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1.0 FOREWORD

The NASA EEE Parts Selection List (NPSL) has been developed as a "parts selection tool" specifically geared toward design and parts engineering organizations internal to NASA and to universities and original equipment manufacturers (OEMs) that do not have the resources for a dedicated quality and reliability infrastructure in parts engineering. The NPSL is a listing of electrical, electronic, and electromechanical (EEE) part types and advanced packaging technologies such as Multi-Chip Modules (MCM) which are produced under various government and/or industry quality systems.

Since NASA's Standard EEE Parts List, MIL-STD-975, was cancelled without replacement on May 3, 1998, the NPSL provides a viable alternative for parts selection. However, there are some key differences in the philosophy of these two documents which users must be aware of:

MIL-STD-975 NPSL

Defines "Standard" and "Non-Standard" Parts Leaves standardization up to the individual flight projects Defines a "Non-Standard Parts Approval Request" (NSPAR) policy Leaves it to the individual flight projects to approve parts for the intended application Intended to be invoked as a contract requirement Not intended to be invoked as a contract requirement Very stringent requirements for parts listings Designed to facilitate listing of newer, advanced technologies

OEMs that have an established parts engineering infrastructure may elect to use the NPSL to augment their own existing part selection lists. The NPSL may be chosen, in part or in its entirety, to be a subset of a Project Approved Parts List (PAPL) or equivalent. The decision to invoke the NPSL shall be made by the project based on the parts management and control requirements for that mission. The NPSL itself, should not be imposed as a contractual requirement, but the associated part listings may be established as approved selections by the project.

2.0 ABOUT THIS DOCUMENT

2.1 General:

The NPSL is a selection tool providing designers with a list of EEE parts intended to meet system design requirements and NASA Parts Program quality/reliability levels. It is not mandatory that the parts listed herein be the only selections used to design a system, but if a particular function is needed and a suitable part is listed, the NASA EEE Parts Assurance Group (NEPAG) recommends the listed part as the first order of precedence for selection. Selecting a part from the NPSL may provide cost savings/ avoidance for the project because:

The procurement specification already exists The manufacturer has had a NASA survey or government audit performed The parts are available under one or several NASA accepted quality assurance systems Part qualification has been successfully completed All or most of the parts engineering has already been performed

The parts listed are approved for use only if NASA flight project approval is given. The document lists parts according to established quality assurance levels and NASA Parts Program knowledge of the product and manufacturer such as qualification history, GIDEP and failure trends, and delivery performance. This combination allows NEPAG to make a technical assessment of the quality, availability, capability and reliability and to list parts at a corresponding quality level within this document.

2.2 World Wide Web Access to the NPSL

The NPSL has been developed and will be maintained as an on-line World Wide Web homepage accessible via http://nepp.nasa.gov/npsl. The primary objectives of using the WWW as the platform for maintaining the NPSL are to:

Provide broad and ready access by NASA affiliated organizations world wide Facilitate quick updates, modifications, and revisions Provide links to additional EEE part information

Users will have to access the NPSL on-line and be able to download the document if a printout is desired.

2.3 Configuration Management

Under Construction

2.4 Appendices:

Appendix A (when released) will contain guidelines for derating parts. In general, these guidelines are accepted by NEPAG for use on all projects. Flight projects may elect to further develop these guidelines into requirements. Appendix A may not contain derating criteria for all part types, but guidelines provided can be used as a baseline for project derating requirements.

Appendix B is a repository of useful WWW links to additional parts information databases which can be accessed to support parts selection and application issues.

3.0 USING THIS DOCUMENT

The NPSL has been structured into four primary sections to facilitate finding the information of interest:

Welcome and User Feedback Section (Banner Page) Use Policy Section Parts Listings by Commodity Type Sections Appendices

The Parts Listings by Commodity Type Sections contains the actual part selection listings. The part types which will be covered in the NPSL consist of advanced packaging technologies such as MCMs and the commodities defined as electrical, electronic, and electromechanical (EEE) parts. The commodity types are listed below according to the Federal Stock Classification (FSC) system.

Part Types FSC

Capacitors 5910 Circuit Breakers 5925 Connectors 5935 Crystals and Crystal Oscillators 5955 Fiber Optics 60GP Filters 5915 Fuses 5920 Inductors 5950 Microcircuits (Monolithic and Hybrid) 5962 Relays 5945 Resistors 5905 Semiconductors (Diode and Transistor) 5961 Thermistors 5905 Transformers 5950 Wire and Cable 6145

Within each commodity class the parts are listed in order by procurement specifications in existence as NASA, DoD, or other space agency (e.g. ESA or NASDA) specifications. The part listing for each specification begins with a detailed explanation of the part numbering system. These explanations and the part listings which follow help the user "build" the appropriate part number for the project application. General functional descriptions and generic part number cross-references are provided to assist the user in matching functionality. The part quality levels, radiation tolerance levels (if known), and the available manufacturer sources are also identified.

Although extensive efforts have been made to maintain the accuracy of the supplier information within the part listings, users are encouraged to visit the Defense Supply Center Columbus (DSCC), http://www.dscc.dla.mil/programs/qmlqpl/. DSCC is the Department of Defense agency responsible for certifying suppliers of military specification EEE parts. At this site, users can download the latest Qualified Products List (QPL) for the part type of interest.

4.0 GENERAL REQUIREMENTS

Selection of parts for inclusion in the device listings in this document is based on a review of technical data by the NASA EEE Parts Assurance Group (NEPAG) for quality and reliability trends. The major criteria used to evaluate candidate parts are:

o Quality system and assurance level the products are produced under

o Product performance

o Product workmanship assessments

o Destructive Physical Analysis results

o Failure histories

o Reliability trends

o GIDEP alert histories of the product and manufacturer

o Qualification and screening test results

o Product availability

o Manufacturer audit and survey results

o Manufacturer responsiveness to corrective actions

o Manufacturer delivery histories

Participation by the manufacturers in a quality program such as QPL, QML, and ISO 9000. will not automatically qualify their products for listing in the NPSL. Listings will be based on results from assessments of all the major criteria listed above. EEE parts-related activities throughout NASA provide recommendations for listing parts in this document.

NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a device's ability to tolerate exposure to various forms of space radiation (e.g., total ionizing dose, single event effects, etc.) should be reviewed and have the device assessed by the Program's radiation assurance experts. The following resources may also be consulted for initial guidance:

NASA Goddard Radiation Effects and Analysis Jet Propulsion Laboratory Radiation Effects

4.1 NASA Parts Levels

The NPSL lists products based on three quality levels defined by NEPAG: Level 1, Level 2, and Level 3. The definitions for each Level and the criteria used to list a part in a particular Level are not part approvals nor is this document a project approved parts list. The NPSL will not provide information on whether or not a part meets individual project flight requirements. Instead, it provides a list of products and associated manufacturers that meet recognized quality assurance baselines, qualification test regimens, and screening requirements necessary for space flight acceptance based on levels of risk. The part selected must be assessed independently by the project or the NASA center or OEM's parts organization to determine if it meets the requirements for the project. The parts engineering organizations at the NASA centers will assist users in making this determination. The Levels herein are not directly related to mission classification, cost, or schedule and users should make the appropriate Level tradeoffs when considering which parts to choose from the list.

4.1.1 Level 1:

Level 1 is the highest product assurance class assigned to parts listed in this document. Level 1 parts are those produced under assurance classes recognized by NASA as providing the highest possible level of quality and reliability (e.g. QML Class V K, JANS for discrete semiconductors, QPL Class S, Failure Rate Level (FRL) S), from NASA approved manufacturing sources, and meeting NASA space level parts and packaging program assessment criteria. The technical assessment results for Level 1 products will show that no known trends exist which have a negative impact on the quality, reliability, or performance for space flight applications. The Level 1 criteria is summarized as follows:

o The supplier's facility(s) must be certified under a recognized quality assurance system (e.g. QML, QPL, ISO 9000) and produce products to the space industry recognized highest assurance classes (e.g. QML V, JANS for discrete semiconductors, QPL Class S, FRL S, GSFC S311 specification) or equivalent. There are exceptions to these levels where this preferred part reliability level is unavailable; these exceptions are shown in the individual part listings.

o A Defense Supply Center Columbus (DSCC) audit or a NASA program manufacturer survey to the highest assurance classes must have been successfully completed within the past 2 years.

o A part procurement specification, containing the highest assurance class requirements, must exist. Parts must have been procured previously by a NASA project using this specification.

o Historical DPA and other parts analysis data on the manufacturer's products must be available and not reveal poor workmanship trends or rejection trends.

o Failure analyses history for the manufacturers products should not reveal problem trends attributed to part quality and reliability.

o No recent unresolved GIDEP Alerts (past 3 years) exist that have a major impact on the Level 1 products quality or reliability. No GIDEP Alert or NASA Parts Advisory trends exist on the manufacturer or product.

o Available data on manufacturer performance must show no trend for late delivery of products to NASA projects.

o Qualification to the requirements of the procurement specification must have been successfully completed. No qualification issues exist and no problem trends from previous qualifications exist.

4.1.2 Level 2:

Level 2 is the second highest product assurance class assigned to parts listed in this document. Level 2 parts are those produced under assurance classes recognized by NASA to have a high level of quality and reliability (e.g. QML Q H, QPL Class B, JANTXV for discrete semiconductors, FRL R or P), from NASA approved manufacturing sources, and meeting NASA space level parts and packaging program assessment criteria. The Level 2 criteria is summarized as follows:

o The supplier's facility(s) must be certified under a recognized quality assurance system (e.g. QML, QPL, ISO 9000) and produce products to space industry recognized high assurance classes (e.g. QML Q, QPL B, JANTXV for discrete semiconductors, FRL R or P, GSFC S311 specification) or equivalent. Any exceptions to these levels where the preferred part reliability level is unavailable, are shown in the individual part listings.

o A Defense Supply Center Columbus (DSCC) audit or a NASA program manufacturer survey must have been successfully completed within the past 2 years.

o A part procurement specification, containing the high assurance class requirements, must exist. Parts must have been procured previously by a NASA project using this specification.

o DPA and other parts analysis data on the manufacturer's products must be available and must not reveal any significant problems due to poor workmanship and must show minimal reject rates.

o Failure analyses history for the manufacturers products should not reveal problem trends attributed to part quality and reliability.

o No unresolved GIDEP Alert trends exist that have a major impact on the Level 2 products quality or reliability. No GIDEP Alert or NASA Parts Advisory trends exist on the manufacturer or product.

o Available data on manufacturer performance must show consistent on-time delivery of products to NASA projects.

o Qualification to the requirements of the procurement specification must have been successfully completed. Qualification issues and problems from previous qualifications must have been resolved (not by waiver).

4.1.3 Level 3:

Level 3 is the minimum product assurance class assigned to parts listed in this document. Level 3 contains many advanced electronic functions (from a space flight applications standpoint) and has been created to provide a technology insertion path into NASA flight projects. Parts listed are those produced by reputable manufacturers under a recognized quality assurance system (QML, QPL, ISO 9000) or their equivalent. Typically, only a limited amount of information is available to NEPAG for these parts and NASA has minimal visibility into the manufacturing and testing of Level 3 product. The parts are usually available commercially and have the capability to be used in space applications. The intent of Level 3 listings is to provide products that are newer, have greater functionality and enhanced performance characteristics, and provide higher levels of integration. Because the product has little or no

heritage in space flight application and data is unavailable or scarce, these parts are considered higher risk than the Level 1 and Level 2 parts. While the price of these parts may be less than the traditional Levels, more engineering evaluation may be needed to qualify the part for the project's application. The overall reliability and cost of ownership should be considered when selecting these parts. The Level 3 criteria is summarized as follows:

The manufacturer has supplied and qualified parts for several NASA space projects within the past 2 years. The parts and manufacturers have been recommended by one of the following NASA programs.

o PSAP o ASAP o ET o AIT

A NASA, DoD, or other space agency procurement specification (e.g. ESA SCC or NASDA QTS) exists. Available data on the manufacturer shows no significant problem trends such as GIDEP Alerts or NASA Parts Advisories, a low DPA rejection rate for the manufacturer's products in general, and no significant failures attributable to product quality and/or reliability.

NEPAG recommends selecting a Level 3 product when a higher Level part does not exist and/or enhanced functionality is required to meet system design requirements. Parts in this Level are not recommended for use in mission critical applications. Selecting these parts may require further engineering evaluation and approval by the project, but some heritage exists. Additionally, having more projects use these parts helps NEPAG acquire the technical data necessary for moving the parts into the higher Levels.

SECTION: MONO

NASA Parts Selection List (NPSL)
MICROCIRCUITS
(
Last Updated: April 21, 2003
)

NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a de

Level 1 Microcircuits
Level 1 microcircuits are defined as those currently qualified to
MIL-PRF-38535 "Integrated Circuits (Microcircuits) Manufacturing, General Specification for" as
QML Class V
or,

MIL-M-38510 "Microcircuits, General Specification for" as

QPL JAN Class S

or,

Space quality source control drawings (SCDs), where QML/QPL does not exist, which meet all of the technical requirements of MIL-STD-883, Method 5004 and 5005 for a Class S device

European Space Agency

(ESA)

SCC Level B Lot Acceptance Level 2 (LA2)

National Space Development Agency of Japan

(NASDA) QTS Class I

Level 2 Microcircuits

Level 2 microcircuits are defined as those currently qualified to

MIL-PRF-38535 "Integrated Circuits (Microcircuits) Manufacturing, General Specification for"

as QML Class Q

or,

MIL-M-38510 "Microcircuits, General Specification for" as

QPL JAN Class B

, when modified/screened per mission requirements for space

European Space Agency

(ESA) SCC Level C [

Note 1

]

National Space Development Agency of Japan

(NASDA) QTS Class II

Notes:

1) ESA has gone to a single Level system based on ESA SCC Level B, so that new product will only be available as SCC Level B. ESA SCC Level C products may remain available for previously manufactured product while stocks last.

Useful Links:

The following links provide additional information to facilitate selection of qualified/available microcircuits

U.S. Military Specifications from the

Defense Supply Center Columbus (DSCC)

Qualified Manufacturers: QML-38535 and QPL-38510

Part Specifications: MIL-PRF-38535 and MIL-M-38510

European Space Agency SCC Specifications

U.S. Military Specification Microcircuit Part Number Explanation

"For Reference Only":

ARCHIVE of NPSL Detailed Microcircuit Listings

On April 21, 2003 the microcircuit section of the NASA Parts Selection List (NPSL) was updated to simplify the listing to show only the acceptable Levels (

see above

). This change has the effect of expanding upon the previous NPSL microcircuit section of acceptable part types without providing a detailed listing of part numbers and descriptions. Previous revisions of the NPSL microcircuit section used these same basic definitions for acceptable Levels, but also

included a detailed list of part numbers, descriptions and sources. Due to the constant state of change in availability of qualified microcircuit technologies and associated sources, this type of detailed listing within the NPSL was never able to remain current. For this reason future updates to the NPSL will no longer attempt to maintain such a detailed listing for microcircuits. For "reference only" the detailed listing from the past NPSL microcircuit section has been retained as an

archive

. Users of the NPSL are advised that the archived listing forms only a small subset of the device technologies considered acceptable per the NPSL guidelines. In addition, the archive is not being maintained, therefore users should consult the latest QML or QPL for current qualification status of these devices.

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July 23, 2002

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NASA Parts Selection List (NPSL)

For REFERENCE ONLY:

ARCHIVE of Detailed Microcircuit Part Number Listings

The following sections contain an "archive" of the detailed microcircuit part number listings previously maintained in the NPSL. It is retained here "for reference only". On April 10, 2003, the NPSL adopted a new approach for defining acceptable microcircuits for Level 1 and Level 2 applications. The new approach defines Level 1 and 2 parts in the same manner as prescribed in this archive, but effectively expands the number of acceptable part types. Refer to the

New NPSL Guidelines for Acceptable Microcircuits

for Level 1 and 2 applications.

NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a de

SUMMARY OF MICROCIRCUITS

(ARCHIVE)

Specification	Description	Type

MIL-PRF-38535, MIL-M-38510	Microcircuits	Monolithic
MIL-PRF-38534	Microcircuits	Hybrids
MIL-PRF-38535	Microcircuits (older technology parts)	Monolithic
NASDA-QTS-38510A	Microcircuits	General Information

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Part Number/Procurement Details

Example 1:

MICROCIRCUITS, MIL-PRF-38535

QML - One Part-One Part Number SMD

MIL-PRF-38535 Part Number Explanation.

5962A9215305#*X where,

5962

Federal Stock Class Designator (1)

A

"A" indicates no Radiation Hardness Assurance (RHA)

92153

Drawing Designator

05

Device Type

#

Device Class:

V = Level 1

Q = Level 2

M = Level 3

*

Case Outline (For specific choices of package styles refer to detail device drawing or Standard Military Drawing (SMD)

X

Lead Finish (MIL-PRF-38535)

(1)

Drawings initiated prior to 1986 may not contain a federal stock class designator

Example 2:

MICROCIRCUITS, MIL-PRF-38535

(MIL-M-38510)

MIL-M-38510 Part Number Explanation.

M38510/65001#*X where,

M38510

Military Specification Number (MIL-M-38510 has been incorporated into MIL-I-38535)

/, -

A "/" or "-" indicates no Radiation Hardness Assurance (RHA).

650

Detail Device Procurement Specification Number

01

Device Type

#

Device Class:

S = Level 1

B = Level 2

*

Case Outline (For specific choices of package styles refer to detail device procurement specification)

X

Lead Finish (MIL-PRF-38535)

Example 3:

MICROCIRCUITS, MIL-PRF-38534 (HYBRIDS)

QML - One Part-One Part Number SMD

MIL-PRF-38534 Part Number Explanation.

