

## MODEL IVT200B

### SMD Voltage Controlled Temperature Compensated Crystal Oscillators

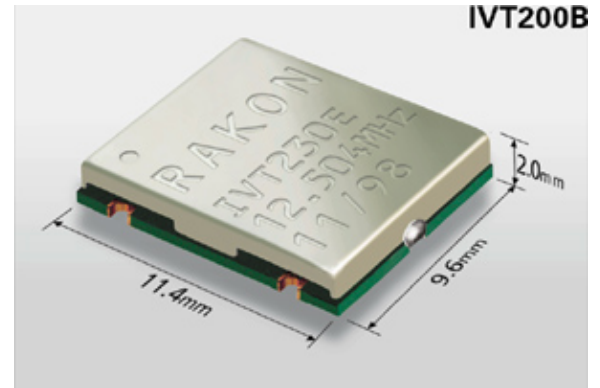
Small, low cost SMD VCTCXO using an analogue IC for compensation. Frequencies ranging from 10MHz to 26MHz.

### Product Description

The IVT200B employs an analogue IC for the oscillator and temperature compensation giving excellent temperature stability performance for low cost.

### Applications include

GSM/TDMA/APMS cellular phones, PCMCIA CDPD cards and many other wireless applications.



### Features

- Standard temperature stability choices are  $\pm 1$ ppm,  $\pm 1.5$ ppm and  $\pm 2.5$ ppm, over wide temperature ranges.
- Unit weight is only 0.1720 grams.
- Clipped sinewave frequency output from 10MHz to 26MHz.
- Frequency slope and perturbation specifications can be customized to the application requirement.
- Internal power regulation. Unit can operate on any supply voltage between 2.7 and 5.5 Volts.
- The unit consumes only 1.2mA typically.
- Frequency control ranges from 6 to 50ppm available

## 1.0 SPECIFICATION REFERENCES

1.1	<b>Model Description</b>	IVT215BE 12.8 MHz
1.2	<b>Reference Number</b>	3424
1.3	<b>Company</b>	Trimble Navigation

## 2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Min.	Max.	Units
2.1	<b>Nominal Frequency</b>	Nominal Frequency referenced to 25 deg. C.		12.8	MHz
2.2	<b>Frequency calibration</b>	Frequency at 23 deg. C $\pm 2$ deg. C. sixty minutes after reflow		2.0	$\pm$ -ppm
2.3	<b>Frequency stability over temperature</b>	Referenced to frequency reading at 25 deg. C. Temperature varied at max. of 2 deg. C per minute. Control voltage held at voltage control range midpoint. (Note 2)		1.5	$\pm$ -ppm
2.4	<b>Temperature range</b>	The operating temperature range over which the frequency stability is measured (Note 3)	-40.0	85.0	Degrees C

2.5	<b>Frequency perturbations</b>	Peak to peak amplitude of frequency perturbation within operating temperature range (Note 1)	1.0	ppm
2.6	<b>Frequency slope of perturbations</b>	Minimum of 1 frequency reading every 2 degrees C, over the operating temperature range (Note 1)	1.0	ppm/deg C
2.7	<b>Static temperature hysteresis</b>	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25 deg C.	0.6	+/-ppm
2.8	<b>Supply voltage stability</b>	Supply voltage varied +/-5% at 25 deg C. Frequencies above 25MHz are not able to be specified below the max. value given. (Note 1)	0.3	+/-ppm
2.9	<b>Load sensitivity</b>	+/-10% load change	0.2	+/-ppm
2.10	<b>Root Allan Variance</b>	1 second Tau. (Note 1)	1.0	ppb
2.11	<b>Long term stability</b>	Frequency drift over 1 year (Note 1)	1.0	+/-ppm
2.12	<b>G Sensitivity</b>	Gamma vector of all three axes from 30Hz to 1500Hz (Note 1)	1.0	ppb/G

