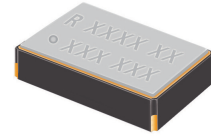


SMD Temperature Compensated Crystal Oscillators

SMD TCXO using analogue ASIC for compensation and two outputs capable of being independently controlled with separate Enable/Disable pins for efficient power management and clock distribution.

Product description

The I(V)T2100L series employs an analogue ASIC for the oscillator and a high order temperature compensation circuit in a 2.0 x 1.6 mm size package. Each of two outputs can be placed in power down mode through a dedicated input pin per output. During standard operation, power consumption is minimized by operating down to a supply voltage of 1.8V. The I(V)T2100L's high stability, low power consumption, small footprint and powerful compensation method makes it a TCXO ideally suited for demanding GPS mobile applications.



Applications

- GPS
- Smartphone
- Communications
- Consumer

Features

- Dual frequency output
- Independent Enable/Disable pin per output
- Excellent phase noise performance
- Low start up drift rate
- Height less than 0.8mm
- Operates at 1.8V supply

Specifications

1.0 SPECIFICATION REFERENCES

Line	Parameter	Description
1.1	Model description	IT2100L / IVT2100L (Draft)
1.2	RoHS compliant	Yes
1.3	Reference number	
1.4	Rakon part number	

2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Frequency		13 to 52	MHz
2.2	Frequency calibration + reflow	Offset from nominal frequency measured at 25°C ±2°C. Two consecutive reflows as per attached profile after 2 hours relaxation at 25°C	±2 max	ppm
2.3	Frequency stability over temperature	Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range. Control voltage set to midpont of control voltage (Note 1)	±0.5 to 2	ppm
2.4	Temperature range	The operating temperature range over which the frequency stability is measured	-30 to 85	°C
2.5	Frequency slope	Minimum of 1 frequency reading every 2°C over the operating temperature range (Note 1)	0.2 to 1	ppm/°C
2.6	Static temperature hysteresis	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C	0.6 max	ppm
2.7	Sensitivity to supply voltage variations	Supply voltage varied ±5% at 25°C	±0.2 max	ppm
2.8	Sensitivity to load variations	±10% load change at 25°C (Note 2)	±0.2 max	ppm
2.9	Long term stability	Frequency drift over 1 year at 25°C	±1 max	ppm

3.0 POWER SUPPLY

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

4.0 CONTROL VOLTAGE OPTION (Note 3)

Line	Parameter	Test Condition	Value	Unit
4.1	Control voltage range	The nominal control voltage value is midway between the minimum and maximum	0.5 to 2.5	V
4.2	Frequency control range	Frequency shift from minimum to maximum control voltage	10 to 20	ppm
4.3	Linearity	Deviation from straight line curve fit	10 max	%
4.4	Control voltage input resistance		500	k Ω

5.0 OSCILLATOR OUTPUT 1

Line	Parameter	Test Condition	Value	Unit
5.1	Output waveform	DC coupled clipped sine-wave (Note 4)		
5.2	Output voltage level	At minimum supply voltage (Note 2)	0.8 min	V
5.3	Output load resistance	Nominal load of 10k Ω	9 to 11	k Ω
5.4	Output load capacitance	Nominal load of 10pF	9 to 11	pF

6.0 OSCILLATOR OUTPUT 2

Line	Parameter	Test Condition	Value	Unit
6.1	Output waveform	DC coupled clipped sinewave (Note 4)		
6.2	Output voltage level	At minimum supply voltage (Note 2)	0.8 min	V
6.3	Output load resistance	Nominal load of 10k Ω	9 to 11	k Ω
6.4	Output load capacitance	Nominal load of 10pF	9 to 11	pF

7.0 POWER DOWN MODE (Enable/Disable 1) & (Enable/Disable 2)

Line	Parameter	Test Condition	Value	Unit
7.1	Power down	RF, Minimum GND	20 max	%Vcc
7.2	Normal operating mode	RF, Maximum Vcc	80 min	%Vcc
7.3	Stand-by current	Typical value <0.01 μ A for output 1 and 2 disabled	2 max	μ A
7.4	Start up time (amplitude)	Within 90% of specified output level	0.5 max	ms
7.5	Start up time (frequency)	Within \pm 0.5ppm of steady state	2 max	ms

8.0 SSB PHASE NOISE

Line	Parameter	Test Condition	Value	Unit
8.1	SSB phase noise power density at 1Hz offset	Typical value for a 26.0MHz oscillator at 25°C	-62	dBc/Hz
8.2	SSB phase noise power density at 10Hz offset	Typical value for a 26.0MHz oscillator at 25°C	-86	dBc/Hz
8.3	SSB phase noise power density at 100Hz offset	Typical value for a 26.0MHz oscillator at 25°C	-109	dBc/Hz
8.4	SSB phase noise power density at 1kHz offset	Typical value for a 26.0MHz oscillator at 25°C	-132	dBc/Hz
8.5	SSB phase noise power density at 10kHz offset	Typical value for a 26.0MHz oscillator at 25°C	-148	dBc/Hz
8.6	SSB phase noise power density at 100kHz offset	Typical value for a 26.0MHz oscillator at 25°C	-149	dBc/Hz

9.0 ENVIRONMENTAL

Line	Parameter	Description
9.1	Shock	Half sine-wave acceleration of 3000g peak amplitude. Duration: 0.3ms, Velocity: 12.3ft/s [MIL-STD-202 M213] (Note 5)
9.2	Humidity	After 48 hours at 85°C ±2°C 85% relative humidity non-condensing (Note 5)
9.3	Thermal shock	Exposed at -40°C for 30 minutes then to 85°C for 30 minutes repeatedly for a period of 5 days (Note 5)
9.4	Vibration	10g RMS from 30 Hz to 1500 Hz random in each of the 3 axis for 4 hours; total of 12 hours (Note 5)
9.5	Storage temperature	-40 to 85°C

10.0 MARKING

Line	Parameter	Description
10.1	Type	Engraved
10.2	Line 1	[R], [XXXX]* = Frequency in MHz (e.g.: 8L00 = 8MHz, 19L2 = 19.2MHz, 100L = 100MHz), and [XX] = Date code
10.3	Line 2	[o] = Pin 1 and [XXX XXX] = Internal code
10.4	* Frequency code	Frequency marking is only represented by the first three significant digits. For example, on an IT2100L TCXO at 16.368MHz, its frequency code marking will be 16L3

11.0 MANUFACTURING INFORMATION

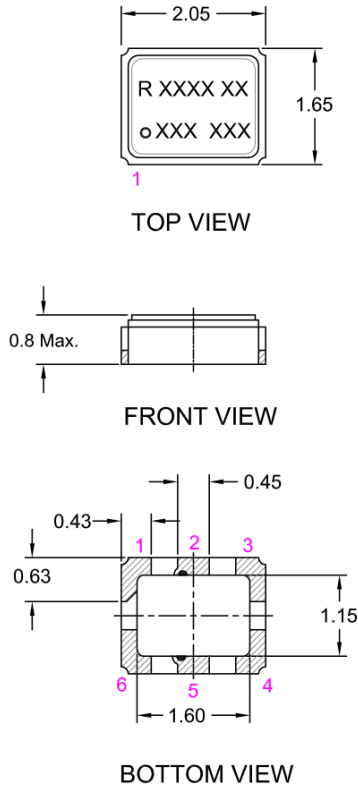
Line	Parameter	Description
11.1	Washing	Able to withstand aqueous washing process
11.2	Reflow	Solder reflow process as per profile attached
11.3	Packaging description	Tape and reel. Standard packing quantity is 4000 per reel

12.0 SPECIFICATION NOTES

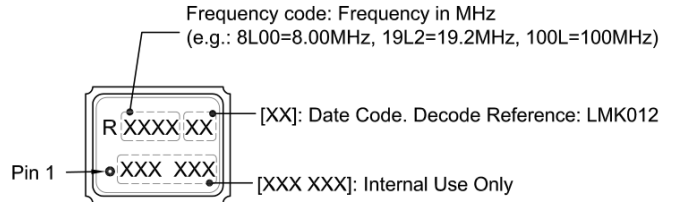
Line	Parameter	Description
12.1	Note 1	Parts should be shielded from drafts causing unexpected thermal gradients. Temperature changes due to ambient air currents on the oscillator can lead to short term frequency drift
12.2	Note 2	Specified for load stated in oscillator output section at 25°C
12.3	Note 3	If selected, control voltage option replaces Enable/Disable
12.4	Note 4	External AC-Coupling capacitor required. 1nF or greater recommended
12.5	Note 5	Frequency shift ≤1ppm after environmental conditions

Drawing Name: I(V)T2100L Model Drawing

MODEL DRAWING



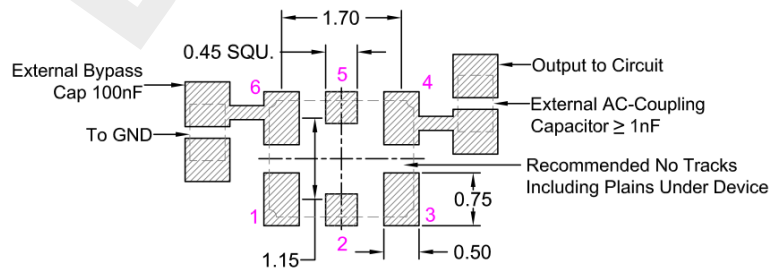
LID MARKING



PIN CONNECTIONS

PIN	IT21..L	IVT21..L
1	Enable / Disable 2	VCO
2	OUTPUT 2	OUTPUT 2
3	GND	GND
4	OUTPUT 1	OUTPUT 1
5	Enable / Disable 1	Enable / Disable 1
6	VCC	VCC

RECOMMENDED PAD LAYOUT TOP VIEW



TITLE: I(V)T2100L MODEL

RELATED DRAWINGS:

FILENAME: CAT595

REVISION: C

DATE: 10-Jul-13

SCALE: 10 : 1

Millimetres

TOLERANCES:

XX =

X.X = ± 0.15

X.XX = ± 0.10

X.XXX =

X° =

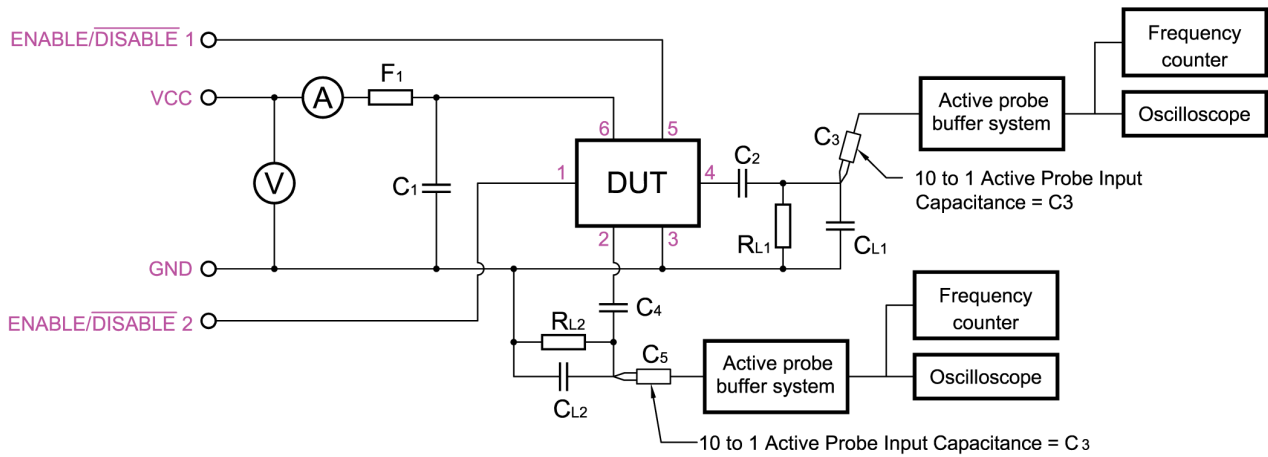
Hole =

rakon

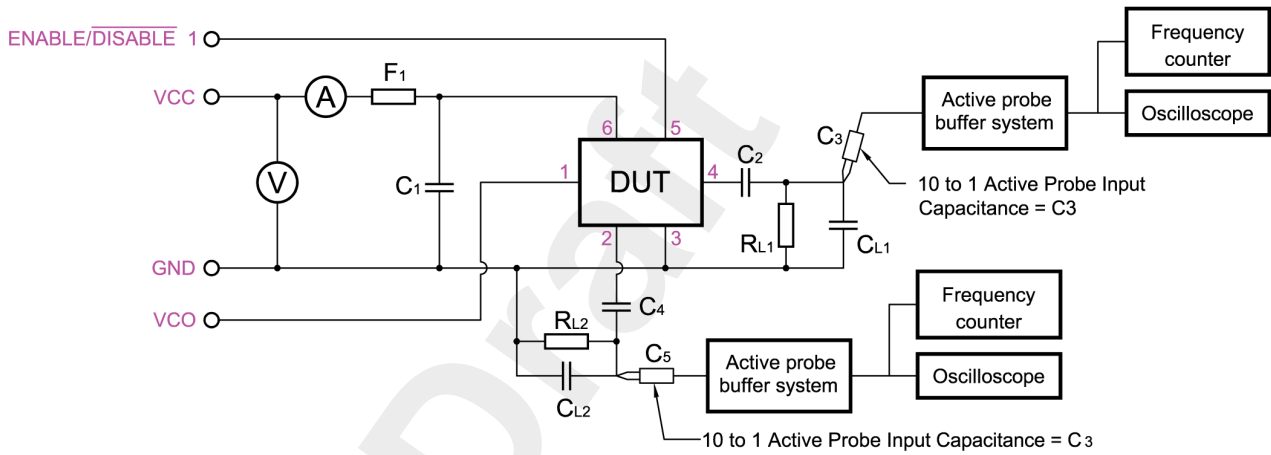
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Drawing Name: I(V)T2100L Series Test Circuit

IT21 ..L TEST CIRCUIT:



IVT21 ..L TEST CIRCUIT:



C1: 100nF
C2, C4: 1nF
RL1, RL2: 10K

$C_{T1} = C_{L1} + C_3$; $C_{T2} = C_{L2} + C_5$

* C3, C5 - Oscilloscope probe capacitance.

* CT as stated in OSCILLATOR OUTPUT section

F1: A ferrite bead or a resistor between 22Ω ~ 47Ω recommended.

TITLE: I(V)T2100L SERIES TEST CIRCUIT

FILENAME: CAT620

RELATED DRAWINGS:

REVISION: A

DATE: 16-Aug-11

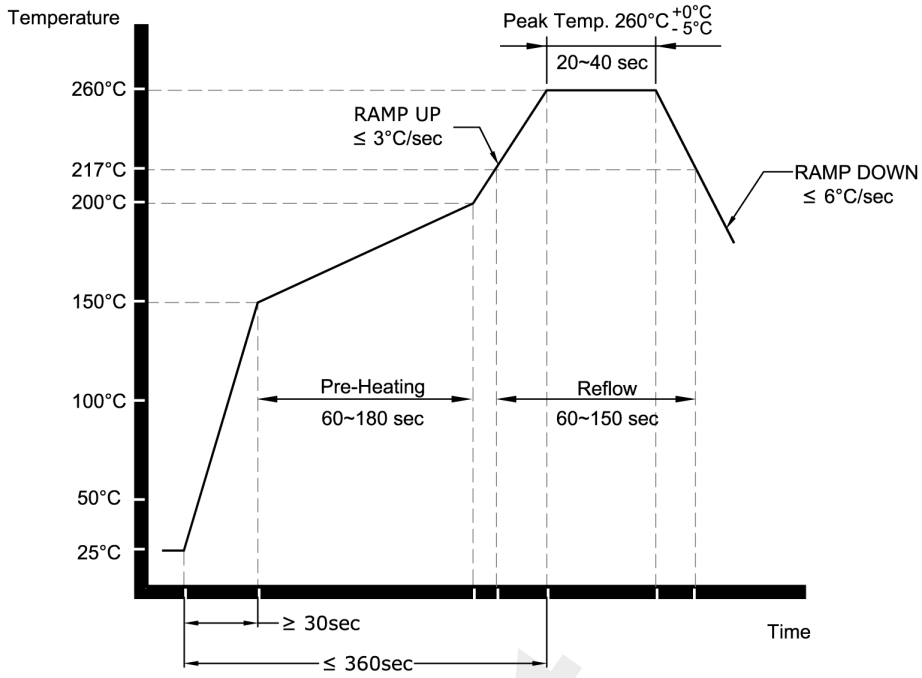
SCALE: NTS

Millimetres

rakon

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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: 05-Sep-11

SCALE: NTS

Millimetres

rakon

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