
PART NUMBER**DS1632J-8883-ROCS**

Rochester Electronics**Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
 - Class Q Military
 - Class V Space Level

Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

DS1631,DS1632,DS1633,DS1634,DS3631, DS3632,DS3633,DS3634

*DS1631 DS3631 DS1632 DS3632 DS1633 DS3633 DS1634 DS3634 CMOS Dual
Peripheral Drivers*



Literature Number: SNOSBL9A

DS1631/DS3631/DS1632/DS3632/DS1633/DS3633/ DS1634/DS3634 CMOS Dual Peripheral Drivers

General Description

The DS1631 series of dual peripheral drivers was designed to be a universal set of interface components for CMOS circuits.

Each circuit has CMOS compatible inputs with thresholds that track as a function of V_{CC} (approximately $\frac{1}{2} V_{CC}$). The inputs are PNPs providing the high impedance necessary for interfacing with CMOS.

Outputs have high voltage capability, minimum breakdown voltage is 56V at 250 μA .

The outputs are Darlington connected transistors. This allows high current operation (300 mA max) at low internal V_{CC} current levels since base drive for the output transistor is obtained from the load in proportion to the required loading conditions. This is essential in order to minimize loading on the CMOS logic supply.

Typical $V_{CC} = 5V$ power is 28 mW with both outputs ON. V_{CC} operating range is 4.5V to 15V.

The circuit also features output transistor protection if the V_{CC} supply is lost by forcing the output into the high impe-

dance OFF state with the same breakdown levels as when V_{CC} was applied.

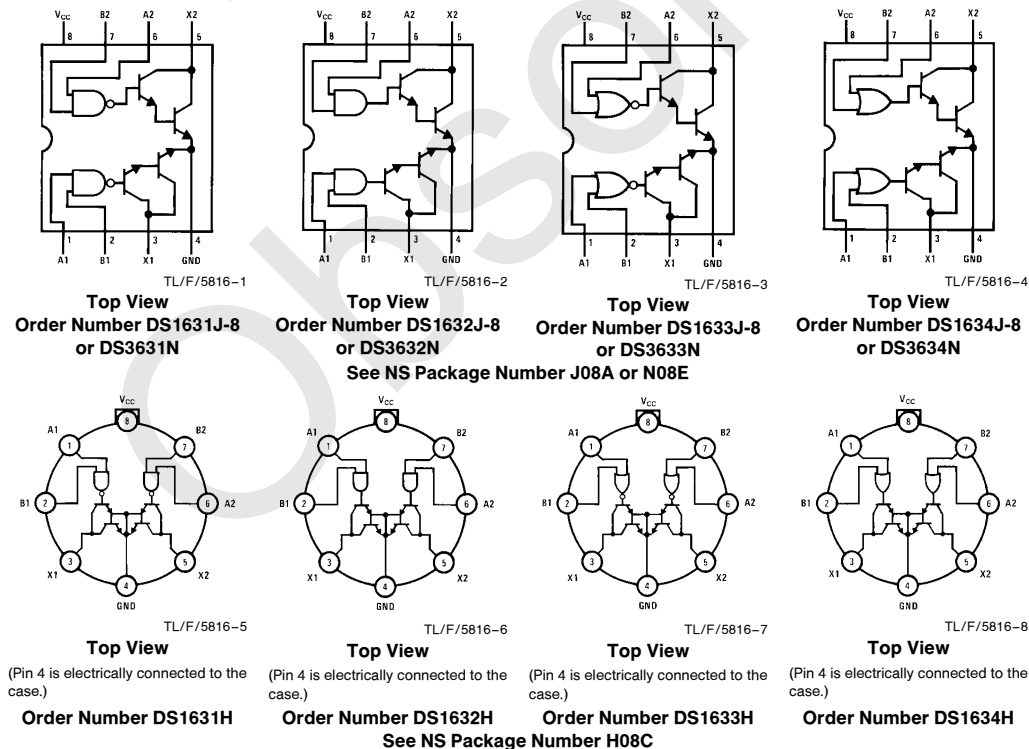
Pin-outs are the same as the respective logic functions found in the following popular series of circuits: DS75451, DS75461. This feature allows direct conversion of present systems to the MM74C CMOS family and DS1631 series circuits with great power savings.

The DS1631 series is also TTL compatible at $V_{CC} = 5V$.

