

# EPRD-2014 PART DESCRIPTIONS

## Electronic Parts Reliability Data 2014 VOLUME ONE



This publication was developed by Quanterion Solutions Incorporated as part of the Core operation of the Reliability Information Analysis Center (RIAC).

The RIAC was the DoD Information Analysis Center (IAC) Center of Excellence for the reliability, maintainability, quality, supportability and interoperability (RMQSI) technical disciplines from 2005-2014. To broaden the former Center's User Community, Quanterion offers this publication to facilitate the design & development of more robust products and systems.



# QUANTERION

---

## SOLUTIONS INCORPORATED

# Electronic Parts Reliability Data (EPRD-2014)

## Part Descriptions



### What is EPRD?

The Electronic Parts Reliability Data (EPRD) publication contains field failure rate data for commercial and military electronic components for use in reliability analyses.

Component types include integrated circuits, discrete semiconductors (diodes, transistors, optoelectronic devices), resistors, capacitors, and inductors/transformers. Data includes part descriptions, quality level, application environments, point estimates of failure rate, data sources, number of failures, total operating hours, miles, or cycles, and detailed part characteristics.

The EPRD database as well as other failure rate, mode and mechanism databases is accessible through a data-as-a-service titled ROADS.

### How to Use This Document

The parts description document provides the parts/components that are listed in the FMD database. The list is alphabetized, to enable users to quickly find part(s). Alternatively, users can press Ctrl+F to enter a search term.

Note: If you do not see your component listed in the following pages, email [Qinfo@Quanterion.com](mailto:Qinfo@Quanterion.com) for assistance.

### How is the Data Used?

Electronic Parts Reliability Data (EPRD) is used by engineers worldwide to:

- **Perform reliability analyses including:**
  - Mean Time Between Failure (MTBF)
  - Fault Tree Analysis (FTA)
  - Safety Analyses
  - And others
- **Meet reliability requirements**
- **Improve product and system reliability**
- **Build reliability into new designs**
- **Produce software for calculating reliability**
- **And more!**

### How Can I Access the Data?

Access the reliability failure rate, mode, and mechanism data through an online subscription to ROADS, which stands for the Reliability Online Automated Databook System.

ROADS provides easy, online access to the Electronic Parts Reliability Data (EPRD), Nonelectronic Parts Reliability Data (NPRD), and Failure Mode/Mechanism Distributions (FMD) databooks.

[Subscribe to the reliability data](#) today.

**ACCESS EPRD ANYWHERE, ANY TIME. [www.quanterion.com/ROADS](http://www.quanterion.com/ROADS)**



Capacitor, Fixed  
Capacitor, Fixed, Carbon  
Capacitor, Fixed, Ceramic  
Capacitor, Fixed, Ceramic, Chip  
Capacitor, Fixed, Ceramic, Chip, Multilayer  
Capacitor, Fixed, Ceramic, Disc  
Capacitor, Fixed, Ceramic, Feed-Thru  
Capacitor, Fixed, Ceramic, Multilayer, Chip  
Capacitor, Fixed, Chip  
Capacitor, Fixed, Electrolytic  
Capacitor, Fixed, Electrolytic, Aluminum  
Capacitor, Fixed, Electrolytic, Chip  
Capacitor, Fixed, Electrolytic, Tantalum  
Capacitor, Fixed, Electrolytic, Tantalum, Foil  
Capacitor, Fixed, Electrolytic, Tantalum, Solid  
Capacitor, Fixed, Electrolytic, Tantalum, Wet Slug  
Capacitor, Fixed, Film, Metallized  
Capacitor, Fixed, Glass  
Capacitor, Fixed, Metal Film  
Capacitor, Fixed, Mica  
Capacitor, Fixed, Mica, Button  
Capacitor, Fixed, Mica, Dipped  
Capacitor, Fixed, Mica, Foil  
Capacitor, Fixed, Mica, Metallized  
Capacitor, Fixed, Mica, Reconstituted  
Capacitor, Fixed, Mica, Silver  
Capacitor, Fixed, Network  
Capacitor, Fixed, Oil Filled  
Capacitor, Fixed, Paper  
Capacitor, Fixed, Paper, Foil  
Capacitor, Fixed, Paper, Metallized  
Capacitor, Fixed, Paper/Plastic  
Capacitor, Fixed, Paper/Plastic, Foil  
Capacitor, Fixed, Paper/Plastic, Metallized  
Capacitor, Fixed, Plastic

Capacitor, Fixed, Plastic, Foil  
Capacitor, Fixed, Plastic, Nylon  
Capacitor, Fixed, Plastic, Polycarbonate, Foil  
Capacitor, Fixed, Plastic, Polycarbonate, Metallized  
Capacitor, Fixed, Plastic, Polyester  
Capacitor, Fixed, Plastic, Polyester, Metallized  
Capacitor, Fixed, Plastic, Polypropylene  
Capacitor, Fixed, Plastic, Polystyrene, Foil  
Capacitor, Fixed, Plastic, Teflon  
Capacitor, Fixed, Polycarbonate  
Capacitor, Fixed, Polycarbonate, Foil  
Capacitor, Fixed, Polycarbonate, Metallized  
Capacitor, Fixed, Polyester, Foil  
Capacitor, Fixed, Polyester, Metallized  
Capacitor, Fixed, Polypropylene  
Capacitor, Fixed, Polypropylene, Foil  
Capacitor, Fixed, Polypropylene, Metallized  
Capacitor, Fixed, Polystyrene  
Capacitor, Fixed, Polystyrene, Foil  
Capacitor, Fixed, Polystyrene, Metallized  
Capacitor, Fixed, Porcelain  
Capacitor, Fixed, Teflon  
Capacitor, Fixed, Ti Diox  
Capacitor, Variable  
Capacitor, Variable, Air  
Capacitor, Variable, Air, Piston Tubular  
Capacitor, Variable, Air, Trimmer  
Capacitor, Variable, Ceramic  
Capacitor, Variable, Ceramic Dielectric  
Capacitor, Variable, FEP  
Capacitor, Variable, Glass  
Capacitor, Variable, Mica  
Capacitor, Variable, Piston  
Capacitor, Variable, Polycarbonate, Foil

CONTINUED ON PAGE 4.

# ELECTRONIC PARTS RELIABILITY DATA (EPRD)

Access a searchable, online database

**BUY NOW**

**QUANTERION**  
SOLUTIONS INCORPORATED

266 Genesee Street Utica, NY 13502  
(877) 808-0097 (toll free)  
Qinfo@Quanterion.com

quanterion.com



Connector, PCB: Printed Circuit Board, Single Mating  
 End, Pin-Terminal, Receptacle  
 Connector, PCB: Printed Circuit Board, Single Mating  
 End, Solder, Receptacle  
 Connector, PCB: Printed Circuit Board, Single Mating  
 End, Solder-Terminal, Receptacle  
 Connector, PWB  
 Connector, PWB: Printed Wiring Board  
 Connector, Phone  
 Connector, Phone, Jack  
 Connector, Piercing  
 Connector, Pin and Socket, Crimp  
 Connector, Pin-Terminal, Receptacle  
 Connector, Pin-Terminal, Single Mating  
 End, Receptacle  
 Connector, Plug  
 Connector, Plug, APU Fire Detector  
 Connector, Plug, Banana  
 Connector, Plug, Clip  
 Connector, Plug, Electric  
 Connector, Plug, Electric, Anti-Collision Light  
 Connector, Plug, Electric, Battery  
 Connector, Plug, Electric, Computer  
 Connector, Plug, Electric, Disconnect  
 Connector, Plug, Electric, External Power Monitor Panel  
 Connector, Plug, Electric, Fire Detector  
 Connector, Plug, Electric, Hydraulic Pressure Switch  
 Connector, Plug, Electric, Jet Panel  
 Connector, Plug, Electric, Panel  
 Connector, Plug, Electric, Power Supply  
 Connector, Plug, Electric, Pressure  
 Connector, Plug, Electric, Sensor  
 Connector, Plug, Electric, USB  
 Connector, Plug, Electric, Yaw  
 Connector, Plug, Electrical  
 Connector, Plug, Fiber  
 Connector, Plug, Field Port  
 Connector, Plug, Keying  
 Connector, Plug, Modular Phone  
 Connector, Plug, SDC Disconnect  
 Connector, Plug, Transmission  
 Connector, Port  
 Connector, Power  
 Connector, Power Lock  
 Connector, Power, Compression  
 Connector, Pressure Type  
 Connector, Printed Circuit- Terminal, Single Mating

End, Receptacle  
 Connector, Probe  
 Connector, Probe, Adapter  
 Connector, Probe, Tip  
 Connector, RF Strip Finger  
 Connector, RF: Radio Frequency  
 Connector, RF: Radio Frequency, BNC  
 Connector, RF: Radio Frequency, Single Mating End, Crimp, Receptacle  
 Connector, RF: Radio Frequency, Subminiature  
 Connector, RF: Radio Frequency, Termination-Open  
 Connector, Rack And Panel  
 Connector, Rack And Panel, Receptacle  
 Connector, Rack And Panel, Single Mating  
 End, Solder, Receptacle  
 Connector, Receptacle  
 Connector, Receptacle, Blue Ribbon  
 Connector, Receptacle, Collective, Sensor  
 Connector, Receptacle, D-Microminiature  
 Connector, Receptacle, D-Subminiature  
 Connector, Receptacle, Disconnect  
 Connector, Receptacle, Electric  
 Connector, Receptacle, Electrical  
 Connector, Receptacle, Electrical, Filter Pin  
 Connector, Receptacle, Microribbon  
 Connector, Receptacle, Modular Phone  
 Connector, Receptacle, Pitch Bias Actuator  
 Connector, Receptacle, Rescue Hoist, Instrument Panel  
 Connector, Receptacle, Utility Light  
 Connector, Rectangular  
 Connector, Rectangular, Electrical  
 Connector, Rectangular, Multi-Contact  
 Connector, Rectangular, Panel  
 Connector, Rectangular, Panel, DIN  
 Connector, Rotary  
 Connector, Round  
 Connector, Screw-Terminal, Single Mating End, Receptacle  
 Connector, Shunt, DIP  
 Connector, Shunt, Programmable  
 Connector, Signal  
 Connector, Signal, Quick Disconnect  
 Connector, Single Mating End  
 Connector, Single Mating End, Receptacle  
 Connector, Socket  
 Connector, Socket, Shim  
 Connector, Socket, Shroud  
 Connector, Solder  
 Connector, Solder Lug, Single Mating End, Receptacle  
 Connector, Solder, Single Mating End, Plug  
 Connector, Solder, Single Mating End, Receptacle



