

***Semiconductor Products,
Circuit Design Tools
and Support***

*Master
Selection Guide*

Master Selection Guide

1990

Catalog of Semiconductor Products and Services



**TEXAS
INSTRUMENTS**

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ULTRIX	Digital Equipment Corporation
UNIX	AT&T Bell Laboratories
VAX	Digital Equipment Corporation
VMS	Digital Equipment Corporation
XDS	Texas Instruments Incorporated
XT	International Business Machines Corporation

INTRODUCTION

The purpose of this book is to facilitate identification of Texas Instruments products and services. Each product and service is designed to satisfy customer needs through the use of leading-edge technology and the principles of Total Quality Control. TI's quality, reliability, comprehensive product support, and innovative customer service programs are all aimed at meeting the varied requirements of customers worldwide. For this reason, the 1990 Master Selection Guide covers both North American and European products and services.

Using this Master Selection Guide, designers can readily assess TI's broad semiconductor line by referring to the Table of Contents. The book is organized into nine main product sections. The nine product sections are: Application Specific Integrated Circuits (ASIC); Standard and Advanced Logic Products; Processors and Controllers; Military Products; Interface Circuits; Linear Circuits; Optoelectronics and Image Sensors; Telecommunications and Speech Products; and Memory Products. The information in each section summarizes the key characteristics of that particular group of products. It is designed as a quick way of determining which TI products and services are generally suited to fulfill a specific customer requirement. A technical literature reference is also given for more thorough, in-depth examination.

In addition to the product sections, Section 11 describes several items that are not specific to one product area. The product-related topics of design tools, packaging, and sockets are covered. Such TI customer services as technical training courses and the Customer Response Center are also included.

Two indexes, an alphanumeric (A/N) index and a functional index, are also provided for reference. To improve "reader-friendliness", the A/N index is sorted to group prefixes alphabetically and arranged in ascending numerical order - rather than strictly alphanumeric. Headers also have been added on each page of the index. In the A/N index, military reference documents are linked to specific package codes. Technical literature references, such as data sheets or data books, are also provided. The functional index gives the reader an alternate means of reference. Key functional descriptions are referred to the appropriate section and page for further information.

To obtain referenced technical literature, including data sheets, data books, and application notes, complete and return the order forms incorporated in the Customer Support section of the Guide. For further convenience, a complete listing of TI field sales offices, authorized TI distributors, TI Regional Technology Centers (RTCs), and the TI Customer Response Center is on the back page.

ALPHANUMERIC INDEX

INTRODUCTION

This section provides the means of identifying TI semiconductor products and support services. It is an alphanumeric (A/N) index, sorted alphabetically to group like prefixes, and arranged in ascending numerical order. Key-word functional indices that match functions to the appropriate catalog products and services are presented in Section 12. Alphanumeric and functional macro listings for Application Specific Integrated Circuits (ASIC) are presented in Section 2.

USING THE ALPHANUMERIC INDEX

The Alphanumeric Index lists and describes all TI semiconductor catalog products and services. This index references the section and page, within the Guide, containing additional information on a particular product, design tool or support service. It also cites the TI reference document containing the most current technical data. The US DESC military drawing numbers and the MIL-M-38510 military device type numbers are included for those qualified military products. Some examples of this A/N index are shown below.

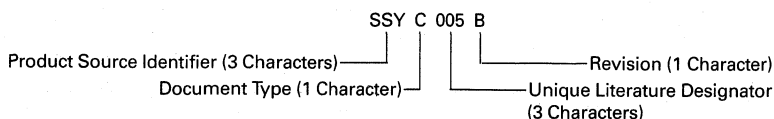
TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
74AC11240	Octal Buffer/Line Driver		3-10	SCAD001A
RC4558	Operational Amplifier		7-10	SLYD003
SMJ27C128-20JM	128-Kilobit EPROM	5962-8766105XA	—	
SN74F374	Octal D-Type Flip-Flop		3-16	SDFD001A
TIBPAL16L8-7	High-Performance IMPACT PAL Circuits	SRPD001	2-6	SRPD001
TMS320C25	CMOS 2nd-Generation DSP		4-8	SPRS010B
TMS4C1024	1M X 1 DRAM, Page Mode		10-5	SMGS024E

SECTION AND PAGE LOCATOR

Column headings “Section and Page” reference the section(s) and page(s) within the Guide containing additional information on specific products or circuit design tools and support services. Familiarity with the numbering sequence makes the Alphanumeric Index of the Master Selection Guide easy to use.

TI DOCUMENT

Column headings “TI Document” provides the latest available technical source for a particular product. TI’s technical literature is identified by a seven- or eight-character literature number. This number consists of four codes that describe the document.



The literature number is printed at the upper right-hand corner on the front cover and the lower left-hand corner on the back cover of a data book, and at the lower left-hand corner on the back page of a data sheet. The Customer Support section of the Guide provides the reader with instructions for obtaining technical literature from Texas Instruments.

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
ADC0803C ADC0803I ADC0804C ADC0804I	A/D Converter A/D Converter A/D Converter A/D Converter		7-18 7-18 7-18 7-18	SLYD004 SLYD004 SLYD004 SLYD004
ADC0805C ADC0805I ADC0808M ADC0809	A/D Converter A/D Converter A/D Converter A/D Converter		7-18 7-18 7-18 7-18	SLYD004 SLYD004 SLYD004 SLYD004
ADC0820 ADC0820B ADC0820C ADC0831A	A/D Converter A/D Converter Peripherals A/D Converter Peripherals A/D Converter Peripherals		7-19 7-18 7-18 7-18	TBA SLYD004 SLYD004 SLYD004
ADC0831B ADC0832A ADC0832B ADC0834A	A/D Converter Peripherals A/D Converter Peripherals A/D Converter Peripherals A/D Converter Peripherals		7-18 7-18 7-18 7-18	SLYD004 SLYD004 SLYD004 SLYD004
ADC0834B ADC0838A ADC0838B AD7524	A/D Converter Peripherals A/D Converter Peripherals A/D Converter Peripherals A/D Converter		7-18 7-18 7-18 7-19	SLYD004 SLYD004 SLYD004 SLYD004
AD7524A AD7524MFKB AD7524MJB AD7528	A/D Converter A/D Converter A/D Converter A/D Converter	5962-87700012A 5962-8770001EA	7-19 7-19 7-19 7-19	SLYD004 SLYD004
AD7528B AD7528K AD7533 AD7533C	A/D Converter A/D Converter A/D Converter A/D Converter		7-19 7-19 7-19 7-19	SLYD004 SLYD004 SLYD004 SLYD004
AD7533L AD7628 AM26LS31 AM26LS32A	A/D Converter A/D Converter Line Driver Line Receiver		7-19 7-19 6-2 6-2	SLYD004 SLYD004 SLYD002 SLYD002
AM26LS32AMFKB AM26LS32AMJB AM26LS32AMWB AM26LS33A	Line Receiver Line Receiver Line Receiver Line Receiver	78020032A 7802003EA 7802003FA	6-2 6-2 6-2 6-3	 SLYD002
AM26LS33AMFKB AM26LS33AMJB AM26LS33AMWB AM26S10C	Line Receiver Line Receiver Line Receiver Bus Transceiver	78020042A 7802004EA 7802004FA	6-3 6-3 6-3 6-4	 SLYD002
AM26S11C DS3680 EP610C-25 EP610C-30	Bus Transceiver Telephone Relay Driver 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev.		6-4 6-7 2-6 2-6	SLYD002 SLYD002 SRPD001 SRPD001
EP910C-30 EP910C-35 EP1810C-35 EP1810C-45	24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev.		2-6 2-6 2-6 2-6	SRPD001 SRPD001 SRPD001 SRPD001
HCPL2502 HCPL2530 HCPL2531 HCPL2601	Optocoupler Optocoupler Optocoupler Optocoupler		8-4 8-4 8-4 8-4	SOYD002A SOYD002A SOYD002A SOYD002A
HCPL2630 HCPL2631 HCPL2730 HCPL2731	Optocoupler Optocoupler Optocoupler Optocoupler		8-4 8-4 8-5 8-5	SOYD002A SOYD002A SOYD002A SOYD002A
ILC7135 JANB16L8AJ JANB16L8A-2J JANB16L8-20J	A/D Converter Programmable Logic Array Programmable Logic Array Programmable Logic Array	JM38510/50401BRA JM38510/50407BRA JM38510/50601BRA	7-18	SLYD004
JANB16L8-30J JANB16R4AJ JANB16R4A-2J JANB16R4-20J	Programmable Logic Array Programmable Logic Array Programmable Logic Array Programmable Logic Array	JM38510/50605BRA JM38510/50404BRA JM38510/50410BRA JM38510/50604BRA		

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
JANB16R4-30J JANB16R6AJ JANB16R6A-2J JANB16R6-20J	Programmable Logic Array Programmable Logic Array Programmable Logic Array Programmable Logic Array	JM38510/50608BRA JM38510/50403BRA JM38510/50409BRA JM38510/50603BRA		
JANB16R6-30J JANB16R8AJ JANB16R8A-2J JANB16R8-20J	Programmable Logic Array Programmable Logic Array Programmable Logic Array Programmable Logic Array	JM38510/50607BRA JM38510/50402BRA JM38510/50408BRA JM38510/50602BRA		
JANB16R8-30J JANB25LS174FK JANB25LS174J JANB54ALS00AFK	Programmable Logic Array Hex D-Type Flip-Flop Hex D-Type Flip-Flop Quad 2-Input NAND Gate	JM38510/50606BRA JM38510/33106B2A JM38510/33106BEA JM38510/37001B2A		
JANB54ALS00AJ JANB54ALS02FK JANB54ALS02J JANB54ALS04BFK	Quad 2-Input NAND Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate Hex Inverter	JM38510/37001BCA JM38510/37301B2A JM38510/37301BCA JM38510/37006B2A		
JANB54ALS04BJ JANB54ALS08FK JANB54ALS08J JANB54ALS10AFK	Hex Inverter Quad 2-Input AND Gate Quad 2-Input AND Gate Triple 3-Input NAND Gate	JM38510/37006BCA JM38510/37401B2A JM38510/37401BCA JM38510/37002B2A		
JANB54ALS10AJ JANB54ALS11AFK JANB54ALS11AJ JANB54ALS20AFK	Triple 3-Input NAND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate Dual 4-Input NAND Gate	JM38510/37002BCA JM38510/37402B2A JM38510/37402BCA JM38510/37003B2A		
JANB54ALS20AJ JANB54ALS27FK JANB54ALS27J JANB54ALS30AFK	Dual 4-Input NAND Gate Triple 3-Input NOR Gate Triple 3-Input NOR Gate 8-Input NAND Gate	JM38510/37003BCA JM38510/37302B2A JM38510/37302BCA JM38510/37004B2A		
JANB54ALS30AJ JANB54ALS32FK JANB54ALS32J JANB54ALS74AFK	8-Input NAND Gate Quad 2-Input OR Gate Quad 2-Input OR Gate Dual D-Type Flip-Flop	JM38510/37004BCA JM38510/37501B2A JM38510/37501BCA JM38510/37101B2A		
JANB54ALS74AJ JANB54ALS109AFK JANB54ALS109AJ JANB54ALS112AFK	Dual D-Type Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/37101BCA JM38510/37102B2A JM38510/37102BEA JM38510/37103B2A		
JANB54ALS112AJ JANB54ALS133FK JANB54ALS133J JANB54ALS138FK	Dual J-K Flip-Flop 13-Input NAND Gate 13-Input NAND Gate 3-8 Line Decoder/Demultiplexer	JM38510/37103BEA JM38510/37005B2A JM38510/37005BEA JM38510/37701B2A		
JANB54ALS138J JANB54ALS161BFK JANB54ALS161BJ JANB54ALS163BFK	3-8 Line Decoder/Demultiplexer 4-Bit Synchronous Binary Counter 4-Bit Synchronous Binary Counter 4-Bit Binary Counter	JM38510/37701BEA JM38510/38001B2A JM38510/38001BEA JM38510/38002B2A		
JANB54ALS163BJ JANB54ALS169BFK JANB54ALS169BJ JANB54ALS174FK	4-Bit Binary Counter 4-Bit Synchronous Binary Counter 4-Bit Synchronous Binary Counter Hex D-Type Flip-Flop	JM38510/38002BEA JM38510/38003B2A JM38510/38003BEA JM38510/37201B2A		
JANB54ALS174J JANB54ALS175FK JANB54ALS175J JANB54ALS240AFK	Hex D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop Octal Buffer/Line Driver	JM38510/37201BEA JM38510/37202B2A JM38510/37202BEA JM38510/38301B2A		
JANB54ALS240AJ JANB54ALS241AFK JANB54ALS241AJ JANB54ALS244AFK	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/38301BRA JM38510/38302B2A JM38510/38302BRA JM38510/38303B2A		
JANB54ALS244AJ JANB54ALS373FK JANB54ALS373J JANB54ALS374FK	Octal Buffer/Line Driver Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/38303BRA JM38510/37203B2A JM38510/37203BRA JM38510/37204B2A		
JANB54ALS374J JANB54ALS573BFK JANB54ALS573BJ JANB54ALS574AFK	Octal D-Type Flip-Flop Octal D-Type Transparent Latch Octal D-Type Transparent Latch Octal D-Type Flip-Flop	JM38510/37204BRA JM38510/38201B2A JM38510/38201BRA JM38510/37104B2A		



TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/PAGE	TI DOCUMENT
JANB54ALS574AJ JANB54ALS857JT JANB54ALS1000AFK JANB54ALS1000AJ	Octal D-Type Flip-Flop Hex 2-To-1 Multiplexer Quad 2-Input NAND Driver Quad 2-Input NAND Driver	JM38510/37104BRA JM38510/37901BLA JM38510/38401B2A JM38510/38401BCA		
JANB54ALS1002AFK JANB54ALS1002AJ JANB54ALS1020AFK JANB54ALS1020AJ	Quad 2-Input NOR Buffer Quad 2-Input NOR Buffer Dual 4-Input NAND Buffer Dual 4-Input NAND Buffer	JM38510/38402B2A JM38510/38402BCA JM38510/38407B2A JM38510/38407BCA		
JANB54ALS1034FK JANB54ALS1034J JANB54F00FK JANB54F00J	Hex Driver Hex Driver Quad 2-Input NAND Gate Quad 2-Input NAND Gate	JM38510/38411B2A JM38510/38411BCA JM38510/33001B2A JM38510/33001BCA		
JANB54F00W JANB54F02FK JANB54F02J JANB54F02W	Quad 2-Input NAND Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate	JM38510/33001BDA JM38510/33301B2A JM38510/33301BCA JM38510/33301BDA		
JANB54F04FK JANB54F04J JANB54F04W JANB54F10FK	Hex Inverter Hex Inverter Hex Inverter Triple 3-Input NAND Gate	JM38510/33002B2A JM38510/33002BCA JM38510/33002BDA JM38510/33003B2A		
JANB54F10J JANB54F10W JANB54F11FK JANB54F11J	Triple 3-Input NAND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate	JM38510/33003BCA JM38510/33003BDA JM38510/34002B2A JM38510/34002BCA		
JANB54F11W JANB54F20FK JANB54F20J JANB54F20W	Triple 3-Input AND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate	JM38510/34002BDA JM38510/33004B2A JM38510/33004BCA JM38510/33004BDA		
JANB54F74FK JANB54F74J JANB54F74W JANB54F109FK	Dual D-Type Flip-Flop Dual D-Type Flip-Flop Dual D-Type Flip-Flop Dual J-K Flip-Flop	JM38510/34101B2A JM38510/34101BCA JM38510/34101BDA JM38510/34102B2A		
JANB54F109J JANB54F109W JANB54F138FK JANB54F138J	Dual J-K Flip-Flop Dual J-K Flip-Flop 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer	JM38510/34102BEA JM38510/34102BFA JM38510/33701B2A JM38510/33701BEA		
JANB54F138W JANB54F153J JANB54F240FK JANB54F240J	3-8 Line Decoder/Demultiplexer Dual 1-of-4 Data Selector/Multiplexer Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/33701BFA JM38510/33902BEA JM38510/33201B2A JM38510/33201BRA		
JANB54F240W JANB54F241FK JANB54F241J JANB54F244FK	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/33201BSA JM38510/33202B2A JM38510/33202BRA JM38510/33203B2A		
JANB54F244J JANB54F245J JANB54F283J JANB54F373FK	Octal Buffer/Line Driver Octal Bus Transceiver 4-Bit Binary Full Adder Dual D-Type Latch	JM38510/33203BRA JM38510/34803BRA JM38510/34201BEA JM38510/34601B2A		
JANB54F373J JANB54F373W JANB54F374FK JANB54F374J	Dual D-Type Latch Dual D-Type Latch Dual D-Type Flip-Flop Dual D-Type Flip-Flop	JM38510/34601BRA JM38510/34601BSA JM38510/34105B2A JM38510/34105BRA		
JANB54F521FK JANB54F521J JANB54F521W JANB54HCT04FK	8-Bit Identity Comparator 8-Bit Identity Comparator 8-Bit Identity Comparator Hex Inverter	JM38510/34701B2A JM38510/34701BRA JM38510/34701BSA JM38510/65751B2A		
JANB54HCT04J JANB54HCT04W JANB54HCT74FK JANB54HCT74J	Hex Inverter Hex Inverter Dual D-Type Flip-Flop Dual D-Type Flip-Flop	JM38510/65751BCA JM38510/65751BDA JM38510/65352B2A JM38510/65352BCA		
JANB54HCT74W JANB54HCT138FK JANB54HCT138J JANB54HCT138W	Dual D-Type Flip-Flop 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer	JM38510/65352BDA JM38510/65852B2A JM38510/65852BEA JM38510/65852BFA		

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JANB54HCT240FK JANB54HCT240J JANB54HCT240W JANB54HCT244FK	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65753B2A JM38510/65753BRA JM38510/65753BSA JM38510/65755B2A		
JANB54HCT244J JANB54HCT244W JANB54HCT245J JANB54HCT245W	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver Octal Bus Transceiver	JM38510/65755BRA JM38510/65755BSA JM38510/65553BRA JM38510/65553BSA		
JANB54HCT373FK JANB54HCT373J JANB54HCT373W JANB54HCT374FK	Octal D-Type Latch Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop	JM38510/65453B2A JM38510/65453BRA JM38510/65453BSA JM38510/65652B2A		
JANB54HCT374J JANB54HCT374W JANB54HCT540FK JANB54HCT540J	Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65652BEA JM38510/65652BFA JM38510/65760B2A JM38510/65760BRA		
JANB54HCT541J JANB54HC00FK JANB54HC00J JANB54HC00W	Octal Buffer/Line Driver Quad 2-Input NAND Gate Quad 2-Input NAND Gate Quad 2-Input NAND Gate	JM38510/65761BRA JM38510/65001B2A JM38510/65001BCA JM38510/65001BDA		
JANB54HC02FK JANB54HC02J JANB54HC02W JANB54HC04FK	Quad 2-Input NOR Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate Hex Inverter	JM38510/65101B2A JM38510/65101BCA JM38510/65101BDA JM38510/65701B2A		
JANB54HC04J JANB54HC04W JANB54HC08FK JANB54HC08J	Hex Inverter Hex Inverter Quad 2-Input AND Gate Quad 2-Input AND Gate	JM38510/65701BCA JM38510/65701BDA JM38510/65203B2A JM38510/65203BCA		
JANB54HC08W JANB54HC10FK JANB54HC10J JANB54HC10W	Quad 2-Input AND Gate Triple 3-Input NAND Gate Triple 3-Input NAND Gate Triple 3-Input NAND Gate	JM38510/65203BDA JM38510/65002B2A JM38510/65002BCA JM38510/65002BDA		
JANB54HC11FK JANB54HC11J JANB54HC11W JANB54HC20FK	Triple 3-Input AND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate Dual 4-Input NAND Gate	JM38510/65204B2A JM38510/65204BCA JM38510/65204BDA JM38510/65003B2A		
JANB54HC20J JANB54HC20W JANB54HC27FK JANB54HC27J	Dual 4-Input NAND Gate Dual 4-Input NAND Gate Triple 3-Input NOR Gate Triple 3-Input NOR Gate	JM38510/65003BCA JM38510/65003BDA JM38510/65102B2A JM38510/65102BCA		
JANB54HC27W JANB54HC30FK JANB54HC30J JANB54HC30W	Triple 3-Input NOR Gate 8-Input NAND Gate 8-Input NAND Gate 8-Input NAND Gate	JM38510/65102BDA JM38510/65004B2A JM38510/65004BCA JM38510/65004BDA		
JANB54HC32FK JANB54HC32J JANB54HC32W JANB54HC74FK	Quad 2-Input OR Gate Quad 2-Input OR Gate Quad 2-Input OR Gate Dual D-Type Flip-Flop	JM38510/65201B2A JM38510/65201BCA JM38510/65201BDA JM38510/65302B2A		
JANB54HC74J JANB54HC74W JANB54HC86FK JANB54HC86J	Dual D-Type Flip-Flop Dual D-Type Flip-Flop Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate	JM38510/65302BCA JM38510/65302BDA JM38510/65202B2A JM38510/65202BCA		
JANB54HC86W JANB54HC109FK JANB54HC109J JANB54HC109W	Quad 2-Input Exclusive-OR Gate Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/65202BDA JM38510/65304B2A JM38510/65304BEA JM38510/65304BFA		
JANB54HC112FK JANB54HC112J JANB54HC112W JANB54HC138FK	Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop 3-8 Line Decoder/Demultiplexer	JM38510/65305B2A JM38510/65305BEA JM38510/65305BFA JM38510/65802B2A		
JANB54HC138J JANB54HC138W JANB54HC139FK JANB54HC139J	3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer Dual 1-4 Line Decoder/Demultiplexer Dual 1-4 Line Decoder/Demultiplexer	JM38510/65802BEA JM38510/65802BFA JM38510/65803B2A JM38510/65803BEA		



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JANB54HC139W JANB54HC161FK JANB54HC161J JANB54HC161W	Dual 1-4 Line Decoder/Demultiplexer 4-Bit Synchronous Binary Counter 4-Bit Synchronous Binary Counter 4-Bit Synchronous Binary Counter	JM38510/65803BFA JM38510/66302B2A JM38510/66302BEA JM38510/66302BFA		
JANB54HC163FK JANB54HC163J JANB54HC163W JANB54HC173FK	4-Bit Binary Counter 4-Bit Binary Counter 4-Bit Binary Counter 4-Bit D-Type Register	JM38510/66304B2A JM38510/66304BEA JM38510/66304BFA JM38510/65306B2A		
JANB54HC173J JANB54HC173W JANB54HC174FK JANB54HC174J	4-Bit D-Type Register 4-Bit D-Type Register Hex D-Type Flip-Flop Hex D-Type Flip-Flop	JM38510/65306BEA JM38510/65306BFA JM38510/65307B2A JM38510/65307BEA		
JANB54HC174W JANB54HC175FK JANB54HC175J JANB54HC175W	Hex D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop	JM38510/65307BFA JM38510/65308B2A JM38510/65308BEA JM38510/65308BFA		
JANB54HC240FK JANB54HC240J JANB54HC240W JANB54HC241FK	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65703B2A JM38510/65703BRA JM38510/65703BSA JM38510/65704B2A		
JANB54HC241J JANB54HC241W JANB54HC244FK JANB54HC244J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65704BRA JM38510/65704BSA JM38510/65705B2A JM38510/65705BRA		
JANB54HC244W JANB54HC245J JANB54HC245W JANB54HC259FK	Octal Buffer/Line Driver Octal Bus Transceiver Octal Bus Transceiver 8-Bit Addressable Latch	JM38510/65705BSA JM38510/65503BRA JM38510/65503BSA JM38510/65402B2A		
JANB54HC259J JANB54HC259W JANB54HC266FK JANB54HC266J	8-Bit Addressable Latch 8-Bit Addressable Latch Quad Exclusive-OR Gate OC Quad Exclusive-OR Gate OC	JM38510/65402BEA JM38510/65402BFA JM38510/65103B2A JM38510/65103BCA		
JANB54HC266W JANB54HC273J JANB54HC273W JANB54HC365FK	Quad Exclusive-OR Gate OC Octal D-Type Flip-Flop Octal D-Type Flip-Flop Hex Bus Driver	JM38510/65103BDA JM38510/65601BRA JM38510/65601BSA JM38510/65706B2A		
JANB54HC365J JANB54HC365W JANB54HC367FK JANB54HC367J	Hex Bus Driver Hex Bus Driver 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer	JM38510/65706BEA JM38510/65706BFA JM38510/65708B2A JM38510/65708BEA		
JANB54HC367W JANB54HC368FK JANB54HC368J JANB54HC368W	3-8 Line Decoder/Demultiplexer Hex Bus Driver Hex Bus Driver Hex Bus Driver	JM38510/65708BFA JM38510/65709B2A JM38510/65709BEA JM38510/65709BFA		
JANB54HC373J JANB54HC373W JANB54HC374FK JANB54HC374J	Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/65403BRA JM38510/65403BSA JM38510/65602B2A JM38510/65602BRA		
JANB54HC374W JANB54HC393FK JANB54HC393J JANB54HC393W	Octal D-Type Flip-Flop Dual 4-Bit Binary Counter Dual 4-Bit Binary Counter Dual 4-Bit Binary Counter	JM38510/65602BSA JM38510/66309B2A JM38510/66309BCA JM38510/66309BDA		
JANB54HC540J JANB54HC540W JANB54HC541J JANB54HC541W	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65710BRA JM38510/65710BSA JM38510/65711BRA JM38510/65711BSA		
JANB54HC573J JANB54HC573W JANB54HC574J JANB54HC574W	Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/65406BRA JM38510/65406BSA JM38510/65604BFA JM38510/65604BFA		
JANB54HC4002FK JANB54HC4002J JANB54HC4002W JANB54LS00FK	Dual 4-Input NOR Gate Dual 4-Input NOR Gate Dual 4-Input NOR Gate Quad 2-Input NAND Gate	JM38510/65104B2A JM38510/65104BCA JM38510/65104BDA JM38510/30001B2A		

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JANB54LS00J JANB54LS00W JANB54LS02FK JANB54LS02J	Quad 2-Input NAND Gate Quad 2-Input NAND Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate	JM38510/30001BCA JM38510/30001BDA JM38510/30301B2A JM38510/30301BCA		
JANB54LS02W JANB54LS03FK JANB54LS03J JANB54LS03W	Quad 2-Input NOR Gate Quad 2-Input NAND Gate OC Quad 2-Input NAND Gate OC Quad 2-Input NAND Gate OC	JM38510/30301BDA JM38510/30002B2A JM38510/30002BCA JM38510/30002BDA		
JANB54LS04FK JANB54LS04J JANB54LS04W JANB54LS08FK	Hex Inverter Hex Inverter Hex Inverter Quad 2-Input AND Gate	JM38510/30003B2A JM38510/30003BCA JM38510/30003BDA JM38510/31004B2A		
JANB54LS08J JANB54LS08W JANB54LS10FK JANB54LS10J	Quad 2-Input AND Gate Quad 2-Input AND Gate Triple 3-Input NAND Gate Triple 3-Input NAND Gate	JM38510/31004BCA JM38510/31004BDA JM38510/30005B2A JM38510/30005BCA		
JANB54LS10W JANB54LS11FK JANB54LS11J JANB54LS11W	Triple 3-Input NAND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate	JM38510/30005BDA JM38510/31001B2A JM38510/31001BCA JM38510/31001BCA		
JANB54LS12FK JANB54LS12J JANB54LS15FK JANB54LS15J	Triple 3-Input NAND Gate OC Triple 3-Input NAND Gate OC Triple 3-Input AND Gate OC Triple 3-Input AND Gate OC	JM38510/30006B2A JM38510/30006BCA JM38510/31002B2A JM38510/31002BCA		
JANB54LS20FK JANB54LS20J JANB54LS20W JANB54LS21FK	Dual 4-Input NAND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate Dual 4-Input AND Gate	JM38510/30007B2A JM38510/30007BCA JM38510/30007BDA JM38510/31003B2A		
JANB54LS21J JANB54LS22FK JANB54LS22J JANB54LS26FK	Dual 4-Input AND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate Quad 2-Input NAND Gate	JM38510/31003BCA JM38510/30008B2A JM38510/30008BCA JM38510/32102B2A		
JANB54LS26J JANB54LS26W JANB54LS27FK JANB54LS27J	Quad 2-Input NAND Gate Quad 2-Input NAND Gate Triple 3-Input NOR Gate Triple 3-Input NOR Gate	JM38510/32102BCA JM38510/32102BDA JM38510/30302B2A JM38510/30302BCA		
JANB54LS27W JANB54LS30FK JANB54LS30J JANB54LS30W	Triple 3-Input NOR Gate 8-Input NAND Gate 8-Input NAND Gate 8-Input NAND Gate	JM38510/30302BDA JM38510/30009B2A JM38510/30009BCA JM38510/30009BDA		
JANB54LS32FK JANB54LS32J JANB54LS32W JANB54LS37FK	Quad 2-Input OR Gate Quad 2-Input OR Gate Quad 2-Input OR Gate Quad 2-Input NAND Buffer	JM38510/30501B2A JM38510/30501BCA JM38510/30501BDA JM38510/30202B2A		
JANB54LS37J JANB54LS37W JANB54LS38FK JANB54LS38J	Quad 2-Input NAND Buffer Quad 2-Input NAND Buffer Quad 2-Input NAND Buffer OC Quad 2-Input NAND Buffer OC	JM38510/30202BCA JM38510/30202BDA JM38510/30203B2A JM38510/30203BCA		
JANB54LS38W JANB54LS40FK JANB54LS40J JANB54LS40W	Quad 2-Input NAND Buffer OC Dual 4-Input NAND Buffer Dual 4-Input NAND Buffer Dual 4-Input NAND Buffer	JM38510/30203BDA JM38510/30201B2A JM38510/30201BCA JM38510/30201BDA		
JANB54LS42FK JANB54LS42J JANB54LS47J JANB54LS51FK	4-Line BCD To 10-Line Decimal Decoder 4-Line BCD To 10-Line Decimal Decoder BCD To Seven-Segment Decoder Dual AND/OR Invert Gate	JM38510/30703B2A JM38510/30703BEA JM38510/30704BEA JM38510/30401B2A		
JANB54LS51J JANB54LS51W JANB54LS54FK JANB54LS54J	Dual AND/OR Invert Gate Dual AND/OR Invert Gate AND/OR Invert Gate AND/OR Invert Gate	JM38510/30401BCA JM38510/30401BDA JM38510/30402B2A JM38510/30402BCA		
JANB54LS54W JANB54LS73AJ JANB54LS73AW JANB54LS74AFK	AND/OR Invert Gate Dual J-K Flip-Flop Dual J-K Flip-Flop Dual D-Type Flip-Flop	JM38510/30402BDA JM38510/30101BCA JM38510/30101BDA JM38510/30102B2A		

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JANB54LS74AJ JANB54LS74AW JANB54LS75J JANB54LS76AJ	Dual D-Type Flip-Flop Dual D-Type Flip-Flop 4-Bit Latch Dual J-K Flip-Flop	JM38510/30102BCA JM38510/30102BDA JM38510/31601BEA JM38510/30110BEA		
JANB54LS76AW JANB54LS83AJ JANB54LS85FK JANB54LS85J	Dual J-K Flip-Flop 4-Bit Binary Adder 4-Bit Magnitude Comparator 4-Bit Magnitude Comparator	JM38510/30110BFA JM38510/31201BEA JM38510/31101B2A JM38510/31101BEA		
JANB54LS85W JANB54LS86AFK JANB54LS86AJ JANB54LS86AW	4-Bit Magnitude Comparator Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate	JM38510/31101BFA JM38510/30502B2A JM38510/30502BCA JM38510/30502BDA		
JANB54LS90J JANB54LS90W JANB54LS92J JANB54LS93J	Decade Counter Decade Counter Divide-By-12 Counter 4-Bit Binary Counter	JM38510/31501BCA JM38510/31501BDA JM38510/31510BCA JM38510/31502BCA		
JANB54LS93W JANB54LS95BFK JANB54LS95BJ JANB54LS96J	4-Bit Binary Counter 4-Bit Shift Register 4-Bit Shift Register 5-Bit Shift Register	JM38510/31502BDA JM38510/30603B2A JM38510/30603BCA JM38510/30604BEA		
JANB54LS107AFK JANB54LS107AJ JANB54LS109AFK JANB54LS109AJ	Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/30108B2A JM38510/30108BCA JM38510/30109B2A JM38510/30109BEA		
JANB54LS109AW JANB54LS112AFK JANB54LS112AJ JANB54LS112AW	Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/30109BFA JM38510/30103B2A JM38510/30103BEA JM38510/30103BFA		
JANB54LS114AFK JANB54LS114AJ JANB54LS122FK JANB54LS122J	Dual J-K Flip-Flop Dual J-K Flip-Flop One Shot Multivibrator One Shot Multivibrator	JM38510/30105B2A JM38510/30105BCA JM38510/31403B2A JM38510/31403BCA		
JANB54LS123FK JANB54LS123J JANB54LS123W JANB54LS125AFK	Dual Monostable Multivibrator Dual Monostable Multivibrator Dual Monostable Multivibrator Quad 3-State Buffer	JM38510/31401B2A JM38510/31401BEA JM38510/31401BFA JM38510/32301B2A		
JANB54LS125AJ JANB54LS126AFK JANB54LS126AJ JANB54LS138FK	Quad 3-State Buffer Quad 3-State Buffer Quad 3-State Buffer 3-8 Line Decoder/Demultiplexer	JM38510/32301BCA JM38510/32302B2A JM38510/32302BCA JM38510/30701B2A		
JANB54LS138J JANB54LS138W JANB54LS139AFK JANB54LS139AJ	3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer 1-4 Decoder/Demultiplexer 1-4 Decoder/Demultiplexer	JM38510/30701BEA JM38510/30701BDA JM38510/30702B2A JM38510/30702BEA		
JANB54LS148FK JANB54LS148J JANB54LS148W JANB54LS151FK	10-4/8-3 Line Priority Encoder 10-4/8-3 Line Priority Encoder 10-4/8-3 Line Priority Encoder Data Selector/Multiplexer	JM38510/36001B2A JM38510/36001BEA JM38510/36001BFA JM38510/30901B2A		
JANB54LS151J JANB54LS151W JANB54LS153FK JANB54LS153J	Data Selector/Multiplexer Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer	JM38510/30901BEA JM38510/30901BFA JM38510/30902B2A JM38510/30902BEA		
JANB54LS153W JANB54LS155AFK JANB54LS155AJ JANB54LS155AW	Dual 4-1 Data Selector/Multiplexer Dual 1-4 Decoder Dual 1-4 Decoder Dual 1-4 Decoder	JM38510/30902BFA JM38510/32601B2A JM38510/32601BEA JM38510/32601BFA		
JANB54LS156FK JANB54LS156J JANB54LS157FK JANB54LS157J	Dual 1-4 Decoder OC Dual 1-4 Decoder OC Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer	JM38510/32602B2A JM38510/32602BEA JM38510/30903B2A JM38510/30903BEA		
JANB54LS157W JANB54LS158FK JANB54LS158J JANB54LS158W	Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer	JM38510/30903BFA JM38510/30904B2A JM38510/30904BEA JM38510/30904BFA		

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JANB54LS160AFK JANB54LS160AJ JANB54LS160AW JANB54LS161AFK	4-Bit Synchronous Decade Counter 4-Bit Synchronous Decade Counter 4-Bit Synchronous Decade Counter 4-Bit Synchronous Binary Counter	JM38510/31503B2A JM38510/31503BEA JM38510/31503BFA JM38510/31504B2A		
JANB54LS161AJ JANB54LS161AW JANB54LS162AFK JANB54LS162AJ	4-Bit Synchronous Binary Counter 4-Bit Synchronous Binary Counter 4-Bit Synchronous Decade Counter 4-Bit Synchronous Decade Counter	JM38510/31504BEA JM38510/31504BFA JM38510/31511B2A JM38510/31511BEA		
JANB54LS163AFK JANB54LS163AJ JANB54LS163AW JANB54LS164FK	4-Bit Binary Counter 4-Bit Binary Counter 4-Bit Binary Counter 8-Bit Shift Register	JM38510/31512B2A JM38510/31512BEA JM38510/31512BFA JM38510/30605B2A		
JANB54LS164J JANB54LS164W JANB54LS165AFK JANB54LS165AJ	8-Bit Shift Register 8-Bit Shift Register 8-Bit Shift Register 8-Bit Shift Register	JM38510/30605BCA JM38510/30605BDA JM38510/30608B2A JM38510/30608BEA		
JANB54LS165AW JANB54LS166AFK JANB54LS166AJ JANB54LS166AW	8-Bit Shift Register 8-Bit Shift Register 8-Bit Shift Register 8-Bit Shift Register	JM38510/30608BFA JM38510/30609B2A JM38510/30609BEA JM38510/30609BFA		
JANB54LS173AFK JANB54LS173AJ JANB54LS173AW JANB54LS174FK	4-Bit D-Type Register 4-Bit D-Type Register 4-Bit D-Type Register Hex D-Type Flip-Flop	JM38510/36101B2A JM38510/36101BEA JM38510/36101BFA JM38510/30106B2A		
JANB54LS174J JANB54LS174W JANB54LS175FK JANB54LS175J	Hex D-Type Flip-Flop Hex D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop	JM38510/30106BEA JM38510/30106BFA JM38510/30107B2A JM38510/30107BEA		
JANB54LS175W JANB54LS190FK JANB54LS190J JANB54LS190W	Quad D-Type Flip-Flop Synchronous Up/Down Decade Counter Synchronous Up/Down Decade Counter Synchronous Up/Down Decade Counter	JM38510/30107BFA JM38510/31513B2A JM38510/31513BEA JM38510/31513BFA		
JANB54LS191FK JANB54LS191J JANB54LS191W JANB54LS192FK	Synchronous Up/Down Binary Counter Synchronous Up/Down Binary Counter Synchronous Up/Down Binary Counter Synchronous Up/Down Decade Counter	JM38510/31509B2A JM38510/31509BEA JM38510/31509BFA JM38510/31507B2A		
JANB54LS192J JANB54LS192W JANB54LS193FK JANB54LS193J	Synchronous Up/Down Decade Counter Synchronous Up/Down Decade Counter Synchronous Up/Down Binary Counter Synchronous Up/Down Binary Counter	JM38510/31507BEA JM38510/31507BFA JM38510/31508B2A JM38510/31508BEA		
JANB54LS193W JANB54LS194AFK JANB54LS194AJ JANB54LS194AW	Synchronous Up/Down Binary Counter 4-Bit Shift Register 4-Bit Shift Register 4-Bit Shift Register	JM38510/31508BDA JM38510/30601B2A JM38510/30601BEA JM38510/30601BFA		
JANB54LS195AFK JANB54LS195AJ JANB54LS195AW JANB54LS221FK	4-Bit Shift Register 4-Bit Shift Register 4-Bit Shift Register Dual Monostable Multivibrator	JM38510/30602B2A JM38510/30602BEA JM38510/30602BFA JM38510/31402B2A		
JANB54LS221J JANB54LS221W JANB54LS240FK JANB54LS240J	Dual Monostable Multivibrator Dual Monostable Multivibrator Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/31402BEA JM38510/31402BFA JM38510/32401B2A JM38510/32401BRA		
JANB54LS240W JANB54LS241FK JANB54LS241J JANB54LS242FK	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver	JM38510/32401BSA JM38510/32402B2A JM38510/32402BRA JM38510/32801B2A		
JANB54LS242J JANB54LS243FK JANB54LS243J JANB54LS244FK	Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver Octal Buffer/Line Driver	JM38510/32801BCA JM38510/32802B2A JM38510/32802BCA JM38510/32403B2A		
JANB54LS244J JANB54LS244W JANB54LS245FK JANB54LS245J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver Octal Bus Transceiver	JM38510/32403BRA JM38510/32403BSA JM38510/32803B2A JM38510/32803BRA		

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JANB54LS245W JANB54LS251FK JANB54LS251J JANB54LS251W	Octal Bus Transceiver 8-Input Data Selector/Multiplexer 8-Input Data Selector/Multiplexer 8-Input Data Selector/Multiplexer	JM38510/32803BSA JM38510/30905B2A JM38510/30905BEA JM38510/30905BFA		
JANB54LS253FK JANB54LS253J JANB54LS253W JANB54LS257BFBK	4-1 Data Selector/Multiplexer 4-1 Data Selector/Multiplexer 4-1 Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer	JM38510/30908B2A JM38510/30908BEA JM38510/30908BFA JM38510/30906B2A		
JANB54LS257BJ JANB54LS257BW JANB54LS258BFBK JANB54LS258BJ	Quad 2-Input Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer	JM38510/30906BEA JM38510/30906BDA JM38510/30907B2A JM38510/30907BEA		
JANB54LS259BFBK JANB54LS259BJ JANB54LS259BW JANB54LS266FK	8-Bit Addressable Latch 8-Bit Addressable Latch 8-Bit Addressable Latch Quad Exclusive-OR Gate OC	JM38510/31605B2A JM38510/31605BEA JM38510/31605BFA JM38510/30303B2A		
JANB54LS266J JANB54LS273FK JANB54LS273J JANB54LS273W	Quad Exclusive-OR Gate OC Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/30303BCA JM38510/32501B2A JM38510/32501BRA JM38510/32501BSA		
JANB54LS279AFK JANB54LS279AJ JANB54LS280FK JANB54LS280J	Quad Set/Reset Latch Quad Set/Reset Latch 9-Bit Parity Generator/Checker 9-Bit Parity Generator/Checker	JM38510/31602B2A JM38510/31602BEA JM38510/32901B2A JM38510/32901BCA		
JANB54LS280W JANB54LS283FK JANB54LS283J JANB54LS283W	9-Bit Parity Generator/Checker 4-Bit Full Adder 4-Bit Full Adder 4-Bit Full Adder	JM38510/32901BDA JM38510/31202B2A JM38510/31202BEA JM38510/31202BFA		
JANB54LS290FK JANB54LS290J JANB54LS293FK JANB54LS293J	Decade Counter Decade Counter 4-Bit Binary Counter 4-Bit Binary Counter	JM38510/32003B2A JM38510/32003BCA JM38510/32004B2A JM38510/32004BCA		
JANB54LS295BFBK JANB54LS295BJ JANB54LS348FK JANB54LS348J	4-Bit Shift Register 4-Bit Shift Register 8-3 Line Priority Encoder 8-3 Line Priority Encoder	JM38510/30606B2A JM38510/30606BCA JM38510/36002B2A JM38510/36002BEA		
JANB54LS365AFK JANB54LS365AJ JANB54LS366AFK JANB54LS366AJ	Hex Bus Driver Hex Bus Driver Hex Bus Driver Hex Bus Driver	JM38510/32201B2A JM38510/32201BEA JM38510/32202B2A JM38510/32202BEA		
JANB54LS366AW JANB54LS367AFK JANB54LS367AJ JANB54LS367AW	Hex Bus Driver Hex Bus Driver Hex Bus Driver Hex Bus Driver	JM38510/32202BFA JM38510/32203B2A JM38510/32203BEA JM38510/32203BFA		
JANB54LS368AFK JANB54LS368AJ JANB54LS368AW JANB54LS373FK	Hex Bus Driver Hex Bus Driver Hex Bus Driver Octal D-Type Latch	JM38510/32204B2A JM38510/32204BEA JM38510/32204BFA JM38510/32502B2A		
JANB54LS373J JANB54LS373W JANB54LS374FK JANB54LS374J	Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/32502BRA JM38510/32502BSA JM38510/32503B2A JM38510/32503BRA		
JANB54LS374W JANB54LS375FK JANB54LS375J JANB54LS377FK	Octal D-Type Flip-Flop 4-Bit Bistable Latch 4-Bit Bistable Latch Octal D-Type Flip-Flop	JM38510/32503BSA JM38510/31604B2A JM38510/31604BEA JM38510/32504B2A		
JANB54LS377J JANB54LS377W JANB54LS390FK JANB54LS390J	Octal D-Type Flip-Flop Octal D-Type Flip-Flop 4-Bit Decade Counter 4-Bit Decade Counter	JM38510/32504BRA JM38510/32504BSA JM38510/32701B2A JM38510/32701BEA		
JANB54LS393FK JANB54LS393J JANB54LS393W JANB54LS395AFK	4-Bit Binary Counter 4-Bit Binary Counter 4-Bit Binary Counter 4-Bit Shift Register	JM38510/32702B2A JM38510/32702BCA JM38510/32702BDA JM38510/30607B2A		

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JANB54LS395AJ JANB54LS490FK JANB54LS490J JANB54LS540FK	4-Bit Shift Register Dual 4-Bit Decade Counter Dual 4-Bit Decade Counter Octal Buffer/Line Driver	JM38510/30607BEA JM38510/32703B2A JM38510/32703BEA JM38510/32404B2A		
JANB54LS540J JANB54LS541FK JANB54LS541J JANB54S00J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Quad 2-Input NAND Gate	JM38510/32404BRA JM38510/32405B2A JM38510/32405BRA JM38510/07001BCA		
JANB54S00W JANB54S02J JANB54S02W JANB54S03J	Quad 2-Input NAND Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate Quad 2-Input NAND Gate OC	JM38510/07001BDA JM38510/07301BCA JM38510/07301BDA JM38510/07002BCA		
JANB54S03W JANB54S04J JANB54S04W JANB54S05J	Quad 2-Input NAND Gate OC Hex Inverter Hex Inverter Hex Inverter OC	JM38510/07002BDA JM38510/07003BCA JM38510/07003BDA JM38510/07004BCA		
JANB54S05W JANB54S10J JANB54S10W JANB54S11J	Hex Inverter OC Triple 3-Input NAND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate	JM38510/07004BDA JM38510/07005BCA JM38510/07005BDA JM38510/08001BCA		
JANB54S11W JANB54S20J JANB54S20W JANB54S22J	Triple 3-Input AND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate Dual 4-Input NAND Gate	JM38510/08001BDA JM38510/07006BCA JM38510/07006BDA JM38510/07007BCA		
JANB54S22W JANB54S30J JANB54S30W JANB54S64J	Dual 4-Input NAND Gate 8-Input NAND Gate 8-Input NAND Gate 4-2-3-2 AND/OR Invert Gate	JM38510/07007BDA JM38510/07008BCA JM38510/07008BDA JM38510/07402BCA		
JANB54S64W JANB54S74J JANB54S74W JANB54S85J	4-2-3-2 AND/OR Invert Gate Dual D-Type Flip-Flop Dual D-Type Flip-Flop 4-Bit Magnitude Comparator	JM38510/07402BDA JM38510/07101BCA JM38510/07101BDA JM38510/08201BEA		
JANB54S86J JANB54S86W JANB54S112J JANB54S112W	Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/07501BCA JM38510/07501BDA JM38510/07102BEA JM38510/07102BFA		
JANB54S138J JANB54S138W JANB54S151J JANB54S151W	3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer Data Selector/Multiplexer Data Selector/Multiplexer	JM38510/07701BEA JM38510/07701BFA JM38510/07901BEA JM38510/07901BFA		
JANB54S153J JANB54S153W JANB54S157J JANB54S158J	Dual 4-1 Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer	JM38510/07902BEA JM38510/07902BFA JM38510/07903BEA JM38510/07904BEA		
JANB54S158W JANB54S174J JANB54S175J JANB54S175W	Quad 2-1 Data Selector/Multiplexer Hex D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop	JM38510/07904BFA JM38510/07105BEA JM38510/07106BEA JM38510/07106BFA		
JANB54S182J JANB54S194J JANB54S194W JANB54S257J	Look Ahead Carry Generator 4-Bit Universal Shift Register 4-Bit Universal Shift Register Quad 2-Input Data Selector/Multiplexer	JM38510/07802BEA JM38510/07601BEA JM38510/07601BFA JM38510/07906BEA		
JANB5400J JANB5401J JANB5401W JANB5402J	Quad 2-Input NAND Gate Quad 2-Input NAND Gate OC Quad 2-Input NAND Gate OC Quad 2-Input NOR Gate	JM38510/00104BCA JM38510/00107BCA JM38510/00107BDA JM38510/00401BCA		
JANB5402W JANB5403J JANB5403W JANB5404J	Quad 2-Input NOR Gate Quad 2-Input NAND Gate OC Quad 2-Input NAND Gate OC Hex Inverter	JM38510/00401BDA JM38510/00109BCA JM38510/00109BDA JM38510/00105BCA		
JANB5404W JANB5405J JANB5405W JANB5406J	Hex Inverter Hex Inverter OC Hex Inverter OC Hex Inverter Buffer/Driver	JM38510/00105BDA JM38510/00108BCA JM38510/00108BDA JM38510/00801BCA		

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JANB5412J JANB5416J JANB5416W JANB5417J	Triple 3-Input NAND Gate OC Hex Inverter Buffer/Driver Hex Inverter Buffer/Driver Hex Buffer/Driver OC	JM38510/00106BCA JM38510/00802BCA JM38510/00802BDA JM38510/00804BCA		
JANB5417W JANB5420J JANB5423J JANB5425J	Hex Buffer/Driver OC Dual 4-Input NAND Gate Dual 4-Input NOR Gate Dual 4-Input NOR Gate	JM38510/00804BDA JM38510/00102BCA JM38510/00402BEA JM38510/00403BCA		
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JANB5476J JANB5483J JANB5486J JANB5486W	Dual J-K Flip-Flop 4-Bit Binary Adder Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate	JM38510/00204BEA JM38510/00602BEA JM38510/00701BCA JM38510/00701BDA		
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JANB54161W JANB54174J JANB54174W JANB54175J	4-Bit Synchronous Binary Counter Hex D-Type Flip-Flop Hex D-Type Flip-Flop Quad D-Type Flip-Flop	JM38510/01306BFA JM38510/01701BEA JM38510/01701BFA JM38510/01702BEA		
JANB54175W JANB55107AJ JANB55108AJ JANB55113J	Quad D-Type Flip-Flop General Purpose Line Receiver General Purpose Line Receiver Dual Differential Line Driver	JM38510/01702BFA JM38510/10401BCA JM38510/10402BCA JM38510/10405BEA		
JANB55114J JANB55115J JANB55325J JANB55451BJG	Dual Differential Line Driver Dual Differential Line Receiver Core Memory Driver Dual Peripheral AND Driver	JM38510/10403BEA JM38510/10404BEA JM38510/13001BEA JM38510/12902BPA		
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JANB55462JG JANB55463JG JANS54F240J JANS54F240W	Dual Peripheral NAND Driver Dual Peripheral OR Driver Octal Buffer Line Driver Octal Buffer Line Driver	JM38510/12908BPA JM38510/12909BPA JM38510/33201SRA JM38510/33201SSA		
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JANS54HCT138J JANS54HCT138W JANS54HCT244J JANS54HCT244W	3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65852SEA JM38510/65852SFA JM38510/65755SRA JM38510/65755SSA		
JANS54HCT245J JANS54HCT245W JANS54HCT374W JANS54HCT540J	Octal Bus Transceiver Octal Bus Transceiver Octal D-Type Flip-Flop Octal Buffer/Line Driver	JM38510/65553SRA JM38510/65553SSA JM38510/65652SSA JM38510/65760SRA		
JANS54HCT540W JANS54HCT541J JANS54HCT541W JANS54HC00J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Quad 2-Input NAND Gate	JM38510/65760SRA JM38510/65761SRA JM38510/65761SSA JM38510/65001SCA		
JANS54HC00W JANS54HC02J JANS54HC02W JANS54HC04J	Quad 2-Input NAND Gate Quad 2-Input NOR Gate Quad 2-Input NOR Gate Hex Inverter	JM38510/65001SDA JM38510/65101SCA JM38510/65101SDA JM38510/65701SCA		
JANS54HC04W JANS54HC08J JANS54HC08W JANS54HC109W	Hex Inverter Quad 2-Input AND Gate Quad 2-Input AND Gate Dual J-K Flip-Flop	JM38510/65701SDA JM38510/65203SCA JM38510/65203SDA JM38510/65304SFA		
JANS54HC10J JANS54HC10W JANS54HC11J JANS54HC11W	Triple 3-Input NAND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate	JM38510/65002SCA JM38510/65002SDA JM38510/65204SCA JM38510/65204SDA		
JANS54HC20J JANS54HC20W JANS54HC27J JANS54HC27W	Dual 4-Input NAND Gate Dual 4-Input NAND Gate Triple 3-Input NOR Gate Triple 3-Input NOR Gate	JM38510/65003SCA JM38510/65003SDA JM38510/65102SCA JM38510/65102SDA		
JANS54HC30J JANS54HC30W JANS54HC32J JANS54HC32W	8-Input NAND Gate 8-Input NAND Gate Quad 2-Input OR Gate Quad 2-Input OR Gate	JM38510/65004SCA JM38510/65004SDA JM38510/65201SCA JM38510/65201SDA		
JANS54HC74J JANS54HC74W JANS54HC86J JANS54HC86W	Dual D-Type Flip-Flop Dual D-Type Flip-Flop Quad 2-Input Exclusive-OR Gate Quad 2-Input Exclusive-OR Gate	JM38510/65302SCA JM38510/65302SDA JM38510/65202SCA JM38510/65202SDA		
JANS54HC109J JANS54HC112J JANS54HC112W JANS54HC138J	Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop 3-8 Line Decoder/Demultiplexer	JM38510/65304SEA JM38510/65305SEA JM38510/65305SFA JM38510/65802SEA		
JANS54HC138W JANS54HC139J JANS54HC139W JANS54HC161J	3-8 Line Decoder/Demultiplexer Dual 1-4 Line Decoder/Demultiplexer Dual 1-4 Line Decoder/Demultiplexer 4-Bit Synchronous Binary Counter	JM38510/65802SFA JM38510/65803SEA JM38510/65803SFA JM38510/66302SEA		
JANS54HC161W JANS54HC163J JANS54HC163W JANS54HC173J	4-Bit Synchronous Binary Counter 4-Bit Binary Counter 4-Bit Binary Counter 4-Bit D-Type Register	JM38510/66302SFA JM38510/66304SEA JM38510/66304SFA JM38510/65306SEA		
JANS54HC173W JANS54HC174J JANS54HC174W JANS54HC175J	4-Bit D-Type Register Hex D-Type Flip-Flop Hex D-Type Flip-Flop Quad D-Type Flip-Flop	JM38510/65306SFA JM38510/65307SEA JM38510/65307SFA JM38510/65308SEA		
JANS54HC175W JANS54HC240J JANS54HC240W JANS54HC241J	Quad D-Type Flip-Flop Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver	JM38510/65308SFA JM38510/65703SRA JM38510/65703SSA JM38510/65704SRA		
JANS54HC241W JANS54HC244J JANS54HC244W JANS54HC245J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver	JM38510/65704SSA JM38510/65705SRA JM38510/65705SSA JM38510/65503SRA		

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JANS54HC266W JANS54HC273J JANS54HC273W JANS54HC365J	Quad Exclusive-OR Gate OC Octal D-Type Flip-Flop Octal D-Type Flip-Flop Hex Bus Driver	JM38510/65103SDA JM38510/65601SRA JM38510/65601SSA JM38510/65706SEA		
JANS54HC365W JANS54HC367J JANS54HC367W JANS54HC368J	Hex Bus Driver 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer Hex Bus Driver	JM38510/65706SFA JM38510/65708SEA JM38510/65708SFA JM38510/65709SEA		
JANS54HC368W JANS54HC373J JANS54HC373W JANS54HC374J	Hex Bus Driver Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop	JM38510/65709SFA JM38510/65403SRA JM38510/65403SSA JM38510/65602SRA		
JANS54HC374W JANS54HC393J JANS54HC393W JANS54HC540J	Octal D-Type Flip-Flop 4-Bit Binary Counter 4-Bit Binary Counter Octal Buffer/Line Driver	JM38510/65602SSA JM38510/66309SEA JM38510/66309SFA JM38510/65710SRA		
JANS54HC540W JANS54HC541J JANS54HC541W JANS54HC573J	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal D-Type Latch	JM38510/65710SSA JM38510/65711SRA JM38510/65711SSA JM38510/65406SRA		
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JANS54HC4002W JANS54LS00J JANS54LS00W JANS54LS02J	Dual 4-Input NOR Gate Quad 2-Input NAND Gate Quad 2-Input NAND Gate Quad 2-Input NOR Gate	JM38510/65104SDA JM38510/30001SCA JM38510/30001SDA JM38510/30301SCA		
JANS54LS02W JANS54LS03J JANS54LS03W JANS54LS04J	Quad 2-Input NOR Gate Quad 2-Input NAND Gate OC Quad 2-Input NAND Gate OC Hex Inverter	JM38510/30301SDA JM38510/30002SCA JM38510/30002SDA JM38510/30003SCA		
JANS54LS04W JANS54LS08J JANS54LS08W JANS54LS10J	Hex Inverter Quad 2-Input AND Gate Quad 2-Input AND Gate Triple 3-Input NAND Gate	JM38510/30003SDA JM38510/31004SCA JM38510/31004SDA JM38510/30005SCA		
JANS54LS10W JANS54LS11J JANS54LS11W JANS54LS20J	Triple 3-Input NAND Gate Triple 3-Input AND Gate Triple 3-Input AND Gate Dual 4-Input NAND Gate	JM38510/30005SDA JM38510/31001SCA JM38510/31001SDA JM38510/30007SCA		
JANS54LS20W JANS54LS26J JANS54LS26W JANS54LS27J	Dual 4-Input NAND Gate Quad 2-Input NAND Gate Quad 2-Input NAND Gate Triple 3-Input NOR Gate	JM38510/30007SDA JM38510/32102SCA JM38510/32102SDA JM38510/30302SCA		
JANS54LS27W JANS54LS30J JANS54LS30W JANS54LS32J	Triple 3-Input NOR Gate 8-Input NAND Gate 8-Input NAND Gate Quad 2-Input OR Gate	JM38510/30302SDA JM38510/30009SCA JM38510/30009SDA JM38510/30501SCA		
JANS54LS32W JANS54LS37J JANS54LS37W JANS54LS38J	Quad 2-Input OR Gate Quad 2-Input NAND Buffer Quad 2-Input NAND Buffer Quad 2-Input NAND Buffer OC	JM38510/30501SDA JM38510/30202SCA JM38510/30202SDA JM38510/30203SCA		
JANS54LS38W JANS54LS40J JANS54LS40W JANS54LS51J	Quad 2-Input NAND Buffer OC Dual 4-Input NAND Buffer Dual 4-Input NAND Buffer Dual AND/OR Invert Gate	JM38510/30203SDA JM38510/30201SCA JM38510/30201SDA JM38510/30401SCA		
JANS54LS51W JANS54LS54J JANS54LS54W JANS54LS73J	Dual AND/OR Invert Gate AND/OR Invert Gate AND/OR Invert Gate Dual J-K Flip-Flop	JM38510/30401SDA JM38510/30402SCA JM38510/30402SDA JM38510/30101SCA		

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JANS54LS76W JANS54LS85J JANS54LS85W JANS54LS86AJ	Dual J-K Flip-Flop 4-Bit Magnitude Comparator 4-Bit Magnitude Comparator Quad 2-Input Exclusive-OR Gate	JM38510/30110SFA JM38510/31101SEA JM38510/31101SFA JM38510/30502SCA		
JANS54LS86AW JANS54LS90J JANS54LS90W JANS54LS93J	Quad 2-Input Exclusive-OR Gate Decade Counter Decade Counter 4-Bit Binary Counter	JM38510/30502SDA JM38510/31501SCA JM38510/31501SDA JM38510/31502SCA		
JANS54LS93W JANS54LS109AJ JANS54LS109AW JANS54LS112AJ	4-Bit Binary Counter Dual J-K Flip-Flop Dual J-K Flip-Flop Dual J-K Flip-Flop	JM38510/31502SDA JM38510/30109SEA JM38510/30109SFA JM38510/30103SEA		
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JANS54LS151W JANS54LS153J JANS54LS153W JANS54LS155AJ	Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer Dual 1-4 Decoder	JM38510/30901SFA JM38510/30902SEA JM38510/30902SFA JM38510/32601SEA		
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JANS54LS158W JANS54LS160AJ JANS54LS160AW JANS54LS161AJ	Quad 2-1 Data Selector/Multiplexer 4-Bit Synchronous Decade Counter 4-Bit Synchronous Decade Counter 4-Bit Synchronous Binary Counter	JM38510/30904SFA JM38510/31503SEA JM38510/31503SFA JM38510/31504SEA		
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JANS54LS166AW JANS54LS173J JANS54LS173W JANS54LS174J	8-Bit Shift Register 4-Bit D-Type Register 4-Bit D-Type Register Hex D-Type Flip-Flop	JM38510/30609SFA JM38510/36101SEA JM38510/36101SFA JM38510/30106SEA		
JANS54LS174W JANS54LS175J JANS54LS175W JANS54LS190J	Hex D-Type Flip-Flop Quad D-Type Flip-Flop Quad D-Type Flip-Flop Synchronous Up/Down Decade Counter	JM38510/30106SFA JM38510/30107SEA JM38510/30107SFA JM38510/31513SEA		
JANS54LS190W JANS54LS191J JANS54LS191W JANS54LS193J	Synchronous Up/Down Decade Counter Synchronous Up/Down Binary Counter Synchronous Up/Down Binary Counter 4-Bit D-Type Register	JM38510/31513SFA JM38510/31509SEA JM38510/31509SFA JM38510/31508SEA		
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JANS54LS251W JANS54LS253J JANS54LS253W JANS54LS257BJ	8-Input Data Selector/Multiplexer 4-1 Data Selector/Multiplexer 4-1 Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer	JM38510/30905SFA JM38510/30908SEA JM38510/30908SFA JM38510/30906SEA		
JANS54LS257BW JANS54LS259BJ JANS54LS259BW JANS54LS273J	Quad 2-Input Data Selector/Multiplexer 8-Bit Addressable Latch 8-Bit Addressable Latch Octal D-Type Flip-Flop	JM38510/30906SFA JM38510/31605SEA JM38510/31605SFA JM38510/32501SRA		
JANS54LS273W JANS54LS280J JANS54LS280W JANS54LS283J	Octal D-Type Flip-Flop 9-Bit Parity Generator/Checker 9-Bit Parity Generator/Checker 4-Bit Full Adder	JM38510/32501SSA JM38510/32901SCA JM38510/32901SDA JM38510/31202SEA		
JANS54LS283W JANS54LS366AJ JANS54LS366AW JANS54LS367AJ	4-Bit Full Adder Hex Bus Driver Hex Bus Driver Hex Bus Driver	JM38510/31202SFA JM38510/32202SEA JM38510/32202SFA JM38510/32203SEA		
JANS54LS367AW JANS54LS368AJ JANS54LS368AW JANS54LS373J	Hex Bus Driver Hex Bus Driver Hex Bus Driver Octal D-Type Latch	JM38510/32203SFA JM38510/32204SEA JM38510/32204SFA JM38510/32502SRA		
JANS54LS373W JANS54LS374J JANS54LS374W JANS54LS377J	Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Flip-Flop	JM38510/32502SSA JM38510/32503SRA JM38510/32503SRA JM38510/32504SRA		
JANS54LS377W JANS54LS393J JANS54LS393W JBP18S030	Octal D-Type Flip-Flop 4-Bit Binary Counter 4-Bit Binary Counter 256 Bits PROM with 3-State Outputs	JM38510/32504SSA JM38510/32702SCA JM38510/32702SDA	-	
JBP28L22 JBP28L42 LF198 LF198A	Low Power PROM with 3-State Outputs Low Power PROM with 3-State Outputs Operational Amplifier Operational Amplifier		- - 7-27 7-27	SLYD003 SLYD003
LF347 LF351 LF353 LF398	Operational Amplifier Operational Amplifier Operational Amplifier Sample-and-Hold Amplifier		7-13 7-6 7-10 7-27	SLYD003 SLYD003 SLYD003 SLYD003
LF398A LF411 LF412 LM101A	Sample-and-Hold Amplifier Operational Amplifier Operational Amplifier Operational Amplifier		7-27 7-6 7-10 7-2	SLYD003 SLYD003 SLYD003 SLYD003
LM107 LM108 LM108A LM118	Operational Amplifier Operational Amplifier Operational Amplifier Operational Amplifier		7-3 7-2 7-2 -	SLYD003 SLOS041 SLOS041
LM111 LM124 LM124FKB LM124JB	Operational Amplifier Operational Amplifier Operational Amplifier Operational Amplifier	77043012A 7704301CA	7-15 7-11 7-11 7-11	SLYD003 SLYD003 SLYD003 SLYD003
LM124WB LM139 LM139A LM148	Operational Amplifier Voltage Comparator Voltage Comparator Operational Amplifier	7704301DA	7-11 7-16 7-16 7-16	SLYD003 SLYD003 SLYD003 SLYD003
LM158 LM185 LM185-2.5 LM193	Operational Amplifier Voltage Reference Voltage Reference, Micropower Operational Amplifier		7-11 - 7-21 7-15	SLYD003 SLYD003 SLYD003 SLYD003
LM201A LM207 LM208 LM208A	Operational Amplifier Operational Amplifier Operational Amplifier Operational Amplifier		7-2 7-4 7-2 7-2	SLYD003 SLYD003 SLOS041 SLOS041

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LM217	Voltage Regulator		7-21	SLYD005
LM218	Operational Amplifier		7-4	SLYD003
LM224	Operational Amplifier		7-12	SLYD003
LM224A	Operational Amplifier		7-12	SLYD003
LM237	Voltage Regulator		7-21	SLYD005
LM239	Voltage Comparator		7-17	SLYD003
LM239A	Voltage Comparator		7-17	SLYD003
LM248	Operational Amplifier		7-12	SLYD003
LM258	Operational Amplifier		7-8	SLYD003
LM258A	Operational Amplifier		7-8	SLYD003
LM293A	Voltage Comparator		7-17	SLYD003
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LM307	Operational Amplifier		7-6	SLYD003
LM308	Operational Amplifier		7-2	SLOS041
LM308A	Operational Amplifier		7-2	SLOS041
LM311	Voltage Comparator		7-17	SLYD003
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LM324	Operational Amplifier		7-13	SLYD003
LM324A	Operational Amplifier		7-13	SLYD003
LM330	Voltage Regulator		7-22	SLYD005
LM3302	Voltage Comparator		7-16	SLYD003
LM336-2.5	Voltage Reference, 2.5 V		7-21	SLYD005
LM337	Voltage Regulator		7-21	SLYD005
LM339	Voltage Comparator		7-17	SLYD003
LM339A	Voltage Comparator		7-17	SLYD003
LM348	Operational Amplifier		7-13	SLYD003
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LM385-2.5	Voltage Reference, Micropower		7-21	SLYD005
LM393	Voltage Comparator		7-17	SLYD003
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LM2900	Operational Amplifier		7-12	SLYD003
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LT1001AC	Operational Amplifier		7-6	SLYD003
LT1001AM	Operational Amplifier		7-3	SLYD003
LT1001C	Operational Amplifier		7-6	SLYD003
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LT1004	Voltage Reference		7-21	SLYD005
LT1007AC	Operational Amplifier		7-6	SLYD003
LT1007AM	Operational Amplifier		7-3	SLYD003
LT1007C	Operational Amplifier		7-6	SLYD003
LT1007M	Operational Amplifier		7-3	SLYD003
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LT1013D LT1013M LT1014C LT1014DC	Operational Amplifier Operational Amplifier Operational Amplifier Operational Amplifier		7-10 7-8 7-14 7-14	SLYD003 SLYD003 SLOS039 SLOS039
LT1014DI LT1014DI LT1014DM LT1014I	Operational Amplifier Operational Amplifier Operational Amplifier Operational Amplifier		7-12 7-12 7-11 7-12	SLOS039 SLOS039 SLOS039 SLOS039
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LT1037C LT1037M LT1054 LT1070	Operational Amplifier Operational Amplifier Operational Amplifier Switching Voltage Regulator		7-6 7-3 7-23 7-24	SLYD003 SLYD003 SLYD003 SLYD005
LT1071C LT1071M LT1084 L293	Switching Regulator Switching Regulator Voltage Regulator Motor Driver		7-24 7-24 7-21 6-8	SLYD005 SLYD005 SLYD005 SLYD002
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MC79L15 MC79L15A MC1445 MC1458	Voltage Regulator Voltage Regulator Video Amplifier Operational Amplifier		7-23 7-23 7-15 7-10	SLYD005 SLYD005 SLYD003 SLYD003
MC1558 MC3303 MC3403 MC3446	Operational Amplifier Operational Amplifier Operational Amplifier Bus Transceiver		7-8 7-12 7-13 6-4	SLYD003 SLYD003 SLYD003 SLYD002
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MC3470A MC3486 MC3550 MC3552	Read Amplifier, Floppy Disk Line Receiver Line Receiver (SN55107) Line Receiver (SN55108)		7-15 6-2 - -	SLYD003 SLYD002 - -
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MOC3011	Optocoupler		8-5	SOYD002A
MOC3012	Optocoupler		8-5	SOYD002A
MOC3020	Optocoupler		8-5	SOYD002A
MOC3021	Optocoupler		8-5	SOYD002A
MOC3022	Optocoupler		8-5	SOYD002A
MOC3023	Optocoupler		8-5	SOYD002A
NE555	Timer		7-25	SLYD003
NE556	Timer		7-25	SLYD003
NE592	Video Amplifier		7-15	SLYD003
NE592A	Video Amplifier		7-15	SLYD003
NE5532	Operational Amplifier		7-10	SLYD003
NE5532A	Operational Amplifier		7-10	SLYD003
NE5534	Operational Amplifier		7-6	SLYD003
NE5534A	Operational Amplifier		7-6	SLYD003
OPI8012	Optocoupler		8-5	SOYD002A
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OP-07D	Operational Amplifier		7-6	SLYD003
OP-07E	Operational Amplifier		7-6	SLYD003
OP-27A	Operational Amplifier		7-3	SLYD003
OP-27C	Operational Amplifier		7-3	SLYD003
OP-27E	Operational Amplifier		7-4	SLYD003
OP-27E	Operational Amplifier		7-5	SLYD003
OP-27G	Operational Amplifier		7-4	SLYD003
OP-27G	Operational Amplifier		7-5	SLYD003
OP-37A	Operational Amplifier		7-3	SLYD003
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OP-37E	Operational Amplifier		7-4	SLYD003
OP-37E	Operational Amplifier		7-5	SLYD003
OP-37G	Operational Amplifier		7-4	SLYD003
OP-37G	Operational Amplifier		7-5	SLYD003
PAL16L8AMFKB	Field Programmable Logic Array	81036072A	-	SRPD001
PAL16L8AMJB	Field Programmable Logic Array	8103607RA	-	SRPD001
PAL16L8AMWB	Field Programmable Logic Array	8103607SA	-	SRPD001
PAL16L8A-2MFKB	Field Programmable Logic Array	81036112A	-	SRPD001
PAL16L8A-2MJB	Field Programmable Logic Array	8103611RA	-	SRPD001
PAL16L8A-2MWB	Field Programmable Logic Array	8103611SA	-	SRPD001
PAL16R4AMFKB	Field Programmable Logic Array	81036102A	-	SRPD001
PAL16R4AMJB	Field Programmable Logic Array	8103610RA	-	SRPD001
PAL16R4AMWB	Field Programmable Logic Array	8103610SA	-	SRPD001
PAL16R4A-2MFKB	Field Programmable Logic Array	81036142A	-	SRPD001
PAL16R4A-2MJB	Field Programmable Logic Array	8103614RA	-	SRPD001
PAL16R4A-2MWB	Field Programmable Logic Array	8103614SA	-	SRPD001
PAL16R6AMFKB	Field Programmable Logic Array	81036092A	-	SRPD001
PAL16R6AMJB	Field Programmable Logic Array	8103609RA	-	SRPD001
PAL16R6AMWB	Field Programmable Logic Array	8103609SA	-	SRPD001
PAL16R6A-2MFKB	Field Programmable Logic Array	81036132A	-	SRPD001
PAL16R6A-2MJB	Field Programmable Logic Array	8103613RA	-	SRPD001
PAL16R6A-2MWB	Field Programmable Logic Array	8103613SA	-	SRPD001
PAL16R8AMFKB	Field Programmable Logic Array	81036082A	-	SRPD001
PAL16R8AMJB	Field Programmable Logic Array	8103608RA	-	SRPD001
PAL16R8AMWB	Field Programmable Logic Array	8103608SA	-	SRPD001
PAL16R8A-2MFKB	Field Programmable Logic Array	81036122A	-	SRPD001
PAL16R8A-2MJB	Field Programmable Logic Array	8103612RA	-	SRPD001
PAL16R8A-2MWB	Field Programmable Logic Array	8103612SA	-	SRPD001
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PC405	Image Sensor Evaluation Board		8-2	SOYD002A
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RC4559	Operational Amplifier		7-10	SLYD003

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RTCWS-320DSP1 RTCWS-320DSP2 RTCWS-320DSP3 RTCWS-34010	TMS320C1X DSP Design Workshop TMS320C2X DSP Design Workshop TMS320C3X DSP Design Workshop TMS34010 Graphics Sys. Proc. Des. Workshop		11-4 11-4 11-4 11-4	SSRC007 SSRC007 SSRC007 SPVU001A
RTCWS-34061 RTCWS-370MICRO RTCWS-380LAN1 RTCWS-380LAN3	TMS34061 Graphics Systems Design Workshop TMS370 Microcontroller Design Workshop TMS380 IBM Token-Ring Network Des. Workshop 2nd Gen. TMS380 IBM Token-Ring Ntwk Des Wkshp		11-4 11-4 11-4 11-4	SPPU014A SPNS014 SSRC007 SPWT084
RV4136 RV4558 SE555 SE556C	Operational Amplifier Operational Amplifier Timer Timer		7-12 7-8 7-25 7-25	SLYD003 SLYD003 SLYD003 SLYD003
SE592 SE5534 SE5534A SE70CP160JD	Video Amplifier Operational Amplifier Operational Amplifier Prototyping Device (TMS70C40A/20A)		7-14 7-3 7-3 4-6	SLYD003 SLYD003 SLYD003 SPND001B
SE70CP162JD SE77C42 SG2524 SG3524	Prototyping Device (TMS70C42) Prototyping Device (TMS70C42) PWM Controller PWM Controller		4-6 4-6 7-24 7-24	SPND001B SPND001B SLYD003 SLYD003
SMJ4C1024 SMJ27C128-20JM SMJ27C128-25JM SMJ27C128-30JM	1M-Bit Dynamic RAM 128K-Bit EPROM 128K-Bit EPROM 128K-Bit EPROM	5962-8766105XA 5962-8766106XA 5962-8766107XA	- - - -	
SMJ27C256-20JM SMJ27C256-25JM SMJ27C256-30JM SMJ27C512-20JM	256K-Bit EPROM 256K-Bit EPROM 256K-Bit EPROM 512K-Bit EPROM	5962-8606301XA 5962-8606302XA 5962-8606303XA 5962-8764802XA	- - - -	
SMJ27C512-25JM SMJ44C256 SMJ320C10FDM SMJ320C10JDM	512K-Bit EPROM 256K-word by 4-Bit Dynamic RAM CMOS 1st-Generation DSP CMOS 1st-Generation DSP	5962-8764803XA 5962-8763301XA 5962-8763301QA	- - - -	
SMJ320C15FDM SMJ320C15JDM SMJ320C15-25FDM SMJ320C15-25JDM	CMOS 1st-Generation DSP CMOS 1st-Generation DSP CMOS 1st-Generation DSP CMOS 1st-Generation DSP	5962-8763307XA 5962-8763307QA 5962-8763308XA 5962-8763308QA	- - - -	
SMJ320C25FDM SMJ320C25GBM SMJ4161 SMJ4164-12JDS	CMOS 2nd-Generation DSP CMOS 2nd-Generation DSP 64K-Bit Multiport Video RAM 64K-word Dynamic RAM	5962-8861901YA 5962-8861901XA 8201008EA	- - - -	
SMJ4164-15JDS SMJ4164-20JDS SMJ4256-12JDS SMJ4256-15JDS	64K-word Dynamic RAM 64K-word Dynamic RAM 64K-Bit Dynamic RAM 256K-Bit Dynamic RAM	8201006EA 8201007EA 8515203EA 8515201EA	- - - -	
SMJ4256-20JDS SMJ4416 SMJ4461 SMJ4464	256K-Bit Dynamic RAM 16K-word by 4-Bit Dynamic RAM 256K-Bit Multiport Video RAM 64K-word by 4-Bit Dynamic RAM	8515202EA	- - - -	
SMJ9914AFDS SMJ9914AJDS SMJ32020 SMJ34010	GPB Controller GPB Controller NMOS 2nd-Generation DSP (20 MHz) 1st-Generation GSP	5962-8751901XA 5962-8751901QA	- - - -	
SMJ34061 SM4C1024 SM44C256 SM4164	Video System Controller 1M-Bit Dynamic RAM 256K-word by 4-Bit Dynamic RAM 16K-word Dynamic RAM		- - - -	
SM4256 SM4416 SM4464 SNJ54ACT11000	256K-Bit Dynamic RAM 16K-word by 4-Bit Dynamic RAM 64K-word by 4-Bit Dynamic RAM Quad 2-Input NAND Gate		- - - 3-4	

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SNJ54ACT11008J SNJ54ACT11010 SNJ54ACT11011 SNJ54ACT11020	Quad 2-Input AND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate DUAL 4-Input NAND Gate	5962-894701EA	3-5 3-4 3-5 3-4	
SNJ54ACT11021 SNJ54ACT11027 SNJ54ACT11030 SNJ54ACT11032FK	DUAL 4-Input AND Gate Triple 3-Input NOR Gate 8-Input NAND Gate Quad 2-Input OR Gate	5962-89736022A	3-5 3-5 3-4 3-5	
SNJ54ACT11032J SNJ54ACT11034 SNJ54ACT11074 SNJ54ACT1109FK	Quad 2-Input OR Gate Hex Non-Inverter Dual D-Type Flip-Flop Dual J-K Flip-Flop	5962-8973602EA 5962-88534022A	3-5 3-8 3-15 3-15	
SNJ54ACT11109J SNJ54ACT11138 SNJ54ACT11240 SNJ54ACT11241FK	Dual J-K Flip-Flop 3-8 Line Decoder/Demultiplexer Octal Buffer/Line Driver Octal Buffer/Line Driver	5962-8853402EA 5962-89847023A	3-15 3-25 3-10 3-10	
SNJ54ACT11241JT SNJ54ACT11244 SNJ54ACT11245 SNJ54ACT11253	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver Dual 4-1 Data Selector/Multiplexer	5962-8984702LA	3-10 3-10 3-11 3-24	
SNJ54ACT11257 SNJ54ACT11280 SNJ54ACT11353 SNJ54ACT11373FK	Quad 4-1 Data Selector/Multiplexer 9-Bit Parity Generator Dual 4-1 Data Selector/Multiplexer Octal D-Type Latch	5962-87556023A	3-24 3-29 3-24 3-18	
SNJ54ACT11373JT SNJ54ACT11374FK SNJ54ACT11374JT SNJ54ACT11520	Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Flip-Flop 8-Bit Identity Comparator	5962-8755602LA 5962-87631023A 5962-8763102LA	3-18 3-16 3-16 3-28	
SNJ54ACT11521 SNJ54ACT11533 SNJ54ACT11534 SNJ54ACT11640	8-Bit Identity Comparator Octal D-Type Transparent Latch Octal D-Type Flip-Flop Octal Bus Transceiver		3-28 3-18 3-16 3-11	
SNJ54AC11000FK SNJ54AC11000J SNJ54AC11002 SNJ54AC11004FK	Quad 2-Input NAND Gate Quad 2-Input NAND Gate Quad 2-Input NOR Gate Hex Inverter	5962-87699022A 5962-8769902EA 5962-87609022A	3-4 3-4 3-5 3-8	
SNJ54AC11004J SNJ54AC11008 SNJ54AC11010 SNJ54AC11011	Hex Inverter Quad 2-Input AND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate	5962-8760902RA	3-8 3-5 3-4 3-5	
SNJ54AC11020 SNJ54AC11021 SNJ54AC11027 SNJ54AC11030	DUAL 4-Input NAND Gate DUAL 4-Input AND Gate Triple 3-Input NOR Gate 8-Input NAND Gate		3-4 3-5 3-5 3-4	
SNJ54AC11032 SNJ54AC11034 SNJ54AC11074FK SNJ54AC11074J	Quad 2-Input OR Gate Hex Non-Inverter Dual D-Type Flip-Flop Dual D-Type Flip-Flop	5962-87525022A 5962-8752502CA	3-5 3-8 3-15 3-15	
SNJ54AC11109 SNJ54AC11138 SNJ54AC11238 SNJ54AC11240FK	Dual J-K Flip-Flop 3-8 Line Decoder/Demultiplexer 3-8 Line Decoder/Demultiplexer Octal Buffer/Line Driver	5962-87759023A	3-15 3-25 3-25 3-10	
SNJ54AC11240JT SNJ54AC11241 SNJ54AC11244 SNJ54AC11245	Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Bus Transceiver	5962-8775902LA	3-10 3-10 3-10 3-11	
SNJ54AC11373FK SNJ54AC11373JT SNJ54AC11374 SNJ54AC11520	Octal D-Type Latch Octal D-Type Latch Octal D-Type Flip-Flop 8-Bit Identity Comparator	5962-87555023A 5962-8755502LA	3-18 3-18 3-16 3-28	

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SNJ54ALS00AW SNJ54ALS01 SNJ54ALS02FK SNJ54ALS02W	Quad 2-Input NAND Gate Quad 2-Input NAND Gate OC Quad 2-Input NOR Gate Quad 2-Input NOR Gate	5962-8683301DA 5962-86844012A 5962-8684401DA	3-4 3-4 3-5 3-5	
SNJ54ALS03B SNJ54ALS04BFBK SNJ54ALS04BW SNJ54ALS05AFK	Quad 2-Input NAND Gate OC Hex Inverter Hex Inverter Hex Inverter OC	5962-86843012A 5962-8684301DA 5962-8684301DA 5962-86840012A	3-4 3-8 3-8 3-8	
SNJ54ALS05AJ SNJ54ALS08FK SNJ54ALS08W SNJ54ALS09FK	Hex Inverter OC Quad 2-Input AND Gate Quad 2-Input AND Gate Quad 2-Input AND Gate OC	5962-8854001CA 5962-86842012A 5962-8684201DA 84142012A	3-8 3-5 3-5 3-4	
SNJ54ALS09J SNJ54ALS10AFK SNJ54ALS10AW SNJ54ALS11AFK	Quad 2-Input AND Gate OC Triple 3-Input NAND Gate Triple 3-Input NAND Gate Triple 3-Input AND Gate	8414201CA 5962-86865012A 5962-8686501DA 5962-86841012A	3-4 3-4 3-4 3-5	
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SN74ALS15A	Triple 3-Input AND Gate OC		3-4	SDAD001B
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SN74ALS27	Triple 3-Input NOR Gate		3-5	SDAD001B
SN74ALS28A	Quad 2-Input NOR Buffer		3-5	SDAD001B
SN74ALS30A	8-Input NAND Gate		3-4	SDAD001B
SN74ALS32	Quad 2-Input OR Gate		3-5	SDAD001B
SN74ALS33A	Quad 2-Input NOR Buffer OC		3-5	SDAD001B
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SN74ALS37A	Quad 2-Input NAND Buffer		3-4	SDAD001B
SN74ALS38A	Quad 2-Input NAND Buffer OC		3-4	SDAD001B
SN74ALS40A	Dual 4-Input NAND Buffer		3-4	SDAD001B
SN74ALS74A	Dual D-Type Flip-Flop		3-15	SDAD001B
SN74ALS86	Quad 2-Input Exclusive OR Gate		3-6	SDAD001B
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SN74ALS112A	Dual J-K Flip-Flop		3-15	SDAD001B
SN74ALS113A	Dual J-K Flip-Flop		3-15	SDAD001B
SN74ALS114A	Dual J-K Flip-Flop		3-15	SDAD001B
SN74ALS131	3-8 Line Decoder/Demultiplexer with Latch		3-25	SDAD001B
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SN74ALS136	Quad 2-Input Exclusive OR Gate		3-6	SDAD001B
SN74ALS137	3-8 Line Decoder/Demultiplexer		3-25	SDAD001B
SN74ALS138	3-8 Line Decoder/Demultiplexer		3-25	SDAD001B
SN74ALS139	Dual 2-4 Decoder/Demultiplexer		3-25	SDAD001B
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SN74ALS153	Dual 4-1 Data Selector/Multiplexer		3-24	SDAD001B
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SN74ALS273 SN74ALS280 SN74ALS299 SN74ALS323	Octal D-Type Flip-Flop 9-Bit Parity Generator/Checker 8-Bit Shift Register 8-Bit Shift/Storage Register		3-16 3-29 3-19 3-19	SDAD001B SDVD001 SDAD001B SDAD001B
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SN74ALS533 SN74ALS534 SN74ALS540 SN74ALS541	Octal D-Type Latch Octal D-Type Flip-Flop Octal Buffer/Line Driver Octal Buffer/Line Driver		3-18 3-16 3-10 3-10	SDAD001B SDAD001B SDAD001B SDAD001B
SN74ALS560A SN74ALS561A SN74ALS563A SN74ALS564A	Synchronous 4-Bit Counter Synchronous 4-Bit Counter Octal D-Type Transparent Latch Octal Edge-Triggered Flip-Flop		3-21 3-21 3-18 3-16	SDAD001B SDAD001B SDAD001B SDAD001B
SN74ALS568A SN74ALS569A SN74ALS573B SN74ALS574A	4-Bit Up/Down Decade Counter 4-Bit Up/Down Binary Counter Octal D-Type Latch Octal D-Type Flip-Flop		3-21 3-21 3-18 3-16	SDAD001B SDAD001B SDAD001B SDAD001B
SN74ALS575A SN74ALS576A SN74ALS577A SN74ALS580A	Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Latch		3-16 3-16 3-16 3-18	SDAD001B SDAD001B SDAD001B SDAD001B

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SN74ALS622A	Octal Bus Transceiver		3-10	SDAD001B
SN74ALS623A	Octal Bus Transceiver		3-12	SDAD001B
SN74ALS632B	Error Detection and Correction Circuit		4-72	SDAD001A
SN74ALS638A	Octal Bus Transceiver		3-10	SDAD001B
SN74ALS639A	Octal Bus Transceiver		3-9	SDAD001B
SN74ALS640B	Octal Bus Transceiver		3-11	SDAD001B
SN74ALS641A	Octal Bus Transceiver		3-9	SDAD001B
SN74ALS642A	Octal Bus Transceiver		3-10	SDAD001B
SN74ALS643A	Octal Bus Transceiver		3-11	SDAD001B
SN74ALS644A	Octal Bus Transceiver		3-10	SDAD001B
SN74ALS645A	Octal Bus Transceiver		3-12	SDAD001B
SN74ALS646	Octal Bus Transceiver and Register		3-11	SDAD001B
SN74ALS647	Octal Bus Transceiver and Register		3-10	SDAD001B
SN74ALS648	Octal Bus Transceiver and Register		3-11	SDAD001B
SN74ALS649	Octal Bus Transceiver and Register		3-10	SDAD001B
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SN74ALS654	Octal Bus Transceiver and Register		3-10	SDAD001B
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SN74ALS667	Octal D-Type Read-Back Latch		3-17	SDAD001B
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SN74ALS689	8-Bit Identity Comparator		3-28	SDAD001B
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SN74ALS760	Octal Buffer/Line Driver OC		3-9	SDAD001B
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SN74ALS805A	Hex 2-Input NOR Driver		3-5	SDAD001B
SN74ALS808A	Hex 2-Input AND Driver		3-9	SDAD001B
SN74ALS810	Quad Exclusive-NOR Gate		3-6	SDAD001B
SN74ALS811	Quad Exclusive-NOR Gate		3-6	SDAD001B
SN74ALS812	Fuse Prog. Identity Comparator/Decoder		3-29	SDAS103
SN74ALS819	8-Bit Diagnostic/Pipeline Register		3-20	SDAS105
SN74ALS832A	Hex 2-Input OR Driver		3-5	SDAD001B
SN74ALS841	10-Bit Bus Interface Latch		3-18	SDAD001B
SN74ALS842	10-Bit Bus Interface Latch		3-18	SDAD001B
SN74ALS843	9-Bit Bus Interface Latch		3-18	SDAD001B
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SN74ALS869	8-Bit Synchronous Up/Down Counter		3-21	SDAD001B
SN74ALS870	Dual Port 16 X 4 Register File		3-20	SDAD001B
SN74ALS871	Dual 16 X 4 Register File		3-20	SDAD001B
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SN74ALS874B	Dual 4-Bit D-Type Flip-Flop		3-16	SDAD001B
SN74ALS876A	Dual 4-Bit D-Type Flip-Flop		3-16	SDAD001B
SN74ALS878A	Dual 4-Bit D-Type Flip-Flop		3-16	SDAD001B
SN74ALS879A	Dual 4-Bit D-Type Flip-Flop		3-16	SDAD001B
SN74ALS880A	Dual 4-Bit D-Type Latch		3-18	SDAD001B
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SN74ALS994	10-Bit D-Type Read-Back Latch		3-17	SDAD001B
SN74ALS995	10-Bit D-Type Read-Back Latch		3-17	SDAD001B
SN74ALS996	8-Bit D-Type Read-Back Latch		3-17	SDAD001B
SN74ALS1000A	Quad NAND Buffer/Driver		3-4	SDAD001B
SN74ALS1002A	Quad NOR Buffer		3-5	SDAD001B
SN74ALS1003A	Quad NOR Buffer OC		3-4	SDAD001B
SN74ALS1004	Hex Inverting Driver		3-8	SDAD001B
SN74ALS1005	Hex Inverting Buffer OC		3-8	SDAD001B
SN74ALS1008A	Quad AND Buffer		3-5	SDAD001B
SN74ALS1010A	Triple 3-Input NAND Buffer		3-30	SDAD001B
SN74ALS1011A	Triple 3-Input AND Buffer		3-5	SDAD001B
SN74ALS1020A	Dual 4-Input NAND Buffer		3-4	SDAD001B
SN74ALS1032A	Quad OR Buffer/Driver		3-5	SDAD001B
SN74ALS1034	Hex Driver		3-9	SDAD001B
SN74ALS1035	Hex Noninverting Buffer		3-9	SDAD001B
SN74ALS1240	Octal Buffer/Line Driver		3-10	SDAD001B
SN74ALS1242	Quad Bus Transceiver		3-11	SDAD001B
SN74ALS1244A	Octal Buffer/Driver		3-10	SDAD001B
SN74ALS1245A	Octal Bus Transceiver		3-11	SDAD001B
SN74ALS1640A	Octal Bus Transceiver		3-12	SDAD001B
SN74ALS1645A	Octal Bus Transceiver		3-12	SDAD001B
SN74ALS1804A	Hex 2-Input NAND Driver		3-4	SDAD001B
SN74ALS1805A	Hex 2-Input NOR Driver		3-5	SDAD001B
SN74ALS1808A	Hex 2-Input AND Driver		3-9	SDAD001B
SN74ALS1832A	Hex 2-Input OR Driver		3-32	SDAD001B
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SN74ALS2233	64 X 9 Asynchronous FIFO, 40 MHz		3-33	TBA
SN74ALS2238	32 X 9 X 2 Asynchronous Bidirectional FIFO		3-31	TBA
SN74ALS2240	Quad Line Driver		3-12	SDAD001B
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SN74ALS2442	NuBus Block Slave Address Generator		4-78	TBA
SN74ALS2540	Octal Buffer and Line Driver		3-12	SDAD001B
SN74ALS2541	Octal Buffer and Line Driver		3-12	SDAD001B
SN74ALS2967	Dynamic Memory Controller		3-27	SDAS121A
SN74ALS2968	Dynamic Memory Controller		3-27	TBA
SN74ALS6301	Dynamic Memory Controller		3-27	SDAS120A
SN74ALS6302	Dynamic Memory Controller		3-27	SDAS120A
SN74ALS6310	Static Column/Page-Mode Access Detectors		4-60	SDAS144B
SN74ALS6311	Static Column/Page-Mode Access Detectors		4-60	SDAS144B
SN74ALS8003A	Dual 2-Input NAND Gate		3-4	SDAD001B
SN74ALS8161	8-Bit Synchronous Binary Counter		3-21	SDAS116
SN74ALS8163	8-Bit Synchronous Binary Counter		3-21	SDAS104
SN74ALS8169	8-Bit Synchronous Up/Down Binary Counter		3-21	SDAS117
SN74ALS29806	2-to-4 Bit Comparator/Decoder		3-28	SDAD001B
SN74ALS29809	2-to-4 Bit Comparator/Decoder		3-28	SDAD001B
SN74ALS29818	8-Bit Diagnostic/Pipeline Register		3-20	SDVD001
SN74ALS29821	10-Bit Register, Non-Inverting, 3-State		3-16	SDAD001B
SN74ALS29822	10-Bit Bus Interface Flip-Flop, 3-State		3-16	SDAD001B
SN74ALS29823	9-Bit Register, Non-Inverting, 3-State		3-16	SDAD001B
SN74ALS29824	9-Bit Bus Interface Flip-Flop, 3-State		3-16	SDAD001B
SN74ALS29825	8-Bit Bus Interface Flip-Flop, 3-State		3-16	SDAD001B
SN74ALS29826	8-Bit Register, Inverting, 3-State		3-16	SDAD001B
SN74ALS29827	10-Bit Buffer/Driver		3-10	SDAD001B
SN74ALS29828	10-Bit Buffer/Driver		3-10	SDAD001B
SN74ALS29833	Bus Transceiver		3-11	SDAS119
SN74ALS29834	Bus Transceiver		3-11	SDAS119
SN74ALS29841	10-Bit Latch, Non-Inverting		3-18	SDAS149
SN74ALS29842	10-Bit Latch, Inverting, 3-State		3-18	SDAS149
SN74ALS29843	9-Bit Latch, Non-Inverting		3-18	SDAS151
SN74ALS29844	9-Bit Latch, Inverting, 3-State		3-18	SDAS151
SN74ALS29845	8-Bit Latch, Non-Inverting		3-18	SDAS150
SN74ALS29846	8-Bit Latch, Inverting, 3-State		3-18	SDAS150

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SN74ALS29854	Bus Transceiver		3-11	SDAS118
SN74ALS29861	10-Bit Transceiver		3-12	SDAD001B
SN74ALS29862	10-Bit Transceiver		3-12	SDAD001B
SN74ALS29863	9-Bit Transceiver		3-11	SDVD001
SN74ALS29864	9-Bit Transceiver		3-11	SDVD001
SN74AS00	Quad 2-Input NAND Gate		3-4	SDAD001B
SN74AS02	Quad 2-Input NOR Gate		3-5	SDAS111
SN74AS04	Hex Inverter		3-8	SDAD001B
SN74AS08	Quad 2-Input AND Gate		3-5	SDAD001B
SN74AS10	Triple 3-Input NAND Gate		3-4	SDAD001B
SN74AS11	Triple 3-Input AND Gate		3-5	SDAD001B
SN74AS20	Dual 4-Input NAND Gate		3-4	SDAD001B
SN74AS21	Dual 4-Input AND Gate		3-5	SDAD001B
SN74AS27	Triple 3-Input NOR Gate		3-5	SDAS112
SN74AS30	8-Input NAND Gate		3-4	SDAD001B
SN74AS32	Quad 2-Input OR Gate		3-5	SDAS113
SN74AS34	Hex Non-Inverter		3-8	SDAD001B
SN74AS74	Dual D-Type Flip-Flop		3-15	SDAD001B
SN74AS86A	Quad 2-Input Exclusive-OR Gate		3-6	SDAS006A
SN74AS95A	4-Bit Shift Register		3-19	SDAS158
SN74AS109	Dual J-K Flip-Flop		3-15	SDAD001B
SN74AS131A	3-8 Line Decoder w/Latch		3-25	SDAD001B
SN74AS136	Quad 2-Input Exclusive-Or Gate		3-6	SDAS162
SN74AS137	3-8 Line Decoder/Demultiplexer		3-25	SDAD001B
SN74AS138	3-8 Line Decoder/Demultiplexer		3-25	SDAD001B
SN74AS151	8-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS153	Dual 4-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS157	Quad 2-1 Data Selector/Multiplexer		3-24	SDAD001B
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SN74AS160	4-Bit Synchronous Decade Counter		3-21	SDAD001B
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SN74AS168A	4-Bit Up/Down Synchronous Decade Counter		3-21	SDAD001B
SN74AS169A	4-Bit Up/Down Synchronous Binary Counter		3-21	SDAD001B
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SN74AS175A	Quad D-Type Flip-Flop		3-15	SDAD001B
SN74AS181B	4-Bit Arithmetic Logic Unit		3-30	SDAD001B
SN74AS182	ASI Look Ahead Carry Generator		3-30	SDAD001B
SN74AS194	Universal Shift Register		3-19	SDAD001B
SN74AS195	4-Bit Sync Binary Counter		3-19	SDAS138
SN74AS230	Octal Buffer/Line Driver		3-10	SDAD001B
SN74AS231	Octal Buffer/Line Driver		3-10	SDAD001B
SN74AS240	Octal Buffer/Line Driver		3-10	SDAD001B
SN74AS241	Octal Buffer/Line Driver		3-10	SDAD001B
SN74AS242	Quad Bus Transceiver		3-11	SDAD001B
SN74AS243	Quad Bus Transceiver		3-11	SDAD001B
SN74AS244	Octal Buffer/Line Driver		3-10	SDAD001B
SN74AS245	Octal Bus Transceiver		3-11	SDAD001B
SN74AS250A	16-1 Multiplexer		3-24	SDAS137
SN74AS251	8-to-1 Multiplexer		3-24	SDAD001B
SN74AS253	Dual 4-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS257	Quad 2-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS258	Quad 2-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS264	ASI Look Ahead Carry Generator		3-30	SDAD001B
SN74AS280	9-Bit Parity Generator/Checker		3-29	SDAD001B
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SN74AS286	9-Bit Parity Generator/Checker		3-29	SDAD001B
SN74AS298	Quad 2-Input Multiplexer		3-20	SDAD001B
SN74AS352	Dual 4-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS353A	Dual 4-1 Data Selector/Multiplexer		3-24	SDAD001B
SN74AS373	Octal D-Type Latch		3-18	SDAD001B
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SN74AS533 SN74AS534 SN74AS573 SN74AS574	Octal D-Type Latch Octal D-Type Flip-Flop Octal D-Type Latch Octal D-Type Flip-Flop		3-18 3-16 3-18 3-16	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS575 SN74AS576 SN74AS577 SN74AS580	Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Flip-Flop Octal D-Type Latch		3-16 3-16 3-16 3-18	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS620 SN74AS621 SN74AS622 SN74AS623	Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver		3-11 3-9 3-10 3-12	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS632 SN74AS638A SN74AS639 SN74AS640	Error Detection and Correction Unit Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver		4-72 3-10 3-9 3-11	SDAS102A SDAD001B SDAD001B SDAD001B
SN74AS641 SN74AS642 SN74AS643 SN74AS644	Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver		3-9 3-10 3-11 3-10	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS645 SN74AS646 SN74AS648 SN74AS651	Octal Bus Transceiver Octal Bus Transceiver and Register Octal Bus Transceiver and Register Octal Bus Transceiver and Register		3-12 3-11 3-11 3-11	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS652 SN74AS756 SN74AS757 SN74AS758	Octal Bus Transceiver and Register Octal Buffer/Line Driver Octal Buffer/Line Driver Quad Bus Transceiver		3-11 3-9 3-9 3-9	SDAD001B SDAS040A SDAD001B SDAD001B
SN74AS759 SN74AS759 SN74AS760 SN74AS762	Quad Bus Transceiver Quad Bus Transceiver Octal Buffer/Line Driver Octal Buffer/Line Driver		3-9 3-9 3-9 3-9	SDAD001B SDAD001B SDAS141 SDAD001B
SN74AS763 SN74AS804B SN74AS805B SN74AS808B	Octal Buffer/Line Driver Hex 2-Input NAND Driver Hex 2-Input NOR Driver Hex 2-Input AND Driver		3-9 3-4 3-5 3-9	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS821 SN74AS822 SN74AS823 SN74AS824	10-Bit Bus Interface Flip-Flop 10-Bit Bus Interface Flip-Flop 9-Bit Bus Interface Flip-Flop 9-Bit Bus Interface Flip-Flop		3-16 3-16 3-16 3-16	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS825 SN74AS826 SN74AS832B SN74AS850	8-Bit Bus Interface Flip-Flop 8-Bit Bus Interface Flip-Flop Hex 2-Input OR Driver 1 of 16 Data Selector/Multiplexer		3-16 3-16 3-5 3-24	SDAD001B SDAD001B SDAD001B SDAS154
SN74AS851 SN74AS852 SN74AS856 SN74AS857A	1 of 16 Data Selector/Multiplexer 8-Bit Universal Port Controller 8-Bit Universal Port Controller Hex 2-to-1 Multiplexer		3-24 3-12 3-12 3-24	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS866 SN74AS867 SN74AS869 SN74AS870	8-Bit Magnitude Comparator 8-Bit Synchronous Up/Down Counter 8-Bit Synchronous Up/Down Counter Dual 16-BY-4 Register File		3-28 3-21 3-21 3-20	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS871 SN74AS873A SN74AS874 SN74AS876	Dual 16-BY-4 Register File Dual 4-Bit D-Type Latch Dual 4-Bit Flip-Flop Dual 4-Bit Flip-Flop		3-20 3-18 3-15 3-15	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS877 SN74AS878 SN74AS879 SN74AS880	8-Bit Universal Transceiver Dual 4-Bit Flip-Flop Dual 4-Bit Flip-Flop Dual 4-Bit D-Type Latch		3-12 3-15 3-16 3-18	SDAD001B SDAD001B SDAD001B SDAD001B
SN74AS881A SN74AS882A SN74AS885 SN74AS1000A	Arithmetic Logic Unit/Function Generator 32-Bit Look-Ahead Carry Generator 8-Bit Magnitude Comparator Quad NAND Buffer/Driver		3-30 3-30 3-28 3-4	SDAD001B SDAD001B SDAD001B SDAD001B

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SN74AS1008A	Quad AND Buffer		3-5	SDAD001B
SN74AS1032A	Quad OR Buffer/Driver		3-5	SDAD001B
SN74AS1034A	Hex Driver		3-9	SDAD001B
SN74AS1036A	Quad 2-Input NOR Driver		3-5	SDAD001B
SN74AS1804	Hex 2-Input NAND Driver		3-4	SDAD001B
SN74AS1805	Hex 2-Input NOR Driver		3-5	SDAD001B
SN74AS1808	Hex 2-Input AND Driver		3-9	SDAD001B
SN74AS1821	10-Bit Bus Interface Flip-Flop		3-16	SDAS131
SN74AS1823	9-Bit Bus Interface Flip-Flop		3-16	SDAS126
SN74AS1832	Hex 2-Input OR Driver		3-5	SDAD001B
SN74AS1841	10-Bit Bus Interface Latch		3-18	SDAS130
SN74AS1843	9-Bit Bus Interface Latch		3-18	SDAS127
SN74AS2620	Octal Bus Transceiver/MOS Driver		3-12	SDAD001B
SN74AS2623	Octal Bus Transceiver/MOS Driver		3-12	SDAD001B
SN74AS2640	Octal Bus Transceiver/MOS Driver		3-12	SDAD001B
SN74AS2645	Octal Bus Transceiver/MOS Driver		3-12	SDAD001B
SN74AS3374	8-Bit Metastable-Resistant Flip-Flop		3-16	SDAS152
SN74AS4374A	8-Bit Metastable-Resistant Flip-Flop		3-16	SDAS109B
SN74BCT125	Quad Bus Buffer Gate with 3-State Output		3-10	SCBD001A
SN74BCT126	Quad Bus Buffer Gate with 3-State Output		3-10	SCBD001A
SN74BCT240	Octal Buffer/Line Driver		3-10	SCBD001A
SN74BCT241	Octal Buffer/Line Driver		3-10	SCBD001A
SN74BCT244	Octal Buffer/Line Driver		3-10	SCBD001A
SN74BCT245	Octal Bus Transceiver		3-11	SCBD001A
SN74BCT299	8-Bit Shift/Storage Reg. with 3-State		3-19	TBA
SN74BCT306	2-Bit Buffer		3-31	TBA
SN74BCT323	8-Bit Shift/Storage Reg. with 3-State		3-19	TBA
SN74BCT373	Octal D-Type Latch		3-18	SCBD001A
SN74BCT374	Octal D-Type Flip-Flop		3-16	SCBD001A
SN74BCT533	Octal D-Type Latch with 3-State		3-18	TBA
SN74BCT534	Octal D-Type Flip-Flop with 3-State		3-16	SCBD001A
SN74BCT540	Octal Bus Driver with 3-State		3-10	SCBD001A
SN74BCT541	Octal Bus Driver with 3-State		3-10	SCBD001A
SN74BCT543	Octal Registered Transceiver with 3-State		3-11	SCBD001A
SN74BCT544	Octal Registered Transceiver with 3-State		3-11	SCBD001A
SN74BCT563	Octal D-Type Latch with 3-State		3-18	TBA
SN74BCT564	Octal D-Type Flip-Flop with 3-State		3-16	TBA
SN74BCT573	Octal D-Type Latch with 3-State		3-18	TBA
SN74BCT620A	Octal Transceiver with 3-State Output		3-11	SCBD001A
SN74BCT623	Octal Bus Transceiver		3-12	SCBD001A
SN74BCT640	Octal Bus Transceiver		3-11	SCBD001A
SN74BCT646	Octal Bus Transceiver and Register		3-11	SCBS037
SN74BCT648	Octal Bus Transceiver and Register		3-11	TBA
SN74BCT651	Octal Bus Transceiver and Register		3-11	TBA
SN74BCT652	Octal Bus Transceiver and Register		3-11	SCBD001A
SN74BCT657	Octal Bus Transceiver		3-11	TBA
SN74BCT756	Octal Buffer and Driver, OC		3-9	SCBD001A
SN74BCT757	Octal Buffer and Driver, OC		3-9	TBA
SN74BCT760	Octal Buffer and Driver, OC		3-9	SCBD001A
SN74BCT2240	Octal MOS Memory Driver with 3-State		3-12	SCBD001A
SN74BCT2241	Octal MOS Memory Driver with 3-State		3-12	SCBD001A
SN74BCT2244	Octal MOS Memory Driver with 3-State		3-12	SCBD001A
SN74BCT2414	3-8 Memory Decoder with Batter B/U		3-25	TBA
SN74BCT2420	NuBus Address/Data Transceivers/Registers		4-76	SDIS007A
SN74BCT2423	16-Bit Multiplexed Transceivers with Latches		4-75	TBA
SN74BCT2424	16-Bit Multiplexed Transceivers with Latches		4-75	TBA
SN74BCT2827A	10-Bit MOS Memory Driver		3-10	SCBD001A
SN74BCT2828A	10-Bit MOS Memory Driver		3-10	SCBD001A
SN74BCT8244	Octal Buffer with 3-State		3-14	SCBD001A
SN74BCT8245	Octal Bus Transceiver with 3-State		3-14	SCBD001A
SN74BCT8373	Octal D-Type Latch with 3-State		3-14	TBA
SN74BCT8374	Octal D-Type Edge-Triggered Flip-Flop		3-14	TBA
SN74BCT29821	10-Bit D-Type Flip-Flop		3-16	SCBD001A

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SN74BCT29823 SN74BCT29824 SN74BCT29825 SN74BCT29827A	ASI 8-TO-9 Bit Parity Bus/Flip-Flop 9-Bit Register 8-Bit Register 10-Bit Bus Driver		3-16 3-16 3-16 3-10	SCBD001A SCBD001A TBA SCBD001A
SN74BCT29828A SN74BCT29833 SN74BCT29834 SN74BCT29841	10-Bit Bus Driver Parity Bus Transceiver Parity Bus Transceiver 10-Bit D-Type Latch		3-10 3-11 3-11 3-18	SCBD001A SCBD001A SCBD001A SCBD001A
SN74BCT29842 SN74BCT29843 SN74BCT29844 SN74BCT29845	10-Bit D-Type Latch 9-Bit Latch 9-Bit Latch 8-Bit Latch		3-18 3-18 3-18 3-18	SCBD001A SCBD001A SCBD001A SCBD001A
SN74BCT29846 SN74BCT29853 SN74BCT29854 SN74BCT29861	8-Bit Latch Parity Bus Transceiver Parity Bus Transceiver 10-Bit Transceiver		3-18 3-11 3-11 3-12	SCBD001A SCBD001A SCBD001A SCBD001A
SN74BCT29862A SN74BCT29863A SN74BCT29864 SN74F00	10-Bit Transceiver 9-Bit Transceiver 9-Bit Transceiver Quad 2-Input NAND Gate		3-12 3-11 3-11 3-4	SCBD001A SCBD001A TBA SDFD001A
SN74F02 SN74F04 SN74F08 SN74F09	Quad 2-Input NOR Gate Hex Inverter Quad 2-Input AND Gate Quad 2-Input AND Gate OC		3-5 3-8 3-5 3-4	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F10 SN74F11 SN74F20 SN74F21	Triple 3-Input NAND Gate Triple 3-Input AND Gate Dual 4-Input NAND Gate Dual 4-Input AND Gate		3-4 3-5 3-4 3-5	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F27 SN74F30 SN74F32 SN74F36	Triple 3-Input NOR Gate 8-Input NAND Gate Quad 2-Input OR Gate Quad 2-Input NOR Gate		3-5 3-4 3-5 3-5	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F37 SN74F38 SN74F40 SN74F51	Quad 2-Input NAND Gate Quad 2-Input NAND Gate Dual 4-Input NAND Buffer Dual 2-Input AND-OR Gate		3-4 3-4 3-4 3-6	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F64 SN74F74 SN74F86 SN74F10	4-2-3-2 Input AND-NOR Gate Dual D-Type Flip-Flop Quad 2-Input Exclusive-OR Gate Dual J K Flip-Flop		3-6 3-15 3-6 3-15	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F11 SN74F11 SN74F11 SN74F12	Dual J K Flip-Flop Dual J-K Flip Flop Dual J-K Flip Flop Quad 3-State Buffer		3-15 3-15 3-15 3-10	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F12 SN74F14 SN74F151A SN74F153	Quad 3-State Buffer 8-3 Line Encoder 8-1 Data Selector/Multiplexer Dual 4-1 Multiplexer		3-10 3-10 3-24 3-24	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F157A SN74F158A SN74F160A SN74F161A	Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer 4 Bit Synchronous Decade Counter 4-Bit Synchronous Binary Counter		3-24 3-24 3-21 3-21	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F162A SN74F163A SN74F166 SN74F168	4-Bit Synchronous Decade Counter 4-Bit Synchronous Binary Counter 8-Bit Shift Register 4-Bit Synchronous Decade Counter		3-21 3-21 3-21 3-21	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F169 SN74F174 SN74F175 SN74F190	4-Bit Synchronous Binary Counter Hex D-Type Flip-Flop Hex D-Type Flip-Flop Synchronous Up/Down Decade Counter		3-21 3-15 3-15 3-21	SDFD001A SDFD001A SDFD001A SDFD001A
SN74F191 SN74F192 SN74F193 SN74F240	Synchronous Up/Down Binary Counter Synchronous Up/Down Decade Counter Synchronous Up/Down Binary Counter Octal Buffer/Line Driver		3-21 3-21 3-21 3-10	SDFD001A SDFD001A SDFD001A SDFD001A

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SN74F241	Octal Buffer/Line Driver		3-10	SDFD001A
SN74F242	Quad Bus Transceiver		3-11	SDFD001A
SN74F243	Quad Bus Transceiver		3-11	SDFD001A
SN74F244	Octal Buffer/Line Driver		3-10	SDFD001A
SN74F245	Octal Bus Transceiver		3-11	SDFD001A
SN74F251A	8-1 Data Selector/Multiplexer		3-24	SDFD001A
SN74F253	Dual 4-Input Multiplexer		3-24	SDFD001A
SN74F257	Quad 2-1 Data Selector/Multiplexer		3-24	SDFD001A
SN74F258	Quad 2-1 Data Selector/Multiplexer		3-24	SDFD001A
SN74F260	Dual 5-Input NOR Gate		3-16	SDFD001A
SN74F273	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F280B	9-Bit Parity Generator/Checker		3-16	SDFD001A
SN74F283	4-Bit Full Adder		3-30	SDFD001A
SN74F299	8-Bit Universal Shift/Storage Register		3-19	SDFD001A
SN74F323	8-Bit Universal Shift/Storage Register		3-19	SDFD001A
SN74F350	4-Bit Shifter		3-25	SDFD001A
SN74F352	Dual Data Selector/Multiplexer		3-24	SDFD001A
SN74F353	Dual 4-1 Multiplexer		3-24	SDFD001A
SN74F373	Octal D-Type Latch		3-18	SDFD001A
SN74F374	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F377	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F378	Hex D-Type Flip-Flop		3-15	SDFD001A
SN74F379	Quad D-Type Flip-Flop		3-15	SDFD001A
SN74F381	ALU Function Generator		3-30	SDFD001A
SN74F382	ALU Function Generator		3-30	SDFD001A
SN74F455	Octal Buffer Parity Generator/Checker		3-29	SDFD001A
SN74F456	Octal Buffer Parity Generator/Checker		3-29	SDFD001A
SN74F518	8-Bit Identity Comparator		3-28	SDFD001A
SN74F519	8-Bit Identity Comparator		3-28	SDFD001A
SN74F520	8-Bit Identity Comparator		3-18	SDFD001A
SN74F521	8-Bit Identity Comparator		3-18	SDFD001A
SN74F533	Octal D-Type Latch		3-18	SDFD001A
SN74F534	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F540	Octal Buffer/Line Driver		3-10	SDFD001A
SN74F541	Octal Buffer/Line Driver		3-10	SDFD001A
SN74F543	Octal Registered Transceiver		3-11	SDFD001A
SN74F544	Octal Registered Transceiver		3-11	SDFD001A
SN74F563	Octal D-Type Latch		3-18	SDFD001A
SN74F564	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F568	4-Bit Synchronous Decade Counter		3-21	SDFD001A
SN74F569	4-Bit Synchronous Binary Counter		3-21	SDFD001A
SN74F573	Octal D-Type Latch		3-18	SDFD001A
SN74F574	Octal D-Type Flip-Flop		3-16	SDFD001A
SN74F620	Octal Bus Transceiver		3-11	SDFD001A
SN74F621	Octal Bus Transceiver		3-9	SDFD001A
SN74F622N	Octal Bus Transceiver		3-10	SDFD001A
SN74F623	Octal Bus Transceiver		3-12	SDFD001A
SN74F657	Octal Bus Transceiver		3-11	SDFD001A
SN74F776	Pi Bus Transceiver		3-11	TBA
SN74HCT00	Quad 2-Input NAND Gate		3-4	SCLD001C
SN74HCT02	Quad 2-Input NOR Gate		3-5	SCLD001C
SN74HCT04	Hex Inverter		3-8	SCLD001C
SN74HCT08	Quad 2-Input AND Gate		3-5	SCLD001C
SN74HCT32	Quad 2-Input OR Gate		3-5	SCLD001C
SN74HCT74	Dual D-Type Flip-Flop		3-15	SCLD001C
SN74HCT137	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HCT138	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HCT237	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HCT238	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HCT240	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HCT241	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HCT242	Quad Bus Transceiver		3-11	SCLD001C
SN74HCT243	Quad Bus Transceiver		3-11	SCLD001C
SN74HCT244	Octal Buffer/Line Driver		3-10	SCLD001C

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
SN74HCT245	Octal Bus Transceiver		3-11	SCLD001C
SN74HCT373	Octal D-Type Latch		3-18	SCLD001C
SN74HCT374	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HCT533	Octal D-Type Latch		3-18	SCLD001C
SN74HCT534	Octal D-Type Flip-Flop		3-18	SCLD001C
SN74HCT540	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HCT541	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HCT563	Octal D-Type Latch		3-18	SCLD001C
SN74HCT564	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HCT573A	Octal D-Type Latch		3-18	SCLD001C
SN74HCT574	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HCT620	Octal Bus Transceiver		3-11	SCLD001C
SN74HCT623	Octal Bus Transceiver		3-12	SCLD001C
SN74HCT640	Octal Bus Transceiver		3-11	SCLD001C
SN74HCT643	Octal Bus Transceiver		3-11	SCLD001C
SN74HCT645	Octal Bus Transceiver		3-12	SCLD001C
SN74HCT646	Octal Bus Transceiver and Register		3-11	SCLD001C
SN74HCT648	Octal Bus Transceiver and Register		3-11	SCLD001C
SN74HCT651	Octal Bus Transceiver and Register		3-11	SCLD001C
SN74HCT652	Octal Bus Transceiver and Register		3-11	SCLD001C
SN74HCT658	Octal Bus Transceiver with Parity		3-11	SCLD001C
SN74HCT659	Octal Bus Transceiver with Parity		3-11	SCLD001C
SN74HCT664	Octal Bus Transceiver with Parity		3-11	SCLD001C
SN74HCT665	Octal Bus Transceiver with Parity		3-11	SCLD001C
SN74HCU04	Hex Inverter		3-8	SCLD001C
SN74HC00	Quad 2-Input NAND Gate		3-4	SCLD001C
SN74HC01	Quad 2-Input NAND Gate OC		3-4	SCLD001C
SN74HC02	Quad 2-Input NOR Gate		3-5	SCLD001C
SN74HC03	Quad 2-Input NAND Gate OC		3-4	SCLD001C
SN74HC04	Hex Inverter		3-8	SCLD001C
SN74HC05	Hex Inverter OC		3-8	SCLD001C
SN74HC08	Quad 2-Input AND Gate		3-5	SCLD001C
SN74HC09	Quad 2-Input AND Gate OC		3-4	SCLD001C
SN74HC10	Triple 3-Input NAND Gate		3-4	SCLD001C
SN74HC11	Triple 3-Input AND Gate		3-5	SCLD001C
SN74HC14	Hex Schmitt-Trigger Inverter		3-8	SCLD001C
SN74HC20	Dual 4-Input NAND Gate		3-4	SCLD001C
SN74HC21	Dual 4-Input AND Gate		3-5	SCLD001C
SN74HC27	Triple 3-Input NOR Gate		3-5	SCLD001C
SN74HC30	8-Input NAND Gate		3-4	SCLD001C
SN74HC32	Quad 2-Input OR Gate		3-5	SCLD001C
SN74HC36	Quad 2-Input NOR Gate		3-5	SCLD001C
SN74HC42	4-of-10 Decoder		3-25	SCLD001C
SN74HC51	Dual AND-OR Invert Gate		3-6	SCLD001C
SN74HC73	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC74	Dual D-Type Flip-Flop		3-15	SCLD001C
SN74HC75	4-Bit Bistable Latch		3-17	SCLD001C
SN74HC76	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC77	Quad D-Type Latch		3-17	SCLD001C
SN74HC78	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC85A	4-Bit Magnitude Comparator		3-28	SCLD001C
SN74HC86	Quad 2-Input Exclusive-OR Gate		3-6	SCLD001C
SN74HC107	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC109	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC112	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC113	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC114	Dual J-K Flip-Flop		3-15	SCLD001C
SN74HC126	Quad 3-State Buffer		3-10	SCLD001C
SN74HC125	Quad 3-State Buffer		3-10	SCLD001C
SN74HC132	Quad 2-Input NAND Schmitt-Trigger		3-4	SCLD001C
SN74HC133	13-Input NAND Gate		3-4	SCLD001C
SN74HC137	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HC138	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HC139	Dual 2-4 Line Decoder/Demultiplexer		3-25	SCLD001C

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SN74HC147	10-to-4 Line Encoder		3-24	SCLD001C
SN74HC148	8-to-3 Line Encoder		3-24	SCLD001C
SN74HC151	8-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC152	8-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC153	Dual 4-1 Data Selector/Multiplexer		3-25	SCLD001C
SN74HC154	4-16 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HC157	Quad 2-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC158	Quad 2-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC160	4-Bit Synchronous Decade Counter		3-21	SCLD001C
SN74HC161	4-Bit Synchronous Binary Counter		3-21	SCLD001C
SN74HC162	4-Bit Synchronous Decade Counter		3-21	SCLD001C
SN74HC163	4-Bit Synchronous Binary Counter		3-21	SCLD001C
SN74HC164	8-Bit Shift Register		3-19	SCLD001C
SN74HC165	8-Bit Shift Register		3-19	SCLD001C
SN74HC166	8-Bit Shift Register		3-19	SCLD001C
SN74HC173	4-Bit D-Type Register		3-20	SCLD001C
SN74HC174	Hex D-Type Flip-Flop		3-15	SCLD001C
SN74HC175	Quad D-Type Flip-Flop		3-15	SCLD001C
SN74HC180	9-Bit Odd/Even Parity Generator		3-29	SCLD001C
SN74HC190	Synchronous Up/Down Decade Counter		3-21	SCLD001C
SN74HC191	Synchronous Up/Down Binary Counter		3-21	SCLD001C
SN74HC192	Synchronous Up/Down Decade Counter		3-21	SCLD001C
SN74HC193	Synchronous Up/Down Binary Counter		3-21	SCLD001C
SN74HC194	4-Bit Universal Shift Register		3-19	SCLD001C
SN74HC195	4-Bit Shift Register		3-19	SCLD001C
SN74HC237	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HC238	3-8 Line Decoder/Demultiplexer		3-25	SCLD001C
SN74HC239	Dual 2-4 Decoder		3-25	SCLD001C
SN74HC240	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HC241	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HC242	Quad Bus Transceiver		3-11	SCLD001C
SN74HC243	Quad Bus Transceiver		3-11	SCLD001C
SN74HC244	Octal Buffer/Line Driver		3-10	SCLD001C
SN74HC245	Octal Bus Transceiver		3-11	SCLD001C
SN74HC251	Data Selector/Multiplexer		3-24	SCLD001C
SN74HC253	Dual 4-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC257	Quad 2-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC258	Quad 2-1 Data Selector/Multiplexer		3-24	SCLD001C
SN74HC259	8-Bit Addressable Latch		3-18	SCLD001C
SN74HC266	Quad 2-Input Exclusive NOR Gate		3-6	SCLD001C
SN74HC273	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HC280	9-Bit Parity Generator/Checker		3-29	SCLD001C
SN74HC283	4-Bit Full Adder		3-30	SCLD001C
SN74HC298	Quad 2-Input Multiplexer		3-20	SCLD001C
SN74HC299	8-Bit Shift Register		3-19	SCLD001C
SN74HC352	Dual 4-1 Selector/Multiplexer		3-24	SCLD001C
SN74HC353	Dual 4-1 Selector/Multiplexer		3-24	SCLD001C
SN74HC354	8-1 Decoder/Demultiplexer		3-24	SCLD001C
SN74HC356	8-1 Selector/Multiplexer Register		3-20	SCLD001C
SN74HC365	Hex Bus Driver		3-9	SCLD001C
SN74HC366	Hex Bus Driver		3-9	SCLD001C
SN74HC367	Hex Bus Driver		3-9	SCLD001C
SN74HC368	Hex Bus Driver		3-9	SCLD001C
SN74HC373	Octal D-Type Latch		3-18	SCLD001C
SN74HC374	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HC375	4-Bit Bistable Latch		3-17	SCLD001C
SN74HC377	Octal D-Type Flip-Flop		3-16	SCLD001C
SN74HC378	Hex D-Type Flip-Flops		3-15	SCLD001C
SN74HC379	Quad D-Type Flip-Flop		3-15	SCLD001C
SN74HC386	Quad 2-Input Exclusive OR Gate		3-6	SCLD001C
SN74HC390	4-Bit Decade/Binary Counter		3-22	SCLD001C
SN74HC393	4-Bit Decade/Binary Counter		3-22	SCLD001C
SN74HC490	Dual 4-Bit Decade Counter		3-22	SCLD001C
SN74HC533	Octal D-Type Latch		3-18	SCLD001C

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SN74HC534 SN74HC540 SN74HC541 SN74HC563	Octal D-Type Flip-Flop Octal Buffer/Line Driver Octal Buffer/Line Driver Octal D-Type Latch		3-16 3-10 3-10 3-18	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC564 SN74HC573 SN74HC574 SN74HC590A	Octal D-Type Flip-Flop Octal D-Type Latch Octal D-Type Flip-Flop Binary Counter With Output Register		3-16 3-18 3-16 3-22	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC594 SN74HC595 SN74HC604 SN74HC620	Shift Register With Output Register Shift Register With Output Register Octal 2-Input Multiplexed Latch Octal Bus Transceiver		3-19 3-19 3-18 3-11	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC623 SN74HC640 SN74HC643 SN74HC645	Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver Octal Bus Transceiver		3-12 3-11 3-11 3-12	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC646 SN74HC648 SN74HC651 SN74HC652	Octal Bus Transceiver and Register Octal Bus Transceiver and Register Octal Bus Transceiver and Register Octal Bus Transceiver and Register		3-11 3-11 3-11 3-11	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC658 SN74HC659 SN74HC664 SN74HC665	Octal Bus Transceiver With Parity Octal Bus Transceiver With Parity Octal Bus Transceiver With Parity Octal Bus Transceiver With Parity		3-11 3-11 3-11 3-11	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC677 SN74HC678 SN74HC679 SN74HC680	16-Bit Address Comparator 16-Bit Address Comparator 12-Bit Address Comparator 12-Bit Address Comparator		3-28 3-28 3-28 3-28	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC682 SN74HC684 SN74HC688 SN74HC804	8-Bit Magnitude Comparator 8-Bit Magnitude Comparator 8-Bit Magnitude Comparator Hex 2-Input NAND Driver		3-28 3-28 3-28 3-4	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC805 SN74HC808 SN74HC832 SN74HC4002	Hex 2-Input NOR Driver Hex 2-Input AND Driver Hex 2-Input OR Driver Dual 4-Input NOR Gate		3-5 3-9 3-5 3-5	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC4017 SN74HC4020 SN74HC4024 SN74HC4040	Decade Counter/Divider 14-Stage Binary Counter 7-Bit Binary Counter 12-Bit Binary Counter		3-22 3-22 3-22 3-22	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC4060 SN74HC4061 SN74HC4075 SN74HC4078A	Asynchronous Binary Counter/Oscillator Asynchronous Binary Counter/Oscillator Triple 3-Input OR Gate 8-Input OR/NOR Gate		3-22 3-22 3-5 3-6	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC4514 SN74HC4515 SN74HC4724 SN74HC7001	4-to-16 Line Decoder/Latch 4-to-16 Line Decoder/Latch 8-Bit Addressable Latch Quad AND Gate		3-25 3-25 3-18 3-4	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC7002 SN74HC7006 SN74HC7008 SN74HC7022	Quad NOR Gate 6-Section Multifunction Circuit 6-Section Multifunction Circuit Octal Counter/Divider		3-5 3-7 3-7 3-22	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC7032 SN74HC7074 SN74HC7075 SN74HC7076	Quad OR Gate 6-Section Multifunction Circuit 6-Section Multifunction Circuit 6-Section Multifunction Circuit		3-5 3-15 3-15 3-15	SCLD001C SCLD001C SCLD001C SCLD001C
SN74HC7266 SN74LS00 SN74LS01 SN74LS02	Quad 2-Input Exclusive NOR Gate Quad 2-Input NAND Gate Quad 2-Input NAND Gate OC Quad 2-Input NOR Gate		3-6 3-4 3-4 3-5	SCLD001C SCLD001A SCLD001A SCLD001A
SN74LS03 SN74LS04 SN74LS05 SN74LS08	Quad 2-Input NAND Gate OC Hex Inverter Hex Inverter OC Quad 2-Input AND Gate		3-4 3-8 3-8 3-5	SCLD001A SCLD001A SCLD001A SCLD001A

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SN74LS09	Quad 2-Input AND Gate OC		3-4	SDLD001A
SN74LS10	Triple 3-Input NAND Gate		3-4	SDLD001A
SN74LS11	Triple 3-Input AND Gate		3-5	SDLD001A
SN74LS12	Triple 3-Input NAND Gate OC		3-4	SDLD001A
SN74LS13	Dual 4-Input NAND Schmitt-Trigger		3-4	SDLD001A
SN74LS14	Hex Schmitt-Trigger Inverter		3-8	SDLD001A
SN74LS15	Triple 3-Input AND Gate OC		3-4	SDLD001A
SN74LS19A	Hex Schmitt-Trigger Inverter		3-8	SDLD001A
SN74LS20	Dual 4-Input NAND Gate		3-4	SDLD001A
SN74LS21	Dual 4-Input AND Gate		3-5	SDLD001A
SN74LS22	Dual 4-Input NAND Gate		3-4	SDLD001A
SN74LS26	Quad 2-Input NAND Gate		3-4	SDLD001A
SN74LS27	Triple 3-Input NOR Gate		3-5	SDLD001A
SN74LS28	Quad 2-Input NOR Buffer		3-5	SDLD001A
SN74LS30	8-Input NAND Gate		3-4	SDLD001A
SN74LS31	Delay Element		3-5	SDLD001A
SN74LS32	Quad 2-Input OR Gate		3-5	SDLD001A
SN74LS33	Quad 2-Input NOR Buffer OC		3-5	SDLD001A
SN74LS37	Quad 2-Input NAND Buffer		3-4	SDLD001A
SN74LS38	Quad 2-Input NAND Buffer OC		3-4	SDLD001A
SN74LS40	Dual 4-Input NAND Buffer		3-4	SDLD001A
SN74LS42	BCD-to-Decimal Decoder		3-25	SDLD001A
SN74LS47	BCD-7-Segment Decoder/Driver		3-26	SDLD001A
SN74LS51	Dual AND-OR-Invert Gate		3-6	SDLD001A
SN74LS54	AND-OR-Invert Gate		3-6	SDLD001A
SN74LS55	AND-OR-Invert Gate		3-6	SDLD001A
SN74LS56	Frequency Divider		3-23	SDLD001A
SN74LS57	Frequency Divider		3-23	SDLD001A
SN74LS68	Dual 4-Bit Decade Counter		3-21	SDLD001A
SN74LS69	Dual 4-Bit Binary Counter		3-21	SDLD001A
SN74LS73A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS74A	Dual D-Type Flip-Flop		3-15	SDLD001A
SN74LS75	4-Bit Latch		3-17	SDLD001A
SN74LS76A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS78A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS83A	4-Bit Binary Adder		3-30	SDLD001A
SN74LS85	4-Bit Magnitude Comparator		3-28	SDLD001A
SN74LS86A	Quad 2-Input Exclusive-OR Gate		3-6	SDLD001A
SN74LS90	Decade Counter		3-22	SDLD001A
SN74LS91	8-Bit Shift Register		3-19	SDLD001A
SN74LS92	Divide-by-12 Counter		3-22	SDLD001A
SN74LS93	4-Bit Binary Counter		3-22	SDLD001A
SN74LS95B	4-Bit Shift Register		3-19	SDLD001A
SN74LS96	5-Bit Shift Register		3-19	SDLD001A
SN74LS107A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS109A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS112A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS113A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS114A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74LS122	One Shot Multivibrator		3-17	SDLD001A
SN74LS123	Dual Monostable Multivibrator		3-17	SDLD001A
SN74LS125A	Quad 3-State Buffer		3-10	SDLD001A
SN74LS126A	Quad 3-State Buffer		3-10	SDLD001A
SN74LS132	Quad 2-Input NAND Schmitt-Trigger		3-4	SDLD001A
SN74LS136	Quad 2-Input Exclusive-OR Gate OC		3-6	SDLD001A
SN74LS137	3-8 Line Decoder/Demultiplexer		3-25	SDLD001A
SN74LS138	3-8 Line Decoder/Demultiplexer		3-25	SDLD001A
SN74LS139A	Dual 2-4 Decoder/Demultiplexer		3-25	SDLD001A
SN74LS145	BCD-TO-Decimal Decoder/Driver		3-26	SDLD001A
SN74LS147	10-4 Line Encoder		3-24	SDLD001A
SN74LS148	8-3 Line Encoder		3-24	SDLD001A
SN74LS151	8-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74LS153	Dual 4-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74LS155A	Dual 1-4 Decoder		3-25	SDLD001A

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SN74LS156 SN74LS157 SN74LS158 SN74LS160A	Dual 1-4 Decoder OC Quad 2-1 Data Selector/Multiplexer Quad 2-1 Data Selector/Multiplexer 4-Bit Synchronous Decade Counter		3-25 3-24 3-24 3-21	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS161A SN74LS162A SN74LS163A SN74LS164	4-Bit Synchronous Binary Counter 4-Bit Synchronous Decade Counter 4-Bit Binary Counter 8-Bit Shift Register		3-21 3-21 3-21 3-19	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS165A SN74LS166A SN74LS169B SN74LS171	8-Bit Shift Register 8-Bit Shift Register 4-Bit Synchronous Binary Counter Dual D-Type Flip-Flop		3-19 3-19 3-21 3-15	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS173A SN74LS174 SN74LS175 SN74LS181	Quad D-Type Register HEX D-Type Flip-Flop Quad D-Type Flip-Flop 4-Bit ALU		3-20 3-15 3-15 3-30	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS183 SN74LS190 SN74LS191 SN74LS192	Dual Carry-Save Full Adder Dual Carry-Save Full Adder Synchronous Up/Down Binary Counter Synchronous Up/Down Decade Counter		3-30 3-21 3-21 3-21	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS193 SN74LS194A SN74LS195A SN74LS196	Synchronous Up/Down Binary Counter 4-Bit Universal Shift Register 4-Bit Shift Register 4-Bit BCD Counter		3-21 3-19 3-19 3-22	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS197 SN74LS221 SN74LS222A SN74LS224A	4-Bit Binary Counter Dual Monostable Multivibrator FIFO Memory 16 X 4 FIFO Memory 16 X 4		3-22 3-17 3-31 3-31	SDLD001A SDLD001A SDVD001A SDVD001A
SN74LS227 SN74LS228 SN74LS240 SN74LS241	FIFO Memory 16 X 4 OC FIFO Memory 16 X 4 OC Octal Buffer/Line Driver Octal Buffer/Line Driver		3-31 3-31 3-10 3-10	SDVD001A SDVD001A SDLD001A SDLD001A
SN74LS242 SN74LS243 SN74LS244 SN74LS245	Quad Bus Transceiver Quad Bus Transceiver Octal Buffer/Line Driver Octal Bus Transceiver		3-11 3-11 3-10 3-11	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS247 SN74LS251 SN74LS253 SN74LS257B	BCD-to-7-Segment Decoder 8-1 Data Selector/Multiplexer 4-1 Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer		3-26 3-24 3-24 3-24	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS258B SN74LS259B SN74LS266 SN74LS273	Quad 2-Input Data Selector/Multiplexer 8-Bit Addressable Latch Quad 2-Input Exclusive-NOR Gate OC Octal D-Type Flip-Flop		3-24 3-18 3-6 3-16	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS279A SN74LS280 SN74LS283 SN74LS290	Quad Set/Reset Latch 9-Bit Parity Generator/Checker 4-Bit Full Adder Decade Counter		3-15 3-29 3-30 3-22	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS292 SN74LS293 SN74LS294 SN74LS295B	30-Bit Programmable Counter 4-Bit Binary Counter 16-Bit Programmable Counter 4-Bit Shift Register		3-23 3-22 3-23 3-19	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS297 SN74LS298 SN74LS299 SN74LS321	Digital Phase Lock Loop Quad 2-Input Multiplexer 8-Bit Shift Register Crystal Controlled Oscillator		3-27 3-20 3-19 3-26	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS322A SN74LS323 SN74LS348 SN74LS352	8-Bit Shift Register 8-Bit Shift/Storage Register 8-3 Line Encoder Dual Data Selector/Multiplexer		3-19 3-19 3-24 3-20	SDLD001A SDLD001A SDLD001A SDLD001A
SN74LS353 SN74LS354 SN74LS355 SN74LS356	Dual Data Selector/Multiplexer 8-1 Selector/Multiplexer Register 8-1 Selector/Multiplexer Register 8-1 Selector/Multiplexer Register		3-20 3-20 3-24 3-20	SDLD001A SDLD001A SDLD001A SDLD001A

