

SN65HVD308xE 低消費電力 RS-485 全二重ドライバおよびレシーバ

1 特長

- 低静止時電力
 - 375 μ A (標準値) のイネーブル・モード
 - 2nA (標準値) のシャットダウン・モード
- 小型 MSOP パッケージ
- 1/8 ユニット負荷 (バスごとに最大 256 ノード)
- 16kV バス・ピンは ESD 保護、すべてのピンは 6kV
- フェイル・セーフ・レシーバ (バス開放、短絡、アイドル)
- TIA/EIA-485A 標準に準拠
- RS-422 互換
- グリッチのない電源オン、電源オフ動作

2 アプリケーション

- モーション・コントローラ
- POS 端末
- ラック・ツー・ラック通信
- 産業用ネットワーク
- 電力インバータ
- バッテリー駆動のアプリケーション
- ビル・オートメーション

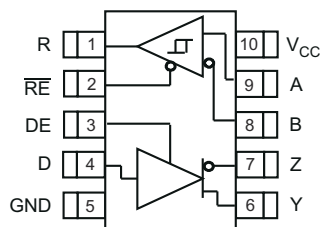


図 2-1. DGS パッケージ (上面図)

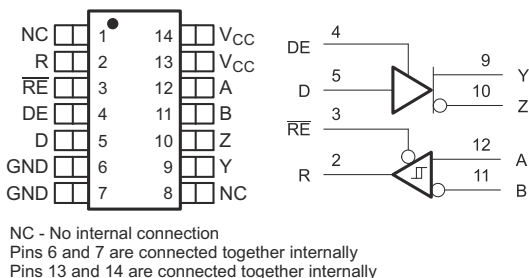


図 2-2. D パッケージ (上面図)

3 概要

これらの各デバイスは、全二重 RS-485 または RS-422 データ・バス・ネットワーク用に設計された平衡型ドライバおよびレシーバです。5V の電源供給により、TIA/EIA-485A 標準に完全準拠しています。

これらのデバイスは、バス出力遷移時間が制御されており、200kbps～20Mbps の信号速度に適しています。

これらのデバイスは、1mA 未満 (標準値、負荷を除く) の非常に小さな電源電流で動作するよう設計されています。非アクティブなシャットダウン・モードでは電源電流は数ナノアンペアまで低下するため、これらのデバイスは消費電力の制約が厳しいアプリケーションに適しています。

これらのデバイスは幅広い同相モード範囲と高 ESD 保護レベルを備えているため、モーション・コントローラ、電気インバータ、産業用ネットワーク、ノイズ耐性が重要となるケーブル接続シャーシの相互接続などの要求の厳しいアプリケーションに適しています。

これらのデバイスは、-40°C～85°C の温度範囲で動作するように規定されています。

製品情報

部品番号	信号速度	パッケージ (1)
SN65HVD3080E	200kbps	DGS、DGSR 10 ピン MSOP (2)
SN65HVD3083E	1Mbps	
SN65HVD3086E	20Mbps	D 14 ピン SOIC

- 最新のパッケージ情報と発注情報については、このデータシートの末尾にある「付録: パッケージ・オプション」を参照するか、テキサス・インスツルメンツの Web サイト www.ti.com または www.tij.co.jp を参照してください。
- R の接尾辞は、テープ・アンド・リールを示しています。

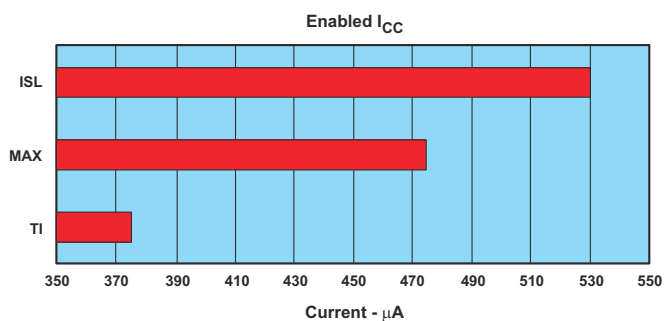


Table of Contents

1 特長	1	5.11 Typical Characteristics.....	7
2 アプリケーション	1	6 Parameter Measurement Information	8
3 概要	1	7 Device Information	11
4 Revision History	2	7.1 Function Tables.....	11
5 Specifications	3	7.2 Equivalent Input and Output Schematic Diagrams...	12
5.1 Absolute Maximum Ratings.....	3	8 Application Information	13
5.2 Power Dissipation Ratings.....	3	8.1 Hot-Plugging.....	13
5.3 Electrostatic Discharge Protection.....	3	9 Device and Documentation Support	14
5.4 Supply Current.....	4	9.1 ドキュメントの更新通知を受け取る方法.....	14
5.5 Recommended Operating Conditions.....	4	9.2 サポート・リソース.....	14
5.6 Thermal Information.....	4	9.3 商標.....	14
5.7 Driver Electrical Characteristics.....	5	9.4 静電気放電に関する注意事項.....	14
5.8 Driver Switching Characteristics.....	5	9.5 用語集.....	14
5.9 Receiver Electrical Characteristics.....	6	10 Mechanical, Packaging, and Orderable Information	14
5.10 Receiver Switching Characteristics.....	6		

4 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

Changes from Revision E (November 2012) to Revision F (March 2023)	Page
• 「注文情報」表を削除.....	1
• 「製品情報」の表を追加.....	1
• Added the <i>Thermal Information</i> table.....	4
• Changed the <i>Typical Characteristics</i>	7

Changes from Revision D (January 2011) to Revision E (November 2012)	Page
• 「特長」にグリッチのない電源オン、電源オフ動作を追加.....	1
• Changed ENABLE in DRIVER FUNCTION TABLE from L to L or OPEN.....	11
• Changed ENABLE in RECEIVER FUNCTION TABLE from H to H or OPEN.....	11
• Added <i>Application Information</i> section.....	13

Changes from Revision C (December 2009) to Revision D (January 2011)	Page
• Added Differential input voltage dynamic to RECOMMENDED OPERATING CONDITIONS.....	4
• Added  7-1	11

Changes from Revision B (March 2007) to Revision C ()	Page
• D パッケージを追加.....	1
• Added D package information to Power Dissipation Ratings.....	3
• Changed Electrostatic Discharge Protection.....	3
• Changed Supply Current information.....	4
• Changed Receiver Switching Characteristics.....	6
• Changed  6-5	8
• Changed  6-6	8

5 Specifications

5.1 Absolute Maximum Ratings

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

		UNIT
V_{CC}	Supply voltage range ⁽²⁾	–0.3 V to 7 V
$V_{(A)}, V_{(B)}, V_{(Y)}, V_{(Z)}$	Voltage range at any bus terminal (A, B, Y, Z)	–9 V to 14 V
$V_{(TRANS)}$	Voltage input, transient pulse through 100 Ω . See 6-10 (A, B, Y, Z)	–50 to 50 V
V_I	Input voltage range (D, DE, $\overline{RE}$)	–0.3 V to $V_{CC}+0.3$ V
P_D	Continuous total power dissipation	See the dissipation rating table
T_J	Junction temperature	170°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 voltage values, except differential I/O bus voltages, are with respect to network ground terminal.