5962H9215305#*X where,

5962

Federal Stock Class Designator (1)

H

Indicates Radiation Hardness Assurance (RHA) level.

92153

Drawing Designator

01

Device Type

#

Device Class:

K = Level 1

H = Level 2

*

Case Outline (For specific choices of package styles refer to detail device procurement specification)

X

Lead Finish (MIL-PRF-38535)

(1)

Drawings initiated prior to 1986 may not contain a federal stock class designator

LEAD FINISH

Lead Finish Designator	Finish
A	Hot solder dip
B	Tin plating
C	Gold plating
D	Palladium plating

Radiation Hardness Assurance Designator

RHA Designator	Total Ionizing Dose [RAD (Si)]	Neutron Fluence (n/cm**2)

A, /, or -	No RHA	No RHA
M	3 x 10**3	2 x 10**12
D	1 x 10**4	2 x 10**12
P	3 x 10**4	2 x 10**12
L	5 x 10**4	2 x 10**12
R	1 x 10**5	2 x 10**12
F	3 x 10**5	2 x 10**12
G	5 x 10**5	2 x 10**12
H	1 x 10**6	2 x 10**12

NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a device's ability to tolerate exposure to various forms of space radiation (e.g., total ionizing dose, single event effects, etc.) should be reviewed and have the device assessed by the Program's radiation assurance experts. The following resources may also be consulted for initial guidance:

NASA Goddard Radiation Effects and Analysis

Jet Propulsion Laboratory Radiation Effects

NASA Parts Selection List (NPSL)

Older Technology Parts

NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a device's ability to tolerate exposure to various forms of space radiation (e.g., total ionizing dose, single event effects, etc.) should be reviewed and have the device assessed by the Program's radiation assurance experts. The following resources may also be consulted for initial guidance:

NASA Goddard Radiation Effects and Analysis

Jet Propulsion Laboratory Radiation Effects

Description
CMOS, Digital, High Speed
CMOS, Digital, High Speed, TTL Compatible

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NOTE: Unless specifically stated within the parts selection tables of the NPSL, listing of a device technology herein does NOT imply/guarantee Radiation Hardness Assurance (RHA). Applications concerned with a device's ability to tolerate exposure to various forms of space radiation (e.g., total ionizing dose, single event effects, etc.) should be reviewed and have the device assessed by the Program's radiation assurance experts. The following resources may also be consulted for initial guidance:

NASA Goddard Radiation Effects and Analysis

Jet Propulsion Laboratory Radiation Effects

Microcircuits

(Monolithic)

Digital, Glue-Logic, BIPOLAR --

LS, ALS, ABT

Digital, Glue-Logic, ADVANCED CMOS--
AC, ACT, ACQ, ACTQ
Digital, CMOS, Radiation Hardened (SOS) --
HCS, HCTS
Digital, CMOS, Radiation Hardened (Bulk and SOS) --
ACS, ACTS
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Memories, CMOS --
SRAMs
Memories, CMOS -- DRAMs (under construction)
Microprocessors and Peripherals --
MOS
Microcontrollers --
CMOS
Application Specific Integrated Circuits --
(ASICs)
Programmable Logic Devices (PLDs) and Field Programmable Gate Arrays --
(FPGAs)
Microcircuits, Linear --
BIPOLAR and CMOS
Interface/Bus Controllers --
CMOS
CMOS, Digital, High Speed (older technology parts) --
HC
CMOS, Digital, High Speed, TTL Compatible (older technology parts) --
HCT
NASDA Qualified Microcircuits and Semiconductors --
General Information
NOTE:
The activity responsible for the MIL-PRF-38535, MIL-PRF-38534, and MIL-M-38510 Qualified parts is the Defence Supply Center Columbus (DSCC).
The activity responsible for the QTS-38510A qualified parts is the National Space Development Agency of Japan (NASDA).
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MICROCIRCUITS

(Monolithic)

DIGITAL, GLUE-LOGIC, ADVANCED CMOS

TYPE	TECHNOLOGY	TECHNOLOGY	TECHNOLOGY	TECHNOLOGY
	54AC	TTL Compatible 54ACT	Quiet Series 54ACQ	Quiet Series, TTL-Compatible 54ACTQ
Buffers/Drivers	X	X	X	X
Comparators	X	-	-	-
Counters	-	-	-	-
Flip-Flops	X	X	X	X
Gates	X	X	-	X
Latches	-	-	X	X
Shift Registers	X	-	-	-

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GSFC SEU Radiation Data Bank

JPL's Radiation Data Bank
Manufacturer:
Active Supplier Assessment Program (ASAP) Core Suppliers List
Part Procurement:
Part Number/Procurement details
Application Notes:
Applicable details
Last Update:
March 1998
Advanced CMOS (AC), Digital
Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54AC240	Octal Buffer/Line Driver W/Inverse 3-State Outputs	M38510R75703#*X	NSC	S, B	100K	-
54AC241	Octal Buffer/Line Driver W/3-State Outputs	M38510R75704#*X	NSC	S, B	100K	-
54AC244	Octal Buffer/Line Driver W/3-State Outputs	M38510R75705#*X	NSC	S, B	100K	-
54AC245	Octal, Bi-Directional W/3-State Outputs	M38510R75503#*X	NSC	S, B	100K	-
54AC541	Octal Buffer/Line Driver W/3 State Outputs	M38510/75711#*X	NSC	S, B	-	-

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Advanced CMOS (AC), Digital
Comparators

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54AC520	8-Bit Magnitude Comparator	5962-9091601#*X	NSC,TI	S, B	-	-
54AC521	8-Bit Identify Comparator	5962R9098501#*X	NSC	S, B	-	-

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Advanced CMOS (AC), Digital
Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54AC74	Dual D-Type, Positive Edge-Trigger	M38510/75302#*X	NSC	S, B	-	-
54AC109	Dual JK Positive Edge-Trigger	M38510/75304#*X	NSC	S, B	-	-
54AC174	Hex D-Type Flip-Flop W/ Master Reset	M38510/75307#*X	NSC	S, B	-	-
54AC273	Octal D-Type Flip-Flop W/Reset	M38510/75601#*X	NSC	S, B	-	-
54AC373	D-Type Octal, W/3-State Outputs	M38510/75403#*X	NSC	S, B	-	-
54AC373	Octal Transparent, W/3-State Outputs	M38510R75403#*X	NSC	S, B	100K	-
54AC374	Octal D-Type W/3-State Outputs	M38510/75602#*X	NSC	S, B	-	-

54AC377	Octal D-Type W/Clock Enable	M38510/75603#*X	NSC	S, B	-	-
54AC574	Octal D-Type W/3-State Outputs	M38510/75604#*X	NSC	S, B	-	-

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Advanced CMOS (AC), Digital
Gates

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54AC00	NAND, Quad 2-Input	M38510R75001#*X	NSC	S, B	100K	-
54AC02	NOR, Quad 2-Input	M38510R75101#*X	NSC	S, B	100K	-
54AC04	Hex Inverter	M38510R75701#*X	NSC	S, B	100K	-
54AC05	Hex Inv. W/ Open Drain Outputs	5962-9059001#*X	NSC	S, B	-	-
54AC08	AND, Quad 2-Input	M38510R75203#*X	NSC	S, B	100K	-
54AC10	NAND, Triple, 3-Input	M38510R75002#*X	NSC	S, B	100K	-
54AC11	AND, Triple, 3-Input	M38510/75204#*X	NSC	S, B	-	-
54AC14	HEX Invert Schmitt Trigger	M38510R75702#*X	NSC	S, B	-	-
54AC20	NAND, Dual 4-Input	M38510R75003#*X	NSC	S, B	100K	-
54AC32	OR, Quad 2-Input	M38510R75201#*X	NSC	S, B	100K	-
54AC86	XOR, Quad 2-Input	M38510R75202#*X	NSC	S, B	100K	-
54AC138	1-Of-8 Decoder/Demux	M38510/75802#*X	NSC	S, B	-	-
54AC139	Dual 1-Of-4 Decoder/Demux	M38510/75803#*X	NSC	S, B	-	-
54AC151	8-Input Multiplexer	M38510/76201#*X	NSC	S, B	-	-
54AC153	Dual 4-Input Multiplexer	M38510/76202#*X	NSC	S, B	-	-
54AC157	Quad 2-Input Multiplexer	M38510/76203#*X	NSC	S, B	-	-

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Shift Registers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54AC299	8-Bit Universal Shift Register	M38510R76506#*X	NSC	S, B	100K	-

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Advanced CMOS, TTL Compatible (ACT), Digital,

Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACT240	Octal Buff/Line Driver W/3-State Outputs	5962-8775901#*X	NSC	S, B	-	-
54ACT240	Octal Buff/Line Driver W/3-State Outputs	5962R8775901#*X	NSC	S, B	100K	-
54ACT244	Octal Buff/Line Driver W/3 State Outputs	5962-8776001#*X	NSC	S, B	-	-
54ACT244	Octal Buff/Line Driver W/3-State Outputs	5962R8776001#*X	NSC	S, B	-	-
54ACT245	Octal Bi-Drectional Xceivers W/3-State I/O	5962-8766301#*X	NSC	S, B	-	-
54ACT245	Octal Bi-Directional Xceivers W/3-State I/O	5962R8766301#*X	NSC	S, B	-	- <!-- #EndEditable -->

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Advanced CMOS, TTL Compatible (ACT), Digital

Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACT74	Dual D Positive Edge-Trigger Flip-Flop	5962-8752501#*X	NSC	S, B	-	-
54ACT112	Dual J-K Negative Edge-Trigger Flip-Flop	5962-8995001#*X	NSC	S, B	-	-
54ACT377	Octal D Flip-Flop W/ Clock Cable	5962-8769701#*X	NSC	S, B	-	-
54ACT574	Octal D Flip-Flop W/ 3-State Outputs	5962-8960101#*X	NSC	S, B	-	-

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Advanced CMOS, TTL Compatible (ACT), Digital,
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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACT00	NAND, Quad 2-Input	5962-8769901#*X	NSC	S, B	-	-
54ACT00	NAND, Quad 2-Input	5962R8769901#*X	NSC	S, B	100K	-
54ACT138	1-To-8 Line Decoder	5962-8755401#*X	NSC	S, B	-	-
54ACT151	8-Input Multiplexer	5962-8875601#*X	NSC	S, B	-	-

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Advanced CMOS, Quiet Series (ACQ), Digital,
Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACQ244DMQB	Buffer/Dri., Octal, Noninverting, With 3-State Outputs	9217601#*X	NSC	M		
54ACQ244FMQB	Buffer/Dri., Octal, Noninverting, With 3-State Outputs	9217601#*X	NSC	M		
54ACQ244LMQB	Buffer/Dri., Octal, Noninverting, With 3-State Outputs	9217601#*X	NSC	M		

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Advanced CMOS, Quiet Series (ACQ), Digital,
Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACQ374DMQB	Flip-Flop, D-Type, With 3-State Outputs	9217901#*X	NSC	M		
54ACQ374FMQB	Flip-Flop, D-Type, With 3-State Outputs	9217901#*X	NSC	M		
54ACQ374LMQB	Flip-Flop, D-Type, With 3-State Outputs	9217901#*X	NSC	M		

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Advanced CMOS, Quiet Series (ACQ), Digital,
Latches

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACQ373DMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9217801#*X	NSC	M		
54ACQ373FMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9217801#*X	NSC	M		
54ACQ373LMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9217801#*X	NSC	M		
54ACQ573DMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9218001#*X	NSC	M		
54ACQ573FMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9218001#*X	NSC	M		

54ACQ573LMQB	Latch, D-Type, 8-Bit, With 3-State Outputs	9218001#*X	NSC	M		

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Advanced CMOS, TTL Compatible, Quiet Series (ACTQ)
Digital, Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACTQ16240W	Buffer/Driver, 16-Bit, With Inverting Three-State Outputs, Digital Adv Cmos	9688001#*X	NSC	Q		
54ACTQ16244FMQB	Buffer/Driver, 16-Bit, With 3-State Outputs, TTL-Comp. Inputs	9561901#*X	NSC	Q		
54ACTQ16244WQV	Buffer/Driver, 16-Bit, With 3-State Outputs, TTL-Comp. Inputs	9561901#*X	NSC	V		
54ACTQ240DMQB	Buffer/Line Driver, Octal, With Inverting 3-State Outputs, TTL-Compatible Inputs	9218401#*X	NSC	M		
54ACTQ240FMQB	Buffer/Line Driver, Octal, With Inverting 3-State Outputs, TTL-Compatible Inputs	9218401#*X	NSC	M		
54ACTQ240LMQB	Buffer/Line Driver, Octal, With Inverting 3-State Outputs, TTL-Compatible Inputs	9218401#*X	NSC	M		
54ACTQ241DMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs, TTL-Compatible Inputs	9218501#*X	NSC	M		
54ACTQ241FMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs, TTL-Compatible Inputs	9218501#*X	NSC	M		
54ACTQ241LMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs, TTL-Compatible Inputs	9218501#*X	NSC	M		
54ACTQ244DMQB	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601#*X	NSC	M		
54ACTQ244EV	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601#*X	NSC	V		
54ACTQ244FMQB	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601#*X	NSC	M		
54ACTQ244J	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601#*X	NSC	V		
54ACTQ244LMQB	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601M#*X	NSC	M		
54ACTQ541DMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs	9682901#*X	NSC	Q		
54ACTQ541FMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs	9682901#*X	NSC	Q		
54ACTQ541LMQB	Buffer/Driver, Octal, Noninverting, With 3-State Outputs	9682901#*X	NSC	Q		
54ACTQ827FMQB	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9219901#*X	NSC	M		
54ACTQ827LMQB	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9219901#*X	NSC	M		
54ACTQ827SDMQB	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9219901#*X	NSC	M		
54ACTQ16245FMQB	Bus Transceiver, 16-Bit, With 3-State Outputs, TTL Compatible Inputs	9562001#*X	NSC	Q		
54ACTQ16245W-QV	Bus Transceiver, 16-Bit, With 3-State Outputs, TTL Compatible Inputs	9562001#*X	NSC	V		
54ACTQ244WV	Buffer/Line Driver, Octal, With Noninverting 3-State Outputs, TTL-Comp. Inputs	9218601#*X	NSC	V		
54ACTQ245DMQB	Bus Transceiver, 8-Bit, Bidirectional, With 3-State Inputs/Outputs	9218701#*X	NSC	M		
54ACTQ245FMQB	Bus Transceiver, 8-Bit, Bidirectional, With 3-State Inputs/Outputs	9218701#*X	NSC	M		
54ACTQ646FMQB	Transceiver/Register, 8-Bit, With 3-State Outputs	9219601#*X	NSC	M		
54ACTQ646LMQB	Transceiver/Register, 8-Bit, With 3-State Outputs	9219601#*X	NSC	M		

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Advanced CMOS, TTL Compatible, Quiet Series (ACTQ)

Digital, Flip-Flops

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54ACTQ16374FMQB	Flip-Flop, D-Type, 16-Bit	5962-9452801Q#*X	NSC	Q		
54ACTQ16374WQV	Flip-Flop, D-Type, 16-Bit	5962-9452801V#*X	NSC	V		
54ACTQ273DMQB	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-8973501RA	NSC	-		
54ACTQ273EV	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-8973501V#*X	NSC	V		
54ACTQ273FMQB	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-8973501SA	NSC	-		
54ACTQ273JV	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-8973501#*X	NSC	V		
54ACTQ273LMQB	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-89735012A	NSC			
54ACTQ273WV	Flip-Flop, D-Type, 4-Bit, With Reset, TTL-Compatible Inputs	5962-8973501#*X	NSC	V		
54ACTQ374DMQB	Flip-Flop, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	5962-9218901#*X	NSC	M		
54ACTQ374FMQB	Flip-Flop, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	5962-9218901#*X	NSC	M		
54ACTQ374LMQB	Flip-Flop, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	5962-9218901#*X	NSC	M		
54ACTQ377DMQB	Flip-Flop, D-Type, 8-Bit, W/Clock Enable, TTL-Compatible Inputs	5962-9219001#*X	NSC	M		
54ACTQ377FMQB	Flip-Flop, D-Type, 8-Bit, W/Clock Enable, TTL-Compatible Inputs	5962-9219001M#*X	NSC	M		
54ACTQ377LMQB	Flip-Flop, D-Type, 8-Bit, W/Clock Enable, TTL-Compatible Inputs	5962-9219001M#*X	NSC	M		<!-- #EndEditable

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Advanced CMOS, TTL Compatible, Quiet Series (ACTQ)

Digital, Gates

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACTQ04DMQB	Hex Inverter, TTL-Compatible Inputs	8973401CA	NSC	-		
54ACTQ04FMQB	Hex Inverter, TTL-Compatible Inputs	8973401DA	NSC	-		
54ACTQ04LMQB	Hex Inverter, TTL-Compatible Inputs	89734012A	NSC	-		