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SN74LS365A	Hex Bus Driver		3-9	SDLD001A
SN74LS366A	Hex Bus Driver		3-9	SDLD001A
SN74LS367A	Hex Bus Driver		3-9	SDLD001A
SN74LS368A	Hex Bus Driver		3-9	SDLD001A
SN74LS373	Octal D-Type Latch		3-18	SDLD001A
SN74LS374	Octal D-Type Flip-Flop		3-16	SDLD001A
SN74LS375	4-Bit Bistable Latch		3-17	SDLD001A
SN74LS377	Octal D-Type Flip-Flop		3-16	SDLD001A
SN74LS378	Hex D-Type Flip-Flop		3-15	SDLD001A
SN74LS379	Quad D-Type Flip-Flop		3-15	SDLD001A
SN74LS381A	ALU/Function Generator		3-30	SDLD001A
SN74LS382A	ALU/Function Generator		3-30	SDLD001A
SN74LS390	4-Bit Decade Counter		3-22	SDLD001A
SN74LS393	4-Bit Binary Counter		3-22	SDLD001A
SN74LS395A	4-Bit Cascadable Shift Register		3-19	SDLD001A
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SN74LS399	Quad 2-Input Multiplexer with Storage		3-24	SDLD001A
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SN74LS445	BCD-Decimal Decoder/Driver		3-11	SDLD001A
SN74LS446	Bus Transceiver		3-26	SDLD001A
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SN74LS590	Binary Counter with Output Register		3-22	SDLD001A
SN74LS591	Binary Counter with Output Register		3-22	SDLD001A
SN74LS592	Binary Counter with Input Register		3-22	SDLD001A
SN74LS593	Binary Counter with Input Register		3-22	SDLD001A
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SN74LS595	Shift Register with Output Latch		3-19	SDLD001A
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SN74LS624	Voltage-Controlled Oscillator		3-26	SDLD001A
SN74LS625	Voltage-Controlled Oscillator		3-26	SDLD001A
SN74LS626	Voltage-Controlled Oscillator		3-26	SDLD001A
SN74LS628	Voltage-Controlled Oscillator		3-26	SDLD001A
SN74LS629	Voltage-Controlled Oscillator		3-26	SDLD001A
SN74LS630	Error Detection and Correction Circuit		3-29	SDLD001A
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SN74LS639	Octal Bus Transceiver		3-9	SDLD001A
SN74LS640	Octal Bus Transceiver		3-11	SDLD001A
SN74LS641	Octal Bus Transceiver		3-9	SDLD001A
SN74LS642	Octal Bus Transceiver		3-10	SDLD001A
SN74LS644	Octal Bus Transceiver		3-10	SDLD001A
SN74LS645	Octal Bus Transceiver		3-12	SDLD001A
SN74LS646	Octal Bus Transceiver and Register		3-11	SDLD001A
SN74LS647	Octal Bus Transceiver and Register		3-10	SDLD001A
SN74LS648	Octal Bus Transceiver and Register		3-11	SDLD001A
SN74LS649	Octal Bus Transceiver and Register		3-10	SDLD001A
SN74LS651	Octal Bus Transceiver and Register		3-11	SDLD001A
SN74LS652	Octal Bus Transceiver and Register		3-11	SDLD001A

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SN74LS670	4-by-4 Register File		3-20	SDLD001A
SN74LS671	4-Bit Shift Register/Latch		3-19	SDLD001A
SN74LS672	4-Bit Shift Register/Latch		3-19	SDLD001A
SN74LS673	16-Bit Shift Register		3-19	SDLD001A
SN74LS674	16-Bit Shift Register		3-19	SDLD001A
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SN74LS682	8-Bit Identity Comparator		3-28	SDLD001A
SN74LS683	8-Bit Identity Comparator		3-28	SDLD001A
SN74LS684	8-Bit Identity Comparator		3-28	SDLD001A
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SN74LS696	Synchronous Up/Down Binary Counter		3-21	SDLD001A
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SN74S02	Quad 2-Input NOR Gate		3-5	SDLD001A
SN74S03	Quad 2-Input NAND Gate OC		3-4	SDLD001A
SN74S04	Hex Inverter		3-8	SDLD001A
SN74S05	Hex Inverter OC		3-8	SDLD001A
SN74S08	Quad 2-Input AND Gate		3-5	SDLD001A
SN74S09	Quad 2-Input AND Gate OC		3-4	SDLD001A
SN74S10	Triple 3-Input NAND Gate		3-4	SDLD001A
SN74S11	Triple 3-Input AND Gate		3-5	SDLD001A
SN74S15	Triple 3-Input AND Gate OC		3-4	SDLD001A
SN74S20	Dual 4-Input NAND Gate		3-4	SDLD001A
SN74S22	Dual 4-Input NAND Gate		3-4	SDLD001A
SN74S30	8-Input NAND Gate		3-4	SDLD001A
SN74S32	Quad 2-Input OR Gate		3-5	SDLD001A
SN74S37	Quad 2-Input NAND Buffer		3-4	SDLD001A
SN74S38	Quad 2-Input NAND Buffer OC		3-4	SDLD001A
SN74S40	Dual 4-Input NAND Buffer		3-4	SDLD001A
SN74S51	Dual AND-OR-Invert Gate		3-6	SDLD001A
SN74S64	4-2-3-2 AND-OR-Invert Gate		3-6	SDLD001A
SN74S65	4-2-3-2 AND-OR-Invert Gate		3-6	SDLD001A
SN74S74A	Dual D-Type Flip-Flop		3-15	SDLD001A
SN74S85	4-Bit Magnitude Comparator		3-28	SDLD001A
SN74S86A	Quad 2-Input Exclusive OR Gate		3-6	SDLD001A
SN74S112A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74S113A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74S114A	Dual J-K Flip-Flop		3-15	SDLD001A
SN74S124	Dual Voltage-Controlled Oscillators		3-26	SDLD001A
SN74S132	Quad 2-Input NAND Schmitt-Trigger		3-4	SDLD001A
SN74S133	13-Input NAND Gate		3-4	SDLD001A
SN74S134	12-Input NAND Gate		3-4	SDLD001A
SN74S135	Quad Exclusive-OR/NOR Gate		3-6	SDLD001A
SN74S138	3-8 Line Decoder/Demultiplexer		3-25	SDLD001A
SN74S139A	Dual 2-4 Decoder/Demultiplexer		3-25	SDLD001A
SN74S140	Dual 4-Input NAND Line Driver		3-13	SDLD001A
SN74S151	8-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74S153	Dual 4-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74S157	Quad 2-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74S158	Quad 2-1 Data Selector/Multiplexer		3-24	SDLD001A
SN74S162A	4-Bit Synchronous Decade Counter		3-21	SDLD001A
SN74S163A	4-Bit Binary Counter		3-21	SDLD001A
SN74S169B	4-Bit Synchronous Binary Counter		3-21	SDLD001A
SN74S174	HEX D-Type Flip-Flop		3-15	SDLD001A
SN74S175	Quad D-Type Flip-Flop		3-15	SDLD001A
SN74S181	4-Bit ALU		3-30	SDLD001A

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SN74S197 SN74S240 SN74S241 SN74S244	4-Bit Binary Counter Octal Buffer/Line Driver Octal Buffer/Line Driver Octal Buffer/Line Driver		3-22 3-10 3-10 3-10	SDLD001A SDLD001A SDLD001A SDLD001A
SN74S251 SN74S253 SN74S258B SN74S273	8-1 Data Selector/Multiplexer 4-1 Data Selector/Multiplexer Quad 2-Input Data Selector/Multiplexer Octal D-Type Flip-Flop		3-24 3-24 3-24 3-16	SDLD001A SDLD001A SDLD001A SDLD001A
SN74S280 SN74S283 SN74S298 SN74S373	9-Bit Parity Generator/Checker 4-Bit Full Adder Quad 2-Input Multiplexer Octal D-Type Latch		3-29 3-30 3-20 3-18	SDLD001A SDLD001A SDLD001A SDLD001A
SN74S374 SN74S377 SN74S381A SN7400	Octal D-Type Flip-Flop Octal D-Type Flip-Flop ALU/Function Generator Quad 2-Input NAND Gate		3-16 3-16 3-30 3-4	SDLD001A SDLD001A SDLD001A SDLD001A
SN7401 SN7402 SN7403 SN7404	Quad 2-Input NAND Gate OC Quad 2-Input NOR Gate Quad 2-Input NAND Gate OC Hex Inverter		3-4 3-5 3-4 3-8	SDLD001A SDLD001A SDLD001A SDLD001A
SN7405 SN7406 SN7407 SN7408	Hex Inverter OC Hex Inverter Buffer/Driver Hex Buffer/Driver Quad 2-Input AND Gate		3-8 3-8 3-9 3-5	SDLD001A SDLD001A SDLD001A SDLD001A
SN7409 SN7410 SN7412 SN7413	Quad 2-Input AND Gate OC Triple 3-Input NAND Gate Triple 3-Input NAND Gate OC Dual 4-Input NAND Schmitt-Trigger		3-4 3-4 3-4 3-4	SDLD001A SDLD001A SDLD001A SDLD001A
SN7414 SN7416 SN7417 SN7420	Hex Schmitt-Trigger Inverter Hex Inverter Buffer/Driver Hex Buffer/Driver Dual 4-Input NAND Gate		3-8 3-8 3-9 3-4	SDLD001A SDLD001A SDLD001A SDLD001A
SN7422 SN7423 SN7425 SN7426	Dual 4-Input NAND Gate Dual 4-Input NOR Gate Dual 4-Input NOR Gate Quad 2-Input NAND Gate		3-4 3-6 3-5 3-4	SDLD001A SDLD001A SDLD001A SDLD001A
SN7427 SN7428 SN7430 SN7432	Triple 3-Input NOR Gate Quad 2-Input NOR Buffer 8-Input NAND Gate Quad 2-Input OR Gate		3-5 3-5 3-4 3-5	SDLD001A SDLD001A SDLD001A SDLD001A
SN7433 SN7437 SN7438 SN7439	Quad 2-Input NOR Buffer OC Quad 2-Input NAND Buffer Quad 2-Input NAND Buffer OC Quad 2-Input NAND Buffer OC		3-5 3-4 3-4 3-4	SDLD001A SDLD001A SDLD001A SDLD001A
SN7440 SN7442 SN7445 SN7446A	Dual 4-Input NAND Buffer BCD-to-Decimal Decoder BCD-to-Decimal Decoder Driver BCD-7-Segment Decoder/Driver		3-4 3-25 3-26 3-26	SDLD001A SDLD001A SDLD001A SDLD001A
SN7447A SN7450 SN7451 SN7453	BCD-7-Segment Decoder/Driver Dual AND-OR-Invert Gate Dual AND-OR-Invert Gate AND-OR-Invert Gate		3-26 3-6 3-6 3-6	SDLD001A SDLD001A SDLD001A SDLD001A
SN7454 SN7470 SN7473 SN7474	AND-OR-Invert Gate AND-Gated J-K Flip-Flop Dual J-K Flip-Flop Dual D-Type Flip-Flop		3-6 3-15 3-15 3-15	SDLD001A SDLD001A SDLD001A SDLD001A
SN7475 SN7476A SN7483A SN7485	4-Bit Latch Dual J-K Flip-Flop 4-Bit Binary Adder 4-Bit Magnitude Comparator		3-17 3-15 3-30 3-28	SDLD001A SDLD001A SDLD001A SDLD001A



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SN7486A SN7490 SN7492 SN7493	Quad 2-Input Exclusive-OR Gate Decade Counter Divide-by-12 Counter 4-Bit Binary Counter		3-6 3-22 3-22 3-22	SDLD001A SDLD001A SDLD001A SDLD001A
SN7495B SN7496 SN7497 SN74107A	4-Bit Shift Register 5-Bit Shift Register Synchronous 6-Bit Binary Rate Multiplier Dual J-K Flip-Flop		3-19 3-19 3-23 3-15	SDLD001A SDLD001A SDLD001A SDLD001A
SN74109A SN74116 SN74120 SN74121	Dual J-K Flip-Flop Dual 4-Bit Latch Dual Pulse Synchronizer/Driver Monostable Multivibrator		3-15 3-18 3-13 3-17	SDLD001A SDLD001A SDLD001A SDLD001A
SN74122 SN74123 SN74125A SN74126A	One-Shot Multivibrator Dual Monostable Multivibrator Quad 3-State Buffer Quad 3-State Buffer		3-17 3-17 3-10 3-10	SDLD001A SDLD001A SDLD001A SDLD001A
SN74128 SN74132 SN74136 SN74143	Line Driver Quad 2-Input NAND Schmitt-Trigger Quad 2-Input Exclusive-OR Gate OC 4-Bit Counter/Latch		3-13 3-4 3-6 3-26	SDLD001A SDLD001A SDLD001A SDLD001A
SN74145 SN74147 SN74148 SN74150	BCD-to-Decimal Decoder/Driver 10-4 Line Encoder 8-3 Line Encoder Data Selector/Multiplexer		3-26 3-24 3-24 3-24	SDLD001A SDLD001A SDLD001A SDLD001A
SN74151 SN74153 SN74154 SN74155A	8-1 Data Selector/Multiplexer Dual 4-1 Data Selector/Multiplexer 4-16 Decoder/Demultiplexer Dual 1-4 Decoder		3-24 3-24 3-25 3-25	SDLD001A SDLD001A SDLD001A SDLD001A
SN74156 SN74157 SN74159 SN74160A	Dual 1-4 Decoder OC Quad 2-1 Data Selector/Multiplexer 4-16 Decoder/Demultiplexer 4-Bit Synchronous Decade Counter		3-25 3-24 3-25 3-21	SDLD001A SDLD001A SDLD001A SDLD001A
SN74161A SN74162A SN74163A SN74164	4-Bit Synchronous Binary Counter 4-Bit Synchronous Decade Counter 4-Bit Binary Counter 8-Bit Shift Register		3-21 3-21 3-21 3-19	SDLD001A SDLD001A SDLD001A SDLD001A
SN74165A SN74166A SN74167 SN74170	8-Bit Shift Register 8-Bit Shift Register Synchronous Decade Rate Multiplier 4-by-4 Register File		3-19 3-19 3-23 3-20	SDLD001A SDLD001A SDLD001A SDLD001A
SN74172 SN74173A SN74174 SN74175	16-Bit Register File Quad D-Type Register HEX D-Type Flip-Flop Quad D-Type Flip-Flop		3-20 3-20 3-15 3-15	SDLD001A SDLD001A SDLD001A SDLD001A
SN74176 SN74177 SN74178 SN74180	35 MHz Decade Binary Counter/Latch 35 MHz Decade Binary Counter/Latch 4-Bit Parallel-Access Shift Register 9-Bit Odd-Even Parity Generator Checker		3-22 3-22 3-19 3-29	SDLD001A SDLD001A SDLD001A SDLD001A
SN74181 SN74182 SN74190 SN74191	4-Bit ALU Look Ahead Carry Generator Synchronous Up/Down Decade Counter Synchronous Up/Down Binary Counter		3-30 3-30 3-21 3-21	SDLD001A SDLD001A SDLD001A SDLD001A
SN74192 SN74193 SN74194A SN74195A	Synchronous Up/Down Decade Counter Synchronous Up/Down Binary Counter 4-Bit Universal Shift Register 4-Bit Shift Register		3-21 3-21 3-19 3-19	SDLD001A SDLD001A SDLD001A SDLD001A
SN74196 SN74197 SN74198 SN74199	4-Bit BCD Counter 4-Bit Binary Counter 8-Bit Shift Register 8-Bit Shift Register		3-22 3-22 3-19 3-19	SDLD001A SDLD001A SDLD001A SDLD001A
SN74221 SN74251 SN74259B SN74265	Dual Monostable Multivibrator 8-1 Data Selector/Multiplexer 8-Bit Addressable Latch Quad Complementary-Output Element		3-17 3-24 3-18 3-7	SDLD001A SDLD001A SDLD001A SDLD001A

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SN74273	Octal D-Type Flip-Flop		3-16	SDLD001A
SN74276	Quad J-K Flip-Flop		3-15	SDLD001A
SN74279A	Quad Set/Reset Latch		3-15	SDLD001A
SN74283	4-Bit Full Adder		3-30	SDLD001A
SN74290	Decade Counter		3-22	SDLD001A
SN74292	30-Bit Programmable Counter		3-23	SDLD001A
SN74293	4-Bit Binary Counter		3-22	SDLD001A
SN74298	Quad 2-Input Multiplexer		3-20	SDLD001A
SN74365A	Hex Bus Driver		3-9	SDLD001A
SN74366A	Hex Bus Driver		3-9	SDLD001A
SN74367A	Hex Bus Driver		3-9	SDLD001A
SN74368A	Hex Bus Driver		3-9	SDLD001A
SN74376	Quad J-K Flip-Flop		3-15	SDLD001A
SN74390	4-Bit Decade Counter		3-22	SDLD001A
SN74393	4-Bit Binary Counter		3-22	SDLD001A
SN74440	Quad Tridirectional Bus Transceiver		3-9	SDLD001A
SN74441	Quad Tridirectional Bus Transceiver		3-9	SDLD001A
SN74442	Bus Transceiver		3-11	SDLD001A
SN74490	Dual 4-Bit Decade Counter		3-22	SDLD001A
SN75ALS053	Line Transceiver		6-4	SLLS028A
SN75ALS056	Bus Transceiver, Trapezoidal		6-4	SLLS028A
SN75ALS057	Bus Transceiver, Trapezoidal		6-4	SLLS028A
SN75ALS085	Driver/Receiver, Dual LAN Interface		6-3	SLLS054
SN75ALS121	Line Driver		6-2	SLLS030
SN75ALS123	Line Receiver		6-3	SLLS031
SN75ALS125	Line Receiver		6-3	SLLS031
SN75ALS126	Line Driver		6-2	SLYD002
SN75ALS127	Line Receiver		6-3	SLLS027A
SN75ALS130	Line Driver		6-2	SLYD002
SN75ALS160	Bus Transceiver		6-4	SLYD002
SN75ALS161	Bus Transceiver		6-4	SLYD002
SN75ALS162	Bus Transceiver		6-4	SLYD002
SN75ALS163	Bus Transceiver		6-4	SLYD002
SN75ALS164	Bus Transceiver		6-4	SLYD002
SN75ALS165	Bus Transceiver		6-4	SLYD002
SN75ALS176	Line Transceiver		6-4	SLLS040A
SN75ALS193	Line Receiver		6-2	SLYD002
SN75ALS195	Line Receiver		6-2	SLYD002
SN75ALS197	Line Receiver		6-2	SLLS045
SN75ALS199	Line Receiver		6-2	SLLS046
SN75AS030	Line Transceiver		6-4	SLLS043
SN75C188	Line Driver		6-2	SLLS033
SN75C189	Line Receiver		6-3	SLYD002
SN75C189A	Line Receiver		6-3	SLYD002
SN75C1154	Line Transceiver		6-4	TBA
SN75C1406	Line Transceiver		6-4	TBA
SN75061	Line Driver and Receiver with Squelch		6-4	SLYD002
SN75107A	Line Receiver		6-3	SLYD002
SN75107B	Line Receiver		6-3	SLYD002
SN75108A	Line Receiver		6-3	SLYD002
SN75108B	Line Receiver		6-3	SLYD002
SN75109A	Line Driver		6-2	SLYD002
SN75110A	Line Driver		6-2	SLYD002
SN75111	Line Driver		6-2	SLYD002
SN75112	Line Driver		6-2	SLYD002
SN75113	Line Driver		6-2	SLYD002
SN75114	Line Driver		6-2	SLYD002
SN75115	Line Receiver		6-3	SLYD002
SN75116	Line Transceiver		6-4	SLYD002
SN75117	Line Transceiver		6-4	SLYD002
SN75118	Line Transceiver		6-4	SLYD002
SN75119	Line Transceiver		6-4	SLYD002
SN75121	Line Driver		6-2	SLYD002
SN75122	Line Receiver		6-3	SLYD002

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SN75123	Line Driver		6-2	SLYD002
SN75124	Line Receiver		6-3	SLYD002
SN75125	Line Receiver		6-3	SLYD002
SN75127	Line Receiver		6-3	SLYD002
SN75128	Line Receiver		6-3	SLYD002
SN75129	Line Receiver		6-3	SLYD002
SN75136	Bus Transceiver		6-4	SLYD002
SN75138	Bus Transceiver		6-4	SLYD002
SN75140	Line Receiver		6-3	SLYD002
SN75141	Line Receiver		6-3	SLYD002
SN75146	Line Receiver		6-2	SLYD002
SN75150	Line Driver		6-2	SLYD002
SN75152	Line Receiver		6-3	SLYD002
SN75154	Line Receiver		6-3	SLYD002
SN75155	Line Driver		6-4	SLYD002
SN75157	Line Receiver		6-2	SLYD002
SN75160B	Bus Transceiver		6-4	SLYD002
SN75161B	Bus Transceiver		6-4	SLYD002
SN75162B	Bus Transceiver		6-4	SLYD002
SN75163B	Bus Transceiver		6-4	SLYD002
SN75164B	Bus Transceiver		6-4	SLYD002
SN75172	Line Driver		6-2	SLYD002
SN75173	Line Receiver		6-2	SLYD002
SN75174	Line Driver		6-2	SLYD002
SN75175	Line Receiver		6-2	SLYD002
SN75176B	Bus Transceiver		6-4	SLYD002
SN75177B	Bus Repeater		6-4	SLYD002
SN75178B	Bus Repeater		6-4	SLYD002
SN75179B	Line Driver and Receiver		6-4	SLYD002
SN75182	Line Receiver		6-3	SLYD002
SN75183	Line Driver		6-2	SLYD002
SN75188	Line Driver		6-2	SLYD002
SN75189	Line Receiver		6-3	SLYD002
SN75189A	Line Receiver		6-3	SLYD002
SN75207	Line Receiver		6-3	SLYD002
SN75207B	Line Receiver		6-3	SLYD002
SN75208	Line Receiver		6-9	SLYD002
SN75372	MOSFET Driver		6-7	SLYD002
SN75374	MOSFET Driver		6-7	SLYD002
SN75435	Actuator/Driver		6-7	SLYD002
SN75436	Actuator/Driver		6-7	SLYD002
SN75437A	Actuator/Driver		6-7	SLYD002
SN75438	Actuator/Driver		6-7	SLYD002
SN75446	Actuator/Driver		6-7	SLYD002
SN75447	Actuator/Driver		6-7	SLYD002
SN75448	Actuator/Driver		6-7	SLYD002
SN75449	Actuator/Driver		6-7	SLYD002
SN75451B	Actuator/Driver		6-7	SLYD002
SN75452B	Actuator/Driver		6-7	SLYD002
SN75453B	Actuator/Driver		6-7	SLYD002
SN75454B	Actuator/Driver		6-7	SLYD002
SN75461	Actuator/Driver		6-7	SLYD002
SN75462	Actuator/Driver		6-7	SLYD002
SN75463	Actuator/Driver		6-7	SLYD002
SN75465	Actuator/Driver		6-7	SLYD002
SN75466	Actuator/Driver		6-7	SLYD002
SN75467	Actuator/Driver		6-7	SLYD002
SN75468	Actuator/Driver		6-7	SLYD002
SN75469	Actuator/Driver		6-7	SLYD002
SN75471	Actuator/Driver		6-7	SLYD002
SN75472	Actuator/Driver		6-7	SLYD002
SN75473	Actuator/Driver		6-7	SLYD002
SN75476	Actuator/Driver		6-7	SLYD002
SN75477	Actuator/Driver		6-7	SLYD002

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
SN75478	Actuator/Driver		6-7	SLYD002
SN75479	Actuator/Driver		6-7	SLYD002
SN75500E	Display Driver		6-6	SLYD002
SN75501E	Display Driver		6-6	SLYD002
SN75512B	Display Driver		6-6	SLYD002
SN75518	Display Driver		6-6	SLYD002
SN75551	Display Driver		6-5	SLYD002
SN75552	Display Driver		6-5	SLYD002
SN751506	Display Driver		6-6	SLYD002
SN751508	Display Driver		6-6	SLYD002
SN761616	Display Driver		6-6	SLYD002
SN751518	Display Driver		6-6	SLYD002
SN754410	Motor Driver		6-8	SLYD002
SN754411	Motor Driver		6-8	SLYD002
SN76494	Sound Generator		7-27	SLYD003
SN76494A	Sound Generator		7-27	SLYD003
SN76496	Sound Generator		7-27	SLYD003
SN76496A	Sound Generator		7-27	SLYD003
SN100KT5538	ECL-TTL Octal Bus Driver, Inverting, OC		3-32	TBA
SN100KT5539	ECL-TTL Octal Bus Driver, OC		3-32	TBA
SN100KT5540	ECL-TTL Octal Bus Driver, Inverting, 3-State		3-32	TBA
SN100KT5541	ECL-TTL Octal Bus Driver, 3-State		3-32	TBA
SN100KT5542	TTL-ECL Octal Bus Driver, Inverting		3-32	SDZS002A
SN100KT5543	TTL-ECL Octal Bus Driver		3-32	SDZS002A
SN100KT5562	ECL-TTL Octal Bus Transceiver		3-32	TBA
SN100KT5563	ECL-TTL Octal Bus Transceiver, Inverting		3-32	TBA
SN100KT5564	ECL-TTL Octal Bus Transceiver		3-32	TBA
SN100KT5565	ECL-TTL Octal Bus Transceiver		3-32	TBA
SN100KT5573	ECL-TTL Octal D-Type Latch, 3-State		3-32	TBA
SN100KT5574	ECL-TTL Octal D-Type Flip-Flop, 3-State		3-32	TBA
SN100KT5575	ECL-TTL Octal D-Type Latch, Inverting, 3-State		3-32	TBA
SN100KT5576	ECL-TTL Octal D-Type Flip-Flop, Inv, 3-State		3-32	TBA
SN100KT5577	TTL-ECL Octal D-Type Latch		3-32	TBA
SN100KT5578	TTL-ECL Octal D-Type Flip-Flop		3-32	TBA
SN100KT5579	TTL-ECL Octal D-Type Latch, Inverting		3-32	TBA
SN100KT5580	TTL-ECL Octal D-Type Flip-Flop, Inverting		3-32	TBA
SN100KT5590	ECL-TTL Octal Registered Transceiver		3-32	TBA
SN100KT5591	ECL-TTL Octal Registered Transceiver, Inverting		3-32	TBA
SN100KT5592	ECL-TTL Octal Registered Bus Transceiver		3-32	TBA
SN100KT5593	ECL-TTL Octal Registered Bus Transceiver, Inv		3-32	TBA
SN100KT5646	ECL-TTL Octal Registered Bus Transceiver		3-32	TBA
SN100KT5648	ECL-TTL Octal Registered Bus Transceiver, Inv		3-32	TBA
TCK102	TC102 Evaluation Kit		8-2	SOYD002
TCK103	TC103 Evaluation Kit		8-2	SOYD002
TCK104	TC104 Evaluation Kit		8-2	SOYD002
TCK106	Image Sensor Evaluation Kit		8-2	SOYD002
TCK108	Evaluation Kit		8-2	TBA
TCM29C13	PCM CODEC and Filter		9-2	SCTD001A
TCM29C14	PCM CODEC and Filter		9-2	SCTD001A
TCM29C16	PCM CODEC and Filter		9-2	SCTD001A
TCM29C17	PCM CODEC and Filter		9-2	SCTD001A
TCM29C18	PCM CODEC and Filter		9-2	SCTS021
TCM29C19	PCM CODEC and Filter		9-2	SCTS021
TCM29C23	PCM CODEC and Filter		9-2	SCTD001A
TCM129C13	PCM CODEC and Filter		9-3	SCTD001A
TCM129C14	PCM CODEC and Filter		9-3	SCTD001A
TCM129C16	PCM CODEC and Filter		9-3	SCTD001A
TCM129C17	PCM CODEC and Filter		9-3	SCTD001A
TCM129C18	PCM CODEC and Filter		9-3	SCTD001A
TCM129C19	PCM CODEC and Filter		9-3	SCTD001A
TCM2912C	PCM CODEC and Filter		9-2	SCTD001A
TCM2913	PCM CODEC and Filter		9-2	SCTD001A
TCM2914	PCM CODEC and Filter		9-2	SCTD001A
TCM2916	PCM CODEC and Filter		9-2	SCTD001A

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TCM2917	PCM CODEC and Filter		9-2	SCTD001A
TCM3105	FSK Modem		9-3	SCTD001A
TCM4204A	Subscriber-Line Control Circuit		9-4	SCTD001A
TCM4205A	Subscriber-Line Control Circuit		9-4	SCTD001A
TCM4207A	Subscriber-Line Control Circuit		9-4	SCTD001A
TCM78808	Asynchronous Receiver/Transmitter		9-3	SCTS022
TC102	Image Sensor, Line Array		8-2	SOYD002
TC102-1	Image Sensor, Line Array		8-2	SOYD002
TC103	Image Sensor, Line Array		8-2	SOYD002
TC103-1	Image Sensor, Line Array		8-2	SOYD002
TC104	Image Sensor, Line Array		8-2	SOYD002
TC104-1	Image Sensor, Line Array		8-2	SOYD002
TC106-1	Image Sensor, Line Array		8-2	SOYD002
TC108	Linear Array		8-2	SOYD002
THCT4502B	256K Dynamic RAM Controller		4-56	SCCS005B
TIASIC	Standard Cell Advanced Course		11-4	SRPD001
TIASIC	Gate Array Advanced Course		11-4	SRPD001
TIBPAD16N8-7C	High-Performance Programmable Address Decoder		2-6	SRPD001
TIBPAD18N8-6C	High-Performance Programmable Address Decoder		2-6	SRPD001
TIBPAL16L8-7C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16L8-10C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16L8-12C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16L8-15C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16L8-15MFKB	High-Performance IMPACT PAL Circuit	5962-85155092A	2-6	SRPD001
TIBPAL16L8-15MJB	High-Performance IMPACT PAL Circuit	5962-8515509RA	2-6	SRPD001
TIBPAL16L8-15MWB	High-Performance IMPACT PAL Circuit	5962-8515509SA	2-6	SRPD001
TIBPAL16L8-20MFKB	High-Performance IMPACT PAL Circuit	5962-85155012A	-	SRPD001
TIBPAL16L8-20MJB	High-Performance IMPACT PAL Circuit	5962-8515501RA	-	SRPD001
TIBPAL16L8-20MWB	High-Performance IMPACT PAL Circuit	5962-8515501SA	-	SRPD001
TIBPAL16L8-25C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16L8-30MFKB	High-Performance IMPACT PAL Circuit	5962-85155052A	-	SRPD001
TIBPAL16L8-30MJB	High-Performance IMPACT PAL Circuit	5962-8515505RA	-	SRPD001
TIBPAL16L8-30MWB	High-Performance IMPACT PAL Circuit	5962-8515505SA	-	SRPD001
TIBPAL16R4-7C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R4-10C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R4-12C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R4-15C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R4-15MFKB	High-Performance IMPACT PAL Circuit	5962-85155122A	2-6	SRPD001
TIBPAL16R4-15MJB	High-Performance IMPACT PAL Circuit	5962-8515512RA	2-6	SRPD001
TIBPAL16R4-15MWB	High-Performance IMPACT PAL Circuit	5962-8515512SA	2-6	SRPD001
TIBPAL16R4-20MFKB	High-Performance IMPACT PAL Circuit	5962-85155042A	-	SRPD001
TIBPAL16R4-20MJB	High-Performance IMPACT PAL Circuit	5962-8515504RA	-	SRPD001
TIBPAL16R4-20MWB	High-Performance IMPACT PAL Circuit	5962-8515504SA	-	SRPD001
TIBPAL16R4-25C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R4-30MFKB	High-Performance IMPACT PAL Circuit	5962-85155082A	-	SRPD001
TIBPAL16R4-30MJB	High-Performance IMPACT PAL Circuit	5962-8515508RA	-	SRPD001
TIBPAL16R4-30MWB	High-Performance IMPACT PAL Circuit	5962-8515508SA	-	SRPD001
TIBPAL16R6-7C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R6-10C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R6-12C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R6-15C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R6-15MFKB	High-Performance IMPACT PAL Circuit	5962-85155112A	2-6	SRPD001
TIBPAL16R6-15MJB	High-Performance IMPACT PAL Circuit	5962-8515511RA	2-6	SRPD001
TIBPAL16R6-15MWB	High-Performance IMPACT PAL Circuit	5962-8515511SA	2-6	SRPD001
TIBPAL16R6-20MFKB	High-Performance IMPACT PAL Circuit	5962-85155032A	-	SRPD001
TIBPAL16R6-20MJB	High-Performance IMPACT PAL Circuit	5962-8515503RA	-	SRPD001
TIBPAL16R6-20MWB	High-Performance IMPACT PAL Circuit	5962-8515503SA	-	SRPD001
TIBPAL16R6-25C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R6-30MFKB	High-Performance IMPACT PAL Circuit	5962-85155072A	-	SRPD001
TIBPAL16R6-30MJB	High-Performance IMPACT PAL Circuit	5962-8515507RA	-	SRPD001
TIBPAL16R6-30MWB	High-Performance IMPACT PAL Circuit	5962-8515507SA	-	SRPD001
TIBPAL16R8-7C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R8-10C	High-Performance IMPACT PAL Circuit		2-6	SRPD001
TIBPAL16R8-12C	High-Performance IMPACT PAL Circuit		2-6	SRPD001

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TIBPAL16R8-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL16R8-15MFKB	High-Performance IMPACT PAL Circuit	5962-85155102A	2-7	SRPD001
TIBPAL16R8-15MJB	High-Performance IMPACT PAL Circuit	5962-8515510RA	2-7	SRPD001
TIBPAL16R8-15MWB	High-Performance IMPACT PAL Circuit	5962-8515510SA	2-7	SRPD001
TIBPAL16R8-20MFKB	High-Performance IMPACT PAL Circuit	5962-85155022A	-	SRPD001
TIBPAL16R8-20MJB	High-Performance IMPACT PAL Circuit	5962-8515502RA	-	SRPD001
TIBPAL16R8-20MWB	High-Performance IMPACT PAL Circuit	5962-8515502SA	-	SRPD001
TIBPAL16R8-25C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL16R8-30MFKB	High-Performance IMPACT PAL Circuit	5962-85155062A	-	SRPD001
TIBPAL16R8-30MJB	High-Performance IMPACT PAL Circuit	5962-8515506RA	-	SRPD001
TIBPAL16R8-30MWB	High-Performance IMPACT PAL Circuit	5962-8515506SA	-	SRPD001
TIBPAL20L8-7C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20L8-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20L8-20MFKB	High-Performance IMPACT PAL Circuit	8412901XA	-	SRPD001
TIBPAL20L8-20MJTB	High-Performance IMPACT PAL Circuit	8412901LA	-	SRPD001
TIBPAL20L8-20MWB	High-Performance IMPACT PAL Circuit	8412901KA	-	SRPD001
TIBPAL20L8-25C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20L10-20C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20L10-25MFKB	High-Performance IMPACT PAL Circuit	8412905XA	-	SRPD001
TIBPAL20L10-25MJTB	High-Performance IMPACT PAL Circuit	8412905LA	-	SRPD001
TIBPAL20L10-25MWB	High-Performance IMPACT PAL Circuit	8412905KA	-	SRPD001
TIBPAL20L10-30C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R4-7C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R4-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R4-20MFKB	High-Performance IMPACT PAL Circuit	8412904XA	-	SRPD001
TIBPAL20R4-20MJTB	High-Performance IMPACT PAL Circuit	8412904LA	-	SRPD001
TIBPAL20R4-20MWB	High-Performance IMPACT PAL Circuit	8412904KA	-	SRPD001
TIBPAL20R4-25C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R6-7C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R6-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R6-20MFKB	High-Performance IMPACT PAL Circuit	8412903XA	-	SRPD001
TIBPAL20R6-20MJTB	High-Performance IMPACT PAL Circuit	8412903LA	-	SRPD001
TIBPAL20R6-20MWB	High-Performance IMPACT PAL Circuit	8412903KA	-	SRPD001
TIBPAL20R6-25C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R8-7C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R8-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20R8-20MFKB	High-Performance IMPACT PAL Circuit	8412902XA	-	SRPD001
TIBPAL20R8-20MJTB	High-Performance IMPACT PAL Circuit	8412902LA	-	SRPD001
TIBPAL20R8-20MWB	High-Performance IMPACT PAL Circuit	8412902KA	-	SRPD001
TIBPAL20R8-25C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X4-20C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X4-25MFKB	High-Performance IMPACT PAL Circuit	8412908XA	-	SRPD001
TIBPAL20X4-25MJTB	High-Performance IMPACT PAL Circuit	8412908LA	-	SRPD001
TIBPAL20X4-25MWB	High-Performance IMPACT PAL Circuit	8412908KA	-	SRPD001
TIBPAL20X4-30C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X8-20C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X8-25MFKB	High-Performance IMPACT PAL Circuit	8412906XA	-	SRPD001
TIBPAL20X8-25MJTB	High-Performance IMPACT PAL Circuit	8412906LA	-	SRPD001
TIBPAL20X8-25MWB	High-Performance IMPACT PAL Circuit	8412906KA	-	SRPD001
TIBPAL20X8-30C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X10-20C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL20X10-25MFKB	High-Performance IMPACT PAL Circuit	8412907XA	-	SRPD001
TIBPAL20X10-25MJTB	High-Performance IMPACT PAL Circuit	8412907LA	-	SRPD001
TIBPAL20X10-25MWB	High-Performance IMPACT PAL Circuit	8412907KA	-	SRPD001
TIBPAL20X10-30C	High-Perf. Exclusive-OR IMPACT PAL Circuit		2-7	SRPD001
TIBPAL22VP10-20C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL22V10AC	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL22V10AMFK	High-Performance IMPACT PAL Circuit	5962-86053013A	-	SRPD001
TIBPAL22V10AMJTB	High-Performance IMPACT PAL Circuit	5962-86053011LA	-	SRPD001
TIBPAL22V10AMW	High-Performance IMPACT PAL Circuit	5962-8605301KA	2-7	SRPD001
TIBPAL22V10C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPAL22V10-15C	High-Performance IMPACT PAL Circuit		2-7	SRPD001
TIBPLS506C	High-Perf. Programmable Logic Sequencer		2-7	SRPD001
TIBPSG507C	High-Perf. Programmable Sequencer Generator		2-7	SRPD001

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TIB82S105BC	16X48X8 Field-Programmable Logic Sequencer		2-7	SRPD001
TIB82S167BC	16X48X8 Field-Programmable Logic Sequencer		2-7	SRPD001
TICPAL16L8-55C	High-Performance CMOS PAL Circuit		2-7	SRPD001
TICPAL16R4-55C	High-Performance CMOS PAL Circuit		2-7	SRPD001
TICPAL16R6-55C	High-Performance CMOS PAL Circuit		2-7	SRPD001
TICPAL16R8-55C	High-Performance CMOS PAL Circuit		2-8	SRPD001
TIEPAL10H16P8-3C	High-Performance 10KH ECL PAL Circuit		2-8	SRPD001
TIEPAL10H16P8-6C	High-Performance 10KH ECL PAL Circuit		2-8	SRPD001
TIL23	Infrared-emitting Diode		8-7	SOYD002A
TIL24	Infrared-emitting Diode		8-7	SOYD002A
TIL24HR2	Infrared-emitting Diode		8-7	SOYD002A
TIL25	Infrared-emitting Diode		8-7	SOYD002A
TIL102	Optocoupler		8-3	SOYD002A
TIL103	Optocoupler		8-3	SOYD002A
TIL111	Optocoupler		8-3	SOYD002A
TIL112	Optocoupler		8-3	SOYD002A
TIL113	Optocoupler		8-3	SOYD002A
TIL114	Optocoupler		8-3	SOYD002A
TIL115	Optocoupler		8-3	SOYD002A
TIL116	Optocoupler		8-3	SOYD002A
TIL117	Optocoupler		8-3	SOYD002A
TIL118	Optocoupler		8-3	SOYD002A
TIL119	Optocoupler		8-3	SOYD002A
TIL119A	Optocoupler		8-3	SOYD002A
TIL120	Optocoupler		8-3	SOYD002A
TIL121	Optocoupler		8-3	SOYD002A
TIL124	Optocoupler		8-4	SOYD002A
TIL125	Optocoupler		8-4	SOYD002A
TIL126	Optocoupler		8-4	SOYD002A
TIL127	Optocoupler		8-4	SOYD002A
TIL128	Optocoupler		8-4	SOYD002A
TIL128A	Optocoupler		8-4	SOYD002A
TIL153	Optocoupler		8-3	SOYD002A
TIL154	Optocoupler		8-3	SOYD002A
TIL155	Optocoupler		8-3	SOYD002A
TIL156	Optocoupler		8-4	SOYD002A
TIL157	Optocoupler		8-4	SOYD002A
TIL157A	Optocoupler		8-4	SOYD002A
TIL181	Optocoupler		8-3	SOYD002A
TIL186	Optocoupler		8-3	SOYD002A
TIL187	Optocoupler		8-4	SOYD002A
TIL188	Optocoupler		8-4	SOYD002A
TIL189	Optocoupler		8-4	SOYD002A
TIL190	Optocoupler		8-4	SOYD002A
TIL191	Optocoupler		8-3	TBA
TIL191A	Optocoupler		8-3	TBA
TIL191B	Optocoupler		8-3	TBA
TIL192	Optocoupler		8-3	TBA
TIL192A	Optocoupler		8-3	TBA
TIL192B	Optocoupler		8-3	TBA
TIL193	Optocoupler		8-3	TBA
TIL193A	Optocoupler		8-3	TBA
TIL193B	Optocoupler		8-3	TBA
TIL194	Optocoupler		8-3	TBA
TIL194A	Optocoupler		8-3	TBA
TIL195	Optocoupler		8-3	TBA
TIL195A	Optocoupler		8-3	TBA
TIL196	Optocoupler		8-3	TBA
TIL196A	Optocoupler		8-3	TBA
TIL302	Numeric Display, LED		8-6	SOYD002A
TIL302A	Numeric Display, LED		8-6	SOYD002A
TIL303	Numeric Display, LED		8-6	SOYD002A
TIL303A	Numeric Display, LED		8-6	SOYD002A
TIL304	Numeric Display, LED		8-6	SOYD002A

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TIL304A	Numeric Display, LED		8-6	SOYD002A
TIL305	Alphanumeric Display, LED		8-6	SOYD002A
TIL306	Numeric Display, LED		8-6	SOYD002A
TIL306A	Numeric Display, LED		8-6	SOYD002A
TIL307	Numeric Display, LED		8-6	SOYD002A
TIL307A	Numeric Display, LED		8-6	SOYD002A
TIL308	Numeric Display, LED		8-6	SOYD002A
TIL308A	Numeric Display, LED		8-6	SOYD002A
TIL309	Numeric Display, LED		8-6	SOYD002A
TIL309A	Numeric Display, LED		8-6	SOYD002A
TIL311	Hexidecimal Display, LED		8-6	SOYD002A
TIL311A	Hexidecimal Display, LED		8-6	SOYD002A
TIL601	Phototransistor		8-7	SOYD002A
TIL602	Phototransistor		8-7	SOYD002A
TIL603	Phototransistor		8-7	SOYD002A
TIL604	Phototransistor		8-7	SOYD002A
TIL604HR2	Phototransistor		8-7	SOYD002A
TIL3009	Coupler		8-5	SOYD002A
TIL3010	Coupler		8-5	SOYD002A
TIL3011	Coupler		8-5	SOYD002A
TIL3012	Coupler		8-5	SOYD002A
TIL3020	Coupler		8-5	SOYD002A
TIL3021	Coupler		8-5	SOYD002A
TIL3022	Coupler		8-5	SOYD002A
TIL3023	Coupler		8-5	SOYD002A
TLC04	Switched-Capacitance Filter		7-20	SLYD004
TLC10/MF10A	Switched-Capacitance Filter		7-20	SLYD004
TLC14/MF4A-100	Switched-Capacitance Filter		7-20	SLYD004
TLC20/MF20C	Switched-Capacitance Filter		7-20	SLYD004
TLC25L2AC	Operational Amplifier		7-10	SLYD003
TLC25L2BC	Operational Amplifier		7-10	SLYD003
TLC25L2C	Operational Amplifier		7-10	SLYD003
TLC25L4AC	Operational Amplifier		7-14	SLYD003
TLC25L4BC	Operational Amplifier		7-14	SLYD003
TLC25L4C	Operational Amplifier		7-14	SLYD003
TLC25M2AC	Operational Amplifier		7-10	SLYD003
TLC25M2BC	Operational Amplifier		7-10	SLYD003
TLC25M2C	Operational Amplifier		7-10	SLYD003
TLC25M4AC	Operational Amplifier		7-14	SLYD003
TLC25M4BC	Operational Amplifier		7-14	SLYD003
TLC25M4C	Operational Amplifier		7-14	SLYD003
TLC27L2AC	Operational Amplifier		7-10	SLYD003
TLC27L2AI	Operational Amplifier		7-9	SLYD003
TLC27L2BC	Operational Amplifier		7-10	SLYD003
TLC27L2BI	Operational Amplifier		7-9	SLYD003
TLC27L2C	Operational Amplifier		7-10	SLYD003
TLC27L2I	Operational Amplifier		7-9	SLYD003
TLC27L2M	Operational Amplifier		7-8	SLYD003
TLC27L4AC	Operational Amplifier		7-14	SLYD003
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TL721	Voltage Comparator		7-15	SLYD003
TL750L05	Voltage Regulator		7-22	SLYD005
TL750L08	Voltage Regulator		7-22	SLYD005
TL750L10	Voltage Regulator		7-22	SLYD005
TL750L12	Voltage Regulator		7-22	SLYD005
TL750M05	Voltage Regulator		7-22	SLYD005
TL750M08	Voltage Regulator		7-22	SLYD005
TL750M10	Voltage Regulator		7-22	SLYD005
TL750M12	Voltage Regulator		7-22	SLYD005
TL751L05	Voltage Regulator		7-22	SLYD005
TL751L08	Voltage Regulator		7-22	SLYD005
TL751L10	Voltage Regulator		7-22	SLYD005
TL751L12	Voltage Regulator		7-22	SLYD005
TL751M05	Voltage Regulator		7-22	SLYD005
TL751M08	Voltage Regulator		7-22	SLYD005
TL751M10	Voltage Regulator		7-22	SLYD005
TL751M12	Voltage Regulator		7-22	SLYD005
TL780-12	Voltage Regulator		7-22	SLYD005
TL780-15	Voltage Regulator		7-23	SLYD005
TL780-O5	Voltage Regulator		7-22	SLYD005
TL783	Voltage Regulator		7-21	SLYD005
TL851	Sonar Circuit		7-26	SLYD003
TL852	Sonar Circuit		7-26	SLYD003
TL853	Sonar Circuit		7-26	SLYD003
TL0808	A/D Converter		7-18	SLYD004
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TL1451A	PWM Control Circuit		7-24	SLYD005
TL1521	Logarithmic Amplifier		-	
TL3013C	Hall-Effect Device		7-26	SLYD003
TL3019C	Hall-Effect Device		7-26	SLYD003
TL3020C	Hall-Effect Device		7-26	SLYD003
TL3101	Hall-Effect Device		7-26	SLYD003
TL3103	Hall-Effect Device		7-26	SLYD003
TL3695	Bus Transceiver		6-4	SLLS044
TL4810B	Display Driver		6-6	SLYD002
TL4810BI	Display Driver		6-6	SLYD002
TL5501	A/D Converter		7-19	SLYD004
TL5601	D/A Converter		7-19	SLYD004
TL5602	D/A Converter		7-19	SLYD004
TL5812	Display Driver		6-6	SLYD002
TL5812I	Display Driver		6-6	SLYD002
TL7702A	Supply Supervisor		7-21	SLYD005
TL7705A	Supply Supervisor		7-21	SLYD005
TL7705AMFKB	Supply Supervisor	5962-88685012A	7-21	
TL7705AMJGB	Supply Supervisor	5962-8868501PA	7-21	
TL7709A	Supply Supervisor		7-21	SLYD005
TL7712A	Supply Supervisor		7-21	SLYD005
TL7715A	Supply Supervisor		7-21	SLYD005
TL7770-12	Supply Supervisor		7-21	SLYD005
TL7770-15	Supply Supervisor		7-21	SLYD005
TL7770-5	Supply Supervisor		7-21	SLYD005
TL7780-12	Supply Supervisor		7-21	SLYD005
TL7780-15	Supply Supervisor		7-21	SLYD005
TL7780-5	Supply Supervisor		7-21	SLYD005
TMDP380ASIC	TMS380 ASIC-LAN Tool Kit		4-35	SPWT018A

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/PAGE	TI DOCUMENT
TMDS2400PK	DSP2400 Prototype Kit		4-10	SPRT033
TMDS7040210-08	TMS7000 DEC VAX VMS Assembler Linker		4-6	SPND001C
TMDS7040810-02	TMS7000 PC/MS-DOS Assembler Linker		4-6	SPND001C
TMDS3411804420	TMS34010 Software Development Board		4-21	SPVU002A
TMDS3440200059	TMS34010 VAX Assembler Package, VMS		4-22	SPVU004A
TMDS3440200069	TMS34010 VAX Assembler Package, DEC ULTRIX		4-22	SPVU004A
TMDS3440202208	TMS34010 VAX Math/Graphics Function Library		4-22	SPVU006
TMDS3440202308	TMS34010 VAX Font Library		4-22	SPVU007
TMDS3440205059	TMS34010 VAX "C" Compiler Package, VMS		4-22	SPVU005A
TMDS3440205069	TMS34010 VAX "C" Compiler Package, DEC ULTRIX		4-22	SPRU005A
TMDS3440802202	TMS34010 PC Math/Graphics Function Library		4-22	SPVU006
TMDS3440802302	TMS34010 PC Font Library		4-22	SPVU007
TMDS3440805002	TMS34010 PC "C" Compiler Package, MS-DOS 2.11+		4-22	SPVU005A
TMDS3440806002	TMS34010 PC Debugger Dev. Pkg. (Not for Resale)		4-22	SPVU004A
TMDS3440806003	TMS34010 PC Debugger Dev. Pkg. (For Resale)		4-22	SPVU004A
TMDS3440808002	TMS34010 PC Assembler Package, MS-DOS 2.11+		4-22	SPVU004
TMDS3469910000	TMS34010 XDS-22 Real-Time Emulator (US)		4-20	SPVU008
TMDS3469981000	TMS34010 XDS-22 Real-Time Emulator (EU)		4-20	SPVU008
TMDS3740810-02	TMS370 Family Assembler/Linker Pkg., MS/PC-DOS		4-31	SPNU010
TMDS3740210-08	TMS370 Family Assembler/Linker Package, VAX/VMS		4-31	SPNU010
TMDS3760510	TMS370 Family PROM Programmer		4-31	SPNU011
TMDS3761110	TMS370 XDS/11 In-Circuit Emulator, 68 Pin Target		4-31	SPNU015
TMDS3761111	TMS370 XDS/11 In-Circuit Emulator, 38 Pin Target		4-31	SPNU015
TMDS3762210	TMS370 XDS/22 In-Circuit Emulator		4-31	SPNU008
TMDS3770110	TMS370 Design Kit		4-31	SPNU013
TMDS380C16LDK	2nd Gen. IBM PC Token-Ring Design Kit		4-35	SPWT084
TMDX380C16PC	2nd Gen. IBM PC Token-Ring Eval. Board		4-35	SPWT084
TMDX7062220	TMS7000 CMOS XDS		4-5	SPND001C
TMS27C291-3	16K CMOS EPROM, 35 ns, 300-mil, 5% VCC		10-2	SMLS291B
TMS27C291-35	16K CMOS EPROM, 35 ns, 300-mil, 10% VCC		10-2	SMLS291B
TMS27C291	16K CMOS EPROM, 45 ns, 300-mil, 5% VCC		10-2	SMLS291B
TMS27C291-45	16K CMOS EPROM, 45 ns, 300-mil, 10% VCC		10-2	SMLS291B
TMS27C291-5	16K CMOS EPROM, 50 ns, 300-mil, 5% VCC		10-2	SMLS291B
TMS27C291-50	16K CMOS EPROM, 50 ns, 300-mil, 10% VCC		10-2	SMLS291B
TMS27C292-3	16K CMOS EPROM, 35 ns, 600-mil, 5% VCC		10-2	SMLS291B
TMS27C292-35	16K CMOS EPROM, 35 ns, 600-mil, 10% VCC		10-2	SMLS291B
TMS27C292-45	16K CMOS EPROM, 45 ns, 600-mil, 10% VCC		10-2	SMLS291B
TMS27C292-5	16K CMOS EPROM, 50 ns, 600-mil, 5% VCC		10-2	SMLS291B
TMS27C292-50	16K CMOS EPROM, 50 ns, 600-mil, 10% VCC		10-2	SMLS291B
TMS27C292	16K CMOS EPROM, 45 ns, 600-mil, 5% VCC		10-2	SMLS291B
TMS2732A-17	32K NMOS EPROM, 170 ns, JEDEC Pinout		10-2	SMES732E
TMS2732A-20	32K NMOS EPROM, 200 ns, JEDEC Pinout		10-2	SMES732E
TMS2732A-25	32K NMOS EPROM, 250 ns, JEDEC Pinout		10-2	SMES732E
TMS2732A-45	32K NMOS EPROM, 450 ns, JEDEC Pinout		10-2	SMES732E
TMS27C32-100	32K CMOS EPROM, 100 ns, 5% VCC		10-2	SMLS032
TMS27C32-10	32K CMOS EPROM, 100 ns, 10% VCC		10-2	SMLS032
TMS27C32-120	32K CMOS EPROM, 120 ns, 5% VCC		10-2	SMLS032
TMS27C32-12	32K CMOS EPROM, 120 ns, 10% VCC		10-2	SMLS032
TMS27C32-150	32K CMOS EPROM, 150 ns, 5% VCC		10-2	SMLS032
TMS27C32-15	32K CMOS EPROM, 150 ns, 10% VCC		10-2	SMLS032
TMS27C32-2	32K CMOS EPROM, 200 ns, 5% VCC		10-2	SMLS032
TMS27C32-20	32K CMOS EPROM, 200 ns, 10% VCC		10-2	SMLS032
TMS27C32	32K CMOS EPROM, 250 ns, 5% VCC		10-2	SMLS032
TMS27C32-25	32K CMOS EPROM, 250 ns, 10% VCC		10-2	SMLS032
TMS2764-17	64K NMOS EPROM, 170 ns, JEDEC Pinout		10-2	SMES764C
TMS2764-20	64K NMOS EPROM, 200 ns, JEDEC Pinout		10-2	SMES764C
TMS2764-25	64K NMOS EPROM, 250 ns, JEDEC Pinout		10-2	SMES764C
TMS2764-45	64K NMOS EPROM, 450 ns, JEDEC Pinout		10-2	SMES764C
TMS27C49-4	64K CMOS EPROM, 600-mil, 45 ns, 5% VCC		10-2	SMLS049
TMS27C49-45	64K CMOS EPROM, 600-mil, 45 ns, 10% VCC		10-2	SMLS049
TMS27C49-5	64K CMOS EPROM, 600-mil, 55 ns, 5% VCC		10-2	SMLS049
TMS27C49-55	64K CMOS EPROM, 600-mil, 55 ns, 10% VCC		10-2	SMLS049
TMS27C64-100	64K CMOS EPROM, 100 ns, 5% VCC		10-2	SMLS064A
TMS27C64-120	64K CMOS EPROM, 120 ns, 5% VCC		10-2	SMLS064A

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TMS27C64-1	64K CMOS EPROM, 150 ns, 5% VCC		10-2	SMLS064A
TMS27C64-2	64K CMOS EPROM, 200 ns, 5% VCC		10-2	SMLS064A
TMS27C64-12	64K CMOS EPROM, 120 ns, 10% VCC		10-2	SMLS064A
TMS27C64-15	64K CMOS EPROM, 150 ns, 10% VCC		10-2	SMLS064A
TMS27C64-20	64K CMOS EPROM, 200 ns, 10% VCC		10-2	SMLS064A
TMS27C64-25	64K CMOS EPROM, 250 ns, 10% VCC		10-2	SMLS064A
TMS27C64	64K CMOS EPROM, 250 ns, 5% VCC		10-2	SMYD008
TMS27C128-100	128K CMOS EPROM, 100 ns 5% VCC		10-2	SMLS128C
TMS27C128-120	128K CMOS EPROM, 120 ns 5% VCC		10-2	SMLS128C
TMS27C128-12	128K CMOS EPROM, 120 ns 10% VCC		10-2	SMLS128C
TMS27C128-1	128K CMOS EPROM, 150 ns, 5% VCC		10-2	SMLS128C
TMS27C128-2	128K CMOS EPROM, 200 ns, 5% VCC		10-2	SMLS128C
TMS27C128-15	128K CMOS EPROM, 150 ns, 10% VCC		10-2	SMLS128C
TMS27C128-20	128K CMOS EPROM, 200 ns, 10% VCC		10-2	SMLS128C
TMS27C128-25	128K CMOS EPROM, 250 ns, 10% VCC		10-2	SMLS128C
TMS27C128	128K CMOS EPROM, 250 ns, 5% VCC		10-2	SMLS128C
TMS29F256-170	256K CMOS FEEPROM, 170 ns, 5% VCC		10-3	SMJS256A
TMS29F256-200	256K CMOS FEEPROM, 200 ns, 5% VCC		10-3	SMJS256A
TMS29F256-20	256K CMOS FEEPROM, 200 ns, 10% VCC		10-3	SMJS256A
TMS29F256-250	256K CMOS FEEPROM, 250 ns, 5% VCC		10-3	SMJS256A
TMS29F256-25	256K CMOS FEEPROM, 250 ns, 10% VCC		10-3	SMJS256A
TMS29F256-300	256K CMOS FEEPROM, 300 ns, 5% VCC		10-3	SMJS256A
TMS29F256-30	256K CMOS FEEPROM, 300 ns, 10% VCC		10-3	SMJS256A
TMS29F256-170	256K CMOS FEEPROM, 170 ns, 5% VCC		10-3	SMJS256A
TMS29F256-200	256K CMOS FEEPROM, 200 ns, 5% VCC		10-3	SMJS256A
TMS29F256-20	256K CMOS FEEPROM, 200 ns, 10% VCC		10-3	SMJS256A
TMS29F256-250	256K CMOS FEEPROM, 250 ns, 5% VCC		10-3	SMJS256A
TMS29F256-25	256K CMOS FEEPROM, 250 ns, 10% VCC		10-3	SMJS256A
TMS29F256-300	256K CMOS FEEPROM, 300 ns, 5% VCC		10-3	SMJS256A
TMS29F256-30	256K CMOS FEEPROM, 300 ns, 10% VCC		10-3	SMJS256A
TMS27C256-120	256K CMOS EPROM, 120 ns, 5% VCC		10-3	SMLS256D
TMS27C256-12	256K CMOS EPROM, 120 ns, 10% VCC		10-3	SMLS256D
TMS27C256-15	256K CMOS EPROM, 150 ns, 10% VCC		10-3	SMLS256D
TMS27C256-1	256K CMOS EPROM, 170 ns, 5% VCC		10-3	SMLS256D
TMS27C256-2	256K CMOS EPROM, 200 ns, 5% VCC		10-3	SMLS256D
TMS27C256-17	256K CMOS EPROM, 170 ns, 10% VCC		10-3	SMLS256D
TMS27C256-20	256K CMOS EPROM, 200 ns, 10% VCC		10-3	SMLS256D
TMS27C256-25	256K CMOS EPROM, 250 ns, 10% VCC		10-3	SMLS256D
TMS27C256-150	256K CMOS EPROM, 150 ns, 5% VCC		10-3	SMLS256D
TMS27C256	256K CMOS EPROM, 250 ns, 5% VCC		10-3	SMLS256D
TMS27C512-150	512K CMOS EPROM, 150 ns, 5% VCC		10-3	SMLS512C
TMS27C512-15	512K CMOS EPROM, 150 ns, 10% VCC		10-3	SMLS512C
TMS27C512-1	512K CMOS EPROM, 170 ns, 5% VCC		10-3	SMLS512C
TMS27C512-17	512K CMOS EPROM, 170 ns, 10% VCC		10-3	SMLS512C
TMS27C512-2	512K CMOS EPROM, 200 ns, 5% VCC		10-3	SMLS512C
TMS27C512-3	512K CMOS EPROM, 300 ns, 5% VCC		10-3	SMLS512C
TMS27C512-20	512K CMOS EPROM, 200 ns, 10% VCC		10-3	SMLS512C
TMS27C512-25	512K CMOS EPROM, 250 ns, 10% VCC		10-3	SMLS512C
TMS27C512-30	512K CMOS EPROM, 300 ns, 10% VCC		10-3	SMLS512C
TMS27C512	512K CMOS EPROM, 250 ns, 5% VCC		10-3	SMLS512C
TMS27C010-170	1M, 128K x 8 CMOS EPROM, 170 ns, 5% VCC		10-3	SMLS010B
TMS27C010-20	1M, 128K x 8 CMOS EPROM, 200 ns, 10% VCC		10-3	SMLS010B
TMS27C010-25	1M, 128K x 8 CMOS EPROM, 250 ns, 10% VCC		10-3	SMLS010B
TMS27C010-30	1M, 128K x 8 CMOS EPROM, 300 ns, 5% VCC		10-3	SMLS010B
TMS27C010-200	1M, 128K x 8 CMOS EPROM, 200 ns, 5% VCC		10-3	SMLS010B
TMS27C010-250	1M, 128K x 8 CMOS EPROM, 250 ns, 5% VCC		10-3	SMLS010B
TMS27C010-300	1M, 128K x 8 CMOS EPROM, 300 ns, 5% VCC		10-3	SMLS010B
TMS27C210-170	1M, 64K x 16 CMOS EPROM, 170 ns, 5% VCC		10-3	SMLS210B
TMS27C210-20	1M, 64K x 16 CMOS EPROM, 200 ns, 10% VCC		10-3	SMLS210B
TMS27C210-25	1M, 64K x 16 CMOS EPROM, 250 ns, 10% VCC		10-3	SMLS210B
TMS27C210-30	1M, 64K x 16 CMOS EPROM, 300 ns, 10% VCC		10-3	SMLS210B
TMS27C210-200	1M, 64K x 16 CMOS EPROM, 200 ns, 5% VCC		10-3	SMLS210B
TMS27C210-250	1M, 64K x 16 CMOS EPROM, 250 ns, 5% VCC		10-3	SMLS210B
TMS27C210-300	1M, 64K x 16 CMOS EPROM, 300 ns, 5% VCC		10-3	SMLS210B

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TMS27PC291-3	16K CMOS PROM, 35 ns, 5% VCC		10-3	SMLS291B
TMS27PC291-35	16K CMOS PROM, 35 ns, 10% VCC		10-3	SMLS291B
TMS27PC291-45	16K CMOS PROM, 45 ns, 10% VCC		10-3	SMLS291B
TMS27PC291-5	16K CMOS PROM, 50 ns, 5% VCC		10-3	SMLS291B
TMS27PC291-50	16K CMOS PROM, 50 ns, 10% VCC		10-3	SMLS291B
TMS27PC291	16K CMOS PROM, 45 ns, 5% VC		10-3	SMLS291B
TMS27PC32-120	32K CMOS PROM, 120 ns, 5% VCC		10-4	SMLS032
TMS27PC32-150	32K CMOS PROM, 150 ns, 5% VCC		10-4	SMLS032
TMS27PC32-2	32K CMOS PROM, 200 ns, 5% VCC		10-4	SMLS032
TMS27PC32	32K CMOS PROM, 250 ns, 5% VCC		10-4	SMLS032
TMS27PC32-12	32K CMOS PROM, 120 ns, 10% VCC		10-4	SMLS032
TMS27PC32-15	32K CMOS PROM, 150 ns, 10% VCC		10-4	SMLS032
TMS27PC32-20	32K CMOS PROM, 200 ns, 10% VCC		10-4	SMLS032
TMS27PC32-25	32K CMOS PROM, 250 ns, 10% VCC		10-4	SMLS032
TMS27PC49-4	64K CMOS PROM, 45 ns, 5% VCC		10-4	SMLS049
TMS27PC49-45	64K CMOS PROM, 45 ns, 10% VCC		10-4	SMLS049
TMS27PC49-5	64K CMOS PROM, 55 ns, 5% VCC		10-4	SMLS049
TMS27PC49-55	64K CMOS PROM, 55 ns, 10% VCC		10-4	SMLS049
TMS27PC64-120	64K CMOS PROM, 120 ns, 5% VCC		10-4	SMLS064A
TMS27PC64-12	64K CMOS PROM, 120 ns, 10% VCC		10-4	SMLS064A
TMS27PC64-1	64K CMOS PROM, 150 ns, 5% VCC		10-4	SMLS064A
TMS27PC64-15	64K CMOS PROM, 150 ns, 10% VCC		10-4	SMLS064A
TMS27PC64-2	64K CMOS PROM, 200 ns, 5% VCC		10-4	SMLS064A
TMS27PC-20	64K CMOS PROM, 200 ns, 10% VCC		10-4	SMLS064A
TMS27PC64	64K CMOS PROM, 250 ns, 5% VCC		10-4	SMLS064A
TMS27PC64-25	64K CMOS PROM, 250 ns, 10% VCC		10-4	SMLS064A
TMS27PC128-1	128K CMOS PROM, 150 ns, 5% VCC		10-4	SMLS128C
TMS27PC128-2	128K CMOS PROM, 200 ns, 5% VCC		10-4	SMLS128C
TMS27PC128-15	128K CMOS PROM, 150 ns, 10% VCC		10-4	SMLS128C
TMS27PC128-20	128K CMOS PROM, 200 ns, 10% VCC		10-4	SMLS128C
TMS27PC128-25	128K CMOS PROM, 250 ns, 10% VCC		10-4	SMLS128C
TMS27PC128	128K CMOS PROM, 250 ns, 5% VCC		10-4	SMLS128C
TMS27PC256-150	256K CMOS PROM, 150 ns, 5% VCC		10-4	SMLS256D
TMS27PC256-1	256K CMOS PROM, 170 ns, 5% VCC		10-4	SMLS256D
TMS27PC256-2	256K CMOS PROM, 200 ns, 5% VCC		10-4	SMLS256D
TMS27PC256	256K CMOS PROM, 250 ns, 5% VCC		10-4	SMLS256D
TMS27PC256-15	256K CMOS PROM, 150 ns, 10% VCC		10-4	SMLS256D
TMS27PC256-17	256K CMOS PROM, 170 ns, 10% VCC		10-4	SMLS256D
TMS27PC256-20	256K CMOS PROM, 200 ns, 10% VCC		10-4	SMLS256D
TMS27PC256-25	256K CMOS PROM, 250 ns, 10% VCC		10-4	SMLS256D
TMS27PC512-150	512K CMOS PROM, 150 ns, 5% VCC		10-4	SMLS512C
TMS27PC512-1	512K CMOS PROM, 170 ns, 5% VCC		10-4	SMLS512C
TMS27PC512-2	512K CMOS PROM, 200 ns, 5% VCC		10-4	SMLS512C
TMS27PC512	512K CMOS PROM, 250 ns, 5% VCC		10-4	SMLS512C
TMS27PC512-3	512K CMOS PROM, 300 ns, 5% VCC		10-4	SMLS512C
TMS27PC512-15	512K CMOS PROM, 150 ns, 10% VCC		10-4	SMLS512C
TMS27PC512-17	512K CMOS PROM, 170 ns, 10% VCC		10-4	SMLS512C
TMS27PC512-20	512K CMOS PROM, 200 ns, 10% VCC		10-4	SMLS512C
TMS27PC512-25	512K CMOS PROM, 250 ns, 10% VCC		10-4	SMLS512C
TMS27PC512-30	512K CMOS PROM, 300 ns, 10% VCC		10-4	SMLS512C
TMS27PC010-200	1M, 128K x 8 CMOS PROM, 200 ns, 5% VCC		10-4	SMYD008
TMS27PC010-20	1M, 128K x 8 CMOS PROM, 200 ns, 10% VCC		10-4	SMYD008
TMS27PC010-250	1M, 128K x 8 CMOS PROM, 250 ns, 5% VCC		10-4	SMYD008
TMS27PC010-25	1M, 128K x 8 CMOS PROM, 250 ns, 10% VCC		10-4	SMYD008
TMS27PC010-300	1M, 128K x 8 CMOS PROM, 300 ns, 5% VCC		10-4	SMYD008
TMS27PC010-30	1M, 128K x 8 CMOS PROM, 300 ns, 10% VCC		10-4	SMYD008
TMS27PC210-200	1M, 64K x 16 CMOS PROM, 200 ns, 5% VCC		10-4	SMYD008
TMS27PC210-20	1M, 64K x 16 CMOS PROM, 200 ns, 10% VCC		10-4	SMYD008
TMS27PC210-250	1M, 64K x 16 CMOS PROM, 250 ns, 5% VCC		10-4	SMYD008
TMS27PC210-25	1M, 64K x 16 CMOS PROM, 250 ns, 10% VCC		10-4	SMYD008
TMS27PC210-300	1M, 64K x 16 CMOS PROM, 300 ns, 5% VCC		10-4	SMYD008
TMS27PC210-30	1M, 64K x 16 CMOS PROM, 300 ns, 10% VCC		10-4	SMYD008
TMS70A2400ANL	DSP2400 V.22bis Modem Controller		4-10	SPRT033A
TMS70C00AFN	8-Bit CMOS Microcontroller		4-4	SPNT020

TI PART NUMBER	GENERAL DESCRIPTION	REFERENCE	SECTION/ PAGE	TI DOCUMENT
TMS70C00AN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C02FN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C02N	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C20AFN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C20AN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C20AN2	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C40AFN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C40AN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C40AN2	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C42FN	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70C42N	8-Bit CMOS Microcontroller		4-4	SPNT020
TMS70CT20AN2	8-Bit CMOS Microcontroller (28 pin PDIP)		4-4	SPND001C
TMS70CT40AN2	8-Bit CMOS Microcontroller (28 pin PDIP)		4-4	SPND001C
TMS320A2400ANL	DSP2400 V.22bis Modem Chip-Set DSP		4-10	SPRT033A
TMS320C10FNL	CMOS 1st-Generation DSP, 20MHz		4-7	SPRS009B
TMS320C10FNL-14	CMOS 1st-Generation DSP, 14 MHz		4-7	SPRS009B
TMS320C10FNL25	CMOS 1st-Generation DSP, 25 MHz		4-7	SPRS009B
TMS320C10NA	320C10NL at Industrial Temp. Range		4-7	SPRS009B
TMS320C10NL	CMOS 1st-Generation DSP, 20MHz		4-7	SPRS009B
TMS320C10NL-14	CMOS 1st-Generation DSP, 14 MHz		4-7	SPRS009B
TMS320C10NL25	CMOS 1st-Generation DSP, 25 MHz		4-7	SPRS009B
TMS320C15FNL	320C10 DSP w/more RAM & ROM, 20MHz		4-7	SPRS009B
TMS320C15FNL25	320C15 DSP, 25 MHz		4-7	SPRS009B
TMS320C15NL	320C10 DSP w/more RAM & ROM, 20MHz		4-7	SPRS009B
TMS320C15NL25	320C15 DSP, 25 MHz		4-7	SPRS009B
TMS320C17FNL	320C15 DSP w/Serial Port & Coproc./IF		4-7	SPRS009B
TMS320C17NL	320C15 DSP w/Serial Port & Coproc./IF		4-7	SPRS009B
TMS320C25FNA	320C25FNL at Industrial Temp. Range		4-7	SPRS010B
TMS320C25FNL	CMOS 2nd-Generation DSP, 40 MHz		4-8	SPRS010B
TMS320C25FNL50	CMOS 2nd-Generation DSP, 50 MHz		4-8	SPRS010B
TMS320C25GBA	320C25GBL at Industrial Temp. Range		4-8	SPRS010B
TMS320C25GBL	CMOS 2nd-Generation DSP, 40 MHz		4-8	SPRS010B
TMS320C30GBL	CMOS 3rd-Generation DSP, 33 MFLOPS		4-8	SPRT036
TMS320C14FNL	CMOS DSP Microcontroller w/4K-Words, 25 MHz		4-7	TBA
TMS320 Dev Tools	TMS320 Development Tools		4-10	SPRU011
TMS320E14FNL	CMOS DSP Microcontroller w/4K-Words, 25 MHz		4-7	TBA
TMS320E14FZL	DSP Microcontroller w/4K-Words EPROM, 25 MHz		4-7	SPRU032
TMS320E15FZL	320C15 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E15FZL25	320C15 DSP w/4K-Words EPROM, 25 MHz		4-7	SPRS009B
TMS320E15JA	320C15 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E15JL	320C15 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E15JL-25	320C15 DSP w/4K-Words EPROM, 25 MHz		4-7	SPRS009B
TMS320E17FZL	320C17 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E17JA	320C17 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E17JL	320C17 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320E25FZL	320C25 DSP w/4K-Words EPROM, 40 MHz		4-8	SPRS010B
TMS320P14FNL	320E14 DSP w/4K-Words EPROM, 25 MHz		4-7	SPRU032
TMS320P15FNL	320E15 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
TMS320P15FNL25	320E14 DSP w/4K-Words EPROM, 25 MHz		4-7	SPRS009B
TMS320P17FNL	320E17 DSP w/4K-Words EPROM, 20MHz		4-7	SPRS009B
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TMS320 Workshops	See RTCWS-320DSP2		11-4	SSRC007
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TMS32020GBL	NMOS 2nd-Generation DSP, 20 MHz		4-8	SPRS010B
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TMS340SDK-PC	TIGA-340 Software Development Kit		4-27	SPVT089
TMS340SPK-PC	TIGA-340 Software Porting Kit		4-27	SPVT089
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TMS34010	TMS34010 Graphics System Processor		4-13	SPVU001A
TMS34010FNL-60	TMS34010 Graphics System Processor, 60 MHz		4-13	SPVU001
TMS34010FNL-40	Graphics System Processor, 40 MHz		4-13	SPVU001
TMS34010FNL-50	Graphics System Processor, 50 MHz		4-13	SPVU001

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TMS34070NL-20	Color Palette, 20 MHz		4-26	SPPU016A
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TMS34082GBL	TMS34082 Floating Point Processor		4-17	SPVT065
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TMS370C010NA	8-Bit Configurable Microcontroller		4-29	SPNS012A
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TMS370C810FNA	8-Bit Configurable Microcontroller		4-29	SPNS012A
TMS370C810NA	8-Bit Configurable Microcontroller		4-29	SPNS012A
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TMS38010NL	Token-Ring LAN Communications Processor		4-32	SPWX005
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TMS38021NL	Token-Ring LAN Protocol Handler		4-32	SPWX005
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TMS38030PQL	Token-Ring LAN System Interface		4-32	SPWX005
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TMS44C251-1	256K x 4 Multiport Video RAM, 100 ns		10-5	SMVS251E
TMS44C251-10	256K x 4 Multiport Video RAM, 100 ns		10-5	SMVS251E
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TMS4C1027-10	1M x 1 DRAM, 100 ns, Static Col. Decode		10-5	SMGS024E
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TMS44C260-10	256K x 4 Parity DRAM, 100 ns, Page Mode		10-5	SMGS260
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TMS48C121-12	128K x 8 Multiport Video RAM, 120 ns		10-5	SMVS121
TMS44100-80	4M x 1 DRAM, 80 ns, Page Mode		10-5	SMHS410
TMS44100-10	4M x 1 DRAM, 100 ns, Page Mode		10-5	SMHS410
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TMS44102-10	4M x 1 DRAM, 100 ns, Static Col. Decode		10-5	SMHS410
TMS44102-12	4M x 1 DRAM, 120 ns, Static Col. Decode		10-5	SMHS410
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TMS44401-12	1M x 4 DRAM, 120 ns, Nibble Mode		10-5	SMHS440
TMS44402-80	1M x 4 DRAM, 80 ns, Static Col. Decode		10-5	SMHS440
TMS44402-10	1M x 4 DRAM, 100 ns, Static Col. Decode		10-5	SMHS440
TMS44402-12	1M x 4 DRAM, 120 ns, Static Col. Decode		10-5	SMHS440
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TMS6788-25	16K x 4, BiCMOS SRAM, 25 ns		10-7	SMSS788B
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TMS6789-30	16K x 4, BiCMOS SRAM, 30 ns		10-7	SMSS789A
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TMS6708-25	64K x 4, BiCMOS SRAM, 25 ns		10-7	SMSS708
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74ACT11008	Quad 2-Input AND Gate		3-5	SCAD001A
74ACT11010	Triple 3-Input NAND Gate		3-4	SCAD001A
74ACT11011	Triple 3-Input AND Gate		3-5	SCAS028
74ACT11013	Dual 4-Input NAND Schmitt-Trigger		3-4	TBA
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74ACT11032	Quad 2-Input OR Gate		3-5	SCAD001A
74ACT11034	Hex Non-Inverter		3-8	SCAS035
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74ACT11086	Quad J-K Flip-Flop		3-6	TBA
74ACT11109	Dual J-K Flip-Flop		3-15	SCAD001A
74ACT11112	Dual J-K Flip-Flop		3-15	TBA
74ACT11132	Quad 2-Input NAND Schmitt-Trigger		3-4	TBA
74ACT11138	3-to-8 Decoder/Demultiplexer		3-25	TBA
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74ACT11150	1-of-16 Data Generator/Multiplexer		3-24	TBA
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74ACT11153	Dual 4-to-1 Multiplexer		3-24	TBA
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74ACT11592	8-Bit Registered Binary Counter		3-22	TBA
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74ACT11640	Octal Bus Transceiver		3-11	SCAD001A
74ACT11643	Octal Bus Transceiver		3-11	SCAD001A
74ACT11646	Octal Bus Transceiver		3-11	SCAD001A
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74ACT11846	8-Bit Latch		3-18	TBA
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74ACT11002	Quad 2-Input NOR Gate		3-5	SCAD001A
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74ACT11008	Quad 2-Input AND Gate		3-5	SCAD001A
74ACT11010	Triple 3-Input NAND Gate		3-4	SCAD001A
74ACT11011	Triple 3-Input AND Gate		3-5	SCAS029
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74ACT11021	Dual 4-Input AND Gate		3-5	SCAS005A
74ACT11027	Triple 3-Input NOR Gate		3-5	SCAD001A
74ACT11030	8-Input NAND Gate		3-4	SCAD001A
74ACT11032	Quad 2-Input OR Gate		3-5	SCAD001A
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74AC11074	Dual D-Type Flip-Flop		3-15	SCAD001A
74AC11086	Quad 2-Input Exclusive-OR Gate		3-6	TBA
74AC11109	Dual J-K Flip-Flop		3-15	SCAD001A
74AC11112	Dual J-K Flip-Flop		3-15	TBA
74AC11132	Quad 2-Input NAND Schmitt-Trigger		3-4	TBA
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74AC11150	1-of-16 Data Generator/Multiplexer		3-24	TBA
74AC11151	8-to-1 Multiplexer		3-24	TBA
74AC11153	Dual 4-to-1 Multiplexer		3-24	TBA
74AC11154	4-to-16 Line Decoder/Demultiplexer		3-25	TBA
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74AC11161	4-Bit Synchronous Binary Counter		3-21	SCAS047
74AC11162	4-Bit Synchronous Decade Counter		3-21	SCAS047
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74AC11168	4-Bit Synchronous Decade Counter		3-21	TBA
74AC11169	4-Bit Synchronous Binary Counter		3-21	TBA
74AC11174	Hex D-Type Flip-Flop		3-15	TBA
74AC11175	Quad D-Type Flip-Flop		3-15	TBA
74AC11181	ALU Function Generator		3-30	TBA
74AC11190	4-Bit Synchronous Decade Counter		3-21	TBA
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74AC11192	4-Bit Synchronous Decade Counter		3-21	TBA
74AC11193	4-Bit Synchronous Binary Counter		3-21	TBA
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74AC11204	Hex Inverting Clock Driver/Buffer		3-31	TBA
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74AC11238	3-to-8 Decoder/Demultiplexer		3-25	SCAS039
74AC11239	Dual 2-to-4 Decoder/Demultiplexer		3-25	TBA
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74AC11244	Octal Buffer/Line Driver		3-10	SCAD001A
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74AC11250	1-to-16 Data Generator/Multiplexer		3-24	TBA
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74AC11253	Dual 4-to-1 Multiplexer		3-24	SCAS041
74AC11257	Quad 2-to-1 Multiplexer		3-24	TBA
74AC11258	Quad 2-to-1 Multiplexer		3-24	TBA
74AC11273	Octal D-Type Flip-Flop		3-16	TBA
74AC11280	9-Bit Parity Generator/Checker		3-29	TBA
74AC11286	9-Bit Parity Generator/Checker		3-29	TBA
74AC11299	8-Bit Universal Shift/Storage Register		3-19	TBA
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74AC11521	8-Bit Identity Comparator		3-28	SCAD001A
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74AC11623	Octal Bus Transceiver		3-12	SCAD001A
74AC11640	Octal Bus Transceiver		3-11	SCAD001A
74AC11643	Octal Bus Transceiver		3-11	SCAD001A
74AC11646	Octal Bus Transceiver		3-11	SCAD001A
74AC11648	Octal Bus Transceiver		3-11	TBA
74AC11651	Octal Bus Transceiver		3-11	TBA
74AC11652	Octal Bus Transceiver		3-11	TBA
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74AC11677	16-Bit Address Comparator		3-28	TBA
74AC11678	16-Bit Latched Address Comparator		3-28	TBA
74AC11800	Triple 4-Input AND/NAND Driver		3-31	TBA
74AC11802	Triple 4-Input OR/NOR Driver		3-31	TBA
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74AC11821	10-Bit D-Type Flip-Flop		3-16	TBA
74AC11822	10-Bit D-Type Flip-Flop		3-16	TBA
74AC11823	9-Bit Register		3-16	TBA
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74AC11827	10-Bit Buffer		3-10	TBA
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74AC11841	10-Bit D-Type Latch		3-18	TBA
74AC11842	10-Bit D-Type Latch		3-18	TBA
74AC11843	9-Bit Latch		3-18	TBA
74AC11844	9-Bit Latch		3-18	TBA
74AC11845	8-Bit Latch		3-18	TBA
74AC11846	8-Bit Latch		3-18	TBA
74AC11852	8-Bit Universal Port Controller		3-31	TBA
74AC11853	8-Bit Latched Bus Transceiver		3-11	TBA
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74AC11861	10-Bit Transceiver		3-12	TBA
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74AC11863	9-Bit Transceiver		3-11	TBA
74AC11864	9-Bit Transceiver		3-11	TBA
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74AC11869	8-Bit Synchronous Up/Down Counter		3-21	TBA
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Alphanumeric Index

APPLICATION SPECIFIC INTEGRATED CIRCUITS (ASIC) ALPHANUMERIC AND FUNCTIONAL MACRO LISTINGS

INTRODUCTION

The use of Application Specific Integrated Circuits (ASIC) provides a means of achieving increased levels of system performance, integration, reliability and design security.

TI's ASIC product offering ranges from 7.5 ns bipolar programmable logic devices based on TI's IMPACT-X™ process to a high performance 1- μ m gate array and standard cell family fabricated in TI's double-level-metal, EPIC™ CMOS process technology.

The TGC100 Series gate array family comprises six arrays in densities up to 18k gates with 216 input/output buffers and a typical two-week prototype turnaround time for logic consolidation applications.

The TSC500 Series 1- μ m standard cell family offers the ultimate in performance and functionality with an expanding library of LSI/VLSI building blocks and a wide variety of packaging options for system consolidation applications. TI's 2- μ m SystemCell Series provides a cost effective solution for applications where the speed and density offered by the TSC500 Series are not primary considerations.

TI offers a 3- μ m standard cell family with a simple analog library, as well as the TAAC family of CMOS arrays which has densities up to 2,500 gates and contains a family of 2- μ m cell macros. The 3- μ m and TAAC families are supported in Europe only.

Texas Instruments offers a full range of design services and technical support to assist in the completion of an ASIC design. The reader is urged to review the information provided in the 1990 Master Selection Guide to become more familiar with TI's ASIC capabilities, and to contact the nearest TI field sales office or TI ASIC distributor for additional technical information. Names and addresses are listed at the back of the Guide.

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The naming convention for ASIC gate array and standard cell functions is shown in Figure 2-1. An index of logic function prefixes is listed in Table 2-1.

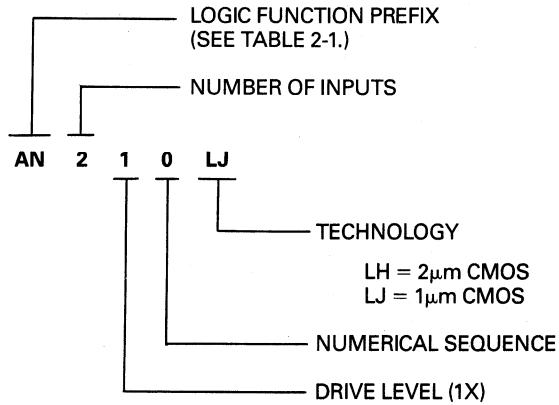


Figure 2-1. ASIC Naming Convention

Table 2-1. Index to Function Prefixes

PREFIX	DESCRIPTION	PREFIX	DESCRIPTION
AD	Adders	LH	Bus Holder Latch
AN	AND Gates	MU	Multiplexers
AO	AND-OR/NOR Gates	MV	Multivibrator (One-Shot)
BF	Multi-stage AND,NAND,NOR,OR Gates	NA	NAND Gates
BU	Buffers	NO	NOR Gates
CK	Clock Splitters/Drivers	OA	OR-AND/NAND Gates
CO	Comparators	OP	Output Buffers
DE	Decoders/Demultiplexers	OR	OR Gates
DF/DT	Flip-Flops,D-Type	OS	Oscillators
DL	Delay Elements	PD/PR	Pulldown Pullup Terminators
EN	Exclusive-NOR Gates	R	Shift Registers
EX	Exclusive-OR Gates	RA	Hardwired RAM Macro Cells
FI	First-In,First-Out Memories	RF	Register Files
GM/GS	S-R Latches,Gated Type	RH	Hardwired RAMs
IO	Bidirectional I/O Buffers	S	Software Macros
IP	Input Buffers	TA	Flip-Flops, Toggle Type
IV	Inverters	TD	SCAN Flip-Flops/Latches
JK	Flip-Flops,J-K Type	TO	Tie-Off Gates
LA	Latches, D-Type and S-R	TP	MegaModule Test Functions

PROGRAMMABLE LOGIC DEVICES

TI's programmable logic products include high-speed (7.5-ns) 20- and 24-pin PAL™ devices, as well as TI's latest standard 20- and 24-pin PAL devices in a variety of speed/power versions. High-density logic integration is provided by the EPLD family.

- High-performance, low-power IMPACT™ and IMPACT-X™ 20- and 24-pin standard PAL circuits
- High-speed (6-ns) TTL Programmable Address Decoder, TIBPAD18N8-6
- Flexible, '22V10-architecture macrocell PAL ICs, including TI's enhanced, 15-ns version, the TIBPAL22VP10-15
- High-speed 6-ns, 10KH ECL and ExCL™ PAL circuits
- Ultra-low-power UV-erasable and one-time programmable CMOS PAL ICs, including 20-pin, '22V10, and generic architectures
- Fast, programmable state machines, including the 58 MHz TIBPSG507 Programmable Sequence Generator and the TIBPLS506 Programmable Logic Sequencer
- EPLD family: high density logic integration

Texas Instruments high-speed programmable bipolar devices utilize TI's advanced IMPACT and new IMPACT-X technologies. IMPACT-X uses trench isolation and polysilicon emitters to increase performance and reduce power dissipation when compared to traditional processes. IMPACT-X provides 1.5- μm feature sizes and 7- μm pitch. Based on IMPACT-X, TI's new ECL processes, ExCL and ExCL-M, offer even greater speed and density for high-performance ECL circuits.

EPLDs (EP610, EP910, and EP1810) can help you achieve system integration faster and easier. These high-density EPLDs make it easy to consolidate logic, reduce system size and cost, and free up board space for additional functionality. EPLDs combine the user-configurability and short lead times of standard programmable logic with the density and architectural flexibility of gate arrays. Above all, EPLDs offer easy and familiar design methodology. Designers used to working with standard TTL and programmable logic can use familiar design concepts (e.g., Boolean equations, schematic capture, state tables) and standard IBM®-AT™ and compatible PC-AT's to design and program TI's EPLDs by using the EP-APLUS development software. Designers familiar with standard PLDs will find the transition to EPLDs especially easy.

Reasons to integrate with TI's EPLDs:

- High-density, flexible architecture
- Fast, easy design methodology
- Off-the-shelf product benefits: short lead time, low cost-of entry
- UV-erasable for immediate implementation of design changes
- Security feature helps protect proprietary designs
- TI's long-term commitment to the EPLD market.

EPLDs operate at up to 50 MHz and offer low CMOS power consumption with virtually zero standby power. The devices are divided into separate logic array macrocells, each containing combinatorial gates — including 10 product terms — and a configurable I/O. Each macrocell can be programmed to accommodate up to 40 equivalent two-input NAND gates. The configurable I/Os can be programmed independently, so that varying logic functions — combinatorial and sequential — can be implemented simultaneously. Output registers can be bypassed or programmed for D, T, JK, or SR flip-flop operation. Registers can be asynchronously or synchronously clocked.

PAL is a registered trademark of Monolithic Memories Inc.

IMPACT AND IMPACT-X are trademarks of Texas Instruments Incorporated.

ExCL is a trademark of Texas Instruments Incorporated.

EP family density and performance are well-suited for industrial process control and telecommunications equipment, as well as computer systems applications. For example, TI's ultimate EP family member, the EP1810, will let you replace 10 to 20 TTL functions with one device to create high-performance designs such as advanced processor support chips. The EP1810 macrocells allow you to implement buried register functions, while allowing the I/O pin to serve as a dedicated input. This feature, known as global macrocells, allows the EP1810 to be used for complex state machine design.

2

ASIC Alphanumeric and Functional Macro Listings

The naming convention for programmable logic devices is shown in Figure 2-2.

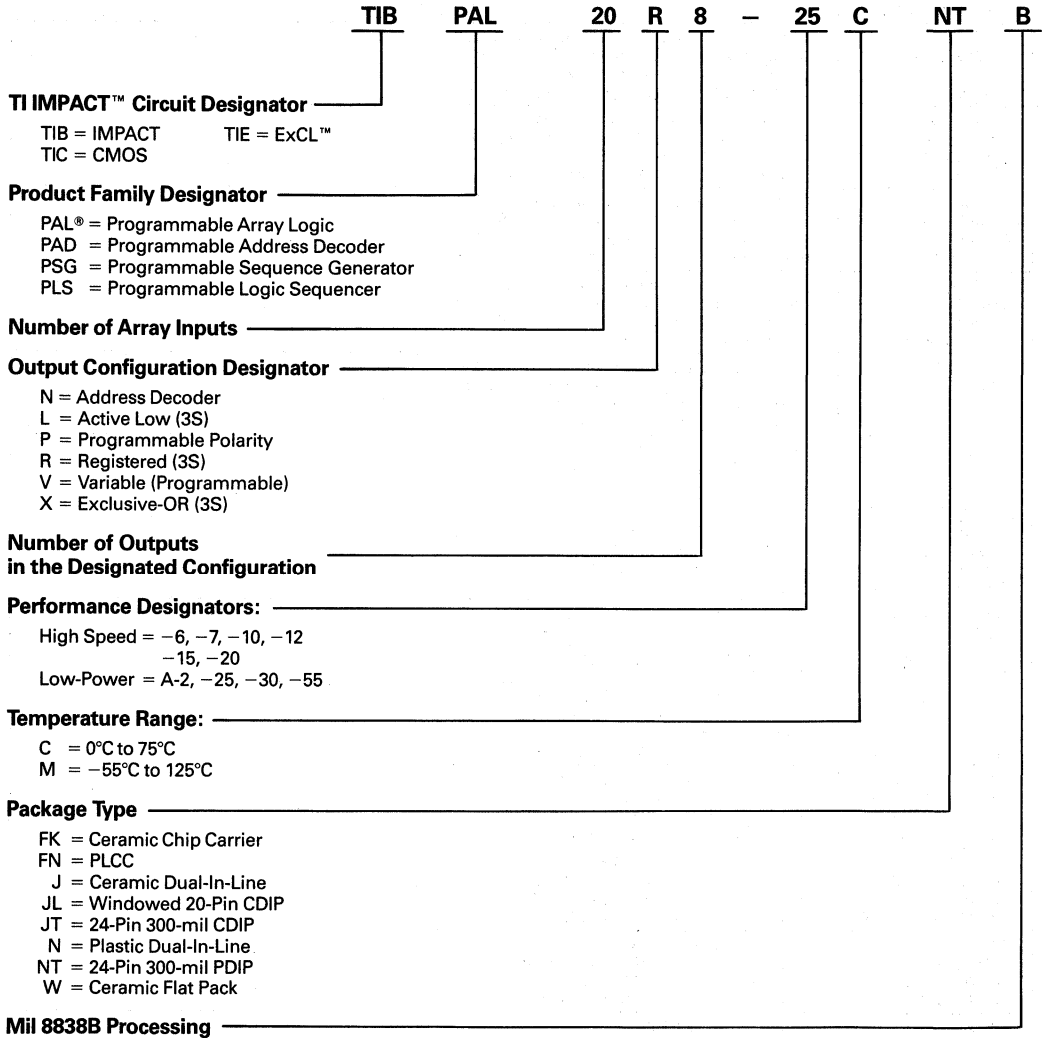


Figure 2-2. PLD Naming Convention

ExCL is a trademark of Texas Instruments Incorporated.
 IMPACT is a trademark of Texas Instruments Incorporated.

ALPHANUMERIC LISTING: PROGRAMMABLE LOGIC DEVICES

PART NUMBER	DESCRIPTION
EP1810LC-35 EP1810LC-45 EP1810JC-35 EP1810JC-45	48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev.
EP610DC-25 EP610DC-30 EP610JC-25 EP610JC-30	16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev.
EP610LC-25 EP610LC-30 EP610PC-25 EP610PC-30	16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev.
EP910DC-30 EP910DC-35 EP910JC-30 EP910JC-35	24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev.
EP910LC-30 EP910LC-35 EP910PC-30 EP910PC-35	24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev.
TIB82S105BCFN TIB82S105BCN TIB82S167BCNT TIBPAD16N8-7CFN	16X48X8 Field-Programmable Logic Sequencer 16X48X8 Field-Programmable Logic Sequencer 16X48X8 Field-Programmable Logic Sequencer High-Performance Programmable Address Decoder
TIBPAD16N8-7CN TIBPAD18N8-6CFN TIBPAD18N8-6CN TIBPAL16L8-10CFN	High-Performance Programmable Address Decoder High-Performance PAD/NAND Array High-Performance PAD/NAND Array High-Performance IMPACT PAL Circuits
TIBPAL16L8-10CN TIBPAL16L8-12CFN TIBPAL16L8-12CN TIBPAL16L8-15CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16L8-15CN TIBPAL16L8-25CFN TIBPAL16L8-25CN TIBPAL16L8-7CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16L8-7CN TIBPAL16R4-10CFN TIBPAL16R4-10CN TIBPAL16R4-12CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R4-12CN TIBPAL16R4-15CFN TIBPAL16R4-15CN TIBPAL16R4-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R4-25CN TIBPAL16R4-7CFN TIBPAL16R4-7CN TIBPAL16R6-10CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-10CN TIBPAL16R6-12CFN TIBPAL16R6-12CN TIBPAL16R6-15CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-15CN TIBPAL16R6-25CFN TIBPAL16R6-25CN TIBPAL16R6-7CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-7CN TIBPAL16R8-10CFN TIBPAL16R8-10CN TIBPAL16R8-12CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits

PART NUMBER	DESCRIPTION
TIBPAL16R8-12CN TIBPAL16R8-15CFN TIBPAL16R8-15CN TIBPAL16R8-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R8-25CN TIBPAL16R8-7CFN TIBPAL16R8-7CN TIBPAL20L10-20CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits
TIBPAL20L10-20CNT TIBPAL20L10-30CNT TIBPAL20L8-15CFN TIBPAL20L8-15CNL	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20L8-15CNT TIBPAL20L8-25CFN TIBPAL20L8-25CNL TIBPAL20L8-25CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20L8-7CFN TIBPAL20L8-7CNT TIBPAL20R4-15CFN TIBPAL20R4-15CNL	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R4-15CNT TIBPAL20R4-25CFN TIBPAL20R4-25CNL TIBPAL20R4-25CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R4-7CFN TIBPAL20R4-7CNT TIBPAL20R6-15CFN TIBPAL20R6-15CNL	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R6-15CNT TIBPAL20R6-25CFN TIBPAL20R6-25CNL TIBPAL20R6-25CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R6-7CFN TIBPAL20R6-7CNT TIBPAL20R8-15CFN TIBPAL20R8-15CNL	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R8-15CNT TIBPAL20R8-25CFN TIBPAL20R8-25CNL TIBPAL20R8-25CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R8-7CFN TIBPAL20R8-7CNT TIBPAL20X10-20CFN TIBPAL20X10-20CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits
TIBPAL20X10-30CNT TIBPAL20X4-20CFN TIBPAL20X4-20CNT TIBPAL20X4-30CNT	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits
TIBPAL20X8-20CFN TIBPAL20X8-20CNT TIBPAL20X8-30CNT TIBPAL22V10ACFN	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL22V10ACNT TIBPAL22V10CFN TIBPAL22V10CNT TIBPAL22V10-15CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL22V10-15CNT TIBPAL22VP10-20CFN TIBPAL22VP10-20CNT TIBPLS506CJT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Perf. Programmable Logic Sequencer
TIBPSG507CJT TICPAL16L8-55CJL TICPAL16R4-55CJL TICPAL16R6-55CJL	High-Perf. Programmable Sequence Generator High Performance CMOS PAL Circuits High Performance CMOS PAL Circuits High Performance CMOS PAL Circuits

PART NUMBER	DESCRIPTION
TICPAL16R8-55CJL	High Performance CMOS PAL Circuits
TIEPAL10H16P8-3CJT	High-Performance Exclusive PAL Circuits
TIEPAL10H16P8-6CJT	High-Performance Exclusive PAL Circuits

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ASIC Alphanumeric and Functional Macro Listings

FUNCTIONAL LISTING: PROGRAMMABLE LOGIC DEVICES

Erasable Programmable Logic Devices (CMOS)

DEVICE	FUNCTIONAL DESCRIPTION
EP610DC-25 EP610DC-30 EP610JC-25 EP610JC-30	16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev.
EP610LC-25 EP610LC-30 EP610PC-25 EP610PC-30	16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev. 16-Macrocell Erasable Programmable Logic Dev.
EP910DC-30 EP910DC-35 EP910JC-30 EP910JC-35	24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev.
EP910LC-30 EP910LC-35 EP910PC-30 EP910PC-35	24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev. 24-Macrocell Erasable Programmable Logic Dev.
EP1810LC-35 EP1810LC-45 EP1810JC-35 EP1810JC-45	48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev. 48-Macrocell Erasable Programmable Logic Dev.

High-Performance Exclusive-OR IMPACT PAL Circuits

DEVICE	FUNCTIONAL DESCRIPTION
TIBPAL20X10-20CFN TIBPAL20X10-20CNT TIBPAL20X10-30CNT TIBPAL20X4-20CFN	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits
TIBPAL20X4-20CNT TIBPAL20X4-30CNT TIBPAL20X8-20CFN TIBPAL20X8-20CNT	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits
TIBPAL20X8-30CNT TIBPAL20L10-20CFN TIBPAL20L10-20CNT TIBPAL20L10-30CNT	High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits High-Perf. Exclusive-OR IMPACT PAL Circuits

High-Performance ECL PAL Circuits

DEVICE	FUNCTIONAL DESCRIPTION
TIEPAL10H16P8-3CJT TIEPAL10H16P8-6CJT	High-Performance ECL PAL Circuits High-Performance ECL PAL Circuits

High-Performance IMPACT PAL Circuits

DEVICE	FUNCTIONAL DESCRIPTION
TIBPAL16L8-10CFN TIBPAL16L8-10CN TIBPAL16L8-12CFN TIBPAL16L8-12CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16L8-15CFN TIBPAL16L8-15CN TIBPAL16L8-25CFN TIBPAL16L8-25CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16L8-7CFN TIBPAL16L8-7CN TIBPAL16R4-10CFN TIBPAL16R4-10CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R4-12CFN TIBPAL16R4-12CN TIBPAL16R4-15CFN TIBPAL16R4-15CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R4-25CFN TIBPAL16R4-25CN TIBPAL16R4-7CFN TIBPAL16R4-7CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-10CFN TIBPAL16R6-10CN TIBPAL16R6-12CFN TIBPAL16R6-12CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-15CFN TIBPAL16R6-15CN TIBPAL16R6-25CFN TIBPAL16R6-25CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R6-7CFN TIBPAL16R6-7CN TIBPAL16R8-10CFN TIBPAL16R8-10CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R8-12CFN TIBPAL16R8-12CN TIBPAL16R8-15CFN TIBPAL16R8-15CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL16R8-25CFN TIBPAL16R8-25CN TIBPAL16R8-7CFN TIBPAL16R8-7CN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20L8-15CFN TIBPAL20L8-15CNL TIBPAL20L8-15CNT TIBPAL20L8-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20L8-25CNL TIBPAL20L8-25CNT TIBPAL20L8-7CFN TIBPAL20L8-7CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R4-15CFN TIBPAL20R4-15CNL TIBPAL20R4-15CNT TIBPAL20R4-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R4-25CNL TIBPAL20R4-25CNT TIBPAL20R4-7CFN TIBPAL20R4-7CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R6-15CFN TIBPAL20R6-15CNL TIBPAL20R6-15CNT TIBPAL20R6-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits

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ASIC Alphanumeric and Functional Macro Listings

High-Performance IMPACT PAL Circuits (Continued)

DEVICE	FUNCTIONAL DESCRIPTION
TIBPAL20R6-25CNL TIBPAL20R6-25CNT TIBPAL20R6-7CFN TIBPAL20R6-7CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R8-15CFN TIBPAL20R8-15CNL TIBPAL20R8-15CNT TIBPAL20R8-25CFN	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL20R8-25CNL TIBPAL20R8-25CNT TIBPAL20R8-7CFN TIBPAL20R8-7CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL22V10ACFN TIBPAL22V10ACNT TIBPAL22V10CFN TIBPAL22V10CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits
TIBPAL22V10-15CFN TIBPAL22V10-15CNT TIBPAL22VP10-20CFN TIBPAL22VP10-20CNT	High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits High-Performance IMPACT PAL Circuits

High-Performance Programmable Address Decoder

DEVICE	FUNCTIONAL DESCRIPTION
TIBPAD16N8-7CFN TIBPAD16N8-7CN TIBPAD18N8-6CFN TIBPAD18N8-6CN	High-Performance Programmable Address Decoder High-Performance Programmable Address Decoder High-Performance PAD/NAND Array High-Performance PAD/NAND Array

High-Performance Programmable Logic Sequencer

DEVICE	FUNCTIONAL DESCRIPTION
TIBPLS506CJT TIBPSG507CJT TIB82S105BCFN TIB82S105BCN TIB82S167BCNT	High-Perf. Programmable Logic Sequencer High-Perf. Programmable Sequencer Generator 16X48X8 Field-Programmable Logic Sequencer 16X48X8 Field-Programmable Logic Sequencer 16X48X8 Field-Programmable Logic Sequencer

High Performance CMOS PAL Circuits

DEVICE	FUNCTIONAL DESCRIPTION
TICPAL16L8-55CJL TICPAL16R4-55CJL TICPAL16R6-55CJL TICPAL16R8-55CJL	High Performance CMOS PAL Circuits High Performance CMOS PAL Circuits High Performance CMOS PAL Circuits High Performance CMOS PAL Circuits

GATE ARRAY PRODUCT FAMILY

1- μ m TGC100 Series CMOS Gate Arrays (US and Europe)

The 1- μ m TGC100 Series consists of six arrays ranging in density from 3200 to 18620 gates with I/O's from 84 to 216. Fabricated in TI's 1- μ m EPIC™ double-level-metal CMOS process, this family offers typical gate utilization of 90% and propagation delays of 500 ps (two-input NAND gate, fan-out = 2) and a maximum toggle rate of 208 MHz.

Specified to operate over the commercial temperature range (0° C to 70° C), Release 2.0 of the TGC100 Series library contains 222 macros including SSI, MSI, I/O, Boolean and "soft macro" functions. In the US, macro libraries are currently supported on Daisy, Mentor, and Valid engineering workstations. In Europe, the libraries are supported on Daisy and Mentor workstations and Valid workstation support is planned.

A predefined selection of industry standard packaging options ranging from 28-pin dual-in-line packages (DIP) to 208-pin plastic pin-grid arrays (PPGA) is available for TGC100 Series designs. In the US, Standard TGC100 Series designs typically provide a two-week prototype cycle time (from customer approval of post-layout simulation to shipment of five ceramic-packaged prototypes) for critical time-to-market logic consolidation applications. In Europe, these designs take a few weeks to manufacture from customer approval of post-layout simulation to shipment of 10 ceramic-packaged verification samples.

Contact the nearest TI Field Sales Office or in the US, your ASIC Distributor for a copy of the TGC100 Family Data Sheet (US: SRGS006A; Europe: SCL115), the TGC100 Series Product Bulletin (US: SRYT048B; Europe: SCL127), and a copy of VISTA Evaluation Software for TGC100 Series Gate Arrays.

GATE ARRAY TYPE	BASIC CELLS 2-INPUT GATES		TOTAL BOND PADS	PRODUCTION PACKAGES																
	TOTAL AVAILABLE	MAXIMUM USABLE		PLASTIC DIP		PLASTIC LEADED CHIP CARRIER				PLASTIC QFP See Note 1				PLASTIC PIN-GRID ARRAY						
				28	40	28	44	68	84	100	120	132	160	100	120	132	144	180	208	
TGC103	3,200	2,880	84	✓	✓	✓	✓	✓	✓							✓				
TGC105	5,376	4,838	118	✓	✓		✓	✓	✓	✓	•					✓	✓			
TGC108	8,896	8,006	142	✓	✓		✓	✓	✓	•	•	✓				✓	✓	✓	✓	
TGC112	12,654	11,389	196					✓	✓		•	✓	•			✓	✓	✓	✓	✓
TGC115	15,580	14,022	216								•	✓	•				✓	✓	✓	✓
TGC118	18,620	16,758	216								•	✓	•				✓	✓	✓	✓

NOTE 1: For the quad-flat packages (QFP) ✓ – JEDEC and • – EIAJ

Military Applications

TI also offers gate array designs processed in compliance with MIL-STD-883, Method 5004/5005 or Method 5010. Refer to the Military Products Designer's Reference Guide (US: SGYZ001B) for more information regarding TI Military ASIC.

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ASIC Alphanumeric and Functional Macro Listings

ALPHANUMERIC MACRO LISTING: TGC100 SERIES 1- μ m CMOS GATE ARRAYS (US and Europe)

Technical data is contained in the TGC100 Series Family Data Sheet (US SRGS006A; Europe: SCL115).

MACRO NUMBER	DESCRIPTION
AD100LJ	One Bit Full Adder
AN210LJ	2-Input AND Gate
AN220LJ	2-Input AND Gate, 2X Drive
AN310LJ	3-Input AND Gate
AN320LJ	3-Input AND Gate, 2X Drive
AN410LJ	4-Input AND Gate
AN420LJ	4-Input AND Gate, 2X Drive
AN510LJ	5-Input AND Gate
AN810LJ	8-Input AND Gate
AO220LJ	AND-OR Gate, 2X Drive $Y = (A \cdot B) + (C \cdot D)$
AO221LJ	AND-NOR Gate, 2X Drive $Y = \overline{(A \cdot B)} + \overline{(C \cdot D)}$
AO241LJ	2-Wide, 2-Input AND-OR Gate
AO320LJ	AND-OR Gate $Y = (A1 \cdot A2 \cdot A3) + (B1 \cdot B2 \cdot B3)$
AO421LJ	AND-NOR Gate $Y = \overline{(A1 \cdot A2 \cdot A3 \cdot A4)} + \overline{(B1 \cdot B2 \cdot B3 \cdot B4)}$
BF001LJ	AND-NOR Gate $Y = \overline{A1} + \overline{(B1 \cdot B2)}$
BF006LJ	AND-NOR Gate $Y = A1 + A2 + \overline{(B1 \cdot B2)}$
BF011LJ	AND-NOR Gate $Y = \overline{(A1 \cdot A2)} + \overline{(B1 \cdot B2)} + \overline{(C1 \cdot C2)}$
BF022LJ	OR-AND-NOR Gate $Y = \overline{A1} \cdot A2 + \overline{(B1 \cdot B2)} \cdot \overline{(C1 + C2)}$
BF051LJ	OR-NAND Gate $Y = \overline{A1} \cdot \overline{(B1 + B2)}$
BF053LJ	OR-NAND Gate $Y = \overline{(A1 + A2)} \cdot \overline{(B1 + B2)}$
BF056LJ	OR-NAND Gate $Y = \overline{A1} \cdot A2 \cdot \overline{(B1 + B2)}$
BU130LJ	Delay Buffer, 3X Drive
BU150LJ	Delay Buffer, 5X Drive
CK120LJ	Dual-Phase, Non-Overlapping Clock Driver
CKD03LJ	Clock Distribution Macro for TGC103 Base Array
CKD05LJ	Clock Distribution Macro for TGC105 Base Array
CKD08LJ	Clock Distribution Macro for TGC108 Base Array
CKD12LJ	Clock Distribution Macro for TGC112 Base Array
CKD15LJ	Clock Distribution Macro for TGC115 Base Array
CKD18LJ	Clock Distribution Macro for TGC118 Base Array
DE210LJ	2-Line to 4-Line Decoder
DLD00LJ	Delay Driver
DLE00LJ	Delay Element
DFB20LJ	D-Type Flip-Flop with Preset, Clear, 2X Drive
DTB00LJ	D-Type Flip-Flop with Preset, Clear
DTB10LJ	D-Type Flip-Flop with Preset, Clear, 1X Drive
DTB20LJ	D-Type Flip-Flop with Preset, Clear, 2X Drive
DTC00LJ	D-Type Flip-Flop with Clear
DTC10LJ	D-Type Flip-Flop with Clear, 1X Drive
DTC20LJ	D-Type Flip-Flop with Clear, 2X Drive
DTN00LJ	D-Type Flip-Flop
DTN10LJ	D-Type Flip-Flop, 1X Drive
DTN20LJ	D-Type Flip-Flop, 2X Drive
DTP00LJ	D-Type Flip-Flop with Preset
DTP10LJ	D-Type Flip-Flop with Preset, 1X Drive
DTP20LJ	D-Type Flip-Flop with Preset, 2X Drive
EN210LJ	2-Input Exclusive-NOR Gate
EX210LJ	2-Input Exclusive-OR Gate
EX220LJ	2-Input Exclusive-OR Gate, 2X Drive
IO#21LJ	2-mA, 3-State I/O Buffer with CMOS Input
IO#24LJ	2-mA, 3-State I/O Buffer with TTL Input
IO#41LJ	4-mA, 3-State I/O Buffer with CMOS Input
IO#44LJ	4-mA, 3-State I/O Buffer with TTL Input
IO#81LJ	8-mA, 3-State I/O Buffer with CMOS Input
IO#84LJ	8-mA, 3-State I/O Buffer with TTL Input
IO#21LJ	2-mA, 3-State I/O Buffer with CMOS Input with Pull-Up
IO#24LJ	2-mA, 3-State I/O Buffer with TTL Input with Pull-Up

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

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ASIC Alphanumeric and Functional Macro Listings

MACRO NUMBER	DESCRIPTION
IO#41LJ IO#44LJ IO#81LJ IO#84LJ	4-mA, 3-State I/O Buffer with CMOS Input with Pull-Up 4-mA, 3-State I/O Buffer with TTL Input with Pull-Up 8-mA, 3-State I/O Buffer with CMOS Input with Pull-Up 8-mA, 3-State I/O Buffer with TTL Input with Pull-Up
IO#21LJ IO#24LJ IO#41LJ IO#44LJ	2-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 2-mA, 3-State I/O Buffer with TTL Input with Pull-Down 4-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 4-mA, 3-State I/O Buffer with TTL Input with Pull-Down
IO#81LJ IO#84LJ IPI00LJ IPI01LJ	8-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 8-mA, 3-State I/O Buffer with TTL Input with Pull-Down CMOS-Compatible Inverting Input Buffer CMOS-Compatible Input Buffer
IPI04LJ IPI06LJ IPI09LJ IPL01LJ	TTL-Compatible Input Buffer CMOS-Compatible Inverting Input Buffer with Hysteresis TTL-Compatible Input Buffer with Hysteresis CMOS-Compatible Input Buffer with Pullup Tap
IPL04LJ IPU01LJ IPU04LJ IV110LJ	TTL-Compatible Input Buffer with Pullup Tap CMOS-Compatible Input Buffer with Pulldown Tap TTL-Compatible Input Buffer with Pulldown Tap Inverter
IV120LJ IV140LJ IV211LJ IV221LJ	Inverter, 2X Drive Inverter, 4X Drive Inverting 3-State Buffer with Low Enable Inverting 3-State Buffer with Low Enable, 2X Drive
IV241LJ JKB20LJ JKB21LJ LAB20LJ	Inverting 3-State Buffer with Low Enable, 4X Drive J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive S-R Latch with 2X Drive
LAH12LJ LAH13LJ LAH14LJ LAH20LJ	D-Type Transparent Latch, 3-State Non-Inverting Output D-Type Transparent Latch, 3-State Inverting Output D-Type Transparent Latch, 3-State Complementary Outputs D-Type Latch with High Enable, 2X Drive
LAH22LJ LH110LJ LH400LJ MU111LJ	D-Type Latch with Low Enable and Clear, 2X Drive 3-State Bus Holder 4-Bit Latch 2-Line to 1-Line Multiplexer
MU220LJ MU311LJ NA210LJ NA220LJ	4-Line to 1-Line Multiplexer, 2X Drive 8-Line to 1-Line Multiplexer 2-Input NAND Gate 2-Input NAND Gate, 2X Drive
NA310LJ NA311LJ NA320LJ NA410LJ	3-Input NAND Gate 3-Input NAND Gate, Inverted A Input $Y = \overline{(A) \cdot B \cdot C}$ 3-Input NAND Gate, 2X Drive 4-Input NAND Gate
NA420LJ NA510LJ NA520LJ NA810LJ	4-Input NAND Gate, 2X Drive 5-Input NAND Gate 5-Input NAND Gate, 2X Drive 8-Input NAND Gate
NA820LJ NO210LJ NO220LJ NO310LJ	8-Input NAND Gate, 2X Drive 2-Input NOR Gate 2-Input NOR Gate, 2X Drive 3-Input NOR Gate
NO320LJ NO410LJ NO420LJ NO510LJ	3-Input NOR Gate, 2X Drive 4-Input NOR Gate 4-Input NOR Gate, 2X Drive 5-Input NOR Gate
NO520LJ NO810LJ NO820LJ OA220LJ	5-Input NOR Gate, 2X Drive 8-Input NOR Gate 8-Input NOR Gate, 2X Drive OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2)$

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

MACRO NUMBER	DESCRIPTION
OA231LJ OA241LJ OP#20LJ OP#21LJ	OR-NAND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$ 2-Wide, 2-Input AND-OR Invert Gate 2-mA, Totem-Pole Output Buffer 2-mA, Open-Drain Output Buffer
OP#23LJ OP#24LJ OP#40LJ OP#41LJ	2-mA, 3-State Output Buffer with Low Enable 2-mA, P-Channel Open-Drain Output Buffer 4-mA, Totem-Pole Output Buffer 4-mA, Open-Drain Output Buffer
OP#43LJ OP#44LJ OP#80LJ OP#81LJ	4-mA, 3-State Output Buffer with Low Enable 4-mA, P-Channel Open-Drain Output Buffer 8-mA, Totem-Pole Output Buffer 8-mA, Open-Drain Output Buffer
OP#83LJ OP#84LJ OP#A0LJ OP#H0LJ	8-mA, 3-State Output Buffer with Low Enable 8-mA, P-Channel Open-Drain Output Buffer 16-mA, Sink/12-mA Source Push-Pull Output Buffer 12-mA, Push-Pull Output Buffer
OP#J0LJ OR210LJ OR220LJ OR310LJ	20-mA, Sink/12-mA Source Push-Pull Output Buffer 2-Input OR Gate 2-Input OR Gate, 2X Drive 3-Input OR Gate
OR320LJ OR410LJ OR420LJ OR510LJ	3-Input OR Gate, 2X Drive 4-Input OR Gate 4-Input OR Gate, 2X Drive 5-Input OR Gate
OR810LJ OSI11LJ OSI12LJ OSI13LJ	8-Input OR Gate Crystal Oscillator, Frequency Range - 55 to 75 MHz Crystal Oscillator, Frequency Range - 35 to 55 MHz Crystal Oscillator, Frequency Range - 20 to 35 MHz
OSI14LJ R2401LJ R2402LJ R2403LJ	Crystal Oscillator, Frequency Range - 1 to 20 MHz 4-Bit Shift Register with Serial In, Asynchronous Clear 4-Bit Shift Register with Serial In, Clear, Complementary Outputs 4-Bit Shift Register with Serial and Parallel Inputs
R2404LJ R2405LJ R2406LJ RF400LJ	4-Bit Shift Register with Serial/Parallel In, Complementary Outputs 4-Bit Flip-Flops with Asynchronous Clear 4-Bit Flip-Flops with Complementary Outputs 16 word by 8 bit, Three-Port Register File
RF402LJ S085LJ S138LJ S139LJ	16 word by 9 bit, Three-Port Register File 4-Bit Magnitude Comparator 3-Line to 8-Line Decoder/Demultiplexer Dual 2-Line to 4-Line Decoder
S150LJ S151LJ S153LJ S157LJ	16-Line to 1-Line Multiplexer 8-Line to 1-Line Multiplexer Dual 4-Line to 1-Line Multiplexer Quad 2-Line to 1-Line Multiplexer
S161ALJ S163ALJ S164LJ S165LJ	Synchronous 4-Bit Binary Counter with Clear Synchronous 4-Bit Binary Counter 8-Bit Parallel-Out Serial Shift Register Parallel-Load 8-Bit Shift Register
S173LJ S175LJ S180XLJ S181LJ	4-Bit D-Type Register with 3-State Outputs Quad D-Type Flip-Flop with Complementary Outputs 8-Bit Odd/Even Parity Tree Arithmetic Logic Unit/Function Generator
S182LJ A191LJ S193LJ S194LJ	4-Bit Look-Ahead Carry Generator Synchronous Up/Down Bin Counter with Down/Up Mode Control Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear) Bidirectional Universal Shift Register
S244LJ S273LJ S283LJ S373LJ	Octal Internal Bus Buffer with 3-State Outputs Octal D-Type Flip-Flop 4-Bit Binary Full Adder with Fast Carry 8-Bit D-Type Latch with 3-State Outputs

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

MACRO NUMBER	DESCRIPTION
S374LJ S375LJ S686LJ S688LJ	8-Bit D-Type Flip-Flop with 3-State Outputs 4-Bit Bistable Latch 8-Bit Magnitude Comparator 8-Bit Identity Comparator
TAB20LJ TDB10LJ TDC11LJ TDN11LJ	Toggle Flip-Flop with Preset, Clear, 2X Drive S-R Master Slave Latch with Asynchronous Clear Master-Slave Latch for SCAN Test, CLR, Master Q & QZ Master-Slave Latch for SCAN Test
TDN12LJ TDN13LJ TDN14LJ TO010LJ	Master-Slave Latch for SCAN Test, Master Q & QZ Master-Slave Latch for SCAN Test, Master Q & QZ, Slave D Master-Slave Latch for SCAN Test, Master Q & QZ, 2X Drive High-Level and Low-Level Tie-Off Gate

FUNCTIONAL MACRO LISTING

TGC100 SERIES 1- μ m CMOS GATE ARRAYS (US and Europe)

Technical data is contained in the TGC100 Series Family Data Sheet (US: SRGS006A; Europe: SCL115).

Adders

MACRO NAME	FUNCTIONAL DESCRIPTION
AD100LJ	One Bit Full Adder

AND Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
AN210LJ	2-Input AND Gate
AN220LJ	2-Input AND Gate, 2X Drive
AN310LJ	3-Input AND Gate
AN320LJ	3-Input AND Gate, 2X Drive
AN410LJ	4-Input AND Gate
AN420LJ	4-Input AND Gate, 2X Drive
AN510LJ	5-Input AND Gate
AN810LJ	8-Input AND Gate

AND-OR/NOR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
AO220LJ	AND-OR Gate, 2X Drive $Y = (A \cdot B) + (C \cdot D)$
AO221LJ	AND-NOR Gate, 2X Drive $Y = \overline{(A \cdot B) + (C \cdot D)}$
AO241LJ	2-Wide, 2-Input AND-OR Gate
AO320LJ	AND-OR Gate, $Y = (A1 \cdot A2 \cdot A3) + (B1 \cdot B2 \cdot B3)$
AO421LJ	AND-NOR Gate, $Y = \overline{[(A1 \cdot A2 \cdot A3 \cdot A4) + (B1 \cdot B2 \cdot B3 \cdot B4)]}$

Arithmetic Operators (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S181LJ	Arithmetic Logic Unit/Function Generator
S182LJ	4-Bit Look-Ahead Carry Generator
S283LJ	4-Bit Binary Full Adder Fast Carry

Boolean Functions

MACRO NAME	FUNCTIONAL DESCRIPTION
BF001LJ	AND-NOR Gate $Y = \overline{A1 + (B1 \cdot B2)}$
BF006LJ	AND-NOR Gate $Y = \overline{[A1 + A2 + (B1 \cdot B2)]}$
BF011LJ	AND-NOR Gate $Y = \overline{[A1 \cdot A2] + (B1 \cdot B2) + [C1 \cdot C2]}$
BF022LJ	OR-AND-NOR Gate $Y = \overline{A1 \cdot A2 + [B1 \cdot B2 \cdot (C1 + C2)]}$
BF051LJ	OR-NAND Gate $Y = \overline{A1 \cdot (B1 + B2)}$
BF053LJ	OR-NAND Gate $Y = \overline{[A1 + A2] \cdot (B1 + B2)}$
BF056LJ	OR-NAND Gate $Y = \overline{[A1 \cdot A2 \cdot (B1 + B2)]}$

Clock Splitters/Drivers

MACRO NAME	FUNCTIONAL DESCRIPTION
CK120LJ	Dual-Phase, Non-Overlapping Clock Driver
CKD03LJ	Clock Distribution Macro for TGC103 Base Array
CKD05LJ	Clock Distribution Macro for TGC105 Base Array
CKD08LJ	Clock Distribution Macro for TGC108 Base Array
CKD12LJ	Clock Distribution Macro for TGC112 Base Array
CKD15LJ	Clock Distribution Macro for TGC115 Base Array
CKD18LJ	Clock Distribution Macro for TGC118 Base Array

Comparators (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S085LJ	4-Bit Magnitude Comparator
S686LJ	8-Bit Magnitude Comparator
S688LJ	8-Bit Identity Comparator

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Counters (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S161ALJ	Synchronous 4-Bit Binary Counter with Clear
S163ALJ	Synchronous 4-Bit Binary Counter
S191LJ	Synchronous Up/Down Bin Counter with Down/Up Mode Control
S193LJ	Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear)

Decoders/Demultiplexers

MACRO NAME	FUNCTIONAL DESCRIPTION
DE210LJ	2-Line to 4-Line Decoder

Decoders/Demultiplexers (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S138LJ	3-Line to 8-Line Decoder/Demultiplexer
S139LJ	Dual 2-Line to 4-Line Decoder

Delay Elements

MACRO NAME	FUNCTIONAL DESCRIPTION
DLD00LJ	Delay Driver
DLE00LJ	Delay Element

Flip-Flops/Registers

MACRO NAME	FUNCTIONAL DESCRIPTION
DFB20LJ	D-Type Flip-Flop with Preset, Clear, 2X Drive
DTB00LJ	D-Type Flip-Flop with Preset, Clear
DTB10LJ	D-Type Flip-Flop with Preset, Clear, 1X Drive
DTB20LJ	D-Type Flip-Flop with Preset, Clear, 2X Drive
DTC00LJ	D-Type Flip-Flop with Clear
DTC10LJ	D-Type Flip-Flop with Clear, 1X Drive
DTC20LJ	D-Type Flip-Flop with Clear, 2X Drive
DTN00LJ	D-Type Flip-Flop
DTN10LJ	D-Type Flip-Flop, 1X Drive
DTN20LJ	D-Type Flip-Flop, 2X Drive
DTP00LJ	D-Type Flip-Flop with Preset
DTP10LJ	D-Type Flip-Flop with Preset, 1X Drive
DTP20LJ	D-Type Flip-Flop with Preset, 2X Drive
R2401LJ	4-Bit Shift Register with Serial In, Asynchronous Clear
R2402LJ	4-Bit Shift Register with Serial In, Clear, Complementary Outputs
R2403LJ	4-Bit Shift Register with Serial and Parallel Inputs
R2404LJ	4-Bit Shift Register with Serial/Parallel In, Complement. Outputs
R2405LJ	4-Bit Flip-Flops with Asynchronous Clear
R2406LJ	4-Bit Flip-Flops with Complementary Outputs

D-Type Flip-Flops (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S173LJ	4-Bit D-Type Register with 3-State Outputs
S175LJ	Quad D-Type Flip-Flop with Complementary Outputs
S273LJ	Octal D-Type Flip-Flop
S374LJ	8-Bit D-Type Flip-Flop with 3-State Outputs

Exclusive-OR/NOR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
EN210LJ	2-Input Exclusive-NOR Gate
EX210LJ	2-Input Exclusive-OR Gate
EX220LJ	2-Input Exclusive-OR Gate, 2X Drive

Inputs/Outputs, Bidirectionals

MACRO NAME	FUNCTIONAL DESCRIPTION
IO#21LJ IO#24LJ IO#41LJ IO#44LJ	2-mA, 3-State I/O Buffer with CMOS Input 2-mA, 3-State I/O Buffer with TTL Input 4-mA, 3-State I/O Buffer with CMOS Input 4-mA, 3-State I/O Buffer with TTL Input
IO#81LJ IO#84LJ IO#21LJ IO#24LJ	8-mA, 3-State I/O Buffer with CMOS Input 8-mA, 3-State I/O Buffer with TTL Input 2-mA, 3-State I/O Buffer with CMOS Input with Pull-Up 2-mA, 3-State I/O Buffer with TTL Input with Pull-Up
IO#41LJ IO#44LJ IO#81LJ IO#84LJ	4-mA, 3-State I/O Buffer with CMOS Input with Pull-Up 4-mA, 3-State I/O Buffer with TTL Input with Pull-Up 8-mA, 3-State I/O Buffer with CMOS Input with Pull-Up 8-mA, 3-State I/O Buffer with TTL Input with Pull-Up
IO#21LJ IO#24LJ IO#41LJ IO#44LJ	2-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 2-mA, 3-State I/O Buffer with TTL Input with Pull-Down 4-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 4-mA, 3-State I/O Buffer with TTL Input with Pull-Down
IO#81LJ IO#84LJ	8-mA, 3-State I/O Buffer with CMOS Input with Pull-Down 8-mA, 3-State I/O Buffer with TTL Input with Pull-Down

Inputs

MACRO NAME	FUNCTIONAL DESCRIPTION
IPI00LJ IPI00LJ IPI01LJ IPI04LJ	CMOS-compatible Inverting Input Buffer Inverting CMOS-Compatible Input Buffer CMOS-Compatible Input Buffer TTL-Compatible Input Buffer
IPI06LJ IPI09LJ IPL01LJ IPL04LJ	CMOS-Compatible Inverting Input Buffer with Hysteresis TTL-Compatible Input Buffer with Hysteresis CMOS-Compatible Input Buffer with Pullup TTL-Compatible Input Buffer with Pullup
IPU01LJ IPU04LJ	CMOS-Compatible Input Buffer with Pulldown TTL-Compatible Input Buffer with Pulldown

Inverters/Buffers

MACRO NAME	FUNCTIONAL DESCRIPTION
BU130LJ BU150LJ IV110LJ IV120LJ	Delay Buffer, 3X Drive Delay Buffer, 5X Drive Inverter Inverter, 2X Drive
IV140LJ IV211LJ IV221LJ IV241LJ S244LJ	Inverter, 4X Drive Inverting 3-State Buffer with Low Enable Inverting 3-State Buffer with Low Enable, 2X Drive Inverting 3-State Buffer with Low Enable, 4X Drive Octal Internal Bus Buffer with 3-State Outputs

J-K Flip-Flops

MACRO NAME	FUNCTIONAL DESCRIPTION
JKB20LJ JKB21LJ	J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive

Latches

MACRO NAME	FUNCTIONAL DESCRIPTION
LAB20LJ LAH12LJ LAH13LJ LAH14LJ	S-R Latch, 2X Drive D-Type Transparent Latch, 3-State Non-Inverting Output D-Type Transparent Latch, 3-State Inverting Output D-Type Transparent Latch, 3-State Complementary Outputs
LAH20LJ LAH22LJ LH110LJ LH400LJ	D-Type Latch with High Enable, 2X Drive D-Type Latch with Low Enable and Clear, 2X Drive 3-State Bus Holder 4-Bit Latch

Latches (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S373LJ	8-Bit D-Type Latch with 3-State Outputs
S375LJ	4-Bit Bistable Latch

Multiplexers

MACRO NAME	FUNCTIONAL DESCRIPTION
MU111LJ	2-Line to 1-Line Multiplexer
MU220LJ	4-Line to 1-Line Multiplexer, 2X Drive
MU311LJ	8-Line to 1-Line Multiplexer

Multiplexers (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S150LJ	16-line to 1-line Multiplexer
S151LJ	8-Line to 1-Line Multiplexer
S153LJ	Dual 4-Line to 1-Line Multiplexer
S157LJ	Quad 2-Line to 1-Line Multiplexer

NAND Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
NA210LJ	2-Input NAND Gate
NA220LJ	2-Input NAND Gate, 2X Drive
NA310LJ	3-Input NAND Gate
NA311LJ	3-Input NAND Gate, Inverted A Input: $Y = \overline{(\overline{A}) \cdot B \cdot C}$
NA320LJ	3-Input NAND Gate, 2X Drive
NA410LJ	4-Input NAND Gate
NA420LJ	4-Input NAND Gate, 2X Drive
NA510LJ	5-Input NAND Gate
NA520LJ	5-Input NAND Gate, 2X Drive
NA810LJ	8-Input NAND Gate
NA820LJ	8-Input NAND Gate, 2X Drive

NOR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
NO210LJ	2-Input NOR Gate
NO220LJ	2-Input NOR Gate, 2X Drive
NO310LJ	3-Input NOR Gate
NO320LJ	3-Input NOR Gate, 2X Drive
NO410LJ	4-Input NOR Gate
NO420LJ	4-Input NOR Gate, 2X Drive
NO510LJ	5-Input NOR Gate
NO520LJ	5-Input NOR Gate, 2X Drive
NO810LJ	8-Input NOR Gate
NO820LJ	8-Input NOR Gate, 2X Drive

OR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
OR210LJ	2-Input OR Gate
OR220LJ	2-Input OR Gate, 2X Drive
OR310LJ	3-Input OR Gate
OR320LJ	3-Input OR Gate, 2X Drive
OR410LJ	4-Input OR Gate
OR420LJ	4-Input OR Gate, 2X Drive
OR510LJ	5-Input OR Gate
OR810LJ	8-Input OR Gate

OR-AND/NAND Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
OA220LJ	OR-AND Gate: $Y = (A1 + A2) \cdot (B1 + B2)$
OA231LJ	OR-NAND Gate: $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$
OA241LJ	2-Wide, 2-Input AND-OR Invert Gate

Oscillators

MACRO NAME	FUNCTIONAL DESCRIPTION
OSI11LJ	Crystal Oscillator, Frequency Range - 55 to 75 MHz
OSI12LJ	Crystal Oscillator, Frequency Range - 35 to 55 MHz
OSI13LJ	Crystal Oscillator, Frequency Range - 20 to 35 MHz
OSI14LJ	Crystal Oscillator, Frequency Range - 1 to 20 MHz

Outputs

MACRO NAME	FUNCTIONAL DESCRIPTION
OP#20LJ	2-mA, Totem-Pole Output Buffer
OP#21LJ	2-mA, Open-Drain Output Buffer
OP#23LJ	2-mA, 3-State Output Buffer with Low Enable
OP#24LJ	2-mA, P-Channel Open-Drain Output Buffer
OP#40LJ	4-mA, Totem-Pole Output Buffer
OP#41LJ	4-mA, Open-Drain Output Buffer
OP#43LJ	4-mA, 3-State Output Buffer with Low Enable
OP#44LJ	4-mA, P-Channel Open-Drain Output Buffer
OP#80LJ	8-mA, Totem-Pole Output Buffer
OP#81LJ	8-mA, Open-Drain Output Buffer
OP#83LJ	8-mA, 3-State Output Buffer with Low Enable
OP#84LJ	8-mA, P-Channel Open-Drain Output Buffer
OP#A0LJ	16-mA Sink/12-mA Source Push-Pull Output Buffer
OP#HOLJ	12-mA Push-Pull Output Buffer
OP#JOLJ	20-mA Sink/12-mA Source Push-Pull Output Buffer

Parity Tree (Software Macro)

MACRO NAME	FUNCTIONAL DESCRIPTION
S180XLJ	8-Bit Odd/Even Parity Tree

Register Files

MACRO NAME	FUNCTIONAL DESCRIPTION
RF400LJ	16 Word by 8 Bit, Three Port Register File
RF402LJ	16 Word by 9 Bit, Three Port Register File

SCAN Latches

MACRO NAME	FUNCTIONAL DESCRIPTION
TDB10LJ	S-R Master-Slave Latch with Asynchronous Clear
TDC11LJ	Master-Slave Latch for SCAN Test, CLR, Master Q & QZ
TDN11LJ	Master-Slave Latch for SCAN Test
TDN12LJ	Master-Slave Latch for SCAN Test, Master Q & QZ
TDN13LJ	Master-Slave Latch for SCAN Test, Master Q & QZ, Slave D
TDN22LJ	Master-Slave Latch for SCAN Test, Master Q & QZ, 2X Drive

Shift Registers (Software Macros)

MACRO NAME	FUNCTIONAL DESCRIPTION
S164LJ	8-Bit Parallel-Out Serial Shift Registers
S165LJ	Parallel-Load 8-Bit Shift Registers
S194ALJ	Bidirectional Universal Shift Registers

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

Toggle Flip-Flop

MACRO NAME	FUNCTIONAL DESCRIPTION
TAB20LJ	Toggle Flip-Flop with Preset, Clear, 2X Drive

Tie-Off Gate

MACRO NAME	FUNCTIONAL DESCRIPTION
TO010LJ	High-Level and Low-Level Tie-Off Gate

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ASIC Alphanumeric and Functional Macro Listings

2- μ m TAAC SERIES CMOS GATE ARRAYS (Europe Only)

Supported in Europe only, the 2- μ m array series consists of 5 arrays ranging in density from 300 to 2500 gates with I/O's from 28 to 100. The array structure is based on TI's established twin-well CMOS 256K DRAM technology with gate lengths of 1.8 microns. The TAAC array family offers typical propagation delays of 1.2 ns (with 8 loads) and a maximum toggle rate of 60 MHz. Normally users can expect a gate utilization of 100%.

The TAAC Series library contains an extensive SSI/MSI macro library, which is a subset of TI's 2- μ m cell library. Standard designs typically take up to 15 working days to manufacture (from customer approval of post-layout simulation to shipment of 10 ceramic-packaged verification samples).

Contact your nearest TI European Sales Office for a copy of the TAAC Series Family Data Sheet (SCL79) the TAAC Series Product Brochure (SCL92), or the TAAC Series Data Manual (SCL90).

ALPHANUMERIC MACRO LISTING: TAAC SERIES 2- μ m CMOS GATE ARRAYS (Europe Only)

Technical data is contained in the TAAC Series Family Data Sheet (US: SRGS006A; Europe: SCL79).

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ASIC Alphanumeric and Functional Macro Listings

MACRO NUMBER	DESCRIPTION
AN210LH AN310LH AN410LH AN510LH	2-Input AND Gate 3-Input AND Gate 4-Input AND Gate 5-Input AND Gate
AN610LH AN710LH AN810LH AO210LH	6-Input AND Gate* 7-Input AND Gate* 8-Input AND Gate AND/OR Gate**
AO211LH BU110LH DFB10LH DFC10LH	AND/OR Invert Gate** Buffer D F-F, Boolean, Preset & Clear D F-F, Boolean, Clear Only**
DFN10LH DFP10LH DFY10LH DFZ10LH	D F-F, Boolean, No Preset or Clear** D F-F, Boolean, Preset Only** D F-F, Boolean, DFP10LH w/D Tied Low** D F-F, Boolean, DFB10LH w/D Tied Low**
DTB10LH DTC10LH DTN10LH DTP10LH	D F-F, Transmission Gate, Preset & Clear D F-F, Transmission Gate, Clear Only D F-F, Transmission Gate, No Preset or Clear D F-F, Transmission Gate, Preset Only
EX210LH IO000LH IO001LH IO002LH	Exclusive OR Gate Bidir. Buffer, In: CMOS Inv, Out: 4mA Non-Inv, AHE* Bidir. Buffer, In: TTL Inv, Out: 4mA Non-Inv, AHE* Bidir. Buffer, In: CMOS Inv, Out: 4mA Open N-Drain Inv*
IO003LH IO004LH IO005LH IO006LH	Bidir. Buffer, In: TTL Inv, Out: 4mA Open N-Drain Inv* Bidir. Buffer, In: CMOS Inv, Out: 4mA Open P-Drain Inv* Bidir. Buffer, In: TTL Inv, Out: 4mA Open P-Drain Inv* Bidir. Buffer, In: TTL Schmitt Inv, Out: 4mA Non-Inv*
IPC00LH IPC03LH IPC06LH IPC09LH	Std. Input Buffer, CMOS Inv Std. Input Buffer, TTL Inv Std. Input Buffer, CMOS Inv Schmitt Std. Input Buffer, TTL Non-Inv Schmitt
IV110LH IV211LH IV212LH JBB10LH	Inverter 3-State Inverter ALE 3-State Inverter AHE J-KZ F-F, Boolean J-KZ Flip-Flop (CK-Q) Preset & Clear*
JBB11LH JBC10LH JBN10LH JBP10LH	J-KZ F-F, Boolean, Neg. Edge Triggered w/Clr* J-KZ F-F, Boolean, Clear Only* J-KZ F-F, Boolean, No Preset or Clear* J-KZ F-F, Boolean, Preset Only*
JKB10LH JKB11LH JKC10LH JKN10LH	J-KZ F-F, Transmission Gate, Preset & Clear** J-KZ F-F, Transmission Gate, Neg. Edge Triggered w/Clr** J-KZ F-F, Transmission Gate, Clear Only* J-KZ F-F, Transmission Gate, No Preset or Clear*
JKP10LH LAB10LH LAH10LH LAL10LH	J-KZ F-F, Transmission Gate, Preset Only* S-R Latch D-Type Latch AHE** D-Type Latch ALE**
NA210LH NA310LH NA410LH NA510LH	2-Input NAND Gate 3-Input NAND Gate 4-Input NAND Gate 5-Input NAND Gate

* No exact 2- μ m Standard Cell counterpart

** 2- μ m Standard Cell has twice the drive capability

*** No exact counterpart for easy migration of design to 2- μ m Standard Cell. Differences are sometimes small. For example, IO000LH, IO001LH and IO006LH have AHE versus ALE for Standard Cell versions.

