National Semiconductor

National Semiconductor offers a broad selection of advanced logic and interface families. Each family uniquely combines certain process and design techniques to address their evolving roles in system design.

System & Board Test Products

SCAN

National's portfolio of SCAN test products lowers a system's cost of ownership over the course of its life cycle. SCAN products enable faster manufacturing board test, system check out, and in-field diagnostics and repair. All products conform to the IEEE 1149.1 Standard established by the Joint Test Action Group (JTAG).

- The low power of SCAN CMOS Test Access Logic makes it ideal to surround non-JTAG-compliant devices for board-level test.
- When added to the card edge of a backplane, SCAN ABT Test Access Logic enables live insertion/ removal of boards without system power down.
- The SCANPSC100F enables microprocessors to create an on-board embedded Test Master, freeing up external test equipment.
- SCANPSC110F enables simultaneous testing of like boards as well as partitioning of complex systems. Use it on each board in a multi-drop or hierarchical system design.

BiCMOS Logic

ABT

ABT Advanced BiCMOS technology offers the dynamic power savings of CMOS with the speed and drive of TTL. Propagation delays as low as 4.8ns support increased up-time in critical systems. Guaranteed high impedance through the power-up/power-down cycle coupled with a staggered pin connector eliminates bus disruption during live board insertion. Faster disable than enable times help avoid bus contention. Extended National ABT specifications provide real-world information. By lowering the margin of error, systems can be pushed to even higher performance levels.

CMOS Logic

FACT™

General purpose, broad portfolio, Advanced CMOS family, offering superior line driving characteristics, excellent ESD tolerance, high radiation resistance, 5.0 and 3.3 volt operation, and latchup immunity. FACT products feature wide fanout capability and an extended power supply range that is guaranteed at 2V - 6V V_{DD}. Typical power consumption is 0.1mW per gate. Propagation delays are less than 5ns at 50pF load.

FACT logic is available in AC (CMOS inputs & outputs) and ACT (TTL inputs/CMOS outputs) versions. Many FACT products offer RHA (Radiation Hardness Assurance) guarantees to the 100 krad level.

FACT Quiet Series™ (FACT QS™)

Specifically designed for noise-sensitive applications, it features the lowest ACMOS device-generated noise, low EMI, improved dynamic threshold, very tight output skew, and speeds 15% faster than FACT. AC performance is faster than FACT. 16-bit functions are available for bus driving applications.

FACT FCT

Offering 7ns speeds, this high-performance, high drive family consists primarily of octal functions and features enhanced noise immunity that surpasses the competition. FACT FCT has a TTL-to-CMOS input buffer stage and is designed to interface with TTL outputs.

National also offers a compliment of standard CMOS logic families, including **CD4K** and **54C**.

Product Overview

Bipolar Logic

FAST™

Offers the best combination of speed/power/broad portfolio and best price/performance of all advanced Schottky TTL families. Typical propagation delay is 5ns.

National also offers a compliment of standard Bipolar logic families, including **Low Power Schottky** (LS), **TTL**, and **DTL**.

ECL Logic

F100K 300 Series ECL

300 Series ECL is the easiest-to-use ECL with the lowest power and best price/performance of any ECL family. Having 100K ECL speed and performance, 300 Series consumes up to 50% less operating power, guarantees 2,000 volt ESD protection, tests output skew specification, and has a stable I/O over a wide range of voltages and temperatures. It is the logic of choice for ECL-based systems as well as those that mix ECL with TTL and/or CMOS. 300 Series ECL is a socket replacement for the 100 Series, and offers inherent Total Dose Radiation tolerance of 1 Meg.

Interface Products

Data Transmission

- National offers a broad line of drivers, receivers, and transceivers for single-ended line, differential line, and backplane applications.
- TIA/EIA-232 devices are designed for 10kbps single-ended data transmission over distances up to 50 feet. TIA/EIA-422 drivers can transmit data differentially up to 10 receivers at rates as high as 10Mbps. TIA/EIA-485 products provide true multipoint communications with up to 32 drivers and 32 receivers connected to a single bus.

Process Flow	Description
JAN Class S	QPL (DESC Qualified Products List) products processed to MIL-PRF-38535 Appendix A for space-level applications.
JAN Class S "R"	QPL (DESC Qualified Products List) products processed to MIL-PRF-38535 Appendix A Level S with guaranteed RHA radiation assurance to 100 krads(Si).
MLS	Microcircuit Line for Space — Non-JAN products processed to space flow.
JAN Class B "R"	QPL (DESC Qualified Products List) products processed to MIL-PRF-38535 Appendix A Level B with guaranteed RHA radiation assurance to 100 krads(Si).
SMD	Standard Microcircuit Drawing tactical-level products processed to QML Level Q with electrical specifications controlled by DESC. (National's SMD products that include an M or Q in the SMD part number are controlled by and fully compliant with MIL-PRF-38535 QML Q.)
/883	Products processed to MIL-STD-883 Level B for military.
QPL	Qualified Product List
QML	Qualified Manufacturers List
KGD	Known Good Die
Other	B+ Flow: JAN Class B with X-ray and PIND. Call for information. S Flows: Call for details.

Key Contacts

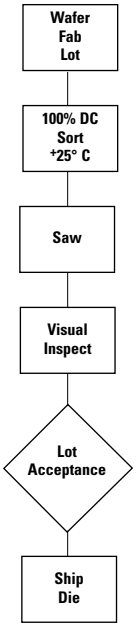
- North America – To order databooks or samples, please contact your local National Semiconductor sales office or Distributor. Or contact the National Semiconductor Customer Response Center at 800-272-9959.
- Europe – Please contact your National Semiconductor sales office or Distributor for further information, databooks, or samples.
- Japan – Please contact Jepico at (03) 3348-0611 for further information, databooks, or samples.
- Internet – To order databooks, datasheets, and applications notes, look for National Semiconductor's home page at http://www.national.com.

KGD Die Process Flow Charts

Option 1: DC Probe

(MDC, MD8, MDCT, MD8T Device Suffixes)

Material processed to Option 1 is available in wafer and die form for all National products. Option 1 is designed for technologies and products that fit the following criteria:



- Technologies having mature manufacturing processes
- Products having well-characterized DC & AC parameters over temperature
- The reliability of the product and manufacturing process are well documented

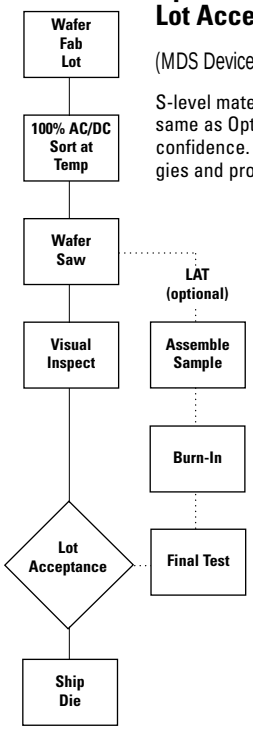
End Applications

- Simplistic or easily-reworked MCMs or Hybrids
- Singular die applications
- Commercial and industrial temperature range applications

Option 2: S-Level DC Probe with Lot Acceptance Test (LAT)

(MDS Device Suffix)

S-level material for Option 2 is processed the same as Option 1 except the LAT allows added confidence. Option 2 is designed for technologies and products that fit the following criteria:



- Technologies that have mature manufacturing processes
- Products that have well-characterized DC and AC parameters over temperature
- The reliability of the product and manufacturing process are well documented
- S-Level LAT, SEM, and/or Total Dose or RHA testing required

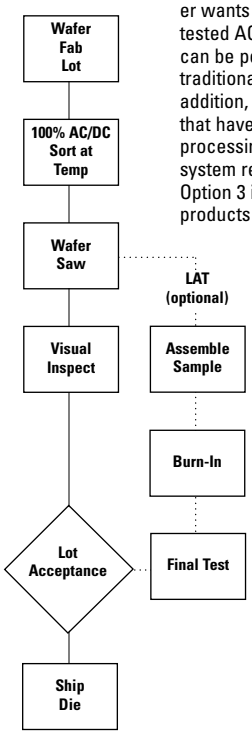
End Applications

- Easily-reworked MCMs or Hybrids for space and high reliability applications
- Low-die-count applications
- Space and military applications, especially where radiation tolerance is required.

Option 3: AC/DC Probe at Worst Case Temperature

(MDA, MDAT, M3S, MWA Device Suffixes)

In many circumstances, the MCM manufacturer wants the added confidence level that a fully tested AC and DC product can offer. Option 3 can be performed on most products that would traditionally fall into Option 1 or 2 categories. In addition, for newer technologies or products that have unestablished reliability or yields, this processing ensures that the die meets required system reliability levels.
Option 3 is designed for technologies and products that fit the following criteria:



- Newer technologies that have established manufacturing processes
- Characterized temperature performance
- The reliability of the product and manufacturing process are documented
- Additional processing: SEM, RAD, LAT, can be added for higher confidence levels

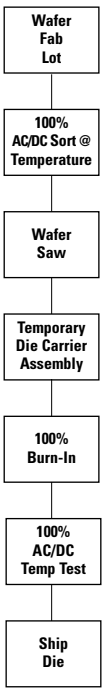
End Applications

- Medium-die-count MCMs
- MCMs using multiple technologies
- Industrial or Military B-Level applications
- Long-term field reliability

Option 4: 100% Die-Level Test at All Temperatures & Burn-In

(MDQ Device Suffix)

Material processed to Option 4 allows products to meet the highest standards in quality and reliability. This option is only available for selected National products. Option 4 is designed for technologies and products that meet the following criteria:

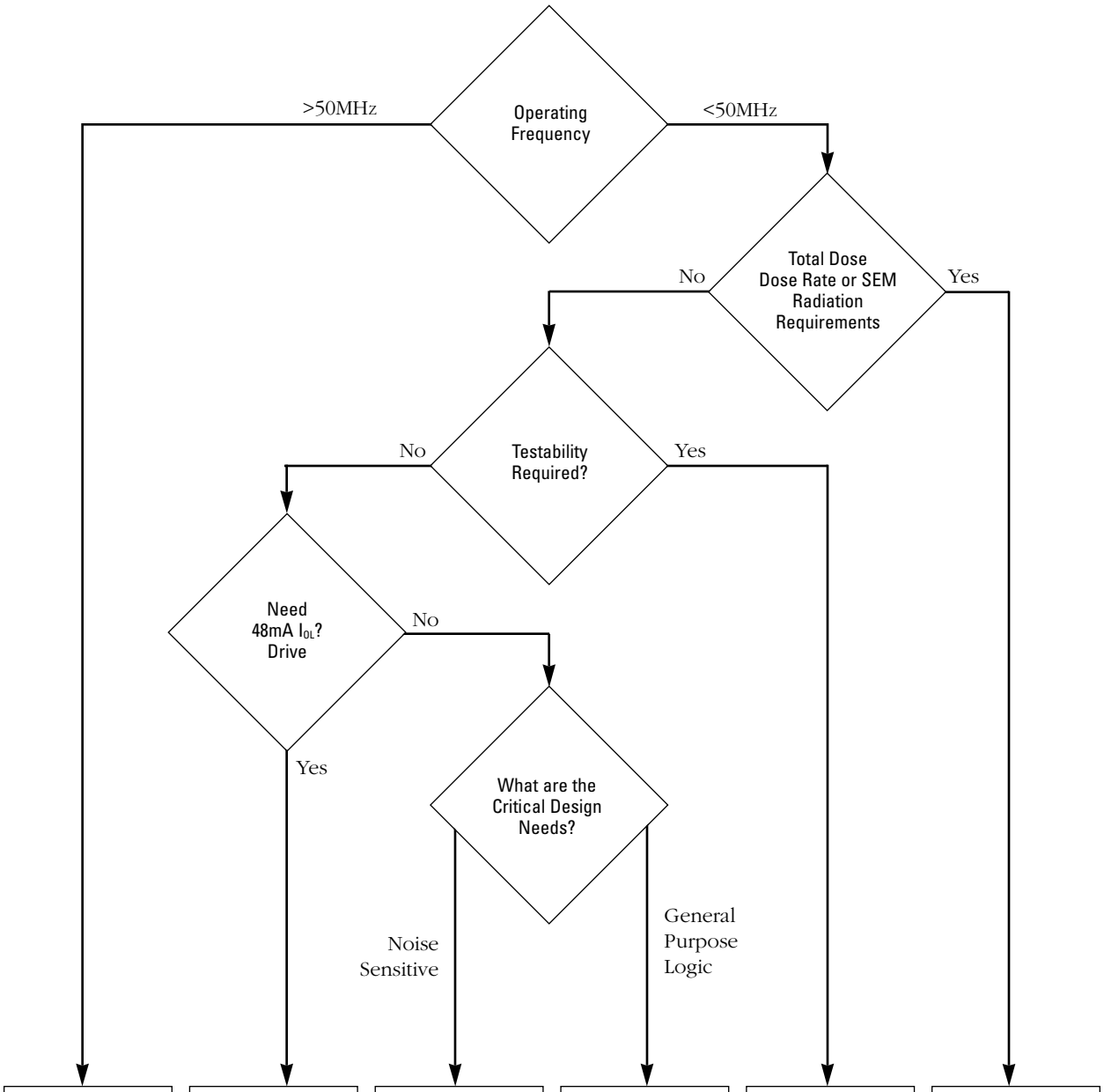


- Variable product yield history
- Variable temperature performance
- Documentation of Burn-In failures

End Applications

- Complex MCMs
- High-die-count and multiple technology MCMs
- Commercial, Industrial, Military & Space applications
- Long-term field reliability

Product Selection Guide



Arithmetic Order Guide

Device	Description	Packages	SMD/883	JM38510/	JAN* B	JAN* S	JAN* RH	QML-V MIL-S	KGD Opt. 3
FACT (AC)									
54AC161	4-Bit Binary Counter Async Reset	CDIP, F/P, LCC	5962-8956101	76302	x	x	x		
54AC163	4-Bit Binary Counter Sync Reset	CDIP, F/P, LCC	5962-8958201	76304	x	x	x		
54AC169	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	5962-9160301				x	x	
54AC191	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	5962-8974901	76305	x	x	x		
FACT (ACT)									
54ACT161	4-Bit Binary Counter Async Reset	CDIP, F/P, LCC	5962-9172201				x	x	
54ACT163	4-Bit Binary Counter Sync Reset	CDIP, F/P, LCC	5962-9172301				x	x	
54ACT169	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	883				x	x	
54ACT283	4-Bit Adder	CDIP, F/P, LCC	883					x	
FAST									
54F160A	4-Bit BCD Counter	CDIP, F/P, LCC	883	34401	x	x			
54F161A	4-Bit Binary Counter Async Reset	CDIP, F/P, LCC	883	34301	x	x			
54F163A	4-Bit Binary Counter Sync Reset	CDIP, F/P, LCC	883	34302	x	x			
54F169	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	5962-8607201						
54F181	4-Bit Arithmetic Logic Unit	CDIP, F/P, LCC	883	33801	x				
54F182	Carry Look Ahead Generator	CDIP, F/P, LCC	883	33802	x				
54F190	4-Bit BCD Counter	CDIP, F/P, LCC	883						
54F191	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	883						
54F192	4-Bit BCD Up/Down Counter	CDIP, F/P, LCC	883	34404	x				
54F193	4-Bit Binary Up/Down Counter	CDIP, F/P, LCC	883	34304	x				
54F283	4-Bit Binary Adder	CDIP, F/P, LCC	883	34201	x	x			
F100K 300 Series ECL									
100336	4-Bit Counter/Shift Register	CDIP, F/P	5962-9230601					QML-V	

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part -One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

Buffers/Transceivers Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
ABT									
54ABT240	Inverting Octal Buffer	CDIP, F/P, LCC	5962-9318801						
54ABT241	Octal Buffer	CDIP, F/P, LCC	5962-9322701†						
54ABT244	Octal Buffer	CDIP, F/P, LCC	5962-9214701†					QML-V	x
54ABT245	Octal Transceiver	CDIP, F/P, LCC	5962-9214801†						
54ABT541	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-94718**					x	
54ABT543	Octal Transceiver/Latch	CDIP, F/P, LCC	5962-9231401†						
54ABT646	Octal Register/Transceiver	CDIP, F/P, LCC	5962-9457701†						
54ABT652	Octal Transceiver/Register	CDIP, F/P, LCC	5962-93242**						
54ABT2244	Octal Buffer with 25 Ohm Series Resistor	F/P	**						
54ABT16244	16-Bit Buffer	F/P	5962-93174**						
54ABT16245	16-Bit Register/Transceiver	F/P	5962-9317502						
54ABT16500	18-Bit Universal Transceiver	F/P	5962-96870**						
54ABT16646	18-Bit Universal Transceiver	F/P	5962-94502**						
FACT (AC)									
54AC125	Quad Buffer	CDIP, F/P, LCC	883	93253	x	x			
54AC240	Inverting Octal Buffer	CDIP, F/P, LCC	5962-8755001	75703	x	x	x		x
54AC241	Octal Buffer	CDIP, F/P, LCC	5962-8755101	75704	x	x	x		x
54AC244	Octal Buffer	CDIP, F/P, LCC	5962-8755201	75705	x	x	x		x
54AC245	Octal Transceiver	CDIP, F/P, LCC	5962-8775801	75503	x	x	x		x
54AC540	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-8769501				x	x	x
54AC541	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-8870601	75711	x	x	x		x
54AC646	Octal Transceiver/Register	CDIP, F/P, LCC	5962-8968201				x	x	
FACT (ACT)									
54ACT240	Inverting Octal Buffer	CDIP, F/P, LCC	5962-8775901	87759	x	x	x		x
54ACT241	Octal Buffer	CDIP, F/P, LCC	5962-8984701			x	x	x	x
54ACT244	Octal Buffer	CDIP, F/P, LCC	5962-8776001	87760	x	x	x		x
54ACT245	Octal Transceiver	CDIP, F/P, LCC	5962-8766301	87663	x	x	x	x	x
FACT Quiet Series (ACQ)									
54ACQ240	Inverting Octal Buffer	CDIP, F/P, LCC	883					x	x
54ACQ244	Octal Buffer	CDIP, F/P, LCC	5962-9217601					x	x
54ACQ245	Octal Transceiver	CDIP, F/P, LCC	5962-9217701					x	x
FACT Quiet Series (ACTQ)									
54ACTQ240	Inverting Octal Buffer	CDIP, F/P, LCC	5962-9218401					x	x
54ACTQ241	Octal Buffer	CDIP, F/P, LCC	5962-9218501					x	x
54ACTQ244	Octal Buffer	CDIP, F/P, LCC	5962-9218601					x	x
54ACTQ245	Octal Transceiver	CDIP, F/P, LCC	5962-9218701					x	x
54ACTQ541	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-9682901						
54ACTQ543	Octal Transceiver/Latch	CDIP, F/P, LCC	5962-92192**						
54ACTQ544	Octal Transceiver/Latch	CDIP, F/P, LCC	5962-92193**						

LOGIC (cont.)

Buffers/Transceivers Order Guide (cont.)