Features

- CMOS compatible inputs
- High impedance inputs
- High output voltage breakdown 56V min
- High output current capability 300 mA max
- Same pin-outs and logic functions as DS75451 and DS75461 series circuits
- Low V_{CC} power dissipation (28 mW both outputs "ON" at 5V)

Connection Diagrams (Dual-In-Line and Metal Can Packages)



Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	16V
Voltage at Inputs	−0.3V to $V_{CC} + 0.3V$
Output Voltage	56V
Storage Temperature Range	−65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1133 mW
Molded Package	1022 mW
TO-5 Package	787 mW
Lead Temperature (Soldering, 4 sec.)	260°C

*Derate cavity package 7.6 mW/°C above 25°C; derate molded package 8.2 mW/°C above 25°C; derate TO-5 package 5.2 mW/°C above 25°C.

Operating Conditions

	Min	Max	Units
Supply Voltage, V_{CC}			
DS1631/DS1632/ DS1633/DS1634	4.5	15	V
DS3631/DS3632/ DS3633/DS3634	4.75	15	V
Temperature, T_A			
DS1631/DS1632/ DS1633/DS1634	−55	+125	°C
DS3631/DS3632/ DS3633/DS3634	0	+70	°C

Electrical Characteristics (Notes 2 and 3)

Symbol	Parameter	Conditions		Min	Typ	Max	Units	
ALL CIRCUITS								
V _{IH}	Logical “1” Input Voltage	(Figure 1)	V _{CC} = 5V	3.5	2.5		V	
			V _{CC} = 10V	8.0	5		V	
			V _{CC} = 15V	12.5	7.5		V	
V _{IL}	Logical “0” Input Voltage	(Figure 1)	V _{CC} = 5V		2.5	1.5	V	
			V _{CC} = 10V		5.5	2.0	V	
			V _{CC} = 15V		7.5	2.5	V	
I _{IH}	Logical “1” Input Current	V _{CC} = 15V, V _{IN} = 15V, (Figure 2)			0.1	10	μA	
I _{IL}	Logical “0” Input Current	V _{IN} = 0.4V, (Figure 3)	V _{CC} = 5V		−50	−120	μA	
			V _{CC} = 15V		−200	−360	μA	
V _{OH}	Output Breakdown Voltage	V _{CC} = 15V, I _{OH} = 250 μA, (Figure 1)			56	65		V
V _{OL}	Output Low Voltage	V _{CC} = Min, (Figure 1), DS1631, DS1632, DS1633, DS1634	I _{OL} = 100 mA		0.85	1.1	V	
			I _{OL} = 300 mA		1.1	1.4	V	
		V _{CC} = Min, (Figure 1), DS3631, DS3632, DS3633, DS3634	I _{OL} = 100 mA		0.85	1.0	V	
			I _{OL} = 300 mA		1.1	1.3	V	
DS1631/DS3631								
I _{CC(0)}	Supply Currents	V _{IN} = 0V, (Figure 4)	V _{CC} = 5V	Output Low		7	11	mA
			V _{CC} = 15V		Both Drivers		14	20
I _{CC(1)}		(Figure 4)	V _{CC} = 5V, V _{IN} = 5V	Output High		2	3	mA
			V _{CC} = 15V, V _{IN} = 15V		Both Drivers		7.5	10
t _{PD1}	Propagation to “1”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				500		ns
t _{PD0}	Propagation to “0”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				750		ns
DS1632/DS3632								
I _{CC(0)}	Supply Currents	(Figure 4)	V _{CC} = 5V, V _{IN} = 5V	Output Low		8	12	mA
			V _{CC} = 15V, V _{IN} = 15V			18	23	mA
I _{CC(1)}		V _{IN} = 0V, (Figure 4)	V _{CC} = 5V	Output High		2.5	3.5	mA
			V _{CC} = 15V			9	14	mA
t _{PD1}	Propagation to “1”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				500		ns
t _{PD0}	Propagation to “0”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				750		ns

Electrical Characteristics (Notes 2 and 3) (Continued)