AHE: Active High Enable; ALE: Active Low Enable

MACRO NUMBER	DESCRIPTION
NA610LH NA710LH NA810LH NO210LH	6-Input NAND Gate* 7-Input NAND Gate* 8-Input NAND Gate 2-Input NOR Gate
NO310LH NO410LH NO510LH NO610LH	3-Input NOR Gate 4-Input NOR Gate 5-Input NOR Gate 6-Input NOR Gate*
NO710LH NO810LH OP000LH OP001LH	7-Input NOR Gate* 8-Input NOR Gate Std. Output Buffer, 2mA Inv*** Std. Output Buffer, 4mA Inv***
OP003LH OP004LH OP005LH OPC00LH	Open-Drain Output Buffer, 4mA Inv Open N (A-Y)*** Open-Drain Output Buffer, 4mA Inv Open P (A-Y)*** Std. Output Buffer, 16mA Inv Low Noise*** Std. Output Buffer, 10mA Non-Inv
OPC20LH OPC42LH OPC60LH OPCA0LH	Std. Output Buffer, 2mA Non-Inv*** 3-State Output Buffer, 4mA Non-Inv (A-Y) Std. Output Buffer, 6mA Non-Inv Std. Output Buffer, 10/16mA Non-Inv***
OR210LH OR310LH OR410LH OR510LH	2-Input OR Gate 3-Input OR Gate 4-Input OR Gate 5-Input OR Gate
OR610LH OR710LH OR810LH TAB10LH	6-Input OR Gate* 7-Input OR Gate* 8-Input OR Gate D F-F, Toggled w/Presets & Clear**
TAC10LH TAP10LH XN210LH	D F-F, Toggled w/Clear** D F-F, Toggled w/Presets** Exclusive NOR Gate

* No exact 2- μ m Standard Cell counterpart

** 2- μ m Standard Cell has twice the drive capability

*** No exact counterpart for easy migration of design to 2- μ m Standard Cell. Differences are sometimes small. For example, IO000LH, IO001LH and IO006LH have AHE versus ALE for Standard Cell versions.

AHE: Active High Enable; ALE: Active Low Enable

FUNCTIONAL MACRO LISTING: TAAC SERIES 2- μ m CMOS GATE ARRAYS (Europe Only)

Technical data is contained in the TAAC Series Family Data Sheet (US: SRGS006A; Europe: SCL79).

AND Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
AN210LH	2-Input AND Gate
AN310LH	3-Input AND Gate
AN410LH	4-Input AND Gate
AN510LH	5-Input AND Gate
AN610LH	6-Input AND Gate*
AN710LH	7-Input AND Gate*
AN810LH	8-Input AND Gate

Buffers, Bidirectional

MACRO NAME	FUNCTIONAL DESCRIPTION
I0000LH	Bidir. Buffer, In: CMOS Inv, Out: 4mA Non-Inv, AHE*
I0001LH	Bidir. Buffer, In: TTL Inv, Out: 4mA Non-Inv, AHE*
I0002LH	Bidir. Buffer, In: CMOS Inv, Out: 4mA Open N-Drain Inv*
I0003LH	Bidir. Buffer, In: TTL Inv, Out: 4mA Open N-Drain Inv*
I0004LH	Bidir. Buffer, In: CMOS Inv, Out: 4mA Open P-Drain Inv*
I0005LH	Bidir. Buffer, In: TTL Inv, Out: 4mA Open P-Drain Inv*
I0006LH	Bidir. Buffer, In: TTL Schmitt Inv, Out: 4mA Non-Inv AHE*

Buffers, Open-Drain Output

MACRO NAME	FUNCTIONAL DESCRIPTION
OP003LH	Open-Drain Output Buffer, 4mA Inv Open N (A-Y)**
OP004LH	Open-Drain Output Buffer, 4mA Inv Open P (A-Y)**

Buffers, Standard Input

MACRO NAME	FUNCTIONAL DESCRIPTION
IPC00LH	Std. Input Buffer, CMOS Inv
IPC03LH	Std. Input Buffer, TTL Inv
IPC06LH	Std. Input Buffer, CMOS Inv Schmitt
IPC09LH	Std. Input Buffer, TTL Non-Inv Schmitt

Buffers, Standard Output

MACRO NAME	FUNCTIONAL DESCRIPTION
OP000LH	Std. Output Buffer, 2mA Inv**
OP001LH	Std. Output Buffer, 4mA Inv**
OP005LH	Std. Output Buffer, 16mA Inv Low Noise**
OPC20LH	Std. Output Buffer, 2mA Non-Inv**
OPC60LH	Std. Output Buffer, 6mA Non-Inv
OPC00LH	Std. Output Buffer, 10mA Non-Inv
OPCA0LH	Std. Output Buffer, 10/16mA Non-Inv**

Buffers, 3-State Output

MACRO NAME	FUNCTIONAL DESCRIPTION
OPC42LH	3-State Output Buffer, 4mA Non-Inv (A-Y)

* No exact 2- μ m Standard Cell counterpart

** No exact counterpart for easy migration of design to 2- μ m Standard Cell. Differences are sometimes small. For example, IO000LH, IO001LH and IO006LH have AHE versus ALE for Standard Cell versions.

*** 2- μ m Standard Cell counterpart has twice the drive capability

AHE: Active High Enable; ALE: Active Low Enable

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Flip-Flops, D-Type, Boolean

MACRO NAME	FUNCTIONAL DESCRIPTION
DFB10LH DFC10LH DFN10LH DFP10LH	D F-F, Boolean, Preset & Clear D F-F, Boolean, Clear Only*** D F-F, Boolean, No Preset or Clear*** D F-F, Boolean, Preset Only***
DFY10LH DFZ10LH	D F-F, Boolean, DFP w/D Tied Low*** D F-F, Boolean, DFB w/D Tied Low***

Flip-Flops, D-Type, Toggled

MACRO NAME	FUNCTIONAL DESCRIPTION
TAP10LH TAC10LH TAB10LH	D F-F, Toggled w/Preset*** D F-F, Toggled w/Clear*** D F-F, Toggled w/Preset & Clear***

Flip-Flops, D-Type, Transmission Gate

MACRO NAME	FUNCTIONAL DESCRIPTION
DTB10LH DTC10LH DTN10LH DTP10LH	D F-F, Transmission Gate, Preset & Clear D F-F, Transmission Gate, Clear Only D F-F, Transmission Gate, No Preset or Clear D F-F, Transmission Gate, Preset Only

Flip-Flops, J-KZ Type, Boolean

MACRO NAME	FUNCTIONAL DESCRIPTION
JBB10LH JBC10LH JBN10LH JBP10LH	J-KZ F-F, Boolean J-KZ Flip-Flop (CK-Q) Preset & Clear* J-KZ F-F, Boolean, Clear Only* J-KZ F-F, Boolean, No Preset or Clear* J-KZ F-F, Boolean, Preset Only*

Flip-Flops, J-KZ Type, Neg. Edge Triggered

MACRO NAME	FUNCTIONAL DESCRIPTION
JBB11LH JKB11LH	J-KZ F-F, Boolean, Neg. Edge Triggered w/Clr* J-KZ F-F, Transmission Gate, Neg. Edge Triggered w/Clr***

Flip-Flops, J-KZ Type, Transmission Gate

MACRO NAME	FUNCTIONAL DESCRIPTION
JKB10LH JKC10LH JKN10LH JKP10LH	J-KZ F-F, Transmission Gate, Preset & Clear*** J-KZ F-F, Transmission Gate, Clear Only* J-KZ F-F, Transmission Gate, No Preset or Clear* J-KZ F-F, Transmission Gate, Preset Only*

Gates, Miscellaneous

MACRO NAME	FUNCTIONAL DESCRIPTION
EX210LH XN210LH AO210LH AO211LH	Exclusive OR Gate Exclusive NOR Gate AND/OR Gate*** AND/OR Invert Gate***
LAB10LH LAL10LH LAH10LH	S-R Latch D-Type Latch ALE*** D-Type Latch AHE***

* No exact 2- μ m Standard Cell counterpart** No exact counterpart for easy migration of design to 2- μ m Standard Cell. Differences are sometimes small. For example, IO000LH, IO001LH and IO006LH have AHE versus ALE for Standard Cell versions.*** 2- μ m Standard Cell counterpart has twice the drive capability

AHE: Active High Enable; ALE: Active Low Enable

Inverters and Buffers

MACRO NAME	FUNCTIONAL DESCRIPTION
IV110LH	Inverter
IV211LH	3-State Inverter ALE
IV212LH	3-State Inverter AHE
BU110LH	Buffer

NAND Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
NA210LH	2-Input NAND Gate
NA310LH	3-Input NAND Gate
NA410LH	4-Input NAND Gate
NA510LH	5-Input NAND Gate
NA610LH	6-Input NAND Gate*
NA710LH	7-Input NAND Gate*
NA810LH	8-Input NAND Gate

NOR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
NO210LH	2-Input NOR Gate
NO310LH	3-Input NOR Gate
NO410LH	4-Input NOR Gate
NO510LH	5-Input NOR Gate
NO610LH	6-Input NOR Gate*
NO710LH	7-Input NOR Gate*
NO810LH	8-Input NOR Gate

OR Gates

MACRO NAME	FUNCTIONAL DESCRIPTION
OR210LH	2-Input OR Gate
OR310LH	3-Input OR Gate
OR410LH	4-Input OR Gate
OR510LH	5-Input OR Gate
OR610LH	6-Input OR Gate*
OR710LH	7-Input OR Gate*
OR810LH	8-Input OR Gate

* No exact 2- μ m Standard Cell counterpart

** No exact counterpart for easy migration of design to 2- μ m Standard Cell. Differences are sometimes small. For example, IO000LH, IO001LH and IO006LH have AHE versus ALE for Standard Cell versions.

*** 2- μ m Standard Cell counterpart has twice the drive capability

AHE: Active High Enable; ALE: Active Low Enable

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ASIC Alphabetic and Functional Macro Listings

STANDARD CELL PRODUCT FAMILY

1- μ m TSC500 SERIES CMOS STANDARD CELLS (US and Europe)

The TSC500 Series, based on TI's proprietary 1- μ m EPIC™ double-level-metal CMOS technology, provides for significant increases in system integration and performance. Typical propagation delay for the smallest version (lowest power, lowest speed) of a two-input NAND gate is 500 ps (fan-out = 2) with a maximum toggle rate of 208 MHz.

TI's third-generation standard cell family contains more than 400 cell types including SSI, MSI, I/O, and Boolean functions. Both hardwired and software macros are available. Hardwired macros provide a broad selection of pre-designed, fully characterized functions. Software macros provide popular TTL/CMOS-type MSI functions that can be used as supplied or modified at your workstation to suit your design requirements. Additional user-defined software macros can be created using the TSC500 Series Library.

MegaModule functions available are RAM, FIFO's, Register Files and 29XX Bit Slice (2901 4-Bit slice, 2902 Carry Look-Ahead, 2904 Status/Shift Controller, 2910 Microprogram Controller) functions. PC Peripheral (8737 DMA Controller, 8254 Internal Timer, 8259A Interrupt Controller, 82284 Clock Generator/Driver, 82288 Bus Controller) are scheduled for future release.

CompilerCell functions such as RAM and ROM, generated automatically on an engineering workstation utilizing user-specified dimensional parameters, are available for 1- μ m designs.

Contact the nearest TI field sales office for a copy of the TSC500 Series Family Data Sheet (US: SRSS033) and TSC500 Series Product Bulletin (US: SRYT03B).

STANDARD-CELL PACKAGE OPTIONS																	
Type	Number of Pins																
	16	20	24	28	40	44	48	68	80	84	100	120	132	144	160	180	208
DIP	C	C	C	C/M	C/M		C/M										
LCC				C/M		C/M		C/M		C/M							
QFP									C**		C/M†*	C*	C/M†		C*		
PGA								M		M	C/M	C/M	C/M	C/M		C/M	M

C = Commercial M = Military

† = JEDEC * = EIAJ

** Europe Only

Military Applications

TI also offers standard cell designs processed in compliance with MIL-STD-883, Method 5004/5005 or Method 5010. Refer to the Military Products Designer's Reference Guide (SGYZ001B) for more information regarding TI Military ASIC.

ALPHANUMERIC CELL LISTING: TSC500 SERIES 1- μ m CMOS STANDARD CELLS (US and Europe)

Technical data is contained in the TSC500 Series Family Data Sheet (US: SRSS033).

CELL NUMBER	DESCRIPTION
AN210LJ AN220LJ AN240LJ AN260LJ	2-Input AND Gate 2-Input AND Gate, 2X Drive 2-Input AND Gate, 4X Drive 2-Input AND Gate, 6X Drive
AN310LJ AN320LJ AN340LJ AN360LJ	3-Input AND Gate 3-Input AND Gate, 2X Drive 3-Input AND Gate, 4X Drive 3-Input AND Gate, 6X Drive
AN410LJ AN420LJ AN440LJ AN460LJ	4-Input AND Gate 4-Input AND Gate, 2X Drive 4-Input AND Gate, 4X Drive 4-Input AND Gate, 6X Drive
AN510LJ AN810LJ AO220LJ AO221LJ	5-Input AND Gate 8-Input AND Gate AND-OR Gate, 2X Drive $Y=(A \cdot B)+(C \cdot D)$ AND-NOR Gate, 2X Drive $Y=(\overline{A \cdot B})+(\overline{C \cdot D})$
AO230LJ AO250LJ AO320LJ AO420LJ	AND-OR Gate, 2X Drive $Y=(A1 \cdot A2)+(B1 \cdot B2)+(C1 \cdot C2)$ AND-OR Gate, 2X Drive $Y=(A1 \cdot A2)+(B1 \cdot B2)+(C1 \cdot C2)+(D1 \cdot D2)+E1$ AND-OR Gate, 2X Drive $Y=(A1 \cdot A2 \cdot A3)+(B1 \cdot B2 \cdot B3)$ AND-OR Gate, 2X Drive $Y=(A1 \cdot A2 \cdot A3 \cdot A4)+(B1 \cdot B2 \cdot B3 \cdot B4)$
AO421LJ BF001LJ BF002LJ BF004LJ	AND-NOR Gate, 2X Drive $Y=(\overline{A1 \cdot A2 \cdot A3 \cdot A4})+(\overline{B1 \cdot B2 \cdot B3 \cdot B4})$ AND-NOR Gate $Y=\overline{A1}+(\overline{B1 \cdot B2})$ AND-NOR Gate $Y=\overline{A1}+(\overline{B1 \cdot B2 \cdot B3})$ AND-NOR Gate $Y=(\overline{A1 \cdot A2})+(\overline{B1 \cdot B2 \cdot B3})$
BF005LJ BF006LJ BF007LJ BF008LJ	AND-NOR Gate $Y=(\overline{A1 \cdot A2 \cdot A3})+(\overline{B1 \cdot B2 \cdot B3})$ AND-NOR Gate $Y=\overline{A1} + A2 + (\overline{B1 \cdot B2})$ AND-NOR Gate $Y=\overline{A1} + A2 + (\overline{B1 \cdot B2 \cdot B3})$ AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot B2}) + (\overline{C1 \cdot C2})$
BF009LJ BF010LJ BF011LJ BF012LJ	AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot B2}) + (\overline{C1 \cdot C2 \cdot C3})$ AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot B2 \cdot B3}) + (\overline{C1 \cdot C2 \cdot C3})$ AND-NOR Gate $Y=(\overline{A1 \cdot A2}) + (\overline{B1 \cdot B2}) + (\overline{C1 \cdot C2})$ AND-NOR Gate $Y=(\overline{A1 \cdot A2}) + (\overline{B1 \cdot B2}) + (\overline{C1 \cdot C2 \cdot C3})$
BF013LJ BF014LJ BF015LJ BF016LJ	AND-NOR Gate $Y=(\overline{A1 \cdot A2}) + (\overline{B1 \cdot B2 \cdot B3}) + (\overline{C1 \cdot C2 \cdot C3})$ AND-NOR Gate $Y=(\overline{A1 \cdot A2 \cdot A3}) + (\overline{B1 \cdot B2 \cdot B3}) + (\overline{C1 \cdot C2 \cdot C3})$ OR-AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot (C1 + C2)})$ AND-OR-NAND Gate $Y=\overline{A1} + ((\overline{B1 + B2}) \cdot (\overline{C1 + C2}))$
BF017LJ BF020LJ BF022LJ BF025LJ	OR-AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot B2 \cdot (C1 + C2)})$ OR-AND-NOR Gate $Y=\overline{A1 \cdot A2} + (\overline{B1 \cdot (C1 + C2)})$ OR-AND-NOR Gate $Y=\overline{A1 \cdot A2} + (\overline{B1 \cdot B2 \cdot (C1 + C2)})$ OR-AND-NOR Gate $Y=\overline{A1 \cdot A2 \cdot A3} + (\overline{B1 \cdot (C1 + C2)})$
BF027LJ BF028LJ BF030LJ BF034LJ	OR-AND-NOR Gate $Y=\overline{A1 \cdot A2 \cdot A3} + (\overline{B1 \cdot B2 \cdot (C1 + C2)})$ OR-AND-NOR Gate $Y=\overline{A1 \cdot A2 \cdot A3} + (\overline{B1 \cdot (C1 + C2) \cdot (D1 + D2)})$ AND-OR-AND-NOR Gate $Y=\overline{A1} + (\overline{B1 \cdot (C1 + (D1 \cdot D2))})$ AND-OR-AND-NOR Gate $Y=(\overline{A1 \cdot A2}) + (\overline{B1 \cdot (C1 + (D1 \cdot D2))})$
BF035LJ BF051LJ BF052LJ BF053LJ	AND-OR-AND-NOR Gate $Y=(\overline{A1 \cdot A2}) + (\overline{B1 \cdot ((C1 \cdot C2) + (D1 \cdot D2))})$ OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + B2})$ OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + B2 + B3})$ OR-NAND Gate $Y=(\overline{A1 + A2}) \cdot (\overline{B1 + B2})$
BF054LJ BF055LJ BF056LJ BF057LJ	OR-NAND Gate $Y=(\overline{A1 + A2}) \cdot (\overline{B1 + B2 + B3})$ OR-NAND Gate $Y=(\overline{A1 + A2 + A3}) \cdot (\overline{B1 + B2 + B3})$ OR-NAND Gate $Y=\overline{A1 \cdot A2} \cdot (\overline{B1 + B2})$ OR-NAND Gate $Y=\overline{A1 \cdot A2} \cdot (\overline{B1 + B2 + B3})$
BF058LJ BF059LJ BF060LJ BF062LJ	OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + B2}) \cdot (\overline{C1 + C2})$ OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + B2}) \cdot (\overline{C1 + C2 + C3})$ OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + B2 + B3}) \cdot (\overline{C1 + C2 + C3})$ OR-NAND Gate $Y=(\overline{A1 + A2}) \cdot (\overline{B1 + B2}) \cdot (\overline{C1 + C2 + C3})$
BF063LJ BF064LJ BF065LJ BF066LJ	OR-NAND Gate $Y=(\overline{A1 + A2}) \cdot (\overline{B1 + B2 + B3}) \cdot (\overline{C1 + C2 + C3})$ OR-NAND Gate $Y=(\overline{A1 + A2 + A3}) \cdot (\overline{B1 + B2 + B3}) \cdot (\overline{C1 + C2 + C3})$ AND-OR-NAND Gate $Y=\overline{A1} \cdot (\overline{B1 + (C1 \cdot C2)})$ AND-OR-NAND Gate $Y=\overline{A1} \cdot ((\overline{B1 + B2}) + (\overline{C1 \cdot C2}))$

CELL NUMBER	DESCRIPTION
BF067LJ BF068LJ BF069LJ BF070LJ	AND-OR-NAND Gate $Y = A1 \cdot [B1 + B2 + (C1 \cdot C2)]$ AND-OR-NAND Gate $Y = A1 \cdot [B1 + (C1 \cdot C2) + (D1 \cdot D2)]$ AND-OR-NAND Gate $Y = A1 \cdot [(B1 \cdot B2) + (C1 \cdot C2) + (D1 \cdot D2)]$ AND-OR-NAND Gate $Y = (A1 + A2) \cdot [B1 + (C1 \cdot C2)]$
BF071LJ BF072LJ BF075LJ BF080LJ	AND-OR-NAND Gate $Y = (A1 + A2) \cdot [(B1 \cdot B2) + (C1 \cdot C2)]$ AND-OR-NAND Gate $Y = (A1 + A2) \cdot [B1 + B2 + (C1 \cdot C2)]$ AND-OR-NAND Gate $Y = (A1 + A2 + A3) \cdot [B1 + (C1 \cdot C2)]$ OR-AND-OR-NAND Gate $Y = A1 \cdot [B1 + (C1 \cdot (D1 + D2))]$
BF081LJ BF082LJ BF088LJ BU110LJ	OR-AND-OR-NAND Gate $Y = A1 \cdot [B1 + ((C1 + C2) \cdot (D1 + D2))]$ OR-AND-OR-NAND Gate $Y = A1 \cdot [(B1 \cdot B2) + (C1 \cdot (D1 + D2))]$ OR-AND-OR-NAND Gate $Y = (A1 + A2 + A3) \cdot [B1 + (C1 \cdot (D1 + D2))]$ Delay Buffer
BU111LJ BU112LJ BU113LJ BU114LJ	Inverting Delay Buffer Delay Buffer Delay Buffer, 10nS MAX Delay Buffer, 15nS MAX
BU120LJ BU130LJ BU221LJ BU222LJ	Delay Buffer, 2X Drive Delay Buffer, 3X Drive 3-State Buffer with Low Enable, 2X Drive 3-State Buffer with High Enable, 2X Drive
BU261LJ BU262LJ CK120LJ DE210LJ	3-State Buffer with Low Enable, 6X Drive 3-State Buffer with High Enable, 6X Drive Dual-Phase, Non-Overlapping Clock Driver, 2X Drive 2-Line to 4-Line Decoder
DE212LJ DFB20LJ DFC20LJ DFN20LJ	2-Line to 4-Line Decoder with High Enable D-Type Flip-Flop with Preset, Clear, 2X Drive D-Type Flip-Flop with Clear, 2X Drive D-Type Flip-Flop, 2X Drive
DFF20LJ DTB10LJ DTC10LJ DTN10LJ	D-Type Flip-Flop with Preset, 2X Drive D-Type Flip-Flop with Preset, Clear, 1X Drive D-Type Flip-Flop with Clear, 1X Drive D-Type Flip-Flop, 1X Drive
DTP10LJ EN210LJ EX210LJ EX220LJ	D-Type Flip-Flop with Preset, 1X Drive 2-Input Exclusive-NOR Gate 2-Input Exclusive-OR Gate 2-Input Exclusive-OR Gate, 2X Drive
EX240LJ F1503LJ F1603LJ F1703LJ	2-Input Exclusive-OR Gate, 4X Drive 32-Word by 9-Bit FIFO with Parallel Module Test 64-Word by 9-Bit FIFO with Parallel Module Test 128-Word by 9-Bit FIFO with Parallel Module Test
IO#21LJ IO#41LJ IO#61LJ IO#01LJ	2-mA, Push-Pull I/O Buffer with CMOS Input 4-mA, Push-Pull I/O Buffer with CMOS Input 6-mA, Push-Pull I/O Buffer with CMOS Input 10-mA, Push-Pull I/O Buffer with CMOS Input
IO#A1LJ IO#B1LJ IO#E1LJ IO#G1LJ	16-mA, Push-Pull I/O Buffer with CMOS Input 16/24-mA, Push-Pull I/O Buffer with CMOS Input 16/48-mA, Push-Pull I/O Buffer with CMOS Input 16/64-mA, Push-Pull I/O Buffer with CMOS Input
IO#24LJ IO#44LJ IO#64LJ IO#04LJ	2-mA, Push-Pull I/O Buffer with TTL Input 4-mA, Push-Pull I/O Buffer with TTL Input 6-mA, Push-Pull I/O Buffer with TTL Input 10-mA, Push-Pull I/O Buffer with TTL Input
IO#A4LJ IO#B4LJ IO#E4LJ IO#G4LJ	16-mA, Push-Pull I/O Buffer with TTL Input 16/24-mA, Push-Pull I/O Buffer with TTL Input 16/48-mA, Push-Pull I/O Buffer with TTL Input 16/64-mA, Push-Pull I/O Buffer with TTL Input
IO#EPLJ IPI01LJ IPI11LJ IPI04LJ	48-mA, Open Drain I/O Buffer, TTL Input with Hysteresis CMOS-Compatible Non-Inverting Input Buffer CMOS-Compatible Non-Inverting Clock Buffer TTL-Compatible Non-Inverting Input Buffer
IPI14LJ IPI07LJ IPI09LJ IV101LJ	TTL-Compatible Non-Inverting Clock Buffer CMOS-Compatible Non-Inverting Input Buffer with Hysteresis TTL-Compatible Non-Inverting Input Buffer with Hysteresis Inverter, 10X Drive

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

CELL NUMBER	DESCRIPTION
IV110LJ IV120LJ IV130LJ IV140LJ	Inverter Inverter, 2X Drive Inverter, 3X Drive Inverter, 4X Drive
IV160LJ IV180LJ IV211LJ IV212LJ	Inverter, 6X Drive Inverter, 8X Drive Inverting 3-State Buffer with Low Enable Inverting 3-State Buffer with High Enable
IV221LJ IV222LJ IV241LJ IV242LJ	Inverting 3-State Buffer with Low Enable, 2X Drive Inverting 3-State Buffer with High Enable, 2X Drive Inverting 3-State Buffer with Low Enable, 4X Drive Inverting 3-State Buffer with High Enable, 4X Drive
JKB20LJ JKB21LJ LAB10LJ LAB20LJ	J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive S-R Latch S-R Latch, 2X Drive
LAH10LJ LAH20LJ LAH23LJ LAH40LJ	D-Type Latch with High Enable D-Type Latch with High Enable, 2X Drive D-Type Latch with High Enable, Preset and Clear, 2X Drive D-Type Latch with High Enable, 4X Drive
LAL20LJ LH110LJ MU110LJ MU111LJ	D-Type Latch with Low Enable 3-State Bus Holder 2-Line to 1-Line Multiplexer with 3-State Output 2-Line to 1-Line Multiplexer
MU210LJ MU310LJ MU320LJ NA210LJ	4-Line to 1-Line Multiplexer 8-Line to 1-Line Multiplexer with 3-State Output 8-Line to 1-Line Multiplexer, 2X Drive 2-Input NAND Gate
NA220LJ NA230LJ NA240LJ NA260LJ	2-Input NAND Gate, 2X Drive 2-Input NAND Gate, 3X Drive 2-Input NAND Gate, 4X Drive 2-Input NAND Gate, 6X Drive
NA310LJ NA320LJ NA330LJ NA340LJ	3-Input NAND Gate 3-Input NAND Gate, 2X Drive 3-Input NAND Gate, 3X Drive 3-Input NAND Gate, 4X Drive
NA410LJ NA420LJ NA430LJ NA510LJ	4-Input NAND Gate 4-Input NAND Gate, 2X Drive 4-Input NAND Gate, 3X Drive 5-Input NAND Gate
NA520LJ NA810LJ NA820LJ NO210LJ	5-Input NAND Gate, 2X Drive 8-Input NAND Gate 8-Input NAND Gate, 2X Drive 2-Input NOR Gate
NO220LJ NO230LJ NO240LJ NO310LJ	2-Input NOR Gate, 2X Drive 2-Input NOR Gate, 3X Drive 2-Input NOR Gate, 4X Drive 3-Input NOR Gate
NO320LJ NO330LJ NO410LJ NO420LJ	3-Input NOR Gate, 2X Drive 3-Input NOR Gate, 3X Drive 4-Input NOR Gate 4-Input NOR Gate, 2X Drive
NO510LJ NO520LJ NO810LJ NO820LJ	5-Input NOR Gate 5-Input NOR Gate, 2X Drive 8-Input NOR Gate 8-Input NOR Gate, 2X Drive
OA220LJ OA230LJ OA231LJ OA240LJ	OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2)$ OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$ OR-NAND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$ OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2) \cdot (D1 + D2)$
OA241LJ OA320LJ OP#20LJ OP#40LJ	OR-NAND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2) \cdot (D1 + D2)$ OR-AND Gate $Y = (A1 + A2 + A3) \cdot (B1 + B2 + B3)$ 2-mA, Push-Pull Output Buffer 4-mA, Push-Pull Output Buffer

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

CELL NUMBER	DESCRIPTION
OP#60LJ OP#00LJ OP#A0LJ OP#B0LJ	6-mA, Push-Pull Output Buffer 10-mA, Push-Pull Output Buffer 16-mA, Push-Pull Output Buffer 16/24-mA, Push-Pull Output Buffer
OP#E0LJ OP#G0LJ OP#21LJ OP#41LJ	16/48-mA, Push-Pull Output Buffer 16/64-mA, Push-Pull Output Buffer 2-mA, Open-Drain Output Buffer 4-mA, Open-Drain Output Buffer
OP#61LJ OP#01LJ OP#A1LJ OP#B1LJ	6-mA, Open-Drain Output Buffer 10-mA, Open-Drain Output Buffer 16-mA, Open-Drain Output Buffer 24-mA, Open-Drain Output Buffer
OP#E1LJ OP#G1LJ OP#23LJ OP#43LJ	48-mA, Open-Drain Output Buffer 64-mA, Open-Drain Output Buffer 2-mA, 3-State Output Buffer 4-mA, 3-State Output Buffer
OP#63LJ OP#03LJ OP#A3LJ OP#B3LJ	6-mA, 3-State Output Buffer 10-mA, 3-State Output Buffer 16-mA, 3-State Output Buffer 16/24-mA, 3-State Output Buffer
OP#E3LJ OP#G3LJ OR210LJ OR220LJ	16/48-mA, 3-State Output Buffer 16/64-mA, 3-State Output Buffer 2-Input OR Gate 2-Input OR Gate, 2X Drive
OR240LJ OR260LJ OR310LJ OR320LJ	2-Input OR Gate, 4X Drive 2-Input OR Gate, 6X Drive 3-Input OR Gate 3-Input OR Gate, 2X Drive
OR340LJ OR360LJ OR410LJ OR420LJ	3-Input OR Gate, 4X Drive 3-Input OR Gate, 6X Drive 4-Input OR Gate 4-Input OR Gate, 2X Drive
OR440LJ OR460LJ OR510LJ OR810LJ	4-Input OR Gate, 4X Drive 4-Input OR Gate, 6X Drive 5-Input OR Gate 8-Input OR Gate
OSI01LJ OSI02LJ OSI03LJ OSI04LJ	75 MHz (MAX) Crystal-Controlled Oscillator 55 MHz (MAX) Crystal-Controlled Oscillator 35 MHz (MAX) Crystal-Controlled Oscillator 20 MHz (MAX) Crystal-Controlled Oscillator
OSI24LJ PD095LJ PR005LJ PR095LJ	Crystal Oscillator, Low Frequency with TTL Trip Point 95- μ A, Pulldown Active Terminator 5- μ A, Pullup Active Terminator 95- μ A, Pullup Active Terminator
PR250LJ PR400LJ PUC00LJ R2401LJ	250- μ A, Pullup Active Terminator 5- μ A, Pullup Active Terminator Power-Up Clear One-Shot 4-Bit Shift Register with Serial Inputs, Asynchronous Clear
R2402LJ R2403LJ R2404LJ R2405LJ	4-Bit Shift Register with Serial Inputs, Complementary Outputs 4-Bit Shift Register with Serial and Parallel Inputs 4-Bit Shift Register with Serial/Parallel Inputs, Complementary Outputs 4-Bit Flip-Flops with Asynchronous Clear
R2406LJ R2407LJ R2408LJ RF400LJ	4-Bit Flip-Flops with Complementary Outputs 4-Bit Flip-Flops with 3-State Outputs 4-Bit Ripple Counter 16-Word by 8-Bit 3-Port Register File with 3-State Outputs
RF401LJ RF402LJ RF600LJ RF601LJ	16-Word by 8-Bit 4-Port Register File with 3-State Outputs 16-Word by 9-Bit 3-Port Register File with 3-State Outputs 64-Word by 8-Bit 3-Port Register File with 3-State Outputs 64-Word by 8-Bit 4-Port Register File with 3-State Outputs
RF602LJ RH000LJ RH001LJ RH002LJ	64-Word by 9-Bit 3-Port Register File with 3-State Outputs 64-Word by 4-Bit Static RAM with Parallel Module Test 64-Word by 8-Bit Static RAM with Parallel Module Test 128-Word by 4-Bit Static RAM with Parallel Module Test

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

CELL NUMBER	DESCRIPTION
RH003LJ RH004LJ RH005LJ RH006LJ	128-Word by 8-Bit Static RAM with Parallel Module Test 256-Word by 4-Bit Static RAM with Parallel Module Test 256-Word by 8-Bit Static RAM with Parallel Module Test 512-Word by 4-Bit Static RAM with Parallel Module Test
RH007LJ RH008LJ RH009LJ RH010LJ	512-Word by 8-Bit Static RAM with Parallel Module Test 1024-Word by 4-Bit Static RAM with Parallel Module Test 1024-Word by 8-Bit Static RAM with Parallel Module Test 2048-Word by 4-Bit Static RAM with Parallel Module Test
RH011LJ S085LJ S137LJ S138LJ	2048-Word by 8-Bit Static RAM with Parallel Module Test 4-Bit Magnitude Comparator 3-Line to 8-Line Decoder with Address Latches 3-Line to 8-Line Decoder/Demultiplexer
S139LJ S151LJ S153LJ S155LJ	Dual 2-Line to 4-Line Decoder 8-Line to 1-Line Multiplexer Dual 4-Line to 1-Line Multiplexer Dual 2-Line to 4-Line Decoder with Data, Enable
S157LJ S158LJ S161ALJ S163ALJ	Quad 2-Line to 1-Line Multiplexer Quad 2-Line to 1-Line Inverting Multiplexer Synchronous 4-Bit Binary Counter with Clear Synchronous 4-Bit Binary Counter
S164LJ S165ALJ S166LJ S173LJ	8-Bit Parallel-Out Serial Shift Register Parallel-Load 8-Bit Shift Register Parallel-Load 8-Bit Shift Register with Clear 4-Bit D-Type Register with 3-State Outputs
S174LJ S175LJ S177LJ S181LJ	Hex D-Type Flip-Flop Quad D-Type Flip-Flop with Complementary Outputs 1-Bit and 3-Bit Binary Ripple Counters Arithmetic Logic Unit/Function Generator
S191LJ S193LJ S194ALJ S195ALJ	Synchronous 4-Bit Up/Down Binary Counter with Down/Up Mode Control Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear) Bidirectional Universal Shift Register 4-Bit Parallel-Access Shift Register
S244LJ S245LJ S251LJ S257ALJ	Octal Internal Bus Buffer with 3-State Outputs Octal Internal 3-State Bus Transceiver 8-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Multiplexer with 3-State Outputs
S258ALJ S259LJ S273LJ S280LJ	Quad 2-Line to 1-Line Inverting Multiplexer with 3-State Outputs 8-Bit Addressable Latch Octal D-Type Flip-Flop 9-Bit Odd/Even Parity Generator/Checker
S283LJ S298LJ S299LJ S299XLJ	4-Bit Binary Full Adder, Fast Carry Quad 2-Input Multiplexer with Negative-Edge-Triggered Register 8-Bit Bidirectional Shift/Storage Register 8-Bit Bidirectional Shift Register
S373LJ S374LJ S375LJ S393LJ	8-Bit D-Type Latch with 3-State Outputs 8-Bit D-Type Flip-Flop with 3-State Outputs 4-Bit Bistable Latch Dual 4-Bit Ripple Counters
S398LJ S399LJ S590LJ S593XLJ	Quad 2-Input Multiplexer with Complementary Output Register Quad 2-Input Multiplexer with Edge-Triggered Register 8-Bit Binary Counter with 3-State Output Register 8-Bit Binary Counter with Input Register
S595LJ S598XLJ S651LJ S652LJ	8-Bit Shift Register with 3-State Output Register 8-Bit Shift Register with Input Register 8-Bit Bidirectional Register with Inverting Data Path 8-Bit Bidirectional Transceiver Register
S669LJ S686LJ S688LJ TAB20LJ	Synchronous 4-Bit Up/Down Binary Counter with Look-Ahead 8-Bit Magnitude Comparator 8-Bit Identity Comparator Toggle Flip-Flop with Preset, Clear, 2X Drive
TAC20LJ TAP20LJ TDB10LJ TDC10LJ	Toggle Flip-Flop with Clear, 2X Drive Toggle Flip-Flop with Preset, 2X Drive S-R Master-Slave Latch with Asynchronous Clear D-Type Scan Flip-Flop with Clear

CELL NUMBER	DESCRIPTION
TDC11LJ TDN10LJ TDN11LJ TDN12LJ	Master-Slave Latch for SCAN Test, Clear, Master Q & QZ D-Type Scan Flip-Flop Master-Slave Latch for SCAN Test Master-Slave Latch for SCAN Test, Master Q & QZ
TDN13LJ TDN14LJ TDN22LJ TO010LJ	Master-Slave Latch for SCAN Test, Master Q & QZ, Slave D Master-Slave Latch for SCAN Test, Master Q & QZ, Two D Inputs Master-Slave Latch for SCAN Test, Master Q & QZ, 2X Drive High-Level and Low-Level Tie-Off Gate
TP000LJ TP006LJ TP008LJ TP009LJ TP010LJ	Test Port for Parallel Module Test Parallel Test Control Logic Output Multiplexer for Parallel Module Test Input Multiplexer for Parallel Module Test Output Multiplexer for PMT, No 3-State on Normal Data Output

**FUNCTIONAL CELL LISTING:
TSC500 SERIES 1- μ m CMOS STANDARD CELLS (US and Europe)**

Technical data is contained in the TSC 500 Series Family Data Sheet (US: SRSS033).

AND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
AN210LJ AN220LJ AN240LJ AN260LJ	2-Input AND Gate 2-Input AND Gate, 2X Drive 2-Input AND Gate, 4X Drive 2-Input AND Gate, 6X Drive
AN310LJ AN320LJ AN340LJ AN360LJ	3-Input AND Gate 3-Input AND Gate, 2X Drive 3-Input AND Gate, 4X Drive 3-Input AND Gate, 6X Drive
AN410LJ AN420LJ AN440LJ AN460LJ	4-Input AND Gate 4-Input AND Gate, 2X Drive 4-Input AND Gate, 4X Drive 4-Input AND Gate, 6X Drive
AN510LJ AN810LJ	5-Input AND Gate 8-Input AND Gate

AND-OR/NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
AO220LJ AO221LJ AO230LJ AO250LJ	AND-OR Gate, 2X Drive $Y=(A+B)+(C\cdot D)$ AND-NOR Gate, 2X Drive $Y=(A\cdot B)+(C\cdot D)$ AND-OR Gate, 2X Drive $Y=A1\cdot A2+B1\cdot B2+C1\cdot C2$ AND-OR Gate, 2X Drive $Y=A1\cdot A2+B1\cdot B2+C1\cdot C2+D1\cdot D2+E1$
AO320LJ AO420LJ AO421LJ	AND-OR Gate, 2X Drive $Y=A1\cdot A2\cdot A3+B1\cdot B2\cdot B3$ AND-OR Gate, 2X Drive $Y=A1\cdot A2\cdot A3\cdot A4+B1\cdot B2\cdot B3\cdot B4$ AND-NOR Gate, 2X Drive $Y=A1\cdot A2\cdot A3\cdot A4+B1\cdot B2\cdot B3\cdot B4$

Arithmetic Operators (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S181LJ S283LJ	Arithmetic Logic Unit/Function Generator 4-Bit Binary Full Adder, Fast Carry

Boolean Functions

CELL NAME	FUNCTIONAL DESCRIPTION
BF001LJ BF002LJ BF004LJ BF005LJ	AND-NOR Gate $Y=A1+(B1\cdot B2)$ AND-NOR Gate $Y=A1+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=(A1\cdot A2\cdot A3)+(B1\cdot B2\cdot B3)$
BF006LJ BF007LJ BF008LJ BF009LJ	AND-NOR Gate $Y=A1+A2+(B1\cdot B2)$ AND-NOR Gate $Y=A1+A2+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=A1+(B1\cdot B2)+(C1\cdot C2)$ AND-NOR Gate $Y=A1+(B1\cdot B2)+(C1\cdot C2\cdot C3)$
BF010LJ BF011LJ BF012LJ BF013LJ	AND-NOR Gate $Y=A1+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2)+(C1\cdot C2)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2)+(C1\cdot C2\cdot C3)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$
BF014LJ BF015LJ BF016LJ BF017LJ	AND-NOR Gate $Y=(A1\cdot A2\cdot A3)+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$ OR-AND-NOR Gate $Y=A1+(B1\cdot (C1+C2))$ AND-OR-NAND Gate $Y=A1+((B1+B2)\cdot (C1+C2))$ OR-AND-NOR Gate $Y=A1+(B1\cdot B2\cdot (C1+C2))$
BF020LJ BF022LJ BF025LJ BF027LJ	OR-AND-NOR Gate $Y=A1\cdot A2+(B1\cdot (C1+C2))$ OR-AND-NOR Gate $Y=A1\cdot A2+(B1\cdot B2\cdot (C1+C2))$ OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+(B1\cdot (C1+C2))$ OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+(B1\cdot B2\cdot (C1+C2))$
BF028LJ BF030LJ BF034LJ BF035LJ	OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+(B1\cdot (C1+C2)\cdot (D1+D2))$ AND-OR-AND-NOR Gate $Y=A1+(B1\cdot (C1+(D1\cdot D2)))$ AND-OR-AND-NOR Gate $Y=(A1\cdot A2)+\{B1\cdot (C1+(D1\cdot D2))\}$ AND-OR-AND-NOR Gate $Y=(A1\cdot A2)+\{B1\cdot [(C1\cdot C2)+(D1\cdot D2)]\}$

2 ASIC Alphanumeric and Functional Macro Listings

Boolean Functions (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
BF051LJ BF052LJ BF053LJ BF054LJ	OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2)$ OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2 + B3)$ OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + B2)$ OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + B2 + B3)$
BF055LJ BF056LJ BF057LJ BF058LJ	OR-NAND Gate $Y = (\overline{A1 + A2 + A3}) \cdot (B1 + B2 + B3)$ OR-NAND Gate $Y = \overline{A1} \cdot A2 \cdot (B1 + B2)$ OR-NAND Gate $Y = \overline{A1} \cdot A2 \cdot (B1 + B2 + B3)$ OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2) \cdot (C1 + C2)$
BF059LJ BF060LJ BF062LJ BF063LJ	OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2) \cdot (C1 + C2 + C3)$ OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2 + B3) \cdot (C1 + C2 + C3)$ OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + B2) \cdot (C1 + C2 + C3)$ OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + B2 + B3) \cdot (C1 + C2 + C3)$
BF064LJ BF065LJ BF066LJ BF067LJ	OR-NAND Gate $Y = (\overline{A1 + A2 + A3}) \cdot (B1 + B2 + B3) \cdot (C1 + C2 + C3)$ AND-OR-NAND Gate $Y = \overline{A1} \cdot (B1 + (C1 \cdot C2))$ AND-OR-NAND Gate $Y = \overline{A1} \cdot ((B1 \cdot B2) + (C1 \cdot C2))$ AND-OR-NAND Gate $Y = \overline{A1} \cdot (B1 + B2 + (C1 \cdot C2))$
BF068LJ BF069LJ BF070LJ BF071LJ	AND-OR-NAND Gate $Y = \overline{A1} \cdot (B1 + (C1 \cdot C2) + (D1 \cdot D2))$ AND-OR-NAND Gate $Y = \overline{A1} \cdot ((B1 \cdot B2) + (C1 \cdot C2) + (D1 \cdot D2))$ AND-OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + (C1 \cdot C2))$ AND-OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot ((B1 \cdot B2) + (C1 \cdot C2))$
BF072LJ BF075LJ BF080LJ BF081LJ	AND-OR-NAND Gate $Y = (\overline{A1 + A2}) \cdot (B1 + B2 + (C1 \cdot C2))$ AND-OR-NAND Gate $Y = (\overline{A1 + A2 + A3}) \cdot (B1 + (C1 \cdot C2))$ OR-AND-OR-NAND Gate $Y = \overline{A1} \cdot \{(B1 + (C1 \cdot (D1 + D2)))\}$ OR-AND-OR-NAND Gate $Y = \overline{A1} \cdot \{(B1 + ((C1 + C2) \cdot (D1 + D2)))\}$
BF082LJ BF088LJ	OR-AND-OR-NAND Gate $Y = \overline{A1} \cdot \{(B1 \cdot B2) + (C1 \cdot (D1 + D2))\}$ OR-AND-OR-NAND Gate $Y = (\overline{A1 + A2 + A3}) \cdot \{(B1 + (C1 \cdot (D1 + D2)))\}$

Buffers, 3-State (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S244LJ S245LJ	Octal Internal Bus Buffer with 3-State Outputs Octal Internal 3-State Bus Transceiver

Clock Splitters/Drivers

CELL NAME	FUNCTIONAL DESCRIPTION
CK120LJ	Dual Phase, Non-Overlapping Clock Driver, 2X Drive

Comparators (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S085LJ	4-Bit Magnitude Comparator
S686LJ	8-Bit Magnitude Comparator
S688LJ	8-Bit Identity Comparator

Counters

CELL NAME	FUNCTIONAL DESCRIPTION
R2408LJ	4-Bit Ripple Counter

Counters (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S161ALJ S163ALJ S177LJ S191LJ	Synchronous 4-Bit Binary Counter with Clear Synchronous 4-Bit Binary Counter 1-Bit and 3-Bit Binary Ripple Counters Synchronous 4-Bit Up/Down Binary Counter with Down/Up Mode Control
S193LJ S393LJ S590LJ S593XLJ S669LJ	Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear) Dual 4-Bit Ripple Counters 8-Bit Binary Counter with 3-State Output Register 8-Bit Binary Counter with Input Register Synchronous 4-Bit Up/Down Binary Counter with Look-Ahead

Decoders/Demultiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
DE210LJ	2-Line to 4-Line Decoder
DE212LJ	2-Line to 4-Line Decoder with High Enable

Decoders/Demultiplexers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S137LJ	3-Line to 8-Line Decoder with Address Latches
S138LJ	3-Line to 8-Line Decoder/Demultiplexer
S139LJ	Dual 2-Line to 4-Line Decoder
S155LJ	Dual 2-Line to 4-Line Decoder with Data, Enable

D-Type Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
DFB20LJ	D-Type Flip-Flop with Preset, Clear, 2X Drive
DFC20LJ	D-Type Flip-Flop with Clear, 2X Drive
DFN20LJ	D-Type Flip-Flop, 2X Drive
DFP20LJ	D-Type Flip-Flop with Preset, 2X Drive
DTB10LJ	D-Type Flip-Flop with Preset, Clear, 1X Drive
DTC10LJ	D-Type Flip-Flop with Clear, 1X Drive
DTN10LJ	D-Type Flip-Flop, 1X Drive
DTP10LJ	D-Type Flip-Flop with Preset, 1X Drive
R2405LJ	4-Bit Flip-Flops with Asynchronous Clear
R2406LJ	4-Bit Flip-Flops with Complementary Outputs
R2407LJ	4-Bit Flip-Flops with 3-State Outputs

D-Type Flip-Flops (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S173LJ	4-Bit D-Type Register with 3-State Outputs
S174LJ	Hex D-Type Flip-Flop
S175LJ	Quad D-Type Flip-Flop with Complementary Outputs
S273LJ	Octal D-Type Flip-Flop
S374LJ	8-Bit D-Type Flip-Flop with 3-State Outputs

Exclusive-OR/NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
EN210LJ	2-Input Exclusive-NOR Gate
EX210LJ	2-Input Exclusive-OR Gate
EX220LJ	2-Input Exclusive-OR Gate, 2X Drive
EX240LJ	2-Input Exclusive-OR Gate, 4X Drive

First-In-First-Out Memories

CELL NAME	FUNCTIONAL DESCRIPTION
FI503LJ	32-Word by 9-Bit FIFO with Parallel Module Test
FI603LJ	64-Word by 9-Bit FIFO with Parallel Module Test
FI703LJ	128-Word by 9-Bit FIFO with Parallel Module Test

Hardwired RAMs

CELL NAME	FUNCTIONAL DESCRIPTION
RH000LJ	64 Word by 4 Bit Static RAM with Parallel Module Test
RH001LJ	64 Word by 8 Bit Static RAM with Parallel Module Test
RH002LJ	128 Word by 4 Bit Static RAM with Parallel Module Test
RH003LJ	128 Word by 8 Bit Static RAM with Parallel Module Test
RH004LJ	256 Word by 4 Bit Static RAM with Parallel Module Test
RH005LJ	256 Word by 8 Bit Static RAM with Parallel Module Test
RH006LJ	512 Word by 4 Bit Static RAM with Parallel Module Test
RH007LJ	512 Word by 8 Bit Static RAM with Parallel Module Test

Hardwired RAMs (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
RH008LJ	1024 Word by 4 Bit Static RAM with Parallel Module Test
RH009LJ	1024 Word by 8 Bit Static RAM with Parallel Module Test
RH010LJ	2048 Word by 4 Bit Static RAM with Parallel Module Test
RH011LJ	2048 Word by 8 Bit Static RAM with Parallel Module Test

Inputs/Outputs, Bidirectionals

CELL NAME	FUNCTIONAL DESCRIPTION
IO#21LJ	2-mA, Push-Pull I/O Buffer with CMOS Input
IO#41LJ	4-mA, Push-Pull I/O Buffer with CMOS Input
IO#61LJ	6-mA, Push-Pull I/O Buffer with CMOS Input
IO#01LJ	10-mA, Push-Pull I/O Buffer with CMOS Input
IO#A1LJ	16-mA, Push-Pull I/O Buffer with CMOS Input
IO#B1LJ	16/24-mA, Push-Pull I/O Buffer with CMOS Input
IO#E1LJ	16/48-mA, Push-Pull I/O Buffer with CMOS Input
IO#G1LJ	16/64-mA, Push-Pull I/O Buffer with CMOS Input
IO#24LJ	2-mA, Push-Pull I/O Buffer with TTL Input
IO#44LJ	4-mA, Push-Pull I/O Buffer with TTL Input
IO#64LJ	6-mA, Push-Pull I/O Buffer with TTL Input
IO#04LJ	10-mA, Push-Pull I/O Buffer with TTL Input
IO#A4LJ	16-mA, Push-Pull I/O Buffer with TTL Input
IO#B4LJ	16/24-mA, Push-Pull I/O Buffer with TTL Input
IO#E4LJ	16/48-mA, Push-Pull I/O Buffer with TTL Input
IO#G4LJ	16/64-mA, Push-Pull I/O Buffer with TTL Input

Inputs

CELL NAME	FUNCTIONAL DESCRIPTION
IPI01LJ	CMOS-Compatible Non-Inverting Input Buffer
IPI11LJ	CMOS-Compatible Non-Inverting Clock Buffer
IPI04LJ	TTL-Compatible Non-Inverting Input Buffer
IPI14LJ	TTL-Compatible Non-Inverting Clock Buffer
IPI07LJ	CMOS-Compatible Non-Inverting Input Buffer with Hysteresis
IPI09LJ	TTL-Compatible Non-Inverting Input Buffer with Hysteresis

Inverters/Buffers

CELL NAME	FUNCTIONAL DESCRIPTION
BU110LJ	Delay Buffer
BU111LJ	Inverting Delay Buffer
BU112LJ	Delay Buffer
BU113LJ	Delay Buffer, 10nS MAX
BU114LJ	Delay Buffer, 15nS MAX
BU120LJ	Delay Buffer, 2X Drive
BU130LJ	Delay Buffer, 3X Drive
BU221LJ	3-State Buffer with Low Enable, 2X Drive
BU222LJ	3-State Buffer with High Enable, 2X Drive
BU261LJ	3-State Buffer with Low Enable, 6X Drive
BU262LJ	3-State Buffer with High Enable, 6X Drive
IV101LJ	Inverter, 10X Drive
IV110LJ	Inverter
IV120LJ	Inverter, 2X Drive
IV130LJ	Inverter, 3X Drive
IV140LJ	Inverter, 4X Drive
IV160LJ	Inverter, 6X Drive
IV180LJ	Inverter, 8X Drive
IV211LJ	Inverting 3-State Buffer with Low Enable
IV212LJ	Inverting 3-State Buffer with High Enable
IV221LJ	Inverting 3-State Buffer with Low Enable, 2X Drive
IV222LJ	Inverting 3-State Buffer with High Enable, 2X Drive
IV241LJ	Inverting 3-State Buffer with Low Enable, 4X Drive
IV242LJ	Inverting 3-State Buffer with High Enable, 4X Drive

Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

J-K Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
JKB20LJ JKB21LJ	J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive

Latches

CELL NAME	FUNCTIONAL DESCRIPTION
LAB10LJ LAB20LJ LAH10LJ LAH20LJ	S-R Latch S-R Latch, 2X Drive D-Type Latch with High Enable D-Type Latch with High Enable, 2X Drive
LAH23LJ LAH40LJ LAL20LJ LH110LJ	D-Type Latch with High Enable, Preset and Clear, 2X Drive D-Type Latch with High Enable, 4X Drive D-Type Latch with Low Enable 3-State Bus Holder

Latches (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S259LJ S373LJ S375LJ	8-Bit Addressable Latch 8-Bit D-Type Latch with 3-State Outputs 4-Bit Bistable Latch

MegaModule Test Functions

CELL NAME	FUNCTIONAL DESCRIPTION
TP000LJ TP006LJ TP008LJ TP009LJ TP010LJ	Test Port for Parallel Module Test Parallel Test Control Logic Output Multiplexer for Parallel Module Test Input Multiplexer for Parallel Module Test Output Multiplexer for PMT, No 3-State on Normal Data Output

Multiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
MU110LJ MU111LJ MU210LJ MU310LJ MU320LJ	2-Line to 1-Line Multiplexer with 3-State Outputs 2-Line to 1-Line Multiplexer 4-Line to 1-Line Multiplexer 8-Line to 1-Line Multiplexer with 3-State Outputs 8-Line to 1-Line Multiplexer, 2X Drive

Multiplexers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S151LJ S153LJ S157LJ S158LJ	8-Line to 1-Line Multiplexer Dual 4-Line to 1-Line Multiplexer Quad 2-Line to 1-Line Multiplexer Quad 2-Line to 1-Line Inverting Multiplexer
S251LJ S257ALJ S258ALJ S298LJ	8-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Inverting Multiplexer with 3-State Outputs Quad 2-Input Multiplexer with Negative-Edge-Triggered Register
S398LJ S399LJ	Quad 2-Input Multiplexer with Complementary Output Register Quad 2-Input Multiplexer with Edge-Triggered Register

NAND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
NA210LJ NA220LJ NA230LJ NA240LJ	2-Input NAND Gate 2-Input NAND Gate, 2X Drive 2-Input NAND Gate, 3X Drive 2-Input NAND Gate, 4X Drive

NAND Gates (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
NA260LJ NA310LJ NA320LJ NA330LJ	2-Input NAND Gate, 6X Drive 3-Input NAND Gate 3-Input NAND Gate, 2X Drive 3-Input NAND Gate, 3X Drive
NA340LJ NA410LJ NA420LJ NA430LJ	3-Input NAND Gate, 4X Drive 4-Input NAND Gate 4-Input NAND Gate, 2X Drive 4-Input NAND Gate, 3X Drive
NA510LJ NA520LJ NA810LJ NA820LJ	5-Input NAND Gate 5-Input NAND Gate, 2X Drive 8-Input NAND Gate 8-Input NAND Gate, 2X Drive

NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
NO210LJ NO220LJ NO230LJ NO240LJ	2-Input NOR Gate 2-Input NOR Gate, 2X Drive 2-Input NOR Gate, 3X Drive 2-Input NOR Gate, 4X Drive
NO310LJ NO320LJ NO330LJ NO410LJ	3-Input NOR Gate 3-Input NOR Gate, 2X Drive 3-Input NOR Gate, 3X Drive 4-Input NOR Gate
NO420LJ NO510LJ NO520LJ NO810LJ NO820LJ	4-Input NOR Gate, 2X Drive 5-Input NOR Gate 5-Input NOR Gate, 2X Drive 8-Input NOR Gate 8-Input NOR Gate, 2X Drive

OR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
OR210LJ OR220LJ OR240LJ OR260LJ	2-Input OR Gate 2-Input OR Gate, 2X Drive 2-Input OR Gate, 4X Drive 2-Input OR Gate, 6X Drive
OR310LJ OR320LJ OR340LJ OR360LJ	3-Input OR Gate 3-Input OR Gate, 2X Drive 3-Input OR Gate, 4X Drive 3-Input OR Gate, 6X Drive
OR410LJ OR420LJ OR440LJ OR460LJ	4-Input OR Gate 4-Input OR Gate, 2X Drive 4-Input OR Gate, 4X Drive 4-Input OR Gate, 6X Drive
OR510LJ OR810LJ	5-Input OR Gate 8-Input OR Gate

OR-AND/NAND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
OA220LJ OA230LJ OA231LJ OA240LJ	OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2)$ OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$ OR-NAND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2)$ OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2) \cdot (D1 + D2)$
OA241LJ OA320LJ	OR-AND Gate $Y = (A1 + A2) \cdot (B1 + B2) \cdot (C1 + C2) \cdot (D1 + D2)$ OR-AND Gate $Y = (A1 + A2 + A3) \cdot (B1 + B2 + B3)$

Oscillators

CELL NAME	FUNCTIONAL DESCRIPTION
OSI01LJ	75-MHz (MAX) Crystal-Controlled Oscillator
OSI02LJ	55-MHz (MAX) Crystal-Controlled Oscillator
OSI03LJ	35-MHz (MAX) Crystal-Controlled Oscillator
OSI04LJ	20-MHz (MAX) Crystal-Controlled Oscillator
OSI24LJ	Crystal Oscillator, Low Frequency with TTL Trip Point

Outputs

CELL NAME	FUNCTIONAL DESCRIPTION
OP#20LJ	2-mA, Push-Pull Output Buffer
OP#40LJ	4-mA, Push-Pull Output Buffer
OP#60LJ	6-mA, Push-Pull Output Buffer
OP#00LJ	10-mA, Push-Pull Output Buffer
OP#A0LJ	16-mA, Push-Pull Output Buffer
OP#B0LJ	16/24-mA, Push-Pull Output Buffer
OP#E0LJ	16/48-mA, Push-Pull Output Buffer
OP#G0LJ	16/64-mA, Push-Pull Output Buffer
OP#21LJ	2-mA, Open-Drain Output Buffer
OP#41LJ	4-mA, Open-Drain Output Buffer
OP#61LJ	6-mA, Open-Drain Output Buffer
OP#01LJ	10-mA, Open-Drain Output Buffer
OP#A1LJ	16-mA, Open-Drain Output Buffer
OP#B1LJ	24-mA, Open-Drain Output Buffer
OP#E1LJ	48-mA, Open-Drain Output Buffer
OP#G1LJ	64-mA, Open-Drain Output Buffer
OP#23LJ	2-mA, 3-State Output Buffer
OP#43LJ	4-mA, 3-State Output Buffer
OP#63LJ	6-mA, 3-State Output Buffer
OP#03LJ	10-mA, 3-State Output Buffer
OP#A3LJ	16-mA, 3-State Output Buffer
OP#B3LJ	16/24-mA, 3-State Output Buffer
OP#E3LJ	16/48-mA, 3-State Output Buffer
OP#G3LJ	16/64-mA, 3-State Output Buffer

Parity Generator/Checker (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S280LJ	9-Bit Odd/Even Parity Generator/Checker

Pulldown/Pullup Terminators

CELL NAME	FUNCTIONAL DESCRIPTION
PD095LJ	95- μ A, Pulldown Active Terminator
PR005LJ	5- μ A, Pullup Active Terminator
PR095LJ	95- μ A, Pullup Active Terminator
PR250LJ	250- μ A, Pullup Active Terminator
PR400LJ	5- μ A, Pullup Active Terminator

Power-Up Clear One-Shot

CELL NAME	FUNCTIONAL DESCRIPTION
PUC00LJ	Power-Up Clear One-Shot

Register Files

CELL NAME	FUNCTIONAL DESCRIPTION
RF400LJ	16-Word by 8-Bit 3-Port Register File with 3-State Outputs
RF401LJ	16-Word by 8-Bit 4-Port Register File with 3-State Outputs
RF402LJ	16-Word by 9-Bit 3-Port Register File with 3-State Outputs
RF600LJ	64-Word by 8-Bit 3-Port Register File with 3-State Outputs

* Output buffers available with and without di/dt control. Output buffers with di/dt control reduce electromagnetic interference (EMI) and transient power requirements. Use of non-di/dt controlled buffers increases the number of power and ground pin requirements and should be limited to outputs with critical timing specifications.

Register Files (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
RF601LJ	64-Word by 8-Bit 4-Port Register File with 3-State Outputs
RF602LJ	64-Word by 9-Bit 3-Port Register File with 3-State Outputs

SCAN Flip-Flops/Latches

CELL NAME	FUNCTIONAL DESCRIPTION
TDB10LJ	S-R Master-Slave Latch with Asynchronous Clear
TDC10LJ	D-Type Scan Flip-Flop with Clear
TDC11LJ	Master-Slave Latch for SCAN Testability, Clear, Master Q & QZ
TDN10LJ	D-Type Scan Flip-Flop without Preset/Clear
TDN11LJ	Master-Slave Latch for SCAN Testability
TDN12LJ	Master-Slave Latch for SCAN Testability, Master Q & QZ
TDN13LJ	Master-Slave Latch for SCAN Testability, Master Q & QZ, Slave D
TDN14LJ	Master-Slave Latch for SCAN Testability, Master Q & QZ, Two D Inputs
TDN22LJ	Master-Slave Latch for SCAN Testability, Master Q & QZ, 2X Drive
TP000LJ	2-Phase Test Port Flip-Flop without Preset/Clear

Shift Registers

CELL NAME	FUNCTIONAL DESCRIPTION
R2401LJ	4-Bit Shift Register with Serial Inputs, Asynchronous Clear
R2402LJ	4-Bit Shift Register with Serial Inputs, Complementary Outputs
R2403LJ	4-Bit Shift Register with Serial and Parallel Inputs
R2404LJ	4-Bit Shift Register with Serial/Parallel Inputs, Complementary Outputs

Shift Registers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S164LJ	8-Bit Parallel-Out Serial Shift Registers
S165LJ	Parallel-Load 8-Bit Shift Registers
S166LJ	Parallel-Load 8-Bit Shift Register with Clear
S194ALJ	Bidirectional Universal Shift Registers
S195ALJ	4-Bit Parallel-Access Shift Registers
S299LJ	8-Bit Bidirectional Shift/Storage Registers
S299XLJ	8-Bit Bidirectional Shift Registers
S595LJ	8-Bit Shift Register with 3-State Out Registers
S598XLJ	8-Bit Shift Register with Input Registers

Toggle Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
TAB20LJ	Toggle Flip-Flop with Preset, Clear, 2X Drive
TAC20LJ	Toggle Flip-Flop with Clear, 2X Drive
TAP20LJ	Toggle Flip-Flop with Preset, 2X Drive

Tie-Off Gate

CELL NAME	FUNCTIONAL DESCRIPTION
TO010LJ	High-Level and Low-Level Tie-Off Gate

Transceiver Registers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S651LJ	8-Bit Bidirectional Register with Inverting Data Path
S652LJ	8-Bit Bidirectional Transceiver Registers

2- μ m SYSTEMCELL SERIES CMOS STANDARD CELLS (US Only)

TI's SystemCell Series currently comprises more than 290 cell types including SSI, MSI, I/O, Boolean and extended functions such as RAM, ROM and PLA. Using 2- μ m (1.6- μ m effective gate length) double-level-metal, twin-well, silicon-gate CMOS technology, SystemCell functions allow for a large variety of circuit implementations at a reduced cost. Typical gate propagation delay for the smallest two-input NAND gate is 1.2 ns (fan-out = 2) with a maximum toggle rate of 69 MHz.

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ASIC Alphanumeric and Functional Macro Listings

ALPHANUMERIC CELL LISTING: SYSTEMCELL SERIES 2- μ m CMOS STANDARD CELLS (US Only)

Technical data is contained in the 2- μ m SystemCell Databook (US: SRSD001).

CELL NUMBER	DESCRIPTION
AN210LH AN220LH AN240LH AN260LH	2-Input AND Gate 2-Input AND Gate, 2X Drive 2-Input AND Gate, 4X Drive 2-Input AND Gate, 6X Drive
AN310LH AN320LH AN340LH AN360LH	3-Input AND Gate 3-Input AND Gate, 2X Drive 3-Input AND Gate, 4X Drive 3-Input AND Gate, 6X Drive
AN410LH AN420LH AN440LH AN460LH	4-Input AND Gate 4-Input AND Gate, 2X Drive 4-Input AND Gate, 4X Drive 4-Input AND Gate, 6X Drive
AN510LH AN810LH AO220LH AO221LH	5-Input AND Gate 8-Input AND Gate AND-OR Gate, 2X Drive $Y=(A+B)+(C+D)$ AND-NOR Gate, 2X Drive $Y=(A\cdot B)+(C\cdot D)$
BF001LH BF002LH BF003LH BF004LH	AND-NOR Gate $Y=A1+(B1\cdot B2)$ AND-NOR Gate $Y=A1+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2\cdot B3)$
BF005LH BF006LH BF007LH BF008LH	AND-NOR Gate $Y=(A1\cdot A2\cdot A3)+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=A1+A2+(B1\cdot B2)$ AND-NOR Gate $Y=A1+A2+(B1\cdot B2\cdot B3)$ AND-NOR Gate $Y=A1+(B1\cdot B2)+(C1\cdot C2)$
BF009LH BF010LH BF011LH BF012LH	AND-NOR Gate $Y=A1+(B1\cdot B2)+(C1\cdot C2\cdot C3)$ AND-NOR Gate $Y=A1+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2)+(C1\cdot C2)$ AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2)+(C1\cdot C2\cdot C3)$
BF013LH BF014LH BF015LH BF016LH	AND-NOR Gate $Y=(A1\cdot A2)+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$ AND-NOR Gate $Y=(A1\cdot A2\cdot A3)+(B1\cdot B2\cdot B3)+(C1\cdot C2\cdot C3)$ OR-AND-NOR Gate $Y=A1+[B1\cdot(C1+C2)]$ AND-OR-NAND Gate $Y=A1+[(B1+B2)\cdot(C1+C2)]$
BF017LH BF020LH BF022LH BF025LH	OR-AND-NOR Gate $Y=A1+[B1\cdot B2\cdot(C1+C2)]$ OR-AND-NOR Gate $Y=A1\cdot A2+[B1\cdot(C1+C2)]$ OR-AND-NOR Gate $Y=A1\cdot A2+[B1\cdot B2\cdot(C1+C2)]$ OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+[B1\cdot(C1+C2)]$
BF027LH BF028LH BF030LH BF034LH	OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+[B1\cdot B2\cdot(C1+C2)]$ OR-AND-NOR Gate $Y=A1\cdot A2\cdot A3+[B1\cdot(C1+C2)\cdot(D1+D2)]$ AND-OR-AND-NOR Gate $Y=A1+\{B1\cdot[C1+(D1\cdot D2)]\}$ AND-OR-AND-NOR Gate $Y=(A1\cdot A2)+\{B1\cdot[C1+(D1\cdot D2)]\}$
BF035LH BF051LH BF052LH BF053LH	AND-OR-AND-NOR Gate $Y=(A1\cdot A2)+\{B1\cdot[(C1+C2)+(D1\cdot D2)]\}$ OR-NAND Gate $Y=A1\cdot(B1+B2)$ OR-NAND Gate $Y=A1\cdot(B1+B2+B3)$ OR-NAND Gate $Y=(A1+A2)\cdot(B1+B2)$
BF054LH BF055LH BF056LH BF057LH	OR-NAND Gate $Y=(A1+A2)\cdot(B1+B2+B3)$ OR-NAND Gate $Y=(A1+A2+A3)\cdot(B1+B2+B3)$ OR-NAND Gate $Y=A1\cdot A2\cdot(B1+B2)$ OR-NAND Gate $Y=A1\cdot A2\cdot(B1+B2+B3)$
BF058LH BF059LH BF060LH BF062LH	OR-NAND Gate $Y=A1\cdot(B1+B2)\cdot(C1+C2)$ OR-NAND Gate $Y=A1\cdot(B1+B2)\cdot(C1+C2+C3)$ OR-NAND Gate $Y=A1\cdot(B1+B2+B3)\cdot(C1+C2+C3)$ OR-NAND Gate $Y=(A1+A2)\cdot(B1+B2)\cdot(C1+C2+C3)$
BF063LH BF064LH BF065LH BF066LH	OR-NAND Gate $Y=(A1+A2)\cdot(B1+B2+B3)\cdot(C1+C2+C3)$ OR-NAND Gate $Y=(A1+A2+A3)\cdot(B1+B2+B3)\cdot(C1+C2+C3)$ AND-OR-NAND Gate $Y=A1\cdot(B1+[C1\cdot C2])$ AND-OR-NAND Gate $Y=A1\cdot[(B1\cdot B2)+(C1\cdot C2)]$
BF067LH BF068LH BF069LH BF070LH	AND-OR-NAND Gate $Y=A1\cdot(B1+B2+[C1\cdot C2])$ AND-OR-NAND Gate $Y=A1\cdot(B1+[C1\cdot C2])+(D1\cdot D2)$ AND-OR-NAND Gate $Y=A1\cdot[(B1\cdot B2)+(C1\cdot C2)+(D1\cdot D2)]$ AND-OR-NAND Gate $Y=(A1+A2)\cdot(B1+[C1\cdot C2])$

CELL NUMBER	DESCRIPTION
BF071LH	AND-OR-NAND Gate $Y = (A1 + A2) \cdot \{ (B1 \cdot B2) + (C1 \cdot C2) \}$
BF072LH	AND-OR-NAND Gate $Y = (A1 + A2) \cdot \{ B1 + B2 + (C1 \cdot C2) \}$
BF075LH	AND-OR-NAND Gate $Y = (A1 + A2 + A3) \cdot \{ B1 + (C1 \cdot C2) \}$
BF080LH	OR-AND-OR-NAND Gate $Y = A1 \cdot \{ B1 + [C1 \cdot (D1 + D2)] \}$
BF081LH	OR-AND-OR-NAND Gate $Y = A1 \cdot \{ B1 + [(C1 + C2) \cdot (D1 + D2)] \}$
BF082LH	OR-AND-OR-NAND Gate $Y = A1 \cdot \{ (B1 \cdot B2) + [C1 \cdot (D1 + D2)] \}$
BF088LH	OR-AND-OR-NAND Gate $Y = (A1 + A2 + A3) \cdot \{ B1 + [C1 \cdot (D1 + D2)] \}$
BU110LH	Delay Buffer
BU111LH	Inverting Delay Buffer
BU112LH	Delay Buffer
BU120LH	Delay Buffer, 2X Drive
BU130LH	Delay Buffer, 3X Drive
BU221LH	3-State Buffer with Low Enable, 2X Drive
BU222LH	3-State Buffer with High Enable, 2X Drive
BU261LH	3-State Buffer with Low Enable, 6X Drive
BU262LH	3-State Buffer with High Enable, 6X Drive
DE210LH	2-Line to 4-Line Decoder
DE212LH	2-Line to 4-Line Decoder with High Enable
DFB20LH	D-Type Flip-Flop with Preset, Clear, 2X Drive
DFC20LH	D-Type Flip-Flop with Clear, 2X Drive
DFN20LH	D-Type Flip-Flop, 2X Drive
DFP20LH	D-Type Flip-Flop with Preset, 2X Drive
DFY20LH	D-Type Flip-Flop with Grounded-D, Preset, 2X Drive
DFZ20LH	D-Type Flip-Flop with Grounded-D Input, Preset, Clear, 2X Drive
DTB10LH	D-Type Flip-Flop with Preset, Clear, 1X Drive
DTC10LH	D-Type Flip-Flop with Clear, 1X Drive
DTN10LH	D-Type Flip-Flop, 1X Drive
DTP10LH	D-Type Flip-Flop with Preset, 1X Drive
EN210LH	2-Input Exclusive-NOR Gate
EX210LH	2-Input Exclusive-OR Gate
EX211LH	2-Input Exclusive-OR Gate
EX220LH	2-Input Exclusive-OR Gate, 2X Drive
EX221LH	2-Input Exclusive-OR Gate, 2X Drive
EX240LH	2-Input Exclusive-OR Gate, 4X Drive
EX241LH	2-Input Exclusive-OR Gate, 4X Drive
GMS10LH	5-Input Gated S-R Latch with Separate Set
GM010LH	4-Input Gated S-R Latch
GM110LH	5-Input Gated S-R Latch with Separate Reset
GM210LH	6-Input Gated S-R Latch with Separate Set, Reset
GM310LH	6-Input Gated S-R Latch
GM410LH	7-Input Gated S-R Latch with Separate Reset
GM510LH	8-Input Gated S-R Latch with Separate Set, Reset
GSS10LH	5-Input Gated S-R Latch with Separate Set
GS010LH	4-Input Gated S-R Latch
GS110LH	5-Input Gated S-R Latch with Separate Reset
GS210LH	Input Gated S-R Latch with Separate Set, Reset
GS310LH	6-Input Gated S-R Latch
GS410LH	7-Input Gated S-R Latch with Separate Reset
GS510LH	8-Input Gated S-R Latch with Separate Set, Reset
IOFB4LH	24-mA, 3-State I/O Buffer with TTL Input
IOFB8LH	24-mA, 3-State I/O Buffer with TTL Input
IOFD8LH	44-mA, 3-State I/O Buffer with Inverting TTL Input
IOFE8LH	48-mA, Open-Drain I/O Buffer with Inverting TTL Input, Hysteresis
IOF00LH	10-mA, 3-State I/O Buffer with Inverting CMOS Input
IOF01LH	10-mA, 3-State I/O Buffer with CMOS Input
IOF03LH	10-mA, 3-State I/O Buffer with Inverting TTL Input
IOF04LH	10-mA, 3-State I/O Buffer with TTL Input
IOF21LH	2-mA, 3-State I/O Buffer with CMOS Input
IOF24LH	2-mA, 3-State I/O Buffer with TTL Input
IOF40LH	4-mA, 3-State I/O Buffer with Inverting CMOS Input
IOF41LH	4-mA, 3-State I/O Buffer with CMOS Input
IOF43LH	4-mA, 3-State I/O Buffer with Inverting TTL Input
IOF44LH	4-mA, 3-State I/O Buffer with TTL Input
IOF47LH	4-mA, 3-State I/O Buffer with Inverting CMOS Input with Hysteresis

CELL NUMBER	DESCRIPTION
IOF48LH IOF64LH IPF00LH IPF01LH	4-mA, 3-State I/O Buffer with Inverting TTL Input with Hysteresis 6-mA, 3-State I/O Buffer with TTL Input CMOS-Compatible Inverting Input Buffer CMOS-Compatible Input Buffer
IPF02LH IPF03LH IPF04LH IPF05LH	CMOS-Compatible Inverting Input Buffer with Pullup Tap TTL-Compatible Inverting Input Buffer TTL-Compatible Input Buffer TTL-Compatible Inverting Input Buffer with Pullup Tap
IPF06LH IPF08LH IPF10LH IPF12LH	CMOS Inverting Input Buffer with Hysteresis TTL Inverting Input Buffer with Hysteresis, Pullup Tap TTL Input Buffer with Hysteresis, Pullup Tap TTL-Compatible Input Buffer
IPF13LH IV101LH IV110LH IV120LH	TTL-Compatible Inverting Input Buffer with Pullup Tap Inverter, 10X Drive Inverter Inverter, 2X Drive
IV130LH IV140LH IV160LH IV180LH	Inverter, 3X Drive Inverter, 4X Drive Inverter, 6X Drive Inverter, 8X Drive
IV211LH IV212LH IV221LH IV222LH	Inverting 3-State Buffer with Low Enable Inverting 3-State Buffer with High Enable Inverting 3-State Buffer with Low Enable, 2X Drive Inverting 3-State Buffer with High Enable, 2X Drive
IV241LH IV242LH JKB20LH JKB21LH	Inverting 3-State Buffer with Low Enable, 4X Drive Inverting 3-State Buffer with High Enable, 4X Drive J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive
LAB10LH LAB20LH LAH10LH LAH11LH	S-R Latch S-R Latch, 2X Drive D-Type Latch with High Enable D-Type Latch with High Enable
LAH20LH LAH21LH LAL20LH LH110LH	D-Type Latch with High Enable, 2X Drive D-Type Latch with High Enable, 2X Drive D-Type Latch with Low Enable 3-State Bus Holder
MU110LH MU111LH MU210LH MU211LH	2-Line to 1-Line Multiplexer with 3-State Output 2-Line to 1-Line Multiplexer 4-Line to 1-Line Multiplexer 4-Line to 1-Line Multiplexer
MU310LH MU320LH MVF00LH NA210LH	8-Line to 1-Line Multiplexer with 3-State Output 8-Line to 1-Line Multiplexer, 2X Drive Retriggerable Monostable Multivibrator 2-Input NAND Gate
NA220LH NA230LH NA240LH NA260LH	2-Input NAND Gate, 2X Drive 2-Input NAND Gate, 3X Drive 2-Input NAND Gate, 4X Drive 2-Input NAND Gate, 6X Drive
NA310LH NA320LH NA330LH NA340LH	3-Input NAND Gate 3-Input NAND Gate, 2X Drive 3-Input NAND Gate, 3X Drive 3-Input NAND Gate, 4X Drive
NA410LH NA420LH NA430LH NA510LH	4-Input NAND Gate 4-Input NAND Gate, 2X Drive 4-Input NAND Gate, 3X Drive 5-Input NAND Gate
NA520LH NA810LH NA820LH NO210LH	5-Input NAND Gate, 2X Drive 8-Input NAND Gate 8-Input NAND Gate, 2X Drive 2-Input NOR Gate
NO220LH NO230LH NO240LH NO310LH	2-Input NOR Gate, 2X Drive 2-Input NOR Gate, 3X Drive 2-Input NOR Gate, 4X Drive 3-Input NOR Gate

CELL NUMBER	DESCRIPTION
NO320LH NO330LH NO410LH NO420LH	3-Input NOR Gate, 2X Drive 3-Input NOR Gate, 3X Drive 4-Input NOR Gate 4-Input NOR Gate, 2X Drive
NO510LH NO520LH NO810LH NO820LH	5-Input NOR Gate 5-Input NOR Gate, 2X Drive 8-Input NOR Gate 8-Input NOR Gate, 2X Drive
OPFB0LH OPFB3LH OPFD3LH OPFE1LH	24-mA, Totem-Pole Output Buffer 24-mA, 3-State Output Buffer with Low Enable 44-mA, 3-State Output Buffer with Low Enable 48-mA, Open-Drain Output Buffer
OPF00LH OPF01LH OPF03LH OPF20LH	10-mA, Totem-Pole Output Buffer 10-mA, Open-Drain Output Buffer 10-mA, 3-State Output Buffer with Low Enable 2-mA, Totem-Pole Output Buffer
OPF23LH OPF40LH OPF41LH OPF43LH	2-mA, 3-State Output Buffer with Low Enable 4-mA, Totem-Pole Output Buffer 4-mA, Open-Drain Output Buffer 4-mA, 3-State Output Buffer with Low Enable
OPF60LH OPF61LH OPF63LH OR210LH	6-mA, Totem-Pole Output Buffer 6-mA, Open-Drain Output Buffer 6-mA, 3-State Output Buffer with Low Enable 2-Input OR Gate
OR220LH OR240LH OR260LH OR310LH	2-Input OR Gate, 2X Drive 2-Input OR Gate, 4X Drive 2-Input OR Gate, 6X Drive 3-Input OR Gate
OR320LH OR340LH OR360LH OR410LH	3-Input OR Gate, 2X Drive 3-Input OR Gate, 4X Drive 3-Input OR Gate, 6X Drive 4-Input OR Gate
OR420LH OR440LH OR460LH OR510LH	4-Input OR Gate, 2X Drive 4-Input OR Gate, 4X Drive 4-Input OR Gate, 6X Drive 5-Input OR Gate
OR810LH OSF00LH OSF01LH OSF06LH	8-Input OR Gate 5-MHz (MAX) Crystal-Controlled Oscillator 100-kHz (MAX) RC Oscillator 800-kHz (MAX) Crystal-Controlled Oscillator
OSF07LH PD095LH PR005LH PR095LH	200-kHz (MAX) RC Oscillator 95- μ A, Pulldown Active Terminator 5- μ A, Pullup Active Terminator 95- μ A, Pullup Active Terminator
PR250LH PR400LH PUC00LH RA408LH	250- μ A, Pullup Active Terminator 5- μ A, Pullup Active Terminator Power-Up Clear One-Shot 16-Word by 8-Bit Static Read/Write RAM with 3-State Outputs
RA608LH RA708LH RA802LH RF408LH	64-Word by 8-Bit Static Read/Write RAM with 3-State Outputs 128-Word by 8-Bit Static Read/Write RAM with 3-State Outputs 256-Word by 2-Bit Static Read/Write RAM with 3-State Outputs 16-Word by 8-Bit 3-Port Register File
R2401LH R2402LH R2403LH R2404LH	4-Bit Shift Register with Serial Input, Asynchronous Clear 4-Bit Shift Register with Serial Input, Complementary Outputs 4-Bit Shift Register with Serial and Parallel Inputs 4-Bit Shift Register with Serial/Parallel Inputs, Complementary Outputs
R2405LH R2406LH R2407LH R2408LH	4-Bit Flip-Flops with Asynchronous Clear 4-Bit Flip-Flops with Complementary Outputs 4-Bit Flip-Flops with 3-State Outputs 4-Bit Ripple Counter
S085LH S137LH S138LH S139LH	4-Bit Magnitude Comparator 3-Line to 8-Line Decoder with Address Latches 3-Line to 8-Line Decoder/Demultiplexer Dual 2-Line to 4-Line Decoder

CELL NUMBER	DESCRIPTION
S151LH S153LH S155LH S157LH	8-Line to 1-Line Multiplexer Dual 4-Line to 1-Line Multiplexer Dual 2-Line to 4-Line Decoder with Data, Enable Quad 2-Line to 1-Line Multiplexer
S158LH S161ALH S163ALH S164LH	Quad 2-Line to 1-Line Inverting Multiplexer Synchronous 4-Bit Binary Counter with Clear Synchronous 4-Bit Binary Counter 8-Bit Parallel-Out Serial Shift Register
S165LH S166LH S173LH S174LH	Parallel-Load 8-Bit Shift Register Parallel-Load 8-Bit Shift Register with Clear 4-Bit D-Type Register with 3-State Outputs Hex D-Type Flip-Flop
S175LH S177LH S181LH S191LH	Quad D-Type Flip-Flop with Complementary Outputs 1-Bit and 3-Bit Binary Ripple Counters Arithmetic Logic Unit/Function Generator Synchronous 4-bit Up/Down Binary Counter with Down/Up Mode Control
S193LH S194ALH S195ALH S244LH	Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear) Bidirectional Universal Shift Register 4-Bit Parallel-Access Shift Register Octal Internal Bus Buffer with 3-State Outputs
S245LH S251LH S257ALH S258ALH	Octal Internal 3-State Bus Transceiver 8-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Inverting Multiplexer with 3-State Outputs
S259LH S273LH S280LH S283LH	8-Bit Addressable Latch Octal D-Type Flip-Flop 9-Bit Odd/Even Parity Generator/Checker 4-Bit Binary Full Adder, Fast Carry
S298LH S299LH S299XLH S373LH	Quad 2-Input Multiplexer with Negative-Edge-Triggered Register 8-Bit Bidirectional Shift/Storage Register 8-Bit Bidirectional Shift Register 8-Bit D-Type Latch with 3-State Outputs
S374LH S375LH S393LH S398LH	8-Bit D-Type Flip-Flop with 3-State Outputs 4-Bit Bistable Latch Dual 4-Bit Ripple Counters Quad 2-Input Multiplexer with Complementary Output Register
S399LH S590LH S593XLH S595LH	Quad 2-Input Multiplexer with Edge-Triggered Register 8-Bit Binary Counter with 3-State Output Register 8-Bit Binary Counter with Input Register 8-Bit Shift Register with 3-State Out Register
S598XLH S651LH S652LH S669LH	8-Bit Shift Register with Input Register 8-Bit Bidirectional Register with Inverting Data Path 8-Bit Bidirectional Transceiver Register Synchronous 4-Bit Up/Down Binary Counter with Look-Ahead
S686LH S688LH TAB20LH TAC20LH	8-Bit Magnitude Comparator 8-Bit Identity Comparator Toggle Flip-Flop with Preset, Clear, 2X Drive Toggle Flip-Flop with Clear, 2X Drive
TAP20LH TO010LH	Toggle Flip-Flop with Preset, 2X Drive High-Level and Low-Level Tie-Off Gate

FUNCTIONAL CELL LISTING: SYSTEMCELL SERIES 2- μ m CMOS STANDARD CELLS (US Only)

Technical data is contained in the 2- μ m SystemCell Databook (US: SRSD001).

AND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
AN210LH AN220LH AN240LH AN260LH	2-Input AND Gate 2-Input AND Gate, 2X Drive 2-Input AND Gate, 4X Drive 2-Input AND Gate, 6X Drive
AN310LH AN320LH AN340LH AN360LH	3-Input AND Gate 3-Input AND Gate, 2X Drive 3-Input AND Gate, 4X Drive 3-Input AND Gate, 6X Drive
AN410LH AN420LH AN440LH AN460LH	4-Input AND Gate 4-Input AND Gate, 2X Drive 4-Input AND Gate, 4X Drive 4-Input AND Gate, 6X Drive
AN510LH AN810LH	5-Input AND Gate 8-Input AND Gate

AND-OR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
AO220LH AO221LH	AND-OR Gate, 2X Drive $Y = (A \cdot B) + (C \cdot D)$ AND-NOR Gate, 2X Drive $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$

Arithmetic Operators (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S181LH S283LH	Arithmetic Logic Unit/Function Generator 4-Bit Binary Full Adder, Fast Carry

Boolean Functions

CELL NAME	FUNCTIONAL DESCRIPTION
BF001LH BF002LH BF003LH BF004LH	AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$
BF005LH BF006LH BF007LH BF008LH	AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$
BF009LH BF010LH BF011LH BF012LH	AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$
BF013LH BF014LH BF015LH BF016LH	AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D}}$ OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ AND-OR-NAND Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$
BF017LH BF020LH BF022LH BF025LH	OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$
BF027LH BF028LH BF030LH BF034LH	OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E}}$ AND-OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$ AND-OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$
BF035LH BF051LH BF052LH BF053LH	AND-OR-AND-NOR Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$ OR-NAND Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$ OR-NAND Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$ OR-NAND Gate $Y = \overline{\overline{A \cdot B} \cdot \overline{C \cdot D} \cdot \overline{E} \cdot \overline{F}}$

Boolean Functions (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
BF054LH BF055LH BF056LH BF057LH	OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$
BF058LH BF059LH BF060LH BF062LH	OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$
BF063LH BF064LH BF065LH BF066LH	OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ OR-NAND Gate $Y = \overline{\text{OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$
BF067LH BF068LH BF069LH BF070LH	AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$
BF071LH BF072LH BF075LH BF080LH	AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ AND-OR-NAND Gate $Y = \overline{\text{AND-OR-NAND Gate } Y}$ OR-AND-OR-NAND Gate $Y = \overline{\text{OR-AND-OR-NAND Gate } Y}$
BF081LH BF082LH BF088LH	OR-AND-OR-NAND Gate $Y = \overline{\text{OR-AND-OR-NAND Gate } Y}$ OR-AND-OR-NAND Gate $Y = \overline{\text{OR-AND-OR-NAND Gate } Y}$ OR-AND-OR-NAND Gate $Y = (A1 + A2 + A3) \cdot (B1 + [C1 \cdot (D1 + D2)])$

Buffers, 3-State (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S244LH S245LH	Octal Internal Bus Buffer with 3-State Outputs Octal Internal 3-State Bus Transceiver

Comparators (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S085LH S686LH S688LH	4-Bit Magnitude Comparator 8-Bit Magnitude Comparator 8-Bit Identity Comparator

Counter

CELL NAME	FUNCTIONAL DESCRIPTION
R2408LH	4-Bit Ripple Counter

Counters (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S161ALH S163ALH S177LH S191LH	Synchronous 4-Bit Binary Counter with Clear Synchronous 4-Bit Binary Counter 1-Bit and 3-Bit Binary Ripple Counters Synchronous 4-Bit Up/Down Binary Counter with Down/Up Mode Control
S193LH S393LH S590LH S593XLH S669LH	Synchronous 4-Bit Up/Down Counter (Dual Clock with Clear) Dual 4-Bit Ripple Counters 8-Bit Binary Counter with 3-State Output Register 8-Bit Binary Counter with Input Register Synchronous 4-Bit Up/Down Binary Counter with Look-Ahead

Decoders/Demultiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
DE210LH DE212LH	2-Line to 4-Line Decoder 2-Line to 4-Line Decoder with High Enable

Decoders/Demultiplexers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S137LH	3-Line to 8-Line Decoder with Address Latches
S138LH	3-Line to 8-Line Decoder/Demultiplexer
S139LH	Dual 2-Line to 4-Line Decoder
S155LH	Dual 2-Line to 4-Line Decoder with Data, Enable

D-Type Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
DFB20LH	D-Type Flip-Flop with Preset, Clear, 2X Drive
DFC20LH	D-Type Flip-Flop with Clear, 2X Drive
DFN20LH	D-Type Flip-Flop, 2X Drive
DFP20LH	D-Type Flip-Flop with Preset, 2X Drive
DFY20LH	D-Type Flip-Flop with Grounded-D, Preset, 2X Drive
DFZ20LH	D-Type Flip-Flop with Grounded-D Input, Preset, Clear, 2X Drive
DTB10LH	D-Type Flip-Flop with Preset, Clear, 1X Drive
DTC10LH	D-Type Flip-Flop with Clear, 1X Drive
DTN10LH	D-Type Flip-Flop, 1X Drive
DTP10LH	D-Type Flip-Flop with Preset, 1X Drive
R2405LH	4-Bit Flip-Flops with Asynchronous Clear
R2406LH	4-Bit Flip-Flops with Complementary Outputs
R2407LH	4-Bit Flip-Flops with 3-State Outputs

D-Type Flip-Flops (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S173LH	4-Bit D-Type Register with 3-State Outputs
S174LH	Hex D-Type Flip-Flop
S175LH	Quad D-Type Flip-Flop with Complementary Outputs
S273LH	Octal D-Type Flip-Flop
S374LH	8-Bit D-Type Flip-Flop with 3-State Outputs

Exclusive-OR/NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
EN210LH	2-Input Exclusive-NOR Gate
EX210LH	2-Input Exclusive-OR Gate
EX211LH	2-Input Exclusive-OR Gate
EX220LH	2-Input Exclusive-OR Gate, 2X Drive
EX221LH	2-Input Exclusive-OR Gate, 2X Drive
EX240LH	2-Input Exclusive-OR Gate, 4X Drive
EX241LH	2-Input Exclusive-OR Gate, 4X Drive

Gated S-R/S-R Latches

CELL NAME	FUNCTIONAL DESCRIPTION
GMS10LH	5-Input Gated S-R Latch with Separate Set
GM010LH	4-Input Gated S-R Latch
GM110LH	5-Input Gated S-R Latch with Separate Reset
GM210LH	6-Input Gated S-R Latch with Separate Set, Reset
GM310LH	6-Input Gated S-R Latch
GM410LH	7-Input Gated S-R Latch with Separate Reset
GM510LH	8-Input Gated S-R Latch with Separate Set, Reset
GSS10LH	5-Input Gated S-R Latch with Separate Set
GS010LH	4-Input Gated S-R Latch
GS110LH	5-Input Gated S-R Latch with Separate Reset
GS210LH	6-Input Gated S-R Latch with Separate Set, Reset
GS310LH	6-Input Gated S-R Latch
GS410LH	7-Input Gated S-R Latch with Separate Reset
GS510LH	8-Input Gated S-R Latch with Separate Set, Reset

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ASIC Alphanumeric and Functional Macro Listings

Inputs/Outputs, Bidirectionals

CELL NAME	FUNCTIONAL DESCRIPTION
IOFB4LH IOFB8LH IOFD8LH IOFE8LH	24-mA, 3-State I/O Buffer with TTL Input 24-mA, 3-State I/O Buffer with TTL Input 44-mA, 3-State I/O Buffer with Inverting TTL Input 48-mA, Open-Drain I/O Buffer with Inverting TTL Input, Hysteresis
IOF00LH IOF01LH IOF03LH IOF04LH	10-mA, 3-State I/O Buffer with Inverting CMOS Input 10-mA, 3-State I/O Buffer with CMOS Input 10-mA, 3-State I/O Buffer with Inverting TTL Input 10-mA, 3-State I/O Buffer with TTL Input
IOF21LH IOF24LH IOF40LH IOF41LH	2-mA, 3-State I/O Buffer with CMOS Input 2-mA, 3-State I/O Buffer with TTL Input 4-mA, 3-State I/O Buffer with Inverting CMOS Input 4-mA, 3-State I/O Buffer with CMOS Input
IOF43LH IOF44LH IOF47LH IOF48LH	4-mA, 3-State I/O Buffer with Inverting TTL Input 4-mA, 3-State I/O Buffer with TTL Input 4-mA, 3-State I/O Buffer with Inverting CMOS Input with Hysteresis 4-mA, 3-State I/O Buffer with Inverting TTL Input with Hysteresis
IOF64LH IOF66LH	6-mA, 3-State I/O Buffer with TTL Input 6-mA, 3-State I/O Buffer with Inverting CMOS Input with Hysteresis

Inputs

CELL NAME	FUNCTIONAL DESCRIPTION
IPF00LH IPF01LH IPF02LH IPF03LH	CMOS-Compatible Inverting Input Buffer CMOS-Compatible Input Buffer CMOS-Compatible Inverting Input Buffer with Pullup Tap TTL-Compatible Inverting Input Buffer
IPF04LH IPF05LH IPF06LH IPF08LH	TTL-Compatible Input Buffer TTL-Compatible Inverting Input Buffer with Pullup Tap CMOS Inverting Input Buffer with Hysteresis TTL-Compatible Inverting Input Buffer with Hysteresis, Pullup Tap
IPF10LH IPF12LH IPF13LH	TTL-Compatible Input Buffer with Hysteresis, Pullup Tap TTL-Compatible Input Buffer TTL-Compatible Inverting Input Buffer with Pullup Tap

Inverters/Buffers

CELL NAME	FUNCTIONAL DESCRIPTION
BU110LH BU111LH BU112LH BU120LH	Delay Buffer Inverting Delay Buffer Delay Buffer Delay Buffer, 2X Drive
BU130LH BU221LH BU222LH BU261LH	Delay Buffer, 3X Drive 3-State Buffer with Low Enable, 2X Drive 3-State Buffer with High Enable, 2X Drive 3-State Buffer with Low Enable, 6X Drive
BU262LH IV101LH IV110LH IV120LH	3-State Buffer with High Enable, 6X Drive Inverter, 10X Drive Inverter Inverter, 2X Drive
IV130LH IV140LH IV160LH IV180LH	Inverter, 3X Drive Inverter, 4X Drive Inverter, 6X Drive Inverter, 8X Drive
IV211LH IV212LH IV221LH IV222LH	Inverting 3-State Buffer with Low Enable Inverting 3-State Buffer with High Enable Inverting 3-State Buffer with Low Enable, 2X Drive Inverting 3-State Buffer with High Enable, 2X Drive
IV241LH IV242LH	Inverting 3-State Buffer with Low Enable, 4X Drive Inverting 3-State Buffer with High Enable, 4X Drive

J-K Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
JKB20LH JKB21LH	J-K Positive-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive J-K Negative-Edge-Triggered Flip-Flop with Preset, Clear, 2X Drive

Latches

CELL NAME	FUNCTIONAL DESCRIPTION
LAB10LH LAB20LH LAH10LH LAH11LH	S-R Latch S-R Latch, 2X Drive D-Type Latch with High Enable D-Type Latch with High Enable
LAH20LH LAH21LH LAL20LH LH110LH	D-Type Latch with High Enable, 2X Drive D-Type Latch with High Enable, 2X Drive D-Type Latch with Low Enable 3-State Bus Holder

Latches (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S259LH S373LH S375LH	8-Bit Addressable Latch 8-Bit D-Type Latch with 3-State Outputs 4-Bit Bistable Latch

Multiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
MU110LH MU111LH MU210LH MU211LH	2-Line to 1-Line Multiplexer with 3-State Output 2-Line to 1-Line Multiplexer 4-Line to 1-Line Multiplexer 4-Line to 1-Line Multiplexer
MU310LH MU320LH	8-Line to 1-Line Multiplexer with 3-State Output 8-Line to 1-Line Multiplexer, 2X Drive

Multiplexers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S151LH S153LH S157LH S158LH	8-Line to 1-Line Multiplexer Dual 4-Line to 1-Line Multiplexer Quadruple 2-Line to 1-Line Multiplexer Quad 2-Line to 1-Line Inverting Multiplexer
S251LH S257ALH S258ALH S298LH	8-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Multiplexer with 3-State Outputs Quad 2-Line to 1-Line Inverting Multiplexer with 3-State Outputs Quad 2-Input Multiplexer with Negative-Edge-Triggered Register
S398LH S399LH	Quad 2-Input Multiplexer with Complementary Output Register Quad 2-Input Multiplexer with Edge-Triggered Register

NAND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
NA210LH NA220LH NA230LH NA240LH	2-Input NAND Gate 2-Input NAND Gate, 2X Drive 2-Input NAND Gate, 3X Drive 2-Input NAND Gate, 4X Drive
NA260LH NA310LH NA320LH NA330LH	2-Input NAND Gate, 6X Drive 3-Input NAND Gate 3-Input NAND Gate, 2X Drive 3-Input NAND Gate, 3X Drive
NA340LH NA410LH NA420LH NA430LH	3-Input NAND Gate, 4X Drive 4-Input NAND Gate 4-Input NAND Gate, 2X Drive 4-Input NAND Gate, 3X Drive

NAND Gates (Continued)

CELL NAME	FUNCTIONAL DESCRIPTION
NA510LH	5-Input NAND Gate
NA520LH	5-Input NAND Gate, 2X Drive
NA810LH	8-Input NAND Gate
NA820LH	8-Input NAND Gate, 2X Drive

NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
NO210LH	2-Input NOR Gate
NO220LH	2-Input NOR Gate, 2X Drive
NO230LH	2-Input NOR Gate, 3X Drive
NO240LH	2-Input NOR Gate, 4X Drive
NO310LH	3-Input NOR Gate
NO320LH	3-Input NOR Gate, 2X Drive
NO330LH	3-Input NOR Gate, 3X Drive
NO410LH	4-Input NOR Gate
NO420LH	4-Input NOR Gate, 2X Drive
NO510LH	5-Input NOR Gate
NO520LH	5-Input NOR Gate, 2X Drive
NO810LH	8-Input NOR Gate
NO820LH	8-Input NOR Gate, 2X Drive

One-Shot

CELL NAME	FUNCTIONAL DESCRIPTION
MVF00LH	Retriggerable Monostable Multivibrator

OR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
OR210LH	2-Input OR Gate
OR220LH	2-Input OR Gate, 2X Drive
OR240LH	2-Input OR Gate, 4X Drive
OR260LH	2-Input OR Gate, 6X Drive
OR310LH	3-Input OR Gate
OR320LH	3-Input OR Gate, 2X Drive
OR340LH	3-Input OR Gate, 4X Drive
OR360LH	3-Input OR Gate, 6X Drive
OR410LH	4-Input OR Gate
OR420LH	4-Input OR Gate, 2X Drive
OR440LH	4-Input OR Gate, 4X Drive
OR460LH	4-Input OR Gate, 6X Drive
OR510LH	5-Input OR Gate
OR810LH	8-Input OR Gate

Outputs

CELL NAME	FUNCTIONAL DESCRIPTION
OPFB0LH	24-mA, Totem-Pole Output Buffer
OPFB3LH	24-mA, 3-State Output Buffer with Low Enable
OPFD3LH	44-mA, 3-State Output Buffer with Low Enable
OPFE1LH	48-mA, Open-Drain Output Buffer
OPF00LH	10-mA, Totem-Pole Output Buffer
OPF01LH	10-mA, Open-Drain Output Buffer
OPF03LH	10-mA, 3-State Output Buffer with Low Enable
OPF20LH	2-mA, Totem-Pole Output Buffer
OPF23LH	2-mA, 3-State Output Buffer with Low Enable
OPF40LH	4-mA, Totem-Pole Output Buffer
OPF41LH	4-mA, Open-Drain Output Buffer
OPF43LH	4-mA, 3-State Output Buffer with Low Enable
OPF60LH	6-mA, Totem-Pole Output Buffer
OPF61LH	6-mA, Open-Drain Output Buffer
OPF63LH	6-mA, 3-State Output Buffer with Low Enable

Oscillators

CELL NAME	FUNCTIONAL DESCRIPTION
OSE00LH	5-MHz (MAX) Crystal-Controlled Oscillator
OSE01LH	100-kHz (MAX) RC Oscillator
OSE06LH	800-kHz (MAX) Crystal-Controlled Oscillator
OSE07LH	200-kHz (MAX) RC Oscillator
OSF02LH	20-MHz (MAX) Crystal-Controlled Oscillator

Parity Generator/Checker (Software Macro)

CELL NAME	FUNCTIONAL DESCRIPTION
S280LH	9-Bit Odd/Even Parity Generator/Checker

Pulldown/Pullup Terminators

CELL NAME	FUNCTIONAL DESCRIPTION
PD095LH	95- μ A, Pulldown Active Terminator
PR005LH	5- μ A, Pullup Active Terminator
PR095LH	95- μ A, Pullup Active Terminator
PR250LH	250- μ A, Pullup Active Terminator
PR400LH	5- μ A, Pullup Active Terminator

Power-Up Clear One-Shot

CELL NAME	FUNCTIONAL DESCRIPTION
PUC00LH	Power-Up Clear One-Shot

RAMs

CELL NAME	FUNCTIONAL DESCRIPTION
RA408LH	16-Word by 8-Bit Static Read/Write RAM with 3-State Outputs
RA608LH	64-Word by 8-Bit Static Read/Write RAM with 3-State Outputs
RA708LH	128-Word by 8-Bit Static Read/Write RAM with 3-State Outputs
RA802LH	256-Word by 2-Bit Static Read/Write RAM with 3-State Outputs

Register Files

CELL NAME	FUNCTIONAL DESCRIPTION
RF408LH	16-Word by 8-Bit 3-Port Register File

Shift Registers

CELL NAME	FUNCTIONAL DESCRIPTION
R2401LH	4-Bit Shift Register with Serial In, Asynchronous Clear
R2402LH	4-Bit Shift Register with Serial In, Complementary Outputs
R2403LH	4-Bit Shift Register with Serial and Parallel Inputs
R2404LH	4-Bit Shift Register with Serial/Parallel Inputs, Complementary Outputs

Shift Registers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S164LH	8-Bit Parallel-Out Serial Shift Registers
S165LH	Parallel-Load 8-Bit Shift Registers
S166LH	Parallel-Load 8-Bit Shift Register with Clear
S194ALH	Bidirectional Universal Shift Registers
S195ALH	4-Bit Parallel-Access Shift Registers
S299LH	8-Bit Bidirectional Shift/Storage Registers
S299XLH	8-Bit Bidirectional Shift Registers
S595LH	8-Bit Shift Register with 3-State Output Registers
S598XLH	8-Bit Shift Register with Input Registers

Toggle Flip-Flops

CELL NAME	FUNCTIONAL DESCRIPTION
TAB20LH	Toggle Flip-Flop with Preset, Clear, 2X Drive
TAC20LH	Toggle Flip-Flop with Clear, 2X Drive
TAP20LH	Toggle Flip-Flop with Preset, 2X Drive

Tie-Off Gate

CELL NAME	FUNCTIONAL DESCRIPTION
TO010LH	High-Level and Low-Level Tie-Off Gate

Transceiver Registers (Software Macros)

CELL NAME	FUNCTIONAL DESCRIPTION
S651LH	8-Bit Bidirectional Register with Inverting Data Path
S652LH	8-Bit Bidirectional Transceiver Register

3- μ m CIRCUITCELL SERIES CMOS STANDARD CELLS (Europe Only)

Supported in Europe only, TI's CircuitCell Series currently comprises more than 240 cell types including SSI, MSI, I/O, Boolean and extended functions such as 1kbit RAM and up to 4kbit ROM fixed blocks. The family also contains a series of simple analog functions including operational amplifiers, voltage regulators, oscillators, A/D, D/A, and comparators. Typical gate propagation delay is 2ns (5 loads) with a maximum toggle rate of 25 MHz. TI's CircuitCell Series is a mature and rugged technology particularly useful in automotive industrial environments. The CircuitCell design manual (SCL71) and the CircuitCell product brochure (SCL08) may be ordered through TI's European Sales Offices.

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ASIC Alphanumeric and Functional Macro Listings

ALPHANUMERIC CELL LISTING: CIRCUITCELL SERIES 3- μ m CMOS STANDARD CELLS (Europe Only)

Technical data is contained in the SN54/74SC Library Guide (Europe: SCL69) or the 3- μ m CircuitCell Design Manual (Europe: SCL71).

CELL NUMBER	DESCRIPTION
SN54/74SC00 SN54/74SC02 SN54/74SC04 SN54/74SC08	2-Input NAND Gate 2-Input NOR Gate Inverter, Always Active 2-Input AND Gate
SN54/74SC10 SN54/74SC11 SN54/74SC20 SN54/74SC21	3-Input NAND Gate 3-Input AND Gate 4-Input NAND Gate 4-Input AND Gate
SN54/74SC27 SN54/74SC30 SN54/74SC32 SN54/74SC74	3-Input NOR Gate 8-Input NAND Gate 2-Input OR Gate D-Type F-F
SN54/74SC75 SN54/74SC86 SN54/74SC109 SN54/74SC260	Bistable Latch, Active-High, Enable Exclusive-OR Gate JK F-F 5-Input NOR Gate
SN54/74SC279 SN54/74SC2004 SN54/74SC2012 SN54/74SC2102	Bistable Latch, Set-Reset 5-Input AND Gate** 5-Input NAND Gate Toggle F-F Ungated
SN54/74SC2108 SN54/74SC2310 SN54/74SC2311 SN54/74SC2320	JK F-F, Neg-Edge Trig. Inverter, 3-S, Active Low Inverter, 3-S, Active High Power-Up Clear
SN54/74SC2321 SN54/74SC2322 SN54/74SC2323 SN54/74SC2330	Non-Inv Delay Buffer One-Shot Multivibrator, Retriggerable Tie-Off For Logical 1 & 0 AND-OR-Invert Gate
SN54/74SC2331 SN54/74SC2340 SN54/74SC2341 SN54/74SC2342	AND-OR Gate 2 Line to 1 Line Multiplexer 4 Line to 1 Line Multiplexer 8 Line to 1 Line Multiplexer
SN54/74SC2350 SN54/74SC2352 SN54/74SC2360 SN54/74SC2361	2 Line to 4 Line Decoder 4 Line to 16 Line Decoder** Design for Test, XOR-Multiplexer** Design for Test, Shift Register Latch**
SN54/74SC2362 SN54/74SC2363 SN54/74SC2364 SN54/74SC2401	Design for Test, Scan D F-F** Design for Test, Data Multiplexer** Design for Test, Clock Multiplexer** 4-Bit Shift Ser-In/Par-Out, Async Clr, Q Output
SN54/74SC2402 SN54/74SC2403 SN54/74SC2404 SN54/74SC2405	4-Bit Shift Ser-In/Par-Out, Async Clr, Q, QZ Output 4-Bit Shift Par-In/Par-Out, Async Clr, Q Output 4-Bit Shift Par-In/Par-Out, Async Clr, Q, QZ Output 4-Bit D-FF, Async Clr, Q Output
SN54/74SC2406 SN54/74SC2407 SN54/74SC2408 SN54/74SC2500	4-Bit D-FF, Async Clr, Q, QZ Output 4-Bit D-FF, Async Clr, Q Output with 3-State 4-Bit Ripple Up-Counter, Async Clr, Q Output Crystal Oscillator, 2-Pin, 5-20 MHz
SN54/74SC2501 SN54/74SC2502 SN54/74SC2503 SN54/74SC2504	Relaxation Oscillator, 1-Pin, External R-C** Voltage Controlled Oscillator** Diff. Comparator, Push-Pull Output Op Amp, Internal**
SN54/74SC2505 SN54/74SC2506 SN54/74SC3000 SN54/74SC3001	Op Amp, External Driver** Voltage Reference** RAM (Procedural Cell)* ROM (Procedural Cell)*

* Available in restricted configurations.

** These functions are under development.

CELL NUMBER	DESCRIPTION
SN5474SC3002 SN5474SC3007 SN5474SC4002 SN5474SC4072	PLA (Procedural Cell)* ALU (Procedural Cell)* 4-Input NOR Gate 4-Input OR Gate
SN5474SC4075 SN5474SC4078 SN5474SC5000 SN5474SC5001	3-Input OR Gate 8-Input NOR Gate Input, CMOS Level, Inv Input, TTL Level, Inv
SN5474SC5002 SN5474SC5003 SN5474SC5004 SN5474SC5005	Input, CMOS Level, Inv w/Hys Input, TTL Level, Inv w/Hys Input, CMOS Level, Inv w/Pull-Up Tap** Input, TTL Level, Inv w/Pull-Up Tap
SN5474SC5006 SN5474SC5007 SN5474SC5010 SN5474SC5013	Input, CMOS Level, Non-Inv Input, TTL Level, Non-Inv Input, TTL Level, Inv w/Hys, Pull-Up Tap Input, TTL Level, Non-Inv w/Pull-Up Tap
SN5474SC5100 SN5474SC5101 SN5474SC5102 SN5474SC5103	Output, 2mA, Push-Pull, Non-Inv Output, 2mA, 3-State, Non-Inv Output, 2mA, Open-Drain, Non-Inv Output, 4mA, Push-Pull, Non-Inv
SN5474SC5104 SN5474SC5105 SN5474SC5106 SN5474SC5107	Output, 4mA, 3-State, Non-Inv Output, 4mA, Open-Drain, Non-Inv Output, 6mA, Push-Pull, Non-Inv Output, 6mA, 3-State, Non-Inv
SN5474SC5108 SN5474SC5111 SN5474SC5120 SN5474SC5121	Output, 6mA, Open-Drain, Non-Inv Output, 2mA, 3-State, Non-Inv Output, 10mA, Push-Pull, Non-Inv Output, 24mA, Open-Drain, Non-Inv
SN5474SC5123 SN5474SC5124 SN5474SC5125 SN5474SC5200	Output, 44mA, Open-Drain, Non-Inv Output, 24mA Sink, 6mA Source, 3-State** Output, 12mA, 3-State, Non-Inverting** 2mA Non-Inv 3-State Output, CMOS Inv Input
SN5474SC5201 SN5474SC5203 SN5474SC5206 SN5474SC5207	2mA Non-Inv 3-State Output, TTL Inv Input 2mA Non-Inv 3-State Output, TTL Inv Input w/Hyst** 2mA Non-Inv 3-State Output, CMOS Non-Inv Input 2mA Non-Inv 3-State Output, TTL Non-Inv Input
SN5474SC5210 SN5474SC5211 SN5474SC5216 SN5474SC5217	4mA Non-Inv 3-State Output, CMOS Inv Input** 4mA Non-Inv 3-State Output, TTL Inv Input** 4mA Non-Inv 3-State Output, CMOS Non-Inv Input** 4mA Non-Inv 3-State Output, TTL Non-Inv Input
SN5474SC5220 SN5474SC5221 SN5474SC5226 SN5474SC5227	6mA Non-Inv 3-State Output, CMOS Inv Input 6mA Non-Inv 3-State Output, TTL Inv Input 6mA Non-Inv 3-State Output, CMOS Non-Inv Input 6mA Non-Inv 3-State Output, TTL Non-Inv Input
SN5474SC5239 SN5474SC5243 SN5474SC5250 SN5474SCM85	10mA Non-Inv 3-State Output, TTL Non-Inv Input 24mA Non-Inv 3-State Output, TTL Inv Input w/Hyst** 24mA Non-Inv Open-Drain Output, CMOS Inv Input 4-Bit Magnitude Comparator
SN5474SCM137 SN5474SCM138 SN5474SCM139 SN5474SCM151	3:8 Decode w/Latches 3:8 Decode Dual 2:4 Decode 8:1 Multiplexer
SN5474SCM153 SN5474SCM155 SN5474SCM157 SN5474SCM158	Dual 4:1 Multiplexer Dual 2:4 Line Decoder/Multiplexer Quad 2:1 Multiplexer, Non-Inv Dual 2:1 Multiplexer, Inv
SN5474SCM161A SN5474SCM163A SN5474SCM164 SN5474SCM165	4-Bit Binary Counter, Async Clr 4-Bit Binary Counter, Sync Clr 8-Bit Shift Register, Ser-In/Par-Out, Async Clr 8-Bit Shift Register, Par-In/Ser-Out, Async Clr
SN5474SCM166 SN5474SCM173 SN5474SCM174 SN5474SCM175	8-Bit Shift Register, Par-In/Ser-Out, Sync Clr Quad D F-F, 3-State Hex D F-F Quad D F-F, Q and \bar{Q} Out

* Available in restricted configurations.

** These functions are under development.

CELL NUMBER	DESCRIPTION
SN54/74SCM177 SN54/74SCM181 SN54/74SCM191 SN54/74SCM193	4-Bit Binary Counter, Async Parallel Load, Ripple Clk 4-Bit ALU 4-Bit Up/Down Binary Counter 4-Bit Up/Down Binary Counter, 2 Clks w/Clear
SN54/74SCM194A SN54/74SCM195A SN54/74SCM244 SN54/74SCM245	4-Bit Shift Register, Par-In/Par-Out, L/R Shift 4-Bit Shift Register, Par-In/Par-Out, R Shift Octal Driver/Receiver, Non-Inv, 3-State Octal Driver/Receiver, Bidir, Non-Inv, 3-State
SN54/74SCM251 SN54/74SCM257 SN54/74SCM258 SN54/74SCM259	8:1 Multiplexer, 3 State Quad 2:1 Multiplexer, Non-Inv, 3-State Quad 2:1 Multiplexer, Inv, 3-State 8-Bit Addressable Latches
SN54/74SCM273 SN54/74SCM280 SN54/74SCM283 SN54/74SCM298	Octal D F-F 9-Bit Parity Generator/Checker 4-Bit Binary Full Adder Quad 2:1 Multiplexer w/FF, Clk HL
SN54/74SCM299 SN54/74SCM299X SN54/74SCM373 SN54/74SCM374	8-Bit Shift/Register, L/R Shift, Bidir, 3-State 8-Bit Shift/Register, L/R Shift, Bidir, 3-State, I/O Separated Octal Latch, 3-State Octal D F-F, 3-State
SN54/74SCM375 SN54/74SCM393 SN54/74SCM398 SN54/74SCM399	Quad Latch Dual 4-Bit Binary Counter Quad 2:1 Multiplexer w/FF, Q, \bar{Q} , Clk LH Quad 2:1 Multiplexer w/FF, Clk LH
SN54/74SCM590 SN54/74SCM593X SN54/74SCM595 SN54/74SCM598X	8-Bit Binary Counter w/Output Registers 8-Bit Binary Counter w/Input Registers 8-Bit Shift Register w/Output Latches 8-Bit Shift Register w/Input Latches
SN54/74SCM651 SN54/74SCM652 SN54/74SCM669 SN54/74SCM686 SN54/74SCM688	Dual 8-Bit Reg & Bus Trans, 3S, BD, D Low Dual 8-Bit Reg & Bus Trans, 3S, BD, D 4-Bit Up/Down Binary Counter 8-Bit Magnitude Comparator, P=Q, P<Q 8-Bit Magnitude Comparator, P=Q Only

FUNCTIONAL CELL LISTING: CIRCUITCELL SERIES 3- μ m CMOS STANDARD CELLS (Europe Only)

Technical data is contained in the SN54/74SC Library Guide (Europe: SCL69) or the 3- μ m CircuitCell Design Manual (Europe: SCL71).

AND/OR/NOR Gates

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC02	2-Input NOR Gate
SN54/74SC08	2-Input AND Gate
SN54/74SC11	3-Input AND Gate
SN54/74SC21	4-Input AND Gate
SN54/74SC27	3-Input NOR Gate
SN54/74SC32	2-Input OR Gate
SN54/74SC260	5-Input NOR Gate
SN54/74SC2004	5-Input AND Gate**
SN54/74SC4002	4-Input NOR Gate
SN54/74SC4072	4-Input OR Gate
SN54/74SC4075	3-Input OR Gate
SN54/74SC4078	8-Input NOR Gate

Arithmetic Functions

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM181	4-Bit ALU
SN54/74SCM280	9-Bit Parity Generator/Checker
SN54/74SCM283	4-Bit Binary Full Adder
SN54/74SC3007	ALU (Procedural Cell)*

Boolean Function

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC86	Exclusive-OR Gate
SN54/74SC2323	Tie-Off For Logical 1 & 0
SN54/74SC2330	AND-OR-Invert Gate
SN54/74SC2331	AND-OR Gate

Buffer-Bidirectional

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC5200	2mA Non-Inv 3-State Output, Inv CMOS Input
SN54/74SC5201	2mA Non-Inv 3-State Output, Inv TTL Input
SN54/74SC5203	2mA Non-Inv 3-State Output, Inv TTL Input w/Hyst**
SN54/74SC5206	2mA Non-Inv 3-State Output, Non-Inv CMOS Input
SN54/74SC5207	2mA Non-Inv 3-State Output, Non-Inv TTL Input
SN54/74SC5210	4mA Non-Inv 3-State Output, Inv CMOS Input**
SN54/74SC5211	4mA Non-Inv 3-State Output, Inv TTL Input**
SN54/74SC5216	4mA Non-Inv 3-State Output, Non-Inv CMOS Input**
SN54/74SC5217	4mA Non-Inv 3-State Output, Non-Inv TTL Input
SN54/74SC5220	6mA Non-Inv 3-State Output, Inv CMOS Input
SN54/74SC5221	6mA Non-Inv 3-State Output, Inv TTL Input
SN54/74SC5226	6mA Non-Inv 3-State Output, Non-Inv CMOS Input
SN54/74SC5227	6mA Non-Inv 3-State Output, Non-Inv TTL Input
SN54/74SC5239	10mA Non-Inv 3-State Output, Non-Inv TTL Input
SN54/74SC5243	24mA Non-Inv 3-State Output, Inv TTL Input w/Hyst**
SN54/74SC5250	24mA Non-Inv Open-Drain Output, Inv CMOS Input

Buffer-Delay

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC2321	Non-Inverting Delay Buffer

* Available in restricted configurations.

** These functions are under development.

Buffer-Input

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC5000 SN54/74SC5001 SN54/74SC5002 SN54/74SC5003	Input, CMOS Level, Inv Input, TTL Level, Inv Input, CMOS Level, Inv w/Hys Input, TTL Level, Inv w/Hys
SN54/74SC5004 SN54/74SC5005 SN54/74SC5006 SN54/74SC5007	Input, CMOS Level, Inv w/Pull-Up Tap** Input, TTL Level, Inv w/Pull-Up Tap Input, CMOS Level, Non-Inv Input, TTL Level, Non-Inv
SN54/74SC5010 SN54/74SC5013	Input, TTL Level, Inv w/Hys, Pull-Up Tap Input, TTL Level, Non-Inv w/ Pull-Up Tap

Buffer-Output

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC5100 SN54/74SC5101 SN54/74SC5102 SN54/74SC5103	Output, 2mA, Push-Pull, Non-Inv Output, 2mA, 3-State, Non-Inv Output, 2mA, Open-Drain, Non-Inv Output, 4mA, Push-Pull, Non-Inv
SN54/74SC5104 SN54/74SC5105 SN54/74SC5106 SN54/74SC5107	Output, 4mA, 3-State, Non-Inv** Output, 4mA, Open-Drain, Non-Inv Output, 6mA, Push-Pull, Non-Inv Output, 6mA, 3-State, Non-Inv
SN54/74SC5108 SN54/74SC5111 SN54/74SC5120 SN54/74SC5121	Output, 6mA, Open-Drain, Non-Inv Output, 2mA, 3-State, Non-Inv Active Low** Output, 10mA, Push-Pull, Non-Inv Output, 24mA, Open-Drain, Non-Inv
SN54/74SC5123 SN54/74SC5124 SN54/74SC5125	Output, 44mA, Open-Drain, Non-Inv Output, 24mA Sink, 6mA Source 3-State** Output, 12mA, 3-State, Non-Inv**

Comparators

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM85 SN54/74SCM686 SN54/74SCM688 SN54/74SC2503	4-Bit Magnitude Comparator 8-Bit Magnitude Comparator, P=Q, PQ 8-Bit Magnitude Comparator, P=Q Only Diff. Comparator, Push-Pull Output

Counters

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM161A SN54/74SCM163A SN54/74SCM177 SN54/74SCM191	4-Bit Binary Counter, Async Clr 4-Bit Binary Counter, Sync Clr 4-Bit Binary Counter, Async Parallel Load, Ripple Clk 4-Bit Up/Down Binary Counter
SN54/74SCM193 SN54/74SCM393 SN54/74SCM590 SN54/74SCM593X	4-Bit Up/Down Binary Counter, 2 Clks w/Clr Dual 4-Bit Binary Counter 8-Bit Binary Counter w/Output Registers 8-Bit Binary Counter w/Input Registers
SN54/74SCM669 SN54/74SC2408	4-Bit Up/Down Binary Counter 4-Bit Ripple Up-Counter, Async Clr, Q Output

Decoders/Demultiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM137 SN54/74SCM138 SN54/74SCM139 SN54/74SCM155	3:8 Decode with Latches 3:8 Decode Dual 2:4 Decode Dual 2:4 Line Decoder/Multiplexer
SN54/74SC2350 SN54/74SC2352	2:4 Line Decoder 4:16 Line Decoder**

* Available in restricted configurations.

** These functions are under development.

Design to Test

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC2360	Design for Test, XOR-Multiplexer**
SN5474SC2361	Design for Test, Shift Register Latch**
SN5474SC2363	Design for Test, Data Multiplexer**
SN5474SC2364	Design for Test, Clk Multiplexer**

Driver/Receiver

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SCM244	Octal Driver/Receiver, Non-Inv, 3 State
SN5474SCM245	Octal Driver/Receiver, Bidir, Non-Inv, 3 State

Flip-Flops, D-Type

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC74	D-Type F-F
SN5474SCM173	Quad D F-F, 3-State
SN5474SCM174	Hex D F-F
SN5474SCM175	Quad D F-F, Q and \bar{Q} Output
SN5474SCM273	Octal D F-F
SN5474SCM374	Octal D F-F, 3-State
SN5474SC2362	Design for Test, Scan D F-F**
SN5474SC2405	4-Bit D-FF, Async Clr, Q Output
SN5474SC2406	4-Bit D-FF, Async Clr, Q, QZ Output
SN5474SC2407	4-Bit D-FF, Async Clr, Q Output with 3-State

Flip-Flops, JK-Type

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC109	JK F-F
SN5474SC2108	JK F-F, Neg Edge Trig.

Flip-Flops, Toggle Type

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC2102	Toggle F-F, Ungated

Inverters

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC04	Inverter, Always Active
SN5474SC2310	Inverter, 3-S, Active Low
SN5474SC2311	Inverter, 3-S, Active High

Latches

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC75	Bistable Latch, Active-High, Enable
SN5474SC279	Bistable Latch, Set-Reset
SN5474SCM259	8-Bit Addressable Latches
SN5474SCM373	Octal Latch, 3-State
SN5474SCM375	Quad Latch
SN5474SC2361	Design for Test, Shift Register Latch**

Memory and PLA

CELL NAME	FUNCTIONAL DESCRIPTION
SN5474SC3000	RAM (Procedural Cell)*
SN5474SC3001	ROM (Procedural Cell)*
SN5474SC3002	PLA (Procedural Cell)*

* Available in restricted configurations.

** These functions are under development.

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ASIC Alphanumeric and Functional Macro Listings

Multiplexers

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM151 SN54/74SCM153 SN54/74SCM157 SN54/74SCM158	8:1 Multiplexer Dual 4:1 Multiplexer Quad 2:1 Multiplexer, Non-Inv Dual 2:1 Multiplexer, Inv
SN54/74SCM251 SN54/74SCM257 SN54/74SCM258 SN54/74SCM298	8:1 Multiplexer, 3 State Quad 2:1 Multiplexer, Non-Inv, 3-State Quad 2:1 Multiplexer, Inv, 3-State Quad 2:1 Multiplexer with FF, Clk HL
SN54/74SCM398 SN54/74SCM399 SN54/74SC2340 SN54/74SC2341	Quad 2:1 Multiplexer with FF, Q, \bar{Q} , Clk LH Quad 2:1 Multiplexer with FF, Clk LH 2:1 Line Multiplexer 4:1 Line Multiplexer
SN54/74SC2342 SN54/74SC2360 SN54/74SC2363 SN54/74SC2364	8:1 Line Multiplexer Design for Test, XOR-Multiplexer** Design for Test, Data Multiplexer** Design for Test, Clk Multiplexer**

NAND Gates

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC00 SN54/74SC10 SN54/74SC20 SN54/74SC30 SN54/74SC2012	2-Input NAND Gate 3-Input NAND Gate 4-Input NAND Gate 8-Input NAND Gate 5-Input NAND Gate

Shift Registers

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM164 SN54/74SCM165 SN54/74SCM166 SN54/74SCM194A	8-Bit Shift Register, Ser-In/Par-Out, Async Clr 8-Bit Shift Register, Par-In/Ser-Out, Async Clr 8-Bit Shift Register, Par-In/Ser-Out, Sync Clr 4-Bit Shift Register, Par-In/Par-Out, L/R Shift
SN54/74SCM195A SN54/74SCM299 SN54/74SCM299X SN54/74SCM595	4-Bit Shift Register, Par-In/Par-Out, R Shift 8-Bit Shift Register, L/R Shift, Bidir, 3-State 8-Bit Shift Register, L/R Shift, Bidir, I/O Separated 8-Bit Shift Register w/ Output Latches
SN54/74SCM598X SN54/74SC2361 SN54/74SC2401 SN54/74SC2402	8-Bit Shift Register w/ Input Latches Design for Test, Shift Register Latch** 4-Bit Shift Ser-In/Par-Out, Async Clr, Q Output 4-Bit Shift Ser-In/Par-Out, Async Clr, Q, QZ Output
SN54/74SC2403 SN54/74SC2404	4-Bit Shift Par-In/Par-Out, Async Clr, Q Output 4-Bit Shift Par-In/Par-Out, Async Clr, Q, QZ Output

Operational Amplifiers

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC2504 SN54/74SC2505	Op Amp, Internal** Op Amp, External Driver**

Oscillators

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC2322 SN54/74SC2500 SN54/74SC2501 SN54/74SC2502	One-Shot Multivibrator, Retriggerable Crystal Oscillator, 2-Pin, 5-20 MHz Relaxation Oscillator, 1-Pin, External R-C** Voltage Controlled Oscillator**

Power-Up Clear

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC2320	Power-Up Clear

* Available in restricted configurations.

** These functions are under development.

Registers

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SCM651	Dual 8-Bit Reg & Bus Trans, 3S, BD, D Low
SN54/74SCM652	Dual 8-Bit Reg & Bus Trans, 3S, BD, D

Voltage Reference

CELL NAME	FUNCTIONAL DESCRIPTION
SN54/74SC2506	Voltage Reference**

- * Available in restricted configurations.
- ** These functions are under development.

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ASIC Alphanumeric and Functional Macro Listings

TECHNICAL DOCUMENTATION

Comprehensive design kits are available for the TGC100 Series gate arrays and the TSC500 Series standard cells. These kits are provided in a 3-ring binder format and include a design manual, two-volume data manual, software utilities manual, and EWS specific library. Design kits are available in both commercial and military versions. Contact the nearest field sales office for more information regarding the design kits.

The reader should refer to the order forms at the back of the Guide for additional information on available technical documentation.

DESIGN SERVICES

Texas Instruments has an established worldwide network of Regional Technology Centers (RTC) staffed by design professionals with direct application experience. Design engineers are available to assist in the evaluation of customer product design — from concept to prototype to production. The ASIC Design Center within each RTC is fully equipped with hardware/software design tools to support design analysis and optimization, schematic capture, simulation and layout. In the US, access to these design tools within many design centers is provided to customers 24-hours a day.

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Contact the nearest RTC for additional information. Names and addresses are listed at the back of the Guide.

IMPACT™ CENTERS

Supported by a professional engineering staff, TI IMPACT Centers are structured to allow maximum design and production assistance on a local basis. Through these local facilities, you have access to complete code development from logic description or schematic entry. Development tools include computer-aided design hardware, backed by user-friendly software.

IMPACT Center production facilities are structured to offer quick turnaround prototypes and volume production capability, aimed at on-time delivery of programmed devices.

To ensure the same quality level as parts shipped directly from Texas Instruments, the centers undertake comprehensive testing and lot acceptance programs of all programmable logic devices — before they are shipped. By using a comprehensive work flow system, the IMPACT Centers provide Quality Assurance with a complete set of documentation. In the US, contact a local TI field sales office for information about the nearest IMPACT Center.

DESIGN WORKSHOPS (EUROPE: DESIGN SEMINAR)

Designers initially engaging with TI are automatically enrolled in a gate array or standard cell design workshop to ensure the successful execution of an ASIC design. (In Europe, designers initially engaging with TI may enroll in a gate array or standard cell design seminar.) These one-day workshops, held at the customer site or at one of TI's Regional Technology Centers (RTC), are intended for designers experienced in logic design and familiar with basic engineering workstation operation. The workshops are instructed by experienced ASIC design engineers, and focus on design practices and techniques necessary to ensure design compatibility with TI's internal design automation tools and test equipment.

Instruction is provided in the following areas:

- ASIC technology options
- selection of TI library functions to meet performance/cost goals
- the effect of design partitioning/package selection on unit/system cost
- designing for testability
- recommended ASIC design practices
- TI ASIC design flow
- use of TI EWS design support software utility programs
- EWS design capture procedures to generate a TI netlist
- test pattern generation including format requirements
- TI ASIC test systems capabilities
- TI design execution requirements
- prototype test procedures
- design submission package preparation
- post layout simulation

Readers should contact the nearest TI Field Sales Office or RTC for more information concerning either workshop. Specific addresses and telephone numbers are listed at the back of this Guide.

DESIGN TOOLS

TI ASIC libraries are supported on several popular engineering workstations. Design support software utilities are provided to supplement the graphic symbol, logic and simulation models, delay and interconnect models contained in each library. These software utilities assure that the final design database is fully verified and compatible with TI's IC design tools and test equipment.

Refer to the table below for a summary of workstations supporting TI ASIC libraries. Contact the nearest TI field sales office for the most up-to-date information regarding CAD library support.

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ASIC Alphabetical and Functional Macro Listings

WORKSTATIONS SUPPORTING TI ASIC LIBRARIES

Product	Family	Workstations		
		Daisy	Mentor	Valid
Gate Arrays	TGC100 Series	X	X	X*
Standard Cells	TSC500 Series	X	X	X*
	SystemCell Series	X	X	X*

*Planned for Europe

Programmable Logic Devices

Designing with TI Programmable Logic Devices (PLD) is supported by several advanced software packages. These packages help develop the logic equations, generate the fuse map and test the logic equations against an input set of test vectors. TI's proLogic(TM) development software is available at no charge for TI PLD designers. This package runs on IBM-compatible MS-DOS PCs. Design assistance for all TI PLDs is provided in the proLogic software. Several third parties also offer PLD design tools. Those listed below support the full line of TI PLDs. Obtain information about these packages and services from the specific vendor.

Vendor — Design Software	Software Support — Software	Programming Support
Data I/O™ — ABEL™	Data I/O — ABEL	Data I/O
Logical Devices Inc. — CUPL™	Logical Devices — CUPL	Logical Devices
Minc Inc. — PLDesigner	TI — proLogic	Advin
		Inlab
		STAG Microsystems

Generating vectors for structured testing of TI PLDs can be done by using two approved software packages. These packages provide the structured test vector sets which assure the highest reliability for your programmed PLDs.

Vector Generation	Vendor
Automated Test Generation (ATG) PLDtest	Anvil Software Data I/O

Development support for TI ELPDs is available in TI's EPLD Development System. This desktop CAE tool includes the following hardware and software design tools for design entry, processing and verification, and for EPLD programming.

- Schematic capture software
- Functional simulation software
- TTL macrofunction library
- A + PLUS design processor
- State machine entry software
- Programming hardware

This desktop CAE system runs on IBM PC/AT compatibles. By using the TI EPLD Development System, a designer can go from design idea to hardware implementation and functional simulation for greater reliability.

STANDARD AND ADVANCED LOGIC PRODUCTS

TI's standard and advanced logic family offers everything from standard bipolar devices to the latest VLSI products. Thanks to TI-proprietary technologies such as IMPACT™ and EPIC™ many TI logic devices feature substantially faster operating speeds and power savings beyond comparable products.

For instance, IMPACT (Implanted Advanced Composed Technology) creates 2- μm features, producing dramatic decreases in device size, length of signal paths and sidewall capacitance. This technology and a derivative, IMPACT-X (which utilizes trench isolation), have made it possible to create high-performance products such as: TI 'ACT 8837 and '8847 32-bit processor (see Section 4, Processors and Controllers); 10-ns programmable array logic (PAL®) devices (see Section 2, ASIC); and memory management products (Section 4, subsection on Cache Tags, EDACs, and DRAM controllers). The 1- μm EPIC™ process, Enhanced Performance Implanted CMOS, is bringing an Advanced CMOS Logic (ACL) family to the forefront of the industry. Three times faster than its standard counterparts, the ACL family includes more than 100 of the most popular 54/74 logic functions.

Along with these premiere products, TI's digital family now includes new BiCMOS bus interface devices (SN74BCTXXX) which combine the best of bipolar and CMOS technologies. These devices can reduce total system power consumption as much as 25 percent while maintaining advanced speed and output drive.

All TI digital logic products have passed a rigorous quality and reliability program, making them prime candidates for ship-to-stock and just-in-time programs. The reader is urged to utilize the Master Selection Guide as a quick reference to TI's entire digital logic family. The reader should refer to the "Alphanumeric Index" and the "Functional Index" for aids in selecting Integrated Circuits. There also are order forms at the back of the Guide for additional information on technical documentation.