Capacitor, Variable, Polyimide-Fl  
 Capacitor, Variable, Polyphe-Fl  
 Capacitor, Variable, Polypropylene, Metal  
 Capacitor, Variable, Polystyrene, Metallized  
 Capacitor, Variable, Teflon  
 Capacitor, Variable, Vacuum  
 Connector  
 Connector, AC: Alternating Current  
 Connector, AMP  
 Connector, Adapter  
 Connector, Air Hose  
 Connector, Amphenol  
 Connector, Anode  
 Connector, Arresting  
 Connector, Assembly  
 Connector, BNC, Single Mating End, Receptacle  
 Connector, Battery  
 Connector, Battery Holder  
 Connector, Bayonet Coupling  
 Connector, Box  
 Connector, Box, Electrical  
 Connector, Cable, Electrical, Flat  
 Connector, Carrier  
 Connector, Circular  
 Connector, Circular, Audio  
 Connector, Circular, KPT  
 Connector, Circular, Miniature  
 Connector, Circular, Multi-Contact  
 Connector, Circular, PT  
 Connector, Circular, Special  
 Connector, Coaxial  
 Connector, Coaxial, 90 Degree  
 Connector, Coaxial, Assembly  
 Connector, Coaxial, Cap  
 Connector, Coaxial, FRRF  
 Connector, Coaxial, Plug  
 Connector, Coaxial, Rack And Panel  
 Connector, Coaxial, Single Mating End, Receptacle  
 Connector, Coaxial, Tap  
 Connector, Coaxial, Termination  
 Connector, Communication  
 Connector, Connector And Filter  
 Connector, Crimp Terminal, Single Mating End, Receptacle  
 Connector, Crimp and Solder, Single Mating End, Receptacle  
 Connector, Crimp, Single Mating End, Plug  
 Connector, Crimp, Single Mating End, Receptacle  
 Connector, Cylinder  
 Connector, D-Subminiature, Single Mating End, Pin-Terminal, Receptacle  
 Connector, DIN  
 Connector, DIP Adapter  
 Connector, Dummy  
 Connector, Dummy, Plug  
 Connector, EMI Filter  
 Connector, Edge Card  
 Connector, Edge Card, Single Mating End, Receptacle  
 Connector, Elastomeric  
 Connector, Electric  
 Connector, Electrical  
 Connector, Electrical, PWB  
 Connector, Electrical, Plug  
 Connector, Electrical, Plug, Dual  
 Connector, Electrical, Plug, PCB: Printed Circuit Board  
 Connector, Electrical, Plug, PCB: Printed Circuit Board, Right Angle  
 Connector, Electrical, Receptacle  
 Connector, Electrical, Receptacle, PCB: Printed Circuit Board  
 Connector, Electrical, Receptacle, PCB: Printed Circuit Board, Filtered  
 Connector, Electrical, Receptacle, Right Angle, Dual  
 Connector, Electrical, Receptacle, Straight, Dual  
 Connector, Electrical, Rectangular  
 Connector, Electrical, Rectangular, D-Sub  
 Connector, Electron Tube  
 Connector, Engine Fire Detector  
 Connector, Ferrite Bead  
 Connector, Flexible Cable  
 Connector, Header, PCB: Printed Circuit Board, Plug  
 Connector, Header, PWB  
 Connector, Hexagon  
 Connector, High Voltage  
 Connector, Instrument Light  
 Connector, Intercom  
 Connector, Jack  
 Connector, Jack, Test  
 Connector, Jackpost  
 Connector, Jackscrew  
 Connector, Jones Type  
 Connector, Male  
 Connector, Metric CIS  
 Connector, Micro  
 Connector, Micro, Ribbon  
 Connector, Mounting Tab  
 Connector, PC  
 Connector, PC, Edge  
 Connector, PCB: Printed Circuit Board  
 Connector, PCB: Printed Circuit Board, Receptacle  
 Connector, PCB: Printed Circuit Board, Single Mating End, Crimp, Receptacle

Connector, Special Purpose	Diode, Current Regulator
Connector, Spiral Wrap	Diode, Detector/Mixer
Connector, Splice, Butt	Diode, Diode Array
Connector, Splice, Prl	Diode, Doubler, Voltage
Connector, Strip, Stamping	Diode, Dual
Connector, Switch	Diode, General Purpose
Connector, Switch Assembly	Diode, Germanium
Connector, Swivel	Diode, High Frequency, Dual
Connector, Tap	Diode, LED: Light Emitting Diode
Connector, Telephone	Diode, LED: Light Emitting Diode, Array
Connector, Telephone Accessory	Diode, LED: Light Emitting Diode, Array, Infrared
Connector, Terminal	Diode, LED: Light Emitting Diode, Lamp
Connector, Terminal Board	Diode, LED: Light Emitting Diode, Lamp, Array
Connector, Terminal Set, Quick Disconnect	Diode, LED: Light Emitting Diode, Light Bar
Connector, Terminal, Feed-Thru	Diode, Low Power
Connector, Terminal, Lug	Diode, Matched Pair
Connector, Terminal, Lug, Solder	Diode, Microwave
Connector, Terminal, Stand-Off	Diode, Microwave, Detector/Mixer
Connector, Terminal, Stud	Diode, Microwave, Gunn Effect
Connector, Test Adapter	Diode, Microwave, PIN
Connector, Test Point	Diode, Microwave, PIN: Positive-Intrinsic-Negative
Connector, Triaxial Plug	Diode, Microwave, Schottky Barrier
Connector, Triaxial Plug, 90 Degree	Diode, Microwave, Step Recovery
Connector, Unfiltered Line	Diode, Microwave, Tunnel
Connector, Utility	Diode, Microwave, Tunnel, Step Recovery
Connector, Utility, Plug	Diode, Microwave, Varactor
Connector, Wafer, Receptacle	Diode, Microwave, Varactor, Voltage Variable
Connector, Wire	Capacitor
Connector, Wire Wrap, Single Mating End, Receptacle	Diode, Noise Generating
Connector, Wire, Dust Cover	Diode, PIN
Connector, Wire, Nut	Diode, Photodiode
Connector, Wire, Saddle	Diode, Power High
Connector, Zero Insertion Force	Diode, Power Low
Contact	Diode, Power Medium
Contact, Button	Diode, Power Rectifier, Fast Recovery
Contact, CRT	Diode, Power Rectifier, Schottky
Contact, Connector	Diode, Power Rectifier, Schottky, Dual
Contact, Connector, RF	Diode, Power Rectifier, Standard Recovery
Contact, Connector, RF, Assembly	Diode, Power Rectifier, Ultra-Fast Recovery
Contact, Electric	Diode, Quad
Contact, Electrical	Diode, Rectifier
Contact, Electrical, Crimp	Diode, Rectifier, Array
Contact, Electrical, Crimp, Male	Diode, Rectifier, Bridge
Contact, Electrical, Receptacle	Diode, Rectifier, Bridge, Full Wave
Contact, Electrical, Strip	Diode, Rectifier, Center Tap
Contact, Finger	Diode, Rectifier, Current
Contact, Pin	Diode, Rectifier, Fast
Contact, Round	Diode, Rectifier, Fast Recovery
Contact, Socket	Diode, Rectifier, Fast Recovery, Silicon
Contact, Socket, Coaxial	Diode, Rectifier, High Power
Contact, Socket, Crimp	Diode, Rectifier, High Power, Silicon
Contact, Switch	Diode, Rectifier, High Speed
Diode	

CONTINUED ON PAGE 7.

# COMING APRIL 3: NPRD-2023

QUANTERION  
SOLUTIONS INCORPORATED

## NONELECTRONIC PARTS RELIABILITY DATA

# NPRD

Nonelectronic Parts Reliability Data 2023 (NPRD-2023) presents field failure rate data on a wide variety of mechanical and electromechanical parts and assemblies. The part types and data in NPRD-2023 cover ground, airborne and naval environments.

### GOAL

Your product's success in the marketplace, by improving operation success, safety, and life-cycle costs with reliability prediction data and analysis.

### NEED

Reliability estimates based off of field data are key when considering design options such as materials, parts, and stress levels. Reliability is maximized when it is designed into products.

### SOLUTION

Use historical reliability field data to support design trade-offs and achieve reliability targets. The NPRD series has been enabling engineers to design reliable products and systems for more than 30 years.



LEARN MORE > [WWW.QUANTERION.COM/NPRD-2023](https://roads.quanterion.com/NPRD-2023)

# ROADS

Reliability Online Automated Databook System

The Quanterion Reliability Online Automated Databook System (ROADS) provides customized access to any or all of these Quanterion Databooks:

- > Nonelectronic Parts Reliability Data (NPRD-2016 and NPRD-2023 when released)
- > Electronic Parts Reliability Data (EPRD-2014)
- > Failure Modes / Mechanisms Distribution (FMD-2016)

ROADS provides efficient search and retrieval of all information contained in the NPRD, EPRD, and FMD hard copy databooks. This interactive online tool can be accessed anywhere with an Internet connection. Users also gain access to NPRD, EPRD, and FMD updates.

The screenshot shows the ROADS web application interface. At the top, there's a search bar for 'Part/Mil Number or National Stock Number (NSN)'. Below it, there are filters for 'Primary Index Term', 'Part Category', 'Part Description', and 'Manufacturer'. There are also checkboxes for 'Exclude Blank Manufacturers' and 'Exclude Vendor Manufacturers'. The main section displays a table with columns: Part Description, Quality, Env, Source, Failure Rate, # Failed, Hours/Miles, and Page. The table lists various bearings and their associated failure data.

Part Description	Quality	Env	Source	Failure Rate	# Failed	Hours/Miles	Page
Bearing	Military	AC	⊕	2.799532	⊕	⊕	177
Bearing	Military	AC	⊕	1.167407	⊕	⊕	177
Bearing	Commercial	AC	⊕	19.84762	⊕	⊕	177
Bearing	Commercial	AUT	NPRD-050	11.40789	5	8.456000	177
Bearing	Commercial	GP	⊕	7.967761	⊕	⊕	177
Bearing	Commercial	GP	23004-800	14.15862	82	5.790779	177
Bearing	Commercial	GP	NPRD-073	4.169924	16	3.857600	177
Bearing	Commercial	GP	NPRD-103	119.41967	0	8.094000	177
Bearing	Commercial	GMFR	NPRD-043	21.92134	34	1.881000	177
Bearing	Military	GMFR	⊕	9.747818	⊕	⊕	177

Learn more > [www.quanterion.com/roads](https://roads.quanterion.com)

