

SN65HVD0x、SN75HVD0x 高出力 RS-485 トランシーバ

1 特長

- 54Ω の負荷に 2.5V の最小差動出力電圧
- 開路、短絡、アイドル・バスのフェイルセーフ・レシーバ
- 1/8 ユニット負荷オプションが使用可能 (バス上に最大 256 ノード)
- 16kV HBM を超えるバス・ピンの ESD 保護
- ドライバ出力スルーレート制御オプション
- ANSI TIA/EIA-485-A 標準と電氣的に互換
- 低電流のスタンバイ・モード: 1μA (標準値)
- ホットプラグ・アプリケーションに適したグリッチのない電源オン/オフ
- 業界標準の SN75176 とピン互換

2 アプリケーション

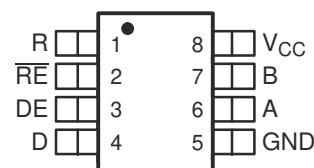
- 長距離または損失の多いライン、または電氣的にノイズの多い環境でのデータ転送
- PROFIBUS ライン・インターフェイス
- 産業用プロセス制御ネットワーク
- POS (販売時点情報管理) ネットワーク
- 電気料金のメーター
- ビル・オートメーション
- デジタル・モーター制御

3 概要

SN65HVD05、SN75HVD05、SN65HVD06、SN75HVD06、SN65HVD07、SN75HVD07 は、3 ステート差動ライン・ドライバと作動ライン・レシーバを組み合わせた製品です。これらは平衡データ転送用に設計されており、ANSI TIA/EIA-485-A および ISO 8482E 標準準拠のデバイスと相互運用が可能です。このドライバは、ノイズ・マージンを大きくするため、これらの規格で要求されている以上の差動出力電圧を供給できるよう設計されています。ドライバとレシーバはそれぞれアクティブ High、アクティブ Low のイネーブルを備えており、それらのイネーブルを外部で互いに接続することで、方向制御として機能させることができます。

ドライバ差動出力とレシーバ差動入力とは内部で接続されており、差動入出力 (I/O) バス・ポートを形成しています。この設計により、ドライバが無効になったり、電力が供給されなくなっても、バスへの負荷が最小限になります。これらのデバイスは正負の同相電圧範囲が広いので、パーティライン・アプリケーションに適しています。

**D OR P PACKAGE
(TOP VIEW)**



**LOGIC DIAGRAM
(POSITIVE LOGIC)**

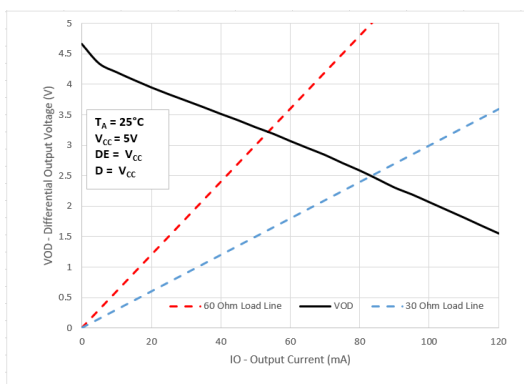
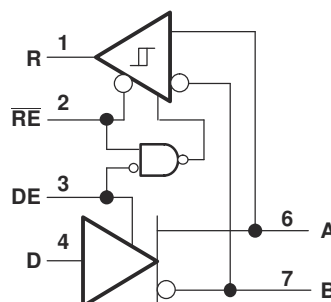


図 3-1. 差動出力電圧と差動出力電流との関係



Table of Contents

1 特長	1	Parameter Measurement Information	12
2 アプリケーション	1	6 Function Tables	16
3 概要	1	6.1 Receiver Failsafe.....	16
4 Revision History	2	7 Equivalent Input and Output Schematic Diagrams	17
5 Specifications	3	8 Application and Implementation	18
5.1 Absolute Maximum Ratings.....	3	Typical Application.....	18
5.2 Recommended Operating Conditions.....	3	9 Device and Documentation Support	19
5.3 Thermal Information.....	4	9.1 ドキュメントの更新通知を受け取る方法.....	19
5.4 Package Dissipation Ratings.....	4	9.2 サポート・リソース.....	19
5.5 Driver Electrical Characteristics.....	5	9.3 商標.....	19
5.6 Driver Switching Characteristics.....	6	9.4 静電気放電に関する注意事項.....	19
5.7 Receiver Electrical Characteristics.....	7	9.5 用語集.....	19
5.8 Receiver Switching Characteristics.....	8	10 Mechanical, Packaging, and Orderable	
5.9 Typical Characteristics.....	9	Information	19

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 (August 2009) to Revision F (March 2023)	Page
• 「注文情報」表を削除.....	1
• Added the <i>Thermal Information</i> table.....	4
• Changed the <i>Typical Characteristics</i>	9
Changes from Revision D (July 2006) to Revision E (August 2009)	Page
• Added IDLE Bus to the Receivers Function Table.....	16
• Added the Receiver Failsafe paragraph.....	16

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range unless otherwise noted^{(1) (2)}

			SN65HVD05, SN65HVD06, SN65HVD07 SN75HVD05, SN75HVD06, SN75HVD07
Supply voltage range, V_{CC}			–0.3 V to 6 V
Voltage range at A or B			–9 V to 14 V
Input voltage range at D, DE, R or RE			–0.5 V to $V_{CC} + 0.5$ V
Voltage input range, transient pulse, A and B, through 100 Ω (see 6-11)			–50 V to 50 V
Receiver output current, I_O			–11 mA to 11mA
Electrostatic discharge	Human body model ⁽³⁾	A, B, and GND	16 kV
		All pins	4 kV
	Charged-device model ⁽⁴⁾	All pins	1 kV
Continuous total power dissipation			See Dissipation Rating Table

- (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.
- (3) Tested in accordance with JEDEC Standard 22, Test Method A114-A.
- (4) Tested in accordance with JEDEC Standard 22, Test Method C101.