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GATES

Positive-NAND Gates

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
8-Input	'30	•	•	•	•	•	•	•	•				
	'11030										•	•	
13-Input	'133			•	•				•				
12-Input	'134			•									
Dual 2-Input	'8003				•								
Dual 4-Input	'13	•	•										
	'11013										▲	▲	
	'20	•	•	•	•	•	•	•					
	'40	•	•	•	•		•						
	'1020				•								
Triple 3-Input	'10	•	•	•	•	•	•	•					
	'1010				•								
	'11010										•	•	
Quad 2-Input	'00	•	•	•	•	•	•	•	•	•			
	'11000										•	•	
	'26	•	•										
	'37	•	•	•	•		•						
	'38	•	•	•	•		•						
	'39	•											
	'132	•	•	•					•				
	'11132											▲	▲
Hex 2-Input	'804				•	•		•					
	'1804				•	•							

Positive-NAND Gate with Open-Collector Outputs

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual 4-Input	'22	•	•	•	•								
Triple 3-Input	'12	•	•		•								
Quad 2-Input	'01	•	•		•			•					
	'03	•	•	•	•			•					
	'1003				•								

Positive-AND Gate with Open-Collector Outputs

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Triple 3-Input	'15		•	•	•								
Quad 2-Input	'09	•	•	•	•		•	•					
	'7001							•					

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Positive-AND Gates

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual 4-Input	'21		●		●	●	●	●					
	'11021										●	●	
Triple 3-Input	'11		●	●	●	●	●	●					
	'1011				●								
	'11011										●	●	
Quad 2-Input	'08	●	●	●	●	●	●	●	●				
	'1008				●	●							
	'11008										●	●	

Positive-OR Gates

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Triple 3-Input	'4075							●					
Quad 2-Input	'32	●	●	●	●	●	●	●	●				
	'1032				●	●							
	'11032										●	●	
Quad 2-Input	'7032							●					
Hex 2-Input	'832				●	●		●					
	'1832				●	●							

Positive-NOR Gates

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual 4-Input with Strobe	'25	●											
Dual 4-Input	'4002							●					
Dual 5-Input	'260			●			●						
Triple 3-Input	'27	●	●		●	●	●	●					
	'11027										●	●	
Quad 2-Input	'02	●	●	●	●	●	●	●	●				
	'28	●	●		●								
	'33	●	●		●								
	'36						●	●					
	'1002				●								
	'1036					●							
	'7002							●					
Hex 2-Input	'11002										●	●	
	'805				●	●		●					
	'1805				●	●							

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Positive-OR/NOR Gates

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
8-Input	'4078							•				

Exclusive OR/NOR Gates

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Quad 2-Input Exclusive OR Gates with Totem-Pole Outputs	'86	•	•	•	•	•	•	•	•	▲		
	'11086										•	•
	'386								•			
Quad 2-Input Exclusive OR Gates with Open-Collector Outputs	'136	•	•		•							
Quad 2-Input Exclusive-NOR Gates	'266		•					•				
	'810				•	•						
	'7266							•	•			
Quad 2-Input Exclusive-NOR Gates with Open-Collector Outputs	'811				•	•						
Quad Exclusive OR/NOR Gates	'135			•								

AND-NOR Gates

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
2-Wide 4-Input	'55		•									
4-Wide 4-2-3-2 Input	'64			•			•					
	'11064									▲	▲	
4-Wide 2-2-3-2 Input	'54	•	•									
Dual 2-Wide 2-Input	'51	•	•	•			•	•				
	'11051									▲	▲	

AND-NOR Gates with Open-Collector Outputs

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
4-Wide 4-2-3-2 Input	'65			•								

Expandable Gates

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Dual 2-Wide AND/OR-Invert	'50	•										
Dual 4-Input Positive-NOR with Strobe	'23	•										
4-Wide and/or Invert	'53	•										

NOTES:

• Product available in technology indicated ▲ New Product planned in technology indicated

Multifunction Gates and Elements

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Inverter, 3-/4-Input NAND/NOR Combination	'7006							•				
6-Section NAND Invert, NOR	'7008							•				
Quadruple Complementary Output Logic Elements	'265	•										

Delay Elements

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Inverting and Noninverting Elements 2-Input NAND-Buffer	'31		•									

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

INVERTING/NONINVERTING BUFFERS

Hex Inverters/Noninverters

DESCRIPTION	TYPE	STD TTL	TECHNOLOGY											
			LS	S	ALS	AS	F	HC	HCT	HCU	AC	ACT	BCT	
Hex Inverters	'04	•	•	•	•	•	•	•	•	•	•			
	'11004											•	•	
	'05	•	•	•	•				•					
	'06	•												
	'14	•	•						•					
	'11014											▲	▲	
	'16	•												
	'19		•											
	'1004					•	•							
'1005					•									
HexNonInverters	'34				•	•								
	'11034											•	•	

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated



Standard and Advanced Logic Products

DRIVERS AND BUS TRANSCEIVERS

Hex Drivers

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Hex Drivers	'07	•	•										
	'17	•											
	'35				•								
	'1034				•	•							
	'1035				•								
Noninverting Hex Buffers/Drivers	'365	•	•						•				
	'366	•	•						•				
	'367	•	•						•				
	'368	•	•						•				

Drivers with Open-Collector Outputs

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Noninverting Octal Buffers, Drivers	'757				•	•							•
	'760				•	•							•
Inverting Octal Buffers, Drivers	'756				•	•							▲
	'763				•	•							
Inverting and Noninverting Octal Buffers, Drivers	'762					•							

Bus Transceivers with Open-Collector Outputs

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Noninverting Quad Transceivers	'759					•							
Inverting Quad Transceivers	'758				•	•							
Quad Tridirectional Transceivers	'440	•											
	'441	•											
12 mA/24 mA/48 mA Sink Transceivers	'615				•								
	'621		•		•	•	•						
	'639		•		•	•							
	'641		•		•	•							

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Bus Transceivers with Open-Collector Outputs (Continued)

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
12 mA/24 mA/48 mA Sink Inverting Output Transceivers	'614				•								
	'622				•	•	•						
	'638		•		•	•							
	'642		•		•	•							
	'653		•		•	•							
12 mA/24 mA/48 mA Sink, True and Inverting Output Transceivers	'644		•		•	•							
Registered With Multiplexed 12 mA/24 mA/48 mA True Output Transceivers	'647		•		•								
	'654				•								
Registered with Multiplexed 12 mA/24 mA/48 mA Inverting Output Transceivers	'649		•		•								

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Standard and Advanced Logic Products

Drivers with 3-State Outputs

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Quad Buffers Drivers with Independent Output Controls	'125	•	•				•	•					•
	'126	•	•				•	•					•
	'425	•											
Noninverting Octal Buffers/Drivers	'241		•	•	•	•	•	•	•	•			•
	'11241										•	•	
	'244		•	•	•	•	•	•	•	•			•
	'11244										•	•	
	'465		•		•								
	'467				•								
	'541		•		•		•	•	•	•			•
'1244				•									
Invert Octal Buffers/ Drivers	'231				•	•							
	'240		•	•	•	•	•	•	•				•
	'11240									•	•		
	'466		•		•								
Inverting Octal Buffers	'468		•		•								
	'540		•		•		•	•	•				•
	'1240				•								
Inverting & Noninverting Octal Buffers/Drivers	'230					•							
Noninverting 10-Bit Buffers/Drivers	'2827												•
	'11827										•	•	
	'29827				•								•
Inverting 10-Bit Buffers/Drivers	'2828												•
	'11828										▲	▲	
	'29828				•								•

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Bus Transceivers with 3-State Outputs

DESCRIPTION	TYPE	TECHNOLOGY									
		LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Noninverting Quad Transceivers	'243	•		•	•	•	•	•			
	'449	•									
Inverting Quad Transceivers	'242	•		•	•	•	•	•			
	'1242			•							
	'446	•									
Quad Tridirectional Transceivers	'442	•									
	'444	•									
Octal Transceivers	'245	•		•	•	•	•	•			•
	'11245								•	•	
	'620	•		•	•	•	•	•			•
	'11620								•	•	
	'640	•		•	•		•	•			•
	'11640								•	•	
	'643			•	•		•	•			
	'11643								•	•	
Octal Bus Transceivers with Registers	'543					▲					•
	'11543								▲	▲	
	'544					•					▲
	'11544								▲	▲	
	'646	•		•	•		•	•			•
	'11646								•	•	
	'648	•		•	•		•	•			▲
	'11648								▲	▲	
	'651	•		•	•		•	•			▲
	'11651								▲	▲	
8-/9-Bit Bus Transceivers with Parity Checker/Generator	'652			•	•		•	•			•
	'11652								▲	▲	
	'657					▲					▲
	'11657								▲	▲	
	'658						•	•			
	'659						•	•			
	'664						•	•			
	'665						•	•			
8-/9-Bit Bus Transceivers with Parity Checker/Generator	'11833								▲	▲	
	'29833			•							•
	'11834								▲	▲	
	'29834			•							•
	'11853								▲	▲	
	'29853			•							•
	'11854								▲	▲	
'29854			•							•	
Noninverting 9-Bit Transceivers	'11863								▲	▲	
	'29863			•							•
Inverting 9-Bit Transceivers	'11864								▲	▲	
	'29864			•							•

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Bus Transceivers with 3-State Outputs (Continued)

DESCRIPTION	TYPE	TECHNOLOGY										
		LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Noninverting 10-Bit Transceivers	'11861									▲	▲	
	'29861			•								•
Inverting 10-Bit Transceivers	'11862									▲	▲	
	'29862			•								•
12 mA/24 mA/48 mA Sink, True Output Transceivers	'623	•		•	•	•	•	•	•	•	•	•
	'11623									•	•	
	'645	•		•	•			•	•			
	'654			•								
	'1640			•								
	'1645			•								
Universal Transceivers/Port Controllers	'852				•							
	'856				•							
	'877				•							

3

Standard and Advanced Logic Products

Line Drivers/Bus Transceivers/MOS Drivers

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Bus Transceivers	'2242				•							
	'2620					•						
	'2623					•						
	'2640					•						
	'2645					•						
Line	'2240				•							•
	'2241											•
	'2244				•							•
	'2540				•							
	'2541				•							

Line Drivers

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Octal Buffers and Line Drivers with Input Pull-up Resistors	'746				•							
	'747				•							

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

50-Ohm/75-Ohm Line Drivers

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Quad 2-Input Positive-NOR	'128	•											
Dual 4-Input Positive-NAND	'140			•									
Hex 2-Input Positive-NAND	'804				•	•		•					
	'1804				•	•							
Hex 2-Input Positive-NOR	'805				•	•		•					
	'1805				•	•							
Hex 2-Input Positive-AND	'808				•	•		•					
	'1808				•	•							
Hex 2-Input Positive-OR	'832				•	•		•					
	'1832				•	•							

Multifunction Drivers

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual Pulse Synchronizers/Drivers	'120	•											

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

TESTABILITY BUS INTERFACE CIRCUITS

SCOPE™ Testability Circuits (3-State Output)

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Octal Buffers/Drivers	'8244												▲
Octal Transceivers	'8245												▲
Octal Transparent Latches	'8373												▲
Octal Flip-Flops	'8374												▲

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

3

Standard and Advanced Logic Products

FLIP-FLOPS

Dual and Single Flip-Flops

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual J-K Edge Triggered	'73	•	•							•			
	'76	•	•							•			
	'78		•							•			
	'107	•	•							•			
	'109	•	•		•	•	•	•					
	'11109										•	•	
	'112		•	•	•	•	•	•					
	'11112										•	•	
	'113		•	•	•			•	•				
'114		•	•	•	•		•	•					
Dual J-K Master-Slave	'111	•											
Single J-K Edge Triggered	'70	•											
Dual D-Type	'74	•	•	•	•	•	•	•	•	•			
	'11074										•	•	
Dual D-Type with 2-Input NAND/NOR Gates	'7074								•				
	'7075								•				
	'7076								•				
Dual 4-Bit D-Type Edge-Triggered	'874				•	•							
	'11874										▲	▲	
	'876				•	•							
	'878				•	•							
	'879				•	•							

Quad and Hex Flip-Flops

DESCRIPTION	OUTPUTS	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Quad D-Type	Q,Q	'171		•										
		'175	•	•	•	•	•	•	•					
		'11175										•	•	
		'379		•					•	•				
		'11379										▲	▲	
Hex D-Type	Q	'174	•	•	•	•	•	▲	•					
		'11174									▲	▲		
		'378		•					▲	•				
		'11378										▲	▲	
Quad J-K	Q	'276	•											
		'279	•	•										
		'376	•											

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

3 Standard and Advanced Logic Products

Octal, 9-Bit, and 10-Bit D-Type Flip-Flops



Standard and Advanced Logic Products

DESCRIPTION	NO. OF BITS	OUTPUTS	TYPE	TECHNOLOGY											
				STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
True Data	Octal	3-State	'374		•	•	•	•	•	•	•	•			
			'11374									•	•		
			'574				•	•	•	•	•				▲
True Data with Clear	Octal	2-State	'273	•	•		•		▲	•	▲				
			'11273									▲	▲		
True Data with Clear	Octal	3-State	'575				•	•							
			'874				•	•							
			'878				•	•							
True Data with Enable	Octal	2-State	'377		•				•	•					
			'11377									▲	▲		
Inverting	Octal	3-State	'534				•	•	•	•	•			•	
			'11534										•	•	
			'564				•		•	•	•				▲
			'576				•	•							
			'826					•							
			'11826											▲	▲
True Data, Metastable Hardened	Octal	3-State	'3374					▲							
			'4374					•							
			'11478									▲	▲		
Inverting with Clear	Octal	3-State	'577				•	•							
			'879				•	•							
Inverting with Preset	Octal	3-State	'876				•	•							
True	Octal	3-State	'825					•							
			'11825									▲	▲		
			'29825				•							▲	
True	9-Bit	3-State	'823					•							
			'11823									▲	▲		
			'29823				•							•	
Inverting	9-Bit	3-State	'824					•							
			'11824									▲	▲		
			'29824				•							▲	
True		3-State	'821					•							
			'11821									▲	▲		
			'29821				•							•	
Inverting	10-Bit	3-State	'822					•							
			'11822									•	•		

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

LATCHES AND MULTIVIBRATORS

Quad Latches With 2-State Outputs

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Bistable	'75	•	•					•				
	'77							•				
	'375		•					•				
S-R	'279	•	•									

Monostable Multivibrators

DESCRIPTION	TYPE	TECHNOLOGY										
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Single	'121	•										
	'122	•	•									
Dual	'123	•	•									
	'221	•	•									
	'423		•									

D-Type Octal, 9-Bit, and 10-Bit Read-Back Latches

DESCRIPTION	NO. OF BITS	TYPE	TECHNOLOGY										
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
Edge-Triggered Inverting and Noninverting	Octal	'996				•							
Transparent True	Octal	'990				•							
Transparent True	9-Bit	'992				•							
Transparent True	10-Bit	'994				•							
Transparent Inverting	Octal	'991				•							
Transparent Inverting	9-Bit	'993				•							
Transparent Inverting	10-Bit	'995				•							
Transparent with Clear True Inputs	Octal	'666				•							
Transparent with Clear Inverting Outputs	Octal	'667				•							

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Octal, 9-Bit, and 10-Bit Latches

DESCRIPTION	NO. OF BITS	OUTPUTS	TYPE	TECHNOLOGY											
				STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Transparent	Octal	3-State	'373		•	•	•	•	•	•	•	•			•
			'11373										•	•	
			'573				•	•	•	•	•				▲
Dual 4-Bit Transparent	Octal	2-State	'116	•											
Dual 4-Bit Transparent	Octal	3-State	'873				•	•							
			'11873										▲	▲	
Inverting Transparent	Octal	3-State	'533				•	•	•	•	•	•			▲
			'11533										•	•	
			'563				•		•	•	•				▲
			'580				•	•							
Dual 4-Bit Inverting Transparent	Octal	3-State	'880				•	•							
2-Input Multiplexed	Octal	3-State	'604		•					•					
2-Input Multiplexed	Octal	OC	'607		•										
Addressable	Octal	2-State	'259	•	•		•				•				
Addressable	Octal	Q Only	'4724								•				
True	10-Bit	3-State	'841				•	•							
			'1841					•							
			'11841										▲	▲	
			'29841				•								•
True	9-Bit	3-State	'843				•	•							
			'1843					•							
			'11843										▲	▲	
			'29843				•								•
True	Octal	3-State	'845				•	•							
			'11845										▲	▲	
			'29845				•								▲
Inverting	10-Bit	3-State	'842				•	•							
			'11842										▲	▲	
			'29842				•								▲
Inverting	9-Bit	3-State	'844				•	•							
			'11844										▲	▲	
			'29844				•								▲
Inverting	Octal	3-State	'846				•	•							
			'11846										▲	▲	
			'29846				•								•

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

REGISTERS

Shift Registers

DESCRIPTION	NO. OF BITS	MODES				TYPE	TECHNOLOGY												
		S-	S	L	H		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT		
Sign Protected		X		X	X	'322		•											
Parallel-In Parallel-Out Bidirection	4	X	X	X	X	'194	•	•	•		•		•						
		X	X	X	X	'11194									▲	▲			
	8	X	X	X	X	'198	•												
		X	X	X	X	'299		•	•	•		•	•						
		X	X	X	X	'11299									▲	▲			
		X	X	X	X	'323		•		•		•							
X	X	X	X	'11323									▲	▲					
Parallel-In Parallel-Out	4	X		X		'95	•	•		•									
		X		X		'178	•												
		X		X		'179	•												
		X		X		'195	•	•	•		•		•						
		X		X		'295		•											
	X		X		'395		•												
5	X	X	X		'96	•	•												
8	X		X	X	'199	•													
Serial-In Parallel-Out	8	X				'164	•	•		•				•					
		X		X	X	'165	•	•		•				•					
Parallel-In Serial-Out	8	X		X	X	'166	•	•		•				•					
		X		X	X	'674		•											
16	X		X	X	'674		•												
Serial-In Serial Out	8	X				'91		•											

Shift Registers with Latches

DESCRIPTION	NO. OF BITS	OUTPUT	TYPE	TECHNOLOGY														
				STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT				
Parallel-In Parallel-Out with Output Latches	4	3-State	'671		•													
			'672		•													
Serial-In Parallel-Out with Output Latches	8	Buffered	'594		•							•						
			'595		•						•							
			'596		•													
			'599		•													
Parallel-In Serial-Out with Input Latches	8	2-State	'673		•													
			'597		•													
Parallel I/O Ports with Input Latches Multiplexed Serial Inputs	8	3-State	'598		•													

NOTES:

- Product available in technology indicated
 - ▲ New Product planned in technology indicated
- Modes: S- = S-R, S = S-L, L = Load, H = Hold

Sign-Protected Registers

DESCRIPTION	NO. OF BITS	MODES				TYPE	TECHNOLOGY											
		S-	S	L	H		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Sign-Protected Registers	8	X		X	X	'322		•										

Register Files

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY															
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT					
Dual 16 Words × 4 Bits	3-State	'870				•	•											
		'11870										▲	▲					
		'871				•	•											
4 words × 4 Bits	3-State	'170		•														
		'670			•													
8 Words × 2 Bits	3-State	'172		•														

Other Registers

DESCRIPTION	TYPE	TECHNOLOGY																
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT						
Quadruple Multiplexers with Storage	'298	•	•			•		•										
8-bit Universal Shift Register	'299		•	•	•			•										
	'11299											▲	▲					
Quadruple Bus Buffer Register	'173	•	•							•								
Data Selector Multiplex/Register	'356		•							•								
8-Bit Diagnostic Pipeline Register	'819				•													
	'11819											▲	▲					
	'29818				•													
8-Bit Storage Register	'396		•															
Dual Rank 8-Bit Shift Register with 3-State Outputs	'692	•																

NOTES:

- Product available in technology indicated
 - ▲ New Product planned in technology indicated
- Modes: S- = S-R, S = S-L, L = Load, H = Hold

COUNTERS

Synchronous Counters – Positive-Edge Triggered

DESCRIPTION	PARALLEL LOAD	TYPE	TECHNOLOGY													
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT			
Decade	Sync	'68		●												
		'160	●	●		●	●	●	●							
		'11160										●	●			
		'162	●	●	●	●	●	●	●							
		'11162										●	▲			
Decade Up/Down	Sync	'168			●	●	●	●								
		'11168										▲	▲			
	Async	'668		●												
		'696		●												
		'190	●	●		●			▲	●						
		'11190										▲	▲			
		'192	●	●		●			▲	●						
	Sync	'568				●			●							
'11568											▲	▲				
4-Bit Binary	Sync	'69		●												
		'161	●	●		●	●	●	●							
		'11161										▲	▲			
		'163	●	●	●	●	●	●	●							
		'11163										▲	▲			
		'561				●										
		'669		●												
8-Bit Binary	Sync	'11579										●	●			
4-Bit Binary Up/Down	Async	'191	●	●		●			▲	●						
		'11191										▲	▲			
		'193	●	●		●			▲	●						
	Sync	'11193										▲	▲			
		'169		●	●	●	●	●	●							
		'11169										▲	▲			
		'569				●			●							
		'11569										▲	▲			
'697		●														
'699		●														
'8169				●												
4-Bit Binary Up/Down with Latch	Sync	'690		●												
		'693		●												
8-Bit Up/Down	Async CLR	'867				●	●									
		'11867										▲	▲			
	Sync CLR	'869				●	●									
		'11869										▲	▲			

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Synchronous Counters – Positive-Edge Triggered (Continued)

DESCRIPTION	PARALLEL LOAD	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Divide-by-10 Johnson Counter	Sync	'4017								•				
Divide-by-8 Johnson Counter	Sync	'7022								•				

Asynchronous Counters (Ripple Clock) – Negative-Edge Triggered

DESCRIPTION	PARALLEL LOAD	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Decade	Set-to-9	'90	•	•										
	Yes	'176	•											
	Yes	'196	•	•	•									
	Set-to-9	'290	•	•										
4-Bit Binary	None	'93	•	•										
	Yes	'177	•											
	Yes	'197	•	•	•									
	None	'293	•	•										
Divide-by-12 Dual Decade	None	'92	•	•										
	None	'390	•	•						•				
	Set-to-9	'490	•	•						•				
Dual 4-Bit Binary	None	'393	•	•						•				
7-Bit Binary	Sync	'4024								•				
12-Bit Binary	Sync	'4040								•				
14-Bit Binary	Sync	'4020								•				
		'4060								•				
		'4061								•				

8-Bit Binary Counters with Registers

DESCRIPTION	PARALLEL LOAD	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Parallel Register Outputs	3-State	'590		•						•				
		'11590										▲	▲	
	OC	'591		•										
Parallel Register Inputs	2-State	'592		•										
		'11592										▲	▲	
Parallel I/O	3-State	'593		•										
		'11593										▲	▲	

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Frequency Dividers, Rate Multipliers

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
60-Bit Binary Rate Multiplier	'97	•											
Decade Multiplier	'167	•											
Programmable Frequency Dividers/ Digital Timers	'292		•										
	'294		•										
Frequency Dividers 50:1	'56		•										
Frequency Dividers 60:1	'57		•										

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

DECODERS, ENCODERS, DATA SELECTORS/MULTIPLEXERS AND SHIFTERS

Encoders/Data Selectors/Multiplexers

DESCRIP- TION	OUTPUT	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Quad 2-to-1	2-State	'157	•	•	•	•	•	•	•	•	•	▲		
		'11157											▲	▲
		'158		•	•	•	•	•	•	•	•			
		'11158											▲	▲
		'298	•	•				•			•			
	'399		•											
	3-State	'257		•	•	•	•	•	•	•	•			
		'11257										•	•	
		'258		•	•	•	•	•	•	•	•			
		'11258										•	•	
Octal 2-to-1 with Storage	3-State	'604		•						•				
	3-State	'606		•										
	OC	'607		•										
Dual 4-to-1	2-State	'153	•	•	•	•	•	•	•	•				
		'11153										▲	▲	
	3-State	'253		•	•	•	•	•	•	•				
		'11253										•	•	
	2-State	'352		•		•	•	•	•	•				
		'11352											▲	▲
3-State	'353		•		•	•	•	•	•					
	'11353											•	•	
Hex 2-to-1 Universal Multiplexer	3-State	'857				•	•							
8-to-1	2-State	'151	•	•	•	•	•	•	•	•				
		'11151										•	•	
		'152								•				
	3-State	'251	•	•	•	•			•	•				
		'11251										▲	▲	
		'354		•						•				
'355		•												
16-to-1	2-State	'150	•											
		'11150										▲	▲	
	3-State	'250						•						
		'11250										▲	▲	
		'850						•						
'851						•								
Full BCD	2-State	'147	•	•						•				
Cascadable Octal	2-State	'148	•	•						•				
	3-State	'348		•										

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

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Standard and Advanced Logic Products

Decoders/Demultiplexers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Dual 2-to-4	2-State	'239								•				
		'11239									•	•		
	2-State	'139		•	•	•		▲	•	•				
		'11139									•	•		
	OC	'156	•	•		•								
3-to-8	2-State	'138		•	•	•	•	•	•	•				
		'11138									•	•		
3-to-8	2-State	'237								•	•			
		'238								•	•			
		'11238										•	•	
3-to-8 with Address Registers	2-State	'131				•	•							
		'137		•		•	•		•	•				
4-to-10 BCD-to-Decimal	2-State	'42	•	•						•				
4-to-16	3-State	'154	•			•				•				
		'11154										▲	▲	
	OC	'159	•											
	2-State	'4514								•				
		'4515								•				
Dual 2-to-4 for Battery Backed-Up Memories	2-State	'2414											•	

Shifters

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
4-Bit Shifter	3-State	'350							•					

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

Open-Collector Display Decoders/Drivers

DESCRIPTION	OFF-STATE OUTPUT VOLTAGE	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
BCD-to-Decimal	30 V	'45	•											
	15 V	'145	•	•										
	7 V	'445		•										
BCD-to-7-Segment	30 V	'46	•											
	15 V	'47	•	•										
		'247		•										

Open Collector Display Decoder/Drivers with Counters/Latch

DESCRIPTION	TYPE	TECHNOLOGY												
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT		
BCD Counter/4-Bit Latch BCD-to-7-Segment Decoder/LAD Driver	'143	•												

Voltage-Controlled Oscillators

NO. OF VCOs	TYPE	COMP'L ZOUT	ENABLE	RANGE OUTPUT	REXT	fMAX MHz	TECHNOLOGY	
							LS	S
Single	'321	No	No	No	No	70	•	
Single	'624	Yes	Yes	Yes	No	20	•	
Single	'628	Yes	Yes	Yes	Yes	20	•	
Dual	'124	No	Yes	Yes	No	60		•
Dual	'625	Yes	No	No	No	20	•	
Dual	'626	Yes	Yes	No	No	20	•	
Dual	'629	No	Yes	Yes	No	20	•	

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

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Standard and Advanced Logic Products

Digital Loops

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Digital Phase-Lock Loop	297		•										

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

COMPARATORS AND ERROR DETECTION CIRCUITS

4-Bit Comparators

DESCRIPTION					TYPE	TECHNOLOGY			
P=Q	P>Q	P<Q	OUTPUT	ENABLE		STD TTL	LS	S	HC
Yes	Yes	No	2-State	No	'85	•	•	•	•

8-Bit Identity Comparators

DESCRIPTION								TYPE	TECHNOLOGY										
INPUT	P=Q	$\overline{P=Q}$	P>Q	$\overline{P>Q}$	P<Q	OUTPUT	ENABLE		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT
20 kOhm Pull-up	Yes	No	No	No	No	OC	Yes	'518				•		•					
	No	Yes	No	No	No	2-State	Yes	'520				•		•					
									'11520								•	•	
	No	Yes	No	No	No	OC	Yes	'522				•							
	No	Yes	No	Yes	No	2-State	No	'682		•					•				
Standard	No	Yes	No	Yes	No	OC	No	'683		•									
	Yes	No	No	No	No	OC	Yes	'519				•		•					
	No	Yes	No	No	No	2-State	Yes	'521				•		•					
									'11521								•	•	
	No	Yes	No	Yes	No	2-State	No	'684		•					•				
	No	Yes	No	Yes	No	OC	No	'685		•									
	No	Yes	No	Yes	No	2-State	Yes	'686		•									
	No	Yes	No	Yes	No	OC	Yes	'687		•									
	No	Yes	No	No	No	2-State	Yes	'688				•			•				
Latched P	No	No	Yes	No	Yes	2-State	Yes	'885				•							
Latched P and Q	Yes	No	Yes	No	Yes	Latch	Yes	'866				•							

Other Identity Comparators

DESCRIPTION	TYPE	TECHNOLOGY																
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT						
6-Bit Identity Comparator Controlling a 2-to-4 Bit Decoder	'29806				•													
9-Bit Identity Comparator	'29809				•													

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

3 Standard and Advanced Logic Products

Address Comparators

DESCRIPTION	OUTPUT ENABLE	LATCHED ENABLE	TYPE	TECHNOLOGY											
				STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
16-Bit to 4-Bit	Yes		'677				•				•				
			'11677										▲	▲	
		Yes	'678				•				•				
			'11678										▲	▲	
12-Bit to 4-Bit	Yes		'679				•				•				
			'680				•				•				

Parity Generators/Checkers, Error Detection and Correction Circuits

DESCRIPTION	NO. OF BITS	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Odd/Even Parity Generators/Checkers	8	'180	•								•			
	9	'280		•	•	•	•	•	•	•				
		'11280											•	•
	9	'286						•						
'11286												•	•	
Parallel Detection and Correction Circuits	3-State	16	'630		•									
	OC	16	'631		•									

Fuse-Programmable Comparators

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
16-Bit Identity Comparator	'526				•								
12-Bit Identity Comparator	'528				•								
12-Bit Identity Comparator Controlling a 2-to-4-Bit Decoder	'812				•								
8-Bit Identity Comparator and 4-Bit Comparator	'527				•								

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

ARITHMETIC CIRCUITS AND PROCESSOR ELEMENTS

Parallel Binary Adders

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
4-Bit	'82	•											
	'83	•	•										
	'183		•										
	'283	•	•	•				•	•				

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Standard and Advanced Logic Products

Accumulators, Arithmetic Logic Units, Look-Ahead Carry Generators

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
4-Bit Parallel Binary Accumulators	'681		•										
16-Bit by 16-Bit Multiplier/Accumulator	'1010				•							•	
4-Bit Arithmetic Logic Units: Function Generators	'181	•	•	•		•							
	'1181										•	•	
	'381		•	•			•						
	'881					•							
	'11881										▲	▲	
4-Bit Arithmetic Logic Unit with Ripple Carry	'382		•				•						
Look Ahead Carry Generators	16-Bit	'182	•		•		•						
		'282					•						
	32-Bit	'882					•						
		'11882										▲	▲

MISCELLANEOUS

Port Controllers

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
8-Bit Universal Port Controller	'11852											•	•

BIPOLAR MEMORY

First-In First-Out Memories (FIFOs)

DESCRIP- TION	OUTPUT	TYPE	TECHNOLOGY											
			STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
16 Words × 4-Bits	3-State	'222		•										
	3-State	'224		•										
	3-State	'232				•								
	OC	'227		•										
	OC	'228		•										
16 Words × 5 Bits	3-State	'225			•									
	3-State	'229				•								
	3-State	'234				•								
	3-State	'233				•								
64 Words × 4-Bits	3-State	'236				•								
64 Words × 5-Bits	3-State	'235				•								
64 Words × 8-Bits	3-State	'2232				•								
64 Words × 9 Bits	3-State	'2233				•								
32 Words × 9-Bits Directional	3-State	'2238				▲								

Clock Driver Families

DESCRIPTION	TYPE	TECHNOLOGY											
		STD TTL	LS	S	ALS	AS	F	HC	HCT	AC	ACT	BCT	
Hex Inverting Clock Drivers/Buffers	'11204										•	•	
Dual 1-to-4 Clock Drivers/Buffers	'11208										•	•	
Triple 4-Input AND/ NAND Clock Drivers	'11800										•	•	
Triple 4-Input OR/NOR Clock Drivers	'11802										•	•	
Octal Divide-by-2 Clock Drivers (6 Invert, 9 Noninvert)	'303						▲						
Octal Divide-by-2 Clock Drivers (8 Noninvert)	'304						▲						
Octal Divide-by-2 Clock Drivers (4 Invert, 4 Noninvert)	'305						▲						

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

ECL-to-TTL or TTL-to-ECL Translators

DEVICE	FUNCTION	AVAILABILITY
SN10KHT5538	ECL-to-TTL Octal Bus Driver, Inverting (O.C.)	▲
SN100KT5538	ECL-to-TTL Octal Bus Driver, Inverting (O.C.)	▲
SN10KHT5539	ECL-to-TTL Octal Bus Driver (O.C.)	▲
SN100KT5539	ECL-to-TTL Octal Bus Driver (O.C.)	▲
SN10KHT5540	ECL-to-TTL Octal Bus Driver, Inverting (3-State)	●
SN100KT5540	ECL-to-TTL Octal Bus Driver, Inverting (3-State)	●
SN10KHT5541	ECL-to-TTL Octal Bus Driver (3-State)	●
SN100KT5541	ECL-to-TTL Octal Bus Driver (3-State)	●
SN10KHT5542	TTL-to-ECL Octal Bus Driver, Inverting (Output Enable)	●
SN100KT5542	TTL-to-ECL Octal Bus Driver, Inverting (Output Enable)	●
SN10KHT5543	TTL-to-ECL Octal Bus Driver (Output Enable)	●
SN100KT5543	TTL-to-ECL Octal Bus Driver (Output Enable)	●
SN10KHT5562	ECL-to-TTL Octal Bus Transceiver (Output Enable)	▲
SN100KT5562	ECL-to-TTL Octal Bus Transceiver (Output Enable)	▲
SN10KHT5563	ECL-to-TTL Octal Bus Transceiver, Inverting (Output Enable)	▲
SN100KT5563	ECL-to-TTL Octal Bus Transceiver, Inverting (Output Enable)	▲
SN10KHT5564	ECL-to-TTL Octal Bus Transceiver	▲
SN100KT5564	ECL-to-TTL Octal Bus Transceiver	▲
SN10KHT5565	ECL-to-TTL Octal Bus Transceiver	▲
SN100KT5565	ECL-to-TTL Octal Bus Transceiver	▲
SN100KT5573	ECL-to-TTL Octal D-Type Latch (3-State)	▲
SN100KT5573	ECL-to-TTL Octal D-Type Latch (3-State)	▲
SN10KHT5574	ECL-to-TTL Octal D-Type Flip-Flop (3-State)	▲
SN100KT5574	ECL-to-TTL Octal D-Type Flip-Flop (3-State)	▲
SN10KHT5575	ECL-to-TTL Octal D-Type Latch, Inverting (3-State)	▲
SN100KT5575	ECL-to-TTL Octal D-Type Latch, Inverting (3-State)	▲
SN10KHT5576	ECL-to-TTL Octal D-Type Flip-Flop, Inverting (3-State)	▲
SN100KT5576	ECL-to-TTL Octal D-Type Flip-Flop, Inverting (3-State)	▲
SN10KHT5577	TTL-to-ECL Octal D-Type Latch (Output Enable)	▲
SN100KT5577	TTL-to-ECL Octal D-Type Latch (Output Enable)	▲
SN10KHT5578	TTL-to-ECL Octal D-Type Flip-Flop (Output Enable)	▲
SN100KT5578	TTL-to-ECL Octal D-Type Flip-Flop (Output Enable)	▲
SN10KHT5579	TTL-to-ECL Octal D-Type Latch, Inverting (Output Enable)	▲
SN100KT5579	TTL-to-ECL Octal D-Type Latch, Inverting (Output Enable)	▲
SN10KHT5580	TTL-to-ECL Octal D-Type Flip-Flop, Inverting (Output Enable)	▲
SN100KT5580	TTL-to-ECL Octal D-Type Flip-Flop, Inverting (Output Enable)	▲
SN10KHT5590	ECL-to-TTL Octal Registered Transceiver (Output Enable)	▲
SN100KT5590	ECL-to-TTL Octal Registered Transceiver (Output Enable)	▲
SN10KHT5591	ECL-to-TTL Octal Registered Transceiver, Inverting (Output Enable)	▲
SN100KT5591	ECL-to-TTL Octal Registered Transceiver, Inverting (Output Enable)	▲
SN10KHT5592	ECL-to-TTL Octal Registered Bus Transceiver (Output Enable)	▲
SN100KT5592	ECL-to-TTL Octal Registered Bus Transceiver (Output Enable)	▲
SN10KHT5593	ECL-to-TTL Octal Registered Bus Transceiver, Inverting (Output Enable)	▲
SN100KT5593	ECL-to-TTL Octal Registered Bus Transceiver, Inverting (Output Enable)	▲
SN10KHT5646	ECL-to-TTL Octal Registered Bus Transceiver (Output Enable)	▲
SN100KT5646	ECL-to-TTL Octal Registered Bus Transceiver (Output Enable)	▲
SN10KHT5648	ECL-to-TTL Octal Registered Bus Transceiver, Inverting (Output Enable)	▲
SN100KT5648	ECL-to-TTL Octal Registered Bus Transceiver, Inverting (Output Enable)	▲

NOTES:

- Product available in technology indicated
- ▲ New Product planned in technology indicated

PART NUMBER IDENTIFICATION

Factory orders for circuits described in this guide should include a four-part type number as explained in the following example.

EXAMPLE SN 74LS02 J 00

1) Prefix: _____

CONTAINS TWO TO FOUR LETTERS

- SN Standard Prefix
- Blank With AC and ACT

2) Unique Circuit Description _____

CONTAINS FOUR TO THIRTEEN CHARACTERS

Examples:

- | | |
|------------|-----------|
| 5430 | 74AS02 |
| 74LS02 | 54HC4078A |
| 54S02 | 74HCT241 |
| 54ALS29864 | 74HCU04 |

3) Package _____

CONTAINS ONE OR TWO LETTERS

- J, JD, JT, JW, N, NT, NW, P (Dual-in-line packages)†
- FE, FK, FN (Chip carriers)
- D, DW (Small outline packages)†
- DL (Shrink small outline packages)
- W (Ceramic flat pack)

4) Instructions _____

CONTAINS ONE OR TWO CHARACTERS

- R Tape and Reel (D and DW packages only)

† These circuits in dual-in-line and small outline packages are shipped in one of the carriers shown below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped in the most practical carrier. Please contact your TI sales representative for the method that will best suit your particular needs.

- Dual-in-line (J, JD, JT, JW, N, NT, NW, P)
- Small outline (D, DW)
- Chip Carrier (FK, FN)

- Slide Magazines
- A-Channel Plastic Tubing
- Barnes Carrier (N only)
- Sectioned Cardboard Box
- Individual Plastic Box
- Tape and Reel (D and DW packages only)



3

Standard and Advanced Logic Products

MICROPROCESSORS AND MICROCONTROLLERS

TI's microprocessors and microcontrollers are designed to meet a wide range of applications. For digital signal processing requirements there is the TMS320 family; for graphics, the TMS340 family; and for local area networking, the TMS380 family. For control in telecommunications, automotive and computer peripherals, TI offers its 8-bit TMS370 family. When high performance is called for, designers can turn to Texas Instruments' ACT88XX 32-bit processor chip set. The TMS7000 family is also available for general purpose microprocessor requirements.

Along with this variety of microprocessors and microcontrollers, TI offers a range of memory and bus interface support. The memory management products include the SN74ACT2150 family of cache address comparators, error detection and correction circuits, and DRAM controllers. Bus interface products consist of transceivers, controllers and address generators.

TI's microprocessors and controllers utilize processing benefits gained from TI's Dynamic Random-Access Memory (DRAM) technology. For instance, the TMS320C250DSP, TMS34010 Graphics Processor and TMS380 LAN family, all draw from technology derived from 256K and one-megabit DRAM processing. All TI processors and controllers also undergo rigorous quality and reliability testing.

Readers should refer to the Alphanumeric Index and to the Customer Support section of the Master Selection Guide for additional information on technical documentation.

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4**Microprocessors and Microcontrollers**

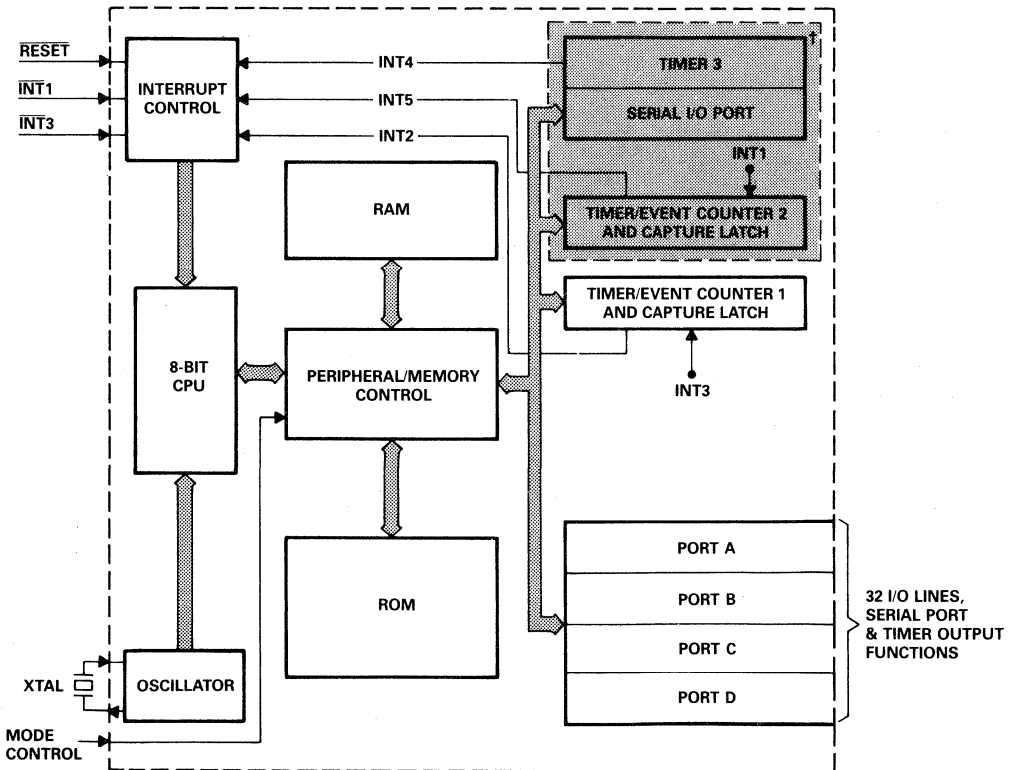
GENERAL PURPOSE PROCESSORS

8-BIT MICROCONTROLLERS – TMS7000 FAMILY

DESCRIPTION

The TMS7000 is a family of 8-bit single-chip microcontrollers. These microcontrollers incorporate a CPU, memory (RAM, ROM, EPROM), bit I/O, serial communication port, timers, interrupts, and external bus interface logic, all on a single chip. The products are available in varying complexity of functions, process technology, performance, and packaging to meet end equipment cost goals and application requirements.

FUNCTIONAL BLOCK DIAGRAM



† Timer 3, serial port, and timer/event counter 2 available for TMS70Cx2 devices only

TMS7000 FAMILY

TMS7000 FAMILY		
DESCRIPTION	TMS70C00 /C20/C40	TMS70C02 /C42
Max. Oscillator Frequency (5V+ – 10%)	5 MHz	6 MHz
On-Chip ROM (K-Bytes)	0/2/4	0/4
On-Chip RAM (Bytes)	128	256
Interrupt Levels:		
External	2	2
Total	4	6
Timers/Event Counters		
21-Bit	–	2
13-Bit	1	–
10-Bit	–	1
I/O Lines:		
Bidirectional	16	24
Output only	8	8
Input only	8	–
Additional Features	–	Serial Port
DEVELOPMENT SUPPORT		
Prototyping		
EPROM	–	SE77C42*
Piggyback	SE70CP160	SE70CP162
XDSR	Yes	Yes
EVM	Yes	Yes
Voltage Range	2.5V to 6.0V	2.5V to 6.0V
Temperature Range	–40° to 85°C	–40° to 85°C

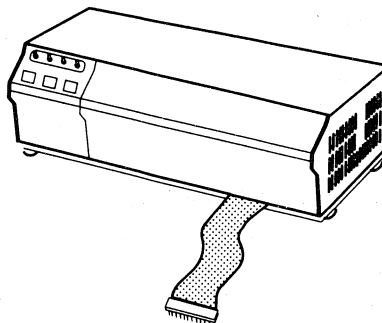
*In the US, SE77C42 is available; in Europe, TMS77C82.

DEVELOPMENT SYSTEMS

There are two development systems available for the TMS7000 family of microcomputers, the XDS® and the EVM. The XDS is a Host independent real time in-circuit emulator with extensive on-board debug capabilities. The EVM is a low-cost Host independent real-time in-circuit emulator with debug capabilities and EPROM programming utilities.

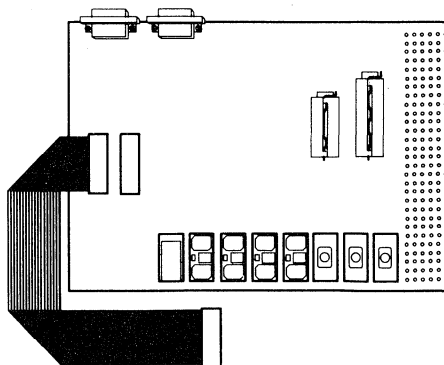
XDS – Extended Development System (TMD5 7062220)

- Full TMS7000 Family Development System
- Host Independent/RS-232-C Interface
- Full Speed In-Circuit Emulation
- Extensive Breakpoint and Trace Functions
 - Detailed Timing Analysis
 - 2K-Byte Trace Samples
 - Breakpoint Sequencing Ability
- Command/Default Storage
- Removable Target Connector
- External Probe for Breakpoint/Trace Qualifiers
- On-Board Assembler and Reverse Assembler
- Multiprocessing Capabilities



EVM – Evaluation Module (RTC/EVM 7000 C-1)

- TMS7000 Family Low Cost Development System
- Single-Chip Mode Emulation Only
- On-Board Assembler/Line Text Editor
- On-Board Hardware/Software Debugger
- Multiple Breakpoints
- Trace Display Function
- EPROM Programmer Utilities



ASSEMBLER/LINKER PACKAGE

Crossware® assembler/linker packages are available through Texas Instruments for the following operating systems:

Operating System	TI Part Number
TI and IBM PC	TMDS7040810-02
DEC VAX VMS	TMDS7040210-08

PROTOTYPING DEVICES

The TMS7000 family contains a wide range of prototyping devices for preproduction and development needs.

SE77C42 EPROM DEVICE:

This 8-bit EPROM device is designed for prototyping purposes. The SE77C42 contains 4K bytes of on-chip EPROM and is completely software and pin compatible with the TMS70C42.

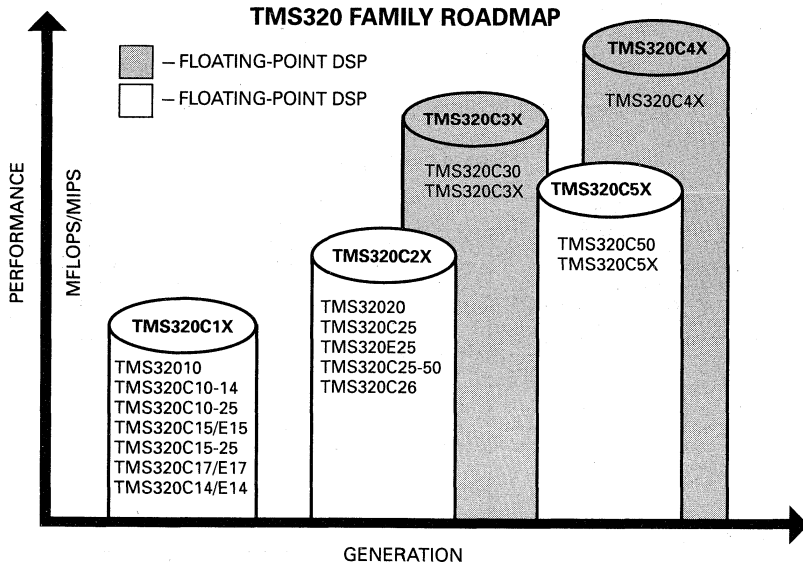
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SE70CP160 AND SE70CP162 PIGGYBACK DEVICES

The Piggyback parts are prototyping devices for the TMS7000 family of microcomputers. These devices are packaged so that a standard '27C64, or '27C128 EPROM can be plugged into the socket on top (piggyback). It is designed to be used in the prototyping environment and support for that purpose. Texas Instruments does not support or warrant the use of the piggyback parts for production purposes.

APPLICATION PROCESSORS

TMS320 FAMILY OF DIGITAL SIGNAL PROCESSORS



The TMS320 family of 16/32-bit single-chip Digital Signal Processors (DSP) utilizes a Harvard-type architecture for increased parallelism and higher throughput. These economical, programmable, general purpose DSPs combine the flexibility of a high-speed controller with the numeric capability of an array processor, offering an inexpensive alternative to custom VLSI and multichip bit-slice processors.

The TMS320 digital signal processor family provides a wide range of devices to satisfy every cost/performance need. Five generations of compatible devices offer DSP solutions for application requirements ranging from very low-cost (\$4) to very high performance (33 MFLOPS).

The five generations of the TMS320 family are:

- TMS320C1X (1st-gen.) — TMS320C10, TMS320C10-14, TMS320C10-25
TMS320C14
TMS320E14 (EPROM on-chip)
TMS320P14 (OTP EPROM on-chip)
TMS320C15, TMS320C15-25
TMS320E15, TMS320E15-25 (EPROM on-chip)
TMS320P15, TMS320P15-25 (OTP EPROM on-chip)
TMS320C17
TMS320E17 (EPROM on-chip)
TMS320P17 (OTP EPROM on-chip)

- TMS320C2X (2nd-gen.) — TMS32020
TMS320C25, TMS320C25-50
TMS320E25 (EPROM on-chip)
TMS320C26
- TMS320C3X (3rd-gen.) — TMS320C30
- TMS320C4X (4th-gen.) — TMS320C40*
- TMS320C5X (5th-gen.) — TMS320C50*

* In development. Contact nearest Texas Instruments Field Sales Office for more information and availability.

TMS320 Family Benefits

DEVICE	PERFORMANCE	SYSTEM BENEFIT	EASE OF USE
TMS320C1X	<ul style="list-style-type: none"> • 14-, 20- and 25-MHz versions (6.25 MIPS max) • Harvard Architecture • Expanded 256-word on-chip RAM • Secure ROM/EPROM • H/W multiplier & barrel shifter 	<ul style="list-style-type: none"> • Expanded 4K-word on-chip ROM • Serial port and co-processor interface 	<ul style="list-style-type: none"> • 4K-word EPROM versions • 4K-word OTP EPROM versions • Flexible, general-purpose instruction set and addressing modes • Complete line of support tools
TMS320C2X	<ul style="list-style-type: none"> • 800/100ns single-cycle execution time (12.5 MIPS max) • 160K-words total memory addressable off-chip at full speed • Separate program & data spaces with multi-bus configuration • H/W multiplier & extended precision ALU & accumulator • Pre and post scaling barrel shifters • Harvard architecture 	<ul style="list-style-type: none"> • 4K-words on-chip ROM 544 words prog/data RAM on-chip • Full duplex, synchronous serial port and interval timer on-chip • Plastic leaded chip carrier package 	<ul style="list-style-type: none"> • 133 general purpose and DSP specific instructions • 4K-word EPROM version • C-compiler for high-level language support • Complete line of hardware and software support tools
TMS320C3X	<ul style="list-style-type: none"> • 60-ns single-cycle execution time (more than 33 MFLOPS) • 2K × 32-bit dual-access RAM • 4K × 32-bit dual-access ROM • 64 × 32-bit instruction cache • single-cycle floating point multiply/accumulative/data move • On-chip DMA controller • Zero-overhead loops and single-cycle branches 	<ul style="list-style-type: none"> • On-chip serial ports and timers • Large on-chip memories, instruction cache, and DMA controller • Peripheral bus for customization 	<ul style="list-style-type: none"> • Floating-point, integer and logical 32/40-bit ALU • 16-megaword memory space • Register-based CPU • Flexible, general-purpose instruction set and addressing modes • Complete line of support tools • High-level language support for: C, FORTRAN, & ADA • DSP operating system support: SPOX
TMS320C5X	<ul style="list-style-type: none"> • 50ns instruction execution (20 MIPS) • Buffered accumulator and product registers • Zero-overhead context switching • Block repeats and delayed branching 	<ul style="list-style-type: none"> • 8.5K words on-chip Program/Data RAM • 2K words boot ROM • S/W waitstate generators for program, data, & I/O spaces • Serial port, timer, multiprocessor I/F • Modular design with peripherals attached via TI Bus™ for quick spin-offs • JTAG scan path for system emulation and testing 	<ul style="list-style-type: none"> • S/W upwardly compatible with 'C1x'/C2X • Added general pur-and DSP instructions • Flexible addressing modes • High-level language support

APPLICATIONS

The TMS320 DSP applications are as varied as:

- Telecommunications
- Graphics/image processing
- Instrumentation
- Automotive
- Military
- Voice/speech processing
- Control systems
- Consumer goods
- Medical

4

Microprocessors and Microcontrollers

TMS320 DIGITAL SIGNAL PROCESSING FAMILY

The TMS320 DSP family currently consists of twenty-four compatible high-speed digital signal processors. The devices are designed to increase DSP system performance, while reducing total system cost.

Devices

FIRST GENERATION (TMS320C1X)						
DEVICE	'320C10 'C10-25 'C10-14	'320E14 '320P14 **	'320C15 'C15-25	'320E15 '320E15-25 **'320P15	'320C17	'320E17 '320P17 **
Data Type:	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit
On-chip (Word)						
RAM	144	256	256	256	256	256
ROM	1.5K	—	4K	—	4K	—
**EPROM	—	4K	—	4K	—	4K
Total Mem Map	4K	4K	4K	4K	4K	4K
I/O						
Parallel	8 × 16	7 × 16	8 × 16	8 × 16	6 × 16	6 × 16
Serial	0	1	0	0	2	2
Ext Interrupts	1	2	1	1	1	1
Timer	0	4	0	0	1	1
Coprocessor IF	—	—	—	—	Yes	Yes
Aux. Registers	2	2	2	2	2	2
Stack Level	4	4	4	4	4	4
Instructions	60	60	60	60	60	60
Cycle Time (ns)	200 160 280	160	200 160	200 160	200	200
Multiply/Accumulate (ns)	400 320 560	320	400 320	400 320	400	400
External Clock Freq. (MHz)	20.5 25.6 14.4	25.6	20.5 25.6	20.5 25.6	20.5	20.5
Typical Power Dissipation (mW) @ 5 Volts	165 200 200	325	225 250	300 275	250	325
Technology	CMOS	CMOS	CMOS	CMOS	CMOS	CMOS

**'320P14, '320P15, '320P15-25, and '320P17 have 4K-words of One Time Programmable (OTP) EPROM on chip.

SECOND GENERATION (TMS320C2X)					THIRD GEN. (TMS320C3X)	FIFTH GEN. (TMS320C5X)
DEVICE	'32020	'320C25 '320C25-50	'320E25	'320C26	'320C30	**'320C50
DATA TYPE:						
Integer	16-bit	16-bit	16-bit	16-bit	32-bit	16-bit
Floating Point	—	—	—	—	32-bit	—
On-chip (Word)						
RAM	544	544	544	1.5K	2K	8.5K
ROM	—	4K	—	256	4K	2K
EPROM	—	—	4K	—	—	—
CACHE	—	—	—	—	64	—
Total Mem Map	160K	160K	160K	160K	16M	160K
I/O						
Parallel	16 × 16	16 × 16	16 × 16	16 × 16	8K × 32	16 × 16
Serial	1	1	1	1	2	1
DMA	Ext.	Ext.	Ext.	Ext.	Int./Ext.	Ext.
Ext Interrupts	3	3	3	3	4	3
Timer	1	1	1	1	2	1
Multiprocessor Interface	Yes	Yes	Yes	Yes	Yes	Yes
Aux. Registers	5	8	8	8	8	8
Stack Level	4	8	8	8	unlimited	8
Shadow Regs	—	—	—	—	—	13
Instructions	109	133	133	133	112	181
Repeat Counter	Yes	Yes	Yes	Yes	block rpt	rpt, block rpt
Cycle Time (ns)	200	100 80	100	100	60	50
Multiply/Accumulate (ns)	200	100 80	100	100	60	50
External Clock Freq. (MHz)	20.5	40.96 51.2	40.96	40.96	33.3	40.96
Typ Pwr (mW)	1250	500 500	500	550	1500	500
Technology	NMOS	CMOS	CMOS	CMOS	CMOS	CMOS

*In development. Contact nearest TI sales office for more information and availability.

Other TMS320 family devices include applications oriented devices such as the TMS320SA32 32-kbit/sec ADPCM Transcoder (TMS320C1X-based), and the DSP2400 V.22 bis Modem Chip-set (also TMS320C1X-based). The DSP2400 Modem Chip-set consists of two devices, the TMS320A2400 DSP and the TMS70A2400 controller devices.

TMS320 FAMILY DEVELOPMENT SUPPORT

Texas Instruments offers an extensive line of support products and documentation to assist the user in all aspects of TMS320 design and development. TMS320 S/W development products include:

- C compilers
- Simulators
- Assembler/linkers
- Application software library
- PC-resident S/W development system (SWDS) for realtime S/W simulation.

4

Microprocessors and Microcontrollers

Many of these software development tools are available to operate in the following environments:

- PC/MS-DOS
- VAX (VMS)
- VAX (ULTRIX)
- SUN-3 (UNIX)

TMS320 hardware development products include:

- Evaluation modules (EVM)
- Analog interface board (AIB)
- Full speed in-circuit emulators (XDS).

A prototype kit is available for evaluation of the DSP2400 modem chip set, with development support also available from over 100 third-parties for the entire TMS320 family.

Extensive documentation, including over 1000 pages of application reports, newsletters, product bulletins, user's guides and textbooks, is available to support DSP design, research, and education. In the US, the TMS320 University program offers assistance to universities in setting up DSP courses and research facilities. TMS320 application assistance is available in the US through the TMS320 Hotline (713-274-2320), TMS320 Hotline facsimile terminal (713-274-2324), and the TMS320 Bulletin Board service (713-274-2323).

TI's Regional Technology Centers (RTC) offer half-day seminars and hands-on workshops on the TMS320 DSPs and development support tools. Three-day hands-on workshops assist users in the development of TMS320-based designs. A half-day seminar provides a quick overview of the TMS320 family.

The following table lists TI's TMS320 development tools. Consult the TMS320 Family Development Support Reference Guide (SPRU011A) for more detailed information on TMS320 support. Call the nearest TI Field Sales Office for information on price and availability.

TMS320 Development Support Tools

HARDWARE	TMS320C1X 1st-GENERATION	TMS320C2X 2nd-GENERATION	TMS320C1X/C2X FAMILY MEMBERS	TMS320C3X 3rd-GENERATION
Evaluation Module (EVM)	RTC/EVM320A-03			
Emulators: XDS/22 TMS320C10/C15 TMS320C14 TMS320C17 TMS320C25 XDS/500 XDS/1000 Development Environment	TMDX3262211 TMDX3262214 TMDX3262217	TMDX3262221		TMDX3260131 TMDX3261030
XDS/22 Upgrades: TMS32010 User Upgrade TMS32020 User Upgrade	TMDX3282216	TMDX3282226		
Analog Interface Board (AIB) AIB Adapter for AIB-1	RTC/EVM320C-06 (AIB-1)	RTC/AIB320A-06 (AIB-2) RTC/ADP320A-06		
EPROM Programmer Adapter Sockets: 320E15/17 40 to 28-Pin 320E14 68 to 28-Pin 320E25 68 to 28-Pin	RTC/PGM320A-06 TMDX3270110	TMDX3270120		
TMS320E15 Starter Kit	RTC/EVM320E-15			
DSP2400 Prototype Kit			TMDS2400PK	
SOFTWARE				
Assembler/Linker: PC/MS-DOS VAX (VMS) VAX (ULTRIX) SUN-3 (UNIX)	(See column 3)	(See column 3)	TMDS3242850-02 TMDS3242250-08 TMDS3242260-08 TMDS3242550-08	TMDX3243850-02 TMDX3243250-08 TMDX3243260-08 TMDX3243550-08
Simulator: PC/MS-DOS VAX (VMS) VAX (ULTRIX)	TMDS3240811-02 TMDS3240211-08	TMDS3242851-02 TMDS3242251-08		TMDX3243851-02 TMDX3243251-08 TMDX3243261-08
C Compiler: PC/MS-DOS VAX (VMS) VAX (ULTRIX) SUN-3 (UNIX)		TMDX3242855-02 TMDX3242255-08 TMDX3242265-08 TMDX3242555-08		TMDX3243855-02 TMDX3243255-08 TMDX3243265-08 TMDX3253555-08
S/W Development System (SWDS) for PC/MS-DOS		TMDX3268821		
Digital Filter Design Package (DFDP) PC/MS-DOS	(See column 3)	(See column 3)	DFDP-IBM002	DFDP-IBM002
DSP Software Library PC/MS-DOS VAX VMS	(See column 3)	(See column 3)	TMDC3240812-12 TMDC3240212-18	TMDC3240812-12 TMDC3240212-18
SPOX – DSP Operating System – Packaged with TMS320C3X XDS1000 Development Environment.				

Note: Contact your local TI Field Sales Office for further information on TMS320 Third-generation tools and the part numbers and availability of TMS320 Fifth-generation development tools.

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VAX and VMS are registered trademarks of Digital Equipment Corporation.

IBM PC is a registered trademark of International Business Machines Corporation.

SPOX is a registered trademark of Spectron Microsystems Incorporated.

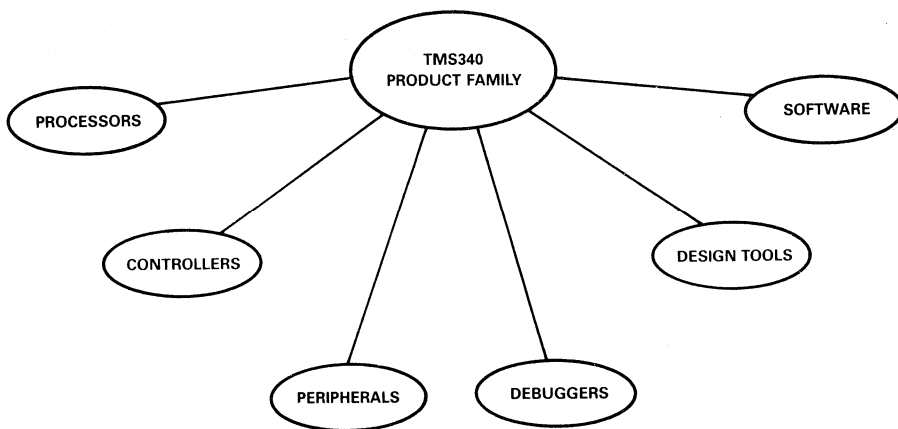
TMS340 GRAPHICS FAMILY

INTRODUCTION

The TMS340 Graphics Product Family offers the broadest range of Graphics-Specific ICs in the industry. TMS340 products satisfy the needs of a wide range of graphic applications with the TMS34010 Graphics System Processor, the TMS34020 second generation Graphics System Processor, and the TMS34082 Floating Point Processor. The availability of peripherals like the TMS34061 Video System Controller, TMS34070 Color Palette, and Video RAMs make TI the undisputed leader in graphics.

4

Microprocessors and Microcontrollers



TMS340 Product Family

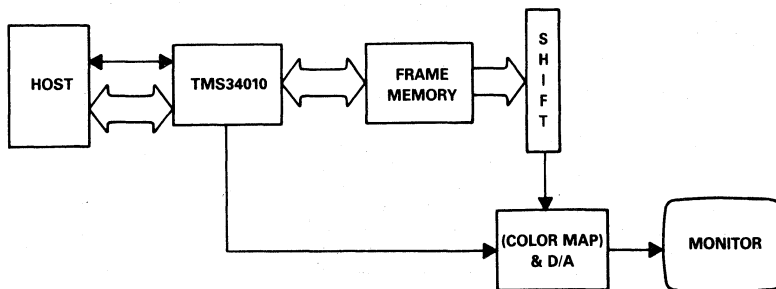
TMS34010 Graphics System Processor

DESCRIPTION

The TMS34010 Graphics System Processor (GSP) is an advanced high-performance CMOS 32-bit microprocessor optimized for graphics display systems. With a built-in instruction cache, the ability to make simultaneous access to memory and registers, and an instruction set designed specifically for raster graphics operation, the TMS34010 provides user-programmable control of the CRT interface as well as the memory interface (both standard DRAM and Multiport Video RAM). The 1-gigabit address space is completely bit-addressable on bit boundaries using variable width data fields (1- to 32-bits). Additional graphics addressing modes support up to 32-bit wide pixels. The TMS34010 is exceptionally well-supported by graphics software interface standards such as TIGA™ and a full line of hardware and software support tools.

KEY FEATURES

- 160-ns Instruction Cycle Time
- Fully Programmable 32-Bit General Purpose Processor with 128-Megabyte Address Range
- Pixel Processing, X-Y Addressing and Window Clip/Pick Built into the Instruction Set
- Programmable Pixel Size with 16 Boolean and 6 Arithmetic Pixel Processing Options (Raster-Ops)
- 31 General Purpose 32-Bit Registers
- 256-Byte LRU On-Chip Instruction Cache
- Direct Interfacing to Both Conventional DRAM and Multiport Video RAM
- Dedicated 8-/16-Bit Host Processor Interface and HOLD/HLDA Interface
- Programmable CRT Control (HSYNC, VSYNC, BLANK)
- High-Level Language Support
- Full Line of Hardware and Software Development Tools including a “C” Compiler
- 68-Leaded Packaging (PLCC)
- 5-Volt CMOS Technology



Typical TMS34010 System Block Diagram

The TMS34010 is a CMOS 32-bit processor with hardware support for graphics operations such as PixBIts (raster ops) and curve-drawing algorithms. Also included is a complete set of general purpose instructions with addressing tuned to support high-level languages. In addition to its ability to address a large external

memory, the TMS34010 contains 30 general purpose 32-bit registers, a hardware stack pointer and a 256-byte instruction cache. On-chip functions include 28 programmable registers that contain CRT control, input/output control, and instruction parameters. The TMS34010 directly interfaces to dynamic RAMs and Video RAMs and generates video monitor control signals. It also accommodates a conventional HOLD/HLDA shared access as well as a separate, generalized interface for communicating with any standard host processor.

The TMS34010 has been constructed to provide single-cycle execution of most common integer arithmetic and Boolean operations from its instruction cache. Additionally, the TMS34010 incorporates a hardware barrel shifter that provides a single-cycle bidirectional shift and rotate function for 1- to 32-bits.

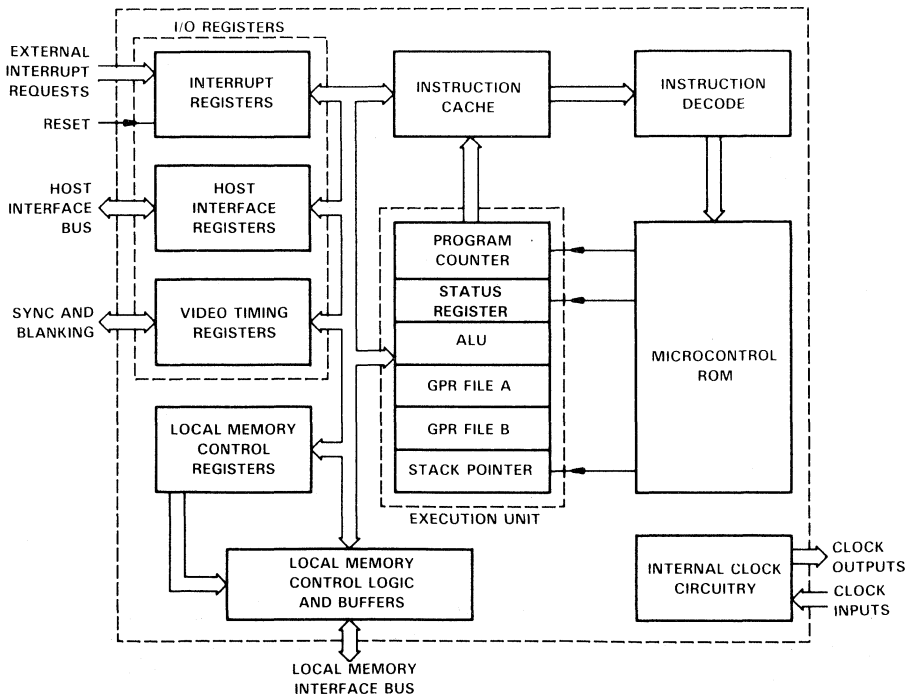
A microcoded local memory controller supports pipelined memory write operations of variable-size fields that may be executed in parallel with subsequent instruction execution.

TMS34010 graphics processing hardware supports pixel and pixel-array processing capability for both monochrome and color systems of variable pixel sizes. The hardware incorporates two-operand raster operations with Boolean and arithmetic operations, X-Y addressing, window clipping, window “pick” operations, one to n bits per pixel transforms, transparency, and plane “masking.” The architecture further supports operations on single pixels (PixT instructions) or on two-dimensional pixel arrays of arbitrary size (PixBlts).

The TMS34010’s flexible graphics processing capability allows software-based graphics algorithms without sacrificing performance. These algorithms include: arbitrary window shapes, custom DDAs (Digital Difference Analyzers), and three operand raster operations.

4

Microprocessors and Microcontrollers



TMS34010 Internal Architecture

TMS34020 Graphics System Processor

OVERVIEW

The TMS34020 Graphics System Processor (GSP) is a programmable 32-bit general-purpose microprocessor optimized for graphics. This second-generation device offers performance that is up to 50 times faster than that of TI's first-generation GSP, the industry-standard TMS34010.

Upwardly object-code compatible with the 34010, the 34020 preserves the user's 34010 software investment. The 34020 also receives full TMS340 Family software and hardware development support.

A closely coupled floating-point processor, TI's TMS34082, has been designed for use with the 34020. The 34082 can perform floating-point operations 10 times faster than coprocessors currently used in PCs.

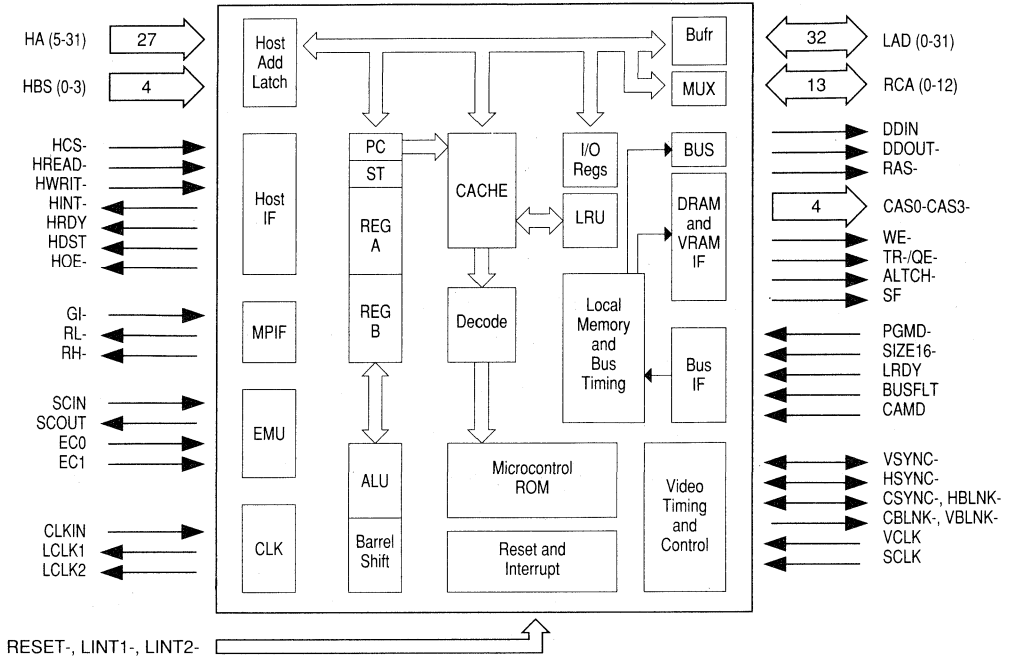
The TMS44C251 1-Mb Video RAM was jointly defined with the 34020 so that systems using the 34020 can take advantage of new VRAM features.

The TMS34020 is the latest in a series of graphics components, software and support tools developed by TI. All are part of TI's integrated system-solution approach to graphics.

FEATURES

The 34020's high performance results from a number of unique graphics management functions:

- 3-operand PixBlts — provides pixel-by-pixel control over which destination pixels are over-written. Used for windowing, pattern fills and half-tone (laser printer) text.
- Enhanced page mode control — enables 142 megabits per second PixBlt operation.
- TMS44C251 Video RAM block write support enables 1.34 billion bits per second fill.
- XY addressing with no pitch restrictions — provides complete programmer control of graphics.
- Faster line draw speed (5 million pixels per second).
- Host port supports random or indexed host access at 20 megabytes/sec.
- 512-byte instruction cache gives 10-MIPS (million instructions per second) peak performance for iterative instruction loops.



34020 Block Diagram

4

Microprocessors and Microcontrollers

FEATURES

- 32-bit data paths
- General-purpose instructions
- 100- or 125-nanosecond instruction cycle
- Multiprocessor interface
- 2 and 3 op PixBlt instructions
- Upwardly object-code compatible with the 34010
- 512-megabyte, bit-addressable linear address range
- Supports block write, write per bit, enhanced page mode and split register reload
- Flexible coprocessor interface

BENEFITS

- Greater throughput and higher performance
- Flexibility to process and graphics algorithm
- High performance with standard DRAM/VRAM
- Enables multiple 34020s and other processors to share the same bus
- Additional support for Windows and laser printer text
- Preserves graphics software investment
- Easy to program and use
- Higher performance and lower system cost, taking advantage of 44C251 megabit VRAM advanced capabilities
- Enables 40-MFLOP 34082 Floating-Point Coprocessor to be used

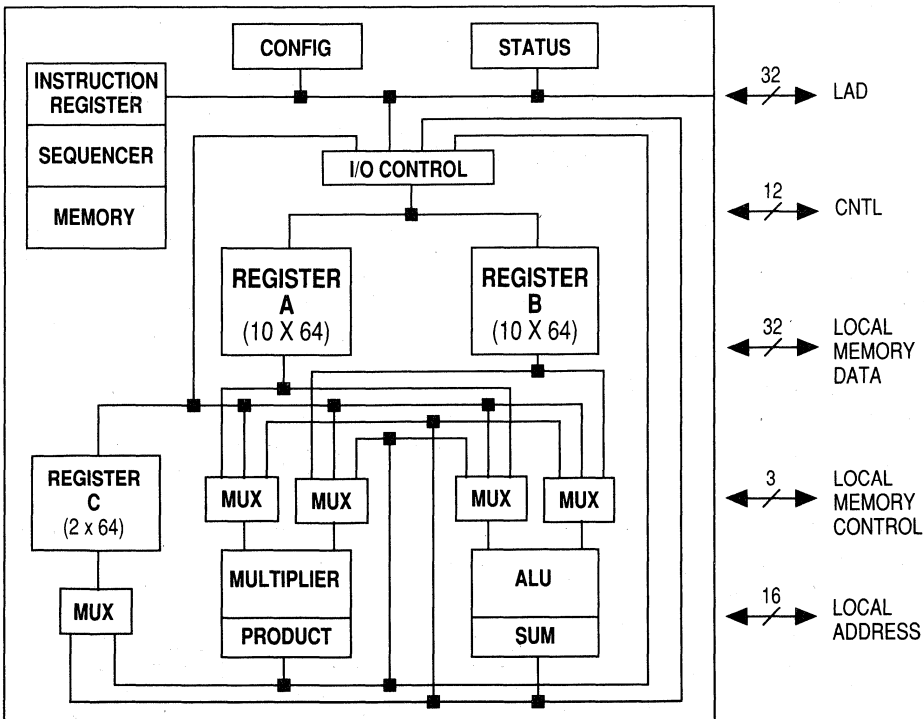
TMS34082 Floating-Point Processor

Many TMS34020 applications require the performance of floating-point operations. The TMS34082 Floating-Point Processor interfaces directly with the address and data buses of the 34020. It operates at up to 40 million floating-point operations per second (MFLOPS).

The TMS34082, one of the industry's most advanced floating-point units (FPUs), allows the 34020 to perform computation-intensive functions more than 100 times faster than a software implementation. Floating-point techniques provide greater accuracy and can handle a wider range of numeric values than traditional integer arithmetic processing.

In the TMS34082, the floating-point expertise TI developed with single-chip FPUs is combined with special graphics capabilities to provide a unique graphics floating-point processor. It performs single- and double-precision floating-point operations with full IEEE STD-754 compatibility and handles integer arithmetic and logical operations.

In addition to normal FPU operations, the TMS34082 performs complex 2-D and 3-D graphics math operations such as 3×3 convolution, 4×4 matrix operations and cubic spline. An external high-speed memory interface for user-defined microcode functions and a coprocessor interface for direct connection to the 34020 are also included.



The 34082 is supplied in a 144-pin ceramic pin grid array (PGA) package.

34082 Floating-Point Processor

The direct coprocessor interface of the 34082 makes for simple system design that does not require extra logic. This means that systems can be designed to optionally add the 34082 at a later time by just leaving a socket.

The TMS34082 is fully supported by the 34020 development tools, making it easy to integrate floating point into graphics systems.

The TMS34082 operates in host-independent mode when used as a stand-alone processor or with other processors. In this mode, the TMS34082 is fully programmable by the user and can interface to other processors or floating-point subsystems through its two 32-bit bidirectional buses.

FEATURES

- Closely coupled with 34020
- Master mode for stand-alone operation
- Sustained 40-MFLOP performance
- Full IEEE, single- and double-precision floating-point operations, 32-bit integer and logical operation
- Single instruction divide/square root operations
- More than 30 complex instructions targeted at graphics math
- External memory interface for defining additional high-level instructions
- Supported by 34020 software and hardware development tools

BENEFITS

- Eliminates the need for external logic interface
- Adds computing muscle to any graphics system
- Brings workstation performance to the PC
- Standardized approach to the floating point for full system compatibility
- Eliminates multiple-cycle software implementation
- Superior performance for 2-D and 3-D graphics applications
- Enables user-tailored high-performance instructions
- Easy to accelerate floating point in graphics systems

4

TMS340 FAMILY HARDWARE AND SOFTWARE SUPPORT

A full range of hardware and software development tools is available for TI's new TMS34010 graphics processor. Key tools are based on IBM PC®, TI Professional, or VAX™ computers. TI's Regional Technology Centers can provide additional support.

TMS34010 PC Software Tools

TMS34010 PC SOFTWARE TOOLS	COMPUTER	OPERATING SYS.	PART NUMBER
* Assembler Package: Assembler, Linker, Archiver, ROM Utility, Simulator NOTE: Only the PC version includes a Simulator	IBM/TI PC	MS-DOSTM 2.11+	TMDS3440808002
	VAXTM	VMSTM	TMDS3440200059
	VAX	Ultrix™	TMDS3440200069
	Sun	UNIX BSD 4.2	TMDS3440550088
	Macintosh™	MPWTM	TMDS3440560021
* "C" Compiler Package	IBM PC	MS-DOS 2.11+	TMDS3440805002
	VAX	VMS	TMDS3440205059
	VAX	Ultrix	TMDS3440205069
	Sun	UNIX BSD 4.2	TMDS3440555088
	Macintosh	MPWTM	TMDS3440565021
	Apollo	UNIX System V	TMDS3440575088
* PC Assembler-Compiler "Combo-Pack"	IBM PC	MS-DOS 2.11+	TMDS3440804003
* PC Debugger Development Package (Internal Use)	IBM PC	MS-DOS 2.11+	TMDS3440806002
* PC Debugger Development Package (Resale)	IBM PC	MS-DOS 2.11+	TMDS3440806003
TMS34010 PC SOFTWARE LIBRARIES	COMPUTER	OPERATING SYS.	PART NUMBER
* Math/Graphics Function Library	IBM PC	MS-DOS 2.11+	TMDS3440802202
	VAX	ALL	TMDS3440202208
* Bit-Map Font Library	IBM PC	MS-DOS 2.11+	TMDS3440802302
	VAX	ALL	TMDS3440202308
TMS3440805002 * CCITT Data Compression Library	IBM PC	MS-DOS 2.11+	TMDS3440802102
	VAX	ALL	TMDS3440202108
TMS3440805002 * 8514/A Emulation Library	IBM PC	MS-DOS 2.11+	TMDS3440802002
TMS34010 PC SOFTWARE TOOL KITS	COMPUTER	OPERATING SYS.	PART NUMBER
TIGA-340TM Driver Developer's Kit	IBM PC	MS-DOS 2.11+	TMS340DDK-PC
TIGA-340 Software Developer's Kit	IBM PC	MS-DOS 2.11+	TMS340SDK-PC
TIGA-340 Software Porting Kit	IBM PC	MS-DOS 2.11+	TMS340SPK-PC

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 VAX, VMS, and ULTRIX are trademarks of Digital Equipment Corporation.
 UNIX is a registered trademark of AT&T.
 TIGA-340 is a trademark of Texas Instruments, Inc.

TMS34010 XDS/22 Emulator

KEY FEATURES

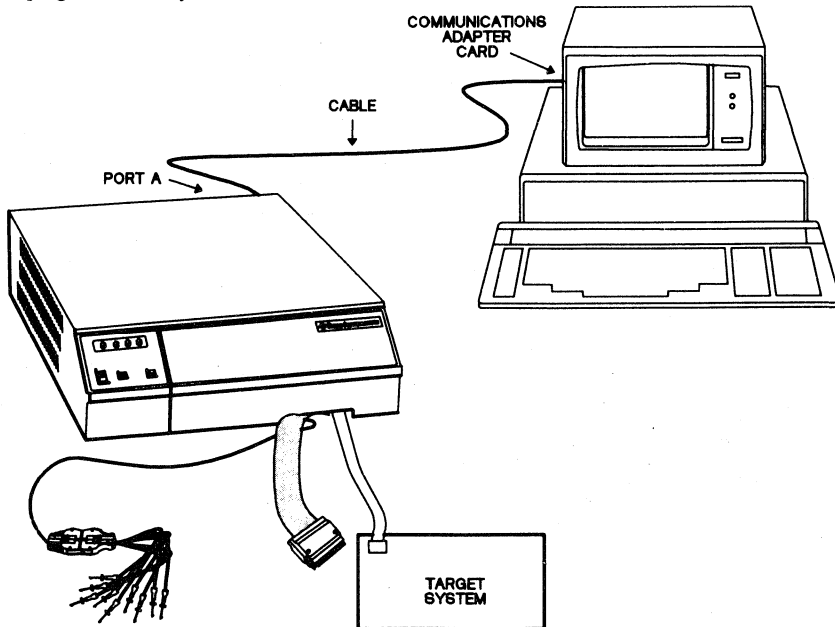
Stand-Alone Terminal

- Full-speed in-circuit emulation
- Host independent
- Full-speed hardware trace
- Multimode hardware single step/breakpoint

PC Debugger Software

- Powerful debug environment
 - Run/stop/single step
 - Set breakpoint/trace
 - Environment save/restore
 - Machine state manipulation
 - Reverse assembly
- Screen-oriented display/single image of machine
- Line-oriented input

Complete and self-contained, TI's TMS34010 XDS/22 Emulator is a user-friendly system for realtime, in-circuit emulation. The emulator may be used in a stand-alone mode through a standard terminal or through a host computer with a powerful debugger interface. The emulator has 128K x 16 words of DRAM (zero wait states) for program memory.

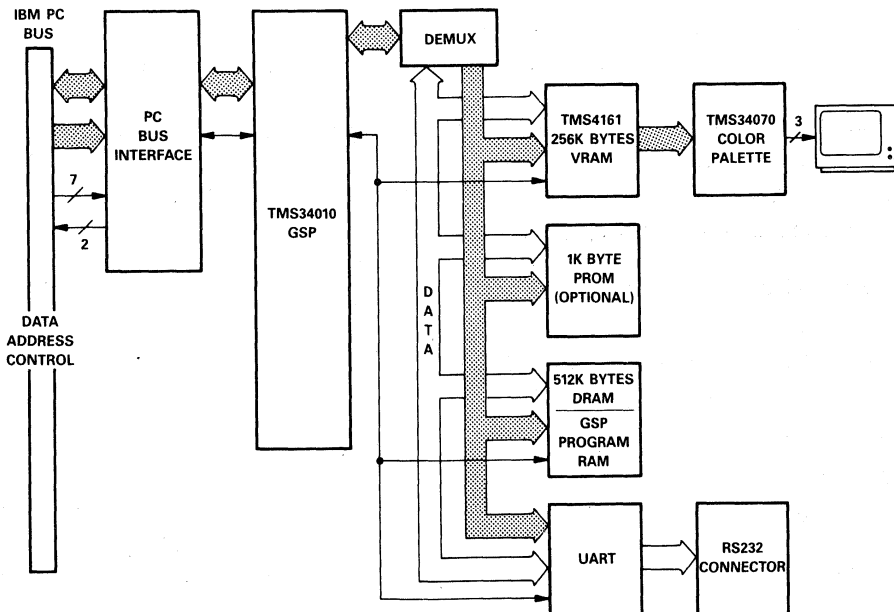


TMS34010 Software Development Board

An easy way to evaluate the power and flexibility of TI's new TMS34010 Graphics System Processor is provided by the TMS34010 Software Development Board (SDB). It is a single-slot, plug-in board populated with TI's GSP, Color Palette, and VRAMs. Large program memory allows execution of graphics software standards as well as user-supplied programs.

KEY FEATURES

- Plugs into IBM PC-compatible and TI professional computers
- 256K bytes of display memory organized as 1,024 x 512 x 4 using TMS4161 VRAMs
- 4,096 colors available per screen, 16 colors per line, using TMS304070 Color Palette
- Analog or digital RGB output
- 512K bytes of TMS34010 program memory using TMS4256 256K-bit DRAM
- Mouse interface/serial port supported on board
- Debugger interface software



TMS34010 Software Development Board

TMS34010 Development Software

Immediately available to speed graphics system design and development is this exceptionally broad software family supporting TI's TMS34010 Graphics System Processor. Included is a Kernighan and Ritchie standard "C" Compiler Package, Assembler Package, Graphics/Math Function Library, Bit-Map Font Library, and PC Debugger Development Package.

KEY FEATURES

Compiler Package

- Full Kernighan and Ritchie "C" with extensions (in-line assembly code, enumerated data type)
- 64-bit IEEE (without implied 1) floating point
- Three-pass optimizing preprocessor, parser, code generator generating TMS34010 assembly source
- Floating-point and memory-management run-time support
- Supports symbolic/statement-level debug
- Assembly linkable

Assembler Package

- COFF (Common Object File Format) section-oriented object code
- Macro assembler/linker supporting packed bit fields, cache alignment, symbol cross-referencing, and output control
- Screen-oriented software debugger (GSPSIM) with breakpoint/trace, instruction execution, input redirection, environment save/restore, on-line help utility
- Source/object archiver
- ROM utility for ROM/PROM/EPROM programming

Graphics/Math Function Library

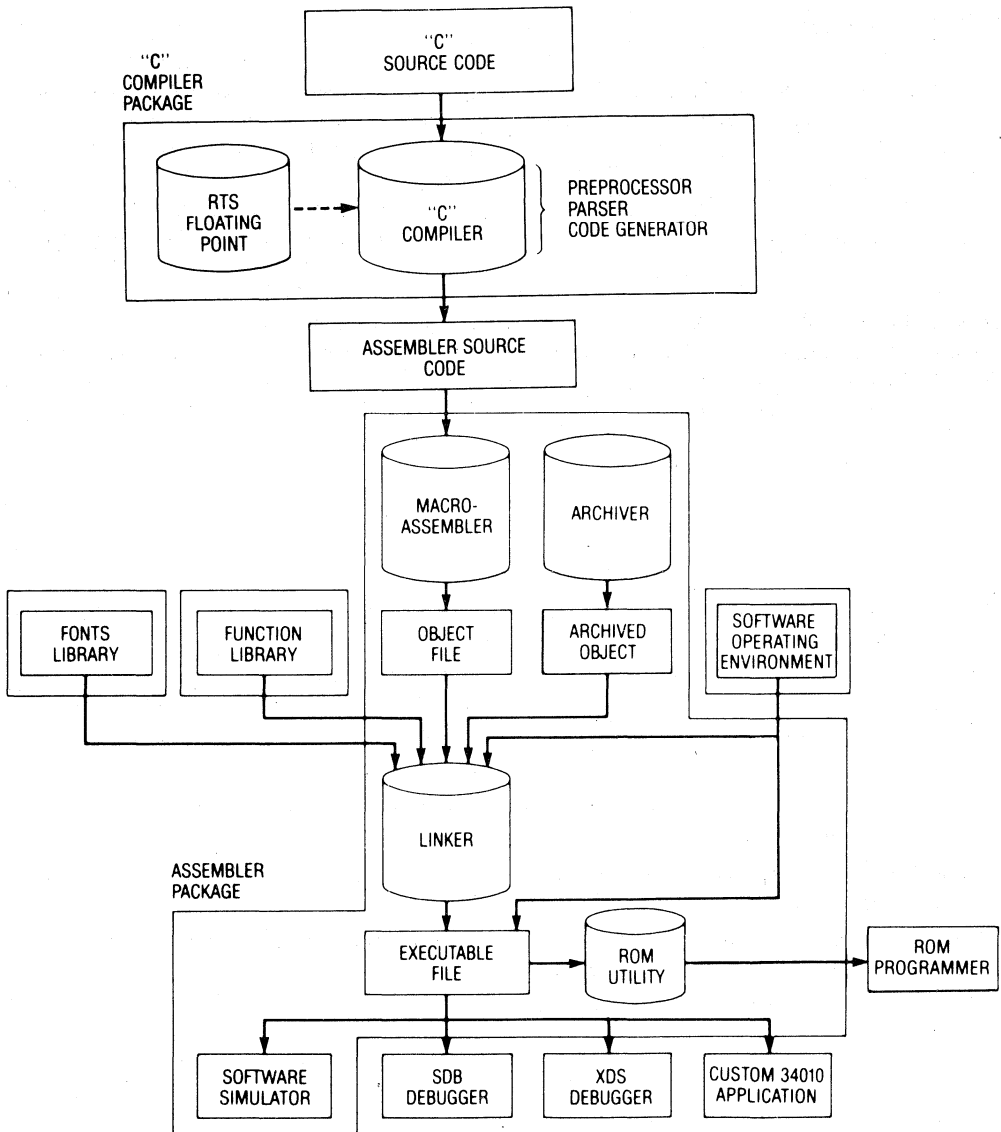
- Graphics primitives
- Transcendental functions (double-precision floating point)
- Matrix operations (3D transforms)
- Text and font functions
- View port support
- Palette management

Bit-Map Font Library

- 19 different font styles
- Over 100 total fonts
- Pixel heights from 7 to 82

PC Debugger Development Package

- Main program is executable object code
- Driver code is customizable source



TMS340 PERIPHERALS

TMS34061 Video System Controller

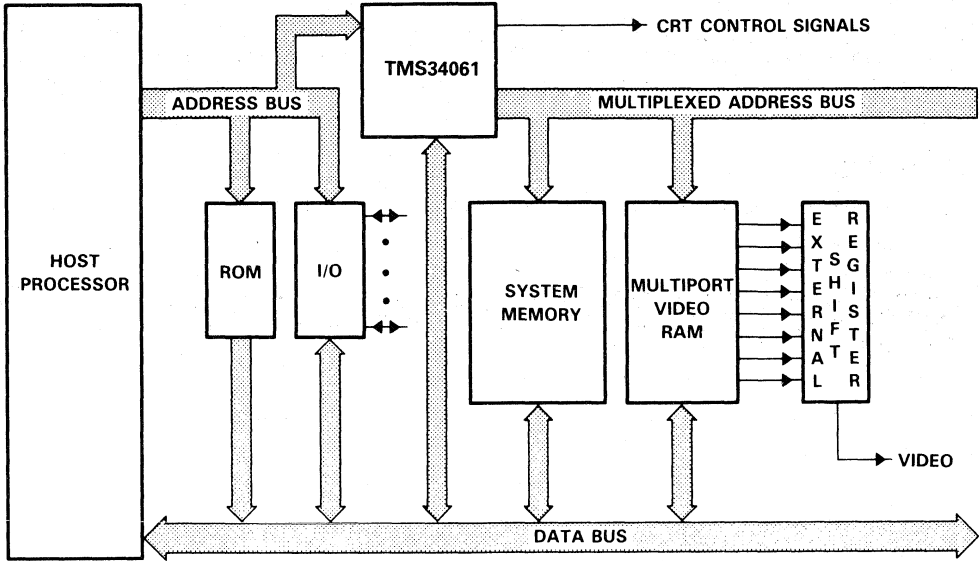
The TMS34061 Video System Controller (VSC) is a high-performance NMOS device that controls the video display and the dynamic memory of bit-mapped graphics system. Although primarily designed to provide control of Multiport Video RAMs (VRAMs), such as the TMS4161 and TMS4461 (see Section 10). The VSC is also compatible with conventional 64K and 256K DRAMs and easily configures to a variety of CPUs. The sync and blanking signals necessary to interface to a raster-scan CRT display are generated by the VSC, which is the only controller currently available that combines VRAM, DRAM, and CRT control on a single chip.

The principal role of the VSC is to provide an external processor with virtually unlimited access to video memory, eliminating delays caused by conflicts with display update functions. Using the VSC, the system CPU is relieved of the burden of controlling the system memory, refreshing video memory, and reloading VRAM internal shift registers for bit-mapped displays. The VSC supports a broad range of raster-scan display systems with various resolutions and scan rates.

4

KEY FUNCTIONS

- Generates all control signals necessary to control VRAM devices, as well as those necessary to control conventional 64K and 256K DRAMs.
- Generates the video synchronization and blanking signals necessary to control a CRT monitor.
- Accommodates processor data paths of arbitrary width. The VSC works equally well with 8-, 16-, 20-, and 32-bit processors.
- Supports both interlaced and non-interlaced displays of essentially any display resolution (from 256 to greater than 4,096 pixels per line).
- Automatically generates the special display-update cycles required by VRAM memories to maintain the CRT display.
- X-Y indirect addressing improves the performance of graphics primitives as well as supporting host processors with limited addressing range.
- Automatically performs periodic DRAM refresh cycles necessary to maintain data stored in the VRAMs, as well as in conventional 64K and 256K DRAMs.
- Universally programmable interface and READY/WAIT logic provides for efficient communication with all leading microprocessors as well as high-speed bit-slice processors.



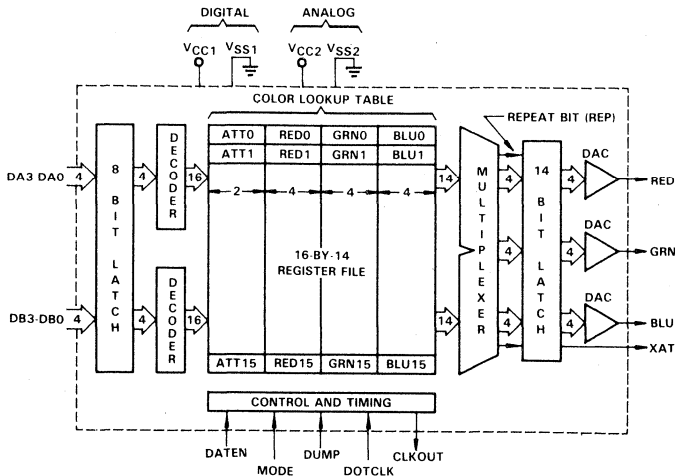
Typical TMS34061 System Block Diagram

TMS34070 Color Palette

The TMS34070 Color Palette is a monolithic integrated circuit containing a color lookup table and providing three channels of analog output for RGB-type CRT monitors operating at frequencies up to 66 MHz. This corresponds to a display resolution of about 1,024 by 760 pixels, assuming a non-interlaced display refreshed at 60 Hz. The TMS34070 supports graphics systems having up to four color planes and allows 16 of 4,096 different colors per line to be displayed simultaneously on the CRT monitor.

KEY FEATURES

- Three 4-bit Video-DAC outputs are capable of directly driving 75-ohm monitor cables.
- Sixteen 14-bit color lookup registers support the simultaneous display of a palette of 16 colors selected from an available 4,096 colors.
- Color lookup table can be automatically loaded with a new set of colors prior to the start of each horizontal scan line without processor intervention.
- Device is versatile and can be used with a variety of controllers and memory types.
- Real-time animation is supported by the REP attribute bit, which facilitates rapid rendering of scenes composed of polygons of various solid colors.
- Video overlay capability is supported by the EXT attribute bit, which is used to control external circuitry.
- Internal pipelining makes possible shorter setup and hold times at the digital data inputs and faster transitions at the analog outputs.
- Worst-case transition time for the Video-DAC outputs is 10 ns.
- Internal multiplexing permits digital data to be input at half the rate at which analog data is output at the Video-DAC pins allowing inexpensive TTL shift registers to be used.
- Analog RGB video data is output from the Video-DAC pins at dot frequencies up to 66 MHz.
- Digital input and output logic levels are TTL-compatible.
- Separate 5-volt power supply pins are provided for digital and analog functions.
- Device is available in a 22-pin, 400-mil plastic dual-in-line package.



TMS34070 Block Diagram

TIGA-340 GRAPHICS SOFTWARE INTERFACE

The TIGA-340 (Texas Instruments Graphics Architecture) interface specification is a software interface standard for the TMS340 family of graphics system processors (GSPs). Its architecture is designed for DOS-based personal computer systems which contain a 8088/86 or 80286/386 host microprocessor and a TI340 graphics processor. As a standard interface, it optimizes the communications between the 340 processor and the host processor. Thus, programs which write to the TIGA interface will run significantly faster on any TIGA-compatible 340X0 based graphics board/system.

The result is an operating environment that enables true multiprocessing. The enhanced performance is achieved because the TIGA interface allows the execution of the application to be shared between the host processor and the 340X0 graphics processor.

The TIGA software interface is the ideal standard for high-performance PC displays. It provides a platform for developing applications that significantly outperform other industry solutions, including VGA and 8514/A. For example, TIGA-based 34010 systems demonstrate an 16X increase in AutoCAD redraw speed.

In addition, TIGA-340 provides graphics software developers with a common target to which to write. The result is programs capable of running on multiple platforms. Hardware OEMs who incorporate the TIGA firmware into their systems or add-in boards will be able to run any TIGA-based application package.

The TIGA-340 interface consists of these key elements:

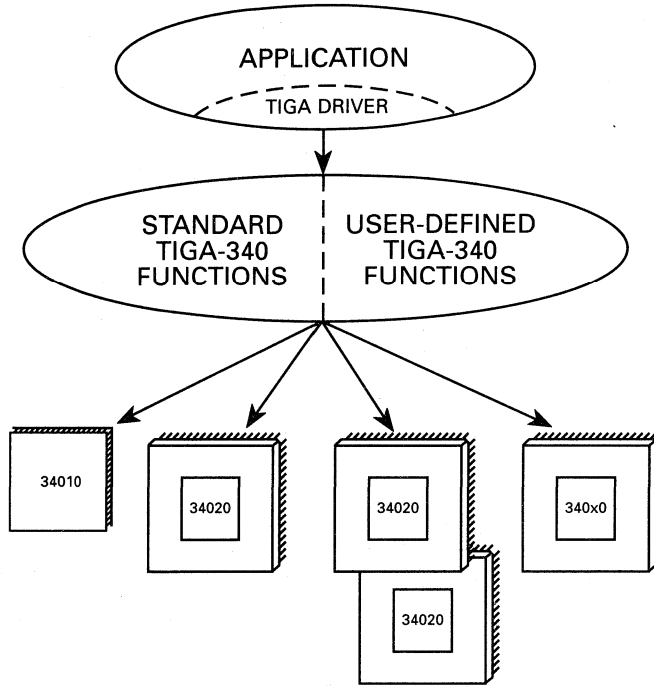
- High-speed command processor
- Standard host/GSP communications functions
- GSP memory management
- Graphics and text primitives
- Board configuration primitives
- Custom function download capability

The Driver Developer's Kit (TMS340DDK-PC) helps software developers make their existing software run on TIGA-compatible 34010 boards. The Software Developers's Kit is for those who want to develop direct 34010 code or custom, downloadable extensions to TIGA. A Software Porting Kit is also available for hardware developers to use in order to make their 34010-based systems TIGA-compatible.

The synergistic combination of the 34010 and the TIGA-340 interface accelerates PC applications performance.

4

Microprocessors and Microcontrollers



TIGA provides an interface to today's high performance 34010- and 34020-based hardware as well as tomorrow's TMS340 processors currently in development. TIGA consists of a core set of graphics primitives and standard functions for commonly used graphics operations. Application developers can extend TIGA with custom functions that can either be used in addition to or instead of the standard functions. Higher level application interfaces like MS-Windows, PM, DGIS, and HALO can also take the place of the standard functions.

TMS340-Based PC System

FEATURES

- Facilitates multiprocessing using high-speed communications
- Efficient partitioning of tasks with minimum command overhead
- Simple set of graphics primitives
- Can use familiar Microsoft C development tools
- Can develop downloadable 340 primitives using C, GSP assembly language or mixture
- Provides software-compatible migration path for 34020, 34082 and future TMS340 processors
- 340 pixel depth and screen resolution independence

BENEFITS

- Applications run faster
- Easy to use
- Extensible
- Hardware-independent

TMS370 FAMILY – HIGH-PERFORMANCE 8-BIT MICROCONTROLLERS

The TMS370 family of configurable microcontrollers are high performance, highly integrated eight-bit devices. Fabricated in CMOS technology, the TMS370 family is the first to include a device with advanced on-chip functions including program EEPROM, data EEPROM, program EPROM and an eight-bit/eight-channel analog to digital converter. Plus all tools you'll need to use for either standard devices or client-specified configurations.

The TMS370 family was developed with a modular design methodology which supports the efficient development and qualification of new devices comprising different function modules. The TMS370 standard configurations meet the requirements of many systems. If your application requires a specially configured device, you can specify the desired function modules and begin software and hardware development immediately using a configured TMS370 XDS in-circuit emulator. Far faster than going with a custom design, this means you can remain with a single microcontroller family -TMS370- for your evolving applications.

TMS370 FAMILY OF 8-BIT MICROCONTROLLERS											
Type	Device	Program Memory (Bytes)	Data Memory (Bytes)		Off-Chip Memory Expansion (Bytes)	Serial Interface Modules	Timer Modules*	A/D Channels	I/O Pins	Pins/ Package	
			EEPROM	SRAM							
ROM	TMS370C010	4K	256	128	None	SPI	T1	–	22	28 DIP/PLCC	
	TMS370C050	4K	256	256	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
	TMS370C052	8K	256	256	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
	TMS370C056	16K	512	512	112K	SPI,SCI	T1/T1	8	55	68 PLCC	
	TMS370C310	4K		128	None	SPI	T1	–	22	28 DIP/PLCC	
	TMS370C350	4K		256	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
	TMS370C352	8K		256	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
	TMS370C356	16K		512	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
	ROM-less**	TMS370C150			256	112K	SPI,SCI	T1/T2	8	23	68 PLCC
		TMS370C250		256	256	112K	SPI,SCI	T1/T2	8	23	68 PLCC
TMS370C156				512	112K	SPI,SCI	T1/T2	8	23	68 PLCC	
TMS370C256			512	512	112K	SPI,SCI	T1/T2	8	23	68 PLCC	
FFE EEPROM	TMS370C810	4K	256	128	None	SPI	T1	–	22	28 DIP/PLCC	
	TMS370C850	4K	256	256	112K	SPI,SCI	T1/T2	8	55	68 PLCC	
FFE EPROM	TMS370C756	16K	512	512	112K	SPI,SCI	T1/T2	8	55	68 CLCC	

*Timer 1 module includes a Watchdog timer which can be programmed as a general purpose 16-bit timer. PACT timer includes a Watchdog timer.

**In ROM-less (microprocessor) mode all Address, Data, and Control lines are fixed in their function.

GENERAL:

V_{cc} : $5 \pm 10\%$

I_{cc} : Active, Halt and Standby Modes

Freq: 2 - 20 MHz

Temp: -40 to $+85^{\circ}\text{C}$

ARCHITECTURE:

- 8-bit CPU
- 73 user instructions
- 14 addressing modes
- Register-to-Register architecture avoids bottlenecks
- All peripheral pins are software configurable for digital I/O
- Voltage generator for EEPROM programming contained on-chip

MEMORY EXPANSION:

- No glue logic needed for external memory support
- Non-multiplexed bus
- Pre-coded chip selects
- Wait state generation and wait pin

SERIAL INTERFACE:

SCI: Serial Communications Interface (UART)

- Asynch = 156 kbits/s
- Isosynch = 2.5 Mbits/s
- Selectable baud rate and data format

SPI: Serial Peripheral Interface

- Synch = 2.5 Mbits/s
- Selectable baud rate, data format, and clock polarity

TIMERS:

- Auto PWM generation
- Capture and compare registers
 Timer 1: 16 bit with 8 bit pre-scale
 Timer 2: 16 bit (not included in TMS370Cx10 devices)
 Watchdog Timer: 24 bit, 10 bit overflow rate

INTERRUPTS:

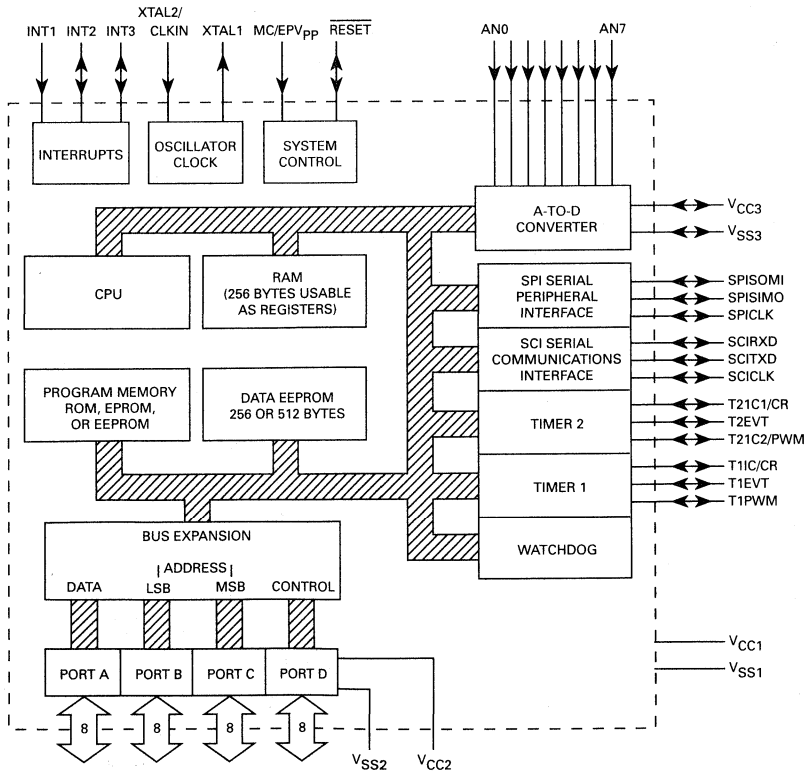
- 10 hardware interrupts, incl. 3 external
- 2 priority levels — s/w programmable
- Edge detection — s/w programmable

Technical Support Hotline (in the US):

713-274-2370

Bulletin Board (in the US): 713-274-3700

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Function Block Diagram – TMS370CX5X

DEVELOPMENT SYSTEM SUPPORT

The TMS370 family development support tools include an Assembler, a Linker, an In-Circuit emulator (XDS – eXtended Development Support), and an EEPROM/UVEPROM programmer that supports standard EPROM and all TMS370 devices. All of the tools work closely together using any MS™-DOS-based Personal Computer (PC) as the host and central control element. This allows selection of the host computer and the text management and editing tools based on user preference.

■ Assembler/Linker

MS DOS version: **TMDS3740810-02**

DEC VAX version: **TMDS3740210-08**

- Extensive macro capability
- High-speed operation
- Format conversion utilities available for popular formats

■ XDS (eXtended Development Support)

In-Circuit Emulator: **TMDS3761110**

TMDS3761111

TMDS3762210

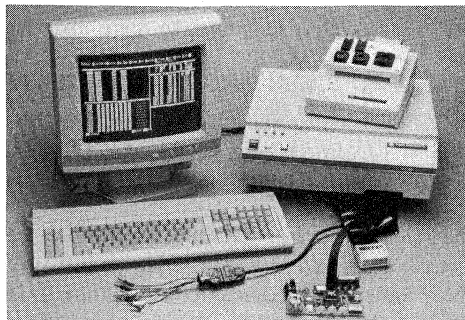
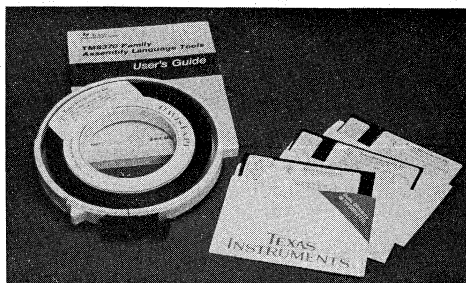
- PC-based, window/function-key oriented user interface for ease of use and a rapid learning environment
- Sophisticated breakpoint and trace support for software debugging and software/hardware integration. Provides 2047 qualified trace samples, up to 32 breakpoints, sequential breakpoint triggering, and counters.
- Symbolic Debugging
- Provides a realtime testbed for software development before target circuitry is available.
- Timing analysis to evaluate and enhance system performance. Provides identification of critical routines and instructions with two timers controlled by the full capabilities of the breakpoint qualification support.
- Disassembly of code and trace history, including symbols.
- Eight-line logic probe to expand the breakpoint and trace visibility
- Logic Analyzer output interface to support circuit-level debugging

■ EEPROM/UVEPROM Programmer (TMDS3760510)

- PC-based, window/function-key oriented user interface for ease of use and a rapid learning environment.
- Supports all TMS370 series devices to provide rapid target prototyping capability.
- Also programs TMS2732, TMS2764, TMS27128, and TMS27256 NMOS and CMOS EPROMs.
- Plug-in personality boards and loadable parameters to support future packages and devices.

■ TMS370 Design Kit (TMDS3770110)

- Includes TMS370 Application Board and TMS370 Assembler diskette and documentation
- Supports quick evaluation of TMS370 functionality.
- Capability to upload and download code
- Capability to execute programs and software routines, and to single-step executable instructions.
- Software breakpoints to halt program execution at selected addresses
- Wire-wrap prototype area
- Reverse assembler



TMS380 TOKEN-RING LAN ADAPTER CHIPSET

TI's first generation TMS380 Token-Ring LAN adapter chipset was developed and tested jointly with IBM™ to ensure IBM compatibility. The single-chip, second generation TMS380 COMMprocessor (communications network processor) maintains the same compatibility while improving performance up to 4 times that of the first generation. The chipset provides manufacturers of computer, peripheral, and telecommunications equipment with a verified connection to the IBM Token-Ring Network.

OVERVIEW

The TMS380 chipsets use a token-passing access technology compatible with the IEEE 802.5 standard. They provide 16-megabit-per-second (Mbps) or 4-megabit-per-second data expressways using various media. The second generation TMS380 COMMprocessor operates on the IBM cabling system, as well as fiber optic and data grade media, while the first generation can utilize telephone twisted pair in addition to the above listed media.

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Microprocessors and Microcontrollers

The integrated LAN adapter architecture of the TMS380 ensures connectivity to the IBM Token-Ring Network by providing all the functions needed to connect an attaching product's host processor bus to the physical media. High reliability of the network is provided via dedicated error checker circuits, on-chip diagnostic and error monitoring software, and other network-management features.

STANDARD TOKEN-RING LAN ADAPTER ARCHITECTURE

The first generation chipset uses advanced VLSI NMOS and bipolar processes. The new second generation TMS380 COMMprocessor is 1.0-micron EPIC™ CMOS technology. The companion ring-interface device is fabricated in Advanced Low-Power Schottky technology.

The second generation TMS380C16 COMMprocessor integrates functions previously achieved by the five-device chipset, and provides a reduction in board area and cost. Incorporated into the TMS380C16 are the TMS38010 communications processor, the TMS38020/21 protocol handler and the TMS38030 system interface chips, along with two VLSI standard cell functions: the bus interface unit and memory expansion unit, which are available in TI's ASIC-LAN Tool Kit. The TMS380C16 performs all the functions of the first-generation devices and maintains complete IBM compatibility while operating at 16 Mbps. For additional information about the functions performed by each of the devices, refer to the TMS380 Adapter Chipset User's Guide (SPWX005) or the Master Selection Guide.

TMS380C16 ENHANCEMENTS

Although the TMS380C16 COMMprocessor is similar in many ways to the first generation TMS380 chipset, a number of enhancements have been made. Enhancements over the original TMS380 chipset include:

- Adapter address space expanded to 2 Megabytes to support expanded link station tables with LLC, expanded data buffers and use of downloadable standard protocols.
- System Interface host address extended to 32 bits to support full address space of new high performance 32-bit microprocessor and system buses.
- Choice of internal adapter bus speeds: 3 MHz for lower memory costs or 4 MHz for increased performance at 16 Mbps ring speed.
- Optional parity on adapter bus can be engaged for adapter memory integrity or disengaged for lower memory cost (one less memory chip).
- Glueless DRAM interface supports 256K, 1M byte, and 4M byte DRAMs directly with no additional decode logic or DRAM control required.

- Adapter Control Register (ACTL) added in the System Interface Block that allows the host to exert greater control over the adapter which offers more system flexibility.

The TMS380C16 COMMprocessor is packaged in a plastic, surface-mountable, 132-pin JEDEC quad flat pack. The 16 Mbps ring interface chip (TMS38053) is housed in a 44-lead plastic leaded chip carrier.

The first generation chipset is available in the following packages:

TMS38010 Communications Processor	48-Pin DIP	Plastic
TMS38021 Protocol Handler	48-Pin DIP	Plastic
TMS38030 System Interface	132-Pin QFP	Plastic
TMS38051 Ring Interface Transceiver	22-Pin DIP	Plastic
TMS38052 Ring Interface Controller	20-Pin DIP	Plastic

TMS380C16 FEATURES

The TMS380C16 enjoys the same IBM compatibility as the first generation chipset, while increasing overall system performance. Complete IBM compatibility is maintained through rigorous verification testing similar to that endured by the first generation chipset.

The TMS380C16 also provides the same industry standard software services as the first generation TMS380 chipset. Compatibility with IBM is provided at the physical layer, Medium Access Control (MAC) layer, and the Logical Link Control (LLC) layer of the OSI reference model. All adapters utilizing TI's TMS380 family of products should be able to interoperate with IBM and other vendors because the MAC and LLC functions are implemented in the chipset. As in the first generation TMS380 chipset, an extensive array of MAC-based network management services are built into the TMS380C16 COMMprocessor. These management services differentiate Token-Ring from other networks like Ethernet or StarLan, which do not offer capabilities comparable to Token-Ring's network management.

TI has reduced the overall cost to develop and produce a Token-Ring product by providing a high degree of system integration on a single chip. The TMS380C16 incorporates many of the external functions previously requiring TTL, PALs, or ASICs. Additional manufacturing cost savings can occur because of reduced board size (less expensive blanks) and reduced number of drilled holes in the board for IC pins or circuit routing.

For a low-cost, 4 Mbps solution, the first generation TMS380 five-chip set in plastic will be the price leader into the early 1990's. If your Token-Ring design need only fit in 20 square inches, with a 4 Mbps data rate, the first generation TMS380 will meet your requirements.

When the TMS380C16 is selected, a complete Token-Ring LAN adapter can be designed by using a minimal number of parts. All that is needed to build an adapter is the TMS380C16 Token-Ring COMMprocessor, the Pulse Engineering Token-Ring Optimized Line Interface (TROLI™), on-board memory, and minimal bus interface logic. The area requirement for a full-function TMS380C16-based IBM compatible Token-Ring adapter for a PC/XT™ will be less than 10 square inches.

Since the TMS380C16 is manufactured in advanced 1-micron CMOS technology, its power consumption is reduced to less than half that of the first generation chipset. This translates to lower equipment operating temperatures.

The TMS380C16 supports the new IEEE 802.5 and IBM 16 million-bit-per-second (Mbps) Token-Ring standard, providing a 400% increase in data rate. This gives Token-Ring a data rate 60% faster than Ethernet, while providing users with the reliable technology of Token-Ring.

In addition to the 16 Mbps data rate, the TMS380C16 will support up to 255 active stations on a single ring. The TMS380C16 outperforms the first generation chipset by providing increased small packet performance at both 4 and 16 Mbps. Small packet performance has been increased an average of 70% versus the first generation TMS380, even at 4 Mbps. This increases network throughput when connection-oriented protocols are used.

The maximum frame size has been expanded to 18,000 bytes (versus Ethernet's 1,500 byte maximum), for efficient transfer of large database and graphics files. A new option called "early token release" is also available to allow multiple frames to circulate around the ring simultaneously, further improving network efficiency.

4

Microprocessors and Microcontrollers

TMS380 CUSTOMER SUPPORT

Texas Instruments, the leader in Token-Ring chipsets, is committed to helping you achieve effective product design in a quick, efficient manner. Consequently, the TMS380 Token-Ring chipset is fully supported with documentation, technical training, development tools, and applications engineering available through Texas Instruments sales offices.

DOCUMENTATION

The TMS380 Token-Ring chipsets offer you extensive information at the introductory/overview level, as well as detailed technical data specifications. The introductory information provides concise information to quickly build your awareness of the TMS380 chipsets and Token-Ring networks. Available documents include:

- Texas Instruments — The Token-Ring Connection (SPWM011)
- Texas Instruments Second Generation Token-Ring LAN Adapter Family Product Bulletin (SPWT084)
- Texas Instruments First Generation Token-Ring LAN Adapter Family Product Bulletin (SPWT018A)

Thorough technical data sheets and applications information on the TMS380 Token-Ring LAN adapter chipset leave no details unspecified. Available documents include:

- TMS380 Second Generation Token-Ring User's Guide (SPWU005)
- First Generation TMS380 LAN Adapter Chipset User's Guide and User's Guide Supplement (SPWX005)
- TMS380 Development Products Family User's Guide

TOKEN-RING TRAINING

To quickly familiarize your decision makers and ramp your design team with state of the art information on Token-Ring, Texas Instruments offers training including:

A three-day technical workshop providing instruction and hands-on equipment with the second generation, 16 Mbps Token-Ring.

DEVELOPMENT SUPPORT PRODUCTS

Texas Instruments provides leadership development tools to accelerate your Token-Ring product design, including: TMS380 16 Mbps Design-In Accelerator Kit (TMDS380C16LDK)—The Second Generation design kit provides hardware and MAC/LLC software necessary to develop a 16 Mbps Token-Ring product. Included in the kit are one TMS380C16 COMMprocessor, one 16 Mbps TROLI Module (Pulse Engineering's Token-Ring Optimized Line Interface), and a TMS380 Second Generation User's Guide.

TMS380 16 Mbps PC Family Development Card (TMDX380C16PC)—This 16-bit compatible product is aimed at the software engineer who wants to prototype a Token-Ring and begin software development and system evaluation. It operates in a PC/XT(TM), PC/AT(TM), PS/2 Models 25 and 30. Hardware included is one TMDX380C16PC adapter card, IEEE 802.5 and 802.2 protocols and a type 2 ring cable. The following software is also provided in the kit: an example of a card driver, together with an IBM-compatible adapter handler, and an IBM LAN Support Program.

TMS380 ASIC-LAN Toolkit (TMDP380ASIC)—This package will assist you in designing an Application Specific IC (ASIC) tailored specifically for the 1st Generation TMS380 LAN chipset. Included in the kit is the ASIC-LAN manual, a set of cartridge tapes containing software macros, detailed data sheets covering more than 30 cell types, and several ASIC-LAN design examples of host system bus interfaces, as well as memory expansion examples. This kit also contains two preconfigured ASIC samples.

APPLICATIONS ENGINEERING SUPPORT

The commitment of Texas Instruments to customer support goes even further by providing you extensive Token-Ring application engineering support, including:

- Regional Technology Centers (RTCs) and ASIC Design Centers with trained engineers for ASIC development and support.
- Factory Applications Engineering with industry-leading expertise in all phases of Token-Ring network and TMS380 applications.
- In the US, use TMS380 Token-Ring Hotline (713) 274-2380 or FAX (713) 274-4027 as a direct line to TI's factory Token-Ring applications engineering for quick answers to any TMS380 application question.

BUILDING BLOCK PROCESSORS

VLSI 32-BIT FAMILY

INTRODUCTION

A new generation of 32-bit VLSI logic devices from Texas Instruments reflects the high degree of system integration made possible by continuing improvements in bipolar and CMOS process technologies. TI will offer the following integrated circuits:

- 74ACT8818 16-bit microsequencer
- 74ACT8832 32-bit registered ALU
- 74ACT8836 32x32 bit multiplier/accumulator
- 74AS8838 32-bit barrel shifter
- 74ACT8841 Digital crossbar switch
- 74ACT8847 64-bit floating point unit

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All the devices except the barrel shifter are designed to support parity checking and generation, as well as master/slave error checking. Pin grid array package sizes range from 84- to 208-pins.

TECHNOLOGY

Fabricated in 1- μm EPIC CMOS or IMPACT Bipolar technology, this chip set offers a combination of maximum integration and superior performance to the designer. Logic functions fabricated in EPIC technology can operate at clock frequencies up to 150 MHz. EPIC devices combine the performance associated with advanced bipolar process with the low power consumption typical of CMOS.

In the past, the use of bipolar technology to achieve the complexities required by today's superminicomputer manufacturers was limited by the power dissipation required for high-speed operation.

TI has solved this problem, for the most part, by using a proprietary internal circuitry known as Schottky Transistor Logic (STL) which requires a 2-volt internal V_{cc} . Using two types of contact metallization on the same substrate to achieve a 300 mV noise margin, STL technology has allowed TI to offer VLSI bipolar products that operate at very low power levels.

CHIP SET DEFINITION

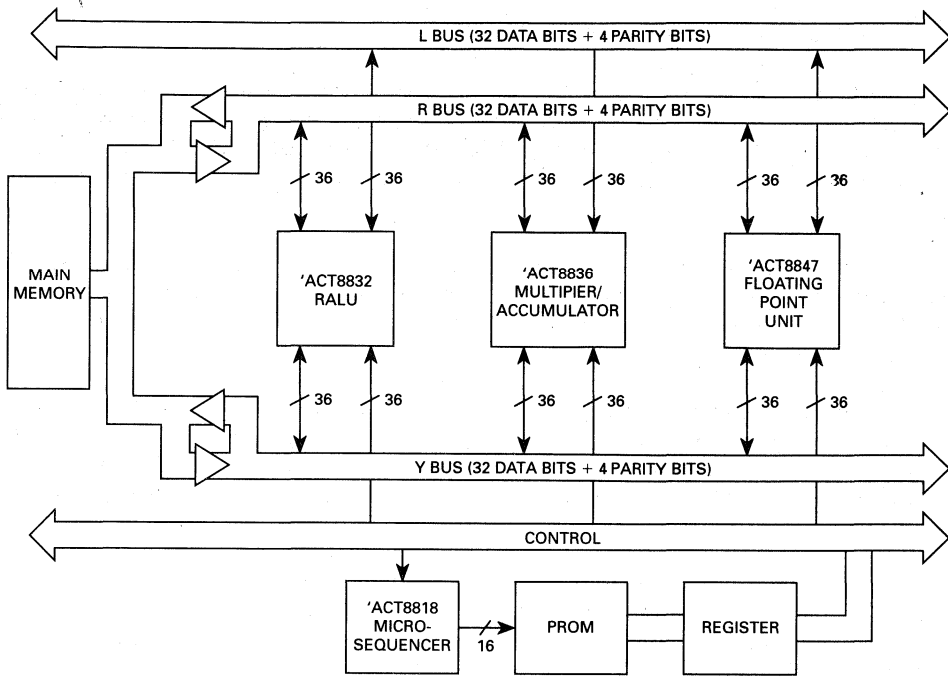
TI's new 32-bit family has been designed to meet the following design criteria:

- 50-75 ns worst case cycle time
- 4 watts maximum power dissipation per package
- scientific accuracy (double precision floating point)
- no elaborate heat sinking required
- no glue logic required
- support 32-bit bus widths (address and data)

TYPICAL APPLICATIONS

These design criteria result in a chip set that is well-suited to the following applications:

- Superminicomputers
- High resolution graphics
- Digital signal processing
- Array processors
- High end engineering workstations
- Artificial intelligence
- Fault tolerant computers



VLSI 32-Bit Family



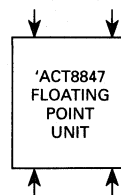
The 74ACT8832 is a 32-bit registered ALU that can be configured to operate as four 8-bit ALU's, two 16-bit ALU's, or a single 32-bit ALU. The device is 100% upwardly compatible with its predecessor the 74AS888 bit-slice processor and includes an on chip 64-word by 36-bit register file and 3 port I/O.

its predecessor the 74AS888 bit-slice processor and includes an on chip 64-word by 36-bit register file and 3 port I/O.



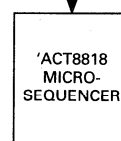
The 74ACT8836, a 32-bit by 32-bit integer multiplier/accumulator, can perform two's complement, unsigned and mux data arithmetic on integer and fractioned numbers, and support Newton-Raphson division. It can be configured for pipelined or flow-through operation.

Newton-Raphson division. It can be configured for pipelined or flow-through operation.



The 74ACT8847 combines floating point and integer capabilities on one chip. It can be configured for pipelined or flow-through operations and can perform up to 33 MFLOPS for both single and double precision operations.

both single and double precision operations.



The 74ACT8818 16-bit microsequencer can address 64K of microcode memory. A 65-word by 16-bit push down stack permits address and status information to be stored during subroutine calls and interrupts.

subroutine calls and interrupts.

SN74ACT8818 16-Bit Microsequencer

The 'ACT8818 microsequencer is designed to control execution of microcode in a microprogrammed system. Basic architecture of such a system usually incorporates at least the microsequencer, one or more processing elements such as the 'ACT8847 FPU or the SN74ACT8832 Registered ALU, microprogram memory, microinstruction register, and status logic to monitor system states and provide status inputs to the microsequencer.

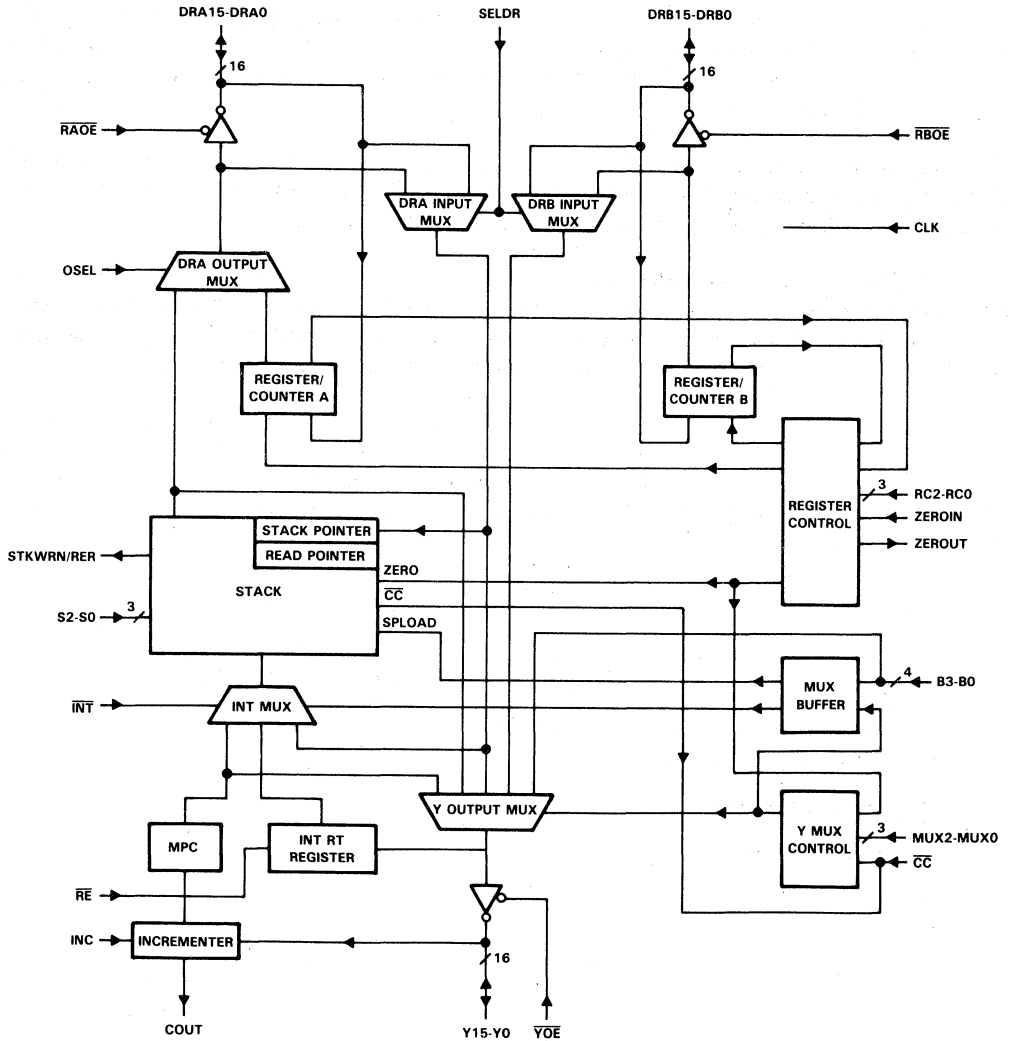
The 'ACT8818 combines flexibility and high speed in a microsequencer that performs multiway branching, conditional subroutine calls, nested loops, and a variety of other microprogrammable operations. The 'ACT8818 can also be cascaded for providing additional register/counters or addressing capability for more complex microcoded control functions.

In this microsequencer, several sources are available for microprogram address selection. The primary source is the 16-bit microprogram counter (MPC), although branch addresses may be input on the two 16-bit address buses, DRA and DRB. An address input on the DRA bus can be pushed on the stack for later selection. Register/counters RCA and RCB can store either branch addresses or loop counts as needed, either for branch operations or for looping on the stack.

The selection of address source can be based on external status from the device being controlled, so that three-way or multiway branching is supported. Once selected, the address which is output on the Y bus passes to the microprogram memory, and the microinstruction from the selected location is clocked into the pipeline register at the beginning of the next cycle.

It is also possible to interrupt the 'ACT8818 by placing the Y output bus in a high-impedance state and forcing an interrupt vector on the Y bus. External logic is required to place the bus in high impedance and load the interrupt vector. The first microinstruction of the interrupt handler subroutine can push the address from the interrupt return register on the stack so that the proper linkage is preserved for the return from subroutine.

- Addresses up to 64K locations of microcode memory
- CLK-to-Y = 30ns (tpd) max
- Selects addresses from eight different sources
- Performs multiway branching, conditional subroutine calls, and nested loops
- 65-word by 16-bit stack
- Cascadable
- Three-port I/O architecture
- Low-power EPIC CMOS



SN74ACT8818 16-Bit Microsequencer

'ACT8832 Registered ALU

The SN74ACT8832 is a 32-bit registered ALU that can be configured to operate as four 8-bit ALU's, two 16-bit ALU's, or a single 32-bit ALU. The processor instruction set is 100 percent upwardly compatible with the 'AS888 and includes 13 arithmetic and logical functions with 8 conditional shifts, multiplication, division, normalization, add and subtract immediate, bit and byte operations, and data conversions such as BCD, excess-3, and sign magnitude. New instructions permit internal flip-flops controlling BCD and divide operations to be loaded or read.

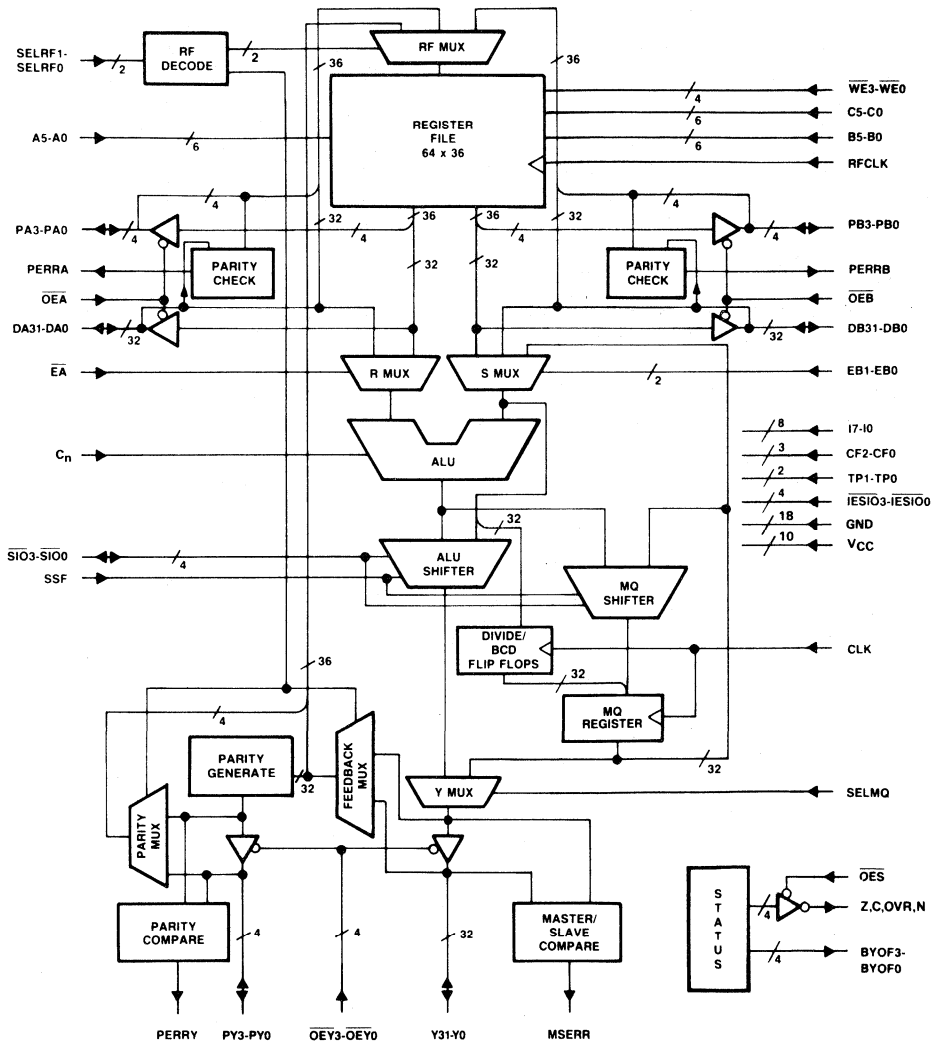
Additional functions added to the 'ACT8832 include byte parity and master/slave operation. Parity is checked at the three data input ports and generated at the Y output port. The 64-word register file is 36 bits wide to permit storage of the parity bits. Master/slave comparator circuitry is provided at the Y port.

The DA and DB ports can simultaneously input data to the ALU and the 64-word by 32-bit register file. Data and parity from the register file can be output on the DA and DB ports. Results of the ALU and shift operations are output at the bidirectional Y port. The Y port can also be used in an input mode to furnish external data to the register file or during master/slave operation as an input to the master/slave comparator.

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Three 6-bit address ports allow a two-operand fetch and an operand write to be performed at the register file simultaneously. An MQ shifter and MQ register can also be configured to function independently to implement double-precision 8-bit, 16-bit, and 32-bit shift operations. An internal ALU bypass path increases the speeds of multiply, divide and normalize instructions. The path is also used by 'ACT8832 instructions that permit bits and bytes to be manipulated.

- 37-ns (tpd) max
- 64-word by 36-bit register file
- Simultaneous ALU and register operations
- Configurable as quad 8-bit or dual 16-bit single-instruction, multiple-data machine
- Two shifters to support double-precision arithmetic
- Three-port I/O architecture
- Low-power EPIC CMOS



SN74ACT8832 32-Bit RALU

SN74ACT8836 32-Bit by 32-Bit Multiplier

The 'ACT8836 is a 32-bit by 32-bit parallel multiplier/accumulator suitable for low-power, high-speed operations in applications such as digital signal processing, array processing, and numeric data processing. High speed is achieved through the use of a Booth and Wallace Tree architecture.

Data is input to the chip through two registered 32-bit DA and DB input ports and output through a registered 32-bit Y output port. These registers have independent clock enable signals and can be made transparent for flowthrough operations.

The device can perform two's complement, unsigned, and mixed-data arithmetic. It can also operate as a 64-bit by 64-bit multiplier. Five clock cycles are required to perform a 64-bit by 64-bit multiplication and multiplex the 128-bit result. Division is supported using Newton-Raphson approximation.

