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## SINGLE M-LVDS RECEIVERS

### FEATURES

- Low-Voltage Differential 30-Ω to 55-Ω Line Receivers for Signaling Rates<sup>(1)</sup> up to 250Mbps; Clock Frequencies up to 125MHz
- SN65MLVD2 Type-1 Receiver Incorporates 25 mV of Input Threshold Hysteresis
- SN65MLVD3 Type-2 Receiver Provides 100 mV Offset Threshold to Detect Open-Circuit and Idle-Bus Conditions
- Wide Receiver Input Common-Mode Voltage Range, -1 V to 3.4 V, Allows 2 V of Ground Noise
- Improved  $V_{IT}$  (35 mV)
- Meets or Exceeds the M-LVDS Standard TIA/EIA-899 for Multipoint Topology
- High Input Impedance with Low Supply Voltage
- Bus-Pin HBM ESD Protection Exceeds 9 kV
- Packaged in 8-Pin SON (DRB) 70% Smaller Than 8-Pin SOIC

<sup>(1)</sup> The signaling rate of a line is the number of voltage transitions that are made per second, expressed in the units bps (bits per second).

### DESCRIPTION

The SN65MLVD2 and SN65MLVD3 are single-channel M-LVDS receivers. These devices are designed in full compliance with the TIA/EIA-899 (M-LVDS) standard, which are optimized to operate at signaling rates up to 250 Mbps. Each receiver channel is controlled by a receive enable ( $\overline{RE}$ ). When  $\overline{RE}$  = low, the corresponding channel is enabled; when  $\overline{RE}$  = high, the corresponding channel is disabled.

The M-LVDS standard defines two types of receivers, designated as Type-1 and Type-2. Type-1 receivers (SN65MLVD2) have thresholds centered about zero with 25 mV of hysteresis to prevent output oscillations with loss of input; Type-2 receivers (SN65MLVD3) implement a failsafe by using an offset threshold. Receiver outputs are slew rate controlled to reduce EMI and crosstalk effects associated with large current surges.

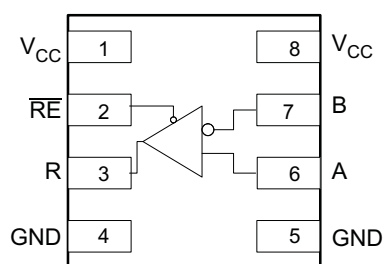
The devices are characterized for operation from -40°C to 85°C.

### APPLICATIONS

- Parallel Multipoint Data and Clock Transmission via Backplanes and Cables
- Cellular Base Stations
- Central Office Switches
- Network Switches and Routers

### PACKAGE AND PIN-OUT

SN65MLVD2DRB  
SN65MLVD3DRB  
SON-8

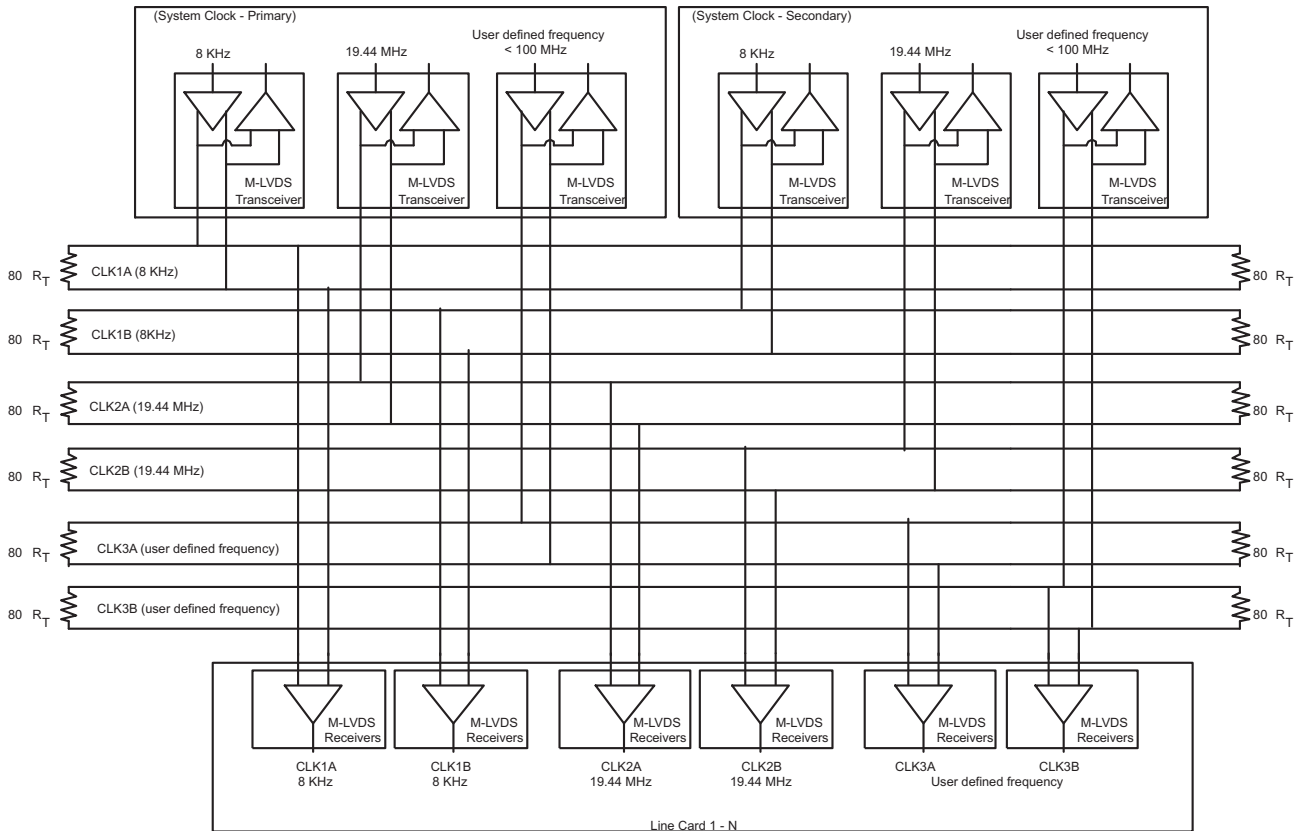


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**SN65MLVD2**  
**SN65MLVD3**  
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**TYPICAL APPLICATION**



AdvancedTCA Backplane - Synchronized System Clock



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### ORDERING INFORMATION<sup>(1)</sup>

PART NUMBER	FUNCTION	PART MARKING	PACKAGE / CARRIER
SN65MLVD2DRBT	M-LVDS Type 1 Receiver	MF2	8-Pin SON / Small Tape and Reel
SN65MLVD2DRBR	M-LVDS Type 1 Receiver	MF2	8-Pin SON / Tape and Reel
SN65MLVD3DRBT	M-LVDS Type 2 Receiver	MF3	8-Pin SON / Small Tape and Reel
SN65MLVD3DRBR	M-LVDS Type 2 Receiver	MF3	8-Pin SON / Tape and Reel

(1) 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.

### ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup>

		VALUE	UNIT
V <sub>CC</sub>	Supply voltage range <sup>(2)</sup>	-0.5 to 4	V
Input voltage range	RE	-0.5 to 4	V
	A or B	-1.8 to 4	V
Output voltage range	R	-0.3 to 4	V
Electrostatic discharge	Human-body model <sup>(3)</sup>	All other pins	±7
		A, B	±9
	Machine model <sup>(4)</sup>	All pins	±200
	Field-induced-charged-device model <sup>(5)</sup>	All pins	±2
Continuous 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. Bus pin stressed with respect to a common connection of GND and V<sub>CC</sub>.

(4) Tested in accordance with JEDEC Standard 22 Test Method A115-A.

(5) Tested in accordance with EIA-JEDEC JESD22-C101C.

### PACKAGE DISSIPATION RATINGS<sup>(1)</sup>

PACKAGE	PCB TYPE	T <sub>A</sub> ≤ 25°C POWER RATING	DERATING FACTOR <sup>(2)</sup> ABOVE T <sub>A</sub> = 25°C	T <sub>A</sub> = 85°C POWER RATING
8-SON DRB	Low-K	280 mW	2.80 mW/°C	112 mW
	High-K	662 mW	6.62 mW/°C	264 mW

(1) The thermal dissipations are in the consideration of soldering down the powerPAD without via on each type of boards.

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

### THERMAL CHARACTERISTICS

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
θ <sub>JB</sub>	Junction-to-board thermal resistance		89		° C/W	
θ <sub>JC</sub>	Junction-to-case thermal resistance		98		° C/W	
P <sub>D</sub>	Device power dissipation	RE at 0 V, C <sub>L</sub> = 15 pF, V <sub>ID</sub> = 400 mV, 125 MHz			90	mW

## SN65MLVD2 SN65MLVD3

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### RECOMMENDED OPERATING CONDITIONS

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

	MIN	NOM	MAX	UNIT
V <sub>CC</sub> Supply voltage	3	3.3	3.6	V
V <sub>IH</sub> High-level input voltage	2		V <sub>CC</sub>	V
V <sub>IL</sub> Low-level input voltage	GND		0.8	V
V <sub>A</sub> or V <sub>B</sub> Voltage at any bus terminal	-1.4		3.8	V
V <sub>ID</sub>   Magnitude of differential input voltage	0.035		V <sub>CC</sub>	V
V <sub>IC</sub> Differential common-mode input voltage	-1		3.4	V
R <sub>L</sub> Differential load resistance	30	50		Ω
1/t <sub>UI</sub> Signaling rate			250	Mbps
T <sub>A</sub> Operating free-air temperature	-40		85	°C

### DEVICE ELECTRICAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	MAX	UNIT
I <sub>CC</sub> Supply current	$\overline{RE}$ at 0 V, C <sub>L</sub> = 15 pF, V <sub>ID</sub> = 400 mV, 125 MHz			25	mA

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

### RECEIVER ELECTRICAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	MAX	UNIT
V <sub>IT+</sub> Positive-going differential input voltage threshold	Type 1			35	mV
	Type 2			135	
V <sub>IT-</sub> Negative-going differential input voltage threshold	Type 1	See Figure 1, Table 1 and Table 2		-35	mV
	Type 2			65	
V <sub>HYS</sub> Differential input voltage hysteresis (V <sub>IT+</sub> - V <sub>IT-</sub> )	Type 1			25	mV
	Type 2			0	
V <sub>OH</sub> High-level output voltage	I <sub>OH</sub> = -8 mA	2.4			V
V <sub>OL</sub> Low-level output voltage	I <sub>OL</sub> = 8 mA			0.4	V
I <sub>IH</sub> High-level input current	V <sub>IH</sub> = 2 V to V <sub>CC</sub>	-10			μA
I <sub>IL</sub> Low-level input current	V <sub>IL</sub> = GND to 0.8 V	-10			μA
I <sub>OZ</sub> High-impedance output current	V <sub>O</sub> = 0 V or V <sub>CC</sub>	-10		15	μA
I <sub>A</sub> or I <sub>B</sub> Receiver input current	One input (V <sub>A</sub> or V <sub>B</sub> ) = -1.4 V or 3.8 V, Other input = 1.2 V	-20		20	μA
I <sub>AB</sub> Receiver differential input current (I <sub>A</sub> - I <sub>B</sub> )	V <sub>A</sub> = V <sub>B</sub> = -1.4 V or 3.8 V	-4		4	μA
I <sub>A(OFF)</sub> or I <sub>B(OFF)</sub> Receiver input current	One input (V <sub>A</sub> or V <sub>B</sub> ) = -1.4 V or 3.8 V, Other input = 1.2 V, V <sub>CC</sub> = GND or 1.5 V	-20		20	μA
I <sub>AB(OFF)</sub> Receiver power-off differential input current (I <sub>A</sub> - I <sub>B</sub> )	V <sub>A</sub> = V <sub>B</sub> = -1.4 V or 3.8 V, V <sub>CC</sub> = GND or 1.5 V	-4		4	μA
C <sub>A</sub> or C <sub>B</sub> Input capacitance	V <sub>I</sub> = 0.4sin(30E6πt) + 0.5V, <sup>(2)</sup> Other input at 1.2 V		3		pF
C <sub>AB</sub> Differential input capacitance	V <sub>AB</sub> = 0.4sin(30E6πt) + 0.5 V <sup>(2)</sup>			2.5	pF
C <sub>A/B</sub> Input capacitance balance, (C <sub>A</sub> /C <sub>B</sub> )		0.99		1.01	

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

(2) HP4194A impedance analyzer (or equivalent)

