#### 查询SN65C23243供应商

# 专业PCB打样ISN65C23243计SN75C23243 3-V TO 5.5-V DUAL RS-232 PORT

SLLS513A - AUGUST 2001 - REVISED MARCH 2004

ip and Single-Supply Interface for PC/AT Serial Ports	DGG OR DL PACKAGE (TOP VIEW)
cceed the Requirements of 32-F and ITU v.28 Standards	
/ith 3-V to 5.5-V V <sub>CC</sub> Supply	RINJA 3 46 ROUTJA
ctive Noninverting Receiver	RIN2A 4 45 ROUT2A
p To 250 kbit/s	
by Current 1 μA Typical	
apacitors $4 \times 0.22  \mu F$	
and the second se	
Flexible Power Down of Either	$C2 - \begin{bmatrix} 11 & 38 \end{bmatrix} V - $
t	C2+ 12 37 V+
use Driveability	GND [] 13 36 ] C1+
2/AT Serial Ports ed the Requirements of and ITU v.28 Standards 3-V to 5.5-V V <sub>CC</sub> Supply e Noninverting Receiver T2) Per Port o 250 kbit/s Current 1 $\mu$ A Typical acitors 4 × 0.22 $\mu$ F ogic Input With 3.3-V Supply kible Power Down of Either Driveability Pin ESD Protection Exceeds Human-Body Model (HBM) wered Systems, Notebooks, almtop PCs, and Hand-Held ing information 243 and SN75C23243 consist of containing three line drivers and rs, and a dual charge-pump circuit	V <sub>CC</sub> [14 35] C1-
ing Human-Body Model (HBM) 🛛 🛛 🦰	FORCEOFFB [15 34] GND
ins and a lab	
Powered Systems, Notebooks,	
s, Palmtop PCs, and Hand-Held	DOUT3B   18 31   DIN3B INVB   19 30   ROUT2B
ent de la grade de la constance de	RIN1B 20 29 ROUT1B
	RIN2B 21 28 ROUTE
dering information	RIN3B 22 27 ROUT3B
22242 and SNZEC22242 appoint of	RIN3B [] 22 27 [] ROUT3B RIN4B [] 23 26 [] ROUT4B
	RIN5B 24 25 ROUT5B
ESD protection pin to pin (corial port	

Single-Chip Two IBM™

- Meet or Exc TIA/EIA-232
- **Operate Wi**
- Always-Act Output (RO
- **Operate Up**
- Low Stand
- **External Ca**
- Accept 5-V
- Allow for F Serial Port
- Serial-Mou
- **RS-232 Bus** ±15 kV Usir
- Application
  - Battery-F Laptops. Equipme

#### description/ord

The SN65C2 two ports, ea five line receivers, and a dual charge-pump circuit with ±15-kV ESD protection pin to pin (serial-port

connection pins, including GND). These devices meet the requirements of TIA/EIA-232-F and provide the electrical interface between an asynchronous communication controller and the serial-port connector. This combination of drivers and receivers matches that needed for two typical serial ports used in an IBM PC/AT, or compatible. The charge pump and four small external capacitors allow operation from a single 3-V to 5.5-V supply. In addition, these devices include an always-active noninverting output (ROUT2) per port, which allows applications using the ring indicator to transmit data while the devices are powered down. The devices operate at data signaling rates up to 250 kbit/s and a maximum of 30-V/ $\mu$ s driver output slew-rate.

Τ <sub>Α</sub>	PACKAGE <sup>†</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING				
			SN75C23243DL	75000040				
–0°C to 70°C	SSOP (DL)	Reel of 1000	SN75C23243DLR	75C23243				
	TSSOP (DGG)	Reel of 2000	SN75C23243DGGR	75C23243				
and the	D-C.CO	Tube of 25	SN65C23243DL	05000040				
-40°C to 85°C	SSOP (DL)	Reel of 1000	SN65C23243DLR	65C23243				
12-W	TSSOP (DGG)	Reel of 2000	SN65C23243DGGR	65C23243				

#### ORDERING INFORMATION

<sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

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### description/ordering information (continued)

Flexible control options for power management are available when either or both serial ports are inactive. The auto-powerdown feature functions when FORCEON is low and FORCEOFF is high. During this mode of operation, if the device does not sense a valid RS-232 signal, the driver outputs of its respective port are disabled. If FORCEOFF is set low, both drivers and receivers (except ROUT2) are shut off, and the supply current is reduced to 1  $\mu$ A. Disconnecting the serial port or turning off the peripheral drivers causes the auto-powerdown condition to occur.