QUANTERION  
SOLUTIONS INCORPORATED

266 Genesee Street Utica, NY 13502

(877) 808-0097 (toll free)

quanteron.com





Diode, Rectifier, High Voltage	IC, Digital, ASIC, FPGA
Diode, Rectifier, Medium Recovery, Silicon	IC, Digital, ASIC: Application Specific Integrated
Diode, Rectifier, Power	Ci, I/O: Input/Output Parallel Port
Diode, Rectifier, Power Schottky	IC, Digital, Adder, Full
Diode, Rectifier, Schottky	IC, Digital, Arithmetic
Diode, Rectifier, Selenium	IC, Digital, Arithmetic, Adder
Diode, Rectifier, Silicon	IC, Digital, Arithmetic, Adder, Full
Diode, Rectifier, Ultra-Fast Recovery	IC, Digital, Arithmetic, Comparator
Diode, Sampler	IC, Digital, Arithmetic, Function Generator, ALU
Diode, Schottky	IC, Digital, Arithmetic, Logic Unit
Diode, Selenium	IC, Digital, Arithmetic, Magnitude Comparator
Diode, Silicon	IC, Digital, Arithmetic, Multiplier
Diode, Silicon Carbide	IC, Digital, Arithmetic, Multiplier/Divider
Diode, Small Signal	IC, Digital, Arithmetic, Parity Generator
Diode, Small Signal, Schottky	IC, Digital, Array
Diode, Small Signal, Switch	IC, Digital, Array, Diode
Diode, Small Signal, Switching	IC, Digital, Array, Field Programmable
Diode, Stabistor	IC, Digital, Array, Gate
Diode, Step Recovery	IC, Digital, Array, Hard Logic
Diode, Suppressor, Transient	IC, Digital, Array, PAL
Diode, Suppressor, Voltage	IC, Digital, Array, PGA
Diode, Surge, Leg Stand Off	IC, Digital, Array, PLA
Diode, Switching	IC, Digital, Array, PLD
Diode, Switching, Dual	IC, Digital, Array, PLD, Erasable
Diode, Switching, High Speed	IC, Digital, Array, PLS
Diode, Switching, Silicon	IC, Digital, Array, Transistor
Diode, TVS: Transient Voltage Suppression	IC, Digital, Buffer
Diode, TVS: Transient Voltage Suppression, Bi-Directional	IC, Digital, Buffer, 8 Position
Diode, TVS: Transient Voltage Suppression, Uni-Directional	IC, Digital, Buffer, Driver
Diode, Thyristor	IC, Digital, Buffer, Dual
Diode, Thyristor, SCR	IC, Digital, Buffer, Dual, NAND
Diode, Thyristor, SCR: Silicon Controlled Rectifier	IC, Digital, Buffer, Expandable
Diode, Thyristor, Triac	IC, Digital, Buffer, Hexagon
Diode, Tunnel	IC, Digital, Buffer, Inverter
Diode, Varactor	IC, Digital, Buffer, Inverter, Hexagon
Diode, Varistor	IC, Digital, Buffer, Inverting, Hex
Diode, Zener	IC, Digital, Buffer, NAND
Diode, Zener, Avalanche	IC, Digital, Buffer, NAND, Quad
Diode, Zener, Transient Suppressor	IC, Digital, Buffer, NAND, Quad, 2 Input
Diode, Zener, Voltage Reference	IC, Digital, Buffer, Non-Inverting, Hex
Diode, Zener, Voltage Reference, Silicon	IC, Digital, Buffer, Non-Inverting, Hexagon
Diode, Zener, Voltage Regulator	IC, Digital, Buffer, Octal
Diode, Zener, Voltage Regulator, Silicon	IC, Digital, Buffer, Schmitt Trigger
IC, Digital	IC, Digital, Buffer, Tri-State, Hex
IC, Digital, ALU: Arithmetic Logic Unit	IC, Digital, Buffer, True/Complement, Quad
IC, Digital, ALU: Arithmetic Logic Unit, Fixed Point	IC, Digital, Buffer, Ultra-High Speed, Tri-State
IC, Digital, AND Gate, 2 Input	IC, Digital, Buffer/Driver
IC, Digital, AND Gate, 2 Input, Dual	IC, Digital, Buffer/Driver, 3-State
IC, Digital, AND Gate, 3 Input, Triple	IC, Digital, Buffer/Driver, AND
IC, Digital, ASIC	IC, Digital, Buffer/Driver, HEX
	IC, Digital, Buffer/Driver, Hexagon
	IC, Digital, Buffer/Driver, Inverting, Hex
	IC, Digital, Buffer/Driver, Inverting, Tri-State, Hex

IC, Digital, Buffer/Driver, Inverting, Tri-State, Octal  
 IC, Digital, Buffer/Driver, NAND, Dual, 4 Input  
 IC, Digital, Buffer/Driver, Non-Inverting, Quad  
 IC, Digital, Buffer/Driver, Non-Inverting, Tri-State, Octal  
 IC, Digital, Buffer/Driver, Octal  
 IC, Digital, Buffer/Driver, Octal, Inverting/3-State  
 IC, Digital, Buffer/Driver, Octal, Non-Invert/3-State  
 IC, Digital, Buffer/Driver, Open Collector  
 IC, Digital, Buffer/Driver, Tri-State, Hex  
 IC, Digital, Buffer/Line Driver, Octal  
 IC, Digital, Buffer/Line Driver, Tri-State, Octal  
 IC, Digital, Carry Generator, Lookahead  
 IC, Digital, Chipset, Modem  
 IC, Digital, Clock Driver  
 IC, Digital, Clock Generator  
 IC, Digital, Clock Generator, Real Time  
 IC, Digital, Color Encoder  
 IC, Digital, Communication  
 IC, Digital, Communication, Asynchronous Adapter  
 IC, Digital, Communication, Asynchronous Adapter, Interface  
 IC, Digital, Comparator  
 IC, Digital, Comparator, 4-Bit  
 IC, Digital, Comparator, 8-Bit  
 IC, Digital, Comparator, Dual  
 IC, Digital, Comparator, Magnitude  
 IC, Digital, Comparator, Quad  
 IC, Digital, Comparator, Voltage  
 IC, Digital, Complex Programmable Logic Device  
 IC, Digital, Controller  
 IC, Digital, Controller, Asynchronous, Binary  
 IC, Digital, Controller, Communication  
 IC, Digital, Controller, DMA: Direct Memory Access  
 IC, Digital, Controller, Disk Drive Data  
 IC, Digital, Controller, Driver  
 IC, Digital, Controller, Dual  
 IC, Digital, Controller, Floppy Disk  
 IC, Digital, Controller, Interface  
 IC, Digital, Controller, Microprogram  
 IC, Digital, Controller, PCI-X To SATA  
 IC, Digital, Controller, Peripheral Interface  
 IC, Digital, Controller, Peripheral Interface, Programmable  
 IC, Digital, Controller, Programmable  
 IC, Digital, Controller, Protocol  
 IC, Digital, Controller, Serial  
 IC, Digital, Controller, Serial Communication  
 IC, Digital, Controller, Synchronizer  
 IC, Digital, Controller, Synchronizer, Edge Trigger  
 IC, Digital, Converter, A/D: Analog to Digital  
 IC, Digital, Converter, Code

IC, Digital, Converter, D/A: Digital to Analog  
 IC, Digital, Converter, DC-DC  
 IC, Digital, Converter, DC-TO-DC  
 IC, Digital, Converter, HEX, Inverter Level OC  
 IC, Digital, Converter/Translator  
 IC, Digital, Counter, Asynchronous, Up  
 IC, Digital, Counter, Synchronous, Up  
 IC, Digital, Counter, Synchronous, Up/Down  
 IC, Digital, Counter/Divider  
 IC, Digital, Counter/Divider, 4-Bit  
 IC, Digital, Counter/Divider, BCD  
 IC, Digital, Counter/Divider, BCD: Binary Coded Decimal  
 IC, Digital, Counter/Divider, Binary  
 IC, Digital, Counter/Divider, Binary, 4-Bit  
 IC, Digital, Counter/Divider, Binary, Dual  
 IC, Digital, Counter/Divider, Binary, Synchronous  
 IC, Digital, Counter/Divider, Binary, Up, Asynchronous  
 IC, Digital, Counter/Divider, Binary, Up/Down  
 IC, Digital, Counter/Divider, Binary, Up/Down, Synchronouuss  
 IC, Digital, Counter/Divider, Decade  
 IC, Digital, Counter/Divider, Decade, BCD: Binary Coded Decimal, Synchronous  
 IC, Digital, Counter/Divider, Decade, Synchronous  
 IC, Digital, Counter/Divider, Decade, Up/Down  
 IC, Digital, Counter/Divider, Decade, Up/Down, Synchronous  
 IC, Digital, Counter/Divider, Decade/ Binary, Presettable  
 IC, Digital, Counter/Divider, Divide By 12  
 IC, Digital, Counter/Divider, Divide By 8  
 IC, Digital, Counter/Divider, Divide By N  
 IC, Digital, Counter/Divider, Frequency, Prescaler  
 IC, Digital, DVI Transmitter  
 IC, Digital, Data Selector/Multiplexer  
 IC, Digital, Data Selector/Multiplexer, 16 Input  
 IC, Digital, Data Selector/Multiplexer, 8 Input  
 IC, Digital, Data Selector/Multiplexer, Dual, 4 Input  
 IC, Digital, Data Selector/Multiplexer, Dual, 4 Input, Tri-State Output  
 IC, Digital, Data Selector/Multiplexer, Quad, 2 Input  
 IC, Digital, Data Selector/Multiplexer, Quad, 2 Input, Storage  
 IC, Digital, Data Selector/Multiplexer, Quad, 2 Input, Tri-State Output  
 IC, Digital, Decoder

IC,Digital,Decoder,1 Of 8	IC,Digital,EDAC: Error Detection and Correction
IC,Digital,Decoder,BCD/Binary	IC,Digital,EDAC: Error Detection and Correction, Generator/Checker,CRC
IC,Digital,Decoder,BCD/Decimal	IC,Digital,EDAC: Error Detection and Correction, Parity/Carry,Generator
IC,Digital,Decoder,BCD: Binary Coded Decimal to Decimal	IC,Digital,Embedded Processor
IC,Digital,Decoder,Binary To Octal	IC,Digital,Encoder
IC,Digital,Decoder,Binary/BCD	IC,Digital,Encoder,Priority
IC,Digital,Decoder,Demultiplexer	IC,Digital,Encoder,Priority,8 To 3 Line
IC,Digital,Decoder,Demultiplexer,1-to-8 Line	IC,Digital,Expander
IC,Digital,Decoder/Demultiplexer	IC,Digital,Expander,Gate Expander
IC,Digital,Decoder/Demultiplexer,1 Of 8	IC,Digital,Flip-Flop
IC,Digital,Decoder/Demultiplexer,2 To 4 Line	IC,Digital,Flip-Flop,D-Type
IC,Digital,Decoder/Demultiplexer,3 To 8 Line	IC,Digital,Flip-Flop,D-Type,Dual
IC,Digital,Decoder/Demultiplexer,4 To 16 Line	IC,Digital,Flip-Flop,D-Type,Hex
IC,Digital,Decoder/Demultiplexer,Dual,2 To 4 Line	IC,Digital,Flip-Flop,D-Type,Hexagon
IC,Digital,Decoder/Driver	IC,Digital,Flip-Flop,D-Type,Octal
IC,Digital,Decoder/Driver,BCD: Binary Coded Decimal to Decimal	IC,Digital,Flip-Flop,D-Type,Octal,3 State
IC,Digital,Decoder/Driver,Display	IC,Digital,Flip-Flop,D-Type,Positive Edge Triggered, Dual
IC,Digital,Delay Line	IC,Digital,Flip-Flop,D-Type,Quad
IC,Digital,Digital	IC,Digital,Flip-Flop,D-Type,Single
IC,Digital,Disk Channel Qualifier	IC,Digital,Flip-Flop,JK
IC,Digital,Divider	IC,Digital,Flip-Flop,JK,Dual
IC,Digital,Driver	IC,Digital,Flip-Flop,JK-Type
IC,Digital,Driver,Bus	IC,Digital,Flip-Flop,JK-Type,Dual
IC,Digital,Driver,Clock	IC,Digital,Flip-Flop,JK-Type,Dual,Negative Edge Triggered
IC,Digital,Driver,Clock,Dual	IC,Digital,Flip-Flop,JK-Type,Positive Edge Triggered,Dual
IC,Digital,Driver,Display,LED: Light Emitting Diode	IC,Digital,Flip-Flop,RS
IC,Digital,Driver,Dual	IC,Digital,Flip-Flop,S/R: Set/Reset
IC,Digital,Driver,Hex,2-Input NAND	IC,Digital,Function Generator
IC,Digital,Driver,Interface	IC,Digital,Gate
IC,Digital,Driver,Line	IC,Digital,Gate,AND
IC,Digital,Driver,Line,Differential,Dual	IC,Digital,Gate,AND,2 Input,Quad
IC,Digital,Driver,Line,Dual	IC,Digital,Gate,AND,Dual
IC,Digital,Driver,Line,NAND	IC,Digital,Gate,AND,Dual,3 Input
IC,Digital,Driver,Line,Quadruple,Single Ended	IC,Digital,Gate,AND,Dual,4 Input
IC,Digital,Driver,Line/Bus	IC,Digital,Gate,AND,Dual-4-Input
IC,Digital,Driver,MOSFET,High Speed,Dual	IC,Digital,Gate,AND,Quad,2 Input
IC,Digital,Driver,Memory	IC,Digital,Gate,AND,Quad-2-Input
IC,Digital,Driver,Memory,Core	IC,Digital,Gate,AND,Triple 3-Input
IC,Digital,Driver,NOR,Hex-2-Input	IC,Digital,Gate,AND,Triple,3 Input
IC,Digital,Driver,OR,Hex-2-Input	IC,Digital,Gate,AND-OR,Inverter
IC,Digital,Driver,Octal	IC,Digital,Gate,AND-OR-INVERT
IC,Digital,Driver,Peripheral,Dual	IC,Digital,Gate,AND-OR-INVERT,2/2/3/3 Input
IC,Digital,Driver,Peripheral,Quad	IC,Digital,Gate,AND-OR-INVERT,4 Wide,2 Input
IC,Digital,Driver,Power,High Current,High Voltage	IC,Digital,Gate,AND-OR-INVERT,4-2-3-2 Input
IC,Digital,Driver,Predriver,Coil	IC,Digital,Gate,AND/NOR,2/2/2/3 Input
IC,Digital,Driver,Quad	IC,Digital,Gate,AND/NOR,Dual,2 Input
IC,Digital,Driver,Receiver	IC,Digital,Gate,AND/NOR,Dual,2/2 Input



