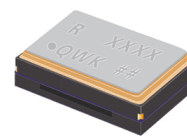


# IT2100D



## SMD Temperature Compensated Crystal Oscillators

Low cost SMD TCXO with voltage control option, using an analogue IC for compensation, Frequencies ranging from 13 MHz to 52 MHz.



### Product description

The I(V)T2100D employs an analogue IC for the oscillator and 5th order compensation circuit. It consumes a minimum amount of power by operating down to a supply voltage of 1.8 V. The I(V)T2100D's small footprint of 2.05 mm x 1.65 mm makes it ideally suited for demanding mobile applications.

### Applications

- Communications
- Consumer Products
- GPS
- Handset
- LBS Handset
- PCMCIA CDPD cards
- PND
- WiFi
- Other

### Features

- Excellent phase noise performance
- Frequency slope and perturbation specifications can be customized to the application requirement
- Height less than 0.8mm
- Clipped sine-wave output
- Operates at 1.8V supply
- Low Start-up drift rate
- Standard temperature stability choices are  $\pm 0.5\text{ppm}$  and  $\pm 2.00\text{ppm}$

### Specifications

#### 1.0 SEPCIFICATION REFERENCES

Line	Parameter	Description
1.1	Model Description	IT2100D / IVT2100D (Draft)
1.2	RoHS compliant	Yes

#### 2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Frequency range	Frequency range available	13 to 52	MHz
2.2	Frequency calibration	Offset from nominal frequency measured at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$	$\pm 1$ max	ppm
2.3	Reflow shift	Two consecutive reflows as per attached profile after 1 hour recovery	$\pm 1$ max	ppm
2.4	Frequency stability over temperature	Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range. Control voltage set to midpoint of control voltage (Note 1, 2)	$\pm 0.5$ to 2	ppm
2.5	Temperature range	The operating temperature range over which the frequency stability is measured (Note 3)	-30 to 85	$^{\circ}\text{C}$
2.6	Frequency slope	Minimum of 1 frequency reading every $2^{\circ}\text{C}$ over the operating temperature range (Note 1, 2)	0.05 to 1	ppm/ $^{\circ}\text{C}$
2.7	Static temperature hysteresis	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at $25^{\circ}\text{C}$	$\pm 0.6$ max	ppm
2.8	Supply voltage stability	Supply voltage varied $\pm 5\%$ at $25^{\circ}\text{C}$ (Note 4)	$\pm 0.1$ max	ppm
2.9	Load sensitivity	$\pm 10\%$ load change at $25^{\circ}\text{C}$	$\pm 0.2$ max	ppm
2.10	Long term stability	Frequency drift over 1 year at $25^{\circ}\text{C}$ (Note 4)	$\pm 1$ max	ppm

**3.0 POWER SUPPLY**

Line	Parameter	Test Condition	Value	Unit
3.1	Supply voltage	Nominal supply voltage range (Note 5)	1.8 to 3	V
3.2	Current	At maximum supply voltage (Note 6)	2 max	mA

**4.0 CONTROL VOLTAGE (VCO) OPTION**

Line	Parameter	Test Condition	Value	Unit
4.1	Control voltage range Mode 1	The nominal control voltage value is midway between the minimum and maximum. Voltage control should not exceed the supply voltage +0.2 V or GND. Supply voltage $\leq$ 2.3 V	0.3 to 1.5	V
4.2	Control voltage range Mode 2	The nominal control voltage value is midway between the minimum and maximum. Voltage control should not exceed the supply voltage +0.2 V or GND. Supply voltage $>$ 2.3 V	0.4 to 2.4	V
4.3	Frequency tuning	Frequency shift from minimum to maximum control voltages (Note 7)	6 to 60	ppm
4.4	Port input impedance	Measured between Control voltage and GND pin	500	kOhm