5.2 Power Dissipation Ratings

PACKAGE	$T_A < 25^\circ\text{C}$	DERATING FACTOR ⁽¹⁾ ABOVE $T_A < 25^\circ\text{C}$	$T_A = 85^\circ\text{C}$
10-pin MSOP (DGS)	463 mW	3.71 mW/°C	241 mW
14-pin SOIC (D)	765 mW	6.1 mW/°C	400 mW

- (1) This is the inverse of the junction-to-ambient thermal resistance when board-mounted and with no air flow.

5.3 Electrostatic Discharge Protection

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Human Body Model ⁽¹⁾	A,B,Y,Z, and GND		16		kV
	All pins		6		kV
Charged Device Mode ⁽²⁾	All pins		1.5		kV
Machine Model ⁽³⁾	All pins		400		V

- (1) Tested in accordance JEDEC Standard 22, Test Method A114-A. Bus pin stressed with respect to a common connection of GND and V_{CC} .
- (2) Tested in accordance JEDEC Standard 22, Test Method C101.
- (3) Tested in accordance JEDEC Standard 22, Test Method A115.

5.4 Supply Current

over recommended operating conditions unless otherwise noted

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{CC}	Supply current	$\overline{RE}$ at 0 V, D and DE at V_{CC} , No load	Receiver enabled, Driver enabled	375	750	μA
		$\overline{RE}$ at 0 V, D and DE at 0 V, No load	Receiver enabled, Driver disabled	300	680	μA
		$\overline{RE}$ at V_{CC} , D and DE at V_{CC} , No load	Receiver disabled, Driver enabled	240	600	μA
		$\overline{RE}$ and D at V_{CC} , DE at 0 V, No load	Receiver disabled, Driver disabled	2	1000	nA

5.5 Recommended Operating Conditions

over operating free-air temperature range unless otherwise noted

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		4.5	5	5.5	V
V_I or V_{IC}	Voltage at any bus terminal (separately or common mode)		-7 ⁽¹⁾		12	
V_{IH}	High-level input voltage	D, DE, $\overline{RE}$	2		V_{CC}	V
V_{IL}	Low-level input voltage	D, DE, $\overline{RE}$	0		0.8	
V_{ID}	Differential input voltage		-12		12	V
		Dynamic, See 7-1				V
I_{OH}	High-level output current	Driver	-60			mA
		Receiver	-10			
I_{OL}	Low-level output current	Driver			60	mA
		Receiver			10	
T_J	Junction temperature				150	$^{\circ}C$
T_A	Ambient still-air temperature		-40		85	

(1) The algebraic convention, in which the least positive (most negative) limit is designated as minimum is used in this data sheet.

5.6 Thermal Information

THERMAL METRIC ⁽¹⁾		D (SOIC)	DGS (VSSOP)	UNIT
		14 PINS	10 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	93.2	75.8	$^{\circ}C/W$
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	47.5	22.0	$^{\circ}C/W$
$R_{\theta JB}$	Junction-to-board thermal resistance	49.4	44.9	$^{\circ}C/W$
Ψ_{JT}	Junction-to-top characterization parameter	11.2	1.0	$^{\circ}C/W$
Ψ_{JB}	Junction-to-board characterization parameter	48.9	44.3	$^{\circ}C/W$

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

5.7 Driver Electrical Characteristics

over recommended operating conditions unless otherwise noted

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V _{OD} Differential output voltage	No load, I _O = 0	3	4.3	V _{CC}	V
	R _L = 54 Ω, See 6-1	1.5	2.3		
	V _{test} = -7 V to 12 V, See 6-2	1.5			
	R _L = 100 Ω, See 6-1	2			
Δ V _{OD} Change in magnitude of differential output voltage	R _L = 54 Ω, See 6-1 and 6-2	-0.2	0	0.2	V
V _{OC(SS)} Steady-state common-mode output voltage	See 6-3	1	2.6	3	V
ΔV _{OC(SS)} Common-mode output voltage (Dominant)		-0.1	0	0.1	
V _{OC(PP)} Peak-to-peak common-mode output voltage			0.5		
I _{Z(Y)} or I _{Z(Z)} High-impedance state output current	V _{CC} = 0 V, V _(Z) or V _(Y) = 12 V Other input at 0 V			1	μA
	V _{CC} = 0 V, V _(Z) or V _(Y) = -7 V Other input at 0 V	-1			
	V _{CC} = 5 V, V _(Z) or V _(Y) = 12 V Other input at 0 V			1	
	V _{CC} = 5 V, V _(Z) or V _(Y) = -7 V Other input at 0 V	-1			
I _I Input current	D, DE	-100		100	μA
I _{OS} Short-circuit output current	-7 V ≤ V _O ≤ 12 V	-250		250	mA

5.8 Driver Switching Characteristics

over recommended operating conditions unless otherwise noted

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH} , t _{PHL} Propagation delay time, low-to-high-level output Propagation delay time, high-to-low-level output	HVD3080E		0.7	1.3	μs
	HVD3083E		150	500	ns
	HVD3086E		12	20	ns
t _r , t _f Differential output signal rise time Differential output signal fall time	HVD3080E	0.5	0.9	1.5	μs
	HVD3083E		200	300	ns
	HVD3086E		7	15	ns
t _{sk(p)} Pulse skew (t _{PHL} - t _{PLH})	HVD3080E		20	200	ns
	HVD3083E		5	50	ns
	HVD3086E		1.4	5	ns
t _{PZH} Propagation delay time, high-impedance-to-high-level output	HVD3080E		2.5	7	μs
	HVD3083E		1	2.5	μs
	HVD3086E		13	30	ns
t _{PHZ} Propagation delay time, high-level-to-high-impedance output	HVD3080E		80	200	ns
	HVD3083E		60	100	ns
	HVD3086E		12	30	ns
t _{PZL} Propagation delay time, high-impedance-to-low-level output	HVD3080E		2.5	7	μs
	HVD3083E		1	2.5	μs
	HVD3086E		13	30	ns
t _{PLZ} Propagation delay time, low-level-to-high-impedance output	HVD3080E		80	200	ns
	HVD3083E		60	100	ns
	HVD3086E		12	30	ns
t _{PZH} , t _{PZL} Propagation delay time, standby-to-high-level output (See 6-5) Propagation delay time, standby-to-low-level output (See 6-6)	R _L = 110 Ω, RE at 3 V		3.5	7	μs

5.9 Receiver Electrical Characteristics

over recommended operating conditions unless otherwise noted

PARAMETER		TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT	
V _{IT+}	Positive-going differential input threshold voltage	I _O = −10 mA		−0.08	−0.01	V	
V _{IT−}	Negative-going differential input threshold voltage	I _O = 10 mA	−0.2	−0.1			
V _{hys}	Hysteresis voltage (V _{IT+} - V _{IT−})			30		mV	
V _{OH}	High-level output voltage	V _{ID} = 200 mV, I _{OH} = −10 mA, See 6-7 and 6-8	4	4.6		V	
V _{OL}	Low-level output voltage	V _{ID} = −200 mV, I _{OH} = 10 mA, See 6-7 and 6-8		0.15	0.4	V	
I _{OZ}	High-impedance-state output current	V _O = 0 or V _{CC}	−1		1	μA	
I _I	Bus input current	Other input at 0V	V _A or V _B = 12 V		0.04	0.11	mA
			V _A or V _B = 12 V, V _{CC} = 0 V		0.06	0.13	
			V _A or V _B = -7 V		−0.1	−0.04	
			V _A or V _B = -7 V, V _{CC} = 0 V		−0.05	−0.03	
I _{IH}	High-level input current	V _{IH} = 2 V	−60	−30		μA	
I _{IL}	Low-level input current	V _{IL} = 0.8 V	−60	−30		μA	
C _{ID}	Differential input capacitance	V _I = 0.4 sin (4E6πt) + 0.5 V		7		pF	

(1) All typical values are at 25°C and with a 3.3-V supply.