## RECEIVER SWITCHING CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	MAX	UNIT	
$t_{PLH}$	Propagation delay time, low-to-high-level output	$C_L = 15\text{ pF}$ , See <a href="#">Figure 2</a>	2		6	ns	
$t_{PHL}$	Propagation delay time, high-to-low-level output		2		6	ns	
$t_r$	Output signal rise time		1		2.3		
$t_f$	Output signal fall time		1		2.3	ns	
$t_{sk(p)}$	Pulse skew ( $ t_{PHL} - t_{PLH} $ )		Type 1		90	210	ps
			Type 2		45	250	
$t_{sk(pp)}$	Part-to-part skew				1	ns	
$t_{jit(per)}$	Period jitter, rms (1 standard deviation) <sup>(2)</sup>		125 MHz clock input			10	ps
$t_{jit(c-c)}$	Cycle-to-cycle jitter, rms <sup>(3)</sup>		125 MHz clock input <sup>(4)</sup>			8	ps
$t_{jit(det)}$	Deterministic jitter <sup>(2)</sup>		Type 1			500	ps
		Type 2			450		
$t_{jit(ran)}$	Random jitter <sup>(2)</sup>	Type 1			8	ps	
		Type 2			8		
$t_{PZH}$	Enable time, high-impedance-to-high-level output	$C_L = 15\text{ pF}$ , See <a href="#">Figure 3</a>			15	ns	
$t_{PZL}$	Enable time, high-impedance-to-low-level output	$C_L = 15\text{ pF}$ , See <a href="#">Figure 3</a>			15	ns	
$t_{PHZ}$	Disable time, high-level-to-high-impedance output	$C_L = 15\text{ pF}$ , See <a href="#">Figure 3</a>			10	ns	
$t_{PLZ}$	Disable time, low-level-to-high-impedance output	$C_L = 15\text{ pF}$ , See <a href="#">Figure 3</a>			10	ns	

- (1) All typical values are at 25°C and with a 3.3-V supply voltage.
- (2) Jitter measured by triggering off of the input source to track out the associated input jitter.
- (3) Stimulus jitter has been subtracted from the numbers.
- (4) Measured over 75K samples
- (5) Measured over BER =  $10^{-6}$ .

## TERMINAL FUNCTIONS

TERMINAL		I/O	DESCRIPTION
NAME	NO.		
A	6	I	M-LVDS Non-inverting input
B	7	I	M-LVDS Inverting input
R	3	O	Data output from receivers
$\overline{RE}$	2	I	Receiver enable, active low, enables all receivers
GND	4, 5		Circuit ground
$V_{CC}$	1, 8		Supply voltage

## DEVICE FUNCTION TABLES

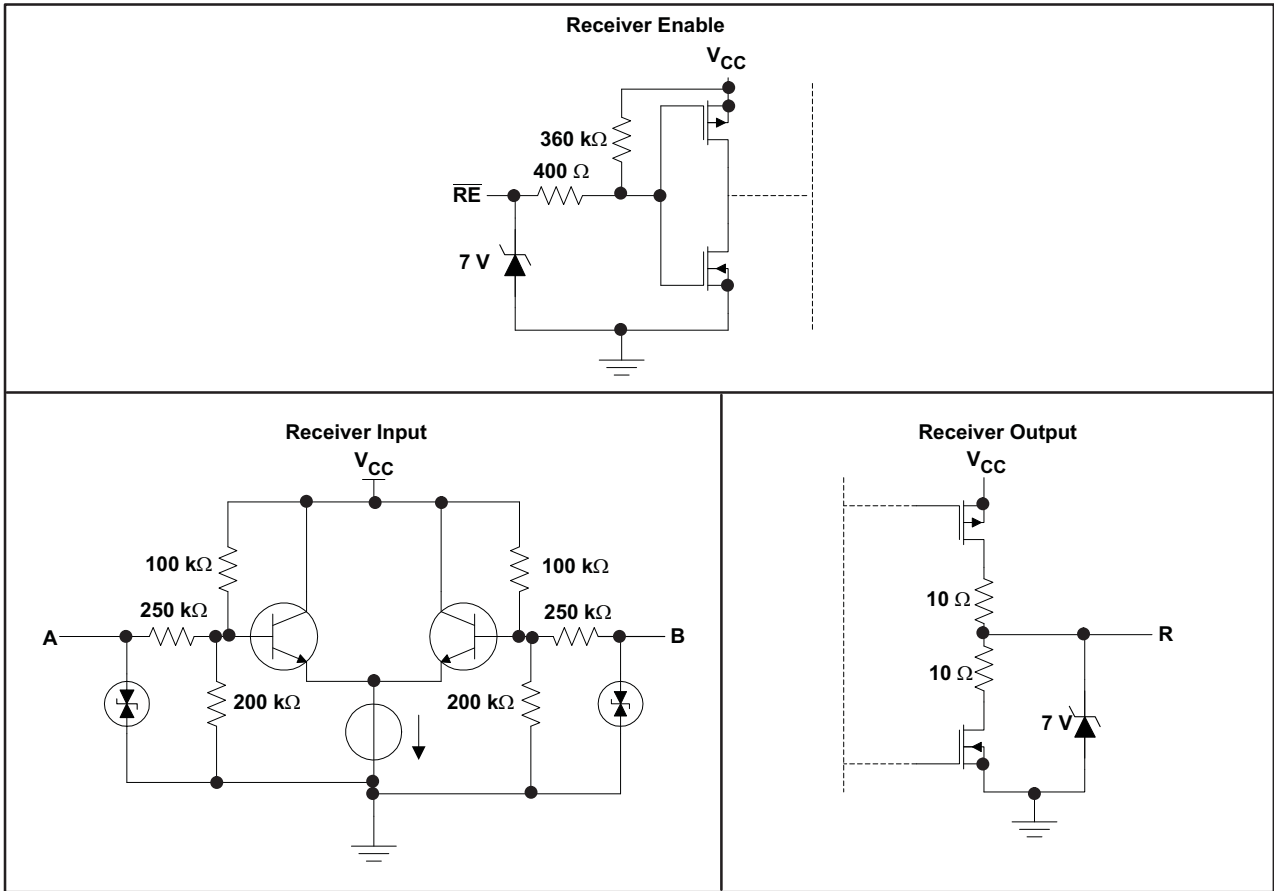
TYPE-1 RECEIVER (SN65MLVD2)			TYPE-2 RECEIVER (SN65MLVD3)		
INPUTS <sup>(1)</sup>		OUTPUT <sup>(1)</sup>	INPUTS <sup>(1)</sup>		OUTPUT <sup>(1)</sup>
$V_{ID} = V_A - V_B$	$\overline{RE}$	R	$V_{ID} = V_A - V_B$	$\overline{RE}$	R
$V_{ID} \geq 35\text{ mV}$	L	H	$V_{ID} \geq 135\text{ mV}$	L	H
$-35\text{ mV} \leq V_{ID} \leq 35\text{ mV}$	L	?	$65\text{ mV} \leq V_{ID} \leq 135\text{ mV}$	L	?
$V_{ID} \leq -35\text{ mV}$	L	L	$V_{ID} \leq 65\text{ mV}$	L	L
X	H	Z	X	H	Z
X	Open	Z	X	Open	Z
Open Circuit	L	?	Open Circuit	L	L