**5.0 OSCILLATOR OUTPUT**

Line	Parameter	Test Condition	Value	Unit
5.1	Output waveform	DC coupled clipped sine-wave (Note 8)		
5.2	Output voltage level	At minimum supply voltage (Note 6)	0.8	V
5.3	Output load resistance	Refer to test circuit. Typical load 10 kOhm	9 to 11	kOhm
5.4	Output load capacitance	Refer to test circuit. Typical load 10 pF	9 to 11	pF

**6.0 SSB PHASE NOISE**

Line	Parameter	Test Condition	Value	Unit
6.1	SSB phase noise power density at 1 Hz offset	Typical value for a 19.2 MHz oscillator at 25°C	-62	dBc/Hz
6.2	SSB phase noise power density at 10 Hz offset	Typical value for a 19.2 MHz oscillator at 25°C	-90	dBc/Hz
6.3	SSB phase noise power density at 100 Hz offset	Typical value for a 19.2 MHz oscillator at 25°C	-115	dBc/Hz
6.4	SSB phase noise power density at 1 kHz offset	Typical value for a 19.2 MHz oscillator at 25°C	-137	dBc/Hz
6.5	SSB phase noise power density at 10 kHz offset	Typical value for a 19.2 MHz oscillator at 25°C	-149	dBc/Hz
6.6	SSB phase noise power density at 100 kHz offset	Typical value for a 19.2 MHz oscillator at 25°C	-150	dBc/Hz

**7.0 ENVIRONMENTAL**

Line	Parameter	Description
7.1	Shock	Half sine-wave acceleration of 100G peak amplitude for 6 ms duration, 3 cycles each plane
7.2	Humidity	After 48 hours at 85°C $\pm$ 2°C 85% relative humidity non-condensing
7.3	Thermal shock	Exposed at -40°C for 30 minutes then 85°C for 30 minutes for a period of 5 days
7.4	Vibration	10G RMS from 30 Hz to 1500 Hz random in each of the 3 axis for 4 hours, total 12 hours
7.5	Storage temperature	-40°C to 85°C

**8.0 MARKING**

Line	Parameter	Description
8.1	Type	Engraved
8.2	Line 1	R and Product code
8.3	Line 2	Pin 1, Frequency code and Date code

**9.0 MANUFACTURING INFORMATION**

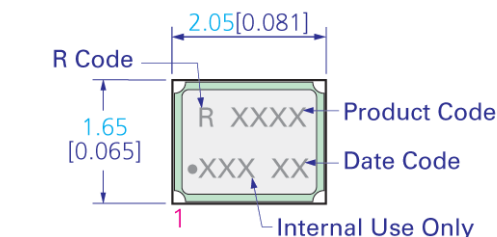
Line	Parameter	Description
9.1	Reflow	Solder reflow processes as per profile attached
9.2	Packaging description	Tape and reel. Standard packing quantity is 4000 units per reel

**10.0 SPECIFICATION NOTES**

Line	Parameter	Description
10.1	Note 1	A maximum frequency stability over the temperature is required to be specified. Standard options are $\pm 0.5\text{ppm}$ and $\pm 2.0\text{ppm}$
10.2	Note 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
10.3	Note 3	The operating temperature range needs to be specified. The extremes for this model are $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$
10.4	Note 4	The maximum value is the specified. A minimum value, if present, indicates the best specification available
10.5	Note 5	The unit will operate on any voltage between the minimum and maximum values
10.6	Note 6	Specified for load stated in 5.3 and 5.4 at $25^{\circ}\text{C}$ . Current consumption depends on crystal oscillation frequency. Higher frequency will result in higher current consumption and a drop in output voltage level
10.7	Note 7	The maximum frequency tuning range depends on the design frequency and the trimming sensitivity of the crystal. Linearity performance degrades if maximum frequency tuning setting is selected
10.8	Note 8	AC-Coupled outputs require an external capacitor, $\geq 1\text{nF}$ recommended

