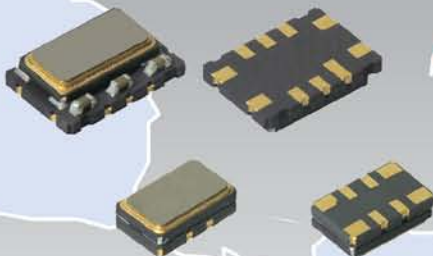
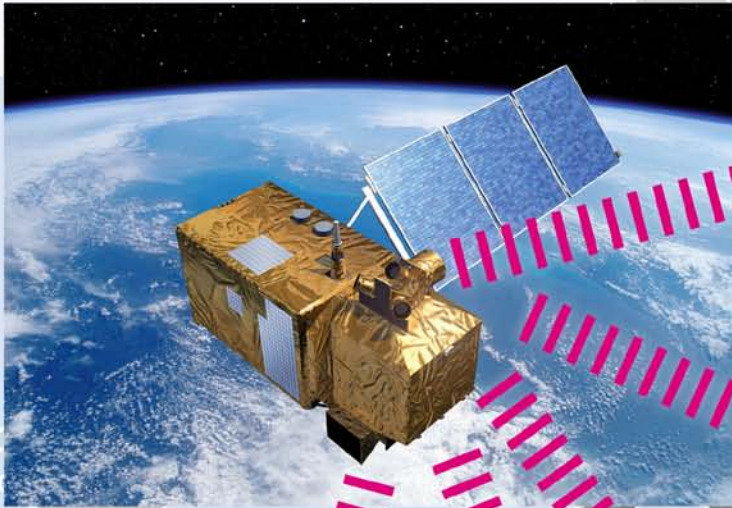


