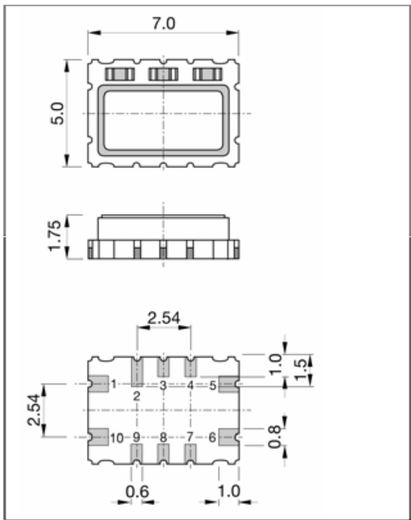
VT7-705-SQ-HPG

High reliable, low G-sensitivity, high shock resistant (>5'000 g) temperature compensated VC-TCXO

QuartzCom
the communications company

Standard frequencies other frequencies on request	**10.0, 12.0, 13.0, 15.360, 16.3680 20.0, 25.0, 27.0 & 40.0 MHz**		
Frequency stability:			
vs. temperature	≤ ±1.0 ppm	over -40 ~ +85 °C	standard
reference to (FMAX+FMIN)/2	≤ ±0.5 ppm	over -40 ~ +85 °C	on request
vs. supply voltage changes reference to frequency at nominal supply	≤ ±0.1 ppm	±5 %	
vs. load changes reference to frequency at nominal load	≤ ±0.1 ppm	±10 %	
vs. aging:	≤ ±1.0 ppm	1st year	
	≤ ±3.0 ppm	5 years	
G-sensitivity	≤ 0.50 ppb/g	Gamma Γ	standard
	≤ 0.15 ppb/g	Gamma Γ	on request
Frequency slope	≤ 0.05 ppm/°C	over operating temperature	
Short term stability ADEV	$< 1 \times 10^{-10}$	$\tau = 1$ s	
Frequency tolerance ex factory	+ 0.5 ~ +1.5 ppm	@+25 °C	
Supply voltage	+2.8 V or +5.0 V	standard 2.8 V, 3.0 V, 3.3 V & 5.0 V	
Output signal	clipped sine wave	CMOS	
Output level	> 0.8 Vp-p	$V_{OH} > 0.9 \times Vcc$ / $V_{OL} < 0.1 \times Vcc$	
Output load	10 kΩ // 10 pF	15 pF Max.	
Current consumption	1.5 ~ 4 mA	2 ~ 6 mA	
Electronic Frequency Control (EFC) range	ΔF > ±8 ppm		
EFC voltage (Vc)	+1.5 V ±1.0 V	other (Vc) on request	
Tri-state function	pin # 9 ≥ 3.5 V or open	pin # 6 ➔ oscillation	
	pin # 9 ≤ 0.9 V or GND	pin # 6 ➔ high Impedance	
Phase noise @ 20 MHz	<-120 dBc/Hz	@ 100 Hz	
	<-145 dBc/Hz	@ 1 kHz	
	<-155 dBc/Hz	@ 10 kHz	
	<-155 dBc/Hz	@ 100 kHz	
Operating temperature range	-40 ~ +85 °C		
Storage temperature range	-55 ~ +105 °C		
Reflow Profiles as per IPC/JEDEC J-STD-020C	≤ 260 °C over 10 sec. Max.		
Moisture sensitivity	Level 1 (unlimited)		

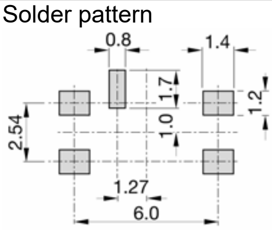


Pin function

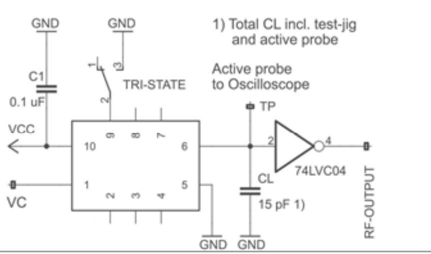
# 1	Vc (EFC)
# 5	GND
# 6	Output
# 9	NC or E/D
# 10	Vcc

Do not connect #2, #3, #4, #7, #8

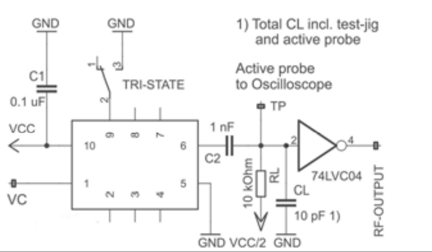
Solder pattern



Test circuit for CMOS



Test circuit clipped sine wave



2011/65/EU RoHS compliant

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Measurement of the G-Sensitivity

1 Vibration profile – Random

Noise shape vibration from 10-2000 Hz with 0.01 g^2/Hz (G_{RMS} = 4.46g) was also measured at 0.1 g²/Hz (G_{RMS} = 14.11g) for the axis with very small G-Sensitivity.

