Performance report for SiT5356 - 38.88 MHz, Clipped Sinewave

Data:

- Frequency stability over temperature
- Frequency slope
- Frequency hysteresis over temperature
- Allan Deviation
- MTIE
- TDEV
- Phase noise
- Output frequency power supply sensitivity
- Output frequency load sensitivity
- Output waveforms
- Pull range linearity
- Random Phase jitter, Duty cycle, Rise/Fall time, Amplitude, Current consumption

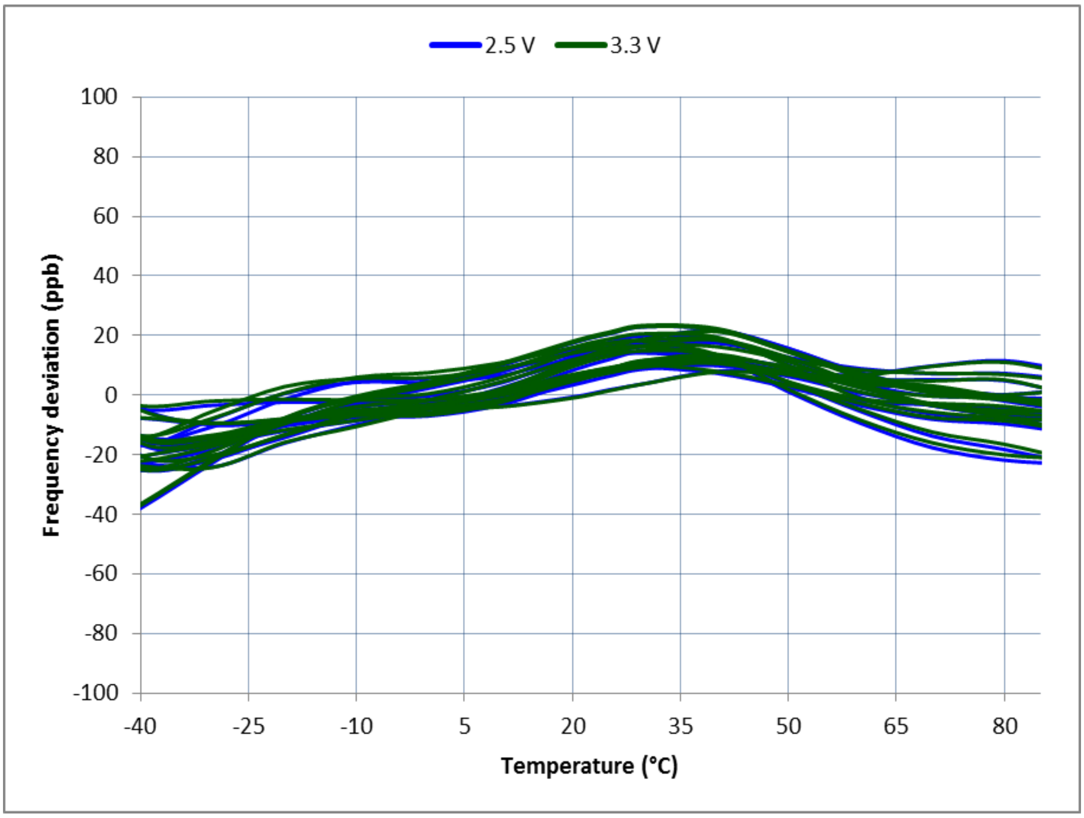


Figure 1: Frequency stability* over temperature, 2.5 V – 3.3 V, 30 devices

*SiT5356 frequency stability is independent of output frequency.