Auto-powerdown can be disabled when FORCEON and FORCEOFF are high and should be done when driving a serial mouse. With auto-powerdown enabled, the RS-232 port is activated automatically when a valid signal is applied to any respective receiver input. The INV output is used to notify the user if an RS-232 signal is present at any receiver input. INV is high (valid data) if any receiver input voltage is greater than 2.7 V or less than -2.7 V or has been between -0.3 V and 0.3 V for less than 30  $\mu$ s. INV is low (invalid data) if all receiver input voltages are between -0.3 V and 0.3 V for more than 30  $\mu$ s. Refer to Figure 5 for receiver input levels.

			EACH DRIVER (each port)		
		INPUTS		OUTPUT	
DIN	FORCEON	FORCEOFF	VALID RIN RS-232 LEVEL	DOUT	DRIVER STATUS
Х	Х	L	Х	Z	Powered off
L	Н	Н	Х	Н	Normal operation with
н	Н	Н	Х	L	auto-powerdown disabled
L	L	н	Yes	Н	Normal operation with
н	L	Н	Yes	L	auto-powerdown enabled
L	L	Н	No	Z	Powered off by
Н	L	Н	No	Z	auto-powerdown feature

# **Function Tables**

H = high level, L = low level, X = irrelevant, Z = high impedance

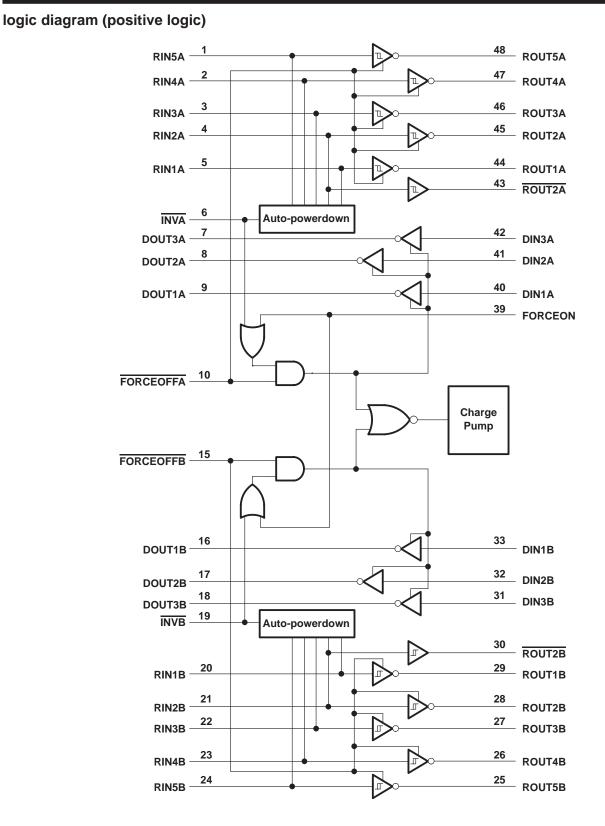
# EACH RECEIVER

			(each port	)		
	INPUTS			OUTPUTS		
RIN2	RIN1, RIN3-RIN5	FORCEOFF	VALID RIN RS-232 LEVEL	ROUT2	ROUT	RECEIVER STATUS
L	Х	L	Х	L	Z	Powered off while
н	Х	L	Х	Н	Z	ROUT2 is active
L	L	Н	Yes	L	Н	
L	Н	Н	Yes	L	L	Normal operation with
н	L	Н	Yes	Н	Н	auto-powerdown
н	Н	Н	Yes	н	L	disabled/enabled
Open	Open	н	No	L	Н	