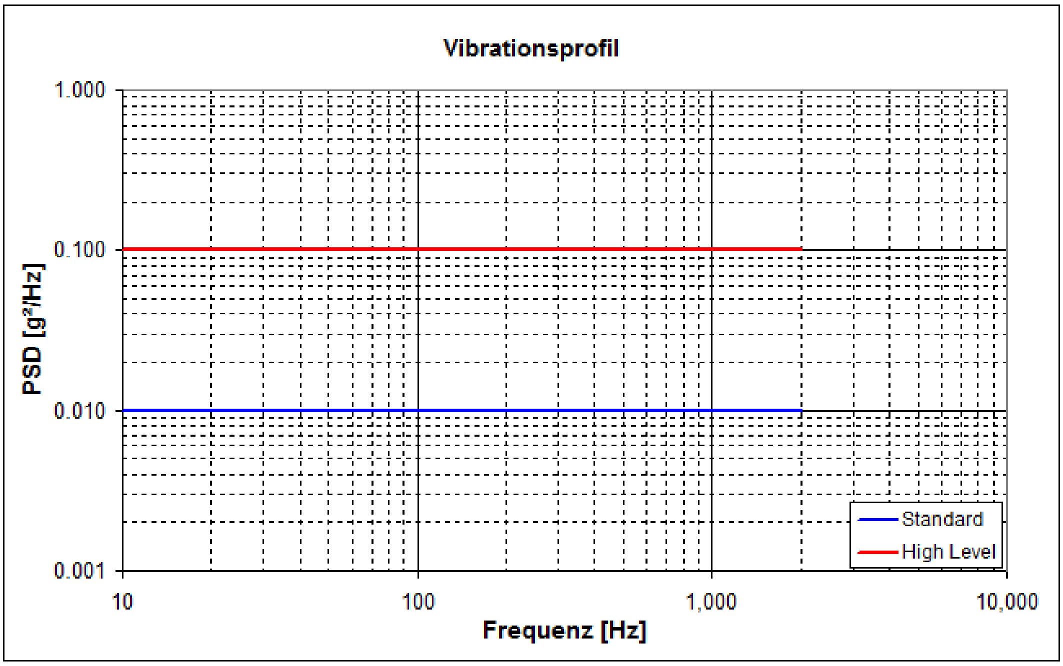

Fig.1 – Vibration profile (Power Spectral Density)

2.1 Definition of the axes

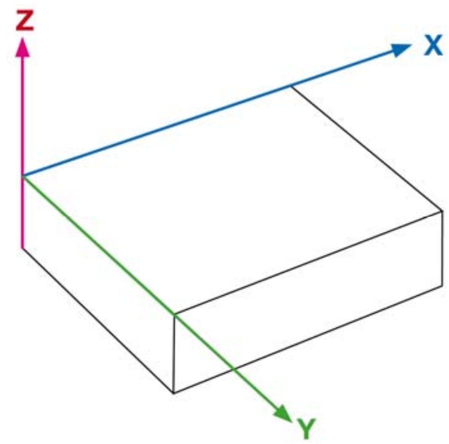

Fig 2

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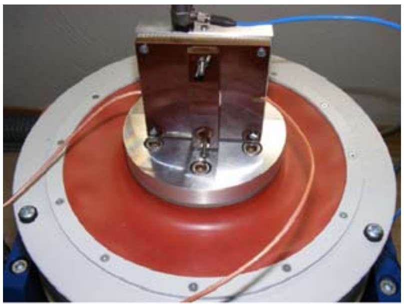
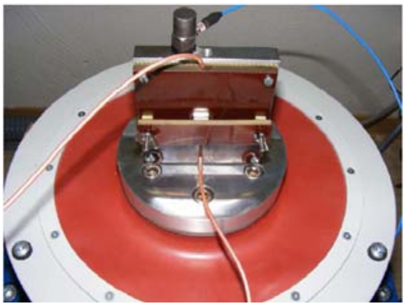
2.2 Instruments & installations

- Agilent Signal Source Analyzer E5052B (phase noise measurement)
- Swing test equipment TIRA TV5220-120 with opposing field coil
- m+p VibPilot VP-HW2 with m+p VibControl Software VC
- Power amplifier TIRA BAA 1000-E
- Xtal-vibration feeders PCB-M353B03
- Test adaption DIL

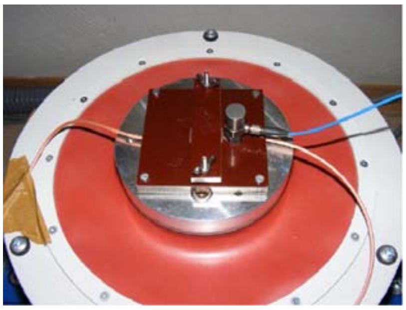
2.3. Shaker with test Jig



X-axis



Y-axis



Z-axis

3. Measurement results

In 3.1 are described the averaged values of the G-Sensitivity in offset area 10 Hz to 1000 Hz. Resonances are appearing above 1000 Hz and around ca. 100 Hz in X- and Y-axis which are due to the overall design on the shaker.
Because of the low G-sensitivity of some oscillators (predominantly in X- und Y-axis) and respectively the higher static noises, the G-sensitivity cannot be exactly calculated as the noise level is situated under vibration or under static noise
Please note that the (very low) G-sensitivity under 100 Hz rises slightly with small released frequency. **It means that the real G-Sensitivity is better than the measured values.**