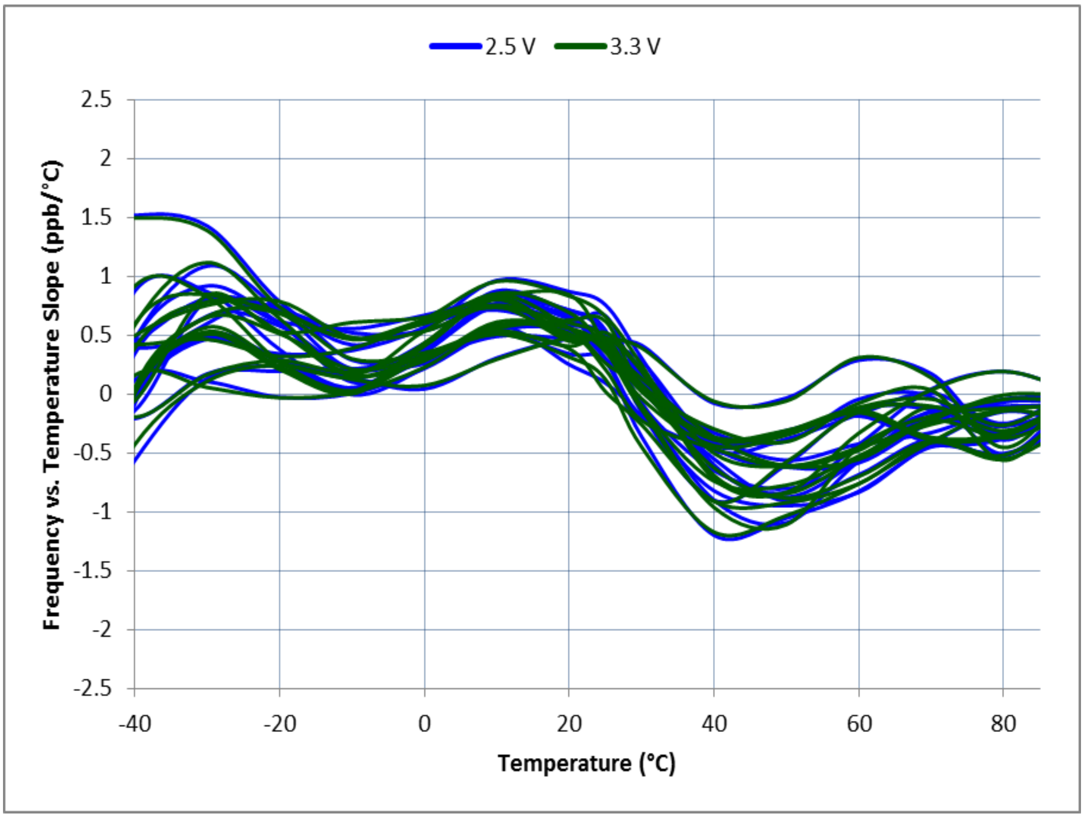


Figure 2: Frequency versus temperature slope, 30 devices

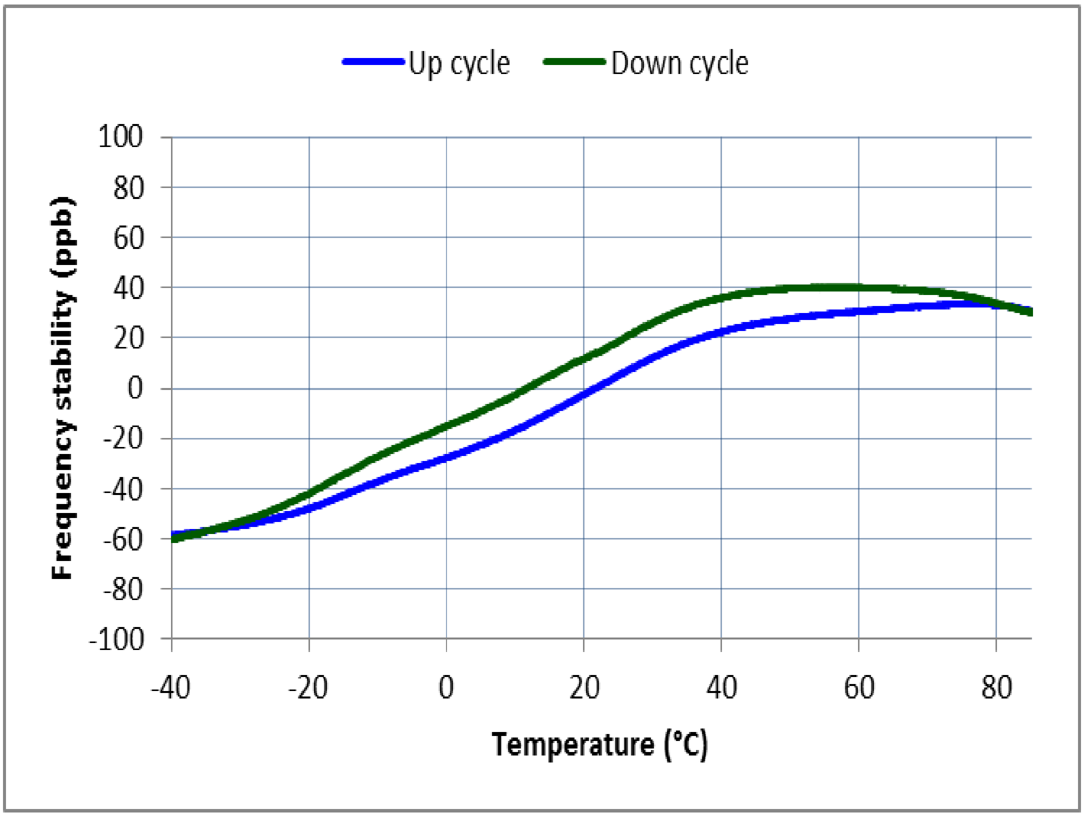


Figure 3: Frequency hysteresis over temperature, temperature ramp rate 0.5°C/min

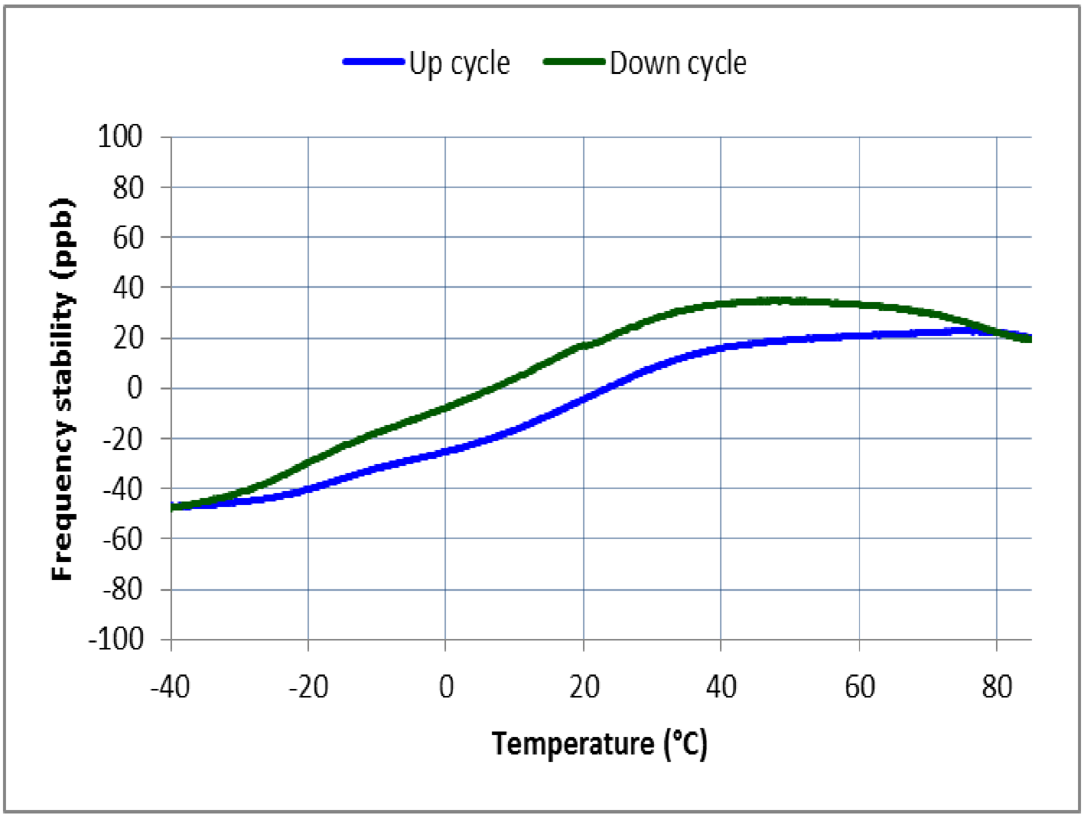


Figure 4: Frequency hysteresis over temperature, temperature ramp rate 1°C/min

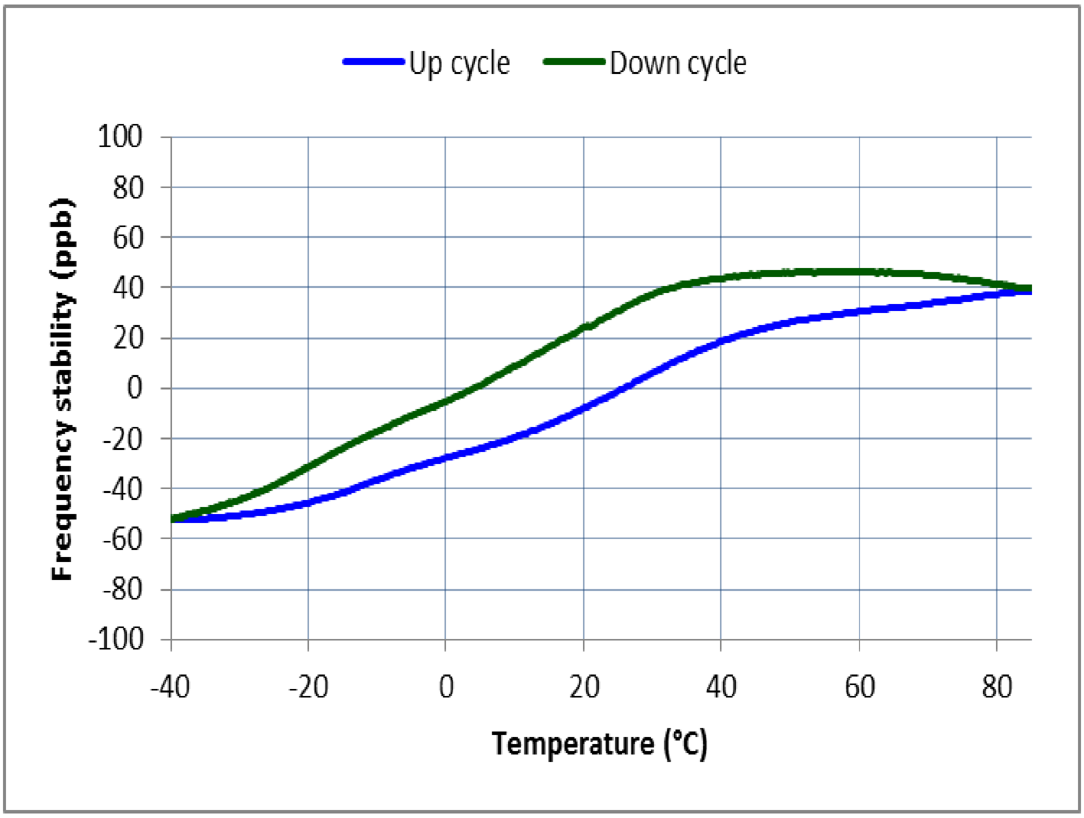


