

DS14C238 Single Supply TIA/EIA-232 4 x 4 Driver/Receiver

Check for Samples: [DS14C238](#)

FEATURES

- Conforms to TIA/EIA-232-E and CCITT V.28
- Internal DC-DC Converter
- Operates with Single +5V Supply
- Low Power Requirement— I_{CC} 10 mA max
- Internal Driver Slew Rate Control
- Receiver Noise Filtering
- Operates Above 120 kbits/sec
- Direct Replacement for MAX238

DESCRIPTION

The DS14C238 is a four driver, four receiver device which conforms to the TIA/EIA-232-E standard and CCITT V.28 recommendations. This device eliminates $\pm 12V$ supplies by employing an internal DC-DC converter to generate the necessary output levels from a single +5V supply. Driver slew rate control and receiver noise filtering have also been internalized to eliminate the need for external slew rate control and noise filtering capacitors.

Connection Diagram

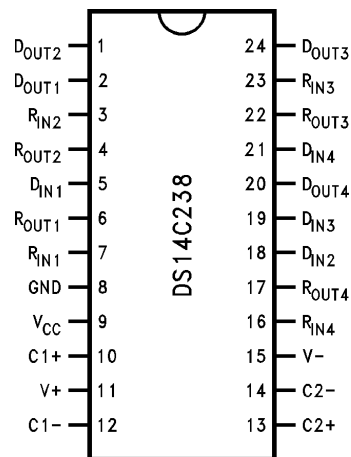


Figure 1. Top View
See Package Number DW0024B



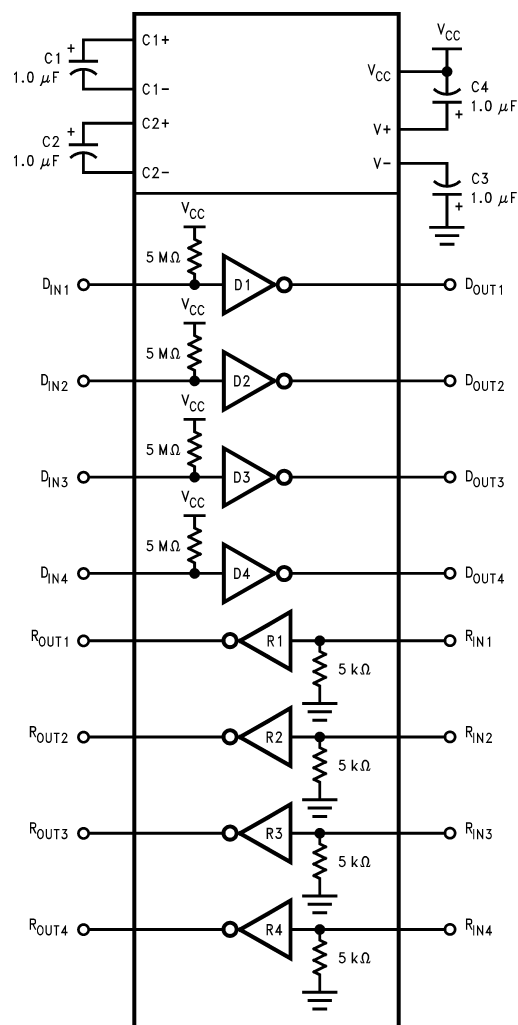
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All 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 © 2004, Texas Instruments Incorporated

Functional Diagram



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⁾

Supply Voltage (V_{CC})		–0.3V to +6V
V+ Pin		($V_{CC} - 0.3V$) to +15V
V– Pin		+0.3V to –15V
Driver Input Voltage		–0.3V to ($V_{CC} + 0.3V$)
Driver Output Voltage		(V+ +0.3V) to (V– –0.3V)
Receiver Input Voltage		±30V
Receiver Output Voltage		–0.3V to ($V_{CC} + 0.3V$)
Junction Temperature		+150°C
Maximum Package Power Dissipation @ +25°C ⁽³⁾	DW Package	1400 mW
Storage Temp. Range		–65°C to +150°C
Lead Temp. (Soldering, 4 Seconds)		+260°C
Short Circuit Duration (D_{OUT})		Continuous
ESD Rating (HBM, 1.5 k Ω , 100 pF)		≥ 2.0 kV

- (1) “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of “Electrical Characteristics” specify conditions for device operation.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
- (3) Ratings apply to ambient temperature at +25°C. Above this temperature derate: DW package 13.5 mW/°C.