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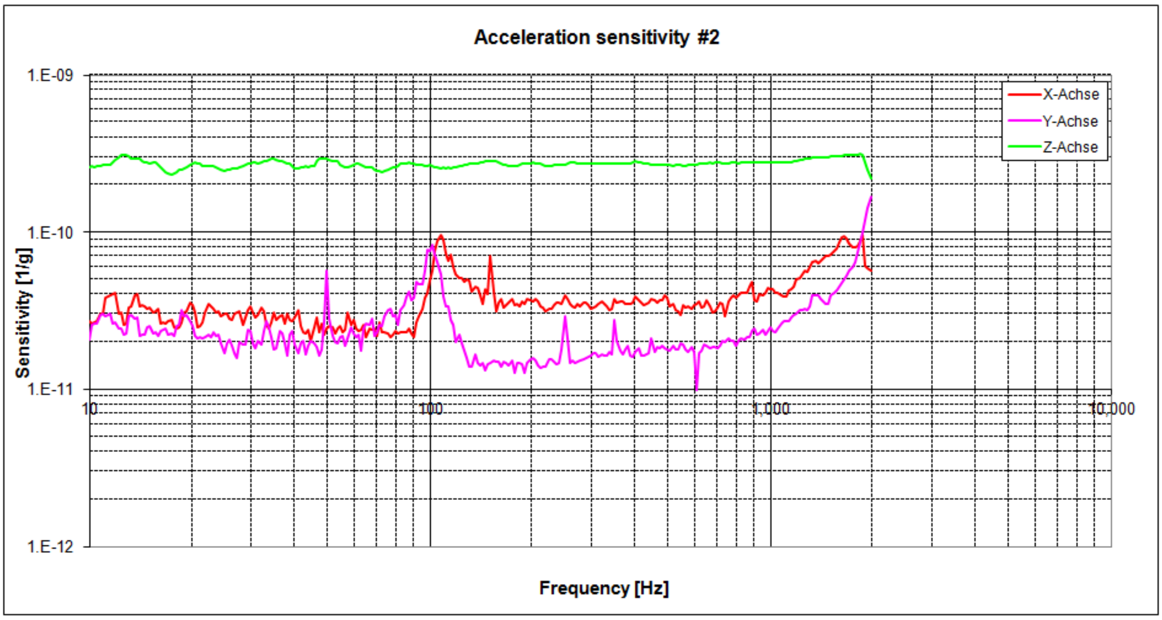
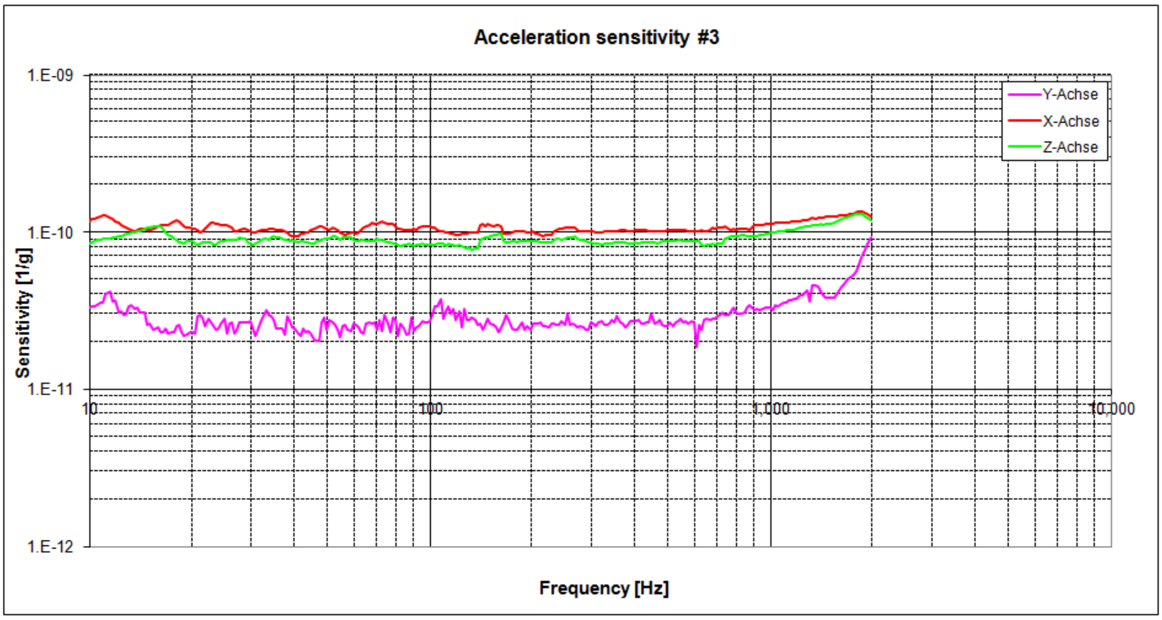
3.1 G-Sensitivity averaged 10 Hz – 2000 Hz

	10.000 MHz			
Osc-#	X- Axis [1/g]	Y- Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	1.79E-11	1.92E-11	1.69E-10	1.71E-10
2	3.41E-11	2.27E-11	2.70E-10	2.73E-10
3	1.05E-10	2.71E-11	8.88E-11	1.40E-10