Figure 5: Frequency hysteresis over temperature, temperature ramp rate 8°C/min

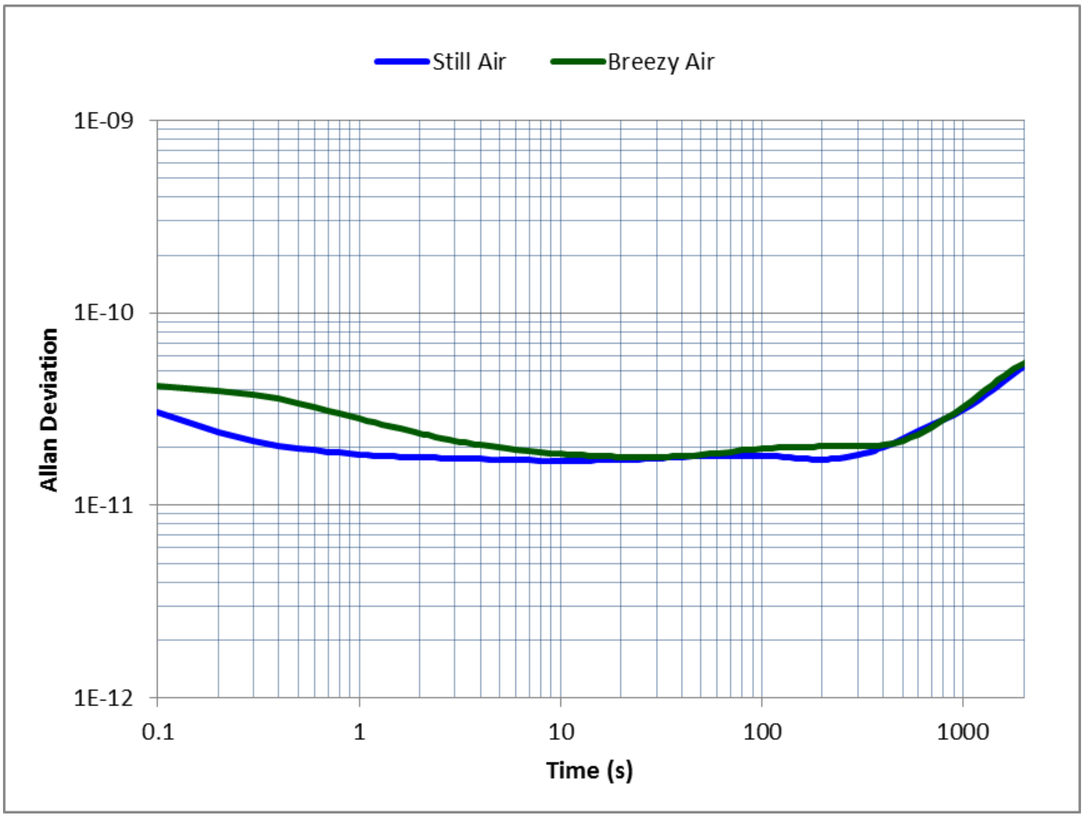
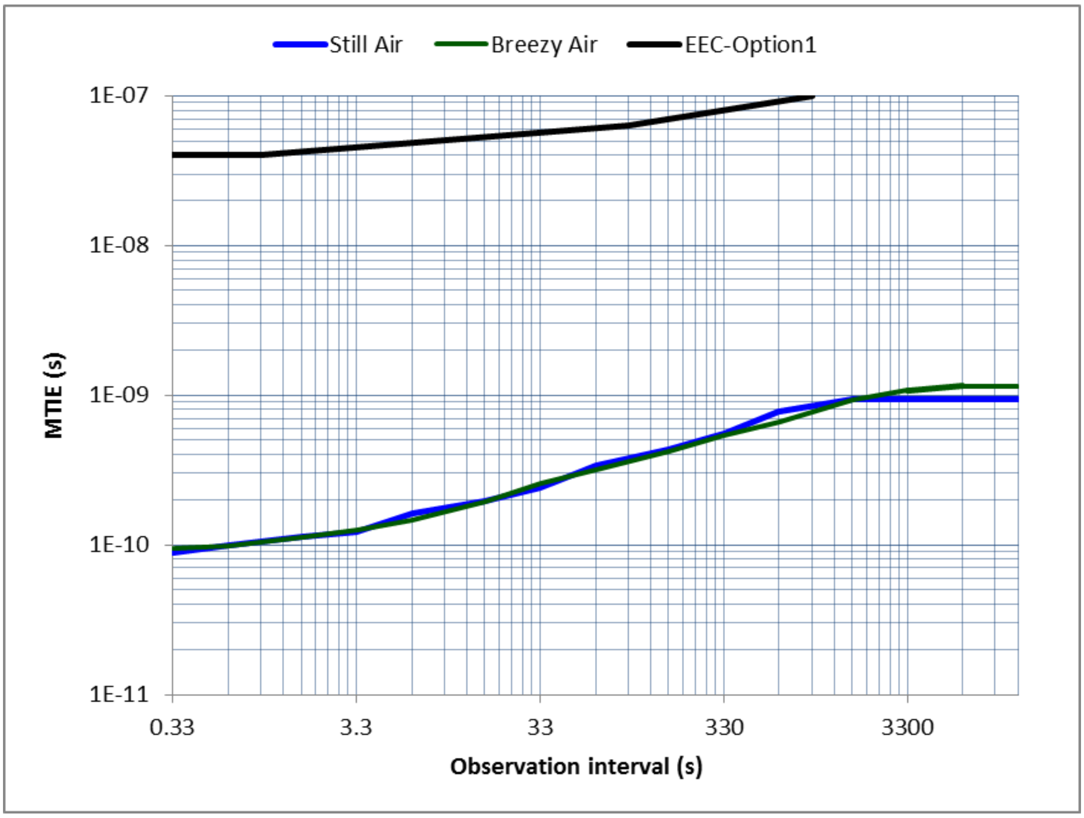


Figure 6: Allan deviation

Table 1: Allan deviation

Time (s)	0.1	1	10	100	1000
Still Air	3.04E-11	1.84E-11	1.71E-11	1.81E-11	3.16E-11
Breezy Air	4.17E-11	2.82E-11	1.85E-11	1.98E-11	3.26E-11



Figere 7: MTIE (PLL bandwidth = 3 Hz)