Drawing Name: IT2100D Model Drawing

MODEL DRAWING



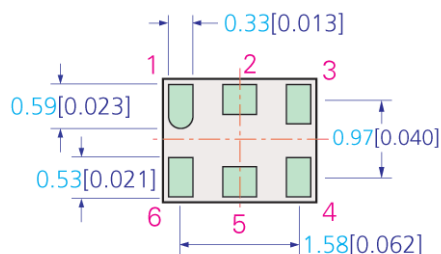
TOP VIEW



SIDE VIEW



END VIEW



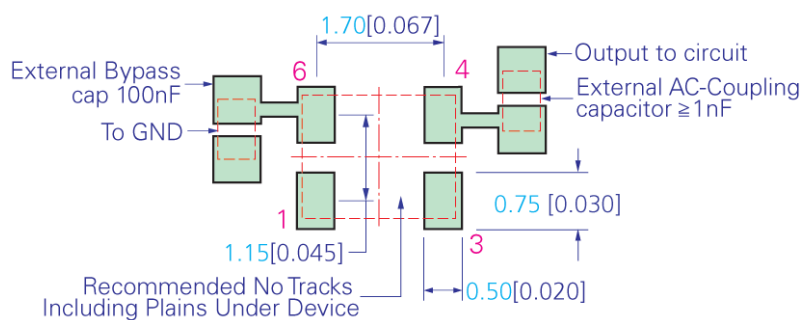
BOTTOM VIEW

PIN CONNECTION OPTIONS

PIN	IT	IVT	ITP
1	NC / GND	VCO	Enable / Disable *
2	NC / GND	NC / GND	NC / GND
3	GND	GND	GND
4	OUTPUT	OUTPUT	OUTPUT
5	NC / GND	NC / GND	NC / GND
6	VCC	VCC	VCC

\* Connect to VCC or floating to enable TCXO.

RECOMMENDED PAD LAYOUT - TOP VIEW



DRAFT

TITLE: IT2100D SERIES MODEL

RELATED DRAWINGS:

FILENAME: CAT536

REVISION: B

DATE: 04-Mar-10

SCALE: 10 : 1

Millimeters [inch]

Tolerance:

XX = ±0.5

X.X = ±0.2

X.XX = ±0.10

X.XXX = ±0.05

X° = ±1.0°

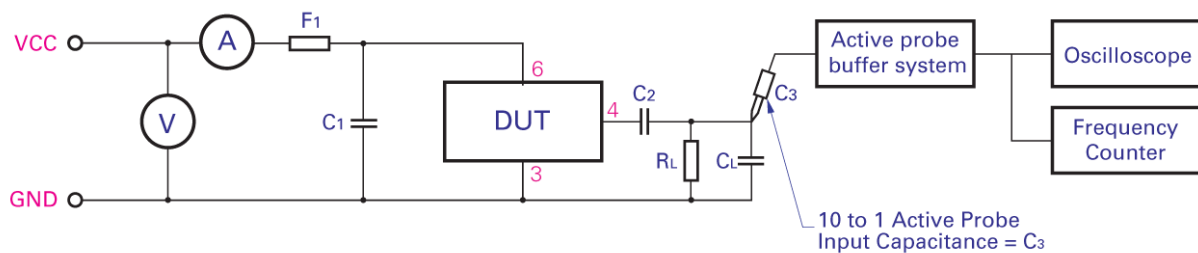
Hole = ±0.10

**rakon**

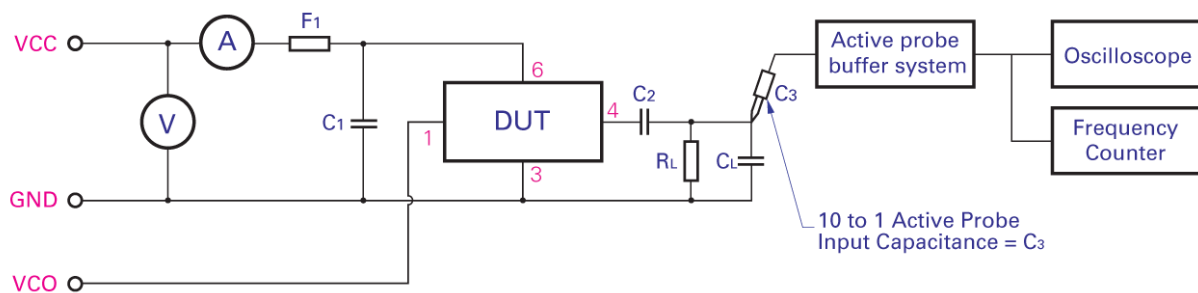
©2009 Rakon Limited

Drawing Name: IT2100D Series Test Circuit

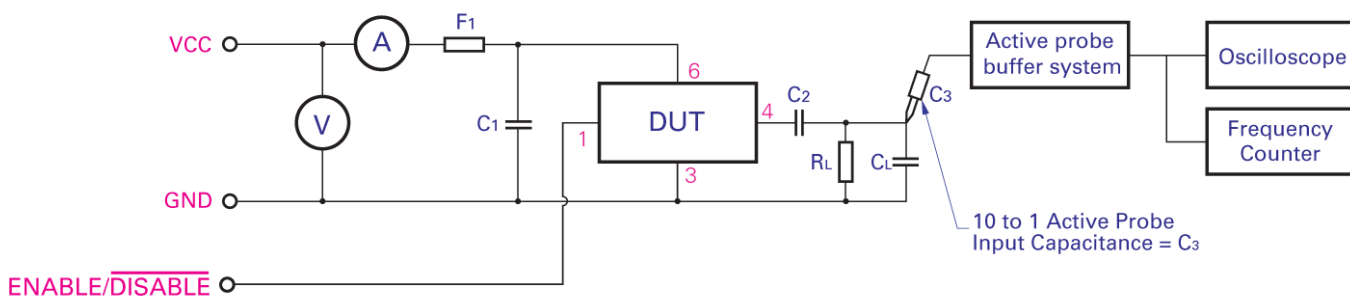
IT TEST CIRCUIT :



IVT TEST CIRCUIT :



ITP TEST CIRCUIT :



C1: 100nF	$C_T = C_L + C_3$ ( $C_3$ - Oscilloscope probe capacitance) $C_T$ as stated in OSCILLATOR OUTPUT section F1: A ferrite bead or a resistor between $22\Omega \sim 47\Omega$ recommended.
C2: $\geq 1nF$	
RL: 10K	

TITLE: IT2100D SERIES TEST CIRCUIT

RELATED DRAWINGS:

FILENAME: CAT538

REVISION: B

DATE: 04-Mar-10

SCALE: NTS

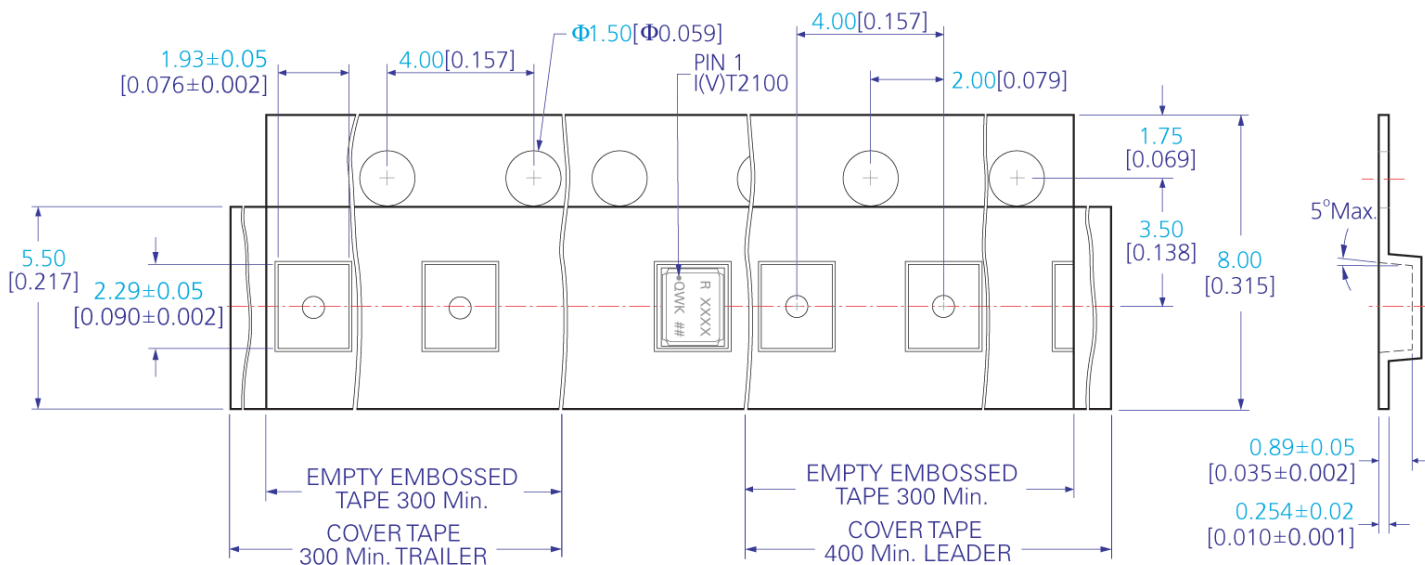
Millimetres [inch]



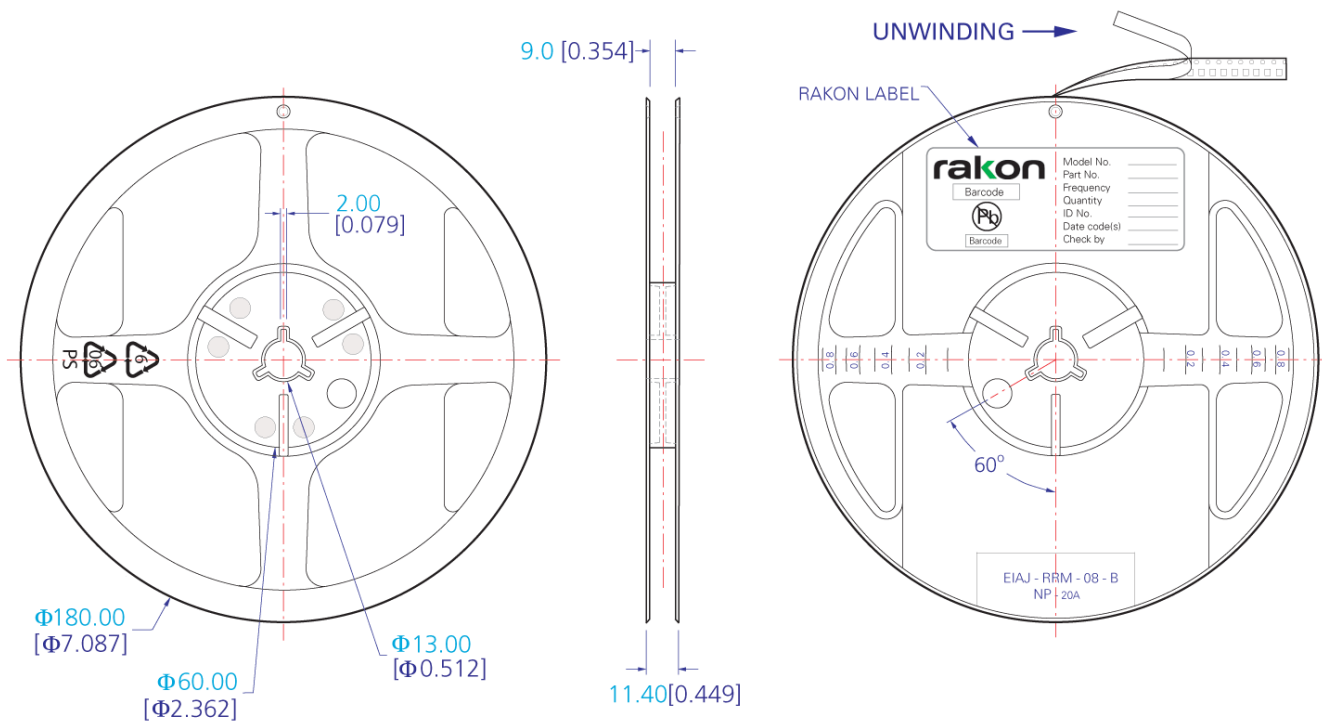
©2009 Rakon Limited

**Drawing Name: 2100 Series Tape & Reel**

**TAPE DETAIL (SCALE 5 : 1)**



**REEL DETAIL (SCALE 1 : 2.5)**



TITLE: 2100 SERIES TAPE & REEL

RELATED DRAWINGS:

FILENAME: CAT461

REVISION: C

DATE: 08-Mar-10

SCALE: See Above

Millimetres [inch]

Tolerance:

XX = ±0.5

X.X = ±0.2

X.XX = ±0.10

X.XXX = ±0.05

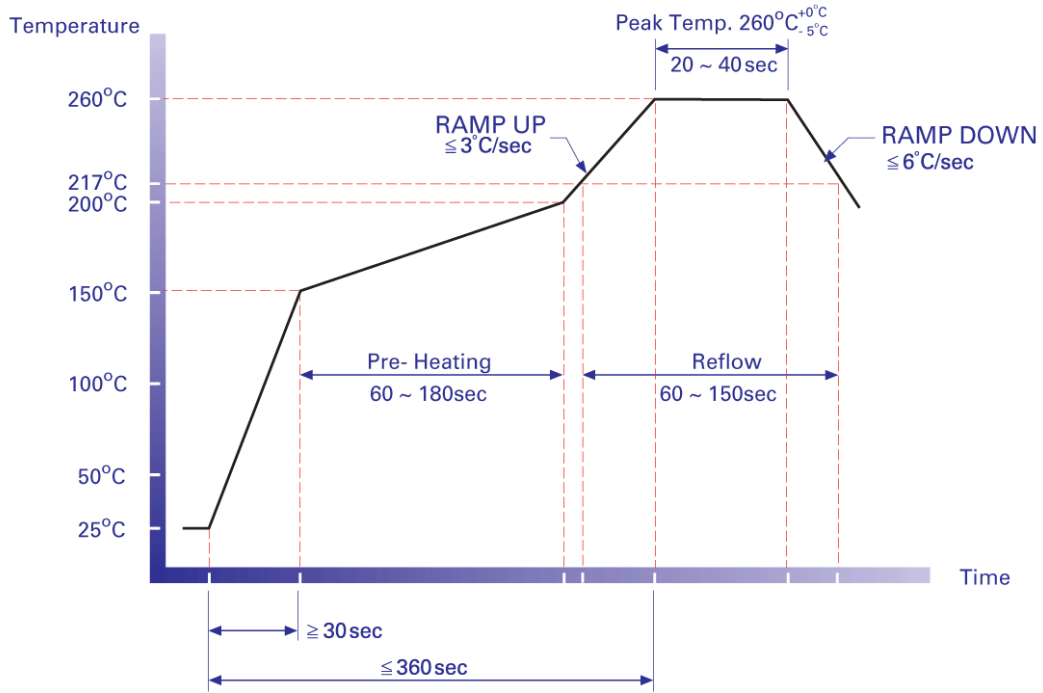
X° = ±1.0°

Hole = ±0.10

**rakon**

©2009 Rakon Limited

Drawing Name: Pb-Free Reflow



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 REFLOW

RELATED DRAWINGS:

FILENAME: CAT541

REVISION: B

DATE: 07-Apr-10

SCALE: NTS

Millimetres [inch]



©2009 Rakon Limited

## Specification History

**Current Version : 1.01**

Version	User	Change	Note
---------	------	--------	------