5.2 Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V _{CC}		4.5		5.5	V
Voltage at any bus terminal (separately or common mode) V _I or V _{IC}		−7 ⁽¹⁾		12	V
High-level input voltage, V _{IH}	D, DE, RE	2			V
Low-level input voltage, V _{IL}	D, DE, RE			0.8	V
Differential input voltage, V _{ID} (see 6-7)		−12		12	V
High-level output current, I _{OH}	Driver	−100			mA
	Receiver	−8			
Low-level output current, I _{OL}	Driver			100	mA
	Receiver			8	
Operating free-air temperature, T _A	SN65HVD05	−40		85	°C
	SN65HVD06				
	SN65HVD07				
	SN75HVD05	0		70	°C
	SN75HVD06				
	SN75HVD07				

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

5.3 Thermal Information

THERMAL METRIC ⁽¹⁾		D (SOIC) SN65 Variation	D (SOIC) SN75 Variation	P (PDIP)	UNIT
		8 PINS	8 PINS	8 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	116.7	175.4	125	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	56.3	53.6	34.9	°C/W
R _{θJB}	Junction-to-board thermal resistance	63.4	45.1	23.7	°C/W
ψ _{JT}	Junction-to-top characterization parameter	8.8	10.1	12.1	°C/W
ψ _{JB}	Junction-to-board characterization parameter	62.6	44.4	23.6	°C/W

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

5.4 Package Dissipation Ratings

(See [5-1](#) and [5-2](#))

PACKAGE	T _A ≤ 25°C POWER RATING	DERATING FACTOR ⁽¹⁾ ABOVE T _A = 25°C	T _A = 70°C POWER RATING	T _A = 85°C POWER RATING
D ⁽²⁾	710 mW	5.7 mW/°C	455 mW	369 mW
D ⁽³⁾	1282 mW	10.3 mW/°C	821 mW	667 mW
P	1000 mW	8.0 m W/°C	640 mW	520 mW

- (1) This is the inverse of the junction-to-ambient thermal resistance when board-mounted and with no air flow.
 (2) Tested in accordance with the Low-K thermal metric definitions of EIA/JESD51-3
 (3) Tested in accordance with the High-K thermal metric definitions of EIA/JESD51-7

5.5 Driver Electrical Characteristics

over operating free-air temperature range unless otherwise noted

PARAMETER			TEST CONDITIONS		MIN	TYP ⁽¹⁾	MAX	UNIT
V _{IK}	Input clamp voltage		I _I = −18 mA		−1.5			V
V _{OD}	Differential output voltage		No Load				V _{CC}	V
			R _L = 54 Ω, See 6-4		2.5			
			V _{test} = −7 V to 12 V, See 6-2		2.2			
Δ V _{OD}	Change in magnitude of differential output voltage		See 6-4 and 6-2		−0.2		0.2	V
V _{OC(SS)}	Steady-state common-mode output voltage		See 6-3		2.2		3.3	V
ΔV _{OC(SS)}	Change in steady-state common-mode output voltage				−0.1		0.1	V
V _{OC(PP)}	Peak-to-peak common-mode output voltage	HVD05	See 6-3		600		mV	
		HVD06			500			
		HVD07			900			
I _{OZ}	High-impedance output current		See receiver input currents					
I _I	Input current	D			−100		0	μA
		DE			0		100	
I _{OS}	Short-circuit output current		−7 V ≤ V _O ≤ 12 V		−250		250	mA
C _(diff)	Differential output capacitance		V _{ID} = 0.4 sin (4E6πt) + 0.5 V, DE at 0 V		16			pF
I _{CC}	Supply current	RE at V _{CC} , D and DE at V _{CC} , No load	Receiver disabled and driver enabled	9		15	mA	
		RE at V _{CC} , D at V _{CC} DE at 0 V, No load	Receiver disabled and driver disabled (standby)	1		5	μA	
		RE at 0 V, D and DE at V _{CC} , No load	Receiver enabled and driver enabled	9		15	mA	

(1) All typical values are at 25°C and with a 5-V supply.

5.6 Driver Switching Characteristics

over operating free-air temperature range unless otherwise noted

PARAMETER		TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
t _{PLH}	Propagation delay time, low-to-high-level output	HVD05		6.5	11	ns
		HVD06		27	40	
		HVD07		250	400	
t _{PHL}	Propagation delay time, high-to-low-level output	HVD05		6.5	11	ns
		HVD06		27	40	
		HVD07		250	400	
t _r	Differential output signal rise time	HVD05		2.7	3.6	ns
		HVD06		18	28	
		HVD07		150	300	
t _f	Differential output signal fall time	HVD05		2.7	3.6	ns
		HVD06		18	28	
		HVD07		150	300	
t _{sk(p)}	Pulse skew (t _{PHL} - t _{PLH})	HVD05			2	ns
		HVD06			2.5	
		HVD07			10	
t _{sk(pp)} ⁽²⁾	Part-to-part skew	HVD05			3.5	ns
		HVD06			14	
		HVD07			100	
t _{PZH1}	Propagation delay time, high-impedance-to-high-level output	HVD05			25	ns
		HVD06			45	
		HVD07			250	
t _{PHZ}	Propagation delay time, high-level-to-high-impedance output	HVD05			25	ns
		HVD06			60	
		HVD07			250	
t _{PZL1}	Propagation delay time, high-impedance-to-low-level output	HVD05			15	ns
		HVD06			45	
		HVD07			200	
t _{PLZ}	Propagation delay time, low-level-to-high-impedance output	HVD05			14	ns
		HVD06			90	
		HVD07			550	
t _{PZH2}	Propagation delay time, standby-to-high-level output	R _L = 110Ω, RE at 3 V, See 6-5			6	μs
t _{PZL2}	Propagation delay time, standby-to-low-level output	R _L = 110Ω, RE at 3 V, See 6-6			6	μs

(1) All typical values are at 25°C and with a 5-V supply.

(2) t_{sk(pp)} is the magnitude of the difference in propagation delay times between any specified terminals of two devices when both devices operate with the same supply voltages, at the same temperature, and have identical packages and test circuits.

5.7 Receiver Electrical Characteristics

over operating free-air temperature range unless otherwise noted

PARAMETER		TEST CONDITIONS			MIN	TYP ⁽¹⁾	MAX	UNIT	
V _{IT+}	Positive-going input threshold voltage	I _O = −8 mA					−0.01	V	
V _{IT-}	Negative-going input threshold voltage	I _O = 8 mA					−0.2		
V _{hys}	Hysteresis voltage (V _{IT+} - V _{IT-})						35	mV	
V _{IK}	Enable-input clamp voltage	I _I = −18 mA					−1.5	V	
V _{OH}	High-level output voltage	V _{ID} = 200 mV,	I _{OH} = −8 mA,	See ☒ 6-7			4	V	
V _{OL}	Low-level output voltage	V _{ID} = -200 mV,	I _{OL} = 8 mA,	See ☒ 6-7			0.4	V	
I _{OZ}	High-impedance-state output current	V _O = 0 or V _{CC}	RE at V _{CC}				−1	1	μA
I _I	Bus input current	HVD05	Other inputat 0 V	V _A or V _B = 12 V			0.23	0.5	mA
				V _A or V _B = 12 V, V _{CC} = 0 V			0.3	0.5	
				V _A or V _B = −7 V			−0.4	0.13	
				V _A or V _B = −7 V, V _{CC} = 0 V			−0.4	0.15	
		HVD06 HVD07	Other inputat 0 V	V _A or V _B = 12 V			0.06	0.1	mA
				V _A or V _B = 12 V, V _{CC} = 0 V			0.08	0.13	
				V _A or V _B = −7 V			−0.1	0.05	
				V _A or V _B = −7 V, V _{CC} = 0 V			−0.05	0.03	
I _{IH}	High-level input current, RE	V _{IH} = 2 V					−60	26.4	μA
I _{IL}	Low-level input current, RE	V _{IL} = 0.8 V					−60	27.4	μA
C _(diff)	Differential input capacitance	V _I = 0.4 sin (4E6πt) + 0.5 V, DE at 0 V					16		pF
I _{CC}	Supply current	RE at 0 V, D and DE at 0 V, No load	Receiver enabled and driver disabled				5	10	mA
		RE at V _{CC} , DE at 0 V, D at V _{CC} , No load	Receiver disabled and driver disabled (standby)				1	5	μA
		RE at 0 V, D and DE at V _{CC} , No load	Receiver enabled and driver enabled				9	15	mA

(1) All typical values are at 25°C and with a 5-V supply.

5.8 Receiver Switching Characteristics

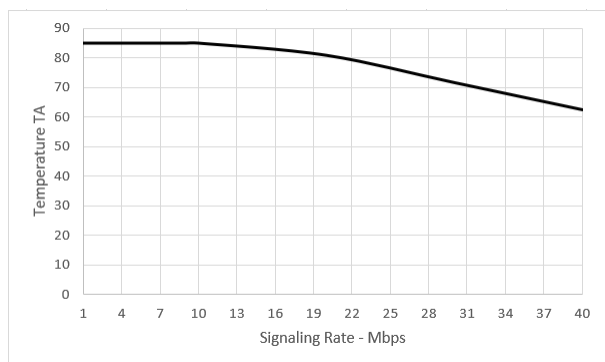
over operating free-air temperature range unless otherwise noted

PARAMETER			TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output 1/2 UL	HVD05	$V_{ID} = -1.5\text{ V to }1.5\text{ V},$ $C_L = 15\text{ pF},$ See 6-8		14.6	25	ns
t_{PHL}	Propagation delay time, high-to-low-level output 1/2 UL	HVD05			14.6	25	ns
t_{PLH}	Propagation delay time, low-to-high-level output 1/8 UL	HVD06			55	70	ns
		HVD07			55	70	
t_{PHL}	Propagation delay time, high-to-low-level output 1/8 UL	HVD06			55	70	ns
		HVD07			55	70	
$t_{sk(p)}$	Pulse skew ($ t_{PHL} - t_{PLH} $)	HVD05				2	ns
		HVD06				4.5	
		HVD07				4.5	
$t_{sk(pp)}$ ⁽²⁾	Part-to-part skew	HVD05				6.5	ns
		HVD06				14	
		HVD07				14	
t_r	Output signal rise time		$C_L = 15\text{ pF},$		2	3	ns
t_f	Output signal fall time		See 6-8		2	3	
t_{PZH1}	Output enable time to high level		$C_L = 15\text{ pF},$ DE at 3 V, See 6-9			10	ns
t_{PZL1}	Output enable time to low level					10	
t_{PHZ}	Output disable time from high level					15	
t_{PLZ}	Output disable time from low level					15	
t_{PZH2}	Propagation delay time, standby-to-high-level output		$C_L = 15\text{ pF},$ DE at 0,			6	μs
t_{PZL2}	Propagation delay time, standby-to-low-level output		See 6-10			6	

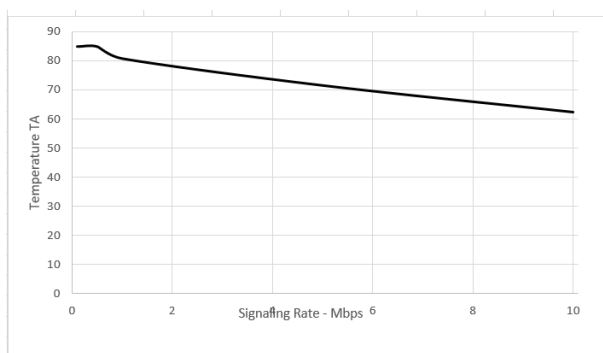
(1) All typical values are at 25°C and with a 5-V supply.

(2) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any specified terminals of two devices when both devices operate with the same supply voltages, at the same temperature, and have identical packages and test circuits.