5.10 Receiver Switching Characteristics

over recommended operating conditions unless otherwise noted

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	Propagation delay time, low-to-high-level output	V _{ID} = -1.5 V to 1.5 V, C _L = 15 pF, See 6-8		75	100	ns
t _{PHL}	Propagation delay time, high-to-low-level output			79	100	
t _{sk(p)}	Pulse skew (t _{PHL} - t _{PLH})			4	10	
t _r	Output signal rise time			1.5	3	
t _f	Output signal fall time			1.8	3	
t _{PZH} , t _{PZL}	Output enable time	DE at V _{CC} , See 6-9		10	50	ns
		From standby DE at GND, See 6-9		1.7	3.5	μs
t _{PHZ} , t _{PLZ}	Output disable time	DE at GND or V _{CC} , See 6-9		7	50	ns

5.11 Typical Characteristics

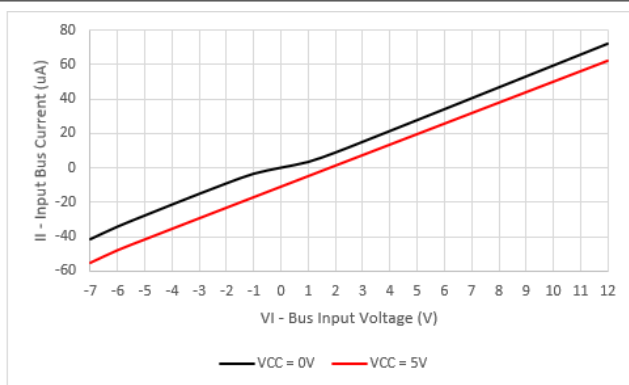


Figure 5-1. Input Bias Current vs BUS Input Voltage

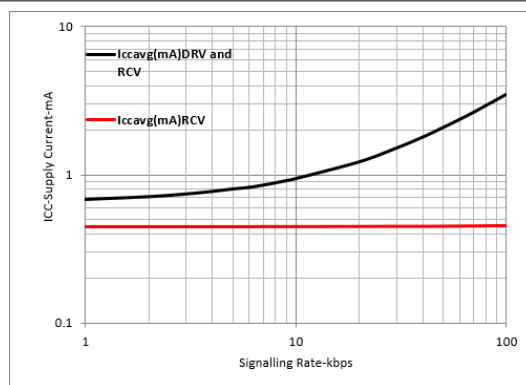


Figure 5-2. HVD3080E Supply Current vs Signaling Rate

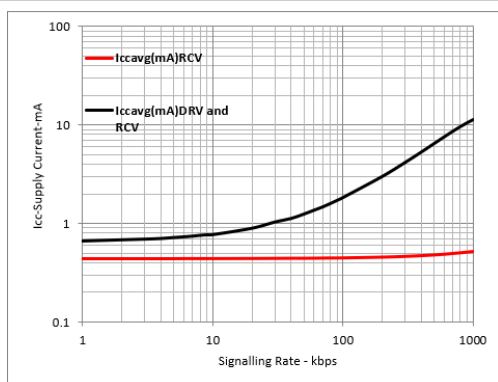


Figure 5-3. HVD3083E Supply Current vs Signaling Rate

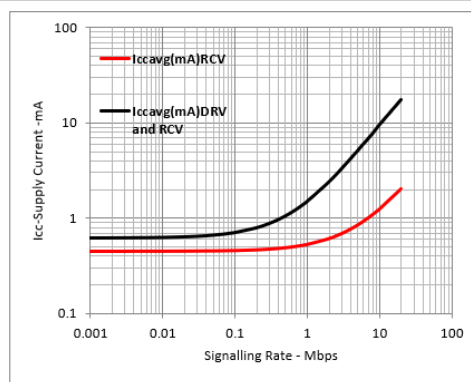


Figure 5-4. HVD3086E Supply Current vs Signaling Rate

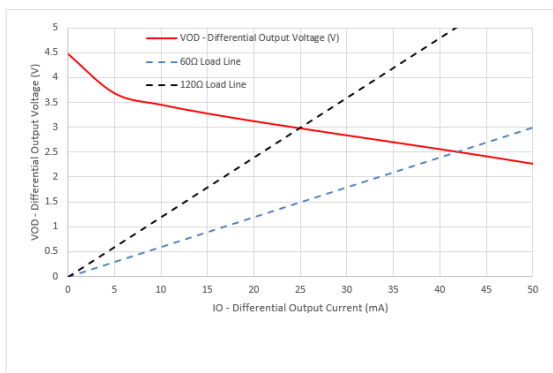


Figure 5-5. Differential Output Voltage vs Differential Output Current

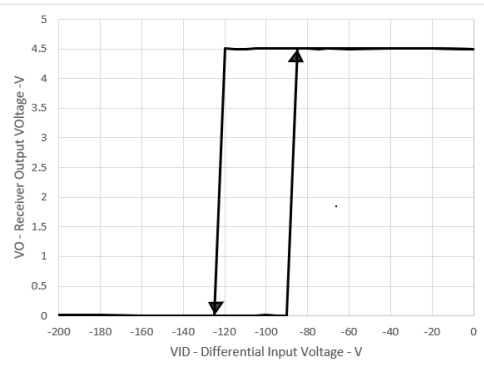