54ACTQ14DMQB	Hex Inverter, TTL-Compatible, Schmitt Trigger Inputs	9218301MCA#*X	NSC	M		
54ACTQ14FMQB	Hex Inverter, TTL-Compatible, Schmitt Trigger Inputs	9218301#*X	NSC	M		
54ACTQ14LMQB	Hex Inverter, TTL-Compatible, Schmitt Trigger Inputs	9218301M2A	NSC	M		
54ACTQ02DMQB	Nor Gate, Quad 2-Input, TTL-Compatible Inputs	9218101#*X	NSC	M		
54ACTQ02FMQB	Nor Gate, Quad 2-Input, TTL-Compatible Inputs	9218101#*X	NSC	M		
54ACTQ02LMQB	Nor Gate, Quad 2-Input, TTL-Compatible Inputs	9218101#*X	NSC	M		
54ACTQ08DMQB	And Gate, Quad 2-Input, With TTL-Compatible Inputs	8954702CA	NSC	-		
54ACTQ08FMQB	And Gate, Quad 2-Input, With TTL-Compatible Inputs	8954702DA	NSC	-		
54ACTQ08LMQB	And Gate, Quad 2-Input, With TTL-Compatible Inputs	89547022A	NSC	-		
54ACTQ10DMQB	Nand Gate, Triple 3-Input, TTL-Compatible Inputs	9218201#*X	NSC	M		
54ACTQ10FMQB	Nand Gate, Triple 3-Input, TTL-Compatible Inputs	9218201#*X	NSC	M		
54ACTQ10LMQB	Nand Gate, Triple 3-Input, TTL-Compatible Inputs	9218201#*X	NSC	M		
54ACTQ32DMQB	Or Gate, Quad 2-Input, With TTL-Compatible Inputs	8973601CA	NSC	-		
54ACTQ32FMQB	Or Gate, Quad 2-Input, With TTL-Compatible Inputs	8973601DA	NSC	-		
54ACTQ32LMQB	Or Gate, Quad 2-Input, With TTL-Compatible Inputs	89736012A	NSC	-		

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Advanced CMOS, TTL Compatible, Quiet Series (ACTQ)

Digital, Latches

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ACTQ16373FMQB	Latch, D-Type, 16-Bit, Transparent, With 3-State Outputs, TTL-Compatible Inputs	9561801#*X	NSC	Q		
54ACTQ373DMQB	Latch, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	9218801#*X	NSC	M		
54ACTQ373FMQB	Latch, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	9218801#*X	NSC	M		
54ACTQ373LMQB	Latch, D-Type, 8-Bit, With 3-State Outputs, TTL-Compatible Inputs	9218801#*X	NSC	M		
54ACTQ573DMQB	Latch, 8-Bit, Transparent, With 3-State Outputs, TTL-Compatible Inputs	9219401#*X	NSC	M		
54ACTQ573FMQB	Latch, 8-Bit, Transparent, With 3-State Outputs, TTL-Compatible Inputs	9219401#*X	NSC	M		
54ACTQ573LMQB	Latch, 8-Bit, Transparent, With 3-State Outputs, TTL-Compatible Inputs	9219401#*X	NSC	M		
54ACTQ841FMQB	Latch, 10-Bit, With 3-State Outputs, TTL-Compatible Inputs	9220001#*X	NSC	M		
54ACTQ841LMQB	Latch, 10-Bit, With 3-State Outputs, TTL-Compatible Inputs	9220001#*X	NSC	M		
54ACTQ841SDMQB	Latch, 10-Bit, With 3-State Outputs, TTL-Compatible Inputs	9220001#*X	NSC	M		<

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DIGITAL, GLUE-LOGIC, BIPOLAR

TYPE	TECHNOLOGY	TECHNOLOGY	TECHNOLOGY
	Schottky, Low Power, 54LS	Schottky, Advanced Low Power, 54ALS	Advanced BiCMOS, 54ABT
Buffers/Drivers	X	X	X
Counters	X	X	
Flip-Flops	X	X	
Gates	X	X	
Latches	X		
Shift Registers	X		

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Schottky, Low Power (LS)

Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS38	Quad, 2-Input Nand, Open-Col.	/30203#*X	T.I	B	-	-
54LS125A	Quad, Noninv 3-State	/32301#*X	T.I	B	-	-
54LS126	Quad, Noninv 3-State	/32302#*X	T.I	B	-	-
54LS240	Octal, Inverter, 3-State	/32401#*X	NSC, T.I	B	-	-
54LS241	Octal, Noninv, 3-State Outputs	/32402#*X	T.I	B	-	-
54LS244	Octal, Noninv, 3-State Outputs	/32403#*X	NSC, T.I	B	-	-
54LS245	Octal, Bus Transceiver, 3-State	/32803#*X	NSC, T.I	B	-	-
54LS365	Hex, Common Enable, 3-State	/32201#*X	NSC, T.I	B	-	-
54LS366	Hex, Inv, Common Enable, 3-State	/32202#*X	T.I	B	-	-
54LS367	Hex, 4-Bit/2-Bit, Noninv, 3-State	/32203#*X	NSC, T.I	B	-	-
54LS368	Hex, 4-Bit/2-Bit, Inverting, 3-State	/32204#*X	NSC, T.I	B	-	-
54LS541	Octal, Noninverting, 3-State Outputs	/32405#*X	T.I	B	-	-

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Schottky, Low Power (LS)
Counters

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS90	4-Bit Decade	/31501#*X	T.I.	B	-	-
54LS92	Divide-By-12	/31510#*X	T.I.	B	-	-
54LS93	4-Bit Decade	/31502#*X	T.I.	B	-	-
54LS160A	4-Bit Sync Decade	/31503#*X	T.I.	B	-	-
54LS161	4-Bit Sync Binary, Async Reset	/31504#*X	NSC, T.I.	B	-	-
54LS163A	4-Bit Sync Binary, Sync Reset	/31512#*X	T.I.	B	-	-
54LS191	4-Bit Sync Bin Up/Down	/31509#*X	T.I.	B	-	-
54LS193	4-Bit Sync Bin Up/Down	/31508#*X	NSC, T.I.	B	-	-
54LS197	Preset 50/30 Mhz Binary	/32002#*X	T.I.	B	-	-
54LS390	Dual 4-Bit A&B I/P Decade	/32701#*X	T.I.	B	-	-
54LS393	Dual 4-Bit Binary	/32702#*X	T.I.	B	-	-

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Radiation Test:	JPL's Radiation Data Bank
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Part Procurement:	Part Number/Procurement details
Application Notes:	Applicable details
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Schottky, Low Power (LS)
Flip Flop

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS74A	D-Type, Dual	/30102#*X	NSC, T.I.	S, B	-	-
54LS76A	JK, Dual, Negative Edg-Trig	/30110#*X	T.I.	B	-	-
54LS109	JK, Dual With Reset/Clear,Pos.	/30109#*X	NSC. T.I.	B	-	-
54LS112	JK, Dual With Reset/Clear, Neg.	/30103#*X	T.I.	B	-	-

54LS113	JK, Dual With Reset/Clear	/30104#*X	T.I.	B	-	-
54LS123	Monostable, Dual, Retrig.	/31401#*X	T.I.	B	-	-
54LS173A	D-Type, Quad	/36101#*X	T.I.	B	-	-
54LS174	D-Type, Hex	/30106#*X	T.I.	B	-	-
54LS175	D-Type, Quad	/30107#*X	NSC, T.I.	B	-	-
54LS221	Monostable, Dual, Retrig.	/31402#*X	T.I.	B	-	-
54LS273	D-Type, Octal With Clear	/32501#*X	NSC, T.I.	B	-	-
54LS374	D-Type, Octal, 3-State Outputs	/32503#*X	T.I.	B	-	-

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Gates

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS00	Quad 2-Input, Nand	/30001#*X	NSC, T.I.	B	-	-
54LS02	Quad 2-Input Nor	/30301#*X	NSC, T.I.	B	-	-
54LS03	Quad 2-In, Nand, Open Collector	/30002#*X	NSC	S, B	-	-
54LS04	Hex Inverter	/30003#*X	NSC, T.I.	S, B	-	-
54LS05	Hex Inverter Open-Collector O/P	/30004#*X	NSC	B	-	-
54LS08	Quad 2-Input And	/31004#*X	NSC, T.I.	B	-	-
54LS09	2-Input, Open Collector And	/31005#*X	T.I.	B	-	-
54LS10	Triple 3-Input Nand	/30005#*X	NSC, T.I.	S, B	-	-
54LS11	Triple 3-Input And	/31001#*X	NSC, T.I.	B	-	-
54LS20	Dual 4-Input Nand	/30007#*X	NSC, T.I.	S, B	-	-
54LS21	Dual 4-Input And	/31003#*X	NSC, T.I.	B	-	-
54LS26	2-Input Open Collector. Nand	/32102#*X	T.I.	B	-	-
54LS27	Triple 3-Input Nor	/30302#*X	NSC, T.I.	S, B	-	-
54LS32	Quad 2-Input Or	/30501#*X	NSC, T.I.	B	-	-
54LS42	Bcd-To-7-Segment Decoder	/30703#*X	NSC, T.I.	S, B	-	-
54LS51	Dual 2-Wide And-Or-Inverter	/30401#*X	T.I.	B	-	-
54LS83A	4-Bit Full Adder, Fast Carry	/31201#*X	T.I.	B	-	-
54LS85	4-Bit Magnitude Comparator	/31101#*X	NSC, T.I.	B	-	-
54LS86	Quad 2-Input X-Or	/30502#*X	NSC, T.I.	B	-	-
54LS138	3-Line-To-8-Line Decoder	/30701#*X	NSC, T.I.	B	-	-
54LS139	Dual 2-Line-To-4-Line Decoder	/30702#*X	NSC, T.I.	S, B	-	-
54LS148	8-Line-To-3-Line Priority Encoder	/36001#*X	T.I.	B	-	-
54LS151	8-In Put Data Select/Mux	/30901#*X	NSC, T.I.	B	-	-
54LS153	Dual 4-Input Data Select/Mux	/30902#*X	NSC, T.I.	S, B	-	-
54LS157	Quad 2-Input Data Select/Mux	/30903#*X	NSC, T.I.	S, B	-	-
54LS158	Quad 2-Input Inv. Outputs Mux	/30904#*X	NSC, T.I.	S, B	-	-
54LS251	8-Bit 3-State, Data Select/Mux	/30905#*X	NSC, T.I.	S, B	-	-
54LS253	4-Input 3- State Data Select/Mux	/30908#*X	T.I.	B	-	-
54LS257B	2-Input 3- State Data Select/Mux	/30906#*X	NSC, T.I.	B	-	-
54LS258B	2-Input 3- State Data Select/Mux	/30907#*X	T.I.	B	-	-
54LS280	9-Bit Parity Generator/Checker	/32901#*X	T.I.	B	-	-
54LS283	4-Bit Full Adder , Fast Carry	/31202#*X	NSC, T.I.	B	-	-
54LS348	8-To-3-Line Priority Encoder	/36002#*X	T.I.	B	-	-

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Schottky, Low Power (LS)

Latches

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS75	D-Type, 4-Bit Bistable	/31601#*X	T.I.	B	-	-
54LS259	D-Type, Octal, Addressable	/31603#*X	T.I.	B	-	-
54LS279	RS, Quad	/31602#*X	NSC	B	-	-
54LS373	D-Type, Octal, Transparent	/32502#*X	T.I.	B	-	-
54LS377	D-Type, Octal	/32504#*X	T.I.	B	-	-

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Schottky, Low Power (LS)

Shift Register

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54LS96	5-Bit Shift Register	/30604#*X	T.I.	B	-	-
54LS164	8-Bit Parallel-Out, Serial-In	/30605#*X	NSC, T.I.	B	-	-
54LS165A	8-Bit Parallel-In, Serial-Out	/30608#*X	T.I.	B	-	-

54LS166	8-Bit Parallel-In, Serial-Out	/30609#*X	T.I.	B	-	-
54LS194A	4-Bit Bidirectional	/30601#*X	T.I.	B	-	-
54LS195A	4-Bit Parallel Access	/30602#*X	T.I.	B	-	-
54LS295B	4-Bit Bidirectional	/30606#*X	SAR	B	-	-
54LS395A	4-Bit Universal	/30607#*X	T.I.	B	-	-
54LS670	4 X 4, 3-State Outputs Register File	/31901#*X	NSC	B	-	-

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Schottky, Advanced Low Power (ALS)

Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ALS240A	Octal, Buffer, Inv, 3-State Output	/38301#*X	T.I.	B	-	-
54ALS241	Octal, Buffer, Noninv, 3-State Output	/38302#*X	T.I.	B	-	-
54ALS244B	Octal, Buffer, Noninv, 3-State Output	/38303#*X	T.I.	B	-	-
54ALS1034	Hex , Noninv Buffer/Driver	/38411#*X	T.I.	B	-	-

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Schottky, Advanced Low Power (ALS)

Counters

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ALS161B	4-Bit Sync, Binary	/38001#*X	T.I.	B	-	-
54ALS163B	4-Bit Sync, Clear Binary	/38002#*X	T.I.	B	-	-
54ALS169B	4-Bit Sync, Up/Down Binary	/38003#*X	T.I.	B	-	-

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Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ALS74A	D-Type, Dual-Positive Trigger	/37101#*X	T.I.	B	-	-
54ALS109A	JK, Dual, Preset, Active High	/37102#*X	T.I.	B	-	-
54ALS112A	JK, Dual, Preset, Active Low	/37103#*X	T.I.	B	-	-
54ALS174	D-Type, Hex, With Clear	/37201#*X	T.I.	B	-	-
54ALS175	D-Type, Quad, With Clear	/37202#*X	T.I.	B	-	-
54ALS373	D-Type, Octal, 3-State Outputs	/37203#*X	T.I.	B	-	-
54ALS374	D-Type, Octal, Edge-Trigger	/37204#*X	T.I.	B	-	-
54ALS573	D-Type,Octal, 3-State Outputs	/38201#*X	T.I.	B	-	-
54ALS574A	D-Type, Octal	/37104#*X	T.I.	B	-	-

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Schottky, Advanced Low Power (ALS)

Gates

Generic or Manufacturer Part #	Description	Procurement Specification MIL-M-38510	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54ALS00A	Quad 2-Input Nand	/37001	T.I.	B	-	-
54ALS10	Triple 3-Input Nand	/37002	T.I.	B	-	-
54ALS20A	Dual 4-Input Nand	/37003	T.I.	B	-	-
54ALS30A	8-Input Nand	/37004	T.I.	B	-	-
54AL133	13-Input Nand	/37005	T.I.	B	-	-
54ALS04B	Hex Inverter	/37006	T.I.	B	-	-
54ALS02	Quad 2-Input Nor	/37301	T.I.	B	-	-
54ALS27	Triple 3-Input Nor	/37302	T.I.	B	-	-
54ALS08	Quad 2-Input And	/37401	T.I.	B	-	-
54ALS11	Triple 3-Input And	/37402	T.I.	B	-	-
54ALS32	Quad 2-Input Or	/37501	T.I.	B	-	-
54ALS1000A	Quad 2-Input Nand	/38401	T.I.	B	-	-
54ALS1002	Quad 2-Input Nor	/38402	T.I.	B	-	-
54ALS1020	Dual 4-Input Nand	/38407	T.I.	B	-	-
54ALS138	3-To-8-Line Decod/Demux	/37701	T.I.	B	-	-

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Advanced BiCMOS Technology (ABT), Digital

Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification 5962-	Manufacturer	Device Class or Flow	Rad- Hard Level	Note
54ABT16244W	Buffer/Driver, 16-Bit, With 3-State Outputs, TTL-Comp. Inputs	9317402#*X	NSC	Q	-	-
54ABT240E	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9318801#*X	NSC	Q	-	-
54ABT240J	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9318801#*X	NSC	Q	-	-
54ABT240W	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL Compatible Inputs	9318801#*X	NSC	Q	-	-
54ABT241E	Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	NSC	Q	-	-
54ABT241J	Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	NSC	Q	-	--
54ABT241W	Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	NSC	Q	-	-
54ABT244E	Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	Q	-	-
54ABT244E	Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	V	-	-
54ABT244J	Buffer/Driver, Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	Q	-	-
54ABT244J	Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	V	-	-
54ABT244W	Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	Q	-	-
54ABT244W	Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	NSC	V	-	-
54ABT541E	Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	NSC	Q	-	-
54ABT541J	Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	NSC	Q	-	-
54ABT541W	Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	NSC	Q	-	-
SNJ54ABT162244WD	16-Bit, Noninverting, With 3-State Outputs, TTL-Compatible Inputs	9458701#*X	T.I.	Q	-	-
SNJ54ABT16240WD	Buffer/Driver, 16-Bit, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9319901#*X	T.I.	M	-	-
SNJ54ABT16241WD	Buffer/Driver, 16-Bit, Non-Inverting, W/ 3-State Outputs, TTL Compatible Inputs	9450101#*X	T.I.	Q	-	-
SNJ54ABT16244WD	Buffer/Driver, 16-Bit, With 3-State Outputs, TTL-Comp. Inputs	9317401#*X	T.I.	M	-	-
SNJ54ABT2240FK	Buffer/Driver, Octal, W/Inverting 3-State Outpus And 25 Ohm Series Resistors	9469701#*X	T.I.	Q	-	-
SNJ54ABT2240J	Buffer/Driver, Octal, W/Inverting 3-State Outpus And 25 Ohm Series Resistors	9469701#*X	T.I.	Q	-	-
SNJ54ABT2240W	Buffer/Driver, Octal, W/Inverting 3-State Outpus And 25 Ohm Series Resistors	9469701#*X	T.I.	Q	-	-
SNJ54ABT2244FK	Buffer/Driver, Octal, With Noninverting 3-State Outputs, TTL-Compatible Inputs	9467301#*X	T.I.	Q	-	-
SNJ54ABT2244J	Buffer/Driver, Octal, With Noninverting 3-State Outputs, TTL-Compatible Inputs	9467301#*X	T.I.	Q	-	-
SNJ54ABT2244W	Buffer/Driver, Octal, With Noninverting 3-State Outputs, TTL-Compatible Inputs	9467301#*X	T.I.	Q	-	-
SNJ54ABT240FK	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9318801#*X	T.I.	M	-	-
SNJ54ABT240J	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9318801#*X	T.I.	M	-	-
SNJ54ABT240W	Buffer/Driver, Octal, Inverting, With 3-State Outputs, TTL-Compatible Inputs	9318801#*X	T.I.	M	-	-
SNJ54ABT241FK	Buffer/Driver, Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	T.I.	Q	-	-
SNJ54ABT241J	Buffer/Driver, Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	T.I.	Q	-	-
SNJ54ABT241W	Buffer/Driver, Octal, Noninverting, With 3-State Output, TTL-Compatible Inputs	9322701#*X	T.I.	Q	-	-
SNJ54ABT244J	Buffer/Driver, Octal, Noninverting, W/3-State Outputs, TTL-Compatible Inputs	9214701#*X	T.I.	M	-	-
SNJ54ABT541FK	Buffer/Driver, Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	T.I.	Q	-	-
SNJ54ABT541J	Buffer/Driver, Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	T.I.	Q	-	-
SNJ54ABT541W	Buffer/Driver, Octal, Non-Inverting, W/3-State Outputs, TTL Compatible Inputs	9471801#*X	T.I.	Q	-	-
SNJ54ABT827FK	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9450901#*X	T.I.	Q	-	-
SNJ54ABT827JT	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9450901#*X	T.I.	Q	-	-
SNJ54ABT827W	Bus Driver, 10-Bit, Noninverting 3-State Outputs, TTL-Compatible Inputs	9450901#*X	T.I.	Q	-	-
54ABT16245W	Bus Transceiver, 16-Bit, With 3-State Outputs, TTL-Compatible Inputs	9317502#*X	NSC	Q	-	-
54ABT16500W	Bus Transceiver, 18-Bit Universal, With Three-State Outputs	9687001#*X	NSC	Q	-	-
54ABT16646W	Bus Transceiver/Register, 16-Bit, W/3-State Outputs, TTL Compatible Inputs	9450202#*X	NSC	Q	-	-
54ABT245E	Bus Transceiver, 8-Bit, 3-State Outputs, TTL-Compatible Inputs	9214801#*X	NSC	Q	-	-
54ABT245J	Bus Transceiver, 8-Bit, 3-State Outputs, TTL-Compatible Inputs	9214801#*X	NSC	Q	-	-
54ABT245W	Bus Transceiver, 8-Bit, 3-State Outputs, TTL-Compatible Inputs	9214801#*X	NSC	Q	-	-