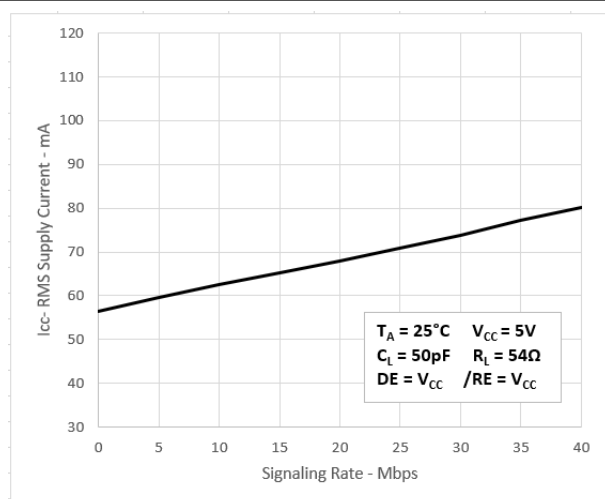
5.9 Typical Characteristics



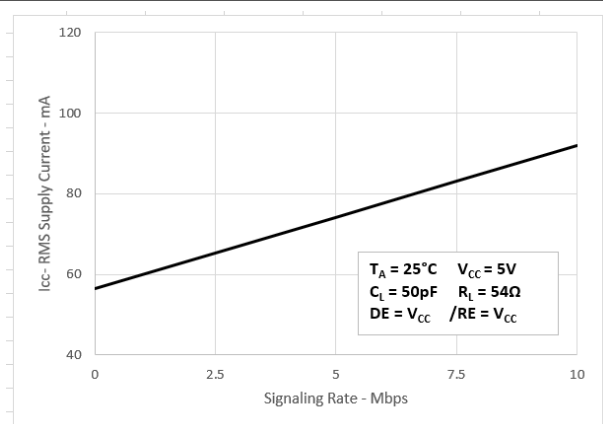
5-1. HVD05 Maximum Recommended Still-Air Operating Temperature vs Signaling Rate (D-Package)



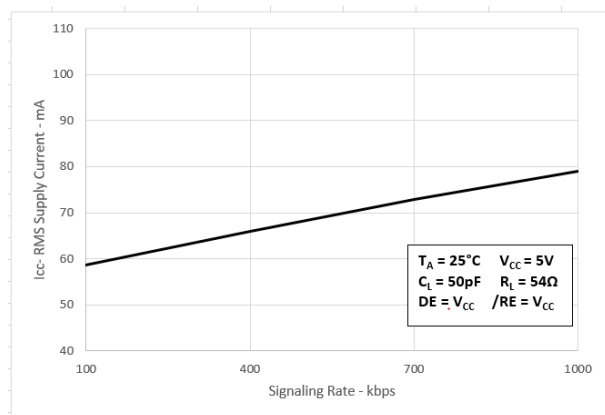
5-2. HVD06 Maximum Recommended Still-Air Operating Temperature vs Signaling Rate (D-Package)



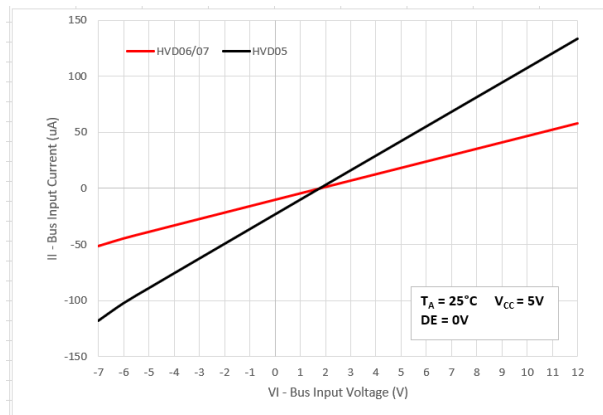
5-3. HVD05 RMS Supply Current vs Signaling Rate



5-4. HVD06 RMS Supply Current vs Signaling Rate

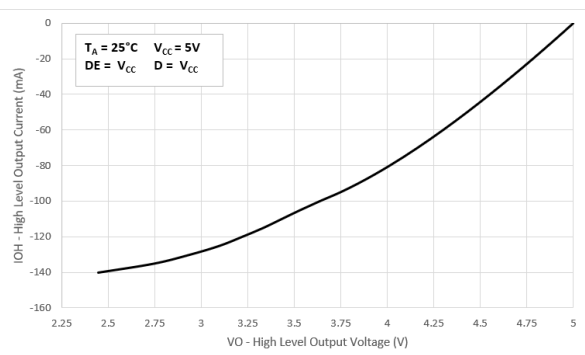


5-5. HVD07 RMS Supply Current vs Signaling Rate

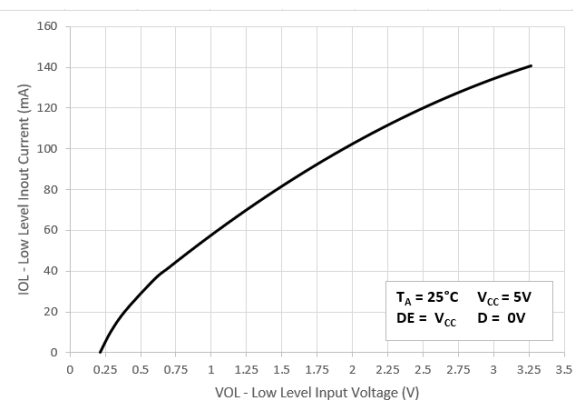


5-6. BUS Input Current vs BUS Input Voltage

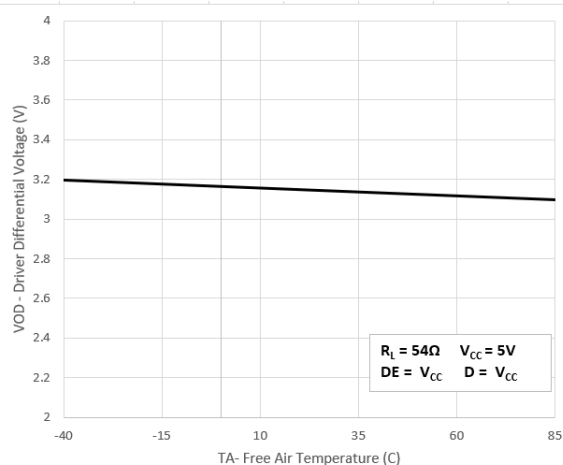
5.9 Typical Characteristics (continued)



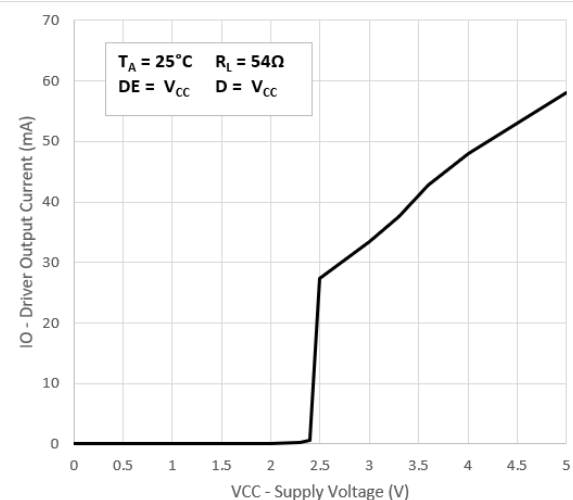
5-7. Driver High-Level Output Current vs High-Level Output Voltage



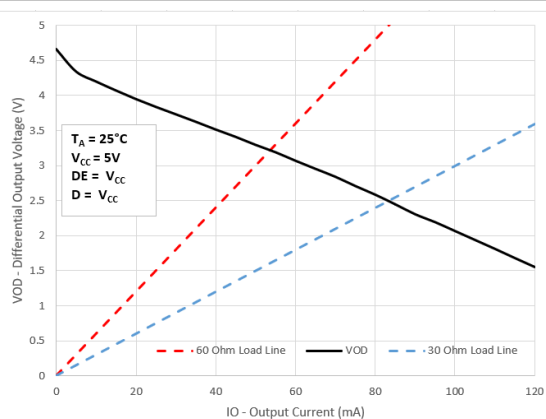
5-8. Driver Low-Level Output Current vs Low-Level Output Voltage



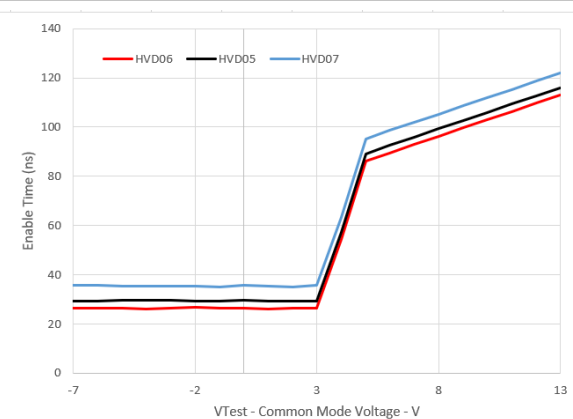
5-9. Differential Output Voltage vs Free-Air Temperature



5-10. Driver Output Current vs Supply Voltage

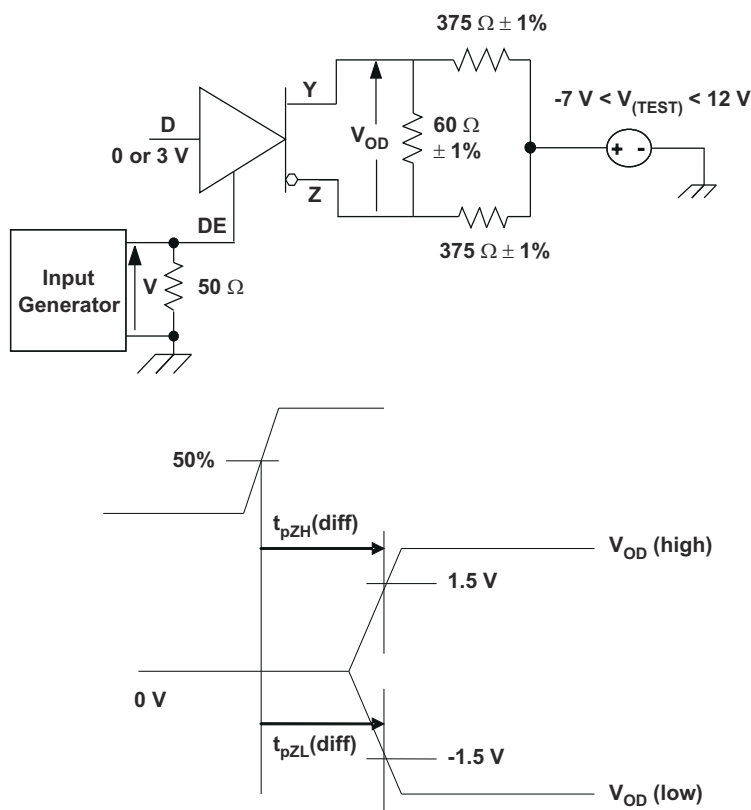


5-11. Differential Output Voltage vs Differential Output Current



5-12. Enable Time vs Common-Mode Voltage
 (See 5-13)

5.9 Typical Characteristics (continued)



5-13. Driver Enable Time From DE to V_{OD}

The diagram shows a 74VHC04 inverter. The input is labeled V_I and can be 0 or 3 V. The input current is I_I . The output is connected to a load resistor of $54\ \Omega \pm 1\%$. The output voltage is V_O . The output current is I_O . The output is also connected to a ground symbol.

Input: PRR = 500 kHz, 50% Duty Cycle, $t_r < 6\text{ns}$, $t_f < 6\text{ns}$, $Z_0 = 50\ \Omega$

Input Generator

V_I

$50\ \Omega$

D

V_{CC}

DE

A

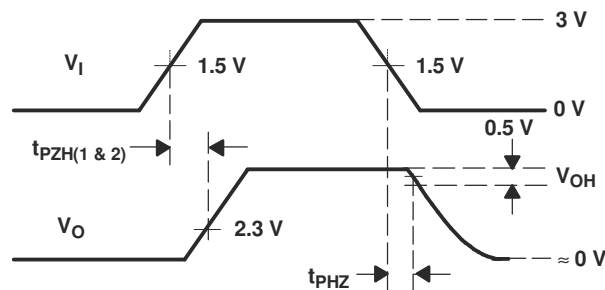
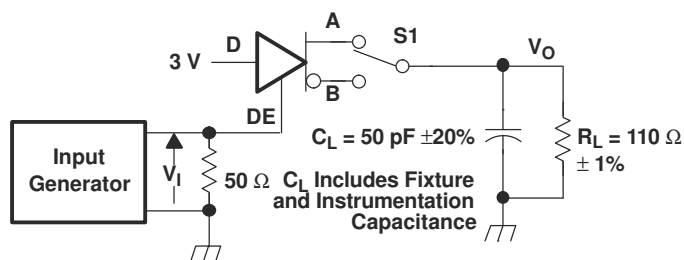
B

$R_L = 54\ \Omega$
 $\pm 1\%$

V_{OD}

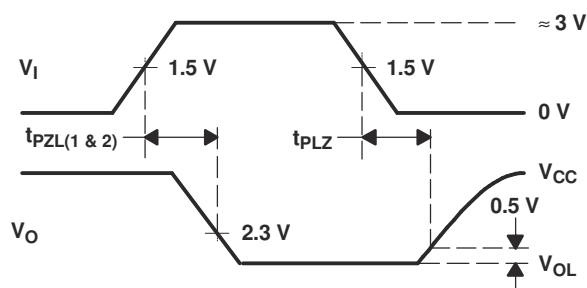
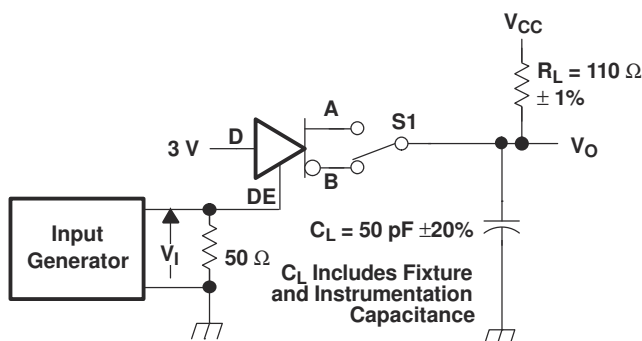
$C_L = 50\ \text{pF} \pm 20\%$
 C_L Includes Fixture and Instrumentation Capacitance

English Data Sheet: [SLLS533](#)



Generator: PRR = 100 kHz, 50% Duty Cycle, $t_r < 6$ ns, $t_f < 6$ ns, $Z_o = 50 \Omega$

图 6-5. Driver High-Level Enable and Disable Time Test Circuit and Voltage Waveforms



Generator: PRR = 100 kHz, 50% Duty Cycle, $t_r < 6$ ns, $t_f < 6$ ns, $Z_o = 50 \Omega$

图 6-6. Driver Low-Level Output Enable and Disable Time Test Circuit and Voltage Waveforms

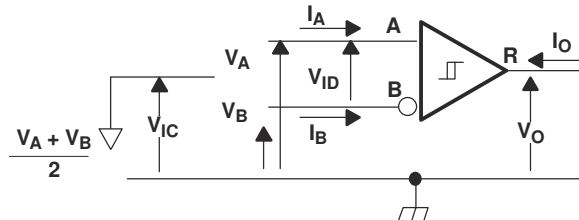
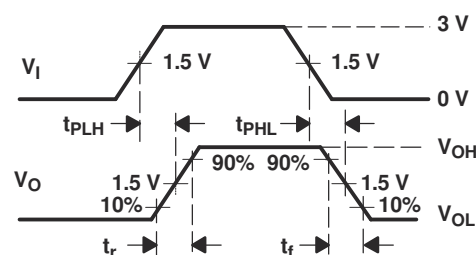
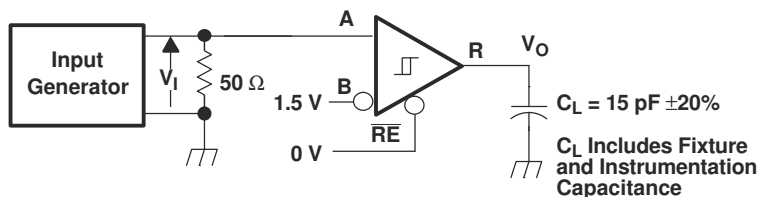
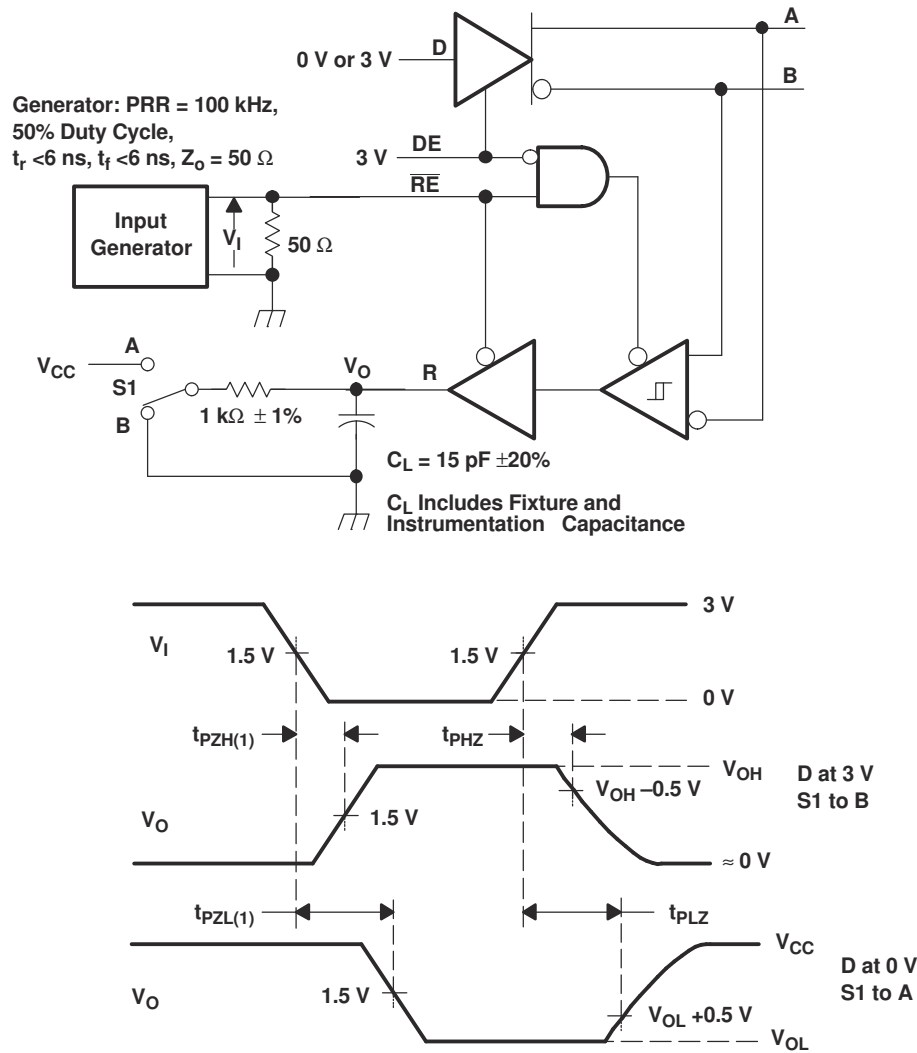