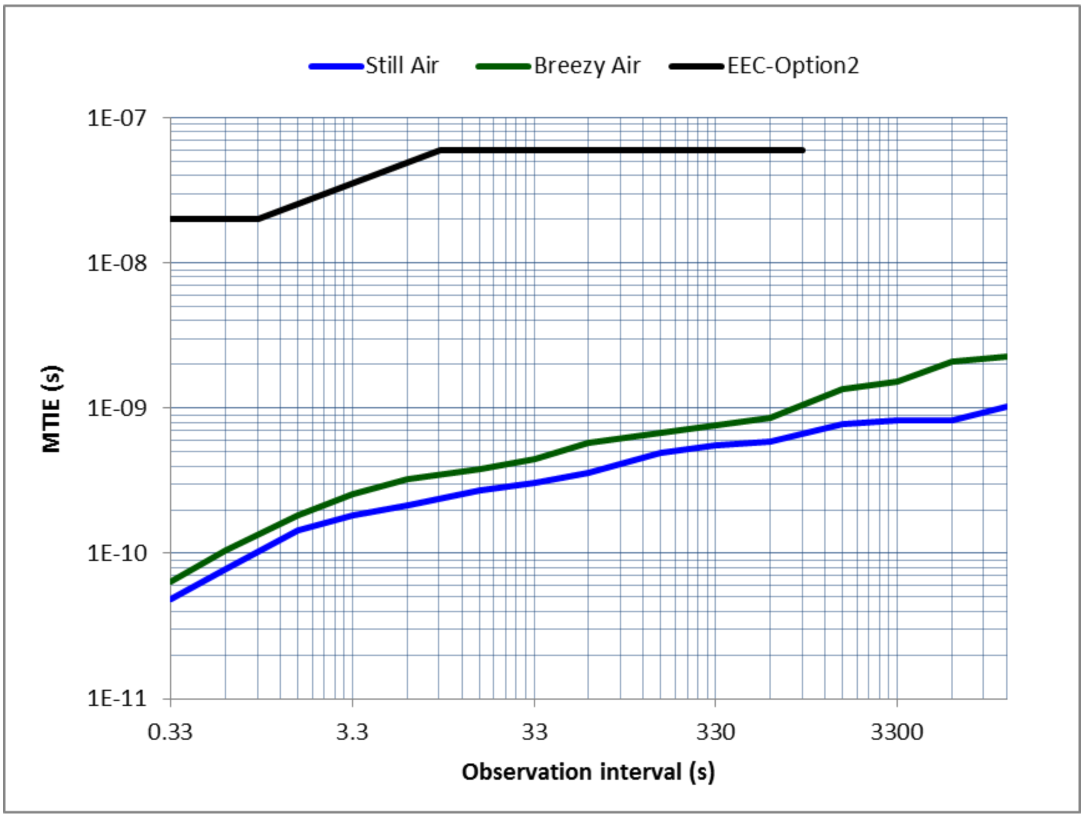


Figure 8: MTIE (PLL bandwidth = 0.1 Hz)

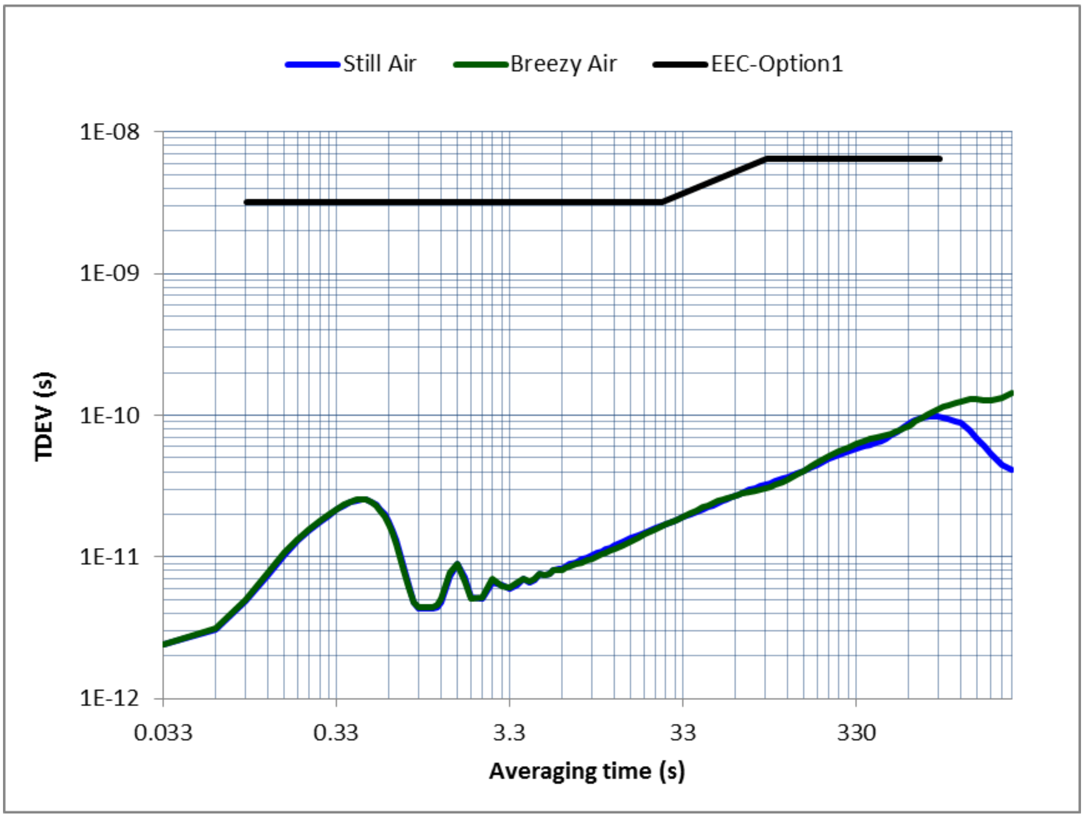


Figure 9: TDEV (PLL bandwidth = 3 Hz)

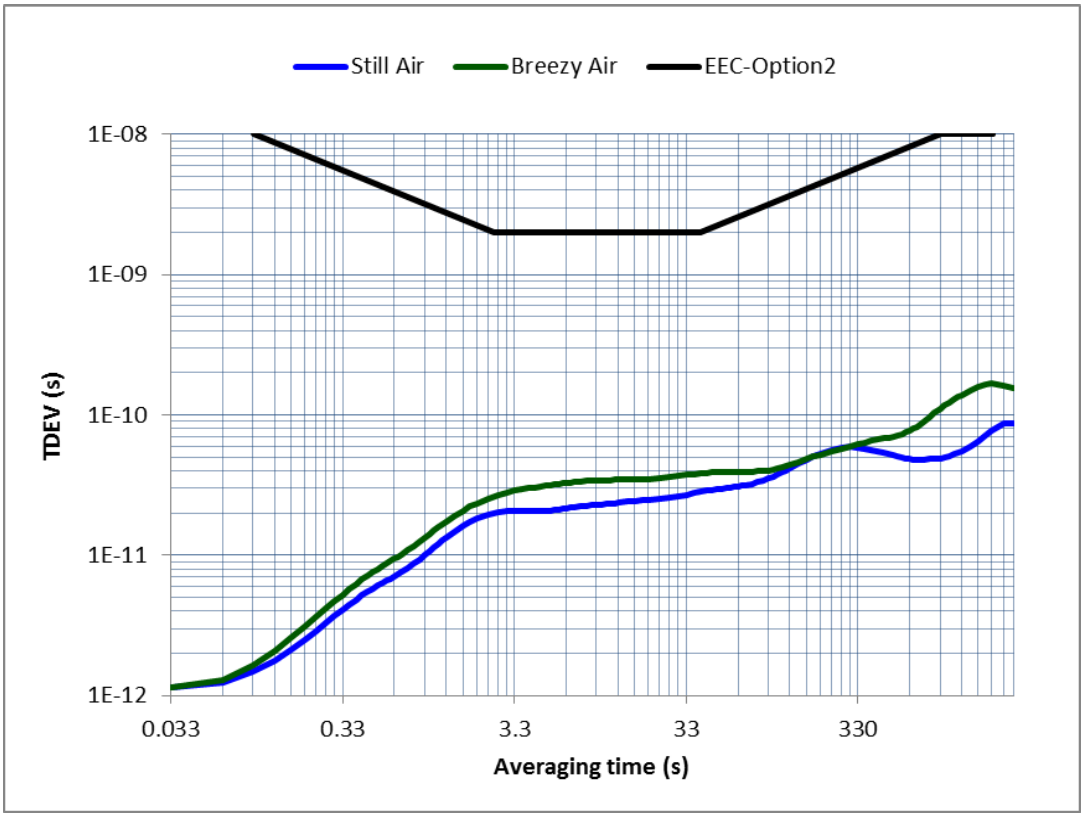


Figure 10: TDEV (PLL bandwidth = 0.1 Hz)

