

MM5483 Liquid Crystal Display Driver

Check for Samples: [MM5483](#)

FEATURES

- Serial Data Input
- Serial Data Output
- Wide Power Supply Operation
- TTL Compatibility
- 31 Segment Outputs
- Alphanumeric and Bar Graph Capability
- Cascade Capability

APPLICATIONS

- COPS™ or Microprocessor Displays
- Industrial Control Indicator
- Digital Clock, Thermometer, Counter, Voltmeter
- Instrumentation Readouts
- Remote Displays

DESCRIPTION

The MM5483 is a monolithic integrated circuit utilizing CMOS metal-gate low-threshold enhancement mode devices. It is available in a 40-pin PDIP package. The chip can drive up to 31 segments of LCD and can be cascaded to increase this number. This chip is capable of driving a 4½-digit 7-segment display with minimal interface between the display and the data source.

The MM5483 stores the display data in latches after it is latched in, and holds the data until another load pulse is received.

Block Diagram

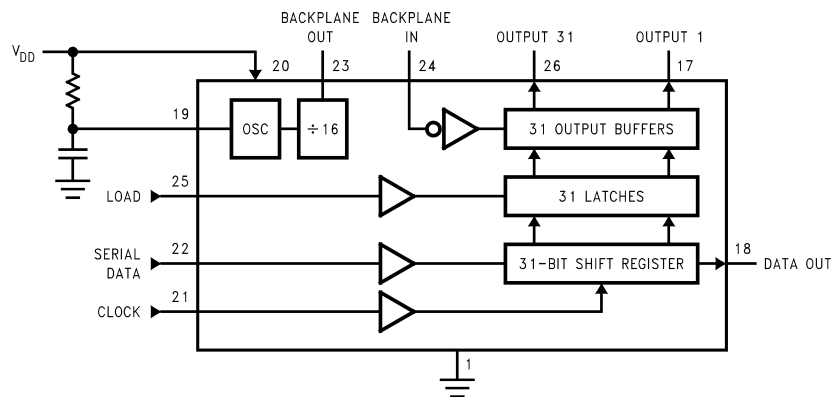


Figure 1. MM5483 Block Diagram



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

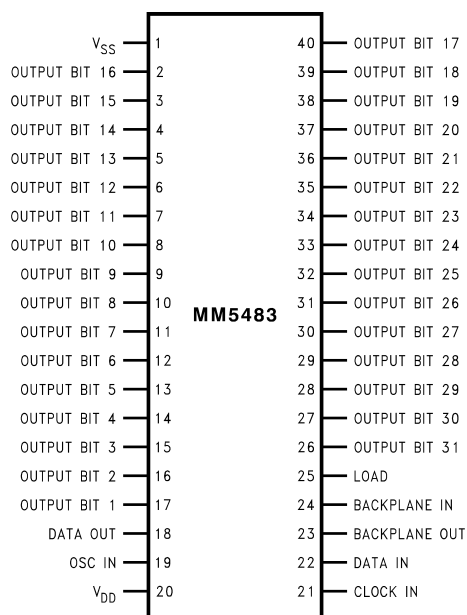
COPS is a trademark of Texas Instruments.

All other trademarks are the property of their respective owners.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2000–2013, Texas Instruments Incorporated

Connection Diagrams



**Figure 2. Dual-In-Line Package
Top View
See Package Number NFJ0040A**

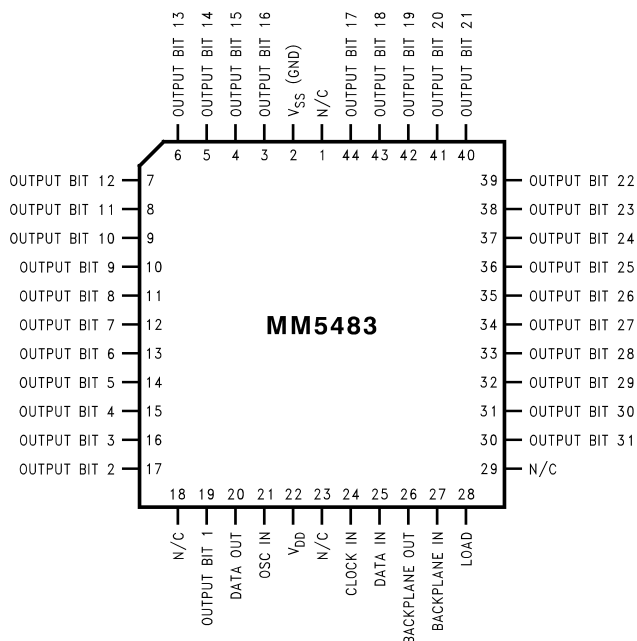


Figure 3. See Package Number FN0044A



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings ⁽¹⁾⁽²⁾

Voltage at Any Pin	V_{SS} to $V_{SS} + 10V$
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Power Dissipation	300 mW at +85°C 350 mW at +25°C
Junction Temperature	+150°C
Lead Temperature (Soldering, 10 seconds)	300°C

- (1) "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be ensured. They are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" specifies conditions of device operation.
- (2) If Military/Aerospace specified devices are required, please contact the TI Sales Office/Distributors for availability and specifications.

DC Electrical Characteristics

T_A within operating range, $V_{DD} = 3.0V$ to $10V$, $V_{SS} = 0V$, unless otherwise specified

Parameter	Conditions	Min	Typ	Max	Units
Power Supply		3.0		10	V
Average Supply Current, I_{DD}	All Outputs Bits = Open, Data Out = Open, BP_Out = Open, Clock In = 0V, Data In = 0V, Data Load = 0V, Osc In = 0V, BP_In = 32Hz				
	$V_{DD} = 3.0V$		1.5	2.5	μA
	$V_{DD} = 5.0V$			10	μA
	$V_{DD} = 10.0V$			40	μA
Input Voltage Levels	Load, Clock, Data				
Logic "0"	$V_{DD} = 5.0V$	2.4		0.9	V
Logic "1"	$V_{DD} = 5.0V$				V
Logic "0"	$V_{DD} = 3.0V$	2.0		0.4	V
Logic "1"	$V_{DD} = 3.0V$				V
Output Current Levels ⁽¹⁾					
Segments and Data Out					
Sink	$V_{DD} = 3.0V$, $V_{OUT} = 0.3V$	20			μA
Source	$V_{DD} = 3.0V$, $V_{OUT} = 2.7V$	20			μA
BP Out Sink	$V_{DD} = 3.0V$, $V_{OUT} = 0.3V$	320			μA
BP Out Source	$V_{DD} = 3.0V$, $V_{OUT} = 2.7V$	320			μA

- (1) Output offset voltage is ± 50 mV with $C_{SEGMENT} = 250$ pF, $C_{BP} = 8750$ pF.

AC Electrical Characteristics

$V_{DD} \geq 4.7V$, $V_{SS} = 0V$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units
f_C	Clock Frequency, $V_{DD} = 3V$			500	kHz
t_{CH}	Clock Period High	⁽¹⁾⁽²⁾ 500			ns
t_{CL}	Clock Period Low	500			ns
t_{DS}	Data Set-Up before Clock	300			ns
t_{DH}	Data Hold Time after Clock	100			ns
t_{LW}	Minimum Load Pulse Width	500			ns
t_{LTC}	Load to Clock	400			ns
t_{CDO}	Clock to Data Valid		400	750	ns

- (1) AC input waveform specification for test purpose: $t_r \leq 20$ ns, $t_f \leq 20$ ns, $f = 500$ kHz, 50% \pm 10% duty cycle.
- (2) Clock input rise and fall times must not exceed 300 ms.

FUNCTIONAL DESCRIPTION

A block diagram for the MM5483 is shown in [Figure 1](#) and a package pinout is shown in [Figure 3](#). [Figure 4](#) shows a possible 3-wire connection system with a typical signal format for [Figure 4](#). Shown in [Figure 5](#), the load input is an asynchronous input and lets data through from the shift register to the output buffers any time it is high. The load input can be connected to V_{DD} for 2-wire control as shown in [Figure 6](#). In the 2-wire control mode, 31 bits (or less depending on the number of segments used) of data are clocked into the MM5483 in a short time frame (with less than 0.1 second there probably will be no noticeable flicker) with no more clocks until new information is to be displayed. If data was slowly clocked in, it can be seen to “walk” across the display in the 2-wire mode. An AC timing diagram can be seen in [Figure 7](#). It should be noted that data out is not a TTL-compatible output.

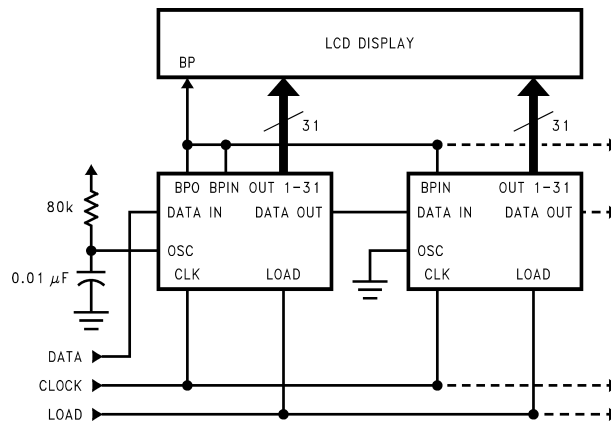


Figure 4. Three-Wire Control Mode

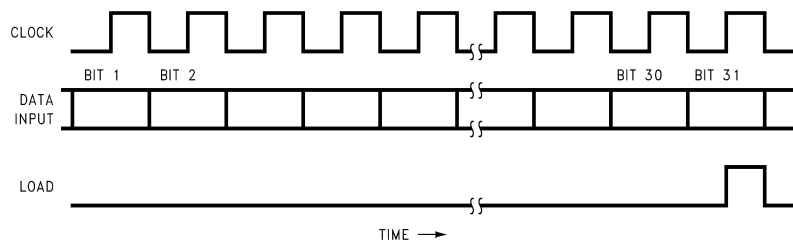


Figure 5. Data Format Diagram

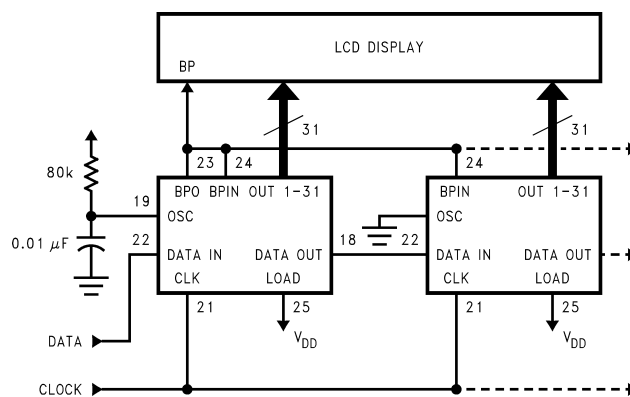


Figure 6. Two-Wire Control Mode

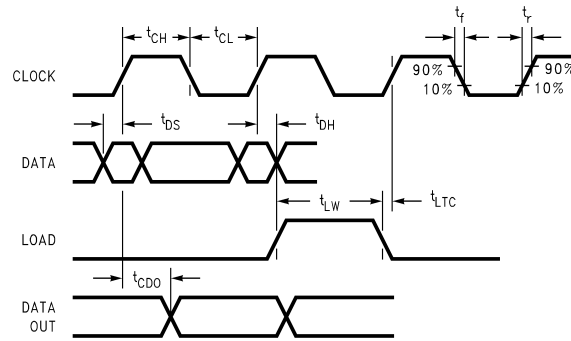


Figure 7. Timing Diagram

REVISION HISTORY

Changes from Revision D (March 2013) to Revision E	Page
• Changed layout of National Data Sheet to TI format	5

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
MM5483N/NOPB	ACTIVE	PDIP	NFJ	40	9	Green (RoHS & no Sb/Br)	SN	Level-1-NA-UNLIM	-40 to 85	MM5483N	Samples
MM5483V	NRND	PLCC	FN	44	25	TBD	Call TI	Call TI	-40 to 85	MM5483V	
MM5483V/NOPB	ACTIVE	PLCC	FN	44	25	Green (RoHS & no Sb/Br)	SN	Level-3-245C-168 HR	-40 to 85	MM5483V	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSELETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

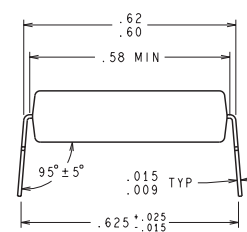
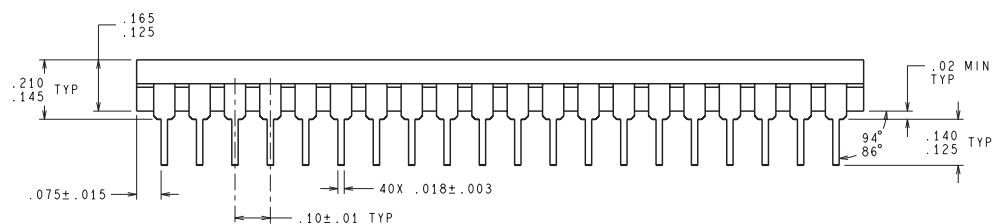
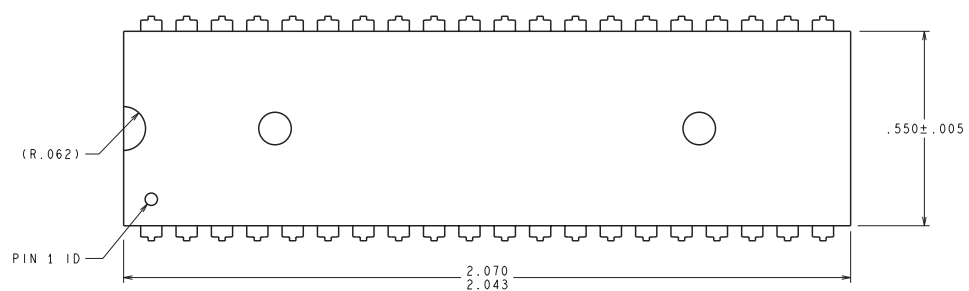
(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and

continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

NFJ0040A

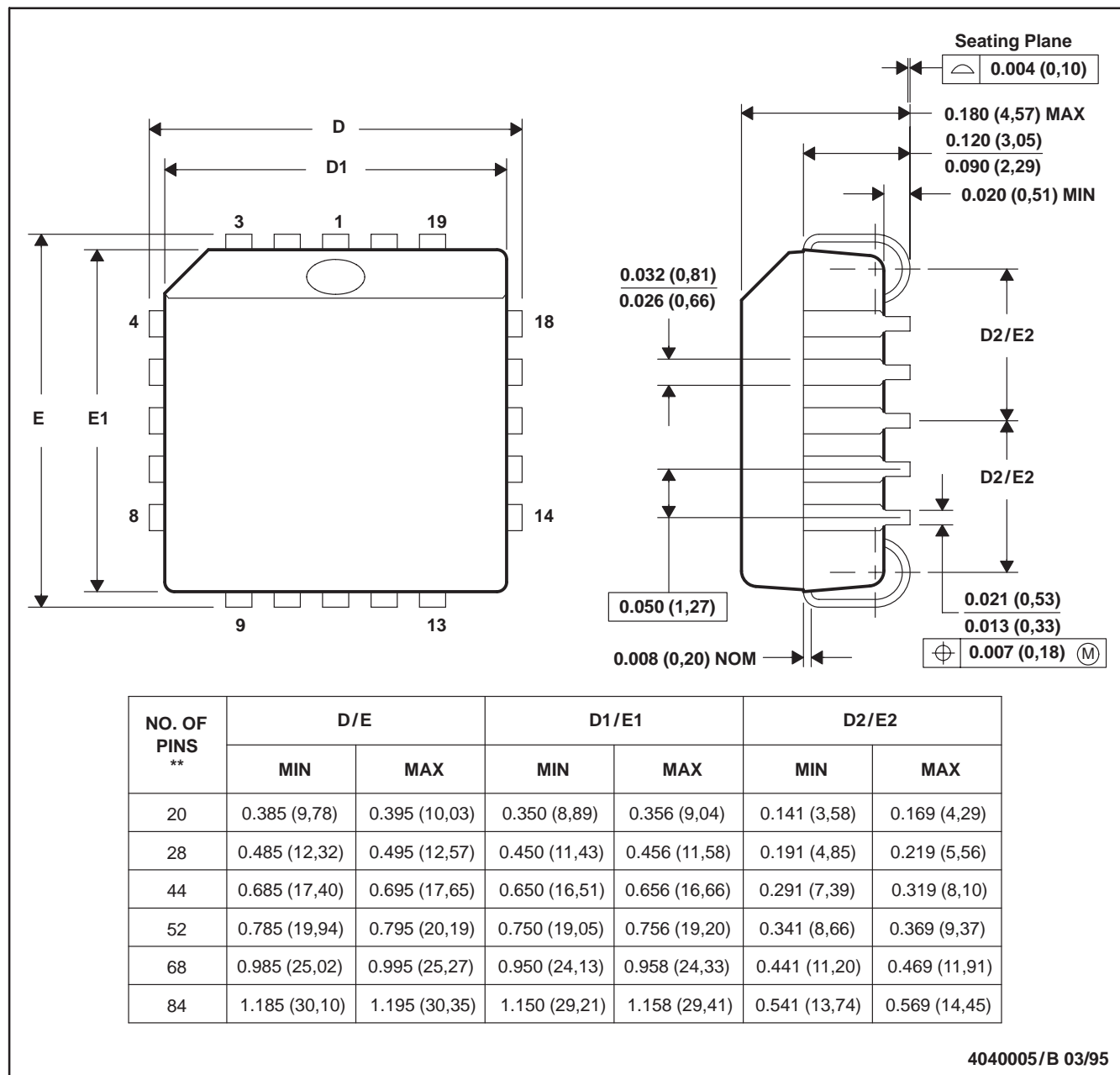


N40A (Rev E)

FN (S-PQCC-J**)

PLASTIC J-LEADED CHIP CARRIER

20 PIN SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-018

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license 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 significant portions 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. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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 Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
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
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com