

符合 RS-232 的 3V 至 5.5V 多通道线路驱动器和接收器

1 特性

- 由 3V 至 5.5V V_{CC} 电源供电
- 始终有效同相接收器输出 (ROUT2B)
- 低待机电流: $1\mu A$ (典型值)
- 外部电容器: $4 \times 0.1\mu F$
- 接受 5V 逻辑输入及 3.3V 电源
- 可与 SN65C3238、SN75C3238 互操作
- 支持 250kbit/s 至 1Mbit/s 的运行速度
- 使用人体放电模型 (HBM) 时, RS-232 总线引脚 ESD 保护大于 $\pm 15kV$

2 应用

- 电池供电型系统
- PDA
- 笔记本电脑
- 便携式计算机
- 掌上电脑
- 手持设备

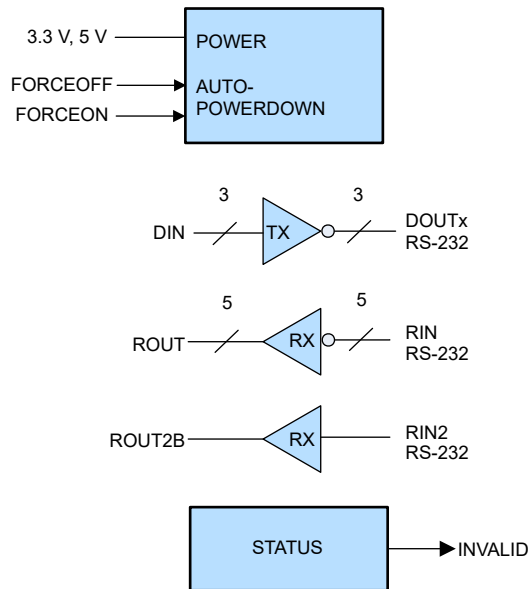
3 说明

TRSF3243 由 3 个线路驱动器、5 个线路接收器和一个双电荷泵电路组成, 具有引脚对引脚 (串行端口连接引脚, 包括 GND) $\pm 15kV$ ESD 保护。该器件可在异步通信控制器和串行端口连接器之间提供电气接口。电荷泵和四个小型外部电容器支持由 3V 至 5.5V 单电源供电。另外, 该器件包括一个始终有效同相输出 (ROUT2B), 这使得使用振铃指示的应用能够在器件断电的情况下发送数据。该器件以高达 1Mbit/s 的数据信号传输速率运行, 具有从 $24V/\mu s$ 至 $150V/\mu s$ 的更高压摆率范围。

封装信息

器件型号	封装 ⁽¹⁾	封装尺寸 (标称值)
TRSF3243	SSOP (DB)	10.20mm × 5.30mm
	SOIC (DW)	17.90 mm × 7.50mm
	TSSOP (PW)	9.70mm × 4.40mm

(1) 如需了解所有可用封装, 请参阅数据表末尾的可订购产品附录。



简化版电路



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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision A (September 2008) to Revision B (October 2022)	Page
• 删除了 订购信息 表.....	1
• 更改了 封装信息 表.....	1
• 添加了 简化原理图	1
• Added the <i>Pin Configuration and Functions</i>	3
• Added the <i>Thermal Information</i> table.....	4
• Changed the I _{CC} Supply current auto-powerdown disabled MAX value from 1 mA to 1.2 mA in the <i>Electrical Characteristics</i>	5
• Added the <i>Detailed Description</i> section.....	12

5 Pin Configuration and Functions

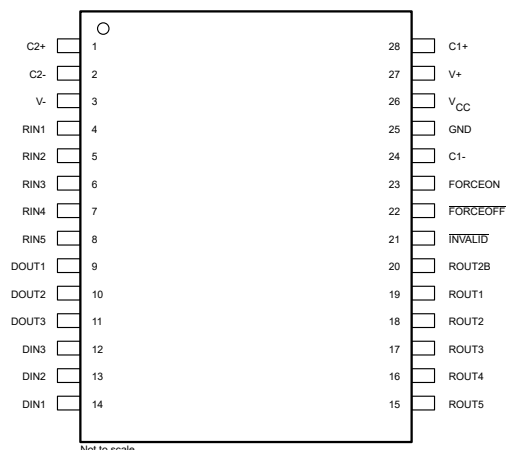


图 5-1. DB, DW, or PW Package, 28 Pin (SSOP, SOIC, TSSOP)
(Top View)

表 5-1. Pin Functions

PIN		TYPE	DESCRIPTION
NO.	NAME		
1	C2+	—	Positive terminal of the voltage-doubler charge-pump capacitor
2	C2-	—	Negative terminal of the voltage-doubler charge-pump capacitor
3	V-	—	Negative charge pump output voltage
4	RIN1	I	RS-232 receiver inputs
5	RIN2		
6	RIN3		
7	RIN4		
8	RIN5		
9	DOUT1	O	RS-232 driver outputs
10	DOUT2		
11	DOUT3		
12	DIN3	I	Driver inputs
13	DIN2		
14	DIN1		
15	ROUT5	O	Receiver outputs
16	ROUT4		
17	ROUT3		
18	ROUT2		
19	ROUT1		
20	ROUT2B	—	Always-active noninverting receiver output;
21	INVALID	O	Invalid Output Pin
22	FORCEOFF	I	Auto Powerdown Control input (Refer to Truth Table)
23	FORCEON	I	Auto Powerdown Control input (Refer to Truth Table)
24	C1-	—	Negative terminal of the voltage-doubler charge-pump capacitor
25	GND	—	Ground
26	V _{CC}	—	3-V to 5.5-V supply voltage
27	V+	—	Positive charge pump output voltage
28	C1+	—	Positive terminal of the voltage-doubler charge-pump capacitor

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

			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
V _I	Input voltage range	Driver (FORCEOFF, FORCEON)	- 0.3	6	V
		Receiver	- 25	25	
V _O	Output voltage range	Driver	- 13.2	13.2	V
T _J	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.

6.2 Recommended Operating Conditions

see 图 7-6 ⁽¹⁾

			MIN	NOM	MAX	UNIT		
Supply voltage		V _{CC} = 3.3 V	3	3.3	3.6	V		
		V _{CC} = 5 V	4.5	5	5.5			
V _{IH}	Driver and control high-level input voltage	DIN, FORCEOFF, FORCEON	V _{CC} = 3.3 V			V		
			V _{CC} = 5 V					
V _{IL}	Driver and control low-level input voltage	DIN, FORCEOFF, FORCEON			0.8	V		
V _I	Driver and control input voltage	DIN, FORCEOFF, FORCEON			0	5.5	V	
V _I	Receiver input voltage		- 25			25	V	
T _A	Operating free-air temperature		TRSF3243I	- 40			85	°C
			TRSF3243C	0			70	

(1) Test conditions are C1 - C4 = 0.1 μF at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μF, C2 - C4 = 0.33 μF at V_{CC} = 5 V ± 0.5 V.