IC, Digital, Gate, AND/OR  
 IC, Digital, Gate, ENOR  
 IC, Digital, Gate, ENOR: Exclusive NOR, Quad, 2 Input  
 IC, Digital, Gate, EOR  
 IC, Digital, Gate, EOR: Exclusive OR, Quad  
 IC, Digital, Gate, EOR: Exclusive OR, Quad, 2 Input  
 IC, Digital, Gate, Expandable  
 IC, Digital, Gate, Multifunction, Expandable  
 IC, Digital, Gate, Multifunction, Expandable, Dual, 4 Input  
 IC, Digital, Gate, NAND  
 IC, Digital, Gate, NAND, 12 Input  
 IC, Digital, Gate, NAND, 13 Input  
 IC, Digital, Gate, NAND, 13-Input  
 IC, Digital, Gate, NAND, 2 Input, Hex  
 IC, Digital, Gate, NAND, 2 Input, Quad  
 IC, Digital, Gate, NAND, 4 Input  
 IC, Digital, Gate, NAND, 4 Input, Dual  
 IC, Digital, Gate, NAND, 8 Input  
 IC, Digital, Gate, NAND, 8-Input  
 IC, Digital, Gate, NAND, Dual  
 IC, Digital, Gate, NAND, Dual, 3 Input  
 IC, Digital, Gate, NAND, Dual, 4 Input  
 IC, Digital, Gate, NAND, Dual-4-Input  
 IC, Digital, Gate, NAND, Quad  
 IC, Digital, Gate, NAND, Quad, 2 Input  
 IC, Digital, Gate, NAND, Quad, 2 Input/Schmitt Trigger  
 IC, Digital, Gate, NAND, Quad-2-Input  
 IC, Digital, Gate, NAND, Schmitt Trigger  
 IC, Digital, Gate, NAND, Single, 8 Input  
 IC, Digital, Gate, NAND, Triple 3 Input  
 IC, Digital, Gate, NAND, Triple, 3 Input  
 IC, Digital, Gate, NAND, Triple-3-Input  
 IC, Digital, Gate, NOR  
 IC, Digital, Gate, NOR, 2 Input, Quad  
 IC, Digital, Gate, NOR, Dual, 4 Input  
 IC, Digital, Gate, NOR, Dual, 5 Input  
 IC, Digital, Gate, NOR, Dual-4-Input  
 IC, Digital, Gate, NOR, Quad  
 IC, Digital, Gate, NOR, Quad, 2 Input  
 IC, Digital, Gate, NOR, Quad-2-Input  
 IC, Digital, Gate, NOR, Triple, 3 Input  
 IC, Digital, Gate, NOR, Triple-3-Input  
 IC, Digital, Gate, NOR/OR, 8 Input  
 IC, Digital, Gate, OR  
 IC, Digital, Gate, OR, 2 Input, Quad  
 IC, Digital, Gate, OR, Dual, 4 Input  
 IC, Digital, Gate, OR, Quad  
 IC, Digital, Gate, OR, Quad, 2 Input  
 IC, Digital, Gate, OR, Quad-2-Input  
 IC, Digital, Gate, OR, Triple, 3 Input  
 IC, Digital, Gate, OR/NOR  
 IC, Digital, Gate, OR/NOR, Dual, 4 Input  
 IC, Digital, Gate, Power  
 IC, Digital, Gate, Schmitt Trigger  
 IC, Digital, Gate, XOR, 2 Input, Quad  
 IC, Digital, Generator  
 IC, Digital, Generator, Clock  
 IC, Digital, Generator, Current Pulse  
 IC, Digital, Generator, Parity, 9 Bit  
 IC, Digital, Generator/Checker, Parity  
 IC, Digital, Graphics Processor  
 IC, Digital, Interface, Peripheral  
 IC, Digital, Inverter  
 IC, Digital, Inverter, Buffer, Hexagon  
 IC, Digital, Inverter, Buffer/Driver  
 IC, Digital, Inverter, HEX  
 IC, Digital, Inverter, HEX, 3 State  
 IC, Digital, Inverter, HEX, Schmitt Trigger  
 IC, Digital, Inverter, Hexagon  
 IC, Digital, Inverter, Schmitt Trigger  
 IC, Digital, Inverter, Schmitt Trigger, Hex  
 IC, Digital, Inverter, Schmitt Trigger, Hexagon  
 IC, Digital, Inverter/Buffer, HEX, Tri-State  
 IC, Digital, Latch

CONTINUED ON PAGE 12.

# Get Started in Reliability Engineering

## Reliability 101:

## Introduction to Reliability Engineering

Offered June 13-15 in Virginia Beach

**REGISTER NOW**

**QUANTERION**  
SOLUTIONS INCORPORATED

266 Genesee Street Utica, NY 13502  
(877) 808-0097 (toll free)  
Qinfo@Quanterion.com

quanterion.com



IC, Digital, Latch Transparent, Octal D  
 IC, Digital, Latch Transparent, Octal D, 3-State  
 IC, Digital, Latch, Addressable  
 IC, Digital, Latch, Bistable  
 IC, Digital, Latch, D-Type  
 IC, Digital, Latch, D-Type, Addressable  
 IC, Digital, Latch, D-Type, Octal  
 IC, Digital, Latch, D-Type, Octal, Tri-State Output  
 IC, Digital, Latch, D-Type, Transparent  
 IC, Digital, Latch, Octal  
 IC, Digital, Latch, RS  
 IC, Digital, Latch, S/R: Set/Reset  
 IC, Digital, Latch, Transparent, Tri-State, Octal  
 IC, Digital, Line/Bus Driver  
 IC, Digital, Line/Bus Driver, Buffer  
 IC, Digital, Line/Bus Receiver  
 IC, Digital, Logic, Programmable, PAL: Programmable Array Logic  
 IC, Digital, Logic, Programmable, PLA: Programmable Array Logic  
 IC, Digital, Logic, Programmable, PLD: Programmable Logic Device, Fuse  
 IC, Digital, MSI/LSI  
 IC, Digital, Memory  
 IC, Digital, Memory, Bubble  
 IC, Digital, Memory, EEPROM: Electrically Erasable Programmable Read Only Memory  
 IC, Digital, Memory, EPROM: Erasable Programmable Read Only Memory  
 IC, Digital, Memory, FIFO  
 IC, Digital, Memory, Flash  
 IC, Digital, Memory, Magnetic - BubbleMem  
 IC, Digital, Memory, NOVRAM  
 IC, Digital, Memory, PROM: Programmable Read Only Memory  
 IC, Digital, Memory, RAM: Random Access Memory  
 IC, Digital, Memory, RAM: Random Access Memory, Dynamic  
 IC, Digital, Memory, RAM: Random Access Memory, Dynamic, Page Mode  
 IC, Digital, Memory, RAM: Random Access Memory, Multiport  
 IC, Digital, Memory, RAM: Random Access Memory, Static  
 IC, Digital, Memory, RAM: Random Access Memory, Static, NOVRAM: Non-Volatile Random Access Memory  
 IC, Digital, Memory, ROM: Read Only Memory  
 IC, Digital, Memory, ROM: Read Only Memory, EEPROM: Electrically Erasable Programmable Read Only Memory  
 IC, Digital, Memory, ROM: Read Only Memory, EPROM: Erasable Read Only Memory  
 IC, Digital, Memory, ROM: Read Only Memory, PROM: Programmable Read Only Memory  
 IC, Digital, Memory, ROM: Read Only Memory, UVEPROM: Ultraviolet Erasable/Programmable Read Only Memory  
 IC, Digital, Memory, SDRAM: Synchronous Dynamic Random-Access Memory  
 IC, Digital, Memory, SDRAM: Synchronous Dynamic Random-Access Memory, DDR  
 IC, Digital, Memory, SDRAM: Synchronous Dynamic Random-Access Memory, LPDDR  
 IC, Digital, Memory, SRAM: Static Random-Access Memory  
 IC, Digital, Memory, SRAM: Static Read Only Memory  
 IC, Digital, Memory, UVROM: Ultra-Violet Erasable Programmable Read Only Memory  
 IC, Digital, Micro Computer  
 IC, Digital, Microcontroller  
 IC, Digital, Microcontroller, 8 Bit  
 IC, Digital, Microcontroller, Timer  
 IC, Digital, Microcontroller, UART  
 IC, Digital, Microcontroller, UART: Universal Asynchronous Receiver/Transceiver  
 IC, Digital, Microprocessor  
 IC, Digital, Microprocessor, 16 Bit  
 IC, Digital, Microprocessor, 16-Bit  
 IC, Digital, Microprocessor, 4-Bit  
 IC, Digital, Microprocessor, 4-Bit, Clock  
 IC, Digital, Microprocessor, 8-Bit, Clock  
 IC, Digital, Microprocessor, Bit Slice, 4 Bit  
 IC, Digital, Modulator  
 IC, Digital, Modulator, Demodulator  
 IC, Digital, Monitor, MPU  
 IC, Digital, Multifunction  
 IC, Digital, Multifunction, Peripheral  
 IC, Digital, Multiplexer  
 IC, Digital, Multiplexer, 8 Channel  
 IC, Digital, Multiplexer, 8-Channel  
 IC, Digital, Multiplexer, 8-Channel, 3-State Output  
 IC, Digital, Multiplexer, Analog  
 IC, Digital, Multiplexer, Analog, 16-Channel  
 IC, Digital, Multiplexer, Analog, 4-Channel  
 IC, Digital, Multiplexer, Analog, 6-Channel  
 IC, Digital, Multiplexer, Analog, 8-Channel  
 IC, Digital, Multiplexer, Data Selector  
 IC, Digital, Multiplexer, Demultiplexer  
 IC, Digital, Multiplier  
 IC, Digital, Multivibrator  
 IC, Digital, Multivibrator, Dual

