TEXAS INSTRUMENTS

SLLS855-AUGUST 2007

FEATURES

- Single-Chip and Single-Supply Interface for Two IBM PC/AT Serial Ports
- Meets or Exceeds the Requirements of TIA/EIA-232-F and ITU v.28 Standards
- Operates With 3-V to 5.5-V V_{CC} Supply
- Always-Active Noninverting Receiver Output (ROUT2) Per Port
- Operates Up To 250 kbit/s
- Low Standby Current . . . 1 μA Typical
- External Capacitors . . . 4 × 0.22 μF
- Accepts 5-V Logic Input With 3.3-V Supply
- Allows for Flexible Power Down of Either Serial Port
- Serial-Mouse Driveability
- RS-232 Bus-Pin ESD Protection Exceeds ±15 kV Using Human-Body Model (HBM)

APPLICATIONS

- Battery-Powered Systems
- Notebooks
- Laptops
- Palmtop PCs
- Hand-Held Equipment

DGG OR DL PACKAGE (TOP VIEW) 48 ∏ ROUT5A RIN5A L 47 NOUT4A RIN4A II 2 RIN3A 🛮 3 46 ∏ ROUT3A RIN2A 4 45 ROUT2A RIN1A 5 44 ROUT1A INVA 16 43 ROUT2A DOUT3A 42 DIN3A DOUT2A 41 ∏ DIN2A DOUT1A 9 40 DIN1A FORCEOFFA [] 10 39 TFORCEON C2- [] 38**∏** V− 37 **∏** V+ C2+ | 12 GND 13 36 C1+ 35 ∏ C1-FORCEOFFB 15 34 GND DOUT1B 16 DIN1B DOUT2B 17 32 DIN2B DOUT3B 18 31 N DIN3B INVB I 19 30 ROUT2B RIN1B [] 20 29 ROUT1B RIN2B **1**21 28 ∏ ROUT2B RIN3B | 22 27 ROUT3B RIN4B [] 23 26 ∏ ROUT4B RIN5B [25 | ROUT5B

DESCRIPTION/ORDERING INFORMATION

The TRSF23243 consists of two ports, each containing three line drivers and five line receivers, and a dual charge-pump circuit with ±15-kV ESD protection pin to pin (serial-port connection pins, including GND). This device meets the requirements of TIA/EIA-232-F and provides 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, this device includes an always-active noninverting output (ROUT2) per port, which allows applications using the ring indicator to transmit data while the device is powered down. The device operates at data signaling rates up to 250 kbit/s and a maximum of 30-V/µs driver output slew-rate.

ORDERING INFORMATION

T _A	PACE	(AGE ⁽¹⁾⁽²⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	SSOP – DL	Tube of 25	TRSF23243CDL	- TRSF23243C
0°C to 70°C	330P - DL	Reel of 1000	TRSF23243CDLR	N. S.
	TSSOP - DGG	Reel of 2000	TRSF23243CDGGR	TRSF23243C
	CCOD DI	Tube of 25	TRSF23243IDL	TDCF000401
-40°C to 85°C	SSOP – DL	Reel of 1000	TRSF23243IDLR	TRSF23243I
	TSSOP - DGG	Reel of 2000	TRSF23243IDGGR	TRSF23243I

(1) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

⁽²⁾ For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.



lf.dzsc.com

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.



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 $\overline{\text{FORCEOFF}}$ 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 $\overline{\text{FORCEOFF}}$ is set low, both drivers and receivers (except $\overline{\text{ROUT2}}$) are shut off, and the supply current is reduced to 1 μA . 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 $\overline{\text{FORCEOFF}}$ 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 $\overline{\text{INV}}$ output is used to notify the user if an RS-232 signal is present at any receiver input. $\overline{\text{INV}}$ 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 μ s. Refer to Figure 5 for receiver input levels.