- (1) H=high level, L=low level, Z=high impedance, X=Don't care, ?=indeterminate

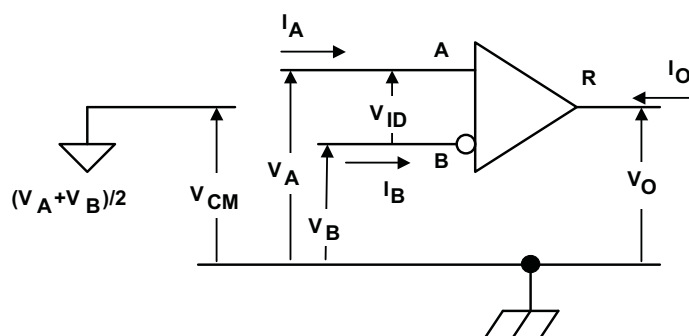
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**EQUIVALENT INPUT AND OUTPUT SCHEMATIC DIAGRAMS**



**PARAMETER MEASUREMENT INFORMATION**



**Figure 1. Receiver Voltage and Current Definitions**

**Table 1. Type-1 Receiver Input Threshold Test Voltages**

APPLIED VOLTAGES		RESULTING DIFFERENTIAL INPUT VOLTAGE	RESULTING COMMON-MODE INPUT VOLTAGE	RECEIVER OUTPUT <sup>(1)</sup>
$V_{IA}$	$V_{IB}$	$V_{ID}$	$V_{IC}$	
2.400	0.000	2.400	1.200	H
0.000	2.400	- 2.400	1.200	L
3.400	3.365	0.035	3.3825	H
3.365	3.400	- 0.035	3.3825	L
-0.965	-1	0.035	-0.9825	H
-1	-0.965	- 0.035	-0.9825	L

(1) H= high level, L = low level, output state assumes receiver is enabled ( $\overline{RE} = L$ )

**Table 2. Type-2 Receiver Input Threshold Test Voltages**

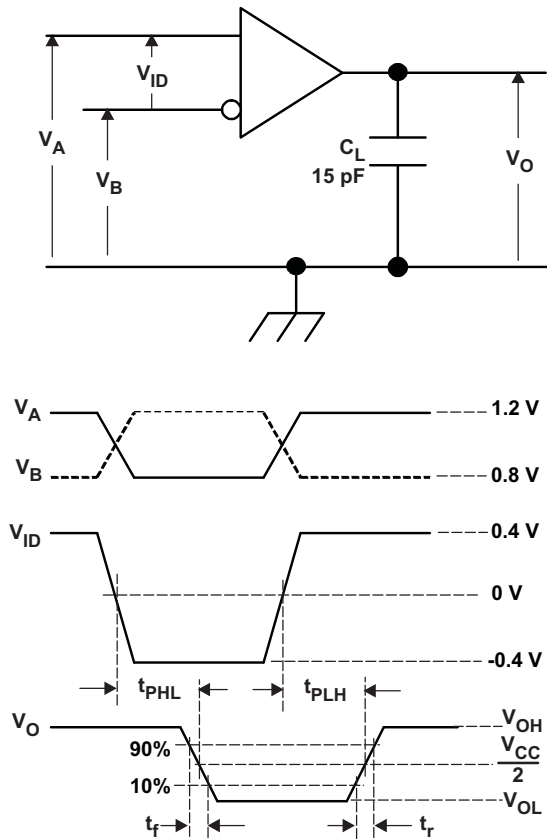
APPLIED VOLTAGES		RESULTING DIFFERENTIAL INPUT VOLTAGE	RESULTING COMMON-MODE INPUT VOLTAGE	RECEIVER OUTPUT <sup>(1)</sup>
$V_{IA}$	$V_{IB}$	$V_{ID}$	$V_{IC}$	
2.400	0.000	2.400	1.200	H
0.000	2.400	- 2.400	1.200	L
3.400	3.265	0.135	3.3325	H
3.4000	3.335	0.065	3.3675	L
-0.865	-1	0.135	-0.9325	H
-0.935	-1	0.065	-0.9675	L

(1) H= high level, L = low level, output state assumes receiver is enabled ( $\overline{RE} = L$ )



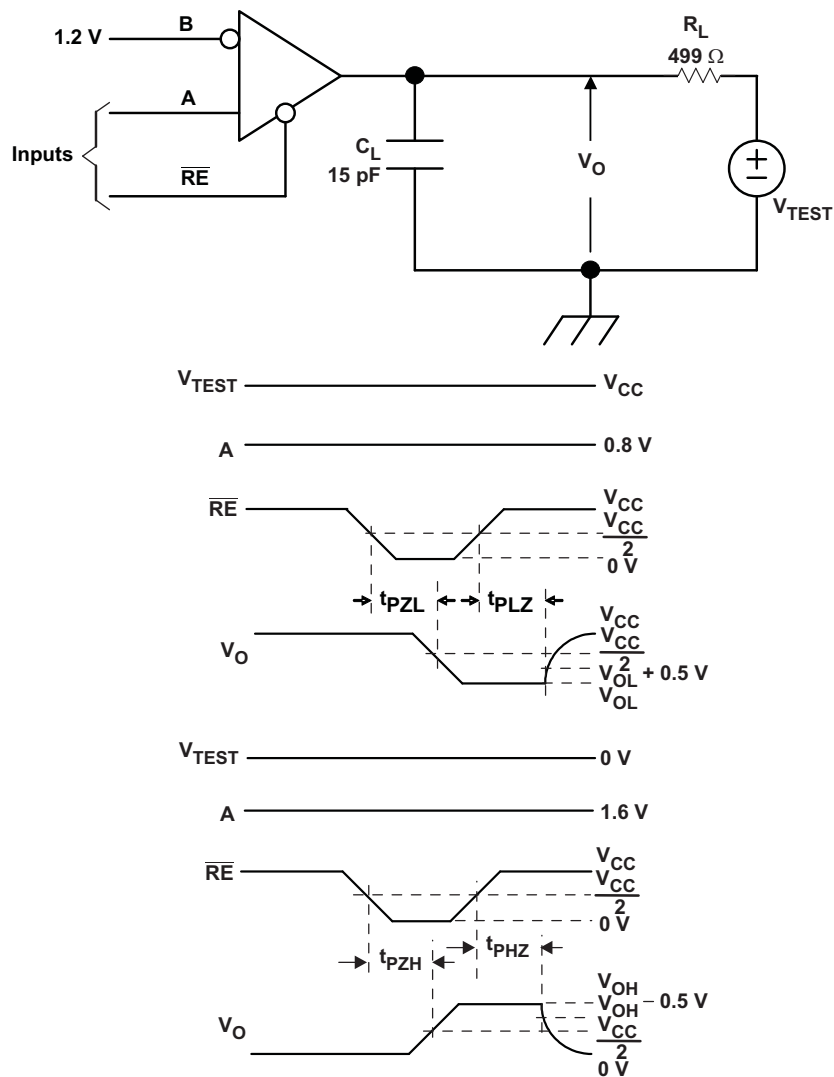
**SN65MLVD2**  
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- A. All input pulses are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1$  ns, Frequency = 1 MHz, duty cycle =  $50 \pm 5\%$ .  $C_L$  is a combination of a 20%-tolerance, low-loss ceramic, surface-mount capacitor and fixture capacitance within 2 cm of the D.U.T.
- B. The measurement is made on test equipment with a  $-3\text{dB}$  bandwidth of at least 1 GHz.

**Figure 2. Receiver Timing Test Circuit and Waveforms**

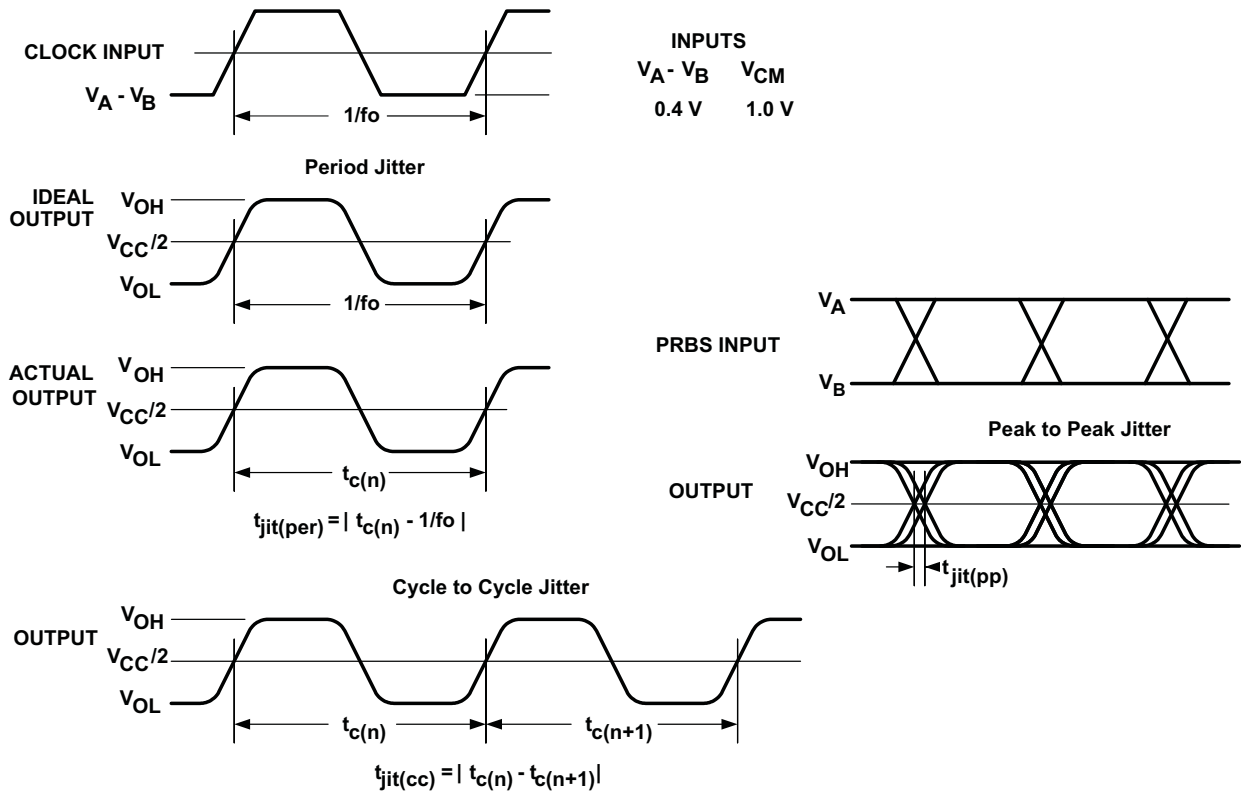


- All input pulses are supplied by a generator having the following characteristics:  $t_r$  or  $t_f \leq 1$  ns, frequency = 1 MHz, duty cycle =  $50 \pm 5\%$ .
- $R_L$  is 1% tolerance, metal film, surface mount, and located within 2 cm of the D.U.T
- $C_L$  is the instrumentation and fixture capacitance within 2 cm of the D.U.T. and  $\pm 20\%$ . The measurement is made on test equipment with a  $-3$ dB bandwidth of at least 1GHz.

**Figure 3. Receiver Enable/Disable Time Test Circuit and Waveforms**

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- A. All input pulses are supplied by the Agilent 81250 Parallel BERT Stimulus System with plug-in E4832A.
- B. The cycle-to-cycle jitter measurement is made on a TEK TDS6604 running TDSJIT3 application software
- C. Period jitter is measured using a 125-MHz 50 ± 1% duty cycle clock input.
- D. Deterministic jitter and random jitter are measured using a 250-Mbps 2<sup>15-1</sup> PRBS input

**Figure 4. Receiver Jitter Measurement Waveforms**

**TYPICAL CHARACTERISTICS**

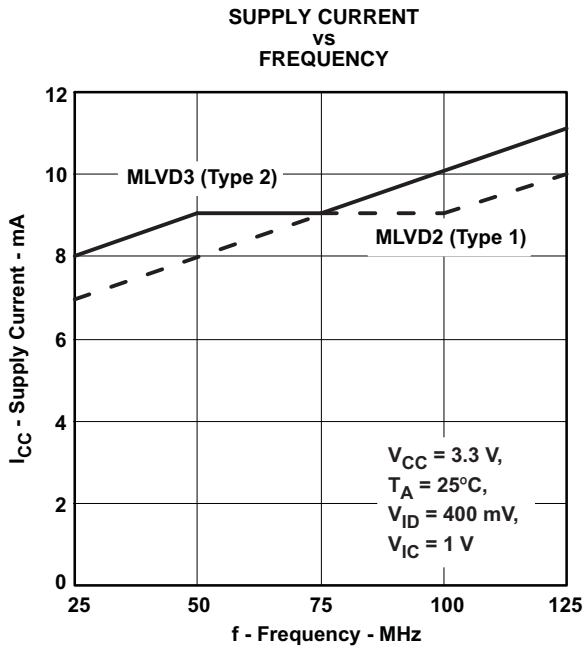


Figure 5.