Osz #2



Osz #3

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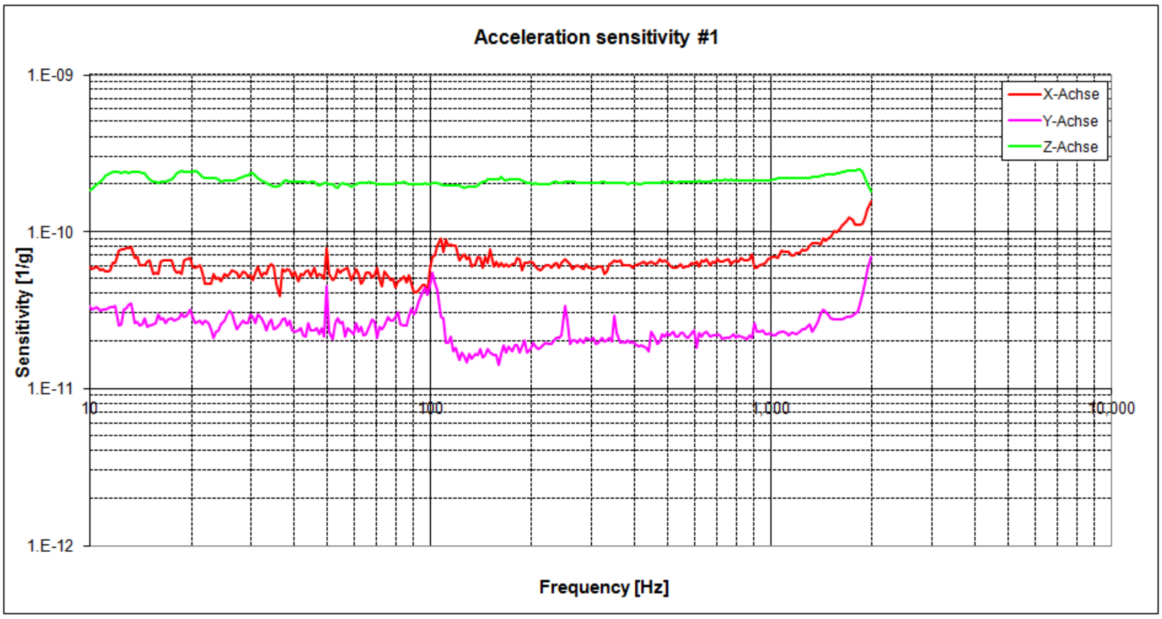
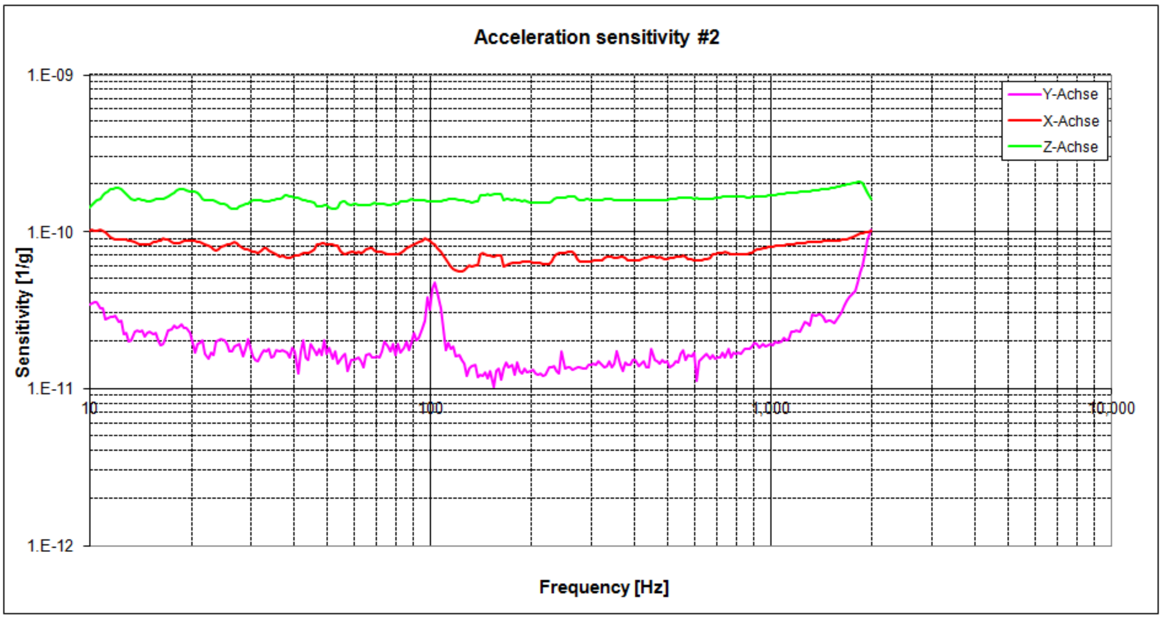
	12.000 MHz			
Osc-#	X-Axis [1/g]	Y-Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	6.01E-11	2.43E-11	2.10E-10	2.20E-10
2	7.48E-11	1.80E-11	1.61E-10	1.78E-10
3	3.37E-11	2.71E-11	3.18E-10	3.21E-10