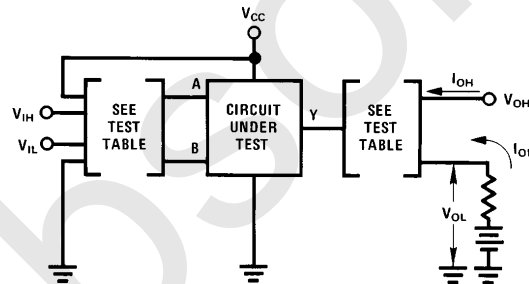
Symbol	Parameter	Conditions		Min	Typ	Max	Units	
DS1633/DS3633								
I _{CC(0)}	Supply Currents	V _{IN} = 0V, (Figure 4)	V _{CC} = 5V	Output Low		7.5	12	mA
			V _{CC} = 15V			16	23	mA
I _{CC(1)}		(Figure 4)	V _{CC} = 5V, V _{IN} = 5V	Output High		2	4	mA
			V _{CC} = 15V, V _{IN} = 15V			7.2	15	mA
t _{PD1}	Propagation to “1”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				500		ns
t _{PD0}	Propagation to “0”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				750		ns
DS1634/DS3634								
I _{CC(0)}	Supply Currents	(Figure 4)	V _{CC} = 5V, V _{IN} = 5V	Output Low		7.5	12	mA
			V _{CC} = 15V, V _{IN} = 15V			18	23	mA
I _{CC(1)}		V _{IN} = 0V, (Figure 4)	V _{CC} = 5V	Output High		3	5	mA
			V _{CC} = 15V			11	18	mA
t _{PD1}	Propagation to “1”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				500		ns
t _{PD0}	Propagation to “0”	V _{CC} = 5V, T _A = 25°C, C _L = 15 pF, R _L = 50Ω, V _L = 10V, (Figure 5)				750		ns

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the $-55^\circ C$ to $+125^\circ C$ temperature range for the DS1631, DS1632, DS1633 and DS1634 and across the $0^\circ C$ to $+70^\circ C$ range for the DS3631, DS3632, DS3633 and DS3634. All typical values are for $T_A = 25^\circ C$.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Test Circuits



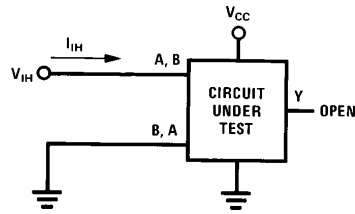
TL/F/5816-9

Circuit	Input Under Test	Other Input	Output	
			Apply	Measure
DS3631	V_{IH}	V_{IH}	I_{OH}	V_{OH}
	V_{IL}	V_{CC}	I_{OL}	V_{OL}
DS3632	V_{IH}	V_{IH}	I_{OL}	V_{OL}
	V_{IL}	V_{CC}	I_{OH}	V_{OH}
DS3633	V_{IH}	GND	I_{OH}	V_{OH}
	V_{IL}	V_{IL}	I_{OL}	V_{OL}
DS3634	V_{IH}	GND	I_{OL}	V_{OL}
	V_{IL}	V_{IL}	I_{OH}	V_{OH}

Note: Each input is tested separately.

FIGURE 1. V_{IH} , V_{IL} , V_{OH} , V_{OL}

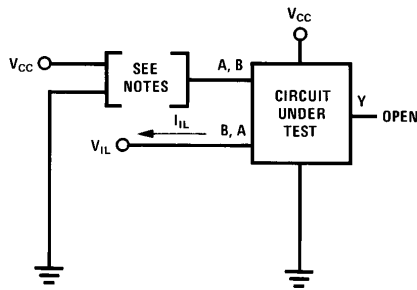
Test Circuits (Continued)



Each input is tested separately.

FIGURE 2. I_{IH}

TL/F/5816-10

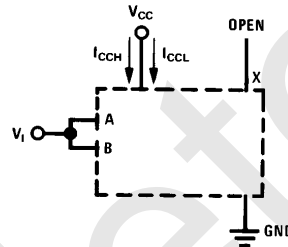


Note A: Each input is tested separately.

Note B: When testing DS1633 and DS1634 input not under test is grounded. For all other circuits it is at V_{CC} .

FIGURE 3. I_{IL}

TL/F/5816-11

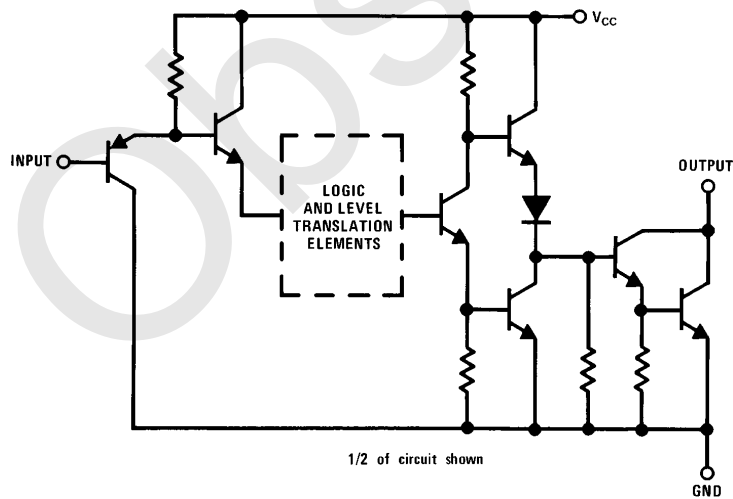


Both gates are tested simultaneously.