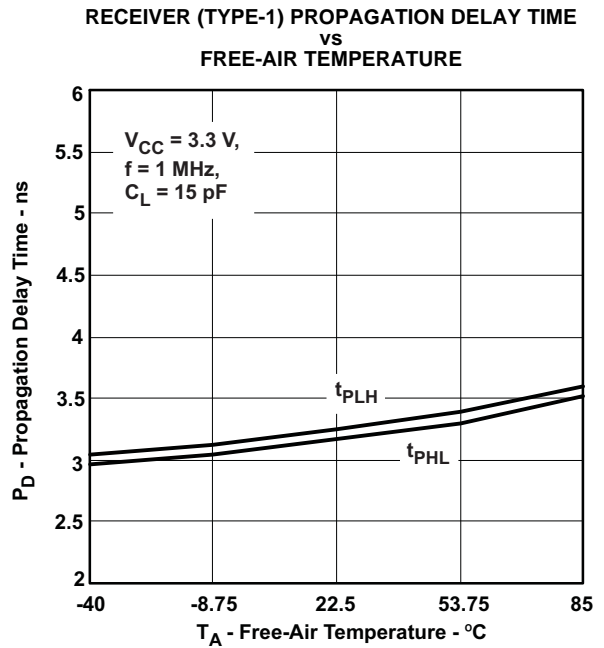


Figure 6.

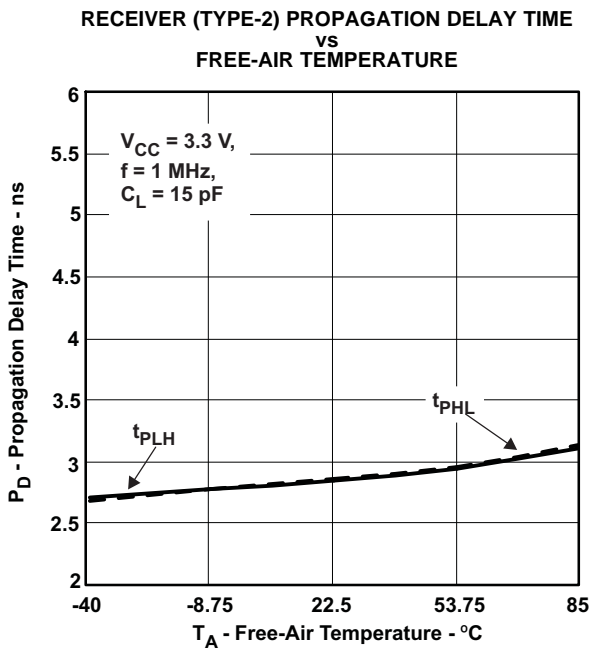


Figure 7.

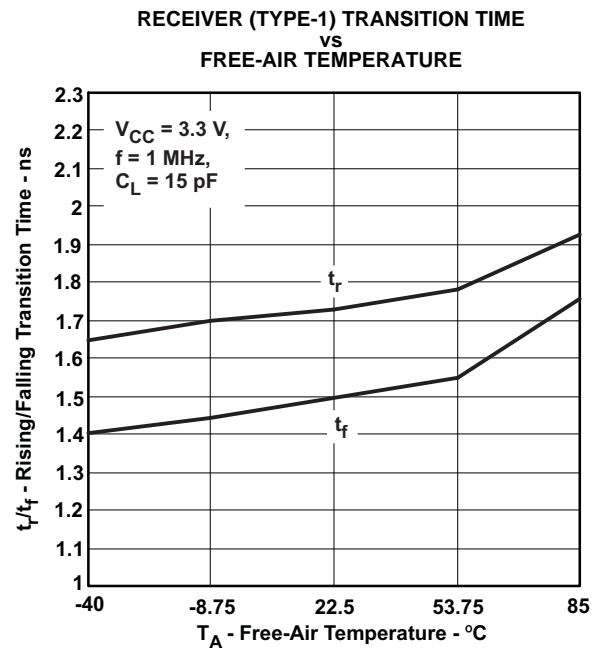


Figure 8.

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**TYPICAL CHARACTERISTICS (continued)**

RECEIVER (TYPE-2) TRANSITION TIME  
 vs  
 FREE-AIR TEMPERATURE

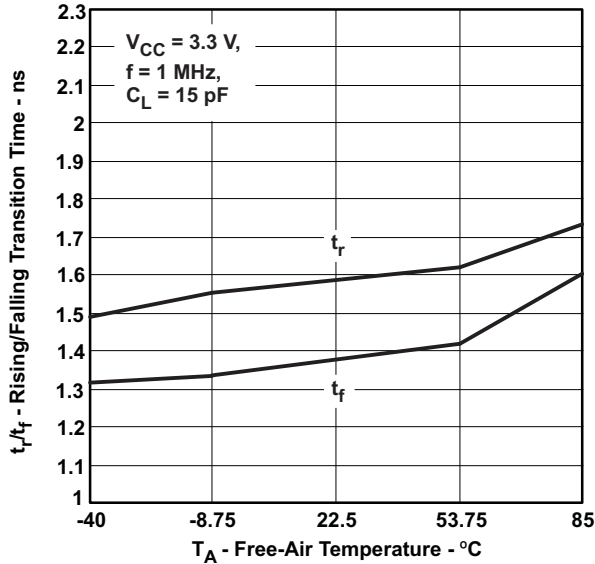


Figure 9.

RECEIVER (TYPE-1) TRANSITION TIME  
 vs  
 OUTPUT LOAD CAPACITOR

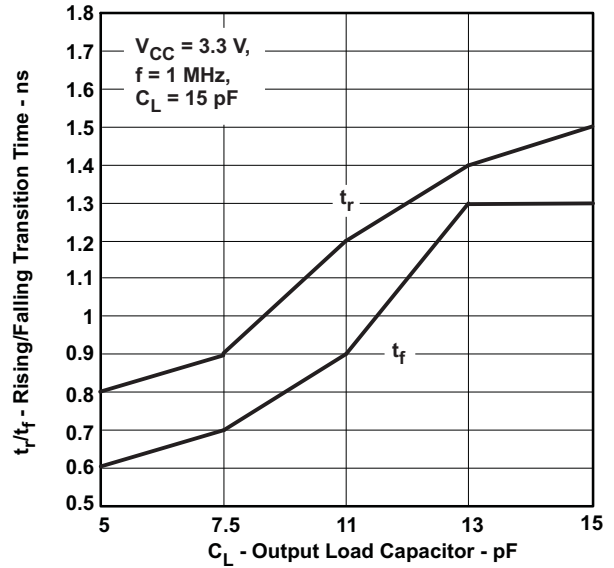


Figure 10.