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MICROCIRCUITS
(Monolithic)
DIGITAL, CMOS, HIGH SPEED, RADIATION HARDENED
SILICON-ON-SAPPHIRE (SOS)

TYPE	TECHNOLOGY	TECHNOLOGY
	54HCS	54HCTS TTL-Compatible
Buffers/Drivers	X	X
Counters	X	X
Decoder/Multiplexer	X	X
Flip-flops	X	X
Gates	X	X
Latches	X	X
Shift Registers	X	X

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Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS125MS	Buffer/Driver, Quad, Non-Inverting, With 3-State Outputs (Low Enable)	5962R9580301#*X	HSC	V	R	
HCS240MS	Buffer/Driver, Octal, Inverting, With 3-State Outputs	5962R9580901#*X	HSC	V	R	
HCS241MS	Buffer/Driver, Octal, Non-Inverting, With 3-State Outputs	5962R9581001#*X	HSC	V	R	
HCS244MS	Buffer/Driver, Octal, Non-Inverting, With 3-State Outputs	5962R9573101#*X	HSC	V	R	

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS160MS	Decade Counter, 4-Bit Synchronous, With Asynchronous Reset	5962R9580601#*X	HSC	V	R	

HCS161MS	Binary Counter, 4-Bit Synchronous, With Asynchronous Clear	5962R9573001#*X	HSC	V	R	
HCS163MS	Binary Counter, 4-Bit Synchronous, With Synchronous Clear	5962R9580701#*X	HSC	V	R	
HCS190MS	Decade Counter, 4-Bit Synchronous Up/Down	5962R9580801#*X	HSC	V	R	
HCS193MS	Binary Counter, 4-Bit Synchronous Up/Down, Presettable	5962R9578801#*X	HSC	V	R	

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Silicon-On-Sapphire (SOS)

Decoder/Multiplexer

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS138MS	Decoder, 3-To-8-Line	5962R9572701#*X	HSC	V	R	
HCS139MS	Decoder, Dual 2-To-4-Line	5962R9580401#*X	HSC	V	R	
HCS151MS	Data Sel/Multiplexer, 8-Input, With Enable	5962R9572801#*X	HSC	V	R	
HCS154MS	Decoder, 4-To-16-Line	5962R9572901#*X	HSC	V	R	
HCS157MS	Data Sel/Multiplexer, Quad 2-Input	5962R9580501#*X	HSC	V	R	
HCS253MS	Data Sel/Multiplexer, Dual 4-Input, With 3-State Outputs	5962R9579001#*X	HSC	V	R	

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Silicon-On-Sapphire (SOS)

Flip-flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS74MS	Flip-flop, D-Type, Dual, With Preset and Clear	5962R9578201#*X	HSC	V	R	
HCS109MS	Flip-flop, JK, Dual	5962R9578401#*X	HSC	V	R	
HCS112MS	Flip-flop, JK, Dual, With Set and Reset	5962R9580201#*X	HSC	V	R	
HCS273MS	Flip-flop, D-Type, 8-Bit, With Clear	5962R9579101#*X	HSC	V	R	
HCS374MS	Flip-flop, D-Type, 8-Bit, With 3-State Outputs	5962R9579301#*X	HSC	V	R	

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Silicon-On-Sapphire (SOS)

Gates

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS00MS	Nand Gate, Quad 2-Input	5962R9572401#*X	HSC	V	R	
HCS02MS	Nor Gate, 2-Input, Quad	5962R9567901#*X	HSC	V	R	
HCS04MS	Hex Inverter	5962R9572501#*X	HSC	V	R	
HCS05MS	Hex Inverter, With Open-Drain Outputs	5962R9580101#*X	HSC	V	R	
HCS08MS	And Gate, Quad, 2-Input	5962R9568001#*X	HSC	V	R	
HCS10MS	Nand Gate, Triple 3-Input	5962R9577701#*X	HSC	V	R	
HCS11MS	And Gate, Triple 3-Input	5962R9572001#*X	HSC	V	R	
HCS20MS	Nand Gate, Dual 4-Input	5962R9577801#*X	HSC	V	R	
HCS21MS	And Gate, Dual 4-Input	5962R9577901#*X	HSC	V	R	
HCS27MS	Nor Gate, Triple 3-Input	5962R9578001#*X	HSC	V	R	
HCS32MS	Or Gate, Quad 2-Input	5962R9578101#*X	HSC	V	R	
HCS86MS	Exclusive-Or Gate, Quad 2-Input	5962R9578301#*X	HSC	V	R	
HCS132MS	Nand Gate, Quad 2-Input, Schmitt Trigger	5962R9572601#*X	HSC	V	R	

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CMOS, High Speed (HCS), Radiation Hardened Silicon-On-Sapphire (SOS) Latches

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS373MS	Latch, D-Type, 8-Bit, With 3-State Outputs	5962R9579201#*X	HSC	V	R	
HCS573MS	Latch, D-Type, 8-Bit, With 3-State Outputs	5962R9579401#*X	HSC	V	R	

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCS164MS	Shift Register, 8-Bit Serial-In, Parallel-Out	5962R9578501#*X	HSC	V	R	
HCS165MS	Shift Register, 8-Bit Parallel-In, Serial-Out	5962R9578601#*X	HSC	V	R	
HCS166MS	Shift Register, 8-Bit Par/Ser In, Ser Out	5962R9578701#*X	HSC	V	R	
HCS195MS	Shift Register, 4-Bit Parallel	5962R9578901#*X	HSC	V	R	

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CMOS, High Speed, TTL Compatible (HCTS), Radiation Hardened Silicon-On-Sapphire (SOS) Buffers/Drivers

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Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS240MS	Buffer/Driver, Octal, Inverting, With 3-State Outputs	5962R9577201#*X	HSC	V	R	
HCTS244MS	Buffer/Driver, Octal, Non-Inverting, With 3-State Outputs	5962R9574401#*X	HSC	V	R	
HCTS365MS	Buffer/Driver, Hex, Non-Inverting, With 3-State Outputs	5962R9577501#*X	HSC	V	R	
HCTS541MS	Buffer/Driver, Octal, Non-Inverting, With 3-State Outputs	5962R9575101#*X	HSC	V	R	

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Counters

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS93MS	Binary Counter, 4-Bit, TTL-Compatible Inputs	5962R9573701#*X	HSC	V	R	
HCTS160MS	Decade Counter, Asynchronous Reset, TTL-Compatible Inputs	5962R9574201#*X	HSC	V	R	
HCTS161MS	Binary Counter, 4-Bit Synchronous, With Async. Clear and LSTTL-Compatible Inputs	5962R9577001#*X	HSC	V	R	
HCTS163MS	Binary Counter, 4-Bit Synchronous, Pre-Settable, TTL-Compatible Inputs	5962R9574301#*X	HSC	V	R	
HCTS190MS	Decade Counter, 4-Bit Synchronous Up/Down	5962R9577101#*X	HSC	V	R	
HCTS191MS	Binary Counter, 4-Bit Synchronous Up/Down, Pre-Settable, TTL-Compatible Inputs	5962R9575601#*X	HSC	V	R	
HCTS193MS	Counter, 4-Bit, Binary, Up/Down, With TTL-Compatible Inputs	5962R9575701#*X	HSC	V	R	
HCTS390MS	Decade Counter, Dual 4-Bit, With A and B Inputs	5962R9574901#*X	HSC	V	R	
HCTS393MS	Binary Counter, Dual 4-Stage, TTL-Compatible Inputs	5962R9575001#*X	HSC	V	R	

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Decoder/Multiplexer

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS138MS	Decoder, 3-To-8-Line	5962R9574001#*X	HSC	V	R	
HCTS139MS	Decoder, Dual 2-To-4-Line	5962R9575301#*X	HSC	V	R	
HCTS147MS	Priority Encoder, 10-To-4-Line	5962R9574101#*X	HSC	V	R	
HCTS153MS	Data Sel/Multiplexer, Dual 4-Input, TTL-Compatible Inputs	5962R9575401#*X	HSC	V	R	
HCTS157MS	Data Sel/Multiplexer, Quad 2-Input, Non-Inverting, TTL-Compatible Inputs	5962R9575501#*X	HSC	V	R	

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Flip-flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS109MS	Flip-flop, JK, Dual, With Set and Reset, TTL-Compatible Inputs	5962R9576901#*X	HSC	V	R	
HCTS112MS	Flip-flop, JK, Dual, With Set and Reset, TTL-Compatible Inputs	5962R9573801#*X	HSC	V	R	
HCTS273MS	Flip-flop, D-Type, 8-Bit, With Clear, TTL-Compatible Inputs	5962R9576401#*X	HSC	V	R	
HCTS374MS	Flip-flop, D-Type, 8-Bit, With Non-Inverting 3-State Outputs	5962R9574801#*X	HSC	V	R	
HCTS74MS	Flip-flop, D-Type, Dual, With Preset and Clear With TTL-Compatible Inputs	5962R9576301#*X	HSC	V	R	
HCTS574MS	Flip-flop, D-Type, 8-Bit, With 3-State Outputs	5962R9575801#*X	HSC	V	R	

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CMOS, High Speed, TTL Compatible (HCTS), Radiation Hardened Silicon-On-Sapphire (SOS) Gates

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CMOS, High Speed, TTL Compatible (HCTS),

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Gates

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS00MS	Nand Gate, Quad 2-Input, With TTL-Compatible Inputs	5962R9563701#*X	HSC	V	R	
HCTS02MS	Nor Gate, 2-Input, Quad, TTL-Compatible Inputs	5962R9568201#*X	HSC	V	R	
HCTS04MS	Hex Inverter, TTL-Compatible Inputs	5962R9573201#*X	HSC	V	R	
HCTS08MS	And Gate, Quad 2-Input, TTL-Compatible Inputs	5962R9568301#*X	HSC	V	R	
HCTS10MS	Nand Gate, Triple 3-Input, TTL Compatible Inputs	5962R9576501#*X	HSC	V	R	
HCTS11MS	And Gate, Triple 3-Input, TTL-Compatible Inputs	5962R9572101#*X	HSC	V	R	
HCTS14MS	Hex Inverter, Schmitt Trigger, With TTL-Compatible Inputs	5962R9571901#*X	HSC	V	R	
HCTS20MS	Nand Gate, Dual 4-Input, TTL-Compatible Inputs	5962R9573301#*X	HSC	V	R	
HCTS21MS	And Gate, Dual 4-Input, With TTL-Compatible Inputs	5962R9576601#*X	HSC	V	R	< /td>
HCTS27MS	Nor Gate, Triple 3-Input, TTL-Compatible Inputs	5962R9573401#*X	HSC	V	R	
HCTS30MS	Nand Gate, 8-Input, TTL-Compatible Inputs	5962R9573501#*X	HSC	V	R	
HCTS32MS	Or Gate, Quad 2-Input, With TTL-Compatible Inputs	5962R9573601#*X	HSC	V	R	
HCTS86MS	Exclusive-Or Gate, Quad 2-Input, TTL-Compatible Inputs	5962R9581401#*X	HSC	V	R	
HCTS132MS	Nand Gate, Quad 2-Input, Schmitt Trigger, TTL-Compatible Inputs	5962R9573901#*X	HSC	V	R	
HCTS4002MS	Nor Gate, Dual 4-Input, TTL-Compatible Inputs	5962R9576001#*X	HSC	V	R	
HCTS7266MS	Exclusive-Nor Gate, Quad 2-Input, With TTL-Compatible Inputs	5962R9575201#*X	HSC	V	R	

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Latches

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS75MS	Latch, Dual 2-Bit, Bi-Stable, Transparent, TTL-Compatible Inputs	5962R9576701#*X	HSC	V	R	
HCTS373MS	Latch, D-Type, 8-Bit, Transparent, With 3-State Outputs, TTL-Compatible Inputs	5962R9574701#*X	HSC	V	R	

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Shift Registers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
HCTS164MS	Shift Register, 8-Bit, Serial-In/Parallel-Out, TTL Comp. Inputs	5962R9566301#*X	HSC	V	R	
HCTS299MS	Shift Register, 8-Bit Universal, With 3-State Outputs	5962R9574601#*X	HSC	V	R	

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NASA Parts Selection List (NPSL)

MICROCIRCUITS

(Monolithic)

DIGITAL, ADVANCED CMOS

SILICON-ON-SAPPHIRE (SOS) and BULK MSI

RADIATION HARDENED

TYPE	TECHNOLOGY	TECHNOLOGY
	ACS	ACTS TTL-Compatible
Buffers/Drivers	X	X
Counters	X	X
Flip-Flops	X	X
Gates	X	X
Latches	X	X
Multiplexers/Demux (Decoders)	X	X

Shift Registers	X	X
Transceivers	X	X

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Advanced CMOS (ACS)

Radiation Hardened

Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACS125	Buffer, Quad, 3-State Output	5962F9670501#*X	HSC	V	F	1
ACS541	Buffer/Driver, Octal, Non1Inv., 3-State Output	5962F9671001#*X	HSC	V	F	1
UT54ACS11	Buffer, Hex, Non-Inv.	5962H9653001#*X	UTMC	V, Q	H	1
UT54ACS240	Buffer/Driver, Octal, Inverting, 3-State Output	5962H9656801#*X	UTMC	V, Q	H	1
UT54ACS244	Buffer/Driver, Octal, Non-Inv., 3-State Output	5962H9657001#*X	UTMC	V, Q	H	1
UT54ACS365	Buffer/Line Driver, Hex, Non-Inv., 3-State Output	5962H9658601#*X	UTMC	V, Q	H	1
UT54ACS540	Buffer/Driver, Octal, Inverting, 3-State Output	5962H9659201#*X	UTMC	V, Q	H	1
UT54ACS541	Buffer/Driver, Octal, Non-Inv., 3-State Output	5962H9659401#*X	UTMC	V, Q	H	1

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Advanced CMOS (ACS) Radiation Hardened Buffers/Drivers

APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS (ACS)

Radiation Hardened

Counters

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACS161	Binary Counter, 4-Bit, Synchronous, Presettable	5962F9670601#*X	HSC	V	F	1
UT54ACS163	Binary Counter, 4-Bit, Synchronous, Presettable	5962H9655401#*X	UTMC	V, Q	H	1
UT54ACS169	Binary Counter, 4-Bit Synchronous Up/Down	5962H9656001#*X	UTMC	V, Q	H	1
UT54ACS190	Counter, Decade 4-Bit Synchronous Up/Down	5962H9656201#*X	UTMC	V, Q	H	1
UT54ACS191	Binary Counter, 4-Bit Synchronous Up/Down	5962H9656401#*X	UTMC	V, Q	H	1
UT54ACS193	Binary Counter, 4-Bit Syn Up/Down, Presettable	5962H9656601#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS (ACS)

Radiation Hardened

Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer		Device Class or Flow	Rad-Hard Level	Notes
ACS74	Flip-Flop, D-Type, Dual, Positive Edge-Triggered, Set and Clear	5962F9679901#*X	HSC		V, Q	F	1
ACS112	Flip-Flop, JK, Dual, Negative Edge-Triggered, Asynchronous Set and Clear	5962F9670401#*X	HSC		V, Q	F	1
ACS374	Flip-Flop, D-Type, 8-Bit, 3-State Output	5962F9565601#*X	HSC		V, Q	F	1
UT54ACS74	Flip-Flop, D-Type, Dual, Positive Edge-Triggered, Set and Clear	5962H9653401#*X	UTMC		V, Q	H	1
UT54ACS109	Flip-Flop, JK, Dual, Positive Edge-Triggered, Set and Clear	5962H9654001#*X	UTMC		V, Q	H	1
UT54ACS273	Flip-Flop, D-Type, 8-Bit, with Clear	5962H9657801#*X	UTMC		V, Q	H	1
UT54ACS374	Flip-Flop, D-Type, 8-Bit, 3-State Output	5962H9659001#*X	UTMC		V, Q	H	1

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(1) The RH1020 and RH1280 are processed on Actel's 0.8 micron epitaxial bulk CMOS process. The manufacturer guarantees device performance to 300Krads.