H = high level, L = low level, X = irrelevant, Z = high impedance (off), Open = input disconnected or connected driver off



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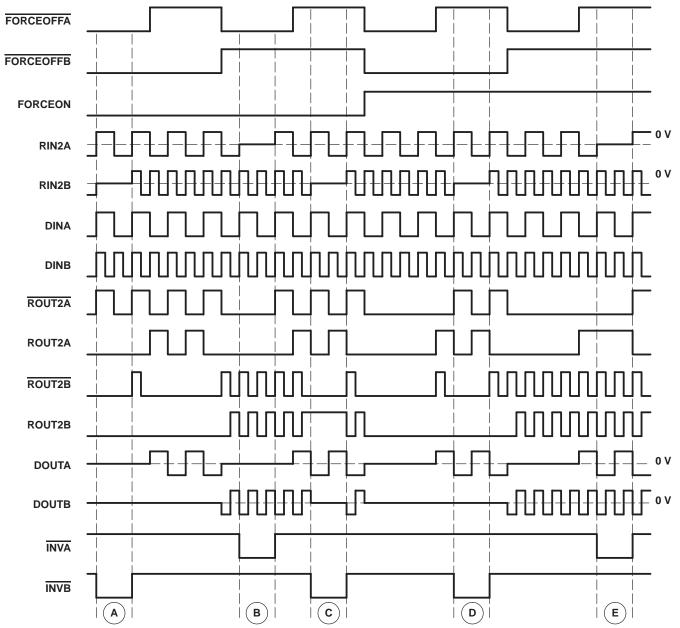




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### timing

Figure 1 shows how the two independent serial ports can be enabled or disabled. As shown by the logic states, depending on the FORCEOFF, FORCEON, and receiver input levels, either port can be powered down. Intermediate receiver input levels indicate a 0-V input. Also, it is assumed a pulldown resistor to ground is used for the receiver outputs. The INV pin goes low when its respective receiver input does not supply a valid RS-232 level. For simplicity, voltage levels, timing differences, and input/output edge rates are not shown.



NOTES: A. Ports A and B manually powered off

- B. Port A manually powered off, port B in normal operation with auto-powerdown enabled
- C. Port B powered off by auto-powerdown, port A in normal operation with auto-powerdown enabled
- D. Port A in normal operation with auto-powerdown disabled, port B manually powered off
- E. Ports A and B in normal operation with auto-powerdown disabled

Figure 1. Timing Diagram



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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, V <sub>CC</sub> (see Note 1)	$\ldots$ –0.3 V to 7 V
Negative output supply voltage, V– (see Note 1)	
Supply voltage difference, V+ – V– (see Note 1)	
Input voltage range, VI: Driver (FORCEOFF, FORCEON)	–0.3 V to 6 V
Receiver	–25 V to 25 V
Output voltage range, V <sub>O</sub> : Driver	13.2 V to 13.2 V
Receiver (INV)	$\dots$ –0.3 V to V <sub>CC</sub> + 0.3 V
Package thermal impedance, $\theta_{JA}$ (see Notes 2 and 3): DGG package	
DL package	63°C/W
Operating virtual junction temperature, T <sub>J</sub>	150°C
Storage temperature range, T <sub>stg</sub>	

<sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltages are with respect to network GND.

2. Maximum power dissipation is a function of  $T_J(max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(max) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can affect reliability.

3. The package thermal impedance is calculated in accordance with JESD 51-7.

### recommended operating conditions (see Note 4 and Figure 7)

					MAX	UNIT
Supply voltage		V <sub>CC</sub> = 3.3 V	3	3.3	3.6	
		$V_{CC} = 5 V$	4.5	5	5.5	V
Driver and control high-level input voltage, $V_{IH}$		V <sub>CC</sub> = 3.3 V	2			N/
	DIN, FORCEOFF, FORCEON	$V_{CC} = 5 V$	2.4			V
Driver and control low-level input voltage, $V_{IL}$	DIN, FORCEOFF, FORCEON				0.8	V
Driver and control input voltage, VI	DIN, FORCEOFF, FORCEON		0		5.5	V
Receiver input voltage, VI	RIN		-25		25	V
		SN75C23243	0		70	°C
Operating free-air temperature, T <sub>A</sub>		SN65C23243	-40		85	50

NOTE 4: Test conditions are C1–C4 = 0.22  $\mu$ F at V<sub>CC</sub> = 3.3 V ± 0.3 V; C1 = 0.047  $\mu$ F, C2–C4 = 0.33  $\mu$ F at V<sub>CC</sub> = 5 V ± 0.5 V.

# electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 7)

PARAMETER			TEST CONDITIONS	MIN	TYP‡	MAX	UNIT
Ц	Input leakage current	FORCEOFF, FORCEON			±0.01	±1	μA
		Auto-powerdown disabled	No load, FORCEOFF and FORCEON at $V_{CC}$		0.6	2	mA
Icc	Supply current	Powered off	No load, FORCEOFF at GND		1	20	
	(T <sub>A</sub> = 25°C)	Auto-powerdown enabled	No load, <del>FORCEOFF</del> at V <sub>CC</sub> , FORCEON at GND, All RIN are open or grounded		1	20	μΑ

<sup>‡</sup> All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V and T<sub>A</sub> = 25°C.

NOTE 4: Test conditions are C1–C4 = 0.22  $\mu$ F at V<sub>CC</sub> = 3.3 V ± 0.3 V; C1 = 0.047  $\mu$ F, C2–C4 = 0.33  $\mu$ F at V<sub>CC</sub> = 5 V ± 0.5 V.



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# **DRIVER SECTION**

# electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 7)

	PARAMETER	TE	ST CONDITION	S	MIN	TYP†	MAX	UNIT
Vон	High-level output voltage	All DOUT at $R_L = 3 \ k\Omega$ to	All DOUT at $R_L = 3 \text{ k}\Omega$ to GND		5	5.4		V
VOL	Low-level output voltage	All DOUT at $R_L = 3 k\Omega$ to GND		-5	-5.4		V	
VO	Output voltage (mouse driveability)	DIN1 = DIN2 = GND, DIN3 = $V_{CC}$ , B-k $\Omega$ to GND at DOUT3, DOUT1 = DOUT2 = -2.5 mA		±5			V	
ЧΗ	High-level input current	$V_{I} = V_{CC}$				±0.01	±1	μA
۱ <sub>IL</sub>	Low-level input current	V <sub>I</sub> at GND				±0.01	±1	μA
		V <sub>CC</sub> = 3.6 V,	VO = 0 V			105	100	
los	Short-circuit output current‡	V <sub>CC</sub> = 5.5 V,	VO = 0 V			±35	±60	mA
r <sub>o</sub>	Output resistance	$V_{CC}$ , V+, and V- = 0 V,	$V_{O} = \pm 2 V$		300	10M		Ω
1			$V_{O} = \pm 12 \text{ V},  V_{CC} = 3 \text{ V to } 3.6 \text{ V}$			±25		
loff	Output leakage current	FORCEOFF = GND	V <sub>O</sub> = ±10 V,	$V_{CC}$ = 4.5 V to 5.5 V			±25	μA

<sup>†</sup> All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V and T<sub>A</sub> =  $25^{\circ}$ C.

<sup>‡</sup> Short-circuit durations should be controlled to prevent exceeding the device absolute power dissipation ratings, and not more than one output should be shorted at a time.

NOTE 4: Test conditions are C1–C4 = 0.22  $\mu$ F at V<sub>CC</sub> = 3.3 V ± 0.3 V; C1 = 0.047  $\mu$ F, C2–C4 = 0.33  $\mu$ F at V<sub>CC</sub> = 5 V ± 0.5 V.

# switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 7)

	PARAMETER	TEST CONDITIONS			TYP†	MAX	UNIT
	Maximum data rate	C <sub>L</sub> = 1000 pF, One DOUT switching,	R <sub>L</sub> = 3 kΩ, See Figure 1	250			kbit/s
<sup>t</sup> sk(p)	Pulse skew§	C <sub>L</sub> = 150 pF to 2500 pF	$R_L = 3 k\Omega$ to 7 kΩ, See Figure 2		100		ns
SR(tr)	Slew rate, transition region	V <sub>CC</sub> = 3.3 V,	C <sub>L</sub> = 150 pF to 1000 pF	6		30	V/us
SK(II)	(see Figure 1)	$V_{CC} = 3.3$ V, R <sub>L</sub> = 3 kΩ to 7 kΩ	$C_{L} = 150 \text{ pF} \text{ to } 2500 \text{ pF}$	4		30	v/µs

<sup>†</sup> All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V and T<sub>A</sub> =  $25^{\circ}$ C.

§ Pulse skew is defined as |tpLH - tpHL| of each channel of the same device.

NOTE 4: Test conditions are C1–C4 =  $0.22 \,\mu$ F at V<sub>CC</sub> =  $3.3 \,V \pm 0.3 \,V$ ; C1 =  $0.047 \,\mu$ F, C2–C4 =  $0.33 \,\mu$ F at V<sub>CC</sub> =  $5 \,V \pm 0.5 \,V$ .



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# **RECEIVER SECTION**

#### electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 7)

	PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
VOH	High-level output voltage	$I_{OH} = -1 \text{ mA}$	V <sub>CC</sub> – 0.6 V	V <sub>CC</sub> – 0.1 V		V
VOL	Low-level output voltage	I <sub>OL</sub> = 1.6 mA			0.4	V
N/	De sitter and se investitions had de site as	$V_{CC} = 3.3 V$		1.6	2.4	
VIT+	Positive-going input threshold voltage	$V_{CC} = 5 V$		1.9	2.4	V
V	Negative-going input threshold voltage	V <sub>CC</sub> = 3.3 V	0.6	1.1		V
V <sub>IT</sub> –		$V_{CC} = 5 V$	0.8	1.4		V
V <sub>hys</sub>	Input hysteresis (V <sub>IT+</sub> – V <sub>IT</sub> )			0.5		V
loff	Output leakage current (except ROUT2B)	FORCEOFF = 0 V		±0.05	±10	μΑ
ri	Input resistance	$V_{I} = \pm 3 V \text{ to } \pm 25 V$	3	5	7	kΩ

<sup>†</sup> All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V and T<sub>A</sub> = 25°C.

NOTE 4: Test conditions are C1–C4 =  $0.22 \,\mu$ F at V<sub>CC</sub> =  $3.3 \,V \pm 0.3 \,V$ ; C1 =  $0.047 \,\mu$ F, C2–C4 =  $0.33 \,\mu$ F at V<sub>CC</sub> =  $5 \,V \pm 0.5 \,V$ .

#### switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 7)

PARAMETER		TEST CONDITIONS	ΜΙΝ ΤΥΡ <sup>†</sup> ΜΑΧ	UNIT
<sup>t</sup> PLH	Propagation delay time, low- to high-level output		150	ns
<sup>t</sup> PHL	Propagation delay time, high- to low-level output	C <sub>L</sub> = 150 pF, See Figure 4	150	ns
ten	Output enable time		200	ns
<sup>t</sup> dis	Output disable time	$C_L = 150 \text{ pF}, R_L = 3 \text{ k}\Omega$ , See Figure 5	200	ns
<sup>t</sup> sk(p)	Pulse skew <sup>‡</sup>	See Figure 4	50	ns

<sup>†</sup> All typical values are at  $V_{CC} = 3.3$  V or  $V_{CC} = 5$  V and  $T_A = 25^{\circ}$ C.

<sup>+</sup> Pulse skew is defined as  $|t_{PLH} - t_{PHL}|$  of each channel of the same device. NOTE 4: Test conditions are C1-C4 = 0.22  $\mu$ F at V<sub>CC</sub> = 3.3 V ± 0.3 V; C1 = 0.047  $\mu$ F, C2-C4 = 0.33  $\mu$ F at V<sub>CC</sub> = 5 V ± 0.5 V.



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# **AUTO-POWERDOWN SECTION**

# electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 6)

	PARAMETER	TEST CONDITIONS	MIN	MAX	UNIT
V <sub>T+(valid)</sub>	Receiver input threshold for INV high-level output voltage	$\frac{FORCEON}{FORCEOFF} = V_{CC}$		2.7	V
VT-(valid)	Receiver input threshold for INV high-level output voltage	$\frac{FORCEON}{FORCEOFF} = V_{CC}$	-2.7		V
VT(invalid)	Receiver input threshold for INV low-level output voltage	$\frac{FORCEON = GND,}{FORCEOFF} = V_{CC}$	-0.3	0.3	V
V <sub>OH</sub>	INV high-level output voltage	$I_{OH} = -1 \text{ mA}$ , FORCEON = GND, FORCEOFF = V <sub>CC</sub>	V <sub>CC</sub> – 0.6		V
VOL	INV low-level output voltage	$I_{OL} = 1.6 \text{ mA}$ , FORCEON = GND, FORCEOFF = V <sub>CC</sub>		0.4	V

# switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 6)

	PARAMETER	MIN TYP <sup>†</sup>	MAX	UNIT
tvalid	Propagation delay time, low- to high-level output	1		μs
tinvalid	Propagation delay time, high- to low-level output	30		μs
t <sub>en</sub>	Supply enable time	100		μs

<sup>†</sup> All typical values are at V<sub>CC</sub> = 3.3 V or V<sub>CC</sub> = 5 V and T<sub>A</sub> = 25°C.



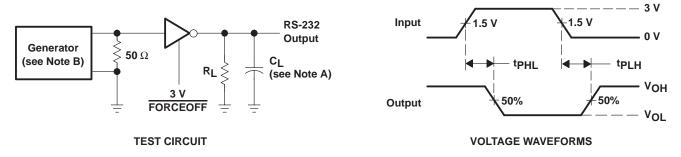
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#### PARAMETER MEASUREMENT INFORMATION 3 V Input **RS-232** 0 V Output Ş Generator **50** Ω $C_L$ (see Note B) <sup>t</sup>THL <sup>t</sup>TLH RL (see Note A) ۷он 3 V 3 V 2 Output FORCEOFF -3 VOL $\text{SR(tr)} = \frac{6 \text{ V}}{t_{\text{THL}} \text{ or } t_{\text{TLH}}}$ **TEST CIRCUIT VOLTAGE WAVEFORMS**

NOTES: A. CL includes probe and jig capacitance.

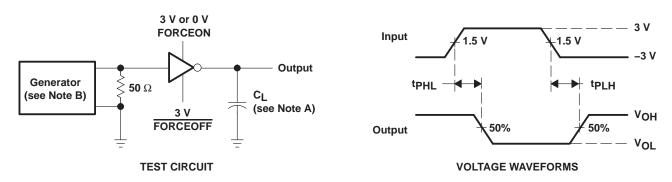
B. The pulse generator has the following characteristics: PRR = 250 kbit/s,  $Z_{\Omega}$  = 50  $\Omega$ , 50% duty cycle,  $t_{r} \le 10$  ns,  $t_{f} \le 10$  ns.

#### Figure 2. Driver Slew Rate





#### Figure 3. Driver Pulse Skew



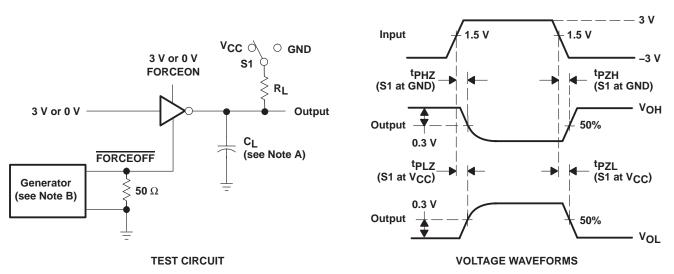
NOTES: A. C<sub>1</sub> includes probe and jig capacitance.

B. The pulse generator has the following characteristics:  $Z_{O} = 50 \Omega$ , 50% duty cycle,  $t_{f} \le 10$  ns,  $t_{f} \le 10$  ns.

Figure 4. Receiver Propagation Delay Times



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# PARAMETER MEASUREMENT INFORMATION

NOTES: A. CL includes probe and jig capacitance.

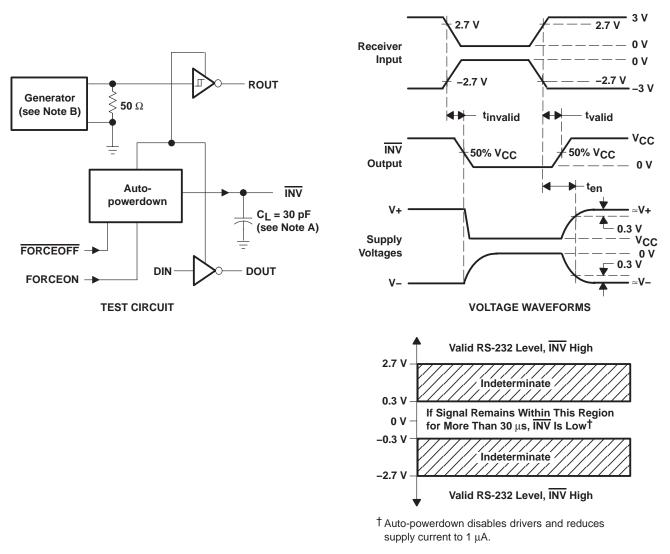
B. The pulse generator has the following characteristics:  $Z_O = 50 \Omega$ , 50% duty cycle,  $t_f \le 10$  ns.  $t_f \le 10$  ns.

- C.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- D.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .

Figure 5. Receiver Enable and Disable Times



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# PARAMETER MEASUREMENT INFORMATION

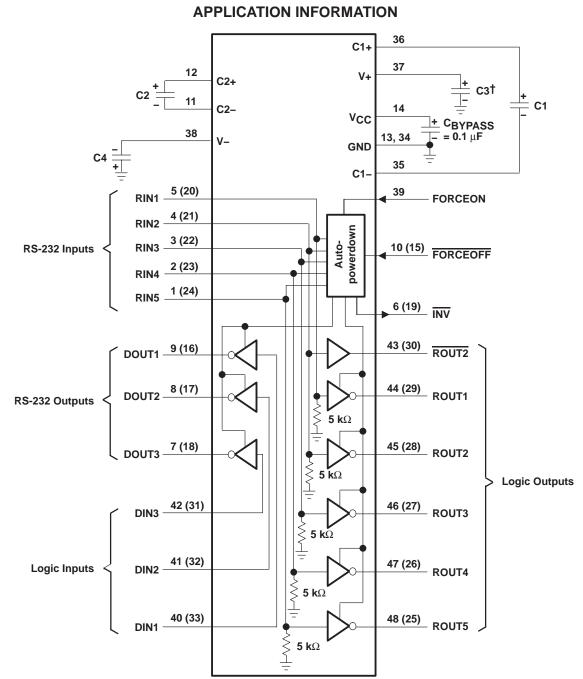
NOTES: A.  $\ensuremath{\mathsf{C}_L}$  includes probe and jig capacitance.

B. The pulse generator has the following characteristics: PRR = 5 kbit/s,  $Z_O = 50 \Omega$ , 50% duty cycle,  $t_r \le 10$  ns.  $t_f \le 10$  ns.

### Figure 6. INV Propagation Delay Times and Supply Enabling Time



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 $^{\dagger}$  C3 can be connected to V<sub>CC</sub> or GND.