### 3.0 POWER SUPPLY

Line	Parameter	Test Condition	Min.	Max.	Units
3.1	<b>Supply voltage</b>	Supply voltage range based on nominal 3V	2.85	3.15	V
3.2	<b>Current</b>	At Max. supply voltage		1.5	mA

### 4.0 CONTROL VOLTAGE

Line	Parameter	Test Condition	Min.	Max.	Units
4.1	<b>Control voltage range</b>	The nominal control voltage value is midway between the minimum and maximum.	0.5	2.5	V
4.2	<b>Frequency tuning</b>	Frequency shift from Min. to Max. control voltages (Note 6)	18.0	30.0	ppm
4.3	<b>Frequency tuning linearity</b>	Deviation from straight line curve fit (Note 1)		20.0	%
4.4	<b>Port input impedance</b>		100.0		K Ohms

### 5.0 OSCILLATOR OUTPUT

Line	Parameter	Test Condition	Min.	Max.	Units
5.1	<b>Output waveform</b>	Clipped sinewave			
5.2	<b>Output voltage level</b>	At min. supply voltage	0.8		V
5.3	<b>Output load resistance</b>	Operating range	9.0	11.0	K Ohms

<b>5.4</b>	<b>Output load capacitance</b>	Operating range	9.0	11.0	pF
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## 6.0 SSB PHASE NOISE

*Quiescent measurement at room temperature. Phase noise dependent on oscillator frequency. The dBc/Hz are typical values.*

<b>6.1</b>	<b>SSB Phase noise density</b>	1Hz offset typical	-55.0	dBc/Hz
<b>6.2</b>	<b>SSB Phase noise density</b>	10Hz offset typical	-85.0	dBc/Hz
<b>6.3</b>	<b>SSB Phase noise density</b>	100Hz offset typical	-110.0	dBc/Hz
<b>6.4</b>	<b>SSB Phase noise density</b>	1KHz offset typical	-125.0	dBc/Hz
<b>6.5</b>	<b>SSB Phase noise density</b>	10KHz offset typical	-140.0	dBc/Hz

## 7.0 ENVIRONMENTAL

*The oscillator shall meet electrical characteristics and suffer no physical damage after being subject to the following conditions:*

<b>7.1</b>	<b>Shock</b>	Half sinewave acceleration of 100G peak amplitude for 11ms duration, 3 cycles each plane.
<b>7.2</b>	<b>Random Vibration</b>	10G RMS 30Hz to 1500Hz duration of 6 Hours.
<b>7.3</b>	<b>Humidity</b>	After 48hours at 85 deg C +/-2% deg C 85% relative humidity non-condensing
<b>7.4</b>	<b>Thermal shock test</b>	Exposed at -40 deg C for 30 minutes then to 85 deg C for 30 minutes constantly for a period of 5 days.
<b>7.5</b>	<b>Storage temperature</b>	-40 to 85 deg C

## 8.0 MARKING

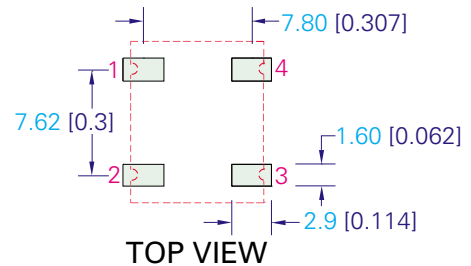
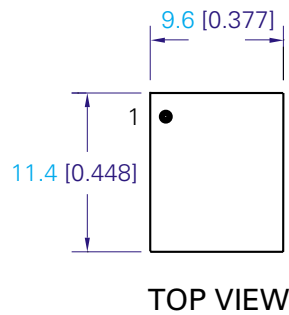
<b>8.1</b>	<b>Type</b>	Engrave
<b>8.2</b>	<b>Line 1</b>	Rakon logo
<b>8.3</b>	<b>Line 2</b>	Model descriptive
<b>8.4</b>	<b>Line 3</b>	Frequency in MHz (to 3 decimal places or greater depending on the no. of significant digits after the decimal point)
<b>8.5</b>	<b>Line 4</b>	Date code WWYY

## 9.0 MANUFACTURING INFORMATION

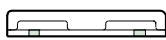
- 9.1 **Reflow and washing** Able to withstand aqueous washing process and normal solder reflow processes.
- 9.2 **Packaging description** Tape and reel (1000pcs max std.)