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Gates

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACS00	NAND Gate, Quad 2-Input	5962F9565001#*X	HSC	V	F	1
ACS03	NAND Gate, Quad 2-Input, Open Drain Output	5962F9670301#*X	HSC	V	F	1
ACS08	AND Gate, Quad 2-Input	5962F9565101#*X	HSC	V	F	1
ACS10	NAND Gate, Triple 3-Input	5962F9565201#*X	HSC	V	F	1
ACS20	NAND Gate, Dual 4-Input	5962F9565301#*X	HSC	V	F	1
ACS86	Exclusive-OR Gate, Quad 2-Input	5962F9565401#*X	HSC	V	F	1
UT54ACS00	NAND Gate, Quad 2-Input	5962H9651201#*X	UTMC	V, Q	H	1
UT54ACS08	AND Gate, Quad 2-Input	5962H9651801#*X	UTMC	V, Q	H	1
UT54ACS11	AND Gate, Triple 3-Input	5962H9652201#*X	UTMC	V, Q	H	1
UT54ACS20	NAND Gate, Dual 4-Input	5962H9652601#*X	UTMC	V, Q	H	1
UT54ACS27	NOR Gate, Triple 3-Input	5962H9652801#*X	UTMC	V, Q	H	1
UT54ACS54	AND-OR-Invert Gate, 4-Wide 2-Input	5962H9653201#*X	UTMC	V, Q	H	1
UT54ACS86	Exclusive-OR Gate, Quad 2-Input	5962H9653801#*X	UTMC	V, Q	H	1
UT54ACS132	NAND Gate, Quad 2-Input, Schmitt Trigger	5962H9654201#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Latches

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACS373	Latch, D-Type, 8-Bit, Transparent 3-State Output	5962F9565501#*X	HSC	V, Q	F	1
ACS573	Latch, D-Type, 8-Bit, 3-State Output	5962F9672401#*X	HSC	V, Q	F	1
UT54ACS279	Latch, RS, 4-Bit	5962H9658001#*X	UTMC	V, Q	H	1
UT54ACS373	Latch, D-Type, 8-Bit, Transparent, 3-State Output	5962H9658801#*X	UTMC	V, Q	H	1

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(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS Silicon-on-Sapphire (ACS)

Radiation Hardened

Multiplexers/Demux (Decoders)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
UT54ACS138	Demux/Decoder, 3-8 Line	5962H9655401#*X	UTMC	V, Q	H	1
UT54ACS139	Decoder, Dual 2-4 Line	5962H9654601#*X	UTMC	V, Q	H	1
UT54ACS151	Data Sel/Mux, 8-Input	5962H9654801#*X	UTMC	V, Q	H	1
UT54ACS153	Data Sel/Mux, Dual 4-Input	5962H9655001#*X	UTMC	V, Q	H	1
UT54ACS157	Data Sel/Mux, Quad 2-Input	5962H9655201#*X	UTMC	V, Q	H	1
UT54ACS253	Data Sel/Mux, Dual 4-Input, 3-State Output	5962H9657401#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS (ACS)

Radiation Hardened

Shift Registers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer		Device Class or Flow	Rad-Hard Level	Notes
UT54ACS164	Shift Register, 8-Bit Serial-In, Parallel-Out	5962H9655601#*X	UTMC		V, Q	H	1
UT54ACS165	Shift Register, 8-Bit Parallel-In, Serial-Out	5962H9655801#*X	UTMC		V, Q	H	1

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Advanced CMOS (ACS) Radiation Hardened Shift Registers

APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Transceivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State inputs/outputs	5962F9670701#*X	HSC	V	F	1
ACS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State inputs/outputs	5962F9670702#*X	HSC	V	F	1
UT54ACS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State inputs/outputs	5962H9657201#*X	UTMC	V, Q	H	1
UT54ACS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State inputs/outputs	5962H9657202#*X	UTMC	V, Q	H	1

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Advanced CMOS (ACS) Radiation Hardened Transceivers

APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Radiation Hardened
Buffers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS125	Buffer, Quad, 3-State Outputs, TTL-Comp. Inputs	5962F9671501#*X	HSC	V, Q	F	-
ACTS240	Buffer/Driver, Octal, Inverting, 3-State Outputs, TTL-Comp. Inputs	5962F9671701#*X	HSC	V, Q	F	-
ACTS244	Buffer/Driver, Noninverting, 3-State Outputs, TTL-Comp. Inputs	5962F9671801#*X	HSC	V, Q	F	-
ACTS541	Buffer/Driver, Noninverting, 3-State Outputs, TTL-Comp. Inputs	5962F9672601#*X	HSC	V, Q	F	-
UT54ACTS34	Buffer, Hex, Noninverting	5962H9653101#*X	UTMC	V, Q	H	1
UT54ACTS240	Buffer/Driver, Octal, Inverting, 3-State Outputs, TTL-Comp.,Inputs	5962H9656901#*X	UTMC	V, Q	H	1
UT54ACTS244	Buffer/Driver, Noninverting, 3-State Outputs, TTL-Comp. Inputs	5962H9657101#*X	UTMC	V, Q	H	1
UT54ACTS365	Buffer/Line Driver, 3-State Outputs	5962H9658701#*X	UTMC	V, Q	H	1
UT54ACTS541	Buffer/Driver, 3-State Outputs, TTL-Comp. Inputs	5962H9659501#*X	UTMC	V, Q	H	1

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened Buffers/Drivers

APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS161	Binary Counter, 4-Bit Synchronous, Presettable, TTL-Comp.	5962F9671601#*X	HSC	V, Q	F	-
UT54ACTS163	Binary Counter, 4-Bit Synchronous, Presettable, TTL-Comp.	5962H9655501#*X	UTMC	V, Q	H	1
UT54ACTS169	Binary Counter, 4-Bit Synchronous Up/Down	5962H9656101#*X	UTMC	V, Q	H	1
UT54ACTS190	Counter, 4-Bit Up/Down BCD Decade, Synchronous	5962H9656301#*X	UTMC	V, Q	H	1
UT54ACTS191	Synchronous 4-Bit Up/Down Binary Counter	5962H9656501#*X	UTMC	V, Q	H	1
UT54ACTS193	Binary Counter, 4-Bit Synchronous Up/Down, Presettable, TTL-Comp. Inputs	5962H9656701#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

Flip-Flops

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS112	Flip-Flop, JK, Dual, Asynchronous Set And Clear	5962F9671401#*X	HSC	V, Q	F	-
ACTS374	Flip-Flop, D-Type, 8-Bit, 3-State Outputs, TTL-Comp. Inputs	5962F9566201#*X	HSC	V, Q	F	-
UT54ACTS74	Flip-Flop, D-Type, Dual, Reset And Clear And TTL-Comp. Inputs	5962H9653501#*X	UTMC	V, Q	H	1
UT54ACTS109	Flip-Flop, JK, Dual, Positive Edge-Triggered, TTL-Comp. Inputs	5962H9654101#*X	UTMC	V, Q	H	1
UT54ACTS273	Flip-Flop, D-Type, 4-Bit, Reset, TTL-Comp. Inputs	5962H9657901#*X	UTMC	V, Q	H	1
UT54ACTS374	Flip-Flop, D-Type, 8-Bit, 3-State Outputs, TTL-Comp. Inputs	5962H9659101#*X	UTMC	V, Q	H	1

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(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS TTL Compatible (ACTS)
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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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NASA Parts Selection List (NPSL)
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Monolithic Microcircuits
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Digital, CMOS, Radiation Hardened (Bulk and SOS)
|
Advanced CMOS TTL Compatible (ACTS)
Radiation Hardened Gates

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS00	Nand Gate, Quad 2-Input, TTL-Compatible Inputs	5962F9563601#*X	HSC	V, Q	F	-
ACTS08	And Gate, Quad 2-Input, TTL-Comp. Inputs	5962F9565701#*X	HSC	V, Q	F	-

ACTS10	Nand Gate, Triple 3-Input, TTL-Comp. Inputs	5962F9565801#*X	HSC	V, Q	F	-
ACTS20	Nand Gate, Dual 4-Input	5962F9565901#*X	HSC	V, Q	F	-
ACTS86	Exclusive-Or Gate, Quad 2-Input, TTL-Comp. Inputs	5962F9566001#*X	HSC	V, Q	F	-
UT54ACTS00	Nand Gate, Quad 2-Input, TTL-Comp. Inputs	5962H9651301#*X	UTMC	V, Q	H	1
UT54ACTS02	Nor Gate, Quad 2-Input, TTL-Comp. Inputs	5962H9651501#*X	UTMC	V, Q	H	1
UT54ACTS08	And Gate, Quad 2-Input, TTL-Comp. Inputs	5962H9651901#*X	UTMC	V, Q	H	1
UT54ACTS10	Nand Gate, Triple 3-Input	5962H9652001#*X	UTMC	V, Q	H	1
UT54ACTS11	And Gate, Triple 3-Input, TTL-Comp. Inputs	5962H9652301#*X	UTMC	V, Q	H	1
UT54ACTS20	Nand Gate, Dual 4-Input	5962H9652701#*X	UTMC	V, Q	H	1
UT54ACTS27	Nor Gate, Triple 3-Input, TTL-Comp. Inputs	5962H9652901#*X	UTMC	V, Q	H	1
UT54ACTS54	And-Or-Invert Gate, 4-Wide 2-Input, TTL-Comp. Inputs	5962H9653301#*X	UTMC	V, Q	H	1
UT54ACTS86	Exclusive-Or Gate, Quad 2-Input, TTL-Comp. Inputs	5962H9653901#*X	UTMC	V, Q	H	1
UT54ACTS132	Nand Gate, Quad 2-Input, Schmitt Trigger, TTL-Comp. Inputs	5962H9654301#*X	UTMC	V, Q	H	1
UT54ACTS4002	Nor Gate, Dual 4-Input	5962H9659701#*X	UTMC	V, Q	H	1

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

Latches

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS373	Latch, D-Type, 8-Bit, Transparent, 3-State Outputs, TTL-Comp. Inputs	5962F9566101#*X	HSC	V, Q	F	-
ACTS573	Latch, D-Type, 8-Bit, 3-State Outputs, TTL-Comp. Inputs	5962F9672501#*X	HSC	V, Q	F	-
UT54ACTS279	Latch, 4-Bit, TTL-Comp. Inputs	5962H9658101#*X	UTMC	V, Q	H	1
UT54ACTS373	Latch, D-Type, 8-Bit, Transparent, 3-State Outputs, TTL-Comp. Inputs	5962H9658901#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Radiation Hardened Multiplexers/Demux (Decoders)

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July 1998

Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

Multiplexers/Demux (Decoders)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
UT54ACTS138	Demux/Decoder, 3-8-Line	5962H9655501#*X	UTMC	V, Q	H	1
UT54ACTS139	Demux/Decoder, Dual, 2-4 Line	5962H9654701#*X	UTMC	V, Q	H	1
UT54ACTS151	Demux/Decoder, 8-Input, TTL-Comp.	5962H9654901#*X	UTMC	V, Q	H	1
UT54ACTS153	Data Sel/Mux, Dual 4-Input, TTL-Comp. Inputs	5962H9655101#*X	UTMC	V, Q	H	1
UT54ACTS157	Data Sel/Mux, Quad 2-Input, TTL-Comp. Inputs	5962H9655301#*X	UTMC	V, Q	H	1

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APPLICATION NOTES

(1) The ACS/ACTS families from Harris Semiconductor are fabricated using Silicon-on-Sapphire (SOS) technology, whereas UTMC ACS/ACTS devices are fabricated on Bulk CMOS Radiation Hardened technology.

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

Shift Registers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
UT54ACTS164	Shift Register, 8-Bit Serial-In, Parallel-Out, TTL-Comp. Inputs	5962H9655701#*X	UTMC	V, Q	H	1
UT54ACTS165	Shift Register, 8-Bit Parallel-In, Serial-Out, LSTTL-Comp. Inputs	5962H9655901#*X	UTMC	V, Q	H	1

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Advanced CMOS TTL Compatible (ACTS) Radiation Hardened Shift Registers

APPLICATION NOTES

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Advanced CMOS TTL Compatible (ACTS)

Radiation Hardened

Transceivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
ACTS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State, TTL Compatible Inputs/Outputs	5962F9671901#*X	HSC	V, Q	F	1
UT54ACTS245	Bus Transceiver, 8-Bit, Bidirectional, 3-State, TTL Compatible Inputs/Outputs	5962H9657301#*X	UTMC	V, Q	H	1

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Advanced CMOS TTL Compatible (ACTS)
Radiation Hardened
Transceivers

APPLICATION NOTES

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NASA Parts Selection List (NPSL)
MICROCIRCUITS
(Monolithic)
MEMORIES
PROGRAMMABLE READ-ONLY MEMORY (PROM) (CMOS)

TYPE	TECHNOLOGY
	CMOS
PROM	X
PROM, Electrically Erasable	X

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MEMORIES, BIPOLAR
Programmable Read-Only Memory (PROM)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
82S23	32 X 8 W/ Open Collector Outputs	M38510/20701#*X	PS	B	-	
82S115	512 X 8 W/3-State Outputs	M38510/20803#*X	PS	B	-	
82S123A	32 X 8 W/3-State Outputs	M38510/20704#*X	PS	B	-	
82S126	256 X 4 W/ Open Collector	M38510/20301#*X	PS	B	-	
82S129	256 X 4 W/3-State Outputs	M38510/20302#*X	PS	B	-	
82S129A	256 X 4 W/3-State Outputs	M38510/20304#*X	PS	B	-	
82S130	512 X 4 W/ Open Collector	M38510/20401#*X	PS	B	-	
82S131	512 X 4 W/3-State Outputs	M38510/20402#*X	PS	B	-	
82S131A	512 X 4 W/3-State Outputs	M38510/20404#*X	PS	B	-	
82S137	1K X 4 W/3-State Outputs	M38510/20602#*X	AMD	B	-	
82S137A	1K X 4 W/3-State Outputs	M38510/20604#*X	PS	B	-	

82S141	512 X 8 W/3-State Outputs	M38510/20802#*X	PS	B	-	
82S181	1K X 8 W/3-State Outputs	M38510/20904#*X	PS	B	-	
82S181A	1K X 8 W/3-State Outputs	M38510/20909#*X	PS	B	-	
82S185	2K X 4 W/3-State Outputs	M38510/20902#*X	RAY	B	-	
82S185A	2K X 4 W/3-State Outputs	M38510/20910#*X	PS	B	-	
82S191	2K X 8 W/3-State Outputs	M38510/21002#*X	PS	B	-	
82S191A	2K X 8 W/3-State Outputs	M38510/21004#*X	RAY	B	-	
HS9-6617RH	2K X 8 Bit	5962R9570801V*X	HSC	V	100 K	
LMP2568C-Q45X	32K X 8, Tri-State, CMOS Input	5962R9689101Q*X	LMFS	Q	100 K	
LMP2568T-V45X	32K X 8, Tri-State	5962R9689102V*X	LMFS	V	100 K	
UT28F64T	8K X 8, Unprogrammed	5962R9687301Q*X	UTMC	Q	100 K	
UT28F256	32K X 8, Asynchr.	5962-96891#*X	UTMC	V, Q	0.5 M	

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Electrically Erasable Programmable Read Only Memory (EEPROM)

(CMOS)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
AS58C1001SF	128K x 8, 150 ns Access Time	5962-3826718QNA	AS	Q	-	-
AS58C1001SF	128K x 8, 200 ns Access Time	5962-3826717QNA	AS	Q	-	-
AS58C1001SF	128K x 8, 250 ns Access Time	5962-3826716QNA	AS	Q	-	-

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Memories, Bipolar, PROM

APPLICATION NOTES

The only remaining QPL supplier for this device will no longer be producing this device type in this grade. These parts are not recommended for new designs. Consult with the supplier for final shipment dates and/or availability information.