IC, Digital, Multivibrator, Dual, Monostable	IC, Digital, Register, Shift, Bidirectional
IC, Digital, Multivibrator, Monostable	IC, Digital, Register, Shift, Dual
IC, Digital, Multivibrator, Monostable, Dual	IC, Digital, Register, Shift, Dynamic, Dual
IC, Digital, Multivibrator, One Shot	IC, Digital, Register, Shift, PIPO
IC, Digital, Multivibrator, One-Shot	IC, Digital, Register, Shift, PISO
IC, Digital, Multivibrator, Retriggerable	IC, Digital, Register, Shift, PISO: Parallel In
IC, Digital, Multivibrator, Retriggerable, Dual	Serial
IC, Digital, PCI Bridge	Out
IC, Digital, PCI To PCI Bridge	IC, Digital, Register, Shift, Parallel
IC, Digital, PCI-PCI Bridge	IC, Digital, Register, Shift, S/PISO
IC, Digital, Peripheral Driver	IC, Digital, Register, Shift, SIPO
IC, Digital, Peripheral Driver, Clock	IC, Digital, Register, Shift, SIPO: Serial In
IC, Digital, Phase Lock Loop	Parallel
IC, Digital, Prescaler	Out
IC, Digital, Prescaler, Divide by 2	IC, Digital, Register, Shift, SISO: Serial In Serial
IC, Digital, Prescaler, Divide by 4	Out
IC, Digital, Processing Unit	IC, Digital, Register, Shift, Serial/Parallel
IC, Digital, Processing Unit, Central	IC, Digital, Register, Shift, Serial/Parallel I/O
IC, Digital, Processing Unit, Co-Processor	IC, Digital, Register, Shift, Single, PISO: Parallel
IC, Digital, Processing Unit, Co-Processor, Floating	In
Point	Serial Out
IC, Digital, Processing Unit, Logical	IC, Digital, Register, Shift, Single, SIPO: Serial In
IC, Digital, Processing Unit, Signal	Parallel Out
IC, Digital, Processor	IC, Digital, Register, Shift, Universal, 4 Bit
IC, Digital, Receiver	IC, Digital, Register, Storage
IC, Digital, Receiver, Interface	IC, Digital, Register, Tri-State, Octal
IC, Digital, Receiver, Interface, Line	IC, Digital, Selector/Multiplexer, 1 Of 4, Tri-
IC, Digital, Receiver, Line	State,
IC, Digital, Receiver, Line, Differential Quad	Dual
IC, Digital, Receiver, Line, Differential, Dual	IC, Digital, Selector/Multiplexer, 1 Of 8
IC, Digital, Receiver, Line, Differential, Quad	IC, Digital, Sequencer
IC, Digital, Receiver, Line, Dual	IC, Digital, Sequencer, Microprogram
IC, Digital, Receiver, Line/Bus	IC, Digital, Switch
IC, Digital, Receiver/Transmitter	IC, Digital, Switch, SPDT: Single Pole Double
IC, Digital, Receiver/Transmitter, DUART	Throw, Quad
IC, Digital, Receiver/Transmitter, UART	IC, Digital, Timer
IC, Digital, Receiver/Transmitter, USART: Universal	IC, Digital, Timer, Dual
Synchronous Asynchronous Receiver/	IC, Digital, Timer, Programmable
Transceiver	IC, Digital, Timer, Programmable Interval
IC, Digital, Register	IC, Digital, Transceiver
IC, Digital, Register, 2 Port, Quad	IC, Digital, Transceiver, Bidirectional, Tri-
IC, Digital, Register, Counter, Shift	State, Octal
IC, Digital, Register, D-Type	IC, Digital, Transceiver, Bus
IC, Digital, Register, Diagnostic, Octal	IC, Digital, Transceiver, Bus, Buffer
IC, Digital, Register, Edge Trigger, Positive	IC, Digital, Transceiver, Bus, Octal
IC, Digital, Register, FIFO	IC, Digital, Transceiver, Bus, Quad
IC, Digital, Register, File, 4 By 4	IC, Digital, Transceiver, Bus, Single, Inverting
IC, Digital, Register, Interface, Bus	IC, Digital, Transceiver, High-Speed, Single Channel
IC, Digital, Register, Pipeline	IC, Digital, Transceiver, Line
IC, Digital, Register, Shift	IC, Digital, Transceiver, MIL-STD-1553
IC, Digital, Register, Shift, 8 Input, Parallel I/O	IC, Digital, Translator
IC, Digital, Register, Shift, 8 Stage, Synchronous	IC, Digital, Translator, ECL-to-TTL
IC, Digital, Register, Shift, 8-Bit	IC, Digital, Translator, TTL-to-ECL, Quad



IC,Digital,True Complement  
 IC,Digital,Voltage Regulator,Switching Controller  
 IC,Digital,Voltage Supply Monitor,Triple  
 IC,Linear  
 IC,Linear,Amplifier  
 IC,Linear,Amplifier,Audio  
 IC,Linear,Amplifier,Differential  
 IC,Linear,Amplifier,Differential,Dual  
 IC,Linear,Amplifier,Gain Phase Meter  
 IC,Linear,Amplifier,IF: Intermediate Frequency  
 IC,Linear,Amplifier,Instrumentation  
 IC,Linear,Amplifier,Microwave  
 IC,Linear,Amplifier,Pre-Amplifier  
 IC,Linear,Amplifier,RF  
 IC,Linear,Amplifier,RF/IF: Radio Frequency/Intermediate Frequency  
 IC,Linear,Amplifier,Video  
 IC,Linear,Amplifier,Wide Band  
 IC,Linear,Amplifier,Wideband  
 IC,Linear,Analog Switch,FET  
 IC,Linear,Array,Diode  
 IC,Linear,Array,Transistor  
 IC,Linear,Array,Transistor,Dual,Complementary Pair  
 IC,Linear,Array,Transistor,Matched Pair  
 IC,Linear,Clock Driver  
 IC,Linear,Comparator  
 IC,Linear,Comparator,Analog  
 IC,Linear,Comparator,Dual  
 IC,Linear,Comparator,Voltage  
 IC,Linear,Comparator,Voltage,Differential,Dual  
 IC,Linear,Comparator,Voltage,Differential,High Speed  
 IC,Linear,Comparator,Voltage,Differential,Quad  
 IC,Linear,Comparator,Voltage,Dual  
 IC,Linear,Comparator,Voltage,Dual,High Speed  
 IC,Linear,Comparator,Voltage,Precision  
 IC,Linear,Comparator,Voltage,Quad  
 IC,Linear,Comparator/Buffer,Precision,Precision  
 IC,Linear,Controller,Motor,Switched Mode,DC  
 IC,Linear,Controller,Pulse Width Modulator  
 IC,Linear,Controller,Video  
 IC,Linear,Controller,Video,Display  
 IC,Linear,Converter  
 IC,Linear,Converter,A/D,10-Bit  
 IC,Linear,Converter,A/D,12 1/2-Bit  
 IC,Linear,Converter,A/D,12-Bit  
 IC,Linear,Converter,A/D,14-Bit  
 IC,Linear,Converter,A/D,16-Bit  
 IC,Linear,Converter,A/D,4 1/2-Bit  
 IC,Linear,Converter,A/D,4-Bit  
 IC,Linear,Converter,A/D,6 1/2-Bit

## Interested to incorporate EPRD data into your software?

Email [Qinfo@Quanterion.com](mailto:Qinfo@Quanterion.com) to ask about our data agreements.

IC,Linear,Converter,A/D,6-Bit  
 IC,Linear,Converter,A/D,8 1/2-Bit  
 IC,Linear,Converter,A/D,8 3/4-Bit  
 IC,Linear,Converter,A/D,8-Bit  
 IC,Linear,Converter,A/D-D/A: Analog to Digital - Digital to Analog  
 IC,Linear,Converter,A/D: Analog to Digital  
 IC,Linear,Converter,A/D: Analog to Digital,12 Bit  
 IC,Linear,Converter,D/A,1 1/2-Bit  
 IC,Linear,Converter,D/A,10-Bit  
 IC,Linear,Converter,D/A,11-Bit  
 IC,Linear,Converter,D/A,12 1/2-Bit  
 IC,Linear,Converter,D/A,12-Bit  
 IC,Linear,Converter,D/A,14-Bit  
 IC,Linear,Converter,D/A,16-Bit  
 IC,Linear,Converter,D/A,2-Bit  
 IC,Linear,Converter,D/A,3 1/2-Bit  
 IC,Linear,Converter,D/A,4-Bit  
 IC,Linear,Converter,D/A,6-Bit  
 IC,Linear,Converter,D/A,8 1/2-Bit  
 IC,Linear,Converter,D/A,8-Bit  
 IC,Linear,Converter,D/A: Digital to Analog  
 IC,Linear,Converter,D/A: Digital to Analog,12 Bit  
 IC,Linear,Converter,Frequency/Voltage  
 IC,Linear,Converter,RMS-TO-DC  
 IC,Linear,Converter,Signal/Logic Level  
 IC,Linear,Converter,Voltage To Frequency  
 IC,Linear,Converter,Voltage-To-Frequency  
 IC,Linear,Detector,Peak  
 IC,Linear,Differential Transceiver  
 IC,Linear,Differential,Amplifier  
 IC,Linear,Driver  
 IC,Linear,Driver,Interface,Display  
 IC,Linear,Driver,Interface,Line  
 IC,Linear,Driver,Line  
 IC,Linear,Driver,Line,Differential  
 IC,Linear,Driver,Line,Differential,Dual  
 IC,Linear,Driver,Line,Differential,Quad  
 IC,Linear,Driver,Octal  
 IC,Linear,Driver/Receiver,EIA-232  
 IC,Linear,Dual Comparator  
 IC,Linear,Encoder/Decoder