图 6-7. Receiver Voltage and Current Definitions

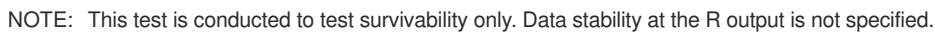


Generator: PRR = 100 kHz, 50% Duty Cycle, $t_r < 6$ ns, $t_f < 6$ ns, $Z_o = 50 \Omega$

图 6-8. Receiver Switching Test Circuit and Voltage Waveforms



6-9. Receiver Enable and Disable Time Test Circuit and Voltage Waveforms With Drivers Enabled



6-11. Test Circuit, Transient Over Voltage Test

6 Function Tables

表 6-1. DRIVER

INPUT	ENABLE	OUTPUTS	
D	DE	A	B
H	H	H	L
L	H	L	H
X	L	Z	Z
Open	H	H	L
X	Open	Z	Z

表 6-2. RECEIVER

DIFFERENTIAL INPUTS ⁽¹⁾	ENABLE	OUTPUT
$V_{ID} = V_A - V_B$	RE	R
$V_{ID} \leq -0.2$ V	L	L
-0.2 V $< V_{ID} < -0.01$ V	L	?
-0.01 V $\leq V_{ID}$	L	H
X	H	Z
Open Circuit	L	H
Short Circuit	L	H
IDLE Bus	L	H
X	Open	Z

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

6.1 Receiver Failsafe

The differential receiver is “failsafe” to invalid bus states caused by:

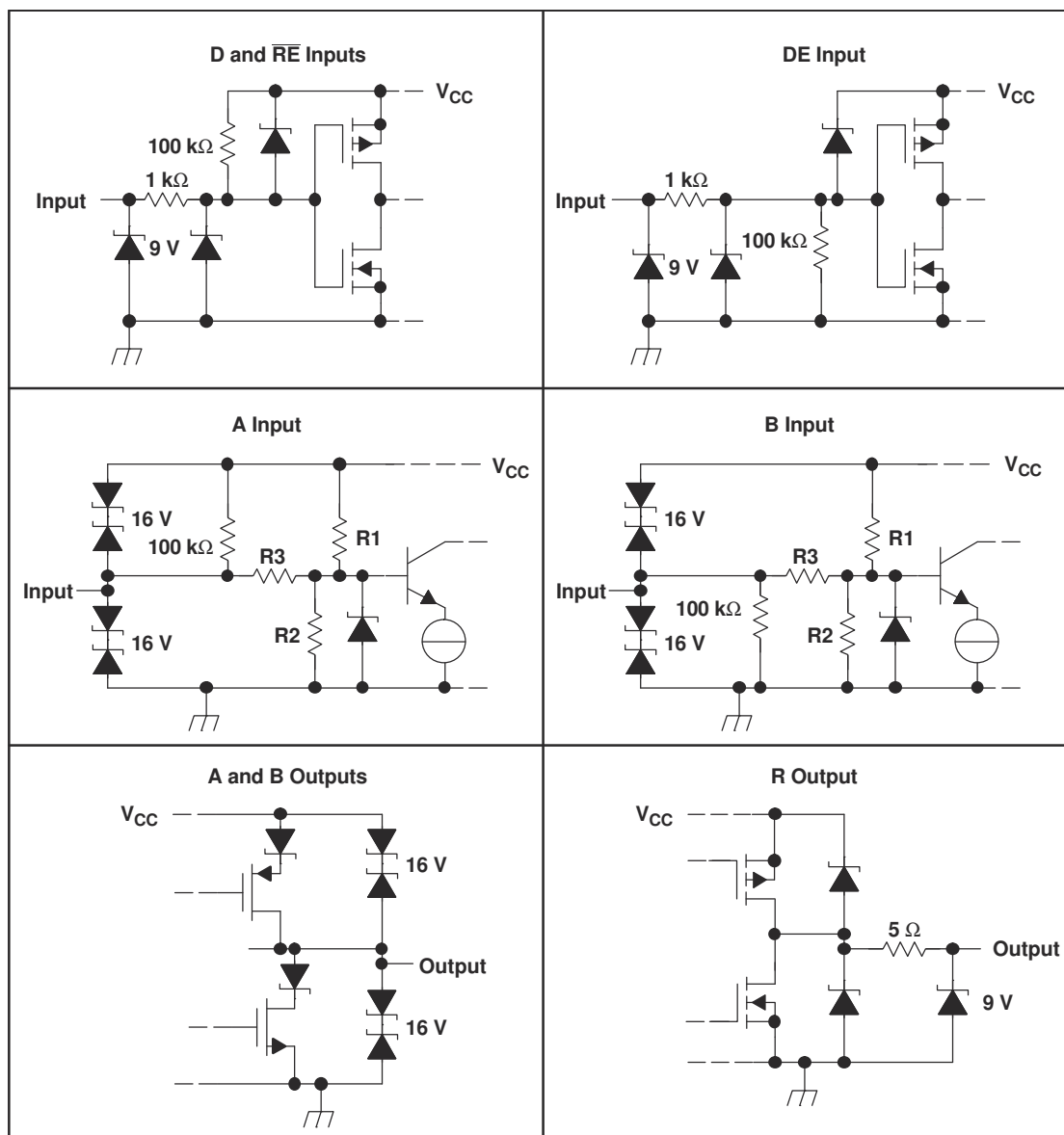
- open bus conditions such as a disconnected connector,
- shorted bus conditions such as cable damage shorting the twisted-pair together, or
- idle bus conditions that occur when no driver on the bus is actively driving

In any of these cases, the differential receiver outputs a failsafe logic High state, so that the output of the receiver is not indeterminate.

Receiver failsafe is accomplished by offsetting the receiver thresholds so that the “input indeterminate” range does not include zero volts differential. To comply with the RS-422 and RS-485 standards, the receiver output *must* output a High when the differential input V_{ID} is more positive than +200 mV, and *must* output a Low when the V_{ID} is more negative than -200 mV. The receiver parameters which determine the failsafe performance are V_{IT+} and V_{IT-} and V_{HYS} . As seen in the [Receiver Electrical Characteristics](#) table, differential signals more negative than -200 mV will always cause a Low receiver output. Similarly, differential signals more positive than +200 mV will *always* cause a High receiver output.