## 10.0 SPECIFICATION NOTES

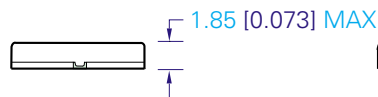
- 10.1 **Note 1** The Max. value is the specification. A Min. value, if present, indicates the tightest specification available.
- 10.2 **Note 2** A max. frequency stability over the temperature is required to be specified. For this model series, values between to  $\pm 1$ ppm and  $\pm 10$ ppm are available. Standard options are  $\pm 1$ ppm,  $\pm 1.5$ ppm,  $\pm 2$ ppm and  $\pm 2.5$ ppm.
- 10.3 **Note 3** The operating temperature range needs to be specified. The extremes for this model are  $-40$  and  $+85$  deg C. If either or both ends of the operating temperature range are at these extremes, then the frequency stability options are limited to greater than  $\pm 1.5$ ppm.
- 10.4 **Note 4** Standard power supply options are 2.7V, 3V, 3.3V, 4V or 5V, but any value between Min. & Max. is available.
- 10.5 **Note 5** The Min value is the specification. A Max value, if present, indicates the widest tuning range available for this model (subject to other parameters).



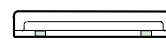
RECOMMENDED PAD LAYOUT  
TRACKS NOT RECOMMENDED UNDER OSCILLATOR



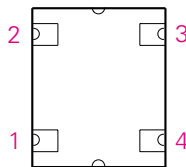
**END VIEW**



**SIDE VIEW**



**END VIEW**



**BOTTOM VIEW**

**PIN CONNECTIONS**

- 1 CONTROL VOLTAGE
- 2 COMMON & CASE
- 3 OUTPUT
- 4 + Vcc

TITLE: IVT200B MODEL

FILENAME: CAT083

REVISION: B

Tolerances:

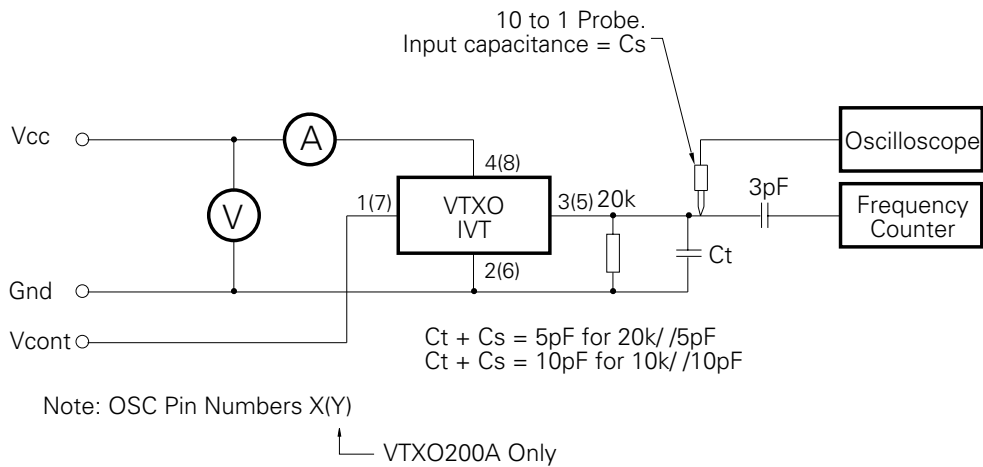
XX = ±0.5  
 X.X = ±0.10  
 X.XX = ±0.05  
 X.XXX = ±0.05  
 X<sup>0</sup> = ±1.0°  
 Hole = ±0.10