IC,Linear,Filter	IC,Linear,Operational Amplifier,Quad
IC,Linear,Filter,PCM Codec	IC,Linear,Operational Amplifier,Quad,Low Power
IC,Linear,Hall Sensor	IC,Linear,Operational Amplifier,Sample and Hold
IC,Linear,Hybrid	IC,Linear,Operational Amplifier,Voltage Feedback
IC,Linear,Interface	IC,Linear,Operational Amplifier,Voltage Follower
IC,Linear,Interface,Communication	IC,Linear,Operational Amplifier,Wide Band
IC,Linear,Interface,Programmable	IC,Linear,Operational Amplifier,Wide Band,High-Frequency
IC,Linear,Interpolation	IC,Linear,Optoelectronic
IC,Linear,Logarithmic	IC,Linear,Oscillator
IC,Linear,Microcontroller,UART: Universal Asynchronous Receiver/Transceiver	IC,Linear,Oscillator,Baud Rate Generator
IC,Linear,Modulator,Pulse Width,Regulating	IC,Linear,Oscillator,Clock
IC,Linear,Multiplexer,1 Of 8	IC,Linear,Oscillator,Clock Generator
IC,Linear,Multiplexer,8 Bit	IC,Linear,Oscillator,Crystal
IC,Linear,Multiplexer,Single Ended	IC,Linear,Oscillator,Freq. Compensated
IC,Linear,Multiplexer/Demultiplexer	IC,Linear,Oscillator,Voltage Control
IC,Linear,Multiplexer/Demultiplexer,Analog	IC,Linear,Oscillator,Voltage Controlled
IC,Linear,Multiplier	IC,Linear,PLL: Phased Lock Loop
IC,Linear,Multiplier,Precision	IC,Linear,Pulse Width Modulator,Current Mode
IC,Linear,Operational Amplifier	IC,Linear,Receiver
IC,Linear,Operational Amplifier,Buffer,Power	IC,Linear,Receiver,AM:Amplitude Modulation
IC,Linear,Operational Amplifier,Compensated	IC,Linear,Receiver,Line,Differential,Quad
IC,Linear,Operational Amplifier,Compensated,High Speed	IC,Linear,Regulator
IC,Linear,Operational Amplifier,Compensated,High-Speed	IC,Linear,Regulator,Adjustable,Negative
IC,Linear,Operational Amplifier,Compensated,High-Speed/Low-Power	IC,Linear,Regulator,Fixed Positive
IC,Linear,Operational Amplifier,Compensated,Low Bias	IC,Linear,Regulator,Low Dropout
IC,Linear,Operational Amplifier,Compensated,Low-Bias	IC,Linear,Regulator,Switch
IC,Linear,Operational Amplifier,Compensated,Low-Offset	IC,Linear,Sense Amplifier,Core Memory
IC,Linear,Operational Amplifier,Dual	IC,Linear,Step-Down Regulator
IC,Linear,Operational Amplifier,Dual,Low Power	IC,Linear,Supervisory Circuit
IC,Linear,Operational Amplifier,High Output Current	IC,Linear,Switch
IC,Linear,Operational Amplifier,High Power	IC,Linear,Switch,Analog
IC,Linear,Operational Amplifier,High Slew Rate	IC,Linear,Switch,Analog,2-Channel
IC,Linear,Operational Amplifier,High Speed,Low Noise,Quad	IC,Linear,Switch,Analog,DPDT: Double Pole Double Throw,Dual
IC,Linear,Operational Amplifier,High Voltage	IC,Linear,Switch,Analog,PIN
IC,Linear,Operational Amplifier,Low Drift	IC,Linear,Switch,Analog,SPDT: Single Pole Double Throw,Dual
IC,Linear,Operational Amplifier,Low Noise	IC,Linear,Switch,Analog,SPST: Single Pole Single Throw
IC,Linear,Operational Amplifier,Low Offset	IC,Linear,Switch,Analog,SPST: Single Pole Single Throw,Dual
IC,Linear,Operational Amplifier,Low Offset,Low Power	IC,Linear,Switch,Analog,SPST: Single Pole Single Throw,Quad
IC,Linear,Operational Amplifier,Power	IC,Linear,Switch,Bilateral,Quad
IC,Linear,Operational Amplifier,Pre-Amplifier	IC,Linear,Switch,Regulator
IC,Linear,Operational Amplifier,Precision,Dual	IC,Linear,Switch,SPST,NO: Normally Open,Quad
IC,Linear,Operational Amplifier,Precision,High Speed	IC,Linear,Temperature Sensor
	IC,Linear,Temperature Sensor,Watchdog
	IC,Linear,Timer
	IC,Linear,Transceiver
	IC,Linear,Transceiver,Bus
	IC,Linear,Transceiver,Bus,Octal

IC, Linear, Transceiver, Bus, Quad  
 IC, Linear, Transceiver, Data Bus, Dual  
 IC, Linear, Transceiver, Ethernet  
 IC, Linear, Transceiver, Line Interface  
 IC, Linear, Transceiver, Optoelectronic, Ethernet, Gigabit  
 IC, Linear, Transceiver, RF, 10/100Base, Octal  
 IC, Linear, Transceiver, RF-to-Baseband, Dual  
 IC, Linear, Transducer, Temperature  
 IC, Linear, VME Bus Interface  
 IC, Linear, Voltage Comparator  
 IC, Linear, Voltage Comparator, Dual  
 IC, Linear, Voltage Comparator, Quad  
 IC, Linear, Voltage Detector  
 IC, Linear, Voltage Follower  
 IC, Linear, Voltage Reference  
 IC, Linear, Voltage Reference, Adjustable  
 IC, Linear, Voltage Reference, Fixed  
 IC, Linear, Voltage Reference, Fixed, 1.8 Volts  
 IC, Linear, Voltage Reference, Precision  
 IC, Linear, Voltage Reference, Shunt Type

IC, Linear, Voltage Regulator  
 IC, Linear, Voltage Regulator, Adjustable  
 IC, Linear, Voltage Regulator, Adjustable, Negative  
 IC, Linear, Voltage Regulator, Adjustable, Positive  
 IC, Linear, Voltage Regulator, Fixed  
 IC, Linear, Voltage Regulator, Fixed, Negative  
 IC, Linear, Voltage Regulator, Fixed, Positive  
 IC, Linear, Voltage Regulator, Switch  
 IC, Linear, Voltage Sensor  
 IC, Optoelectronic  
 IC, Optoelectronic, Optocoupler  
 IC, Optoelectronic, Optocoupler, Darlington NPN Output DC Input  
 IC, Optoelectronic, Optocoupler, Logic Gate Output  
 IC, Optoelectronic, Optocoupler, NPN Output  
 IC, Optoelectronic, Optocoupler, Phototransistor  
 IC, Optoelectronic, Optocoupler, Transistor Stage Output  
 IC, Optoelectronic, Optoisolator  
 IC, Optoelectronic, Photo/Optocoupler

**CONTINUED ON PAGE 17.**

# TAP INTO OUR EXPERTISE

Quanterion Solutions has been providing customized reliability engineering consulting and analyses for decades.

Projects are customized to match company needs and can range from one-time consultations to regular reliability work.

**LEARN MORE > [www.quanterion.com/reliability-consulting](http://www.quanterion.com/reliability-consulting)**

**QUANTERION**  
 SOLUTIONS INCORPORATED

266 Genesee Street Utica, NY 13502  
 (877) 808-0097 (toll free)  
[Qinfo@Quanterion.com](mailto:Qinfo@Quanterion.com)

[quanterion.com](http://quanterion.com)





Inductive Device	Relay, Contact, Midget
Inductive Device, Choke	Relay, Contact, Miniature
Inductive Device, Choke, Plate	Relay, Contact, Miniature, High Speed
Inductive Device, Coil	Relay, Contact, NC: Normally Closed
Inductive Device, Coil, Electrical	Relay, Contact, Power
Inductive Device, Coil, Fixed, Pick Offs	Relay, Contact, Sealed
Inductive Device, Coil, Fixed, Repeater	Relay, Contact, Sensitive
Inductive Device, Coil, RF: Radio Frequency	Relay, Contact, Signal
Inductive Device, Coil, RF: Radio Frequency, Chip	Relay, Contact, Thermal
Inductive Device, Delay Line	Relay, Contact, Vacuum
Inductive Device, EMI: Electromagnetic Interference	Relay, Contactor
Inductive Device, Inductor	Relay, DPDT: Double Pole Double Throw
Inductive Device, Inductor, Charging Reactor	Relay, DPDT: Double Pole Double Throw, RF: Radio Frequency
Inductive Device, Inductor, Choke	Relay, Electromagnetic
Inductive Device, Inductor, Choke, Filter	Relay, Electromagnetic, Armature
Inductive Device, Inductor, Choke, Low Frequency	Relay, Electromagnetic, Armature, Balanced
Inductive Device, Inductor, Choke, Microwave, RF: Radio Frequency	Relay, Electromagnetic, Armature, Long
Inductive Device, Inductor, Choke, Parasitic Suppressor	Relay, Electromagnetic, Armature, Short
Inductive Device, Inductor, Choke, Plate	Relay, Electromagnetic, General Purpose
Inductive Device, Inductor, Coil, Fixed	Relay, Electromagnetic, Latching
Inductive Device, Inductor, Ferrite Bead	Relay, Electromagnetic, Time Delay
Inductive Device, Inductor, Filter, Power	Relay, Electromechanical
Inductive Device, Inductor, Magnetic Amplifier	Relay, Electromechanical, Armature
Inductive Device, Inductor, Microwave, RF: Radio Frequency	Relay, Electromechanical, Armature, Balanced
Inductive Device, Inductor, Microwave, RF: Radio Frequency, Fixed	Relay, Electromechanical, Armature, Long
Inductive Device, Inductor, Microwave, RF: Radio Frequency, Variable	Relay, Electromechanical, Armature, Short
Inductive Device, Inductor, Pulse	Relay, Electromechanical, General Purpose
Inductive Device, Inductor, Solenoid	Relay, Electromechanical, Latching
Inductive Device, Inductor, Variable, Tunable	Relay, Electromechanical, Mercury Wetted
Inductive Device, Motor Winding	Relay, Electromechanical, Non-Latching
Inductive Device, Reactor	Relay, Electromechanical, Reed
Oscillator, Clock	Relay, Electromechanical, Reed, Coil Magnetic
Oscillator, Crystal	Relay, Electromechanical, Reed, Dry
Oscillator, Crystal Controlled	Relay, Electronic
Oscillator, Crystal, Low Jitter	Relay, Hybrid
Oscillator, Crystal, Quartz	Relay, Lantern
Oscillator, Local	Relay, Low Level
Oscillator, Microwave	Relay, Meter Movement
Oscillator, Volt Converter	Relay, Motor Driven
Relay	Relay, Piston Assembly
Relay, Assembly	Relay, Power
Relay, Bus Contactor, External Power Monitor	Relay, Retainer
Relay, Bus Tie Contactor, External Power/APU	Relay, Rotary
Relay, Coaxial	Relay, SPDT: Single Pole Double Throw
Relay, Contact, Amplifier, General Purpose	Relay, Solenoid
Relay, Contact, Armature Type	Relay, Solenoid, Solenoid-Driven
Relay, Contact, Heavy Duty Solenoid	Relay, Solid
	Relay, Solid State
	Relay, Solid State, Electronic
	Relay, Strap
	Relay, Switch Subassembly
	Relay, Thermal