Recommended Operating Conditions

		Min	Max	Units
Supply Voltage, V_{CC}		4.5	5.5	V
Operating Free Air Temp. (T_A)	DS14C238	0	+70	°C

Electrical Characteristics⁽¹⁾

Over recommended operating conditions, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ ⁽²⁾	Max	Units
DEVICE CHARACTERISTICS						
V+	Positive Power Supply	R _L = 3 kΩ, C1–C4 = 1.0 μF, D _{IN} = 0.8V		9.0		V
V–	Negative Power Supply	R _L = 3 kΩ, C1–C4 = 1.0 μF, D _{IN} = 2.0V		–8.0		V
I _{CC}	Supply Current (V _{CC})	No Load		7.0	10	mA
DRIVER CHARACTERISTICS						
V _{IH}	High Level Input Voltage		2.0		V _{CC}	V
V _{IL}	Low Level Input Voltage		GND		0.8	V
I _{IH}	High Level Input Current	V _{IN} ≥ 2.0V	–10		+10	μA
I _{IL}	Low Level Input Current	V _{IN} ≤ 0.8V	–10		+10	μA
V _{OH}	High Level Output Voltage	R _L = 3 kΩ	5.0	7.4		V
V _{OL}	Low Level Output Voltage			–6.3	–5.0	V
I _{OS} ⁺	Output High Short Circuit Current	V _O = 0V, V _{IN} = 0.8V	⁽³⁾ –3 0	–15	–5.0	mA
I _{OS} [–]	Output Low Short Circuit Current	V _O = 0V, V _{IN} = 2.0V		5.0	12	30
R _O	Output Resistance	–2V ≤ V _O ≤ +2V, V _{CC} = GND = 0V	300			Ω
RECEIVER CHARACTERISTICS						
V _{TH}	Input High Threshold Voltage			1.9	2.4	V
V _{TL}	Input Low Threshold Voltage		0.8	1.5		V
V _{HY}	Hysteresis		0.2	0.4	1.0	V
R _{IN}	Input Resistance		3.0	4.5	7.0	kΩ
I _{IN}	Input Current	V _{IN} = +15V	2.14	3.8	5.0	mA
		V _{IN} = +3V	0.43	0.6	+1.0	mA
		V _{IN} = –3V	–1.0	–0.6	–0.43	mA
		V _{IN} = –15V	–5.0	–3.8	–2.14	mA
V _{OH}	High Level Output Voltage	V _{IN} = –3V, I _O = –3.2 mA	3.5	4.5		V
		V _{IN} = –3V, I _O = –20 μA	4.0	4.9		V
V _{OL}	Low Level Output Voltage	V _{IN} = +3V, I _O = +2.0 mA		0.25	0.4	V

- (1) Current into device pins is defined as positive. Current out of device pins is defined as negative. All voltages are referenced to ground unless otherwise specified.
- (2) All typicals are given for $V_{CC} = 5.0\text{V}$ and $T_A = +25^\circ\text{C}$.
- (3) I_{OS+} and I_{OS–} values are for one output at a time. If more than one output is shorted simultaneously, the device power dissipation may be exceeded.

Switching Characteristics⁽¹⁾

Over recommended operating conditions, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ ⁽²⁾	Max	Units
DRIVER CHARACTERISTICS						
t_{PLH}	Propagation Delay LOW to HIGH	$R_L = 3\text{ k}\Omega$		0.7	4.0	μs
t_{PHL}	Propagation Delay HIGH to LOW	$C_L = 50\text{ pF}$		0.6	4.0	μs
t_{sk}	Skew $ t_{PLH} - t_{PHL} $	(Figure 2, Figure 3)		0.1	1.0	μs
SR1	Output Slew Rate	$R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$, $C_L = 50\text{ pF}$	4.0	15	30	$\text{V}/\mu\text{s}$
SR2	Output Slew Rate	$R_L = 3\text{ k}\Omega$, $C_L = 2500\text{ pF}$	3.0	5.0		$\text{V}/\mu\text{s}$
RECEIVER CHARACTERISTICS						
t_{PLH}	Propagation Delay LOW to HIGH	Input Pulse Width $> 10\text{ }\mu\text{s}$		2.0	6.5	μs
t_{PHL}	Propagation Delay HIGH to LOW	$C_L = 50\text{ pF}$		2.8	6.5	μs
t_{sk}	Skew $ t_{PLH} - t_{PHL} $	(Figure 4, Figure 5)		0.8	2.0	μs
t_{NW}	Noise Pulse Width Rejected	(Figure 4, Figure 5)		2.5	1.0	μs

- (1) Receiver AC input waveform for test purposes: $t_r = t_f = 200\text{ ns}$, $V_{IH} = 3\text{V}$, $V_{IL} = -3\text{V}$, $f = 64\text{ kHz}$ (128 kbits/sec). Driver AC input waveform for test purposes: $t_r = t_f \leq 10\text{ ns}$, $V_{IH} = 3\text{V}$, $V_{IL} = 0\text{V}$, $f = 64\text{ kHz}$ (128 kbits/sec).
 (2) All typicals are given for $V_{CC} = 5.0\text{V}$ and $T_A = +25^\circ\text{C}$.

Parameter Measurement Information

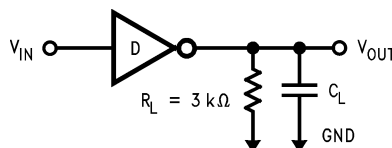


Figure 2. Driver Load Circuit

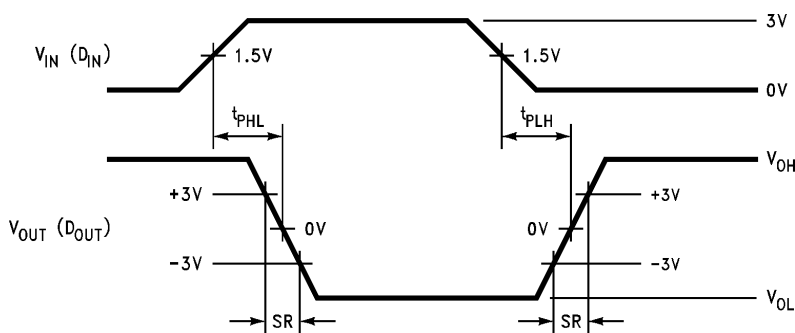


Figure 3. Driver Switching Waveform

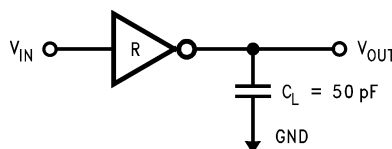


Figure 4. Receiver Load Circuit

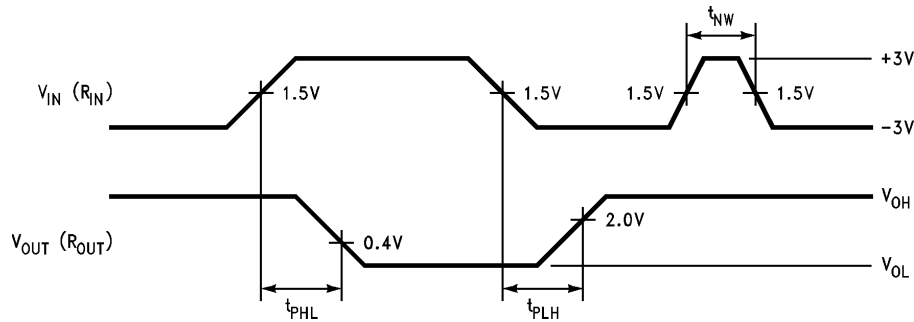


Figure 5. Receiver Propagation Delays and Noise Rejection

PIN DESCRIPTIONS

V_{CC} (pin 9)— Power supply pin for the device,
+5V (±10%).

V+ (pin 11)—Positive supply for TIA/EIA-232-E drivers. Recommended external capacitor: C4 = 1.0 μF (6.3V). This supply is not intended to be loaded externally.

V- (pin 15)—Negative supply for TIA/EIA-232-E drivers. Recommended external capacitor: C3 = 1.0 μF (16V). This supply is not intended to be loaded externally.

C1+, C1- (pins 10 and 12)— External capacitor connection pins. Recommended capacitor – 1.0 μF (6.3V).

C2+, C2- (pins 13 and 14)— External Capacitor connection pins. Recommended capacitor – 1.0 μF (16V).

D_{IN} 1–4 (pins 5, 18, 19, and 21)— Driver input pins are TTL/CMOS compatible. Inputs of unused drivers may be left open, an internal pull-up resistor (500 kΩ minimum, typically 5 MΩ) pulls input to V_{CC}. Output will be LOW for open inputs.

D_{OUT} 1–4 (pins 2, 1, 24, and 20)— Driver output pins conform to TIA/EIA-232-E levels.

R_{IN1} 1–4 (pins 3, 7, 23, and 16)— Receiver input pins accept TIA/EIA-232-E input voltages (±15V). Receivers feature a noise filter and guaranteed hysteresis of 200 mV. Unused receiver input pins may be left open. Internal input resistor (5 kΩ) pulls input LOW, providing a failsafe HIGH output.

R_{OUT} 1–4 (pins 4, 6, 22, and 17)— Receiver output pins are TTL/CMOS compatible. Receiver output HIGH voltage is specified for both CMOS and TTL load conditions.

GND (pin 8)—Ground Pin.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
DS14C238WMX	ACTIVE	SOIC	DW	24	1000	TBD	Call TI	Call TI	0 to 70	DS14C238WM	Samples
DS14C238WMX/NOPB	ACTIVE	SOIC	DW	24	1000	Green (RoHS & no Sb/Br)	CU SN	Level-3-260C-168 HR	0 to 70	DS14C238WM	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.

