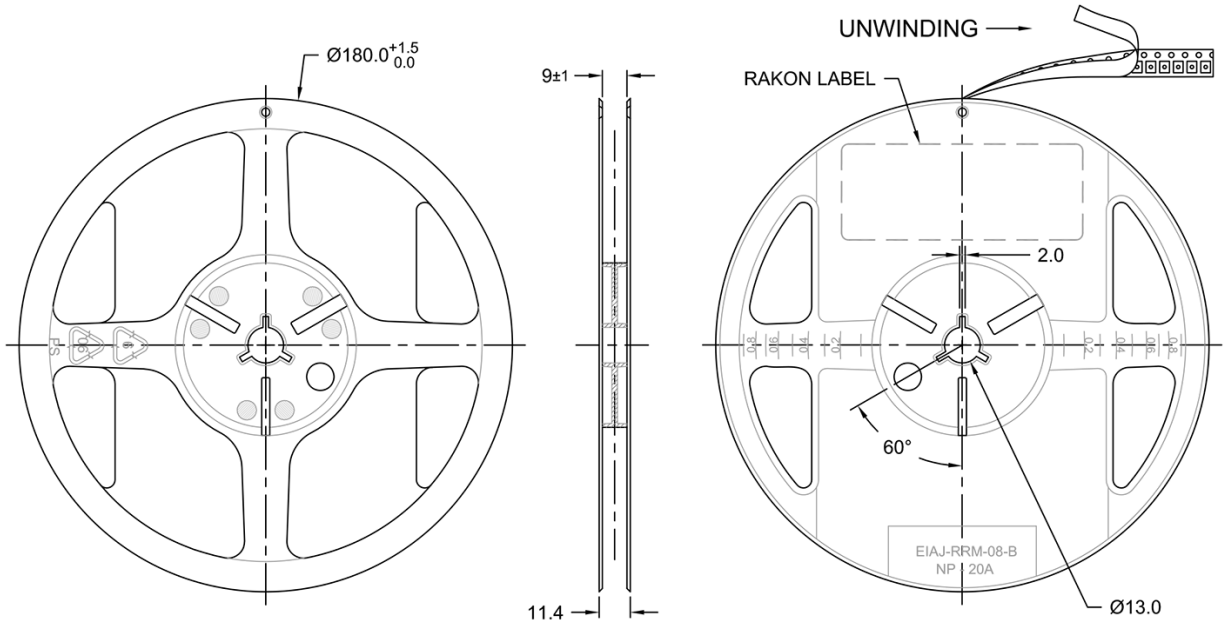
13.0 Tape and Reel (Ø180mm): IT2200K

TAPE DETAIL (Scale 5 : 1)



REEL DETAIL (Scale 1 : 2.5)



TITLE: 2520 SERIES TAPE & REEL	FILENAME: CAT422	TOLERANCES:	
RELATED DRAWINGS:	REVISION: F	XX =	
	DATE: 29-Jul-13	X.X = ±0.1	
	SCALE: See Above	X.XX = ±0.05	
	Millimetres	X.XXX =	
		X° =	
		Hole =	

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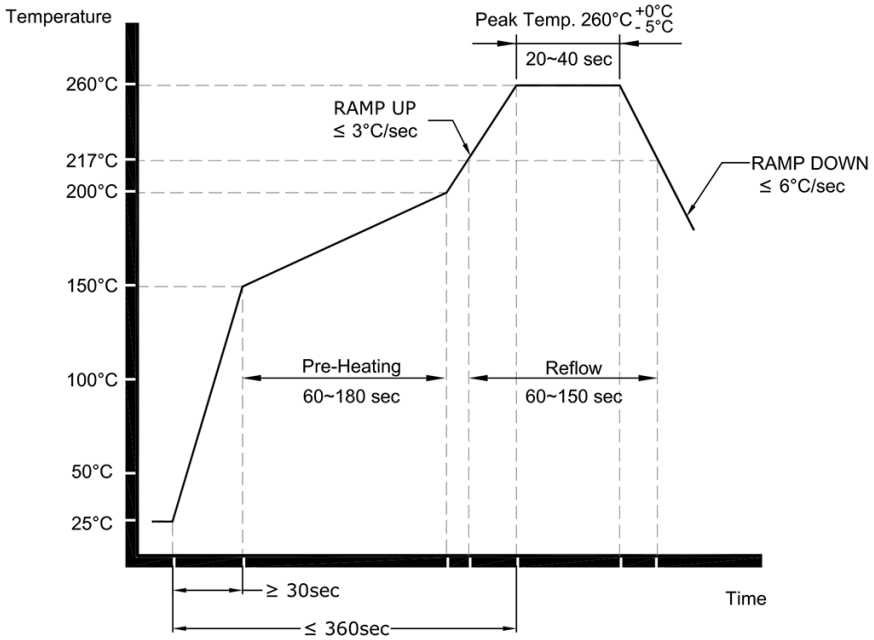
14.0 Reflow: IT2200K



NOTE:
The product has been tested to withstand the Reflow Profile shown. The Reflow Profile used to solder Rakon products is determined by the solder paste Manufacturer's specification. It is recommended that the Reflow Profile used does not exceed the one shown above.

TITLE: Pb-FREE SERIES OSCILLATORS REFLOW	FILENAME: CAT541
RELATED DRAWINGS:	REVISION: B
	DATE: 05-Sep-11
	SCALE: NTS
	Millimetres

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15.0 Specification History

Version	Notes	Approver	Date
1.0	Specification created	Sowmya Injeti	10 Nov, 2017
1.1	Updated phase noise section	Sowmya Injeti	23 Feb, 2018