When the differential input signal is close to zero, it will still be above the V_{IT+} threshold, and the receiver output is High. Only when the differential input is more negative than V_{IT-} will the receiver output transition to a Low state. So, the noise immunity of the receiver inputs during a bus fault condition includes the receiver hysteresis value V_{HYS} (the separation between V_{IT+} and V_{IT-}) as well as the value of V_{IT+} .

7 Equivalent Input and Output Schematic Diagrams



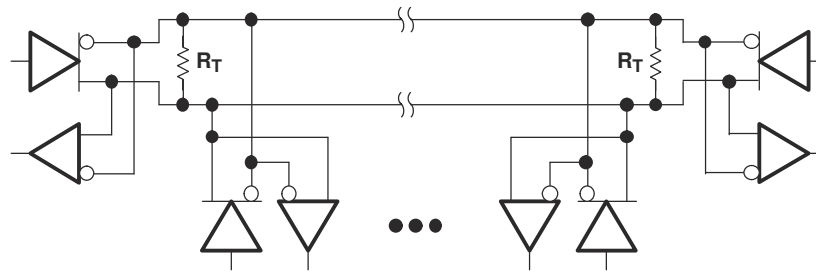
	R1/R2	R3
SN65HVD05	9 kΩ	45 kΩ
SN65HVD06	36 kΩ	180 kΩ
SN65HVD07	36 kΩ	180 kΩ

8 Application and Implementation

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。

Typical Application



Device	Number of Devices on Bus
HVD05	64
HVD06	256
HVD07	256

NOTE: The line should be terminated at both ends with its characteristic impedance ($R_T = Z_O$).
 Stub lengths off the main line should be kept as short as possible.

図 8-1. Typical Application Circuit

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)
SN65HVD05D	Obsolete	Production	SOIC (D) 8	-	-	Call TI	Call TI	-40 to 85	VP05
SN65HVD05DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP05
SN65HVD05DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP05
SN65HVD05DRG4	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP05
SN65HVD05DRG4.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP05
SN65HVD05P	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD05
SN65HVD05P.A	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD05
SN65HVD06DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP06
SN65HVD06DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP06
SN65HVD06P	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD06
SN65HVD06P.A	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD06
SN65HVD07D	Obsolete	Production	SOIC (D) 8	-	-	Call TI	Call TI	-40 to 85	VP07
SN65HVD07DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP07
SN65HVD07DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP07
SN65HVD07DRG4	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP07
SN65HVD07DRG4.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	VP07
SN65HVD07P	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD07
SN65HVD07P.A	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	65HVD07
SN75HVD05D	Obsolete	Production	SOIC (D) 8	-	-	Call TI	Call TI	0 to 70	VN05
SN75HVD05P	Obsolete	Production	PDIP (P) 8	-	-	Call TI	Call TI	0 to 70	75HVD05
SN75HVD06D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN06
SN75HVD06D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN06
SN75HVD06DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN06
SN75HVD06DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN06
SN75HVD07D	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN07
SN75HVD07D.A	Active	Production	SOIC (D) 8	75 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN07
SN75HVD07DR	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN07
SN75HVD07DR.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	VN07
SN75HVD07P	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	75HVD07

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)
SN75HVD07P.A	Active	Production	PDIP (P) 8	50 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	75HVD07

- ⁽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
SN65HVD05DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN65HVD05DRG4	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN65HVD06DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN65HVD07DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN65HVD07DRG4	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN75HVD06DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
SN75HVD07DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN65HVD05DR	SOIC	D	8	2500	340.5	336.1	25.0
SN65HVD05DRG4	SOIC	D	8	2500	353.0	353.0	32.0
SN65HVD06DR	SOIC	D	8	2500	340.5	336.1	25.0
SN65HVD07DR	SOIC	D	8	2500	340.5	336.1	25.0
SN65HVD07DRG4	SOIC	D	8	2500	353.0	353.0	32.0
SN75HVD06DR	SOIC	D	8	2500	340.5	336.1	25.0
SN75HVD07DR	SOIC	D	8	2500	353.0	353.0	32.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN65HVD05P	P	PDIP	8	50	506	13.97	11230	4.32
SN65HVD05P.A	P	PDIP	8	50	506	13.97	11230	4.32
SN65HVD06P	P	PDIP	8	50	506	13.97	11230	4.32
SN65HVD06P.A	P	PDIP	8	50	506	13.97	11230	4.32
SN65HVD07P	P	PDIP	8	50	506	13.97	11230	4.32
SN65HVD07P.A	P	PDIP	8	50	506	13.97	11230	4.32
SN75HVD06D	D	SOIC	8	75	507	8	3940	4.32
SN75HVD06D.A	D	SOIC	8	75	507	8	3940	4.32
SN75HVD07D	D	SOIC	8	75	507	8	3940	4.32
SN75HVD07D.A	D	SOIC	8	75	507	8	3940	4.32
SN75HVD07P	P	PDIP	8	50	506	13.97	11230	4.32
SN75HVD07P.A	P	PDIP	8	50	506	13.97	11230	4.32



PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. 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 .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

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

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

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.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001 variation BA.

重要なお知らせと免責事項

TI 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みいかなる保証も、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、TI 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 TI 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、TI は一切の責任を拒否します。

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 TI 製品を使用するアプリケーションの開発の目的でのみ、TI 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。TI 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、TI およびその代理人を完全に補償するものとし、TI は一切の責任を拒否します。

TI の製品は、[TI の販売条件](#)、[TI の総合的な品質ガイドライン](#)、[ti.com](#) または TI 製品などに関連して提供される他の適用条件に従い提供されます。TI がこれらのリソースを提供することは、適用される TI 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。TI がカスタム、またはカスタマー仕様として明示的に指定していない限り、TI の製品は標準的なカタログに掲載される汎用機器です。

お客様がいかなる追加条項または代替条項を提案する場合も、TI はそれらに異議を唱え、拒否します。

Copyright © 2026, Texas Instruments Incorporated

最終更新日：2025 年 10 月