Figure 5-6. Receiver Output Voltage vs Differential Input Voltage

6 Parameter Measurement Information

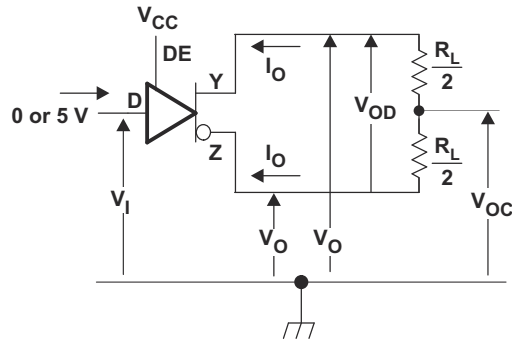


FIG 6-1. Driver V_{OD} Test Circuit and Current Definitions

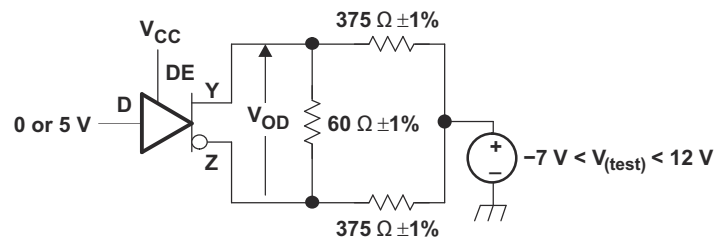


FIG 6-2. Driver V_{OD} With Common-Mode Loading Test Circuit

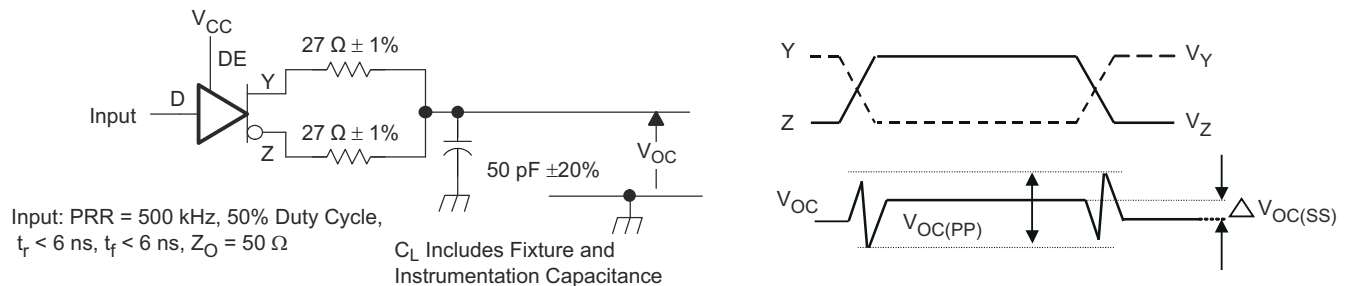


FIG 6-3. Test Circuit and Definitions for the Driver Common-Mode Output Voltage

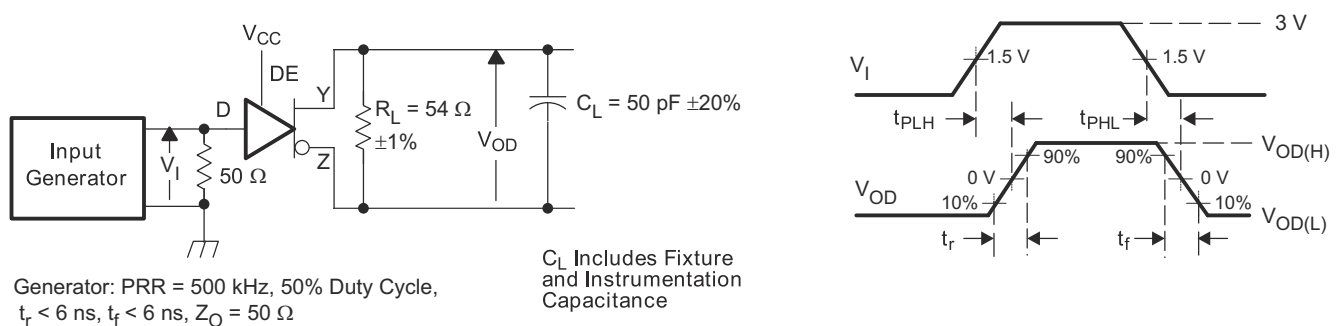
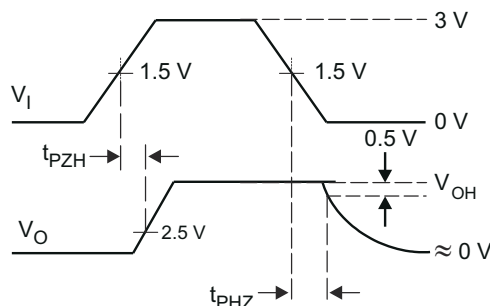


FIG 6-4. Driver Switching Test Circuit and Voltage Waveforms



0 V when testing Y,
3 V when testing Z

Y

Z

S1

V_{CC}

$R_L = 110\ \Omega$
 $\pm 1\%$

V_O

$C_L = 50\text{ pF}$
 $\pm 20\%$

Input Generator

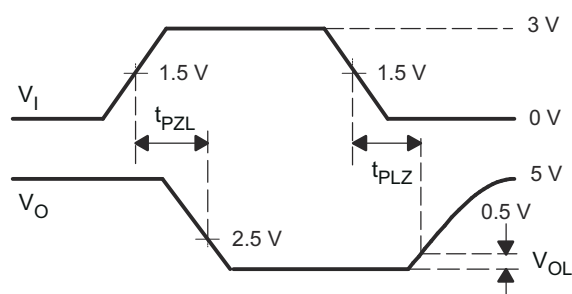
V_I

50 Ω

DE

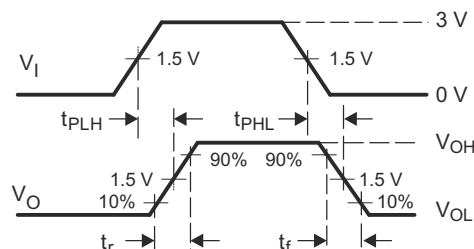
Generator: PRR = 500 kHz,
50% Duty Cycle, $t_r < 6\text{ ns}$,
 $t_f < 6\text{ ns}$, $Z_O = 50\ \Omega$

C_L Includes Fixture and
Instrumentation Capacitance



Generator: PRR = 500 kHz,
50% Duty Cycle, $t_r < 6$ ns,
 $t_f < 6$ ns, $Z_0 = 50 \Omega$

C_L Includes Fixture and Instrumentation Capacitance



9

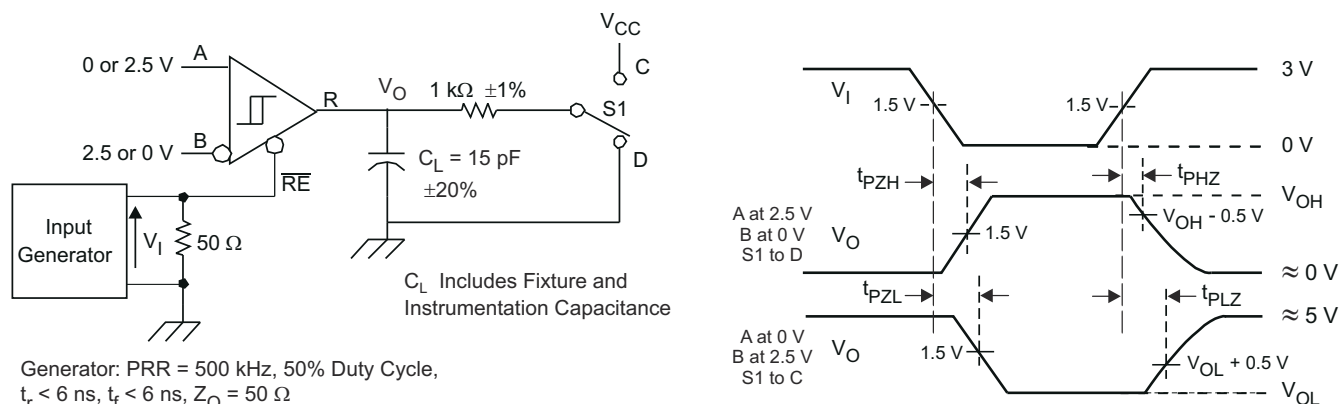
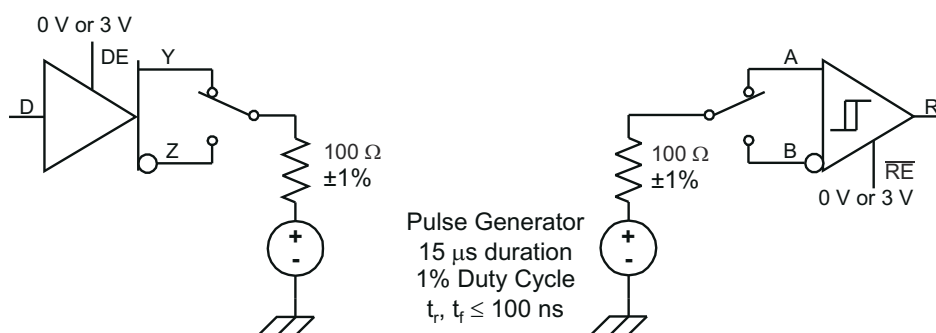