Osz #1



Osz #2

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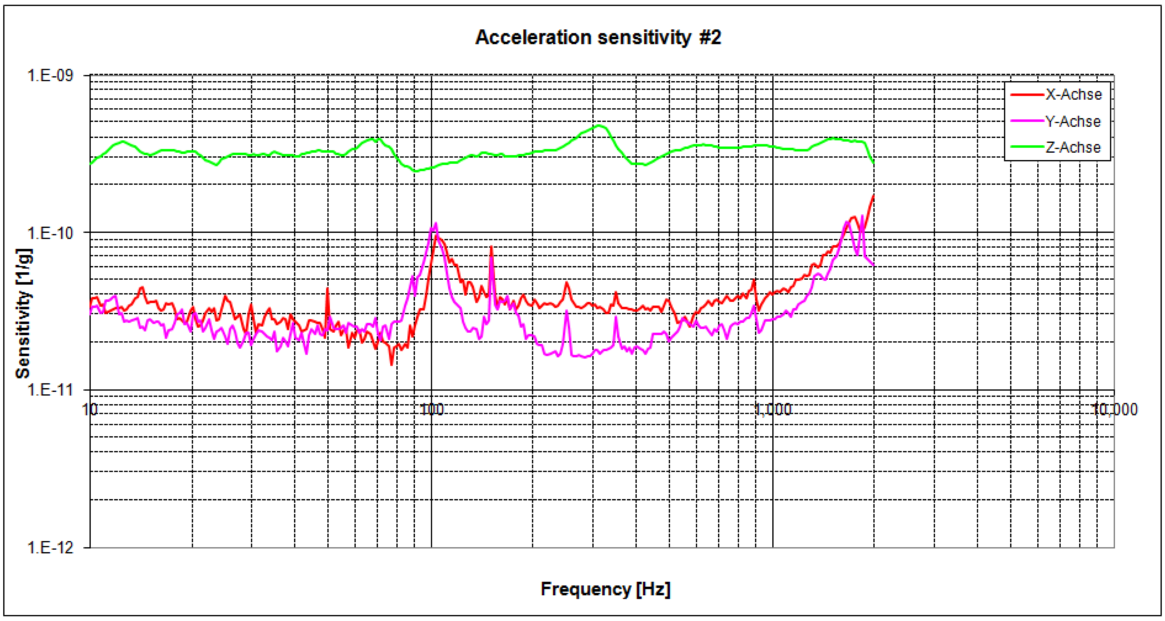
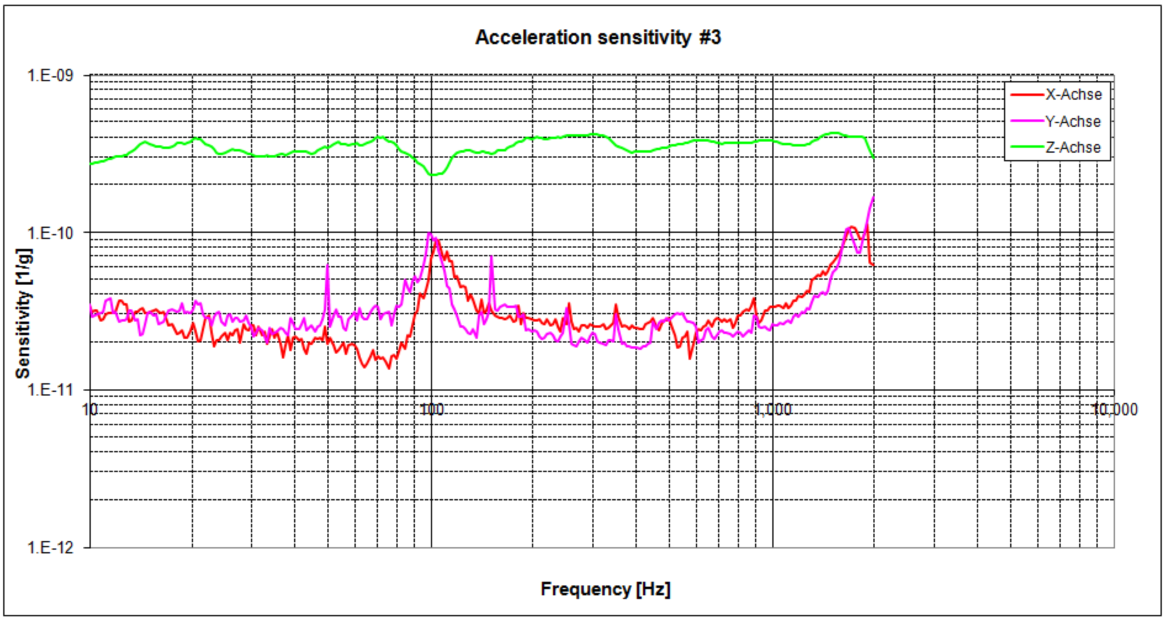
	13.000 MHz			
Osc-#	X- Axis [1/g]	Y- Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	2.06E-11	2.22E-11	3.26E-10	3.28E-10
2	3.44E-11	2.78E-11	3.27E-10	3.30E-10
3	2.79E-11	2.96E-11	3.48E-10	3.50E-10