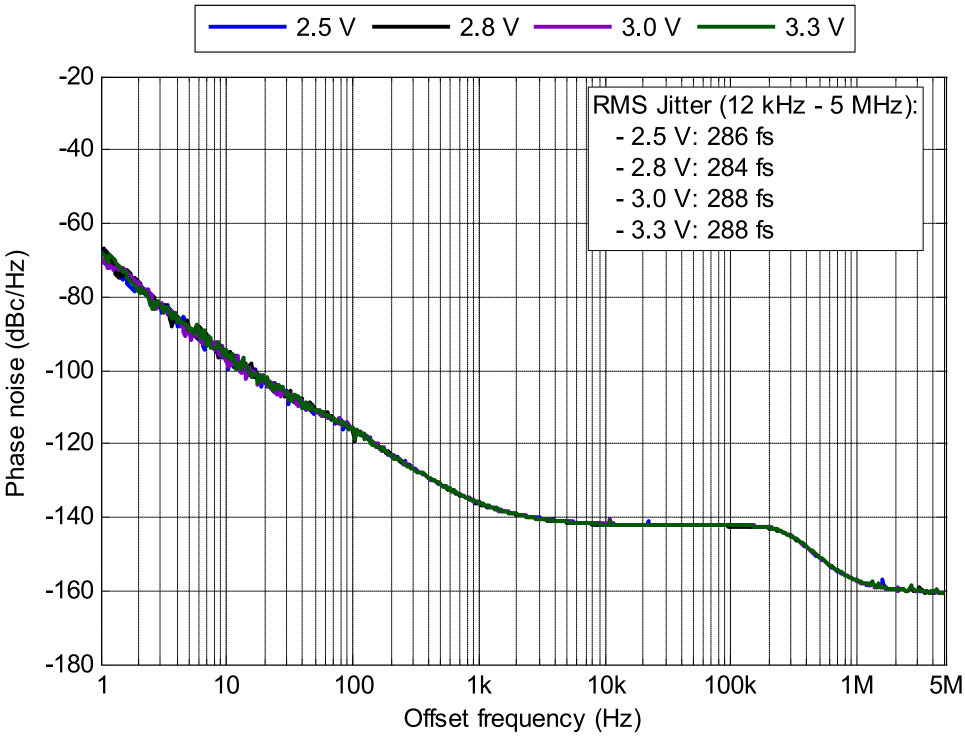


Figure 11: Phase noise TCXO/DCTCXO, 2.5 V - 3.3 V

Table 2: Phase noise TCXO/DCTCXO

Voltage	Phase noise (dBc/Hz)							
	1 Hz	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz	5 MHz
2.5 V	-67.0	-95.2	-116.0	-135.9	-142.0	-142.3	-157.3	-160.6
2.8 V	-65.7	-96.6	-116.5	-136.1	-142.0	-142.4	-157.3	-160.7
3.0 V	-69.3	-97.2	-115.8	-136.3	-141.9	-142.2	-157.4	-160.6
3.3 V	-67.7	-95.2	-115.8	-136.1	-141.9	-142.3	-157.2	-160.6

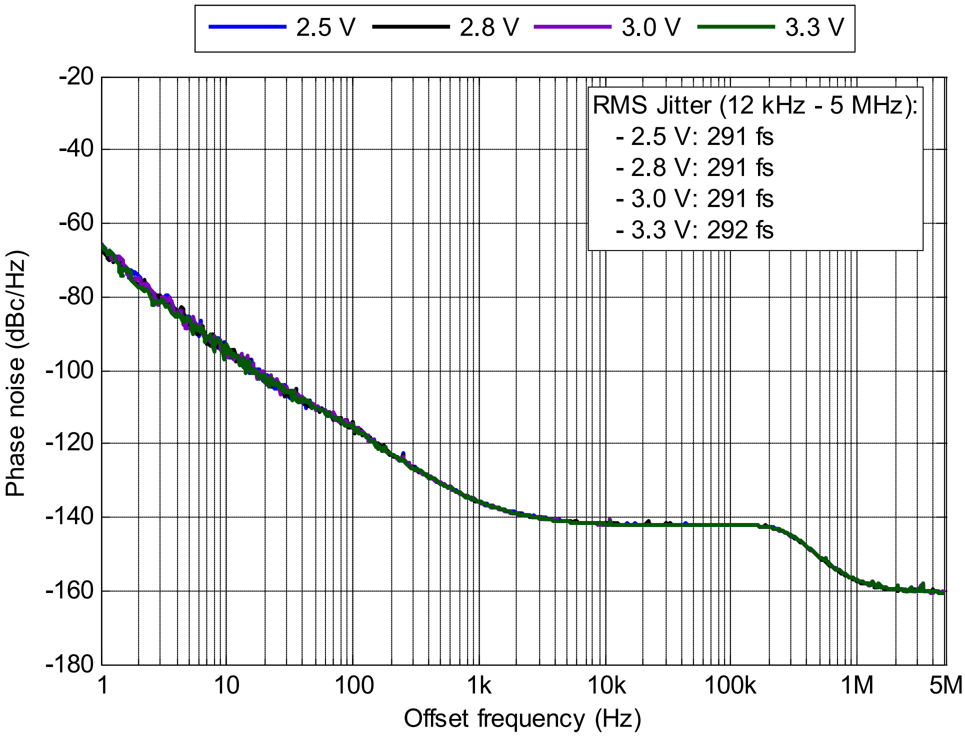


Figure 12: Phase noise VCTCXO, 2.5 V - 3.3 V

Table 3: Phase noise VCTCXO

Voltage	Phase noise (dBc/Hz)							
	1 Hz	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz	5 MHz
2.5 V	-65.5	-95.6	-113.8	-135.9	-141.9	-142.1	-157.3	-160.6
2.8 V	-66.8	-95.8	-114.1	-135.7	-141.9	-142.1	-157.3	-160.6
3.0 V	-65.6	-95.7	-114.4	-135.5	-141.9	-142.2	-157.2	-160.6
3.3 V	-65.6	-93.0	-114.5	-135.8	-141.9	-142.1	-157.2	-160.5