NOTES: A. Resistor values shown are nominal.

B. Numbers in parentheses are for B section.

#### V<sub>CC</sub> vs CAPACITOR VALUES

Vcc	C1	C2, C3, and C4
₩00		62, 63, and 64
3.3 V ± 0.3 V	<b>0.22</b> μ <b>F</b>	<b>0.22</b> μ <b>F</b>
5 V ± 0.5 V	<b>0.047</b> μ <b>F</b>	<b>0.33</b> μF
3 V to 5.5 V	<b>0.22</b> μ <b>F</b>	1 μF

Figure 7. Typical Operating Circuit and Capacitor Values

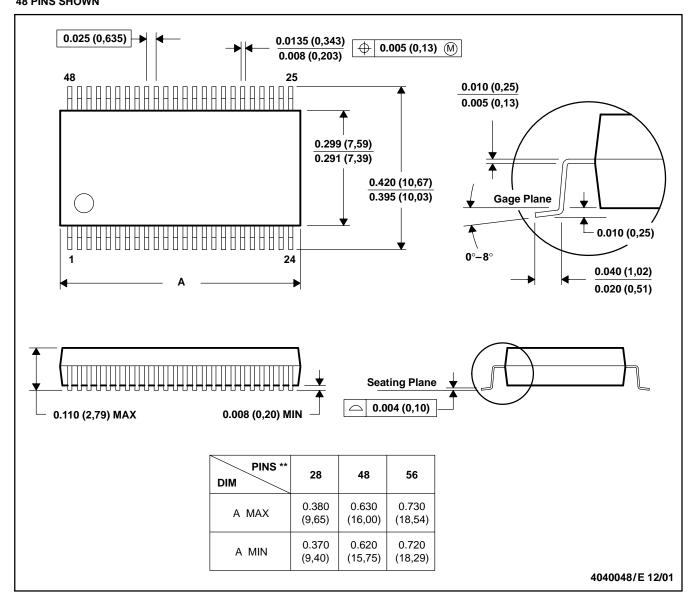


# **MECHANICAL DATA**

MSSO001C - JANUARY 1995 - REVISED DECEMBER 2001

#### PLASTIC SMALL-OUTLINE PACKAGE

# DL (R-PDSO-G\*\*) 48 PINS SHOWN



NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- D. Falls within JEDEC MO-118

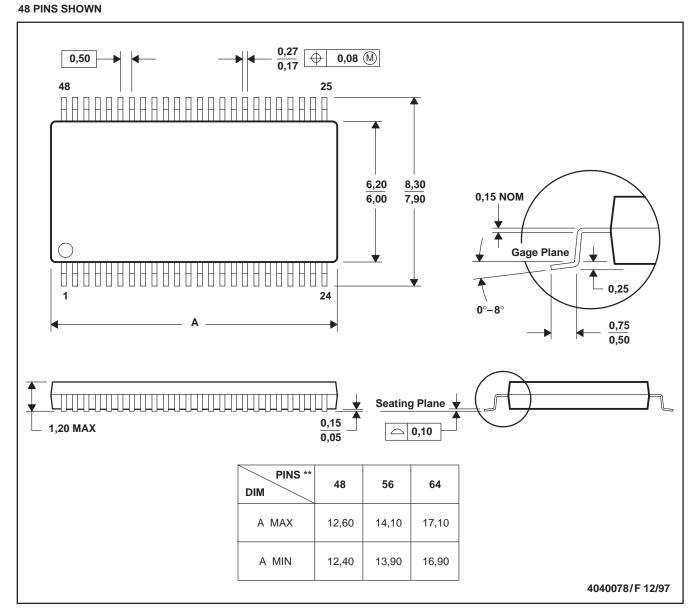


# **MECHANICAL DATA**

MTSS003D - JANUARY 1995 - REVISED JANUARY 1998

# PLASTIC SMALL-OUTLINE PACKAGE

DGG (R-PDSO-G\*\*)



NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold protrusion not to exceed 0,15.

D. Falls within JEDEC MO-153



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