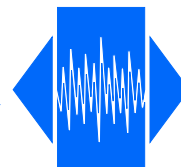


TCXO High Precision Analogue Compensated Crystal Oscillators

for Location and Navigation

GPS, GALILEO, GLONASS, COMPASS, QZSS, MSAS and COSPAS-SARSAT





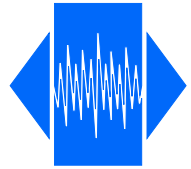
for location and navigation

Applications	<ul style="list-style-type: none"> • GPS, GALILEO, GLONASS, BaiDou, MSAS & GNSS • COSPAS-SARSAT • Mobile radio, satellite communications
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Features	<ul style="list-style-type: none"> • Tight stability: ± 0.5 ppm over -40 to +85 °C ± 0.25 ppm over -40 to +85 °C on request • Low G-sensitivity: 1.5 ppb/g Gamma Γ standard 0.5 ppb/g Gamma Γ on request • Short term stability: $< 1 \times 10^{-10}$ @ $\tau = 1$ s
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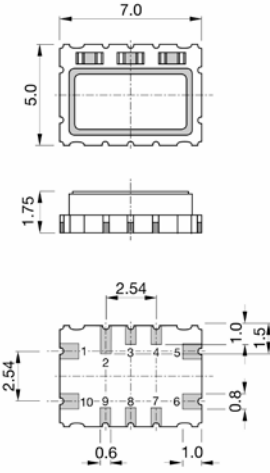
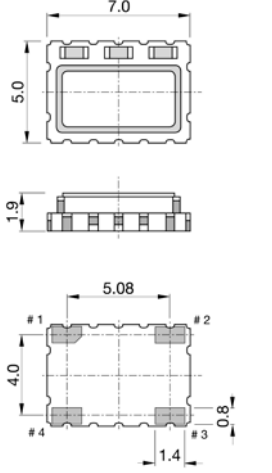
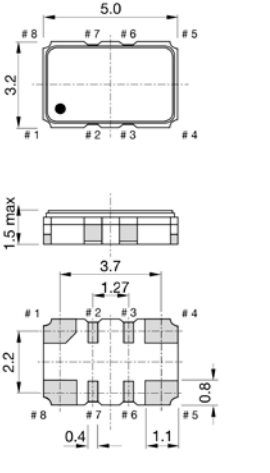
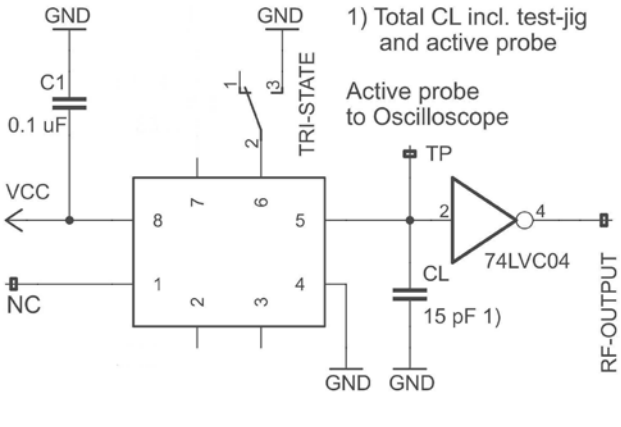
Standard frequencies	10.0, 12.2880, 16.3840, 20.0, 25.0, 32.5120, 33.60, 49.1520 & 50.0 MHz		
Frequency range	10.0 ~ 52.0 MHz		
Frequency stability vs. temperature reference to $(F_{MAX}+F_{MIN})/2$	$\leq \pm 0.5$ ppm $\leq \pm 0.2$ ppm $\leq \pm 1.0$ ppm	over -40 to +85 °C over -40 to +85 °C over -55 to +95 °C	standard on request on request
vs. supply voltage changes reference to frequency at nominal supply	$\leq \pm 0.05$ ppm	± 5 %	
vs. load changes reference to frequency at nominal load	$\leq \pm 0.05$ ppm	± 5 %	
vs. aging	$\leq \pm 1.0$ ppm	1 st year	
Frequency slope	≤ 0.05 ppm/°C	over operating temperature	
G-sensitivity	< 1.5 ppb/g < 0.5 ppb/g	Gamma Γ Gamma Γ	standard on request
Short term stability (ADEV)	$< 1 \times 10^{-10}$	$\tau = 1$ s	
Supply voltage (Vdc)	+2.7 V to +5.0 V	nominal value needs to be defined, standard: 3.3 V and 5.0 V ± 5 %	
Supply current	< 3 mA < 8 mA	10 MHz ~ 25 MHz up to 52 MHz	
Output signal	Clipped sine wave	CMOS	
Output level	> 0.8 Vp-p	$V_{OH} > 0.9 \times V_{dc} / V_{OL} < 0.1 \times V_{dc}$	
Output load	10 k Ω // 10 pF	≤ 15 pF	
Symmetry (duty cycle)		45 / 55 % @ $\frac{1}{2}$ Vdc	
Tri-state function	Input $\geq 0.7 \times V_{dc}$ or open Input $\leq 0.3 \times V_{dc}$ or GND	Output \rightarrow oscillation Output \rightarrow high impedance	
Phase noise @ 20.0 MHz	< -95 dBc/Hz < -125 dBc/Hz < -145 dBc/Hz < -155 dBc/Hz < -155 dBc/Hz	@ 10 Hz @ 100 Hz @ 1 kHz @ 10 kHz @ 100 kHz	
Operating temperature range	-20 ~ +70 °C -40 ~ +85 °C -55 ~ +95 °C	indoor outdoor (extended temperature range on request)	
Storage temperature range	-55 ~ +125 °C		
Reflow Profiles as per IPC/JEDEC J-STD-020C	≤ 260 °C over 10 sec. Max.		
Moisture sensitivity	Level 1 (unlimited)		
Packing units	tape & reel	500 or 1000 pieces	

Environmental	Reference STD.		Test condition
Vibration sinusoidal	IEC 60028-2-6	IEC 60679-1-5.6.7	Test Fc, 30 min per axis 10 Hz – 55 Hz with 0.75 mm, 55 Hz – 2 kHz with 10 g
Shock	IEC 60028-2-27	IEC 60679-1-5.6.8	Test Ea, 3 x per axis, 100 g, 6 ms half sine pulse
Solderability	IEC 60028-2-20 IEC 60028-2-58	IEC 60679-5.6.3	Test Ta (235 ± 2) °C Method 1 Test Tb Method 1A, 5 s