RELATED DRAWINGS: VTXO & IVT CLIPPED  
 SINEWAVE TEST CIRCUIT (CAT003)  
 200A&B TAPE & REEL (CAT011)  
 200SERIES REFLOW (CAT015)

DATE: 1 OCT 98

SCALE: 2:1

Millimetres [inch]



TITLE: VT XO & IVT CLIPPED SINEWAVE TEST CIRCUIT FILENAME: CAT003

REVISION: B

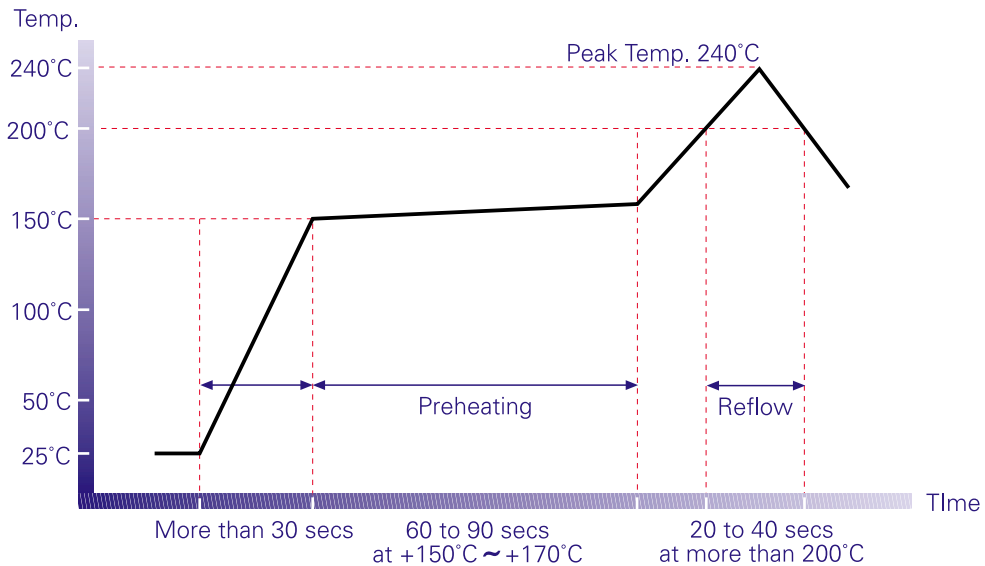
RELATED DRAWINGS: VT XO100 VT XO200A  
IVT100 VT XO200B  
IVT200B VT XO200U

DATE: 28 AUG 98

SCALE: NTS

Millimetres [inch]