Osz #2



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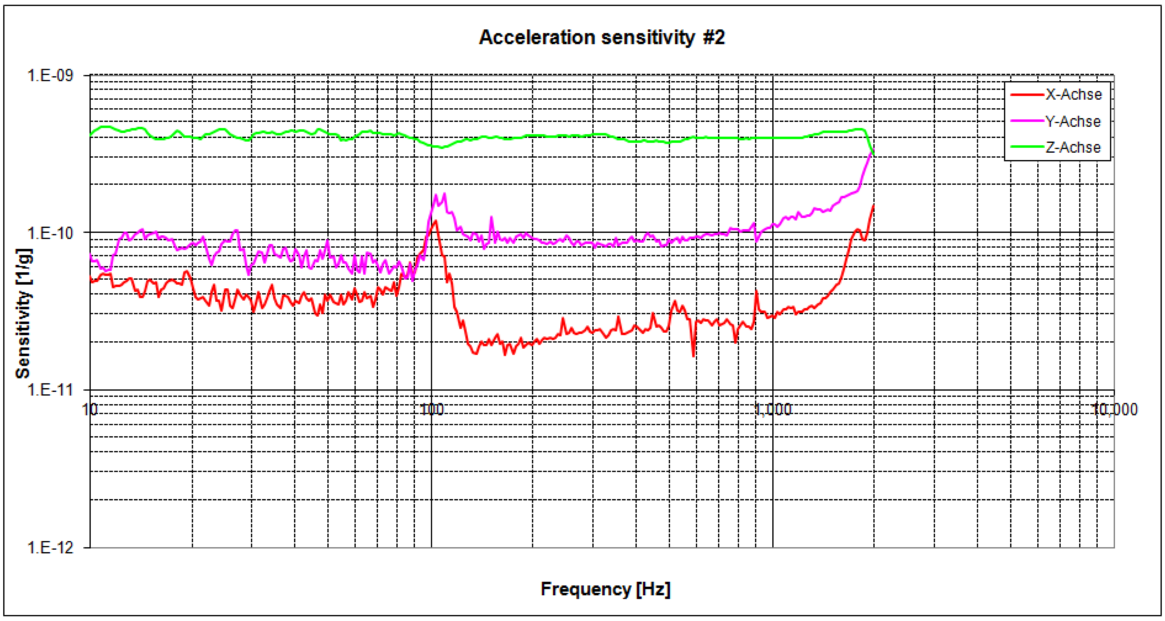
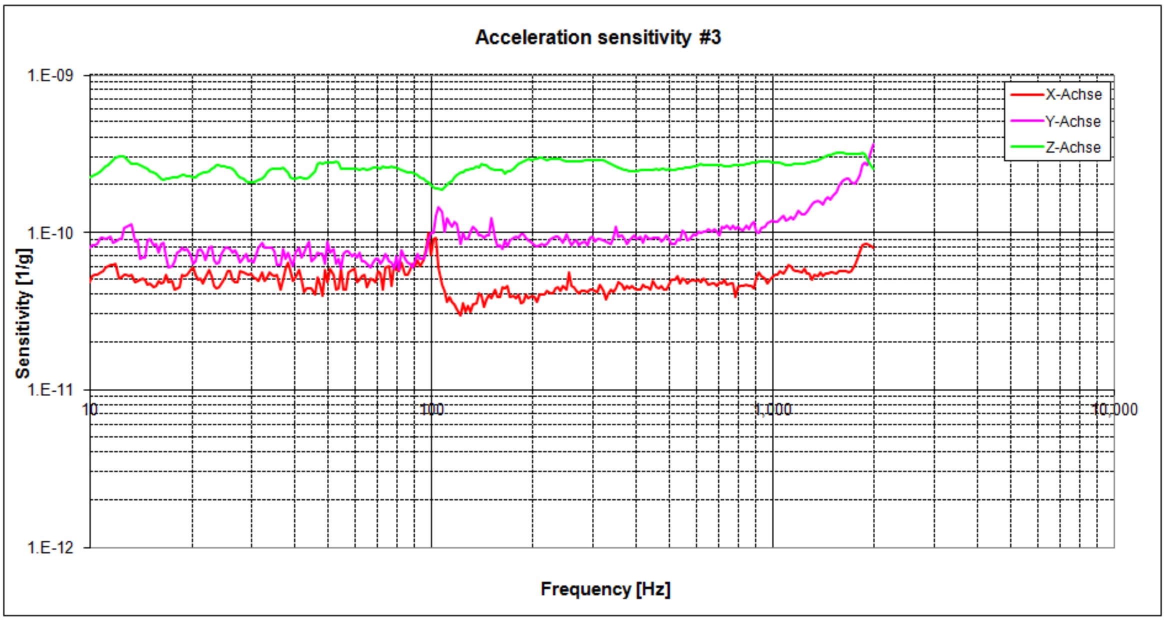
	20.000 MHz			
Osc-#	X- Axis [1/g]	Y- Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	2.67E-11	4.55E-11	3.55E-10	3.59E-10
2	3.61E-11	8.59E-11	4.09E-10	4.19E-10
3	4.88E-11	8.60E-11	2.55E-10	2.73E-10