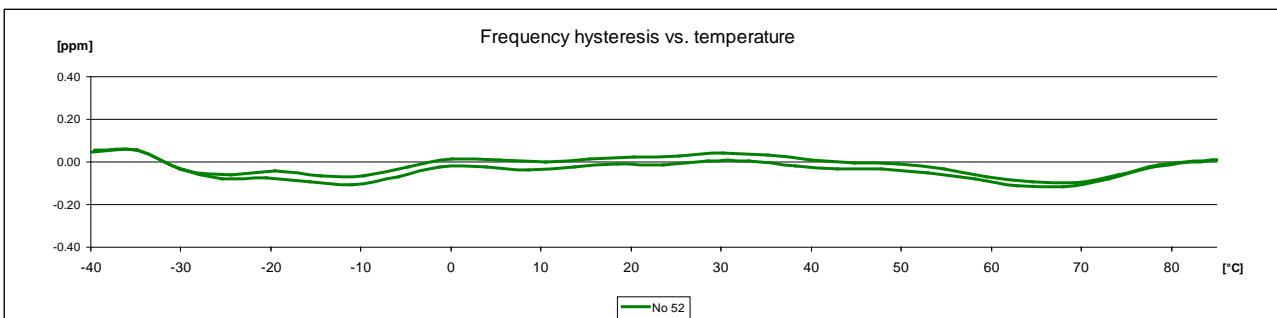
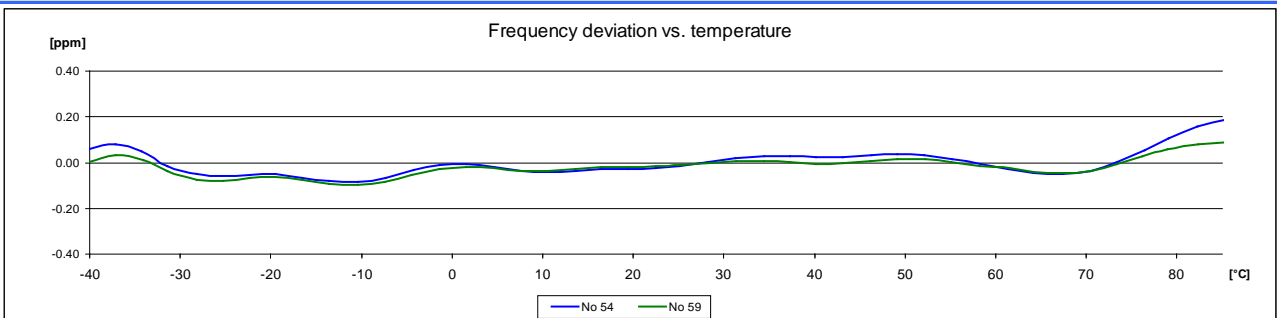


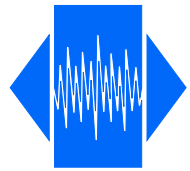
for location and navigation

Package outline and recommended solder pattern

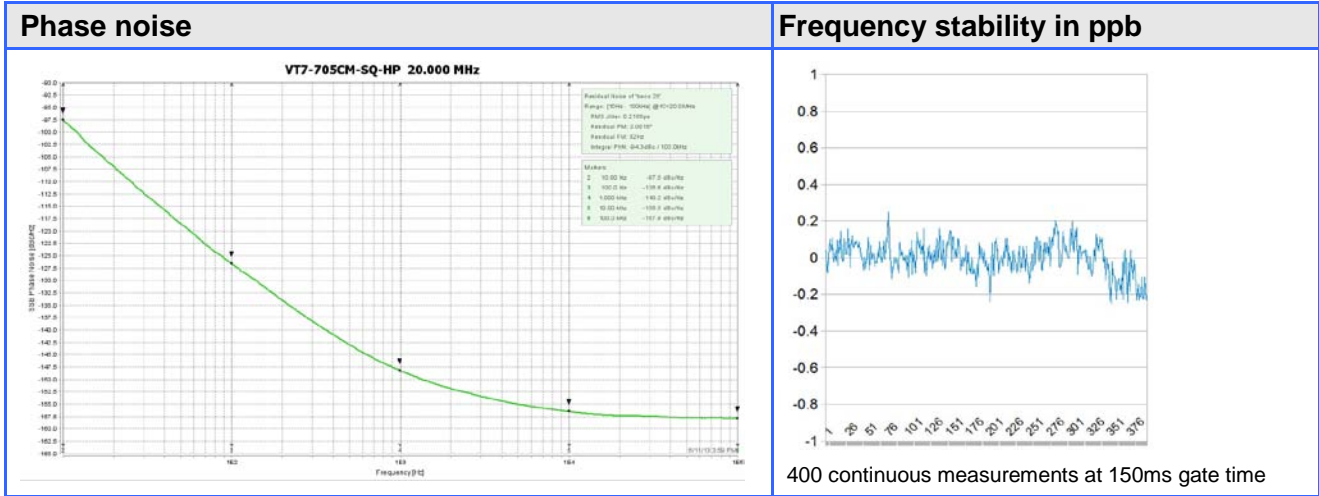
<p>TX7-705CM-SQ-HP</p>  <p>Pin function</p> <ul style="list-style-type: none"> # 1 Do not connect Vc on request # 5 GND # 6 Output # 9 Tri-state # 10 Vdc <p>Do not connect: #2, #3, #4, #7 & #8</p> <p>Solder pattern</p>	<p>TX7-705CM-TQ-HP</p>  <p>Pin function</p> <ul style="list-style-type: none"> # 1 Do not connect Vc on request # 2 GND # 3 Output # 4 Vdc <p>Solder pattern</p>
<p>TX7-503CM-SQ-HP</p>  <p>Pin function</p> <ul style="list-style-type: none"> # 1 Do not connect Vc on request # 4 GND # 5 Output # 6 Tri-state (Enable) # 8 Vdc <p>Do not connect: #2, #3 & #7</p> <p>Solder pattern</p>	<p>Test circuit of the TX7-503CM-SQ-HP</p>  <p>1) Total CL incl. test-jig and active probe</p> <p>Active probe to Oscilloscope</p> <p>74LVC04</p> <p>15 pF 1)</p> <p>RF-OUTPUT</p>