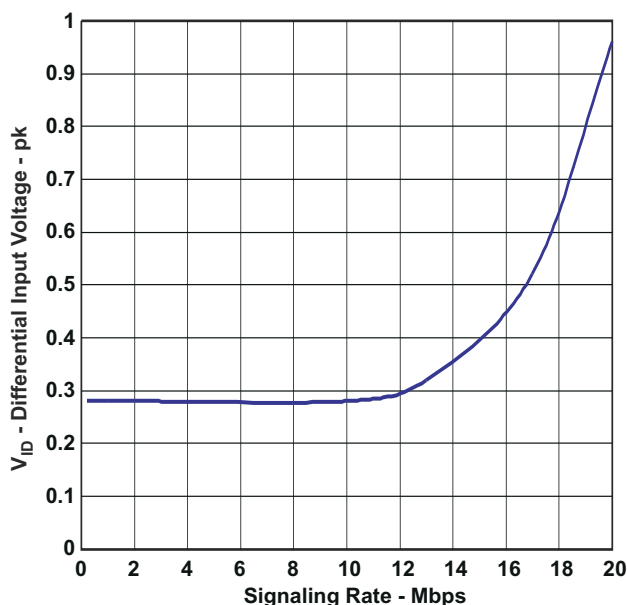
FIG 6-9. Receiver Enable and Disable Test Circuit and Voltage Waveforms



A. This test is conducted to test survivability only. Data stability at the R output is not specified.

FIG 6-10. Transient Overvoltage Test Circuit

7 Device Information



7-1. Recommended Minimum Differential Input Voltage vs Signaling Rate

7.1 Function Tables

DRIVER

INPUT ⁽¹⁾	ENABLE	OUTPUTS	
D	DE	Y	Z
H	H	H	L
L	H	L	H
X	L or OPEN	Z	Z
Open	H	H	L

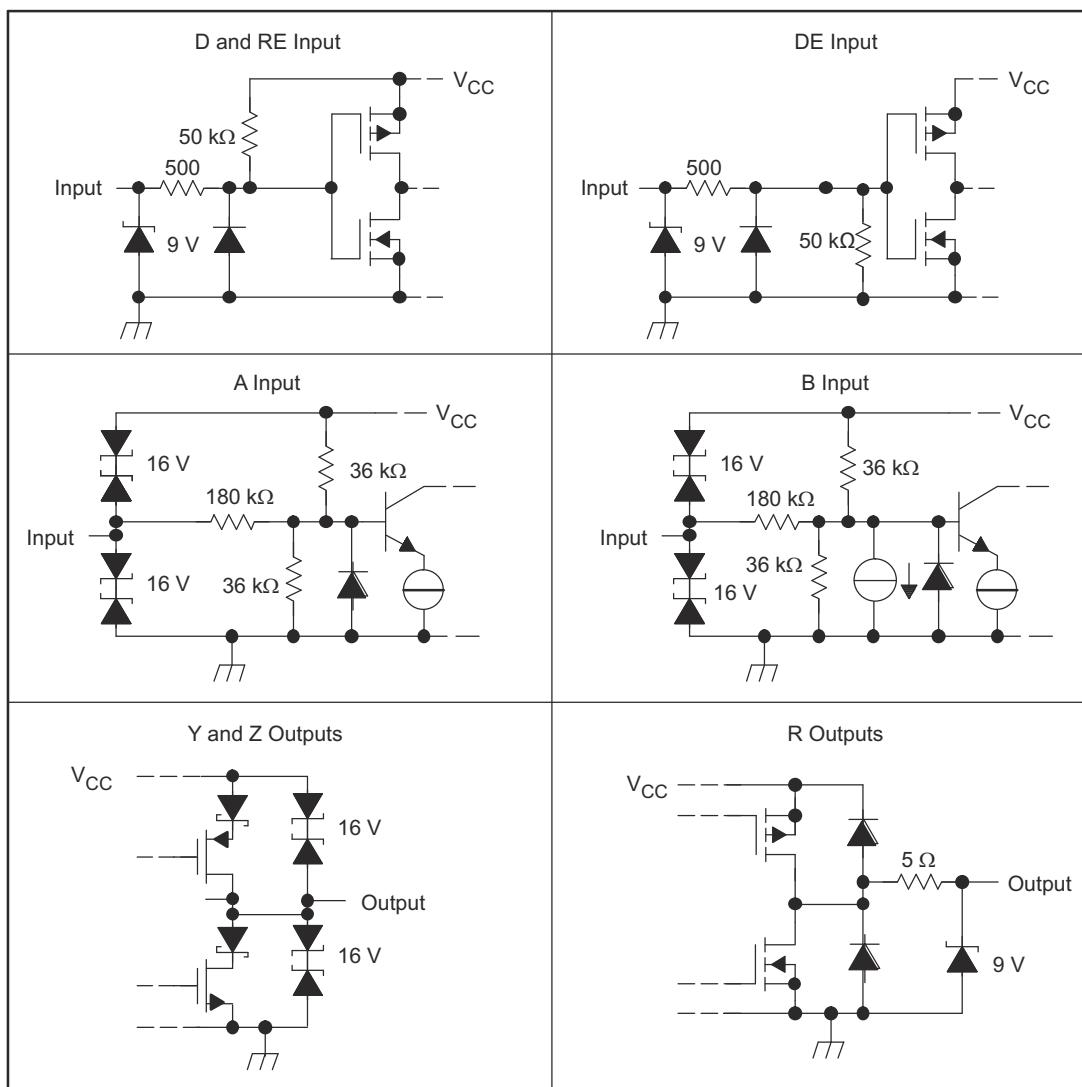
(1) H = high level, L = low level, Z = high impedance, X = irrelevant, ? = indeterminate

RECEIVER

DIFFERENTIAL INPUTS ⁽¹⁾ $V_{ID} = V_{(A)} - V_{(B)}$	ENABLE RE	OUTPUT R
$V_{ID} \leq -0.2 \text{ V}$	L	L
$-0.2 \text{ V} < V_{ID} < -0.01 \text{ V}$	L	?
$-0.01 \text{ V} \leq V_{ID}$	L	H
X	H or OPEN	Z
Open Circuit	L	H
BUS Idle	L	H
Short Circuit	L	H

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

7.2 Equivalent Input and Output Schematic Diagrams



8 Application Information

注

以下のアプリケーション情報は、TI の製品仕様に含まれるものではなく、TI ではその正確性または完全性を保証いたしません。個々の目的に対する製品の適合性については、お客様の責任で判断していただくことになります。お客様は自身の設計実装を検証しテストすることで、システムの機能を確認する必要があります。

8.1 Hot-Plugging

These devices are designed to operate in “hot swap” or “hot pluggable” applications. Key features for hot-pluggable applications are power-up, power-down glitch free operation, default disabled input/output pins, and receiver failsafe. An internal Power-On Reset circuit keeps the outputs in a high-impedance state until the supply voltage has reached a level at which the device will reliably operate. This ensures that no spurious transitions (glitches) will occur on the bus pin outputs as the power supply turns on or turns off.