MEMORIESSTATIC RANDOM ACCESS MEMORY (SRAM)(CMOS)

TYPE	TECHNOLOGY
	CMOS
SRAM, Radiation Hardened	X

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MEMORIES, CMOS

Static Random Access Memory (SRAM)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
2147	4096x1, 3 State Outputs	M38510/23801#*X	INTEL	B	-	-
7C147	4096x1, 35 ns	M38510/28901#*X	CYP	B	-	-
6504	4096x1, 3 State Outputs	M38510/24501#*X	INT	B	-	-
6504R	4096x1, Synch,	M38510R24503#*X	INT	S	100 K	-
6514	1024x4, 3 State Outputs	M38510/24502#*X	INT	B	-	-
6516	2kx8, 200 ns	M38510/29102#*X	INT	B	-	-
65642	8kx8, Selectable Mode	M38510/229205#*X	INT	B	-	-
6716485	8kx8, 85 ns	M38510H3829435#*X	UTMC	S	1 M	-
6716470	8kx8, 70 ns	M38510H3829436#*X	UTMC	S	1 M	-
6716455	8kx8, 55 ns	M38510H3829437#*X	UTMC	S	1 M	-
65262	16kx1, 85 ns	M38510/29103#*X	INT	B	-	-
HC6364/1X#HBT	8kx8	5962H3829438#9X	HON	V, Q	1 M	-
HC6364/1X#HBC	8kx8	5962H3829440#9X	HON	V, Q	1 M	-
HC6364/1X#HCT	8kx8	5962H3829442#9X	HON	V, Q	1 M	-
HC6364/1X#HCC	8kx8	5962H3829443#9X	HON	V, Q	1 M	-
HC6856/1W#HZC	32Kx8, 60 ns	5962H9215305#UX	HON	Q	1 M	-
HC6856/1X#HZC	32Kx8, 60 ns	5962H9215305#ZX	HON	Q	1 M	-
HC6856/1W#HZT	32Kx8, 60 ns	5962H9215306#UX	HON	Q	1 M	-
HC6856/1X#HZT	32Kx8, 60 ns	5962H9215306#ZX	HON	Q	1 M	-
HC6856/1W#HAC	32Kx8, 40 ns	5962H9215307#UX	HON	Q	1 M	-
HC6856/1X#HAC	32Kx8, 40 ns	5962H9215307#ZX	HON	Q	1 M	-
HC6856/1W#HAT	32Kx8, 40 ns	5962H9215308#UX	HON	Q	1 M	-
HC6856/1X# HAT	32Kx8, 40 ns	5962H9215308#ZX	HON	Q	1 M	-
HC6856/1W#RZC	32Kx8, 60 ns	5962R9215305#UX	HON	Q	100 K	-
HC6856/1X#RZC	32Kx8, 60 ns	5962R9215305#ZX	HON	Q	100 K	-
HC6856/1W#RZT	32Kx8, 60 ns	5962R9215306#UX	HON	Q	100 K	-
HC6856/1X#RZT	32Kx8, 60 ns	5962R9215306#ZX	HON	Q	100 K	-
HC6856/1W#RAC	32Kx8, 40 ns	5962R9215307#UX	HON	Q	100 K	-
HC6856/1X#RAC	32Kx8, 40 ns	5962R9215307#ZX	HON	Q	100 K	-
HC6856/1W#RAT	32Kx8, 40 ns	5962R9215308#UX	HON	Q	100 K	-
HC6856/1X#RAT	32Kx8, 40 ns	5962R9215308#ZX	HON	Q	100 K	-
LOR6408C-#55Y	8Kx8	5962H3829444#9C	LMFS	V, Q	1 M	-
LOR6401C-#55X	64x1, 55 ns, CMOS	5962H9215401#ZC	LMFS	V, Q	1 M	-
LOR6401C-#55G	64x1, 55 ns, CMOS	5962H9215401#YC	LMFS	V, Q	1 M	-
LOR6401C-#55X	64x1, 55 ns, TTL	5962H9215402#XC	LMFS	V, Q	1 M	-
LOR6401C-#55G	64x1, 55 ns, TTL	5962H9215402#YC	LMFS	V, Q	1 M	-
LOR2568C-#60X	32Kx8, 60 ns	5962H9215301#XC	LMFS	V, Q	1 M	-
LOR2568C-#60Y	32Kx8, 60 ns	5962H9215301#YC	LMFS	V, Q	1 M	-
LOR2568C-#60I	32Kx8, 60 ns	5962H9215301#NC	LMFS	V, Q	1 M	-
LOR2568T-#60X	32Kx8, 60 ns	5962H9215302#XC	LMFS	V, Q	1 M	-
LOR2568T-#60Y	32Kx8, 60 ns	5962H9215302#YC	LMFS	V, Q	1 M	-
LOR2568T-#60I	32Kx8, 60 ns	5962H9215302#NC	LMFS	V, Q	1 M	-
LOR2568C-#40X	32Kx8, 60 ns	5962H9215303#XC	LMFS	V, Q	1 M	-
LOR2568C-#40Y	32Kx8, 40 ns	5962H9215303#YC	LMFS	V, Q	1 M	-
LOR2568C-#40I	32Kx8, 40 ns	5962H9215303#NC	LMFS	V, Q	1 M	-
LOR2568T-#40X	32Kx8, 40 ns	5962H9215304#XC	LMFS	V, Q	1 M	-

LOR2568T-#40Y	32Kx8, 40 ns	5962H9215304#YC	LMFS	V, Q	1 M	-
LOR2568T-#40I	32Kx8, 40 ns	5962H9215304#NC	LMFS	V, Q	1 M	-
LOR2568C-#30X	32Kx8, 30 ns	5962H9215313#XC	LMFS	V, Q	1 M	-
LOR2568C-#30Y	32Kx8, 30 ns	5962H9215313#YC	LMFS	V, Q	1 M	-
LOR2568C-#30I	32Kx8, 30 ns	5962H9215313#NC	LMFS	V, Q	1 M	-
LOR2568T-#30X	32Kx8, 30 ns	5962H9215314#XC	LMFS	V, Q	1 M	-
LOR2568T-#30Y	32Kx8, 30 ns	5962H9212802#YC	LMFS	V, Q	1 M	-
LOR2568T-#30I	32Kx8, 30 ns	5962H925314#NC	LMFS	V, Q	1 M	-
LOR2561C-#60X	256Kx1, 60 ns	5962H9312801#XC	LMFS	V, Q	1 M	-
LOR2561C-#60Y	256Kx1, 60 ns	5962H9312801#YC	LMFS	V, Q	1 M	-
LOR2561C-#60I	256Kx1, 60 ns	5962H9312801#ZC	LMFS	V, Q	1 M	-
LOR2561T-#60X	256Kx1, 60 ns	5962H9312802#XC	LMFS	V, Q	1 M	-
LOR2561T-#60Y	256Kx1, 60 ns	5962H9312802#YC	LMFS	V, Q	1 M	-
LOR2561T-#60I	256Kx1, 60 ns	5962H9312802#ZC	LMFS	V, Q	1 M	-
LOR2561C-#40Y	256Kx1, 40 ns	5962H9312803#XC	LMFS	V, Q	1 M	-
LOR2561C-#40Y	256Kx1, 40 ns	5962H9312803#YC	LMFS	V, Q	1 M	-
LOR2561T-#50X	256Kx1, 50 ns	5962H9312805#XC	LMFS	V, Q	1 M	-
LOR2561T-#50Y	256Kx1, 50 ns	5962H9312805#YC	LMFS	V, Q	1 M	-
LOR2561T-#50I	256Kx1, 50 ns	5962H9312805#ZC	LMFS	V, Q	1 M	-
201A072	Dual, 256K x 8, Rad Hard	5962H99541V*X	LMFS	V	1 M	(1)
HX6356XQRC	Dual Enable, CMOS, 32Kx8	5962R9584503Q*X	HON	Q	100 K	-
HX6356XVRC	Dual Enable, CMOS, 32Kx8	5962R9584503V*X	HON	V	100 K	-

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MICROCIRCUITS

(Monolithic)

MICROPROCESSORS and PERIPHERALS

TYPE	TECHNOLOGY
	MOS
Microprocessors and Peripheral	X
Microprocessors, Rad-Hard	(under construction)

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Microprocessors and Peripherals

(MOS)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
FLPC - #47F	Floating Point Processor	5962H9210301#*X	LMFS	V, Q	1 M&	
FXPC - #49F	Fixed Point Processor	5962-9202601#*X	LMFS	V, Q	-	
APIC - #47F	Address Processor	5962H9210401#*X	LMFS	V, Q	1 M	
IBMAP2 - #45Z	Address Processor	5962H9210601#*X	LMFS	V, Q	1 M	
MG80486DX250	32-Bit, 50 MHz Microprocessor	5962-9310503#*X	INTEL	Q	-	
MQ80486DX250	32-Bit, 50 MHz Microprocessor	5962-9310503#*X	INTEL	Q	-	
MG80486DX33	32-Bit, 33 MHz, JTAG Comp. Microprocessor	5962-9310506#*X	INTEL	Q	-	
MG80486DX266	32-Bit, 66 MHz Microprocessor	5962-9310504#*X	INTEL	Q	-	
MQ80486DX266	32-Bit, 66 MHz Microprocessor	5962-9310504#*X	INTEL	Q	-	
MG80486DX25	32-Bit, 25 MHz Microprocessor	5962-9310505#*X	INTEL	Q	-	

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Microprocessor

APPLICATION NOTES

Additional preferred products may be available from these flows. Other SMD products produced to the "V" and "Q" assurance levels on these flows are also considered suitable for space applications.

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Last Update:
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MICROCONTROLLERS

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS8-RTX2010RH-Q	16-Bit, Rad Hard, Microcontroller	5962F9563501V*X	INT	V	300 K	-
UT69R00016WCC	16-Bit, Two Port, Rad Hard, High Performance Microcontroller	5962H9855202V*X	UTMC	V	1 M	-
UT69RH051WC	8-Bit, Rad Hard, High Performance Microcontroller	5962H9563801Q*X	UTMC	Q	1 M	-

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Microcontrollers
APPLICATION NOTES
Harris recently sold its semiconductor business to Intersil Corporation. All semiconductor parts previously listed under Harris are now listed as Intersil parts. The generic semiconductor part numbers and the SMD numbers used by Harris have not changed including the Cage Code.
Memories, CMOS, SRAM
APPLICATION NOTES
This LMFS Rad Hard CMOS 256K X 8 SRAM device is composed of two 128K X 8 memory die assembled in a single, double-sided ceramic substrate (Stack of two 1 MBit die). The device is available in a 40 Pin flat pack package.
Harris recently sold its semiconductor business to Intersil Corporation. All semiconductor parts previously listed under Harris are now listed as Intersil parts. The generic semiconductor part numbers and the SMD numbers used by Harris have not changed including the Cage Code.

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(Monolithic)
Application Specific Integrated Circuits (ASICs)
Gate Arrays, CMOS

TYPE	GATES AVAILABLE
Gate Array Family	
Semicustom	15,001 - 25,000
Semicustom	45,001 - 55,000

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Application Specific Integrated Circuits (ASICs)
Gate Arrays (15-25K Gates)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
-	15,001-25,000 Gates	M38510H60514#*X	UTMC	S, B	1M	-
-	15,001-25,000 Gates	M38510/60614#*X	UTMC	S, B	1M	-
-	15,001-25,000 Gates	M38510/60714#*X	UTMC	S, B	1M	-
-	15,001-25,000 Gates	M38510H60814#*X	UTMC	S, B	1M	-

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Application Specific Integrated Circuits (ASICs)
Gate Array (45-55K Gates)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
-	45,001-55,000 Gates	M38510H60617#*X	UTMC	S, B	1M	-
-	45,001-55,000 Gates	M38510/60717#*X	UTMC	S, B	1M	-

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MICROCIRCUITS
(Monolithic)
Programmable Logic Devices (PLDs) and Field Programmable Gate Arrays (FPGAs)

TYPE	TECHNOLOGY	TECHNOLOGY
	Bipolar	CMOS
PLDs	X	
Linear Cell Arrays	X	
FPGAs	-	(Under construction)

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Programmable Logic Devices (PLDs)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
16L8A	16-Input 8-Output And-Or-Invert	M38510/50401BRA	T.I.	B	-	
16R8A	16-Input 8-Output And-Or	M38510/50402BRA	T.I.	B	-	
16R6A	16-Input 6-Output And-Or	M38510/50403BRA	T.I.	B	-	
16R4A	16-Input 4-Output And-Or	M38510/50404BRA	T.I.	B	-	
16L8A-2	16-Input 8 Output And-Or-Invert	M38510/50407BRA	T.I.	B	-	
16R8A-2	16-Input 8-Output Registered And-Or	M38510/50408BRA	T.I.	B	-	
16R6A-2	16-Input 6-Output Registered And-Or	M38510/50409BRA	T.I.	B	-	
16R4A-2	16-Input 4-Output Registered And-Or	M38510/50410BRA	T.I.	B	-	
20L8-15	20-Input 8-Output And-Or-Invert	M38510/50501BLA	T.I.	B	-	
20R8-15	20-Input 8-Output Registered And-Or	M38510/50502BLA	T.I.	B	-	
20R6-15	20-Input 6-Output Registered And-Or	M38510/50503BLA	T.I.	B	-	
20R4-15	20-Input 4-Output Registered And-Or	M38510/50504BLA	T.I.	B	-	
16L8A-15	16-Input 8-Output And-Or-Invert	M38510/50601BRA	T.I.	B	-	
16R8A-15	16-Input 8-Output Registered And-Or	M38510/50602BRA	T.I.	B	-	
16R6A-15	16-Input 6-Output Registered And-Or	M38510/50603BRA	T.I.	B	-	
16R4A-15	16-Input 4-Output Registered And-Or	M38510/50604BRA	T.I.	B	-	
16L8A	16-Input 8-Output And-Or-Invert	M38510/50605BRA	T.I.	B	-	
16R8A	16-Input 8-Output Registered And-Or	M38510/50606BRA	T.I.	B	-	
16R6A	16-Input 6-Output Registered And-Or	M38510/50607BRA	T.I.	B	-	
16R4A	16-Input 4-Output Registered And-Or	M38510/50608BRA	T.I.	B	-	

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Semi-custom Linear Cell Arrays

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
RLA80	8 Macrocell Locations	M38510/70601	RAY	B	-	
RLA120	12 Macrocell Locations	M38510/70602	RAY	B	-	
RLA160	12 Macrocell Locations	M38510/70603	RAY	B	-	

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Programmable Logic Devices (PLDs)

and

Field Programmable Gate Arrays (FPGAs)

APPLICATION NOTES

Additional preferred products may be available from these flows. Other SMD products produced to the "V" and "Q" assurance levels on these flows are also considered suitable for space applications.

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(Monolithic)
LINEAR
BIPOLAR AND CMOS
NASA Advisory NA-GSFC-2002-02
: Single Event Transients in Linear Technology Microcircuits

TYPE	TECHNOLOGY	TECHNOLOGY
	Bipolar	CMOS
Analog Mux/Demux		X
Analog Switches		X
Converters, A/D-D/A	X	
Line Receivers/Drivers	X	
OP-Amps	X	
Pulse Width Modulators	X	_
Sample and Hold Amplifier	X	

Timers	X	
Voltage Comparators	X	
Voltage Reference	X	
Voltage Regulators	X	

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Last Update:	October 1999

Linear

Converters

Analog to Digital (A/D)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level sub rads (Si) TD	Notes
AD976	16-Bit A/D, Parallel Interface	5962-9756401Q*X	ANA	Q	-	-

HS1-9008RH	8-Bit A/D, Flash	5962F9669601V*X	INT	V	300 K	-
574AT	12 Bit A/D W/ m P Interface	M38510/14002#*X	ANA	B	-	-
574AU	12 Bit A/D W/ m P Interface	M38510/14001#*X	ANA	B	-	-

Converters

Digital to Analog (D/A)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level sub rads (Si) TD	Notes
DAC-08	8-Bit D/A, 0.19% Linearity	M38510/11301#*X	ANA, RAY	B	-	-
DAC-08A	8-Bit D/A, 0.10% Linearity	M38510/11302#*X	ANA, RAY	S	-	-
HS9-565ARH	12-Bit D/A	5962R9675501V*X	INT	V	100 K	-
561	10 Bit Binary D/A, Internal Reference	M38510/13301#*X	ANA	B	-	-
562	12 Bit D/A, External Reference	M38510/12101#*X	ANA	B	-	-
565	12 Bit D/A, Internal Reference, High Speed	M38510/12103#*X	ANA	B	-	-
7521	12 Bit D/A, W/ 10 Bit End-Point Linearity	M38510/12703#*X	ANA	B	-	-

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Analog to Digital (A/D) Digital to Analog (D/A)

APPLICATION NOTES

1) Harris recently sold its semiconductor business to Intersil Corporation. All semiconductor parts previously listed under Harris are now listed as Intersil parts. The generic semiconductor part numbers and the SMD numbers used by Harris have not changed including the Cage Code.

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS1-302RH-Q	Dual Channel, DPST, Rad Hard	5962R9581201VCX	INT	V	100 K	-
HS1-303RH-Q	Dual Channel, SPDT, Rad Hard	5962R9581301VCX	INT	V	100 K	-
181A	Dual Channel, 30 Ohm SPST	M38510/11101#*X	SIL	B	-	-
182A	Dual Channel, 75 Ohm SPST	M38510/11102#*X	SIL	B	-	-
184A	Dual Channel, 30 Ohm DPST	M38510/11103#*X	SIL	B	-	-
185A	Dual Channel, 75 Ohm DPST	M38510/11104#*X	SIL	B	-	-
187A	Single Channel, 30 Ohm SPDT	M38510/11105#*X	SIL	B	-	-
188A	Single Channel, 75 Ohm SPDT	M38510/11106#*X	SIL	B	-	-
190A	Dual Channel, 30 Ohm SPDT	M38510/11107#*X	SIL	B	-	-
191A	Dual Channel, 75 Ohm SPDT	M38510/11108#*X	SIL	B	-	- <!-- #EndEditable -->

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1) Harris recently sold its semiconductor business to Intersil Corporation. All semiconductor parts previously listed under Harris are now listed as Intersil parts. The generic semiconductor part numbers and the SMD numbers used by Harris have not changed including the Cage Code.