FUNCTION TABLES

Each Driver⁽¹⁾ (Each Port)

		INPUTS		OUTPUT	
DIN	FORCEON	FORCEOFF	VALID RIN RS-232 LEVEL	DOUT	DRIVER STATUS
Х	Х	L	X	Z	Powered off
L	Н	Н	X	Н	Normal operation with
Н	Н	Н	X	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

(1) H = high level, L = low level, X = irrelevant, Z = high impedance

Each Receiver⁽¹⁾ (Each Port)

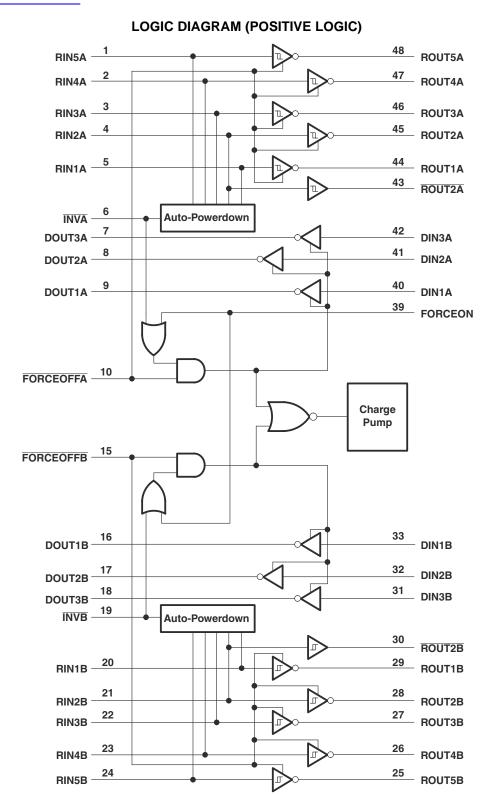
		INPUTS		OUT	PUTS	
RIN2	RIN1, RIN3–RIN5	FORCEOFF	VALID RIN RS-232 LEVEL	ROUT2	ROUT	RECEIVER STATUS
L	X	L	X	L	Z	Powered off while
Н	X	L	X	Н	Z	ROUT2 is active
L	L	Н	Yes	L	Н	
L	Н	Н	Yes	L	L	Normal operation with
Н	L	Н	Yes	Н	Н	auto-powerdown
Н	Н	Н	Yes	Н	L	disabled/enabled
Open	Open	Н	No	L	Н	

(1) H = high level, L = low level, X = irrelevant,

Z = high impedance (off),

Open = input disconnected or connected driver off

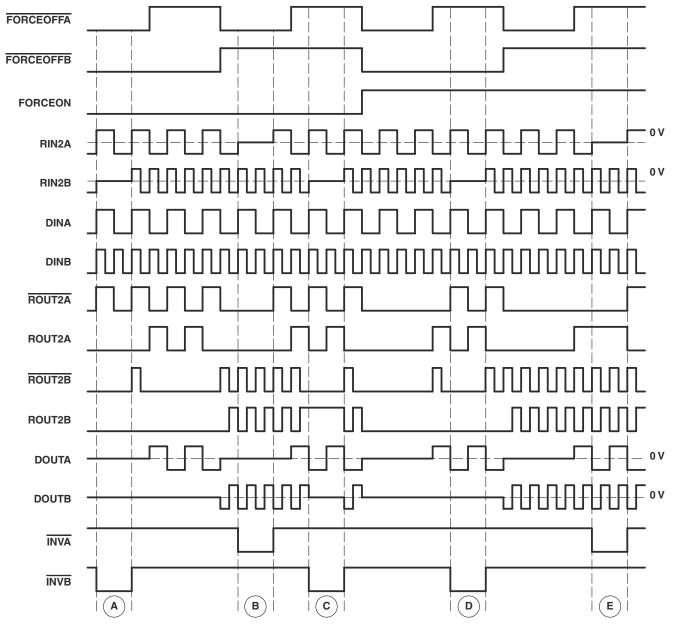






Timing

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.



- 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

Absolute Maximum Ratings⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V _{CC}	Supply voltage range ⁽²⁾		-0.3	6	V
V+	Positive-output supply voltage range ⁽²⁾		-0.3	7	V
V-	Negative-output supply voltage range ⁽²⁾		0.3	-7	V
V+ - V-	Supply voltage difference ⁽²⁾			13	V
\/	Input voltage range	Driver (FORCEOFF, FORCEON)	-0.3	6	V
VI	Input voltage range	Receiver		V	
	Output voltage range	Driver	-13.2	13.2	V
Vo	Output voltage range	Receiver (ĪNV)	-0.3	V _{CC} + 0.3	V
0	Package thermal impedance (3)(4)	DGG package		70	°C/W
θ_{JA}	Package thermal impedance (**/*)	DL package		63	-0/00
TJ	Operating virtual junction temperature			150	°C
T _{stg}	Storage temperature range		-65	150	°C

⁽¹⁾ 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.

(2) All voltages are with respect to network GND.

Recommended Operating Conditions⁽¹⁾

See Figure 7

				MIN	NOM	MAX	UNIT
	Supply voltage		V _{CC} = 3.3 V	3	3.3	3.6	V
	Supply voltage		$V_{CC} = 5 V$	4.5	5	5.5	V
\/	Driver and control	DIN FORCEOFF FORCEON	$V_{CC} = 3.3 \text{ V}$	2		V	
V _{IH}	high-level input voltage	DIN, FORCEOFF, FORCEON	$V_{CC} = 5 V$	2.4			V
V _{IL}	Driver and control low-level input voltage	DIN, FORCEOFF, FORCEON				0.8	V
\/	Driver and control input voltage	DIN, FORCEOFF, FORCEON		0		5.5	V
VI	Receiver input voltage			-25		25	V
т	Operating free-air temperature		TRSF23243C	0		70	°C
IA			TRSF23243I	-40		85	C

⁽¹⁾ Test conditions are C1–C4 = 0.1 μ F at V_{CC} = 3.3 $V \pm 0.3$ V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 $V \pm 0.5$ V.

Electrical Characteristics(1)

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

	PAF	RAMETER	TEST CONDITIONS	MIN	TYP ⁽²⁾	MAX	UNIT
II	Input leakage current	FORCEOFF, FORCEON			±0.01	±1	μΑ
		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	
	$(T_A = 25^{\circ}C)$	Auto-powerdown enabled	No load, FORCEOFF at V _{CC} , FORCEON at GND, All RIN are open or grounded		1	20	μΑ

⁽¹⁾ Test conditions are C1–C4 = 0.1 μ F at V_{CC} = 3.3 V \pm 0.3 V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 V \pm 0.5 V.

⁽³⁾ Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_J(max) – T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can affect reliability.

⁽⁴⁾ The package thermal impedance is calculated in accordance with JESD 51-7.

⁽²⁾ All typical values are at $V_{CC} = 3.3 \text{ V}$ or $V_{CC} = 5 \text{ V}$, and $T_A = 25^{\circ}\text{C}$.



DRIVER SECTION

Electrical Characteristics(1)

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

	PARAMETER	TEST CONDITIONS	MIN	TYP ⁽²⁾	MAX	UNIT
V _{OH}	High-level output voltage	All DOUT at R _L = $3 \text{ k}\Omega$ to GND	5	5.4		V
V _{OL}	Low-level output voltage	All DOUT at R _L = $3 \text{ k}\Omega$ to GND	– 5	-5.4		V
Vo	Output voltage (mouse driveability)	DIN1 = DIN2 = GND, DIN3 = V_{CC} , 3- $k\Omega$ to GND at DOUT3, DOUT1 = DOUT2 = -2.5 mA	±5			V
I _{IH}	High-level input current	$V_I = V_{CC}$		±0.01	±1	μΑ
$I_{\rm IL}$	Low-level input current	V _I at GND		±0.01	±1	μΑ
1	Short-circuit output	$V_{CC} = 3.6 \text{ V}$ $V_{O} = 0 \text{ V}$		±35	±60	mA
Ios	current ⁽³⁾	$V_{CC} = 5.5 \text{ V}$ $V_{O} = 0 \text{ V}$		±33	±60	IIIA
ro	Output resistance	V_{CC} , V+, and V- = 0 V, V_{O} = ± 2 V	300	10M		Ω
	Output looks as surrent	FORCEOFF = GND, $V_0 = \pm 12 \text{ V}, V_{CC} = 3 \text{ V to } 3.6 \text{ V}$			±25	
l _{OZ}	Output leakage current	FORCEOFF = GND, $V_{O} = \pm 10 \text{ V}, V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$			±25	μA

⁽¹⁾ Test conditions are C1–C4 = 0.1 μ F at V_{CC} = 3.3 V \pm 0.3 V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 V \pm 0.5 V. (2) All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

Switching Characteristics⁽¹⁾

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

	PARAMETER	1	TEST CONDITIONS	MIN	TYP ⁽²⁾ MAX	UNIT
	Maximum data rate	$R_L = 3 \text{ k}\Omega,$ One DOUT switching	C _L = 1000 pF, See Figure 2	250		kbit/s
t _{sk(p)}	Pulse skew ⁽³⁾	C _L = 150 pF to 2500 pF,	$R_L = 3 \text{ k}\Omega \text{ to } 7 \text{ k}\Omega, \text{ See Figure 2}$		100	ns
	Slew rate,	V _{CC} = 3.3 V,	C _L = 150 pF to 1000 pF	6	30	
SR(tr)	transition region (see Figure 2)	$R_L = 3 \text{ k}\Omega \text{ to } 7 \text{ k}\Omega$	C _L = 150 pF to 2500 pF	4	30	V/µs

⁽¹⁾ Test conditions are C1–C4 = 0.1 μ F at V_{CC} = 3.3 $V \pm 0.3$ V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 $V \pm 0.5$ V. (2) All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C. (3) Pulse skew is defined as $|t_{PLH}|$ of each channel of the same device.

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.

RECEIVER SECTION

Electrical Characteristics(1)

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

	PARAMETER	TEST CONDITIONS	MIN	TYP ⁽²⁾	MAX	UNIT
V_{OH}	High-level output voltage	$I_{OH} = -1 \text{ mA}$	V _{CC} - 0.6	V _{CC} - 0.1		V
V_{OL}	Low-level output voltage	I _{OL} = 1.6 mA			0.4	V
\/	Positive-going input threshold voltage	V _{CC} = 3.3 V		1.6	2.4	V
V _{IT+}	Positive-going input tilleshold voltage	V _{CC} = 5 V		1.9	2.4	V
\/	Negative-going input threshold voltage	V _{CC} = 3.3 V	0.6	1.1		V
V _{IT}	Negative-going input tilleshold voltage	V _{CC} = 5 V	0.8	1.4		V
V_{hys}	Input hysteresis (V _{IT+} - V _{IT-})			0.5		V
I_{OZ}	Output leakage current (except ROUT2B)	FORCEOFF = 0 V	-	±0.05	±10	μΑ
rı	Input resistance	$V_I = \pm 3 \text{ V to } \pm 25 \text{ V}$	3	5	7	$k\Omega$

⁽¹⁾ Test conditions are C1–C4 = 0.22 μ F at V_{CC} = 3.3 V \pm 0.3 V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 V \pm 0.5 V. (2) All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

Switching Characteristics⁽¹⁾

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 3)

	PARAMETER	TI	EST CONDITIONS	TYP ⁽²⁾	UNIT
t _{PLH}	Propagation delay time, low- to high-level output	C _L = 150 pF,	See Figure 4	150	ns
t _{PHL}	Propagation delay time, high- to low-level output	C _L = 150 pF,	See Figure 4	150	ns
t _{en}	Output enable time	C _L = 150 pF, See Figure 5	$R_L = 3 \text{ k}\Omega,$	200	ns
t _{dis}	Output disable time	C _L = 150 pF, See Figure 5	$R_L = 3 \text{ k}\Omega,$	200	ns
t _{sk(p)}	Pulse skew ⁽³⁾	See Figure 4		50	ns

⁽¹⁾ Test conditions are C1–C4 = 0.22 μ F at V_{CC} = 3.3 V \pm 0.3 V; C1 = 0.047 μ F, C2–C4 = 0.33 μ F at V_{CC} = 5 V \pm 0.5 V. (2) All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C. (3) Pulse skew is defined as $|t_{PLH}|$ of each channel of the same device.



AUTO-POWERDOWN SECTION

Electrical Characteristics

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

	PARAMETER	TEST C	CONDITIONS	MIN	MAX	UNIT
V _{T+(valid)}	Receiver input threshold for INV high-level output voltage	FORCEON = GND,	FORCEOFF = V _{CC}		2.7	V
V _{T(valid)}	Receiver input threshold for INV high-level output voltage	FORCEON = GND,	FORCEOFF = V _{CC}	-2.7		V
V _{T(invalid)}	Receiver input threshold for INV low-level output voltage	FORCEON = GND,	FORCEOFF = V _{CC}	-0.3	0.3	V
V _{OH}	ĪNV high-level output voltage	I _{OH} = -1 mA, FORCEOFF = V _{CC}	FORCEON = GND,	V _{CC} - 0.6		V
V _{OL}	INV low-level output voltage	I _{OL} = 1.6 mA, FORCEOFF = V _{CC}	FORCEON = GND,		0.4	V

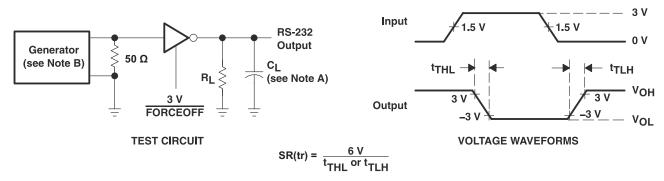
Switching Characteristics

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

	PARAMETER	TYP ⁽¹⁾	UNIT
t _{valid}	Propagation delay time, low- to high-level output	1	μs
t _{invalid}	Propagation delay time, high- to low-level output	30	μs
t _{en}	Supply enable time	100	μs

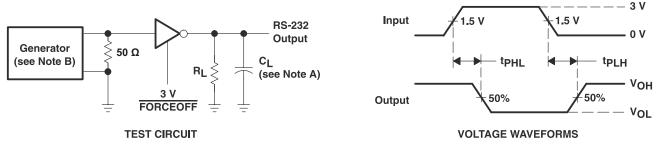
⁽¹⁾ All typical values are at V_{CC} = 3.3 V or V_{CC} = 5 V, and T_A = 25°C.

PARAMETER MEASUREMENT INFORMATION



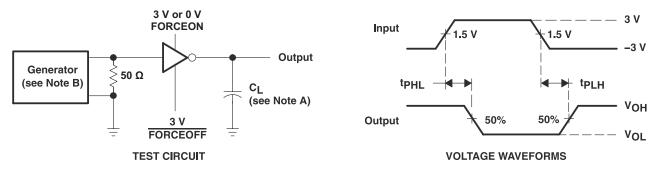
- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbits/s, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \le 10$ ns, $t_f \le 10$ ns.

Figure 2. Driver Slew Rate



- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbits/s, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \le 10$ ns, $t_f \le 10$ ns.