OBSOLETE: 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⁾ Only one of markings shown within the brackets will appear on the physical device.

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.

TAPE AND REEL INFORMATION


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
DS14C238WMX	SOIC	DW	24	1000	330.0	24.4	10.8	15.9	3.2	12.0	24.0	Q1
DS14C238WMX/NOPB	SOIC	DW	24	1000	330.0	24.4	10.8	15.9	3.2	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS

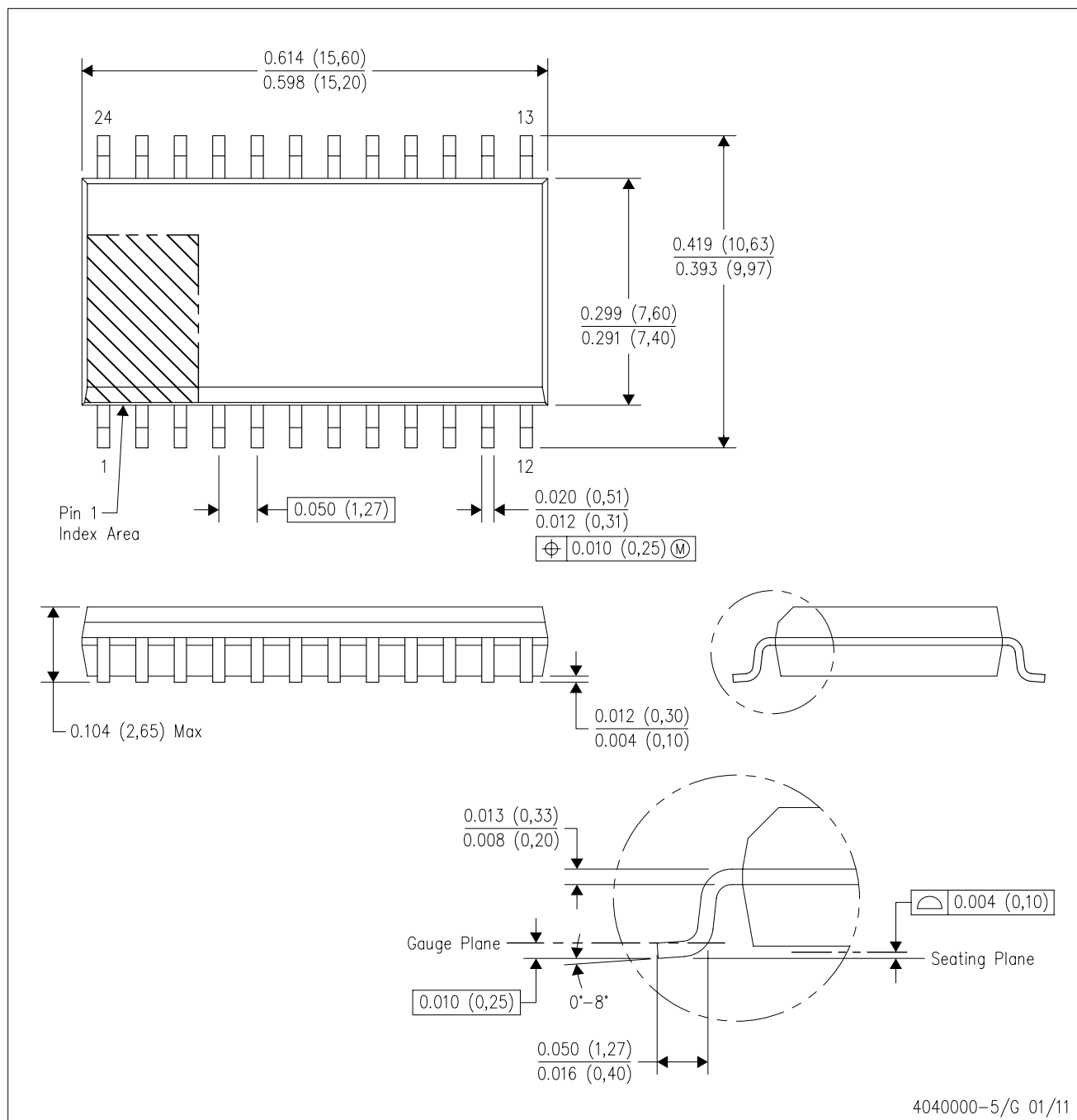


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS14C238WMX	SOIC	DW	24	1000	367.0	367.0	45.0
DS14C238WMX/NOPB	SOIC	DW	24	1000	367.0	367.0	45.0

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-013 variation AD.

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



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.