As shown in the device FUNCTION TABLES, the ENABLE inputs have the feature of default disable on both the driver enable and receiver enable. This ensures that the device will neither drive the bus nor report data on the R pin until the associated controller actively drives the enable pins.

9 Device and Documentation Support

9.1 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、ti.com のデバイス製品フォルダを開いてください。「更新の通知を受け取る」をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取れます。変更の詳細については、修正されたドキュメントに含まれている改訂履歴をご覧ください。

9.2 サポート・リソース

TI E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計に必要な支援を迅速に得ることができます。

リンクされているコンテンツは、該当する貢献者により、現状のまま提供されるものです。これらは TI の仕様を構成するものではなく、必ずしも TI の見解を反映したものではありません。TI の[使用条件](#)を参照してください。

9.3 商標

TI E2E™ is a trademark of Texas Instruments.

すべての商標は、それぞれの所有者に帰属します。

9.4 静電気放電に関する注意事項



この IC は、ESD によって破損する可能性があります。テキサス・インスツルメンツは、IC を取り扱う際には常に適切な注意を払うことを推奨します。正しい取り扱いおよび設置手順に従わない場合、デバイスを破損するおそれがあります。

ESD による破損は、わずかな性能低下からデバイスの完全な故障まで多岐にわたります。精密な IC の場合、パラメータがわずかに変化するだけで公表されている仕様から外れる可能性があるため、破損が発生しやすくなっています。

9.5 用語集

[テキサス・インスツルメンツ用語集](#)

この用語集には、用語や略語の一覧および定義が記載されています。

10 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 part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN65HVD3080EDGS	Obsolete	Production	VSSOP (DGS) 10	-	-	Call TI	Call TI	-40 to 85	BTT
SN65HVD3080EDGSR	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTT
SN65HVD3080EDGSR.A	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTT
SN65HVD3083EDGS	Obsolete	Production	VSSOP (DGS) 10	-	-	Call TI	Call TI	-40 to 85	BTU
SN65HVD3083EDGSR	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTU
SN65HVD3083EDGSR.A	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTU
SN65HVD3086ED	Obsolete	Production	SOIC (D) 14	-	-	Call TI	Call TI	-40 to 85	HVD3086E
SN65HVD3086EDGSR	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTF
SN65HVD3086EDGSR.A	Active	Production	VSSOP (DGS) 10	2500 LARGE T&R	Yes	SN	Level-2-260C-1 YEAR	-40 to 85	BTF
SN65HVD3086EDR	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HVD3086E
SN65HVD3086EDR.A	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HVD3086E

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that 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

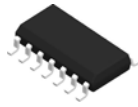
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN65HVD3080EDGSR	VSSOP	DGS	10	2500	330.0	12.4	5.25	3.35	1.25	8.0	12.0	Q1
SN65HVD3083EDGSR	VSSOP	DGS	10	2500	330.0	12.4	5.25	3.35	1.25	8.0	12.0	Q1
SN65HVD3086EDGSR	VSSOP	DGS	10	2500	330.0	12.4	5.25	3.35	1.25	8.0	12.0	Q1
SN65HVD3086EDR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS

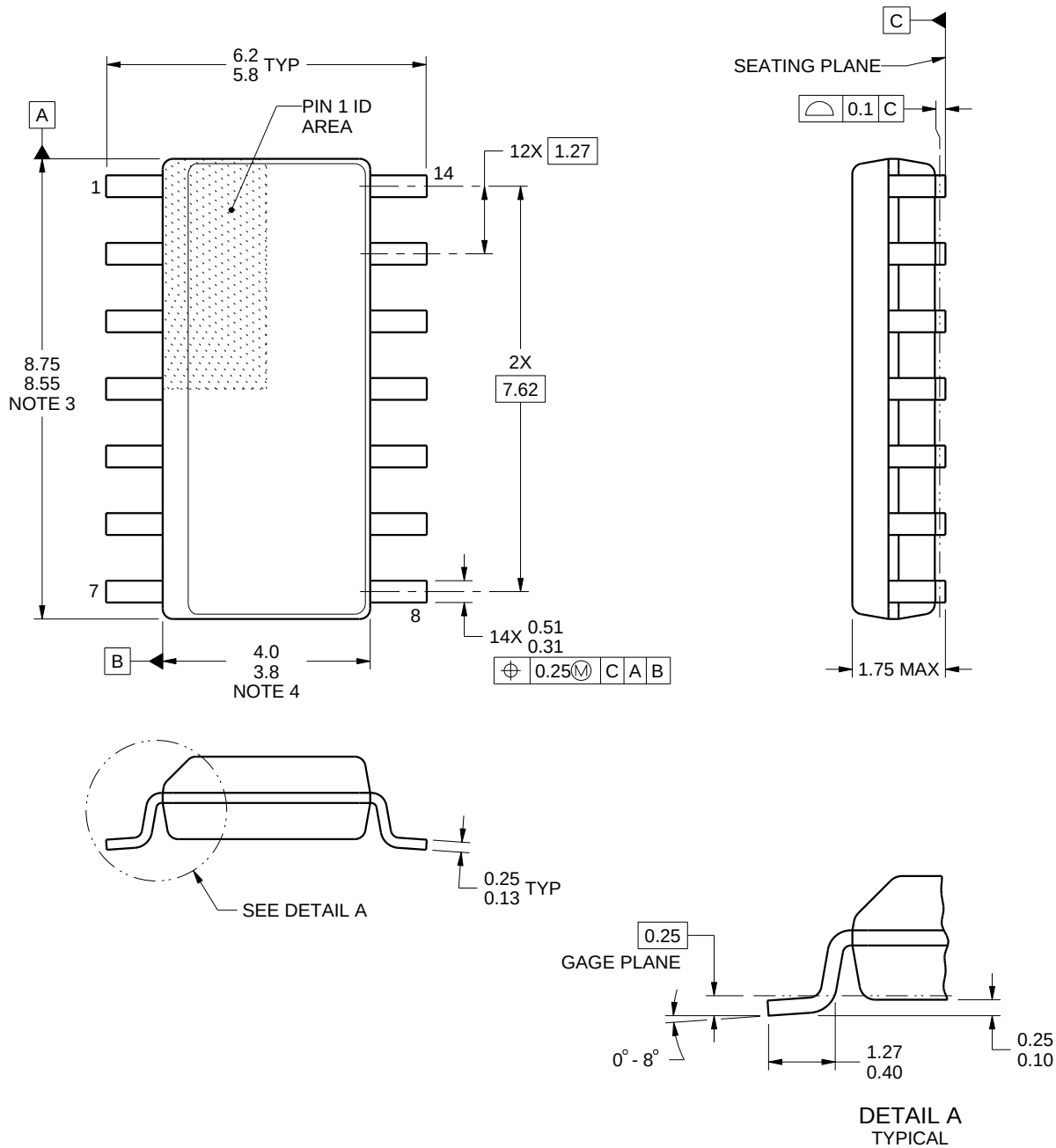


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN65HVD3080EDGSR	VSSOP	DGS	10	2500	366.0	364.0	50.0
SN65HVD3083EDGSR	VSSOP	DGS	10	2500	366.0	364.0	50.0
SN65HVD3086EDGSR	VSSOP	DGS	10	2500	366.0	364.0	50.0
SN65HVD3086EDR	SOIC	D	14	2500	353.0	353.0	32.0

D0014A**PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

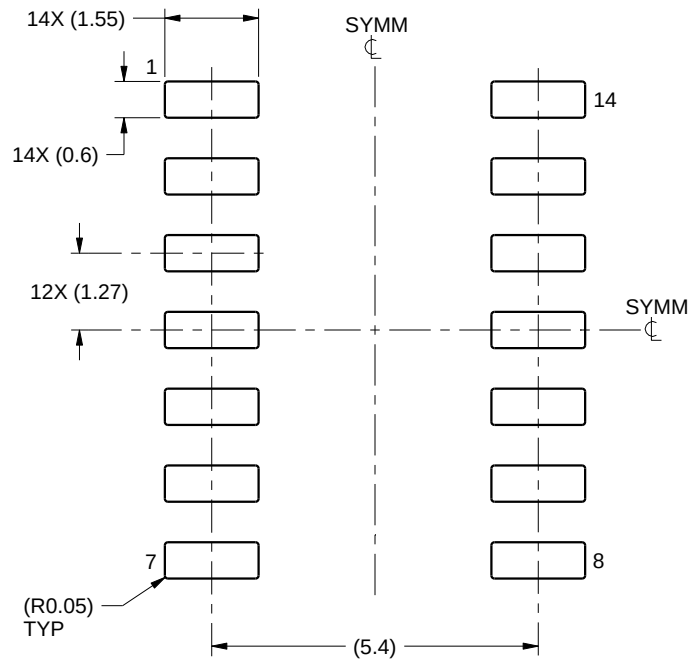
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

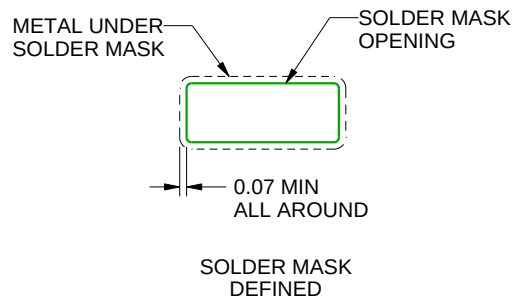
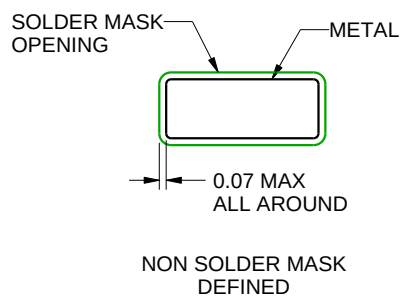
D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

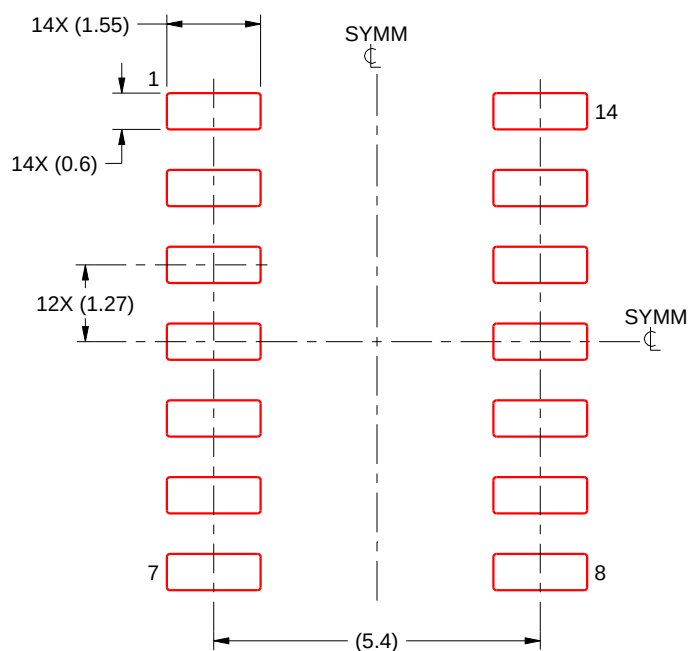
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