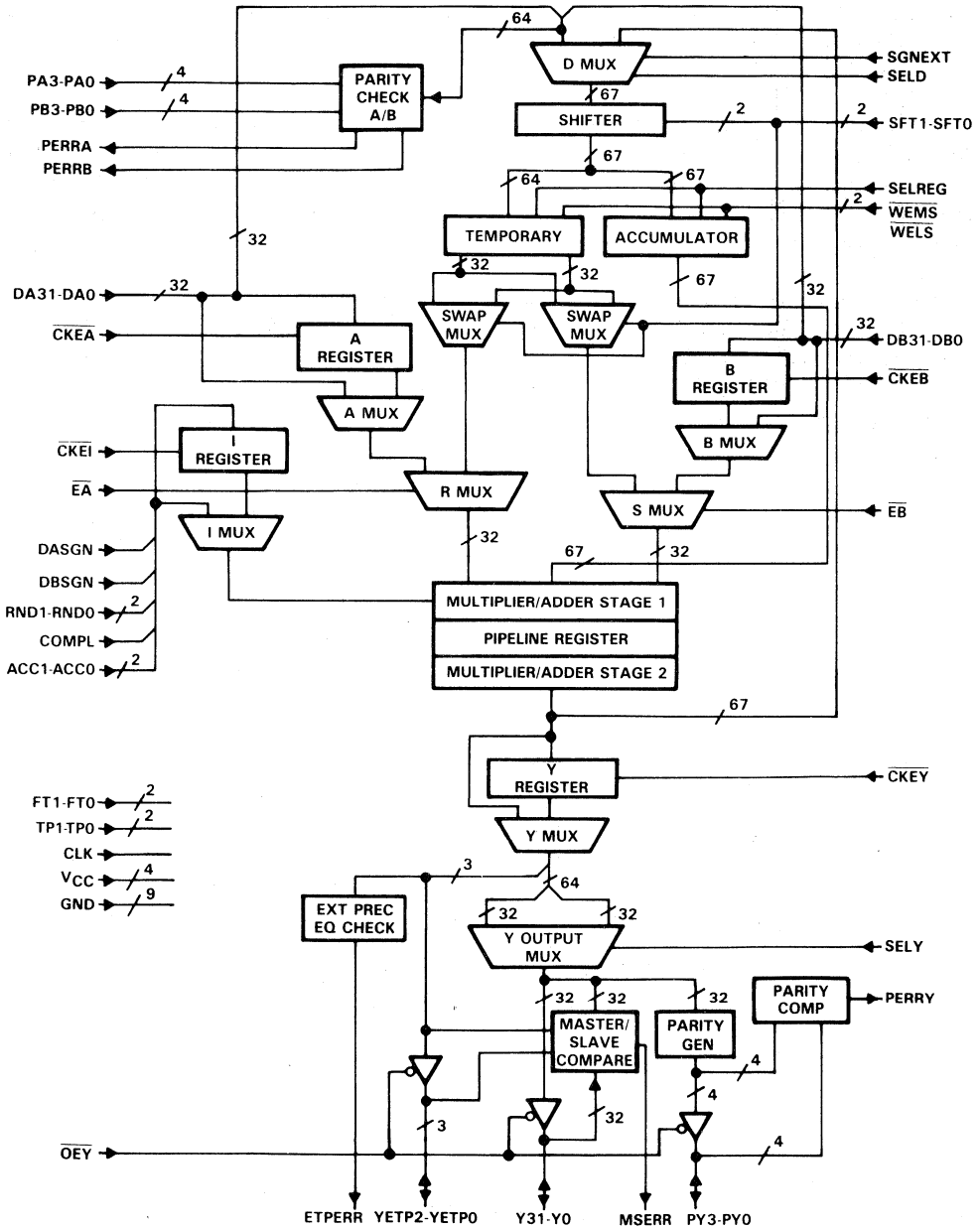
A multiply/accumulate mode is provided to add or subtract the accumulator from the product or the complement of the product. The accumulator is 67 bits wide to accommodate possible overflow. A warning flag (ETERR) indicates whether overflow has occurred.

A rounding feature in the 'ACT8836 allows the result to be truncated or rounded to the nearest 32-bits. To ensure data integrity, byte parity checking is provided at the input ports, and a parity generator and master/slave error detection comparator are provided at the output port.

- Performs full 32- × 32-bit integer MAC in 48 ns flowthrough, 30 ns pipelined
- Can perform 64- × 64-bit operations
- Signed, unsigned, or mixed operands; integer or fractional operands
- Overflow status; three extended precision bits
- Supports division using Newton-Raphson algorithm
- Low-power EPIC CMOS

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FUNCTIONAL BLOCK DIAGRAM (POSITIVE LOGIC)



SN74ACT8836 32-Bit by 32-Bit Multiplier

SN74AS8838 32-Bit Barrel Shifter

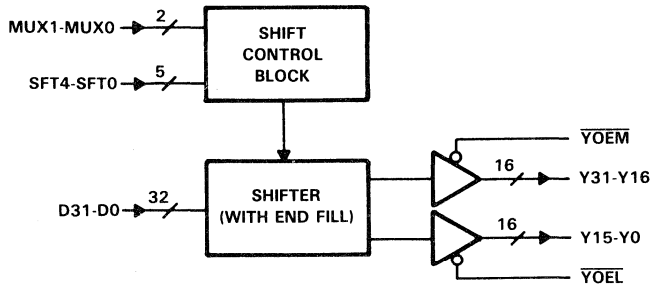
The SN74AS8838 is a high-speed 32-bit barrel shifter in an 85-pin ceramic pin grid array. The devices can shift up to 32 bits in a single instruction cycle of under 25 ns. Five basic shifts can be programmed: circular left and right; logical left and right; and arithmetic right.

Unlike conventional shift registers, whose shift operations are controlled by the number of input clock pulses applied, the number of positions to be shifted by the 74AS8838 is determined by an input decoder. This form of implementation does not require an input clock; thus the shift operation is restricted only by internal propagation delays. The delay is the same regardless of the number of positions to be shifted, resulting in a high-speed “flash” shift.

Input to the chip is through the 32-bit D data port; output is through two 16-bit Y data ports. Two 3-state output controls enable the Y data ports. A shift control block decodes the instruction inputs and the shift position controls and transmits the resulting control signals to the shifter. MUX1-MUX0 control shift instruction selection, while SFT4-SFT0 specify the number of bit positions to be shifted.

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- High-speed “flash” shift operations
- Shifts up to 32 positions in less than 25 ns typical
- Performs logical, circular and arithmetic shifts
- 3-state outputs allow 32-bit and 16-bit bus interface
- 85-pin package
- Uses less than 1.5 W (max)



32-Bit Barrel Shifter

SN74ACT8841 Digital Crossbar Switch

DESCRIPTION

The SN74ACT8841 is a flexible, high-speed digital crossbar switch. It is easily microprogrammable to support user-definable interconnection patterns. This crossbar switch is especially suited to multiprocessor interconnects that are dynamically reconfigurable or even reprogrammable after each system clock. The 'ACT8841 is built in Texas Instruments advanced 1- μ m EPIC CMOS process to enhance performance and reduce power consumption. The switch requires only a 5-V power supply.

Because the 'ACT8841 is a 16-port device, system architectures based on the 'ACT8841 can include up to 16 switching nodes, which may be processors, data memories, or bus interfaces. Larger processor arrays can be built with multistage interconnection schemes. Most applications will use the crossbar switch as a broadband bus interface controller, for example, between closely coupled processors which must exchange data with very low propagation delays.

The 'ACT8841 has ten selectable control sources, including eight banks of programmable control flip-flops and two hard-wired control circuits. The device can switch from 1 to 16 nibbles (4 to 64 bits) of data in a single cycle.

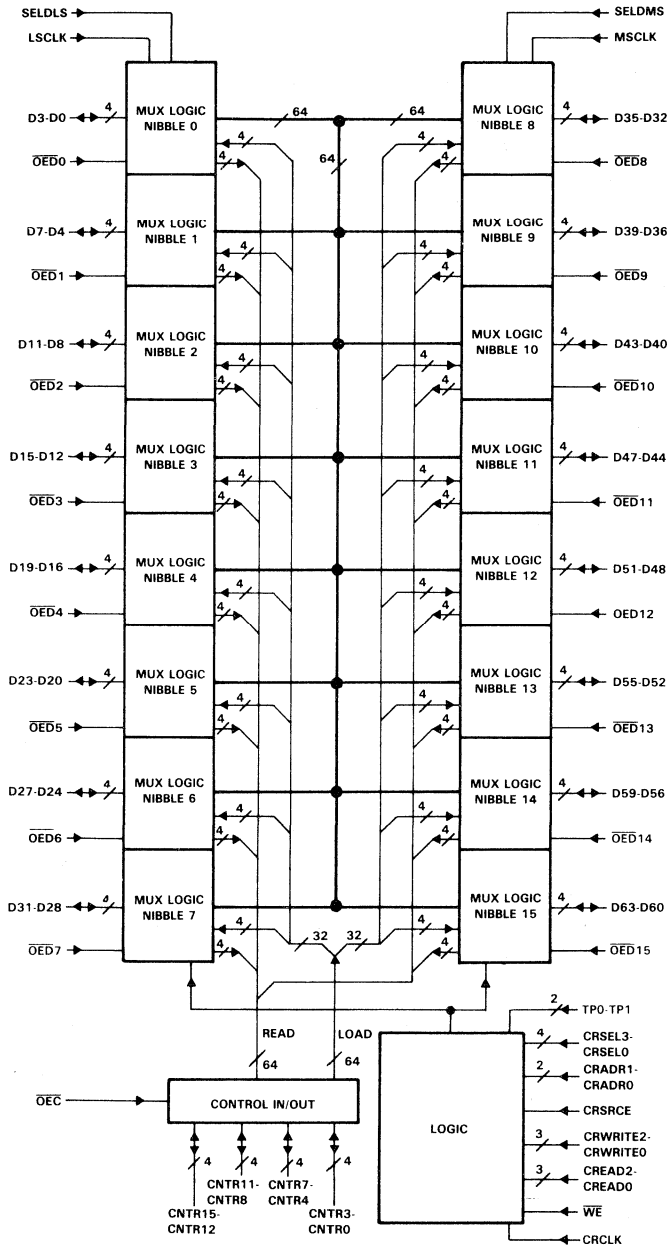
The 64 I/O pins of the 'ACT8841 are arranged in 16 switchable nibbles (see Figure 1). A single input nibble can be broadcast to any combination of 15 output nibbles, or even to 16 nibbles (including itself) if operating off registered data. Multiple input nibbles can be switched to multiple outputs, depending on the programmed configurations available in the control flip-flops.

The digital crossbar switch is intended primarily for multiprocessor interconnection and parallel processing applications. The device can be used to select and transfer data from multiple sources to multiple destinations. Since it can be dynamically reprogrammed, it is suitable for use in reconfigurable networks for fault-tolerant routing.

The 'ACT8841 and its predecessor the bipolar SN74AS8840 share the same architecture. Microcode written for the 'AS8840 can be run on the 'ACT8841 if the additional control inputs to the 'ACT8841 are properly terminated. However, because the 'ACT8841 is a CMOS device with six additional control inputs, the 'AS8840 and the 'ACT8841 are not socket-compatible and cannot be used interchangeably. A summary of the differences between the SN74AS8840 and the SN74ACT8841 is provided in the 'AS8840 and 'ACT8841 FUNCTIONAL COMPARISON at the end of the data sheet.

- 50-MHz programmable switch for parallel processing
- 64 data I/Os configurable as 16 four-bit ports, 8 eight-bit ports, or four 16-bit ports
- I/O selection programmable by nibble
- Eight banks of control flip-flops for storing configurations
- Two selectable hard-wired or real-time inputs
- Selectable stored-data or real-time inputs

FUNCTION BLOCK DIAGRAM



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Microprocessors and Microcontrollers

SN74ACT8841 Digital Crossbar Switch

SN74ACT8847 Floating Point Unit

The SN74ACT8847 is a high-speed floating point unit implemented in TI's advanced 1- μ m CMOS technology. The device is fully compatible with IEEE Standard 754-1985 for addition, subtraction, multiplication, division, square root, and comparison.

The 'ACT8847 FPU also performs integer arithmetic, logic operations, and logical shifts. Absolute value conversions, floating point to integer conversions, and integer to floating point conversions are available. The ALU and multiplier are both included in the same device and can be operated in parallel to perform sums of products and products of sums (see figure).

IEEE formatted denormal numbers are directly handled by the ALU. Denormal numbers must be wrapped by the ALU before being used in multiplication, division, or square root operations. A fast mode in which all denormals are forced to zero is provided for applications not requiring gradual underflow.

The 'ACT8847 input buses can be configured to operate as two 32-bit data buses or as a single 64-bit bus, providing a number of system interface options. Registers are provided at the inputs, outputs, and inside the ALU and multiplier to support multilevel pipelining. These registers can be bypassed for nonpipelined operation.

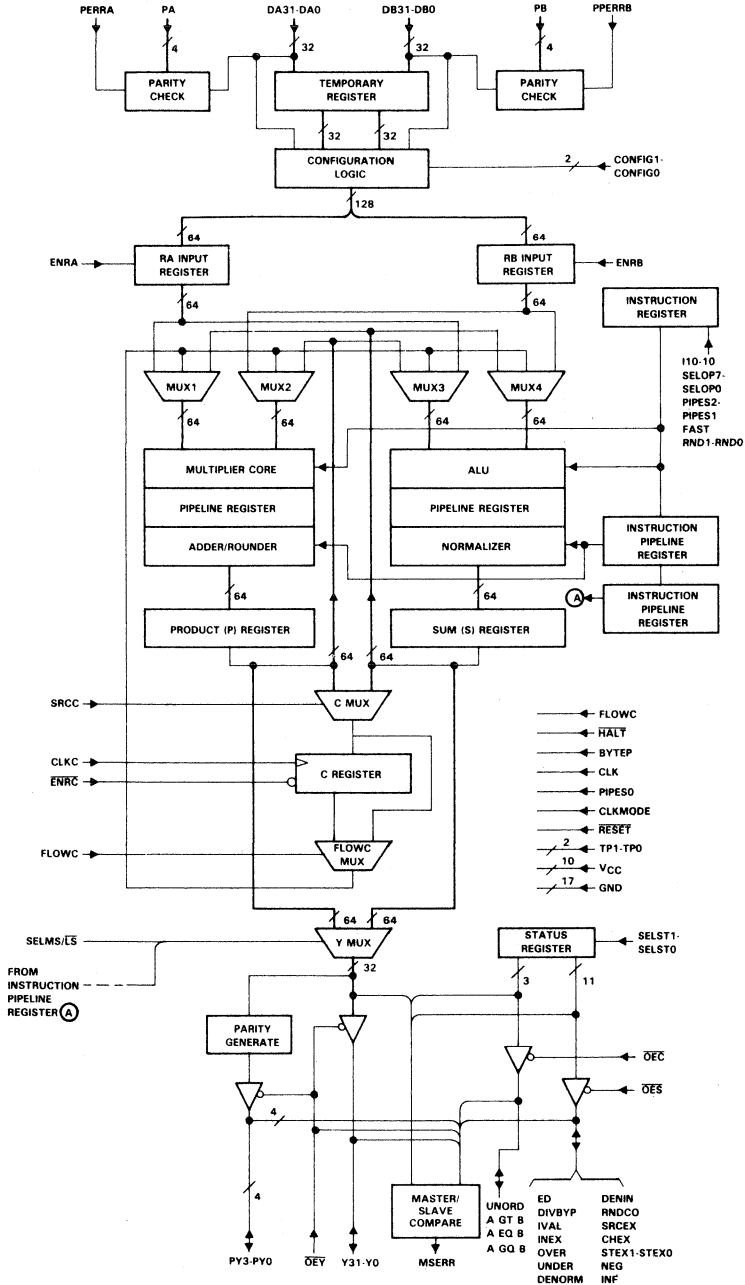
A clock mode control allows the temporary input register to be clocked on the rising edge or the falling edge of the clock to support double-precision ALU operations at the same rate as single-precision operations. A feedback register (C register) with a separate clock is provided for temporary internal storage of a multiplier result, ALU result or constant.

To ensure data integrity, parity checking is performed on input data, and parity is generated for output data. A master/slave comparator supports fault-tolerant system design. Two test pin control inputs allow all I/Os and outputs to be forced high, low, or placed in a high-impedance state to facilitate system testing.

- Multiplier and ALU on one chip
- Pipelined or flowthrough operation
- 30-ns, 40-ns, and 50-ns pipelined performance
- IEEE-standard for single- and double-precision operations
- Floating point and integer add, subtract, multiply, divide, square root, and compare
- 64-bit divide in 11 cycles, 64-bit square root in 14 cycles; both implemented via hardwired control

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Microprocessors and Microcontrollers



SN74ACT8847 64-Bit Floating Point Unit

SN74ACT8867 32-Bit Vector Processor Unit

- Fast Numeric Processor Optimized for Graphics
- Simultaneous Independent Operation of Multiplier and ALU
- Onboard Six-Port Register File, 46 Words \times 40 Bits
- Operates in Pipelined or Flowthrough Mode
- 62-ns Cycle Time in Fully Pipelined Mode
- Onboard Floating Point Seed ROM for Newton-Raphson Division and Square Root
- Three 32-Bit Data Ports support High Data Bandwidth
- Selectable Format Conversion from Fixed Point to Floating Point at Input Ports and Floating Point to Fixed Point at Output Port
- Low-Power EPIC CMOS Technology

On a single chip the SN74ACT8867 Vector Processor Unit (VPU) combines a multiplier, ALU and six-port register file for floating point and integer arithmetic. The VPU performs single-precision floating point operations and fixed point operations in single or double precision.

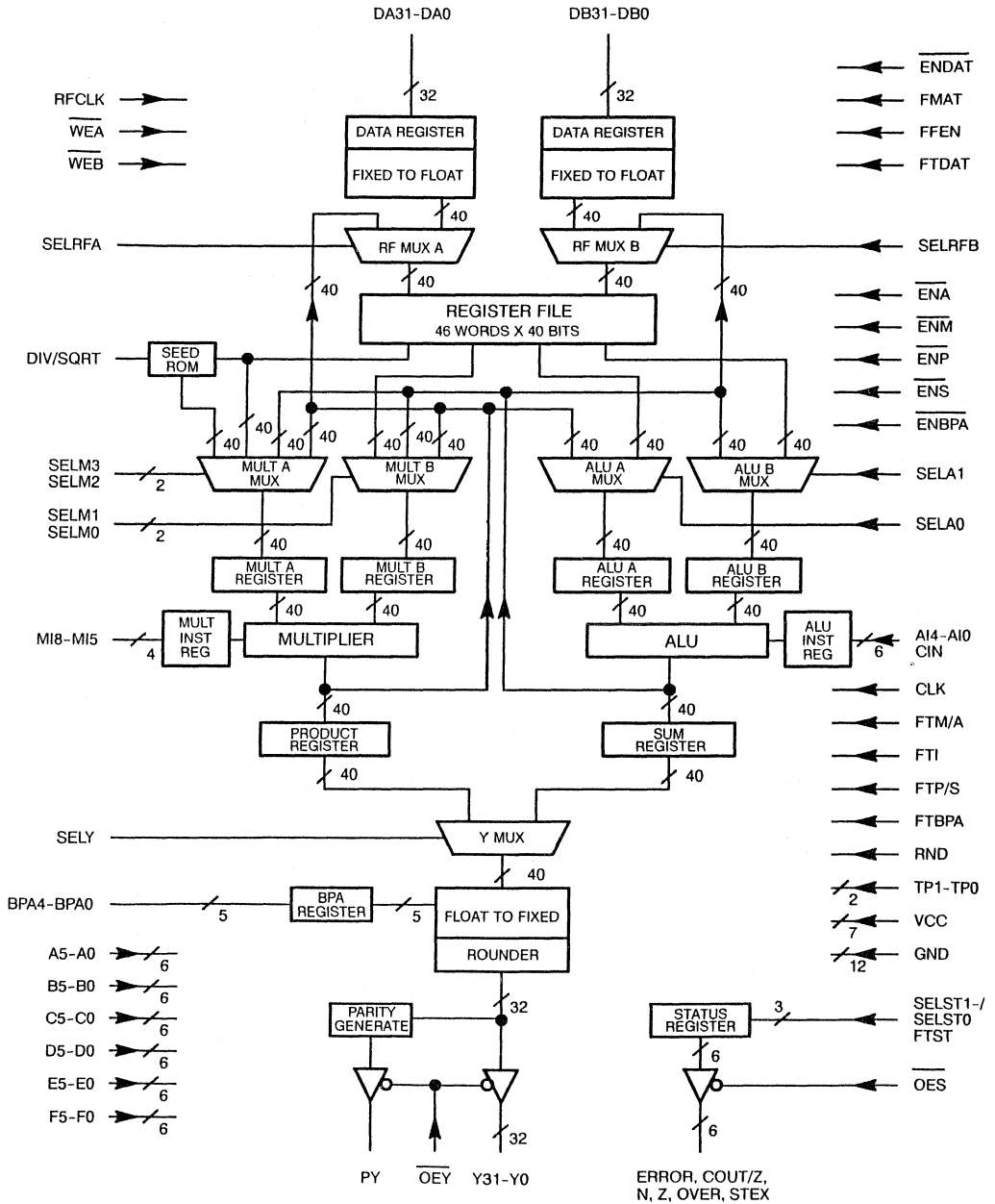
Applications such as graphics workstations and high-end digital signal processors can make use of the speed and flexibility offered by the independent multiplier and ALU, which are separately programmable and operate concurrently. The register file can be double-pumped to input four operands within one clock period, matching the input bandwidth of the register file to the data bandwidth through the multiplier and ALU in concurrent operation.

The 'ACT8867 accepts operands from its two 32-bit input buses as 2's complement integers, 2's complement fractions, or floating point numbers in Digital Equipment Corporation (DEC) 'F' format. Internally, the VPU supports 40-bit floating point arithmetic and 32-bit or 64-bit fixed point arithmetic.

Format conversion logic is available to translate fixed point inputs to floating point format without tying up the ALU. Similarly, floating point results can be translated to fixed point outputs by using the logic elements provided for float-to-fixed conversion and binary point adjustment.

When all the main functional blocks are active simultaneously, the VPU can perform a multiply, an ALU operation, and three format conversions (two fixed point to floating point and one floating point to fixed point) within a single clock cycle.

4 Microprocessors and Microcontrollers



ACT8867 Functional Block Diagram

8800 Software Development Board (SDB)

Texas Instruments' 8800 Software Development Board (8800 SDB) is offered as an evaluation and training tool. The 8800 SDB allows users to evaluate performance and write microprograms for several 8800 devices using a range of software development tools. In addition, user microprograms are executed and verified on the actual VLSI devices contained on the SDB.

The SDB is designed to complement other design support tools, such as functional evaluation models and behavioral simulation models. Using the SDB microcode can be developed earlier in the system's design cycle, so that code development parallels, rather than follows, prototype design. The 8800 SDB makes device evaluation and initial microcode development fast and easy since prebuilt microcode definition files are provided.

Implemented on a PC/AT card occupying a single slot, the 8800 SDB includes an 'ACT8818 microsequencer, 'ACT8832 registered ALU, and an 'ACT8847 floating point unit, along with 32K by 128 bits of microcode memory, and 32K by 32 bits of local data memory. Interface software is provided so that microcode and local data memory may be loaded and read from the PC/AT bus.

The 8800 SDB Design Kit includes:

- 8800 SDB board assembly
- User's Guide (includes printed PLD equations and schematics)
- Microcode definition files for HILEVEL, STEP Engineering, and Texas Instruments microcode development tools
- MS-DOS (version 3.2) software tools written in Microsoft C (version 5.1). Software source code is included
- PLD equation files written in ABEL (version 3.0)
- Schematic files in a Schema (version 2.0) format are available upon request. The Schema package is offered from Omation at (214) 231-5167.
- Photo-plotted artwork is available upon request

For ordering and pricing information, please call your local TI sales representative. The part number for the 8800 SDB Design Kit is 'SN74SDB8800'. The intent of the 8800 SDB Design Kit is to let users begin developing microprograms within hours of receiving the kit instead of weeks or months.

The MetaStep or TI Meta Assembler may be purchased through Texas Instruments directly. For additional technical information, please contact the VLSI Systems Engineering Group at (214) 997-3970.

Users may write microcode source with the HILEVEL C Compiler, HILEVEL HALE Macro Meta Assembler, the MetaStep Assembler from STEP Engineering, TI Meta Assembler (TIM), or TI's Reconfigurable Compiler System (RCS) for C and Fortran 77. Both HILEVEL's and TI's are retargetable, meaning that the same C source code can be reused for different system microprogrammed architectures. As prebuilt 8800 SDB definition files are available for each of these compilers, users can begin developing microcode quickly. Information on TI microcode development tools may be obtained through your local TI Field Sales Representative. Company addresses for HILEVEL Technology and STEP Engineering are listed below:

HILEVEL Technology, Inc.
31 Technology Drive
Irvine, CA 92718
(800) 445-3825

STEP Engineering
661 East Arques Avenue
P.O. Box 61166
Sunnyvale, CA 94088
(800) 538-1750

MEMORY MANAGEMENT PRODUCTS

DYNAMIC RAM CONTROLLERS

SN74ALS6301 and SN74ALS6302 Dynamic RAM Controller

FEATURES

- Provides Control for 16K, 64K, 256K, and 1M Dynamic RAMs
- Highest-Order Two-Address Bits Select One of Four Banks of RAMs
- Supports Scrubbing Operations and Nibble-Mode Access
- Separate Output Enable for Multi-Channel Access to Memory
- 52-Pin Dual-In-Line Package

DESCRIPTION

4**Microprocessors and Microcontrollers**

The 'ALS6301 and 'ALS6302 dynamic memory controllers (DMCs) are designed for use in today's high-performance memory systems. The DMC acts as the address controller between any processor and dynamic memory array.

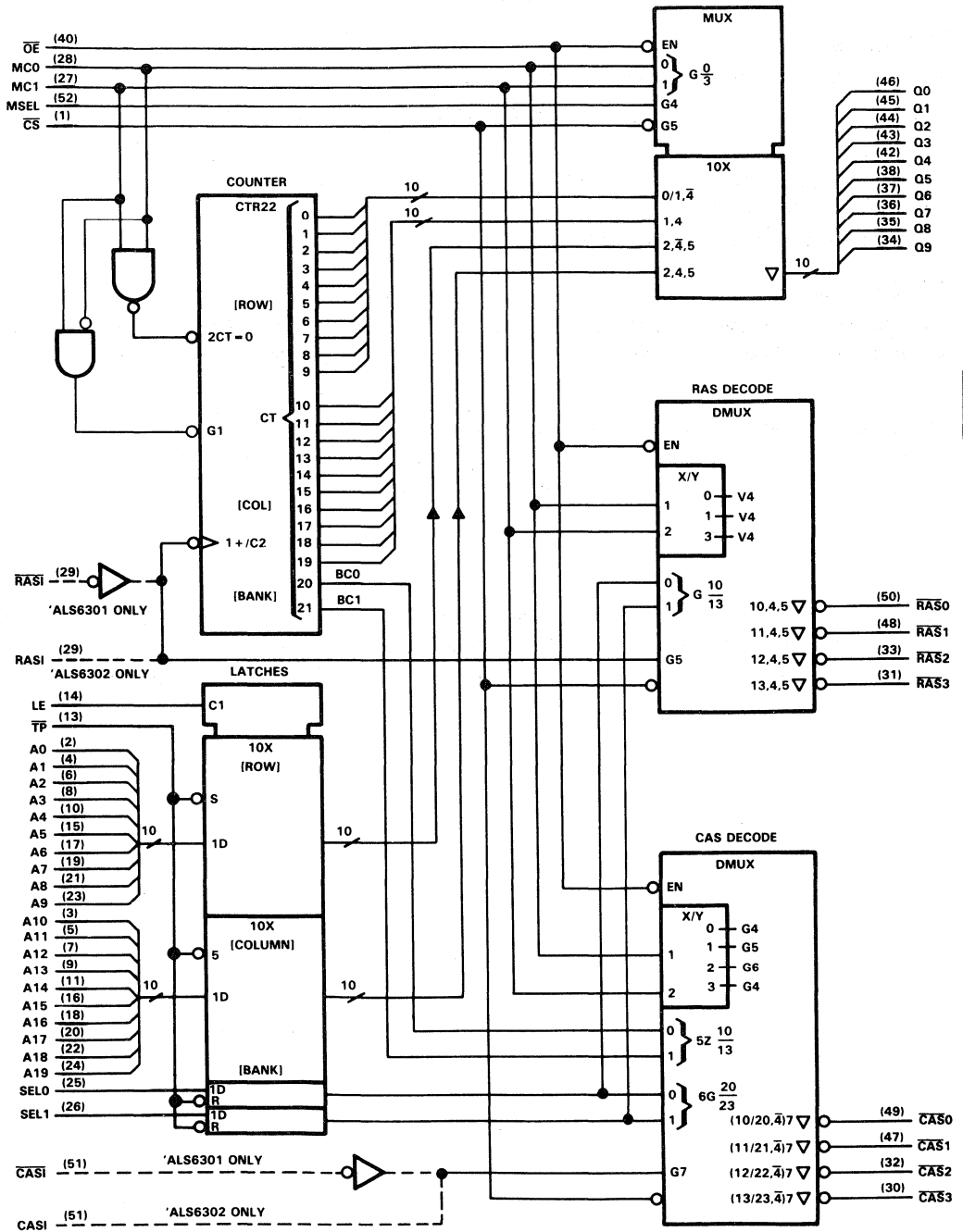
Two versions are provided that help simplify interfacing to the system dynamic timing controller. The 'ALS6301 offers active-low Row Address Strobe Input ($\overline{\text{RAS}}\text{I}$) and Column Address Strobe Input ($\overline{\text{CAS}}\text{I}$), while the 'ALS6302 offers active-high Row Address Strobe Input (RASI) and Column Address Strobe Input (CASI) inputs.

Using two 10-bit address latches, the DMC will hold the row and column addresses for any DRAM up to 1M. These latches and the two row/column refresh address counters feed into a 10-bit, 4-input MUX for output to the dynamic RAM address lines. A 2-bit bank select latch is provided to select one of the four $\overline{\text{RAS}}$ and $\overline{\text{CAS}}$ outputs. The two bits are normally obtained from the two highest-order address bits.

'ALS6301 and 'ALS6302 have two basic modes of operation, read/write and refresh. During normal read/write operations, the row and column addresses are multiplexed to the dynamic RAM, with the corresponding $\overline{\text{RAS}}$ and $\overline{\text{CAS}}$ signals activated to strobe the addresses into the RAM. In the refresh mode, the two counters cycle through the refresh addresses. If memory scrubbing is not being implemented, only the row counter is used. When memory scrubbing is being performed, both the row and column counters are used to perform read-modify-write cycles. In this mode all $\overline{\text{RAS}}$ outputs will be active (low) while only one $\overline{\text{CAS}}$ output is active at a time.

The SN74ALS6301 and SN74ALS6302 are characterized for operation from 0°C to 70°C.

LOGIC DIAGRAM (POSITIVE LOGIC)



SN74ALS6301 and SN74ALS6302

TMS4500A 64K Dynamic RAM Controller

FEATURES

- Provides Control for 8K, 16K, 32K, and 64K Dynamic RAMs
- One Package Contains Address Multiplexer, Refresh Control, and Timing Control
- Operates from Microprocessor Clock
 - No Crystals, Delay Lines or RC Networks
 - Eliminates Arbitration Delays
- Refresh May Be Internally or Externally Initiated

DESCRIPTION

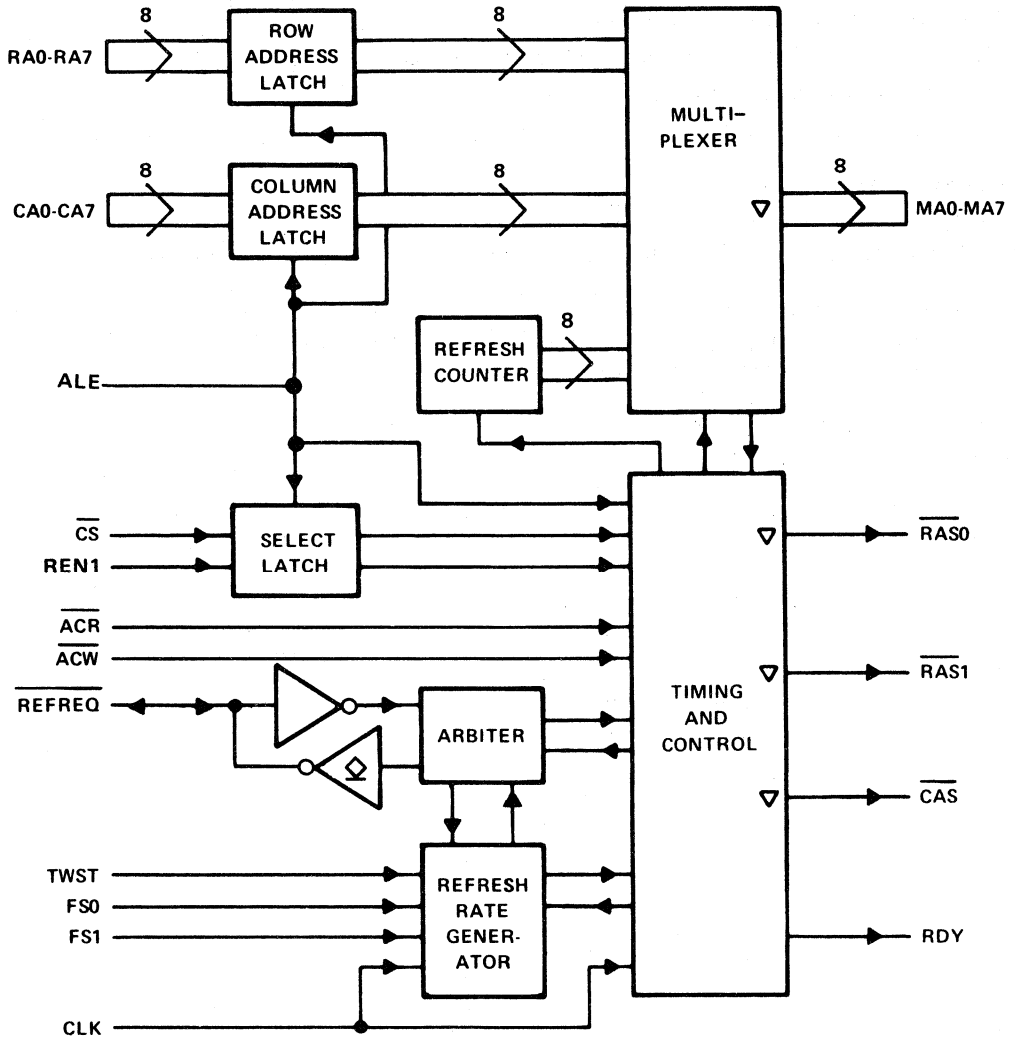
The TMS4500A is a monolithic DRAM system controller designed to provide address multiplexing, timing, control and refresh/access arbitration functions to simplify the interface of dynamic RAMs to microprocessor systems.

4

The controller contains a 16-bit multiplexer that generates the address lines for the memory device from the 16 system address bits and provides the strobe signals required by the memory to decode the address. An 8-bit refresh counter generates the 256-row addresses required for refresh.

A refresh timer is provided that generates the necessary timing to refresh the dynamic memories and assure data retention.

The TMS4500A also contains refresh/access arbitration circuitry to resolve conflicts between memory access requests and memory refresh cycles. The TMS4500A is offered in a 40-pin, 600-mil dual-in-line plastic package and 44-pin, 650-mil square plastic chip carrier package. It is characterized for operation from 0°C to 70°C.



THCT4502B 256K Dynamic RAM Controller

FEATURES

- Provides Control for 64K and 256K Dynamic RAMs
- Contains Address Multiplexer, Refresh Control, and Timing Control
- Operates from Microprocessor Clock
- 3-State Outputs Allows Multiport Memory Configuration

DESCRIPTION

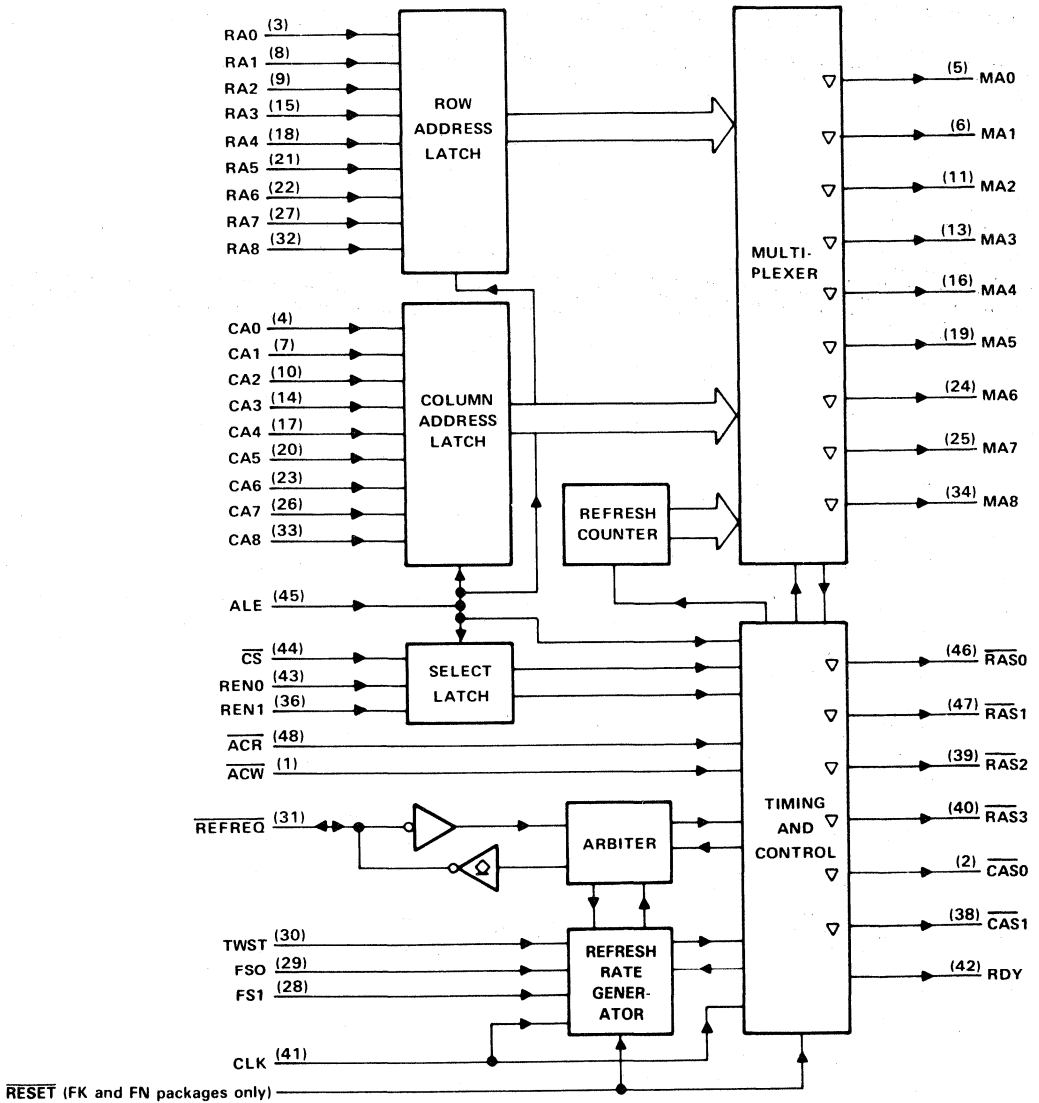
The THCT4502B is a monolithic DRAM system controller providing address multiplexing, timing, control and refresh/access arbitration functions to simplify the interface of dynamic RAMs to microprocessor systems.

The controller contains an 18-bit multiplexer that generates the address lines for the memory device from the 18 system address bits and provides the strobe signals required by the memory to decode the address. A 9-bit refresh counter generates up to 512 row addresses required to refresh.

A refresh timer is provided to generate the necessary timing to refresh the dynamic memories and ensure data retention.

The THCT4502B also contains refresh/access arbitration circuitry to resolve conflicts between access requests and memory-refresh cycles.

The THCT4502B is characterized for operation from 0°C to 70°C.



4 Microprocessors and Microcontrollers

THCT4502B

SN74ACT4503 1M Dynamic RAM Controller

FEATURES

- Provides Control for 64K, 256K, and 1M Dynamic RAMs
- Contains Address Multiplexer, Refresh Control, and Timing Control
- Directly Addresses and Drives Up to 4 Banks of Memory
- Refresh May Be Internally or Externally Initiated

DESCRIPTION

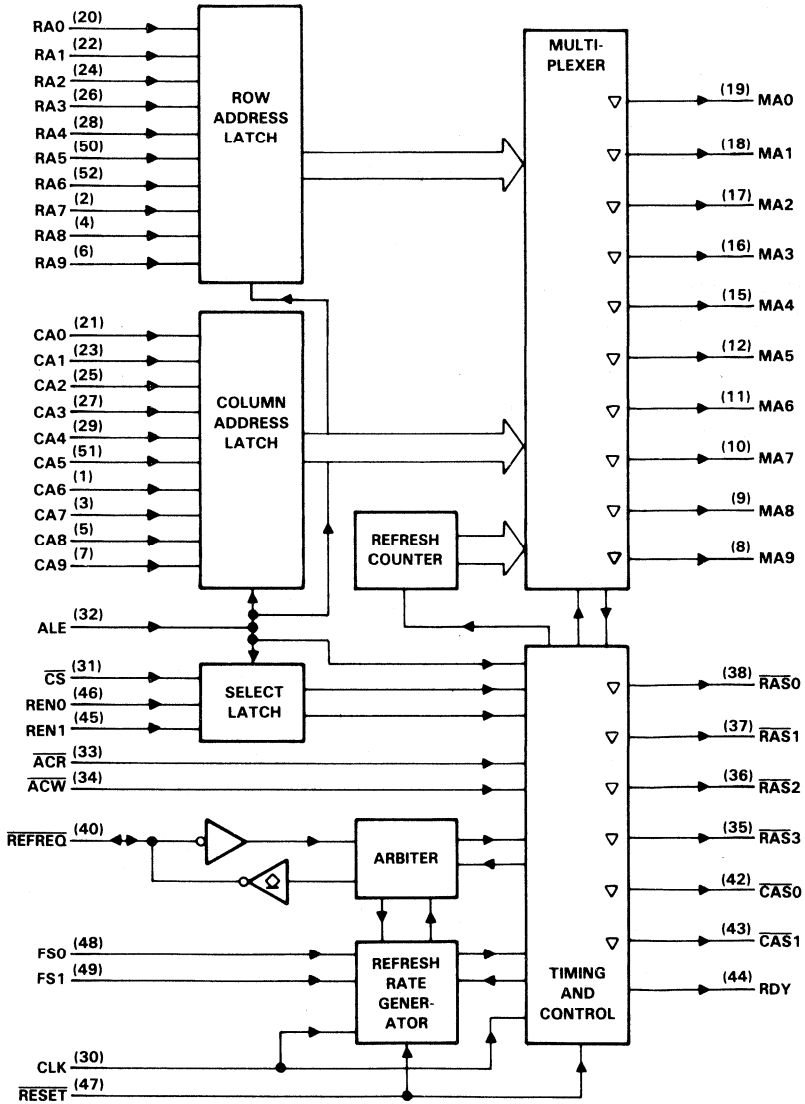
The 'ACT4503 is a monolithic DRAM system controller providing address multiplexing, timing, control, and refresh/access arbitration functions to simplify the interface of dynamic RAMs to microprocessor systems.

The controller contains a 20-bit multiplexer that generates the address lines for the memory device from the 20 system address bits and provides the strobe signals required by the memory to decode the address. A 10-bit refresh counter generates up to 1,024 row addresses required to refresh.

A refresh timer is provided to generate the necessary timing to refresh the dynamic memories and ensure data retention.

The 'ACT4503 also contains refresh/access arbitration circuitry to resolve conflicts between access requests and memory-refresh cycles. In order to guarantee correct refresh/access arbitration, the falling edge of ALE must not occur within a specified time period of either the rising or falling edge of CLK. The selection of the arbitration CLK edge is determined during reset. Knowing the processor's ALE to CLK timing relationship allows the designer to select the proper CLK edge to guarantee refresh/access arbitration on the 'ACT4503.

The SN74ACT4503 is characterized for operation from 0°C to 70°C.



SN74ACT4503

SN74ALS6310 AND SN74ALS6311 STATIC COLUMN AND PAGE MODE DETECTORS

- Detects Present Row Equal to Last Row Address
- High-Performance Compare:
 - 'ALS6310 CLK to HSA = 18 ns
 - 'ALS6311 Address to HSA = 14 ns
- Compatible with 16K to 1M DRAMs
- Easily Interfaced with Microprocessor and Memory Timing Controller
- Dependable Texas Instruments Quality and Reliability

DESCRIPTION

The 'ALS6310 and 'ALS6311 are high performance address comparators designed for implementing static column and page-mode access cycles.

4**Microprocessors and Microcontrollers**

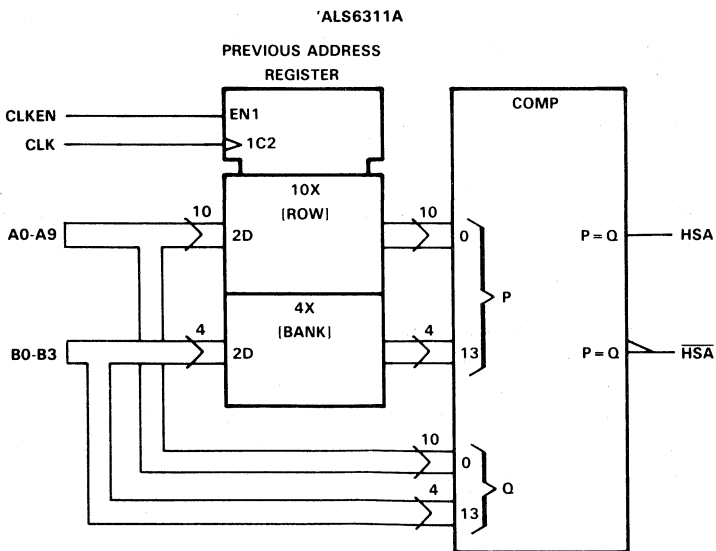
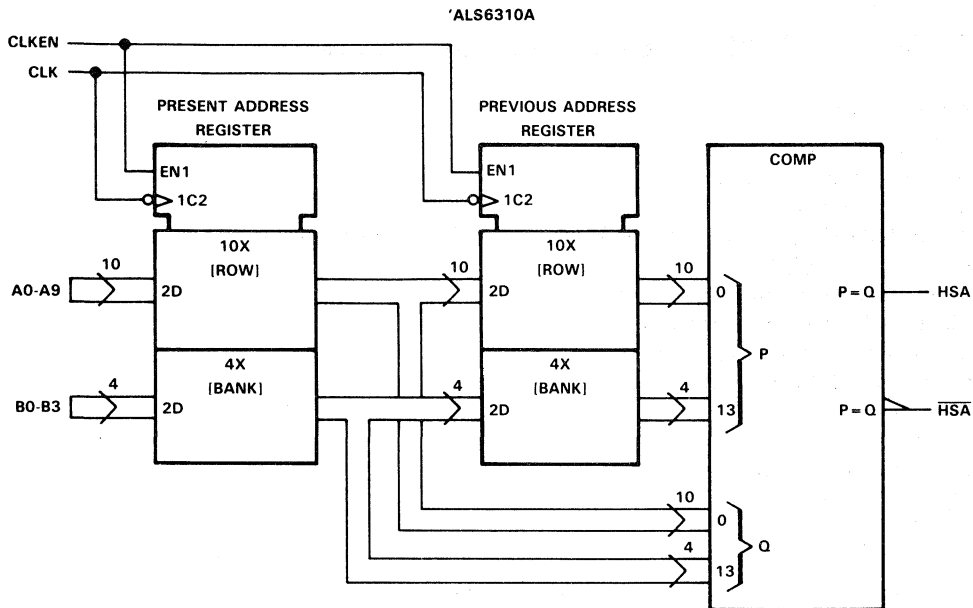
When interfaced with the memory timing controller, these devices will detect if the present row being accessed is the same as the last row accessed. This is the fundamental requirement for implementing static column decode or page-mode access cycles.

The 'ALS6310 features two 14-bit registers and a high-speed address comparator. The first register is used to save the present row address while the second register is used to save the previous row address. On the high-to-low transition of CLK, the first register loads the new row address present on A0-A9. At the same time, the second register loads the address previously saved in the first register. The two row addresses are then compared. The High-Speed Access outputs (HSA and HSA) will signal if the two addresses are equal.

The B0-B1 inputs are provided to monitor access cycles to different banks of memory. When used in conjunction with the 'ALS2968 and 'ALS6302 series DRAM controllers, the 'ALS6310 and 'ALS6311 can monitor up to 16 banks of memory. The CLK input on the 'ALS6310 can typically be interfaced with the microprocessor's Address Latch Enable (ALE) or Address Strobe (AS) outputs. This configuration simplifies the memory timing controller interface. Refer to the typical application diagram for further information.

The 'ALS6311 features on 14-bit register feeding a high-speed address comparator. This architecture offers a faster address match time, but does require the memory timing controller to generate the CLK input. Typically, the 14-bit register would only be updated if there was a change in row or bank address. Refer to the application diagram for further information.

The SN74ALS6310 and SN74ALS6311 are characterized for operation from 0°C to 70°C.



SN74ALS6310 and SN74ALS6311

CACHE ADDRESS COMPARATORS

SN74ACT2150A 512 × 8 Cache Address Comparator

KEY FEATURES

- Fast Address to Match Valid Data
- Two Speed Ranges: 20 ns, 30 ns
- 512 × 9 Internal RAM
- 300-Mil 24-Pin Ceramic Side-Braced or Plastic Dual-in-Line or Small Outline Packages
- 53 mA Typical Supply Current
- On-Chip Parity Generation and Checking
- Parity Error Output/Force Parity Error Input
- On-Chip Address/Data Comparator
- Asynchronous, Single-Cycle Reset
- Easily Expandable
- Fully Static
- Reliable Advanced CMOS Technology
- Fully TTL Compatible

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Microprocessors and Microcontrollers

DESCRIPTION

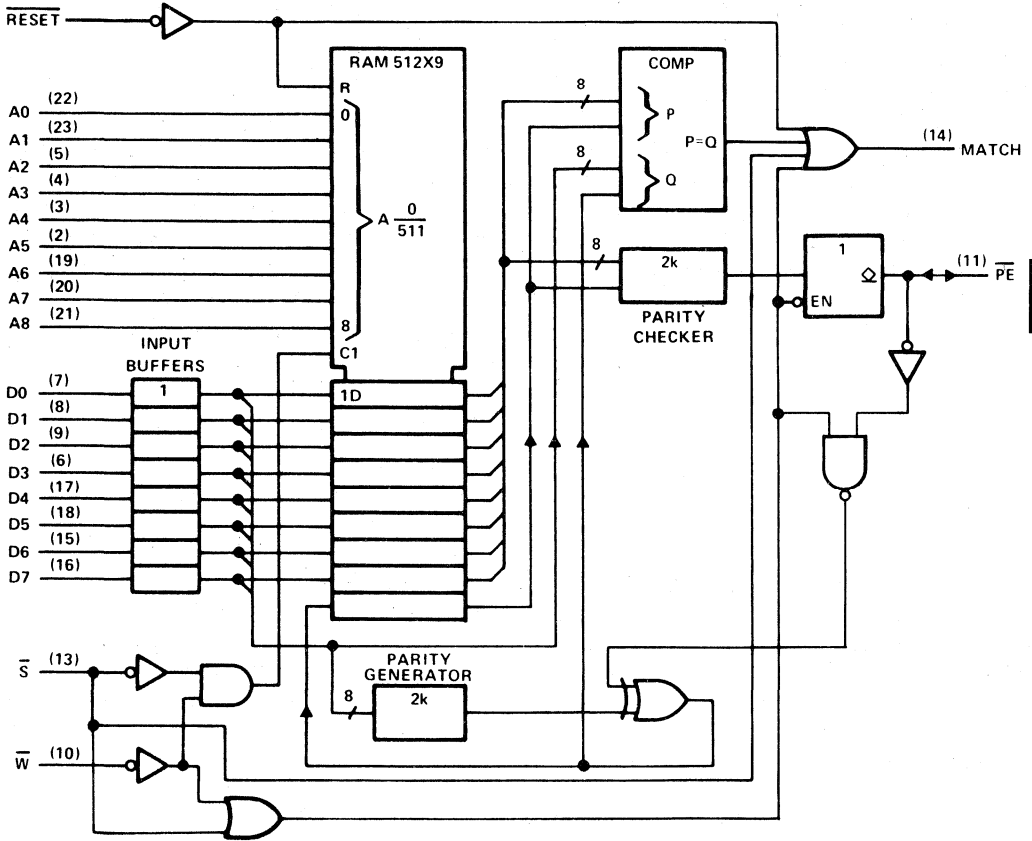
This 8-bit slice cache address comparator consists of a high-speed 512 × 9 static RAM array, parity generator, parity checker, and 9-bit high-speed comparator. It is fabricated using advanced CMOS technology for high-speed, low-power interface with bipolar TTL circuits. The cache address comparator is easily cascadable for wider tag addresses or deeper tag memories. Significant reductions in cache memory component count, board area, and power dissipation can be achieved with this device.

When \bar{S} is low and \bar{W} is high, the cache address comparator compares the contents of the memory location addressed by A0-A8 with the data on D0-D7 plus generated parity. An equality is indicated by the high level on the MATCH output. A low-level output from \overline{PE} signifies a parity error in the internal RAM data. \overline{PE} is an N-channel open-drain output for easy OR-tying. During a write cycle (\bar{S} and \bar{W} low), data on D0-D7 plus generated even parity are written in the 9-bit memory location addressed by A0-A8. Also during write, a parity error may be forced by holding \overline{PE} low.

A \overline{RESET} input is provided for initialization. When \overline{RESET} goes low, all 512 × 9 RAM locations are cleared to zero (with valid parity) and the MATCH output is forced high. If an input data word of zero is compared to any memory location that has not been written into since reset, MATCH will be high indicating that input data, plus generated parity, is equal to the reset memory location. \overline{PE} will be high for every addressed memory location after reset indicating no parity error in the RAM data. By tying a single data input pin high, this bit will function as a valid bit and a match will not occur unless data has been written into the addressed memory location. When cascading in the width direction, only one bit needs to be tied high regardless of the address width.

The ACT2150A operates from a single 5 V supply and is offered in a 24-pin 300-mil ceramic side-braced and plastic "Small Outline" packages. The device is fully TTL compatible and is characterized for operation for 0°C to 70°C.

FUNCTION BLOCK DIAGRAM



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Microprocessors and Microcontrollers

SN74ACT2151 and SN74ACT2153 1K × 12 Cache Address Comparator

KEY FEATURES

- Fast Address to Match Times of 22 ns and 25 ns Max
- 1K × 12 Internal RAM
- On-Chip Parity Generation, Storage, and Checking
- Easily Expandable
- On-Chip Address/Data Comparator

The 'ACT2151 and 'ACT2153 cache address comparators consist of a high-speed 1K × 12 static RAM array, parity generator, parity checker, and 12-bit high-speed comparator. They are fabricated using advanced silicon-gate CMOS technology for high speed and simple interface with bipolar TTL circuits. These cache address comparators are easily cascadable for wider tag address or deeper tag memories. Significant reductions in cache memory component count, board area, and power dissipation can be achieved with these devices. The 'ACT2151 has a totem-pole MATCH output while the 'ACT2153 has an open-drain MATCH output for easy AND-tying.

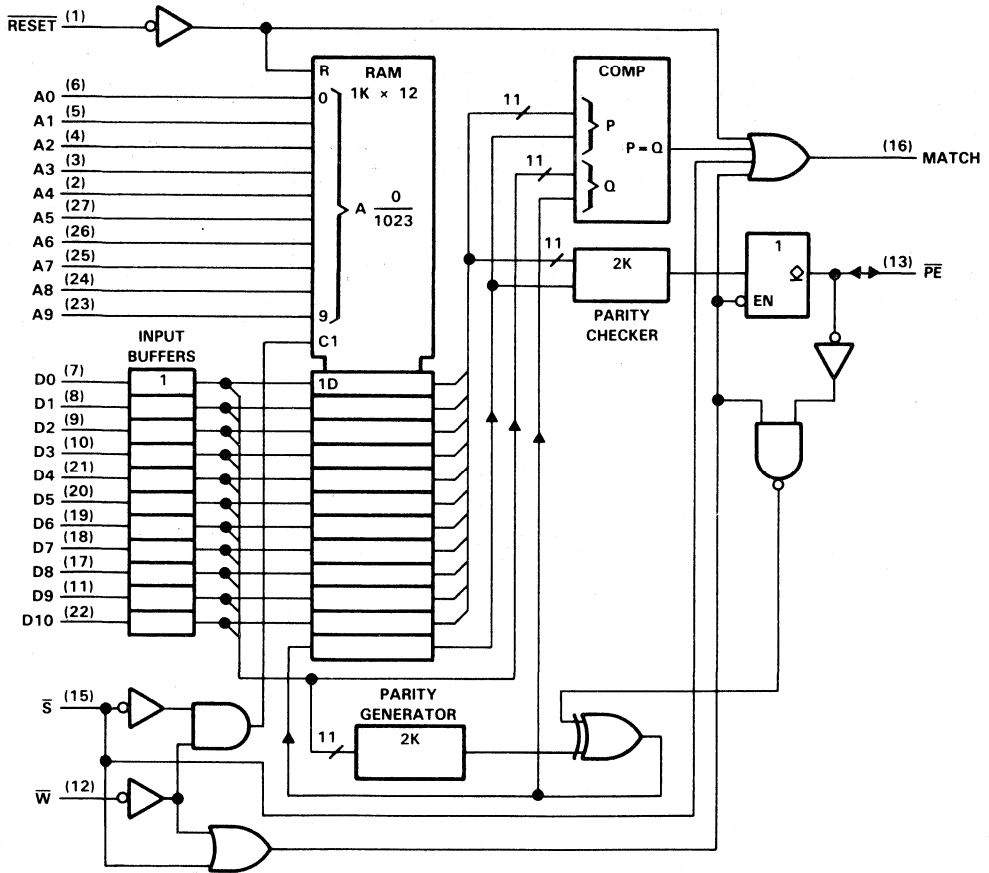
4**Microprocessors and Microcontrollers**

If S is low and W is high, the cache address comparator compares the contents of the memory location addressed by A0-A9 with the data D0-D10 plus generated parity. An equality is indicated by a high level on the MATCH output. A low-level output on PE signifies a parity error in the internal RAM data. PE is an N-channel open-drain for easy OR-tying. During a write cycle (S and W low), data on D0-D10 plus generated odd parity are written in the 12-bit memory location addressed by A0-A10. Also during write, a parity error may be forced by holding PE low.

A reset input is provided for initialization. When RESET is taken low, all 1K × 12 RAM locations are cleared to zero (with valid parity) and the MATCH output is forced high. If an input data word of zero is compared to any memory location that has not been written into since reset, MATCH will be high indicating that input data, plus generated parity, is equal to the reset memory location. PE will be high after reset for every addressed memory location, indicating no parity error in the RAM data. By tying a single data input pin high, this bit will function as a valid bit and a match will not occur unless data has been written into the addressed memory location. When cascading in the width direction, only one bit must be tied high regardless of the address width.

The 'ACT2151 and 'ACT2153 are characterized for operation from 0°C to 70°C.

LOGIC DIAGRAM (POSITIVE LOGIC)



SN74ACT2152A and SN74ACT2154A 2K × 8 Cache Address Comparators

KEY FEATURES

- Fast Address to Match Delay 20 or 25 ns Max
- Common I/O with Read Feature
- On-Chip Address/Data Comparator
- Parity Error Output, Force Parity Error Input
- Easily Expandable
- Choice of Open-Drain or Totem-Pole MATCH Output
- EPIC (Enhanced Performance Implanted CMOS) 1- μ m Process
- Fully TTL-Compatible

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Microprocessors and Microcontrollers

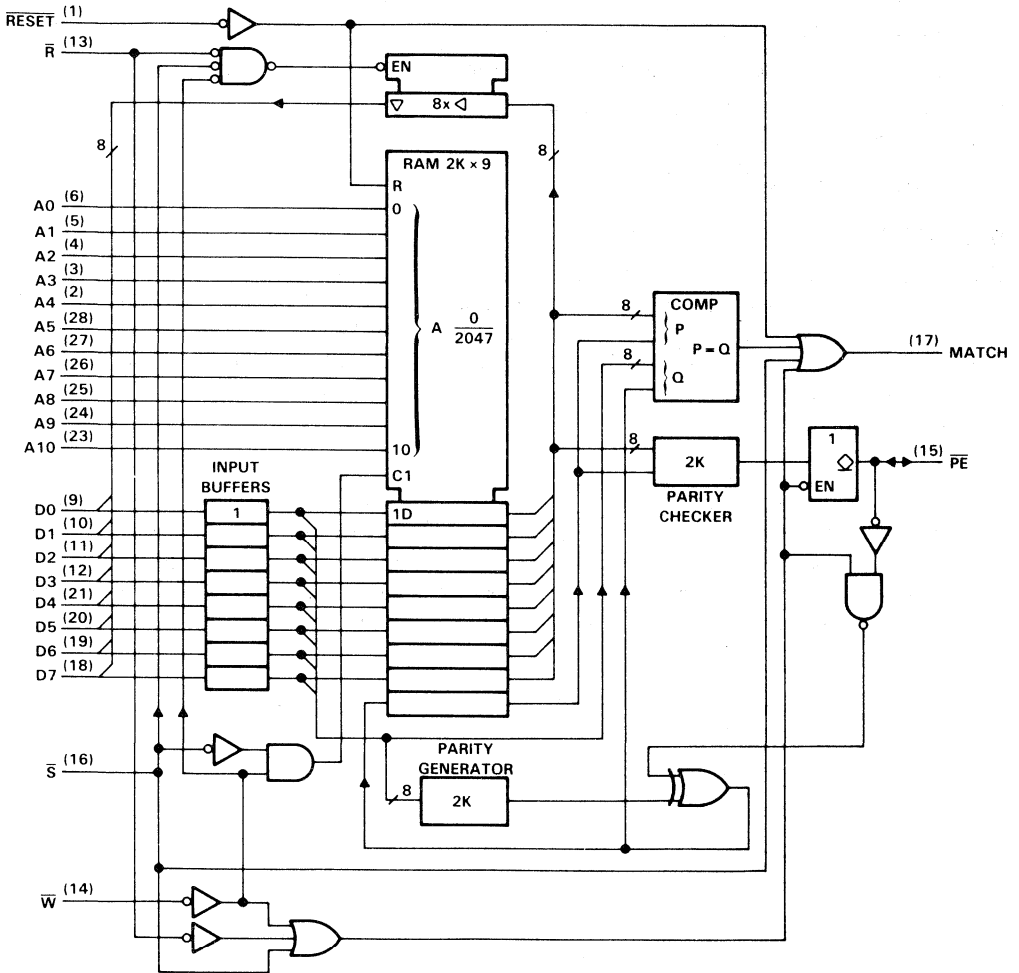
The 'ACT2152 and 'ACT2154 cache address comparators consist of a high-speed 2K × 9 static RAM array, parity generator, parity checker, and 9-bit high-speed comparator. They are fabricated using advanced silicon-gate CMOS technology for high speed and simple interface with bipolar TTL circuits. These cache address comparators are easily cascadable for wider tag addresses or deeper tag memories. Significant reductions in cache memory component count, board area, and power dissipation can be achieved with these devices. The 'ACT2152 has a totem-pole MATCH output while the 'ACT2154 has an open-drain MATCH output for easy AND-tying.

If S is low and W and R are high, the cache address comparator compares the contents of the memory location address by A0-A10 with the data D0-D7 plus generated parity. An equality is indicated by a high level on the MATCH output. A low-level output on PE signifies a parity error in the internal RAM data. PE is an N-channel open-drain output for easy OR-tying. During a write cycle (S and W low), data on D0-D7 plus generated odd parity are written in the 9-bit memory location addressed by A0-A10. Also during write, a parity error may be forced by holding PE low.

A read mode is provided with the 'ACT2152 and 'ACT2154, which allows the contents of RAM to be read at the D0-D7 pins. The read mode is selected when R and S are low, and W is high.

A reset input is provided for initialization. When RESET is taken low, all 2K × 9 RAM locations are cleared to zero (with valid parity) and the MATCH output is forced high. If an input data word of zero is compared to any memory location that has not been written into since reset, MATCH will be high indicating that input data, plus generated parity, is equal to the reset memory location. PE will be high after reset for every addressed memory location, indicating no parity error in the RAM data. By tying a single data input pin high, this bit will function as a valid bit and a match will not occur unless data has been written into the addressed memory location. When cascading in the width direction, only one bit must be tied high regardless of the address width.

FUNCTIONAL BLOCK DIAGRAM (POSITIVE LOGIC)



SN74ACT2152A and SN74ACT2154A

SN74ACT2155 2K × 8 Cache Address Comparator/Data RAM

KEY FEATURES

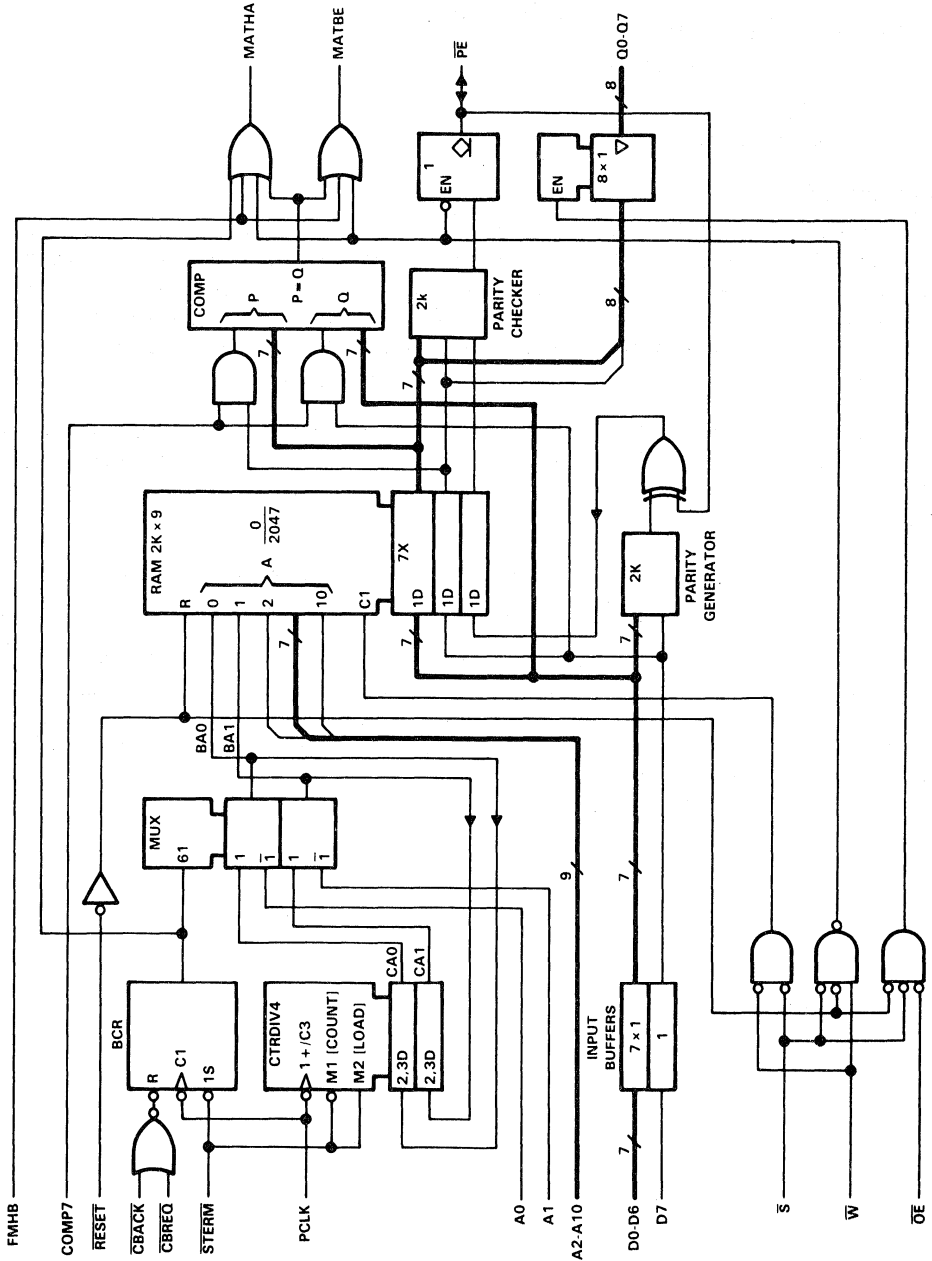
- Supports Motorola MC68030 Cache burst fill with No Added Wait States
- Upward compatibility for 68030 speed upgrades
- Cache Data RAM with parity and internal burst counter
- Dirty bit storage capability for use in copy-back caches
- Separate I/O supports copy-back
- Easily Expandable in depth and width

DESCRIPTION

The 'ACT2155 burst cache address comparator/data RAM consists of a high-speed 2K × 9 static RAM array, 2-bit burst counter and control circuitry, parity generator, parity checker, and 9-bit high-speed comparator. The 'ACT2155 is fabricated using advanced silicon gate CMOS technology for high speed and simple interface with bipolar TTL circuits. The 'ACT2155 provides a valuable building block for building fast efficient caches. By combining this device with programmable logic a cache can be constructed that specifically addresses the individual system requirements. Significant reductions in cache memory component count, board area, and power dissipation can be achieved by using this device.

The 'ACT2155 was designed to be used as the tag comparator and data RAM necessary to provide a cache that meets the MC68030 internal cache burst fill requirement by supplying 4 long words to the processor in 4 or 5 clock cycles. In addition the 'ACT2155 provides two match outputs that can be tied directly to the BERR and HALT inputs of the 68030. Even though the 'ACT2155 is designed for use with the 68030 processor it can also be used with other processors to implement write-through or copy-back class caches.

LOGIC DIAGRAM (POSITIVE LOGIC)



SN74ACT2155

SN74ACT2163 and SN74ACT2164 16K × 5 Cache Address Comparator

KEY FEATURES

- Fast Address to Match Delay 20 ns and 25 ns MAX
- Common I/O with Read Feature
- On-Chip Address/Data Comparator
- Easily Expanded in Depth and Width

DESCRIPTION

The 'ACT2163 and 'ACT2164 cache address comparators consist of a high-speed 16K × 5 static RAM array and a 5-bit high-speed comparator. They are fabricated using advanced silicon gate CMOS technology for high speed and simple interface with bipolar TTL circuits. These cache address comparators are easily cascadable for wider tag addresses or deeper tag memories. Significant reductions in cache memory component count, board area, and power dissipation can be achieved with these devices. The 'ACT2163 has a totem-pole MATCH output while the 'ACT2164 has an open-drain MATCH output for easy AND-tying.

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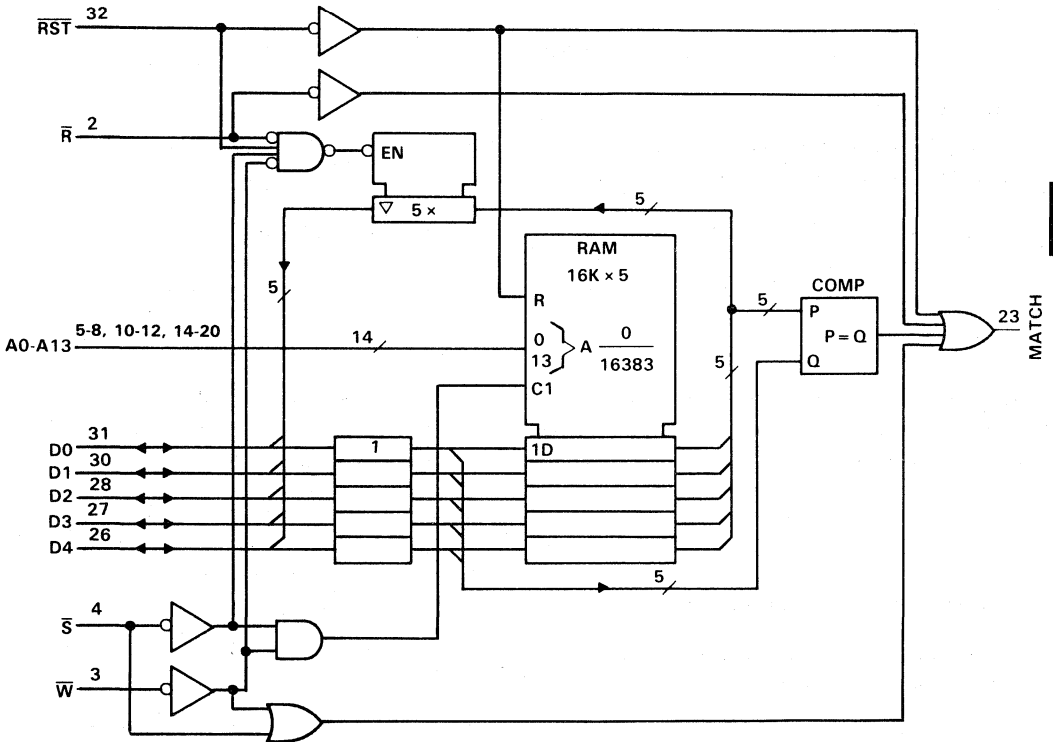
Microprocessors and Microcontrollers

When S is low and W and R is high, the cache address comparator compares the contents of the memory location addressed by A0-A13 with the data D0-D4. An equality is indicated by a high level on the MATCH output. During a write cycle (S and W low), data on D0-D4 is written in the 5-bit memory addressed by A0-A13.

A read mode is provided with the 'ACT2163 and 'ACT2164 which allows the contents of RAM to be read at the D0-D4 pins. The read mode is selected when R and S is low, and W is high.

A reset input is provided for initialization. When RESET is taken low, all 16K × 5 RAM locations are cleared to zero and the MATCH output is forced high. If an input data word of zero is compared to any memory location that has not been written into since reset, MATCH will be high indicating that input data is equal to reset memory location. By tying a single data input pin high this bit will function as a valid bit and a match will not occur unless data has been written into the addressed memory location.

FUNCTIONAL BLOCK DIAGRAM (POSITIVE LOGIC)



SN74AS632 and SN74ALS632B Error Detection and Correction Circuits

KEY FEATURES

- Detects and Corrects Single-Bit Errors
- Detects and Flags Dual-Bit Errors
- Built-In Diagnostic Capability
- Fast Write and Read Cycle Processing Times
- Byte-Write Capability
- Dependable Texas Instruments Quality and Reliability

DESCRIPTION

The 'AS632 and 'ALS632B devices are 32-bit parallel error detection and correction circuits (EDACs). The 'ALS632B is a low power version of the 'AS632.

4

The EDACs use a modified Hamming code to generate a 7-bit check word from a 32-bit data word. This check word is stored along with the data word during the memory cycle. During the memory read cycle, the 39-bit words from memory are processed by the EDACs to determine if errors have occurred in memory.

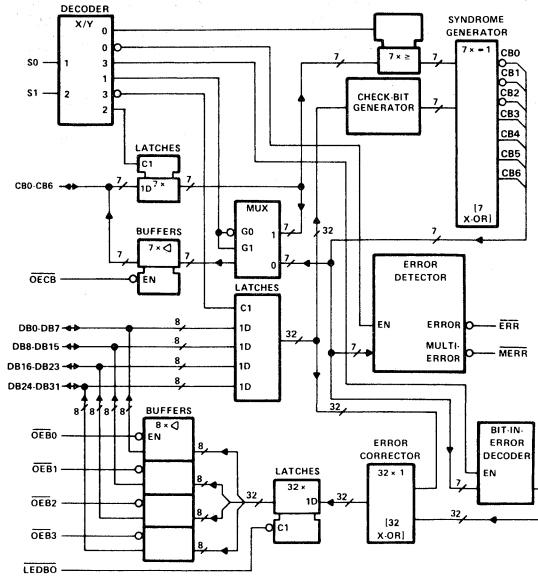
Single-bit errors in the 32-bit data word are flagged and corrected.

Single-bit errors in the 7-bit check word are flagged, and the CPU sends the EDAC through the correction cycle even though the 32-bit data word is not in error. The correction cycle will simply pass along the original 32-bit data word in this case and produce error syndrome bits to pinpoint the error-generating location.

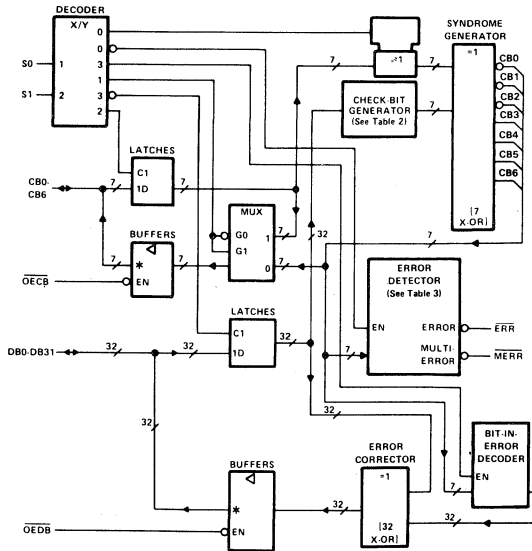
Dual-bit errors are flagged but not corrected. These errors may occur in any two bits of the 39-bit data word from memory (two errors in the 32-bit data word, two errors in the 7-bit check word, or one error in each word). The gross-error condition of all lows or all highs from memory will be detected. Otherwise, errors in three or more bits of the 39-bit word are beyond the capabilities of these devices to detect.

Read-modify-write (byte-control) operations can be performed with the 'AS632 and 'ALS632B by using output latch enable, LEDBO, and the individual OEBO through OEB 3 byte.

'ALS632 AND 'AS632 LOGIC DIAGRAM (POSITIVE LOGIC)



'ALS634 AND 'AS634 LOGIC DIAGRAM (POSITIVE LOGIC)



MEMORY MAPPERS

FUNCTION	DESCRIPTION	OUTPUT	TYPE	DOCUMENT
▪ Expand 4 Address Lines to 12 Address Lines ▪ Designed for Paged Memory Mapping	Memory Mappers	3-State	SN74LS612	SDL001A
	Memory Mappers with Output Latches	3-State	SN74LS610	SDL001A

4

Microprocessors and Microcontrollers

BUS INTERFACE

GENERAL

SN74BCT2423 and SN74BCT2424 Bus Transceivers

FEATURES

- Multiplexed Real-Time and Latched Data
- Byte Control for Byte-Write Applications
- Useful in NuBus™ Interface Applications
- Useful in Memory Interleave Applications
- BiCMOS Design Substantially Reduces Standby Current
- Operating Temperature Range: 0°C to 70°C
- Dependable Texas Instruments Quality and Reliability

DESCRIPTION

The 'BCT2423 and 'BCT2424 are general-purpose 16-bit bidirectional transceivers with data storage latches and byte control circuitry arranged for use in applications where two separate data paths must be multiplexed onto, or demultiplexed from, a single data path. Typical applications includes multiplexing and/or demultiplexing of address and data information in microprocessor- or bus-interface applications. These devices are particularly useful for memory interleaving applications. The 'BCT2423 and 'BCT2424 offer inverted and noninverted data paths, respectively.

The 'BCT2423 and 'BCT2424 were designed by using Texas Instruments BiCMOS process, which features bipolar drive characteristics, but also greatly reduces the standby power of the device when disabled. This is valuable when the device is not performing an address or data transfer.

Three 16-bit I/O ports are available for address and/or data transfer. Control signals through these ports allow byte-control of the most significant byte and least significant byte for each bus.

NuBus INTERFACE

SN74BCT2420 NuBus Address/Data Transceivers and Registers

FEATURES

- Designed for NuBus Interface Applications
- Conforms to ANSI/IEEE Std 1196-1987
- On-Chip Comparator Provides Slot Identification
- Multiplexed Real-Time and Latched Address/Data
- Designed to Operate with SN74ACT2440 NuBus Controller
- BiCMOS Design Substantially Reduces Standby Current
- Operating Temperature Range: 0°C to 70°C

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DESCRIPTION

The 'BCT2420 consists of bus transceiver circuits, D-type flip-flops, latches, and control circuitry arranged for multiplexed transmission of address and data information in NuBus applications. An on-chip comparator has been included to detect when a NuBus transfer cycle is requesting the local board. The device is easily configured around ASIC or other PAL[®]-based controllers.

The 'BCT2420 was designed by using Texas Instruments BiCMOS process, which features bipolar drive characteristics and also greatly reduces the standby power of the device when disabled. This is valuable when the device is not performing a NuBus transaction. In typical NuBus applications, two devices are required in order to provide the full 32-bit address/data path.

SN74ACT2440 NuBus Interface Controller

FEATURES

- Designed for NuBus Interface Applications
- Conforms to ANSI/IEEE Std 1196-1987
- Designed to Operate with SN74ACT2420 NuBus Data/Address Interface Devices
- Supports Master, Slave, and Master/Slave Applications
- EPIC™ (Enhanced Performance Implanted CMOS 1- μ m Process)
- Fully TTL-Compatible
- Operating Temperature Range: 0°C to 70°C

DESCRIPTION

The 'ACT2440 NuBus Controller handles NuBus signaling protocol in compliance with ANSI/IEEE Std 1196-1987. The device allows a simple connection to the NuBus; typical configurations include master-only, slave-only, and master/slave. Additionally, it provides extra status and control lines to facilitate more sophisticated approaches. While NuBus block transfers are not directly supported by this device, this controller may be used in applications where block transfers are controlled by external logic.

Data and address buffering is handled via two 'BCT2420s. The 'BCT2420s are BiCMOS buffers designed specifically for supporting NuBus interfacing. The 'ACT2440 provides the buffer control signals needed to directly drive the 'BCT2420s; however, in simpler applications, standard SSI and MSI buffers may be used in place of the 'BCT2420s.

The 'ACT2440 includes five major signal groups: byte decode signals, data/address interface-control signals, master/slave input signals, NuBus card-slot signals, and NuBus status signals. Byte decode determines which type of NuBus cycle is being performed. Data/address interface control provides the buffering signals required to multiplex and de-multiplex the NuBus data/address lines. The master/slave inputs control the master- and slave-state machines. The NuBus card-slot signals provide for interface with the NuBus. The NuBus status signals indicate the status of the master/slave-state machines and provide buffered NuBus signals.

SN74ALS2442 NuBus Block Slave Address Generator

FEATURES

- Designed to Support NuBus Block Slave Address Generation as Defined by ANSI/IEEE Std 1196-1987
- Interfaces Directly with Texas Instruments 'ACT2440 (NuBus Controller) and 'BCT2420 (NuBus Transceivers)
- Operating Temperature Range: 0°C to 70°C

DESCRIPTION

A common method for improving NuBus transfer performance is through block transfers. A block transfer is a read or write transaction in which multiple data values are transferred during each Nubus ownership sequence. The IEEE specification for NuBus allows block transfers in lengths of 2, 4, 8, or 16 words. For additional details, consult the Application Report on NuBus block slave transfers.

MILITARY PRODUCTS

The Texas Instruments Military program offers high-reliability integrated circuits covering a wide product spectrum. It is designed to meet and support semiconductor requirements of the military end-equipment manufacturers and users who require high-reliability integrated circuits.

Processing per the requirements of MIL-M-38510 and specified methods in MIL-STD-883 provides the user with a broad selection of high-quality, high reliability, standard products. Standard process flows include JM38510, DESC Military Drawings, and JEDEC Publication 101 Class B (SNJ, JBP, SMJ, B). These flows are backed by a comprehensive Quality Conformance program summarized annually in the Military Products Reliability report.

Texas Instruments is in full support of government and industry standardization programs. To this end, a wide range of products is available processed per the above standard flows. Particular emphasis is being placed on both JM38510 and DESC Military Drawings.

In Europe, Texas Instruments manufactures and supplies high reliability integrated circuits for space and strategic military applications under the European Space Agency (ESA)/Space Component Committee (SCC) specification system.

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OVERVIEW

PRODUCT LINE	PROCESSING FLOWS	TYPES
Logic	SN, SNJ, JM38510	54TTL 54HC 54F 54S 54HCT 54LS 54AC 54ALS 54ACT 54AS 54BCT
	B	PAL®
Linear	SN, SNJ, B, JM38510	Interface, Control, Data Acquisition
MOS Memory	SMJ	EPROM, DRAM, SRAM
Bipolar Memory	JBP, SNJ	PROM, FIFO
Microprocessor	SMJ	32010, 320XXX, 340XXX

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MILITARY PRODUCT FLOWS

PROCESS LEVEL	PREFIX	DESCRIPTION
JM38510 Class B	JM385101 XXXXXBXA JM38510/XXX	Qualified per MIL-M-38510 Class B. Produced in DESC certified production facilities.
JM38510 Class S	JM385101 XXXXXSXA	Qualified per MIL-M-38510 Class S. Produced in DESC certified production facilities.
DESC	DESC Part Number	Certified and symbolized to the DESC Military Drawing where TI is an approved source.
Class B	SNJ, B, SMJ, JBP	Screened per requirements of MIL-STD-883 Class B Method 5004. Conforms to the requirements of JEDEC Publication 101. (For detailed screening information, see Military Products Designers Reference Guide (SGYZ001B).)
Military Temperature Range	SN54	Standard Commercial Processing

LOGIC NOMENCLATURE

Example: SNJ 54 LS00 J

Prefix _____

- SN = Standard Prefix, Commercial Processing
- SNJ = Class B Process Option
- JANB = JM38510 Qualified

Military Temperature Range _____

- 54 = -55°C to 125°C

Circuit Designator _____

- Blank = Standard TTL
- LS = Low-Power Schottky TTL
- S = Schottky TTL
- ALS = Advanced Low-Power Schottky TTL
- AS = Advanced Schottky TTL
- HC = High-Speed CMOS
- HCT = TTL-Compatible HCMOS
- AC = Advanced High-Speed CMOS
- ACT = TTL-Compatible AC
- BCT = BiCMOS
- F = Fast

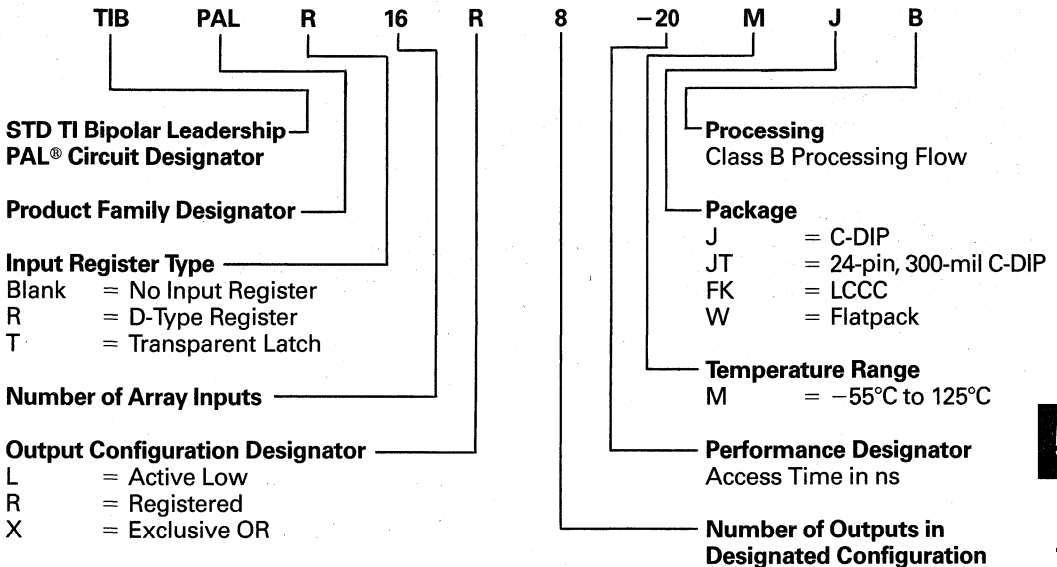
Package _____

- J = C-DIP
- JT = 24-Pin, 300-mil C-DIP
- FK = LCCC
- W = Flatpack

5 Military Products

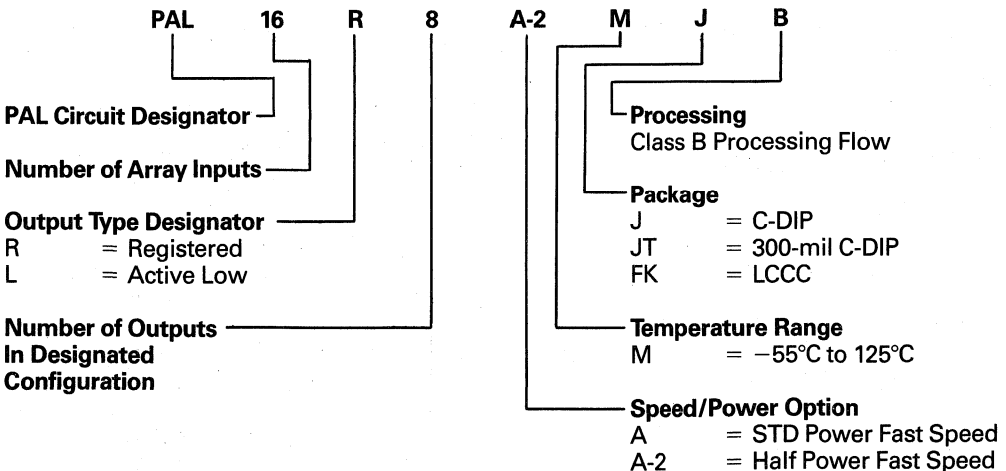
PROGRAMMABLE ARRAY LOGIC NOMENCLATURE

PAL® Nomenclature (Industry Leadership Part Types)



PAL – Registered trademark of Monolithic Memories Inc.

PAL® Nomenclature (Industry Standard Part Types)



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Military Products

LINEAR CONTROL CIRCUITS NOMENCLATURE

Example: TL 074 M J B

Prefix

TL = Linear
TLC = LinCMOS

Second Source Prefix

LM = National	SE = Signetics
MC = Motorola	SG = Silicon General
RM = Raytheon	μA = Fairchild

Unique Device Designation

Possibly with A or B in Last Position

Military Temperature Range

-55°C to 125°C

Package Designation

FK = LCCC	LD = T046 Metal Can
J = 14/16-Pin C-DIP	U = 10-Lead Flatpack
JG = 8-Pin C-DIP	W = 14-Lead Flatpack
L = T099/T0100 Metal Can	

Processing

B = Class B
No Letter = STD

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Military Products

LinCMOS OP AMP NOMENCLATURE

Example: TLC 27 M 4 A M J B

Prefix

TLC = LinCMOS

Circuit Designation

Bias Current

L = Low
M = Medium
No Letter = High

Device Complexity

1 = Single
2 = Dual
4 = Quad

Processing

B = Class B
No Letter = STD

Package Designation

FK = LCCC
J = 14/16-Pin C-DIP
JG = 8-Pin C-DIP
L = T099/T0100 Metal Can
LD = T046 Metal Can

Military Temperature Range

-55°C to 125°C

Input Offset Voltage

A = 5 mV
B = 2 mV
No Letter = 10 mV

INTERFACE CIRCUITS NOMENCLATURE

Example: SNJ 55 109A J

Prefix

SN = Standard
 SNJ = Class B Processing

Second Source Prefix

AM = AMD
 DS = National
 MC = Motorola

Operating Temperature Range

55 = Military: -55°C to 125°C
 95 = Limited Military – Check Data Sheet For Temperature Range

Unique Device Designation

Possibly with A or B in Last Position

Package Designation

FK = LCCC
 J = 14/16-Pin C-DIP
 JG = 8-Pin C-DIP
 W = 14-Lead Flatpack

BIPOLAR PROM NOMENCLATURE

These two digits comprise the series designation

Example:

JBP 2 8 S 4 2 M J

Prefix

JBP = Class B Processing,
JEDEC Publication 101

Generic Programming Family

- 1 = Single Level
- 2 = Double Level
- 3 = Oxide Isolated
- 4 = Other

Output Word Width

4 or 8

Output Type

- S = Standard Three-State
- L = Low-Power Three-State
- R = Registered Three-State
- SA = Standard Open-Collector

Bit Complexity

- 03 = 256 Bits
- 1 = 1,024 Bits
- 2 = 2,048 Bits
- 4 = 4,096 Bits
- 8 = 8,192 Bits
- 16 = 16,384 Bits
- 32 = 32,768 Bits

Package

- J/JT = Ceramic Dual-in-Line
- FK/FG = Ceramic Chip Carrier

Temperature Range

- M = -55°C to 125°C

Package Size*

Row Spacing in
Inches (mm)

No. of Pins	0.300 (7,62)	0.400 (10,16)	0.600 (15,24)
16	0	—	—
18	1	—	—
20	2	—	—
22	3	4	—
24	5	—	6
28	—	—	7
40	—	—	8

*Package-size designation is not applicable with chip carrier (FK or FG) and should be replaced with the letter X for this package type.

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Military Products

MOS DRAM MEMORY NOMENCLATURE

Example: **SMJ 4164 -15 JD S**

Prefix

- SM = Standard Prefix, Commercial Processing
- SMJ = Class B Processing, JEDEC Publication 101

Circuit Designator

Must contain four characters

Access Time

Device types are available with various speeds

Package

Must contain one or two letters: J, JD, FG, HJ, FQ, HK

Temperature Range

Must contain one letter only

- M = -55° to 125°C
- S = -55° to 100°C (except 4164 & 4256 which are -55°C to 110°C)
- E = -40° to 85°C
- L = 0° to 70°C

DIGITAL SIGNAL PROCESSOR NOMENCLATURE

Example: **SMJ 320 10 JD S**

Prefix

- SM = Standard Prefix, Commercial Processing
- SMJ = Class B Processing

Family Designator

- 320 = DSP
- 340 = Graphics System Processor

Family Member/Generation Designator

- 1X = First Generation
- 2X = Second Generation
- 3X = Third Generation

Package

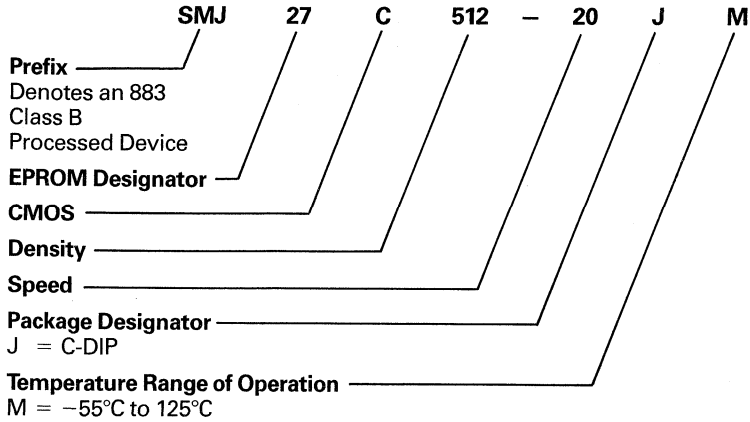
- JD = Side-Braced DIP
- FD = LCCC
- FJ = "J" Formed LDCC

Temperature Range

- L = 0°C to 70°C
- S = -55°C to 110°C
- M = -55°C to 125°C



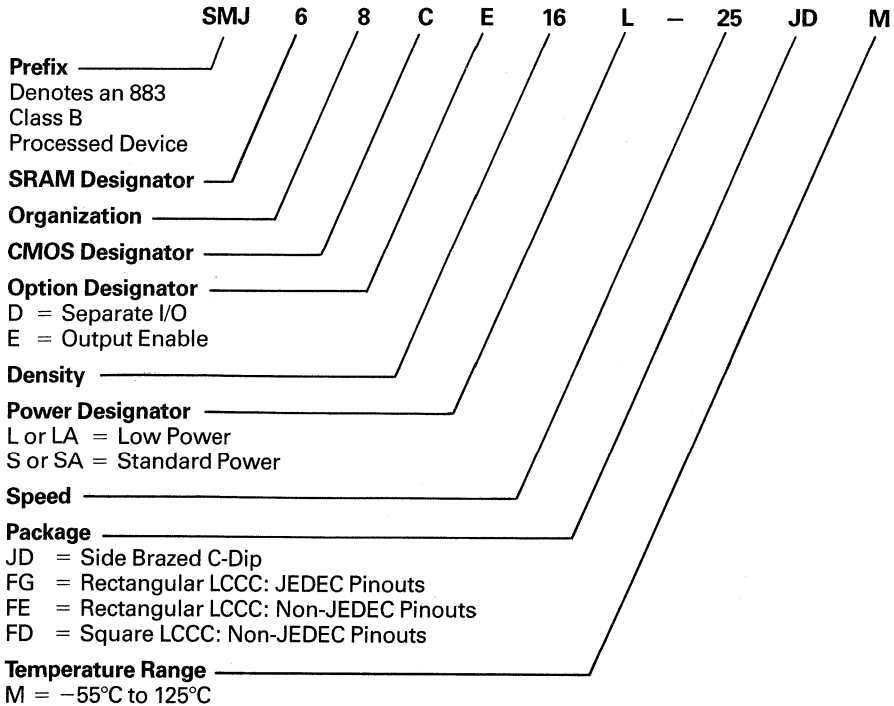
CMOS EPROM NOMENCLATURE



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CMOS SRAM NOMENCLATURE

Military Products



PACKAGES

The packages offered by Military products are designed to provide the most efficient and cost-effective method of meeting systems requirements. Products are offered in ceramic dual-in-line packages, flatpacks, and leadless ceramic chip carriers.

PACKAGES AVAILABLE

PACKAGE	DESCRIPTION
FD	Three-Layer Square Chip Carrier: Non-JEDEC Pinouts
FE	Three-Layer Rectangular Chip Carrier: Non-JEDEC Pinouts
FG, FV	Three-Layer Rectangular Chip Carrier: JEDEC Pinouts
FJ	J Formed Ceramic Leaded Chip Carrier
FK	Three-Layer Square Chip Carrier: JEDEC Pinouts
FQ	LCCC Version of the HJ Package
GB	Pin Grid Array
HJ	J Formed Ceramic SO Package
HK	Flatpack Version of the HJ Package
J, JG, JT	Ceramic DIP
JD	Side Braze Ceramic DIP
L	T099/T0100 Metal Can
LD	T046 Metal Can
W, WA, WC, U	Ceramic Flatpack (Note 1)

STANDARD PACKAGES BY PRODUCT LINE

PACKAGE	LOGIC	LINEAR	BIPOLAR MEMORY	MOS MEMORY	MICROPROCESSOR
FD		•			•
FE, FG, FV				•	
FJ		•			•
FK	ALS, AS, HC, HCT, LS, S AC, ACT, BCT, F	•	•		•
GB					•
HJ, FQ, HK				•	
J	ALL	•	•	•	•
JD				•	•
JG		•			
JT	ALS, AS, HC, HCT, LS, AC, ACT, BCT, F		•		
W	ALL	•			
L, LD		•			
U, WC		•			

NOTE 1: The 24-pin flatpack (WC) dimensions may vary from F-6 outline in Appendix C of MIL-M-38510F Refer to appropriate TI data book.
NOTE 2: AC, ACT, BCT, and F are all new logic families.

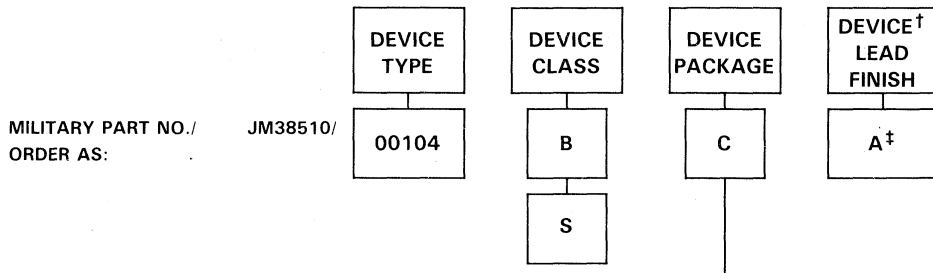
5
Military Products

JM38510

Texas Instruments devices marked JM38510, and presented in **Bold** type, are qualified and have government endorsement under MIL-M-38510. These products are in full compliance with the military detail specifications and are listed on the Qualified Products List (QPL). They are produced in DESC certified production facilities. This section contains cross references for both Class B and Class S qualifications.

PART NUMBER CROSS-REFERENCE GUIDE

Example: 5400 TTL NAND gate in ceramic dual-in-line package to JM38510 Class B with standard solder dipped leads.



CASE OUTLINE							
JAN CODE	38510 APP/C	DESCRIPTION	TI CODE	JAN CODE	38510 APP/C	DESCRIPTION	TI CODE
A	F-1	14-pin F/P 1/4" x 1/4"	NA	K	F-6	24-pin F/P 3/8" x 5/8"	W(1)
B	F-3	14-pin F/P 3/16" x 1/4"	WA	L	D-9	24-pin C DIP (300 mil)	JT
C	D-1	14-pin C-DIP	J	M	A-3	12-pin can (TO-101)	NA
D	F-2	14-pin F/P 1/4" x 3/8"	W	P	D-4	8-pin C-DIP	JG
E	D-2	16-pin C-DIP	J	Q	D-5	40-pin C-DIP	NA
F	F-5	16-pin F/P 1/4" x 3/8"	W	R	D-8	20-pin C-DIP	J
G	A-1	8-pin can (TO-99)	NA	S	F-9	20-pin F/P 1/4" x 1/2"	W
H	F-4	10-pin F/P 1/4" x 1/4"	NA	V	D-6	18-pin C-DIP	NA
I	A-2	10-pin can (TO-100)	NA	W	D-7	22-pin C-DIP	NA
J	D-3	24-pin C-DIP	J	2	C-2	20-pad Sq Chip Carrier	FD/FK
				3	C-4	28-pad Sq Chip Carrier	FD/FK

†Solder dip lead finish normally supplied by TI.

‡Lead finish designators: A = solder tip, B = tin plate, C = gold plate.

NOTE 1: 24-pin flatpack (W, WC, RA) dimensions may vary from F-6 outline in Appendix C of MIL-M-38510H. Refer to appropriate TI data book.

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
00101	5430
00102	5420
00103	5410
00104	5400
00105	5404
00106	5412
00107	5401
00108	5405
00109	5403
00201	5472
00202	5473
00203	54107
00204	5476
00205	5474
00206	5470
00207	5479
00301	5440
00302	5437
00303	5438
00401	5402
00402	5423
00403	5425
00404	5427
00501	5450
00502	5451
00503	5453
00504	5454
00601	5482
00602	5483
00603	9304
00604	5480
00701	5486
00801	5406
00802	5416
00803	5407
00804	5417
00805	5426
00901	5495
00902	5496
00903	54164
00904	54165

Military Device Type JM38510/	Generic/ Industry no.
00905	54194
00906	54195
01001	5442
01002	5443
01003	5444
01004	5445
01005	54145
01006	5446
01007	5447
01008	5448
01009	5449
01101	54181
01101	9341
01102	54182
01102	9342
01201	54121
01202	54122
01203	54123
01204	9601
01205	9602
01301	5492
01302	5493
01303	54160
01304	54163
01305	54162
01306	54161
01307	5490
01308	54192
01309	54193
01401	54150
01402	9312
01403	54153
01404	9309
01405	9322
01405	54157
01406	54151
01501	5475
01502	5477
01503	9308
01503	54116
01504	9314
01601	5408

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
01602	5409	02801	54L95
01701	54174	02802	54L164
01702	54175	02803	93L28
01801	54170	02804	93L00
01901	54180	02805	76L70
02001	54L30	02901	54L42
02002	54L20	02902	54L43
02003	54L10	02903	54L44
02004	54L00	02904	54L46
02005	54L04	02905	54L47
02006	54L03	02906	76L42A
02006	54L01	02907	93L01
02101	54L71	03001	930
02102	54L72	03002	940
02103	54L73	03002	935
02104	54L78	03003	936
02105	54L74	03004	946
02201	54H72	03005	962
02202	54H73	03101	932
02203	54H74	03102	944
02204	54H76	03103	957
02205	54H101	03104	958
02206	54H103	03105	933
02301	54H30	03201	951
02302	54H20	03301	945
02303	54H10	03302	948
02304	54H00	03303	950
02305	54H04	03304	9093
02306	54H01	03501	MH0026
02307	54H22	04001	54H50
02401	54H40	04002	54H51
02501	54L90	04003	54H53
02502	54L93	04004	54H54
02503	54L193	04005	54H55
02504	93L10	04101	54L51
02505	93L16	04102	54L54
02601	54L86	04103	54L55
02701	54L02	04201	54L121
		04202	54L122

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
04301	93L18	05503	4049A
04401	93L24	05504	4050A
04501	93L14	05505	4041A
04502	93L08	05551	4009UB
04601	93L09	05552	4010B
04602	93L12	05553	4049UB
04603	93L22	05554	4050B
05001	4011A	05555	4041UB
05002	4012A	05601	4017A
05003	4023A	05602	4018A
05051	4011B	05603	4020A
05052	4012B	05604	4022A
05053	4023B	05605	4024A
05101	4013A	05651	4017B
05102	4027A	05652	4018B
05103	4043A	05653	4020B
05151	4013B	05654	4022B
05152	4027B	05655	4024B
05153	4043B	05701	4006A
05201	4000A	05702	4014A
05202	4001A	05703	4015A
05203	4002A	05704	4021A
05204	4025A	05705	4031A
05251	4000B	05706	4034A
05252	4001B	05751	4006B
05253	4002B	05752	4014B
05254	4025B	05753	4015B
05301	4007A	05754	4021B
05302	4019A	05755	4031B
05303	4030A	05756	4034B
05304	4048A	05801	4016A
05351	4007UB	05802	4066A
05352	4019B	05851	4016B
05353	4030B	05852	4066B
05354	4048B	05901	4028A
05401	4008A	05951	4028B
05451	4008B	06001	10501
05501	4009A	06002	10502
05502	4010A	06003	10505
		06004	10506
		06005	10507
		06006	10509

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
06101	10531	07904	54S158
06102	10631	07905	54S251
06103	10576	07906	54S257
06104	10535	07907	54S258
		07908	54S253
06201	10504	08001	54S11
06202	10597	08003	54S08
06301	10524	08101	54S140
06302	10525	08201	54S85
07001	54S00	10101	741A
07002	54S03	10102	747A
07003	54S04	10103	LM101A
07004	54S05	10104	LM108A
07005	54S10	10105	LH2101A
07006	54S20	10106	LH2108A
07007	54S22	10107	LM118
07008	54S30	10108	1558
07009	54S133	10201	LM723
07101	54S74	10301	710
07102	54S112	10302	711
07103	54S113	10303	LM106
07104	54S114	10304	LM111
07105	54S174	10305	LH2111
07106	54S175	10401	55107A
07201	54S40	10402	55108A
07301	54S02	10403	55114
07401	54S51	10403	9614
07402	54S64	10404	55115
07501	54S86	10404	9615
07502	54S135	10405	55113
07601	54S194	10406	7831
07602	54S195	10407	7832
07701	54S138	10501	5040
07702	54S139	10502	5041
07801	54S181	10503	5042
07802	54S182	10504	5043
		10505	5044
07901	54S151	10506	5045
07902	54S153	10507	5046
07903	54S157	10508	5047
		10601	LM102

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
10602	LM110
10603	LH2110
10701	LM109
10702	78M05
10703	78M12
10704	78M15
10705	78M24
10706	LM140K-05
10706	7805
10707	LM140K-12
10707	7812
10708	LM140K-15
10708	7815
10709	LM140K-24
10709	7824
10801	3018A
10802	3045
10901	555
10902	556
10903	557 (I SOURCE = 60 mA)
11001	LM148
11002	LM149
11003	4741, 4156
11004	4136
11005	LM124
11101	DG181A
11102	DG182A
11103	DG184A
11104	DG185A
11105	DG187A
11106	DG188A
11107	DG190A
11108	DG191A
11201	LM139
11202	LM193
11301	DAC-08
11302	DAC-08A
11401	LF155
11402	LF156
11403	LF157
11404	LF155A

Military Device Type JM38510/	Generic/ Industry no.
11405	LF156A
11406	LF157A
11501	LM120H-05
11501	79M05
11502	LM120H-12
11502	79M12
11503	LM120H-15
11503	79M15
11504	LM120H-24
11504	79M24
11505	LM120K-05
11505	7905
11506	LM120K-12
11506	7912
11507	LM120K-15
11507	7915
11508	LM120K-24
11508	7924
11601	300
11602	301
11603	302
11604	303
11605	304
11606	305
11607	306
11608	307
11701	78MG
11702	78G
11703	LM117H
11704	LM117K
11705	LM150K
11706	LM138K
11801	79MG
11802	79G
11803	LM137H
11804	LM137K
11901	061
11902	062
11903	064
11904	071
11904	771
11904	LF151

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
11905	072	12502	5537
11905	772	12601	1524
11905	LF153	12701	7523
11906	074	12702	7520
11906	774	12703	7521
11906	LF147	12704	7541
12001	5200	12705	1020
12002	5203	12706	1220
12003	5201	12707	1218
12004	5204	12801	584S
12005	5202	12802	584T
12006	5205	12901	55450
12007	5206	12902	55451
12008	5207	12903	55452
12009	5210	12904	55453
12010	5213	12905	55454
12011	5211	12906	55460
12012	5214	12907	55461
12013	5212	12908	55462
12014	5215	12909	55463
12015	5216	12910	55464
12016	5217	13001	55325
12101	562	13002	55326
12102	563	13003	55327
12103	565	13101	5534A
12104	566	13102	5532A
12201	2700	13301	561
12202	2600	13401	ADC571
12203	2620	13501	OP-07A
12204	2500	13502	OP-07, 714
12205	2510	13503	OP-27A
12206	2520	13504	OP-227A
12301	200	13505	OP-37A
12302	201	13601	2700
12401	LM199A	13601	R675B-4
12402	LM129A	13602	2702
12403	REF10	13602	R675B-3
12404	LM199A	13701	DAC87 (Hybrid)
12405	LM129A	13702	DAC87 (Monolithic)
12406	REF10		
12501	198		

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
13703	DAC87 (Hybrid)	15602	54148
13801	VFC32	15603	9318
13802	VFC320	15701	9338
13803	AD 650	15801	9321
		15802	9317
13901	534T	15901	9300
13902	534S	15902	9328
13903	532S	16001	9334
14001	574AU monolithic	16101	5432
14002	574AT monolithic	16201	5428
14003	574AU hybrid	16301	54365
14004	574AT hybrid	16302	54366
14005	674AU monolithic	16303	54367
14006	674AT monolithic	16304	54368
14103	2003	17001	4081B
14301	524S	17002	4082B
14401	AD558T	17003	4073B
14801	TL431	17101	4071B
15001	5485	17102	4072B
15002	9324	17103	4075B
15101	5413	17201	4085B
15102	5414	17202	4086B
15103	54132	17203	4070B
15201	54154	17204	4077B
15201	9311	17301	4514B
15202	54155	17302	4515B
15203	54156	17303	4532B
15204	8250	17304	4555B
15205	8251	17305	4556B
15206	8252	17401	4069UB
15206	9301	17402	40107B
15301	54125	17403	4502B
15302	54126	17404	40109B
15501	54H08	17501	4076B
15502	54H11	17502	4095B
15503	54H21	17503	4096B
15504	54H08	17504	4098B
15601	54147	17505	40174B

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
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17601	4099B
17602	4508B
17701	4093B
17702	40106B
17801	4067B
17802	4097B
17803	40257B
19001	506
19001	6116
19002	506A
19003	507
19003	6216
19004	507A
19005	508A
19006	509A
19007	508
19007	6108
19008	509
19008	6208
20101	HPROM-0512
20101	MCM5303

Military Device Type JM38510/	Generic/ Industry no.
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20102	MCM5304
20201	IM5603A
20202	IM5623
20301	7610
20301	5300-1
20301	82S126
20301	93417
20302	7611
20302	5301-1
20302	54S287
20302	82S129
20302	93427
20401	7620
20401	5303-1
20401	82S130
20401	93436
20402	7621
20402	5306-1
20402	82S131
20402	93446
20601	7642

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
20601	5352-1
20601	82S136
20601	93452
20602	7643
20602	5353-1
20602	82S137
20602	93453
20603	7644
20701	7602
20701	5330
20701	82S23
20702	7603
20702	5331
20702	82S123
20903	93450
20904	27S181
20904	77S181
20904	29631
20904	7681
20904	5381-2
20904	82S181
20904	93451

Military Device Type JM38510/	Generic/ Industry no.
20905	82S2708
20905	93461
20906	93460
20907	53S840
20908	53S841
20908	29651
21001	77S190
21001	76160
21001	53S1680
21001	82S190
21002	77S191
21002	93Z511
21002	27S191
21002	28S166A
21002	76161
21002	53S1681
21002	82S191
20801	7640
20801	5340-1
20801	82S140
20801	93438
20802	5341-1

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type* JM38510/	Generic/ Industry no.
20802	54S474	21003	93Z510
20802	7641	21004	93Z511
20802	82S141	21004	28S166A
20802	93448	21005	76165
20803	82S115	21101	82HS321A
20804	5348-1	21102	82HS321A
20805	5349-1	21102	76321
20901	53S480	21102	53S3281
20901	7684	21102	29671
20901	77S184	21201	82HS641A-70
20901	82S184	21201	93Z665-70
20902	29651	21201	93Z667-70
20902	53S841	21202	82HS641A-55
20902	7685	21202	93Z665-55
20902	77S185	21202	93Z667-55
20902	82S185	21203	93Z665-50
20903	27S180	21203	93Z667-50
20903	77S180	21204	82HS641-45
20903	7680	21204	93Z665-45
20903	5380-2	21204	93Z667-45
20903	82S180	21901	6654
21002	3636	22001	2708
21002	29681		

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
22101	2716
22201	2532
22401	27256-250
22402	27256-200
22403	27256-170
22601	NMC2816
22701	X2816A-45
22702	X2816A-35
22703	X2816A-30
22704	X2816A-25
22801	X2864A-45
22802	X2864A-35
22803	X2864A-30
22804	X2864A-25
22805	X2864A-35
22806	X2864A-25
22807	2864-350
22808	2864-250
22809	2864H-250
22810	5564-250
22811	5564-250
23001	93410
23002	93421
23003	93411
23004	93L420
23101	93415 60 ns ($t_{WHAC} = 5$ ns, $t_{AVWL} = 15$ ns)
23102	93425 60 ns ($t_{WHAC} = 5$ ns, $t_{AVWL} = 15$ ns)
23103	93L415 70 ns
23104	93L425 70 ns
23105	93415 60 ns ($t_{WHAC} = 10$ ns, $t_{AVWL} = 10$ ns)
23106	93425 60 ns ($t_{WHAC} = 10$ ns, $t_{AVWL} = 10$ ns)
23107	93415 45 ns
23107	82S10 45 ns

Military Device Type* JM38510/	Generic/ Industry no.
23108	93425A 45 ns
23108	82S11 45 ns
23109	93412 60 ns
23110	93422 60 ns
23111	93L412 75 ns
23112	93L422 75 ns
23113	93L425A 50 ns
23114	93422A 45 ns
23115	93L422A 55 ns
23201	93419
23301	93470
23302	93471
23501	TMS4060 (85°C MAX)
23502	TMS4050 (85°C MAX)
23503	TMS4060 (100°C MAX)
23504	TMS4050 (100°C MAX)
23505	MM5280 (85°C MAX)
23506	MM5280 (100°C MAX)
23601	MCM6605 (85°C MAX)
23602	MCM6604A (85°C MAX)
23602	MKB4096 (85°C MAX)
23603	MCM6605 (100°C MAX)
23604	MCM6604A (100°C MAX)
23604	MKB4096 (100°C MAX)
23701	AM9130CFC
23702	AM9130AFC
23703	AM9130CFM
23703	AM9130CDM
23704	AM9130ADM
23704	AM9130AFM
23705	AM91L30CF
23706	AM91L30AF
23707	AM91L30CFM
23707	AM91L30CDM
23708	AM91L30AFM
23708	AM91L30ADM
23709	AM9140CFC
23710	AM9140AFC
23711	AM9140CFM
23711	AM9140CDM
23712	AM9140AFM
23712	AM9140ADM

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
23713	AM91L40CFC	24501	6504
23714	AM91L40AFC	24502	6514
23715	AM91L40CFM		
23715	AM91L40CDM	24601	M41256P-12
23716	AM91L40AFM	24601	MT1257-12
23716	AM91L40ADM	24602	M41256P-15
		24602	MT1257-15
23801	2147	24603	M41256N-12
23802	2114	24603	MT1259-12
23803	2147H	24604	M41256N-15
23804	2114A	24604	MT1259-15
23805	2147H-3		
23806	2148H	25001	MKB4501-81
23807	2147H-2	25001	7C412-12
		25002	MKB4501-80
23901	6508	25002	7C412-10
23901	54C929	25003	MKB4501-88
23902	6518		
23902	54C930	28901	7C147
		28902	7C148
24001	2117	28903	2147
	(200 ns access time)	28904	2148
24001	4116		
	(200 ns access time)	29101	6116, 65162
24002	2117	29102	6516
	(250 ns access time)	29103	65262
24002	4116	29104	6116, 65162
	(250 ns access time)	29105	6116, 65162
24003	2117	29106	51C67
	(200 ns page mode operation guaranteed)	29106	61CD16
24003	4116	29201	7187S55
	(200 ns page mode operation guaranteed)	29201	99C641-55
		29202	7187S45
		29202	99C641-45
24401	2164 (1 ms refresh)	29203	7187L55
24401	4564 (1 ms refresh)	29203	99CL641-55
24401	6665 (1 ms refresh)	29204	7187L70
24401	8264 (1 ms refresh)	29204	99CL641-70
24402	2164 (2 ms refresh)	29205	65642
24402	4564 (2 ms refresh)	29206	65643
24402	6665 (2 ms refresh)		
24402	8264 (2 ms refresh)	30001†	54LS00†
24403	6665 (2 ms refresh)	30002†	54LS03†
24403	4564 (2 ms refresh)	30003†	54LS04†
24403	2164 (2 ms refresh)	30004	54LS05
24403	8264 (2 ms refresh)	30005†	54LS10†
		30006	54LS12

† JM38510 Class S qualified in addition to Class B.

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
30007†	54LS20†	30901†	54LS151†
30008	54LS22	30902†	54LS153†
30009†	54LS30†	30903†	54LS157†
30101†	54LS73A†	30904†	54LS158†
30102†	54LS74A†	30905†	54LS251†
30103†	54LS112A†	30906†	54LS257B†
30104	54LS113A	30907	54LS258B
30105	54LS114A	30908†	54LS253†
30106†	54LS174†	30909	54LS298
30107†	54LS175†	31001†	54LS11†
30108	54LS107A	31002	54LS15
30109†	54LS109A†	31003	54LS21
30110†	54LS76A†	31004†	54LS08†
30201†	54LS40†	31005	54LS09
30202†	54LS37†	31101†	54LS85†
30203†	54LS38†	31201	54LS83A
30204	54LS28	31202†	54LS283†
30301†	54LS02†	31301	54LS13
30302†	54LS27†	31302	54LS14
30303	54LS266	31303	54LS132
30401†	54LS51†	31401†	54LS123†
30401	9LS51	31402†	54LS221†
30402†	54LS54†	31403	54LS122
30402	9LS54	31501	54LS90
30501†	54LS32†	31502†	54LS93†
30502†	54LS86A†	31503†	54LS160A†
30601†	54LS194A†	31504†	54LS161A†
30602†	54LS195A†	31505	54LS168
30603	54LS95B	31506	54LS169A
30604	54LS96	31507†	54LS192†
30605†	54LS164†	31508†	54LS193†
30606	54LS295B	31509†	54LS191†
30607	54LS395A	31510	54LS92
30608†	54LS165A†	31511	54LS162A
30609	54LS166A	31512†	54LS163A†
30701†	54LS138†	31513†	54LS190†
30702	54LS139	31601	54LS75
30703	54LS42	31602	54LS279A
30704	54LS47	31603	54LS259
30801	54LS181	31604	54LS375
		31605†	54LS259B†

† JM38510 Class S qualified in addition to Class B.

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
31801	54LS261
31901	54LS670
31902	54LS170
32001	54LS196
32002	54LS197
32003	54LS290
32004	54LS293
32102†	54LS26†
32201	54LS365A
32202†	54LS366A†
32203†	54LS367A†
32204†	54LS368A†
32301	54LS125A
32302	54LS126A
32401†	54LS240†
32402	54LS241
32403†	54LS244†
32404	54LS540
32405	54LS541
32501†	54LS273†
32502†	54LS373†
32503†	54LS374†
32504†	54LS377†
32601†	54LS155A†
32602	54LS156
32701	54LS390
32702†	54LS393†
32703	54LS490
32801	54LS242
32802	54LS243
32803†	54LS245†
32804	54LS646
32805	54LS648
32901†	54LS280†
33001	54F00
33002	54F04
33003	54F10
33004	54F20

Military Device Type JM38510/	Generic/ Industry no.
33106	25LS174
33107	25LS175
33201†	54F240†
33202†	54F241†
33203	54F244
33301	54F02
33401	54F64
33501	54F32
33601	54F194
33701	54F138
33702	54F139
33801	54F181
33802	54F182
33803	54F381
33804	54F382
33901	54F151
33902	54F153
33903	54F157
33904	54F158
33905	54F251
33906	54F257
33907	54F258
33908	54F253
33909	54F352
33910	54F353
34001	54F08
34002	54F11
34101	54F74
34102	54F109
34103	54F112
34104	54F175
34105†	54F374†
34106	54F534
34107	54F174
34201	54F283
34301	54F161A
34302	54F163A
34303	54F191

† JM38510 Class S qualified in addition to Class B.

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
34304	54F193
34401	54F160A
34402	54F162A
34403	54190
34404	54F192
34501	54F86
34601	54F373
34602	54F533
34603	54F563
34604	54F573
34701	54F521
34801	54F242
34802	54F243
34803†	54F245†
34901	54F280
35001	54F398
35002	54F399
35101	54F365
35201	54F37
35202	54F38
35203	54F40
36001†	54LS148†
36002	54LS348
36101†	54LS173A†
37001	54ALS00A
37002	54ALS10A
37003	54ALS20A
37004	54ALS30A
37005	54ALS133
37006	54ALS04B
37101	54ALS74A
37102	54ALS109A
37103	54ALS112A
37104	54ALS574A
37105	54ALS576
37106	54ALS874
37107	54ALS876

† JM38510 Class S qualified in addition to Class B.

Military Device Type JM38510/	Generic/ Industry no.
37201	54ALS174
37202	54ALS175
37203	54ALS373
37204	54ALS374
37301	54ALS02
37302	54ALS27
37401	54ALS08
37402	54ALS11A
37501	54ALS32
37601	54ALS299
37602	54ALS323
37701	54ALS138
37901	54ALS857
38001	54ALS161B
38002	54ALS163B
38003	54ALS169B
38004	54ALS561
38005	54ALS569
38101	54ALS160
38102	54ALS162
38103	54ALS168
38104	54ALS560
38105	54ALS568
38201	54ALS573B
38202	54ALS580
38203	54ALS873
38204	54ALS880
38301	54ALS240A
38302	54ALS241A
38303	54ALS244A
38401	54ALS1000A/54ALS37
38402	54ALS1002A/54ALS28
38403	54ALS1003/54ALS38
38404	54ALS1008
38405	54ALS1010
38406	54ALS1011
38407	54ALS1020A/54ALS40
38408	54ALS1032
38409	54ALS1004

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
38410	54ALS1005
38411	54ALS1034
38412	54ALS1035
38501	54ALS640B
38502	54ALS641
38503	54ALS642
38504	54ALS643
38505	54ALS645
38506	54ALS242
38507	54ALS243
40001	6800
40101	MC6821
40201	6810
40301	2316E
40301	2616
40301	3516E
40301	9218
40301	S6831B
40301	MK34000
40301	52116
40301	68A316E
42001	8080A
42101	8212
42101	54S412
42201	8224
42301	8228
44001	2901B
44101	2905
44102	2906
44103	2907
44104	2915
44105	2916
44106	2917
44201	2918
46001	9900A
46501	SBP9989
47001	1802D

Military Device Type JM38510/	Generic/ Industry no.
47101	1821
47102	1822
47201	1832
47301	1852
47401	1853
47601	1856
47602	1857
48001	Z-80A CPU
48002	Z-80 CPU
48003	Z-80B CPU
48101	Z-80A S10/2
48102	Z-80 S10/2
48201	Z-80A DMA
48202	Z-80 DMA
48301	Z80A CTC
48302	Z80 CTC
48401	Z80A P10
48402	Z80 P10
49001	8048
49002	8035L
50001	TDC1008JM
50002	TDC1009JM
50003	TDC1010JM
50004	MPY-8HJM
50005	MPY-12HJM
50006	MPY-16HJM
50201	82S101
50201	93458
50202	82S100
50202	93459
50301	PAL10H8
50302	PAL12H6
50303	PAL14H4
50304	PAL16H2
50305	PAL16C1
50306	PAL10L8
50307	PAL12L6
50308	PAL14L4

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Military Products

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
50309	PAL16L2	60503	Gate Array
50401	PAL16L8A	60504	Gate Array
50402	PAL16R8A	60505	Gate Array
50403	PAL16R6A	60506	Gate Array
50404	PAL16R4A	61001	6564-1
50405	PAL16X4	61002	6564-2
50406	PAL16A4	61003	6564-3
50407	PAL16L8A-2	61501	1HC3425
50408	PAL16R8A-2	61502	1HC3435
50409	PAL16R6A-2	61503	1HC3450
50410	PAL16R4A-2	61601	1HC38
50501	PAL20L8A	63001	BFRP10
50502	PAL20R8A		
50503	PAL20R6A	65001†	54HC00†
50504	PAL20R4A	65002†	54HC10†
50601	PAL16L8-20	65003†	54HC20†
50602	PAL16R8-20	65004†	54HC30†
50603	PAL16R6-20	65005	54HC132
50604	PAL16R4-20	65101†	54HC02†
50605	PAL16L8-30	65102†	54HC27†
50606	PAL16R8-30	65103†	54HC266†
50607	PAL16R6-30	65104†	54HC4002†
50608	PAL16R4-30	65105	54HC7266
50609	PAL16L8-15	65201†	54HC32†
50610	PAL16R8-15	65202†	54HC86†
50611	PAL16R6-15	65203†	54HC08†
50612	PAL16R4-15	65204†	54HC11†
52001	Z8001CPU	65301	54HC73
52002	Z8002CPU	65302†	54HC74†
52003	Z8001ACPU	65303	54HC107
52004	Z8002ACPU	65304†	54HC109†
53001	8086	65305†	54HC112†
54001	MC68000-6	65306†	54HC173†
54002	MC68000-8	65307†	54HC174†
55501	UT1553BRT1	65308†	54HC175†
60001	Gate Array	65352†	54HCT74†
60002	Gate Array	65401	54HC75
60003	Gate Array	65402†	54HC259†
60501	Gate Array	65403†	54HC373†
60502	Gate Array	65404	54HC533
		65405	54HC563

† JM38510 Class S qualified in addition to Class B.

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.
65406†	54HC573†	65853	54HCT139
65453†	54HCT373†	66301	54HC160
65501	54HC242	66302†	54HC161†
65502	54HC243	66303	54HC162
65503†	54HC245†	66304†	54HC163†
65506	54HC640	66305	54HC191
65507	54HC643	66306	54HC192
65508	54HC646	66307	54HC193
65509	54HC648	66308	54HC390
65553†	54HCT245†	66309†	54HC393†
65601†	54HC273†	66310	54HC4017
65602†	54HC374†	66311	54HC4020
65603	54HC377	66312	54HC4024
65604†	54HC574†	66313	54HC4040
65605	54HC534		
65606	54HC564		
65652	54HCT374		
65701†	54HC04†		
65702	54HC14		
65703†	54HC240†		
65704†	54HC241†		
65705†	54HC244†		
65706†	54HC365†		
65707	54HC366		
65708†	54HC367†		
65709†	54HC368†		
65710†	54HC540†		
65711†	54HC541†		
65712	54HC4049		
65713	54HC4050		
65751	54HCT04		
65752	54HCT14		
65753	54HCT240		
65754	54HCT241		
65755†	54HCT244†		
65760	54HCT540		
65761	54HCT541		
65801	54HC42		
65802†	54HC138†		
65803†	54HC139†		
65804	54HC154		
65805	54HC238		
65852†	54HCT138†		

† JM38510 Class S qualified in addition to Class B.

JM38510 INTEGRATED CIRCUITS AND GENERIC TYPE CROSS-REFERENCE

Military Device Type JM38510/	Generic/ Industry no.
65504	54HC620
65505	54HC623
65901	54HC123
65902	54HC221
66001	54HC147
66002	54HC148
66101	54HC85
66102	54HC682
66103	54HC684
66104	54HC686
66105	54HC688
66201	54HC151
66202	54HC153
66203	54HC157
66204	54HC158
66205	54HC251
66206	54HC253
66207	54HC257
66208	54HC354
66209	54HC356
66314	54HC4520
66401	54HC590
66402	54HC592
66403	54HC593
66501	54HC164
66502	54HC165
66503	54HC166
66504	54HC194
66505	54HC195
66506	54HC299
66507	54HC595
66508	54HC597
66601	54HC670
66701	54HC283
66801	54HC280

*Tentative Assignments



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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
061	11901	2117	24003
062	11902	2147	23801
064	11903	2147	28903
071	11904	2147H	23803
072	11905	2147H-2	23807
074	11906	2147H-3	23805
198	12501	2148	28904
1020	12705	2148H	23806
1218	12707	2164	24401
1220	12706	2164	24402
1524	12601	2164 (2 ms refresh)	24403
1558	10108	2316E	40301
1802D	47001	2500	12204
1821	47101	2510	12205
1822	47102	2520	12206
1832	47201	2532	22201
1852	47301	25LS174	33106
1853	47401	25LS175	33107
1856	47601	2600	12202
1857	47602	2616	40301
10501	06001	2700	12201
10502	06002	2702	13602
10504	06201	2708	22001
10505	06003	2716	22101
10506	06004	27256-170	22403
10507	06005	27256-200	22402
10509	06006	27256-250	22401
10524	06301	2620	12203
10525	06302	27S180	20903
10531	06101	27S181	20904
10535	06104	27S191	21002
10576	06103	2864-250	22808
10597	06202	2864-350	22807
10631	06102	2864H-250	22809
1HC3425	61501	28S166A	21002
1HC3435	61502	28S166A	21004
1HC3450	61503	2901B	44001
1HC38	61601	2905	44101
200	12301	2906	44102
200	12303	2907	44103
201	12302	2915	44104
201	12304	2916	44105
2003	14103	2917	44106
2114	23802	2918	44201
2114A	23804	29631	20904
2117	24001	29651	20902
2117	24002	29651	20908

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
29671	21102	4019B	05352
29681	21002	4020A	05603
300	11601	4020B	05653
301	11602	4021A	05704
302	11603	4021B	05754
303	11604	4022A	05604
304	11605	4022B	05654
305	11606	4023A	05003
306	11607	4023B	05053
307	11608	4024A	05605
3018A	10801	4024B	05655
3045	10802	4025A	05204
3516E	40301	4025B	05254
3636	21002	4027A	05102
4000A	05201	4027B	05152
4000B	05251	4028A	05901
4001A	05202	4028B	05951
4001B	05252	4030A	05303
4002A	05203	4030B	05353
4002B	05253	4031A	05705
4006A	05701	4031B	05755
4006B	05751	4034A	05706
4007A	05301	4034B	05756
4007UB	05351	4041A	05505
4008A	05401	4041UB	05555
4008B	05451	4043A	05103
4009A	05501	4043B	05153
4009UB	05551	4048A	05304
4010A	05502	4048B	05354
4010B	05552	4049A	05503
4011A	05001	4049UB	05553
4011B	05051	4050A	05504
4012A	05002	4050B	05554
4012B	05052	4066A	05802
4013A	05101	4066B	05852
4013B	05151	4067B	17801
4014A	05702	4069UB	17401
4014B	05752	4070B	17203
4015A	05703	4071B	17101
4015B	05753	4072B	17102
4016A	05801	4073B	17003
4016B	05851	4075B	17103
4017A	05601	4076B	17501
4017B	05651	4077B	17204
4018A	05602	4081B	17001
4018B	05652	4082B	17002
4019A	05302	4085B	17201

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
4086B	17202	565	12103
4093B	17701	566	12104
4095B	17502	584S	12801
4096B	17503	584T	12802
4097B	17802	5040	10501
4098B	17504	5041	10502
4099B	17601	5042	10503
4116	24001	5043	10504
4116	24002	5044	10505
4116	24003	5045	10506
4136	11004	5046	10507
4156	11003	5047	10508
4502B	17403	5200	12001
4508B	17602	5201	12003
4514B	17301	5202	12005
4515B	17302	5203	12002
4532B	17303	5204	12004
4555B	17304	5205	12006
4556B	17305	5206	12007
4564	24401	5207	12008
4564	24402	5210	12009
4564 (2 ms refresh)	24403	5211	12011
4741	11003	52116	40301
40106B	17702	5212	12013
40107B	17402	5213	12010
40109B	17404	5214	12012
40174B	17505	5215	12014
40257B	17803	5216	12015
506	19001	5217	12016
506A	19002	5300-1	20301
507	19003	5301-1	20302
507A	19004	5303-1	20401
508	19007	5306-1	20402
508A	19005	5330	20701
509	19008	5331	20702
509A	19006	5340-1	20801
51C67	29106	5341-1	20802
524S	14301	5348-1	20804
532S	13903	5349-1	20805
534S	13902	5352-1	20601
534T	13901	5353-1	20602
555	10901	5380-2	20903
*555 ($I_{\text{source}} = 60 \text{ mA}$)	10903	5381-2	20904
556	10902	53S480	20901
561	13301	53S840	20907
562	12101	53S841	20902
563	12102	53S841	20908

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
53S1680	21001	5476	00204
53S1681	21002	5477	01502
53S3281	21102	5479	00207
5400	00104	5480	00604
5401	00107	5482	00601
5402	00401	5483	00602
5403	00109	5485	15001
5404	00105	5486	00701
5405	00108	5490	01307
5406	00801	5492	01301
5407	00803	5493	01302
5408	01601	5495	00901
5409	01602	5496	00902
5410	00103	54107	00203
5412	00106	54116	01503
5413	15101	54121	01201
5414	15102	54122	01202
5416	00802	54123	01203
5417	00804	54125	15301
5420	00102	54126	15302
5423	00402	54132	15103
5425	00403	54145	01005
5426	00805	54147	15601
5427	00404	54148	15602
5428	16201	54150	01401
5430	00101	54151	01406
5432	16101	54153	01403
5437	00302	54154	15201
5438	00303	54155	15202
5440	00301	54156	15203
5442	01001	54157	01405
5443	01002	54160	01303
5444	01003	54161	01306
5445	01004	54162	01305
5446	01006	54163	01304
5447	01007	54164	00903
5448	01008	54165	00904
5449	01009	54170	01801
5450	00501	54174	01701
5451	00502	54175	01702
5453	00503	54180	01901
5454	00504	54181	01101
5470	00206	54182	01102
5472	00201	54190	34403
5473	00202	54192	01308
5474	00205	54193	01309
5475	01501	54194	00905

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
54195	00906	54ALS576	37105
54365	16301	54ALS580	38202
54366	16302	54ALS640B	38501
54367	16303	54ALS641	38502
54368	16304	54ALS642	38503
54ALS00A	37001	54ALS643	38504
54ALS02	37301	54ALS645	38505
54ALS04B	37006	54ALS857	37901
54ALS08	37401	54ALS873	38203
54ALS10A	37002	54ALS874	37106
54ALS11A	37402	54ALS876	37107
54ALS20A	37003	54ALS880	38204
54ALS27	37302	54ALS1000A	38401
54ALS28	38402	54ALS1002A	38402
54ALS30A	37004	54ALS1003	38403
54ALS32	37501	54ALS1004	38409
54ALS37	38401	54ALS1005	38410
54ALS38	38403	54ALS1008	38404
54ALS40	38407	54ALS1010	38405
54ALS74A	37101	54ALS1011	38406
54ALS109A	37102	54ALS1020A	38407
54ALS112A	37103	54ALS1032	38408
54ALS133	37005	54ALS1034	38411
54ALS138	37701	54ALS1035	38412
54ALS160	38101	54C929	23901
54ALS161B	38001	54C930	23902
54ALS162	38102	54F00	33001
54ALS163B	38002	54F02	33301
54ALS168	38103	54F04	33002
54ALS169B	38003	54F08	34001
54ALS174	37201	54F10	33003
54ALS175	37202	54F11	34002
54ALS240A	38301	54F20	33004
54ALS241A	38302	54F32	33501
54ALS242	38506	54F37	35201
54ALS243	38507	54F38	35202
54ALS244A	38303	54F40	35203
54ALS299	37601	54F64	33401
54ALS323	37602	54F74	34101
54ALS373	37203	54F86	34501
54ALS374	37204	54F109	34102
54ALS560	38104	54F112	34103
54ALS561	38004	54F138	33701
54ALS568	38105	54F139	33702
54ALS569	38005	54F151	33901
54ALS573B	38201	54F153	33902
54ALS574A	37104	54F157	33903

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
54F158	33904	54H21	15503
54F160A	34401	54H22	02307
54F161A	34301	54H30	02301
54F162A	34402	54H40	02401
54F163A	34302	54H50	04001
54F191	34303	54H51	04002
54F192	34404	54H53	04003
54F193	34304	54H54	04004
54F174	34107	54H55	04005
54F175	34104	54H72	02201
54F181	33801	54H73	02202
54F182	33802	54H74	02203
54F194	33601	54H76	02204
54F240†	33201†	54H101	02205
54F241	33202	54H103	02206
54F242	34801	54HC00†	65001†
54F243	34802	54HC02†	65101†
54F244	34203	54HC04†	65701†
54F245†	34803†	54HC08†	65203†
54F251	33905	54HC10†	65002†
54F253	33908	54HC11†	65204†
54F257	33906	54HC14	65702
54F258	33907	54HC20†	65003†
54F280	34901	54HC27†	65102†
54F283	34201	54HC30†	65004†
54F352	33909	54HC32†	65201†
54F353	33910	54HC42	65801
54F365	35101	54HC73	64301
54F373	34601	54HC74†	65302†
54F374†	34105†	54HC75	65401
54F381	33803	54HC86†	65202†
54F382	33804	54HC107	65303
54F398	35001	54HC109†	65304†
54F399	35002	54HC112†	65305†
54F521	34701	54HC132	65005
54F533	34602	54HC138†	65802†
54F534	34106	54HC139†	65803†
54F563	34603	54HC154	65804
54F573	34604	54HC160	66301
54H00	02304	54HC161	66302
54H01	02306	54HC162	66303
54H04	02305	54HC163	66304
54H08	15501	54HC173†	65306†
54H08	15504	54HC174†	65307†
54H10	02303	54HC175†	65308†
54H11	15502	54HC191	66305
54H20	02302	54HC192	66306

† JM38510 Class S qualified in addition to Class B.