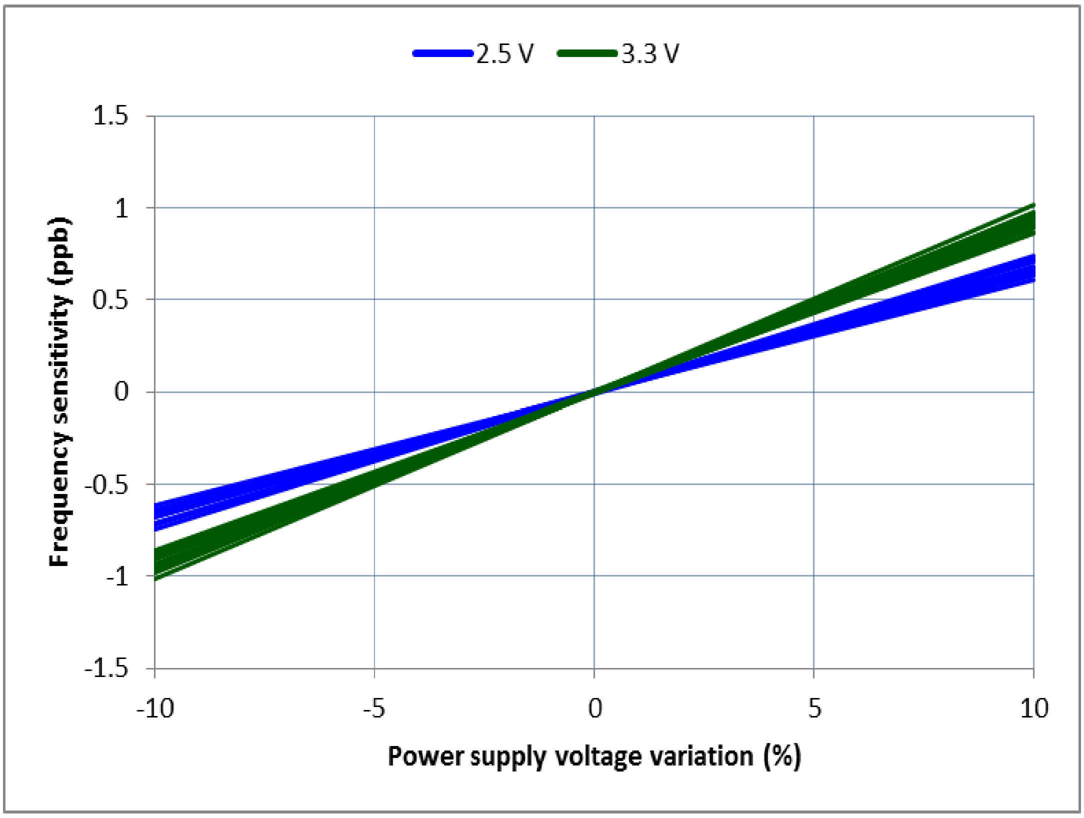


Figure 13: Output frequency power supply sensitivity, 30 devices

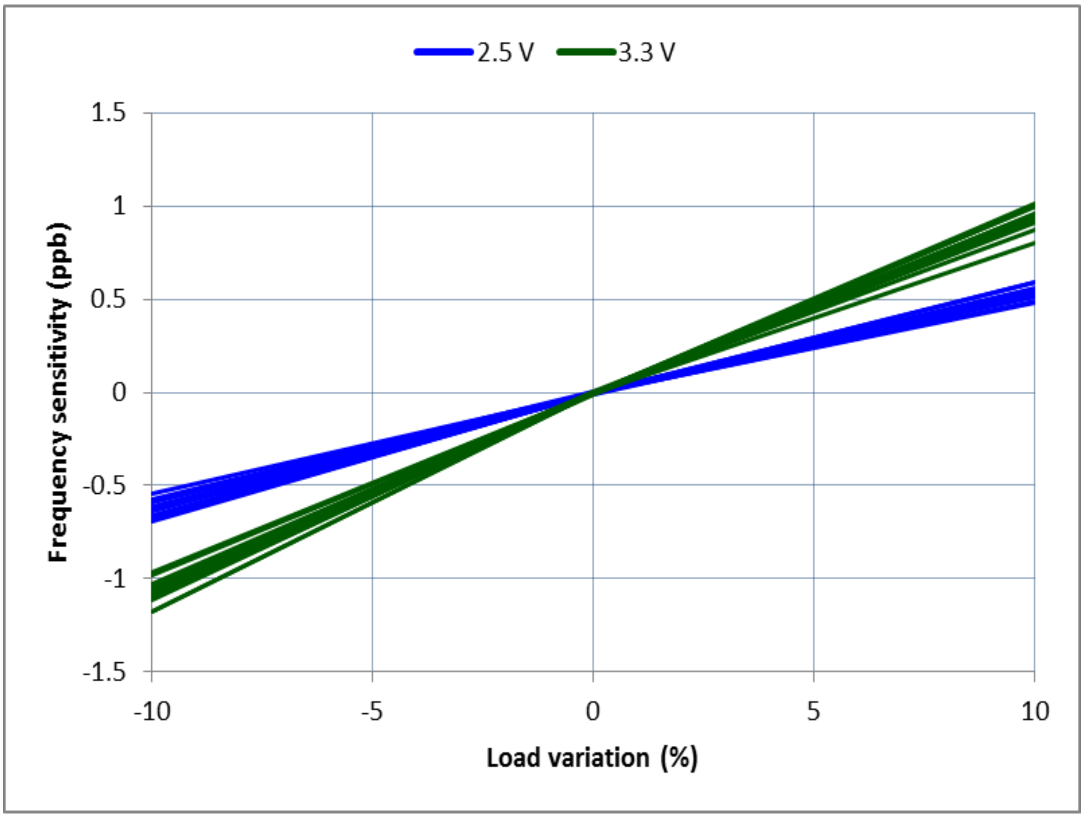


Figure 14: Output frequency load sensitivity, 30 devices

Figure 15: Output waveform, 2.5 V

Figure 16: Output waveform, 2.8 V

Figure 17: Output waveform, 3.0 V

Figure 18: Output waveform, 3.3 V

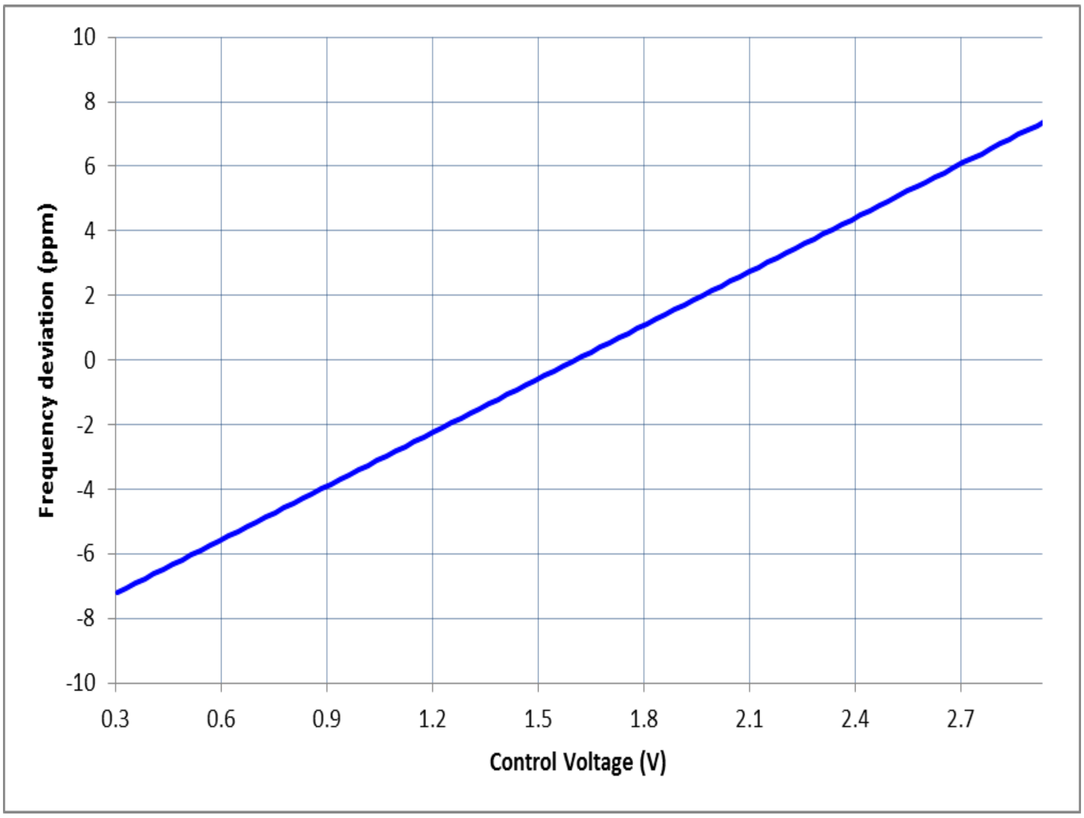


Figure 19: Pull range linearity VCTCXO.

