

DIFFERENTIAL PRESSURE SENSING QUARTZ CRYSTAL RESONATOR BLOCK BRKM-P

APPLICATIONS

BRKM-P is a quartz crystal resonator whose construction consist of measuring and reference quartz crystals packaged to rectangular quartz crystal case. Frequency of oscillation of BRKM-P varies with pressure-induced stress. The crystal designed for function as a component of the precision electronic differential pressure transducers, manometers and controllers with a frequency output for conversion the current values of absolute pressure and overpressure (differential pressure) to frequency.

FEATURES

- High resolution and accuracy
- Long term quartz crystal stability
- Wide temperature range (-55...+80 °C)
- Low power consumption
- Suitable for precision pressure equipment



In gauges of overpressure BRKM-P is intended for conversion of overpressure to a differential frequency output signal

$F = F_{\text{MEASURING}} - F_{\text{REFERENCE}}$. An absolute pressure (overpressure) P1 (look at the picture of external dimensions) stressed on diaphragm (1). Absolute atmospheric pressure (basic pressure) P2 operates on a diaphragm (3). It can supply to the reference resonator through the metal connecting pipe (6). One end of the connecting pipe is attached to an outlet of the quartz block, and the second - to an internal cavity of the case of the gauge (5) where BRKM-P settle down, perceiving overpressure P1. The internal cavity of the gauge is usually filled up by oil.

ELECTRICAL CHARACTERISTICS (at normal climatic conditions) / OPERATING CONDITIONS

PARAMETERS			SPECIFICATIONS AND REMARKS		UNITS		
Electrical characteristics							
Frequency Range, f_0			32.000...48.000		kHz		
Series Resistance typ./max., R_s			200 / 250		kOhm		
Drive Level max., D_L			3.0		μW		
Insulation Resistance min., IR			400		M		
Motional characteristics							
$F(P) = f_0 + A_1 * P + A_2 * P^2 + A_3 * P^3$,							
There: $F(P)$ – crystal's frequency at current value of pressure P (Hz),							
f_0 – crystal's frequency at zero value of pressure P (Hz),							
P – current value of pressure (MPa),							
A_2, A_3 – the second and the third order coefficients. They are determinate a nonlinearity which value less than 0.4% FS.*							
Operation conditions							
Model of the crystal	Pressure Range, MPa	UNIT	Sensitivity (Linear Coefficient A_1)		UNIT	Overall Dimensions / Weight	UNIT
			measuring crystal	reference crystal			
BRKM-0.16	0 – 0.16	MPa	7959 ± 5...20%FS		Hz/MPa	25 x 23 x 4.5 / 6.0	mm / gm
BRKM-0.5	0 – 0.50	MPa	3367 ± 5...20%FS		Hz/MPa	25 x 23 x 5.1 / 7.0	mm / gm
BRKM-1.5	0 – 1.50	MPa	1235 ± 5...20%FS		Hz/MPa	25 x 23 x 7.0 / 9.5	mm / gm
BRKM-6.0	0 – 6.00	MPa	304 ± 5...20%FS		Hz/MPa	25 x 23 x 10.4 / 17.0	mm / gm
BRKM-16.0	0 – 16.00	MPa	127 ± 5...20%FS		Hz/MPa	25 x 23 x 12.2 / 18.5	mm / gm
Pressure Range, P			0.1...25.0		MPa		
Reference Crystal's Pressure range			79.98...106.64		kPa		
Change of a difference of frequencies of measuring and reference crystals in an operation temperature range for every 10 °C no more, %			0.1		%		
Operating Temperature, T_{OPR} (typ/max)			-55...+80 / -40...+100; -196...+250**		°C		
Storage Temperature, T_{STR}			+5...+40		°C		
Maximum Deviation Over Temperature			0.75		%		
Relative Deviation of linear coefficient A_1 from its average value (gets out at the request)			± 5...± 20		%		
Aging first year/next years max.			± 5 / ± 25		PPM		
FS Pressure Hysteresis no more			0.02		%		
Dependence Of Frequency Of The Crystal On Temperature $f_T = f_0 + A_1 * T + A_2 * T^2$ is reproduced with accuracy			0.05		%		
Vibration Resistance, DF/F_0			5g / 10-2000 Hz, 8 hours / ± 7 PPM max.		PPM		

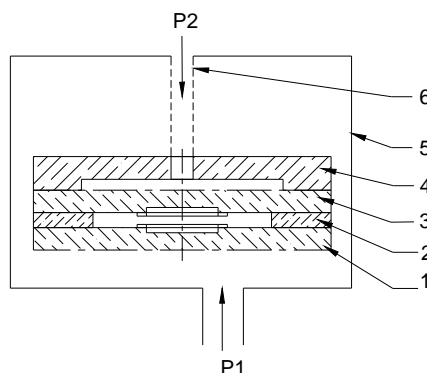
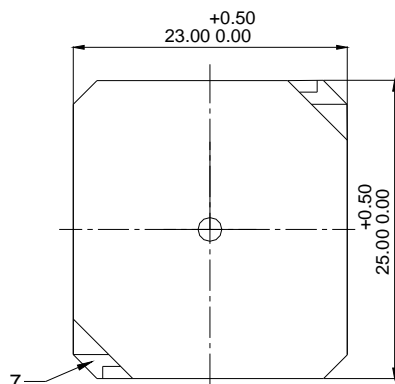
* A_1, A_2 and A_3 coefficients are specified on request.

**Temperature range can be increased from -196 to +250 °C on request.

Temperature sensing quartz crystal RKT206 is used for compensation of a temperature deviation of BRKM-P.

Based on the differential pressure sensing quartz crystal resonator blocks BRKM-P the differential pressure transducers, manometers and controllers with a compensation of the temperature error (accuracy class up to 0.03) are developed and made.

EXTERNAL DIMENSIONS



UNITS: millimeters

- 1 – bottom diaphragm
- 2 - gasket
- 3 – up diaphragm
- 4 – cover
- 5 – gauge internal cavity
- 6 – connecting pipe
- 7 – contact surfaces