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
54HC193	66307	54HCT244†	65755†
54HC238	65805	54HCT245†	65553†
54HC240†	65703†	54HCT373†	65453†
54HC241†	65704†	54HCT374	65652
54HC242	65501	54HCT540	65760
54HC243	65502	54HCT541	65761
54HC244†	65705†	54L00	02004
54HC245†	65503†	54L01	02006
54HC259†	65402†	54L02	02701
54HC266†	65103†	54L03	02006
54HC273†	65601†	54L04	02005
54HC365†	65706†	54L10	02003
54HC366	65707	54L20	02002
54HC367†	65708†	54L30	02001
54HC368†	65709†	54L42	02901
54HC373†	65403†	54L43	02902
54HC374†	65602†	54L44	02903
54HC377	65603	54L46	02904
54HC390	66308	54L47	02905
54HC393	66309	54L51	04101
54HC533	65404	54L54	04102
54HC534	65605	54L55	04103
54HC540†	65710†	54L71	02101
54HC541†	65711†	54L72	02102
54HC563	65405	54L73	02103
54HC564	65606	54L74	02105
54HC573†	65406†	54L78	02104
54HC574†	65604†	54L86	02601
54HC640	66506	54L90	02501
54HC643	66507	54L93	02502
54HC646	66508	54L95	02801
54HC648	66509	54L121	04201
54HC4002†	65104†	54L122	04202
54HC4017	66310	54L164	02802
54HC4020	66311	54L193	02503
54HC4024	66312	54LS00†	30001†
54HC4040	66313	54LS02†	30301†
54HC4049	65712	54LS03†	30002†
54HC4050	65713	54LS04†	30003†
54HC7266	65105	54LS05	30004
54HCT04	65751	54LS08†	31004†
54HCT14	65752	54LS09	31005
54HCT74†	65352†	54LS10†	30005†
54HCT138†	65852†	54LS11†	31001†
54HCT139	65853	54LS12	30006
54HCT240	65753	54LS13	31301
54HCT241	65754	54LS14	31302

† JM38510 Class S qualified in addition to Class B.

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
54LS15	31002	54LS160A†	31503†
54LS20†	30007†	54LS161A†	31504†
54LS21	31003	54LS162A	31511
54LS22	30008	54LS163A†	31512†
54LS26†	32102†	54LS164†	30605†
54LS27†	30302†	54LS165A†	30608†
54LS28	30204	54LS166A†	30609†
54LS30†	30009†	54LS168	31505
54LS32†	30501†	54LS169A	31506
54LS37†	3020†	54LS170	31902
54LS38†	30203†	54LS173A†	36101†
54LS40†	30201†	54LS174†	30106†
54LS42	30703	54LS175†	30107†
54LS47	30704	54LS181	30801
54LS51†	30401†	54LS190†	31513†
54LS54†	30402†	54LS191†	31509†
54LS73A†	30101†	54LS192	31507
54LS74A†	30102†	54LS193†	31508†
54LS75	31601	54LS194A†	30601†
54LS76A†	30110†	54LS195A	30602
54LS83A	31201	54LS196	32001
54LS85†	31101†	54LS197	32002
54LS86A†	30502†	54LS221†	31402†
54LS90†	31501†	54LS240†	32401†
54LS92	31510	54LS241	32402
54LS93†	31502†	54LS242	32801
54LS95B	30603	54LS243	32802
54LS96	30604	54LS244†	32403†
54LS107A	30108	54LS245†	32803†
54LS109A†	30109†	54LS251†	30905†
54LS112A†	30103†	54LS253†	30908†
54LS113A	30104	54LS257B†	30906†
54LS114A	30105	54LS258B	30907
54LS122	31403	54LS259	31603
54LS123†	31401†	54LS259B†	31605†
54LS125A	32301	54LS261	31801
54LS126A	32302	54LS266	30303
54LS132	31303	54LS273†	32501†
54LS138†	30701†	54LS279A	31602
54LS139	30702	54LS280†	32901†
54LS148†	36001†	54LS283†	31202†
54LS151†	30901†	54LS290	32003
54LS153†	30902†	54LS293	32004
54LS155A†	32601†	54LS295B	30606
54LS156	32602	54LS298	30909
54LS157†	30903†	54LS348	36002
54LS158†	30904†	54LS365A	32201

† JM38510 Class S qualified in addition to Class B.

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Military Products

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
54LS366A†	32202†	54S151	07901
54LS367A†	32203†	54S153	07902
54LS368A†	32204†	54S157	07903
54LS373†	32502†	54S158	07904
54LS374†	32503†	54S174	07105
54LS375	31604	54S175	07106
54LS377†	32504†	54S181	07801
54LS390	32701	54S182	07802
54LS393†	32702†	54S194	07601
54LS395A	30607	54S195	07602
54LS424	42201	54S251	07905
54LS428	42301	54S253	07908
54LS490	32703	54S257	07906
54LS540	32404	54S258	07907
54LS541	32405	54S287	20302
54LS646	32804	54S288	20702
54LS648	32805	54S412	42101
54LS670	31901	54S472	20805
54S00	07001	54S473	20804
54S02	07301	54S474	20802
54S03	07002	54S475	20801
54S04	07003	54S570	20401
54S05	07004	54S571	20402
54S08	08003	54S572	20601
54S09	08004	54S573	20603
54S10	07005	55107A	10401
54S11	08001	55108A	10402
54S15	08002	55113	10405
54S20	07006	55114	10403
54S22	07007	55115	10404
54S30	07008	55325	13001
54S40	07201	55326	13002
54S51	07401	55327	13003
54S64	07402	5532A	13102
54S65	07403	5534A	13101
54S74	07101	5537	12502
54S85	08201	55450	12901
54S86	07501	55451B	12902
54S112	07102	55452B	12903
54S113	07103	55453B	12904
54S114	07104	55454B	12905
54S133	07009	55460	12906
54S134	07010	55461	12907
54S135	07502	55462	12908
54S138	07701	55463	12909
54S139	07702	55464	12910
54S140	08101	574AT hybrid	14004

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† JM38510 Class S qualified in addition to Class B.

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
574AT monolithic	14002	741A	10101
574AU hybrid	14003	747A	10102
574AU monolithic	14001	771	11904
		772	11905
5564-250	22810	774	11906
5564-250	22811	7181	01101
61C016	29106	7413	15101
6108	19007	7414	15102
6116	19001	7520	12702
6116	29101	7521	12703
6116	29104	7523	12701
6116	29105	7541	12704
6208	19008	7602	20701
6216	19003	7603	20702
6504	24501	7610	20301
6508	23901	7611	20302
6514	24502	76160	21001
6516	29102	76161	21002
65162	29101	7620	20401
65162	29104	7621	20402
65162	29105	76321	21102
6518	23902	7640	20801
65262	29103	7641	20802
6564-1	61001	7642	20601
6564-2	61002	7643	20602
6564-3	61003	7644	20603
65642	29205	7680	20903
65643	29206	7681	20904
6654	21901	7684	20901
6665	24401	7685	20902
6665	24402	76L42A	02906
6665	24403	76L70	02805
6665 (2 ms refresh)	24401	76165	21005
6665 (2 ms refresh)	24403	77S180	20903
674AU monolithic	14005	77S181	20904
674AT monolithic	14006	77S184	20901
6800	40001	77S185	20902
6810	402	77S190	21001
68A316E	40301	77S191	21002
710	10301	7805	10706
711	10302	7812	10707
714	13502	7815	10708
7187L55	29203	7824	10709
7187L70	29204	7831	10406
7187S45	29202	7832	10407
7187S55	29201	78G	11702
723	10201	78MG	11701

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
78M05	10702	82S136	20601
78M12	10703	82S137	20602
78M15	10704	82S140	20801
78M24	10705	82S141	20802
7905	11505	82S180	20903
7912	11506	82S181	20904
7915	11507	82S184	20901
7924	11508	82S185	20902
79G	11802	82S190	21001
79MG	11801	82S191	21002
79M05	11501	82S2708	20905
79M12	11502	930	03001
79M15	11503	932	03101
79M24	11504	933	03105
7C147	28901	935	03002
7C148	28902	936	03003
7C412-10	25002	940	03002
7C412-12	25001	944	03102
8035L	49002	945	03301
8048	49001	946	03004
8080A	42001	948	03302
8086	53001	950	03303
8212	42101	951	03201
8224	42201	957	03103
8228	42301	958	03104
8250	15204	962	03005
8251	15205	9093	03304
8252	15206	9218	40301
8264	24401	9300	15901
8264	24402	9301	15206
8264 (2 ms refresh)	24403	9304	00603
82HS321A	21101	9308	01503
82HS321A	21102	9309	01404
82HS641A	21201	9311	15201
82HS641A-55	21202	9312	01402
82HS641-45	21204	9314	01504
82S10	23107	9317	15802
82S11	23108	9318	15603
82S23	20701	9321	15801
82S100	50202	9322	01405
82S101	50201	9324	15002
82S115	20803	9328	15902
82S123	20702	9334	16001
82S126	20301	9338	15701
82S129	20302	9341	01101
83S130	20401	93410	23001
83S131	20402	93411	23003

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
93412	23109	93L425	23104
93415	23101	93L425A	23113
93415	23105	93Z510	21003
93415	23107	93Z511	21002,21004
93417	20301	93Z665-45	21204
93419	23201	93Z665-50	21203
9342	01102	93Z665-55	21202
93421	23002	93Z665-70	21201
93422	23110	93Z667-45	21204
93422A	23114	93Z667-50	21203
93425	23102	93Z667-55	21202
93425	23106	93Z667-70	21201
93425A	23108	9601	01204
93427	20302	9602	01205
93436	20401	9614	10403
93438	20801	9615	10404
93446	20402	9900A	46001
93448	20802	99C641-45	29202
93450	20903	99C641-55	29201
93451	20904	99CL641-55	29203
93452	20601	99CL641-70	29204
93453	20602	9LS51	30401
93458	50201	9LS54	30402
93459	50202	AD558T	14401
93460	20906	AD650	13803
93461	20905	ADC571	13401
93470	23301	AM9130CFC	23701
93471	23302	AM9130AFC	23702
93510	21001	AM9130CFM,AM9130CDM	23703
93511	21002	AM9130AFM,AM9130ADM	23704
93L00	02804	AM91L30CF	23705
93L01	02907	AM91L30AF	23706
93L08	04502	AM91L30CFM,	
93L09	04601	AM91L30CDM	23707
93L10	02504	AM91L30AFM,	
93L12	04602	AM91L30ADM	23708
93L14	04501	AM9140CFC	23709
93L16	02505	AM9140AFC	23710
93L18	04301	AM9140CFM,AM9140CDM	23711
93L22	04603	AM9140AFM,AM9140ADM	23712
93L24	04401	AM91L40CFC	23713
93L28	02803	AM91L40AFC	23714
93L412	23111	AM91L40CFM,	
93L415	23103	AM91L40CDM	23715
93L420	23004	AM91L40AFM,	
93L422	23112	AM91L40ADM	23716
93L422A	23115	BFRP10	63001

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
DAC-08	11301	LM117K	11704
DAC-08A	11302	LM118	10107
DAC87 (hybrid)	13701	LM120H-05	11501
DAC87 (monolithic)	13702	LM120H-12	11502
DAC87 (hybrid)	13703	LM120H-15	11503
DG181A	11101	LM120H-24	11504
DG182A	11102	LM120K-05	11505
DG184A	11103	LM120K-12	11506
DG185A	11104	LM120K-15	11507
DG187A	11105	LM120K-24	11508
DG188A	11106	LM124	11005
DG190A	11107	LM129A	12402
DG191A	11108	LM129B	12406
DG200	12301	LM137H	11803
Gate Array	60001	LM137K	11804
Gate Array	60002	LM138K	11706
Gate Array	60003	LM139	11201
Gate Array	60501	LM140H-05	10702
Gate Array	60502	LM140H-12	10703
Gate Array	60503	LM140H-15	10704
Gate Array	60504	LM140H-24	10705
Gate Array	60505	LM140K-05	10706
Gate Array	60506	LM140K-12	10707
HPROM-0512	20101	LM140K-15	10708
IM5603A	20201	LM140K-24	10709
IM5623	20202	LM148	11001
LF147	11906	LM149	11002
LF151	11904	LM150K	11705
LF153	11905	LM193	11202
LF155	11401	LM199	12404
LF155A	11404	LM199A	12401
LF156	11402	LM199A-20	12405
LF156A	11405	LM723	10201
LF157	11403	M41256N-12	24603
LF157A	11406	M41256N-15	24604
LH2101A	10105	M41256P-12	24601
LH2108A	10106	M41256P-15	24602
LH2110	10603	MC6821	40101
LH2111	10305	MC68000-6	54001
LM101A	10103	MC68000-8	54002
LM102	10601	MCM4096 (85°C Max)	23602
LM106	10303	MCM4096 (100°C Max)	23604
LM108A	10104	MCM5303	20101
LM109	10701	MCM5304	20102
LM110	10602	MCM6604A (85°C Max)	23602
LM111	10304	MCM6604A (100°C Max)	23604
LM117H	11703	MCM6605 (85°C Max)	23601

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GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/	Generic/ Industry no.	Military Device Type JM38510/
MCM6605 (100°C Max)	23603	PAL16R4-30	50608
MH0026	03501	PAL16R4A-2	50410
MK34000	40301	PAL16R6A	50403
MKB4096 (85°C max)	23602	PAL16R6A-2	50409
MKB4096 (100°C max)	23604	PAL16R8A	50402
MKB4501-80	25002	PAL16R8A-2	50408
MKB4501-81	25001	PAL16X4	50405
MKB4501-88	25003	PAL20L8A	50501
MM5280 (85°C max)	23505	PAL20R4A	50504
MM5280 (100°C max)	23506	PAL20R6A	50503
MPY-8HJM	50004	PAL20R8A	50502
MPY-12HJM	50005	R675B-3	13602
MPY-16HJM	50006	R675B-4	13601
MT1257-12	24601	REF10	12403
MT1257-15	24602	S6831B	40301
MT1259-12	24603	SBP9989	46501
MT1259-15	24604	TDC1008JM	50001
NMC2816	22601	TDC1009JM	50002
OP-07	13502	TDC1010JM	50003
OP-07A	13501	TL431	14801
OP-27A	13503	TMS4050 (85°C max)	23502
OP-37A	13505	TMS4050 (100°C max)	23504
OP-227A	13504	TMS4060 (85°C max)	23501
PAL10H8	50301	TMS4060 (100°C max)	23503
PAL10L8	50306	UT1553BRT1	55501
PAL12H6	50302	VFC32	13801
PAL12L6	50307	VFC320	13802
PAL14H4	50303	X2816A-25	22704
PAL14L4	50308	X2816A-30	22703
PAL16A4	50406	X2816A-35	22702
PAL16C1	50305	X2816A-45	22701
PAL16H2	50304	X2864A-25	22804
PAL16L2	50309	X2864A-25	22806
PAL16L8-15	50609	X2864A-30	22803
PAL16L8-20	50601	X2864A-35	22802
PAL16L8-30	50605	X2864A-35	22805
PAL16L8A	50401	X2864A-45	22801
PAL16L8A-2	50407	Z-80 CPU	48002
PAL16R4A	50404	Z80 CTC	48302
PAL16R8-15	50610	Z80-DMA	48202
PAL16R6-15	50611	Z80-PIO	48402
PAL16R4-15	50612	Z80-SIO2	48102
PAL16R8-20	50602	Z-80A CPU	48001
PAL16R6-20	50603	Z80A CTC	48301
PAL16R4-20	50604	Z80A-DMA	48201
PAL16R8-30	50606	Z80A PIO	48401
PAL16R6-30	50607	Z80A-SIO/2	48101

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type JM38510/
Z-80B CPU	48003
Z8001 CPU	52001
Z8001A CPU	52003
Z8002 CPU	52002
Z8002A CPU	52004

GENERIC TYPE AND JM38510 DEVICE CROSS-REFERENCE GUIDE

Generic/ Industry no.	Military Device Type* JM38510/
54HC85	66101
54HC123	65901
54HC147	66001
54HC148	66002
54HC151	66201
54HC153	66202
54HC157	66203
54HC158	66204
54HC164	66501
54HC165	66502
54HC166	66503
54HC194	66504
54HC195	66505
54HC221	65902
54HC238	65805
54HC251	66205
54HC253	66206
54HC257	66207
54HC280	66801
54HC283	66701
54HC299	66506
54HC354	66208
54HC356	66209
54HC590	66401
54HC592	66402
54HC593	66403
54HC595	66507
54HC597	66508
54HC620	65504
54HC623	65505
54HC670	66601
54HC682	66102
54HC684	66103
54HC686	66104
54HC688	66105
54HC4520	66314

*Tentative Assignments

DESC Standard Drawings

The DESC Standard Drawing program provides industry standard specifications in compliance with Class B requirements for devices that are not JM38510 qualified. Texas Instruments fully supports the DESC Standard Drawing Program. Refer to Logic Product Spectrum for approved product listing.

DESC STANDARD DRAWING NOMENCLATURE

Example:

5962-85155

Drawing Number

or
82005

01

F

A

Device

Package

- A = 14-pin flatpack (1/4" × 1/4")
- B = 14-pin flatpack (3/16" × 1/4")
- C = 14-pin DIP
- D = 14-pin flatpack
- E = 16-pin DIP
- F = 16-pin flatpack
- G = 8-pin can
- H = 10-pin flatpack
- I = 10-pin can
- J = 24-pin DIP
- K = 24-pin flatpack
- L = 24-pin DIP (300 mil)
- M = 12-pin can
- P = 8-pin DIP
- Q = 40-pin DIP
- R = 20-pin DIP
- S = 20-pin flatpack
- V = 18-pin DIP
- W = 22-pin DIP
- 2 = 20-pad LCC
- 3 = 28-pad LCC
- X = other packages

Lead Finish

- A = Solder Dip
- B = Tin Plate
- C = Gold Plate

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Military Products

DESC CROSS-REFERENCE GUIDE

Generic Part Number	DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.
0056	7800801	26S02	5962-8766201
10516	7800901	26S10	5962-8671901
10H503	5962-8756501	26S12	5962-8753401
10H506	5962-8756401	2700	8503001
10H513	5962-8755801	2700	8503002
10H531	5962-8756101	2702	8503003
10H536	5962-8700101	2702	8503004
10H558	5962-8756601	27128 (450 ns)	8202501
10H560	5962-8756201	27128 (250 ns)	8202502
10H561	5962-8756701	27128A-11	8282507
10H571	5962-8756801	27128A-15	8282506
10H586	5962-8756301	27128A-20	8282503
10H609	5962-8756901	27128A-25	8282505
14584	8550102	27128A-30	8282504
145xxB	See 45xxB	2716 (350 ns)	7802202
1526	8551501	27256 (350 ns)	8411101
1536	7800304	27256 (250 ns)	8411102
1545	8671201	27256 (200 ns)	8411103
15530-8	7802901	27256 (170 ns)	8411104
1823	7901801	2732	8001201
1842	8670401	2732A25	8001203
1853	7901901	2732A45	8001204
1854	7901701	27512-25	5962-8513501
201A	7705301	27512-30	5962-8513503
2118	8101501	27512-35	5962-8513502
2168-55	5962-8608101	27512-45	5962-8513504
2168-70	5962-8608102	2764 (450 ns)	8200501
2169-50	5962-8608103	2764 (250 ns)	8200502
2169-70	5962-8608104	2764A (350 ns)	8200503
2420	8001601	2764A (250 ns)	8200504
2516-45	7802201	2764A (200 ns)	8200505
25LS09	8670801	27C64-20	8510203
25LS13	5962-8754201	27C64-25	8510201
25LS299	7802402	27C64-35	8510202
25LS2518	5962-8671901	27C128-20	5962-8766105
25LS2519	5962-8670201	27C128-25	5962-8766106
25LS2521	5962-8671301	27C128-30	5962-8766107
25LS2569	5962-8754401	27C256-20	5962-8606301
25S09	5962-8672801	27C256-25	5962-8606302
25S10	5962-8671801	27C256-30	5962-8606303
25S240	5962-8672401	27C512-20	5962-8764802
25S241	5962-8672501	27C512-25	5962-8764803
26LS30	5962-8672101	27LS00	8602001
26LS32B	5962-8761601	27LS00A	8602002
26LS34	5962-8759601	27LS01	8602003
		27LS01A	8602004

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DESC CROSS-REFERENCE GUIDE

Generic Part Number	DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.
27LS02	8605103	2964B	5962-8757401
27LS03	8605107	2965	5962-8670701
27LS07	7801504	2966	5962-8670702
27PS191	5962-8552601	29705A	8602501
27PS191A	5962-8552602	29C82X	5962-8766701
27PS291	5962-8552603	29C86X	5962-8770401
27PS291A	5962-8552604	29C116	5962-8861201
27S02	8605101	29FCT520	5962-8873601
27S02A	8605102	29PL141	5962-8872001
27S03	8605104		
27S03A	8605106	3130	7703301
27S07	7801503	32010	8405301
27S07A	7801501	320C10	5962-8763301
27S19	5962-8670301		
27S19A	5962-8670302	4013B	7901101
27S29	5962-8769001	40174B	8202201
27S35	5962-8670601	4021B	7901201
27S35A	5962-8670602	4023B	7901301
27S37	5962-8670603	4029B	8101601
27S37A	5962-8670604	4035B	8101701
27S45	5962-8552701	4040B	7705801
27S45A	5962-8552702	4042B	8101901
27S47	5962-8552703	4044B	7702601
27S47A	5962-8552704	4047B	8102001
27S49	8200901	4049UB	7901401
27S49A	8200902	4052B	7901501
2864	5962-8683001	4053B	8101801
28HC16-55	5962-8867601	4060A	7703101
2901A,B	7700701	4069B	7702701
2901C	8405701	4072B	7706001
2904	8601701	4073B	7705101
2909A	8602701	4078B	7704401
2910	7801701	4081B	7702401
2910A	7801702	4082B	7705901
291A	8602901	4093B	7704601
2911A	8602801	4094B	7702501
29116	5962-8686301	4098B	7705501
2917A	5962-8671401	4164 (120 ns)	8201008
2918	5962-8671501	4164 (150 ns)	8201006
2919	5962-8670201	4164 (200ns)	8201007
2930	5962-8757301	4167 (100 ns)	8200701
2940	8603001	4167 (70 ns)	8200702
2942	5962-8680101	4167 (55 ns)	8200703
2947	5962-8672301	4256-12	8515203
2960	5962-8760201	4256-15	8515201
29633	7902401	4256-20	8515202

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Generic Part Number	DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.
4344	5962-8780301	54AC240	5962-8755001
4502B	7702001	54AC241	5962-8755101
4514B	7703501	54AC244	5962-8755201
4515B	7703201	54AC251	5962-8769201
4516	8101502	54AC253	5962-8769301
4520B	7702301	54AC273	5962-8775601
4528B	7704501	54AC299	5962-8875401
4555B	7704701	54AC373	5962-8755501
4556B	7704801	54AC541	5962-8870601
4557B	7901601	54AC11000	5962-8754902
4564 (150 ns)	8201001,02	54AC11004	5962-8760902
4564 (200 ns)	8201003	54AC11020	5962-8761302
4585	7703702	54AC11240	5962-8755002
46106B	5962-8550101	54ACT00	5962-8769901
506A	5962-8513101	54ACT138	5962-8755401
507A	5962-8513102	54ACT139	5962-8755301
508A	7705201	54ACT151	5962-8875601
508A (0-Vprot.)	7705202	54ACT158	5962-8875501
509A	5962-8513103	54ACT174	5962-8775701
5040	8100601,09	54ACT245	5962-8766301
5041	8100602,10	54ACT299	5962-8877101
5042	8100603,11	54ACT373	5962-8755601
5043	8100604,12	54ACT541	5962-8870401
5044	8100605,13	54ACT821	5962-8870501
5045	8100606,14	54ACT11000	5962-8769902
5046	8100607,15	54ACT11008	5962-8954701
5047	8100608,16	54ACT11074	5962-8752502
51C67	8413202	54ACT11109	5962-8853402
521	5962-8751601	54ACT11240	5962-8775902
529	5962-8757202	54ACT11244	5962-8755202
52B33	5962-8683004	54ACT11374	5962-8763102
5341	7801601	54ALS00A	5962-8683301
54185A	7703001	54ALS02	5962-8684401
54221	5962-8771101	54ALS04B	5962-8684301
54AC00	5962-8754901	54ALS05A	5962-8854001
54AC02	5962-8761201	54ALS08	5962-8684201
54AC04	5962-8760901	54ALS09	8414201
54AC08	5962-8761501	54ALS10A	5962-8686501
54AC10	5962-8761001	54ALS11A	5962-8684101
54AC11	5962-8761101	54ALS20A	5962-8858901
54AC14	5962-8762401	54ALS21A	8414301
54AC20	5962-8761301	54ALS27	5962-8683801
54AC32	5962-8761401	54ALS30A	5962-8683701
54AC153	5962-8762501	54ALS32	5962-8683601
54AC174	5962-8762601	54ALS38A	5962-8687101
		54ALS74A	8401101

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Generic Part Number	DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.
54ALS86	5962-8862101	54ALS580A	8401202
54ALS109A	8400001	54ALS640B	5962-8872701
54ALS112A	8400002	54ALS645A	8403301
54ALS133	5962-8859001	54ALS652	5962-8867301
54ALS138	5962-8686601	54ALS688	5962-8857801
54ALS139	5962-8768301	54ALS804A	5962-8869301
54ALS151	8414101	54ALS805A	5962-8869401
54ALS153	8413401	54ALS808A	5962-8869501
54ALS157	5962-8686901	54ALS832A	8414501
54ALS158	5962-8862501	54ALS857	5962-8753301
54ALS161B	8302201	54ALS873B	8403201
54ALS162B	8407901	54ALS874B	8401001
54ALS163B	8302202	54ALS876	8401002
54ALS164	5962-8687001	54ALS880	8403202
54ALS165	5962-8957401	54ALS996	5962-8994501
54ALS169B	8302501	54ALS1000A	8405901
54ALS174	8301901	54ALS1004	8406101
54ALS175	8301902	54ALS1008A	8409701
54ALS191	5962-8684001	54ALS1010A	8406001
54ALS193	5962-8869801	54ALS1034	8403101
54ALS240A	5962-8859101	54ALS1035	5962-8874201
54ALS241A	5962-8859601	54ALS1244A	5962-8873801
54ALS242B	8401301	54ALS1245A	5962-8873701
54ALS243A	8401302	54AS21	5962-8780401
54ALS244A	5962-8683901	54AS286	5962-8966301
54ALS245A	8403001	54AS640	5962-8955301
54ALS251	8413501	54AS646	5962-8759501
54ALS253	8509601	54AS651	5962-8875301
54ALS257	8509701	54AS652	5962-8868701
54ALS258	5962-8862601	54AS804B	5962-8776601
54ALS259	5962-8874101	54AS805B	5962-8779401
54ALS273	8413601	54AS808B	5962-8852201
54ALS299	8302101	54AS823	5962-8952501
54ALS323	8302102	54AS832B	5962-8852301
54ALS373	8302001	54AS867	5962-8966801
54ALS374	8302002	54AS1004A	5962-8872901
54ALS520	5962-8869101	54AS1032A	5962-8873001
54ALS534	5962-8866801	54AS1034A	5962-8873101
54ALS541	5962-8960201		
54ALS561A	8302203	54C08	7703601
54ALS563A	5962-8870001	54C85	7703701
54ALS564A	5962-8872801	54C906	7705601
54ALS569A	8302502	54C922	5962-8752101
54ALS573B	8401201		
54ALS574A	8400101	54F09	5962-8872301
54ALS576A	8400102	54F14	5962-8875201

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Generic Part Number	DESC Drawing Part no.
54F21	5962-8955401
54F27	5962-8951001
54F30	5962-8870801
54F36	5962-8870901
54F38	5962-8687201
54F51	5962-8877401
54F85	5962-8606901
54F164	5962-8607101
54F194	5962-8685001
54F241	5962-8687401
54F243	5962-8683401
54F245	8551101
54F350	5962-8607501
54F381	5962-8671001
54F518	5962-8871001
54F519	5962-8871101
54F520	5962-8871201
54F544	5962-8955501
54F776	5962-8870701
54FCT161	5962-8864001
54FCT374A	5962-8762801
54FCT823	5962-8865601
54FCT841	5962-8857501
54FCT863	5962-8866101
54HC00	8403701
54HC02	8404101
54HC03	5962-8764701
54HC04	8409801
54HC05	5962-8871801
54HC08	8404701
54HC09	5962-8862001
54HC10	8403801
54HC11	8404801
54HC14	8409101
54HC20	8403901
54HC21	5962-8857601
54HC27	8404201
54HC30	8404001
54HC32	8404501
54HC42	5962-8682101
54HCT73	5962-8515301
54HC74	8405601
54HC75	8407001
54HC86	8404601
54HC107	5962-8515401

Generic Part Number	DESC Drawing Part no.
54HC109	8415001
54HC112	8408801
54HC123	5962-8684701
54HC125	5962-8772101
54HC126	5962-8684801
54HC133	5962-8772301
54HC138	8406201
54HC139	8409201
54HC147	8406401
54HC151	8412801
54HC153	8409301
54HC154	5962-8682201
54HC157	5962-8606101
54HC158	5962-8682301
54HC160	5962-8682401
54HC161	8407501
54HC162	8409401
54HC163	8607601
54HC164	8416201
54HC165	8409501
54HC173	5962-8682501
54HC174	8407301
54HC175	8408901
54HC191	5962-8689101
54HC192	5962-8780801
54HC193	5962-8772401
54HC194	5962-8682601
54HC195	5962-8680701
54HC237	5962-8860601
54HC238	5962-8688401
54HC240	8407401
54HC242	5962-8863301
54HC243	8409001
54HC244	8409601
54HC245	8408501
54HC251	8512501
54HC253	5962-8868201
54HC257	8512401
54HC259	8551901
54HC266	8404301
54HC273	8409901
54HC280	8607701
54HC299	5962-8780601
54HC365	8500101
54HC366	5962-8682801
54HC367	8500201

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Generic Part Number	DESC Drawing Part no.
54HC368	5962-8681201
54HC373	8407201
54HC374	8407101
54HC377	5962-8780701
54HC390	8600901
54HC393	8410001
54HC4002	8404401
54HC4017	8601101
54HC4020	8500301
54HC4024	8601201
54HC4040	8500401
54HC4049	5962-8681901
54HC4050	5962-8682001
54HC4075	5962-8772201
54HC4538	5962-8688601
54HC533	5962-8681301
54HC534	5962-8681401
54HC563	5962-8606201
54HC564	5962-8681501
54HC573	8512801
54HC590A	5962-8960301
54HC595	5962-8681601
54HC597	5962-8681701
54HC640	5962-8780901
54HC646	5962-8688501
54HC688	5962-8681801
54HCT00	5962-8683101
54HCT08	5962-8688301
54HCT14	5962-8689001
54HCT32	5962-8685201
54HCT74	5962-8685301
54HCT138	8550401
54HCT154	5962-8670101
54HCT161	5962-8685401
54HCT165	5962-8685501
54HCT240	8550501
54HCT244	8513001
54HCT245	8550601
54HCT373	5962-8686701
54HCT374	8550701
54HCT573	5962-8685601
54HCT688	5962-8685701
54HCU04	8601001
54LS09	8001901
54LS26	7602001

Generic Part Number	DESC Drawing Part no.
54LS33	8512601
54LS42	7603101
54LS47	7604501
54LS75	7601201
54LS76A	7601301
54LS83A	7601401
54LS90	7603201
54LS93	7700101
54LS122	7600301
54LS123	7603901
54LS124	7704101
54LS132	7600401
54LS138	7600501
54LS139A	7600701
54LS145	8508401
54LS148	7802701
54LS151	7601001
54LS153	7601101
54LS154	83017
54LS157	7600201
54LS158	7603301
54LS160A	7700901
54LS161A	7600801
54LS163A	7603401
54LS165A	7700601
54LS166A	8001701
54LS168	8001801
54LS169B	8001802
54LS170	8002501
54LS190	7603501
54LS191	7600901
54LS192	7603601
54LS193	7600601
54LS196	7701001
54LS197	7601501
54LS221	7604201
54LS240	7801201
54LS242	8002001
54LS243	8002002
54LS244	7705701
54LS245	8002101
54LS251	7601601
54LS253	7601701
54LS257	7603701

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Generic Part Number	DESC Drawing Part no.
54LS258B	7603801
54LS261	8002601
54LS273	7801001
54LS279A	7601801
54LS283	7604301
54LS298	7601901
54LS299	7802401
54LS353	8550801
54LS374	7801101
54LS382A	5962-8688101
54LS390	7802601
54LS399	8415401
54LS540	8415501
54LS541	8415601
54LS590	5962-8751701
54LS592	5962-8762101
54LS595	5962-8671701
54LS629	8102101
54LS640	8416101
54LS668	5962-8687601
54LS670	7704201
54LS673	5962-8860201
54LS674	5962-8860701
54LS682	8415101
54LS684	8415201
54LS688	8415301
54S138	7604101
54S139	7700401
54S189	7801502
54S194	7604001
54S251	8002201
54S258	8002301
5539	5962-8606401
55110A	5962-8754701
55113	5962-8874401
55115	5962-8874501
55116	5962-8851101
55117	5962-8851102
55118	5962-8851103
55119	5962-8851104
55121	5962-8776901
55138	5962-8851201
55182	7900801
55183	7900901
55188	5962-8688901

Generic Part Number	DESC Drawing Part no.
55189A	5962-8688802
55452B	7704901
55454	5962-8871501
55500E	8601801
55501E	8601802
55ALS160	5962-8968001
55ALS161	5962-8968101
55ALS192	5962-8871701
55ALS195	5962-8864901
567	5962-8700301
56001	5962-8951201
572	5962-8757201
574AU	5962-8512701,03
574AT	5962-8512702,04
57C191B-45	5962-8765001
6N134	8102801
6N140A	8302401
6108	7705201
6164-55	8552505
6168	5962-8670501
61CD16LA-45	8413209
61CD16LA-55	8413208
61CD16SA-35	8413205
61CD16SA-45	8413202
6207C	5962-8872501
6268	5962-8670502
63105	5962-8604901
63125	5962-8757901
64C16S-35	5962-8670503
64C16S-45	5962-8670505
64C16L-45	5962-8670506
64C16S-55	5962-8670507
64C16L-55	5962-8670508
64C16S-70	5962-8670509
64C16L-70	5962-8670510
6504	8102401
65112	5962-8753501
6514	8102402
6516-8	8403601
65162C	8403603
65162-8	8403602
65262	8413201
68000 (6MHz)	8202101
68000 (8MHz)	8202102

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Generic Part Number	DESC Drawing Part no.
68000 (10MHz)	8202103
68020	5962-8603201
685	8600801
68881	5962-8602101
68CE16S-35	8403614
68CE16S-45	8403609
68CE16S-55	8403611
68CE16L-25	5962-8874002
68CE16L-35	5962-8874001
69CE72	5962-8868301
733	8418501
71331	5962-8866501
7226	5962-8780201
76321	8200801
7641	7801601
76641	8200901
7667	5962-8766001
7681	7902401
7820A	7900801
7831	8004101
7832	8004102
79M05	7704001
79M12	7704003
79M15	7704004
79M24	7704005
7905K	7704001
7912K	7704003
7915K	7704004
7924K	7704005
8001	8000301
8001A	8000303
8002	8000302
80386	5962-8766801
8080A	7700201
8085A	7901001
8097	8506301
80C31	8506401
80C51	8506402
80C86	8405201
8155	5962-8759301
8156	5962-8759302
82188	5962-8767201
82288-6	8514901
82288-8	8514902
8253	5962-8752001
8255A	5962-8757001

Generic Part Number	DESC Drawing Part no.
8259A	5962-8751801
8282	8417901
8283	8417902
8286	5962-8686801
8287	5962-8686802
82720	5962-8608801
82C52	8501501
82C54	8406501
82C55A	8406601
82C59C	5962-8501601
82C82	8406701
82C84A	8406801
82C86	5962-8757701
82C87	5962-8757702
82C88	8406901
82C89	8552801
82S141	7801601
82S153A	5962-8768201
82S16	8602301
82S62	5962-8754301
82S105	5962-8670901
8397	8552001
8751H8	8419001
87C51	5962-8768401
8X305	8550201
8X320	8550301
8X3S0	5962-8605201
9064-15	8201009
9064-20	8201010
9128-12	8103907
9128-20	8103908
9128-90	8103906
9150	5962-8759201
93448	7801601
93S16	5962-8672701
93S48	5962-8672601
93Z565	8200901
93Z565A	8200902
9450	8416901
9513A	8552301
9517A	5962-8757501
9519A	5962-8759701
9622	5962-8752201
9636A	5962-8752301
9637A	5962-8752401
9638	5962-8754601

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Generic Part Number	DESC Drawing Part no.
9914A	5962-8751901
99668	5962-8670503
99C88-10	8552503
99C88-12	8552502
99C88-15	8552501
99C8870	8552504
AD390	5962-8850901
AD562	8100801
AD563	8100802
AD567	5962-8780101
AD570	5962-8680201
AD578	5962-8865801
AD585	5962-8754001
AD590	5962-8757101
AD7228	5962-8866301
AD7245	5962-8876601
AD7248	5962-8876602
AD7524	5962-8770001
ADC0820	5962-8865001
AM686	7801801
AM687	7801901
AM26LS31	7802301
AM26LS32	7802001
AM26LS33	7802002
AM2932	8605001
AT28HC256	5962-8863401
CA3130B	7703301
CMOS PAL16XX	5962-8867801
CMOS PAL16XX	5962-8871301
CT50002	7801301
CY7C245	5962-8752901
DAC703	5962-8856301
DAC87 (HYB)	8300201
DAC87 (MONO)	8300301
DG129	7801401
DG201A	7705301
DG508A	7705201
DS1631	5962-8863101
EP1800	5962-8854901
EP310	5962-8863501
HA-2640	7800302
H1508A	7705202
HC221	5962-8780501
HC221A	5962-8780502
HI-201HS	5962-8671601

Generic Part Number	DESC Drawing Part no.
ICM7170	5962-8765301
IDT7133	5962-8861001
IDT71682	5962-8861101
IDT7203S-50	5962-8866901
IH5116	5962-8513104
IH5208	5962-8513105
IH5216	5962-8513106
IH6108	7705201
LF198H	5962-8760801
LH0002	7801301
LH0021	8508801
LH0032	8001301
LH0033	8001401
LH0041	8508701
LH0070	5962-8688201
LH0101	8508902
LH0101A	8508901
LM10H	5962-8760401
LM103H-1.8	7702801
LM103H-2.0	7702802
LM103H-2.2	7702803
LM103H-2.4	7702804
LM103H-2.7	7702805
LM103H-3.0	7702806
LM103H-3.3	7702807
LM103H-3.6	7702808
LM103H-3.9	7702809
LM103H-4.3	7702810
LM103H-4.7	7702811
LM103H-5.1	7702812
LM103H-5.6	7702813
LM104	5962-8760501
LM106	8003701
LM110	5962-8760601
LM113	5962-8671101
LM113-1	5962-8671102
LM113-2	5962-8671103
LM117K	7703401
LM117HV	7703402
LM119	8601401
LM119A	8601402
LM120H-5.0	7704001
LM120H-12	7704003
LM120H-15	7704004
LM120H-24	7704005

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Generic Part Number	DESC Drawing Part no.
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LM120K-5.0	7704001
LM120K-12	7704003
LM120K-15	7704004
LM120K-24	7704005
LM124	7704301
LM131AH	5962-8760701
LM136A	8418001
LM137	7703403
LM137HV	7703404
LM139	7700801
LM143	7800303
LM144	7800301
LM161	5962-8757203
LM185	5962-8759401
LM709	7800701
LM4250	7703901
LT1013	5962-8876001
LT1016	5962-8684501
LT1017	5962-8950401
LT1021-5	5962-8876201
LT1028	5962-8862201
LT1039	5962-8875101
LT1085	5962-8864601
M80186(6 MHz)	8501002
M80186(8 MHz)	8501001
M80286-6	5962-8514802
M80286-8	5962-8514801
MC1536B	7800304
MKB4516	8101502
MN3008	5962-8768801
MN3009	5962-8768802
MUX24	5962-8771801
NSC800(2.5 MHz)	8301301
NSC800(4 MHz)	8301302
OP07	8203602
OP07A	8203601
OP14	5962-8771401
OP37	5962-8853701
OP207	5962-8771501
OP215	5962-8853801
OP270	5962-8872101
OP271	5962-8872102
OP421	5962-8855901
OP-227A	5962-8688701

Generic Part Number	DESC Drawing Part no.
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OPA501	5962-8762001
PAL10H8	8103501
PAL10L8	8103506
PAL12H6	8103502
PAL12L6	8103507
PAL12L10	5962-8680402
PAL14H4	8103503
PAL14L4	8103508
PAL14L8	5962-8680403
PAL16A4	8103606
PAL16C1	8103505
PAL16H2	8103504
PAL16L2	8103509
PAL16L6	5962-8680404
PAL16L8	8103601
PAL16L8A	8103607
PAL16L8A-2	8103611
PAL16L8A-4	8506501
PAL16R4	8103604
PAL16R4A	8103610
PAL16R4A-2	8103614
PAL16R4A-4	8106504
PAL16R6	8103603
PAL16R6A	8103609
PAL16R6A-2	8103613
PAL16R6A-4	8506503
PAL16R8	8103602
PAL16R8A	8103608
PAL16R8A-2	8103612
PAL16R8A-4	8506502
PAL16X4	8103605
PAL18L4	5962-8680401
PAL18P8	5962-8752801
PAL20C1	5962-8680406
PAL20L2	5962-8680405
PAL20L8	5962-8767101
PAL20L8A	8412901
PAL20L10A	8412905
PAL20R4	5962-8767104
PAL20R4A	8412904
PAL20R6	5962-8767103
PAL20R6A	8412903
PAL20R8	5962-8767102
PAL20R8A	8412902
PAL20RA10	5962-8680301

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Generic Part Number	DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.
PAL20X4A	8412908	TP0033	8001401
PAL20X8A	8412906	UC1707	5962-8761901
PAL20X10A	8412907	UC1846	5962-8680601
PAL22V10A	5962-8605301	UH502	5962-8856401
REF02A	8551401	UHC0508	8550001
RM4194	7705401	ULS2070	5962-8753201
SG1524	7802801	XC2018	5962-8863801
SG1626	5962-8871601	XR-2211	7705001
TCM29C13	5962-8873201	Z0858106	5962-8752602
TIBPAL16L8-15	5962-8515509	Z0858110	5962-8752601
TIBPAL16L8-20	5962-8515501	Z8001	8000301
TIBPAL16L8-30	5962-8515505	Z8001A	8000303
TIBPAL16R4-15	5962-8515512	Z8001B	8000304
TIBPAL16R4-20	5962-8515504	Z8002	8000302
TIBPAL16R4-30	5962-8515508	Z8002B	8000305
TIBPAL16R6-15	5962-8515511	Z8030	5962-8551802
TIBPAL16R6-20	5962-8515503	Z8030A	5962-8551801
TIBPAL16R6-30	5962-8515507	Z8036	8551702
TIBPAL16R8-15	5962-8515510	Z8036A	8551701
TIBPAL16R8-20	5962-8515502	Z8420	8418602
TIBPAL16R8-30	5962-8515506	Z8420A	8418601
TIBPAL20L8-20	8412901	Z8430	8301602
TIBPAL20L10-25	8412905	Z8430A	8301601
TIBPAL20R4-20	8412904	Z8442	8301502
TIBPAL20R6-20	8412903	Z8442A	8301501
TIBPAL20R8-20	8412902	Z8530	5962-8752701
TIBPAL20X4-25	8412908	Z8536	8300101
TIBPAL20X8-25	8412906	Z8536A	8300102
TIBPAL20X10-25	8412907		
TL061	8102301		
TL062	8102302		
TL064	8102303		
TL071	8102304		
TL072	8102305		
TL074	8102306		
TL431	8410901		
TL514	5962-8687801		
TL7702A	5962-8868502		
TL7705A	5962-8868501		
TLC372	5962-8765801		
TLC374	5962-8765901		
TMC208KB5V	5962-8873901		
TP0032	8001301		

DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number
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7600201	54LS157
7600301	54LS122
7600401	54LS132
7600501	54LS138
7600601	54LS193
7600701	54LS139A
7600801	54LS161A
7600901	54LS191
7601001	54LS151
7601101	54LS153
7601201	54LS75
7601301	54LS76A
7601401	54LS83A
7601501	54LS197
7601601	54LS251
7601701	54LS253
7601801	54LS279A
7601901	54LS298
7602001	54LS26
7603101	54LS42
7603201	54LS90
7603301	54LS158
7603401	54LS163A
7603501	54LS190
7603601	54LS192
7603701	54LS257
7603801	54LS258B
7603901	54LS123
7604001	54S194
7604101	54S138
7604201	54LS221
7604301	54LS283
7604501	54LS47
7700101	54LS93
7700201	8080A
7700401	54S139
7700601	54LS165A
7700701	2901A, B
7700801	LM139
7700901	54LS160A
7701001	54LS196
7702001	4502B
7702301	4520B
7702401	4081B
7702501	4094B
7702601	4044B
7702701	4069B

DESC Drawing Part no.	Generic Part Number
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7702801	LM103H-1.8
7702802	LM103H-2.0
7702803	LM103H-2.2
7702804	LM103H-2.4
7702805	LM103H-2.7
7702806	LM103H-3.0
7702807	LM103H-3.3
7702808	LM103H-3.6
7702809	LM103H-3.9
7702810	LM103H-4.3
7702811	LM103H-4.7
7702812	LM103H-5.1
7702813	LM103H-5.6
7703001	54185A
7703101	4060A
7703201	4515B
7703301	3130
7703301	CA3130B
7703401	LM117K
7703402	LM117HV
7703403	LM137
7703404	LM137HV
7703501	4514B
7703601	54C08
7703701	54C85
7703702	4585
7703901	LM4250
7704001	7905K
7704001	79M05
7704001	LM120H-5.0
7704001	LM120K-5.0
7704003	7912K
7704003	79M12
7704003	LM120H-12
7704003	LM120K-12
7704004	7915K
7704004	79M15
7704004	LM120H-15
7704004	LM120K-15
7704005	7924K
7704005	79M24
7704005	LM120H-24
7704005	LM120K-24
7704101	54LS124
7704201	54LS670
7704301	LM124

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DESC Drawing Part no.	Generic Part Number
7704401	4078B
7704501	4528B
7704601	4093B
7704701	4555B
7704801	4556B
7704901	55452B
7705001	XR-2211
7705101	4073B
7705201	508A
7705201	DG508A
7705201	IH6108
7705201	6108
7705202	508A (0-Vprot.)
7705202	H1508A
7705301	201A
7705301	DG201A
7705401	RM4194
7705501	4098B
7705601	54C906
7705701	54LS244
7705801	4040B
7705901	4082B
7706001	4072B
7800301	LM144
7800302	HA-2640
7800303	LM143
7800304	MC1536B
7800304	1536
7800701	LM709
7800801	0056
7800901	10516
7801001	54LS273
7801101	54LS374
7801201	54LS240
7801301	CT50002
7801301	LH0002
7801401	DG129
7801501	27S07A
7801502	54S189
7801503	27S07
7801504	27LS07
7801601	82S141
7801601	5341
7801601	7641
7801601	93448
7801701	2910

DESC Drawing Part no.	Generic Part Number
7801702	2910A
7801801	AM686
7801901	AM687
7802001	AM26LS32
7802002	AM26LS33
7802201	2516-45
7802202	2716 (350 ns)
7802301	AM26LS31
7802401	54LS299
7802402	25LS299
7802601	54LS390
7802701	54LS148
7802801	SG1524
7802901	15530-8
7900801	55182
7900801	7820A
7900901	55183
7901001	8085A
7901101	4013B
7901201	4021B
7901301	4023B
7901401	4049UB
7901501	4052B
7901601	4557B
7901701	1854
7901801	1823
7901901	1853
7902401	29633
7902401	7681
8000301	Z8001
8000302	Z8002
8000303	Z8001
8000304	Z8001B
8000305	Z8002B
8001201	2732
8001203	2732A25
8001204	2732A45
8001301	LH0032
8001301	TP0032
8001401	LH0033
8001401	TP0033
8001601	2420
8001701	54LS166A
8001801	54LS168
8001802	54LS169B
8001901	54LS09

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DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number
8002001	54LS242
8002002	54LS243
8002101	54LS245
8002201	54S251
8002301	54S258
8002501	54LS170
8002601	54LS261
8003701	LM106
8004101	7831
8004102	7832
8100601,09	5040
8100602,10	5041
8100603,11	5042
8100604,12	5043
8100605,13	5044
8100606,14	5045
8100607,15	5046
8100608,16	5047
8100609	5040
8100610	5041
8100611	5042
8100612	5043
8100613	5044
8100614	5045
8100615	5046
8100616	5047
8100801	AD562
8100802	AD563
8101501	2118
8101502	4516
8101601	4029B
8101701	4035B
8101801	4053B
8101901	4042B
8102001	4047B
8102101	54LS629
8102301	TL061
8102302	TL062
8102303	TL064
8102304	TL071
8102305	TL072
8102306	TL074
8102401	6504
8102402	6514
8102801	6N134
8103501	PAL10H8

DESC Drawing Part no.	Generic Part Number
8103502	PAL12H6
8103503	PAL14H4
8103504	PAL16H2
8103505	PAL16C1
8103506	PAL10L8
8103507	PAL12L6
8103508	PAL14L4
8103509	PAL16L2
8103601	PAL16L8
8103602	PAL16R8
8103603	PAL16R6
8103604	PAL16R4
8103605	PAL16X4
8103606	PAL16A4
8103607	PAL16L8A
8103608	PAL16R8A
8103609	PAL16R6A
8103610	PAL16R4A
8103611	PAL16L8A-2
8103612	PAL16R8A-2
8103613	PAL16R6A-2
8103614	PAL16R4A-2
8103906	9128-90
8103907	9128-12
8103908	9128-20
8106504	PAL16R4A-4
8200501	2764 (450 ns)
8200502	2764 (250 ns)
8200503	2764A (350 ns)
8200504	2764A (250 ns)
8200505	2764A (200 ns)
8200701	4167 (100 ns)
8200702	4167 (70 ns)
8200703	4167 (55 ns)
8200801	76321
8200901	27S49
8200901	93Z565
8200901	76641
8200902	27S49A
8200902	93Z565A
8201001,02	4564 (150 ns)
8201001	4164
8201003	4564 (200 ns)
8201006	4164 (150 ns)
8201007	4164 (200 ns)
8201008	4164 (120 ns)

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DESC Drawing Part no.	Generic Part Number
8201009	9064-15
8201010	9064-20
8202101	68000 (6 MHz)
8202102	68000 (8 MHz)
8202103	68000 (10 MHz)
8202201	40174B
8202501	27128 (450 ns)
8202502	27128 (250 ns)
8282503	27128A-20
8282504	27128A-30
8282505	27128A-25
8282506	27128A-15
8282507	27128A-11
8203601	OP07A
8203602	OP07
8300101	Z8536
8300102	Z8536A
8300201	DAC87 (HYB)
8300301	DAC87 (MONO)
8301301	NSC800 (2.5 MHz)
8301302	NSC800 (4 MHz)
8301501	Z8442A
8301502	Z8442
8301601	Z8430A
8301602	Z8430
8301701	54LS154
8301901	54ALS174
8301902	54ALS175
8302001	54ALS373
8302002	54ALS374
8302101	54ALS299
8302102	54ALS323
8302201	54ALS161B
8302202	54ALS163B
8302203	54ALS561A
8302401	6N140A
8302501	54ALS169B
8302502	54ALS569A
8400001	54ALS109A
8400002	54ALS112A
8400101	54ALS574A
8400102	54ALS576A
8401001	54ALS874B
8401002	54ALS876
8401101	54ALS74A
8401201	54ALS573B

DESC Drawing Part no.	Generic Part Number
8401202	54ALS580A
8401301	54ALS242B
8401302	54ALS243A
8403001	54ALS245A
8403101	54ALS1034
8403201	54ALS873B
8403202	54ALS880
8403301	54ALS645A
8403601	6516-8
8403602	65162-8
8403603	65162C
8403609	68CE16S-45
8403611	68CE16S-55
8403614	68CE16S-35
8403701	54HC00
8403801	54HC10
8403901	54HC20
8404001	54HC30
8404101	54HC02
8404201	54HC27
8404301	54HC266
8404401	54HC4002
8404501	54HC32
8404601	54HC86
8404701	54HC08
8404801	54HC11
8405201	80C86
8405301	32010
8405601	54HC74
8405701	2901C
8405901	54ALS1000A
8406001	54ALS1010A
8406101	54ALS1004
8406201	54HC138
8406401	54HC147
8406501	82C54
8406601	82C55A
8406701	82C82
8406801	82C84A
8406901	82C88
8407001	54HC75
8407101	54HC374
8407201	54HC373
8407301	54HC174
8407401	54HC240
8407501	54HC161

DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number
8407901	54ALS162B
8408501	54HC245
8408801	54HC112
8408901	54HC175
8409001	54HC243
8409101	54HC14
8409201	54HC139
8409301	54HC153
8409401	54HC162
8409501	54HC165
8409601	54HC244
8409701	54ALS1008A
8409801	54HC04
8409901	54HC273
8410001	54HC393
8410901	TL431
8411101	27256 (350 ns)
8411102	27256 (250 ns)
8411103	27256 (200 ns)
8411104	27256 (170 ns)
8412801	54HC151
8412901	PAL20L8A
8412901	TIBPAL20L8-20
8412902	PAL20R8A
8412902	TIBPAL20R8-20
8412903	PAL20R6A
8412903	TIBPAL20R6-20
8412904	PAL20R4A
8412904	TIBPAL20R4-20
8412905	PAL20L10A
8412905	TIBPAL20L10-25
8412906	PAL20X8A
8412906	TIBPAL20X8-25
8412907	PAL20X10A
8412907	TIBPAL20X10-25
8412908	PAL20X4A
8412908	TIBPAL20X4-25
8413201	65262
8413202	51C67
8413202	61CD16SA-45
8413205	61CD16SA-35
8413208	61CD16LA-55
8413209	61CD16LA-45
8413401	54ALS153
8413501	54ALS251
8413601	54ALS273

DESC Drawing Part no.	Generic Part Number
8414101	54ALS151
8414201	54ALS09
8414301	54ALS21A
8414501	54ALS832A
8415001	54HC109
8415101	54LS682
8415201	54LS684
8415301	54LS688
8415401	54LS399
8415501	54LS540
8415601	54LS541
8416101	54LS640
8416201	54HC164
8416901	9450
8417901	8282
8417902	8283
8418001	LM136A
8418501	733
8418601	Z8420A
8418602	Z8420
8419001	8751H-8
8500101	54HC365
8500201	54HC367
8500301	54HC4020
8500401	54HC4040
8501001	M80186 (8 MHz)
8501002	M80186 (6 MHz)
8501501	82C52
5962-8501601	82C59A
8503001	2700
8503002	2700
8503003	2702
8503004	2702
8506301	8097
8506401	80C31
8506402	80C51
8506501	PAL16L8A-4
8506502	PAL16R8A-4
8506503	PAL16R6A-4
8506504	PAL16R4A-4
8508401	54LS145
8508701	LH0041
8508801	LH0021
8508901	LH0101A
8508902	LH0101
8509601	54ALS253

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DESC Drawing Part no.	Generic Part Number
8509701	54ALS257
8510201	27C64-25
8510202	27C64-35
8510203	27C64-20
8512401	54HC257
8512501	54HC251
8512601	54LS33
5962-8512701	574AU
5962-8512702	574AT
5962-8512703	574AU
5962-8512704	574AT
8512801	54HC573
8513001	54HCT244
5962-8513101	506A
5962-8513102	507A
5962-8513103	509A
5962-8513104	IH5116
5962-8513105	IH5216
5962-8513106	IH5208
5962-8513301	80287
5962-8513501	27512-25
5962-8513502	27512-35
5962-8513503	27512-30
5962-8513504	27512-45
5962-8514801	M80286-8
5962-8514802	M80286-6
5962-8514901	82288-6
5962-8514902	82288-8
8515201	4256-15
8515202	4256-20
8515203	4256-12
5962-8515301	54HC73
5962-8515401	54HC107
5962-8515501	TIBPAL16L8-20
5962-8515502	TIBPAL16R8-20
5962-8515503	TIBPAL16R6-20
5962-8515504	TIBPAL16R4-20
5962-8515505	TIBPAL16L8-30
5962-8515506	TIBPAL16R8-30
5962-8515507	TIBPAL16R6-30
5962-8515508	TIBPAL16R4-30
5962-8515509	TIBPAL16L8-15
5962-8515510	TIBPAL16R8-15
5962-8515511	TIBPAL16R6-15
5962-8515512	TIBPAL16R4-15
8550001	UHC0508

DESC Drawing Part no.	Generic Part Number
5962-8550101	46106B
8550102	14584
8550201	8X305
8550301	8X320
8550401	54HCT138
8550501	54HCT240
8550601	54HCT245
8550701	54HCT374
8550801	54LS353
8551101	54F245
8551401	REF02A
8551501	1526
8551701	Z8036A
8551702	Z8036
5962-8551801	Z8030A
5962-8551802	Z8030
8551901	54HC259
8552001	8397
5962-8552301	9513A
5962-8552501	99C88-15
5962-8552502	99C88-12
5962-8552503	99C88-10
5962-8552504	99C88-70
5962-8552505	6164-55
5962-8552601	27PS191
5962-8552602	27PS191A
5962-8552603	27PS291
5962-8552604	27PS291A
5962-8552701	27S45
5962-8552702	27S45A
5962-8552703	27S47
5962-8552704	27S47A
5962-8552801	82C89
8600801	685
8600901	54HC390
8601001	54HCU04
8601101	54HC4017
8601201	54HC4024
8601401	LM119
8601402	LM119A
8601701	2904
8601801	55500E
8601802	55501E
8602001	27LS00
8602002	27LS00A
8602003	27LS01
8602004	27LS01A

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DESC Drawing Part no.	Generic Part Number
5962-8602101	68881
8602301	82S16
8602501	29705A
8602701	2909A
8602801	2911A
8602901	291A
8603001	2940
5962-8603201	68020
5962-8604901	63105
8605001	AM2932
8605101	27S02
8605102	27S02A
8605103	27LS02
8605104	27S03
8605106	27S03A
8605107	27LS03
5962-8605201	8X350
5962-8605301	PAL22V10A
5962-8605801	2803
5962-8606101	54HC157
5962-8606201	54HC563
5962-8606301	27C256-20
5962-8606302	27C256-25
5962-8606303	27C256-30
5962-8606401	5539
5962-8606901	54F85
5962-8607101	54F164
5962-8607501	54F350
5962-8607601	54HC163
5962-8607701	54HC280
5962-8608101	2168-55
5962-8608102	2168-70
5962-8608103	2169-50
5962-8608104	2169-70
5962-8608801	82720
5962-8670101	54HCT154
5962-8670201	2919
5962-8670201	25LS2519
5962-8670301	27S19
5962-8670302	27S19A
5962-8670401	1842
5962-8670501	6168
5962-8670502	6268
5962-8670503	64C16S-35
5962-8670503	99C68
5962-8670505	64C16S-45
5962-8670506	64C16L-45

DESC Drawing Part no.	Generic Part Number
5962-8670507	64C16S-55
5962-8670508	64C16L-55
5962-8670509	64C16S-70
5962-8670510	64C16L-70
5962-8670601	27S35
5962-8670602	27S35A
5962-8670603	27S37
5962-8670604	27S37A
5962-8670701	2965
5962-8670702	2966
5962-8670801	25LS09
5962-8670901	82S105
5962-8671001	54F381
5962-8671101	LM113
5962-8671102	LM113-1
5962-8671103	LM113-2
5962-8671201	1545
5962-8671301	25LS2521
5962-8671401	2917A
5962-8671501	2918
5962-8671601	HI-201HS
5962-8671701	54LS595
5962-8671801	25S10
5962-8671901	25LS2518
5962-8672001	26S10
5962-8672101	26LS30
5962-8672301	2947
5962-8672401	25S240
5962-8672501	25S241
5962-8672601	93S48
5962-8672701	93S16
5962-8672801	25S09
5962-8680101	2942
5962-8680201	AD570
5962-8680301	PAL20RA10
5962-8680401	PAL18L4
5962-8680402	PAL12L10
5962-8680403	PAL14L8
5962-8680404	PAL16L6
5962-8680405	PAL20L2
5962-8680406	PAL20C1
5962-8680601	UC1846
5962-8680701	54HC195
5962-8681201	54HC368
5962-8681301	54HC533
5962-8681401	54HC534
5962-8681501	54HC564

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DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.	Generic Part Number
5962-8681601	54HC595	5962-8687201	54F38
5962-8681701	54HC597	5962-8687401	54F241
5962-8681801	54HC688	5962-8687601	54LS668
5962-8681901	54HC4049	5962-8687801	TL514
5962-8682001	54HC4050	5962-8688101	54LS382A
5962-8682101	54HC42	5962-8688201	LH0070
5962-8682201	54HC154	5962-8688301	54HCT08
5962-8682301	54HC158	5962-8688401	54HC238
5962-8682401	54HC160	5962-8688501	54HC646
5962-8682501	54HC173	5962-8688601	54HC4538
5962-8682601	54HC194	5962-8688701	OP-227A
5962-8680701	54HC195	5962-8688802	55189A
5962-8682801	54HC366	5962-8688901	55188
5962-8683001	2864	5962-8689001	54HCT14
5962-8683004	52B33	5962-8689101	54HC191
5962-8683101	54HCT00	5962-8700101	10H536
5962-8683301	54ALS00A	5962-8700301	567
5962-8683401	54F243	5962-8751601	521
5962-8683601	54ALS32	5962-8751701	54LS590
5962-8683701	54ALS30A	5962-8751801	8259A
5962-8683801	54ALS27	5962-8751901	9914A
5962-8683901	54ALS244A	5962-8752001	8253
5962-8684001	54ALS191	5962-8752101	54C922
5962-8684101	54ALS11A	5962-8752201	9622
5962-8684201	54ALS08	5962-8752301	9636A
5962-8684301	54ALS04B	5962-8752401	9637A
5962-8684401	54ALS02	5962-8752502	54ACT11074
5962-8684501	LT1016	5962-8752601	Z0858110
5962-8684701	54HC123	5962-8752602	Z0858106
5962-8684801	54HC126	5962-8752701	Z8530
5962-8685001	54F194	5962-8752801	PAL18P8
5962-8685201	54HCT32	5962-8752901	CY7C245
5962-8685301	54HCT74	5962-8753201	ULS2070
5962-8685401	54HCT161	5962-8753301	54ALS857
5962-8685501	54HCT165	5962-8753401	26S12
5962-8685601	54HCT573	5962-8753501	65112
5962-8685701	54HCT688	5962-8754001	AD585
5962-8686301	29116	5962-8754201	25LS2513
5962-8686501	54ALS10A	5962-8754201	25LS13
5962-8686601	54ALS138	5962-8754301	82S62
5962-8686701	54HCT373	5962-8754401	25LS2569
5962-8686801	8286	5962-8754601	9638
5962-8686802	8287	5962-8754701	55110A
5962-8686901	54ALS157	5962-8754901	54AC00
5962-8687001	54ALS164	5962-8754902	54AC11000
5962-8687101	54ALS38A	5962-8755001	54AC240

DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number
5962-8755002	54AC11240
5962-8755101	54AC241
5962-8755201	54AC244
5962-8755202	54ACT11244
5962-8755301	54ACT139
5962-8755401	54ACT138
5962-8755501	54AC373
5962-8755601	54ACT373
5962-8755801	10H513
5962-8756101	10H531
5962-8756201	10H560
5962-8756301	10H586
5962-8756401	10H506
5962-8756501	10H503
5962-8756601	10H558
5962-8756701	10H561
5962-8756801	10H571
5962-8756901	10H609
5962-8757001	8255A
5962-8757101	AD590
5962-8757201	572
5962-8757202	529
5962-8757203	LM161
5962-8757301	2930
5962-8757401	2964B
5962-8757501	9517A
5962-8757701	82C86
5962-8757702	82C87
5962-8757901	63125
5962-8759201	9150
5962-8759301	8155
5962-8759302	8156
5962-8759401	LM185
5962-8759501	54AS646
5962-8759601	26LS34
5962-8759701	9519A
5962-8760201	2960
5962-8760401	LM10H
5962-8760501	LM104
5962-8760601	LM110
5962-8760701	LM131AH
5962-8760801	LF198H
5962-8760901	54AC04
5962-8760902	54AC11004
5962-8761001	54AC10
5962-8761101	54AC11

DESC Drawing Part no.	Generic Part Number
5962-8761201	54AC02
5962-8761301	54AC20
5962-8761302	54AC11020
5962-8761401	54AC32
5962-8761501	54AC08
5962-8761601	26LS32B
5962-8761901	UC1707
5962-8762001	OPA501
5962-8762101	54LS592
5962-8762401	54AC14
5962-8762501	54AC153
5962-8762601	54AC174
5962-8762801	54FCT374A
5962-8763102	54ACT11374
5962-8763301	320C10
5962-8764701	54HC03
5962-8764802	27C512-20
5962-8764803	27C512-25
5962-8765001	57C191B-45
5962-8765301	ICM7170
5962-8765801	TLC372
5962-8765901	TLC374
5962-8766001	7667
5962-8766105	27C128-20
5962-8766106	27C128-25
5962-8766107	27C128-30
5962-8766201	26S02
5962-8766301	54ACT245
5962-8766701	29C82X
5962-8766801	80386
5962-8767101	PAL20L8
5962-8767102	PAL20R8
5962-8767103	PAL20R6
5962-8767104	PAL20R4
5962-8767201	82188
5962-8768201	82S153A
5962-8768301	54ALS139
5962-8768401	87C51
5962-8768801	MN3008
5962-8768802	MN3009
5962-8769001	27S29
5962-8769201	54AC251
5962-8769301	54AC253
5962-8769901	54ACT00
5962-8769902	54ACT11000
5962-8770001	AD7524

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Military Products

DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number	DESC Drawing Part no.	Generic Part Number
5962-8770401	29C86X	5962-8859101	54ALS240A
5962-8771101	54221	5962-8859601	54ALS241A
5962-8771401	OP14	5962-8860201	54LS673
5962-8771501	OP207	5962-8860601	54HC237
5962-8771801	MUX24	5962-8860701	54LS674
5962-8772101	54HC125	5962-8861001	IDT7133
5962-8772201	54HC4075	5962-8861101	IDT71682
5962-8772301	54HC133	5962-8861201	29C116
5962-8772401	54HC193	5962-8862001	54HC09
5962-8775601	54AC273	5962-8862101	54ALS86
5962-8775701	54ACT174	5962-8862201	LT1028
5962-8775902	54ACT11240	5962-8862501	54ALS158
5962-8776601	54AS804B	5962-8862601	54ALS258
5962-8776901	55121	5962-8863101	DS1631
5962-8779401	54AS805B	5962-8863301	54HC242
5962-8780101	AD567	5962-8863401	AT28HC256
5962-8780201	7226	5962-8863501	EP310
5962-8780301	4344	5962-8863801	XC2018
5962-8780401	54AS21	5962-8864001	54FCT161
5962-8780501	HC221	5962-8864601	LT1085
5962-8780502	HC221A	5962-8864901	55ALS195
5962-8780601	54HC299	5962-8865001	ADC0820
5962-8780701	54HC377	5962-8865601	54FCT823
5962-8780801	54HC192	5962-8865801	AD578
5962-8780901	54HC640	5962-8866101	54FCT863
5962-8850901	AD390	5962-8866301	AD7228
5962-8851101	55116	5962-8866501	71331
5962-8851102	55117	5962-8866801	54ALS534
5962-8851103	55118	5962-8866901	IDT7203S-50
5962-8851104	55119	5962-8867301	54ALS652
5962-8851201	55138	5962-8867601	28HC16-55
5962-8852201	54AS808B	5962-8867801	CMOS PAL16XX
5962-8852301	54AS832B	5962-8868201	54HC253
5962-8853402	54ACT11109	5962-8868301	69CE72
5962-8853701	OP37	5962-8868501	TL7705A
5962-8853801	OP215	5962-8868502	TL7702A
5962-8854001	54ALS05A	5962-8868701	54AS652
5962-8854901	EP1800	5962-8869101	54ALS520
5962-8855901	OP421	5962-8869301	54ALS804A
5962-8856301	DAC703	5962-8869401	54ALS805A
5962-8856401	UH502	5962-8869501	54ALS808A
5962-8857501	54FCT841	5962-8869801	54ALS193
5962-8857601	54HC21	5962-8870001	54ALS563A
5962-8857801	54ALS688	5962-8870401	54ACT541
5962-8858901	54ALS20A	5962-8870501	54ACT821
5962-8859001	54ALS133	5962-8870601	54AC541

DESC CROSS-REFERENCE GUIDE

DESC Drawing Part no.	Generic Part Number
5962-8870701	54F776
5962-8870801	54F30
5962-8870901	54F36
5962-8871001	54F518
5962-8871101	54F519
5962-8871201	54F520
5962-8871301	CMOS PAL16XX
5962-8871501	55454
5962-8871601	SG1626
5962-8871701	55ALS192
5962-8871801	54HC05
5962-8872001	29PL141
5962-8872101	OP270
5962-8872102	OP271
5962-8872301	54F09
5962-8872501	6207C
5962-8872701	54ALS640B
5962-8872801	54ALS564A
5962-8872901	54AS1004A
5962-8873001	54AS1032A
5962-8873101	54AS1034A
5962-8873201	TCM29C13
5962-8873601	29FCT520
5962-8873701	54ALS1245A
5962-8873801	54ALS1244A
5962-8873901	TMC208KB5V
5962-8874001	68CE16L-35
5962-8874002	68CE16L-25
5962-8874101	54ALS259
5962-8874201	54ALS1035
5962-8874401	55113
5962-8874501	55115
5962-8875101	LT1039
5962-8875201	54F14
5962-8875301	54AS651
5962-8875401	54AC299
5962-8875501	54ACT158
5962-8875601	54ACT151
5962-8876001	LT1013
5962-8876201	LT1021-5
5962-8876601	AD7245
5962-8876602	AD7248
5962-8877101	54ACT299
5962-8877401	54F51

DESC Drawing Part no.	Generic Part Number
5962-8950401	LT1017
5962-8951001	54F27
5962-8951201	56001
5962-8952501	54AS823
5962-8954701	54ACT11008
5962-8955301	54AS640
5922-8955401	54F21
5962-8955501	54F544
5962-8957401	54ALS165
5962-8960201	54ALS541
5962-8960301	54HC590A
5962-8966301	54AS286
5962-8966801	54AS867
5962-8968001	55ALS160
5962-8968101	55ALS161
5962-8994501	54ALS996

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Military Products

European Military & Space Specifications

EUROPEAN MILITARY SPECIFICATIONS

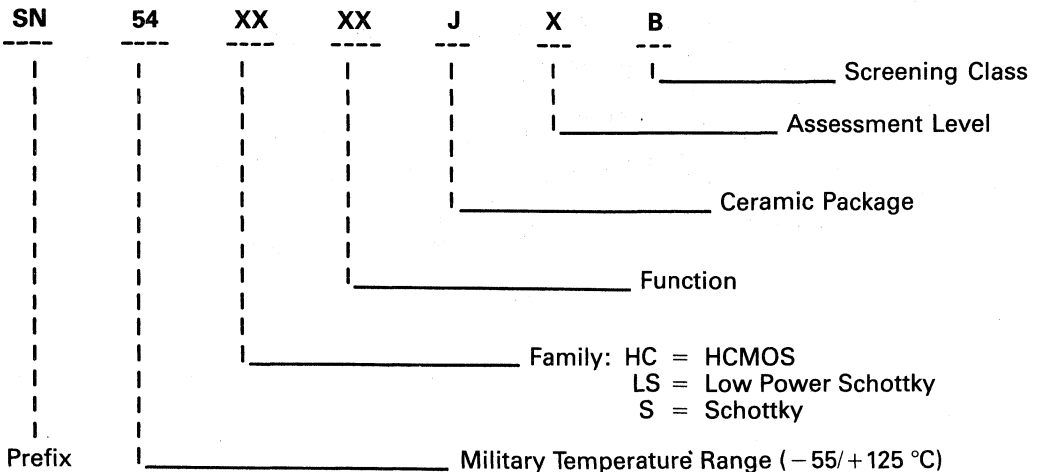
For over ten years, Texas Instruments in Europe has supported the British and French National Military Standards which are now included in the Cenelec Electronic Components Committee (CECC).

CECC is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized system for electronic components of assessed quality.

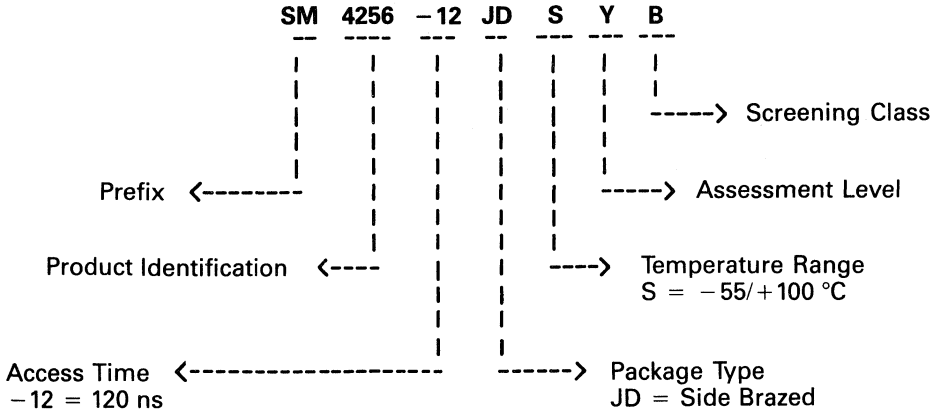
At this time, the member countries of the CECC are: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

CECC Nomenclature

Logic



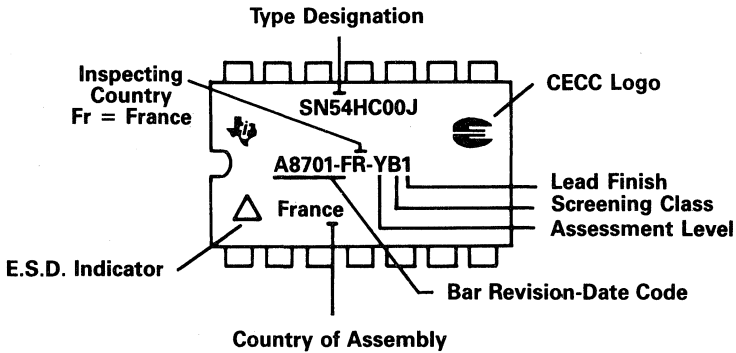
Advanced Products



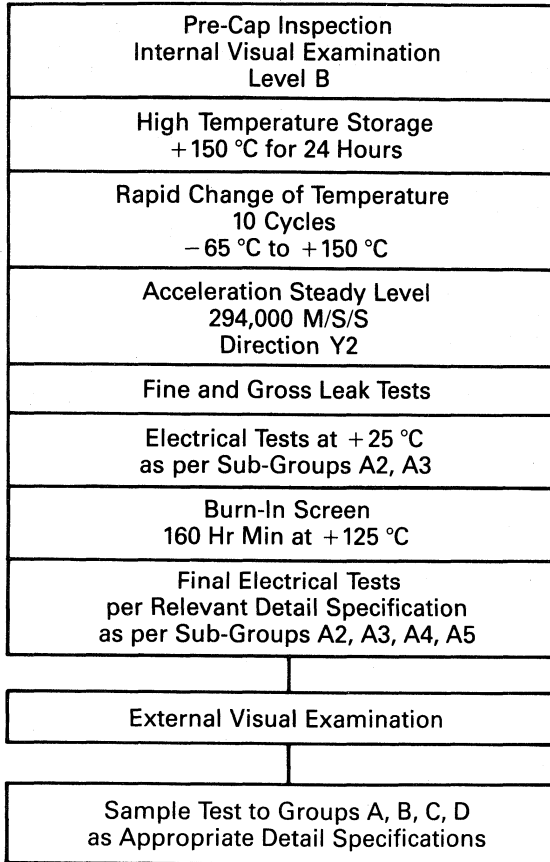
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Military Products

CECC SYMBOLIZATION



CECC Class B Screening Option



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Military Products

CECC Quality Assurance Tests

Group	Description	Frequency
A	Electrical DC and AC parameter test at ambient, high and low temperature, on a sample.	Each lot
B	Mechanical and environmental tests on a sample, burn in. Solderability, hermeticity..	Every week code per family per package
C	Die-related tests (1000 hrs life test, elec test, temp cycling, acceleration, hermeticity...)	Every quarter per family per package
D	Burn in (8000 hrs)	Every year

CECC Low Power Schottky Product Spectrum

The following products are qualified or to be qualified to Class B CECC flow. Texas Instruments does not guarantee qualification on planned devices.

Generic Industry No	BS CECC Spec #	Assessment Level	UTE CECC Spec #	Assessment Level	Qual Status
54LS00	90103-001	R	90103-183	Y	Approved
54LS01	90103-002	R	90103-186	Y	Approved
54LS02	90103-003	R	90103-188	Y	Approved
54LS03	90103-004	R	90103-186	Y	Approved
54LS04	90103-005	R	90103-183	Y	Approved
54LS08	90103-007	R	90103-226	Y	Approved
54LS09	90103-008	R	90103-227	Y	Approved
54LS10	90103-009	R	90103-183	Y	Approved
54LS11	90103-010	R	90103-226	Y	Approved
54LS12	90103-011	R			Approved
54LS13	90103-012	R	90103-225	Y	Approved
54LS14	90103-013	R	90103-225	Y	Approved
54LS15	90103-014	R			Approved
54LS20	90103-015	R	90103-183	Y	Approved
54LS21	90103-016	R	90103-226	Y	Approved
54LS22	90103-017	R			Approved
54LS26	90103-018	R	90103-190	Y	Approved
54LS27	90103-019	R	90103-188	Y	Approved
54LS28	90103-020	R	90103-218	Y	Approved
54LS30	90103-021	R	90103-184	Y	Approved
54LS32	90103-022	R	90103-208	Y	Approved
54LS33	90103-023	R			Approved
54LS37	90103-024	R	90103-185	Y	Approved
54LS38	90103-025	R	90103-187	Y	Approved
54LS40	90103-026	R			Approved
54LS42	90103-027	R	90103-198	Y	Approved
54LS47	90103-028	R			Approved
54LS49	90103-029	R			Approved
54LS51	90103-030	R	90103-189	Y	Approved
54LS54	90103-031	R	90103-189	Y	Approved
54LS74A	90103-034	R	90103-196	Y	Approved
54LS75	90103-035	R			Approved
54LS76A	90103-036	R			Approved
54LS83A	90103-038	R			Approved
54LS85	90103-039	R	90103-199	Y	Approved
54LS86A			90103-275	Y	Approved
54LS90	90103-041	R			Approved
54LS91	90103-042	R			Approved
54LS92	90103-043	R	90103-243	Y	Approved
54LS93	90103-044	R			Approved
54LS95B	90103-135	R			Approved
54LS107A	90103-046	R	90103-283	Y	Approved
54LS109A	90103-047	R	90103-200	Y	Approved
54LS122	90103-050	R	90103-237	Y	Approved

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CECC Low Power Schottky Product Spectrum

Generic Industry No	BS CECC Spec #	Assessment Level	UTE CECC Spec #	Assessment Level	Qual Status
54LS123	90103-051	R	90103-191	Y	Approved
54LS125A	90103-053	R	90103-201	Y	Approved
54LS126A	90103-054	R	90103-285	Y	Approved
54LS132	90103-055	R	90103-225	Y	Approved
54LS136	90103-056	R			Approved
54LS138	90103-057	R	90103-209	Y	Approved
54LS139A			90103-209	Y	Approved
54LS145	90103-059	R			Approved
54LS151	90103-062	R	90103-193	Y	Approved
54LS153	90103-063	R	90103-194	Y	Approved
54LS156	90103-064	R			Approved
54LS157	90103-065	R	90103-195	Y	Approved
54LS158	90103-066	R	90103-231	Y	Approved
54LS160A	90103-067	R	90103-286	Y	Approved
54LS161A	90103-068	R	90103-210	Y	Approved
54LS162A	90103-069	R	90103-254	Y	Approved
54LS163A	90103-070	R	90103-255	Y	Approved
54LS164	90103-071	R	90103-207	Y	Approved
54LS165A			90103-287	Y	Approved
54LS166A	90103-073	Y			Planned
54LS169B			90103-309	Y	Planned
54LS170	90103-075	R			Approved
54LS173A	90103-076	R			Approved
54LS174	90103-077	R	90103-202	Y	Approved
54LS175	90103-138	R	90103-205	Y	Approved
54LS183	90103-079	R			Approved
54LS190	90103-080	R			Approved
54LS191	90103-139	R	90103-266	Y	Approved
54LS192	90103-081	R	90103-245	Y	Approved
54LS193	90103-083	R	90103-214	Y	Approved
54LS194A	90103-033	R	90103-206	Y	Approved
54LS195A	90103-084	R	90103-232	Y	Approved
54LS221	90103-086	R	90103-220	Y	Approved
54LS240	90103-087	R	90103-217	Y	Approved
54LS241	90103-088	R	90103-276	Y	Approved
54LS242	90103-089	R			Approved
54LS243	90103-090	R	90103-253	Y	Approved
54LS244	90103-091	R	90103-216	Y	Approved
54LS245	90103-092	R			Approved
54LS247	90103-093	R			Approved
54LS248	90103-094	R			Approved
54LS251	90103-096	R	90103-211	Y	Approved
54LS253	90103-097	R	90103-212	Y	Approved
54LS257B			90103-213	Y	Approved

CECC Low Power Schottky Product Spectrum

Generic Industry No	BS CECC Spec #	Assessment Level	UTE CECC Spec #	Assessment Level	Qual Status
54LS258B			90103-257	Y	Approved
54LS259B			90103-203	Y	Approved
54LS261	90103-101	R			Approved
54LS266	90103-182	R			Approved
54LS273	90103-102	R	90103-249	Y	Approved
54LS279A			90103-238	Y	Approved
54LS280	90103-105	R	90103-221	Y	Approved
54LS283	90103-106	R	90103-204	Y	Approved
54LS290	90103-107	R			Approved
54LS293	90103-108	R	90103-242	Y	Approved
54LS295B	90103-171	R			Approved
54LS298	90103-109	R	90103-239	Y	Approved
54LS348	90103-117	R			Approved
54LS352	90103-118	R			Approved
54LS353	90103-119	R			Approved
54LS365A	90103-143	R	90103-272	Y	Approved
54LS366A	90103-120	R			Approved
54LS367A	90103-121	R	90103-235	Y	Approved
54LS368A	90103-144	R	90103-240	Y	Approved
54LS373			90103-223	Y	Approved
54LS374			90103-224	Y	Approved
54LS375	90103-181	R			Approved
54LS377	90103-124	R			Approved
54LS386A			90103-275	Y	Approved
54LS390	90103-128	R	90103-263	Y	Approved
54LS393	90103-129	R	90103-264	Y	Approved
54LS395A	90103-172	R	90103-246	Y	Approved
54LS399	90103-131	R			Approved
54LS490	90103-180	R			Approved
54LS540	90103-146	R			Approved
54LS541	90103-147	R			Approved
54LS640	90103-163	Y			Approved
54LS645	90103-168	R			Approved
54LS668	90103-169	R			Approved
54LS669	90103-173	R			Approved
54LS670	90103-174	R			Approved

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Military Products

CECC Schottky Product Spectrum

The following products are qualified or to be qualified to Class B CECC flow. Texas Instruments does not guarantee qualification on planned devices.

Generic Industry No	BS CECC Spec #	Assessment Level	Qual Status
54S00	90102-001	R	Approved
54S02	90102-045	Y	Approved
54S04	90102-003	R	Approved
54S08	90102-014	R	Approved
54S10	90102-004	R	Approved
54S11	90102-016	R	Approved
54S113	90102-048	R	Approved
54S132	90102-010	R	Approved
54S133	90102-011	R	Approved
54S134	90102-024	R	Approved
54S135	90102-049	R	Approved
54S138	90102-050	R	Approved
54S151	90102-052	R	Approved
54S153	90102-053	R	Approved
54S157	90102-026	R	Approved
54S158	90102-027	R	Approved
54S162	90102-054	R	Approved
54S163	90102-028	R	Approved
54S169	90102-030	R	Approved
54S174	90102-031	R	Approved
54S175	90102-055	R	Approved
54S182	90102-056	R	Approved
54S194	90102-033	R	Approved
54S20	90102-005	R	Approved
54S241			Planned
54S244	90102-042	Y	Approved
54S251	90102-059	R	Approved
54S257	90102-060	R	Approved
54S258	90102-061	R	Approved
54S260	90102-036	R	Approved
54S280	90102-062	Y	Approved
54S283	90102-040	R	Approved
54S30	90102-007	R	Approved
54S32	90102-046	Y	Approved
54S37	90102-018	R	Approved
54S373	90102-038	Y	Approved
54S374	90102-039	Y	Planned
54S38	90102-008	R	Approved
54S40	90102-009	R	Approved
54S51	90102-063	R	Approved
54S64	90102-019	R	Approved
54S74	90102-021	R	Approved
54S85	90102-044	R	Approved
54S86	90102-022	R	Approved

CECC HCMOS Product Spectrum

The following products are qualified or to be qualified to Class B CECC flow. Texas Instruments does not guarantee qualification on planned devices.

Generic Industry No	CECC Spec #	Assessment Level	Qual Status
54HC00	90109-601	Y	Approved
54HC02	90109-617	Y	Approved
54HC03	90109-654	Y	Approved
54HC04	90109-633	Y	Approved
54HC05	90109-676	Y	Approved
54HC08	90109-605	Y	Approved
54HC09	90109-677	Y	Approved
54HC10	90109-602	Y	Approved
54HC11	90109-622	Y	Approved
54HC14	90109-640	Y	Approved
54HC20	90109-603	Y	Approved
54HC21	90109-658	Y	Approved
54HC27	90109-618	Y	Approved
54HC30	90109-604	Y	Approved
54HC32	90109-619	Y	Approved
54HC36	90109-659	Y	Approved
54HC42	90109-672	Y	Approved
54HC51	90109-660	Y	Approved
54HC74	90109-606	Y	Approved
54HC86	90109-620	Y	Approved
54HC107	90109-637	Y	Approved
54HC109	90109-627	Y	Approved
54HC112	90109-638	Y	Approved
54HC113	90109-639	Y	Approved
54HC114	90109-679	Y	Approved
54HC125	90109-665	Y	Approved
54HC126	90109-666	Y	Approved
54HC132	90109-623	Y	Approved
54HC133	90109-661	Y	Approved
54HC137	90109-680	Y	Approved
54HC138	90109-608	Y	Approved
54HC139	90109-681	Y	Approved
54HC151	90109-641	Y	Approved
54HC152	90109-732	Y	Approved
54HC153	90109-642	Y	Approved
54HC157	90109-643	Y	Approved
54HC158	90109-644	Y	Approved
54HC160	90109-630	Y	Approved
54HC161	90109-631	Y	Approved
54HC163	90109-646	Y	Approved
54HC164	90109-621	Y	Approved
54HC165	90109-682	Y	Approved
54HC166	90109-799	Y	Approved
54HC173	90109-711	Y	Approved

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Military Products

CECC HCMOS Product Spectrum

Generic Industry No	CECC Spec #	Assessment Level	Qual Status
54HC174	90109-609	Y	Approved
54HC175	90109-624	Y	Approved
54HC180	90109-734	Y	Approved
54HC190	90109-752	Y	Approved
54HC191	90109-727	Y	Approved
54HC192	90109-728	Y	Approved
54HC193	90109-729	Y	Approved
54HC194	90109-615	Y	Approved
54HC195	90109-632	Y	Approved
54HC237	90109-738	Y	Approved
54HC238	90109-735	Y	Approved
54HC240	90109-616	Y	Approved
54HC241	90109-647	Y	Approved
54HC242	90109-648	Y	Approved
54HC243	90109-649	Y	Approved
54HC244	90109-610	Y	Approved
54HC245	90109-611	Y	Approved
54HC251	90109-683	Y	Approved
54HC253	90109-724	Y	Approved
54HC257	90109-628	Y	Approved
54HC258	90109-754	Y	Approved
54HC259	90109-684	Y	Approved
54HC266	90109-753	Y	Approved
54HC273	90109-625	Y	Approved
54HC280	90109-612	Y	Approved
54HC352	90109-715	Y	Approved
54HC353	90109-716	Y	Approved
54HC365	90109-668	Y	Approved
54HC366	90109-669	Y	Approved
54HC367	90109-670	Y	Approved
54HC368	90109-671	Y	Approved
54HC373	90109-626	Y	Approved
54HC374	90109-613	Y	Approved
54HC377	90109-750	Y	Approved
54HC378	90109-748	Y	Approved
54HC379	90109-749	Y	Approved
54HC386	90109-717	Y	Approved
54HC390	90109-730	Y	Planned
54HC393	90109-686	Y	Approved
54HC533	90109-675	Y	Planned
54HC534	90109-614	Y	Planned
54HC540	90109-757	Y	Planned
54HC541	90109-758	Y	Planned
54HC563	90109-673	Y	Approved

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Military Products

CECC HCMOS Product Spectrum

Generic Industry No	CECC Spec #	Assessment Level	Qual Status
54HC573	90109-674	Y	Planned
54HC574	90109-726	Y	Approved
54HC590A	90109-TBD	Y	Planned
54HC620	90109-746	Y	Approved
54HC623	90109-747	Y	Approved
54HC640	90109-652	Y	Approved
54HC643	90109-653	Y	Approved
54HC645	90109-611	Y	Approved
54HC688	90109-687	Y	Planned
54HC4002	90109-662	Y	Approved
54HC4024	90109-655	Y	Approved
54HC4075	90109-663	Y	Approved
54HC4078	90109-664	Y	Approved
54HCT240	90109-688	Y	Approved
54HCT241	90109-689	Y	Approved
54HCT244	90109-690	Y	Approved
54HCT245	90109-691	Y	Approved
54HCT373	90109-695	Y	Approved
54HCT374	90109-704	Y	Approved

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Military Products

CECC Memory Product Spectrum

The following products are qualified or to be qualified to Class B CECC flow. Texas Instruments does not guarantee qualification on planned devices.

Generic Industry No	CECC Spec #	Assessment Level	Qual Status
4416 DRAM	90112-001	Y	Approved
4164 DRAM	90112-002	Y	Approved
4256 DRAM	90112-003	Y	Approved
27C256 EPROM	90113-001	Y	Approved
61CD76 SRAM	90111-003	Y	Planned
61CD16 SRAM			

CECC Standard TTL Product Spectrum

The following standard TTL devices previously qualified to BS9000 specifications are planned to be qualified to the CECC system. Texas Instruments does not guarantee qualification on planned devices.

5400	5447A	54153
5402	5472	54154
5404	5473	54155
5405	5474	54157
5406	5475	54161
5407	5476	54163
5408	5486	54164
5409	5490A	54165
5410	5492A	54173
5414	5493A	54174
5416	5494	54175
5417	5495A	54178
5420	54120	54180
5425	54121	54199
5427	54122	54221
5430	54123	54365A
5432	54128	54367A
5433	54132	54368A
5437	54136	
5438	54150	
5440	54151A	

EUROPEAN SPACE PRODUCTS

For over 15 years, Texas Instruments in Europe has manufactured and supplied high reliability integrated circuits for space and strategic military applications under the European Space Agency (ESA) / Space Component Committee (SCC) specification system.

Space Project History and References

Communication Satellites: OLYMPUS, EUTELSAT, INMARSAT, TELECOM 1, SKYNET IV, DFS, ITALSAT, INSAT II, TDF, TVSAT, TELE X, INTELSAT, ECS, TELECOM 2.

Observation Satellites : SPOT, ARGOS/SARSAT, METEOSAT, ERS, HIPPARCOS, ROSAT, ISO.

Scientific Satellites : EURECA, TOPEX/POSEIDON, TETHERED, SIGMA, EXOSAT.

Launcher : ARIANE, SPACELAB.

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Military Products

Market Commitment

Texas Instruments provides a dedicated facility in Villeneuve-Loubet, France, for engineering and manufacturing of European Space Products. Personnel are assigned for marketing, engineering, production, and quality assurance functions.

Specifications / Qualification

The ESA / SCC Specification System is used for all space production and Texas Instruments European facilities have been qualified by ESA.

Generic Specification for Integrated Circuits: ESA/SCC 9000

Detail Specification for Each Device Type : More than 300 available for TI products,
ESA/SCC 9XXX/XXX

Basic Specifications : ESA/SCC 2XXXX

Conditions for ESA Qualification

Evaluation Phase : Front end survey by ESA inspector.
 Assembly/test survey by ESA inspector.
 Temperature step stress on the technology.
 Process identification document (PID) with similarity list.

Qualification Phase: Qualification, environment and endurance test matrix (Chart IV of ESA/SCC 9000 specification) with similarity rules.
 Detail ESA/SCC specification and number for each device type.
 Bar picture in the PID for each device type.

Qualification maintenance every 2 years

Quarterly review of PID with ESA and French Space Agency (CNES) inspectors

Similarity Rules

Three criteria have been defined to cover all electrical function aspects with a limited number of product types:

Device Complexity : $1000 \times \text{Gates} / \text{Sq Mil}$ (≥ 7 "High", < 7 "Low")
 Output Configuration: Totem Pole, Open Collector, Tri State
 Power Dissipation : Low Power, High Power (Buffers)

Family	Complexity	Power	Output
A	Low	Low	TP
B	High	Low	TP
C	Low/High	High	TP
D	Low	Low	OC
E	High	Low	OC
F	Low/High	High	OC
G	Low	Low	TS
H	High	Low	TS
I	Low/High	High	TS

SCC Flows

Requirements	Level B	Level C
Front end approval	ESA	ESA
Manufacturing approval	ESA/CNES	ESA/CNES
Traceability to diff lot	*	*
SEM inspection	*	
Hirel assembly/control	*	*
Precap Condition A	*	*
Destr. bond strength	*	*
Die shear test	*	*
High temp stab bake	*	*
Temp cycling	*	*
Constant acceleration	*	*
Pind test	*	
Marking	*	*
Serialization	*	
Electr Measurements 1	100% + Recording	100% No Recording
HTRB (HCMOS only)	2 × 72 Hrs	2 × 72 Hrs
Electr Measurements 2	100% + Recording	100% No Recording
Burn-in	240 Hrs	168 Hrs
Electr. Measurement 3	100% + Recording	100% No Recording
Drift Calculation	*	
X Ray inspection	*	*
Seal test (fine & gross)	*	*
Data documentation	SEM, Xrays, Datalogs, Lot traceability, COC	Lot traceability, COC
LAT 3, 2 or 1	*	*

*Asterisks denote activity performed.



Military Products

Lot Acceptance Tests

Requirements	LAT 3	LAT 2	LAT 1
Electrical measurements	*	*	*
External visual	*	*	*
Solderability	*	*	*
Marking permanence	*	*	*
Terminal strength	*	*	*
Operating life test		1000 Hrs	1000 Hrs
Elect measur at life test		*	*
External visual		*	*
Shock test			*
Vibration			*
Constant acceleration			*
Thermal shock			*
Moisture resistance			*
Seal test			*

*Asterisks denote activity performed.

Technology Availability/Qualification

Technology	Space Flow Availability	ESA Qualification
LS	Yes	Yes
ALS	Yes	Yes
S	Yes	Yes
HCMOS	Yes	Planned (CNES PPL)
55XXX	Yes	No
TTL	Yes	No
MICROPROC. 9989D	Yes	CNES PPL
DSP 320C25	1989	
SRAM (16,64,256K)	1989	Planned

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Military Products

SCC Product Status

The ESA/SCC part number is obtained by ESA/SCC specification number + option + level; i.e., a 54LS00J ESA/SCC level B is 920101506B.

If other device types are requested, contact TI to check availability and to obtain the appropriate ESA/SCC specification from ESA.

ALS Family SCC Product Status

Type	ESA/SCC Spec	Issue	Date	J	W	FK	ESA Qual Status
54LS00	9201/015	4B	Oct 85	06	02		Yes
54LS02	9201/016	4B + DCR	Oct 85	06	02		Yes
54LS03	9201/069	1B + DCR	Oct 85	04	02		Yes
54LS04	9202/009	4B	Oct 85	06	02	03	Yes
54LS05	9401/009	3C + DCR	Oct 85	06	02		Yes
54LS08	9201/035	4B	Oct 85	06	02		Yes
54LS09	9201/073	1B	Oct 85	06	02		Yes
54LS10	9201/017	4B + DCR	Oct 85	06	02		Yes
54LS11	9201/049	4B	Oct 85	06	02		Yes
54LS13	9409/001	3C + DCR	Oct 85	06	02		Yes
54LS14	9202/013	4C + DCR	Oct 85	06	02		Yes
54LS20	9201/018	4B + DCR	Oct 85	06	02		Yes
54LS21	9201/053	2B	Oct 85	06	02		Yes
54LS26	9201/036	3C	Oct 85	06	02		Yes
54LS27	9201/028	4B + DCR	Oct 85	06	02		Yes
54LS28	9401/008	3B + DCR	Oct 85	06	02		Yes
54LS30	9201/019	4D	Jul 87	06	02		Yes
54LS32	9201/038	5C + DCR	Oct 85	06	02		Yes
54LS37	9401/007	3B	Oct 85	06	02		Yes
54LS38	9202/017	4B	Oct 85	06	02		Yes
54LS40	9201/039	3B	Oct 85	06	02		Yes
54LS42	9205/008	4B	Oct 85	06	02		Yes
54LS51	9201/025	4B + DCR	Oct 85	06	02		Yes
54LS54	9201/026	2B	Oct 85	06	02		Yes
54LS73A	9203/014	4C + DCR	Oct 85	06	02		Yes
54LS74A	9203/013	4D	Mar 88	06	02	03	Yes
54LS75	9203/008	4C	Jul 87	06	02		Yes
54LS76A	9203/015	4C	Jul 87	06	02		Yes
54LS83A	9202/030	3C	Oct 85	06	02		Yes
54LS85	9202/031	4B + DCR	Oct 85	06	02		Yes
54LS86A	9201/014	3B	Oct 85	14	10		Yes
54LS90	9204/010	4B	Oct 85	06	02		Yes
54LS92	9204/007	4C	Oct 87	06	02		Yes
54LS93	9204/008	3C	Oct 85	06	02		Yes
54LS95B	9306/009	4C + DCR	Oct 85	06	02		Yes
54LS96	9306/020	4C	Oct 85	06	02		Yes

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Military Products

LS Family SCC Product Status

Type	SCC Spec	Issue	Date	J	W	FK	SCC Qual Status
54LS107A	9203/020	4B	Oct 85	06	02		Yes
54LS109A	9203/024	3B	Oct 85	06	02		Yes
54LS122	9207/004	2C	Jul 87	06	02		Yes
54LS123	9207/002	3B + DCR	Oct 85	06	02		Yes
54LS125A	9401/011	1C	Jul 87	06	02		Yes
54LS132	9409/004	1A	Oct 85	06	02		Yes
54LS138	9205/004	3C	Nov 87	06	02	03	Yes
54LS139A	9205/003	3C	Nov 87	14	10		Yes
54LS145	9406/002	1A	Oct 85	06	02		Yes
54LS148	9410/003	1A	Oct 85	06	02		Yes
54LS151	9202/015	3D + DCR	Nov 87	06	02		Yes
54LS153	9202/016	3C	Oct 85	06	02		Yes
54LS155A	9205/009	3B	Oct 85	06	02		Yes
54LS157	9202/027	3B	Oct 85	06	02		Yes
54LS158	9202/028	3B	Oct 85	06	02		Yes
54LS160A	9204/014	3B + DCR	Oct 85	06	02		Yes
54LS161A	9204/015	3B	Oct 85	06	02		Yes
54LS163A	9204/016	4B + DCR	Oct 85	06	02		Yes
54LS164	9306/011	3C + DCR	Oct 85	06	02		Yes
54LS165A	9306/029	1B + DCR	Oct 85	12	10		Yes
54LS166A	9306/030	1C	Aug 87	12	10		Yes
54LS174	9203/018	4B	Oct 85	06	02		Yes
54LS175	9203/019	3C	Oct 85	06	02		Yes
54LS181	9202/005	3C	Oct 85	06	02		Yes
54LS183	9202/064	1B	Oct 85	06	02		Yes
54LS191	9204/031	Draft B	May 84	06	02		Yes
54LS193	9204/017	3B	Oct 85	06	02		Yes
54LS194A	9306/012	4C	Oct 85	06	02		Yes
54LS195A	9306/019	3B	Oct 85	06	02		Yes
54LS196	9204/018	3C	Oct 85	06	02		Yes
54LS197	9204/019	3B	Oct 85	06	02		Yes
54LS221	9202/033	3C	Nov 87	06	02		Yes
54LS240	9401/014	1D	Mar 88	06			Yes
54LS241	9401/016	1C	Oct 85	06			Yes
54LS242	9405/003	1B	Oct 85	06	02		Yes
54LS243	9405/004	1B	Oct 85	06	02		Yes
54LS244	9402/003	1B	Oct 85	06		03	Yes
54LS245	9405/002	1C	Oct 87	06		03	Yes
54LS251	9202/052	3B	Oct 85	06	02		Yes
54LS253	9202/029	3C	Jul 87	06	02		Yes
54LS257B	9202/010	3C + DCR	Aug 87	12	10		Yes
54LS259B	9202/070	1	Nov 87	06	02		Yes
54LS266	9201/050	3B	Oct 85	06	02		Yes
54LS273	9203/030	1C	Jul 87	06			Yes
54LS279A	9202/053	3B + DCR	Oct 85	06	02		Yes
54LS280	9208/001	3B	Oct 85	06	02		Yes
54LS283	9202/032	2B + DCR	Oct 85	06	02		Yes
54LS321	9202/066	1A	Apr 86	06	02		Yes

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Military Products

LS Family SCC Product Status

Type	SCC Spec	Issue	Date	J	W	FK	SCC Qual Status
54LS365A	9401/017	1A	Oct 85	06	02		Yes
54LS367A	9202/054	3B	Oct 85	06	02		Yes
54LS368A	9202/055	4B + DCR	Oct 85	06	02		Yes
54LS373	9203/034	1B + DCR	Oct 85	06			
54LS374	9203/031	1B	Oct 85	06			Yes
54LS375	9203/039	1C	Jul 87	06	02		Yes
54LS377	9203/035	1B	Oct 85	06			Yes
54LS386A	9201/081	1B + DCR	Oct 85	14	10		
54LS390	9204/033	1	Nov 85	06	02		Yes
54LS393	9204/034	1C	Aug 87	06	02		Yes
54LS399	9408/016	1B	Oct 85	06	02		Yes
54LS624	9410/004	Draft B	Oct 85	06	02		
54LS630	9410/007	Draft E	Apr 85	05			
54LS670	9301/001	3C	Jul 87	06	02		Yes
54LS673	9306/035	1C	Aug 88	06	02		Yes
54LS674	9306/036	1A	Oct 85	06	02		Yes
54LS295B	MA9306/027	4	May 88				

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Military Products

S Family SCC Product Status

Type	ESA/SCC Spec	Issue	Date	J	W	FK	ESA Qual Status
54S00	9201/056	1B	Mar 86	06	02		Yes
54S02	9201/074	1B	Mar 86	06	02		Yes
54S04	9401/012	1B	Mar 86	06	02		Yes
54S09	9201/057	1B	Mar 86	06	02		Yes
54S10	9201/058	1B	Mar 86	06	02		Yes
54S11		Draft A	Jul 85				
54S20	9201/059	1B	Mar 86	06	02		Yes
54S22	9201/077	1B	Mar 86	06	02		Yes
54S30	9201/060	1B	Jan 87	06	02		Yes
54S32	9201/112	1	Apr 86	06	02		
54S37	9401/015	1B	Mar 86	06	02		Yes
54S51	9201/078	1	Feb 87	06	02		
54S74	9203/026	1C	Aug 88	06	02		Yes
54S86	9201/079	1B	Mar 86	06	02		Yes
54S112	9203/028	2A	Aug 87	06	02		Yes
54S113	9203/027	1B	Aug 87	06	02		Yes
54S138	9408/010	1B	Mar 86	06	02		Yes
54S140	9402/004	1B	Aug 87	06	02		Yes
54S151	9408/007	1B	Mar 86	06	02		Yes
54S153	9408/008	1B	Mar 86	06	02		Yes
54S158	9408/042	2	Mar 88	06	02		
54S163	9204/029	1B	Mar 86	06	02		Yes
54S174	9203/032	1B	Mar 86	06	02		Yes
54S175	9203/033	1B	Jan 87	06	02		Yes
54S189	9301/006	Draft 1	Jan 80	04	06		
54S194	9306/031	1C + DCR	Feb 88	06	02		Yes
54S195	9306/024	1B	Mar 86	06	02		Yes
54S196	9204/044	1B	Mar 86	06	02		Yes
54S251	9408/020	1B	Mar 86	06	02		Yes
54S260	9201/083	1	Feb 87	06	02		
54S280	9202/059	1B	Mar 86	06	02		Yes
54S374	9203/041	1B	Mar 86	06			Yes

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Military Products

HC Family SCC Product Status

Type	Spec	Issue	Date	J	W	FK	ESA Qual Status
54HC241	Data Book			J		FK	
54HC242	Data Book			J		FK	
54HC243	Data Book			J		FK	
54HC244	Data Book			J		FK	
54HC245	Data Book			J		FK	
54HC251	Data Book			J		FK	
54HC253	Data Book			J		FK	
54HC257	Data Book			J		FK	
54HC258	Data Book			J		FK	
54HC259	Data Book			J		FK	
54HC266	Data Book			J		FK	
54HC27	Data Book			J		FK	
54HC273	Data Book			J		FK	
54HC280	Data Book			J		FK	
54HC30	Data Book			J		FK	
54HC32	Data Book			J		FK	
54HC36	Data Book			J		FK	
54HC365	Data Book			J		FK	
54HC366	Data Book			J		FK	
54HC367	Data Book			J		FK	
54HC368	Data Book			J		FK	
54HC373	Data Book			J		FK	
54HC374	Data Book			J		FK	
54HC377	Data Book			J		FK	
54HC378	Data Book			J		FK	
54HC379	Data Book			J		FK	
54HC386	Data Book			J		FK	
54HC390	Data Book			J		FK	
54HC393	Data Book			J		FK	
54HC4002	Data Book			J		FK	
54HC4024	Data Book			J		FK	
54HC4075	Data Book			J		FK	
54HC4078A	Data Book			J		FK	
54HC42	Data Book			J		FK	
54HC51	Data Book			J		FK	
54HC533	Data Book			J		FK	
54HC534	Data Book			J		FK	
54HC540	Data Book			J		FK	
54HC541	Data Book			J		FK	
54HC563	Data Book			J		FK	
54HC564	Data Book			J		FK	
54HC573	Data Book			J		FK	
54HC574	Data Book			J		FK	
54HC590A	Data Book			J		FK	
54HC595	Data Book			J		FK	
54HC620	Data Book			J		FK	
54HC623	Data Book			J		FK	

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Military Products

HC Family SCC Product Status

Type	Spec	Issue	Date	J	W	FK	ESA Qual Status
54HC00	Data Book			J		FK	
54HC02	Data Book			J		FK	
54HC03	Data Book			J		FK	
54HC04	Data Book			J		FK	
54HC05	Data Book			J		FK	
54HC08	Data Book			J		FK	
54HC09	Data Book			J		FK	
54HC10	Data Book			J		FK	
54HC107	Data Book			J		FK	
54HC109	Data Book			J		FK	
54HC11	Data Book			J		FK	
54HC112	Data Book			J		FK	
54HC113	Data Book			J		FK	
54HC114	Data Book			J		FK	
54HC125	Data Book			J		FK	
54HC126	Data Book			J		FK	
54HC132	Data Book			J		FK	
54HC133	Data Book			J		FK	
54HC137	Data Book			J		FK	
54HC138	Data Book			J		FK	
54HC139	Data Book			J		FK	
54HC14	Data Book			J		FK	
54HC151	Data Book			J		FK	
54HC152	Data Book			J		FK	
54HC153	Data Book			J		FK	
54HC157	Data Book			J		FK	
54HC158	Data Book			J		FK	
54HC160	Data Book			J		FK	
54HC161	Data Book			J		FK	
54HC163	Data Book			J		FK	
54HC164	Data Book			J		FK	
54HC165	Data Book			J		FK	
54HC166	Data Book			J		FK	
54HC173	Data Book			J		FK	
54HC174	Data Book			J		FK	
54HC175	Data Book			J		FK	
54HC180	Data Book			J		FK	
54HC190	Data Book			J		FK	
54HC191	Data Book			J		FK	
54HC192	Data Book			J		FK	
54HC193	Data Book			J		FK	
54HC194	Data Book			J		FK	
54HC195	Data Book			J		FK	
54HC20	Data Book			J		FK	
54HC21	Data Book			J		FK	
54HC237	Data Book			J		FK	
54HC238	Data Book			J		FK	
54HC240	Data Book			J		FK	

Microprocessor

Type	ESA/SCC Spec	Issue	Date	J	W	FK	ESA Qual Status
SBP9989D	9511/002	Draft B	Apr 88	06	03		

TTL Family SCC Product Status

Type	SCC Spec	Issue	Date	J	W	FK	SCC Qual Status
5400	9201/001	2	Apr 79	06	02		
5402	9201/085	1	Jul 83	06	02		
5404	9202/001	2	Apr 79	06	02		
5406	9401/002	2A + DCR	Jul 87	06	02		
5410	9201/086	1 + DCR	Jul 83	06	02		
5413	9202/002	2	Apr 79	06	02		
5420	9201/002	2	Apr 79	06	02		
5430	9201/090	Draft A	Nov 83	06	02		
5438	9201/003	2A + DCR	Jul 87	06	02		
5440	9201/004	2	Apr 79	06	02		
5451	9201/005	1	Aug 78	06	02		
5472	9203/011	1A	Jul 87	06	02		
5473	9203/001	2A	Jul 87	06	02		
5474	9203/002	2	Apr 79	06	02		
5486	9201/087	1	Jul 83	06	02		
5495A	9306/037	1	Jul 83	06	02		
54121	9206/002	2A	Jul 87	06	02		
54125	9401/003	2A	Jul 87	06	02		
54126	9401/004	2A	Jul 87	06	02		
54148	9205/005	2	Apr 79	06	02		
54151A	9202/007	2	Apr 79	06	02		
54155	9205/002	2	Apr 79	06	02		
54163	9204/027	2	Apr 79	06	02		
54164	9306/038	1	Jul 83	06	02		
54173	9306/021	2A	Jul 87	06	02		
54174	9203/029	1	Jan 80	06	02		
54180	9202/008	1	Aug 78	06	02		
54193	9204/049	1	Jul 83	06	02		
54367A	9401/001	2	Apr 79	06	02		
54368A	9401/005	2	Apr 79	06	02		

5**Military Products**

ALS Family SCC Product Status

Type	ESA/SCC Spec	Issue	Date	J	W	FK	ESA Qual Status
54ALS00A	9201/088	2	Jan 87	06	02	03	Yes
54ALS02	9201/089	2	Jan 87	06	02	03	Yes
54ALS04A	9401/024	2	Jan 87	06	02	03	Yes
54ALS05	9401/023	2	Jan 87	06	02	03	Yes
54ALS08	9201/092	2	Jan 87	06	02	03	Yes
54ALS09	9201/104	1A	Mar 86	06	02	03	Yes
54ALS10	9201/093	2 + DCR	Jan 87	06	02	03	Yes
54ALS11	9201/094	2	Jan 87	06	02	03	Yes
54ALS20A	9201/095	2	Jan 87	06	02	03	Yes
54ALS21	9201/096	2	Jan 87	06	02	03	Yes
54ALS27	9201/097	2	Jan 87	06	02	03	Yes
54ALS28A	9401/027	1	Mar 85	06	02	03	Yes
54ALS30	9201/098	2	Jan 87	06	02	03	Yes
54ALS32	9201/091	2	Jan 87	06	02	03	Yes
54ALS37A	9401/026	1	Mar 85	06	02	03	Yes
54ALS38A	9401/022	2	Mar 85	12	08	09	Yes
54ALS40A	9401/025	1	Mar 85	06	02	03	Yes
54ALS74A	9203/043	2 + DCR	May 87	12	08	09	
54ALS86		Draft A	Jul 85				
54ALS109	9203/049	1A	May 87	06	02	03	Yes
54ALS109A	9203/049	1A	May 87	12	08	09	
54ALS112A	9203/055	1	Mar 86	06	02	03	
54ALS138	9205/012	1	Mar 86	06	02	03	
54ALS151	9408/029	1A	Apr 86	06	02	03	
54ALS161A	9204/055	1	Apr 86	06	02	03	Yes
54ALS163A	9204/057	1	Mar 86	06	02	03	Yes
54ALS174	9203/047	1A	Apr 86	06	02	03	
54ALS175	9203/048	1A	Mar 86	06	02	03	
54ALS193	9204/058	1	Mar 86	06	02	03	Yes
54ALS240A	9401/032	1	Mar 86	06		03	
54ALS241A	9401/028	2	Jul 87	12		09	Yes
54ALS244A	9402/005	1A	Mar 87	06		03	Yes
54ALS245A	9405/006	1A	Apr 86	06		03	Yes
54ALS253	9408/031	1A	Mar 86	06	02	03	
54ALS257	9408/032	1A	Mar 86	06	02	03	
54ALS258	9408/033	1	Mar 86	06	02	03	
54ALS299	9306/039	1	Apr 86	06		03	Yes
54ALS353	9408/034	1	Mar 86	06	02	03	
54ALS373	9202/071	1A	Mar 86	06		03	
54ALS374	9203/045	Draft B	Feb 86	06		03	
54ALS520	9209/003	1	Apr 86	06		03	Yes
54ALS569A	9204/056	Draft A	Mar 84	06		03	
54ALS573	9202/067	1	Mar 86	06		03	Yes
54ALS574A	9203/042	2 + DCR	Jan 87	12		09	
54ALS576	9203/056	1	Mar 86	06		03	
54ALS645A	9405/005	1	Mar 85	06		03	Yes
54ALS874A	9203/046	1A	May 87	12	08	09	
54ALS1000A	9201/100	1	Mar 86	06	02	03	Yes

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Military Products

HC Family SCC Product Status

Type	Spec	Issue	Date	J	W	FK	ESA Qual Status
54HC640	Data Book			J		FK	
54HC643	Data Book			J		FK	
54HC645	Data Book			J		FK	
54HC688	Data Book			J		FK	
54HC74	Data Book			J		FK	
54HC75	Data Book			J		FK	
54HC85A	Data Book			J		FK	
54HC86	Data Book			J		FK	
54HCT137	Data Book			J		FK	
54HCT138	Data Book			J		FK	
54HCT237	Data Book			J		FK	
54HCT238	Data Book			J		FK	
54HCT240	Data Book			J		FK	
54HCT241	Data Book			J		FK	
54HCT244	Data Book			J		FK	
54HCT245	Data Book			J		FK	
54HCT373	Data Book			J		FK	
54HCT374	Data Book			J		FK	
54HCT540	Data Book			J		FK	
54HCT541	Data Book			J		FK	

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Military Products

ALS Family SCC Product Status

Type	ESA/SCC Spec	Issue	Date	J	W	FK	ESA Qual Status
54ALS1002A	9201/101	Draft C	Jun 85	06	02	03	
54ALS1004	9401/036	1	Mar 86	06	02	03	
54ALS1008A	9401/021	3	Jan 87	12	08	09	Yes
54ALS1010A	9401/031	1	Mar 86	06	02	03	Yes
54ALS1011A	9201/102	1	Mar 86	06	02	03	Yes

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Military Products

INTERFACE CIRCUITS

TI offers a broad line of linear interface products for applications involving an interface between logic circuitry and the real world. This includes microprocessor-compatible circuits that can amplify, convert analog signals, transmit and receive digital signals or drive actuators or displays.

TI's linear interface circuits represent technologies from classic bipolar through BIFET and BIFET, to LinCMOS™ and Advanced LinCMOS™ processes. LinCMOS and Advanced LinCMOS feature a step-function improvement in impedance, power dissipation and threshold stability.

Also available are surface mount packages including plastic and ceramic chip carriers and small outline (SO) packages. These increase board density with little impact on power handling capability.

Readers should refer to the Alphanumeric Index of the Master Selection Guide for additional information on technical documentation.

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LINE CIRCUITS

Line Drivers

Interface Circuits

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APPLICATION	OUTPUT	QUANTITY PER PKG	TYPE	PACKAGE	DOCUMENT
EIA Standard RS-422-A	Differential	2	SN75158	D,J,G,P	SLYD002
		2	SN75159	D,J,N	SLYD002
		2	SN75ALS191	D,P	SLLS032
		2	uA9638	D,P	SLYD002
EIA Standard RS-422-A	Differential	4	AM26LS31	D,FK,J,N	SLYD002
		4	MC3487	D,J,N	SLYD002
		4	SN75151	DW,J,N	SLYD002
		4	SN75153	DW,J,N	SLYD002
		4	SN75172	DW,J,N	SLYD002
		4	SN75174	DW,J,N	SLYD002
		4	SN75ALS192	DW,J,N	SLYD002
		4	SN75ALS194	DW,J,N	SLYD002
EIA Standard RS-485	Differential	4	SN75172	DW,J,N	SLYD002
		4	SN75174	DW,J,N	SLYD002
EIA Standard RS-423-A	Single-Ended	2	uA9636A	D,J,G,P	SLYD002
EIA Standard RS-232-C	Single-Ended	2	SN75150	D,J,G,P	SLYD002
		2	uA9636A	D,J,G,P	SLYD002
		4	SN75188	D,J,N	SLYD002
		4	SN75C188	J,N	SLLS033
IBM 360/370	Single-Ended	2	SN75123	D,J,N	SLYD002
		2	SN75ALS123	J,N	TBD
		4	SN75ALS126	D,N	SLYD002
		4	SN75ALS130	D,N	SLYD002
General Purpose	Single-Ended	2	SN75121	D,J,N	SLYD002
General Purpose	Differential	2	SN75ALS121	D,N	SLLS030
		2	SN75109A	D,J,N	SLYD002
		2	SN75110A	D,J,N	SLYD002
		2	SN75112	D,J,N	SLYD002
		2	SN75113	D,J,N	SLYD002
		2	SN75114	D,J,N	SLYD002
		2	SN75183	D,N	SLYD002
		4	MC3453	D,J,N	SLYD002
		4	SN75111	D,J,N	SLYD002
		ANSI/EIA-230-D-1986	Single-Ended	4	LT1030

Line Receivers

APPLICATION	INPUT	QUANTITY PER PKG	TYPE	PACKAGE	DOCUMENT
EIA Standard RS-422-A	Differential	2	SN75146	D,J,G,P	SLYD002
		2	SN75157	D,J,G,P	SLYD002
		2	uA9637A	D,J,G,P	SLYD002
		2	uA9639	D,J,G,P	SLYD002
	Differential	4	AM26LS32A	D,FK,J,N	SLYD002
		4	MC3486	D,J,N	SLYD002
		4	SN75173	D,J,N	SLYD002
		4	SN75175	D,J,N	SLYD002
Differential	4	SN75ALS193	J	SLYD002	
	4	SN75ALS195	J	SLYD002	
EIA Standard RS-485	Differential	4	SN75173	D,J,N	SLYD002
		4	SN75175	D,J,N	SLYD002
CCITT V.10	Differential	4	SN75ALS197	D,N	SLLS045
		4	SN75ALS199	D,N	SLLS046

Line Receivers (Continued)

APPLICATION	INPUT	QUANTITY PER PKG	TYPE	PACKAGE	DOCUMENT
EIA Standard RS-423-A	Single-Ended	2	SN75146	D,J,G,P	SLYD002
		2	SN75157	D,J,G,P	SLYD002
		2	uA9637A	D,J,G,P	SLYD002
		2	uA9639	D,J,G,P	SLYD002
		4	AM26LS32A	D,FK,J,N	SLYD002
		4	MC3486	D,J,N	SLYD002
		4	SN75173	D,J,N	SLYD002
		4	SN75175	D,J,N	SLYD002
		4	SN75ALS193	J	SLYD002
		4	SN75ALS195	J	SLYD002
CCITT V.11	Single-Ended	4	SN75ALS197	D,N	SLLS045
		4	SN75ALS199	D,N	SLLS046
EIA Standard RS-232-C	Single-Ended	2	SN75152	D,J,N	SLYD002
		4	SN75154	D,J,N	SLYD002
		4	SN75189	D,J,N	SLYD002
		4	SN75C189	D,N	SLYD002
		4	SN75189A	D,J,N	SLYD002
		4	SN75C189A	D,N	SLYD002
IBM 360/370	Single-Ended	2	SN75ALS123	D,N	SLLS031
		3	SN75124	D,J,N	SLYD002
		7	SN75125	D,J,N	SLYD002
		7	SN75ALS125	D,N	TBD
		7	SN75127	D,J,N	SLYD002
		7	SN75ALS127	D,N	SLYD002
		8	SN75128	DW,J,N	SLYD002
		8	SN75129	DW,J,N	SLYD002
General Purpose	Single-Ended	2	SN75122	D,J,N	SLYD002
		2	SN75140	D,J,G,P	SLYD002
		2	SN75141	D,J,G,P	SLYD002
General Purpose	Differential	2	SN75107A	D,J,N	SLYD002
		2	SN75107B	D,J,N	SLYD002
		2	SN75108A	D,J,N	SLYD002
		2	SN75108B	D,J,N	SLYD002
		2	SN75115	D,J,N	SLYD002
		2	SN75182	D,N	SLYD002
		2	SN75207	D,N	SLYD002
		2	SN75207B	D,N	SLYD002
		4	AM26LS33A	D,FK,J,N	SLYD002
		4	MC3450	D,J,N	SLYD002
4	MC3452	D,J,N	SLYD002		
LAN Access Unit Interface IOS 8802.3: 1989 ANSI/IEEE Std. 802.3-1988		2	SN75ALSO85	NT	SLLS054

Line Transceivers

APPLICATION	I/O BUS	QUANTITY PER PKG	TYPE	PACKAGE	DOCUMENT
EIA Standard RS-232-C	Single-Ended	1	SN75155	D,J,G,P	SLYD002
		3	SN75C1406	D,N	TBD
		4	SN75C1154	D,N	TBD
EIA Standard RS-422A	Differential	2	SN75AS030	D,N	TBD
EIA RS-422-A/RS-485	Differential	1	SN65176B	D,J,G,P	SLYD002
		1	SN75176B	D,J,G,P	SLYD002
		1	SN75ALS176	D,P	SLYD002
		1	SN75177B	D,J,G,P	SLYD002
		1	SN75178B	D,J,G,P	SLYD002
		1	SN75179B	D,J,G,P	SLYD002
		1	TL3695	D,P	SLLS044
IEEE 488 GPIB	Single-Ended	4	MC3446	D,J,N	SLYD002
		8	SN75ALS160	DW,N	SLYD002
		8	SN75161B	DW,J,N	SLYD002
		8	SN75ALS161	DW,N	SLYD002
		8	SN75162B	DW,J,N	SLYD002
		8	SN75ALS162	DW,N	SLYD002
		8	SN75164B	DW,J,N	SLYD002
		8	SN75ALS164	DW,N	SLYD002
		8	SN75ALS165	DW,N	SLYD002
IEEE 802.3 1BASE5	Differential	1	SN75061	DW,N	SLYD002
General Purpose	Single-Ended	4	AM26S10C	D,J,N	SLYD002
		4	AM26S11C	D,J,N	SLYD002
		4	SN75136	D,J,N	SLYD002
		4	SN75138	D,J,N	SLYD002
		8	SN75163B	DW,J,N	SLYD002
	Differential	1	SN75116	D,J,N	SLYD002
		1	SN75117	D,J,G,P	SLYD002
		1	SN75118	D,J,N	SLYD002
		1	SN75119	D,J,G,P	SLYD002
IEEE 896.1	Single-Ended	4	SN75ALS053	FN,N	SLLS028A
		8	SN75ALS056	DW,N	SLLS028A
		4	SN75ALS057		SLLS028A

DISPLAY DRIVERS

Electroluminescent Display Drivers

PRODUCT FEATURES	POWER SUPPLY	TYPE	PACKAGE	DOCUMENT
<ul style="list-style-type: none"> ▪ Row Driver ▪ 225-V open-drain DMOS outputs ▪ Serial-in, parallel-out architecture ▪ 50-mA current sink output capability ▪ Extremely low steady state power consumption ▪ Left side (SNXX551) and right side (SNXX552) drivers enhance circuit layout ▪ Input Compatibility: CMOS ▪ 32 drivers per package 	V_{CC1} (logic) = 10.8 to 15 V	SN65551 SN65552 SN75551 SN75552	FN,N FN,N FN,N FN,N	SLYD002 SLYD002 SLYD002 SLYD002
<ul style="list-style-type: none"> ▪ Row Driver ▪ Monolithic BIFET integrated circuits ▪ Very low steady-state power consumption ▪ 300-mA output capability ▪ High-voltage open-collector N-P-N outputs ▪ Input Compatibility: CMOS ▪ 32 drivers per package 	V_{CC1} (logic) = 10.8 to 15 V	SN75557 SN75558	FN FN	SLYD002 SLYD002
<ul style="list-style-type: none"> ▪ Row Driver ▪ 225-V totem-pole BIFET output structures ▪ 70-mA output source/sink capability ▪ Very low steady-state power consumption ▪ 3-state capabilities ▪ Selectable open-source or open-drain output ▪ Input Compatibility: CMOS ▪ 34 drivers per package 	V_{CC1} (logic) = 10.8 to 15 V	SN65563A SN65564A SN75563A SN75564A	FN FN FN FN	SLYD002 SLYD002 SLYD002 SLYD002
<ul style="list-style-type: none"> ▪ Column Driver ▪ 60-V totem-pole BIFET output structures ▪ Serial-in, parallel-out architecture ▪ 15-mA sink or source output capability ▪ Top (SNXX553) and bottom (SNXX554) drivers enhance circuit layout ▪ Input Compatibility: CMOS ▪ 32 drivers per package 	V_{CC1} (logic) = 10.8 to 15 V	SN65553 SN65554 SN75553 SN75554	FN,N FN,N FN,N FN,N	SLYD002 SLYD002 SLYD002 SLYD002
<ul style="list-style-type: none"> ▪ Column Driver ▪ 90-V output voltage swing capability ▪ 15-mA output source and sink current capability ▪ High-speed serially-shifted data input ▪ Totem-pole outputs ▪ Latches on all driver outputs ▪ Input Compatibility: CMOS ▪ 32 drivers per package 	V_{CC1} (logic) = 10.8 to 15 V	SN65555 SN65556 SN75555 SN75556	FN,N FN,N FN,N FN,N	SLYD002 SLYD002 SLYD002 SLYD002

Vacuum Fluorescent Display Drivers

PRODUCT FEATURES	POWER SUPPLY	TYPE	PACKAGE	DOCUMENT
<ul style="list-style-type: none"> • 60-V totem-pole outputs • Anode and Grid Drivers • Segment or dot matrix formats • Serial-in, parallel-out architecture • 25-mA current source output capability • On-board latches • Input Compatibility: TTL • 12 drivers per package 	V_{CC1} (logic) = 5 V to 15 V, V_{CC2} (display) = 0 V to 60 V	SN65512B SN75512B	DW,N DW,N	SLYD002 SLYD002
<ul style="list-style-type: none"> • All features same as SN65512B except • 32 bits for large format displays • Input Compatibility: TTL, CMOS • 32 drivers per package 	V_{CC1} (logic) = 5V to 15 V, V_{CC2} (display) = 0 V to 60 V	SN65518 SN75518	FN,N FN,N	SLYD002 SLYD002
<ul style="list-style-type: none"> • Anode, Grid Drivers • Segment or dot matrix formats • Serial-in, parallel-out architecture • 60-V totem-pole outputs • 40-mA current source output capability • Improved direct replacement for UCN4810A and TL4810A • Input Compatibility: CMOS; Qty/Pkg: 10 	V_{CC1} (logic) = 5 V to 15 V, V_{CC2} (display) = 0 V to 60 V	TL4810B TL4810BI	DW,N DW,N	SLYD002 SLYD002
<ul style="list-style-type: none"> • Anode, Grid Drivers • Segment or dot matrix formats • 70-V output voltage swing capability • Drives up to 20 lines • Direct replacement for Sprague UCN5812A • Input Compatibility: CMOS; Qty/Pkg: 20 	V_{CC1} (logic) = 5 V to 15 V, V_{CC2} (display) = 0 V to 60 V	TL5812 TL5812I	FN,N FN,N	SLYD002 SLYD002

Plasma and Gas Discharge Display Drivers

PRODUCT FEATURES	POWER SUPPLY	TYPE	PACKAGE	DOCUMENT
<ul style="list-style-type: none"> • Scan Line Driver VCC • 180-V open drain parallel outputs • 220-mA parallel output sink current • Left side (SN751506) and right side (SN751516) drivers enhance circuit layout • Input Compatibility: CMOS; Qty/Pkg: 32 	V_{CC} (logic) = 4 V to 6 V	SN751506 SN751516	FT FT	SLYD002 SLYD002
<ul style="list-style-type: none"> • Data Line Driver • 120-V open collector P-N-P parallel outputs • Two parallel high-speed 16-bit shift registers • Latches on all driver outputs Top (SN751508) and bottom (SN751518) drivers enhance circuit layout • Input Compatibility: CMOS; Qty/Pkg: 32 	V_{CC} (logic) = 4.5 V to 5.5 V	SN751508 SN751518	FT FT	SLYD002 SLYD002

AC Plasma Display Drivers

PRODUCT FEATURES	POWER SUPPLY	TYPE	PACKAGE	DOCUMENT
<ul style="list-style-type: none"> • Axis Drivers • High-speed serial-in, parallel-out architecture (8 MHz) • Fast output transitions (150 ns typ) • 15-mA output current capability • X-axis driver (SNXX500) • Y-axis driver (SNXX501) • Input Compatibility: CMOS • 32 drivers per package (8 bits with 1 of 4 selectors) 	V_{CC1} (logic) = 10.8 V to 13.2 V, V_{CC2} (display) = 0 V to 100 V	SN65500E SN75500E SN65501E SN75501E	FN,N FN,N FN,N FN,N	SLYD002

PERIPHERAL DRIVERS

General Purpose Drivers and Actuators

FUNCTION	INPUT CAPABILITY	SWITCHING VOLTAGE MAX (V)	OFF-STATE VOLTAGE MAX (V)	OUTPUT CURRENT (mA)	DRIVERS PER PACKAGE	OUTPUT CLAMP DIODES	DELAY TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
AND	TTL	20	30	300	2	No	18	SN75451B	D,P	SLYD002
NAND	TTL	20	30	300	2	No	25	SN75452B	D,P	SLYD002
OR	TTL	20	30	300	2	No	18	SN75453B	D,P	SLYD002
NOR	TTL	20	30	300	2	No	26	SN75454B	D,P	SLYD002
MOS Driver	TTL	24	24	500	2	Yes	35	SN75372	D,P	SLYD002
MOS Driver	TTL	24	24	500	4	Yes	35	SN75374	D,N	SLYD002
AND	TTL	30	35	300	2	No	28	SN75461	D,P	SLYD002
NAND	TTL	30	35	300	2	No	38	SN75462	D,P	SLYD002
OR	TTL	30	35	300	2	No	28	SN75463	D,P	SLYD002
Invert w/Enable	TTL,CMOS	35	70	500	4	Yes	1050	SN75437A	NE	SLYD002
Invert w/Enable	TTL,CMOS	35	70	600	4	Yes	750	SN75435	NE	SLYD002
Invert w/Enable	TTL,CMOS	35	70	1000	4	Yes	1050	SN75438	NE	SLYD002
Invert	TTL,5 V MOS	35	50	1500	4	No	500	UDN2841	NE	SLYD002
Invert	TTL,5 V MOS	35	50	1500	4	No	500	UDN2845	NE	SLYD002
Invert	TTL	35	50	1250	4	Yes	500	ULN2064	NE	SLYD002
Invert	MOS	35	50	1250	4	Yes	500	ULN2066	NE	SLYD002
Invert	TTL,CMOS	35	50	1250	4	Yes	500	ULN2068	NE	SLYD002
Invert	TTL,CMOS	35	50	1250	4	No	500	ULN2074	NE	SLYD002
AND	TTL,CMOS	55	70	350	2	Yes	300	SN75446	D,P	SLYD002
NAND	TTL,CMOS	55	70	350	2	Yes	300	SN75447	D,P	SLYD002
OR	TTL,CMOS	55	70	350	2	Yes	300	SN75448	D,P	SLYD002
NOR	TTL,CMOS	55	70	350	2	Yes	300	SN75449	D,P	SLYD002
Invert w/Enable	TTL,CMOS	50	70	500	4	Yes	1050	SN75436	NE	SLYD002
Invert	TTL,CMOS,PMOS	50	50	350	7	Yes	250	ULN2001A	D,N	SLYD002
Invert	25 V PMOS	50	50	350	7	Yes	250	ULN2002A	D,N	SLYD002
Invert	TTL,CMOS	50	50	350	7	Yes	250	ULN2003A	D,N	SLYD002
Invert	15 V MOS	50	50	350	7	Yes	250	ULN2004A	D,N	SLYD002
Invert	TTL	50	50	350	7	Yes	250	ULN2005A	D,N	SLYD002
Invert	TTL	50	80	1500	4	Yes	500	ULN2065	NE	SLYD002
Invert	TTL	50	80	1500	4	Yes	500	ULN2067	NE	SLYD002
Invert	TTL,5 V MOS	50	80	1500	4	Yes	500	ULN2069	NE	SLYD002
Invert	TTL,5 V MOS	50	80	1500	4	No	500	ULN2075	NE	SLYD002
AND	TTL	55	70	300	2	No	28	SN75471	D,P	SLYD002
NAND	TTL	55	70	300	2	No	38	SN75472	D,P	SLYD002
OR	TTL	55	70	300	2	No	28	SN75473	D,P	SLYD002
AND	TTL,CMOS	55	70	300	2	Yes	200	SN75476	D,P	SLYD002
NAND	TTL,CMOS	55	70	300	2	Yes	200	SN75477	D,P	SLYD002
OR	TTL,CMOS	55	70	300	2	Yes	200	SN75478	D,P	SLYD002
NOR	TTL,CMOS	55	70	300	2	Yes	200	SN75479	D,P	SLYD002
Telecom Ry Drv	TTL,CMOS,MOS	60	60	100	4	Yes	1000	DS3680	D,N	SLYD002
Invert	TTL	60	100	350	7	Yes	250	SN75465	D,N	SLYD002
Invert	TTL,CMOS,PMOS	60	100	350	7	Yes	250	SN75466	D,N	SLYD002
Invert	25 V PMOS	60	100	350	7	Yes	250	SN75467	D,N	SLYD002
Invert	TTL,CMOS	60	100	350	7	Yes	250	SN75468	D,N	SLYD002
Invert	15 V MOS	60	100	350	7	Yes	250	SN75469	D,N	SLYD002

Motor Drivers and Power Actuators

FUNCTION	INPUT CAPABILITY	OFF-STATE VOLTAGE MAX (V)	OUTPUT CURRENT (mA)	DRIVERS PER PACKAGE	OUTPUT CLAMP DIODES	TYPE	PACKAGE	DOCUMENT
Half-H Driver	TTL	36	600	4	Yes	L293D	NE	SLYD002
Half-H Driver	TTL	36	1000	4	No	L293	NE	SLYD002
Half-H Driver	TTL,CMOS	36	1000	4	Yes	SN754410	NE	SLYD002
Half-H Driver	TTL,CMOS	36	1000	4	No	SN754411	NE	SLYD002
Full-H Driver	TTL	46	2000	2	No	L298	KV	SLRS011
Octal Driver	TTL,CMOS	32	500	8	Yes	TPIC2801	KV	TBD
Quad Driver	TTL,CMOS	50	1200	4	Yes	TPIC2406	NE	TBD
High Side Driver	TTL,CMOS	85	6000	1	Yes	TPIC3101	KV	TBD
Actuator	TTL,CMOS	50	2500	2	No	TPIC1209	KV	TBD
Low Side Driver	TTL,CMOS	45	1000	4	Yes	TPIC2404	HS	TBD

MEMORY INTERFACE

MOS-Memory Sense Amplifiers

OUTPUT TYPE	QTY PER PACK	THRESHOLD SENSITIVITY (mV)	*t _{PD} * TYP (ns)	DEVICE TYPE	PACKAGES	DOCUMENT
Totem Pole	2	± 25	17	SN75107A	D,J,N	SLYD002
Totem Pole	2	± 25	17	SN75107B	D,J,N	SLYD002
Open Collector	2	± 25	19	SN75108A	D,J,N	SLYD002
Open Collector	2	± 25	19	SN75108B	D,J,N	SLYD002
Totem Pole	2	± 10	25	SN75207	D,J,N	SLYD002
Open Collector	2	± 10	25	SN75208	D,J,N	SLYD002

*t_{PD} Propagation Delay Time

Factory orders for circuits described in this guide should include a four-part type number as explained in the following example.