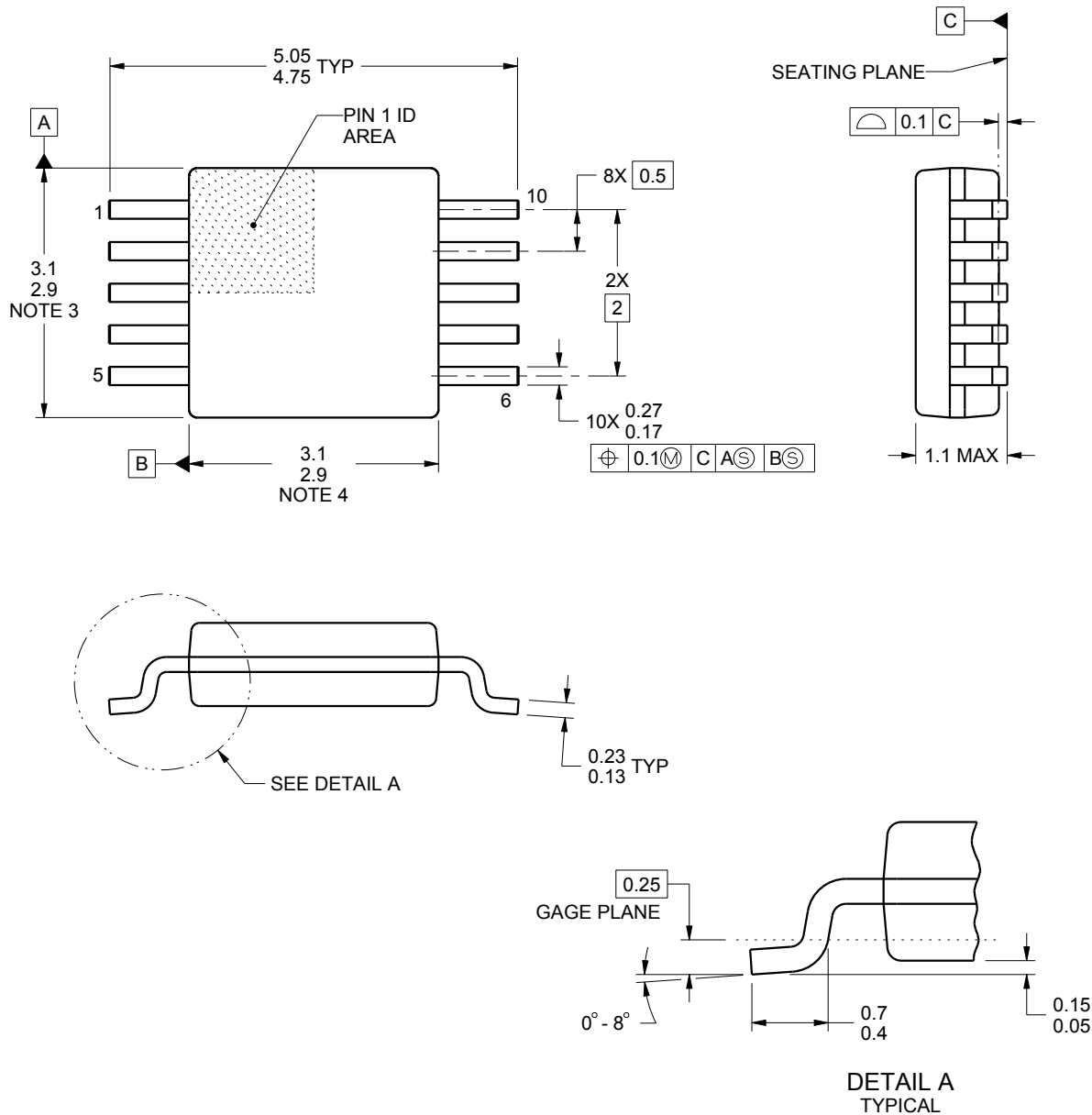


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

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.



4221984/A 05/2015

NOTES:

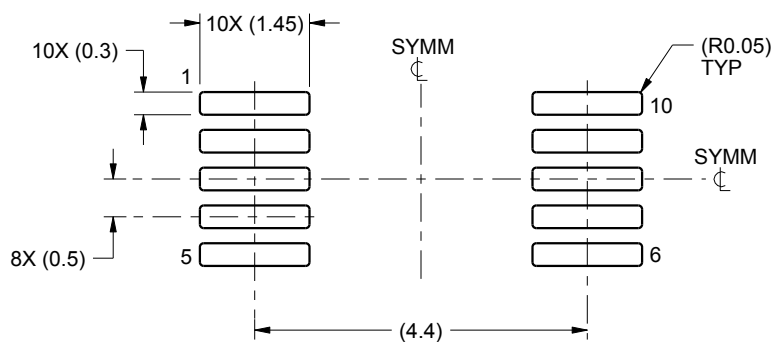
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-187, variation BA.

EXAMPLE BOARD LAYOUT

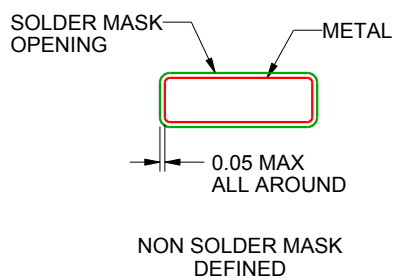
DGS0010A

VSSOP - 1.1 mm max height

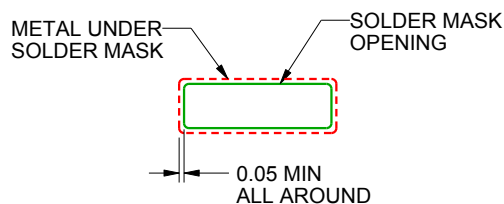
SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
SCALE:10X



NON SOLDER MASK
DEFINED



SOLDER MASK
DEFINED

SOLDER MASK DETAILS
NOT TO SCALE

4221984/A 05/2015

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

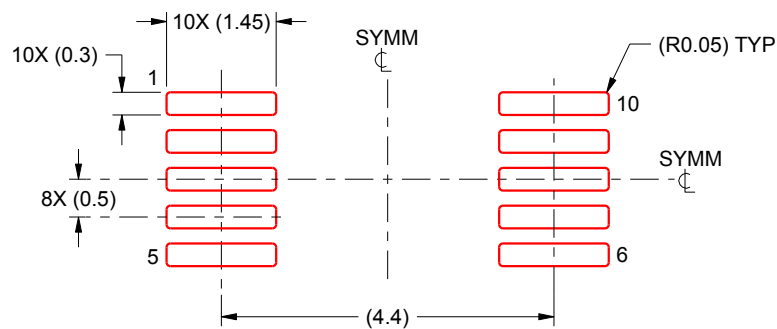
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DGS0010A

VSSOP - 1.1 mm max height

SMALL OUTLINE PACKAGE



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

4221984/A 05/2015

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.

重要なお知らせと免責事項

テキサス・インスツルメンツは、技術データと信頼性データ (データシートを含みます)、設計リソース (リファレンス デザインを含みます)、アプリケーションや設計に関する各種アドバイス、Web ツール、安全性情報、その他のリソースを、欠陥が存在する可能性のある「現状のまま」提供しており、商品性および特定目的に対する適合性の黙示保証、第三者の知的財産権の非侵害保証を含むいかなる保証も、明示的または黙示的にかかわらず拒否します。

これらのリソースは、テキサス・インスツルメンツ製品を使用する設計の経験を積んだ開発者への提供を意図したものです。(1) お客様のアプリケーションに適した テキサス・インスツルメンツ製品の選定、(2) お客様のアプリケーションの設計、検証、試験、(3) お客様のアプリケーションに該当する各種規格や、その他のあらゆる安全性、セキュリティ、規制、または他の要件への確実な適合に関する責任を、お客様のみが単独で負うものとします。

上記の各種リソースは、予告なく変更される可能性があります。これらのリソースは、リソースで説明されている テキサス・インスツルメンツ製品を使用するアプリケーションの開発の目的でのみ、テキサス・インスツルメンツはその使用をお客様に許諾します。これらのリソースに関して、他の目的で複製することや掲載することは禁止されています。テキサス・インスツルメンツや第三者の知的財産権のライセンスが付与されている訳ではありません。お客様は、これらのリソースを自身で使用した結果発生するあらゆる申し立て、損害、費用、損失、責任について、テキサス・インスツルメンツおよびその代理人を完全に補償するものとし、テキサス・インスツルメンツは一切の責任を拒否します。

テキサス・インスツルメンツの製品は、[テキサス・インスツルメンツの販売条件](#)、または [ti.com](https://www.ti.com) やかかる テキサス・インスツルメンツ製品の関連資料などのいずれかを通じて提供する適用可能な条項の下で提供されています。テキサス・インスツルメンツがこれらのリソースを提供することは、適用される テキサス・インスツルメンツの保証または他の保証の放棄の拡大や変更を意味するものではありません。

お客様がいかなる追加条項または代替条項を提案した場合でも、テキサス・インスツルメンツはそれらに異議を唱え、拒否します。

郵送先住所：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated