

## IT2100F

The IT2100F employs an analogue ASIC for the oscillator and a high order temperature compensation circuit in a 2.0 x 1.6 mm size package. The device can be placed in power down mode through a single input pin. During standard operation, power consumption is minimised by operating down to a supply voltage of 1.8 V. The IT2100F's high stability, low power consumption, small footprint and powerful compensation method makes it a TCXO ideally suited for demanding GNSS mobile applications.

### Features

- Excellent phase noise performance
- Low start up drift rate
- Height less than 0.8 mm
- Power down mode
- Standard temperature stability of  $\pm 0.5$  ppm over wide temperature ranges

### Applications

- **Time and frequency reference**
  - GNSS
  - Smartphone
  - Communications
  - Consumer

### 2.0 x 1.6 mm



## Standard Specifications

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
Nominal frequency		13 - 52		MHz	
Frequency calibration			$\pm 1$	ppm	Offset from nominal frequency measured at 25°C $\pm 2^\circ\text{C}$
Reflow shift			$\pm 1$	ppm	Two consecutive reflows as per attached profile after 2 hours relaxation at 25°C
Operating temperature range	-40		85	°C	The operating temperature range over which the frequency stability is measured
Frequency stability over temperature			$\pm 0.5 - \pm 2$	ppm	Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range <sup>1</sup> Control voltage set to midpoint of Vc
Frequency slope			$\pm 0.05 - \pm 1$	ppm/°C	Minimum of one frequency reading every 2°C over the operating temperature range <sup>1</sup>
Static temperature hysteresis			0.6	ppm	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C
Sensitivity to supply voltage variations			$\pm 0.1$	ppm	V <sub>DD</sub> varied $\pm 5\%$ at 25°C
Sensitivity to load variations			$\pm 0.2$	ppm	$\pm 10\%$ load change at 25°C
Long term stability			$\pm 1$	ppm	Frequency drift over 1 year at 25°C
Supply voltage (V <sub>DD</sub> )		1.8 - 3.3		V	With a tolerance of $\pm 5\%$
Supply current			2.2	mA	At minimum V <sub>DD</sub> <sup>2</sup>
Control voltage (Vc) range V <sub>DD</sub> $\leq$ 2.3 V	0.3		1.5	V	The nominal Vc value is midway between the minimum and maximum. Voltage control should not exceed the V <sub>DD</sub> +0.2 V or GND
Control voltage (Vc) range V <sub>DD</sub> > 2.3 V	0.4		2.4	V	The nominal Vc value is midway between the minimum and maximum. Voltage control should not exceed the V <sub>DD</sub> +0.2 V or GND
Frequency tuning	$\pm 6 - \pm 30$			ppm	Frequency shift from minimum to maximum Vc
Start-up time (amplitude)			0.5	ms	Within 90% of the minimum specified output level
Start-up time (frequency)			2	ms	Within $\pm 0.5$ ppm of steady state frequency

<sup>1</sup> 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.

<sup>2</sup> Specified for load stated in oscillator output section at 25°C.

## Model Outline and Recommended Pad Layout

**TOP VIEW**: Dimensions 2.05 mm width and 1.65 mm height. Pin 1 is located at the top-left corner.

**SIDE VIEW**: Maximum height of 0.8 mm.

**BOTTOM VIEW**: Dimensions 1.60 mm width and 1.15 mm height. Pin 1 is 0.43 mm from the left edge, and pin 2 is 0.63 mm from the top edge.

**RECOMMENDED PAD LAYOUT - TOP VIEW**: Shows pin connections with dimensions: Pin 1 width 1.15 mm, Pin 2 width 0.50 mm, Pin 3 width 0.75 mm, Pin 4 width 1.70 mm. Includes an external bypass capacitor (100nF) connected to Pin 4 and ground, and an external AC-coupling capacitor (≥ 1nF) connected to Pin 3 and ground. A note states: "Recommended No Tracks Including Plains Under Device".

PIN	TCXO	VC-TCXO	Power Down
1 *	GND / NC	V <sub>c</sub>	Enable / $\overline{\text{Disable}}$
2	GND	GND	GND
3	OUTPUT	OUTPUT	OUTPUT
4	V <sub>DD</sub>	V <sub>DD</sub>	V <sub>DD</sub>

\* Depending on specification

NOTE: Outline unit is mm.

## Test Circuit

The test circuit shows the DUT (Device Under Test) connected to a power supply (V<sub>DD</sub>) through a ferrite bead (F<sub>1</sub>) and a bypass capacitor (C<sub>1</sub>). Pin 1 is connected to ground (GND / NC for TCXO or V<sub>c</sub> for VC-TCXO). Pin 2 is connected to ground. Pin 3 is connected to a load resistor (R<sub>L</sub>) and a load capacitor (C<sub>L</sub>). Pin 4 is connected to V<sub>DD</sub>. The output signal from Pin 3 is measured using a 10 to 1 Active Probe with input capacitance C<sub>3</sub>, which is connected to an active probe buffer system. The buffer system is connected to an oscilloscope and a frequency counter.

C <sub>1</sub> : 100nF	C <sub>T</sub> = C <sub>L</sub> + C <sub>3</sub> (C <sub>3</sub> - Oscilloscope probe capacitance)
C <sub>2</sub> : ≥1nF	C <sub>T</sub> as stated in OSCILLATOR OUTPUT section
R <sub>L</sub> : 10K	F <sub>1</sub> : A ferrite bead or a resistor between 22Ω ~ 47Ω recommended.