RECEIVER (TYPE-2) TRANSITION TIME  
 vs  
 OUTPUT LOAD CAPACITOR

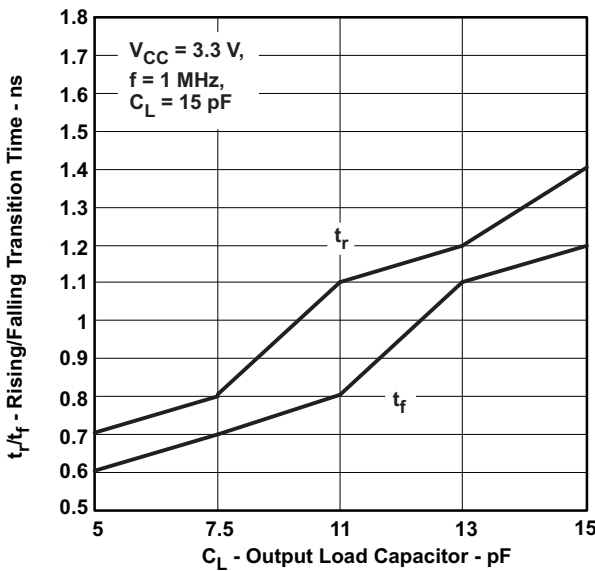


Figure 11.

ADDED RECEIVER PEAK-TO-PEAK JITTER  
 vs  
 SIGNALING RATE

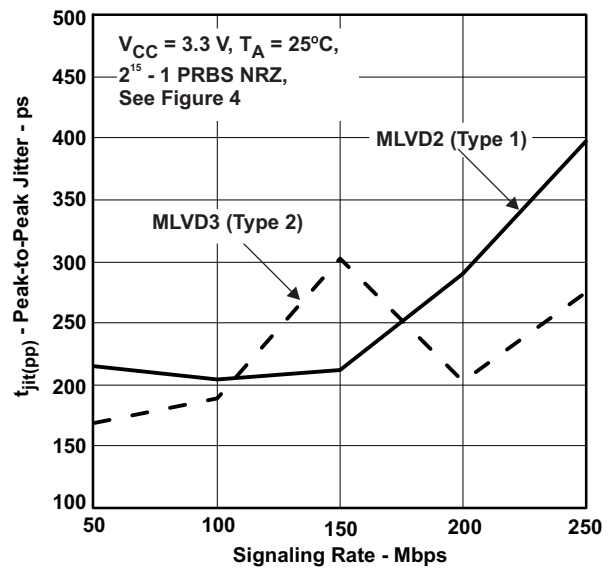


Figure 12.

**TYPICAL CHARACTERISTICS (continued)**

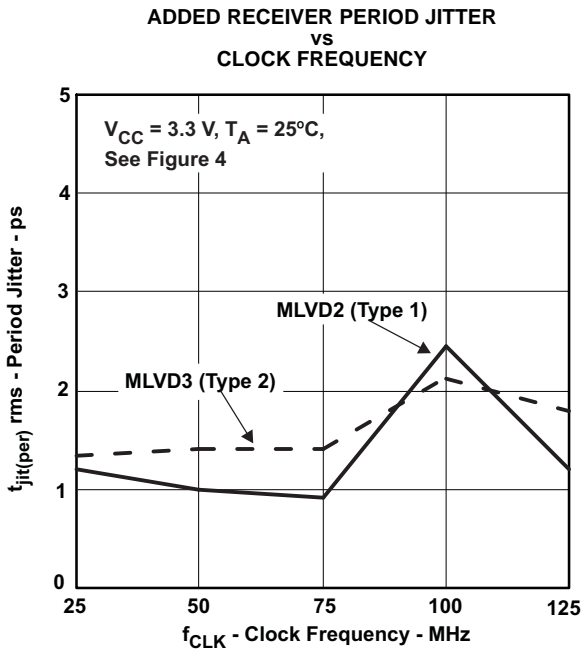


Figure 13.

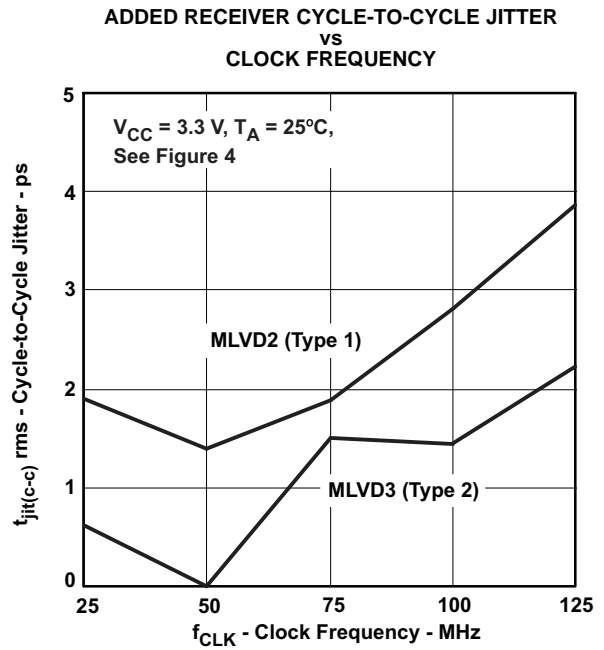


Figure 14.