6.3 Thermal Information

THERMAL METRIC ⁽¹⁾		TSSOP (PW)	SOIC (DW)	DB (SSOP)	UNIT
		28 PINS	28 PINS	28 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	70.3	59.0	76.1	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	21.0	28.8	35.8	°C/W
R _{θJB}	Junction-to-board thermal resistance	29.2	30.3	37.4	°C/W
ψ _{JT}	Junction-to-top characterization parameter	1.3	7.8	7.4	°C/W
ψ _{JB}	Junction-to-board characterization parameter	28.8	30.0	37.0	°C/W
R _{θJC(bot)}	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.

6.4 Electrical Characteristics

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see 图 7-6) ⁽²⁾

PARAMETER		TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
I _I	Input leakage current	FORCEOFF, FORCEON		±0.01	±1	μ A
I _{CC}	Supply current	Auto-powerdown disabled	No load, FORCEOFF and FORCEON = V _{CC} For DB and PW package	0.3	1.2	mA
		Auto-powerdown disabled	No load, FORCEOFF and FORCEON = V _{CC} For DW package	0.3	1	mA
		Powered off	No load, FORCEOFF = GND	1	10	μ A
		Auto-powerdown enabled	No load, FORCEOFF = V _{CC} , FORCEON = GND, All RIN are open or grounded, All DIN are grounded	1	10	

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

(2) Test conditions are C1 - C4 = 0.1 μ F at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μ F, C2 - C4 = 0.33 μ F at V_{CC} = 5 V ± 0.5 V.

6.5 Electrical Characteristics: Driver

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see 图 7-6)

PARAMETER		TEST CONDITIONS ⁽³⁾	MIN	TYP ⁽¹⁾	MAX	UNIT
V _{OH}	High-level output voltage	All DOUT at R _L = 3 kΩ to GND	5	5.4		V
V _{OL}	Low-level output voltage	All DOUT at R _L = 3 kΩ to GND	- 5	- 5.4		V
V _O	Output voltage (mouse driveability)	DIN1 = DIN2 = GND, DIN3 = V _{CC} , 3-kΩ to GND at DOUT3, DOUT1 = DOUT2 = 2.5 mA	±5			V
I _{IH}	High-level input current	V _I = V _{CC}	±0.01		±1	μ A
I _{IL}	Low-level input current	V _I = GND	±0.01		±1	μ A
I _{OS}	Short-circuit output current ⁽²⁾	V _{CC} = 3.6 V, V _O = 0 V	±35		±60	mA
		V _{CC} = 5.5 V, V _O = 0 V	±35		±90	
r _o	Output resistance	V _{CC} , V ₊ , and V ₋ = 0 V, V _O = ±2 V	300	10M		Ω
I _{off}	Output leakage current	FORCEOFF = GND, V _O = ±12 V, V _{CC} = 3 V to 3.6 V			±25	μ A
		V _O = ±10 V, V _{CC} = 4.5 V to 5.5 V			±25	

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

(2) 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.

(3) Test conditions are C1 - C4 = 0.1 μ F at V_{CC} = 3.3 V ± 0.3 V; C1 = 0.047 μ F, C2 - C4 = 0.33 μ F at V_{CC} = 5 V ± 0.5 V.

6.6 Switching Characteristics: Driver

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 7-6](#))

PARAMETER	TEST CONDITIONS ⁽³⁾	MIN	TYP ⁽¹⁾	MAX	UNIT
Maximum data rate (see Figure 7-1)	$R_L = 3\text{ k}\Omega$, One DOUT switching	$C_L = 1000\text{ pF}$	250		kbit/s
		$C_L = 250\text{ pF}$, $V_{CC} = 3\text{ V to }4.5\text{ V}$	1000		
		$C_L = 1000\text{ pF}$, $V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1000		
$t_{sk(p)}$ Pulse skew ⁽²⁾	$C_L = 150\text{ pF to }2500\text{ pF}$, $R_L = 3\text{ k}\Omega\text{ to }7\text{ k}\Omega$, See Figure 7-2		25		ns
SR(tr) Slew rate, transition region (see Figure 7-1)	$C_L = 150\text{ pF to }1000\text{ pF}$, $R_L = 3\text{ k}\Omega\text{ to }7\text{ k}\Omega$, $V_{CC} = 3.3\text{ V}$		18	150	V/ $\mu\text{ s}$

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

(2) Pulse skew is defined as $|t_{PLH} - t_{PHL}|$ of each channel of the same device.

(3) Test conditions are $C_1 - C_4 = 0.1\text{ }\mu\text{F}$ at $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$; $C_1 = 0.047\text{ }\mu\text{F}$, $C_2 - C_4 = 0.33\text{ }\mu\text{F}$ at $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$.

6.7 Electrical Characteristics: Receiver

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see [Figure 7-6](#))

PARAMETER	TEST CONDITIONS ⁽²⁾	MIN	TYP ⁽¹⁾	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	$I_{OL} = 1.6\text{ mA}$			0.4	V
V_{IT+} Positive-going input threshold voltage	$V_{CC} = 3.3\text{ V}$		1.6	2.4	V
	$V_{CC} = 5\text{ V}$		1.9	2.4	
V_{IT-} Negative-going input threshold voltage	$V_{CC} = 3.3\text{ V}$	0.6	1.1		V
	$V_{CC} = 5\text{ V}$	0.8	1.4		
V_{hys} Input hysteresis ($V_{IT+} - V_{IT-}$)			0.5		V
I_{off} Output leakage current (except ROUT2B)	FORCEOFF = 0 V		± 0.05	± 10	$\mu\text{ A}$
r_i Input resistance	$V_I = \pm 3\text{ V to } \pm 25\text{ V}$	3	5	7	k Ω

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

(2) Test conditions are $C_1 - C_4 = 0.1\text{ }\mu\text{F}$ at $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$; $C_1 = 0.047\text{ }\mu\text{F}$, $C_2 - C_4 = 0.33\text{ }\mu\text{F}$ at $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$.