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT Quiet Series (ACTQ) cont.									
54ACTQ646	Octal Register/Transceiver	CDIP, F/P, LCC	5962-9219601					x	
54ACTQ827	10-Bit Buffer	CDIP, F/P, LCC	5962-9219901					x	
54ACTQ16244	16-Bit Buffer	F/P	5962-9561901†						x
54ACTQ16245	16-Bit Transceiver	F/P	5962-9562001†						x
54ACTQ16540	16-Bit Buffer	F/P	883						
54ACTQ16541	16-Bit Buffer	F/P	883						
54ACTQ16646	16-Bit Register/Transceiver	F/P	5962-9581601†						
FACT FCT									
54FCT240	Inverting Octal Buffer	CDIP, F/P, LCC	5962-8765501					x	x
54FCT241	Octal Buffer	CDIP, F/P, LCC	883						x
54FCT244	Octal Buffer	CDIP, F/P, LCC	5962-8763001					x	x
54FCT245	Octal Transceiver	CDIP, F/P, LCC	5962-8762901						
54FCT540	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-8976701					x	x
54FCT541	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	5962-8976601					x	x
FAST									
54F240	Inverting Octal Buffer	CDIP, F/P, LCC	883						
54F241	Octal Buffer	CDIP, F/P, LCC	883	33202	x	x			
54F244	Octal Buffer	CDIP, F/P, LCC	883	33203	x	x			
54F245	Octal Transceiver	CDIP, F/P, LCC	883	34803	x	x			
54F365	Hex Buffer	CDIP, F/P, LCC	883	35101	x				
54F540	Octal Buffer/Broadside Pinout	CDIP, F/P, LCC	883	33204	x				
54F544	Octal Transceiver/Latch	CDIP, F/P, LCC	883						
54F545	Octal Transceiver/Broadside Pinout	CDIP, F/P, LCC	883	34804	x				
54F646	Octal Transceiver/Register	CDIP, F/P, LCC	5962-8975401						
54F648	Octal Transceiver/Register	CDIP, F/P, LCC	5962-8975402						
54F651	Octal Transceiver/Register	CDIP, F/P, LCC	883						
54F652	Octal Transceiver/Register	CDIP, F/P, LCC	5962-8955801						
54F827	10-Bit Buffer	CDIP, F/P, LCC	5962-9209001						
54F2241	Octal Buffer w/25 Ω Series Resistors	CDIP, F/P, LCC	883						
54F2243	Quad Transceiver w/25 Ω Series Resistors	CDIP, F/P, LCC	883						
54F2244	Octal Buffer w/25 Ω Series Resistors	CDIP, F/P, LCC	5962-9325001						
F100K 300 Series ECL									
100313	Quad Driver	CDIP, F/P	5962-9673201					x	
100314	Quint Receiver	CDIP, F/P	5962-9162901					QML-V	
100322	9-Bit Buffer	CDIP, F/P	883					x	
100352	8-Bit Buffer w/Cut-Off Drivers	CDIP, F/P	883					x	

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

Clock Distribution & Timing Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC2525	Minimum Skew Clock Driver	CDIP, F/P, LCC	5962-9217401				x	x	
FACT (ACT)									
54ACT715	Video Sync Generator	CDIP, LCC	5962-9309701				x	x	
54ACT715-R	Video Sync Generator	CDIP, LCC	5962-9309702						
54ACT2525	Minimum Skew Clock Driver	CDIP, F/P, LCC	883				x	x	
F100K 300 Series ECL									
100315	Minimum Skew Clock Driver	F/P	5962-9469601					x	

Comparators Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC520	8-Bit Comparator with Pull Ups	CDIP, F/P, LCC	5962-9091601	90916	x	x	x		
54AC521	8-Bit Identity Comparator	CDIP, F/P, LCC	5962-9098501	90985	x	x	x		
FACT (ACT)									
54ACT520	8-Bit Comparator with Pull Ups	CDIP, F/P, LCC	5962-8979301				x	x	
54ACT521	8-Bit Identity Comparator	CDIP, F/P, LCC	5962-8979302				x	x	
FACT FCT									
54FCT521	8-Bit Identity Comparator	CDIP, F/P, LCC	5962-8854301					x	
FAST									
54F521	8-Bit Identity Comparator	CDIP, F/P, LCC	883	34701	x	x			

Decoders/Encoders Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC138	1-of-8 Decoder	CDIP, F/P, LCC	5962-8762201	75802	x	x	x		x
54AC139	Dual 1-of-4 Decoder	CDIP, F/P, LCC	5962-8762301	75803	x	x	x		x
FACT (ACT)									
54ACT138	1-of-8 Decoder	CDIP, F/P, LCC	5962-8755401	87554	x	x	x	x	x
54ACT139	Dual 1-of-4 Decoder	CDIP, F/P, LCC	5962-8755301				x	x	x
FACT FCT									
54FCT138	1-of-8 Decoder	CDIP, F/P, LCC	5962-8765401				x	x	x

Decoders/Encoders Order Guide (cont.)

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
CMOS									
54C922	Keyboard Encoder	CDIP	5962-8752101						
FAST									
54F138	1-of-8 Decoder	CDIP, F/P, LCC	883	33701	x	x			
54F139	Dual 1-of-4 Decoder	CDIP, F/P, LCC	883	33702	x	x			

Flip-Flops Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
ABT									
54ABT273	Octal D Flip-Flop	CDIP,F/P,LCC	5962-9321701†						
54ABT374	Octal D with TRI-STATE®	CDIP, F/P, LCC	5962-9314901†						
54ABT377	Octal D with Clock Enable	CDIP,F/P,LCC	5962-9314801†						
54ABT574	Octal D with Broadside Pinout	CDIP, F/P, LCC	5962-9322001†						
FACT (AC)									
54AC74	Dual D	CDIP, F/P, LCC	5962-8852001	75302	x	x	x		
54AC109	Dual JK	CDIP, F/P, LCC	5962-8955101	75304	x	x	x		
54AC174	Hex D	CDIP, F/P, LCC	5962-8762601	75307	x	x	x		
54AC175	Quad D	CDIP, F/P, LCC	5962-8955201				x	x	
54AC273	Octal D with MR	CDIP, F/P, LCC	5962-8775601	75601	x	x	x		
54AC374	Octal D with TRI-STATE	CDIP, F/P, LCC	5962-8769401	75602	x	x	x		x
54AC377	Octal D with Clock Enable	CDIP, F/P, LCC	5962-8870201	75603	x	x	x		
54AC574	Octal D with TRI-STATE	CDIP, F/P, LCC	883	75604	x	x			
54AC821	10-Bit D	CDIP, F/P, LCC	5962-9160601				x	x	
FACT (ACT)									
54ACT74	Dual D	CDIP, F/P, LCC	5962-8752501	87525	x	x	x		
54ACT109	Dual JK	CDIP, F/P, LCC	5962-8853401				x	x	
54ACT112	Dual JK Negative Edge Trigger	CDIP, F/P, LCC	5962-8995001	89950	x	x	x		
54ACT174	Hex D	CDIP, F/P, LCC	5962-8775701				x	x	
54ACT175	Quad D	CDIP, F/P, LCC	5962-8969301				x	x	
54ACT374	Octal D with TRI-STATE	CDIP, F/P, LCC	5962-8763101				x	x	x
54ACT377	Octal D with Clock Enable	CDIP, F/P, LCC	5962-8769701	87697	x		x	x	
54ACT534	Inverting Octal D with TRI-STATE	CDIP, F/P, LCC	5962-8965801				x	x	x
54ACT564	Inverting Broadside Octal D	CDIP, F/P, LCC	5962-8955701				x	x	
54ACT574	Octal D with Broadside Pinout	CDIP, F/P, LCC	5962-8960101	89601	x	x	x		
54ACT821	10-Bit D with TRI-STATE	CDIP, F/P, LCC	5962-8870501				x	x	
54ACT823	9-Bit D with Clock Enable	CDIP, F/P, LCC	5962-9161001				x	x	

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

Flip-Flops Order Guide (cont.)

Device	Description	Packages	SMD/883	JAN* JM38510/ B	S	RH	QML-V MIL-S	KGD Opt.3
ABT								
54ABT16374	16-Bit Octal with TRI-STATE	F/P	5962-93201**					
FACT Quiet Series (ACQ)								
54ACQ374	Octal D Flop with TRI-STATE	CDIP, F/P, LCC	5962-9217901				x	x
FACT Quiet Series (ACTQ)								
54ACTQ273	Octal D with MR	CDIP, F/P, LCC	5962-8973501				x	
54ACTQ374	Octal D Flop with TRI-STATE	CDIP, F/P, LCC	5962-9218901				x	x
54ACTQ377	Octal D with Clock Enable	CDIP, F/P, LCC	5962-9219001				x	
54ACTQ574	Octal D Flop, Broadside Pinout	CDIP, F/P, LCC	5962-92195**				x	x
54ACTQ821	10-Bit Flop	CDIP, F/P, LCC	5962-92198**				x	
54ACTQ16374	16-Bit D Flop with TRI-STATE	F/P	5962-9452801†					x
FACT FCT								
54FCT273	Octal D Flop with MR	CDIP, F/P, LCC	5962-8765601				x	
54FCT374	Octal D Flop with TRI-STATE	CDIP, F/P, LCC	5962-8762801				x	x
54FCT377	Octal D Flop with CE	CDIP, F/P, LCC	5962-8762701				x	
54FCT574	Octal D with Broadside Pinout	CDIP, F/P, LCC	5962-8951301				x	x
FAST								
54F74	Dual D	CDIP, F/P, LCC	883	34101	x	x		
54F109	Dual JK	CDIP, F/P, LCC	883	34102	x			
54F174	Hex D	CDIP, F/P, LCC	883	34107	x	x		
54F175	Quad D	CDIP, F/P, LCC	883	34104	x			
54F273	Octal D with MR	CDIP, F/P, LCC	5962-8855001				x	
54F374	Octal D with TRI-STATE	CDIP, F/P, LCC	883	34105	x			
54F377	Octal D with Clock Enable	CDIP, F/P, LCC	5962-9091001				x	
54F534	Inverting Octal D	CDIP, F/P, LCC	883	34106	x			
54F564	Inverting Broadside Octal D	CDIP, F/P, LCC	883					
54F574	Octal D with Broadside Pinout	CDIP, F/P, LCC	883					
54F821	10-Bit D with TRI-STATE	CDIP, F/P, LCC	883					
54F823	9-Bit D with Clock Enable	CDIP, F/P, LCC	883					
54F825	8-Bit D with Clock Enable and Clear	CDIP, F/P, LCC	883					
F100K 300 Series ECL								
100331	Triple D	CDIP, F/P	5962-9153001				QML-V	
100351	Hex D Flip-Flop	CDIP, F/P	5962-9457901				QML-V	

LOGIC (cont.)