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Voltage Comparators

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
AD9696	Single, Voltage Comp./Latch	5962-9234703V*X	ANA	V	-	-
LM119	Dual, High	5962-9679801V*X	NSC	V	-	-
LM139	Quad, Voltage Comp.	5962-8773901V*X	NSC	V	-	-
111	Precision Buffer	M38510/10304#*X	NSC,TI	S, B	-	-
119	Dual, High Speed	M38510/10306#*X	LTC, NSC	S, B	-	-
139	Quad, Single Supply, Low Power	M38510/11201#*X	NSC, TI	S, B	-	-
193	Dual, Low Power, Low Offset	M38510/11202#*X	NSC, TI	S, B	-	-
710	Single, Differential	M38510/10301#*X	NSC	B	-	-
2111	Dual Precision Voltage Comp/Buffer	M38510/10305#*X	NSC	S, B	-	-

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Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS1-5104ARH-Q	Quad, Low-Noise, Rad Hard	5962R9569001V*X	INT	V	100 K	-
HS9-5104ARH-Q	Quad, Low-Noise, Rad Hard	5962R9569001V*X	INT	V	100 K	-
LM124AW	Quad, Rad Hard	5962R9950401#*X	INT	V, Q	100 K	-
LM158A	Dual, Rad Hard	5962L8771002#*X	INT	V, Q	50 K	-
LMC6464A	Quad, Low Power	5962-9560302Q*X	INT	Q	-	-
OP07	Single, Low Offset, Internally Compensated	M38510/13502#*X	LTC, ANA, RAY, NSC	B	-	-
OP07A	Single, Ultra Low Offset, Internally Compensated	M38510/13501#*X	LTC, ANA, RAY	S, B	-	-
OP27A	Single, Ultra Low Noise and Offset, Internally Compensated	M38510/13503#*X	TI	S, B	-	-
OP37AL	Low Noise, High Speed	5962-8853701V*X	ANA	V	-	-
OP43AJ	Fast, JFET	5962-9763701V*X	ANA	V	-	-
OP200AZ	Dual	5962-8859301V*X	ANA	V	-	-
OP400AY	Quad, Low Power	5962-8777101V*X	ANA	V	-	-
26C31	Dual	5962-9163901Q*X	NSC	Q	-	-
118	Precision, High-Speed	M38510/10107#*X	NSC, TI	S, B	-	-
124	Quad, Single Supply, Low Power	M38510/11005#*X	NSC, TI	S, B	-	-
148	Quad, Medium Power, Internally Compensated	M38510/11001#*X	NSC	S, B	-	-
155	JFET Input, Low Power	M38510/11401#*X	NSC	S, B	-	-
156	JFET Input, Wide Band	M38510/11402#*X	NSC	S, B	-	-
1558	Dual, Internally Compensated	M38510/10108#*X	NSC	S, B	-	-
2500	High Slew Rate, Internally Compensated, Precision	M38510/12204#*X	INT	B	-	-
2510	Single, Internally Compensated	M38510/12205#*X	INT	B	-	-
2520	Single, Internally Compensated	M38510/12206#*X	INT	B	-	-
2600	Single, High Impedance, Internally Compensated, Wide Band	M38510/12202#*X	INT	B	-	-
2620	Single, Externally Compensated,High Impedance Wide	M38510/12203#*X	INT	B	-	-
101A	Single, Externally Compensated	M38510/10103#*X	NSC, LINF	S, B	-	-
108A	Single, Externally Compensated	M38510/10104#*X	NSC, TI, MOT	S, B	-	-
155A	JFET Input, High Performance, Low Power, Low Offset	M38510/11404#*X	LTC, ANA	S, B	-	-
156A	JFET Input, High Performance Wide Band, Low Offset	M38510/11406#*X	LTC	B	-	-
157A	JFET Input, High Performance Wide Band, Low Offset	M38510/11406#*X	LTC	B	-	-
741A	Single, Internally Compensated	M38510/10101#*X	NSC	S,B	-	-
747A	Dual, Internally Compensated	M38510/10102#*X	NSC	S, B	-	-
2101A	Dual, Externally Compensated	M38510/10105#*X	LINF, RAY	B	-	-
2108A	Dual, Externally Compensated	M38510/10106#*X	RAY	S, B	-	-

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Pulse-Width Modulators

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
1524	Regulating Pulse-Width Modulator	M38510/12601#*X	LINF	S, B	-	-
1525A	Regulating Pulse-Width Modulator	M38510/12602#*X	LINF	B	-	-
1526	Regulating Pulse-Width Modulator	M38510/12603#*X	LINF	B	-	-

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Line Receivers/Drivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS1-26C31RH-Q	Quad Differential Line Receiver	5962F9666301V	INT	V	300 K	-
HS1-26C32RH-Q	Quad Differential Line Receiver	5962F9568901V	INT	V	300 K	-
HS1-26CT31RH-Q	Quad Differential Line Receiver	5962F9563201V	INT	V	300 K	-
HS1-26CT32RH-Q	Quad Differential Line Receiver	5962F9563101V	INT	V	300 K	-
HS1-26CT31RH-8	Quad Differential Line Receiver	5962F9563201Q	INT	Q	300 K	-
HS1-26CT32RH-8	Quad Differential Line Receiver	5962F9563101Q	INT	Q	300 K	-
55107	Dual Line Receiver	M38510/10401#*X	NSC,TI	B	-	-
55108	Dual Line Receiver, Open Collector	M38510/10402#*X	NSC	B	-	-
55113	Dual Differential Line Driver, 3-State Outputs	M38510/10405#*X	TI	B	-	-
55451	Driver, Dual AND	M38510/12902#*X	TI	B	-	-
55452	Driver, Dual NAND	M38510/12903#*X	TI	B	-	-
55454	Driver, Dual NOR	M38510/12905#*X	TI	B	-	-
55462	Driver, Dual AND	M38510/12908#*X	TI	B	-	-
55463	Driver, Dual High Voltage, Medium Speed Switching	M38510/12909#*X	TI	B	-	-

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Sample and Hold Amplifier

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
198	Sample and Hold, 10K	M38510/12501#*X	LTC, NSC	S, B	-	-

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Timers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
555	Timer, Single, Precision	M38510/10901#*X	NSC,TI	S, B	-	-
556	Timer, Dual, Precision	M38510/10902#*X	TI	B	-	-

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Transceivers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
UT63M-147	Digital, Dual Channel, Bus Transceiver	5962H9322603Q*X	UTMC	Q	1 M	- <!-- #EndEditable -->

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Voltage Reference

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS9-REF05RH-Q	Voltage Reference, Temperature Compensated	5962-96A0301VRX	INT	V	-	-

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Voltage Regulators

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
109	5-Volt Positive Regulator, 1.5 A	M38510/10701#*X	LINF, NSC	S, B	-	-
117H	3-Terminal Adjustable Regulator, 0.5 A	M38510/11703#*X	NSC, LINF	S, B	-	-
117K	3-Terminal Adjustable Regulator, 1.5 A	M38510/11704#*X	LINF, NSC	S, B	-	-
120H-05	5-Volt Negative Voltage Regulator, 0.5 A	M38510/11501#*X	NSC, LINF	S, B	-	-
120H-12	12-Volt Negative Voltage Regulator, 0.5 A	M38510/11502#*X	NSC, LINF	S, B	-	-
120H-15	15-Volt Negative Voltage Regulator, 0.5 A	M38510/11503#*X	NSC, LINF	S, B	-	-
120K-05	5-Volt Negative Voltage Regulator, 1.0 A	M38510/11505#*X	NSC, LINF	S, B	-	-
120K-12	12-Volt Negative Voltage Regulator, 1.0 A	M38510/11506#*X	NSC, LINF	S, B	-	-
120K-15	15-Volt Negative Voltage Regulator, 1.0 A	M38510/11507#*X	NSC, LINF	S, B	-	-
137H	3 Terminal Adjustable Regulator, 0.5 A	M38510/11803#*X	NSC	S, B	-	-
137K	3 Terminal Adjustable Regulator, 1.5 A	M38510/11804#*X	NSC, LINF	S, B	-	-
140K-05	5-Volt Positive Voltage Regulator, 1.0 A	M38510/10706#*X	NSC, LINF	S, B	-	-
140K-12	12-Volt Positive Voltage Regulator, 1.0 A	M38510/10707#*X	NSC, LINF	S, B	-	-
140K-15	15-Volt Positive Voltage Regulator, 1.0 A	M38510/10708#*X	NSC, LINF	S, B	-	-
140K-24	24-Volt Positive Voltage Regulator, 1.0 A	M38510/10709#*X	NSC	S, B	-	-
78M05	5-Volt Positive Voltage Regulator, 0.5 A	M38510/10702#*X	LINF, NSC	S, B	-	-
78M12	12-Volt Positive Voltage Regulator, 0.5 A	M38510/10703#*X	LINF, NSC	S, B	-	-
78M15	15-Volt Positive Voltage Regulator, 0.5 A	M38510/10704#*X	NSC	S, B	-	-

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NASA Parts Selection List (NPSL)

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GSFC SEU Radiation Data Bank

JPL's Radiation Data Bank

Manufacturer:

Active Supplier Assessment Program (ASAP) Core Suppliers List

Part Procurement:

Part Number/Procurement details

Application Notes:

Applicable details

Last Update:

October 1999

Linear

CMOS

Multiplexer/Demultiplexer

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
HS1-508ARH	Mux/Demux, 8-Ch	5962R9674201V*X	INT	V	100 K	-
HS9-1840RH	Mux, 16 to 1	5962R9563001V*X	INT	V	100 K	-
506	Mux, 16-CH	M38510/11101#*X	SIL	B	-	-
507	Mux, Diff., 8-Ch	M38510/11103#*X	SIL	B	-	-
508	Mux/Demux, 8-Ch	M38510/11105#*X	SIL	B	-	-
509	Mux/Demux, 4-Ch	M38510/11107#*X	SIL	B	-	-
506A	Mux/Demux, 16 Ch	M38510/11102#*X	SIL	B	-	-
507A	Mux/Demux, 8-Ch	M38510/11104#*X	SIL	B	-	-
508A	Mux/Demux, 8-Ch	M38510/11106#*X	SIL	B	-	-
509A	Mux/Demux, Diff., 8-Ch	M38510/11108#*X	SIL	B	-	-

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Linear, CMOS

Multiplexer/Demultiplexer

APPLICATION NOTES

1) Harris recently sold its semiconductor business to Intersil Corporation. All semiconductor parts previously listed under Harris are now listed as Intersil parts. The generic semiconductor part numbers and the SMD numbers used by Harris have not changed including the Cage Code.

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Part Procurement:

Part Number/Procurement details

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Applicable details

Last Update:

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Interface/Bus Controllers

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level rads (Si) TD	Notes
UT63M-147	Digital, Dual Channel, Bus Transceiver	5962H9322603Q*X	UTMC	Q	1 M	-
UT1553B-BCRTV	Bus Controller, Remote Control	5962H8862801V*X	UTMC	V	1 M	-
UT69151EWB	Serial, Micro-coded, Multi-mode, Intelligent Terminal	5962R9211802V*X	UTMC	V	100 K	-

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Manufacturer:

Active Supplier Assessment Program (ASAP) Core Suppliers List

Part Procurement:

Part Number/Procurement details

Application Notes:

Applicable details

Last Update:

April 1997

High Speed CMOS (HC), Digital

(Older Technology Parts)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad Hard Level	Notes
54HC00	Gate, NAND, Quad 2 Input	M38510/65001#*X	TI	B	-	-
54HC02	Gate, NOR, Quad 2 Input	M38510/65101#*X	TI	B	-	-
54HC04	Gate, HEX Inverter	M38510/65701#*X	TI	B	-	--
54HC08	Gate, AND, Quad 2 Input	M38510/65203#*X	TI	B	-	-
54HC10	Gate, NAND, Triple 3 Input	M38510/65002#*X	TI	B	-	-
54HC11	Gate, AND, Triple 3 Input	M38510/65204#*X	TI	B	-	-
54HC14	Gate, Hex Invert, Schmitt Trigger	M38510/65702#*X	TI	B	-	-
54HC20	Gate, NAND, Dual 4 Input	M38510/65003#*X	TI	B	-	-
54HC27	Gate, NOR, Triple 3 Input	M38510/65102#*X	TI	B	-	-
54HC30	Gate, NAND, 8 Input	M38510/65004#*X	TI	B	-	-
54HC32	Gate, OR, Quad 2 Input	M38510/65201#*X	TI	B	-	-
54HC74	Counter, Dual D, Positive Edge Trigger. W/Clear And Preset	M38510/65302#*X	TI	B	-	-
54HC86	Gate, XOR, Quad 2 Input	M38510/65202#*X	TI	B	-	-
54HC109	Counter, Dual J-K, + Edge Trigger. W/Clear And Preset	M38510/65304#*X	TI	B	-	-
54HC112	Counter, Dual J-K, - Edge Trigger. W/Clear And Preset	M38510/65305#*X	TI	B	-	-
54HC138	Decoder/MUX, 3-To-8 Line Decoder	M38510/65802#*X	TI	B	-	-
54HC139	Decoder/MUX, Dual 2-To-4 Line Decoder	M38510/65803#*X	TI	B	-	-

54HC158	Decoder/MUX, Quad 2-Input Data Select/MUX	M38510/66204#*X	TI	B	-	-
54HC161	Gate, 4-Bit Binary Control, Async. Reset, Sync. Load	M38510/66302#*X	TI	B	-	-
54HC163	Counter, 4-Bit Binary Control, Sync. Reset And Load	M38510/66304#*X	TI	B	-	-
54HC164	Register, 8-Bit Parallel-Out Shift Register.	M38510/66501#*X	TI	B	-	-
54HC165	Register, 8-Bit Parallel-In Shift Register.	M38510/66502#*X	TI	B	-	-
54HC173	Counter, Quad D-Type W/ 3-St Outputs And Clear	M38510/65306#*X	TI	B	-	-
54HC174	Counter, Hex D-Flip-Flop W/ Clear	M38510/65307#*X	TI	B	-	-
54HC175	Flip-Flop, Quad D-Flip-Flop W/ Clear	M38510/65308#*X	TI	B	-	-
54HC240	Buffer, Octal Invert Buff W/ 3-State Outputs	M38510/65703#*X	TI	B	-	-
54HC241	Buffer, Octal Buff W/ 3-State Outputs	M38510/65704#*X	TI	B	-	-
54HC244	Gate, Octal Non-Inv. Buff W/3-State Buffer	M38510/65705#*X	TI	B	-	-
54HC245	Transceiver, Octal Noninv., W/ 3-State Outputs	M38510/65503#*X	TI	B	-	--
54HC259	Latch, 8 Bit Addressable Latch	M38510/65402#*X	TI	B	-	-
54HC273	Flip-Flop, Octal D-Type W/ Dir. Clear Input	M38510/65601#*X	TI	B	-	-
54HC365	Driver, Hex Bus Driver W/ 3-St Outputs	M38510/65706#*X	TI	B	-	-
54HC367	Driver, Hex Bus Driver W/ 3-St Outputs	M38510/65708#*X	TI	B	-	-
54HC368	Driver, Hex Inv Bus Driver W/ 3-St Outputs	M38510/65709#*X	TI	B	-	-
54HC373	Latch, Octal D-Type W/ 3 State Outputs	M38510/65403#*X	TI	B	-	-
54HC374	Flip-Flop, Octal D-Type W/ 3-St Outputs	M38510/65602#*X	TI	B	-	-
54HC393	Counter, Dual 4-Bit Sync. Binarycontrol, Async. Reset	M38510/66309#*X	TI	B	-	-
54HC540	Driver, Octal Inv Bus Driver W/ 3-St Outputs	M38510/65710#*X	TI	B	-	-
54HC541	Driver, Octal Noninv. W/ 3-State Outputs	M38510/65711#*X	TI	B	-	-
54HC573	Latch, Octal D-Type W/ 3-St Outputs	M38510/65406#*X	TI	B	-	-
54HC574	Flip-Flop, Octal D-Type W/ 3-State Outputs	M38510/65604#*X	TI	B	-	-
54HC4002	Gate, NOR, Dual 4-Input	M38510/65104#*X	TI	B	-	-

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NASA Parts Selection List (NPSL)

CMOS, Digital, High speed (Older Technology Parts)

APPLICATION NOTES

The HC technology has been shown to be vulnerable to total dose radiation levels as low as 3 Krads. DC parametric specification limits were exceeded after radiation exposure as low as 3 Krads and functional failures occurred at levels as low as 20 Krads. Lot by lot radiation testing is recommended.

The only remaining QPL supplier for this device will no longer be producing this device type in this grade. These parts are not recommended for new designs. Consult with the supplier for final shipment dates and/or availability information.

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Manufacturer:	Active Supplier Assessment Program (ASAP) Core Suppliers List
Part Procurement:	Part Number/Procurement details
Application Notes:	Applicable details
Last Update:	April 1997

High Speed CMOS, TTL Compatible (HCT), Digital,
(Older Technology Parts)

Generic or Manufacturer Part #	Description	Procurement Specification	Manufacturer	Device Class or Flow	Rad-Hard Level	Notes
54HCT04	Gate, Hex Inverter	M38510/65751#*X	TI	B	-	-
54HCT74	Flip-Flop, Dual D-Type	M38510/65352#*X	TI	B	-	-
54HCT138	Decoder, 3 To 8 Line Decoder	M38510/65852#*X	TI	B	-	-
54HCT240	Buff, Invert Octal 3-St Buffer	M38510/65753#*X	TI	B	-	-
54HCT244	Buff, Octal Buff W/ 3-State Outputs	M38510/65755#*X	TI	B	-	-
54HCT245	Bus Xceiver, Octal Non-Invert W/3 State Outputs	M38510/65553#*X	TI	B	-	-
54HCT373	Flip-Flop, Octal D-Type W/3-State Outputs	M38510/65453#*X	TI	B	-	-
54HCT374	Flip-Flop, Octal D-Type W/3-State Outputs	M38510/65652#*X	TI	B	-	-
54HCT540	Buff, Octal Inv Bus Driver W/ 3-State Outputs	M38510/65760#*X	TI	B	-	-
54HCT541	Buffer, Octal Noninvert. Bus Driver W/3-State Outputs	M38510/65761#*X	TI	B	-	-

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NASA Parts Selection List (NPSL)

CMOS, Digital, High speed, TTL Compatible (Older Technology Parts)

APPLICATION NOTES

The HC technology has been shown to be vulnerable to total dose radiation levels as low as 3 Krads. DC parametric specification limits were exceeded after radiation exposure as low as 3 Krads and functional failures occurred at levels as low as 20 Krads. Lot by lot radiation testing is recommended.