6.8 Switching Characteristics: Receiver

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

PARAMETER	TEST CONDITIONS ⁽³⁾	TYP ⁽¹⁾	UNIT
t_{PLH} Propagation delay time, low- to high-level output	$C_L = 150\text{ pF}$, See Figure 7-3	150	ns
t_{PHL} Propagation delay time, high- to low-level output	$C_L = 150\text{ pF}$, See Figure 7-3	150	ns
t_{en} Output enable time	$C_L = 150\text{ pF}$, $R_L = 3\text{ k}\Omega$, See Figure 7-4	200	ns
t_{dis} Output disable time	$C_L = 150\text{ pF}$, $R_L = 3\text{ k}\Omega$, See Figure 7-4	200	ns
$t_{sk(p)}$ Pulse skew ⁽²⁾	See Figure 7-3	50	ns

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

(2) Pulse skew is defined as $|t_{PLH} - t_{PHL}|$ of each channel of the same device.

(3) Test conditions are $C_1 - C_4 = 0.1\text{ }\mu\text{F}$ at $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$; $C_1 = 0.047\text{ }\mu\text{F}$, $C_2 - C_4 = 0.33\text{ }\mu\text{F}$ at $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$.

6.9 Electrical Characteristics: Auto-Powerdown

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see 图 7-5)

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

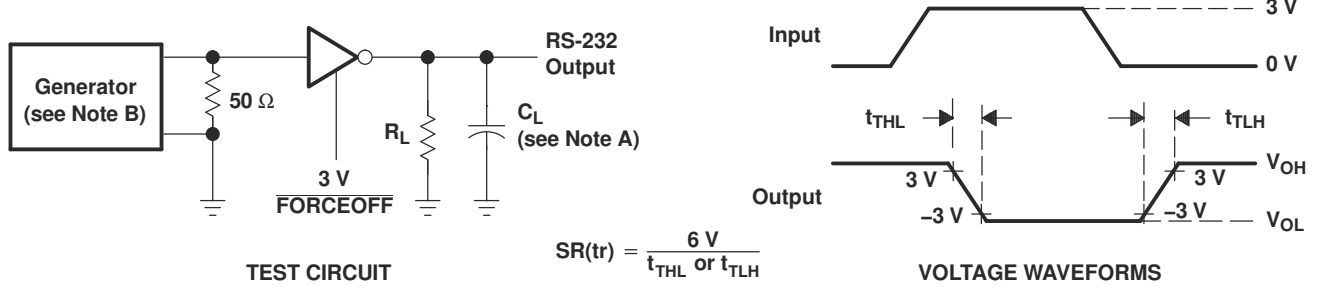
6.10 Switching Characteristics: Auto-Powerdown

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see 图 7-5)

PARAMETER		TYP ⁽¹⁾	UNIT
t_{valid}	Propagation delay time, low- to high-level output	1	$\mu\text{ s}$
t_{invalid}	Propagation delay time, high- to low-level output	30	$\mu\text{ s}$
t_{en}	Supply enable time	100	$\mu\text{ s}$

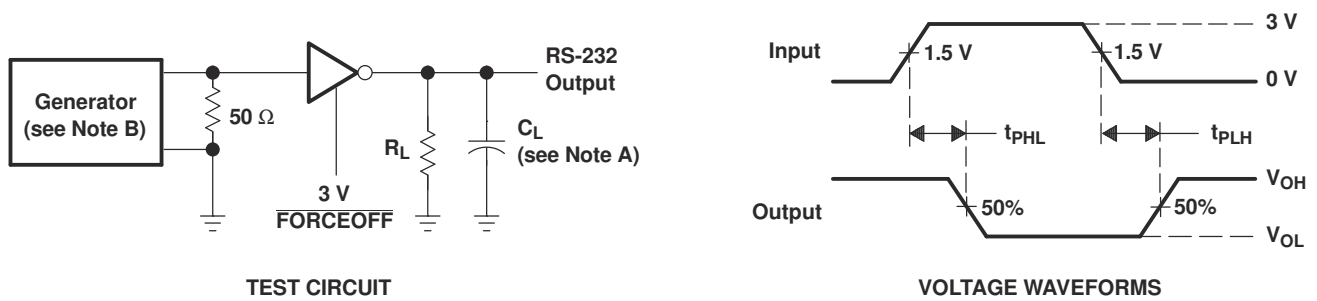
(1) All typical values are at $V_{CC} = 3.3\text{ V}$ or $V_{CC} = 5\text{ V}$, and $T_A = 25^\circ\text{C}$.

Parameter Measurement Information



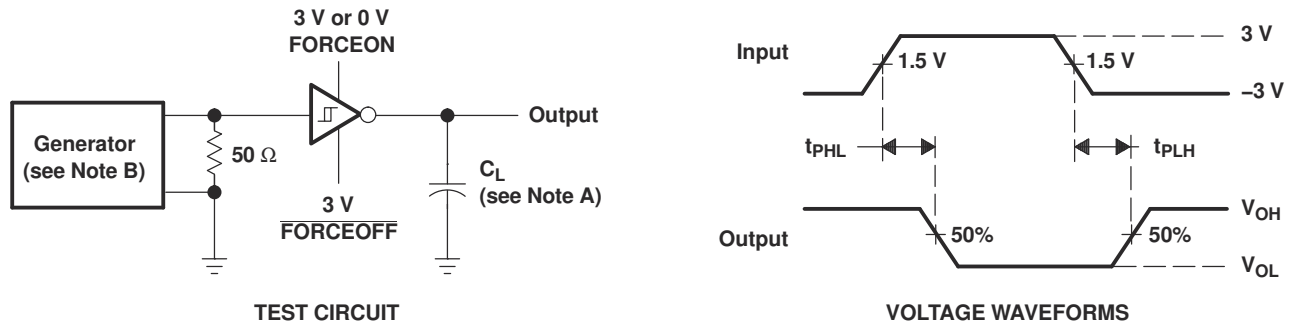
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: PRR = 1 Mbit/s, $Z_O = 50\ \Omega$, 50% duty cycle, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

图 7-1. Driver Slew Rate



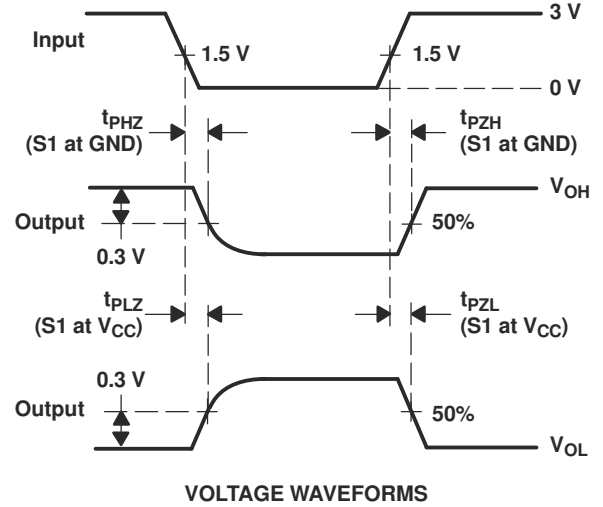
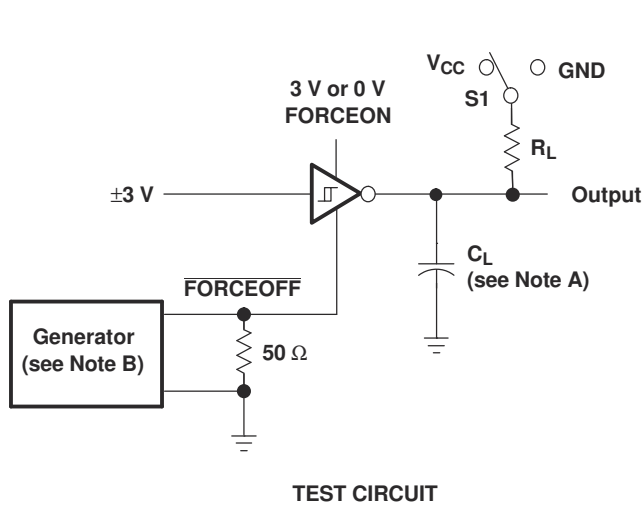
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: PRR = 1 Mbit/s, $Z_O = 50\ \Omega$, 50% duty cycle, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

图 7-2. Driver Pulse Skew



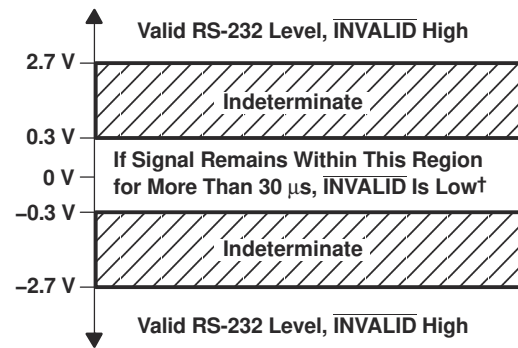
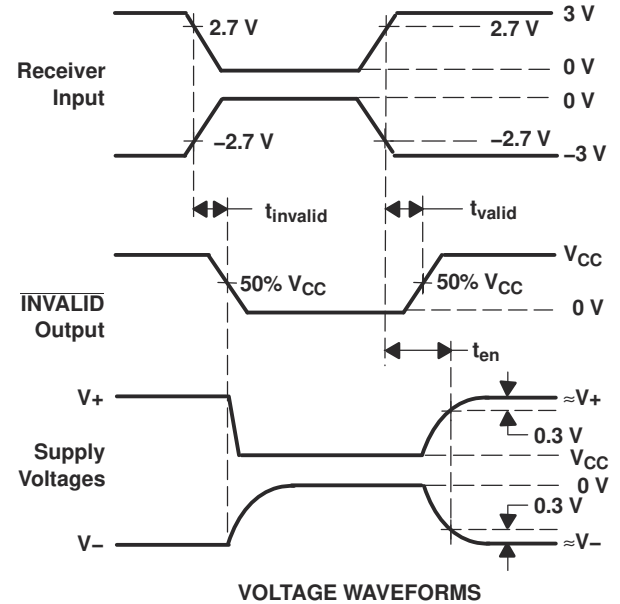
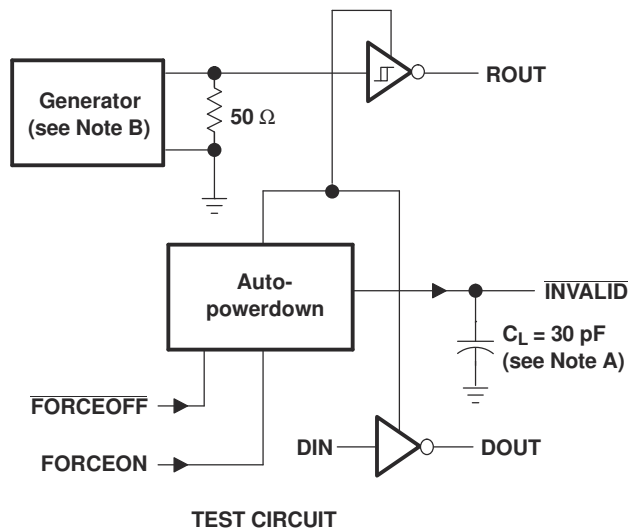
NOTES: A. C_L includes probe and jig capacitance.
B. The pulse generator has the following characteristics: $Z_O = 50\ \Omega$, 50% duty cycle, $t_r \leq 10\text{ ns}$, $t_f \leq 10\text{ ns}$.

图 7-3. Receiver Propagation Delay Times



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

图 7-4. Receiver Enable and Disable Times

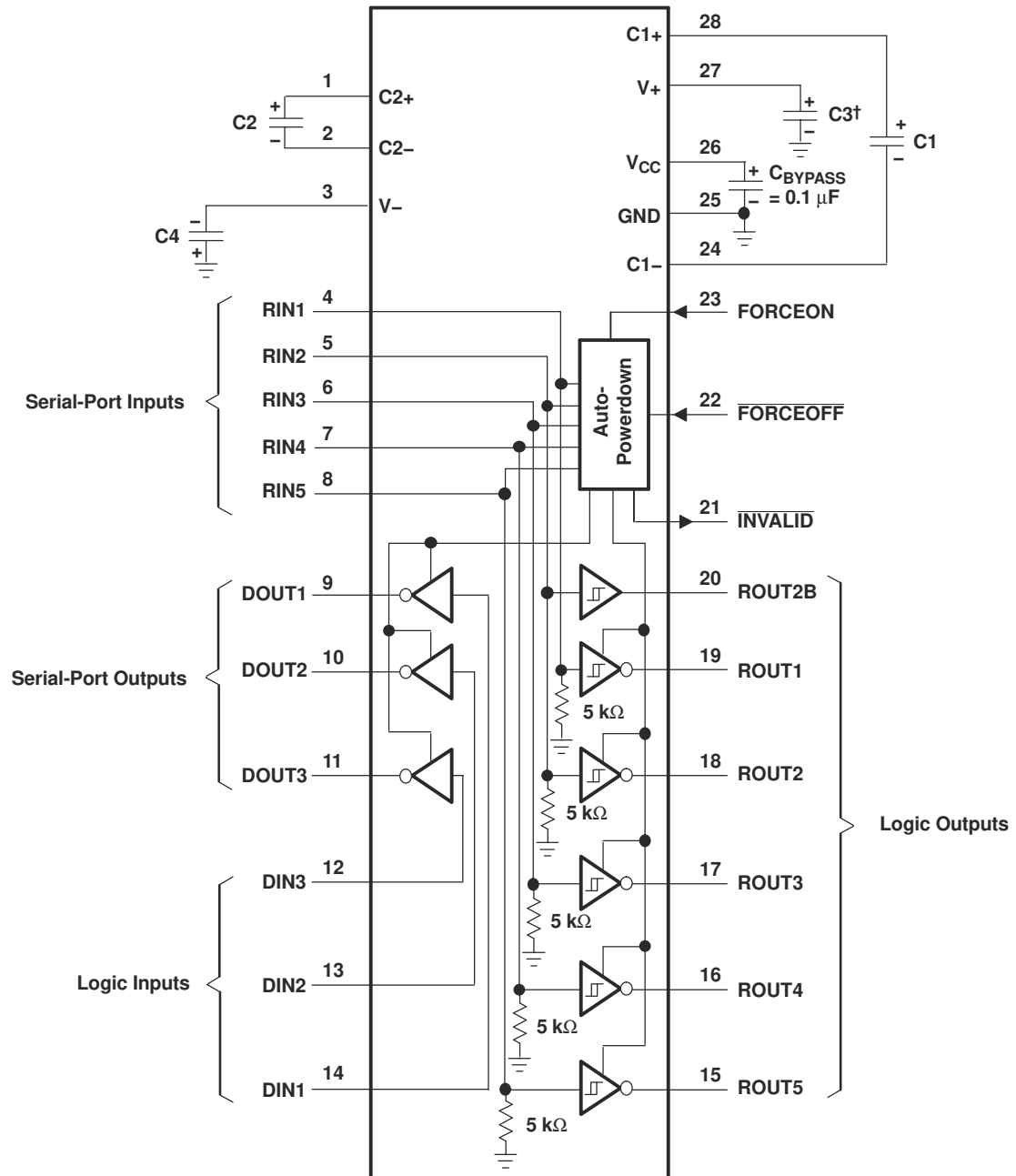


† Auto-powerdown disables drivers and reduces supply current to 1 μA .

NOTES: A. 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, $t_r \leq 10 \text{ ns}$, $t_f \leq 10 \text{ ns}$.

图 7-5. $\overline{\text{INVALID}}$ Propagation Delay Times and Supply Enabling Time



† C3 can be connected to V_{CC} or GND.

NOTE A: Resistor values shown are nominal.

V_{CC} vs CAPACITOR VALUES

V_{CC}	C1	C2, C3, and C4
3.3 V $\pm$ 0.3 V	0.1 μ F	0.1 μ F
5 V $\pm$ 0.5 V	0.047 μ F	0.33 μ F
3 V to 5.5 V	0.1 μ F	0.47 μ F

图 7-6. Typical Operating Circuit and Capacitor Values

7 Detailed Description

7.1 Overview

Flexible control options for power management are available when the serial port is 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 are disabled. If **FORCEOFF** is set low, both drivers and receivers (except **ROUT2B**) are shut off, and the supply current is reduced to 1 μ 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 device is activated automatically when a valid signal is applied to any receiver input. The **INVALID** output is used to notify the user if an RS-232 signal is present at any receiver input. **INVALID** 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. **INVALID** is low (invalid data) if all receiver input voltages are between -0.3 V and 0.3 V for more than 30 μ s. Refer to [Figure 7-5](#) for receiver input levels.

7.2 Device Functional Modes

7.2.1 Function Tables

EACH DRIVER⁽¹⁾

INPUTS				OUTPUT DOUT	DRIVER STATUS
DIN	FORCEON	FORCEOFF	VALID RIN RS-232 LEVEL		
X	X	L	X	Z	Powered off
L	H	H	X	H	Normal operation with auto-powerdown disabled
H	H	H	X	L	
L	L	H	Yes	H	Normal operation with auto-powerdown enabled
H	L	H	Yes	L	
L	L	H	No	Z	Powered off by auto-powerdown feature
H	L	H	No	Z	

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

EACH RECEIVER⁽¹⁾

INPUTS				OUTPUTS			RECEIVER STATUS
RIN2	RIN1, RIN3 – RIN5	FORCEOFF	VALID RIN RS-232 LEVEL	ROUT2B	ROUT2	ROUT1, ROUT3 – 5	
L	X	L	X	L	Z	Z	Powered off while ROUT2B is active
H	X	L	X	H	Z	Z	
L	L	H	YES	L	H	H	Normal operation with auto-powerdown disabled/enabled
L	H	H	YES	L	L	L	
H	L	H	YES	H	H	H	
H	H	H	YES	H	L	L	
Open	Open	H	YES	L	H	H	