Gates Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC00	Quad 2-Input NAND	CDIP, F/P, LCC	5962-8754901	75001	x	x	x		
54AC02	Quad 2-Input NOR	CDIP, F/P, LCC	5962-8761201	75101	x	x	x		
54AC04	Hex Inverter	CDIP, F/P, LCC	5962-8760901	75701	x	x	x		x
54AC08	Quad 2-Input AND	CDIP, F/P, LCC	5962-8761501	75203	x	x	x		
54AC10	Triple 3-Input NAND	CDIP, F/P, LCC	5962-8761001	75002	x	x	x		
54AC11	Triple 3-Input AND	CDIP, F/P, LCC	5962-8761101	75204	x	x	x		
54AC20	Dual 4-Input NAND	CDIP, F/P, LCC	5962-8761301	75003	x	x	x		
54AC32	Quad 2-Input OR	CDIP, F/P, LCC	5962-8761401	75201	x	x	x		
54AC86	Quad 2-Input Exclusive OR	CDIP, F/P, LCC	5962-8955001	75202	x	x	x		
FACT (ACT)									
54ACT00	Quad 2-Input NAND	CDIP, F/P, LCC	5962-8769901	87699	x	x	x		x
FACT Quiet Series (ACTQ)									
54ACTQ02	Quad 2-Input NOR	CDIP, F/P, LCC	5962-9218101					x	x
54ACTQ04	Hex Inverter	CDIP, F/P, LCC	5962-8973401					x	x
54ACTQ08	Quad 2-Input AND	CDIP, F/P, LCC	5962-8954702					x	x
54ACTQ10	Triple 3-Input NAND	CDIP, F/P, LCC	5962-9218201					x	x
54ACTQ32	Quad 2-Input OR	CDIP, F/P, LCC	5962-8973601					x	x
FAST									
54F00	Quad 2-Input NAND	CDIP, F/P, LCC	883	33001	x	x			
54F02	Quad 2-Input NOR	CDIP, F/P, LCC	883	33301	x	x			
54F04	Hex Inverter	CDIP, F/P, LCC	883	33002	x	x			
54F08	Quad 2-Input AND	CDIP, F/P, LCC	883	34001	x	x			
54F10	Triple 3-Input NAND	CDIP, F/P, LCC	883	33003	x	x			
54F11	Triple 3-Input AND	CDIP, F/P, LCC	883	33002	x	x			
54F20	Dual 4-Input NAND	CDIP, F/P, LCC	883	33004	x	x			
54F32	Quad 2-Input OR	CDIP, F/P, LCC	883	33501	x	x			
54F64	AND/OR Invert	CDIP, F/P, LCC	883	33401	x	x			
54F86	Exclusive OR	CDIP, F/P, LCC	883	34501	x	x			
F100K 300 Series ECL									
100301	Triple 5-Input OR/NOR	CDIP, F/P	5962-9152801				x		
100302	Quint 2-Input OR/NOR	CDIP, F/P	5962-9152802				x	QML-V	
100304	Quint AND/NAND	CDIP, F/P	5962-9153701				x	QML-V	
100307	Quint Exclusive OR/NOR	CDIP, F/P	5962-9459001				x	QML-V	
100321	9-Bit Inverter	CDIP, F/P	883				x		

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

Latches Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
ABT									
54ABT373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-9321801†						
54ABT573	Octal D with Broadside Pinout	CDIP, F/P, LCC	5962-9321901†						
54ABT16373	16-Bit Octal D	F/P	5962-93200**						
FACT (AC)									
54AC373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-8755501	75403	x	x	x		x
FACT (ACT)									
54ACT373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-8755601				x	x	x
54ACT563	Inverting Octal D Latch	CDIP, F/P, LCC	5962-8955601				x	x	
54ACT573	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	5962 8766401				x	x	
FACT Quiet Series (ACQ)									
54ACQ373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-9217801					x	x
54ACQ573	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	5962-9218001					x	x
FACT Quiet Series (ACTQ)									
54ACTQ373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-9218801					x	x
54ACTQ533	Inverting Octal D Latch	CDIP, F/P, LCC	5962-92919**					x	x
54ACTQ573	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	5962-9219401					x	x
54ACTQ841	10-Bit D Latch	CDIP, F/P, LCC	5962-9220001					x	
54ACTQ16373	16-Bit D Latch with TRI-STATE	F/P	5962-9561801†						x
FACT FCT									
54FCT373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	5962-8764401						x
54FCT533	Inverting Octal D Latch	CDIP, F/P, LCC	5962-8865101						x
54FCT573	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	5962-8863901						x
FAST									
54F373	Octal D Latch with TRI-STATE	CDIP, F/P, LCC	883	34601	x	x			
54F533	Inverting Octal D Latch	CDIP, F/P, LCC	883	34602	x				
54F563	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	883	34603	x				
54F573	Octal D Latch, Broadside Pinout	CDIP, F/P, LCC	5962-9173801	34604	x				
F100K 300 Series ECL									
100343	8-Bit Latch	CDIP, F/P	883					x	
100344	8-Bit Latch with Cutoff Drivers	CDIP, F/P	883					x	

Multiplexers Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC151	8-Input Multiplexer	CDIP, F/P, LCC	5962-8769101	76201	x	x	x		
54AC153	Dual 4-Input Multiplexer	CDIP, F/P, LCC	5962-8762501	76202	x	x	x		
54AC157	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8953901	76203	x	x			
54AC158	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8972901					x	
54AC251	8-Input Multiplexer with TRI-STATE	CDIP, F/P, LCC	5962-8769201				x	x	
54AC253	Dual 4-Input Multiplexer	CDIP, F/P, LCC	5962-8769301				x	x	
54AC257	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8870301	76207	x	x	x		x
54AC258	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-9160401				x	x	x
FACT (ACT)									
54ACT151	8-Input Multiplexer	CDIP, F/P, LCC	5962-8875601	88756	x	x	x		
54ACT153	Dual 4-Input Multiplexer	CDIP, F/P, LCC	5962-8769801				x	x	
54ACT157	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8953901				x	x	x
54ACT158	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8875501				x	x	x
54ACT251	8-Input Multiplexer	CDIP, F/P, LCC	5962-8959901				x	x	
54ACT253	Dual 4-Input Multiplexer	CDIP, F/P, LCC	5962-8776101				x	x	x
54ACT257	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8968901				x	x	x
54ACT258	Quad 2-Input Multiplexer	CDIP, F/P, LCC	5962-8870401				x	x	x
FAST									
54F151A	8-Input Multiplexer	CDIP, F/P, LCC	883	33901	x	x			
54F153	Dual 4-Input Multiplexer	CDIP, F/P, LCC	883	33902	x	x			
54F157A	Quad 2-Input Multiplexer	CDIP, F/P, LCC	883	33903	x	x			
54F158A	Quad 2-Input Multiplexer	CDIP, F/P, LCC	883	33904	x	x			
54F251A	8-Input Multiplexer	CDIP, F/P, LCC	883	33905	x	x			
54F253	Dual 4-Input Multiplexer	CDIP, F/P, LCC	883	33908	x	x			
54F257A	Quad 2-Input Multiplexer	CDIP, F/P, LCC	883	33906	x	x			
54F258A	Quad 2-Input Multiplexer	CDIP, F/P, LCC	883	33907	x	x			
F100K 300 Series ECL									
100355	Quad Multiplexer/Latch	CDIP, F/P	5962-9165401					QML-V	
100363	Dual 8-Input Multiplexer	CDIP, F/P	5962-9165501					x	
100364	16-Input Multiplexer	CDIP, F/P	5962-9459201					QML-V	
100371	Triple 4-Input Multiplexer w/Enable	CDIP, F/P	883					x	

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

One Shots Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
TTL									
54121	Multivibrator	CDIP, F/P	883						
54122	Multivibrator	CDIP, F/P	883						
9601	Multivibrator	CDIP, F/P	883	01204	x				
9602	Multivibrator	CDIP, F/P	883	01205	x				
96L02	Multivibrator	CDIP, F/P	883						
96LS02	Multivibrator	CDIP, F/P	883						
CMOS									
54HC123A	Monostable Multivibrator	CDIP, LCC	8684702						

Open Collector/Drain Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)									
54AC05	Hex Inverter with Open Drain	CDIP, F/P, LCC	5962-9059001	90590	x	x	x		x
CMOS									
54C906	Hex Buffer with Open Drain	CDIP	883						
54C907	Hex Buffer with Open Drain	CDIP	883						
FAST									
54F38	Quad 2-Input NAND Buffer OC	CDIP, F/P, LCC	883	35202	x				
TTL									
5406	HV Hex Inverter with OC	CDIP, F/P	883	00801	x	x			
5407	HV Hex Inverter with OC	CDIP, F/P	883	00803	x	x			
5409	Quad 2-Input AND with OC	CDIP, F/P	883	01602	x				
5416	Triple 3-Input AND with OC	CDIP, F/P	883	00802	x				
5417	HV Hex Inverter with OC	CDIP, F/P	883	00804	x				