200 Series A,B & U TXO/VTXO



TITLE: 200 SERIES REFLOW

FILENAME: CAT015

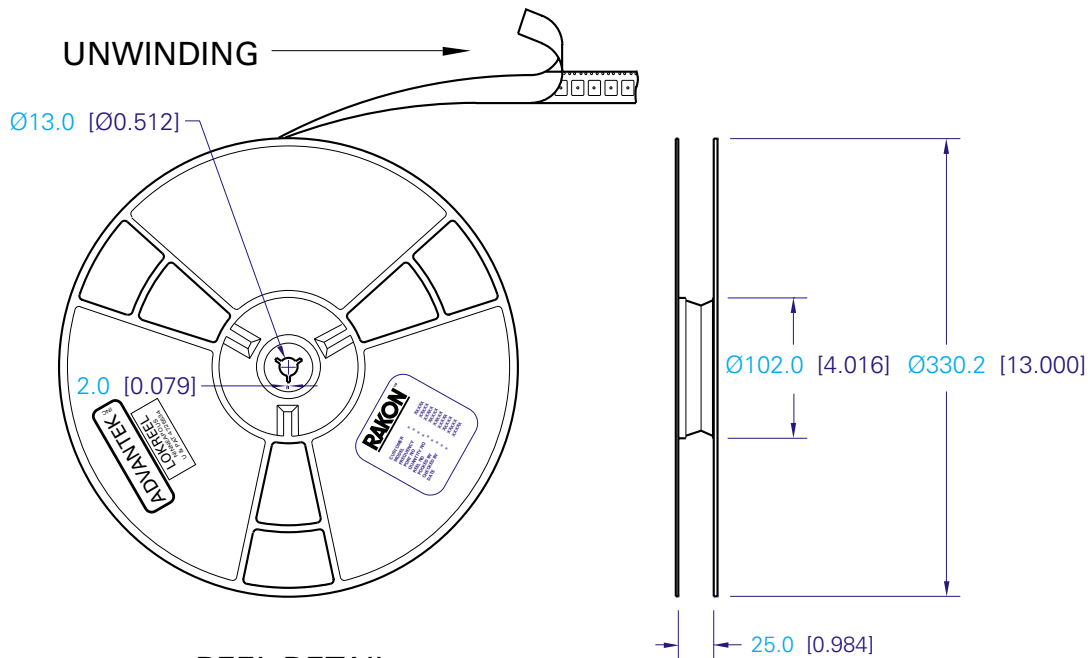
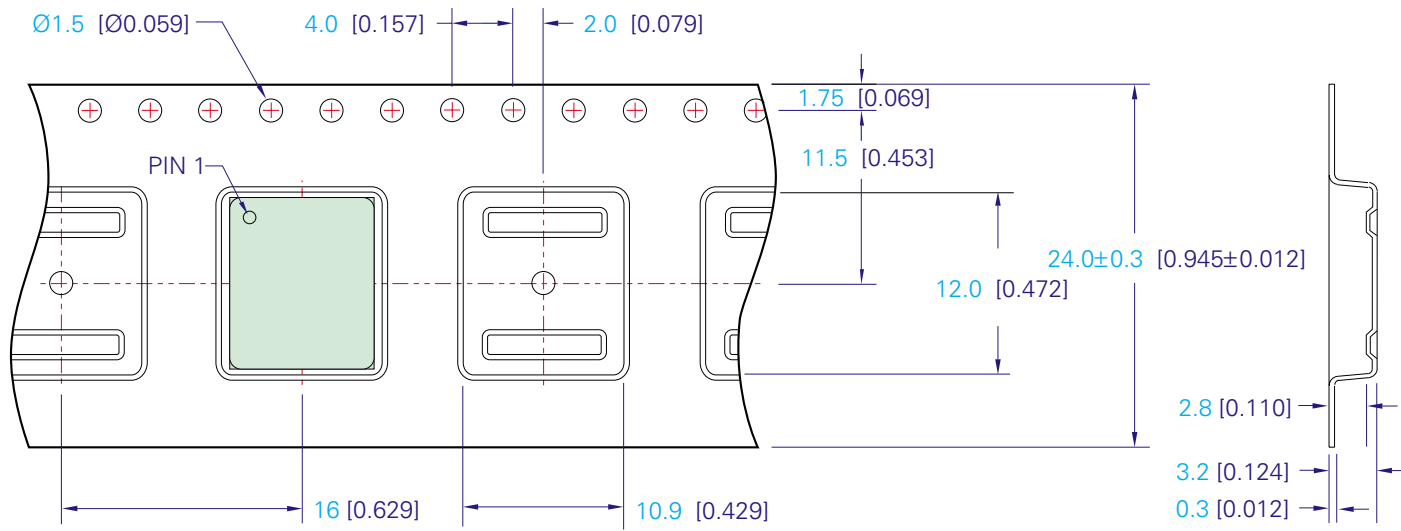
REVISION: B

RELATED DRAWINGS: TXO200A (CAT008) VTXO200A (CAT004) IT200B (CAT082)  
TXO200B (CAT009) VTXO200B (CAT005) IVT200B (CAT083)  
TXO200U (CAT010) VTXO200U (CAT006)

DATE: 16 SEPT 98

SCALE: NTS

Millimetres [inch]



REEL DETAIL  
SCALE 1:5