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

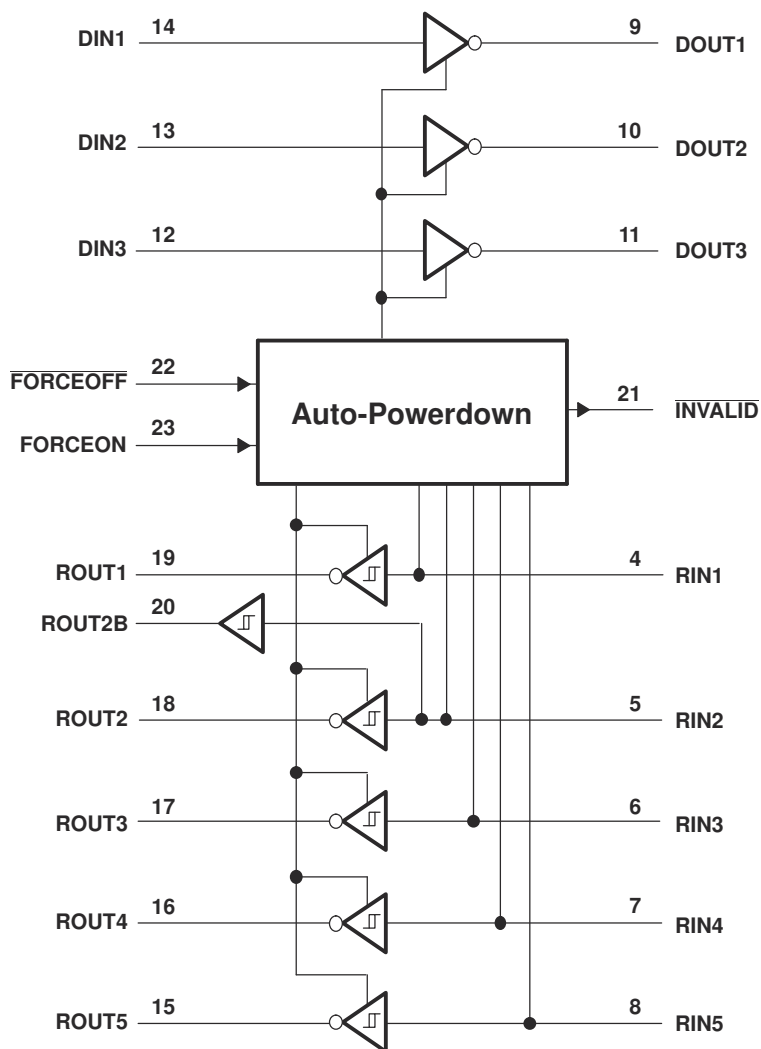


图 7-1. LOGIC DIAGRAM (POSITIVE LOGIC)

8 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

8.1 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 [订阅更新](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

8.2 支持资源

[TI E2E™ 支持论坛](#) 是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

8.3 商标

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

8.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.5 术语表

[TI 术语表](#) 本术语表列出并解释了术语、首字母缩略词和定义。

9 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TRSF3243IDB	ACTIVE	SSOP	DB	28	50	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		TRSF3243I	Samples
TRSF3243IPWR	ACTIVE	TSSOP	PW	28	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	RT43I	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⁾ **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

⁽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 finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material 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.

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
TRSF3243IPWR	TSSOP	PW	28	2000	330.0	16.4	6.9	10.2	1.8	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TRSF3243IPWR	TSSOP	PW	28	2000	356.0	356.0	35.0

TUBE

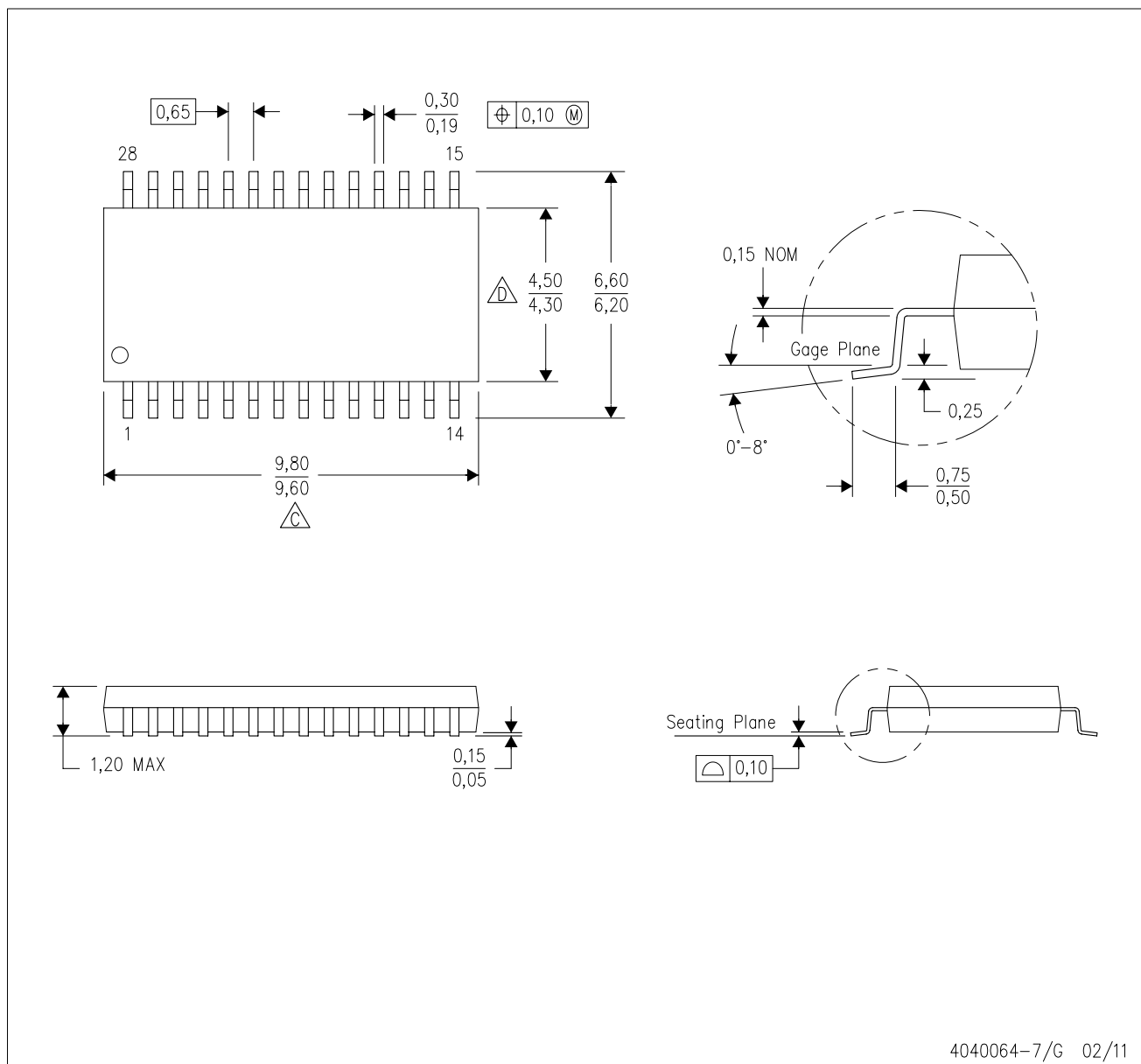


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
TRSF3243IDB	DB	SSOP	28	50	530	10.5	4000	4.1

PW (R-PDSO-G28)