Registers Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
FACT(AC)									
54AC299	Octal Universal Shift Register	CDIP, F/P, LCC	5962-8875401	76506	x	x	x		
54AC378	Hex D Register with Enable	CDIP, F/P, LCC	5962-9160501				x	x	
FACT (ACT)									
54ACT299	Octal Universal Shift Register	CDIP, F/P, LCC	5962-8877101				x	x	
54ACT323	Octal Universal Shift Register	CDIP, F/P, LCC	5962-9160701				x	x	
54ACT399	Quad 2-Port Register	CDIP, F/P, LCC	5962-90934**				x	x	
FAST									
54F164A	Serial to Parallel Shift Register	CDIP, F/P, LCC	5962-8607101						
54F299	Octal Universal Shift Register	CDIP, F/P, LCC	883						
54F322	Octal Serial/Parallel Shift Register	CDIP, F/P, LCC	5962-8607401						
54F323	Octal Universal Shift Register	CDIP, F/P, LCC	883						
54F378	Hex D Register with Enable	CDIP, F/P, LCC	5962-8855501						
54F379	Quad Register with Enable	CDIP, F/P, LCC	883						
54F398	Quad 2-Port Register	CDIP, F/P, LCC	883	35001	x	x			
54F399	Quad 2-Port Register	CDIP, F/P, LCC	883	35002	x	x			
54F407	Data Access Register	CDIP, F/P, LCC	883						
54F676	16-Bit Serial/Parallel Shift Register	CDIP, F/P, LCC	883						
F100K 300 Series ECL									
100341	Octal Shift Register	CDIP, F/P	5962-9459101					QML-V	

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

System & Board Test (IEEE 1149.1) & Error Detection Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
ABT									
54ABT899	9-Bit Bidirectional Transceiver Generator/Checker	CDIP, F/P, LCC	5962-96871**		x	x			
FACT (AC)									
54AC280	9-Bit Parity Generator/Checker	CDIP, F/P, LCC	5962-9220101				x	x	
FACT (ACT)									
54ACT818	8-Bit Diagnostic Register	CDIP, F/P, LCC	5962-9160901				x	x	
54ACT899	9-Bit Bidirectional Transceiver Generator/Checker	CDIP, LCC	5962-9314101					x	
SCAN									
SCAN18540T	18-Bit Buffer with 1149.1	F/P	5962-9312701						x
SCAN18541T	18-Bit Buffer with 1149.1	F/P	5962-9311601						x
SCAN18245T	18-Bit Buffer with 1149.1	F/P	5962-9311501						x
SCAN18373T	18-Bit Buffer with 1149.1	F/P	5962-9311801						x
SCAN18374T	18-Bit Buffer with 1149.1	F/P	5962-9320701						x
SCANPSC100F	Embedded Boundary Scan Controller	CDIP, F/P, LCC	5962-94750**†						x
SCANPSC110F	SCAN Bridge (IEEE 1149.1 Hierarchal & Multidrop Addressable JTAG Port)	CDIP, F/P, LCC	883						x
FACT Quiet Series (ACTQ)									
54ACTQ657	Bidirectional Transceiver with Parity	CDIP, F/P, LCC	5962-9219701					x	
FAST									
54F280	9-Bit Parity Generator/Checker	CDIP, F/P, LCC	883	34901		x	x		
54F402	Polynomial Generator/Checker	CDIP, F/P, LCC	883						

Schmitt Triggers Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/ B	S	RH	QML-V MIL-S	KGD Opt.3
FACT (AC)								
54AC14	Hex Inverter with Schmitt	CDIP, F/P, LCC	5962-8762401	75702 x	x	x		x
FACT Quiet Series (ACTQ)								
54ACTQ14	Hex Inverter with Schmitt	CDIP, F/P, LCC	5962-9218301				x	
CMOS								
54C914	HV Hex Schmitt Trigger	CDIP, F/P	883					
FAST								
54F13	Dual 4-Input NAND	CDIP, F/P, LCC	883					
54F14	Hex Inverter with Schmitt	CDIP, F/P, LCC	8875201					
54F132	Quad 2-Input NAND with Schmitt	CDIP, F/P, LCC	5962-8948701					

Translators Order Guide

Device	Description	Packages	SMD/883	JAN* JM38510/ B	S	RH	QML-V MIL-S	KGD Opt.3
F100K 300 Series ECL								
100324	Hex TTL-to-ECL Translator	CDIP, F/P	5962-9153001				QML-V	
100325	Hex ECL-to-TTL Translator	CDIP, F/P	5962-9153101				QML-V	
100328	Bidirectional ECL-to-TTL Translator	CDIP, F/P	883				x	
100329	Bidirectional ECL-to-TTL Translator	CDIP, F/P	5962-9206601				x	
Interface								
DS7800	Dual Voltage Level Translator	MCAN	883					
CMOS								
MM54C901	Hex TTL Buffer, Inverting	CDIP, F/P	883					
MM54C902	Hex TTL Buffer, Non-inverting	CDIP, F/P	883					
MM54C906	Hex Buffer, Open Drain N-Channel	CDIP, F/P	883					
MM54C907	Hex Buffer, Open Drain P-Channel	CDIP, F/P	883					

* Where the JAN part number is the same as the SMD part number, this device is available under the One Part-One Part Number DESC drawing system.

** Pending

† Qualified under QML as SMD.

Product Availability Guide by Function

	Bipolar			BiCMOS	CMOS						
	FAST	LS	TTL	ABT	AC	ACQ	ACT	ACTQ	C	FCT	HC
Function											
00	•	•	•		•		•		•		
01			•								
02	•	•	•		•			•			
03		•	•								
04	•	•	•		•			•	•		
05		•			•						
06			•								
07			•								
08	•	•	•		•			•	•		
09			•								
10	•	•	•		•			•			
11	•	•			•						
13	•										
14	•	•	•		•			•	•		
15		•									
16			•								
17			•								
20	•	•	•		•						
21		•									
27		•									
30		•	•						•		
32	•	•			•			•			
37			•								
38	•		•								
40			•								
42		•	•						•		
47			•								
49											
51		•	•								
54		•									
64	•										
73		•									
74	•	•	•		•		•		•		
76			•						•		
83		•	•								
85		•							•		
86	•	•	•		•				•		
90			•						•		
95			•								
97			•								
109	•	•			•		•				
112							•				
113		•									
121			•								
122			•								
123			•								•
125		•	•		•						
132	•										
133		•									
138	•	•			•		•			•	
139	•	•			•		•				
150			•								
151	•	•	•		•		•		•		
153	•	•	•		•		•				
154		•	•								

LOGIC (cont.)

Product Availability Guide by Function

	Bipolar			BiCMOS	CMOS						
	FAST	LS	TTL	ABT	AC	ACQ	ACT	ACTQ	C	FCT	HC
Function											
157	•	•	•		•		•		•		
158	•	•			•		•				
160	•										
161	•	•	•		•				•		
163	•		•		•						
164	•	•							•		
165		•	•								
168		•									
169	•	•			•		•				
173			•								
174	•	•	•		•		•		•		
175	•	•	•		•		•		•		
180			•								
181	•										
182	•										
189	•										
190	•										
191	•		•		•						
192											
193	•	•							•		
194	•	•	•								
195		•							•		
219	•										
221									•		
240	•	•		•	•	•	•	•		•	
241	•	•		**	•		•	•		•	
243	•										
244	•	•		•	•	•	•	•		•	
245	•	•		•	•	•	•	•		•	
251	•	•			•		•				
253	•	•			•		•				
257	•	•			•		•				
258	•	•			•		•				
259		•									
260		•									
273	•	•		•	•		•	•		•	
279		•	•								
280	•				•						
283		•	•				•				
295		•									
298		•	•								
299	•	•			•		•				
322	•										
323	•						•				
365	•	•									
366		•									
367		•	•								
368		•									
373	•	•		•	•	•	•	•	•	•	
374	•	•		•	•	•	•	•	•	•	

• = Available
**= Pending

Product Availability Guide by Function

	Bipolar			BiCMOS	CMOS						
	FAST	LS	TTL	ABT	AC	ACQ	ACT	ACTQ	C	FCT	HC
Function											
377	•	•		•	•		•	•		•	
378	•				•						
379	•										
398	•										
399	•						•				
402	•										
403	•										
407	•										
410	•										
413	•										
447		•									
502		•									
503		•									
520					•		•				
521	•				•		•			•	
533	•							•		•	
534	•						•				
540	•				•					•	
541				**	•			•		•	
543				•				•			
544	•							•			
545	•										
563	•						•				
564	•						•				
573	•			•		•	•	•		•	
574	•			•	•		•	•		•	
646	•			•	•			•			
648	•										
651	•										
652	•			**							
670		•									
657	•							•			
676	•										
715								•			
715-R								•			
818							•				
821	•				•		•	•			
823	•						•				
825	•						•				
827	•							•			
841								•			
899				**						•	
902									•		
906									•		
907									•		
914									•		
922									•		
2241	•										
2243	•										
2244	•			**							
2245										•	

Product Availability Guide by Function

Bipolar			BiCMOS	CMOS						
FAST	LS	TTL	ABT	AC	ACQ	ACT	ACTQ	C	FCT	HC
Function										
2525				•		•				
16244			**				•			
16245			•				•			
16373			**				•			
16374			**				•			
15500			**							
16540							•			
16541							•			
16646			**				•			
96L02		•								