EXAMPLE: TL 062M JG /883B

1. **Prefix**

CONTAINS TWO TO FOUR LETTERS

- TCM TI Telecommunication Products
- TISP Transient Suppressors
- TL TI Linear Products (excluding Interface)
- TLC TI Linear Silicon-Gate CMOS Products
- TPIC TI Power Circuits
- TSP Speech Products
- SN TI Special Function or Interface Products

STANDARD SECOND-SOURCE PREFIXES

- ADC Analog Devices
- AM AMD
- DS National
- L Linear Technology Corp.
- LM National
- LT Linear Technology Corp.
- MC Motorola
- NE, SA, or SE Signetics
- OP PMI
- RC, RM or RV Raytheon
- SG Silicon General
- TP National
- uA Fairchild
- UDN Sprague
- ULN Sprague

2. **Unique Circuit Designator Including Temperature Range (If not already specified by the prefix)**

CONTAINS THREE TO SEVEN CHARACTERS
(From Individual Data Sheets)

- Examples:
- | | |
|-------|---------|
| 062M | 28867 |
| 5941 | 78L05AC |
| 532AI | |

3. **Package**

CONTAINS ONE OR TWO LETTERS

- D, DW, FK, FN, J, JD, JG, KC, KH, KV, LP, LU, N, P, U, W
- (From Pin-Connection Diagram on Individual Data Sheet)

4. **MIL-STD-883B, Method 5004, Class B**

OMIT/883B WHEN NOT APPLICABLE

Circuits are shipped in one of the carriers below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped on the most practical carrier.

Dual-In-Line (D, DW, J, JD, JG, N, P)

- Slide Magazines
- A-Channel Plastic Tubing
- Barnes Carrier
- Sectioned Cardboard Box
- Individual Cardboard Box

Plug-In (LP, LU)

- Barnes Carrier
- Sectional Cardboard Box
- Individual Cardboard Box

Chip Carriers (FK, FN)

- Anti-Static Plastic Tubing

Flat (U, W)

- Barnes Carrier
- Milton Ross Carrier

Power Tab (KC, KH, KV)

- Sleeves

LINEAR CIRCUITS

The rapid advance in high-tech digital processing creates new demands for microprocessor-compatible circuits that can sense or amplify analog signals or provide regulated power to a system. This section presents information on TI's broad line of integrated circuits designed for applications involving analog signal conditioning.

These circuits span the recent rapid development of integrated circuit technology from classical bipolar through BIFET and BDFET to TI's LinCMOS™ processing that provides a step function improvement in input impedance, power dissipation and threshold stability. Surface mount packages include plastic and ceramic chip carriers and small-outline packages that increase board density with little impact on power handling capability.

Readers should refer to the Alphanumeric Index and to the Customer Support section of the Master Selection Guide for additional information on technical documentation.

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LINEAR SIGNAL CONDITIONING CIRCUITS

Operational Amplifiers

Operational Amplifiers, Noncompensated, Single Military Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
High Performance, Bipolar	± 5	± 22	2	75	50	1	0.5	LM101A	FK,JG,U,W	SLYD003
High Performance, Low Bias Current, Bipolar	± 2	± 20	2	2	50	1	0.3	LM108	D,JG,L,P	SLOS041
	± 2	± 20	0.5	2	80	1	0.3	LM108A	D,JG,L,P	SLOS041
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL060M	JG	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	25	3	13	TL080M	JG	SLYD003
General Purpose, Precision Input, Bipolar	± 9	± 18	2	200	45 Typ	1	0.3	uA709AM	J,JG,U,W	SLYD003
General Purpose, Bipolar	± 9	± 18	5	500	45 Typ	1	0.3	uA709M	J,JG,U,W	SLYD003
	± 2	± 22	5	500	50	1	0.5	uA748M	JG,U	SLYD003

Operational Amplifiers, Noncompensated, Single Industrial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
High Performance, Bipolar	± 5	± 22	2	75	50	1	0.5	LM201A	D,JG,P	SLYD003
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL060I	D,JG,P	SLYD003
BIFET, Low Noise	± 3.5	± 18	6	200	50	3	13	TL070I	D,JG,P	SLYD003
BIFET, Low Power	± 3.5	± 18	6	400	25	3	13	TL080I	D,JG,P	SLYD003
High Performance, Low Bias Current, Bipolar	± 2	± 20	2	2	50	1	0.3	LM208	D,JG,L,P	SLOS041
	± 2	± 20	0.5	2	80	1	0.3	LM208A	D,JG,L,P	SLOS041

Operational Amplifiers, Noncompensated, Single Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
High Performance	± 5	± 18	7.5	250	15	1	7.5	LM301A	D,JG,P	SLYD003
	± 2	± 18	7.5	7	25	1	0.3	LM308	D,JG,L,P	SLOS041
	± 2	± 18	0.5	7	80	1	0.3	LM308A	D,JG,L,P	SLOS041
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL060AC	D,JG,P	SLYD003
	± 3.5	± 18	3	0.2	4	1	3.5	TL060BC	D,JG,P	SLYD003
	± 3.5	± 18	15	0.4	3	1	3.5	TL060C	D,JG,P	SLYD003
BIFET, Low Noise	± 3.5	± 18	6	0.2	50	3	13	TL070AC	D,JG,P	SLYD003
	± 3.5	± 18	10	0.2	25	3	13	TL070C	D,JG,P	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL080AC	D,JG,P	SLYD003
	± 3.5	± 18	15	0.4	25	3	13	TL080C	D,JG,P	SLYD003
General Purpose, Bipolar	± 9	± 18	7.5	1500	15	1	0.3	uA709C	D,JG,P	SLYD003
	± 2	± 18	6	500	20	1	0.5	uA748C	D,JG,P	SLYD003

**Operational Amplifiers, Internally Compensated, Single
Military Temperature Range**

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
High Performance	± 5	± 20	2	75	50	1	0.5	LM107	J,J,G,U,W	SLYD003
Precision	± 5 ± 5	± 22 ± 22	0.015 0.06	2 4	450 400	0.8	0.25 0.25	LT1001AM LT1001M	JG,L JG,L	SLYD003 SLYD003
Low Noise, High Speed, Precision Input, Noncompensated, $A_{VL} \geq 5$	± 2.5 ± 2.5	± 22 ± 22	0.025 0.060	35 55	7000 5000	8 8	2.5 2.5	LT1007AM LT1007M	JG,L JG,P	SLYD003 SLYD003
Ultra Precision	± 2.5	± 20	0.035	0.1	300	0.8	2	LT1012M	L	SLYD003
Low Noise, High Performance	± 4.5 ± 4.5	± 16 ± 20	0.12 0.18	150 300	300 200	25 25	15 15	LT1028AM LT1028M	D,J,G,L,P D,J,G,L,P	SLYD003 SLYD003
Low Noise, High Speed, Noncompensated, $A_{VL} \geq 5$	± 2.5 ± 2.5	± 22 ± 22	0.025 0.060	35 55	7000 5000	60 60	15 15	LT1037AM LT1037M	JG,L JG,L	SLYD003 SLYD003
Chopper-Stabilized	± 1.9	± 8	0.005	0.03	1000	1.2	4	LTC1052M	J,J,G,L	SLYD003
Low Noise, High Speed	± 3.5 ± 3.5	± 22 ± 22	0.025 0.1	40 80	1000 700	8 8	2.8 2.8	OP-27A OP-27C	JG,L JG,L	SLYD003 SLYD003
Low Noise, High Speed, Noncompensated, $A_{VL} \geq 5$	± 4 ± 4	± 22 ± 22	0.025 0.1	40 80	1000 700	40 40	17 17	OP-37A OP-37C	JG,L JG,L	SLYD003 SLYD003
Low Noise, High Performance	± 3 ± 3	± 22 ± 22	2 2	800 800	50 50	10 10	13 13	SE5534 SE5534A	FK,JG FK,JG	SLYD003 SLYD003
BIFET, Low Power, Precision	± 3.5 ± 3.5	± 18 ± 18	0.8 1.5	0.2 0.2	5 5	1.1 1.1	2.9 2.9	TL031AM TL031M	FK,JG,L FK,JG,L	SLYD003 SLYD003
BIFET, Precision	± 3.5 ± 3.5	± 18 ± 18	0.8 1.5	0.2 0.2	50 50	3.1 3.1	20 20	TL051AM TL051M	FK,JG,L FK,JG,L	SLYD003 SLYD003
BIFET, Low Power	± 1.5	± 18	6	0.2	4	1	3.5	TL061M	FK,JG,U	SLYD003
BIFET, Adjustable, Low-Power	± 1.2	± 18	6	0.2	4	1	3.5	TL066M	FK,JG	SLYD003
BIFET, Low Noise	± 3.5	± 18	6	0.2	35	3	13	TL071M	FK,JG	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	25	3	13	TL081M	FK,JG	SLYD003
BIFET, Low VIO	± 3.5	± 18	3	0.4	50	3	13	TL088M	JG,U	SLYD003
LinCMOS, Programmable, Low Bias	4	16	10	Typ 0.007	50	0.11	0.04	TLC271M	FK,JG	SLYD003
LinCMOS, Programmable, Medium Bias	4	16	10	Typ 0.007	25	0.64	0.56	TLC271M	FK,JG	SLYD003
LinCMOS, Programmable, Low Bias	4	16	10	Typ 0.007	10	2.2	4.6	TLC271M	FK,JG	SLYD003
LinCMOS, Low Noise, Precision	± 2.3 ± 2.3 ± 2.3	± 8 ± 8 ± 8	0.2 0.2 0.5	Typ. 0.001 Typ. 0.001 Typ. 0.001	400 400 400	1.9 1.9 1.9	2.7 2.7 2.7	TLC2201AM TLC2201BM TLC2201M	D,FK,JG,L,P D,FK,JG,L,P D,FK,JG,L,P	SLYD003 SLYD003 SLYD003
LinCMOS, Precision, Chopper Stabilized	± 1.9 ± 1.9 ± 2.3 ± 2.3	± 8 ± 8 ± 8 ± 8	0.001 0.003 0.01 0.02	Typ. 0.004 Typ. 0.004 Typ. 0.05 Typ. 0.05	5600 1000 5600 1000	1.9 1.9 1.9 2.2	2.8 2.8 2 2	TLC2652AM TLC2652M TLC2654AM TLC2654M	D,FK,J,J,G, L,N,P D,FK,J,J,G, L,N,P D,FK,J,J,G, L,N,P D,FK,J,J,G, L,N,P	SLYD003 SLYD003 SLYD003 SLYD003
Excalibur, High-Speed, Precision	± 2 ± 2 ± 2	± 20 ± 20 ± 20	0.5 0.2 0.1	50 50 50	1000 1000 1000	2 2 2	0.9 0.9 0.9	TLE2021M TLE2021AM TLE2021BM	D,FK,JG,L,P D,FK,JG,L,P JG,L	SLOS024A SLOS024A SLOS024A
General Purpose	± 2	± 22	5	500	50	1	0.5	uA741M	FK,J,J,G,U	SLYD003

Operational Amplifiers, Internally Compensated, Single
Automotive Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VO} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
High Performance	± 5	± 22	2	75	50	1	0.5	LM207	D,J,JG,N, PW	SLYD003
	± 5	± 20	4	250	50	15	70	LM218	D,J,G,P	SLYD003
Chopper-Stabilized	± 1.9	± 8	0.005	0.03	1000	1.2	4	LTC1052C	J,JG,L,N,P	SLYD003
	± 1.9	± 8	0.005	0.03	1000	1.2	4	LTC7652C	L	SLYD003
Low Noise, High Speed	± 3.5	± 22	0.025	40	1000	8	2.8	OP-27E	JG,L,P	SLYD003
	± 3.5	± 22	0.1	80	700	8	2.8	OP-27G	JG,L,P	SLYD003
Low Noise, High Speed, Noncompensated, $AVL \geq 5$	± 4	± 22	0.025	40	1000	40	17	OP-37E	JG,L,P	SLYD003
	± 4	± 22	0.1	80	700	40	17	OP-37G	JG,P	SLYD003
BIFET, Low Power, Precision	± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL031AI	D,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL031I	D,JG,L,P	SLYD003
BIFET, Precision	± 3.5	± 18	0.8	0.2	50	3.1	20	TL051AI	D,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	50	3.1	20	TL051I	D,JG,L,P	SLYD003
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL061I	D,JG,L,P	SLYD003
BIFET, Adjustable Low Power	± 1.2	± 18	6	0.2	4	1	3.5	TL066I	D,J,G,P	SLYD003
BIFET, Low Noise	± 3.5	± 18	6	0.2	50	3	13	TL071I	D,J,G,P	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL081I	D,J,G,P	SLYD003
BIFET, Low Offset Voltage	± 3.5	± 18	0.5	0.2	50	3	13	TL087I	D,J,G,P	SLYD003
	± 3.5	± 18	1	0.2	50	3	13	TL088I	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	4	16	5	Typ 0.007	50	0.11	0.04	TLC271AI	D,J,G,P	SLYD003
LinCMOS, Programmable, Med. Bias	4	16	5	Typ 0.007	25	0.64	0.56	TLC271AI	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	4	16	5	Typ 0.007	10	2.2	4.6	TLC271AI	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	4	16	2	Typ 0.007	50	0.11	0.04	TLC271BI	D,J,G,P	SLYD003
LinCMOS, Programmable, Med. Bias	4	16	2	Typ 0.007	25	0.64	0.56	TLC271BI	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	4	16	2	Typ 0.007	10	2.2	4.6	TLC271BI	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	4	16	10	Typ 0.007	50	0.11	0.04	TLC271I	D,J,G,P	SLYD003
LinCMOS, Programmable, Med. Bias	4	16	10	Typ 0.007	25	0.64	0.56	TLC271I	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	4	16	10	Typ 0.007	10	2.2	4.6	TLC271I	D,J,G,P	SLYD003
LinCMOS, Low Noise Precision	± 2.3	± 8	0.2	Typ 0.001	400	1.9	2.7	TLC2201AI	D,JG,L,P	SLYD003
	± 2.3	± 8	0.2	Typ 0.001	400	1.9	2.7	TLC2201BI	D,JG,L,P	SLYD003
	± 2.3	± 8	0.5	Typ 0.001	400	1.9	2.7	TLC2201I	D,JG,L,P	SLYD003
LinCMOS, Precision, Chopper Stabilized	± 1.9	± 8	0.001	Typ 0.004	5600	1.9	2.8	TLC2652AI	D,J,JG,L,N,P	SLYD003
	± 1.9	± 8	0.003	Typ 0.004	1000	1.9	2.8	TLC2652I	D,J,JG,L,N,P	SLYD003
LinCMOS, Low-Noise, Precision, Chopper Stabilized	± 2.3	± 8	0.01	Typ 0.05	5600	1.9	2	TLC2654AI	D,J,JG,L,N,P	SLYD003
	± 2.3	± 8	0.02	Typ 0.05	1000	1.9	2	TLC2654I	D,J,JG,L,N,P	SLYD003
Excalibur, High-Speed, Precision	± 2	± 20	0.5	50	1000	2	0.9	TLE2021I	D,JG,L,P	SLOS024A
	± 2	± 20	0.2	50	1000	2	0.9	TLE2021AI	D,JG,L,P	SLOS024A
	± 2	± 20	0.1	50	1000	2	0.9	TLE2021BI	JG,L	SLOS024A

Operational Amplifiers, Internally Compensated, Single Industrial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VO} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT	
	MIN	MAX									
Chopper-Stabilized	± 1.9 ± 1.9	± 8 ± 8	0.005 0.005	0.03 0.03	1000 1000	1.2 1.2	4 4	LTC1052C LTC7652C	J,JG,L,N,P L	SLYD003 SLYD003	
Low Noise, High Speed	± 3.5 ± 3.5	± 22 ± 22	0.025 0.1	40 80	1000 700	8 8	2.8 2.8	OP-27E OP-27G	JG,L,P JG,L,P	SLYD003 SLYD003	
Low Noise, High Speed, Bipolar, Noncompensated, $A_{VL} \geq 5$	± 4 ± 4	± 22 ± 22	0.025 0.1	40 80	1000 700	40 40	17 17	OP-37E OP-37G	JG,L,P JG,L,P	SLYD003 SLYD003	
BIFET, Low Power, Precision	± 3.5 ± 3.5	± 18 ± 18	0.8 1.5	0.2 0.2	5 5	1.1 1.1	2.9 2.9	TL031AI TL031I	D,JG,L,P D,JG,L,P	SLYD003 SLYD003	
BIFET, Precision	± 3.5 ± 3.5	± 18 ± 18	0.8 1.5	0.2 0.2	50 50	3.1 3.1	20 20	TL051AI TL051I	D,JG,L,P D,JG,L,P	SLYD003 SLYD003	
BIFET, Low Power	± 3.5 ± 3.5	± 18 ± 18	6 6	0.2 0.2	4 4	1 1	3.5 3.5	TL061I	D,JG,P	SLYD003	
BIFET, Adjustable, Low-Power	± 1.2 ± 1.2	± 18 ± 18	6 6	0.2 0.2	4 4	1 1	3.5 3.5	TL066I	D,JG,P	SLYD003	
BIFET, Low Noise	± 3.5 ± 3.5	± 18 ± 18	6 6	0.2 0.2	50 50	3 3	13 13	TL071I	D,JG,P	SLYD003	
BIFET, General Purpose	± 3.5 ± 3.5	± 18 ± 18	6 6	0.2 0.2	50 50	3 3	13 13	TL081I	D,JG,P	SLYD003	
BIFET, Low Offset	± 3.5 ± 3.5	± 18 ± 18	0.5 0.5	0.2 0.2	50 50	3 3	13 13	TL087I	D,JG,P	SLYD003	
BIFET, LOW V_{IO}	± 3.5 ± 3.5	± 18 ± 18	1 1	0.2 0.2	50 50	3 3	13 13	TL088I	D,JG,P	SLYD003	
Single LM324, High Performance	S/S D/S	3 ± 1.5	30 ± 15	5	-150	50	0.6	0.3	TL321I	JG,P	SLYD003
LinCMOS, Programmable, Low Bias	4	16	5	Typ 0.007	50	0.11	0.04	TLC271AI	D,JG,P	SLYD003	
LinCMOS, Programmable, Med. Bias	4	16	5	Typ 0.007	25	0.64	0.56	TLC271AI	D,JG,P	SLYD003	
LinCMOS, Programmable, High Bias	4	16	5	Typ 0.007	10	2.2	4.6	TLC271AI	D,JG,P	SLYD003	
LinCMOS, Programmable, Low Bias	4	16	2	Typ 0.007	50	0.11	0.04	TLC271BI	D,JG,P	SLYD003	
LinCMOS, Programmable, Med. Bias	4	16	2	Typ 0.007	25	0.64	0.56	TLC271BI	D,JG,P	SLYD003	
LinCMOS, Programmable, High Bias	4	16	2	Typ 0.007	10	2.2	4.6	TLC271BI	D,JG,P	SLYD003	
LinCMOS, Programmable, Low Bias	4	16	10	Typ 0.007	50	0.11	0.04	TLC271I	D,JG,P	SLYD003	
LinCMOS, Programmable, Med. Bias	4	16	10	Typ 0.007	25	0.64	0.56	TLC271I	D,JG,P	SLYD003	
LinCMOS, Programmable, High Bias	4	16	10	Typ 0.007	10	2.2	4.6	TLC271I	D,JG,P	SLYD003	
LinCMOS, Precision, Low Noise	± 2.3 ± 2.3 ± 2.3	± 8 ± 8 ± 8	0.2 0.2 0.5	Typ 0.001 Typ 0.001 Typ 0.001	400 400 400	1.9 1.9 1.9	2.7 2.7 2.7	TLC2201AI TLC2201BI TLC2201I	D,JG,L,P D,JG,L,P D,JG,L,P	SLYD003 SLYD003 SLYD003	
LinCMOS, Precision, Chopper Stabilized	± 1.9 ± 1.9	± 8 ± 8	0.001 0.003	Typ 0.004 Typ 0.004	5600 1000	1.9 1.9	2.8 2.8	TLC2652AI TLC2652I	D,J,JG,L,N,P D,J,JG,L,N,P	SLYD003 SLYD003	
LinCMOS, Low-Noise, Precision, Chopper Stabilized	± 2.3 ± 2.3	± 8 ± 8	0.01 0.02	Typ 0.05 Typ 0.05	5600 1000	1.9 1.9	2 2	TLC2654AI TLC2654I	D,J,JG,L,N,P D,J,JG,L,N,P	SLYD003 SLYD003	
Excalibur, High-Speed, Precision	± 2 ± 2 ± 2	± 20 ± 20 ± 20	0.5 0.2 0.1	50 50 50	1000 1000 1000	2 2 2	0.9 0.9 0.9	TLE2021I TLE2021AI TLE2021BI	D,JG,L,P D,JG,L,P JG,L	SLOS024A SLOS024A SLOS024A	

Operational Amplifiers, Internally Compensated, Single
Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
BIFET	± 3.5	± 18	10	0.2	25	3	13	LF351	D,JG,P	SLYD003
	± 3.5	± 18	2	0.2	25	3	13	LF411	D,JG,P	SLYD003
High Performance	± 2	± 18	7.5	250	25	1	0.5	LM307	D,J,JG,N, PW	SLYD003
	± 5	± 20	10	250	25	15	70	LM318	D,JG,P	SLYD003
Precision	± 5	± 22	0.025	2	450	0.8	0.25	LT1001AC	JG,L,P	SLYD003
	± 5	± 22	0.06	4	400	0.8	0.25	LT1001C	JG,L,P	SLYD003
Low Noise, High Speed, Precision Input, Noncompensated, $A_{VL} \geq 5$	± 2.5	± 22	0.025	35	7000	8	1.7	LT1007AC	JG,P	SLYD003
	± 2.5	± 22	0.060	55	5000	8	1.7	LT1007C	JG,P	SLYD003
Ultra Precision	± 2.5	± 20	0.05	0.15	200	—	0.2	LT1012C	L,P	SLYD003
Low Noise, High Performance	± 4.5	± 18	0.08	120	500	75	15	LT1028AC	D,JG,L,P	SLYD003
	± 4.5	± 18	0.13	240	300	75	15	LT1028C	D,JG,L,P	SLYD003
Low Noise, High Speed, Noncompensated, $A_{VL} \geq 5$	± 2.5	± 22	0.025	35	7000	60	15	LT1037AC	JG,P	SLYD003
	± 2.5	± 22	0.060	55	5000	60	15	LT1037C	JG,P	SLYD003
Low Noise, High Performance	± 3	± 22	4	1500	25	10	13	NE5534	D,JG,P	SLYD003
	± 3	± 22	4	1500	25	10	13	NE5534A	D,JG,P	SLYD003
Ultra-Low Offset Voltage	± 3	± 22	0.15	7	120	0.6	0.3	OP-07C	D,JG,P	SLYD003
	± 3	± 22	0.15	12	120	0.6	0.3	OP-07D	D,JG,P	SLYD003
	± 3	± 22	0.075	4	200	0.6	0.3	OP-07E	D,JG,P	SLYD003
BIFET, Low Power, Precision	± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL031AC	D,FK,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL031C	D,FK,JG,L,P	SLYD003
BIFET, Precision	± 3.5	± 18	0.8	0.2	50	3.1	20	TL051AC	D,FK,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	50	3.1	20	TL051C	D,FK,JG,L,P	SLYD003
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL061AC	D,JG,P	SLYD003
	± 3.5	± 18	3	0.2	4	1	3.5	TL061BC	D,JG,P	SLYD003
	± 3.5	± 18	15	0.2	3	1	3.5	TL061C	D,JG,P	SLYD003
BIFET, Adjustable, Low-Power	± 1.2	± 18	6	0.2	4	1	3.5	TL066AC	D,JG,P	SLYD003
	± 1.2	± 18	3	0.2	4	1	3.5	TL066BC	D,JG,P	SLYD003
	± 1.2	± 18	15	0.4	3	1	3.5	TL066C	D,JG,P	SLYD003
BIFET, Low Noise	± 3.5	± 18	6	0.2	50	3	13	TL071AC	D,JG,P	SLYD003
	± 3.5	± 18	3	0.2	50	3	13	TL071BC	D,JG,P	SLYD003
	± 3.5	± 18	10	0.2	25	3	13	TL071C	D,JG,P	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL081AC	D,JG,P	SLYD003
	± 3.5	± 18	3	0.2	50	3	13	TL081BC	D,JG,P	SLYD003
	± 3.5	± 18	15	0.4	25	3	13	TL081C	D,JG,P	SLYD003
BIFET, Low V_{IO}	± 3.5	± 18	0.5	0.2	50	3	13	TL087C	D,JG,L,P	SLYD003
	± 3.5	± 18	1	0.2	50	3	13	TL088C	D,JG,L,P	SLYD003
Single LM324, High Performance	S/S D/S	3 30 15	7	-250	25	0.6	0.3	TL321C	JG,P	SLYD003
LinCMOS, Programmable, Low Bias		1 16	5	Typ 0.001	30	0.1	0.04	TLC251AC	D,JG,P	SLYD003
LinCMOS, Programmable, Medium Bias		1 16	5	Typ 0.001	20	0.7	0.6	TLC251AC	D,JG,P	SLYD003
LinCMOS, Programmable, High Bias		1 16	5	Typ 0.001	10	2.3	4.5	TLC251AC	D,JG,P	SLYD003
LinCMOS, Programmable, Low Bias		1 16	2	Typ 0.001	30	0.1	0.04	TLC251BC	D,JG,P	SLYD003
LinCMOS, Programmable, Medium Bias		1 16	2	Typ 0.001	20	0.7	0.6	TLC251BC	D,JG,P	SLYD003
LinCMOS, Programmable, High Bias		1 16	2	Typ 0.001	10	2.3	4.5	TLC251BC	D,JG,P	SLYD003
LinCMOS, Programmable, Low Bias		1 16	10	Typ 0.001	30	0.1	0.04	TLC251C	D,JG,P	SLYD003

Operational Amplifiers, Internally Compensated, Single (Continued)
 Commercial Temperature Range
(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
LinCMOS, Programmable, Medium Bias	1	16	10	Typ 0.001	20	0.7	0.6	TLC251C	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	1	16	10	Typ 0.001	10	2.3	4.5	TLC251C	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	3	16	5	Typ 0.007	50	0.11	0.04	TLC271AC	D,J,G,P	SLYD003
LinCMOS, Programmable, Medium Bias	3	16	5	Typ 0.007	25	0.64	0.56	TLC271AC	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	3	16	5	Typ 0.007	10	2.2	4.6	TLC271AC	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	3	16	2	Typ 0.007	50	0.11	0.04	TLC271BC	D,J,G,P	SLYD003
LinCMOS, Programmable, Medium Bias	3	16	2	Typ 0.007	25	0.64	0.56	TLC271BC	D,J,G,P	SLYD003
LinCMOS, Programmable, High Bias	3	16	2	Typ 0.007	10	2.2	4.6	TLC271BC	D,J,G,P	SLYD003
LinCMOS, Programmable, Low Bias	3	16	10	Typ 0.007	50	0.11	0.04	TLC271C	D,J,G,P	SLYD003
LinCMOS, Programmable, Medium Bias	3	16	10	Typ 0.007	25	0.64	0.56	TLC271C	D,J,G,P	SLYD003
LinCMOS Programmable, High Bias	3	16	10	Typ 0.007	10	2.2	4.6	TLC271C	D,J,G,P	SLYD003
LinCMOS, Precision, Low Noise	± 2.3	± 8	0.2	Typ 0.001	400	1.9	2.7	TLC2201AC	D,J,G,L,P	SLYD003
	± 2.3	± 8	0.2	Typ 0.001	400	1.9	2.7	TLC2201BC	D,J,G,L,P	SLYD003
	± 2.3	± 8	0.5	Typ 0.001	400	1.9	2.7	TLC2201C	D,J,G,L,P	SLYD003
LinCMOS, Precision Chopper Stabilized	± 1.9	± 8	0.001	Typ 0.004	5600	1.9	2.8	TLC2652AC	D,J,JG, L,N,P	SLYD003
	± 1.9	± 8	0.003	Typ 0.004	1000	1.9	2.8	TLC2652C	D,J,JG, L,N,P	SLYD003
LinCMOS, Low-Noise, Precision, Chopper Stabilized	± 2.3	± 8	0.01	Typ 0.05	5600	1.9	2	TLC2654AC	D,J,JG, L,N,P	SLYD003
	± 2.3	± 8	0.02	Typ 0.05	1000	1.9	2	TLC2654C	D,J,JG, L,N,P	SLYD003
Excalibur, High-Speed, Precision	± 2	± 20	0.5	50	1000	2	0.9	TLE2021C	D,J,G,L,P	SLOA024A
	± 2	± 20	0.2	50	1000	2	0.9	TLE2021AC	D,J,G,L,P	SLOA024A
	± 2	± 20	0.1	50	1000	2	0.9	TLE2021BC	JG,L	SLOA024A
General Purpose	± 2	± 18	6	500	20	1	0.5	uA741C	D,J,G,P	SLYD003

Operational Amplifiers, Internally Compensated, Dual
Military Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION		SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
		MIN	MAX								
High Gain, Low Power, Bipolar	S/S	3	30	5	-150	50	0.6	0.2	LM158	FK,JG,U	SLYD003
	D/S	± 1.5	± 15								
General Purpose		± 2	± 22	5	500	50	1	0.5	MC1558	FK,JG,U	SLYD003
Precision		± 5	± 22	0.15	20	1500	0.7	0.4	LT1013AM	JG,L	SLYD003
		± 5	± 22	0.3	30	1200	0.7	0.4	LT1013M	JG,L	SLYD003
High Performance		± 4	± 22	5	500	50	3.5	1.7	RM4558	JG	SLYD003
Low Power		± 2	± 22	5	100	1	0.5	0.5	TL022M	U	SLYD003
BIFET, Low Power, Precision		± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL032AM	FK,JG,L	SLYD003
		± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL032M	FK,JG,L	SLYD003
BIFET, Precision		± 3.5	± 18	0.8	0.2	50	3	16	TL052AM	FK,JG,L	SLYD003
		± 3.5	± 18	1.5	0.2	50	3	16	TL052M	FK,JG,L	SLYD003
BIFET, Low Power		± 3.5	± 18	6	0.2	4	1	3.5	TL062M	FK,JG,U	SLYD003
		± 3.5	± 18	6	0.2	35	3	13	TL072M	FK,JG	SLYD003
BIFET, General Purpose		± 3.5	± 18	16	0.2	25	3	13	TL082M	FK,JG	SLYD003
		± 3.5	± 18	6	0.2	25	3	13	TL083M	FK,J	SLYD003
		± 3.5	± 18	3	0.4	50	3	13	TL287M	JG,U	SLYD003
		± 3.5	± 18	3	0.4	50	3	13	TL288M	JG,U	SLYD003
LinCMOS, High Bias		4	16	10	Typ 0.005	10	2.2	5.3	TLC272M	FK,JG	SLYD003
		4	16	0.5	Typ 0.005	10	2.2	5.3	TLC277M	FK,JG	SLYD003
LinCMOS, Low Bias		4	16	10	Typ 0.005	50	0.1	0.05	TLC27L2M	FK,JG	SLYD003
		4	16	0.5	Typ 0.005	50	0.1	0.05	TLC27L7M	FK,JG	SLYD003
LinCMOS, Medium Bias		4	16	10	Typ 0.005	25	0.6	0.6	TLC27M2M	FK,JG	SLYD003
		4	16	0.5	Typ 0.005	25	0.6	0.6	TLC27M7M	FK,JG	SLYD003
LinCMOS, Micro Power, Precision		4	16	0.6	Typ 0.007	500	0.11	0.5	TLC1078M	FK,JG	SLYD003
Excalibur, High Speed, Precision		± 2	± 20	0.5	60	800	2.8	0.9	TLE2022M	D,FK,JG,L,P	SLOS027
		± 2	± 20	0.3	55	1000	2.8	0.9	TLE2022AM	D,FK,JG,L,P	SLOS027
		± 2	± 20	0.15	50	1500	2.8	0.9	TLE2022BM	JG,L	SLOS027

Operational Amplifiers, Internally Compensated, Dual
Automotive Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION		SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
		MIN	MAX								
High Gain, Low Power, Bipolar	S/S	3	30	5	-150	50	0.6	0.2	LM258	D,JG,P,U	SLYD003
	D/S	± 1.5	± 1.5								
	S/S	3	30								
	D/S	± 1.5	± 1.5	3	-80	50	0.6	0.2	LM258A	D,JG,P,U	SLYD003
	S/S	3	26	7	-250	100 Typ	0.6	0.2	LM2904	D,JG,P,U	SLYD003
	D/S	± 1.5	± 13								
High Performance		± 4	± 18	6	-500	20	3	1.7	RV4558	D,JG,P	SLYD003
BIFET, Low Power, Precision		± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL032AI	D,JG,L,P	SLYD003
		± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL032I	D,JG,L,P	SLYD003
BIFET, Precision		± 3.5	± 18	0.8	0.2	50	3	16	TL052AI	D,JG,L,P	SLYD003
		± 3.5	± 18	1.5	0.2	50	3	16	TL052I	D,JG,L,P	SLYD003
BIFET, Low Power		± 3.5	± 18	6	0.2	4	1	3.5	TL062I	D,JG,P	SLYD003
		± 3.5	± 18	6	0.2	50	3	13	TL072I	D,JG,P	SLYD003
BIFET, General Purpose		± 3.5	± 18	6	0.2	50	3	13	TL082I	D,JG,P	SLYD003
		± 3.5	± 18	6	0.2	50	3	13	TL083I	D,JG,P	SLYD003
		± 3.5	± 18	0.5	0.2	50	3	13	TL287I	D,JG,P	SLYD003
		± 3.5	± 18	1	0.2	50	3	13	TL288I	D,JG,P	SLYD003

Operational Amplifiers, Internally Compensated, Dual (Continued)
Automotive Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
Low Power	± 1.5	± 18	8	-500	20	1	0.6	TL322I	D,JG,P	SLYD003
LinCMOS, High Bias	4	16	5	Typ 0.005	10	2.2	5.3	TLC272AI	D,JG,P	SLYD003
	4	16	2	Typ 0.005	10	2.2	5.3	TLC272BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	10	2.2	5.3	TLC272I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	10	2.2	5.3	TLC277I	D,JG,P	SLYD003
LinCMOS, Low Bias	4	16	5	Typ 0.005	50	0.1	0.05	TLC27L2AI	D,JG,P	SLYD003
	4	6	2	Typ 0.005	50	0.1	0.05	TLC27L2BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	50	0.1	0.05	TLC27L2I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	50	0.1	0.05	TLC27L7I	D,JG,P	SLYD003
LinCMOS, Medium Bias	4	16	5	Typ 0.005	25	0.6	0.6	TLC27M2AI	D,JG,P	SLYD003
	4	16	2	Typ 0.005	25	0.6	0.6	TLC27M2BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	25	0.6	0.6	TLC27M2I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	25	0.6	0.6	TLC27M7I	D,JG,P	SLYD003
LinCMOS, Micro Power, Precision	3	16	0.6	Typ 0.007	500	0.11	0.05	TLC1078I	D,JG,P	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	0.5	60	800	2.8	0.9	TLE2022I	D,JG,L,P	SLOS027
	± 2	± 20	0.3	55	1000	2.8	0.9	TLE2022AI	D,JG,L,P	SLOS027
	± 2	± 20	0.15	50	1500	2.8	0.9	TLE2022BI	JG,L	SLOS027

Operational Amplifiers, Internally Compensated, Dual
Industrial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
BIFET, Low Power, Precision	± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL032AI	D,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL032I	D,JG,L,P	SLYD003
BIFET, Precision	± 3.5	± 18	0.8	0.2	50	3	16	TL052AI	D,JG,L,P	SLYD003
	± 3.5	± 18	1.5	0.2	50	3	16	TL052I	D,JG,L,P	SLYD003
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL062I	D,JG,P	SLYD003
	± 3.5	± 18	6	0.2	50	3	13	TL072I	D,JG,P	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL082I	D,JG,P	SLYD003
	± 3.5	± 18	6	0.2	50	3	13	TL083I	D,JG,P	SLYD003
	± 3.5	± 18	0.5	0.2	50	3	13	TL287I	D,JG,P	SLYD003
	± 3.5	± 18	1	0.2	50	3	13	TL288I	D,JG,P	SLYD003
Low Power	± 1.5	± 18	8	-500	20	1	0.6	TL322I	D,JG,P	SLYD003
LinCMOS, High Bias	4	16	5	Typ 0.005	10	2.2	5.3	TLC272AI	D,JG,P	SLYD003
	4	16	2	Typ 0.005	10	2.2	5.3	TLC272BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	10	2.2	5.3	TLC272I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	10	2.2	5.3	TLC277I	D,JG,P	SLYD003
LinCMOS, Low Bias	4	16	5	Typ 0.005	50	0.1	0.05	TLC27L2AI	D,JG,P	SLYD003
	4	6	2	Typ 0.005	50	0.1	0.05	TLC27L2BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	50	0.1	0.05	TLC27L2I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	50	0.1	0.05	TLC27L7I	D,JG,P	SLYD003
LinCMOS, Medium Bias	4	16	5	Typ 0.005	25	0.6	0.6	TLC27M2AI	D,JG,P	SLYD003
	4	16	2	Typ 0.005	25	0.6	0.6	TLC27M2BI	D,JG,P	SLYD003
	4	16	10	Typ 0.005	25	0.6	0.6	TLC27M2I	D,JG,P	SLYD003
	4	16	0.5	Typ 0.005	25	0.6	0.6	TLC27M7I	D,JG,P	SLYD003
LinCMOS, Micro Power, Precision	3	16	0.6	Typ 0.007	500	0.11	0.05	TLC1078I	D,JG,P	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	0.5	60	800	2.8	0.9	TLE2022I	D,JG,L,P	SLOS027
	± 2	± 20	0.3	55	1000	2.8	0.9	TLE2022AI	D,JG,L,P	SLOS027
	± 2	± 20	0.15	50	1500	2.8	0.9	TLE2022BI	JG,L	SLOS027

Operational Amplifiers, Internally Compensated, Dual
Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT	
	MIN	MAX									
BIFET, General Purpose	± 3.5	± 18	10	0.2	25	3	13	LF353	D,J,G,P	SLYD003	
BIFET, Low Offset	± 3.5	± 18	3	0.2	25	3	13	LF412	D,J,G,P	SLYD003	
High Gain, Low Power, Bipolar	S/S	3	30	7	-250	25	0.6	0.2	LM358	D,J,G,PU	SLYD003
	D/S	± 1.5	± 15								
	S/S	3	30	3	-100	25	0.6	0.2	LM358A	D,J,G,PU	SLYD003
	D/S	± 1.5	± 15								
Precision		± 5	± 22	0.15	20	1500	0.7	0.4	LT1013AC	JG,L,P	SLYD003
		± 5	± 22	0.3	30	1200	0.7	0.4	LT1013C	JG,L,P	SLYD003
		± 5	± 22	0.3	30	1200	0.7	0.4	LT1013D	D,J,G,L,P	SLYD003
General Purpose	± 1.5	± 18	6	500	20	1	0.5	MC1458	D,J,G,PU	SLYD003	
Low Noise	± 3	± 20	4	800	25	10	9	NE5532	J,G,P	SLYD003	
	± 3	± 20	4	800	25	10	9	NE5532A	J,G,P	SLYD003	
High Performance	± 4	± 18	6	500	20	3	1.7	RC4558	D,J,G,P	SLYD003	
	± 4	± 18	6	250	20	4	2	RC4559	D,P	SLYD003	
Low Power	± 2	± 18	5	250	1	0.5	0.5	TL022C	D,J,G,P	SLYD003	
BIFET, Low Power, Precision	± 3.5	± 18	0.8	0.2	5	1.1	2.9	TL032AC	D,J,G,L,P	SLYD003	
	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL032C	D,J,G,L,P	SLYD003	
BIFET, Precision	± 3.5	± 18	1.5	0.2	50	3	16	TL052AC	D,J,G,L,P	SLYD003	
	± 3.5	± 18	4	0.2	50	3	16	TL052C	D,J,G,L,P	SLYD003	
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL062AC	D,J,G,P	SLYD003	
	± 3.5	± 18	3	0.2	4	1	3.5	TL062BC	D,J,G,P	SLYD003	
	± 3.5	± 18	15	0.4	3	1	3.5	TL062C	D,J,G,P	SLYD003	
BIFET, Low Noise	± 3.5	± 18	6	0.2	50	3	13	TL072AC	D,J,G,P	SLYD003	
	± 3.5	± 18	3	0.2	50	3	13	TL072BC	D,J,G,P	SLYD003	
	± 3.5	± 18	10	0.2	25	3	13	TL072C	D,J,G,P	SLYD003	
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL082AC	D,J,G,P	SLYD003	
	± 3.5	± 18	3	0.2	50	3	13	TL082BC	D,J,G,P	SLYD003	
	± 3.5	± 18	15	0.4	25	3	13	TL082C	D,J,G,P	SLYD003	
	± 3.5	± 18	6	0.2	50	3	13	TL083AC	D,J,G,N	SLYD003	
	± 3.5	± 18	15	0.4	25	3	13	TL083C	D,J,G,N	SLYD003	
	± 3.5	± 18	0.5	0.2	50	3	13	TL287C	D,J,G,P	SLYD003	
	± 3.5	± 18	1	0.2	50	3	13	TL288C	D,J,G,P	SLYD003	
Low Power	± 1.5	± 18	10	-500	20	1	0.6	TL322C	D,J,G,P	SLYD003	
LinCMOS, High Bias	1	16	5	Typ 0.005	10	2.2	5.3	TLC252AC	D,J,G,P	SLYD003	
	1	16	2	Typ 0.005	10	2.2	5.3	TLC252BC	D,J,G,P	SLYD003	
	1	16	10	Typ 0.005	10	2.2	5.3	TLC252C	D,J,G,P	SLYD003	
LinCmos, Low Bias	1	16	5	Typ 0.005	30	0.1	0.05	TLC25L2AC	D,J,G,P	SLYD003	
	1	16	2	Typ 0.005	30	0.1	0.05	TLC25L2BC	D,J,G,P	SLYD003	
	1	16	10	Typ 0.005	30	0.1	0.05	TLC25L2C	D,J,G,P	SLYD003	
LinCmos, Medium Bias	1	16	5	Typ 0.005	20	0.6	0.6	TLC25M2AC	D,J,G,P	SLYD003	
	1	16	2	Typ 0.005	20	0.6	0.6	TLC25M2BC	D,J,G,P	SLYD003	
	1	16	10	Typ 0.005	20	0.6	0.6	TLC25M2C	D,J,G,P	SLYD003	
LinCMOS, High Bias	3	16	5	Typ 0.005	10	2.2	5.3	TLC272AC	D,J,G,P	SLYD003	
	3	16	2	Typ 0.005	10	2.2	5.3	TLC272BC	D,J,G,P	SLYD003	
	3	16	10	Typ 0.005	10	2.2	5.3	TLC272C	D,J,G,P	SLYD003	
	3	16	0.5	Typ 0.005	10 Typ	2.2	5.3	TLC277C	D,J,G,P	SLYD003	
LinCmos, Low Bias	3	16	5	Typ 0.005	50	0.1	0.05	TLC27L2AC	D,J,G,P	SLYD003	
	3	16	2	Typ 0.005	50	0.1	0.05	TLC27L2BC	D,J,G,P	SLYD003	
	3	16	10	Typ 0.005	50	0.1	0.05	TLC27L2C	D,J,G,P	SLYD003	
	3	16	0.5	Typ 0.005	50	0.1	0.05	TLC27L7C	D,J,G,P	SLYD003	
LinCmos, Medium Bias	3	16	5	Typ 0.005	25	0.6	0.6	TLC27M2AC	D,J,G,P	SLYD003	
	3	16	2	Typ 0.005	25	0.6	0.6	TLC27M2BC	D,J,G,P	SLYD003	
	3	16	10	Typ 0.005	25	0.6	0.6	TLC27M2C	D,J,G,P	SLYD003	
	3	16	0.5	Typ 0.005	25	0.6	0.6	TLC27M7C	D,J,G,P	SLYD003	

Operational Amplifiers, Internally Compensated, Dual (Continued)

Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μs) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
LinCMOS, Micro Power, Precision	1.4	16	0.6	Typ 0.007	500	0.11	0.05	TLC1078C	D,J,G,P	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	0.5	60	800	2.8	0.9	TLE2022C	D,J,G,L,P	SLOS027
	± 2	± 20	0.3	55	1000	2.8	0.9	TLE2022AC	D,J,G,L,P	SLOS027
	± 2	± 20	0.15	50	1500	2.8	0.9	TLE2022BC	JG,L	SLOS027
General Purpose	± 5	± 22	6	500	25	1	0.5	uA747C	D,J,N	SLYD003

Operational Amplifiers, Internally Compensated, Quad

Military Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μs) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
General Purpose	3	30	5	-150	50	0.6	0.13	LM124	FK,J,W	SLYD003
	± 4	± 22	5	100	50	1	0.5	LM148	FK,J	SLYD003
QUAD uA741, High Performance	± 4	± 22	4	400	50	3.5	1.7	RM4136	FK,J,W	SLYD003
BIFET, Low Power, Precision	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL034AM	FK,J	SLYD003
	± 3.5	± 18	4	0.2	5	1.1	2.9	TL034M	FK,J	SLYD003
Low Power	± 2	± 22	5	100	72	0.5	0.5	TL044M	FK,J,W	SLYD003
BIFET, Precision	± 3.5	± 18	1.5	0.2	50	2.7	16	TL054AM	FK,J	SLYD003
	± 3.5	± 18	4	0.2	50	2.7	16	TL054M	FK,J	SLYD003
	3.5	20	0.3	-30	1200	—	0.4	LT1014M	J,N	SLOS039
	3.5	20	0.3	-30	1200	—	0.4	LT1014DM	J,N	SLOS039
BIFET, Low Power	± 3.5	± 18	9	0.2	4	1	3.5	TL064M	FK,J,W	SLYD003
BIFET, Low Noise	± 3.5	± 18	9	0.2	35	3	13	TL074M	FK,J,W	SLYD003
BIFET, General Purpose	± 3.5	± 18	9	0.2	25	3	13	TL084M	FK,J,W	SLYD003
LinCMOS, High Bias	4	16	10	0.005 Typ	10	2.2	5.3	TLC274M	FK,J	SLYD003
	4	16	1.2	0.005 Typ	10	2.2	5.3	TLC279M	FK,J	SLYD003
LinCMOS, Low Bias	4	16	10	0.005 Typ	50	0.1	0.05	TLC27L4M	FK,J	SLYD003
	4	16	5	0.005 Typ	50	0.1	0.05	TLC27L9M	FK,J	SLYD003
LinCMOS, Medium Bias	4	16	10	0.005 Typ	20	0.6	0.6	TLC27M4M	FK,J	SLYD003
	4	16	5	0.005 Typ	20	0.6	0.6	TLC27M9M	FK,J	SLYD003
LinCMOS, Micro Power, Precision	3	± 16	1.15	0.007 Typ	500	0.11	0.05	TLC1079M	D,J,G,P	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	1	60	400	2.8	0.9	TLE2024M	DW,FK,J,N	SLOS028
	± 2	± 20	0.75	55	800	2.8	0.9	TLE2024AM	DW,FK,J,N	SLOS028
	± 2	± 20	0.5	50	1000	2.8	0.9	TLE2024BM	FK,J,N	SLOS028

Operational Amplifiers, Internally Compensated, Quad
Automotive Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION		SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
		MIN	MAX								
Norton Amplifier, Bipolar,	S/S	4.5	32		200	1.2	2.5	0.5	LM2900	J,N	SLYD003
	D/S	± 2.5	± 16								
Extended Temperature Range LM324		3	26	7	-250	100 Typ	0.6	0.3	LM2902	D,J,N,W	SLYD003
Low Power, Bipolar	S/S	3	36	8	-500	20	1	0.6	MC3303	D,J,N	SLYD003
	D/S	± 1.5	± 18								
Quad uA741		± 4.5	± 18	6	500	20	3	1.7	RV4136	D,J,N,W	SLYD003
BIFET, Low Power, Precision		± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL034AI	D,J,N	SLYD003
		± 3.5	± 18	4	0.2	5	1.1	2.9	TL034I	D,J,N	SLYD003
BIFET, Precision		± 3.5	± 18	1.5	0.2	50	2.7	16	TL054AI	D,J,N	SLYD003
		± 3.5	± 18	4	0.2	50	2.7	16	TL054I	D,J,N	SLYD003
		± 3.5	± 18	6	0.2	4	1	3.5	TL064I	D,J,N	SLYD003
		± 3.5	± 18	6	0.2	50	3	13	TL074I	D,J,N	SLYD003
		± 3.5	± 18	6	0.2	50	3	13	TL084I	D,J,N	SLYD003
		3.5	20	0.3	-30	1200	-	0.4	LT1014I	J,N	SLOS039
		3.5	20	0.8	-30	1200	-	0.4	LT1014DI	J,N	SLOS039
LinCMOS, High Bias		4	16	5	0.001 Typ	10	2.2	5.3	TLC274AI	D,J,N	SLYD003
		4	16	2	0.001 Typ	10	2.2	5.3	TLC274BI	D,J,N	SLYD003
		4	16	10	0.001 Typ	10	2.2	5.3	TLC274I	D,J,N	SLYD003
		4	16	1.2	0.005 Typ	10	2.2	5.3	TLC279I	D,J,N	SLYD003
LinCMOS, Low Bias		4	16	5	0.005 Typ	50	0.1	0.05	TLC27L4AI	D,J,N	SLYD003
		4	16	2	0.005 Typ	50	0.1	0.05	TLC27L4BI	D,J,N	SLYD003
		4	16	10	0.005 Typ	50	0.1	0.05	TLC27L4I	D,J,N	SLYD003
		4	16	5	0.005 Typ	50	0.1	0.05	TLC27L9I	D,J,N	SLYD003
LinCMOS, Medium Bias		4	16	5	0.005 Typ	25	0.6	0.6	TLC27M4AI	D,J,N	SLYD003
		4	16	2	0.005 Typ	25	0.6	0.6	TLC27M4BI	D,J,N	SLYD003
		4	16	10	0.005 Typ	25	0.6	0.6	TLC27M4I	D,J,N	SLYD003
		4	16	2	0.005 Typ	25	0.6	0.6	TLC27M9I	D,J,N	SLYD003
LinCMOS, Micro Power, Precision		3	± 16	1.15	Typ 0.007	500	0.11	0.05	TLC1079I	D,J,G,P	SLYD003
Excalibur, High Speed, Precision		± 2	± 20	1	60	400	2.8	0.9	TLE2024I	DW,J,N	SLOS028
		± 2	± 20	0.75	55	800	2.8	0.9	TLE2024AI	DW,J,N	SLOS028
		± 2	± 20	0.5	50	1000	2.8	0.9	TLE2024BI	DW,J,N	SLOS028

Operational Amplifiers, Internally Compensated, Quad
Industrial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION		SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_{IB} (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
		MIN	MAX								
General Purpose, Bipolar		3	30	5	-150	50	0.6	0.3	LM224	D,J,N,W	SLYD003
		3	30	3	-80	50	0.6	0.3	LM224A	D,J,N,W	SLYD003
		± 4	± 18	6	200	25	1	0.5	LM248	D,J,N	SLYD003
High Gain, Low Power, Bipolar	S/S	3	32	5	-150	50	0.6	0.2	LM258	D,J,N	SLYD003
	D/S	± 1.5	± 22								
Single Supply, Norton Amplifier, Bipolar	S/S	4	32	-	200	1.2	2.5	0.5	LM2900	D,J,N	SLYD003
	D/S	± 2	± 16								
BIFET, Low Power		± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL034AI	D,J,N	SLYD003
		± 3.5	± 18	4	0.2	5	1.1	2.9	TL034I	D,J,N	SLYD003
BIFET, Precision		± 3.5	± 18	1.5	0.2	50	2.7	16	TL054AI	D,J,N	SLYD003
		± 3.5	± 18	4	0.2	50	2.7	16	TL054I	D,J,N	SLYD003
		± 3.5	20	0.3	-30	1200	-	0.4	LT1014I	J,N	SLOS039
		± 3.5	20	0.3	-30	1200	-	0.4	LT1014DI	J,N	SLOS039

Operational Amplifiers, Internally Compensated, Quad (Continued)

Industrial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
BIFET, Low Power, Precision	± 3.5	± 18	6	0.2	4	1	3.5	TL064I	D,J,N	SLYD003
	± 3.5	± 18	6	0.2	50	3	13	TL074I	D,J,N	SLYD003
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL084I	D,J,N	SLYD003
LinCMOS, High Bias	4	16	5	0.001 Typ	10	2.2	5.3	TLC274AI	D,J,N	SLYD003
	4	16	2	0.001 Typ	10	2.2	5.3	TLC274BI	D,J,N	SLYD003
	4	16	10	0.001 Typ	10	2.2	5.3	TLC274I	D,J,N	SLYD003
	4	16	0.75	0.005 Typ	10	2.2	5.3	TLC279I	D,J,N	SLYD003
LinCMOS, Low Bias	4	16	5	0.005 Typ	50	0.1	0.05	TLC27L4AI	D,J,N	SLYD003
	4	16	2	0.005 Typ	50	0.1	0.05	TLC27L4BI	D,J,N	SLYD003
	4	16	10	0.005 Typ	50	0.1	0.05	TLC27L4I	D,J,N	SLYD003
	4	16	5	0.005 Typ	50	0.1	0.05	TLC27L9I	D,J,N	SLYD003
LinCMOS, Medium Bias	4	16	5	0.005 Typ	25	0.6	0.6	TLC27M4AI	D,J,N	SLYD003
	4	16	2	0.005 Typ	25	0.6	0.6	TLC27M4BI	D,J,N	SLYD003
	4	16	10	0.005 Typ	25	0.6	0.6	TLC27M4I	D,J,N	SLYD003
	4	16	2	0.005 Typ	25	0.6	0.6	TLC27M9I	D,J,N	SLYD003
LinCMOS, Micro Power, Precision	3	± 16	1.15	Typ 0.007	500	0.11	0.05	TLC1079I	D,J,G,P	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	1	60	400	2.8	0.9	TLE2024I	DW,J,N	SLOS028
	± 2	± 20	0.75	55	800	2.8	0.9	TLE2024AI	DW,J,N	SLOS028
	± 2	± 20	0.5	50	1000	2.8	0.9	TLE2024BI	DW,J,N	SLOS028

Operational Amplifiers, Internally Compensated, Quad

Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT	
	MIN	MAX									
BIFET General Purpose	± 3.5	± 18	10	0.2	25	3	13	LF347	D,J,N	SLYD003	
General Purpose	3	30	7	-250	25	0.6	0.3	LM324	D,J,N,W	SLYD003	
	3	30	3	-100	25	0.6	0.3	LM324A	D,J,N,W	SLYD003	
	± 4	± 18	6	200	25	1	0.5	LM348	D,J,N	SLYD003	
Single Supply, Norton Amplifier, Bipolar	S/S	4	32	200	1.2	2.5	0.5	LM3900	D,J,N	SLYD003	
	D/S	± 2	± 16								
Low Power, Bipolar	S/S	3	36	10	-500	20	1	0.6	MC3403	D,J,N	SLYD003
	D/S	± 1.5	± 18								
Quad uA741, High Performance	± 4	± 18	6	500	20	3	1.7	RC4136	D,J,N,W	SLYD003	
BIFET, Low Power, Precision	± 3.5	± 18	1.5	0.2	5	1.1	2.9	TL034AC	D,J,N	SLYD003	
	± 3.5	± 18	4	0.2	5	1.1	2.9	TL034C	D,J,N	SLYD003	
General Purpose	± 2	± 18	5	250	60	0.5	0.5	TLO44C	J,N,W	SLYD003	
BIFET, Precision	± 3.5	± 18	1.5	0.2	50	2.7	16	TL054AC	D,J,N	SLYD003	
	± 3.5	± 18	4	0.2	50	2.7	16	TL054C	D,J,N	SLYD003	
	3.5	20	0.3	-30	1200	-	0.4	LT1014C	J,N	SLOS039	
	3.5	20	0.8	-30	1200	-	0.4	LT1014DC	J,N	SLOS039	
BIFET, Low Power	± 3.5	± 18	6	0.2	4	1	3.5	TL064AC	D,J,N	SLYD003	
	± 3.5	18	3	0.2	4	1	3.5	TL064BC	D,J,N	SLYD003	
	± 3.5	18	15	0.4	3	1	3.5	TL064C	D,J,N	SLYD003	
BIFET, Low Noise	± 3.5	± 18	6	0.2	50	3	13	TL074AC	D,J,N	SLYD003	
	± 3.5	± 18	3	0.2	50	3	13	TL074BC	D,J,N	SLYD003	
	± 3.5	± 18	10	0.2	50	3	13	TL074C	D,J,N	SLYD003	
	± 3.5	± 18	10	0.2	25	3	13	TL075C	J,N	SLYD003	

Operational Amplifiers, Internally Compensated, Quad (Continued)

Commercial Temperature Range

 (Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	SUPPLY VOLTAGE (V)		V_{IO} (mV) MAX	I_B (nA) MAX	A_{VD} (V/mV) MIN	B_1 (MHz) TYP	SR (V/ μ s) TYP	DEVICE NUMBER	PACKAGES	DOCUMENT
	MIN	MAX								
BIFET, General Purpose	± 3.5	± 18	6	0.2	50	3	13	TL084AC	D,J,N	SLYD003
	± 3.5	± 18	3	0.2	50	3	13	TL084BC	D,J,N	SLYD003
	± 3.5	± 18	15	0.4	25	3	13	TL084C	D,J,N	SLYD003
	± 3.5	± 18	15	0.4	25	3	13	TL085C	J,N	SLYD003
High Performance, Bipolar	± 4	± 18	6	500	20	3	2	TL136C	N	SLYD003
LinCMOS, High Bias	1	16	5	0.005 Typ	10	2.2	5.3	TLC254AC	D,J,N	SLYD003
	1	16	2	0.005 Typ	10	2.2	5.3	TLC254BC	D,J,N	SLYD003
	1	16	10	0.005 Typ	10	2.2	5.3	TLC254C	D,J,N	SLYD003
LinCMOS, Low Bias	1	16	5	0.005 Typ	30	0.1	0.05	TLC25L4AC	D,J,N	SLYD003
	1	16	2	0.005 Typ	30	0.1	0.05	TLC25L4BC	D,J,N	SLYD003
	1	16	10	0.005 Typ	30	0.1	0.05	TLC25L4C	D,J,N	SLYD003
LinCMOS, Medium Bias	1	16	5	0.005 Typ	20	0.6	0.6	TLC25M4AC	D,J,N	SLYD003
	1	16	2	0.005 Typ	20	0.6	0.6	TLC25M4BC	D,J,N	SLYD003
	1	16	10	0.005 Typ	20	0.6	0.6	TLC25M4C	D,J,N	SLYD003
LinCMOS, High Bias	3	16	5	0.005 Typ	10	2.2	5.3	TLC274AC	D,J,N	SLYD003
	3	16	2	0.005 Typ	10	2.2	5.3	TLC274BC	D,J,N	SLYD003
	3	16	10	0.005 Typ	10	2.2	5.3	TLC274C	D,J,N	SLYD003
	3	16	0.75	0.005 Typ	10	2.2	5.3	TLC279C	D,J,N	SLYD003
LinCMOS, Low Bias	3	16	5	0.005 Typ	50	0.1	0.05	TLC27L4AC	D,J,N	SLYD003
	3	16	2	0.005 Typ	50	0.1	0.05	TLC27L4BC	D,J,N	SLYD003
	3	16	10	0.005 Typ	50	0.1	0.05	TLC27L4C	D,J,N	SLYD003
	3	16	0.75	0.005 Typ	50	0.1	0.05	TLC27L9C	D,J,N	SLYD003
LinCMOS, Medium Bias	3	16	5	0.005 Typ	25	0.6	0.6	TLC27M4AC	D,J,N	SLYD003
	3	16	2	0.005 Typ	25	0.6	0.6	TLC27M4BC	D,J,N	SLYD003
	3	16	10	0.005 Typ	25	0.6	0.6	TLC27M4C	D,J,N	SLYD003
	3	16	0.75	0.005 Typ	25	0.7	0.6	TLC27M9C	D,J,N	SLYD003
LinCMOS, Micro Power, Precision	1.4	± 16	1.15	0.007 Typ	500	0.11	0.05	TLC1079C	D,J,N	SLYD003
Excalibur, High Speed, Precision	± 2	± 20	1	60	400	2.8	0.9	TLE2024C	DW,J,N	SLOS028
	± 2	± 20	0.75	55	800	2.8	0.9	TLE2024AC	DW,J,N	SLOS028
	± 2	± 20	0.5	50	1000	2.8	0.9	TLE2024BC	DW,J,N	SLOS028

Differential Video Amplifiers

Military Temperature Range

 (Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	BAND-WIDTH	NOISE V_n , TYP	GAIN	DEVICE NUMBER	PACKAGES	DOCUMENT
Amplifier with internal frequency compensation and adjustable/selectable gain options	90	12 μ V	600 Max	SE592	D,N	SLYD003
Amplifier with internal frequency compensation	200	12 μ V	10,100,400	uA733M	J,U	SLYD003

Differential Video Amplifiers Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	BANDWIDTH	NOISE V_n , TYP	GAIN	DEVICE NUMBER	PACKAGES	DOCUMENT
Amplifier with 2 multiplexed inputs and wide AGC range	60MHz	25 μV	100 Max	MC1445	J,N	SLYD003
Amplifier with internal frequency compensation and adjustable/selectable gain options	90MHz	12 μV	600 Max	NE592	D,N	SLYD003
Similar to NE592 but with tighter gain distribution	90MHz	12 μV	600 Max	NE592A	D,N	SLYD003
Amplifier with a wide AGC range	50MHz	12 μV	100	TL026C	D,P,J,G	SLYD003
Amplifier with a wide AGC range	50MHz	12 μV	400 Max	TL027C	D,J,N	SLYD003
2-channel multiplexed Video Amp	20MHz	>5 μV	600 Max	TLO40C	D,N	SLYD003
Similar to NE592 but in 8-pin package	90MHz	12 μV	600 Max	TL592	D,P	SLYD003
Similar to NE592A but in 8-pin package	90MHz	12 μV	600 Max	TL592A	D,P	SLYD003
Low-noise version of NE592 and TL592	90MHz	3 μV	600 Max	TL592B	D,N,P	SLYD003
Amplifier with internal frequency compensation	200MHz	12 μV	10,100,400	uA733C	D,N	SLYD003

Logarithmic Amplifiers Military Temperature Range

DESCRIPTION	BANDWIDTH	GAIN	TYPE	PACKAGES	DOCUMENT
Logarithmic Amplifier	40 Mhz	Logarithmic Curve	TL441AM	J,FK	SLYD003

Magnetic-Media Interface Circuits

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	DEVICE NUMBER	PACKAGES	DOCUMENT
Read-Amplifier System	MC3470	N	SLYD003
	MC3470A	N	SLYD003
Tape-Read Amplifier	TL040C	D,N	SLYD003
Tape-Read Signal Conditioner	TL041C	DW,NT	SLYD003
Disk-Memory Read-Chain Data	TL712	D,J,G,P	SLYD003
Disk-Memory Read-Chain Data Comparator with MECL III and MECL 1000	TL721	D,J,G,P	SLYD003

Voltage Comparators

Internally Compensated, Single Military Temperature Range

(Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_{IB} MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Single	Strobe	4-30	0	3	0.1	.8	115	LM111	FK,J,J,G,U	SLYD003
	Ultra Low Power, Strobe	4-30	0	7.5	0.1	1.6	1200	LP111	FK,J,G	SLYD003
	Strobe	4-30	0	1.5	0.05	50	150	LT1011M	JG,L	SLYD003
	Strobe	4-30	0	0.5	0.025	50	150	LT1011A	JG,L	SLYD003
	Ultra Fast, Precision	5	-5	+2	10	10	10	LT1016M	JG,L	SLYD003
Dual	Low Power, Bipolar	4-30	0	5	0.1	6	300	LM193	FK,J,G,L	SLYD003
	Dual TL510M	12	-6	2	15	2	30	TL514M	FK,J,W	SLYD003
	Ultra Low Offset, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC352M	FK,J,G	SLYD003
	High Speed LinCMOS	4-18	0	10	5 pA Typ	6	200	TLC372M	FK,J,G	SLYD003
	Ultra Low Power, Open-Drain Output	4-18	0	5	5 pA Typ	6	1100	TLC393M	FL,KG	SLYD003
	Ultra Low Power, Push-Pull Output	4-18	0	5	5 pA Typ	4	1300	TLC3702M	FK,J,G	SLYD003

Internally Compensated, Single (Continued)
 Military Temperature Range

 (Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_B MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Quad	Low Power, Bipolar Precision Input	4-30	0	5	-0.1	6	300	LM139	FK,J	SLYD003
		4-30	0	2	-0.1	2	300	TL139A	FK,J	SLYD003
	Ultra Low Power, Open-Drain Output	4-18	0	5	5 pA Typ	6	1100	TLC339M	FK,J	SLYD003
	Ultra Low Supply, LinCMOS High Speed LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC354M	FK,J	SLYD003
		4-18	0	10	5 pA Typ	6	200	TLC374M	FK,J	SLYD003
Ultra Low Power, Push-Pull Output	4-18	0	5	5 pA Typ	4	1300	TLC3704M	FK,J	SLYD003	

Internally Compensated, Single
 Automotive Temperature Range

 (Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_B MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Dual	Automotive LM393	4-30	0	7	0.25	6	300	LM2903	D,J,G,P	SLYD003
	Ultra Low Supply, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC352I	D,J,G,P	SLYD003
	High Speed, LinCMOS	3-18	0	10	5 pA Typ	6	200	TLC372I	D,J,G,P	SLYD003
	Ultra Low Power, Push Pull Output	3-18	0	5	5 pA Typ	4	1300	TLC3702I	D,J,G,P	SLYD003
	Ultra Low Power, Open Drain Output	3-18	0	5	5 pA Typ	6	1100	TLC393I	D,J,G,P	SLYD003
Quad	Automotive LM339 Temp. Low Cost LM2901	4-30	0	7	-0.25	6	300	LM2901	D,J,N	SLYD003
		4-26	0	20	0.5	6	300	LM3302	D,J,N	SLYD003
	Ultra Low Power, Automotive LP339, Bipolar	5	0	± 5	-0.025	20	8000	LP2901	D,J,N	SLYD003
	Open Drain Output	3-18	0	5	5 pA Typ	6	1100	TLC33	D,J,N	SLYD003
	Ultra Low Offset, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC354I	D,J,N	SLYD003
	High Speed, LinCMOS Push Pull Output	3-18	0	10	5 pA Typ	6	200	TLC374I	D,J,N	SLYD003
		3-18	0	5	5 pA Typ	4	1300	TLC3704I	D,J,N	SLYD003

Internally Compensated, Single
 Industrial Temperature Range

 (Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_B MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Single	Strobe	4-30	0	3	0.1	8	115	LM211	D,J,G,P	SLYD003
	Ultra Low Power, Strobe	4-30	0	7.5	0.1	1.6	1200	LP211	D,J,G,P	SLYD003
	Single LM339	4-30	0	5	-0.1	6	300	TL331I	D,J,G,P	SLYD003

Internally Compensated, Single (Continued)

Industrial Temperature Range

(Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_{IB} MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Dual	Industrial LM393	4-30	0	2	0.25	6	300	LM293A	D,J,G,P	SLYD003
	Industrial LM393, Low Offset	4-30	0	2	0.25	6	300	LM293A	D,J,G,P	SLYD003
	Ultra Low Supply, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC352I	D,J,G,P	SLYD003
	High Speed LinCMOS	3-18	0	10	5 pA Typ	6	200	TLC372I	D,J,G,P	SLYD003
	Ultra Low Power, Open Drain Output	3-18	0	5	5 pA Typ	6	1100	TLC393I	D,J,G,P	SLYD003
	Ultra Low Power, Push-Pull Output	3-18	0	5	5 pA Typ	4	1300	TLC3702I	D,J,G,P	SLYD003
Quad	Industrial LM339	4-30	0	5	-0.25	6	300	LM239	D,J,N	SLYD003
	Industrial LM339 LoOffset	4-30	0	2	-0.25	6	300	LM239A	D,J,N	SLYD003
	Ultra Low Power, Industrial LP339, Bipolar	4-30	0	± 5	-0.025	20	8000	LP239	D,J,N	SLYD003
	Ultra Low Power, Open-Drain Output	3-18	0	5	5 pA Typ	6	1100	TLC339I	D,J,N	SLYD003
	Ultra Low Supply, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC354I	D,J,N	SLYD003
	High Speed LinCMOS	3-18	0	10	5 pA Typ	6	200	TLC374I	D,J,N	SLYD003
	Ultra Low Power, Push-Pull Output	3-18	0	5	5 pA Typ	4	1300	TLC3704I	D,J,N	SLYD003

Internally Compensated, Single

Commercial Temperature Range

(Values specified at $T_A = 25^\circ\text{C}$)

CHANNEL TYPE	DESCRIPTION	POWER SUPPLIES		V_{IO} MAX (mV)	I_{IB} MAX (μA)	I_{OL} MIN (mA)	RESPONSE TIME TYP (ns)	TYPE	PACKAGE	DOCUMENT
		V_{CC+} NOM (V)	V_{CC-} NOM (V)							
Single	Strobe	4-30	0	7.5	0.25	8	115	LM311	D,J,G,P	SLYD003
	Ultra Low Power, Strobe	4-30	0	7.5	0.1	1.6	1200	LP311	D,J,G,P	SLYD003
	Strobe	4-30	0	0.5	0.025	50	150	LT1011AC	JG,PL	SLYD003
	Strobe	4-30	0	1.5	0.05	50	150	LT1011C	JG,PL	SLYD003
	Ultra Fast Precision	5	-5	± 3	10	10	10	LT1016C	D,J,G,L,P	SLYD003
	Single LM339	4-30	0	5	-0.25	6	300	TL331C	D,J,G,P	SLYD003
	Output Enable	5	0	± 1	-	Max 16	25	TL712	D,J,G,P	SLYD003
	High Speed	5	0	-	-	Max 16	7	TL714C	D,P	SLYD003
	High Speed	0	-5.2	± 1	-	Max 16	Max 12	TL721	D,P	SLYD003
	Dual	V_{CC} : 2 V to 36 V	4-30	0	5	0.25	6	300	LM393	D,J,G,P
V_{CC} : 2 V to 36 V		4-30	0	2	0.25	6	300	LM393A	D,J,G,P	SLYD003
Ultra Low Supply, LinCMOS		1.4-18	0	10	5 pA Typ	6	200	TLC352C	D,J,G,P	SLYD003
High Speed, LinCMOS		3-18	0	10	5 pA Typ	6	200	TLC372C	D,J,G,P	SLYD003
Ultra Low Power, CMOS Open Drain Output		3-18	0	5	5 pA Typ	6	1100	TLC393C	D,J,G,P	SLYD003
Ultra Low Power, CMOS Push-Pull Output		3-18	0	5	5 pA Typ	4	1300	TLC3702C	D,J,G,P	SLYD003
Quad		V_{CC} : 2 V to 36 V	4-30	0	5	-0.25	6	300	LM339	D,J,N
	V_{CC} : 2 V to 36 V	4-30	0	2	-0.25	6	300	LM339A	D,J,N	SLYD003
	Ultra Low Power, Bipolar	4-30	0	± 5	-0.025	6	8000	LP339	D,J,N	SLYD003
	Ultra Low Power, CMOS Open Drain Output	3-18	0	5	5 pA Typ	6	1100	TLC339C	D,J,N	SLYD003
	Ultra Low Supply, LinCMOS	1.4-18	0	10	5 pA Typ	6	200	TLC354C	D,N	SLYD003
	High Speed, CMOS	3-18	0	10	5 pA Typ	6	200	TLC374C	D,J,N	SLYD003
	Ultra Low Power, CMOS Push-Pull Output	3-18	0	5	5 pA Typ	4	1300	TLC3704C	D,J,N	SLYD003

Data Acquisition and Conversion Circuits

Single-Slope and Dual-Slope A/D Converters

CONVERSION FUNCTION	RESOLUTION	SPEED (ms)	TYPE	PACKAGE	DOCUMENT
Dual-Slope A/D with BCD Output	4½ Digits	34	TLC7135	FN,N	SLYD004
	4½ Digits	34	ILC7135	FN,N	SLYD004
Dual-Slope Analog Processors	4½ Digits	80	TL500	J,DW	SLYD004
	3½ Digits	80	TL501	J,DW	SLYD004
Digital Processors with Seven-Segment Outputs	4½ Digits	80	TL502	N	SLYD004
Digital Processors with BCD Outputs	4½ Digits	80	TL503	N	SLYD004
Dual-Slope Analog Processor	10 Bits	50	TL505	N	SLYD004
Pulse-Width Modulator for Single-Slope Converter	7 Bits	1	TL507	P	SLYD004

Successive-Approximation and Semi-Flash A/D Converters

ADDRESS AND DATA I/O FORMAT	SIGNAL INPUTS ANALOG DEDICATED	SIGNAL INPUTS ANALOG* DIGITAL	RESOLUTION BITS	CONVERSION SPEED (µs)**	POWER DISSIPATION (TYP)	UNADJUSTED ERROR (MAX) ±LSB	TYPE	PACKAGES	DOCUMENT
Parallel	1†	0	8	100	10 mW	0.5	ADC0803	N	SLYD004
	1†	0	8	100	10 mW	1.0	ADC0804	N	SLYD004
	1†	0	8	100	10 mW	1.0	ADC0805	N	SLYD004
	8	0	8	100	10 mW	0.75	ADC0808	FN,N	SLYD004
	8	0	8	100	10 mW	0.75	ADC0808M	FK,JD	SLYD004
	8	0	8	100	10 mW	1.25	ADC0809	FN,N	SLYD004
	8	0	8	100	0.5 mW	0.75	TL0808	FN,N	SLYD004
	8	0	8	100	0.5 mW	1.25	TL0809	FN,N	SLYD004
	1†	0	8	1	35 mW	0.5	ADC0820B	DW,FN,N	SLYD004
	1†	0	8	1	35 mW	1.0	ADC0820C	DW,FN,N	SLYD004
	1†	0	8	1	35 mW	1.0	TLC0820A	DW,FN,N	SLYD004
	1†	0	8	1	35 mW	0.5	TLC0820B	DW,FN,N	SLYD004
	5	6	8	15	6 mW	0.5	TLC532A	FN,N	SLYD004
	5	6	8	30	6 mW	0.5	TLC533A	FN,N	SLYD004
	1	0	13	10	45 mW	1.0	TLC1225A	J,N	SLYD004
	1	0	13	10	45 mW	0.5	TLC1225B	J,N	SLYD004
Serial	1†	0	8	84	10 mW	1.0	ADC0831A	P	SLYD004
	1†	0	8	84	10 mW	0.5	ADC0831B	P	SLYD004
	2†	0	8	84	10 mW	1.0	ADC0832A	P	SLYD004
	2†	0	8	84	10 mW	0.5	ADC0832B	P	SLYD004
	4†	0	8	84	10 mW	1.0	ADC0834A	N	SLYD004
	4†	0	8	84	10 mW	0.5	ADC0834B	N	SLYD004
	8	0	8	84	10 mW	1.0	ADC0838A	FN,N	SLYD004
	8	0	8	84	10 mW	0.5	ADC0838B	FN,N	SLYD004
	11	0	8	13	6 mW	0.5	TLC540	FN,N,DW	SLYD004
	11	0	8	25	6 mW	0.5	TLC541	FN,N,DW	SLYD004
	8	0	8	40	10 mW	0.5	TLC542	FN,N	SLYD004
	5	0	8	22	6 mW	0.5	TLC543	D,J,N	SLYD004
	5	0	8	25	6 mW	0.5	TLC544		SLYD004
	19	0	8	13	6 mW	0.5	TLC545	FN,N	SLYD004
	19	0	8	25	6 mW	0.5	TLC546	FN,N	SLYD004
	1	0	8	22	6 mW	0.5	TLC548	D,P	SLYD004
	1	0	8	25	6 mW	0.5	TLC549	D,P	SLYD004
	11	0	10	31	6 mW	0.5	TLC1540	FK,FN,N,J	SLYD004
	11	0	10	31	6 mW	1.0	TLC1541	FK,FN,N,J	SLYD004

*Used as digital logic inputs or inputs for A/D conversion. TLC532/3A can have 11 analog, 5 analog, and 6 digital inputs or combinations.

**Includes access time.

†Differential input.

D/A Converters (5 V to 15 V)

FUNCTION	RESOLUTION	SETTLING TIME (ns)	TYPE	PACKAGES	DOCUMENT
Single Multiplying D/A	8 Bits	100	AD7524A AD7524J TLC7524	N FN,N D, FN,N	SLYD004 SLYD004 SLYD004
Dual Multiplying D/A	8 Bits	100	AD7528B AD7528K TLC7528 AD7628 TLC7628	FN,N FN,N DW, FN,N FN,N DW, FN,N	SLYD004 SLYD004 SLYD004 SLYD004 SLNS025
Single Multiplying D/A	10 Bits	150	AD7533C AD7533L TLC7533	FN,N FN,N D, FN,N	SLYD004 SLYD004 SLYD004

*AD7628 TTL Compatible at 15 V, other items not.

Analog Interface for Digital Signal Processors

FUNCTION	TRANSFER CHARACTERISTIC	DYNAMIC RANGE	RESOLUTION	SAMPLING RATE	PART NUMBER	PACKAGES	DOCUMENT
Discrete Interfaces, A/D and D/A (No On-Board Filters)	Linear	8 Bits	8 Bits	1 MHz (A/D) 5 MHz (D/A) 5 MHz (D/A) 5 MHz (Dual D/A) 5 MHz (Dual D/A)	TLC0820/ADC0820 TLC7524 AD7524 TLC7528 AD7528	FN,N	TBD SLYD004 SLYD004 SLYD004 SLYD004
		10 Bits	10 Bits	4 MHz (D/A)	TLC7533/AD7533	FN,N	SLYD004
High-Performance Combo* (On-Board Filters)	Linear	14 Bits	14 Bits	19.2 kHz (Programmable)	TLC32040 TLC32041 TLC32042	FN,N	SLYD004 TBD TBD
Voiceband A/C (On-Board Filters)	Linear	14 Bits	14 Bits	20 kHz	TLC32044 TLC32045	FN,N	TBD TBD

*The TLC32040 and TLC32041 have two differential inputs for 14-bit A/D and a serial port input for 14 bit D/A. The A/D conversion accuracy for this device is measured in terms of signal-to-quantization distortion and also in LSB over certain converter ranges. Please refer to the data sheet.

Video Converters

CONVERSION FUNCTION	RESOLUTION	POWER DISSIPATION	TYPE	PACKAGES	DOCUMENT
Video A/D Converter	6 Bits	300 mW	TL5501	N	SYLD004
	8 Bits	300 mW	TLC5502	N	SYLD004
Video D/A Converter	6 Bits	325 mW	TL5601	N	SYLD004
	8 Bits	375 mW	TL5602	N	SYLD004
	8 Bits	125 mW	TLC5602	N	SYLD004

Analog Switches and Multiplexers

FUNCTION	POWER SUPPLIES (V)	VOLTAGE RANGE (V)	TYPICAL IMPEDANCE (OHMS)	TYPE	PACKAGES	DOCUMENT
Twin SPDT	± 15	± 10	100	TL182	N	SLYD004
Twin SPDT	± 15	± 10	150	TL185	N	SLYD004
Dual SPST	± 15	± 10	100	TL188	N	SLYD004
Twin Dual SPST	± 15	± 10	150	TL191	N	SLYD004
SPDT	± 25	-17 to +25	100	TL601	JG,P	SLYD004
Dual SPDT	± 25	-17 to +25	100	TL604	JG,P	SLYD004
SPST with Enable	± 25	-17 to +25	100	TL607	JG,P	SLYD004
SPST with Logic Inputs	± 25	-17 to +25	80	TL610	JG,P	SLYD004
Quad Bilateral	12	2 to 12	50	TLC4016	N,D,J	SLYD004
Analog Switch	12	2 to 12	30	TLC4066	N,D,J	SLYD004

Switched-Capacitor Filter ICs

FUNCTION	FILTER ORDER	SUPPLY VOLTAGE (V)	TYPE	PACKAGES	DOCUMENT
Dual Filter, General Purpose	2	± 4 to ± 5	TLC10/MF10A	FN,N	SLYD004
	2	± 4 to ± 5	TLC20/MF20C	FN,N	SLYD004
Low Pass, Butterworth	4	± 2.5 to ± 6	TLC04/MF4A-50	D,P	SLYD004
	4	± 2.5 to ± 6	TLC14/MF4A-100	D,P	SLYD004

POWER SUPPLY CIRCUITS

Power Supply Supervisors

(Values specified for $T_A = 25^\circ\text{C}$)

FUNCTION	SENSE INPUT SUPPLY		SENSE INPUT THRESHOLD (V TYP)	THRESHOLD TOLERANCE %	OUTPUT	DEVICE NUMBER	PACKAGES	DOCUMENT
	1 VSU	2 VSU						
Over Voltage Monitor	*	—	2.6	5	Open-Emitter	MC3423	D,P	SLYD005
Under Voltage Monitor	*	—	2.53	1	Open-Collector	TL7702A	D,P	SLYD005
	5 V	—	4.55	1	Open-Collector	TL7705A	D,P	SLYD005
	9 V	—	7.6	1	Open-Collector	TL7709A	D,P	SLYD005
	12 V	—	10.8	1	Open-Collector	TL7712A	D,P	SLYD005
	15 V	—	13.2	1	Open-Collector	TL7715A	D,P	SLYD005
CMOS Under Voltage Monitor	*	—	1.2	1	Open-Drain	TLC7701	D,J,G,P	SLYD005
	*	—	1.2	1	Push-Pull	TLC7721	D,J,G,P	SLYD005
	5 V	—	4.55	1	Open-Drain	TLC7705	D,J,G,P	SLYD005
	5 V	—	4.55	1	Push-Pull	TLC7725	D,J,G,P	SLYD005
	5 V	—	4.55	1	Open-Collector	TL7780-5	D,N	SLYD005
	12 V	—	10.9	1	Open-Collector	TL7780-12	D,N	SLYD005
	15 V	—	13.64	1	Open-Collector	TL7780-15	D,N	SLYD005
Dual Under Voltage/Over Voltage*	5 V	—	4.55	1	Open-Collector	TL7770-5	DW,N	SLYD005
	12 V	—	10.9	1	Open-Collector	TL7770-12	DW,N	SLYD005
	15 V	—	13.64	1	Open-Collector	TL7770-15	DW,N	SLYD005

*Programmable.

Shunt Voltage Regulators/References

(Values specified for $T_A = 25^\circ\text{C}$)

REG VOLTAGE RANGE	MINIMUM SHUNT CURRENT TO MAINTAIN REG	MAX SHUNT CURRENT	TOLERANCE	TEMPERATURE COEFFICIENT	DEVICE	PACKAGES	DOCUMENT
2.5V (Typ)	10 μA	20 mA	1%	20 PPM/ $^\circ\text{C}$ (Typ)	LT1004	D,LD,LP	SLYD005
2.5V (Typ)	20 μA	20 mA	2%	20 PPM/ $^\circ\text{C}$ (Typ)	LM185-2.5	L	SLYD005
2.5V (Typ)	20 μA	20 mA	2%	20 PPM/ $^\circ\text{C}$ (Typ)	LM385-2.5	D,LD,LP	SLYD005
2.5V (Typ)	400 μA	10 mA	2%	10 PPM/ $^\circ\text{C}$ (Typ)	LM336-2.5	D,LD,LP	SLYD005
2.5V (Typ)	400 μA	20 mA	0.2%	15 PPM/ $^\circ\text{C}$ (Typ)	LT1009	D,LD,LP	SLYD005
2.5V to 30V	500 μA (Typ)	150 mA	4%	120 PPM/ $^\circ\text{C}$ (Typ)	TL430	LP	SLYD005
2.5V to 36V	270 μA (Typ)	150 mA	2%	30 PPM/ $^\circ\text{C}$ (Typ)	TL431	D,L,PLD,J,G	SLYD005
2.5V to 36V	270 μA (Typ)	150 mA	1%	30 PPM/ $^\circ\text{C}$ (Typ)	TL431A	D,L,PP	SLYD005

Adjustable Series-Pass Voltage Regulators

OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT VOLTAGE RANGE	REFERENCE TOLERANCE %	MAX ($V_1 - V_0$) DIFFERENTIAL	DEVICE	PACKAGES	DOCUMENT
Positive Output Voltage	100 mA	1.2V to 32V	5	35 V	TL317	D,LP,J,G	SLYD005
	750 mA	1.25V to 125V	5	125 V	TL783	KC	SLYD005
	1.5 A	1.2V to 37V	5	40 V	LM217	KC	SLYD005
	1.5 A	1.2V to 37V	5	40 V	LM317	KC	SLYD005
Neg Output	1.5 A	-1.2V to -37V	4	-40 V	LM237	KC	SLYD005
	1.5 A	-1.2V to -37V	4	-40 V	LM337	KC	SLYD005
Pos or Neg Output	150 mA	2.0V to 37V	5	38 V	uA723	D,J,N,U	SLYD005
Pos Output	5 A	3.0 V to 28 V	2	30 V	LT1084	KA,KK	SLYD005

Positive Fixed Output Series-Pass Voltage Regulators

OUTPUT VOLTAGE (V)	OUTPUT CURRENT RATING	OUTPUT VOLTAGE TOLERANCE %	MINIMUM DIFFERENTIAL VOLTAGE	TYPE	PACKAGES	DOCUMENT	
2.6	100 mA	±10	2 V	uA78L02	LPD,JG	SLYD005	
	100 mA	±5	2 V	uA78L02A	LPD,JG	SLYD005	
5	100 mA	±5	2 V	uA78L05A	LPD,KC	SLYD005	
	100 mA	±5	0.6 V	LM2931-5AQ	LPD,KC	SLYD005	
	100 mA	±10	2 V	uA78L05	LPD,JG	SLYD005	
	150 mA	±5	0.6 V	LM330	KC	SLYD005	
	150 mA	±10	0.6 V	LM2930-5	KC,LP	SLYD005	
	150 mA	±5	0.6 V	TL750L05	D,KC,LPP	SLYD005	
5	150 mA	±5	0.6 V	TL751L05	D,P	SLYD005	
	500 mA	±5	2 V	uA78M05	KC,JG	SLYD005	
	750 mA	±1	0.6 V	TL750M05	KC	SLYD005	
	750 mA	±1	0.6 V	TL751M05	KC	SLYD005	
	1.5 A	±2	2 V	TL780-05	KC	SLYD005	
	1.5 A	±5	2 V	uA7805	KC	SLYD005	
6	500 mA	±5	2 V	uA78M06	KC	SLYD005	
6.2	1.5 A	±5	2 V	uA7806	KC	SLYD005	
	100 mA	±10	2 V	uA78L06	D,L,P,JG	SLYD005	
	100 mA	±5	2 V	uA78L06A	D,L,P,JG	SLYD005	
8	100 mA	±10	2 V	uA78L08	D,L,P,JG	SLYD005	
	100 mA	±5	2 V	uA78L08A	D,L,P,JG	SLYD005	
8	150 mA	±10	0.6 V	LM2930-8	KC,LP	SLYD005	
	150 mA	±5	0.6 V	TL750L08	KC,D,LPP	SLYD005	
	150 mA	±5	0.6 V	TL751L08	D,P	SLYD005	
	500 mA	±5	2 V	uA78M08	KC	SLYD005	
	750 mA	±1	0.6 V	TL750M08	KC	SLYD005	
	750 mA	±1	0.6 V	TL751M08	KC	SLYD005	
8.5	1.5 A	±5	2 V	uA7808	KC	SLYD005	
	9	100 mA	±10	2 V	uA78L09	LPD,JG	SLYD005
		500 mA	±5	2 V	uA78M09	KC	SLYD005
100 mA		±5	2 V	uA78L09A	LPD,JG	SLYD005	
10	100 mA	±5	2 V	uA78L10A	LPD,JG	SLYD005	
	100 mA	±10	2 V	uA78L10	LPD,JG	SLYD005	
	150 mA	±5	0.6 V	TL750L10	D,KC,LPP	SLYD005	
	150 mA	±5	0.6 V	TL751L10	D,P	SLYD005	
	500 mA	±5	2 V	uA78M10	KC	SLYD005	
	Dual	5	75 mA	±4	2.2 V	LT1036	KJ,KV
12		3 A	±4	2.2 V	LT1036	KJ,KV	SLYD005
10	750 mA	±1	2 V	TL750M10	KC	SLYD005	
	750 mA	±1	2 V	TL751M10	KC	SLYD005	
	1.5 A	±5	2 V	uA7810	KC	SLYD005	
12	100 mA	±5	2 V	uA78L12A	LPD,JG	SLYD005	
	100 mA	±10	2 V	uA78L12	LPD,JG	SLYD005	
	150 mA	±5	0.6 V	TL750L12	LPD,KC	SLYD005	
	150 mA	±5	0.6 V	TL751L12	PD	SLYD005	
	500 mA	±5	2 V	uA78M12	KC,JG	SLYD005	
	750 mA	±1	0.6 V	TL750M12	KC	SLYD005	
12	750 mA	±1	0.6 V	TL751M12	KC	SLYD005	
	1.5 A	±5	2 V	uA7812	KC	SLYD005	
	1.5 A	±2	2 V	TL780-12	KC	SLYD005	
15	100 mA	±5	2 V	uA78L15A	LPD,JG	SLYD005	
	100 mA	±10	2 V	uA78L15	LPD,JG	SLYD005	
	1.5 A	±2	2 V	TL780-15	KC	SLYD005	
	1.5 A	±5	2 V	uA7815	KC	SLYD005	
	500 mA	±5	2 V	uA78M15	KC	SLYD005	

Positive Fixed Output Series-Pass Voltage Regulators (Continued)

OUTPUT VOLTAGE (V)	OUTPUT CURRENT RATING	OUTPUT VOLTAGE TOLERANCE %	MINIMUM DIFFERENTIAL VOLTAGE	TYPE	PACKAGES	DOCUMENT
18	1.5 A	±5	2 V	μA7818	KC	SLYD005
20	500 mA	±5	2 V	μA78M20	KC	SLYD005
24	500 mA	±5	2 V	μA78M24	KC	SLYD005
	1.5 A	±4	2 V	μA7824	KC	SLYD005

Values specified over operating temperature range.

Negative Fixed Output Series-Pass Voltage Regulators

OUTPUT VOLTAGE (V)	OUTPUT CURRENT RATING	OUTPUT VOLTAGE TOLERANCE %	MINIMUM DIFFERENTIAL VOLTAGE	TYPE	PACKAGES	DOCUMENT
5	100 mA	±5	1.7 V	MC79L05A	D,LP	SLYD005
	100 mA	±10	1.7 V	MC79L05	D,LP	SLYD005
	1.5 A	±5	2 V	μA7905	KC	SLYD005
	1.5 A	±5	2 V	μA79M05	KC,JG	SLYD005
5.2	1.5 A	±5	2 V	μA7952	KC	SLYD005
6	1.5 A	±5	2 V	μA7906	KC	SLYD005
	1.5 A	±5	2 V	μA79M06	KC,JG	SLYD005
8	1.5 A	±5	2 V	μA79M08	KC,JG	SLYD005
	1.5 A	±5	2 V	μA7908	KC	SLYD005
12	100 mA	±10	1.7 V	MC79L12	D,LP	SLYD005
	100 mA	±5	1.7 V	MC79L12A	D,LP	SLYD005
	1.5 A	±5	2 V	μA7912	KC	SLYD005
	1.5 A	±5	2 V	μA79M12	KC,JG	SLYD001
15	100 mA	±5	1.7 V	MC79L15A	D,LP	SLYD005
	100 mA	±10	1.7 V	MC79L15	D,LP	SLYD005
	1.5 A	±5	2 V	μA79M15	KC	SLYD005
	1.5 A	±5	2 V	μA7915	KC,JG	SLYD005
18	1.5 A	±5	2 V	μA7918	KC	SLYD005
20	1.5 A	±5	2 V	μA79M20	KC	SLYD005
24	1.5 A	±5	2 V	μA7924	KC	SLYD005
	1.5 A	±5	2 V	μA79M24	KC	SLYD005

Values specified over operating temperature range.

Switched Capacitor Voltage Converters

(Values specified for $T_A = 25^\circ\text{C}$)

CONTROL TOPOLOGY	OUTPUT SWITCH	SUPPLY VOLTAGE RANGE	QUIESCENT CURRENT NO LOAD	MAXIMUM CONTINUOUS I_{OUT}	MAXIMUM FREQUENCY (kHz)	TYPICAL CONVERSION EFFICIENCY	DEVICE	PACKAGES	DOCUMENT
Voltage Mode	Single	1.5-9 V	200 μA	50 mA	10	95%	LTC1044	JG,L,P	SLYD005
	Single	3.5-15 V	150 μA	300 mA	35	90%	LT1054	JG,L,P	SLYD005

Switching Power Supply Controllers and Regulators

(Values specified for $T_A = 25^\circ\text{C}$)

OUTPUT STEERING CONTROL	PROGRAMMABLE OUTPUTS	DEAD-TIME CONTROL	UNDER-VOLTAGE LOCKOUT	SOFT START	ON-BOARD AMPLIFIERS	50% CURRENT-SENSE AMPLIFIERS	MAX DUTY CYCLE	SINGLE-ENDED	FIXED PUSHPULL	SINGLE SWITCH OUTPUTS	TOTEM POLE OUTPUTS	OUTPUT CURRENT PER SWITCH (mA)	MAX FREQ (kHz)	VOLTAGE REFERENCE TOLERANCE (%)	PULSE-BY-PULSE CURRENT LIMITING	TYPE	PACKAGES	DOCUMENT
—	—	●	—	—	2	—	—	●	—	●	—	250	200	5	—	MC34060	D,N	SLYD005
—	—	●	—	—	2	—	—	●	—	●	—	250	300	5	—	TL493	D,N	SLYD005
—	●	●	—	—	2	—	—	—	—	●	—	250	300	5	—	TL494	D,J,N	SLYD005
●	●	●	—	—	2	—	—	—	—	●	—	250	300	5	—	TL495	N	SLYD005
—	—	—	—	—	1	1	—	—	●	—	—	250	300	5	—	SG2524	J,N	SLYD005
—	—	—	—	—	1	1	—	—	●	—	—	250	300	5	—	SG3524	J,N	SLYD005
—	●	●	●	—	2	—	—	—	—	●	—	250	300	1	—	TL594	D,N	SLYD005
●	●	●	●	—	2	—	—	—	—	●	—	250	300	1	—	TL595	D,N	SLYD005
—	●	●	●	—	2	—	—	—	—	●	●	250	300	1	—	TL598	D,J,N	SLYD005
—	—	●	●	—	—	●	—	●	—	Dual	—	21	500	4	—	TL1451A	D,N	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC2842	D,P	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC2843	D,P	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC3842	D,P	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC3843	D,P	SLYD005
—	—	—	●	—	1	●	●	●	—	—	●	±1000	500	1	●	UC2844	D,P	SLYD005
—	—	—	●	—	1	●	●	●	—	—	●	±1000	500	1	●	UC2845	D,P	SLYD005
—	—	—	●	—	1	●	●	●	—	—	●	±1000	500	1	●	UC3844	D,P	SLYD005
—	—	—	●	—	1	●	●	●	—	—	●	±1000	500	1	●	UC3845	D,P	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC1846	J	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC1847	J	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC2846	FN,N	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC2847	FN,N	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC3846	FN,N	SLYD005
—	—	—	●	—	1	●	—	●	—	—	●	±1000	500	1	●	UC3847	FN,N	SLYD005
—	—	—	—	—	1	●	—	●	—	—	—	5000	40	2	●	LT1070	K,J,KV	SLYD005
—	—	—	—	—	1	●	—	●	—	—	—	2500	40	2	●	LT1071	K,J,KV	SLYD005
—	—	—	—	—	—	—	—	●	—	●	—	1200	40	10	—	TL496*	D,P	SLYD005
—	—	—	—	—	—	—	—	●	—	●	—	1200	40	5	—	TL499A*	P	SLYD005
—	—	—	—	—	—	—	—	●	—	●	—	700	50	5	—	TL497A*	D,J,N	SLYD005

Linear Circuits

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● Applicable data. — Nonapplicable data. *One on-board amplifier.

Control Topology for all devices: voltage-mode pulse-width-modulated controllers with the exception that for TL496, TL496A, and TL497A, it is the fixed on-time voltage mode.

SPECIAL FUNCTIONS

Timers

Military Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	OUTPUT CURRENT	TIMING		DEVICE NUMBER	PACKAGES	DOCUMENT
		FROM	TO			
Single Timer, Bipolar	$\pm 200\text{ mA}$ $\pm 200\text{ mA}$	$1\ \mu\text{s}$ $1\ \mu\text{s}$	Hours Hours	SE55 SE5	FK,JG FK,JG	SLYD003 SLYD003
Dual Timer, Bipolar	$\pm 200\text{ mA}$ $\pm 200\text{ mA}$	$1\ \mu\text{s}$ $1\ \mu\text{s}$	Hours Hours	SE55 SE556C	FK,J FK,J	SLYD003 SLYD003
LinCMOS, Single High-Speed Timer	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC555M	FK,JG	SLYD003
LinCMOS, Dual High-Speed Timer	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC556M	FK,J	SLYD003

Commercial Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	OUTPUT CURRENT	TIMING		DEVICE NUMBER	PACKAGES	DOCUMENT
		FROM	TO			
Single Timer, Bipolar	$\pm 200\text{ mA}$	$10\ \mu\text{s}$	Hours	NE555	D,JG,P	SLYD003
Dual Timer, Bipolar	$\pm 200\text{ mA}$	$10\ \mu\text{s}$	Hours	NE556	D,J,N	SLYD003
Single High-Speed Timer LinCMOS, 1-Volt Operation	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TCL551C	D,P	SLYD003
Dual High-Speed Timer LinCMOS, 1-Volt Operation	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC552C	D,J,N	SLYD003
Single High-Speed Timer LinCMOS	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC555C	D,JG,P	SLYD003
Dual High-Speed Timer LinCMOS	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC556C	D,J,N	SLYD003
Programmable Timer/Counter	4 mA	$10\ \mu\text{s}$	Days	$\mu\text{A}2240\text{C}$	N	SLYD003

Automotive Temperature Range

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	OUTPUT CURRENT	TIMING		DEVICE NUMBER	PACKAGES	DOCUMENT
		FROM	TO			
Single Timer, Bipolar	$\pm 200\text{ mA}$	$10\ \mu\text{s}$	Hours	SA555	D,JG,P	SLYD003
Dual Timer, Bipolar	$\pm 200\text{ mA}$	$10\ \mu\text{s}$	Hours	SA556	D,J,N	SLYD003
LinCMOS, Single High-Speed Timer	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC555I	D,JG,P	SLYD003
LinCMOS, Dual High-Speed Timer	100 mA -10 mA	$1\ \mu\text{s}$	Hours	TLC556I	D,J,N	SLYD003

Frequency-to-Voltage Converters

DESCRIPTION	DEVICE NUMBER	PACKAGES	DOCUMENT
<ul style="list-style-type: none"> ■ Output swings to ground for zero-frequency input ■ Only one RC network provides frequency doubling for low ripple ■ 8-pin versions interface directly to variable-reluctance magnetic pickups 	LM2917 LM2907	D,P,N D,P,N	SLYD003 SLYD003

Sonar Ranging Functions

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION		DEVICE NUMBER	PACKAGES	DOCUMENT
Sonar Ranging Module	Sonar ranging module for measuring distances from a range of 6 inches to 35 feet using the TL851 and TL852	SN28827	—	SLYD003
	Sonar ranging module for measuring distances from a range of 6 inches to 35 feet using the TL852 and TL853	SN28828	—	SLYD003
Controller Circuit	Control integrated circuit for use in a sonar ranging module, capable of driving 50-kHz transducers with a simple interface	TL851	N	SLYD003
Receiver Circuit	Receiver integrated circuit for use in a sonar ranging module	TL852	N	SLYD003
Control Circuit	Control integrated circuit for use in a sonar ranging module, capable of driving 40-kHz transducers with a simple interface	TL853	N	SLYD003

Current Mirrors

(Values specified for $T_A = 25^\circ\text{C}$)

DESCRIPTION	TEMPERATURE RANGE	CURRENT RATIO INPUT TO OUTPUT	INPUT CURRENT RANGE	DEVICE NUMBER	PACKAGES	DOCUMENT
Programmable	0 to 70°C	3:1 to 1:15	Variable	TL010C	P	SLYD003
	-40 to 85°C	3:1 to 1:15	Variable	TL010I	P	SLYD003
Fixed	0 to 70°C	1:1	1 μA to 1 mA	TL011C	LP	SLYD003
	-40 to 85°C	1:1	1 μA to 1 mA	TL011I	LP	SLYD003
	0 to 70°C	1:2	1 μA to 1 mA	TL012C	LP	SLYD003
	-40 to 85°C	1:2	1 μA to 1 mA	TL012I	LP	SLYD003
	0 to 70°C	1:4	1 μA to 1 mA	TL014AC	LP	SLYD003
	0 to 70°C	1:2	2 μA to 2 mA	TL021C	LP	SLYD003
	-40 to 85°C	1:2	2 μA to 2 mA	TL021I	LP	SLYD003

Linear Circuits

7 Hall-Effect Products

Hall-Effect Switches

(Values specified for $T_A = 25^\circ\text{C}$)

RELEASE POINT (GAUSS) MIN	OPERATING POINT (GAUSS) MAX	MINIMUM HYSTERESIS (GAUSS)	DEVICE NUMBER	PACKAGES	DOCUMENT
-250	250	50	TL170	LP	SLYD003
100	600	230	TL172	LP	SLYD003
25	450	30	TL3013C	LU	SLYD003
125	500	50	TL3019C	LU	SLYD003
50	350	20	TL3020C	LU	SLYD003
-250	250	50	TL3101	LU	SLYD003

Hall-Effect Linear Circuits

(Values specified for $T_A = 25^\circ\text{C}$)

RELEASE POINT (GAUSS) MIN	OPERATING POINT (GAUSS) MAX	MINIMUM HYSTERESIS (GAUSS)	DEVICE NUMBER	PACKAGES	DOCUMENT
-500	500	1.4	TL173	LP	SLYD003
-500	500	1.4	TL3103	LU	SLYD003

Programmable Tone/Noise Generator

DESCRIPTION	DEVICE NUMBER	PACKAGES	DOCUMENT
<ul style="list-style-type: none"> ■ Complex sound generators designed to provide low-cost digital tones or noise. ■ Programmable white-noise and attenuation functions, and simultaneous sounds under microprocessor control. ■ TTL compatible. 	SN76494/	N	SLYD003
	SN76494A	N	SLYD003
	SN76496/	N	SLYD003
	SN76496A	N	SLYD003

Sample and Hold Amplifiers

Military Temperature Range (Values specified for operation temperature range)

DESCRIPTION	OFFSET VOLTAGE	GAIN ERROR	TYPE	PACKAGES	DOCUMENT
Precision Sample-and-Hold Amplifier	1 mV	0.002%	LF198	L	SLYD003
	0.5 mV	0.001%	LF198A	L	SLYD003

Commercial Temperature Range (Values specified for operation temperature range)

DESCRIPTION	OFFSET VOLTAGE	GAIN ERROR	TYPE	PACKAGES	DOCUMENT
Precision Sample-and-Hold Amplifier	2 mV	0.004%	LF398	L	SYLD003
	1 mV	0.001%	LF398A	L	SLYD003

Factory orders for circuits described in this guide should include a four-part type number as explained in the following example.

EXAMPLE: TL 062M JG /883B

1. **Prefix**

CONTAINS TWO TO FOUR LETTERS

- TCM TI Telecommunication Products
- TISP Transient Suppressors
- TL TI Linear Products (excluding Interface)
- TLC TI Linear Silicon-Gate CMOS Products
- TPIC TI Power Circuits
- TSP Speech Products
- SN TI Special Function or Interface Products

STANDARD SECOND-SOURCE PREFIXES

- ADC Analog Devices
- AM AMD
- DS National
- L Linear Technology Corp.
- LM National
- LT Linear Technology Corp.
- MC Motorola
- NE, SA, or SE Signetics
- OP PMI
- RC, RM or RV Raytheon
- SG Silicon General
- TP National
- uA Fairchild
- UDN Sprague
- ULN Sprague

2. **Unique Circuit Designator Including Temperature Range (If not already specified by the prefix)**

CONTAINS THREE TO SEVEN CHARACTERS
(From Individual Data Sheets)

- Examples: 062M 28867
 5941 78L05AC
 532AI

3. **Package**

CONTAINS ONE OR TWO LETTERS

- D, DW, FK, FN, J, JD, JG, KC, KH, KV, LP, LU, N, P, U, W
- (From Pin-Connection Diagram on Individual Data Sheet)

4. **MIL-STD-883B, Method 5004, Class B**

OMIT/883B WHEN NOT APPLICABLE

Circuits are shipped in one of the carriers below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped on the most practical carrier.

<p>Dual-In-Line (D, DW, J, JD, JG, N, P)</p> <ul style="list-style-type: none"> - Slide Magazines - A-Channel Plastic Tubing - Barnes Carrier - Sectioned Cardboard Box - Individual Cardboard Box 	<p>Plug-In (LP, LU)</p> <ul style="list-style-type: none"> - Barnes Carrier - Sectional Cardboard Box - Individual Cardboard Box <p>Chip Carriers (FK, FN)</p> <ul style="list-style-type: none"> - Anti-Static Plastic Tubing 	<p>Flat (U, W)</p> <ul style="list-style-type: none"> - Barnes Carrier - Milton Ross Carrier <p>Power Tab (KC, KH, KV)</p> <ul style="list-style-type: none"> - Sleeves
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Linear Circuits

7

OPTOELECTRONICS AND IMAGE SENSORS

INTRODUCTION

TI offers three major categories of Optoelectronic and Image Sensor devices:

- CCD Image Sensors
- Optocouplers/Optoisolators
- Intelligent LED Displays.

NMOS image sensors are available for line sensors, small-area sensors and large-area sensors. Solid-state image sensors offer many advantages over tube-type imagers such as Vidicons and Newicons by eliminating image lag, image burn-in, and distortion. TI's patented virtual phase technology minimizes the number of clock electrodes required by the image sensor, resulting in simpler external circuitry requirements and improved device performance.

The optocoupler/optoisolator devices are offered in metal-can and plastic dual-in-line packages. JEDEC-registered metal cans provide transistor output functions. All TI's optocouplers are UL-recognized and provide functions such as logic gates, triac, and transistor or Darlington outputs.

The red LED displays are plastic-encapsulated in dual-in-line packages that contain TTL-compatible on-board electronics to decode input signals and provide constant current to each LED. Also included in the Selection Guide are infrared emitters and phototransistors in the hermetically sealed standard pill package. Readers should refer to the Alphanumeric Index and to the Customer Support section of the Master Selection Guide for additional information on technical documentation.

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CCD IMAGE SENSORS AND SUPPORT FUNCTIONS

Linear Arrays, 10-Pin CDIP

TYPE	PIXELS	PIXEL SIZE (μm)	SENSITIVITY	PACKAGE	DOCUMENT
TC102†	128 × 1	12.7 × 12.7	3.5 V/μJ/cm ²	10-pin CDIP (0.300 in.)	SOYD002A
TC102-1‡	128 × 1	12.7 × 12.7	3.5 V/μJ/cm ²	10-pin CDIP (0.300 in.)	SOYD002A

† Minimum and typical values of Write Reference (WR) and End of Scan (EOS) are specified.

‡ Typical values of WR and EOS are specified.

Linear Arrays, 24-pin CDIP

TYPE	PIXELS	PIXEL SIZE (μm)	SENSITIVITY	PACKAGE	DOCUMENT
TC103†	2048 × 1	12.7 × 12.7	3.5 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOYD002A
TC103-1‡	2048 × 1	12.7 × 12.7	3.5 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOYD002A
TC104†	3456 × 1	10.7 × 10.7	2.0 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOYD002A
TC104-1‡	3456 × 1	10.7 × 10.7	2.0 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOYD002A
TC106-1‡	2592 × 1	10.7 × 10.7	2.0 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOYD002A
TC108	5000 × 1	7.0 × 7.0	2.0 V/μJ/cm ²	24-pin CDIP (0.600 in.)	SOC5012A

† Minimum and typical values of Write Reference (WR) and End of Scan (EOS) are specified.

‡ Typical values of WR and EOS are specified.

Evaluation Boards

TYPE	DEVICE EVALUATED	REMARKS	DOCUMENT
PC401	TC103, TC103-1, TC104, TC104-1, TC106-1	Device socket fits TC103, TC103-1, TC104, TC104-1, TC106-1 (See TCK Evaluation Kits)	SOYD002A
PC402	TC102, TC102-1	Device socket fits TC102, TC102-1 (See TCK102 Evaluation Kit)	SOYD002A
PC405	TC108	Board operates TC108 exclusively	SOYD002A

Evaluation Kits

TYPE	CONTENTS	REMARKS	DOCUMENT
TCK102	TC102 and PC402	See Application section "Operating Instructions for Linear CCD Image Sensors"	SOYD002A
TCK103	TC103 and PC401		SOYD002A
TCK104	TC104 and PC401		SOYD002A
TCK106	TC106-1 and PC401		SOYD002A
TCK108	TC108 and PC405		TBD

OPTOCOUPLERS

Optocouplers, Peak Isolation 0.5 to 5.0 kV

TYPE	PEAK ISOLATION (kV) f = 60 Hz	RMS ISOLATION (kV) f = 60 Hz	CTR (MIN) (%)	CTR (MAX) (%)	FEATURES	DOCUMENT
4N28	0.5	—	10		6-Pin DIP, UL File E-65085	SOYD002A
TIL120	1.0	—	25		6-Pin Metal Can	SOYD002A
4N22A†	1.0	—	25		6-Pin Metal Can	SOYD002A
4N22†	1.0	—	25		6-Pin Metal Can	SOYD002A
TIL102	1.0	—	25		6-Pin Metal Can	SOYD002A
3N261	1.0	—	50		6-Pin Metal Can	SOYD002A
4N47‡	1.0	—	50		6-Pin Metal Can	SOYD002A
TIL121	1.0	—	50		6-Pin Metal Can	SOYD002A
4N23A†	1.0	—	60		6-Pin Metal Can	SOYD002A
4N23†	1.0	—	60		6-Pin Metal Can	SOYD002A
4N24†	1.0	—	100		6-Pin Metal Can	SOYD002A
TIL103	1.0	—	100		6-Pin Metal Can	SOYD002A
4N24A†	1.0	—	100		6-Pin Metal Can	SOYD002A
3N262	1.0	—	100	500	6-Pin Metal Can	SOYD002A
4N48‡	1.0	—	100	500	6-Pin Metal Can	SOYD002A
3N263	1.0	—	200	1000	6-Pin Metal Can	SOYD002A
4N49‡	1.0	—	200	1000	6-Pin Metal Can	SOYD002A
TIL115	1.5	—	2		6-Pin DIP, UL File E-65085	SOYD002A
TIL112	1.5	—	2		6-Pin DIP, UL File E-65085	SOYD002A
TIL118	1.5	—	10		6-Pin DIP, UL File E-65085	SOYD002A
4N27	1.5	—	10		6-Pin DIP, UL File E-65085	SOYD002A
TIL114	1.5	—	13		6-Pin DIP, UL File E-65085	SOYD002A
TIL111	1.5	—	13		6-Pin DIP, UL File E-65085	SOYD002A
MCT2	1.5	—	20		6-Pin DIP, UL File E-65085	SOYD002A
4N26	1.5	—	20		6-Pin DIP, UL File E-65085	SOYD002A
TIL116	1.5	—	20		6-Pin DIP, UL File E-65085	SOYD002A
TIL117	1.5	—	50		6-Pin DIP, UL File E-65085	SOYD002A
4N37	1.5	1.05	100		6-Pin DIP, UL File E-65085	SOYD002A
TIL113	1.5	—	300		6-Pin DIP, UL File E-65085	SOYD002A
TIL119‡	1.5	—	300		6-Pin DIP, UL File E-65085	SOYD002A
TIL119A‡	1.5	—	300		6-Pin DIP, UL File E-65085 Rev. A: no base connection	SOYD002A
4N25‡	2.5	—	20		6-Pin DIP, UL File E-65085	SOYD002A
4N36	2.5	1.75	100		6-Pin DIP, UL File E-65085	SOYD002A
4N45	3.0	—	250		6-Pin DIP, UL File E-65085	SOYD002A
4N46	3.0	—	350		6-Pin DIP, UL File E-65085	SOYD002A
TIL153	3.54	2.5	10		6-Pin DIP, UL File E-65085	SOYD002A
TIL191	3.54	2.5	20		4-Pin DIP, UL File E-65085	SOYD002A
TIL194	3.54	2.5	20		4-Pin DIP, AC Input	SOYD002A
TIL154	3.54	2.5	20		6-Pin DIP, UL File E-65085	SOYD002A
MCT2E	3.54	—	20		6-Pin DIP, UL File E-65085	SOYD002A
TIL192	3.54	2.5	20		8-Pin DIP, UL File E-65085	SOYD002A
TIL195	3.54	2.5	20		8-Pin DIP, AC Input	SOYD002A
TIL193	3.54	2.5	20		16-Pin DIP, UL File E-65085	SOYD002A
TIL196	3.54	2.5	20		16-Pin DIP, AC Input	SOYD002A
TIL191A	3.54	2.5	50		4-Pin DIP, UL File E-65085	SOYD002A
TIL194A	3.54	2.5	50		4-Pin DIP, AC Input	SOYD002A
TIL181	3.54	2.5	50		6-Pin DIP, UL File E-65085	SOYD002A
TIL155	3.54	2.5	50		6-Pin DIP, UL File E-65085	SOYD002A
TIL192A	3.54	2.5	50		8-Pin DIP, UL File E-65085	SOYD002A
TIL195A	3.54	2.5	50		8-Pin DIP, AC Input	SOYD002A
TIL193A	3.54	2.5	50		16-Pin DIP, UL File E-65085	SOYD002A
TIL196A	3.54	2.5	50		16-Pin DIP, AC Input	SOYD002A
TIL191B	3.54	2.5	100		4-Pin DIP, UL File E-65085	SOYD002A
4N35	3.54	2.5	100		6-Pin DIP, UL File E-65085	SOYD002A
TIL186	3.54	2.5	100		AC-Input Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL192B	3.54	2.5	100	I _F =10mA	8-Pin DIP, UL File E-65085	SOYD002A
TIL193B	3.54	2.5	100		16-Pin DIP, UL File E-65085	SOYD002A

† JAN, JANTX, JANTXV levels to MIL-S-19500/486A USAF are also available.

‡ JAN, JANTX, JANTXV levels to MIL-S-19500/548 are also available.

§ Available in PEP3 processing also.



Optocouplers, Peak Isolation 0.5 to 5.0 kV (Continued)

TYPE	PEAK ISOLATION (kV) f = 60 Hz	RMS ISOLATION (kV) f = 60 Hz	CTR (MIN) (%)	CTR (MAX) (%)	FEATURES	DOCUMENT
TIL156	3.54	2.5	300		Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL157	3.54	2.5	300		Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL157A	3.54	2.5	300		Darlington, 6-Pin DIP, UL File E-65085 (Revision A has no base connection.)	SOYD002A
TIL187	3.54	2.5	500		AC-Input Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL188§	3.54	2.5	500		AC-Input Darlington, 6-Pin DIP, UL File E-65085 (No base lead connection for Hi-EMI environment)	SOYD002A
TIL189	3.54	2.5	500		6-Pin DIP, UL File E-65085	SOYD002A
TIL190§	3.54	2.5	500		6-Pin DIP, UL File E-65085 (No base lead connection for Hi-EMI environment)	SOYD002A
TIL124	5.0	—	10		6-Pin DIP, UL File E-65085	SOYD002A
TIL125	5.0	—	20		6-Pin DIP, UL File E-65085	SOYD002A
TIL126	5.0	—	50		6-Pin DIP, UL File E-65085	SOYD002A
TIL128A	5.0	—	300		Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL128	5.0	—	300		Darlington, 6-Pin DIP, UL File E-65085	SOYD002A
TIL127	5.0	—	300		Darlington, 6-Pin DIP, UL File E-65085	SOYD002A

§ Available in PEP3 processing also.

Optocouplers in 8-Pin Plastic DIP, High-Speed, Logic Gate

($T_A = 25^\circ\text{C}$ unless otherwise noted)

TYPE	CTR (MIN)% $V_O = 0.4\text{ V}$ $I_F = 16\text{ mA}$	V_{OL} (MAX) $I_F = 16\text{ mA}$ $T_A = 0-70^\circ\text{C}$	V_F (MAX) $I_F = 16\text{ mA}$	SWITCHING TIMES (MAX) $I_F = 16\text{ mA}$ t_{PLH} OR t_{PHL}	ISOLATION VOLTAGE (MIN)	DOCUMENT
6N135	7	0.4 V ($I_O = 1.1\text{ mA}$)	1.7 V	1.5 μs ($I_O = 2.4\text{ mA}$)	3 kV dc	SOYD002A
HCPL2530 (Dual Channel)	7	0.4 V ($I_O = 1.1\text{ mA}$)	1.7 V	1.5 μs ($I_O = 2.4\text{ mA}$)	3 kV dc	SOOS016
HCPL2502	15	0.4 V ($R_L = 4.1\text{ k}\Omega$)	1.7 V	0.8 μs ($R_L = 1.9\text{ k}\Omega$)	3 kV dc	SOYD002A
6N136	19	0.4 V ($R_L = 4.1\text{ k}\Omega$)	1.7 V	0.8 μs ($R_L = 1.9\text{ k}\Omega$)	3 kV dc	SOYD002A
HCPL2531 (Dual Channel)	19	0.4 V ($I_O = 1.1\text{ mA}$)	1.7 V	0.8 μs ($I_O = 2.4\text{ mA}$)	3 kV dc	SOOS016

Optocouplers in 8-Pin Plastic DIP, High-Speed

($T_A = 25^\circ\text{C}$ unless otherwise noted)

TYPE	V_{OL} (MAX) $I_F = 5\text{ mA}$ $I_{OL} = 13\text{ mA}$ $T_A = 0-70^\circ\text{C}$	V_F (MAX) $I_F = 10\text{ mA}$	SWITCHING TIMES (MAX) $I_F = 7.5\text{ mA}$ $R_L = 350\ \Omega$, $C_L = 15\text{ pF}$		ISOLATION VOLTAGE (MIN)	DOCUMENT
			t_{PLH}	t_{PHL}		
6N137	0.6 V	1.75 V	75 ns	75 ns	3 kV dc	SOYD002A
HCPL2601	0.6 V	1.75 V	75 ns	75 ns	3 kV dc	SOYD002A
HCPL2630 (Dual Channel)	0.6 V	1.75 V	75 ns	75 ns	3 kV dc	SOYD002A
HCPL2631 (Dual Channel)	0.6 V	1.75 V	75 ns	75 ns	3 kV dc	SOOS017

Optocouplers in 8-Pin Plastic DIP, High-Speed, High Gain (Peak Isolation Voltage = 3 kV)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

TYPE	CTR (MIN)% $V_O = 0.4\text{ V}$ $I_F = 1.6\text{ mA}$ $T_A = 0\text{-}70^\circ\text{C}$	V_{OL} (MAX) $I_F = 1.6\text{ mA}$ $T_A = 0\text{-}70^\circ\text{C}$	SWITCHING TIMES (MAX) $I_F = 1.6\text{ mA}$		DOCUMENT
			t_{PLH}	t_{PHL}	
6N138	300	0.4 V ($I_O = 4.8\text{ mA}$)	35 μs ($I_O = 6.4\text{ mA}$)	10 μs ($I_O = 6.4\text{ mA}$)	SOYD002A
HCPL2730	300	0.4 V ($I_O = 4.8\text{ mA}$)	35 μs ($I_O = 6.4\text{ mA}$)	10 μs ($I_O = 6.4\text{ mA}$)	SOYD002A
6N139	400	0.4 V ($R_L = 2.2\text{ k}\Omega$)	60 μs ($R_L = 4.7\text{ k}\Omega$)	25 μs ($R_L = 4.7\text{ k}\Omega$)	SOYD002A
HCPL2731	400	0.4 V ($R_L = 2.2\text{ k}\Omega$)	60 μs ($R_L = 4.7\text{ k}\Omega$)	25 μs ($R_L = 4.7\text{ k}\Omega$)	SOYD002A

Couplers in 6-Pin Plastic DIP, Triac Drivers

($T_A = 25^\circ\text{C}$ unless otherwise noted)

TYPE	ISOLATION VOLTAGE (MIN)	I_{FT} (MAX) $V_{TM} = 3\text{ V}$	V_F (MAX) $I_F = 10\text{ mA}$	V_{TM} (MAX) $I_{TM} = 100\text{ mA}$	I_{DRM} (MAX) RATED V_{DRM}	dv/dt (TYP)	DOCUMENT
TIL3012	3.5 kVdc	5 mA	1.5 V	3 V	100 nA	12 V/ μs	SOYD002A
TIL3023	3.5 kVdc	5 mA	1.5 V	3 V	100 nA	100 V/ μs	SOYD002A
TIL3011	3.5 kVdc	10 mA	1.5 V	3 V	100 nA	12 V/ μs	SOYD002A
TIL3022	3.5 kVdc	10 mA	1.5 V	3 V	100 nA	100 V/ μs	SOYD002A
TIL3010	3.5 kVdc	15 mA	1.5 V	3 V	100 nA	12 V/ μs	SOYD002A
TIL3021	3.5 kVdc	15 mA	1.5 V	3 V	100 nA	100 V/ μs	SOYD002A
TIL3009	3.5 kVdc	30 mA	1.5 V	3 V	100 nA	12 V/ μs	SOYD002A
TIL3020	3.5 kVdc	30 mA	1.5 V	3 V	100 nA	100 V/ μs	SOYD002A
MOC3012	7.5 kVdc	5 mA	1.5 V	3 V	100 nA	12 V/ μs	SOOS015
MOC3023	7.5 kVdc	5 mA	1.5 V	3 V	100 nA	100 V/ μs	SOOS015
MOC3011	7.5 kVdc	10 mA	1.5 V	3 V	100 nA	12 V/ μs	SOOS015
MOC3022	7.5 kVdc	10 mA	1.5 V	3 V	100 nA	100 V/ μs	SOOS015
MOC3010	7.5 kVdc	15 mA	1.5 V	3 V	100 nA	12 V/ μs	SOOS015
MOC3021	7.5 kVdc	15 mA	1.5 V	3 V	100 nA	100 V/ μs	SOOS015
MOC3009	7.5 kVdc	30 mA	1.5 V	3 V	100 nA	12 V/ μs	SOOS015
MOC3020	7.5 kVdc	30 mA	1.5 V	3 V	100 nA	100 V/ μs	SOOS015

Couplers in 6-Pin Plastic DIP, Schmitt Trigger

($T_A = 25^\circ\text{C}$ unless otherwise noted)

TYPE	LOGIC FUNCTION	OUTPUT CONFIGURATION	I_{FT+} (MAX)	HYSTERESIS RATIO (TYP)	SWITCHING TIMES (MAX)		ISOLATION VOLTAGE (MIN)	DOCUMENT
					t_r OR t_f	t_{PLH} OR t_{PHL}		
OPI8012	Buffer	Totem pole	10 mA	1.4	70 ns	5 μs	3.54 kV dc	SOYD002A
OPI8013	Buffer	Open collector	10 mA	1.4	70 ns	5 μs	3.54 kV dc	SOYD002A
OPI8014	Inverter	Totem pole	10 mA	1.4	70 ns	5 μs	3.54 kV dc	SOYD002A
OPI8015	Inverter	Open collector	10 mA	1.4	70 ns	5 μs	3.54 kV dc	SOYD002A

INTELLIGENT SINGLE-DIGIT LED DISPLAYS

Intelligent Single-Digit LED Displays in Dual-In-Line Plastic Packages

TYPE	TYPE OF CHARACTER(S)	CHARACTER HEIGHT mm (inches)	COLOR OF DISPLAY	PACKAGE	REMARKS	DOCUMENT
TIL302	7-Segment	6.9 mm (0.270 in.)	Red	14-Lead	Left decimal	SOYD002A
TIL302A	7-Segment	6.9 mm (0.270 in.)	Red	14-Lead	Left decimal	SOYD002A
TIL303	7-Segment	6.9 mm (0.270 in.)	Red	14-Lead	Right decimal	SOYD002A
TIL303A	7-Segment	6.9 mm (0.270 in.)	Red	14-Lead	Right decimal	SOYD002A
TIL304	Polarity/ overflow unit	6.9 mm (0.270 in.)	Red	14-Lead	Right decimal	SOYD002A
TIL304A		6.9 mm (0.270 in.)	Red	14-Lead	Right decimal	SOYD002A
TIL306	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Left decimal	SOYD002A
TIL306A	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Left decimal	SOYD002A
TIL308	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Left decimal	SOYD002A
TIL308A	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Left decimal	SOYD002A
TIL307	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Right decimal	SOYD002A
TIL307A	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Right decimal	SOYD002A
TIL309	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Right decimal	SOYD002A
TIL309A	7-Segment	6.9 mm (0.270 in.)	Red	16-Lead	Right decimal	SOYD002A
TIL305	5 × 7 alphanumeric	7.6 mm (0.300 in.)	Red	14-Lead	Left decimal	SOYD002A
TIL311	Hexadecimal	7.6 mm (0.300 in.)	Red	14-Lead	Left and right decimals. Logic includes latch, decoder, and driver.	SOYD002A
TIL311A	Hexadecimal	7.6 mm (0.300 in.)	Red	14-Lead		SOYD002A

INFRARED EMITTERS AND PHOTOTRANSISTORS

Infrared-Emitting Diodes

TYPE	POWER OUTPUT		ϕ HI	V_f (MAX) $I_f = 50$ mA	λP (TYP)	FEATURES	DOCUMENT
	P_o (MIN) (mW)	I_f (mA)					
TIL23	0.4	50	35°	1.5 V	940 nm	Pill package for mounting on double sided printed circuit boards. Compatible with TIL601 Series.	SOYD002A
TIL24	1.0	50	35°	1.5 V	940 nm		SOYD002A
TIL25	0.75	50	35°	1.5 V	940 nm		SOYD002A
TIL24HR2	1.0	50	35°	1.5 V	940 nm		SOYD002A

Phototransistors

TYPE	LIGHT CURRENT $V_{CE} = 5$ V		DARK CURRENT (MAX) $V_{CE} = 30$ V	FEATURES	DOCUMENT
	MIN	MAX			
1N5722	0.5 mA	3 mA	25 nA	EIA-registered versions of TIL601 through TIL604.	SOYD002A
1N5723	2 mA	5 mA	25 nA		SOYD002A
1N5724	4 mA	8 mA	25 nA		SOYD002A
1N5725	7 mA		25 nA		SOYD002A
LS600	0.8 mA		25 nA	Pill package designed for mounting on double-sided printed board.	SOYD002A
TIL601	0.5 mA	3 mA	25 nA		SOYD002A
TIL602	2 mA	5 mA	25 nA		SOYD002A
TIL603	4 mA	8 mA	25 nA		SOYD002A
TIL604	7 mA		25 nA		SOYD002A
TIL604HR2	7 mA		25 nA	SOYD002A	

Factory orders for devices described in this guide should include a two-part or three-part number as explained in the following example.

EXAMPLE: TIL 604 HR2

1. **Prefix**

CONTAINS TWO TO SIX LETTERS

- JAN, JANTX, JANTXV Military Qualified Products
- LS Light Sensor Products
- PC Printed Circuit Board
- TC TI CCD Image Sensor Products
- TCK TI CCD Printed Circuit Board Kits
- TIL TI DISD Opto Products
- 1N, 3N, 4N, 6N JEDEC Registered Products

STANDARD SECOND-SOURCE PREFIXES

- HCPL Hewlett Packard
- MCT General Instruments
- MOC Motorola
- OPI TRW Optron

2. **Package**

CONTAINS TWO TO SIX CHARACTERS

Package Type	Prefix
P-DIP	TIL (100 Series)
	4N Series (4N25-28, 4N35-37)
	HCPL, MCT, MOC, OPI
C-DIP	TC (CCD)
	TIL (300 Series, excluding TIL305)
PILL PACK	TIL23, TIL24, TIL24HR2
	TIL601-604, TIL604HR2
	LS600
HERMETIC	3N, 4N Series (4N22-24/22A-24A, 4N47-49)
	JAN, JANTX, JANTXV
	TIL102, TIL103
	TIL305
PCB	CCD KITS (TCK)

3. **Unique Device Designator**

CONTAINS ONE TO SIX CHARACTERS

- Examples: 103 106-1 5725
 22A 119A

4. **Military Qualified**

(If not already specified by Prefix)

Type	MIL-STD
JAN	19500/486A or 19500/548
JANTX	
JANTXV	
HR2	750

Circuits are shipped in one of the carriers below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped on the most practical carrier.

- | | |
|---------------------------|----------------------------------|
| Plug-In (Hermetic) | Dual-In-Line (P-Dip, C-Dip, PCB) |
| – Sectional Cardboard Box | – Anti-static Slide Magazines |
| CCD | Pill Pak |
| – Conductive Boxes | – Anti-static Bags |



TELECOMMUNICATIONS AND SPEECH PRODUCTS

Semiconductor technology provides powerful new capability to telecommunications in the form of large scale integration (LSI) and very large-scale integration (VLSI) integrated circuits. Today it is possible to put an entire μ -law or A-law CODEC with a filter on a single chip to replace 50 general-purpose ICs. TI engineers can select from a broad line of technologies, including BIFET, CMOS, NMOS and conventional bipolar and linear to satisfy the requirements of specific applications.

Since 1978, Texas Instruments has produced a wide range of speech-generating devices based on the technique of pitch-excited linear predictive coding (LPC). This technique extracts data from original, recorded speech to define the control parameters for a mathematical model of the vocal tract and glottal excitation. The model is implemented as a customized digital signal processor which produces a series of digital samples representative of the acoustical waveform.

As a result, the speech generated retains all the inflection and voice characteristics of the original spoken phrase and does not possess the robotic quality often associated with synthesis-by-rule systems.

In addition to the LPC synthesis functions, a complete voice output system must contain a storage area for the compressed model data, and a control function to select the words or phrases to be spoken. As with all sampled data systems, a low-pass smoothing filter is required to remove spectral data above the valid band-width limit (one-half of the sampling frequency.)

For additional information on technical documentation, refer to the Alphanumeric Index and to the Customer Support section of the Master Selection Guide.