The only remaining QPL supplier for this device will no longer be producing this device type in this grade. These parts are not recommended for new designs. Consult with the supplier for final shipment dates and/or availability information.

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Monolithic and Hybrid Microcircuit Manufacturer Listing

Listed below are links to manufacturer data sites that may provide additional part related information. The linked sites are not under the control of NPSL and NASA is not responsible for information contained in the linked site. We are providing these links for your convenience only.

ACT

Actel Corporation

East Arques Avenue

Sunnyvale, CA 94086-4533

Cage Code: 0J4Z0

Phone No: (408) 522-4584

AMD

Advanced Micro Devices

901 Thompson Pl.

Sunnyvale, CA 94086-3453

Cage Code: 34335

Phone No: (408) 732-2400

ANA

Analog Devices

804 Wilburn Street

Wilmington, MA 01887

Cage Code: 51640

Phone No: (617) 937-2470

AS

Austin Semiconductor

8701 Cross Park Drive

Austin, TX 78754-4566

Cage Code: OEU86

Phone No: (512) 339-1188

CYP

Cypress Semiconductor

3901 North First Street

San Jose, CA 95134-1599

Cage Code: 65786

Phone No: (408) 943-2656

HON

Honeywell SSEC

12001 State Highway 55

Plymouth, MN 55441-4799

Cage Code: 34168
Phone No: (612) 954-2956
HSC
Harris Semiconductor Products
2401 Palm Bay Road Northeast
Palm Bay, FL 32905
Cage Code: 34371
Phone No: (407) 724-7783
INTEL
Intel Corporation
500 West Chandler Boulevard
Chandler, AZ 85226-4702
Cage Code: 34649
Phone No: (602) 554-8450
LINF
Linfinity
11861 Western Avenue
Garden Grove, CA 92641-2119
Cage Code: 34333
Phone No: (714) 898-8121
LMFS
Lockheed Martin Federal Systems
(Formerly Loral Federal Systems Corporation)
9500 Godwin Drive
Manassas, VA 20110-4157
Cage Code: 52088
Phone No: (703) 367-1378
LTC
Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035-7487
Cage Code: 64155
Phone No: (408) 432-1900
MOT
Motorola
1303 E. Algonquin Rd.
Shaumburg, IL 60196-1065
Cage Code: 34344
Phone No: (708) 576-6700
NSC

National Semiconductor Corporation
2900 Semiconductor Drive
Santa Clara, CA 95052-8090
Cage Code: 27014
Phone No: (408) 721-4189
PS
Phillips Semiconductor
811 East Arques Avenue
Sunnyvale, CA 94088
Cage Code: 18324
Phone No: (408) 991-2720
RAY
Raytheon
Semiconductor Div. HQ
350 Ellis St.
Mountain View, CA 94039-7016
Cage Code: 07933
Phone No: (415) 968-9211
SIL
Siliconix, Inc.
2201 Laurelwood Road
Santa Clara, CA 95056-0951
Cage Code: 17856
Phone: No: (408) 970-5260
TI
Texas Instruments
Post Office Box 60448
Midland, TX 79711-0448
Cage Code: 01295
Phone No: (915) 561-6614
UTMC
United Technologies Microelectronics Center
1575 Garden of the Gods Road
Colorado Springs, CO 80907-3486
Cage Code: 6534
Phone No: (719) 594-8000

Active Parts Core Suppliers List (CSL)

The Active Parts Core Suppliers Listing (CSL) is a listing of manufacturers who are considered preferred suppliers of monolithic microcircuits, hybrid microcircuits, transistors or diodes by NASA. The CSL consists of two parts:

Core Suppliers List Part I

Introduction Section I - Microcircuits Section II - Hybrids Section III - Diodes Section IV - Transistors

Core Suppliers List Part II

Japanese Space Agency (NASDA) Listings European Space Agency (ESA) Listings

NOTE: A Portable Document Format (PDF) reader will be needed to view the CSL files on this page. A PDF reader, along with installation instructions, can be obtained free from Adobe Systems Incorporated.

Part I follows, and includes only those suppliers who satisfy the following criteria:

Are listed in QML-38535 (Qualified Manufacturers List of Advanced Microcircuits Qualified Under Military Specification MIL-PRF-38535?), QML-38534 (?Qualified Manufacturers List of Custom Hybrid Microcircuits Qualified under Military Specification List of Custom Hybrid Microcircuits Qualified under Military Specification MIL-H-38534?) or QPL-19500 (?Qualified Products List of Products Qualified under Military Specification MIL-S-19500) Offer one or more products which are currently listed in either MIL-STD-975 or the GSFC PPL Offer QML/QPL products to quality assurance levels which are considered suitable for spaceflight use Have established a history of providing high reliability parts to NASA.

The CSL, Part II, includes active part suppliers, who are not necessarily QML/QPL-certified, but who satisfy the following criteria:

Manufacturers parts on DESC certified and qualified lines Have compiled a satisfactory history of supplying high reliability parts which are currently procured through contractor (or OEM) SCDs Manufacture parts to NASA specifications Are certified and qualified by ESA/NASDA to provide parts to ESA/SCC or NASDA specifications)

The CSL is intended to assist NASA project management, parts/reliability engineers and designers in avoiding EEE part reliability/mission schedule problems which can result when parts are procured from unproven suppliers or suppliers who show recent trends indicative of unsatisfactory performance.

For each manufacturer listed in the CSL, Part I, herein, there is accompanying information related to the processing technologies and product lines for which the manufacturer is considered a core supplier and the name/phone number of a company representative to whom questions may be directed.

The information described in this report was obtained from NASA GSFC Preferred Parts List (PPL-21), NASA Standard Electrical, Electronic and Electromechanical parts list (MIL-STD-975), Qualified Manufacturers List for Monolithic Microcircuits (QML-38535), Qualified Manufacturers list for Custom Hybrid Microcircuits (QML- 38534), and Qualified Products List for Diodes and Transistors (QPL-19500).

For convenience, the listings have been grouped by part commodity. Introductory remarks for each section provide an explanation of the information contained therein. Please note that the manufacturer's listing and the accompanying information are considered accurate at the time of issue of this document. However, the semiconductor industry is one known for rapid change of technology and development including fabrication processes and assembly locations. As a result, the listings are subject to change without notice; revisions or amendments will be issued, as necessary.

For additional information regarding this Core Suppliers Listing, please contact:

Ashok Sharma NASA Goddard Space Flight Center Greenbelt, Maryland 20771 Attn: Ashok Sharma (Active Parts Specialist Code 562) (301) 286-6165 (301) 286-1695 (fax)

Appendix A Derating Criteria

Under Construction.

Appendix B Additional Parts Information Links

Listed below are some useful Links to other data sites that can be used in obtaining additional part related information:

NASA Parts and Packaging Program (NPPP)

Site managed by the Jet Propulsion Laboratory (JPL) -- This Site Contains Electronic Parts Reliability Information Studies of Emerging Microelectronics Technologies Radiation Effects Information JPL's Electronic Parts Information Network System (EPINS)

Electronic Parts Information Management System (EPIMS) User ID/Password Controlled -- This Site Contains GIDEP Alerts GSFC Parts Analysis Web System (PAWS) NASA Parts Advisories NASA Project Parts Lists Nonstandard Part Approval Requests Manufacturer CAGE code/address look up

GSFC SEU Radiation Data Bank

JPL's Radiation Data Bank

GSFC Procurement Specifications

Appendix C Prohibited Materials Section

The following section of the NASA Parts Selection List (NPSL) has been developed to identify materials often used in the manufacture and assembly of EEE parts that shall be prohibited from use in high reliability NASA electronic systems and flight hardware. Users are strongly urged to familiarize themselves with these issues to minimize the risk of introducing potential problems. In addition to the issues noted in this section, each commodity section within the NPSL has application notes that are unique to the commodity. Therefore, users should also review the application notes contained in each commodity section.

1. Pure Tin Plating 2. Cadmium Plating 3. Zinc Plating

Pure Tin Plating Prohibition

Policy:

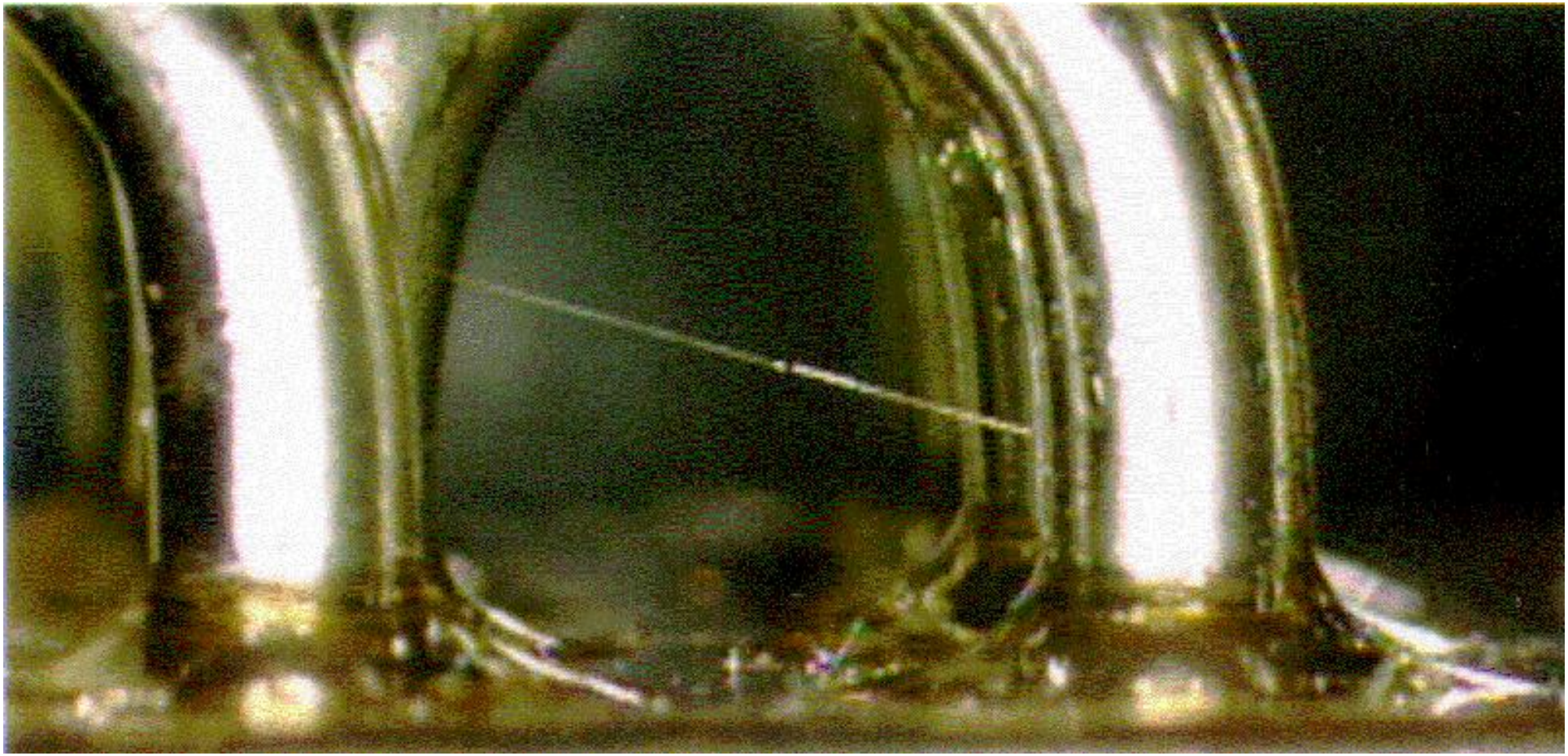
Pure tin plating is prohibited as a final finish on EEE parts and associated hardware

Reference:

NASA Advisory NA-044 October 23, 1998 NASA Advisory NA-044A December 17, 1998 NASA GSFC Tin Whisker Homepage

Rationale:

Pure tin finishes are susceptible to the spontaneous growth of electrically conductive single crystal structures known as tin whiskers. Over time these whiskers may grow to be several millimeters (mm) long. Tin whiskers are capable of causing electrical failures ranging from parametric deviations to sustained plasma arcing (in vacuum) that can result in catastrophic short circuits.



An Example of a Tin Whisker

Several instances have been reported where tin whiskers have caused system failures in both earth and space-based applications including at least 3 reports where a tin whisker induced short circuit resulted in complete failure of the commercial satellite.

The general risks fall into four categories:

Stable short circuits in low voltage, high impedance circuits.In such circuits there may be insufficient current available to fuse the whisker open and a stable short circuit results. Depending on the diameter and length of the whisker, it can take more than 50 milliamps (mA) to fuse one open. More typical is ~10mA Transient short circuits. At atmospheric pressure, if the available current exceeds the fusing current of the whisker, the circuit may only experience a transient glitch as the whisker fuses open. Plasma arcing in vacuum.In vacuum a much more destructive phenomenon can occur. If currents of above a few amps are available, the whisker will fuse open but the vaporized tin may initiate a plasma that can conduct over 200 amps. An adequate supply of tin from the plated surface is necessary to sustain the arc. This phenomenon is reported to have occurred on several commercial satellites resulting in blown fuses that rendered the spacecraft non-operational. Debris/Contamination.Whiskers or parts of whiskers may break loose and bridge isolated conductors or interfere with optical surfaces

Recommendations:

At this time, the only sure way of avoiding tin whiskers is not to use parts plated with pure tin. Despite procurement specification requirements that prohibit pure tin, errors sometimes occur resulting in pure tin plated components being delivered. Therefore, users are advised to independently test and analyze the plating composition of the products received as a verification that pure tin plating is not in use. Simple visual inspection is generally not sufficient because pure tin plating may appear similar to other plated finishes such as tin/lead or nickel.

Utilization of procurement specifications that have clear restrictions against the use of pure tin plating is still recommended. Most, but not all, of the commonly used military specifications currently have prohibitions against pure tin plating. Studies have shown that alloying tin with a second metal reduces the propensity for whisker growth. Alloys of tin and lead are acceptable where the alloy contains a minimum of 3% lead by weight.

In the event pure tin plated parts cannot be avoided, there are some additional processing techniques that may be used to reduce but not eliminate the risks associated with tin whiskers. The effectiveness of these approaches is variable and most require further evaluation to determine their suitability for long duration missions. Examples of these approaches include:

Solder dipping pure tin plated terminations and leads using a leaded solder. The effectiveness of this approach at covering all pure tin plated surfaces can be variable. Application of conformal coat material to pure tin plated surfaces. Conformal coat appears to reduce the growth rate of tin whiskers, but whiskers are still capable of growing through some conformal coat materials such as polyurethanes. For some device types manufacturers may be willing to replate surfaces using finishes such as tin/lead or nickel which are substantially less prone to whisker formation.

Cadmium Plating Prohibition

Policy:

Cadmium plating is prohibited on EEE parts and associated hardware. In some applications use of Cadmium plating may be acceptable via a Project approved waiver process that includes review and approval by both Materials and Parts Engineering disciplines.

Reference:

MSFC-HDBK-527, Materials Selection List for Space Hardware Systems JSC 11123, Space Transportation System Payload Safety Guidelines Handbook

Rationale:

There are several reasons for prohibiting the use of Cadmium plating in space flight electronic systems.

Cadmium is known to sublimate in a hard vacuum environment (especially at temperatures above 75°C). The sublimation products, which are conductive, can redeposit resulting in short circuits. The sublimation products may also interfere with sensitive optics. Cadmium is a toxic material that should not be used in manned spaceflight applications Cadmium is subject to the spontaneous growth of Cadmium whiskers. The propensity of Cadmium to grow whiskers

appears to be lower than that of zinc and especially tin. Cadmium whiskers (like tin whiskers) grow spontaneously and are capable of causing electrical failures ranging from parametric deviations to sustained plasma arcing that can result in catastrophic short circuits. See prohibition against pure tin plating for additional insight regarding the risks of metal whiskers.

Recommendations:

Cadmium plating is commonly used on connectors, connector hardware and mechanical hardware such as fasteners. It provides excellent resistance to salt corrosion and is therefore offered in many military specifications predominantly for use in naval applications. However, most NASA applications are not concerned with salt corrosion and the risks associated with use of Cadmium plating noted above outweigh the benefits of its use in spaceflight applications. There are several alternatives to Cadmium plating that are suited for spaceflight use. For connectors, electroless nickel plating is preferred. Gold plating is preferred when the application requires additional shielding effectiveness or low residual magnetism. Passivated stainless steel is the preferred material for hardware items such as fasteners. Consult your materials or parts specialists for suggested alternatives to Cadmium plating.

Zinc Plating Prohibition

Policy:

Zinc plating is prohibited on EEE parts and associated hardware. In some applications use of Zinc plating may be acceptable via a Project approved waiver process that includes review and approval by both Materials and Parts Engineering disciplines.

Reference: NA

Rationale:

There are several reasons for prohibiting the use of Zinc plating in space flight electronic systems.

Zinc is known to sublimate in a vacuum environment (especially at elevated temperatures). The sublimation products are conductive and can result in short circuits. Zinc is subject to the spontaneous growth of Zinc whiskers. Zinc whiskers (like tin whiskers) grow spontaneously and are capable of causing electrical failures ranging from parametric deviations to sustained plasma arcing that can result in catastrophic short circuits. See prohibition against pure tin plating for additional insight regarding the risks of metal whiskers

Recommendations:

Zinc (galvanized) plating is occasionally used on mechanical hardware such as fasteners for its corrosion resistant properties. By using alternative plating materials most NASA applications can avoid the risks associated with the use of Zinc plating while still achieving suitable corrosion resistance. Consult your materials or parts specialists for suggested alternatives to Zinc plating.