Osz #2



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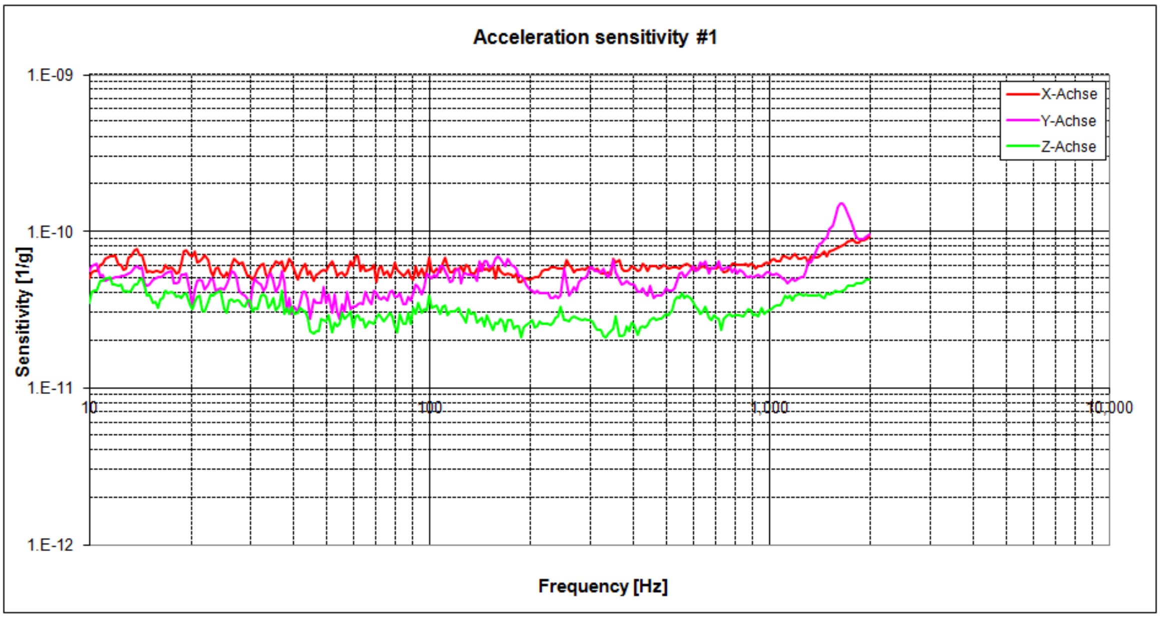
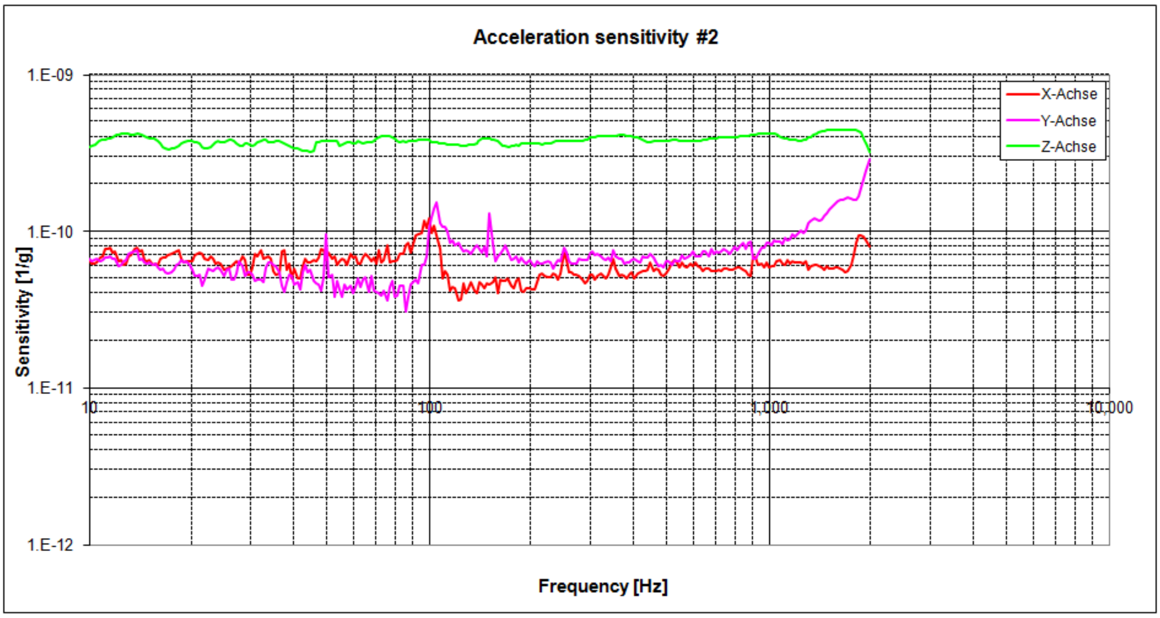
	25.000 MHz			
Osc-#	X- Axis [1/g]	Y- Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	5.84E-11	4.78E-11	3.13E-11	8.17E-11
2	6.15E-11	6.41E-11	3.78E-10	3.88E-10
3	3.03E-11	5.52E-11	4.69E-10	4.73E-10