• = Available

HCMOS to Recommended FACT AC Upgrade

HCMOS Device	Function Description	Functional Replacement
MM54HC00	NAND Gate	54AC00
MM54HC02	NOR Gate	54AC02
MM54HC03	NAND Gate	54AC03
MM54HC04	Inverter	54AC04
MM54HC08	AND Gate	54AC08
MM54HC10	NAND Gate	54AC10
MM54HC14	Schmitt Trigger	54AC14
MM54HC32	OR Gate	54AC32
MM54HC42	Decoder	MM54C42
MM54HC73	Flip-Flop	None
MM54HC74	Flip-Flop	54AC74
MM54HC75	Latch	None
MM54HC76	Flip-Flop	MM54C76
MM54HC85	Comparator	MM54C85
MM54HC86	OR Gate	54AC86
MM54HC123	Dual Retriggerable	Available from National
MM54HC125	Buffer Gate	54LS125
MM54HC126	Buffer Gate	None
MM54HC132	Schmitt Trigger	54F132
MM54HC138	Demultiplexer	54AC138
MM54HC139	Demultiplexer	54AC139
MM54HC147	Decoder	None
MM54HC151	Multiplexer	54AC151
MM54HC153	Multiplexer	54AC153
MM54HC154	Demultiplexer	54LS154
MM54HC157	Multiplexer	54AC157
MM54HC161	Counter	54AC161
MM54HC163	Counter	54AC163
MM54HC164	Register	MM54C164
MM54HC165	Register	54LS165
MM54HC174	FIlip-Flop	54AC174
MM54HC175	Flip-Flop	54AC175
MM54HC193	Counter	MM54C193
MM54HC221A	Multivibrator	MM54C221
MM54HC240	Buffer/Driver	54AC240
MM54HC244	Buffer/Driver	54AC244

HCMOS Device	Function Description	Functional Replacement
MM54HC245	Transceiver	54AC245
MM54HC257	Multiplexer	54AC257
MM54HC259	Latch	54LS259
MM54HC273	Flip-Flop	54AC273
MM54HC283	Adder	54ACT283
MM54HC298	Multiplexer	54LS198
MM54HC299	Register	54AC299
MM54HC365	Buffer	54F365
MM54HC373	Latch	54AC373
MM54HC374	Flip-Flop	54AC374
MM54HC390	Counter	None
MM54HC393	Counter	None
MM54HC423A	Multivibrator	None
MM54H563	Latch	54ACT563
MM54HC564	Flip-Flop	54ACT564
MM54HC573	Latch	54ACQ573
MM54HC574	Flip-Flop	54ACQ574
MM54HC640	Transceiver	None
MM54HC646	Transceiver	54AC646
MM54HC688	Comparator	None
MM54HC4017	Counter	None
MM54HC4020	Counter	None
MM54HC4040	Counter	None
MM54HC4049	Converter	None
MM54HC4050	Converter	None
MM54HC4511	Driver	None
MM54HC4514	Decoder	None
MM54HC4538	Multivibrator	None
MM54HCT138	Demultiplexer	54ACT138
MM54HCT241	Driver	54ACT241
MM54HCT244	Driver	54ACT244
MM54HCT245	Transceiver	54ACT245
MM54HCT373	Latch	54ACT373
MM54HCT374	Flip-Flop	54ACT374
MM54HCT688	Comparator	None

CD4K Availability and Recommended Upgrade

CD4K Device	Function Description	Functional Replacement	Pin for Pin Compatible?
4001	NOR Gate	54AC02	No
4011	NAND Gate	54AC00	No
4013	D Flip-Flop	54AC74	No
4023	NAND Gate	54AC10	No
4027	J-K Flip-Flop	None	
4028	Decoder	None	
4029	Counter	54AC191	No
4040	12-Bit Counter	None	
4047	Multivibrator	None	
4049	Hex Buffer	54AC04	No
4050	Hex Buffer	None	
4051	Analog Multiplexer/Demultiplexer	None	
4052	Analog Multiplexer/Demultiplexer	None	
4053	Analog Multiplexer/Demultiplexer	None	
4060	Counter	None	
4069	Hex Inverter	54AC04	Yes
4070	Exclusive-OR Gate	54AC86	No
4071	OR Gate	54AC32	No
4081	AND Gate	54AC08	No
4093	NAND Gate	None	
40106	Schmitt Trigger	54AC14	Yes
40161	Binary Counter	54AC161	Yes
40163	Binary Counter	54AC163	Yes
40174	D Flip-Flop	54AC174	Yes
40175	D Flip-Flop	54AC175	Yes
40193	Up/Down Counter	None	
4528	Multivibrator	None	
4724	Latch	None	

Advanced Bus Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
DS1776	28	Octal PI Bus Transceiver	F/P	5962-9231701						

General Purpose Bus Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	QML-V MIL-S	KGD Opt.3
DS7833	16	Quad TRI-STATE Transceiver	CDIP, F/P	883						
DS7834	16	Quad TRI-STATE Transceiver	CDIP, F/P	883						
DS7835	16	Quad TRI-STATE Transceiver	CDIP, F/P	883						
DS7836	14	Quad Unified Bus Receiver	CDIP, F/P	883						
DS7837	16	Quad Unified Bus Receiver	CDIP, F/P	883						
DS7838	16	Quad Unified Bus Transceiver	CDIP, F/P	883						

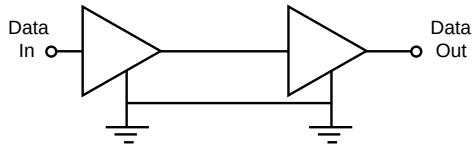
CLOCK GENERATION & SUPPORT

Clock Generation & Support Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
F100K 300 Series ECL										
100315	16	Low Skew Quad Differential Clock Driver	F/P	5962-9469601					x	
FACT										
54ACT715	20	Programmable Video Sync Generator	CDIP, F/P, LCC	5962-9309701						
54ACT715-R	20	Programmable Video Sync Generator	CDIP, F/P, LCC	5962-9309702						
CGS™										
CGS54C2525	14	1-to-8 Minimum Skew CMOS Clock Driver	CDIP, F/P, LCC	5962-9217401						
CGS54CT2525	14	1-to-8 Minimum Skew Clock Driver	CDIP, F/P, LCC	883						
CGS3301	Die	Crystal Clock Generator	Die	883						x
Real Time CLock										
DP8572	28	Clock with Power Fail Features	CDIP, LCC	5962-9164101						

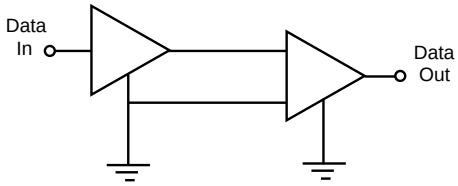
EIA/TIA SPECIFICATIONS

TIA/EIA-232-E Application



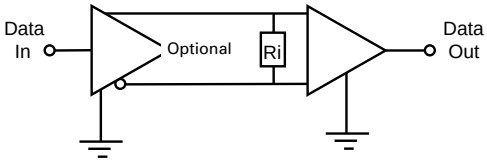
TIA-EIA-232-E was developed for Single-ended Transmission at relatively slow data rates (20kb/s) over short distances (typically up to 50ft).

TIA/EIA-423-A Application



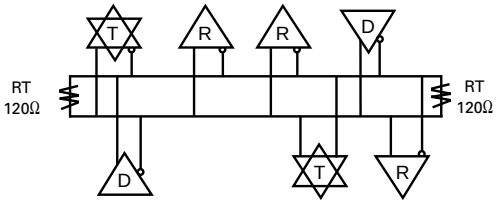
TIA/EIA-423-A extends the data rate of TIA/EIA-232 to 100kb/s (up to 30ft) and the maximum distance to 4000ft (up to 1kb/s). TIA/EIA also requires high impedance driver outputs with power off to not load the transmission line.

TIA/EIA-422-A Application



TIA/EIA-422-A is a differential data transmission standard that allows data rates up to 10Mbps (up to 40ft) and line lengths up to 4000ft (up to 100Kbps).

TIA/EIA-485 Application



TIA/EIA-485-A meets all the requirements of TIA/EIA-422 and allows up to 32 drivers and 32 receivers to be connected to a single bus to form a true multipoint bus. TIA/EIA-485 also features an extended common-mode range (-7v to +12v) for both drivers and receivers in TRI-STATE and with power off, and drivers can withstand contention and bus faults.

Specification	**EIA/TIA-232**	**EIA/TIA-423**	**EIA/TIA-422**	**EIA/TIA-485**
Mode of Operation	Single-ended	Single-ended	Differential	Differential
Number of Drivers and Receivers allowed on one line	1 Dr, 1 Rr	1 Dr, 10 Rr	1 Dr, 10 Rr	32 Dr, 32 Rr
Maximum Cable Length	~ 50 feet	4000 feet	4000 feet	4000 feet
Maximum Data Rate	20 kb/s	100 kb/s	10 Mb/s	10 Mb/s
Driver Output Maximum Voltage	+/- 25 V	+/- 6 V	- 0.25 to +6 V	-7 to +12V
Driver Output Signal Level (Loaded)	+/- 5 V to +/-15 V	+/- 3.6 V	+/- 2 V	+/- 1.5 V
(Unloaded)	+/- 25V	+/- 6V	+/- 6 V	+/- 6 V
Driver Load Impedance	3 to 7 KΩ	>/= 450 Ω	100 Ω	54 Ω
Maximum Driver Ouput Current (Power On)	N/A	N/A	N/A	+/- 100 µA
(High Impedance State) (Power Off)	+/-6.6 mA (+/- 2V)	+/- 100 µA	+/- 100µA	+/- 100 µA
Slew Rate	30V/µs max	Controls Provided	N/A	N/A
Receiver Input Voltage Range	+/- 15 V	+/- 12 V	-10 to +10V	-7 to +12 V
Receiver Input Sensitivity	+/- 3 V	+/- 200 mV	+/- 200 mV	+/- 200 mV
Receiver Input Resistance	3 to 7 K Ω	4 K Ω min	4 K Ω min	~ >/= 12 K Ω min

See EIA/TIA Standards for exact conditions and limits.

Transmission Line Drivers, Receivers & Transceivers Order Guide (cont.)

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
General Purpose Products (cont.)										
DS7835	16	Quad TRI-STATE Line Transceiver	CDIP, F/P	883						
DS7836	14	Quad Unified Bus Transceiver	CDIP, F/P	883						
DS7837	16	Quad Unified Bus Receiver	CDIP, F/P	883						
DS7838	16	Quad Unified Bus Transceiver	CDIP, F/P	883						
DS9615M	16	Dual Differential Line Receiver	CDIP, F/P	883					x	
DS9622M	16	Triple Line Receiver	CDIP, F/P, LCC	883						
MM78C29	14	Quad Single-Ended Line Driver	CDIP, F/P	883						

Memory Support Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
DS0026	8	5MHz 2-Phase MOS Clock Driver	CDIP, MCAN	7800802					x	
DS0056	8	5MHz 2-Phase MOS Clock Driver	CDIP, MCAN	7800801						
DS16179	16	Hex MOS Driver	CDIP	883						
DS1649	16	Hex TTL-MOS Driver	CDIP, F/P	883						

Peripheral/Power Drivers Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
DP7311	20	Octal Latched Peripheral Driver	CDIP	883						
DS1631	8	CMOS Dual Peripheral Driver	CDIP, MCAN	883						
DS1632	8	CMOS Dual Peripheral Driver	CDIP, MCAN	883						
DS1634	8	CMOS Dual Peripheral Driver	CDIP, MCAN	883						
LM195	3	Power Transistor	MCAN	8777801						

Display Controllers/Drivers Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
DS55494	16	Hex Digit Driver	CDIP, F/P	883						
MM5452	40	32 Seg LCD Display Driver	CDIP	-MIL						

Microprocessor Support Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/	B	S	RH	MIL-S	KGD Opt.3
DP8216	16	4-Bit Bus Transceiver	CDIP	883						
DP8228	28	System Controller & Bus Driver	CDIP	-MIL						
DP8238	28	System Controller & Bus Driver	CDIP	-MIL						
MM78C30	14	Dual Differential Line Driver	CDIP	883						

Transmission Line Drivers, Receivers & Transceivers Order Guide

Device	Leads	Description	Packages	SMD/883	JAN* JM38510/ B S RH	QML-V MIL-S	KGD Opt.3
TIA-232 Products							
DS14C232	16	Dual Line Driver & Receiver	CDIP, LCC	883			
DS9616	14	Triple Line Driver	CDIP, LCC	883			
DS9627	16	Dual Line Receiver	CDIP, LCC	5962-8978701			
TIA-422/423 Products							
DS1691A	16	Single Line Driver	CDIP	883			
DS26C31M	16	Quad Line Driver	CDIP, F/P, LCC	5962-9163901		x	x
DS26C32AM	16	Quad Line Receiver	CDIP, F/P, LCC	5962-9164001		x	x
DS26F31M	16	Quad Line Driver	CDIP, F/P, LCC	5962-7802302		x	x
DS26F32M	16	Quad Line Receiver	CDIP, F/P, LCC	5962-7802005		x	x
DS26LS31M	16	Quad Line Driver	CDIP, F/P, LCC	5962-7802301		x	
DS26LS32M	16	Quad Line Receiver	CDIP, F/P, LCC	883		x	
DS26LS33M	16	Quad Line Receiver	CDIP, F/P, LCC	883		x	
DS78C20	14	Dual Line Receiver	CDIP	883			
DS78C120	16	Dual Line Receiver	CDIP, F/P	883		x	
DS78LS120	16	Dual Line Receiver	CDIP, F/P	883		x	
DS9636AM	8	Dual Line Driver	CDIP	5962-8752301			
DS9637AM	8	Dual Line Receiver	CDIP	5962-8752401			
DS9638M	8	Dual Line Driver	CDIP	5962-8754601		x	
TIA-485 Products							
DS16F95	8	High-Speed Single Transceiver	CDIP, F/P, LCC	5962-8961501		x	x
DS96F172M	16	Quad Line Driver	CDIP, F/P, LCC	5962-9076501			
DS96F173M	16	Quad Line Receiver	CDIP, F/P, LCC	5962-9076602			
DS96F174M	16	Quad Line Driver	CDIP, F/P, LCC	5962-9076502		x	
DS96F175M	16	Quad Line Receiver	CDIP, F/P, LCC	5962-9076601		x	
General Purpose Products							
DS1603	14	Dual TRI-STATE Line Receiver	CDIP	883			
DS55107A	14	Dual Line Receiver	CDIP	883			
DS55110A	14	Dual Line Driver	CDIP	883			
DS55113	16	Dual Differential TRI-STATE Line Driver	CDIP	883			
DS55115	16	Dual Differential Line Receiver	CDIP, F/P		10404 x		
DS55122	16	Triple Line Receiver	CDIP	883			
DS7820	14	Dual Line Receiver	CDIP, F/P	883		x	
DS7820A	14	Dual Line Receiver	CDIP, F/P	883		x	
DS7830	16	Dual Differential Line Driver	CDIP, F/P	883		x	
DS7831	16	Dual Differential TRI-STATE Line Driver	CDIP, F/P	8004101			
DS7832	16	Dual Differential TRI-STATE Line Driver	CDIP, F/P	8004102			
DS7833	16	Quad TRI-STATE Transceiver	CDIP, F/P	883			
DS7834	16	Quad TRI-STATE Transceiver	CDIP, F/P	883			

RADIATION HARDNESS ASSURED DATA

	Total Ionizing Dose Results Radiation-Sensitive Parameters @ 100 krad(Si) (max. limits)			Single Events Effects Heavy Ion Test Results		
Device	I_{CC}(µA)	I_{OZ}(µA)	Functional Level [krad(Si)]	RHA Qualification	Effects Upset (SEU) [MeV/(mg/cm^2)]	Latchup (SEL) [MeV/(mg/cm^2)]
FACT (AC)						
54AC00	700		>100	R		>120
54AC02	700		>100	R		>120
54AC04	700		>100	R		>120
54AC05	1200		>100			>120
54AC08	700		>100	R		>120
54AC10	700		>100	R		>120
54AC11	700		>100	R		>120
54AC14	1500		>100	R		>120
54AC20	700		>100	R		>120
54AC32	700		>100	R		>120
54AC74	700		>100	R	>40	>120
54AC86	700		>100	R		>120
54AC109	TBD		>100		>40	>120
54AC125	TBD	TBD	>100			>120
54AC138	1700		>100	R		>120
54AC139	TBD		>100	R		>120
54AC151	TBD		>100			>120
54AC153	TBD		>100			>120
54AC157	TBD		>100			>120
54AC158	TBD		>100			>120
54AC161	TBD		>100		>40	>120
54AC163	TBD		>100		>40	>120
54AC169	TBD		>100		>40	>120
54AC174	700		>100		>40	>120
54AC175	700		>100		>40	>120
54AC191	700		>100	R	>40	>140
54AC240	700	20	>100	R		>120
54AC244	700	20	>100	R		>120
54AC245	700	20	>100	R		>120
54AC251	TBD	TBD	>100			>120
54AC253	TBD	TBD	>100			>120
54AC257	TBD	TBD	>100			>120
54AC258	TBD	TBD	>100			>120
54AC273	700		>100	R	>40	>120
54AC299	700		>100	R	>40	>120
54AC373	700	20	>100	R	>40	>120
54AC374	700	20	>100	R	>40	>120
54AC520	TBD		>100	R		>120
54AC521	700		>100	R		>120
54AC540	700	20	>100	R		>120

Notes: 1. National Semiconductor's testing procedure for CMOS and BiCMOS products includes irradiating samples that meet customer's burn-in requirements as well as an additional +25°C, 168-hour biased anneal for space product.
2. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krads(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

RADIATION HARDNESS ASSURED DATA

Device	Total Ionizing Dose Results Radiation-Sensitive Parameters @ 100 krad(Si) (max. limits) I_{CC}(µA)	I_{OZ}(µA)	Functional Level [krad(Si)]	Single Events Effects Heavy Ion Test Results RHA Qualification	Effects Upset (SEU) [MeV/(mg/cm^2)]	Latchup (SEL) [MeV/(mg/cm^2)]
FACT (AC) continues						
54AC541	700	20	>100	R		>120
54AC574	700	20	>100	R	>40	>120
54AC2525	700		>100			>120
54AC2526	TBD		TBD			>120
FACT Quiet Series (ACQ)*						
54ACQ244*	TBD	TBD	>50			>120
54ACQ245*	TBD	TBD	>50			>120
54ACQ273*	TBD	TBD	TBD	TBD	25 - 30	>120
54ACQ373*	TBD		>50		25 - 30	>120
54ACQ374*	TBD		>50		25 - 30	>120
54ACQ543*	TBD	TBD	>50		25 - 30	>120
FACT (ACT)						
54ACT00	3		>100	R		>120
54ACT74	3		>100	R	>40	>120
54ACT109	3		>100		>40	>120
54ACT112	3		>100		>40	>120
54ACT138	>3.5		>100	R		>120
54ACT151	TBD		>100			>120
54ACT153	TBD		>100			>120
54ACT157	TBD		>100			>120
54ACT158	TBD		>100		>40	>120
54ACT161	TBD		>100		>40	>120
54ACT163	TBD		>100		>40	>120
54ACT174	TBD		>100		>40	>120
54ACT175	TBD		>100		>40	>120
54ACT240	>3.5	20	>100	R		>120
54ACT241	>3.5	20	>100			>120
54ACT244	>3.5	20	>100	R		>120
54ACT245	>3.5	20	>100	R		>120
54ACT251	TBD	TBD	>100			>120
54ACT253	TBD	TBD	>100			>120
54ACT299	>3.5	20	>100		>40	>120

* FACT Quiet Series ACQ products are in the process of being requalified.

Notes: 1. National Semiconductor's testing procedure for CMOS and BiCMOS products includes irradiating samples that meet customer's burn-in requirements as well as an additional +25°C, 168-hour biased anneal for space product.
2. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krads(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

RADIATION HARDNESS ASSURED DATA

Device	Total Ionizing Dose Results Radiation-Sensitive Parameters @ 100 krad(Si) (max. limits) I_{CC}(mA)	I_{OZ}(mA)	Functional Level [krad(Si)]	Single Events Effects Heavy Ion Test Results RHA Qualification	Effects Upset (SEU) [MeV/(mg/cm^2)]	Latchup (SEL) [MeV/(mg/cm^2)]
FACT (ACT) continues						
54ACT373	>3.5	20	>100		>40	>120
54ACT374	>3.5	20	>100		>40	>120
54ACT520	TBD	TBD	>100			>120
54ACT521	TBD	TBD	>100			>120
54ACT573	TBD	TBD	>100		>40	>120
54ACT574	TBD	TBD	>100		>40	>120
FACT Quiet Series (ACTQ)*						
54ACTQ02*	TBD		>80			>120
54ACTQ08*	TBD		>80			>120
54ACTQ10*	TBD	TBD	>80			>120
54ACTQ14*	TBD	TBD	>80			>120
54ACTQ32*	TBD	TBD	>80			>120
54ACTQ240*	TBD	TBD	>50			>120
54ACTQ241*	TBD	TBD	>50			>120
54ACTQ244*	TBD	TBD	>50			>120
54ACTQ245*	TBD	TBD	>50			>120
54ACTQ273*	TBD		TBD	TBD	TBD	>120
54ACTQ373*	TBD	TBD	>50		TBD	>120
54ACTQ374*	TBD	TBD	>50		TBD	>120
54ACTQ533*	TBD	TBD	TBD		TBD	>120
54ACTQ574*	TBD	TBD	TBD		TBD	>120
54ACTQ646*	TBD	TBD	TBD		TBD	>120
54ACTQ657*	TBD	TBD	TBD		TBD	>120
54ACTQ827*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ841*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16240*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16244*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16245*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16373*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16374*	TBD	TBD	TBD	TBD	TBD	TBD
54ACTQ16540*	TBD	TBD	TBD	TBD	TBD	TBD

* FACT Quiet Series ACQ products are in the process of being requalified.

FACT FCT

National Semiconductor's FACT FCT products will be tested in the future.

ABT

National Semiconductor's ABT Logic products will be tested in 1996.

Notes: 1. National Semiconductor's testing procedure for CMOS and BiCMOS products includes irradiating samples that meet customer's burn-in requirements as well as an additional +25°C, 168-hour biased anneal for space product.
2. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krads(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

RADIATION HARDNESS ASSURED DATA

	Single Events Effects Total Ionizing Dose Results		Heavy Ion Test Results	
Device	Total Dose to Pre-Rad Limits [Mrad(Si)]	Functional Level [Mrad(Si)]	Effects Upset (SEU) [MeV/(mg/cm^2)]	Latchup (SEL) [MeV/(mg/cm^2)]
F100K 300 Series ECL				
100301	Note 1	>1		>120
100302	Note 1	>1		>120
100304	Note 1	Note 1		>120
100307	Note 1	Note 1		>120
100313	Note 1	Note 1		>120
100314	< 30krad	Note 1	TBD	>120
100321	Note 1	Note 1	TBD	TBD
100322	Note 1	Note 1	TBD	TBD
100324	Note 1	Note 1	TBD	TBD
100325	>1	>1	TBD	TBD
100341	Note 1	Note 1	3 - 5	>120
100343	Note 1	Note 1	TBD	>120
100344	Note 1	Note 1	TBD	>120
100352	Note 1	Note 1	TBD	>120
100355	>1	>1	3 - 5	>120
100363	Note 1	Note 1	TBD	TBD
100371	Note 1	Note 1	TBD	TBD
100395	Note 1	Note 1	TBD	TBD

Notes: 1. Typical F100K 300 Series ECL response is >1Mrad.
2. National Semiconductor's testing procedure includes irradiating samples that meet customers' burn-in requirements.

	Total Ionizing Dose Results Radiation-Sensitive Parameters		Single Events Effects Heavy Ion Test Results		
Device	I_{CC}(mA)	I_{OZ}(mA)	Functional Level [krad(Si)]	Effects Upset (SEU) [MeV/(mg/cm^2)]	Latchup (SEL) [MeV/(mg/cm^2)]
SCAN					
SCAN18245T	TBD	TBD	TBD	TBD	>120
SCAN18373T	TBD	TBD	TBD	TBD	>120
SCAN18374T	TBD	TBD	TBD	TBD	>120
SCAN18540T	TBD	TBD	TBD	50	>120
SCAN18541T	6mA	TBD	TBD	50	>120
SCANPSC100F	TBD	TBD	TBD	TBD	>120
SCANPSC110F	TBD	TBD	TBD	TBD	>120

* SCAN products are in the process of being requalified.

Notes: 1. National Semiconductor's testing procedure for CMOS and BiCMOS products includes irradiating samples that meet customer's burn-in requirements as well as an additional +25°C, 168-hour biased anneal for space product.
2. Parts qualified to RHA Level R are guaranteed to meet their post rad specifications after 100 krads(Si) total dose. Rad levels for all other products are typical and are not guaranteed.

RADIATION HARDNESS ASSURED DATA

	Single Events Effects Total Ionizing Dose Results		Heavy Ion Test Results
Device	Total Dose to Pre-Rad Limits [krad(Si)]	Functional Level [krad(Si)]	Latchup (SEL) [MeV/(mg/cm^2)]
IInterface			
DS26C31	10	> 25	>40
DS26C32	10	> 25	>40
DS16F95	>550	>550	TBD
DS26F31	100	100	TBD
DS26F32	>350	>350	TBD
DS26LS31	>350	>350	TBD
DS26LS32	>350	>350	TBD
DS9667	TBD	TBD	TBD

Notes: National Semiconductor's testing procedure includes irradiating samples that meet customers' burn-in requirements.
CMOS and BiCMOS products will have a post-irradiation, +25°C, 168-hour biased anneal for space product.

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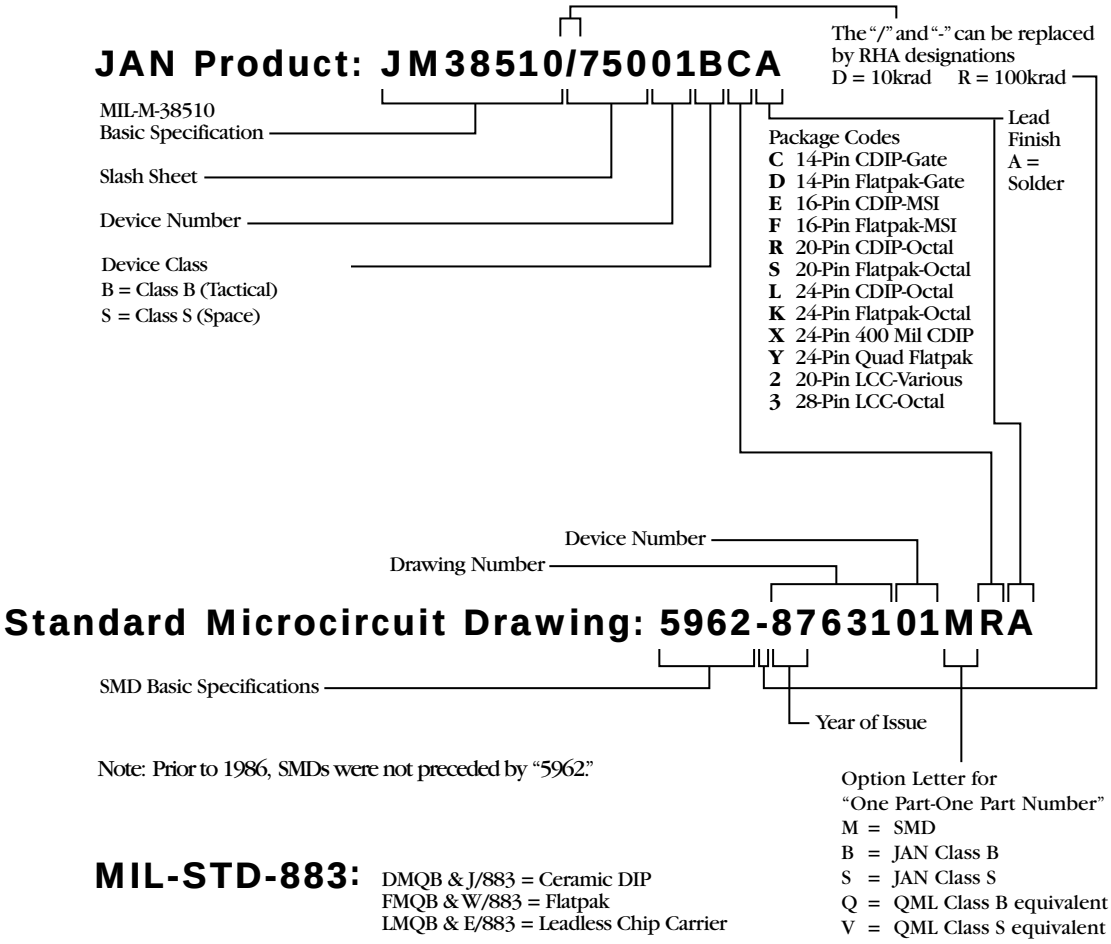

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