FIGURE 4. I_{CC} for AND and NAND Circuits

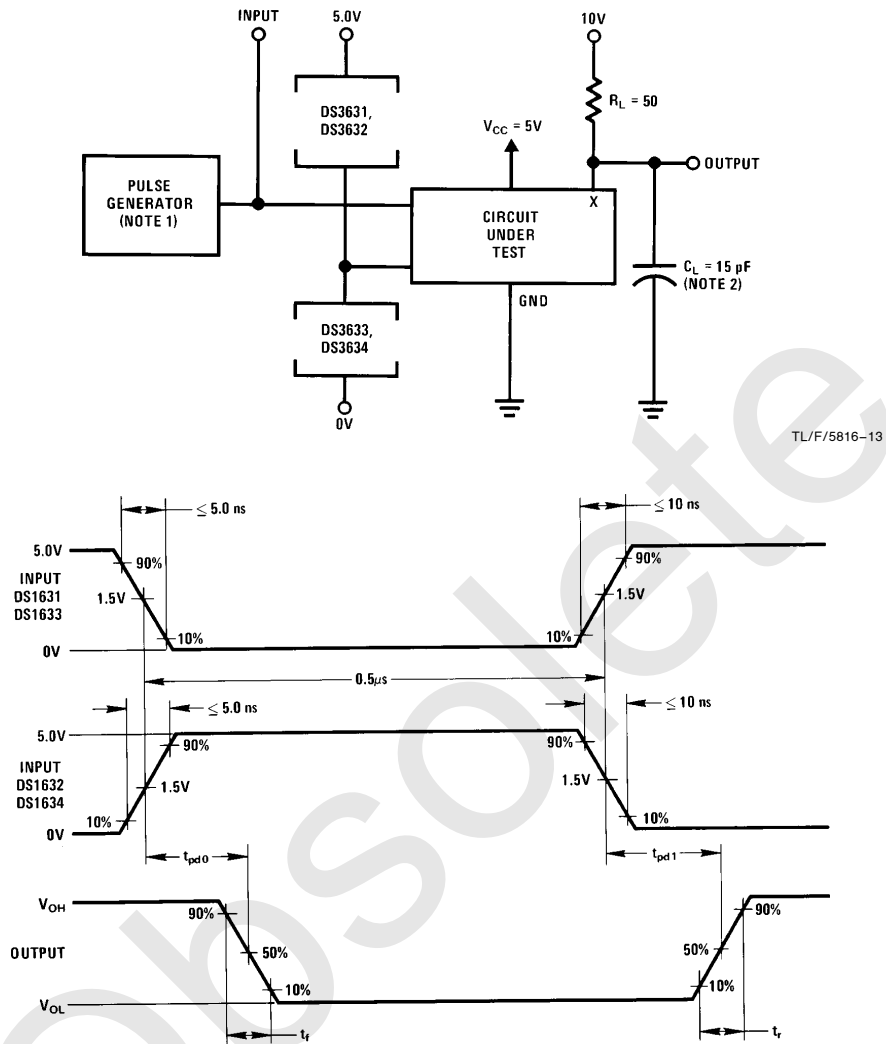
TL/F/5816-12

Schematic Diagram (Equivalent Circuit)



TL/F/5816-15

Switching Time Waveforms

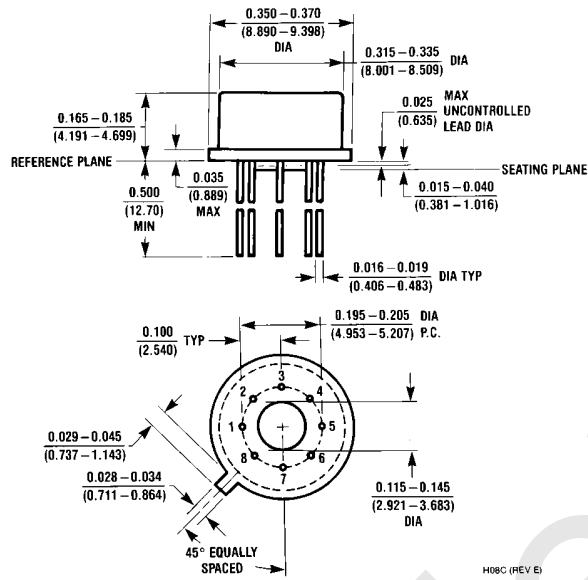


Note 1: The pulse generator has the following characteristics: PRR = 500 kHz, $Z_{OUT} \approx 50\Omega$