Osz #1



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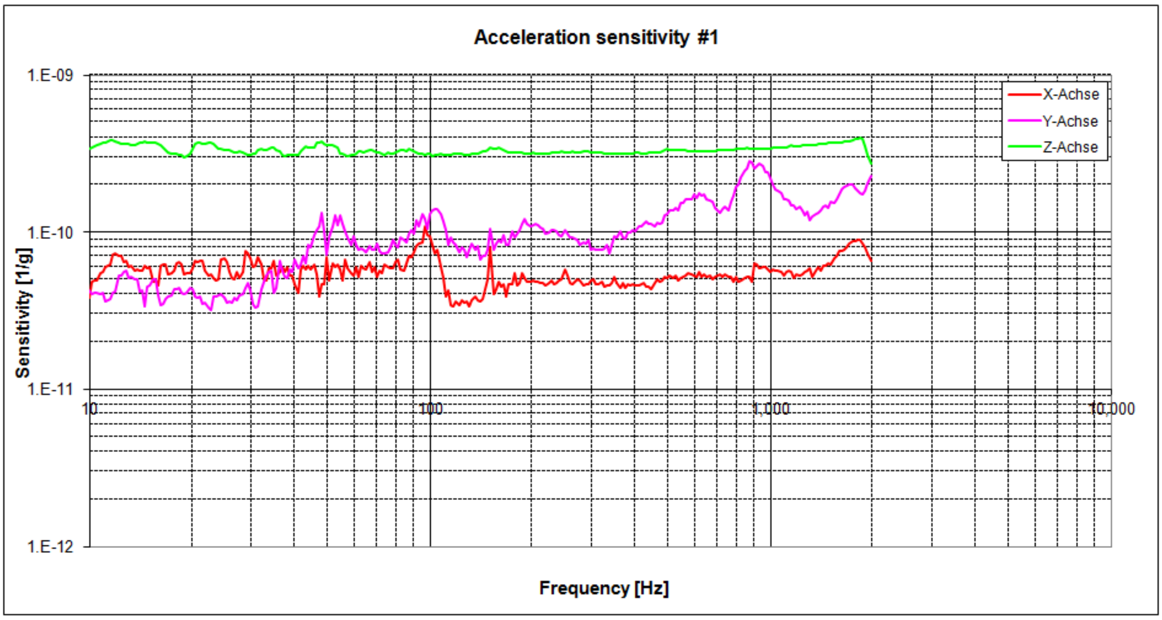
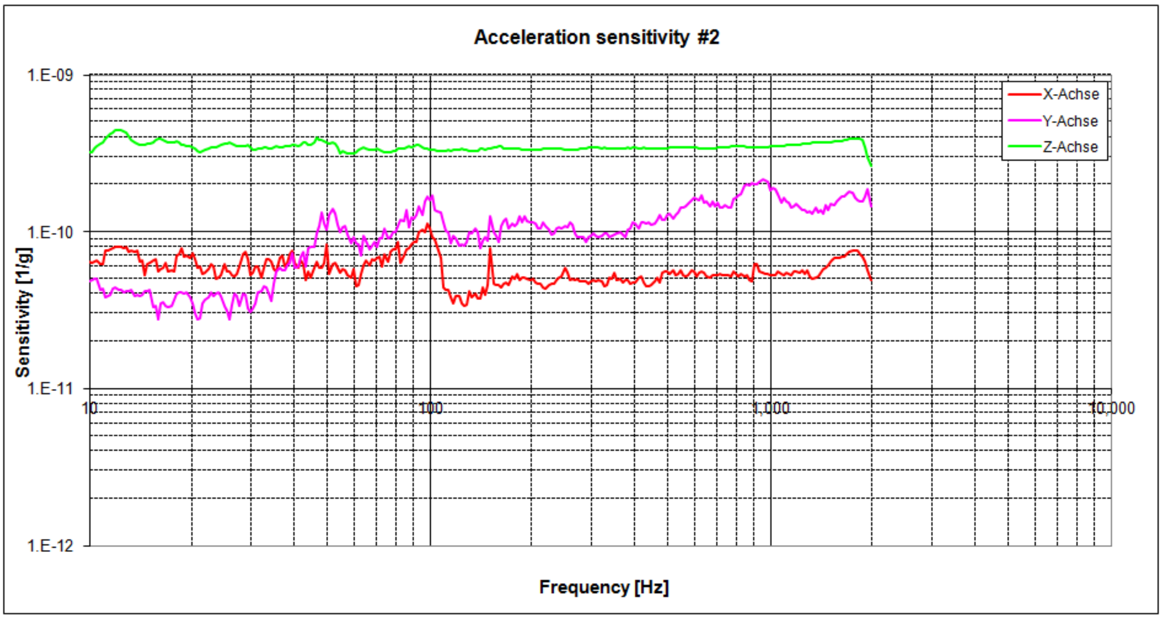
	40.000 MHz			
Osc-#	X- Axis [1/g]	Y- Axis [1/g]	Z- Axis [1/g]	Gamma Γ [1/g]
1	5.46E-11	9.31E-11	3.31E-10	3.48E-10
2	5.82E-11	9.43E-11	3.48E-10	3.65E-10
3	5.87E-11	5.01E-11	3.45E-10	3.54E-10



Osz #1



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Environmental conditions

Test	IEC 60068 Part…	IEC 60679-1 Clause	MIL-STD-202G Method	MIL-STD-810F Method	MIL-PRF-55310D Clause	Test conditions (IEC)
Sealing tests (if applicable)	2-17	5.6.2	112E		3.6.1.2	Gross leak: Test Qc, Fine leak: Test Qk
Solderability Resistance to soldering heat	2-20 2-58	5.6.3	208H 210F		3.6.52 3.6.48	Test Ta method 1, Test Td_1 method 2, Test Td_2 method 2
Shock *	2-27	5.6.8	213B	516.4	3.6.40	Test Ea, 3 x per axis 100 g, 6 ms half-sine pulse
Vibration, sinusoidal*	2-6	5.6.7.1	201A 204D	516.4-4	3.6.38.1 3.6.38.2	Test Fc, 30 min per axis, 1 oct/min 10 Hz – 55 Hz 0,75 mm; 55 Hz – 2 kHz, 10 g
Vibration, random*	2-64	5.6.7.3	214A	514.5	3.6.38.3 3.6.38.4	Test Fdb
Endurance tests - ageing - extended ageing		5.7.1 5.7.2	108A		4.8.35	30 days @ 85 °C 1000 h, 2000 h, 8000 h @ 85 °C

Other environmental conditions on request

Handling precautions

Flux Residue Resistance

Yes, even an unclean board can affect analog circuit performance.

Be aware that if the circuit has very high resistances — even in the low MΩ — special attention may need to be paid to cleaning. A finished assembly may be adversely affected by flux or cleansing residue. The electronics industry in the past few years has joined the rest of the world in becoming environmentally responsible. Hazardous chemicals are being removed from the manufacturing process — including flux that has to be cleaned with organic solvents. Water-soluble fluxes are becoming more common, but water itself can become contaminated easily with impurities. These impurities will lower the insulation characteristics of the PCB substrate. It is vitally important to clean with freshly distilled water every time a high-impedance circuit is cleaned. There are applications that may call for the older organic fluxes and solvents, such as very low power battery powered equipment with resistors in the 10s of MΩ range. Nothing can beat a good vapor defluxing machine for ensuring that the board is clean.

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