Relay, Time Delay  
Relay, Time Delay, Hydraulic/Pneumatic  
Relay, Time Delay, Thermal  
Resistor  
Resistor, Fixed  
Resistor, Fixed, Carbon  
Resistor, Fixed, Carbon Composition  
Resistor, Fixed, Composition  
Resistor, Fixed, Film  
Resistor, Fixed, Film, Carbon  
Resistor, Fixed, Film, Chip  
Resistor, Fixed, Film, Chip, Tantalum  
Resistor, Fixed, Film, Metal  
Resistor, Fixed, Film, Precision  
Resistor, Fixed, Film, Thick  
Resistor, Fixed, Film, Thin  
Resistor, Fixed, Fuse  
Resistor, Fixed, Metal Foil  
Resistor, Fixed, Metal Oxide  
Resistor, Fixed, Multiple, Matched Set  
Resistor, Fixed, Network  
Resistor, Fixed, Network, Film  
Resistor, Fixed, Nichrome  
Resistor, Fixed, Precision  
Resistor, Fixed, Precision, Tapped  
Resistor, Fixed, Single  
Resistor, Fixed, Thermal  
Resistor, Fixed, Thermistor  
Resistor, Fixed, Thermistor, PTC  
Resistor, Fixed, Thyrite  
Resistor, Fixed, Varistor  
Resistor, Fixed, Wirewound  
Resistor, Fixed, Wirewound, Actuator  
Resistor, Fixed, Wirewound, Heater Element  
Resistor, Fixed, Wirewound, High Power  
Resistor, Fixed, Wirewound, Inductive  
Resistor, Fixed, Wirewound, Power  
Resistor, Fixed, Wirewound, Precision  
Resistor, Network  
Resistor, Network, Film  
Resistor, Network, Fixed  
Resistor, Network, Shunt  
Resistor, Thermal  
Resistor, Thermistor  
Resistor, Thermistor, Bead  
Resistor, Thermistor, Bead, Dual  
Resistor, Thermistor, Disc  
Resistor, Thermistor, PTC  
Resistor, Thermistor, Probe  
Resistor, Thermistor, Rod  
Resistor, Thermistor, Surge Protector  
Resistor, Thermistor, Tub  
Resistor, Thermistor, Wafer  
Resistor, Variable  
Resistor, Variable, Carbon Composition  
Resistor, Variable, Carbon Composition, Trimmer  
Resistor, Variable, Carbon Film, Trimmer  
Resistor, Variable, Cermet  
Resistor, Variable, Cermet, Trimmer  
Resistor, Variable, Composition  
Resistor, Variable, Conductive Plastic  
Resistor, Variable, Conductive Plastic, Trimmer  
Resistor, Variable, Film  
Resistor, Variable, Film, Metal  
Resistor, Variable, Formation Lights  
Resistor, Variable, Metal Glass, Trimmer  
Resistor, Variable, Metal Oxide  
Resistor, Variable, Motor Driven  
Resistor, Variable, Multiple  
Resistor, Variable, Non-Wirewound  
Resistor, Variable, Non-Wirewound, Non-Precision  
Resistor, Variable, Non-Wirewound, Precision  
Resistor, Variable, Potentiometer  
Resistor, Variable, Potentiometer, Carbon Deposit  
Resistor, Variable, Potentiometer, Composition  
Resistor, Variable, Potentiometer, Molded  
Resistor, Variable, Potentiometer, Motor Driven  
Resistor, Variable, Potentiometer, Trimmer  
Resistor, Variable, Potentiometer, Wirewound  
Resistor, Variable, Rheostat  
Resistor, Variable, Single  
Resistor, Variable, Thick Film, Trimmer  
Resistor, Variable, Thin Film, Trimmer  
Resistor, Variable, Trimmer  
Resistor, Variable, Wire  
Resistor, Variable, Wire Wound  
Resistor, Variable, Wire, Non-Precision  
Resistor, Variable, Wire, Precision  
Resistor, Variable, Wirewound  
Resistor, Variable, Wirewound, Precision  
Resistor, Variable, Wirewound, Trimmer  
Resistor, Varistor  
Resistor, Vitreous Enamel  
Resistor, Voltage  
Resistor, Voltage Sensitive  
Resistor, Voltage Sensitive, Aluminum Oxide  
Resistor, Voltage Sensitive, Beryllium Copper  
Resistor, Voltage Sensitive, Metal  
Resistor, Voltage Sensitive, Suppressor  
Resistor, Voltage Sensitive, Suppressor, Metal  
Switch  
Switch, Accelerometer/Timer  
Switch, Actuator  
Switch, Adapter, Switch Actuator  
Switch, Altitude And Airspeed  
Switch, Antenna

Switch, Arm and Disarm  
 Switch, Array  
 Switch, Audio  
 Switch, Centrifugal  
 Switch, Coaxial  
 Switch, Code Indicating Wheel  
 Switch, Contact  
 Switch, Contact, Lever Action  
 Switch, Contact, Micro  
 Switch, Contact, Momentary  
 Switch, Contact, Plunger  
 Switch, Contact, Plunger, Slide  
 Switch, Contact, Power  
 Switch, Contact, Pressure  
 Switch, Contact, Push Button  
 Switch, Contact, Rotary  
 Switch, Contact, Rotary, Motor Drive  
 Switch, Contact, Selector  
 Switch, Contact, Sensitive, Large  
 Switch, Contact, Sensitive, Small  
 Switch, Contact, Snap Action  
 Switch, Contact, Thermal  
 Switch, Contact, Toggle  
 Switch, Contact, Waveguide  
 Switch, Control  
 Switch, Control Panel  
 Switch, Control, Limit  
 Switch, Crank  
 Switch, DIP: Dual In-line Package  
 Switch, DIP: Dual In-line Package, Rocker  
 Switch, DIP: Dual In-line Package, Rotary  
 Switch, DIP: Dual In-line Package, Slide  
 Switch, DIP: Dual In-line Package, Surface Mount, Slide  
 Switch, DIP: Dual In-line Package, Toggle  
 Switch, Disconnect, Enclosed  
 Switch, Disconnect, Fused, DC: Direct Current  
 Switch, Display  
 Switch, Electric  
 Switch, Electric, Breaker Type, Non-Knife  
 Switch, Electrical  
 Switch, Electronic  
 Switch, Explosive Actuator  
 Switch, Float  
 Switch, Float, Electric  
 Switch, Flow  
 Switch, Flow, Liquid  
 Switch, Flow, Paddle Type  
 Switch, Foot  
 Switch, Frame  
 Switch, Gear Limit  
 Switch, High  
 Switch, Humidity



Switch, Humidity, Control  
 Switch, Impact  
 Switch, Indicator Light  
 Switch, Inertial  
 Switch, Interlock  
 Switch, KVM  
 Switch, Keyboard  
 Switch, Keylock  
 Switch, Keypswitch  
 Switch, Landing  
 Switch, Lever  
 Switch, Light, Dimmer  
 Switch, Limit  
 Switch, Link  
 Switch, Liquid Level  
 Switch, Lock  
 Switch, Lock Out Device  
 Switch, Low Oil Pressure  
 Switch, Membrane  
 Switch, Mic Button  
 Switch, Micro  
 Switch, Microwave  
 Switch, Microwave, Coaxial  
 Switch, Microwave, RF: Radio Frequency  
 Switch, Module Assembly  
 Switch, Oil Filled  
 Switch, Oil Pressure  
 Switch, Overcurrent  
 Switch, Overspeed, Pressure  
 Switch, Pressure  
 Switch, Pressure, Aerial Refueling  
 Switch, Pressure, Air Flow  
 Switch, Pressure, Automotive, Stoplight  
 Switch, Pressure, Diaphragm  
 Switch, Pressure, Differential  
 Switch, Pressure, Engine, Feed  
 Switch, Pressure, Engine, Low Oil

CONTINUED ON PAGE 20.



# ELECTRONIC DERATING

*for Optimum  
Component Reliability*

Second Edition

## NEW CALCULATOR AND GUIDE!

### What is electronic derating?

Electronic parts derating is limiting thermal, electrical, and/or mechanical stresses on components to levels below the manufacturer's ratings.

### What's the benefit of derating?

When derating is applied across-the-board to all components in a system, the system reliability can be enhanced.

### How can this guide and calculator help with derating?

“**Electronic Derating for Optimum Component Reliability**” is designed to maximize the reliable application of the components in electronic equipment. The guide includes an introduction to part stress derating and general information relative to part derating theory, and updated electronic derating guidelines.

The calculator is an Excel-based tool that allows the user to determine if a design is in compliance with derating guidelines.

### ORDER THE NEW CALCULATOR!

#### Includes Guidelines for Additional Technologies:

- › MnO<sub>2</sub> capacitors
- › VHSLI (high density small geometry) microcircuits
- › GaN microcircuits
- › MMICs
- › Laser opto-electronic devices
- › Pin photo diodes
- › Patch-cord (jacketed) fiber optic cables
- › Solid state relays
- › DIP, snap dome and conductive rubber switches
- › IGBTs
- › GaN transistors
- › And more!

**ORDER YOUR DERATING GUIDE AND CALCULATOR >**

[quanterion.com/electronic-derating](http://quanterion.com/electronic-derating)

Switch,Pressure,Fluid  
 Switch,Pressure,Fuel  
 Switch,Pressure,Hydraulic  
 Switch,Pressure,Low Oil  
 Switch,Pressure,Refuel Line Check  
 Switch,Programmable  
 Switch,Proximity  
 Switch,Pull  
 Switch,Push  
 Switch,Push Button  
 Switch,Push Button,Assembly  
 Switch,Push Button,Illuminated  
 Switch,Push Button,Pendant-Hoist Key  
 Switch,Push Button,Sensitive  
 Switch,Push Button,Switch Extender  
 Switch,Push&Light  
 Switch,Push,Emergency  
 Switch,Push/Pull  
 Switch,Pushbutton  
 Switch,Pushwheel  
 Switch,RF: Radio Frequency  
 Switch,RF: Radio Frequency,Ferrite  
 Switch,RF: Radio Frequency,SPST: Single Pole  
 Single Throw  
 Switch,RF: Radio Frequency,Transmission Line  
 Switch,Reed  
 Switch,Reed,Parking  
 Switch,Rocker  
 Switch,Rocker,Actuator  
 Switch,Rotary  
 Switch,Rotary,Code Indicator Wheel  
 Switch,Rotary,Fire  
 Switch,Rotary,Selector  
 Switch,Rotary,Stepping  
 Switch,Rotary,Thumbwheel  
 Switch,Safety  
 Switch,Safety,Neutral  
 Switch,Section  
 Switch,Selector  
 Switch,Selector,Fuel Quantity Gauging System  
 Switch,Sensitive  
 Switch,Sensitive,Fire  
 Switch,Sensitive,Micro  
 Switch,Sensitive,Starter  
 Switch,Sensor  
 Switch,Sequencer  
 Switch,Shield  
 Switch,Slat,Safety  
 Switch,Slide  
 Switch,Snap Disc  
 Switch,Solid State  
 Switch,Spacer  
 Switch,Static

Switch,Temperature  
 Switch,Temperature,Service Air  
 Switch,Thermal,Fixed  
 Switch,Thermal,NO: Normally Open  
 Switch,Thermostatic  
 Switch,Thermostatic,Bimetal  
 Switch,Thermostatic,Remote Bulb  
 Switch,Thermostatic,SPST: Single Pole Single  
 Throw,NO: Normally Open  
 Switch,Thumbwheel  
 Switch,Time  
 Switch,Timer Unit  
 Switch,Toggle  
 Switch,Toggle,APU  
 Switch,Toggle,Alarm  
 Switch,Toggle,Anti-Collision Lights  
 Switch,Toggle,Back  
 Switch,Toggle,Battery  
 Switch,Toggle,Cabin Dome Light  
 Switch,Toggle,Engine  
 Switch,Toggle,Fire  
 Switch,Toggle,Hydraulic  
 Switch,Toggle,Land  
 Switch,Toggle,Navigation Lights  
 Switch,Toggle,Pitot  
 Switch,Toggle,Pushbutton  
 Switch,Toggle,Sensitive  
 Switch,Toggle,Standby Compass  
 Switch,Toggle,Tail Servo  
 Switch,Toggle,Vent Blower Heater  
 Switch,Transfer,Automatic  
 Switch,Transfer,Manual  
 Switch,Transmission  
 Switch,Tribasic  
 Switch,Trigger  
 Switch,Video Polarity  
 Switch,Voltage  
 Switch,Wave Guide  
 Switch,Waveguide  
 Transformer  
 Transformer,Air Cooled  
 Transformer,Audio Frequency  
 Transformer,Audio,RF: Radio Frequency  
 Transformer,Coil,RF: Radio Frequency  
 Transformer,Control  
 Transformer,Converter  
 Transformer,Current  
 Transformer,Current Sensing  
 Transformer,Driver  
 Transformer,Filament  
 Transformer,Flyback

Transformer, Forced Air, Liquid Filled  
 Transformer, Gate Drive  
 Transformer, HV, Flyback  
 Transformer, High Voltage  
 Transformer, Intermediate Frequency  
 Transformer, Inverter  
 Transformer, Inverter, Radar  
 Transformer, Isolation  
 Transformer, Isolation, Delta Wye  
 Transformer, Isolator  
 Transformer, Isolator, Delta Wye

Transformer, Liquid Filled  
 Transformer, Low Voltage  
 Transformer, Magnet Amplifier  
 Transformer, Motor  
 Transformer, Output  
 Transformer, Over/Under Current Monitor  
 Transformer, Planar  
 Transformer, Plate  
 Transformer, Power

CONTINUED ON PAGE 23.