Frequency deviation vs. temperature





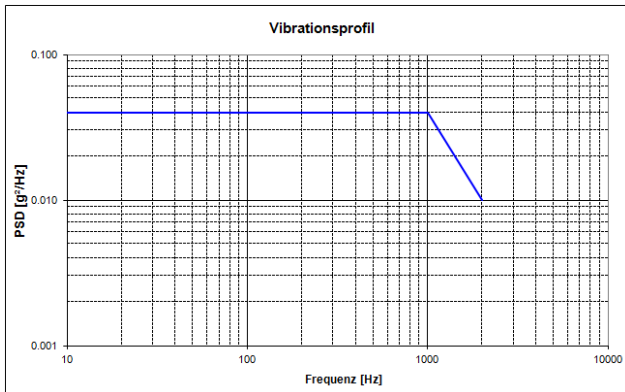
for location and navigation



G-sensitivity measurement

Random vibration profile

Noise Vibration:
20 – 1000 Hz with 0.04 g²/Hz, -6 dB/octave to 2 kHz,
effective acceleration value (G_{RMS}) = 7.7 g

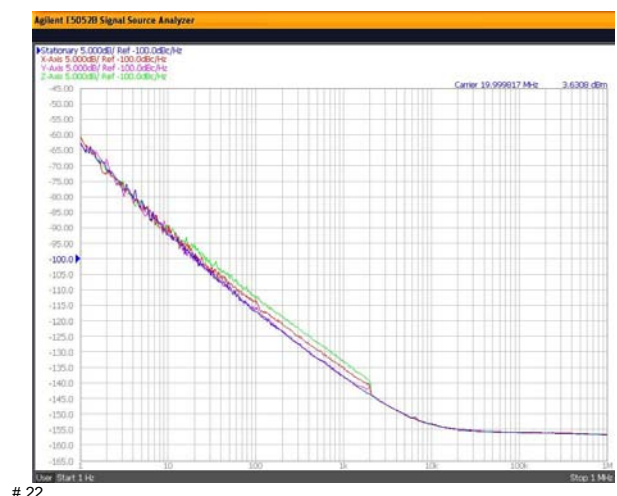
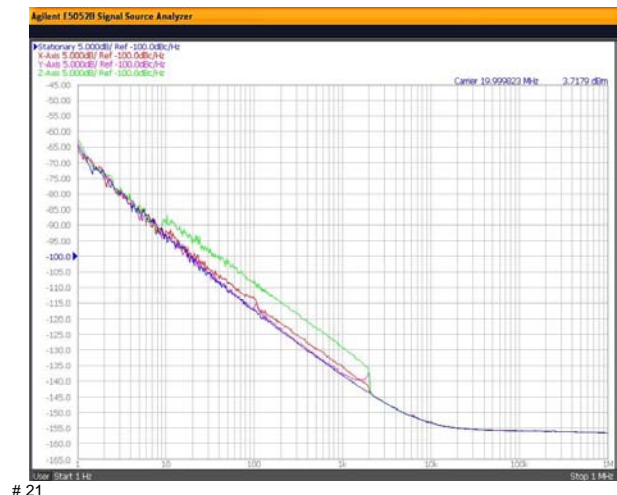


Vibration profile (power spectral density)

Gamma Γ G-sensitivity

Oscillator no.	X-Axis [ppb/g]	Y-Axis [ppb/g]	Z-Axis [ppb/g]	Gamma Γ [ppb/G]
# 21	0.13	0.10	0.26	0.31
# 22	0.13	0.11	0.17	0.25

Phase noise measurement under vibration



QuartzCom, more than frequency