PLASTIC SMALL OUTLINE

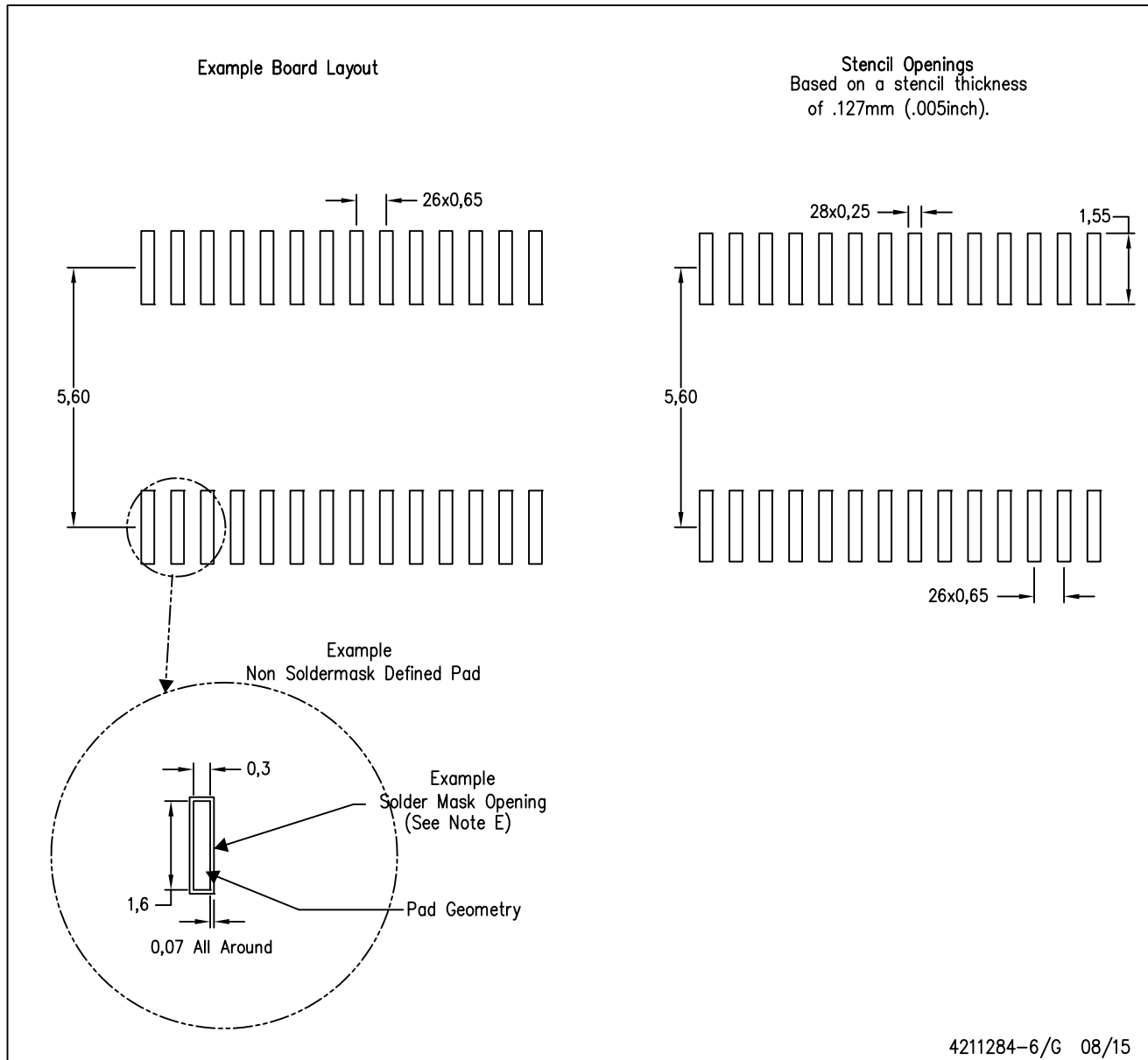


4040064-7/G 02/11

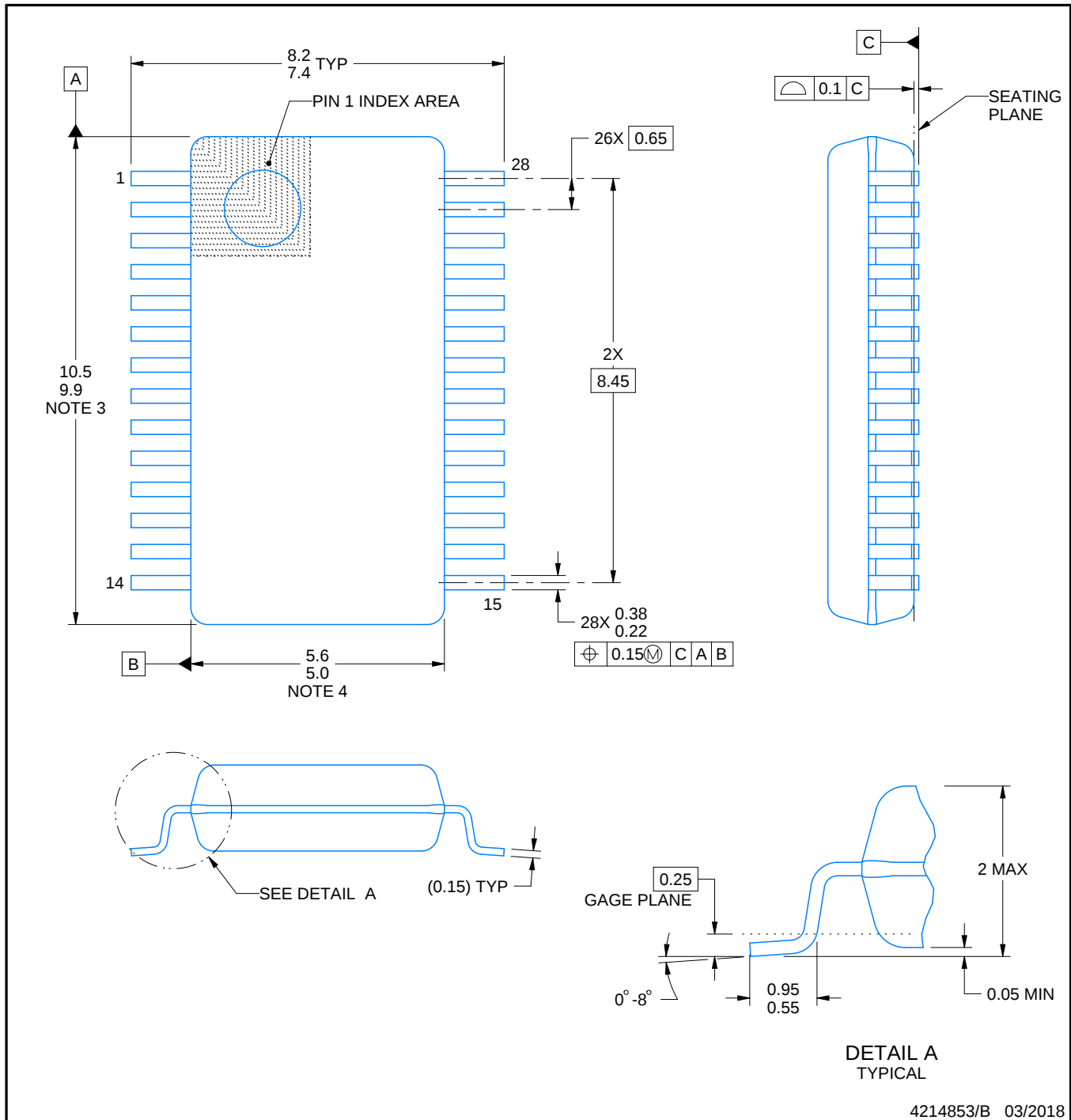
- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