Note 2: C_L includes probe and jig capacitance

FIGURE 5. Switching Times

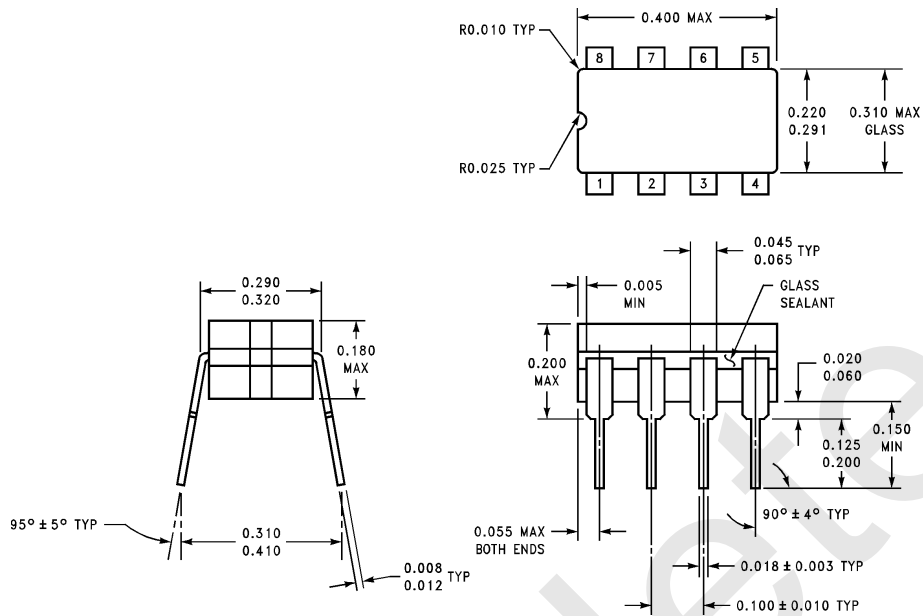
Physical Dimensions inches (millimeters)



Metal Can Package (H)
Order Number DS1631H, DS1632H, DS1633H or DS1634H
NS Package Number H08C

H08C (REV E)

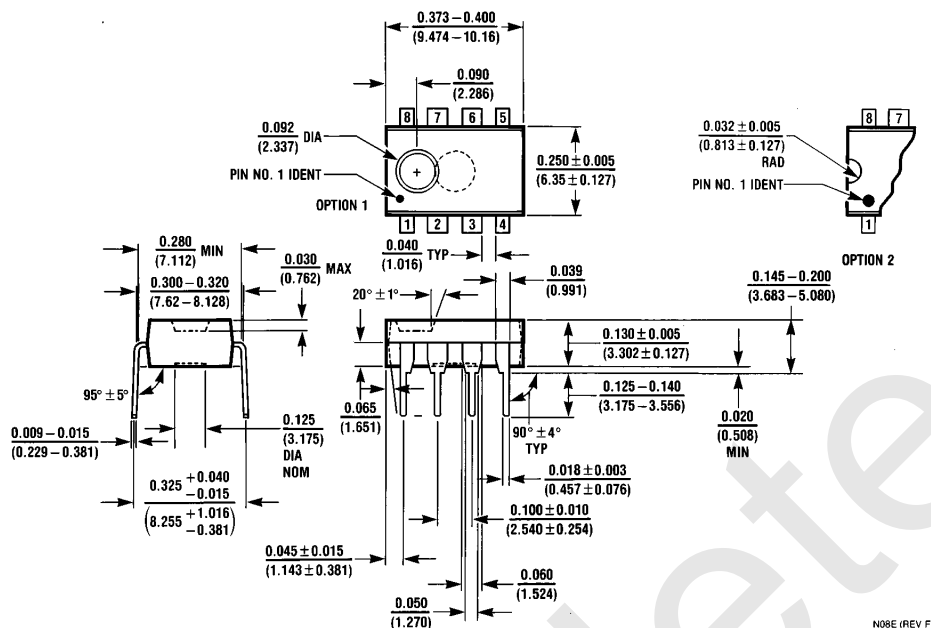
Physical Dimensions inches (millimeters) (Continued)



Ceramic Dual-In-Line Package (J)
Order Number DS1631J-8, DS1632J-8, DS1633J-8 or DS1634J-8
NS Package Number J08A

J08A (REV K)

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number DS3631N, DS3632N,
DS3633N and DS3634N
NS Package Number N08E

N08E (REV F)

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: onjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
19th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated