

# **General Standards Corporation**

## **High Performance Bus Interface Solutions**

### MTBF (Mean Time Between Failures)

MTBF information for various General Standards products is included below. If you do not see the product you are interested in, please contact the factory.

#### **PCIe-SIO4BX2-SYNC:**

Failure rate: (FPMH) = 5.6686  
MTBF = 1.7641E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

#### **VME-SIO4A:**

Failure rate: (FPMH) = .457743  
MTBF = 2,184,631 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

#### **CPCI3U64-HVDO16MI:**

Failure rate: (FPMH) = 1.9855  
MTBF = 5.0365E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

#### **OPTO32:**

Failure rate: (FPMH) = 2.6725  
MTBF = 3.7418E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

#### **CPCI6U64-HVDOTP16MI:**

Failure rate: (FPMH) = 3.2526  
MTBF = 3.0745E+05  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

#### **CCPMC-16AI32SSA:**

Failure rate: (FPMH) = 4.0571  
MTBF = 2.4648E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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### **PMC-SIO4BX-4KLC:**

Failure rate: = 1,383.364130  
MTBF = 722,855  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **24DSI16WRC:**

Failure rate: (FPMH) = 3.8986  
MTBF = 2.5650E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **cPCI6U64-24DSI20C500K:**

Failure rate: (FPMH) = 2.8018  
MTBF = 3.5692E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **16AO20:**

Failure rate: (FPMH) = 4.0571  
MTBF = 2.4648E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI-HPDI32A-485-256K:**

Failure rate: (FPMH) = 6.909599  
MTBF = 144,726 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **66-16AI32SSC:**

Failure rate: (FPMH) = 1.9114  
MTBF = 5.2318E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **CCPMC66-16AI32SSA:**

Failure rate: (FPMH) = 2.6069  
MTBF = 3.8359E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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### **CPCI6U64-16AIF16MIWR:**

Failure rate: (FPMH) = 4.5330  
MTBF = 2.2060E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **CPCI6U64-16AISS8AO8MI:**

Failure rate: (FPMH) = 4.3820  
MTBF = 2.2821E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **CPCI6U64-16AO16MI:**

Failure rate: (FPMH) = 4.7935  
MTBF = 2.0861E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **CPCI6U-24DSI32R:**

Failure rate: (FPMH) = 18.7050  
MTBF = 5.3462E+04 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI SIO8BXS:**

Failure rate: (FPMH) = .545100  
MTBF = 1.8340E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCIe4 to PMC Adapter:**

Failure rate: (FPMH) = 1.289234  
MTBF = 775,654 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCIe4-PMC-1:**

Failure rate: (FPMH) = 2.9641  
MTBF = 3.3737E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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## **High Performance Bus Interface Solutions**

### **PCIe-16AI64SSA-64-50M-50K:**

Failure rate: (FPMH) = 7.3242  
MTBF = 1.3653E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCIe-16HSDI6:**

Failure rate: (FPMH) = 2.1410  
MTBF = 4.6708E+05hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCIe to PMC Adapter:**

Failure rate: (FPMH) = 1.8382  
MTBF = 5.4401E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Ground Benign

### **PCIe OPTO32C-12V-Contact:**

Failure rate: (FPMH) = 2.6725  
MTBF = 37,418 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC66-16AO16-12-F100-DF-49.152Mhz:**

Failure rate: (FPMH) = 4.6051  
MTBF = 2.1715E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC66-16AISS8AO4:**

Failure rate: (FPMH) = 4.4325  
MTBF = 2.2560E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC66-SIO4BXR:**

Failure rate: (FPMH) = 1.2317  
MTBF = 8.1190E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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### **PMC-12AISS8AO4-8-64K:**

Failure rate: (FPMH) = 5.0717  
MTBF = 1.9717E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC-16AIO168:**

Failure rate: (FPMH) = 6.029887  
MTBF = 1.6584E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC 24DSI12-8:**

Failure rate: (FPMH) = .326655  
MTBF = 3.06133+E05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **XMC-SIO4BX:**