PW (R-PDSO-G28)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



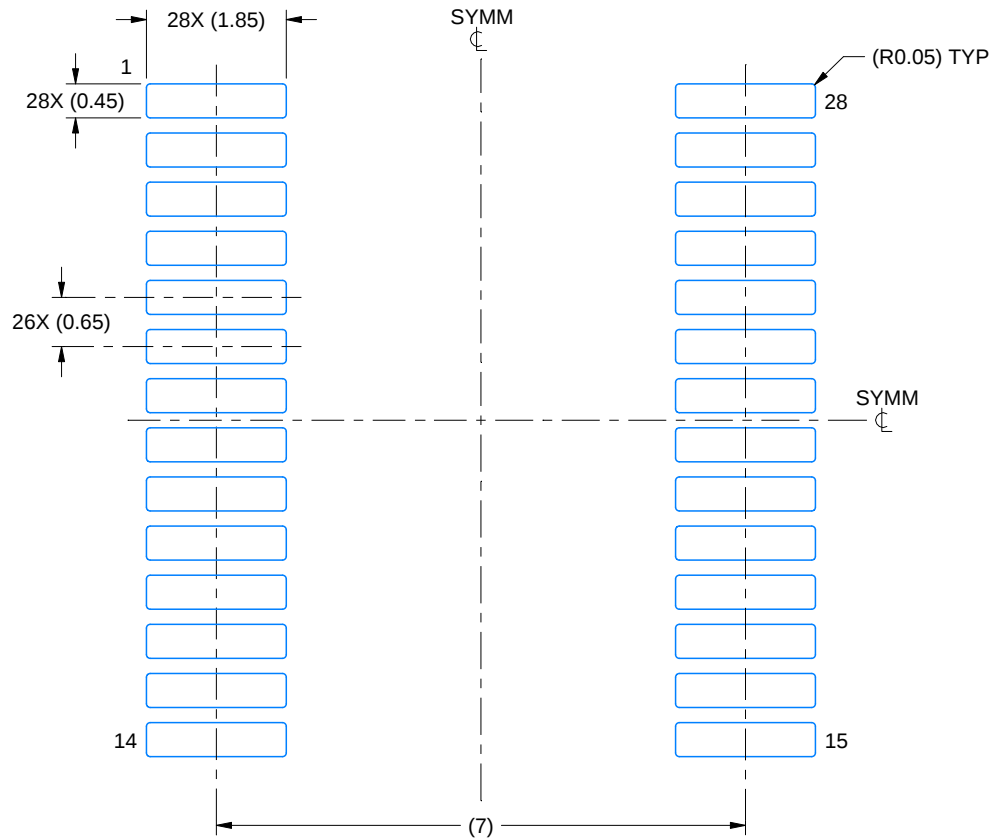
4214853/B 03/2018

EXAMPLE BOARD LAYOUT

DB0028A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4214853/B 03/2018

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

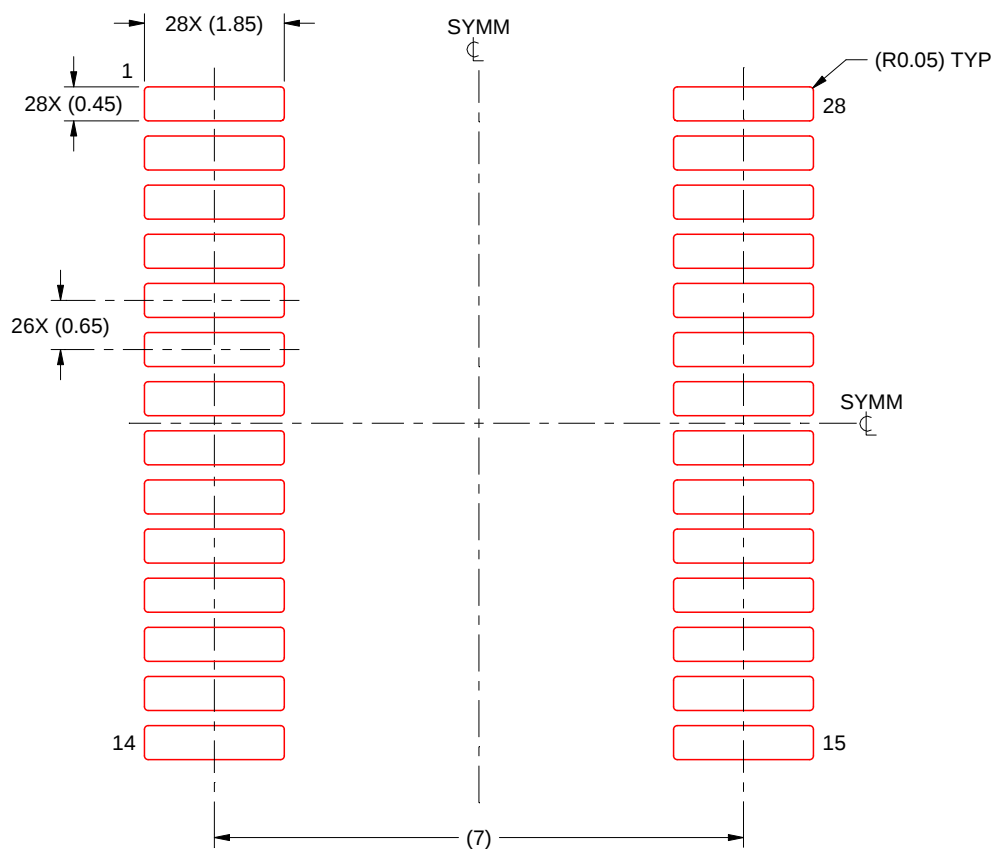
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0028A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4214853/B 03/2018

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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