High MTBF ensures accuracy and reduces replacement costs

Wilcoxon's 786 series offers the longest MTBF rate in the industry, providing continuous cost savings and reliable performance for up to 25 years.

MTBF

Mean time between failures (MTBF) represents the average expected time that will elapse between failures of like units under like conditions. Purchasers should consider MTBF of sensors before buying them. Accelerometers with a low (short) MTBF result in higher costs due to the manpower required for troubleshooting, replacement of faulty sensors and lost data associated with the more frequent failures.

Total hybrid failure rate (λ_p)

The Department of Defense developed a calculation to be used for electronic systems and circuits. Military Handbook MIL-HDBK-217 provides guidance for computing the MTBF for hermetically sealed electronic circuits.

The 786A is sealed to a leak rate of 1×10^{-8} cc/sec and is considered to be truly hermetically sealed. An analysis of failures indicates that the hybrid circuit board and connections are the only parts to fail due to normal environmental exposure. The piezoelectric sensing element does not play a significant role in failures.

$$\lambda_p = [\Sigma N_C \lambda_C] (1 + 0.2\, \pi_E)\, \pi_F\, \pi_Q\, \pi_L \text{ failures per 1,000,000 hours}$$

Where

- N_C = number of each particular component
- λ_C = failure rate of each particular component
- π_E = environmental factor
- π_F = hybrid function factor
- π_Q = quality (screening) factor
- π_L = longevity (experience) factor

N is determined from the part or connection count. All other factors are determined through reference to MIL-HDBK-217 for the particular component or element.

Components for 786 series sensors

N components/elements	60°C	120°C
48 connections	0.018122	0.018122
4 plated through holes	0.000041	0.000041
1 crystal	0.0058	0.0058
1 bipolar transistor	0.00029	0.000773
1 FET	0.0135	0.0324
3 diodes	0.00731	0.027655
3 capacitors	0.16082	0.13992
5 resistors	0.00363	0.00594
Individual $N_C\lambda_C$	0.064775	0.230651

Calculated total hybrid failure rate of 786A

Total hybrid failure rate at 60°C:

λ_p = [0.064775] 70.18
= 4.5459 per 10^6 hrs
= 219,978 hours MTBF (25 years)

Total hybrid failure rate at 120°C:

λ_p = [0.230651] 70.18
= 16.187087 per 10^6 hrs
= 61,778 hours MTBF (7 years)

Reliability for every application

A wide range of top-exit, case isolated models offer precision that stands the test of time.

Model	Description	Performance	Connector
786A	General purpose	100 mV/g, ±5%	MIL-5015
786A-M12	General purpose	100 mV/g, ±5%	M12
786B-10	General purpose, affordable	100 mV/g, ±10%	MIL-5015
786C	General purpose, BNC	100 mV/g, ±5%	BNC
786F	16 ft. integral cable	100 mV/g, ±5%	-
786LF	Extremely low frequency (0.1 Hz)	100, 250, 500 mV/g, ±5%	MIL-5015
786T	Dual output temperature and acceleration	100 mV/g, ±5%	MIL-5015
786-500	Broadband high sensitivity, low frequency	500 mV/g, ±5%	MIL-5015, M12
HT786A	High temperature 150°C	100 mV/g, ±5%	MIL-5015

info@wilcoxon.com
+1 (301) 330 8811
wilcoxon.com
buy.wilcoxon.com

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