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TELECOMMUNICATIONS CIRCUITS

Filters

Temperature Range: 0°C to 70°C

DESCRIPTION	FUNCTION	TECH-NOLOGY	SUPPLY VOLTAGE	PRODUCT FEATURES	TYPE	PACKAGE	DOCUMENT
PCM Interface	Line Filter	NMOS	± 5 V	<ul style="list-style-type: none"> High-pass transmit filter for rejection of all low-frequency noise 6th-order low-pass transmit filter CCITT G.172 compatible AT&T D3/D4 compatible Three-state PWRO+ and PWRO- outputs 	TCM2912C	16-Pin J	SCTD001

Combination CODEC and Filter

Temperature Range: 0°C to 70°C

DESCRIPTION	FUNCTION	TECH-NOLOGY	SUPPLY VOLTAGE	PRODUCT FEATURES	TYPE	PACKAGE	DOCUMENT
PCM Interface	Combo	NMOS	± 5 V	<ul style="list-style-type: none"> Synchronous, μ-LAW, A-Law coding Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM2913	20-pin J	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous/asynchronous μ-Law, A-Law coding, 8th-bit signaling Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM2914	24-pin J 28-pin FN	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous, μ-Law, variable data rate Fixed data rate 2.048 MHz 	TCM2916	16-pin J	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous, A-Law, variable data rate Fixed data rate 2.048 MHz 	TCM2917	16-pin	SCTD001
		CMOS	± 5 V	<ul style="list-style-type: none"> Synchronous, μ-LAW, A-Law coding Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM29C13	DW20, DY20 J20,N20	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous/asynchronous μ-Law, A-Law coding, 8th-bit signaling Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM29C14	DW24,J24	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous, μ-Law, variable data rate Fixed data rate 2.048 MHz 	TCM29C16	J16,N16	SCTD001
			± 5 V	<ul style="list-style-type: none"> Synchronous, A-Law, variable data rate Fixed data rate 2.048 MHz 	TCM29C17	J16	SCTD001
				<ul style="list-style-type: none"> Analog Interface for DSP Variable Data Rate 2.048 MHz μ-Law Coding 	TCM29C18	N16	SCTS021
				<ul style="list-style-type: none"> Analog Interface for DSP Variable Data Rate 1.536 MHz μ-Law Coding 	TCM29C19	N16	SCTS021
				<ul style="list-style-type: none"> Synchronous, μ-LAW, A-Law coding Variable data rate to 4.096 MHz DSP Interface 	TCM29C23	DW20,N20	TBD

Combination CODEC and Filters

Temperature Range: -40° to $+85^{\circ}\text{C}$

DESCRIPTION	FUNCTION	TECHNOLOGY	SUPPLY VOLTAGE	PRODUCT FEATURES	TYPE	PACKAGE	DOCUMENT
PCM Interface	Combo	CMOS	$\pm 5\text{ V}$	<ul style="list-style-type: none"> Synchronous, μ-LAW, A-Law coding Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM129C13	DW20,DY20 J20,N20	TBD
				<ul style="list-style-type: none"> Synchronous/asynchronous μ-Law, A-Law coding, 8th-bit signaling Variable data rate Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz 	TCM129C14	DW24,J24 J,DW	TBD
				<ul style="list-style-type: none"> Synchronous, μ-Law, variable data rate Fixed data rate 2.048 MHz 	TCM129C16	J16,N16	TBD
			$\pm 5\text{ V}$	<ul style="list-style-type: none"> Synchronous, A-Law, variable data rate Fixed data rate 2.048 MHz 	TCM129C17	J16	TBD
				<ul style="list-style-type: none"> Analog Interface for DSP Variable Data Rate 2.048 MHz μ-Law Coding 	TCM129C18	N16	TBD
				<ul style="list-style-type: none"> Analog Interface for DSP Variable Data Rate 1.536 MHz μ-Law Coding 	TCM129C19	N16	TBD
			$\pm 5\text{ V}$	<ul style="list-style-type: none"> Synchronous/asynchronous μ-Law coding and decoding Variable data rate to 2.048 MHz Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz Compatible with National devices. 	TP3054A TP3957A	J16,N16	SCTS026
				<ul style="list-style-type: none"> Synchronous/asynchronous μ-Law coding and decoding Variable data rate to 2.048 MHz Fixed data rate 1.536 MHz, 1.544 MHz, 2.048 MHz Compatible with National devices. 	TP3064 TP3967	J20,N20	SCTS025

FSK Modems/UART

DESCRIPTION	FUNCTION	TECHNOLOGY	SUPPLY VOLTAGE	PRODUCT FEATURES	TYPE	PACKAGE	DOCUMENT
Modem	Bell 202/ CCITT V.23	CMOS	$\pm 5\text{ V}$	<ul style="list-style-type: none"> Asynchronous Half-duplex operation up to 1200 baud Full-duplex operation 1200/150 baud, reversible 	TCM3105	DW24,JE16 JL16,N16	SCTD001
Serial Comm. Interface	Octal UART	NMOS		<ul style="list-style-type: none"> Programmable baud rates: 50 to 19,200 	TCM78808	HA68,HB68 FN68	SCTS022
Serial Comm. Interface	Single-Channel UART	CMOS		<ul style="list-style-type: none"> Programmable rates: 50 to 56,000 	TL16C450	N40,FN44	SLLS037

Subscriber Products

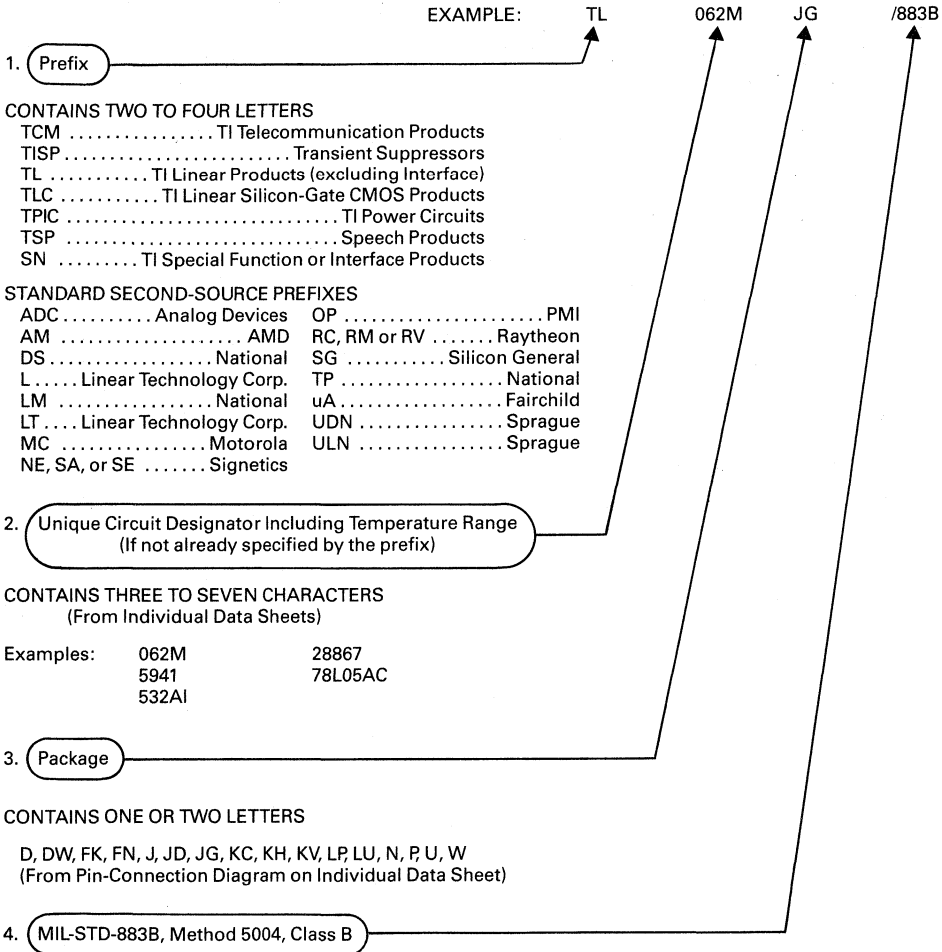
DESCRIPTION	FUNCTION	TECH-NOLOGY	SUPPLY VOLTAGE	PRODUCT FEATURES	TYPE	PACKAGE	DOCUMENT
Subscriber Line Control Circuits	TTL-Compatible	CMOS	± 5 V	▪ Three selectable balance networks	TCM4204A	J24	SCTD001
				▪ Three selectable balance networks ▪ Three auxiliary relay outputs ▪ Ground-start operation	TCM4205A	J28	SCTD001
				▪ Flux-canceling option ▪ Two selectable balance networks	TCM4207A	J24	SCTD001
	Quad Telephone Relay Driver	Bipolar	5 V, -60 V	50-mA output current capability	DS3680	D14,J14 N14	SCTD001
Ringers	Telephone Tone Ringer Drivers	BIDFET	40-150 Vac	▪ Output Center Frequency (Hz): 2000	TCM1531	P8	SCTD001
				▪ Output Center Frequency (Hz): 2000	TCM1501B	P8	SCTD001
				▪ Output Center Frequency (Hz): 1250	TCM1532	P8	SCTD001
				▪ Output Center Frequency (Hz): 1250	TCM1512B	P8	SCTD001
				▪ Output Center Frequency (Hz): 500	TCM1536	P8	SCTD001
▪ Output Center Frequency (Hz): 500	TCM1506B	P8	SCTD001				
▪ Output Center Frequency (Hz): 2000	TCM1539	P8	SCTD001				
Tone Encoder	DTMF Standard	CMOS	3.5-10 V	▪ SPST/DPST keyboard or electronic input ▪ Low impedance tone output	TCM5087	D16,N16	SCTD001
				▪ Transmitter switch and mute output ▪ DPST keyboard or electronic input ▪ Keyboard active output	TCM5089	N16	SCTD001
				▪ SPST/DPST keyboard or electronic input ▪ Mute output ▪ Tone enable	TCM5092 TCM5094	N16 N16	SCTD001 SCTD001
				Ring Detector	TTL/MOS Output	CMOS	40-150 Vac
Optocoupler	TTL-Compatible	Bipolar	12V	▪ Peak high-voltage isolation: 3.54 kV	TIL181	6-pin CP-7	SCTD001

SPEECH PRODUCTS

Speech Synthesis Circuits

CATEGORY	DESCRIPTION	PROCESS	LPC	MEMORY	SUPPLY VOLTAGE	MASK CHARGE	DEVICE NUMBER	PACKAGE	DOCUMENT
Synthesizer, Microprocessor and Memory	28-pin speech and control system with 64K-bit ROM and 128-byte RAM memory with 2.5 8-bit interface ports	CMOS	10	64K bits	4-6V	Yes	TSP50C41	N	TBD
	28-pin speech and control system with 64K-bit ROM and 128-byte RAM memory with 2.5 8-bit interface ports. Memory programmed for 5220, D6, or PCM speech data	CMOS	10	Programmed	4-6V	Yes	TSP53C30	N	TBD
	40-pin speech and control system with 64K-bit ROM and 128-byte RAM memory with 4 8-bit interface ports	CMOS	10	64K bits	4-6V	Yes	TSP50C42	N	TBD
	28-pin speech and control system with 128K-bit ROM and 128-byte RAM memory with 2.5 8-bit interface ports	CMOS	10	128K bits	4-6V	Yes	TSP50C43	N	TBD
	40-pin speech and control system with 128K-bit ROM and 128-byte RAM memory with 4 8-bit interface ports	CMOS	10	128K bits	4-6V	Yes	TSP50C44	N	TBD
	16-pin speech and control system with 128-word RAM, 1 8-bit port, and 1 2-bit port. LPC-12 synthesizer	CMOS	12	128 words	4-6V	Yes	TSP50C10	N	TBD
	Memory Serial Output ROM: 256-bit ROM for use with the TSP50C4X series	CMOS	NA	256K bytes	4-6V	Yes	TSP60C20	N	SYLD002

Factory orders for circuits described in this guide should include a four-part type number as explained in the following example.



OMIT/883B WHEN NOT APPLICABLE

Circuits are shipped in one of the carriers below. Unless a specific method of shipment is specified by the customer (with possible additional costs), circuits will be shipped on the most practical carrier.

Dual-In-Line (D, DW, J, JD, JG, N, P)

- Slide Magazines
- A-Channel Plastic Tubing
- Barnes Carrier
- Sectioned Cardboard Box
- Individual Cardboard Box

Plug-In (LP, LU)

- Barnes Carrier
- Sectional Cardboard Box
- Individual Cardboard Box

Chip Carriers (FK, FN)

- Anti-Static Plastic Tubing

Flat (U, W)

- Barnes Carrier
- Milton Ross Carrier

Power Tab (KC, KH, KV)

- Sleeves



MEMORY PRODUCTS

At the heart of TI semiconductor development are memory products. The technology developed for Dynamic Random Access Memories (DRAMs) has given TI the processing base to create extensive lines ranging from high-performance logic products to sophisticated application processors. Included in TI's MOS Memory product line are DRAMs, Single In-line Package DRAM memory modules (SIPs), Erasable Programmable Read-Only Memories (EPROMs), high-speed CMOS EPROMs (bipolar PROM compatible access time and pinout), One-Time-Programmable Read-Only Memories (OTP PROMs) and 5-V Flash EEPROMs.

TI's MOS memories meet stringent quality and reliability standards, making them suitable for programs such as ship-to-stock and just-in-time delivery. With DRAMs, TI also encourages self/joint qualification and will support customers with a huge data base of pertinent quality and reliability information.

The reader should refer to the Alphanumeric Index and to the Customer Support section of the Master Selection Guide for additional information on technical documentation.

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MOS MEMORY PRODUCTS

MOS EPROM

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE*	COMMENTS	DOCUMENT					
					ACTIVE (mW)	STANDBY (mW)									
16K	2K × 8	TMS27C291-3	35	5 ± 5%	394	N/A	24	J	High-Speed CMOS	SMLS291B					
		TMS27C291-35	35	5 ± 10%	413										
		TMS27C291	45	5 ± 5%	315										
		TMS27C291-45	45	5 ± 10%	330										
		TMS27C291-5	50	5 ± 5%	289										
		TMS27C291-50	50	5 ± 10%	303										
	TMS27C292-3	35	5 ± 5%	394	N/A	24	J	High-Speed CMOS	SMLS291B						
	TMS27C292-35	35	5 ± 10%	413											
	TMS27C292	45	5 ± 5%	315											
	TMS27C292-45	45	5 ± 10%	330											
	TMS27C292-5	50	5 ± 5%	289											
	TMS27C292-50	50	5 ± 10%	303											
32K	4K × 8	TMS27C32-100	100	5 ± 5%	132	1.4	24	J	CMOS	SMLS032					
		TMS27C32-10	100	5 ± 10%	138										
		TMS27C32-120	120	5 ± 5%	132										
		TMS27C32-12	120	5 ± 10%	138										
		TMS27C32-150	150	5 ± 5%	132										
		TMS27C32-15	150	5 ± 10%	138										
		TMS27C32-2	200	5 ± 5%	132										
		TMS27C32-20	200	5 ± 10%	138										
		TMS27C32	250	5 ± 5%	132										
		TMS27C32-25	250	5 ± 10%	138										
		TMS2732A-17	170	5 ± 5%	657						158	24	J	NMOS	SMES732E
		TMS2732A-20	200												
	TMS2732A-25	250													
	TMS2732A-45	450													
	64K	8K × 8	TMS27C49-4	45	5 ± 5%	473	N/A	24	J, JT	High-Speed CMOS	SMLS049				
TMS27C49-45			45	5 ± 10%	495										
TMS27C49-5			55	5 ± 5%	473										
TMS27C49-55			55	5 ± 10%	495										
TMS27C64-100			100	5 ± 5%	158	1.4						28	J	CMOS	SMLS064A
TMS27C64-120			120	5 ± 5%	158										
TMS27C64-12		120	5 ± 10%	165											
TMS27C64-1		150	5 ± 5%	158											
TMS27C64-15		150	5 ± 10%	165											
TMS27C64-2		200	5 ± 5%	158											
TMS27C64-20		200	5 ± 10%	165											
TMS27C64		250	5 ± 5%	158											
TMS27C64-25		250	5 ± 10%	165											
TMS2764-17		170	5 ± 5%	788	184	28	J	NMOS	SMES764C						
TMS2764-20		200													
TMS2764-25		250													
TMS2764-45		450													
128K		16K × 8	TMS27C128-100	100	5 ± 5%	158	1.4	28	J	CMOS	SMLS128C				
	TMS27C128-120		120	5 ± 5%	158										
	TMS27C128-12		120	5 ± 10%	165										
	TMS27C128-1		150	5 ± 5%	158										
	TMS27C128-15		150	5 ± 10%	165										
	TMS27C128-2		200	5 ± 5%	158										
	TMS27C128-20		200	5 ± 10%	165										
	TMS27C128		250	5 ± 5%	158										
	TMS27C128-25		250	5 ± 10%	165										

* J = Ceramic DIP

JT = 300-mil Ceramic DIP (TMS27C49 only)

MOS EPROM (Continued)

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE*	COMMENTS	DOCUMENT					
					ACTIVE (mW)	STANDBY (mW)									
256K	32K × 8	TMS27C256-120	120	5 ± 5%	158	1.4	28	J	CMOS	SMLS256D					
		TMS27C256-12	120	5 ± 10%	165										
		TMS27C256-150	150	5 ± 5%	158										
		TMS27C256-15	150	5 ± 10%	165										
		TMS27C256-1	170	5 ± 5%	158										
		TMS27C256-17	170	5 ± 10%	165										
		TMS27C256-2	200	5 ± 5%	158										
		TMS27C256-20	200	5 ± 10%	165										
		TMS27C256	250	5 ± 5%	158										
		TMS27C256-25	250	5 ± 10%	165										
		TMS29F256-170	170	5 ± 5%	79						19.3	28	J, N, FM	CMOS Flash EEPROM	SMJS256A
		TMS29F256-200	200	5 ± 5%	79										
		TMS29F256-20	200	5 ± 10%	83										
		TMS29F256-250	250	5 ± 5%	79										
TMS29F256-25	250	5 ± 10%	83												
TMS29F256-300	300	5 ± 5%	79												
TMS29F256-30	300	5 ± 10%	83												
512K	64K × 8	TMS27C512-150	150	5 ± 5%	158	1.4	28	J	CMOS	SMLS512C					
		TMS27C512-15	150	5 ± 10%	165										
		TMS27C512-1	170	5 ± 5%	158										
		TMS27C512-17	170	5 ± 10%	165										
		TMS27C512-2	200	5 ± 5%	158										
		TMS27C512-20	200	5 ± 10%	165										
		TMS27C512	250	5 ± 5%	158										
		TMS27C512-25	250	5 ± 10%	165										
		TMS27C512-3	300	5 ± 5%	158										
		TMS27C512-30	300	5 ± 10%	165										
1024K	128K × 8	TMS27C010-170	170	5 ± 5%	210	1.4	32	J	CMOS	SMLS010B					
		TMS27C010-200	200	5 ± 5%	210										
		TMS27C010-20	200	5 ± 10%	220										
		TMS27C010-250	250	5 ± 5%	210										
		TMS27C010-25	250	5 ± 10%	220										
		TMS27C010-300	300	5 ± 5%	210										
		TMS27C010-30	300	5 ± 10%	220										
		64K × 16	TMS27C210-170	170	5 ± 5%						210	1.4	40	J	CMOS
	TMS27C210-200		200	5 ± 5%	210										
	TMS27C210-20		200	5 ± 10%	220										
	TMS27C210-250		250	5 ± 5%	210										
	TMS27C210-25		250	5 ± 10%	220										
	TMS27C210-300		300	5 ± 5%	210										
	TMS27C210-30	300	5 ± 10%	220											

* J = Ceramic DIP
N = Plastic DIP
FM = Plastic Chip Carrier

MOS OTP PROM (One-Time Programmable)

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE*	COMMENTS	DOCUMENT
					ACTIVE (mW)	STANDBY (mW)				
16K	2K × 8	TMS27PC291-3	35	5 ± 5%	394	N/A	24, 28	N, FN	High-Speed CMOS	SMLS291B
		TMS27PC291-35	35	5 ± 10%	413					
		TMS27PC291	45	5 ± 5%	315					
		TMS27PC291-45	45	5 ± 10%	330					
		TMS27PC291-5	50	5 ± 5%	289					
		TMS27PC291-50	50	5 ± 10%	303					

* N = Plastic DIP
FN = Plastic Chip Carrier

MOS OTP PROM (One-Time Programmable) (Continued)

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE*	COMMENTS	DOCUMENT
					ACTIVE (mW)	STANDBY (mW)				
32K	4K × 8	TMS27PC32-120	120	5 ± 5%	132	1.4	24	N	CMOS	SMLS032
		TMS27PC32-12	120	5 ± 10%	138					
		TMS27PC32-150	150	5 ± 5%	132					
		TMS27PC32-15	150	5 ± 10%	138					
		TMS27PC32-2	200	5 ± 5%	132					
		TMS27PC32-20	200	5 ± 10%	138					
		TMS27PC32	250	5 ± 5%	132					
TMS27PC32-25	250	5 ± 10%	138							
64K	8K × 8	TMS27PC49-4	45	5 ± 5%	473	N/A	24, 24, 28	N, NT, FN	High-Speed CMOS	SMLS049
		TMS27PC49-45	45	5 ± 10%	495					
		TMS27PC49-5	55	5 ± 5%	473					
		TMS27PC49-55	55	5 ± 10%	495					
		TMS27PC64-120	120	5 ± 5%	158	1.4	28	N	CMOS	SMLS064A
		TMS27PC64-12	120	5 ± 10%	165					
		TMS27PC64-1	150	5 ± 5%	158					
		TMS27PC64-15	150	5 ± 10%	165					
		TMS27PC64-2	200	5 ± 5%	158					
		TMS27PC64-20	200	5 ± 10%	165					
TMS27PC64	250	5 ± 5%	158							
TMS27PC64-25	250	5 ± 10%	165							
128K	16K × 8	TMS27PC128-1	150	5 ± 5%	158	1.4	28, 32	N, FM	CMOS	SMLS128C
		TMS27PC128-15	150	5 ± 10%	165					
		TMS27PC128-2	200	5 ± 5%	158					
		TMS27PC128-20	200	5 ± 10%	165					
		TMS27PC128	250	5 ± 5%	158					
		TMS27PC128-25	250	5 ± 10%	165					
256K	32K × 8	TMS27PC256-150	150	5 ± 5%	158	1.4	28, 32	N, FM	CMOS	SMLS256D
		TMS27PC256-15	150	5 ± 10%	165					
		TMS27PC256-1	170	5 ± 5%	158					
		TMS27PC256-17	170	5 ± 10%	165					
		TMS27PC256-2	200	5 ± 5%	158					
		TMS27PC256-20	200	5 ± 10%	165					
		TMS27PC256	250	5 ± 5%	158					
		TMS27PC256-25	250	5 ± 10%	165					
512K	64K × 8	TMS27PC512-150	150	5 ± 5%	158	1.4	28, 32	N, FM	CMOS	SMLS512C
		TMS27PC512-15	150	5 ± 10%	165					
		TMS27PC512-1	170	5 ± 5%	158					
		TMS27PC512-17	170	5 ± 10%	165					
		TMS27PC512-2	200	5 ± 5%	158					
		TMS27PC512-20	200	5 ± 10%	165					
		TMS27PC512	250	5 ± 5%	158					
		TMS27PC512-25	250	5 ± 10%	165					
		TMS27PC512-3	300	5 ± 5%	158					
		TMS27PC512-30	300	5 ± 10%	165					
1024K	128K × 8	TMX27PC010-200	200	5 ± 5%	210	1.4	32	N	CMOS	SMYD008
		TMX27PC010-20	200	5 ± 10%	220					
		TMX27PC010-250	250	5 ± 5%	210					
		TMX27PC010-25	250	5 ± 10%	220					
		TMX27PC010-300	300	5 ± 5%	210					
	TMX27PC010-30	300	5 ± 10%	220						
	64K × 16	TMX27PC210-200	200	5 ± 5%	210	1.4	40	N	CMOS	SMYD008
		TMX27PC210-20	200	5 ± 10%	220					
		TMX27PC210-250	250	5 ± 5%	210					
		TMX27PC210-25	250	5 ± 10%	220					
TMX27PC210-300		300	5 ± 5%	210						
TMX27PC210-30	300	5 ± 10%	220							

* N = Plastic DIP
 NT = 300-mil Plastic DIP (TMS27PC49 only)
 FM = Plastic Chip Carrier
 FN = Plastic Chip Carrier

MOS DRAM/VRAM

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE*	COMMENTS	DOCUMENT					
					ACTIVE (mW)	STANDBY (mW)									
256K	64K × 4	TMS4461-12 TMS4461-15	120 150	5 ± 10%	853 770	110	24, 24	N, SD	Multiport Video RAM	SMVS011B					
1024K	1024K × 1	TMS4C1024-80	80	5 ± 10%	413	11	18, 20/26, 20/26, 20	N, DJ, DN, SD	CMOS Enhanced Page Mode	SMGS024D					
		TMS4C1024-10	100		358										
		TMS4C1024-12	120		303										
		TMS4C1025-80	80	5 ± 10%	413	11	18, 20/26, 20/26, 20	N, DJ, DN, SD	CMOS Nibble Mode	SMGS024D					
	TMS4C1025-10	100	358												
	TMS4C1025-12	120	303												
	TMS4C1027-80	80	5 ± 10%	413	11	18, 20/26, 20/26, 20	N, DJ, DN, SD	CMOS Static Column Decode Mode	SMGS024D						
	TMS4C1027-10	100		358											
	TMS4C1027-12	120		303											
	256K × 4	TMS44C251-1 TMS44C251-10 TMS44C251-12	100	5 ± 5%	578	26	28, 28	DJ, SD	CMOS Multiport Video RAM	SMVS251B					
			100	5 ± 10%	605	28									
			120	5 ± 10%	523	28									
TMS44C256-80 TMS44C256-10 TMS44C256-12		80 100 120	5 ± 10%	385 358 303	11	20, 20/26, 20	N, DJ, DN, SD	CMOS Enhanced Page Mode	SMGS256B						
TMS44C260-70 TMS44C260-80 TMS44C260-10		70 80 100		5 ± 10%						440 413 385	11	24/26	DJ	CMOS Parity and Enhanced Page Mode	SMGS260
TMS4C1050-30 TMS4C1050-40 TMS4C1050-60		25 30 50								5 ± 10%					
TMS48C121-80 TMS48C121-10 TMS48C121-12		80 100 120	5 ± 10%		660 523 468	193 165 165	40	DJ	CMOS Multiport Video RAM						
TMS44100-80 TMS44100-10 TMS44100-12		80 100 120		5 ± 10%	468 413 358						11	20/26, 20	DM, DN, SD	CMOS Enhanced Page Mode	SMHS410
TMS44101-80 TMS44101-10 TMS44101-12	80 100 120	5 ± 10%			468 413 358					11					
TMS44102-80 TMS44102-10 TMS44102-12	80 100 120		5 ± 10%		468 413 358	11	20/26, 20	DM, DN, SD	CMOS Static Column Decode Mode						
TMS44103-80 TMS44103-10 TMS44103-12	80 100 120			5 ± 10%	468 413 358						11	20/26, 20	DM, DN, SD	CMOS Serial Mode	SMHS410
TMS44400-80 TMS44400-10 TMS44400-12	80 100 120	5 ± 10%			468 413 358					11					
TMS44401-80 TMS44401-10 TMS44401-12	80 100 120		5 ± 10%		468 413 358	11	20/26, 20	DM, DN, SD	CMOS Nibble Mode						
TMS44402-80 TMS44402-10 TMS44402-12	80 100 120			5 ± 10%	468 413 358						11	20/26, 20	DM, DN, SD	CMOS Static Column Decode Mode	SMHS440
TMS44403-80 TMS44403-10 TMS44403-12	80 100 120	5 ± 10%			468 413 358					11					

* N = Plastic Dual In-line Package (DIP)
 DJ = Plastic Small Outline J-lead (SOJ)
 DM = Plastic Small Outline J-lead (SOJ)
 DN = Plastic Thin Small Outline J-lead (Thin SOJ)
 SD = Plastic Zig-zag In-line Package (ZIP)

MOS Dynamic RAM Module

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX POWER DISSIPATION		PINS	PACKAGE	COMMENTS	DOCUMENT		
					ACTIVE (mW)	STANDBY (mW)						
4096K	1024K × 4	TM024HAC4-80	80	5 ± 10%	1540	44	24	Leaded	CMOS Enhanced Page Mode	SMMS104A		
		TM024HAC4-10	100		1430							
		TM024HAC4-12	120		1210							
8192K	1024K × 8	TM024GAD8-80	80	5 ± 10%	3080	88	30	Socketable	CMOS Enhanced Page Mode	SMMS108		
		TM024GAD8-10	100		2860							
		TM024GAD8-12	120		2420							
		TM024GAD8T-80	80	5 ± 10%	3080	88	30	Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS108		
		TM024GAD8T-10	100		2860							
		TM024GAD8T-12	120		2420							
9216K	1024K × 9	TM024EAD9-80	80	5 ± 10%	3465	99	30	Socketable	CMOS Enhanced Page Mode	SMMS109		
		TM024EAD9-10	100		3218							
		TM024EAD9-12	120		2723							
		TM024EBJ9T-80	80	5 ± 10%	3465	99	30	Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS109		
		TM024EBJ9T-10	100		3218							
		TM024EBJ9T-12	120		2723							
16384K	2048K × 8	TM024JAD8-80	80	5 ± 10%	3080	88	30	Double-sided, Socketable	CMOS Enhanced Page Mode	SMMS108		
		TM024JAD8-10	100		2860							
		TM024JAD8-12	120		2420							
		TM024JAD8T-80	80	5 ± 10%	3080	88	30	Double-sided, Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS108		
		TM024JAD8T-10	100		2860							
		TM024JAD8T-12	120		2420							
18432K	2048K × 9	TM024DBJ9T-80	80	5 ± 10%	3465	99	30	Double-sided, Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS109		
	TM024DBJ9T-10	100	3218									
	TM024DBJ9T-12	120	2723									
32768K	4096K × 8	TM4100GBD8-80	80	5 ± 10%	3740	88	30	Socketable	CMOS Enhanced Page Mode	SMMS108		
	TM4100GBD8-10	100	3300									
	TM4100GBD8-12	120	2860									
36864K	4096K × 9	TM4100EBD9-80	80	5 ± 10%	4208	99	30	Socketable	CMOS Enhanced Page Mode	SMMS409		
		TM4100EBD9-10	100		3713							
		TM4100EBD9-12	120		3218							
		TM4100EBJ9-80	80	5 ± 10%	4208	99	30	Socketable	CMOS Enhanced Page Mode	SMMS409		
		TM4100EBJ9-10	100		3713							
		TM4100EBJ9-12	120		3218							
		TM4100EBJ9T-80	80	5 ± 10%	4208	99	30	Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS409		
		TM4100EBJ9T-10	100		3713							
		TM4100EBJ9T-12	120		3218							
		73728K	8192K × 9	TM4100DBJ9-80	80	5 ± 10%	4208	99	30	Double-sided, Socketable	CMOS Enhanced Page Mode	SMMS409
				TM4100DBJ9-10	100		3713					
				TM4100DBJ9-12	120		3218					
TM4100DBJ9T-80	80			5 ± 10%	4208	99	30	Double-sided, Socketable, ThinSOJ	CMOS Enhanced Page Mode	SMMS409		
TM4100DBJ9T-10	100				3713							
TM4100DBJ9T-12	120				3218							

Memory Products

MOS SRAM

DENSITY BITS	ORGANIZATION (WORDS × BITS)	DEVICE NUMBER	MAX ACCESS TIME (ns)	POWER SUPPLY (V)	MAX SUPPLY CURRENT			PINS	PACKAGE*	COMMENTS	DOCUMENT				
					ACTIVE (mA)	STANDBY (mA)									
						TTL	CMOS								
16K	2K × 8	TMS6716-25	25	5 ± 10%	120	30	10	24	N	BiCMOS Output Enable	SMSS716A				
64K	64K × 1	TMS6787-15	15	5 ± 10%	120	30	10	22, 24	N, DJ	BiCMOS	SMSS787A				
		TMS6787-20	20		120	30	10	22, 24							
		TMS6787-25	25		100	40	20	22							
		TMS6787-30	30		100	40	20	22							
	16K × 4	TMS6788-15	15	5 ± 10%	120	30	10	22	N	BiCMOS	SMSS788B				
		TMS6788-20	20												
		TMS6788-25	25												
		TMS6788-30	30												
	TMS6789-15	15	5 ± 10%	120	30	10	24, 24	N, DJ	BiCMOS Output Enable	SMSS789A					
		TMS6789-20		20											
		TMS6789-25		25											
		TMS6789-30		30											
8K × 8	TMS6264-10	100	5 ± 10%	55	3	2	28, 28	N, NW, DH	CMOS Output Enable	SMSS264B					
	TMS6264-12	120		45			28								
	TMS6264-15	150		45											
	TMS6264L-10	100		5 ± 10%	55	3	0.1				28, 28	N, NW, DH	CMOS Low Power Output Enable	SMSS264B	
TMS6264L-12	120	45													
TMS6264L-15	150	45													
256K	256K × 1	TMS6707-20	20	5 ± 10%	120	30	10	24, 24	N, DJ	BiCMOS	SMSS707				
		TMS6707-25	25												
	64K × 4	TMS6708-20	20	5 ± 10%	120	30	10	24, 24	N, DJ	BiCMOS	SMSS708				
		TMS6708-25	25												
	TMS6709-20	20	5 ± 10%	550	165	55	28	DJ	BiCMOS	SMSS709					
		TMS6709-25		25	5 ± 10%										
	32K × 8	TMS62256-85	85	5 ± 10%	70	3	2	28, 28	NW, DH	CMOS Output Enable	SMSS256B				
		TMS62256-10	100												
		TMS62256-12	120												
		TMS62256-15	150												
	TMS62256L-85	85	5 ± 10%	70	3	0.1	28, 28	NW, DH	CMOS Low Power Output Enable	SMSS256B					
		TMS62256L-10		100											
TMS62256L-12		120													
TMS62256L-15		150													
1024K	256K × 4	TMS62456-35	35	5 ± 10%	660	330	1.1	28	DJ	CMOS Common I/O	SMSS456				
		TMS62456-45	45												
		TMS62457-35	35		5 ± 10%	660	330	1.1				32	DJ	CMOS Separate I/O	SMSS457
		TMS62457-45	45												
	128K × 8	TMS62828-85	85	5 ± 10%	70	3	2	32, 32	NW, DK	CMOS Output Enable	SMSS828				
		TMS62828-10	100												
		TMS62828-12	120												
		TMS62828L-85	85		5 ± 10%	70	3	0.1				32, 32	NW, DK	CMOS Low Power Output Enable	SMSS828
	TMS62828L-10	100													
	TMS62828L-12	120													

* N = Plastic Dual In-line Package (DIP) (300-mil)
 NW = Plastic Dual In-line Package (DIP) (600-mil)
 DH = Plastic Small Outline Package (SOP)
 DJ = Plastic Small Outline J-lead (SOJ)
 DK = Plastic Small Outline Package (SOP)

COMMERCIAL EPROM/OTP PROM PRODUCTS CROSS REFERENCE GUIDE

PART NUMBER	TEXAS INSTRUMENTS PART NUMBER	PART NUMBER	TEXAS INSTRUMENTS PART NUMBER	PART NUMBER	TEXAS INSTRUMENTS PART NUMBER
AM27128A-1DC	TMS27C128-1JL	AM27C1024-455DC	TMS27C210-250JL	D27512-200V05	TMS27C512-2JL
AM27128A-20PC	TMS27PC128-20NL	AM27C1024DC	TMS27C010-250JL	D27512-200V10	TMS27C512-20JL
AM27128A-25DC	TMS27C128-25JL	AM27C128-15DC	TMS27C128-15JL	D27512-25	TMS27C512-25JL
AM27128A-25PC	TMS27PC128-25NL	AM27C256-150DC	TMS27C256-15JL	D27512-250V05	TMS27C512JL
AM27128A-2DC	TMS27C128-2JL	AM27C256-155DC	TMS27C256-150JL	D27512-250V10	TMS27C512-25JL
AM27128A-2PC	TMS27PC128-2NL	AM27C256-200DC	TMS27C256-20JL	D27512-3	TMS27C512JL
AM27128A-30DC	TMS27C128-25JL	AM27C256-200PC	TMS27PC256-20NL	D27512-30	TMS27C512-25JL
AM27128A-3DC	TMS27C128JL	AM27C256-205DC	TMS27C256-2JL	D2764A	TMS27C512-25JL
AM27128A-45DC	TMS27C128-25JL	AM27C256-205PC	TMS27PC256-2NL	D2764A-1	TMS2764-17JL
AM27128A-45PC	TMS27PC128-25NL	AM27C256-250DC	TMS27C256-25JL	D2764A-2	TMS2764-20JL
AM27128A-4DC	TMS27C128JL	AM27C256-250PC	TMS27PC256-25NL	D2764A-3	TMS2764-30JL
AM27128A-4PC	TMS27PC128NL	AM27C256-255DC	TMS27C256JL	D2764A-4	TMS2764-45JL
AM27128ADC	TMS27C128JL	AM27C256-305DC	TMS27C256JL	D27C256	TMS27C256JL
AM27128APC	TMS27PC128NL	AM27C256-450DC	TMS27C256-25JL	D27C256-20	TMS27C256-20JL
AM27256-1DC	TMS27C256-1JL	AM27C256-455DC	TMS27C256JL	D27C256-200V05	TMS27C256-2JL
AM27256-20DC	TMS27C256-20JL	AM27C512-200DC	TMS27C512-20JL	D27C256-200V10	TMS27C256-20JL
AM27256-20PC	TMS27PC256-20NL	AM27C512-205DC	TMS27C512-20JL	D27C256-25	TMS27C256-25JL
AM27256-25DC	TMS27C256-25JL	AM27C512-205DC	TMS27PC512-2NL	D27C256-30	TMS27C256-25JL
AM27256-25PC	TMS27PC256-25NL	AM27C512-250DC	TMS27C512-25JL	D27C256-300V10	TMS27C512-25JL
AM27256-2DC	TMS27C256-2JL	AM27C512-450DC	TMS27C512-25JL	DQ27128-2	TMS27C128-2JL
AM27256-2PC	TMS27PC256-2NL	AM27C512-455DC	TMS27C512JL	DQ27128-20	TMS27C128-20JL
AM27256-30DC	TMS27C256-25JL	AM27C512DC	TMS27C512JL	DQ27128-25	TMS27C128-25JL
AM27256-3DC	TMS27C256JL	AM27S291APC	TMS27C291-35JL	DQ27128-3	TMS27C128JL
AM27256-40DC	TMS27C256-25JL	AM27S291PC	TMS27C291-45JL	DQ27128-30	TMS27C128-25JL
AM27256-4DC	TMS27C256JL	AP27C64	TMS27PC64NL	DQ27128-4	TMS27C128JL
AM27256-4PC	TMS27PC256NL	AP27C64-1	TMS27PC64-1NL	DQ27128-45	TMS27C128-25JL
AM27256DC	TMS27C256JL	AP27C64-2	TMS27PC64-2NL	DQ27256	TMS27C256JL
AM2732B-205DC*	TMS2732A-20JL	AP27C64-3	TMS27PC64NL	DQ27256-25	TMS27C256-25JL
AM2732B-305DC*	TMS2732A-30JL	CY7C292-35DC	TMS27C292-3JL	DQ27256-3	TMS27C256JL
AM2732B-455DC*	TMS2732A-45JL	D27128A	TMS27C128JL	DQ27256-30	TMS27C256-25JL
AM2732BDC*	TMS2732A-25JL	D27128A-1	TMS27C128-1JL	DQ2764-16	TMS27C64-15JL
AM27512-25DC	TMS27C512-250JL	D27128A-2	TMS27C128-2JL	DQ2764-2	TMS27C64-2JL
AM27512-30DC	TMS27C512-25JL	D27128A-20	TMS27C128-20JL	DQ2764-20	TMS27C64-20JL
AM27512-3DC	TMC27C512JL	D27128A-25	TMS27C128-25JL	DQ2764-3	TMS27C64JL
AM27512DC	TMS27C512JL	D27128A-3	TMS27C128JL	DQ2764-30	TMS27C64-25JL
AM2764A-1DC*	TMS2764-17JL	D27128A-30	TMS27C128-25JL	DQ2764-4	TMS27C64JL
AM2764A-2DC*	TMS2764-20JL	D27128A-4	TMS27C128JL	DQ2764-45	TMS27C64-25JL
AM2764A-2PC	TMS27PC64-2NL	D27210-170V05	TMS27C210-170JL	DQ27C256	TMS27C256JL
AM2764A-3DC*	TMS2764-30JL	D27210-170V10	TMS27C210-17JL	DQ27C256-25	TMS27C256-25JL
AM2764A-4DC*	TMS2764-45JL	D27210-200V05	TMS27C210-200JL	DQ27C256-3	TMS27C256JL
AM2764ADC*	TMS2764-25JL	D27210-200V10	TMS27C210-20JL	DQ27C256-30	TMS27C256-25JL
AM2764APC	TMS27PC64NL	D27210-250V05	TMS27C210-250JL	DQ27C256-4	TMS27C256-25JL
AM27C010-175DC	TMS27C010-170JL	D27210-250V10	TMS27C210-25JL	DQ27C256-45	TMS27C256-25JL
AM27C010-200DC	TMS27C010-200JL	D27210-300V05	TMS27C210-250JL	M27128A-2F1	TMS27C128-2JL
AM27C010-205DC	TMS27C010-200JL	D27210-300V10	TMS27C210-25JL	M27128A-3F1	TMS27C128JL
AM27C010-250DC	TMS27C010-25JL	D2732A	TMS2732A-25JL	M27128A-4F1	TMS27C128JL
AM27C010-255DC	TMS27C010-250JL	D2732A-2	TMS2732A-20JL	M27128A-F1	TMS27C128JL
AM27C1024-200DC	TMS27C210-200JL	D2732A-3	TMS2732A-30JL	M27256-2F1	TMS27C128-2JL
AM27C1024-205DC	TMS27C010-200JL	D2732A-4	TMS2732A-45JL	M27256-3F1	TMS27C128JL
AM27C1024-250DC	TMS27C010-250JL	D27512-170V05	TMS27C512-1JL	M27256-4F1	TMS27C128JL
AM27C1024-250DC	TMS27C210-250JL	D27512-2	TMS27C512-2JL	M27256F1	TMS27C256JL
AM27C1024-300DC	TMS27C210-250JL	D27512-20	TMS27C512-20JL	M2732A-2F1	TMS2732A-20JL

*These devices use a 12.5 volt programming voltage versus TI devices which use 21 volts.
(All TI parts listed parts are direct crosses or improved versions.)

Memory Products

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COMMERCIAL EPROM/OTP PROM PRODUCTS CROSS REFERENCE GUIDE (Continued)

PART NUMBER	TEXAS INSTRUMENTS PART NUMBER	PART NUMBER	TEXAS INSTRUMENTS PART NUMBER	PART NUMBER	TEXAS INSTRUMENTS PART NUMBER
M2732A-3F1	TMS2732A-25JL	NMC27C64N200	TMS27PC64-20NL	27256-25/J	TMS27C256-25JL
M2732A-4F1	TMS2732A-25JL	NMC27C64N250	TMS27PC64-25NL	27C128-20/J	TMS27C128-20JL
M2732AF1	TMS2732A-25JL	NMC27C64Q15	TMS27C64-1JL	27C128-25/J	TMS27C128-25JL
M27512-2F1	TMS27C512-2JL	NMC27C64Q150	TMS27C64-15JL	27C256-17FA	TMS27C256-1JL
M27512-3F1	TMS27C512JL	NMC27C64Q200	TMS27C64-20JL	27C256-20/J	TMS27C256-20JL
M27512-4F1	TMS27C512JL	NMC27C64Q250	TMS27C64JL	27C256-20FA	TMS27C256-2JL
M27512F1	TMS27C512JL	NMC27C64Q300	TMS27C64-25JL	27C256-25/J	TMS27C256-25JL
M2764A-2F1	TMS2764-20JL	NMC27CP128Q200	TMS27PC128-2NL	27C256-25FA	TMS27C256JL
M2764A-3F1	TMS2764-30JL	NMC27CP128Q250	TMS27PC128NL	27C512-20/J	TMS27C512-20JL
M2764A-4F1	TMS2764-45JL	NMC27CP128Q300	TMS27PC128NL	27C512-25/J	TMS27C512-25JL
M2764AF1	TMS2764-25JL	P27128-2	TMS27PC128-2NL	27C64-20FA	TMS27C64-2JL
NMC27C256Q20	TMS27C256-2JL	P27128-25	TMS27PC128-25NL	27C64-25FA	TMS27C64JL
NMC27C256Q200	TMS27C256-20JL	P27128-3	TMS27PC128NL		
NMC27C256Q25	TMS27C256JL	P27128A	TMS27PC128NL		
NMC27C256Q250	TMS27C256-25JL	WS27C256L-12D	TMS27C256-120JL		
NMC27C512Q20	TMS27C512-2JL	WS27C256L-15D	TMS27C256-150JL		
NMC27C512Q200	TMS27C512-20JL	WS27C256L-15J	TMS27PC256-150FML		
NMC27C512Q25	TMS27C512JL	WS27C512L-15D	TMS27C512-150JL		
NMC27C512Q250	TMS27C512-25JL	WS57C191-45D	TMS27C292-25JL		
NMC27C64N15	TMS27PC64-1NL	27256-20/J	TMS27C256-20JL		

*These devices use a 12.5 volt programming voltage versus TI devices which use 21 volts.
(All TI parts listed parts are direct crosses or improved versions.)

MOS MEMORY PRODUCTS EPROM/OTP PROM ORDERING INFORMATION

Factory orders for EPROMs/OTP PROMs should include a nine-part type number as explained in the following example:

TMS 27 P C 512 -10 FM L 4

1) Prefix: _____

- TMS Commercial MOS
- TMX Pre-production Commercial MOS

2) Product Family: _____

- 27 EPROM/OTP PROM
- 29 Flash EEPROM

3) Erasability: _____

- P Non-erasable
- Blank Erasable

4) Technology: _____

- C CMOS
- F CMOS Flash EEPROM
- Blank NMOS

5) Density: _____

- | | | | |
|-----|-----|-----|-------|
| 291 | 16K | 128 | 128K |
| 292 | 16K | 256 | 256K |
| 32 | 32K | 512 | 512K |
| 49 | 64K | 010 | 1024K |
| 64 | 64K | 210 | 1024K |

6) Speed Designator: _____

- | | | | |
|--------|----------------|--------|------------------|
| 35 ns | -3, -35 | 150 ns | -1, -15, -150 |
| 45 ns | Blank, -4, -45 | 170 ns | -1, -17, -170 |
| 50 ns | -5, -50 | 200 ns | -2, -20, -200 |
| 55 ns | -5, -55 | 250 ns | Blank, -25, -250 |
| 100 ns | -10, -100 | 300 ns | -3, -30, -300 |
| 120 ns | -12, -120 | 450 ns | -45 |

7) Package: _____

OTP PROMs (Plastic)	EPROMs (Ceramic)	Flash EEPROMs
N Dual In-line (DIP)	J Cerpak/Cerdip	J Ceramic DIP
FN Chip Carrier	JT 300-mil Cerdip	N Plastic Dip
FM Chip Carrier	(TMS27PC49 Only)	FM Plastic Chip Carrier
NT 300-mil DIP (TMS27PC49 Only)		

8) Temperature Range: _____

- E -40°C to 85°C
- L 0°C to 70°C

9) 168 Hour Burn-in Option: _____

- 4 168 Hour Burn-in
- Blank No Burn-in

Memory Products

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MOS MEMORY PRODUCTS DRAM/VRAM ORDERING INFORMATION

Factory orders for DRAMs/VRAMs (except 4 Meg DRAM*) should include an eight-part type number as explained in the following example:

TMS 4 4 C 256 -10 DJ -

1) Prefix: _____
 TMS Commercial MOS
 TMX Pre-production Commercial MOS

2) Product Family: _____
 4 DRAM/VRAM/FRAM

3) Word Width: _____
 1 ×1
 Blank ×1 (256K and 1 Meg DRAMs Only)
 Blank ×4 (1 Meg FRAM Only)
 4 ×4

4) Technology: _____
 C CMOS
 Blank NMOS

5) Density: _____
 61 256K VRAM ('4461) 1024 1 Meg DRAM ('4C1024)
 251 1 Meg VRAM ('44C251) 1025 1 Meg DRAM ('4C1025)
 256 1 Meg DRAM ('44C256) 1027 1 Meg DRAM ('4C1027)
 260 1 Meg Parity DRAM ('44C260) 1050 1 Meg FRAM ('4C1050)

6) Speed Designator: _____

DRAMs/VRAMs	FRAMs
-70 70 ns	-3 25 ns
-80 80 ns	-4 30 ns
-1 100 ns	-6 50 ns
-10 100 ns	
-12 120 ns	
-15 150 ns	

7) Package: _____
 N Dual In-line (DIP)
 DJ Small Outline J-lead (SOJ)
 SD Zig-zag In-line (ZIP)

8) Temperature Range: _____
 Blank 0°C to 70°C (1 Meg DRAM Only)
 L 0°C to 70°C

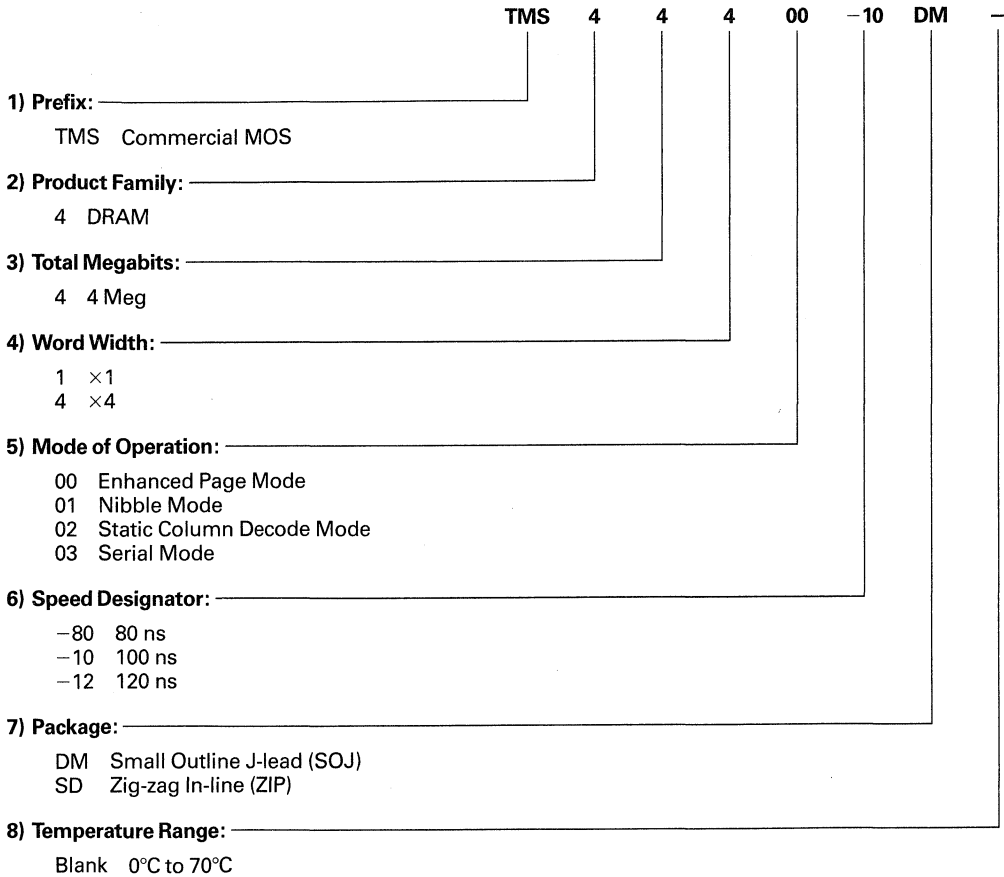
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*For 4 Meg DRAM ordering information, see the next page.

MOS MEMORY PRODUCTS 4 MEG DRAM ORDERING INFORMATION

Factory orders for 4 Meg DRAMs should include an eight-part type number as explained in the following example:



Memory Products

MOS MEMORY PRODUCTS DRAM MODULE ORDERING INFORMATION

Factory orders for DRAM Modules, also known as Single In-line Packages (SIPs), should include an eight-part type number as explained in the following example:

TM 024 D BJ 9 T -80 L

1) Prefix: _____

TM Commercial MOS

2) Memory Device: _____

024 1 Meg DRAM, Enhanced Page Mode
4100 4 Meg DRAM, Enhanced Page Mode

3) Pinout Configuration: _____

D G J
E H

4) Board Dimensions: _____

AC BD
AD BJ

5) Word Width Output: _____

6) DRAM Package Type: _____

Blank Standard SOJ Packaged DRAMs
T ThinSOJ Packaged DRAMs

7) Speed Designator: _____

-80 80 ns
-10 100 ns
-12 120 ns

8) Temperature Range: _____

L 0°C to 70°C (1 Meg DRAMs)
Blank 0°C to 70°C (4 Meg DRAMs)

MOS MEMORY PRODUCTS SRAM ORDERING INFORMATION

Factory orders for SRAMs should include an eight-part type number as explained in the following example:

TMS 6 2 64 L -12 NW -

1) **Prefix:** _____
TMS Commercial MOS

2) **Product Family:** _____
6 SRAM

3) **Technology:** _____
2 CMOS
7 BiCMOS

4) **Density:** _____

16	16K ('6716)	64	64K ('6264, '6264L)
87	64K ('6787)	07	256K ('6707)
88	64K ('6788)	08	256K ('6708)
89	64K ('6789)	256	256K ('62256, '62256L)
		456	1024K ('62456L)
		457	1024K ('62457, '62457L)
		828	1024K ('62828, '62828L)

5) **Power:** _____
L Low Power
Blank Standard Power

Memory Products

6) **Speed Designator:** _____

- 10 100 ns
- 12 120 ns
- 15 15 ns, 150 ns
- 20 20 ns
- 25 25 ns
- 30 30 ns
- 35 35 ns
- 45 45 ns
- 85 85 ns

10 7) **Package:** _____

- DH Small Outline Package (SOP)
- DJ Small Outline J-lead (SOJ)
- DK Small Outline Package (SOP)
- N Plastic Dual-In-Line (DIP) (300-mil)
- NW Plastic Dual-In-Line (DIP) (600-mil)

8) **Temperature Range:** _____
Blank 0°C to 70°C

CUSTOMER SUPPORT AND GENERAL INFORMATION

Texas Instruments offers a wide array of circuit design tools and support services ranging from Customer Response Center, design kits, Regional Technology Centers (RTCs), technical training seminars and workshops, to technical documentation.

Regional Technology Centers (RTCs) offer an unmatched array of up-to-date technical seminars and workshops for the benefit of customers requiring engineering details on TI products for design or evaluation purposes. Through lectures and hands-on lab exercises utilizing the latest TI development tools, the design learning curve can be accelerated.

Technical documentation is fully described — forms are provided to simplify the ordering process.

Packages offered by Texas Instruments are designed to meet the most efficient and cost effective method of meeting customer requirements and today's high-density packaging needs.

During the last decade, TI has produced one of the largest IC socket families. TI's sockets include every type and size socket in common use today and are available in a wide choice of contact materials and designs.

As a major manufacturer of surface mount components, TI is committed to help customers make the transition to surface mount as easy and economical as possible.

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CUSTOMER SUPPORT

CUSTOMER RESPONSE CENTER

The TI Customer Response Center's (CRC) mission is to answer telephone inquiries concerning product or service. If a TI sales office or distributor near you cannot be of assistance, the CRC is the place to call.

When the CRC Information Specialists are unable to provide the necessary information, they will put customers in touch with a TI expert. The customer has the choice of having that expert return the call or receiving the number if it is more convenient to call at another time.

The CRC is dedicated to providing quality customer service. If the customer elects to have a TI expert call back, the CRC will follow up to ensure that the customer has been contacted and has been satisfied. The goal of CRC is to provide the requested assistance within two hours of the initial call.

In addition to providing product and service information, CRC welcomes customer comments — criticism or praise — and will be happy to pass them along to TI management.

TO REACH THE TI CUSTOMER RESPONSE CENTER FROM 8:00 A.M. TO 5:00 P.M. CST MONDAY-FRIDAY

1-800-336-5236 (US and Canada) 214-995-6611 (Dallas, TX and International)

REMEMBER: "WE'RE HERE FOR *YOU*."

TEXAS INSTRUMENTS SEMICONDUCTOR TECHNICAL TRAINING

TI Technical training — the fast track to tomorrow's designs.

At Texas Instruments, customers and their success in the design process are a critical concern. To support that commitment, a Total Quality Control program is in place, serving as the cornerstone for all Texas Instruments products and services. TQC principles are practiced and monitored within all areas of TI, benefiting customers throughout the world by means of continuous product and service enhancements and performance improvements.

As technologies continue to advance rapidly and competition becomes keener, the need to dramatically shorten the cycle time from design concept to market availability is becoming critical. This reduced window of product development requires that designers be abreast of state-of-the-art skills and disciplines in order to implement their ideas quickly, produce a quality product and deliver it to the marketplace before the competition.

To assist customers in the design phase of this process, TI has Regional Technology Centers in place throughout the world. These centers offer designers the latest training in support of advanced TI technologies, as well as consultative expertise in applying that knowledge to a designer's unique concepts and situations. Through lectures and hands-on lab exercises utilizing the latest TI development tools, designers can accelerate the learning curve by taking advantage of TI's strong knowledge base of advanced electronics technology.

Courses offered are developed to help customers involved in the design process to successfully:

- Shorten the design cycle
- Control development costs
- Solve design challenges

As the progress of technology continues to change at an increased rate, designers must be poised to adapt and implement at that increased speed.

Visit a TI Regional Technology Center, where experienced, knowledgeable instructors, the latest support tools and focused system design courses are available to help place you and your products on the fast track.

Texas Instruments Regional Technology Centers (RTCs) offer an array of up-to-date technical seminars and workshops at seven convenient locations across North America for the benefit of customers requiring engineering details on Texas Instruments products for design or evaluation purposes.

HANDS-ON WORKSHOPS

RTC workshops give design engineers and implementors experience using the latest advanced technology TI products, development tools, and design techniques. Participants can improve their learning curves by attending these up-to-date, hands-on workshops.

TI goes beyond the standard format. Students get started right away by using the latest development tools possible and by interacting with qualified instructors. The exercises and lab experiments start with the basics and move quickly into real-world examples. In TI workshops, students learn by DOING, not just by listening and watching. Courses currently being offered include:

- TMS320C1X Digital Signal Processor (DSP) Design Workshop (RTCWS-320DSP1)

- TMS320C2X Digital Signal Processor (DSP) Design Workshop (RTCWS-320DSP2)
- TMS320C3X Digital Signal Processor (DSP) Design Workshop (RTCWS-320DSP3)
- TIASIC Standard Cell Advanced Course
- TIASIC Gate Array Advanced Course
- TMS34010 Graphics System Processor Design Workshop (RTCWS-340GSP1)
- TMS370 Configurable Microcontroller Design Workshop (RTCWS-370MICRO)
- TMS380 IBM Token-Ring Network Design Workshop (RTCWS-380LAN1)

Workshops in development include:

- TMS320C5X Digital Signal Processor (DSP) Design Workshop
- TMS34020 Graphics System Processor Design Workshop
- Applications in C

TMS320 Digital Signal Processor Design Workshops (RTCWS-320DSP1,RTCWS-320DSP2,RTCWS-320DSP3)

The established leader in digital signal processing, TI offers a complete family of compatible DSPs. The three-day TMS320C1X workshop (RTCWS-320DSP1) is an excellent introductory course for first-time TMS320 users. The intensive three-day TMS320C2X workshop (RTCWS-320DSP2) is for advanced applications using the TMS320C2X “second generation” digital signal processor. The three-day TMS320C3X workshop (RTCWS-320DSP3) introduces the powerful third-generation digital signal processor.

All three workshops are practical design courses which allow the student to practice what he or she learns. Workshops in development include TMS320C4X and TMS320C5X, available second half 1990; Graphics 34020, second quarter 1990; Token Ring 380 update covering second generation LAN, second quarter 1990.

TIASIC Standard Cell Advanced Course TIASIC Gate Array Advanced Course

Digital logic design engineers can easily make the transition to gate array and/or standard cell IC design at TI's one-day ASIC workshops. They will be taught by experienced ASIC design engineers from RTC design sites, and will gain a detailed understanding of the overall ASIC design flow. The course is valuable whether the customer intends to use RTC design services or else his or her own in-house design team.

TMS34010 Graphics System Processor Design (RTCWS-340GSP1)

This three and one-half day workshop will enable the design engineer to get the most out of the powerful new TMS34010 Graphics System Processor (GSP), by accelerating the learning curve and speeding the design and delivery of a TMS34010-based product. The student will learn how to use the TMS34010, either alone or as a system building block, by the use of numerous design techniques commonly used in the application of bit-mapped graphics.

TMS370 Configurable Microcontroller Design Workshop (RTCWS-370MICRO)

This 3-day workshop will provide you a thorough hands-on introduction to the TMS370 family of microcontrollers. The TMS370 family is the first family of configurable microcontrollers. In addition to high-performance architecture, the TMS370 family includes peripheral features such as A/D, serial ports, timers, and EEPROMs.

IBM Token-Ring Network Design Workshop (RTCWS-380LAN2)

In this three-day workshop, the student learns how to design the IBM Token-Ring Network into his or her end equipment using the second generation TI TMS380 Token-Ring LAN chipset, the only complete LAN connection solution compatible with the IBM Token-Ring Network and the IEEE 802.5 specification. During the workshop, the design engineer will learn how to use the TMS380 chipset with popular 16- and 32-bit microprocessors, backplane buses, and operating systems, as well as IBM-compatible LLC.

ENROLLMENT AND ADDITIONAL INFORMATION

To enroll in a workshop or for more information, in the US or Canada call Technical Training Central Registration

1-800-336-5236, extension 3904

1-214-917-3894

Workshop enrollment is normally limited to 12 per class. To reserve space in a workshop, we recommend that you sign up at least four weeks in advance.

SEMICONDUCTOR LITERATURE

Technical literature is available for the products and services listed in the Master Selection Guide. TI's semiconductor literature is identified by a seven- or eight-character product source code consisting of four alpha characters, three numeric characters, and a revision letter if applicable. The fourth alpha character designates a particular document as follows:

CODES	DESCRIPTION
A	Application Notes, Briefs, Reports
B	Brochures
C	Catalogs, Master Selection Guide
D	Data Books
S	Data Sheets, Data Manuals on Single Products
T	Direct Mail Materials
U	Owner's Manuals, Software Manuals, User's Guides
Z	Other

As an example, literature code SDLD001 identifies a data book; code SLNA001, an application report; and SPVB061, a brochure.

For your ordering convenience, a list of available data sheets is provided; semiconductor books, including application notes, data books and user's guides, are briefly described.

DATA SHEET / OTHER LITERATURE ORDER FORM

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SPRS011

SPNS012A

SEMICONDUCTOR BOOK DESCRIPTIONS

- Advanced CMOS Logic Designer's Handbook — 1988** **296 Pages** **SCAA001A**
 A reference guide that spells out the technical issues confronting advanced logic design engineers and describes the methods for handling the issues. Provides an overview of TI's EPIC(TM) Advanced CMOS Logic (ACL) family, its characterization and specifications, and the very important issue of simultaneous switching, which, if not treated correctly, can result in unreliable systems operation. PC board and system-level design considerations are included.
- Advanced CMOS Logic Data Book — 1988** **300 Pages** **SCAD001A**
 Detailed specifications and applications information on the TI family of 1- μ m EPIC Advanced CMOS Logic devices. ACL offers less than 3 ns propagation delays at CMOS power dissipation, yet has 24 mA drive capability. Product selection guide and alphanumeric index are included.
- BiCMOS Bus Interface Logic Data Book — 1989** **200 Pages** **SCBD001A**
 This book contains detailed specifications and applications information on the TI family of BiCMOS logic devices. These devices combine the speed and power of advanced bipolar devices with the low power consumption of CMOS products. The document includes numerical and functional indexes, as well as device ordering information and mechanical data.
- High-Speed CMOS Logic Data Book — 1989** **800 Pages** **SCLD001C**
 Detailed specifications and application information on the TI family of High-Speed CMOS (HCMOS) Logic devices. Includes product selection guide, glossary and alphanumeric index.
- SN74ACT8800 Family Data Manual — 1989** **734 Pages** **SCSS006B**
 Presents technical information on the SN74ACT8800 family of 32-bit processor "building block" circuits. Includes specifications and operational information on the following high-performance Advanced CMOS devices: 16-bit microsequencer, 32-bit registered ALU, 32-bit x 32-bit multiplier/accumulator, 64-bit floating-point processor, 64-bit floating-point/integer processor, and digital crossbar switch.
- 8800 Software Development Board User's Guide — 1989** **200 Pages** **SCSU003**
 This document describes the operation and use of the 8800 Software Development Board (SN74SDB8800 SDB). The 8800 SDB allows users to evaluate performance and write microprograms for several SN74ACT8800 family building blocks using a range of software development tools. By using the SDB, microcode can be developed earlier in a system's design cycle, so that code development parallels, rather than follows, prototype design. Prebuilt microcode definition files are provided to facilitate initial code development.
- Telecommunications Circuits Data Book — 1988** **464 Pages** **SCTD001A**
 Detailed specifications and applications information on the TI family of telecommunications products. This includes switching and transmission, codecs, filters, combos, FSK modems, subscriber line control, subscriber products, silicon-gate expanded temperature range and surface-mount devices. Includes product selection guide, glossary and alphanumeric index.

ALS/AS Logic Data Book — 1986**1100 Pages SDAD001B**

Detailed specifications and applications information on the TI family of Advanced Low-Power Schottky (ALS) and Advanced Schottky (AS) logic devices. Includes a functional index of all TI bipolar digital devices.

SN54/74F Logic Data Book — 1989**281 Pages SDFD001A**

Detailed specifications and application information on the TI family of SN54F/SN74F TTL logic devices. The logic symbols are in accordance with IEEE and IEC standards.

TTL Data Book — 1988**1246 Pages SDLD001A**

Detailed specifications and application information on the TI family of Low-power Schottky (LS), Schottky (S) and standard TTL logic devices.

Military Products Designer's Reference Guide — 1990**1200 Pages SGYZ001C**

This guide provides data on the complete line of TI Military Semiconductor Products. It contains a discussion and product spectrum of Military logic/programmable logic, linear interface, MOS memory and LSI, bipolar LSI, Opto, Military ASIC, and system level and space products. In addition, European Military and Space specifications plus mechanical data are also reviewed.

Linear Circuits, Volume 1: Amplifiers, Comparators, and Special Functions — 1989**1344 Pages SLYD003**

Detailed specifications on operational amplifiers, voltage comparators, current mirrors, sonar circuits, disk controllers, timers, amplifiers, and special functions. Includes LinCMOS (TM) functions. Contains product guide, interchangeability guide, glossary and alphanumeric index.

Linear Circuits, Volume 2: Data Acquisition and Conversion — 1989**494 Pages SLYD0004**

Detailed specifications on data-acquisition devices, A/D converters, and switches. Includes LinCMOS (TM) functions. Contains product guide, interchangeability guide, glossary and alphanumeric index.

Linear Circuits, Volume 3: Voltage Regulators and Supervisors — 1989**580 Pages SLYD005**

Detailed specifications on voltage regulators, voltage references, supply supervisors, voltage converters, and 224 pages of detailed applications. Includes LinCMOS (TM) functions. Contains product guide, interchangeability guide, glossary and alphanumeric index.

Interface Circuits Data Book — 1987**1300 Pages SLYD002**

Detailed specifications on display drivers, line driver/receivers, peripheral drivers/actuators, and memory interface, data acquisition, and speech synthesis circuits. Includes cross reference guides, power derating curves, and explanation of logic symbols.

MOS Memory Data Book — 1988**804 Pages SMYD008**

Detailed specifications information on Dynamic RAMs (DRAMs). Single In-line Package (SIP) DRAM Modules, CMOS and NMOS EPROMs, One-Time Programmable CMOS PROMs, and CMOS EEPROMs. Contains military specifications for the DRAM product line. Includes reference and selection guides, alternative source directories, glossary, alphanumeric index, and IC line-up chart. Also, includes chapters on quality and reliability, applications information, logic symbols and ESD guidelines.

- TMS7000 Family Data Manual — 1989** **560 Pages** **SPND001C**
 Describes the architecture, the on-chip peripheral functions and the instruction set of the TMS7000 Family of NMOS and CMOS 8-bit microcomputers. Contains the assembly language user's guide, data sheets and application notes.
- Optoelectronics and Image-Sensor Data Book — 1987** **480 Pages** **SOYD002A**
 Detailed specifications on CCD image sensors, optocouplers/optoisolators, intelligent displays, and infrared-emitting diodes and phototransistors. Includes quality/reliability and applications notes, mechanical information on each device, alphanumeric index, reference guides, interchangeability guide, and glossary.
- TMS370 Family Data Manual — 1988** **480 Pages** **SPNS014A**
 Provides details on implementing a design by using a TMS370 8-bit configurable microcontroller. Topics include architecture, electrical specifications, instruction set, design aids and development support tools.
- TMS34061 User's Guide — 1986** **218 Pages** **SPPU014A**
 A detailed description of the TMS34061 Video System Controller's architecture and specifications. Includes application solutions.
- TMS34070 User's Guide — 1986** **98 Pages** **SPPU016A**
 Detailed description of the TMS34070 Color Palette's architecture and specifications. Includes application solutions.
- Color Graphics Controller Board User's Guide — 1986** **50 Pages** **SPPU019A**
 Detailed description of the installation and operation of the PC-compatible TMS34061/34070 Color Graphics Controller Board. Includes theory of operation, how to program, PAL equations and schematics.
- DSP Primer — 1988** **80 Pages** **SPRA015B**
 This primer contains an orderly, logical, and simplified discussion of the DSP concept. Includes information on DSP solutions that TI has developed in response to design opportunities, a guideline for determining which TI products are best suited to particular applications, and development support available through TI.
- Digital Signal Processing Applications with the TMS320 Family, Vol 1 — 1986** **724 Pages** **SPRA012A**
 Twenty-four detailed application reports containing the theory, implementation and TMS320 source code for the application. Common DSP routines such as FIRs, IIRs AND FFTs are covered as well as telecom and computer specific applications such as echo cancellation, encryption, ADPCM, speed coding, DTMF, graphics, digital control and others.
- Digital Signal Processing Applications with the TMS320 Family, Vol 2 — 1990** **650 Pages** **SPRA016**
 Eleven detailed application reports. Includes DSP interface and algorithm debug techniques, as well as data communications, telecommunications, and digital control applications for the TMS320 Family.

**Digital Signal Processing Applications with the TMS320 Family,
Vol 3 — 1990****650 Pages SPRA017**

Ten detailed application reports. This volume focuses on applications using the TMS32030, such as implementation of FFT, DCT and other transforms, double-length floating-point arithmetic, floating-point format converter, implementation of a CELP speech coder, a 3-D graphics system, and others.

proLogic Compiler User Guide — 1990**117 Pages SRPU001**

This guide contains a detailed description of Programmable Logic Device (PLD) Design software. This proLogic and your PC allow you to configure TI PLDs into customized devices meeting your high performance design requirements. Software discs are attached to the back cover of the book.

TMS320 Family Simulator User's Guide — 1988**200 Pages SPRU009B**

This user's guide is a reference for development engineers and students utilizing the TMS320C1X and TMS320C2X simulators. Information on installation procedures, simulator commands and simulator stop codes is included. Debugging examples for three variations of the simulator are demonstrated. These examples show how to find and correct program errors in the software debug stage of development.

TMS320 Family Development Support Reference Guide — 1989**351 Pages SPRU011A**

This guide contains a detailed description of the development support available for the TMS320 Family of DSPs, including TI software and hardware development tools, hands-on seminars and workshops, technical documentation, TI's University Program, and support available through TMS320 third parties and consultants.

TMS320 1st Generation User's Guide — 1989**400 Pages SPRU013B**

A useful reference for all the first-generation devices of the TMS320 Family — the TMS32010 (NMOS) and TMS320C10/C15/E15/C17/E17 (CMOS). The TMS320 Family has now expanded into five generations of processors. This guide covers the first generation giving readers in-depth information on device architecture, specifications (data sheet), pinouts, assembly language instruction set, and hardware/software applications.

TMS320 2nd Generation User's Guide — 1989**500 Pages SPRU014A**

Designed to assist hardware/software engineers in application development, this guide covers the TMS320C25 (CMOS) and TMS32020 (NMOS) devices. It provides information regarding the high-performance, versatility, and specialized device features used in a variety of sophisticated Digital Signal Processor (DSP) applications. This guide covers second generation devices and gives readers in-depth information on device architecture, specifications (data sheets), pinouts, assembly language instruction set and hardware/software applications.

**TMS320C1X/TMS320C2X Assembly Language Tools
User's Guide — 1989****248 Pages SPRU018A**

Designed to aid software development using revisions 5.0 and higher of the TMS320 assembly language tools, this guide contains detailed descriptions of the assembler/linker including how to invoke the assembler, assembler directives, macro directives, creating macros, invoking the archiver, linker operations and the object file format converter. Common Object File Format (COFF) is discussed and sample linker command files are provided. Also see SPRU025.

- TMS320C25 C Compiler Reference Guide—1990** **160 Pages** **SPRU024A**
 This guide provides detailed information for software development using the TMS320C25 C Compiler— a full implementation of the standard Kernighan and Ritchie C. Topics include compiler operation, a description of the TMS320C25 C language, technical information related to the runtime environment and information on the runtime-support functions provided. A list of standard preprocessor directives is included as an appendix.
- Third Generation TMS320 User's Guide—1988** **625 Pages** **SPRU031A**
 This guide describes the most advanced generation of the TMS320 Family. It contains information for designers of high-performance DSP applications, numeric computation intensive applications, and multiprocessing systems. This guide covers device architecture, electrical and timing specifications, pin-outs, the assembly language instruction set and hardware/software applications.
- TMS320C14/TMS320E14 User's Guide—1989** **406 Pages** **SPRU032A**
 This guide describes the TMS320C14, a first generation spin-off of the TMS320 family, which provides the high performance of a DSP with the on-chip peripherals of a microcontroller. Specific information is included for designers of control application. This guide provides device architecture, timing and electrical specifications, pin-outs, the assembly language instruction set and hardware/software applications.
- TMS320C30 C Compiler Reference Guide—1989** **180 Pages** **SPRU034A**
 Designed to assist in software development using the TMS320C30 C Compiler for the high-performance TMS320C3X family. This guide includes information on compiler operation, the TMS320C30 C language, runtime-support functions, and the runtime environment. The TMS320C30 C Compiler is a full implementation of the standard Kernighan and Ritchie C.
- TMS320C3X Assembly Language Tools User's Guide—1989** **248 Pages** **SPRU035A**
 Designed to aid software development using the assembly language tools for the high-performance TMS320C3X family, this guide provides information on invoking the tools, assembler directive functions, macro directives, creating macros, archiver operations and linker functionality. The object file format converter is described and a detailed linker example is presented.
- TMS34010 Application Guide—1988** **170 Pages** **SPVA007A**
 This document contains TMS34010 hardware and software design examples. The following designs are discussed: minimum-chip graphics systems; 34010 to host interface; 34010 to DRAM interface; EGA and VGA compatibility; Bresenham line algorithm; conic spline algorithms; compiler and applications oriented benchmarks.
- TMS340 Family Third Party Guide—2Q 1990** **100 Pages** **SPVB066C**
 The TMS340 Family Third Party Guide satisfies a growing demand for information about products using TMS340 Graphics Family Products. Many companies participated with descriptions about their PC add-in boards, electronic publishing systems, image processing systems, TIGA-compatible software, and many other applications.

- TMS34010 User's Guide—1989** **600 Pages** **SPVU001A**
Provides a detailed description of the TMS34010 Graphics System Processor. Topics include the TMS34010 architecture, memory organization, instruction set and specifications. This manual is indispensable for evaluating or designing with the TMS34010.
- TMS34010 Software Development Board User's Guide—1987** **224 Pages** **SPVU002A**
Describes the installation and operation of the TMS34010 Software Development Board. The commands and syntax for the user interface debugger are discussed in detail.
- TMS34010 Software Development Board Schematics—1987** **10 Pages** **SPVU003**
A complete set of schematics for the TMS34010 Software Development Board. Includes definition of components; external connections; CPU section; address decoder and RAS controller; local RAM; display memory; jumper interconnections; and serial communications.
- TMS34010 Assembly Language Tools User's Guide—1988** **358 Pages** **SPVU004A**
Describes the operation of the TMS34010 Assembler Package. Included are details of the macro-assembler, archiver, linker, ROM utility, and software simulator.
- TMS34010 Math/Graphics Function Library User's Guide—1988** **208 Pages** **SPVU006**
Describes the operation of the 34010 Math/Graphics Function Library. Detailed descriptions and examples are given for over 140 commonly used graphics drawing functions and transcendental math operations.
- TMS34010 Font Library User's Guide—1987** **72 Pages** **SPVU007**
Describes the TMS34010 Font Library. Includes ASCII representations of each font character along with printed examples.
- TIGA-340 User's Guide—1989** **100 Pages** **SPVU015A**
Provides detailed information on installation, programming and porting the Texas Instruments Graphics Architecture (TIGA) Interface. TIGA primitives, functions, and data structures are discussed. Application examples are provided.
- TMS34020 User's Guide—1989** **425 Pages** **SPVU019**
Provides a detailed description of the next generation graphics system processor, the 34020. Topics include the TMS34020 architecture, memory organization, instruction set and specifications. This manual is indispensable for evaluating the 34020 or using it in designs.
- TMS340 Family Code Generator Tools User's Guide—1Q 1990** **275 Pages** **SPVU020**
Provides detailed information on the set of software tools designed to support both the 34010 and the 34020 graphics processors. Installation and operation of the C-compiler, assembler and linker are discussed.

TMS380 Adapter Chipset User's Guide—1988**648 Pages SPWX005**

Information about the TMS380 LAN (Local Area Network) Adapter Chipset used for the IEEE802.5-compatible 4-Mbps IBM (R) Token-Ring Network (TM). Included are: an introduction to the Token-Ring architecture and the 4-Mbps TMS380 chipset, application examples, details on adapter communication services, adapter design information, component specification data sheets, LLC system software interface, adapter debug software, ring interface layout guidelines and bridge application. The guide for the 16-Mbps TMS380 chipset will be available in the second quarter of 1990.

TGC100 Series 1.2 Micron CMOS Gate Array Data Manual—1989**608 Pages SRGS007**

Detailed specifications on the 1.2 micron TGC100 Family. Includes over 290 macro functions, alphanumeric and functional indexes, mechanical data, definitions and ratings, and a library summary.

Programmable Logic Data Book—1990**714 Pages SRPD001**

Detailed specifications and applications information on the TI family of bipolar and CMOS programmable logic devices. Includes existing and future products including standard PAL (R) circuits, EPLDs, and 500 MHz programmable state machines.

TSC500 Series 1.2 Micron CMOS Standard Cells Data Manual—1989**1360 Pages SRSS034**

Detailed specifications on the 1.2 micron TSC500 family of over 44500 standard cells that include high-performance memory, register files, and JTAG-compatible SCOPE (TM) cells. The manual includes mechanical data, functional and alphanumeric indexes, definitions and ratings, a library summary, and individual data sheets. SCOPE is a TI trademark.

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GENERAL INFORMATION

Packages offered by Texas Instruments are designed to meet the most efficient and cost effective method of meeting customer requirements and today's high-density packaging needs.

During the last decade, TI has produced one of the largest IC socket families. TI's sockets include every type and size socket in common use today and are available in a wide choice of contact materials and designs.

As a major manufacturer of surface mount components, TI is committed to help customers make the transition to surface mount as easy and economical as possible.

PACKAGING OVERVIEW

Texas Instruments integrates the design of semiconductor components and packaging to satisfy the increasing demands for enhanced performance in high-density applications. To optimize the value customers receive from its components, TI continues to be a leader in semiconductor packaging technology. The packaging options for standard TI IC products are explained in this section. Semicustom Gate Arrays and Standard Cells packaging options are covered in Section 2 and are not included here.

Texas Instruments offers a variety of through-hole and surface-mount packages. Nearly all logic, interface, linear, military, and memory components are assembled in package options that support both assembly methods. Plastic, ceramic, and metal packages are all used to optimize the performance of the mounted circuit. Industry-standard dimensions and pin configurations are applied except where otherwise specified. Eight categories of packages used with TI standard semiconductor devices are described in the following pages. Examples of each are also shown.

The package designation of an integrated circuit is embedded in the part's nomenclature. Generally the suffix identifies the type of package. These one- and two-character package identifiers are described in the following table. This table also references a specific package category for each identifier.

An exception to the assignment of package identifiers is found in EPLD part numbers on pages 2-6 and 2-9. The Altera part numbering is used rather than the TI package identifiers. The following chart explains the unique identifiers used with these second-sourced components.

- D Ceramic dual-in-line package with window
- J Ceramic leaded chip carrier with window
- L Plastic leaded chip carrier
- P Plastic dual-in-line package

PACKAGE DESIGNATIONS

CODE	TYPE	DESCRIPTION
D	Small Outline	Plastic, Standard Body
DH	Small Outline	Plastic, 28-Pin, 450-mil Width
DJ	Small Outline	Plastic, J-Lead, 6 Center Positions Unused, 300-mil Width
DK	Small Outline	Plastic, 32-Pin, 525-mil Width
DM	Small Outline	Plastic, J-Lead, 6 Center Positions Unused, 350-mil Width
DN	Small Outline	Plastic, Thin SOJ
DW	Small Outline	Plastic, Wide Body
FD	Chip Carrier, Leadless	Ceramic, Square, 3-Layer, Non-JEDEC Pinouts
FE	Chip Carrier, Leadless	Ceramic, Rectangular, 3-Layer
FG	Chip Carrier, Leadless	Ceramic, Rectangular
FJ	Chip Carrier, Leaded	Ceramic, Square
FK	Chip Carrier, Leadless	Ceramic, Square, 1-Layer, JEDEC Pinouts
FM	Chip Carrier, Leaded	Plastic, Rectangular
FN	Chip Carrier, Leaded	Plastic, Square
FQ	Chip Carrier, Leadless	Ceramic, Rectangular, 6 Center Positions Unused, 300-mil Width
FT	Flatpack	Plastic
FV	Chip Carrier, Leadless	Ceramic, Long Rectangular
FZ	Chip Carrier, Leaded	Ceramic, Square, Windowed
GA	Grid-Array	Ceramic, Cavity-Down
GB	Grid-Array	Ceramic, Cavity-Up
HA	Flatpack	Ceramic, Quadriform
HJ	Small Outline	Ceramic, J-Lead, 6 Center Positions Unused
HK	Flatpack	Ceramic, Brazed Lead
J	In-Line, Dual	Ceramic, Ceramic Cap
JD	In-Line, Dual	Ceramic, Metal Lid, Side-Braze
JG	In-Line, Dual	Ceramic, Ceramic Cap, 8-Pin
JL	In-Line, Dual	Ceramic, Ceramic Cap, Windowed
JT	In-Line, Dual	Ceramic, 300-mil Width
JW	In-Line, Dual	Ceramic, 600-mil Width
KC	Flange Mount	Plastic, Leads Straight
KH	Flange Mount	Plastic, Leads Bent Down
KJ	Flange Mount	Metal Can, Similar to TO-3, 4-Terminals
KV	Flange Mount	Plastic, Leads Bent Up
L	Cylinder or Can	Metal Can
LD	Cylinder or Can	Metal Can, 200-mil Pin Circle
LP	Cylinder or Can	Plastic, Cylindrical with Flat Side
LU	Cylinder or Can	Plastic, Square
N	In-Line, Dual	Plastic, Standard Body
NE	In-Line, Dual	Plastic, Standard Body, Internal Tabs
NT	In-Line, Dual	Plastic, 300-mil Width
NW	In-Line, Dual	Plastic, 600-mil Width
P	In-Line, Dual	Plastic, 8-Pin
SD	In-Line, Single	Plastic, Zig-zag In-line Package (ZIP)
U	Flatpack	Ceramic, Glass Seal
W	Flatpack	Ceramic Base and Cap
WA	Flatpack	Ceramic Base and Cap, Mini-Package, 14-Pin
WC	Flatpack	Ceramic Base and Cap, Mini-Package, 24-Pin

Chip Carrier

A chip carrier is a low-profile package whose chip cavity or mounting area occupies a major fraction of the package area and whose connections, usually on all four sides of the package, consist of metal pad surface (on the leadless versions) or leads formed around the sides and under the package or out from the package (on leaded versions).

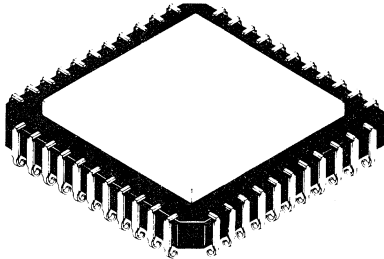
NOTE: The body of the chip carrier, usually square or of low aspect ratio, is similar to that of a flatpack.

Leaded

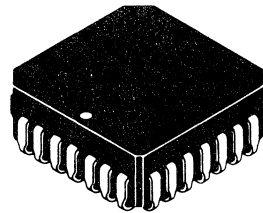
The ceramic leaded chip-carrier package consists of a three-layer alumina ceramic case, a metal lid (gold-plated kovar), and gold-tin-braze-attached lead frame. Hermetic sealing is accomplished with a gold-tin-solder braze. The lead material is Alloy 42 base with nickel followed by gold plating. The final lead finish is gold plate or tin-lead solder dip. The package is designed for direct PC board mounting by reflow soldering or socket mounting. The square J-formed ceramic chip-carrier package is used for microprocessor, display driver, and ASIC product families.

The plastic leaded chip-carrier package consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound withstands soldering temperature with no deformation, and circuit performance characteristics remain stable when the devices are operated in high-humidity conditions. The packages are intended for surface mounting. Leads require no additional cleaning or processing when used in soldered assembly.

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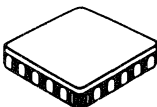
44-pin FJ package



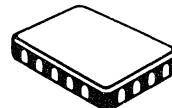
28-pin FN Package

Leadless

The leadless hermetically sealed chip-carrier packages has a three-layer ceramic base with a metal lid and braze seal. The package is intended for surface mounting on solder lands on 1.27-mm (0.050-inch) centers. Terminals require no additional cleaning or processing when used in soldered assembly. The rectangular leadless ceramic chip carrier is used for memory products.



20-pin FK package



18-pin FG package

Cylinder or Can

These cylindrical packages look like a can or a top hat. They usually have terminals that exit on one end parallel to the central axis of the package and mount perpendicular to the seating plane.

The hermetically sealed cylinder or can package consists of a welded metal base and cap with individual leads secured by an insulating glass sealant. The leads require no additional cleaning or processing when used in soldered assembly.

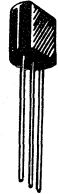
The plastic cylinder or can package, such as the LP consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics remain stable when operated in high-humidity conditions.



8-pin L package



3-pin LD package

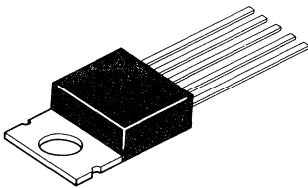


3-pin LP package

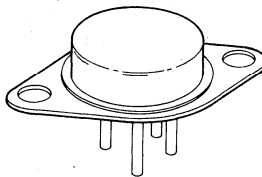
Flange Mount

This package has a flange-mounted heat sink that is an integral part of the package and provides mechanical mounting to a packaging interconnect structure or cold plate. It usually has terminals that exit from, or attach to, any surface of the package in a variety of forms.

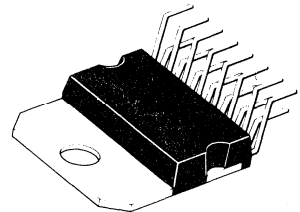
The plastic flange-mount package, such as KC or KV, consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperatures with no deformation. Circuit performance characteristics will remain stable when operated under high humidity conditions. Hermetically sealed power packages consist of a nickel-plated steel base and can.



5-pin KC package



4-pin KJ package



15-pin KV package

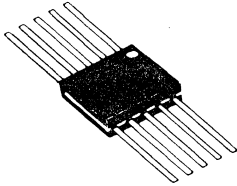
Flatpack

The leads of this low-profile package project parallel to, and are designed primarily to be attached parallel to, the seating plane.

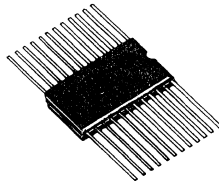
NOTE 1: The body of the flatpack is similar to that of a chip carrier.

NOTE 2: The leads typically originate from either two or four sides of the package.

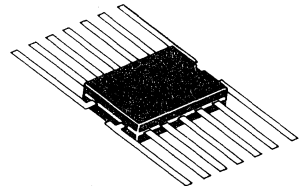
The flatpack is a hermetically sealed package that consists of an electrically nonconductive ceramic base and cap and a lead frame. Hermetic sealing is accomplished with glass. Tin-plated or tin-lead-solder-dipped leads require no additional cleaning or processing when use in soldered assembly.



10-lead U package



24-pin W package

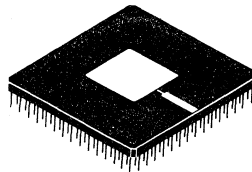


14-pin WA package

Grid-Array

The terminals of this package are located on one surface in a matrix of at least three rows and three columns.

The grid array is a hermetically sealed ceramic multilayer insertion-mount package with metal cap and gold-plated pins. Selected leads are specially designed for low resistance and low inductance. The package is used for microprocessor and memory product families, as well as for military logic array designs that require a high I/O count.



68-pin GB package

In-Line

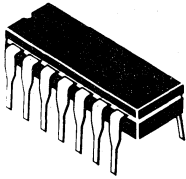
These rectangular packages have one row or two or more parallel rows of leads designed primarily for insertion mounting perpendicular to the seating plane.

Dual

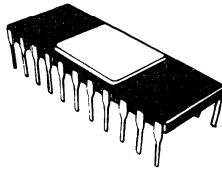
The ceramic dual-in-line package, such as J or JD, consists of a ceramic base, ceramic cap, and a lead frame. Hermetic sealing is accomplished with glass. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Tin-plated (bright-dipped) leads require no additional cleaning or processing when used in soldered assembly.

The letter J is used by itself, except for the 24-pin package, since only the 24-pin package is available in more than one row-spacing. If no second letter or row-spacing is specified, the package is assumed to have 15.24-mm (0.600-inch) row-spacing.

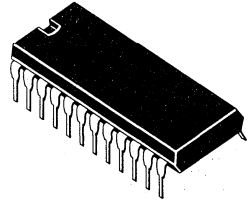
The plastic dual-in-line package, such as NT, consists of a circuit mounted on a lead frame and encapsulated within an electrically nonconductive plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated under high-humidity conditions. Once the leads are compressed and inserted, sufficient tension is provided to secure the package in the board during soldering. Leads require no additional cleaning or processing when used in soldered assemblies.



14-pin J package



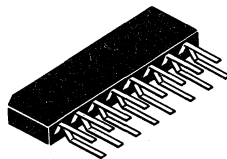
22-pin JD package



24-pin NT package

Single

The single-in-line package consists of a circuit mounted on a lead frame and encapsulate within a plastic compound. The compound withstands soldering temperature with no deformation, and circuit performance characteristics remain stable when operated under high humidity conditions. The SD single-in-line package has zig-zag leads.



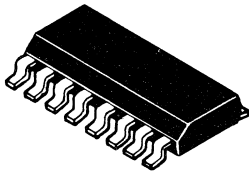
16-pin SD package

Small Outline

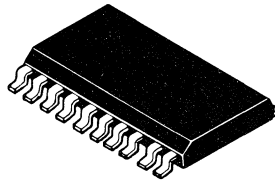
The small-outline package is a low-profile rectangular or square-mount component package. Its chip (die) is bonded to an inner land contact area, primarily a lead-frame. External terminals exit parallel to the seating plane on opposite (dual or quad) sides of the molded, flat package.

NOTE: The lead form is usually gull-wing but other lead forms are possible.

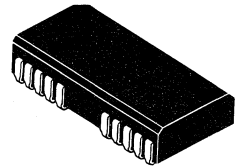
The small-outline package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. This compound withstands soldering temperature with no deformation, and circuit performance characteristics remain stable when operated in high-humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



16-pin D package



20-pin DW package



20-pin DJ package

IC SOCKETS

INTRODUCTION

Texas Instruments has developed solutions for today's high density packaging needs. The TI facility at Attleboro, Massachusetts (one of the world's largest suppliers of multimetal systems) provides leading-edge technology which, combined with reliable, high-volume, off-the-shelf interconnection products, allows TI to quickly meet volume commercial applications.

During the last decade, TI has produced one of the largest IC socket families. TI's sockets include every type and size socket in common use today and are available in a wide choice of contact materials and designs.

Our sockets are designed for:

- easy and efficient hand assembly
- compatibility with automatic assembly equipment
- maximum performance and board density

This section provides information on the following types of IC socket products.

PRODUCTION SOCKETS

Single-in-Line Packages	SIP
Pin-Grid Arrays	PGA
Dual In-Line	DIP
Dual In-Line 0.070-inch spacing	Shrink Pack
Quad In-Line	QUIP

BURN-IN/TEST SOCKETS

	TYPE
Plastic Leaded Chip Carrier	PLCC
Pin Grid Array	PGA
Small Outline	J Lead
Dual In-Line	DIP
Dual In-Line 0.070-inch spacing	Shrink Pack
Small Outline	Flat Pack
Quad	Flat Pack

Specially formulated alloys give the TI contact springs:

- Low Contact Resistance
- High Contact Strength (to stand up to repetitive insertions and withdrawals)
- High normal forces assure gas-tight reliability

A full line of reliable, readily available, low-cost interconnection systems means premium performance at an economical price.

Additional information on these and other TI products, including pricing and delivery quotations, may be obtained from your nearest authorized TI Distributor, TI Sales Representative or:

Texas Instruments Incorporated
 Connector Systems Department, MS 14-3 Telephone: (508) 699-5269
 Attleboro, Massachusetts 02703 TELEX: 92-7708

IC SOCKETS PLCC BURN-IN/TEST

PRODUCT FEATURES

- Can be loaded by top actuated insertion or press-in insertion, either manually or automatically
- High reliability due to high pressure contact point
- Open body and high stand-off design provide high efficiency in heat dissipation
- High durability up to 10,000 cycles
- Compact design

PERFORMANCE SPECIFICATIONS

Mechanical

- Accommodates IC leads per specific IC device
- Recommended PCB thickness range: 0.062 in to 0.092 in
- Recommended PCB hole size range: 0.032 in to 0.042 in
- Durability: 10,000 cycles 10 mΩ max contact resistance change

- Insertion force: Zero g
- Withdrawal force: Zero g†

Electrical

- Contact rating: 1 A per contact
- Contact resistance: 20 mΩ max initial
- Insulation resistance: 1000 MΩ per MIL-STD 202, Method 302, Condition B
- Dielectric withstanding voltage: 500 V ac rms per MIL-STD 202, Method 301

Environmental

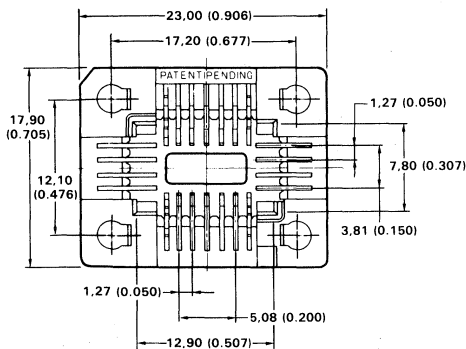
- Thermal shock: 100 cycles, -25°C to +150°C
- Temperature soak: 150°C for 48 hours
- Operating temperature: -40°C to +150°C

MATERIALS

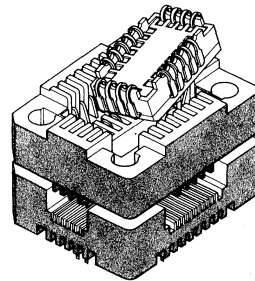
- Body — ULTEM glass filled (UL 94 V-0)
- Contact — copper alloy
- Plating‡ — overall gold plate 4 μin over min 70 μin nickel plating

- †After IC is unlocked from the socket
 - ‡For additional plating options contact factory
- For complete test report contact the factory

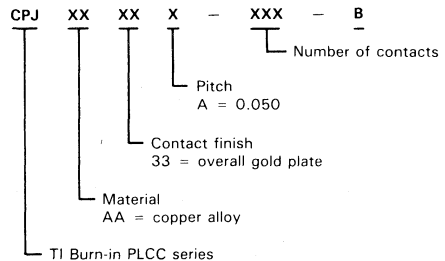
PLCC BURN-IN/TEST SOCKETS CPJ SERIES



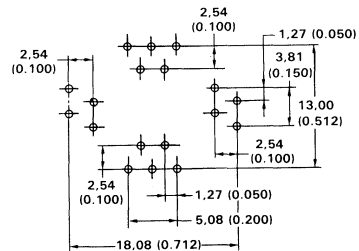
Dimensions in parentheses are inches
Contact factory for detailed information



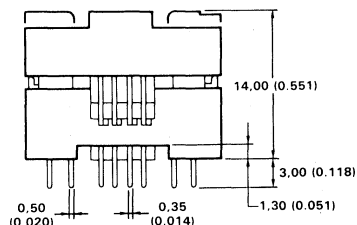
PART NUMBER SYSTEM



18 PIN FOOTPRINT SHOWN



SIZES: 18 PIN
22 PIN



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IC SOCKETS SINGLE-IN-LINE PACKAGE SOCKETS

PERFORMANCE SPECIFICATIONS†

Mechanical

Vibration: MIL-STD-202
 Durability: 30 cycles
 Insertion force: Zero g
 Withdrawal force: Zero g‡
 Contact (normal) force: 200 g min
 Contact retention force: 2 lbs per circuit min

Electrical

Contact rating: 1 A
 Contact resistance: 30 mΩ max initial
 Insulation resistance: 1000 MΩ at 500 dc
 Dielectric strength: 1500 V ac rms
 Capacitance: 2 pF max

†Values may vary due to test sequence and SIP module configuration

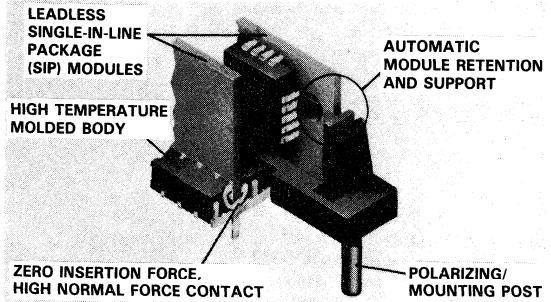
‡After module is unlocked from the receptacle
 For a complete test report, please contact factory

Environmental

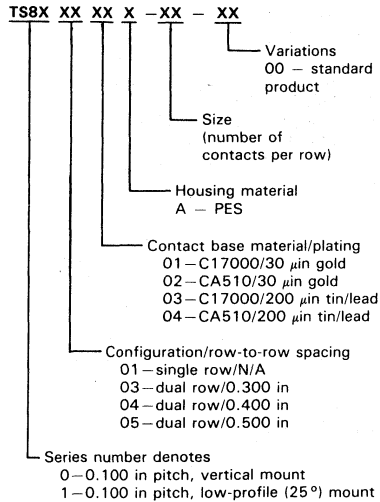
(20 mΩ max contact resistance change after all tests)
 Operating and storage temperature: -40°C to 100°C
 Humidity: MIL-STD 202, Method 106D, 10 days
 Temperature soak: 85°C for 160 hours
 Thermal Shock: 5 cycles, -40°C to 85°C per MIL-STD 202, Method 107E

MATERIALS

Body — PES polyether sulfone, glass filled, UL 94 V-0
 Contact — Beryllium copper C17000; phosphor bronze alloy CA510
 Contact finishes — Post plate min 200 μin tin/lead over min 50 μin nickel overall
 Post plate min 30 μin hard gold over min 75 μin nickel overall
 For additional plating options contact the factory.

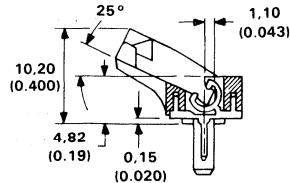


PART NUMBER SYSTEM



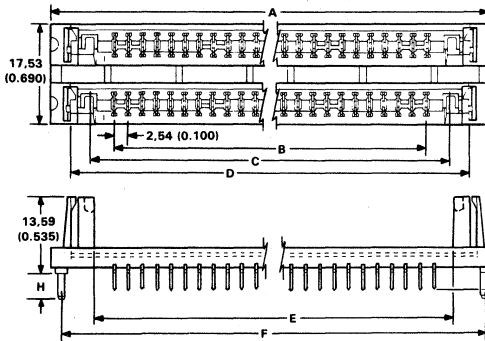
Consult factory for availability of configurations, materials, and sizes.

SINGLE ROW LOW PROFILE



Ckt. Size	A	B	C	D	E	F	G	H
30	96.52 (3.800)	73.66 (2.900)	82.14 (3.234)	89.28 (3.515)	80.52 (3.170)	92.71 (3.650)	2.79 (0.110)	3.86 (0.152)

DUAL ROW VERTICAL



Contact factory for detailed information

Dimensions in parentheses are in inches

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Customer Support and General Information

IC SOCKETS HIGH DENSITY PIN GRID ARRAY

PERFORMANCE SPECIFICATIONS

Mechanical

Accommodates IC leads 0.015 in to 0.021 in diameter
 Recommended PCB thickness range: 0.062 in to 0.092 in
 Recommended PCB hole size range: 0.032 in to 0.042 in
 Recommended hole grid pattern: 0.100 in \pm 0.002 in each direction

Vibration: 15 G, 10-2000 Hz per MIL-STD 1344A, Method 2005.1 Test Condition III

Shock: 100 G, sawtooth waveform, 2 shocks each direction per MIL-STD 202, Method 213, Test Condition I

Durability: 5 cycles, 10 m Ω max contact resistance change per MIL-STD 1344, Method 2016

Insertion force: 3.6 oz (102 g) per pin typ using 0.018 in diameter test pin

Withdrawal force: 0.5 oz (14 g) per pin min using 0.018 in diameter test pin

Electrical

Contact rating: 1 A per contact

Contact resistance: 20 m Ω max initial

Insulation resistance: 1000 M Ω at 500 V dc per MIL-STD 1344, Method 3003.1

Dielectric withstanding voltage: 1000 V ac rms per MIL-STD 1344, Method 3001.1

Capacitance: 1 pF max per MIL-STD 202, Method 305

Environmental

Operating temperature: -65°C to 125°C, gold; -40°C to 100°C, tin/lead

Corrosive atmosphere: 10 m Ω max contact resistance change when exposed to 22% ammonium sulfide for 4 hours

Gas tight: 10 m Ω max contact resistance change when exposed to nitric acid vapor for 1 hour

Temperature soak: 10 m Ω max contact resistance change when exposed to 105°C temperature for 48 hours

MATERIALS

Body - PBT polyester UL 94 V-0

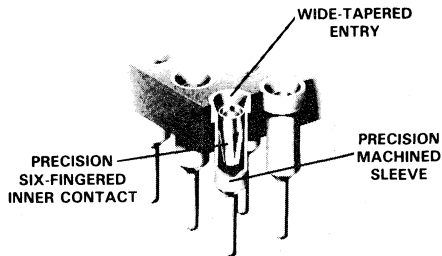
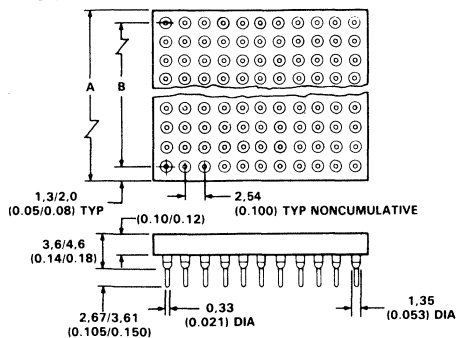
On request, G10/FR4 or Mylar film

Outer sleeve - Machined Brass (QQ-B-626)

Inner contact - Beryllium copper (QQ-C-530) heat treated

Plating: (specified by part number)

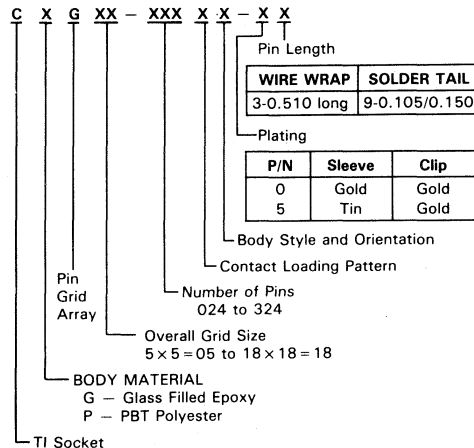
PIN GRID ARRAY



Inner contact - 30 μ m gold over 50 μ m nickel or 100 μ m tin/lead over 50 μ m nickel

Outer sleeve - 10 μ m gold over 50 μ m nickel or 50 μ m tin/lead over 50 μ m nickel

PART NUMBER SYSTEM



Insulator Size	A ± 0.010		B $\pm 0.005^\dagger$	
	9 x 9	(0.950)	24,13	(0.800)
10 x 10	(1.050)	26,67	(0.900)	22,86
11 x 11	(1.150)	29,21	(1.000)	25,40
12 x 12	(1.250)	31,75	(1.100)	27,94
13 x 13	(1.350)	34,29	(1.200)	30,48
14 x 14	(1.450)	36,83	(1.300)	33,02
15 x 15	(1.550)	39,37	(1.400)	35,56
16 x 16	(1.650)	41,91	(1.500)	38,10
17 x 17	(1.750)	44,45	(1.600)	40,64
18 x 18	(1.850)	46,99	(1.700)	43,18

[†]Noncumulative
 Dimensions in parentheses are inches
 Consult factory for detailed information

Customer Support and General Information

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PERFORMANCE SPECIFICATIONS

Mechanical

Accommodates IC leads per specific IC device
 Recommended PCB thickness range: 0.062 in to 0.092 in
 Recommended PCB hole size range: 0.032 in to 0.042 in
 Durability: 10,000 cycles, 20 mΩ max contact resistance change

Insertion force: 1.3 oz per position max
 Withdrawal force: 8.8 grams per position min

Electrical

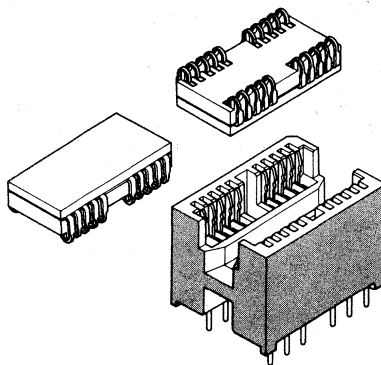
Contact rating: 1.0 A per contact
 Contact resistance: 20 mΩ max initial
 Insulation resistance: 1000 MΩ per MIL-STD 202, Method 302, Condition B
 Dielectric withstanding voltage: 700 V ac rms per MIL-STD 202, Method 301

Environmental

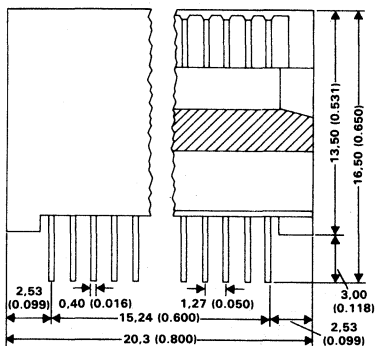
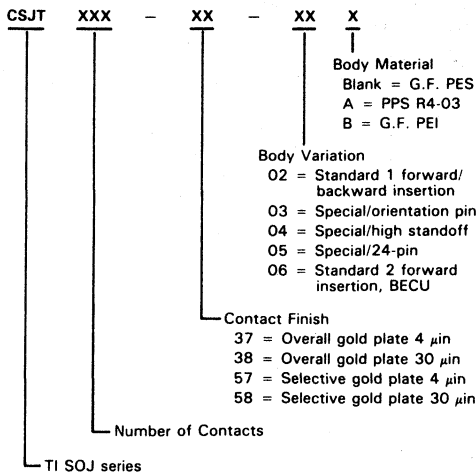
Thermal shock: 100 cycles, -25°C to +180°C, 1 hour
 Temperature soak: 180°C for 1000 hours, 80 mΩ max change
 Operating temperature: -65°C to +180°C

MATERIALS

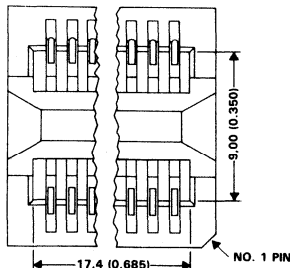
Body - PES glass filled UL 94 V-0
 Contact - copper alloy
 Plating - overall gold plate min 4 μin over min 70 μin nickel plating



PART NUMBER SYSTEM



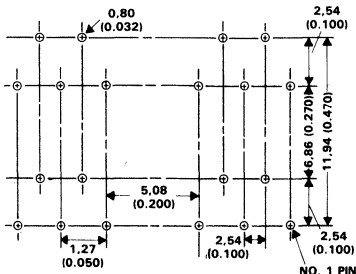
02 VERSION SHOWN



Dimensions in parentheses are inches
 Contact factory for detailed information

SIZES: 20 pin
 26 pin

20-PIN (02 VERSION) FOOTPRINT SHOWN



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IC SOCKETS DUAL-IN-LINE

PERFORMANCE SPECIFICATIONS

Mechanical

Accommodates IC leads 0.011 ± 0.003 in by 0.018 ± 0.003
 Recommended PCB thickness range: 0.062 in to 0.092 in
 Recommended PCB hole size range: 0.032 in to 0.042 in
 Recommended hole grid pattern: 0.100 in \pm 0.003 in each direction
 Vibration: 15 G, 10-2000 Hz per MIL-STD 1344A, Method 2005.1 Test Condition III.
 Shock: 100 G, sawtooth waveform, 2 shocks each direction per MIL-STD 202, Method 213, Test Condition I
 Durability: 5 cycles, 10 m Ω max contact resistance change per MIL-STD 1344, Method 2016
 Insertion force (C7X and C86): 16 oz (454 g) per pin max
 Withdrawal force: (40 g) per pin min

Electrical

Contact rating: 1 A per contact
 Contact resistance: 20 m Ω max initial
 Insulation resistance: 1000 M Ω at 500 V dc per MIL-STD 1344, Method 3003
 Dielectric withstanding voltage: 1000 V ac rms per MIL-STD 1344, Method 3001.1
 Capacitance: 1 pF max per MIL-STD 202, Method 305

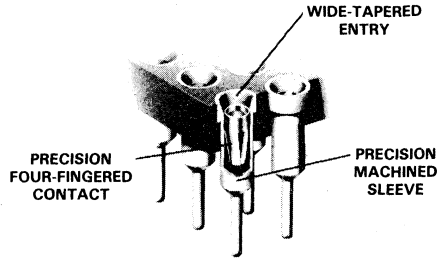
Environmental

Operating temperature: -55°C to 125°C, gold; -40°C to 100°C, tin
 Corrosive atmosphere: 10 m Ω max contact resistance change when exposed to 22% ammonium sulfide for 4 hours
 Gas tight: 10 m Ω max contact resistance change when exposed to nitric acid vapor for 1 hour
 Temperature soak: 10 m Ω max contact resistance change when exposed to 105°C temperature for 48 hours

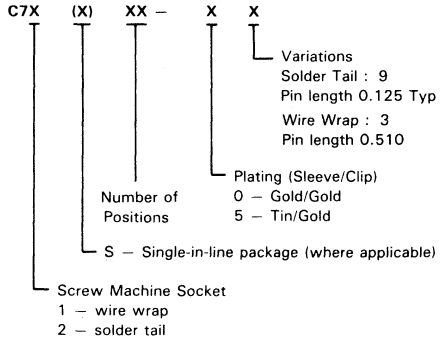
Materials (C7X and C84)

Body - PBT polyester UL 94 V-0
 C7X Contacts - Outer sleeve: brass
 Clip: BECU
 Contact finish - clip 30 μ in gold over 50 μ in nickel or 50 μ in tin/lead over 50 μ in nickel
 Specified by Part Number - sleeve 10 μ in gold over 50 μ in nickel or 50 μ in tin/lead over 50 μ in nickel
 C84 Contacts - Phosphor bronze base metal
 C84 Contact-finish - Tin plate 200 μ in over copper flash

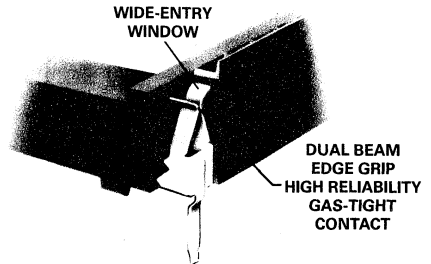
C7X SERIES - SCREW MACHINE



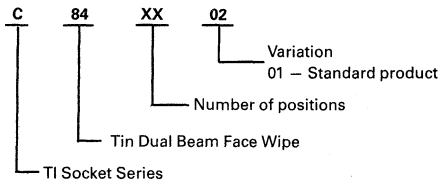
C7X SERIES - SCREW MACHINE PART NUMBER SYSTEM



C84 SERIES - STAMPED AND FORMED



C84 SERIES PART NUMBER SYSTEM



Customer Support and General Information

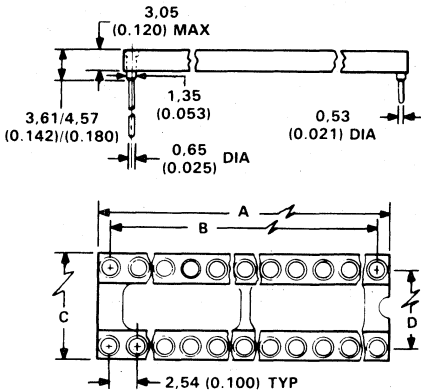
11

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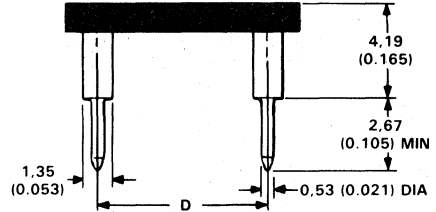
**TEXAS
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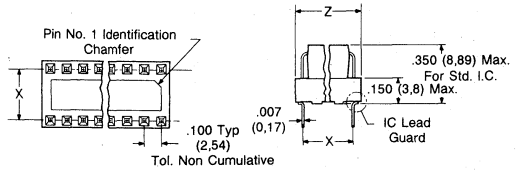
DUAL-IN-LINE
C7X AND C84 SERIES



C7X SERIES



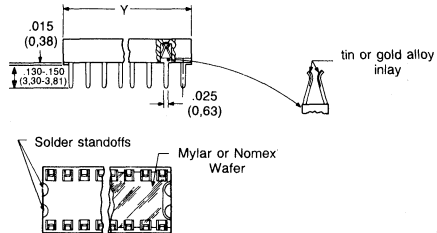
C84 SERIES



DIPS

Positions	±0.005				Positions	±0.005			
	Dim A Max	Dim B	Dim C Max	Dim D		Dim A Max	Dim B	Dim C Max	Dim D
6	7.62 (0.300)	5.08 (0.200)	10.16 (0.400)	7.62 (0.300)	†24	30.48 (1.200)	27.94 (1.100)	12.76 (0.500)	10.16 (0.400)
8	10.16 (0.400)	7.62 (0.300)	10.16 (0.400)	7.62 (0.300)	28	35.56 (1.400)	33.02 (1.300)	17.78 (0.700)	15.24 (0.600)
14	17.78 (0.700)	15.24 (0.600)	10.16 (0.400)	7.62 (0.300)	32	40.64 (1.600)	38.10 (1.500)	17.78 (0.700)	15.24 (0.600)
16	20.32 (0.800)	17.78 (0.700)	10.16 (0.400)	7.62 (0.300)	34	45.72 (1.800)	43.18 (1.700)	17.78 (0.700)	15.24 (0.600)
18	22.86 (0.900)	20.32 (0.800)	10.16 (0.400)	7.62 (0.300)	40	50.80 (2.000)	48.26 (1.900)	17.78 (0.700)	15.24 (0.600)
20	25.40 (1.000)	22.86 (0.900)	10.16 (0.400)	7.62 (0.300)	48	60.96 (2.400)	58.42 (2.300)	17.78 (0.700)	15.24 (0.600)
22	27.94 (1.100)	25.40 (1.000)	12.76 (0.500)	10.16 (0.400)	50	63.50 (2.500)	60.96 (2.400)	25.40 (1.000)	7.62 (0.300)
24	30.48 (1.200)	27.94 (1.100)	17.78 (0.700)	15.24 (0.600)	64	81.28 (3.200)	78.74 (3.100)	25.40 (1.000)	22.86 (0.900)
†24	30.48 (1.200)	27.94 (1.100)	10.16 (0.400)	7.62 (0.300)					

†Nonstandard sizes
Not all sizes available in each series
Dimensions apply to all series



Customer Support and General Information

Dimensions in parentheses are inches
Contact factory for detailed information

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IC SOCKETS BURN-IN/TEST DIP

PERFORMANCE SPECIFICATIONS

Mechanical

Accommodates IC leads 0.011 in by 0.018 in
Recommended PCB thickness range: 0.062 in to 0.092 in
Recommended PCB hold size range: 0.032 in to 0.042 in
Durability: 10K cycles — CM Series, 5K cycles — CP/CQ

Electrical

Contact rating: 1 A per contact
Contact resistance: 20 mΩ max initial
Insulation resistance: 1000 MΩ at 500 V dc
Dielectric withstanding voltage: 1000 V ac rms
Capacitance: 1 pF max per MIL-STD 202, Method 305

Environmental

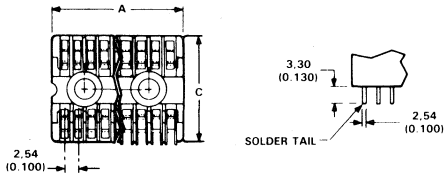
Operating temperature: -65°C to 170°C — CP/CM Series,
-65°C to 150°C — CQ Series
Humidity: 10 mΩ max contact resistance
Temperature Soak: 10 mΩ max contact resistance change

MATERIALS

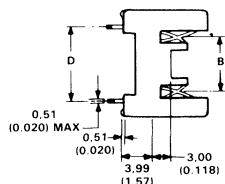
Body — PPS (polyphenylen sulfide) UL 94 V-0
Contacts — Higher performance copper nickel alloy
Plating: † 4 μin of gold min over 100 μin of nickel min

†For additional plating options consult the factory

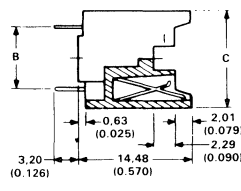
BURN-IN/TEST DIP SOCKETS



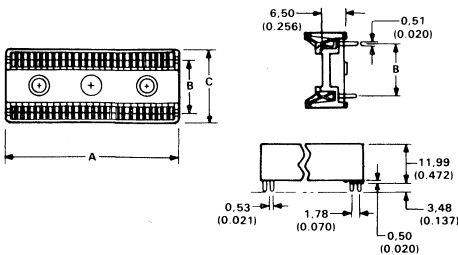
CQ37 SERIES



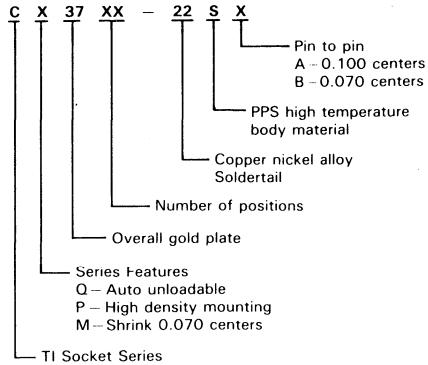
CP37 SERIES



CM37 SERIES



PART NUMBER SYSTEM



CQ37 SERIES

Number of Positions	A ± 0.01 Length	D ± 0.02	C ± 0.01 Width	B ± 0.01 Contact
14	20,32 (0.800)			
16	22,35 (0.880)	12,70 (0.500)	15,24 (0.600)	7,62 (0.300)
18	24,89 (0.980)			
20	27,43 (1.080)			
24	32,51 (1.280)			
28	37,59 (1.480)	19,05 (0.750)	22,86 (0.900)	15,24 (0.600)
40	52,83 (2.080)			
42	55,37 (2.180)			

CP37 SERIES

Number of Positions	A max Length	B ± 0.02	C max Width
8	11,68 (0.460)		
14	17,78 (0.700)		
16	20,32 (0.800)	7,62 (0.300)	12,70 (0.500)
18	22,86 (0.900)		
20	25,40 (1.000)		
24	30,48 (1.200)		
28	35,56 (1.400)	15,24 (0.600)	20,32 (0.800)
40	50,80 (2.000)		

CM37 SERIES

Number of Positions	A ± 0.016 Length	B ± 0.02	C ± 0.016 Width
28	27,18 (1.070)	10,67 (0.420)	17,20 (0.677)
40	37,85 (1.490)		
42	39,62 (1.560)	16,51 (0.650)	23,11 (0.910)
54	50,29 (1.980)		
64	59,18 (2.330)	20,32 (0.800)	26,92 (1.060)

Dimensions in parentheses are inches
Contact factory for detailed information

Customer Support and General Information

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**TEXAS
INSTRUMENTS**

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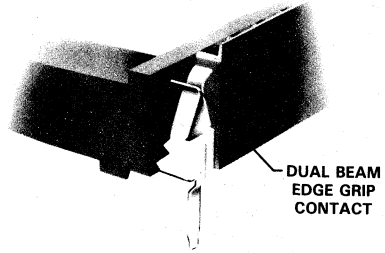
IC SOCKETS QUAD-IN-LINE/SHRINK PACK

PERFORMANCE SPECIFICATIONS

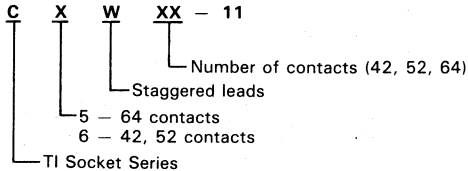
Insertion force: 16 oz (454 g) per pin max
 Withdrawal force: 1.5 oz (42 g) per pin min
 Operating temperature: -40°C to 100°C, tin/lead
 Accommodates IC leads 0.011 ± 0.0003 in by
 0.018 ± 0.003 in
 Contact rating: 1 A per contact

MATERIALS

Body — PBT polyester UL 94 V-0
 C4S & CxW Contacts — Copper alloy
 Contact finish — Reflow tin plating, 40 µin min



PART NUMBER SYSTEM FOR CxW SERIES

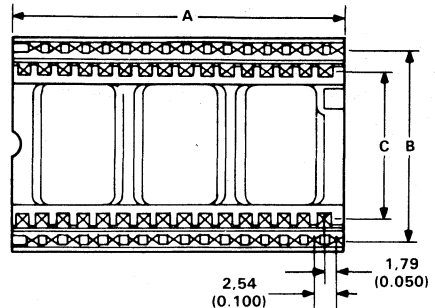


QUAD-IN-LINE (CxW SERIES)

Product Number	A Max Length	B Row to Row	C Max Row to Row
C5W64-11	41,90 (1.65)	22,90 (0.950)	19,05 (0.750)
C6W42-11	27,90 (1.10)	22,90 (0.900)	17,80 (0.700)
C6W52-11	34,30 (1.35)	22,90 (0.900)	17,80 (0.700)

Dimensions in parentheses are inches
 Contact factory for detailed information

QUAD-IN-LINE (CxW SERIES)

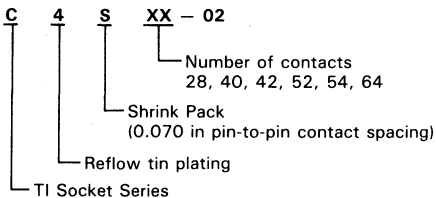


C4S SERIES

Positions	A Max Length	B Row to Row	C Max Width
28	25,02 (0.985)	10,16 (0.400)	13,00 (0.512)
40	35,69 (1.405)	15,24 (0.600)	17,98 (0.708)
64	57,07 (2.247)	19,05 (0.750)	21,62 (0.851)

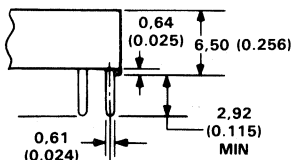
Dimensions in parentheses are inches

PART NUMBER SYSTEM† FOR C4S SERIES

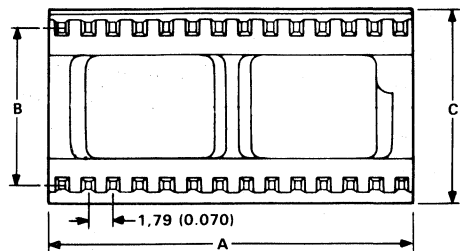


†Also available in screw machine contacts

C4S SERIES



SHRINK PACK DIP (C4S SERIES)



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TEXAS
INSTRUMENTS

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Customer Support and General Information

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IC SOCKETS BURN-IN/TEST

PERFORMANCE SPECIFICATIONS

Mechanical

Accommodates IC leads per specific IC device
 Recommended PCB thickness range: 0.062 in to 0.092 in
 Recommended PCB hole size range: 0.032 in to 0.042 in
 Durability: 5000 cycles, 10 mΩ max contact resistance change per MIL-STD 1344, Method 2016

Electrical

Contact rating: 1 A per contact
 Contact resistance: 20 mΩ max initial
 Insulation resistance: 1 MΩ at 500 V dc per MIL-STD 1344, Method 3003.1
 Dielectric withstanding voltage: 700 V ac rms per MIL-STD 1344, Method 3001.1
 Capacitance: 1 pF max per MIL-STD 202, Method 305

Environmental

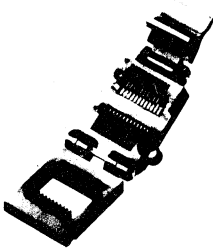
Operating temperature: -65°C to 170°C
 Humidity: 10 mΩ max contact resistance change when tested per MIL-STD 202, Method 103B
 Temperature soak: 10 mΩ max contact resistance change when exposed to 105°C temperature for 48 hours

MATERIALS

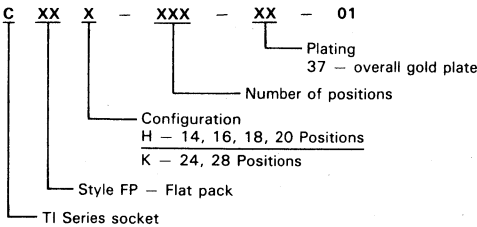
Body - CFP Series - PES (polyether sulfone) glass filled UL 94 V-0
 Temperature: -65°C to 170°C
 Contact - Beryllium copper
 Plating:† Overall gold plate min 4 μin over min 70 μin nickel plating

†For additional plating option consult the factory.
 Dimensional drawings available from factory.

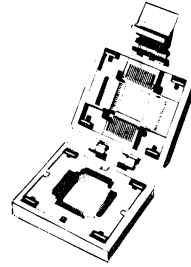
SMALL OUTLINE FLAT PACK (CFPH/K SERIES)



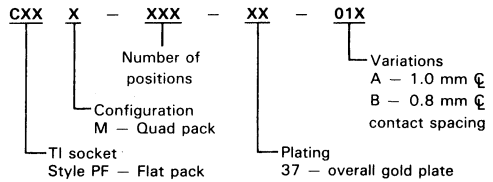
PART NUMBER SYSTEM



QUAD FLAT PACK (CFPM SERIES)



PART NUMBER SYSTEM



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Aved Electronics
Cypress Electronics
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SURFACE MOUNT TECHNOLOGY

One of the primary goals of today's solid-state equipment manufacturers is increased density—to pack more functions into an enclosure of a given size, or to maintain the same functional capability, but reduce the size. Another goal is to reduce cost. Surface Mount Technology (SMT) for solid-state assemblies helps meet both of these goals and is applicable to consumer, commercial, industrial and military equipment.

As the next step in the advance of high-density integrated circuit assemblies for equipment manufacture, SMT opens new avenues of freedom to the electronic design engineer frustrated by size, weight, and density limitations of conventional packaging. It can dramatically increase board density, while affording significant performance advantages. It can reduce the volume, weight, and cost of many printed-circuit boards (PCBs).

Surface mount components (SMCs) lend themselves readily to automated assembly, using high-speed pick-and-place machines. Thus, shipping, inventory, and handling costs are reduced. Additional benefits offered by SMCs include:

1. Increased reliability
2. Lower noise and improved frequency response resulting from shorter circuit paths.
3. Simpler electromagnetic interference (EMI) shielding and filtering needed to meet Federal Communications standards for EMI generation.

As a major manufacturer of SMCs, TI is committed to helping the customer make the transition to surface mount as easy and economical as possible. Getting started in SMT—switching from older and less efficient methods of PCB fabrication—means learning some new manufacturing techniques, and may entail some capital outlay. In volume production, however, it can actually reduce capital and space costs.

BROAD SURFACE MOUNT CHOICE

TI's commitment to the program is evidenced by the steadily expanding list of IC products in surface mount packages. There are currently over 3000 different device types which include:

- More than 1700 digital bipolar logic devices
- More than 300 linear circuits—operational amplifiers, comparators and timers, line circuits, peripheral drivers, and voltage regulators.
- More than 650 CMOS digital devices
- MOS DRAMS, TI's video RAM, FPLA, and IMPACT™ PAL circuits
- Microcontrollers, standard cells and gate arrays.

SURFACE MOUNT COMPONENT PACKAGING OPTIONS

TI manufactures seven types of surface mounted IC packages to support the design, development and production of surface mount assemblies (see table). Small outline integrated circuits (SOIC), Plastic leaded chip carriers (PLCC), small outline integrated circuits with "J" leads (SOJ), JEDEC standard plastic quad flat packs (PQFP), and EIAJ standard plastic quad flat packs (QFP) support the commercial market. Leadless ceramic chip carriers (LCCC) and leaded ceramic chip carriers (LDCC) support the military market. TI participated in the establishment of JEDEC standards, and most of the surface mount products manufactured by TI have JEDEC standard pin-outs.

Surface Mount Component Packaging Options

PACKAGE TYPE	PIN COUNT	LINEAR	LOGIC	PAL's FPLA EPROM's	SEMI CUSTOM	DRAM's	MICROPROCESSOR & PERIPHERALS
D (SOIC)	8	•					
	14	•	•				
	16	•	•				
DJ (SOJ)	20					•	
DW (SOIC)	16		•				
	20	•	•				
	24	•	•				
	28		•				
FD (LCCC)	44	•	•		•		•
	68		•		•		•
FG (LCCC)	18					•	
FK (LCCC)	20	•	•	•	•		
	28	•	•	•	•		•
FJ (LDCC)	44	•					
	68				•		•
FM (PLCC)	18					•	
	22					•	
	32			•			
FN (PLCC)	20	•	•	•			
	28	•	•	•	•		•
	44	•	•		•		•
	68		•		•		•
	84				•		
FV (PLCC)	18					•	
PH (EIAJ QFP)	80				•		
PJ (EIAJ QFP)	100				•		
PB (EIAJ QFP)	120				•		
PC (EIAJ QFP)	160				•		
PQ (JEDEC PQFP)	84				•		
	100				•		
	132				•		
	164				•		

Package Usages

It is anticipated that most new users of surface-mounted components will require the PLCC, SOIC, SOJ, QFP, or PQFP packages since they were developed primarily for commercial, industrial and consumer-oriented products. The LCCC and LDCC packages were developed primarily for military equipment that requires the extended environmental characteristics and high reliability specifications provided by hermetically sealed packages.

MEMORY MODULES

The memory module provides a somewhat different approach for satisfying increased memory density requirements. The complete assembly—consisting of several memory devices in chip-carriers or SOJ packages mounted with decoupling capacitors on a common substrate with connections to the module pins or “nodules” along one edge of the substrate—is called a Single In-line Package (SIP) memory module. Since they can be mounted perpendicularly on a motherboard of standard through-hole design, SIPs require smaller footprints than designs in which standard DIPs are used. Socketable SIPs can also be mounted on the motherboard by using standard connectors from such manufacturers as Texas Instruments. Sockets are available in perpendicular and angular (for height sensitive applications) versions.

11

PRODUCT LISTING

The demand for SMC's is increasing and the product line is steadily expanding. There are only a very few TI devices that are not available in surface mount packages. Contact you local TI field sales office or local authorized distributor if you have any questions.

QUALITY, RELIABILITY AND SERVICE

The goal of Texas Instruments is to offer product quality, reliability, and service unequaled in the semiconductor industry. The foundation for this approach is to consistently ship outstanding quality — which allows the elimination of costly incoming inspection through ship-to-stock programs. Ship-to-stock product quality, coupled with performance quality and 100% on-time delivery to narrow shipping windows, supports manufacturing cost reduction through just-in-time (JIT) manufacturing technology. This combination of quality, reliability, and service can be measured by a single index called “the cost-of-ownership!” Very simply stated, the cost-of-ownership — which consists of the purchase price, inventory, quality and reliability cost adders — is the total cost to own a product over its lifetime.

In today’s highly competitive electronics industry, it is critical to know what your costs are, where they are, and whether or not you can reduce or eliminate them to improve profits without degrading either quality or reliability. The cost-of-ownership concept provides this tool and clearly shows the value of making procurement decisions based on “total costs” rather than just “purchase price.” An analysis of cost-of-ownership shows that reliability related costs are much more significant than is generally recognized. Contact your local field sales office and request the brochure “Texas Instruments Lowers Semiconductor Cost-of-Ownership, SSYB057,” if you would like more information about the concept.

OUTSTANDING QUALITY AND DELIVERY, COUPLED WITH LEADERSHIP RELIABILITY, LEADS TO LOWERED COST OF OWNERSHIP FOR TI CUSTOMERS.

¹TI defines the “cost-of-ownership” as being composed of the purchase price, quality adders (for incoming inspection and board rework), inventory adders (for maintenance of a buffer inventory for suppliers who cannot meet JIT delivery), in-house reliability adders (for in-house system burn-in and system rework), and field reliability adders (for warranty and post-warranty field repairs).

QUALITY

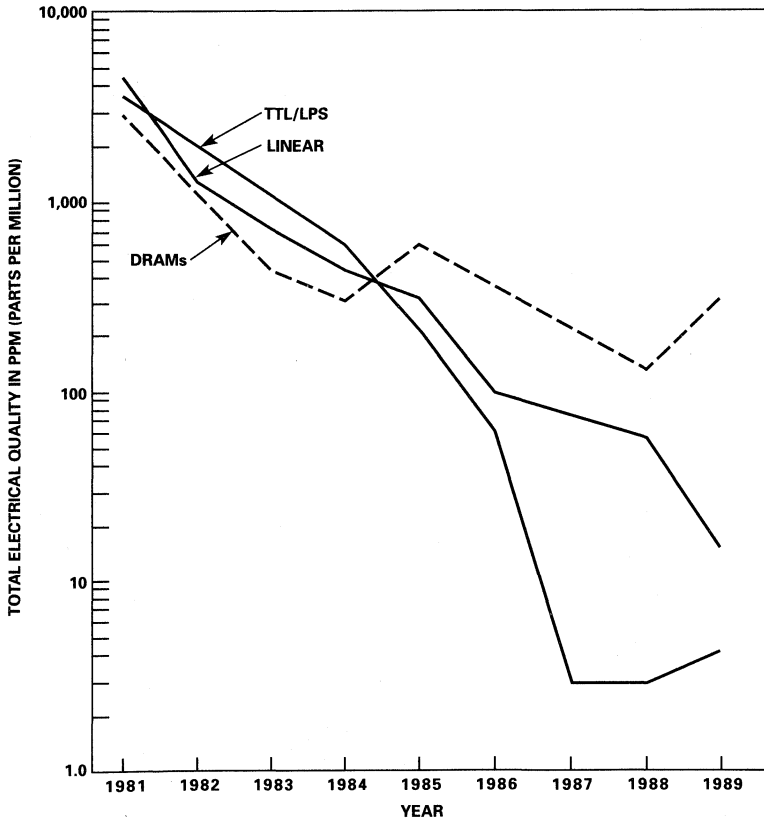
TI's quality goals are being achieved through significant improvement in product quality by:

- better definition of customer requirements
- greater emphasis on quality as a design criterion
- improved control of incoming materials
- intensive training of supervisors and operators
- extensive use of statistical process control
- more complete automation of operations to minimize operator related defects.

Between 1981 and first half 1989, electrical quality for Linear products has improved by 99% (from 4200 ppm to 14 ppm). Digital products have improved by 99% (3622 ppm to 4 ppm) and DRAMs by 87% (2786 ppm to 362 ppm). As evidenced by 139 major quality awards in the last four years, significant improvement in product quality has been publicly recognized by TI's customers. Included among these awards are Ford's Q-1 award, the Naval Quality Award, and the Deming Prize — Japan's most prestigious quality award.

Customer Support and General Information

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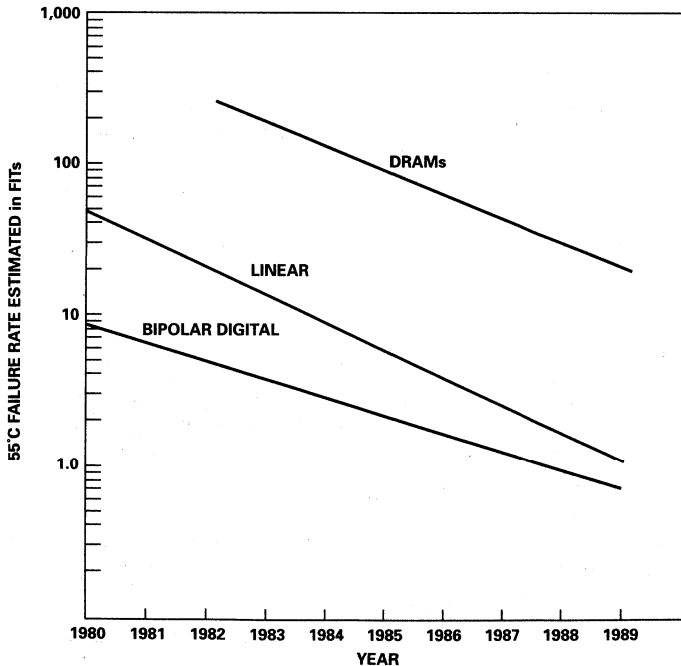
Texas Instruments Outgoing Electrical Quality

RELIABILITY

Recognizing the critical importance of low IC failure rates in system performance, TI continues in its goal to drive IC failure rates down through use of the following:

- rigid circuit design rules
- computer-aided-design (CAD) programs
- computer-aid programs to verify proper implementation of circuit design rules
- emphasis on statistical process control
- stringent qualification testing prior to product release
- routine reliability monitoring of released products
- extensive failure mode tracking/feedback system for IC failures.

Since the early 1980's, DRAMs, Linear ICs, and Bipolar Digital ICs have all exhibited a device failure rate improvement trend which approximately halves the failure rate every two years. However, since device complexity has also increased during this time period, the failure rate by function has improved (lowered) at an even faster pace. For example, the 1982 DRAM failure rate of 257 FITs¹ was on 64K DRAMs while the 1989 failure rate of 20 FITs is on 256K DRAMs. The 1989 failure rate estimate for Linear is 1 FIT, and for Bipolar Digital² is 0.7 FITs. TI continues to emphasize reliability improvement as a major factor in reducing the total cost-of-ownership for its customers.



Texas Instruments Reliability Improvement Trends (55°C and 60% UCL³)

¹ One FIT is one failure per billion unit-hours

² Includes the following families: ACL, AS, ALS, 74F, LPS, STTL, TTL, PALs, and PROMs

³ Upper Confidence Limit

SERVICE

Outstanding service is a key factor in achieving the lowest cost-of-ownership for TI customers. TI's efforts to provide outstanding service are focused on specific actions, programs, and systems which directly benefit its customers in the areas of delivery, responsiveness, ship-to-stock programs, and electronic data interchange, as delineated below.

- Delivery — to execute deliveries on committed dates with controlled transit times to assure customer receipt of product shipments in support of customer JIT programs.
- Responsiveness — to effect the timely response to special customer needs and situations, as exemplified by:
 - 1) short cycle times for:
 - print evaluations
 - disposition of returned material
 - analysis of failed devices
 - establishing test correlation
 - 2) timely technical assistance.
- Ship-to-stock Programs — to eliminate or at least minimize customer incoming product inspection.
- Electronic Data Interchange (EDI) — to provide a system approach for direct order entry and data exchange.

TI has also installed a fully integrated computer operating system to:

- provide automatic check of print and revision level approvals at time of order entry
- schedule capacity and material starts
- track orders through fabrication, test, and shipping.

TI's goals for service include: 100% on-time delivery, short lead times, reduction of customer inventory levels, and quick response to special customer needs and situations.

FUNCTIONAL INDEX

Functional Index — a key-word index that matches functions to the appropriate section and page within the Master Selection Guide — is intended to aid those readers unfamiliar with specific TI products.

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