Figure 3. Driver Pulse Skew

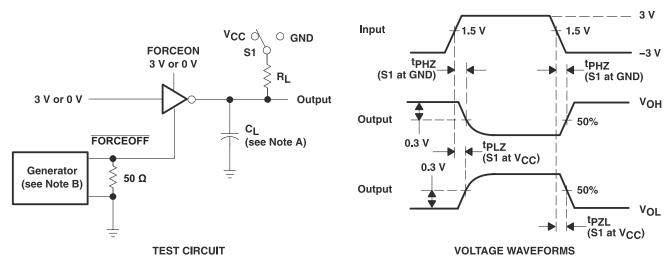


- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbits/s, Z_O = 50 Ω , 50% duty cycle, $t_r \le$ 10 ns, $t_f \le$ 10 ns.

Figure 4. Receiver Propagation Delay Times



PARAMETER MEASUREMENT INFORMATION (continued)

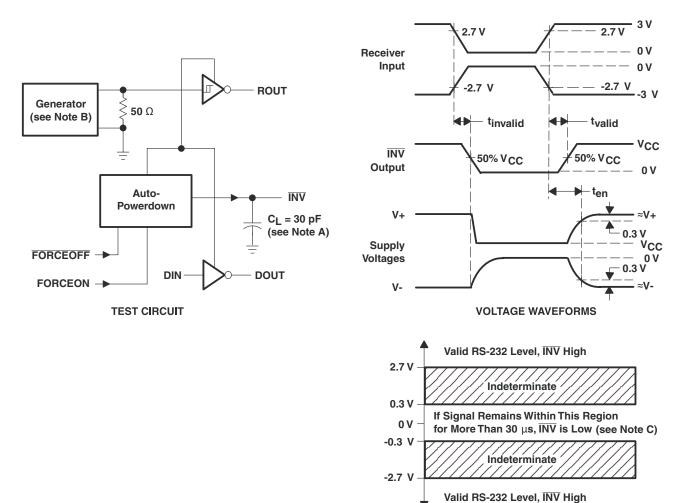


- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbits/s, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \le 10$ ns, $t_f \le 10$ ns.
- C. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
- D. t_{PZL} and t_{PZH} are the same as t_{en} .

Figure 5. Receiver Enable and Disable Times



PARAMETER MEASUREMENT INFORMATION (continued)

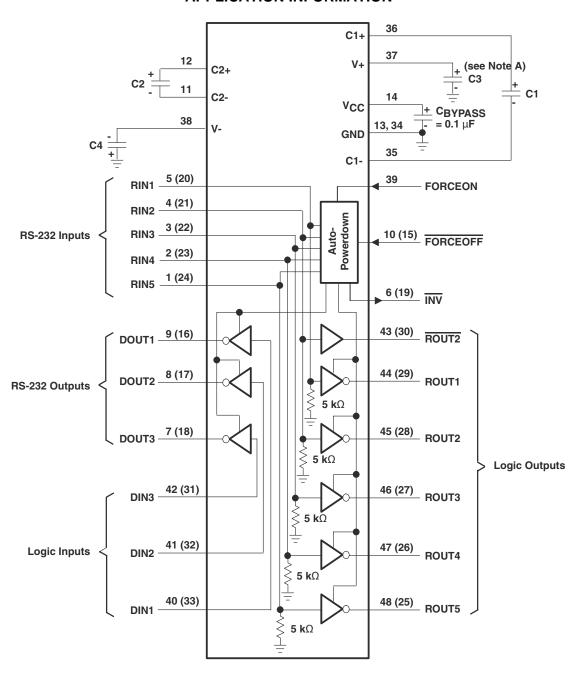


- A. C_L includes probe and jig capacitance.
- B. The pulse generator has the following characteristics: PRR = 250 kbits/s, $Z_O = 50 \Omega$, 50% duty cycle, $t_r \le 10$ ns, $t_f \le 10$ ns.