## ACCESS EPRD DATA ONLINE!

ROADS provides online access to the Electronic Parts Reliability Data (EPRD), Nonelectronic Parts Reliability Data (NPRD), and Failure Mode/Mechanism Distributions (FMD) datasets.

See an example below of a search for data on a bearing.

SEARCH PART/MIL NUMBER

Part/Mil Number or National Stock Number (NSN)

SEARCH

Type, paste, or select the drop-down menu to find your components

Primary Index Term

Part Category

Part Description

Manufacturer

☐ Exclude Blank Manufacturers

☐ Exclude "Various" Manufacturers

SEARCH WITH QUALIFIERS

RESULTS ⓘ

Ⓜ NPRD-2016 Ⓜ EPRD-2014 Ⓜ FMD-2016

Part Description

Bearing

FAILURE RATE SUMMARY		FAILURE RATE DETAILS		FAILURE MODES			
Part Description	Quality	Env	Source	Failure Rate	# Failed	Hours/Miles	Page
▼ Bearing	Military	AC	①	2.799532	①	①	177
▼ Bearing	Military	AC	①	1.187417	①	①	177
▼ Bearing	Commercial	AC	①	10.94702	①	①	177
▼ Bearing	Commercial	AUT	NPRD-090	11.46789	5	0.436000	177
▼ Bearing	Commercial	GF	①	7.607761	①	①	177
▼ Bearing	Commercial	GF	23009-000	14.15802	82	5.791770	177
▼ Bearing	Commercial	GF	NPRD-073	4.169924	16	3.837000	177
▼ Bearing	Commercial	GF	NPRD-103	<10.41667	0	0.096000	177

ORDER TODAY! > [www.quanterion.com/roads](http://www.quanterion.com/roads)



Transformer, Power Console Lights	Transistor, Bipolar, Silicon, Power, High, PNP
Transformer, Power, Radar	Transistor, Bipolar, Silicon, Power, Low
Transformer, Power, Single Phase	Transistor, Bipolar, Silicon, Power, Low, NPN
Transformer, Power, Single-Phase	Transistor, Bipolar, Silicon, Power, Low, PNP
Transformer, Precision	Transistor, Bipolar, Silicon, Power, Medium, NPN
Transformer, Pulse	Transistor, Bipolar, Silicon, Power, Medium, PNP
Transformer, Pulse, 10/100base-T	Transistor, Bipolar, Silicon, Power, NPN
Transformer, Pulse, 10/100base-T, Quad	Transistor, Bipolar, Silicon, Power, PNP
Transformer, Pulse, Radar	Transistor, Bipolar, Silicon, Small Signal, NPN
Transformer, RF: Radio Frequency	Transistor, Bipolar, Silicon, Small Signal, PNP
Transformer, RF: Radio Frequency, Coil	Transistor, Bipolar, Small Signal, NPN
Transformer, Radar	Transistor, Bipolar, Small Signal, PNP
Transformer, Radar, Filament	Transistor, Darlington, Power
Transformer, Roll And Speed Brake	Transistor, Darlington, Power, NPN
Transformer, Saturable	Transistor, Darlington, Power, PNP
Transformer, Switch	Transistor, FET: Field Effect Transistor
Transformer, Switching	Transistor, FET: Field Effect Transistor, Chip, N-Channel
Transformer, Synchro	Transistor, FET: Field Effect Transistor, GaAs, Chip
Transformer, Synchro, Servo	Transistor, FET: Field Effect
Transformer, Toroidal	Transistor, GaAs, Chip, N-Channel
Transformer, Toroidal, Current Sensing	Transistor, FET: Field Effect Transistor, GaAs, N-Channel
Transformer, Toroidal, Pulse	Transistor, FET: Field Effect Transistor, Junction, Chip
Transformer, Trifilar	Transistor, FET: Field Effect Transistor, Junction, Dual, N-Channel
Transformer, Upconverter	Transistor, FET: Field Effect Transistor, Junction, Matched Pair, N-Channel
Transformer, Variable	Transistor, FET: Field Effect Transistor, Junction, Matched Pair, P-Channel
Transistor	Transistor, FET: Field Effect
Transistor, Array	Transistor, Junction, N-Channel
Transistor, Array, Chip	Transistor, FET: Field Effect
Transistor, Bipolar, Darlington, NPN	Transistor, Junction, P-Channel
Transistor, Bipolar, NPN	Transistor, FET: Field Effect Transistor, MOS: Metal
Transistor, Bipolar, NPN, Switch	Oxide Semiconductor
Transistor, Bipolar, NPN, Switching	Transistor, FET: Field Effect Transistor, MOS: Metal
Transistor, Bipolar, PNP	Oxide Semiconductor, N-Channel
Transistor, Bipolar, PNP, Switching	Transistor, FET: Field Effect Transistor, MOS: Metal
Transistor, Bipolar, Power	Oxide Semiconductor, P-Channel
Transistor, Bipolar, Power High	Transistor, FET: Field Effect Transistor, N-Channel
Transistor, Bipolar, Power High, NPN	Transistor, FET: Field Effect Transistor, P-Channel
Transistor, Bipolar, Power High, PNP	Transistor, FET: Field Effect Transistor, Silicon
Transistor, Bipolar, Power Low	Transistor, FET: Field Effect Transistor, Silicon, Junction
Transistor, Bipolar, Power Low, NPN	Transistor, FET: Field Effect Transistor,
Transistor, Bipolar, Power Medium	
Transistor, Bipolar, Power Medium, NPN	
Transistor, Bipolar, Power Medium, PNP	
Transistor, Bipolar, Power, PNP	
Transistor, Bipolar, Silicon	
Transistor, Bipolar, Silicon, Amplifier, NPN	
Transistor, Bipolar, Silicon, Amplifier, PNP	
Transistor, Bipolar, Silicon, Darlington, Power	
Transistor, Bipolar, Silicon, Darlington, Power, NPN	
Transistor, Bipolar, Silicon, NPN	
Transistor, Bipolar, Silicon, PNP	
Transistor, Bipolar, Silicon, Power	
Transistor, Bipolar, Silicon, Power, High, NPN	

Silicon, Junction, Dual  
 Transistor, FET: Field Effect Transistor,  
 Silicon, Junction, Dual, N-Channel  
 Transistor, FET: Field Effect Transistor,  
 Silicon, Junction, N-Channel  
 Transistor, FET: Field Effect Transistor,  
 Silicon, Junction, P-Channel  
 Transistor, FET: Field Effect  
 Transistor, Silicon, MOS:  
 Metal Oxide Semiconductor  
 Transistor, FET: Field Effect  
 Transistor, Silicon, MOS:  
 Metal Oxide Semiconductor, N-Channel  
 Transistor, FET: Field Effect  
 Transistor, Silicon, MOS:  
 Metal Oxide Semiconductor, P-Channel  
 Transistor, FET: Field Effect Transistor, Silicon, N-  
 Channel  
 Transistor, FET: Field Effect Transistor, Silicon,  
 Small Signal, P-Channel  
 Transistor, FET: Field Effect Transistor, Small  
 Signal, P-Channel  
 Transistor, Germanium  
 Transistor, Germanium, Mesa  
 Transistor, Germanium, NPN  
 Transistor, Germanium, PNP  
 Transistor, Germanium, Power  
 Transistor, Germanium, Power, PNP  
 Transistor, MOSFET  
 Transistor, MOSFET, HEXFET, Power  
 Transistor, MOSFET, N-Channel  
 Transistor, MOSFET, N-Channel, HEXFET  
 Transistor, MOSFET, P-Channel  
 Transistor, Microwave  
 Transistor, Microwave/RF  
 Transistor, Microwave/RF, Bipolar  
 Transistor, Multiple, Darlington, Silicon  
 Transistor, Multiple, Darlington, Silicon, Matched  
 Transistor, Multiple, Darlington, Silicon, PNP  
 Transistor, Multiple, Dual  
 Transistor, Multiple, Dual, NPN  
 Transistor, Multiple, Dual, PNP  
 Transistor, Phototransistor, Optocoupler  
 Transistor, Power Low, PNP  
 Transistor, Silicon, High Frequency, Microwave  
 Transistor, Silicon, High Frequency, NPN  
 Transistor, Silicon, Microwave, RF: Radio Frequency  
 Transistor, Silicon, Multiple, Dual, NPN  
 Transistor, Silicon, Multiple, Dual, PNP  
 Transistor, Silicon, Phototransistor  
 Transistor, Silicon, RF: Radio Frequency  
 Transistor, Silicon, Surface Barrier  
 Transistor, Silicon, Switching  
 Transistor, Silicon, Switching, NPN  
 Transistor, Silicon, Switching, PNP  
 Transistor, Silicon, Unijunction  
 Transistor, Thyristor  
 Transistor, Thyristor, SCR  
 Transistor, Thyristor, Triac  
 Transistor, Unijunction



## EXPLORE DATA, MODELS, AND GUIDES FOR RELIABILITY ANALYSES

[www.quanterion.com/catalog](http://www.quanterion.com/catalog)

# RELIABILITY ENGINEERING TRAINING

QUANTERION  
SOLUTIONS INCORPORATED



TAKE YOUR SKILLS TO THE NEXT LEVEL >>>

## INTRODUCTORY

- ✓ Reliability 101
- ✓ Design for Reliability

## INTERMEDIATE

- ✓ Quantitative Reliability Analyses – Practical Approaches

## ADVANCED

- ✓ Reliability, Availability and Maintainability (RAM) Modeling

## SPECIAL TOPICS

- ✓ Weibull Analysis
- ✓ Software Failure Modes Effects Analysis
- ✓ Reliability Growth Through Robust Design and Test
- ✓ Reliability Testing
- ✓ Reliability Centered Maintenance
- ✓ Expanded Applications of FMECA



LEARN MORE ABOUT OUR  
CUSTOMIZED TRAINING

**VISIT:** [quanterion.com/training](https://quanterion.com/training)

**EMAIL:** [ginfo@quanterion.com](mailto:ginfo@quanterion.com)

**CALL:** (877) 808-0097 (toll free)

DISCOVER CUSTOMIZED ON-SITE, OPEN, AND REMOTE COURSES >

[quanterion.com/training](https://quanterion.com/training)

QUANTERION  
SOLUTIONS INCORPORATED

quanterion.com  
266 Genesee Street Utica, NY 13502