*Referred to the output frequency for control voltage equal to VDD/2

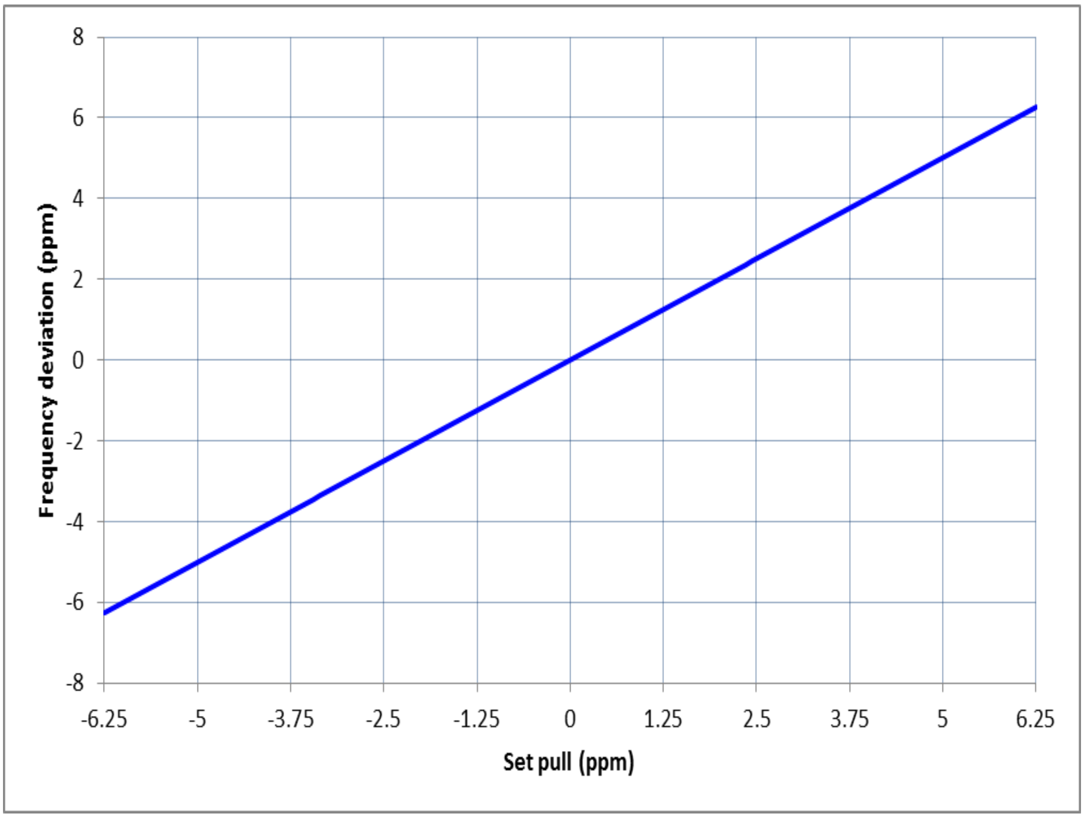


Figure 20: Pull range linearity DCTCXO.

*Referred to the output frequency for frequency control value equal to 0

Table 4: Summary performance data

Parameter	Units	Voltage			
		2.5 V	2.8 V	3.0 V	3.3 V
TCXO/DCTCXO Integrated Phase jitter (12 kHz - 5 MHz)	fs, rms	286	284	288	288
VCTCXO Integrated Phase jitter (12 kHz - 5 MHz)	fs, rms	291	291	291	292
Duty cycle	%	48.8	49.1	49.2	49.3
Rise time (20% - 80%)	ps	3.17	3.05	3.02	2.97
Fall time (80% - 20%)	ps	3.41	3.37	3.35	3.34
Amplitude	V	1.04	1.04	1.04	1.04
Current consumption TCXO (no load)	mA	44.6	44.8	44.8	44.9
Current consumption VCTCXO (no load)	mA	48.1	48.2	48.3	48.4
Current consumption DCTCXO (no load)	mA	45.1	45.1	45.2	45.3

Conditions:

- Frequency: 38.88 MHz
- VDD: 2.5 V, 2.8 V, 3.0 V, 3.3 V
- Pull range: ±6.25 ppm
- Temperature: 25 °C

Equipment:

Model	Measurement / Purpose
Keysight DSA90604A (6 GHz, 20 Gsps)	Output amplitude, rise/fall time, duty cycle
Keysight 5052B Signal Source Analyzer	Phase noise, integrated phase jitter
Keysight 34980A	Power supply current
Keysight E3631A	Power supply
Keysight 53230A	Frequency

Test setup:

For waveform parameters measurement (rise/fall time, amplitude, duty cycle), DUT output is loaded with 10 pF || 10 kΩ. Output signal is measured using Keysight 1134B active probe with Keysight N5425B probe head. Figure 21 shows test setup diagram for waveform parameters measurement.

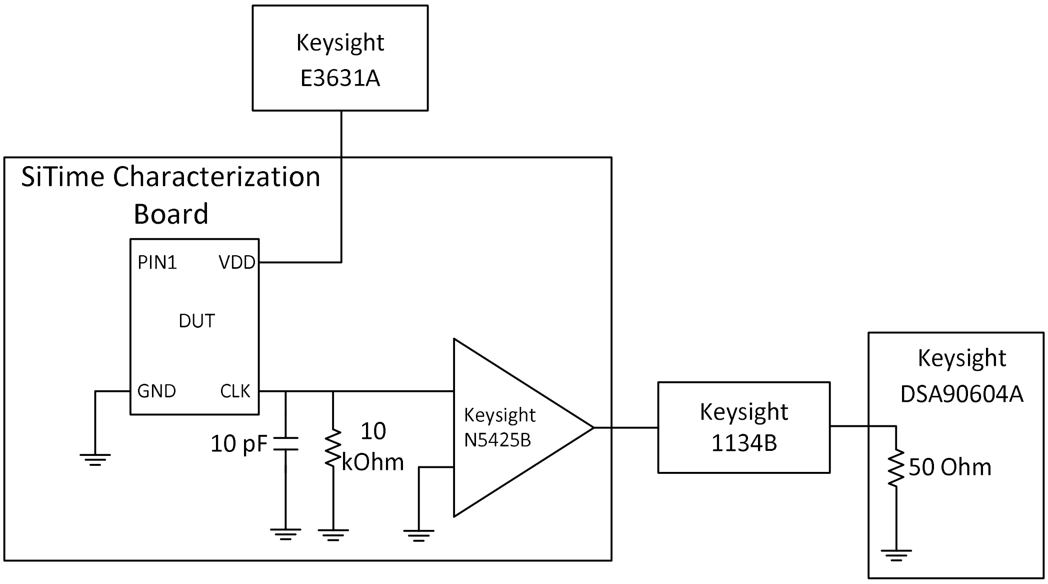


Figure 21: Test setup for measuring waveform parameters (rise/fall time, amplitude, duty cycle)

For phase noise measurements output is connected to 50 Ω measurement instrument input through Mini Circuits RF amplifier (ZX60-3018G-S+). Amplifier output is AC coupled. Figure 22 shows test setup diagram for phase noise measurement.