Figure 6. INV Propagation Delay Times and Supply Enabling Times



APPLICATION INFORMATION



V_{CC} vs CAPACITOR VALUES

VCC	C1	C2, C3, and C4			
$\begin{array}{c} 3.3 \ V \ \pm \ 0.3 \ V \\ 5 \ V \ \pm \ 0.5 \ V \\ 3 \ V \ to \ 5.5 \ V \end{array}$	0.22 μF 0.047 μF 0.22 μF	0.22 μF 0.33 μF 1 μF			

- A. C3 can be connected to V_{CC} or GND.
- B. Resistor values shown are nominal.
- C. Numbers in parentheses are for B section.

Figure 7. Typical Operating Circuit and Capacitor Values



PACKA

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Pe
TRSF23243CDGGR	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260
TRSF23243CDGGRG4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260
TRSF23243CDLR	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260
TRSF23243CDLRG4	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260

⁽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

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.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 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 **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, 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 retard in homogeneous material)

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

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 provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate in continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical at 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 Cu



查询"JRSF23243"供应商

23-Jul-2010

TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

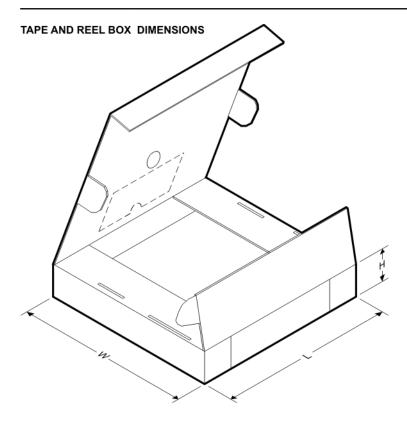


*All dimensions are nominal

Device	Package Type	Package Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TRSF23243CDGGR	TSSOP	DGG	48	2000	330.0	24.4	8.6	15.8	1.8	12.0	24.0	Q1
TRSF23243CDLR	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1

查询"JRSF23243"供应商

23-Jul-2010

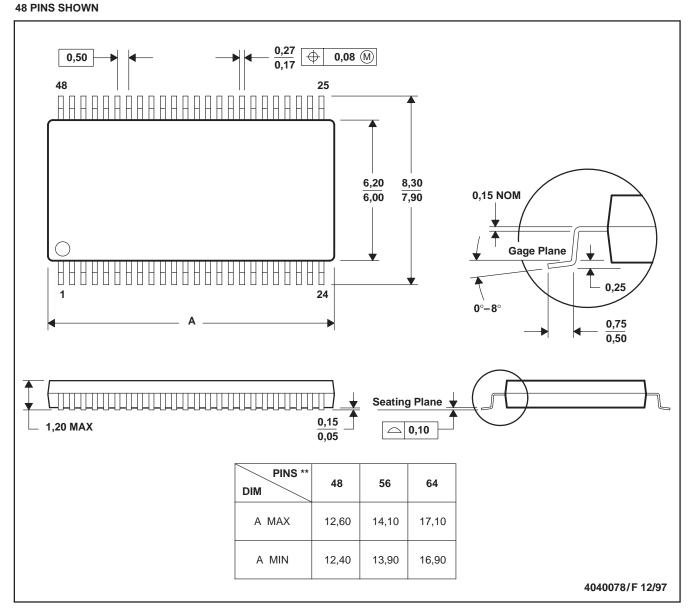


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TRSF23243CDGGR	TSSOP	DGG	48	2000	346.0	346.0	41.0
TRSF23243CDLR	SSOP	DL	48	1000	346.0	346.0	49.0

DGG (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE



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

查询"TRSF23243"供应商

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		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Communications and Telecom	www.ti.com/communications
DSP	<u>dsp.ti.com</u>	Computers and Peripherals	www.ti.com/computers
Clocks and Timers	www.ti.com/clocks	Consumer Electronics	www.ti.com/consumer-apps
Interface	interface.ti.com	Energy	www.ti.com/energy
Logic	logic.ti.com	Industrial	www.ti.com/industrial
Power Mgmt	power.ti.com	Medical	www.ti.com/medical
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Space, Avionics & Defense	www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video and Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless-apps