Failure rate: (FPMH) = 58.3878  
MTBF = 1.7127+E05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **CPCI-16AO16:**

Failure rate: (FPMH) = 3.5160  
MTBF = 284,399 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PC104P-24DSI12:**

Failure rate: (FPMH) = 4.2880  
MTBF = 233,201 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI-12AIO:**

Failure rate: (FPMH) = 1.3917  
MTBF = 718,504 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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### **PCI-16AIO-41:**

Failure rate: (FPMH) = 5.9328  
MTBF = 168,553 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI-16AO12:**

Failure rate: (FPMH) = 3.5161  
MTBF = 284,399 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI-16HSDI:**

Failure rate: (FPMH) = 5.3212  
MTBF = 187,926 hrs  
Ambient temp: 25 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCI-SIO4B-SYNC:**

Failure rate: (FPMH) = 3.2374  
MTBF = 308,890 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC-16AO4MF:**

Failure rate: (FPMH) = 2.7237  
MTBF = 367,145 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PMC-SIO4BX:**

Failure rate: (FPMH) = 1.3833  
MTBF = 722,875 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

### **PCIe-16AI64SSC:**

Failure rate: (FPMH) = 1.9114  
MTBF = 5.2318E+05 hrs  
Ambient temp: 30 C  
Calculated at MIL-HDBK-217F  
Environment: Ground Benign

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## **High Performance Bus Interface Solutions**

### **PMC to cPCI Adapter**

**Failure rate:** (FPMH) = .3740

**MTBF** = 2.6736E+06 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC SIO4-64K**

**Failure rate:** (FPMH) = 2.9868

**MTBF** = 334,801 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **CCPMC-24DSI8R-8-SF-RUG**

**Failure rate:** (FPMH) = 4.4396

**MTBF** = 2.2525E+05 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PNL-BNC-2x16AO16-SE**

**Failure rate:** (FPMH) = .1535

**MTBF** = 6.5156E+06 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PNL-BNC-2x16AI64SSC-DF**

**Failure rate:** (FPMH) = .0347

**MTBF** = 2.8823E+06 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCIe 20AO8C500K**

**Failure rate:** (FPMH) = 4.2764

**MTBF** = 2.3384E+05 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

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## **High Performance Bus Interface Solutions**

### **PCIe 24DSI32**

**Failure rate:** (FPMH) = 12.9861

**MTBF** = 7.7005E+04 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCIe 24DSI6LN**

**Failure rate:** (FPMH) = 1.5440

**MTBF** = 6.4767E+05 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **SIO4BX**

**Failure rate:** (FPMH) = 1.3833

**MTBF** = 722,875 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **HPDI32A-COS**

**Failure rate:** (FPMH) = 1.2792

**MTBF** = 7.8176E+05 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC66-16LI8CLO4**

**Failure rate:** (FPMH) = 1.5167

**MTBF** = 6.5931E+05 hrs

**Ambient temp**: 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC to PCI Adapter**

**Failure rate:** (FPMH) = 1.5723

**MTBF** = 4.5501E+05 hrs

**Ambient temp** : 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

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## **High Performance Bus Interface Solutions**

### **PMC OPTO32D**

**Failure rate:** (FPMH) = 2.3163

**MTBF** = 4.3172E+05 hrs

**Ambient temp :** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **OPTO32A**

**Failure rate:** (FPMH) = .4998

**MTBF** = 2.0009E+06 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC66-16AO16-12-F100-DF-49.152Mhz:**

**Failure rate:** (FPMH) = 4.6051

**MTBF** = 2.1715E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **66-18AI32SSC1M:**

**Failure rate:** (FPMH) = 1.7519

**MTBF** = 5.7082E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC66-16AO16**

**Failure rate:** (FPMH) = 4.6051

**MTBF** = 2.1715E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC-24CDS16LN**

**Failure rate:** (FPMH) = 3.2265

**MTBF** = 3.1613E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

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## **High Performance Bus Interface Solutions**

**PCIe-16A064C-32D-BP-F3-49.152M-0-0|**

**Failure rate: (FPMH) = 4.6640**

**MTBF = 2.1441E+05 hrs**

**Ambient temp: 30 C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

**PMC66-24DSI6C500k**

**Failure rate: (FPMH) = 1.1599**

**MTBF = 8.6214E+05 hrs**

**Ambient temp: 30 C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

**PMC66-16AI64SSC-64-50.000M-LL**

**Failure rate: (FPMH) = 1.8534**

**MTBF = 5.3581E+05 hrs**

**Ambient temp: 30 C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

**PCI OPTO32B-12V-CONTACT:**

**Failure rate: (FPMH) = 2.6725**

**MTBF = 37,418 hrs**

**Ambient temp: 30 C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

**PCI OPTO32B-12V-CONTACT-8x28:**

**Failure rate: (FPMH) = 2.8257**

**MTBF = 35,209 hrs**

**Ambient temp: 30C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

**PCI 16SDI HS4:**

**Failure rate: (FPMH) = 5.321**

**MTBF = 1.8792E+05 hrs**

**Ambient temp : 30 C**

Calculated at MIL-HDBK-217F

**Environment: Ground Benign**

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### **PMC-DIO24:**

**Failure rate:** (FPMH) = 2.5989

**MTBF** = 3.8477E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCI-DIO24:**

**Failure rate:** (FPMH) = 2.5989

**MTBF** = 3.8477E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCI-16SDI-HS4:**

**Failure rate:** (FPMH) = 5.1322

**MTBF** = 2.8972E+05hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **66-16HSDI4AO4:**

**Failure rate:** (FPMH) = 4.9926

**MTBF** = 2.0030E+05hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC-16AIO-41**

**Failure rate:** (FPMH) = 6.3275

**MTBF** = 153,497 hrs

**Ambient temp:** 20 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCIe-SIO4BX2:**

**Failure rate:** (FPMH) = 5.6606

**MTBF** = 1.7666E+05hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

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### **PCIe-SIO4BX2-X:**

**Failure rate:** (FPMH) = 5.6606

**MTBF** = 1.7666E+05hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PCIe-HPDI32B-COS-32K**

**Failure rate:** (FPMH) = 1.2375

**MTBF** = 7.7246E+05 hrs

**Ambient temp :** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **CCPMC66-16AICS32R:**

**Failure rate:** (FPMH) = 2.3275

**MTBF** = 3.7461E+05 hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC ADADIO-311**

**Failure rate:** (FPMH) = 2.0890

**MTBF** = 4.7870E+05hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

### **PMC-HPDI32B-256K-P1-L3SFB**

**Failure rate:** (FPMH) = 43.8884

**MTBF** = 2.2785E+04hrs

**Ambient temp:** 30 C

Calculated at MIL-HDBK-217F

**Environment:** Ground Benign

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### **Development of MTBF Values:**

The most widely known and used reliability prediction handbook is Mil-217. It is used by both commercial companies and the defense industry, and is accepted and known world-wide. The most recent revision is "Military Handbook, Reliability Prediction of Electronic Equipment", MIL-HDBK-217, Revision F, Notice 2, which was released in February of 1995. It contains failure rate models for numerous electronic components such as integrated circuits, transistors, diodes, resistors, capacitors, relays, switches, and connectors, to name a few. MIL-217 requires a greater amount data entered into the model. It also is a little harsher in the calculation of failure rate data than the Bellcore standard. Typically, but not always, MIL-217 calculated results will show a higher failure rate than Bellcore standard for the same system. This difference in the standards obviously stems from the original intended use of the MIL-217 standard for aerospace and military, or mission critical applications.

Maintaining reliability and providing reliability engineering is an essential need with modern electronic systems. Reliability engineering for electronic equipment requires a means for a quantitative baseline, or a reliability prediction analysis. The MIL-217 standard was developed for military and aerospace applications; however, it has become widely used for industrial and commercial electronic equipment applications throughout the world. Using the Mil-217 standard for reliability prediction produces calculated Failure Rate and Mean Time Between Failures (MTBF) numbers for the individual components, equipment and the overall system. The final calculated prediction results are based on the roll-up, or summation, of all the individual component failure rates.