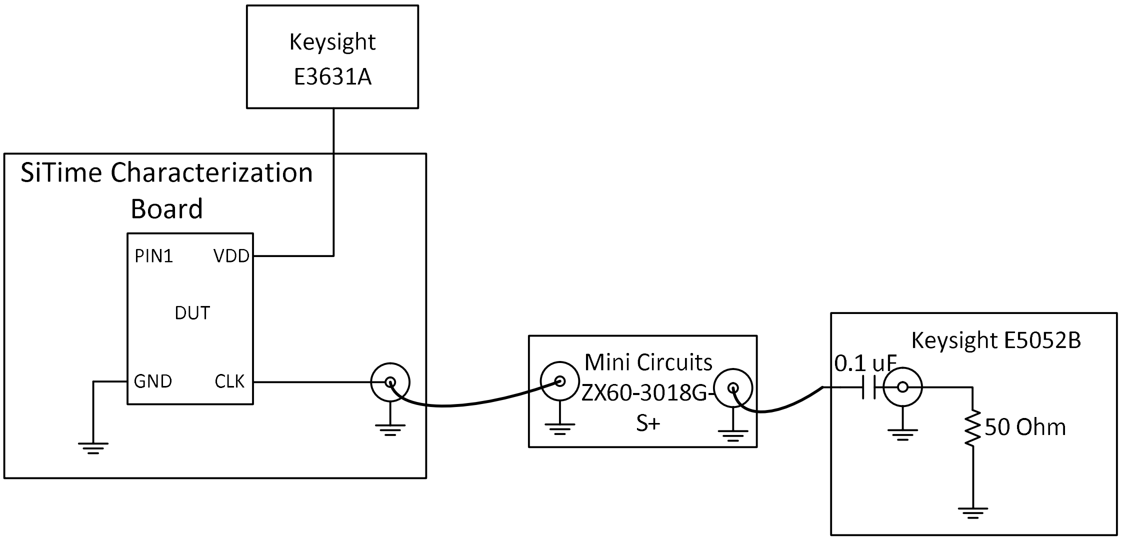


Figure 22: Test setup for measuring phase noise

For frequency measurement (stability over temperature, frequency hysteresis, stability over voltage, stability over load, ADEV, TDEV, MTIE) buffered device output is connected to 50 Ω measurement instrument input (see figure 23).

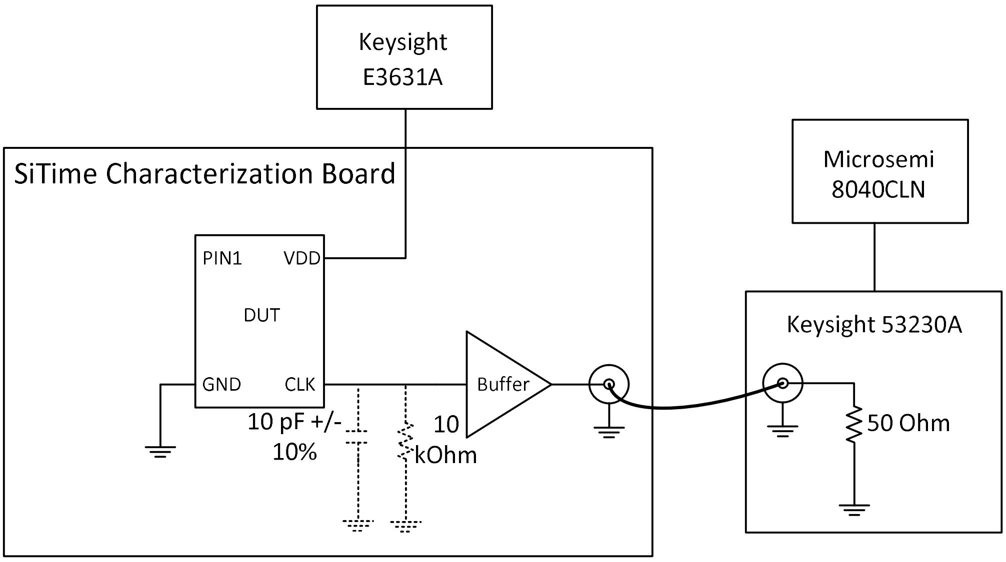


Figure 23: Test setup for measuring frequency

For wander (MTIE, TDEV) measurement AD9548 DPLL is used. DPLL is referenced from rubidium frequency reference. SiTime Super-TCXO is used as system clock for DPLL programmed to different bandwidths. Frequency is measured continuously (gap free mode) with 33 ms gate time. Figure 24 shows setup diagram for wander measurements.

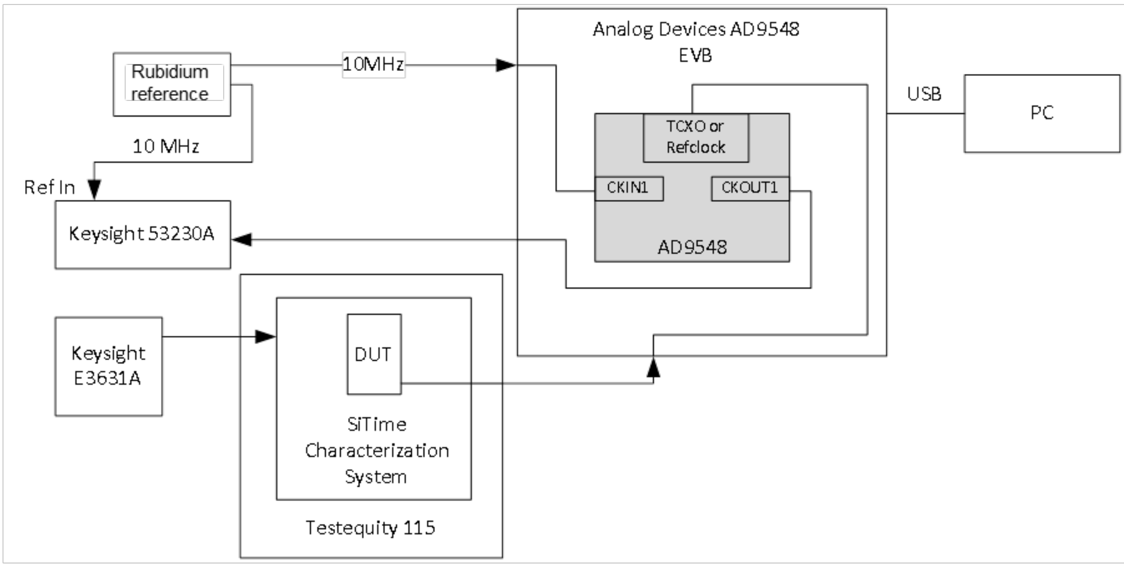


Figure 24: Test setup for measuring wander