**EYE PATTERNS**

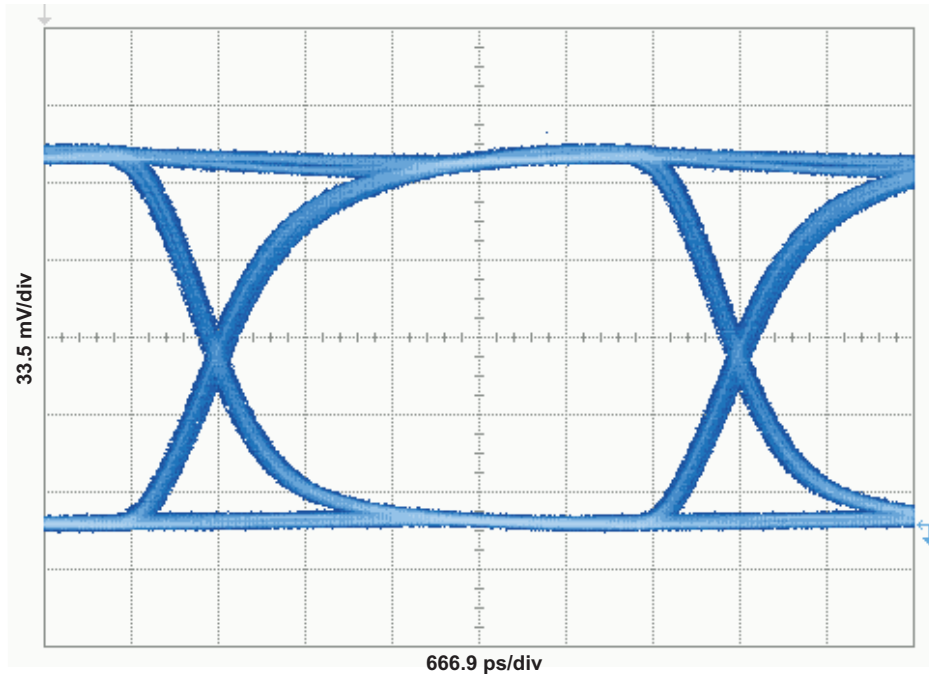


Figure 15. SN65MLVD2 Output ( $V_{CC} = 3.3\text{ V}$ ,  $C_L = 15\text{ pF}$ ) 250 Mbps  $2^{15}-1$  PRBS

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TYPICAL CHARACTERISTICS (continued)

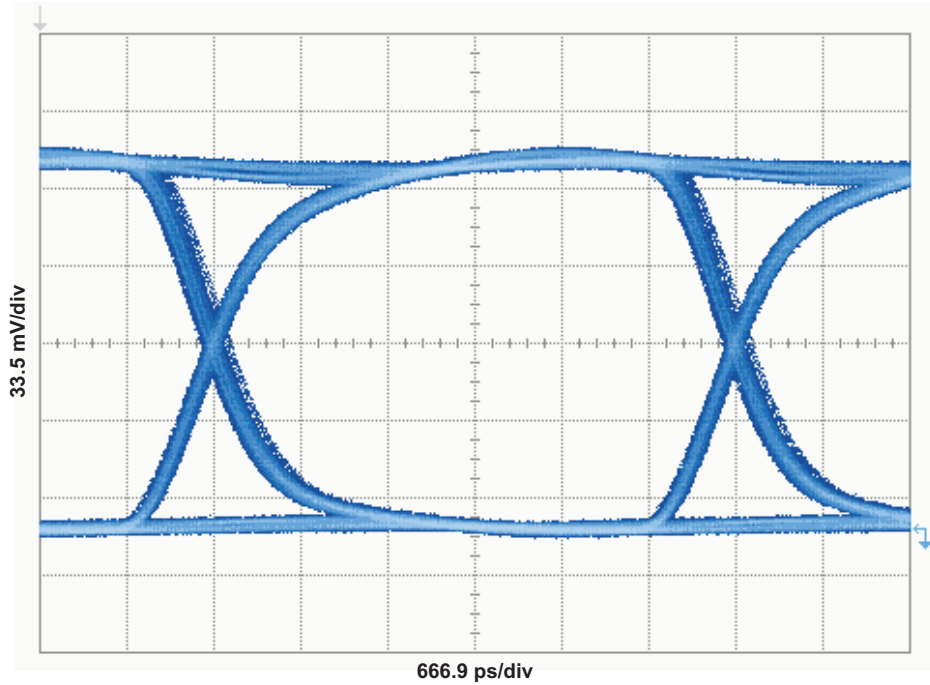







Figure 16. SN65MLVD3 Output ( $V_{CC} = 3.3\text{ V}$ ,  $C_L = 15\text{ pF}$ ) 250 Mbps  $2^{15}-1$  PRBS

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN65MLVD2DRBR	ACTIVE	SON	DRB	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	MF2	
SN65MLVD2DRBT	ACTIVE	SON	DRB	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	MF2	
SN65MLVD3DRBR	ACTIVE	SON	DRB	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	MF3	
SN65MLVD3DRBT	ACTIVE	SON	DRB	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	MF3	
SN65MLVD3DRBTG4	ACTIVE	SON	DRB	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	MF3	

(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.

**OBSELETE:** 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.ti.com/productcontent> for the latest availability 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 6 substances, including the requirement that 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 use in specified lead-free processes.

**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, or 2) lead-based die adhesive used between 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 retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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.





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**PACKAGE OPTION ADDENDUM**

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24-Apr-2015

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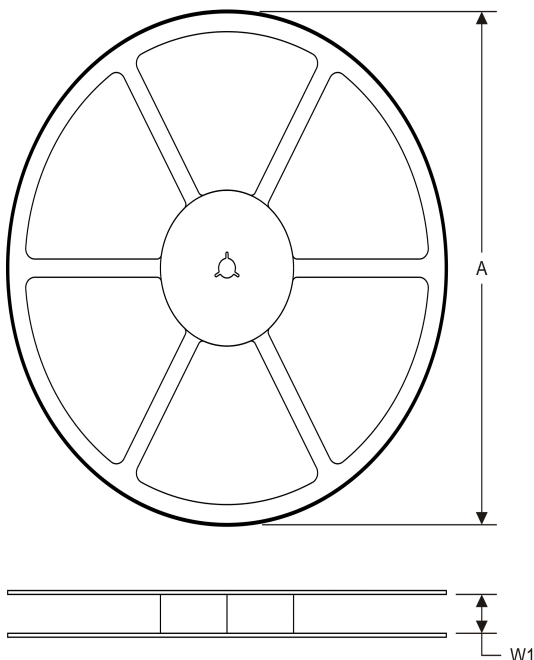
<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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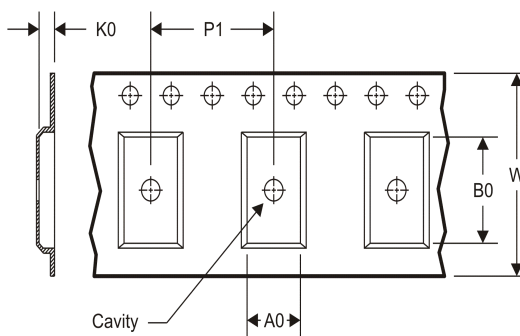
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**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**



**TAPE DIMENSIONS**



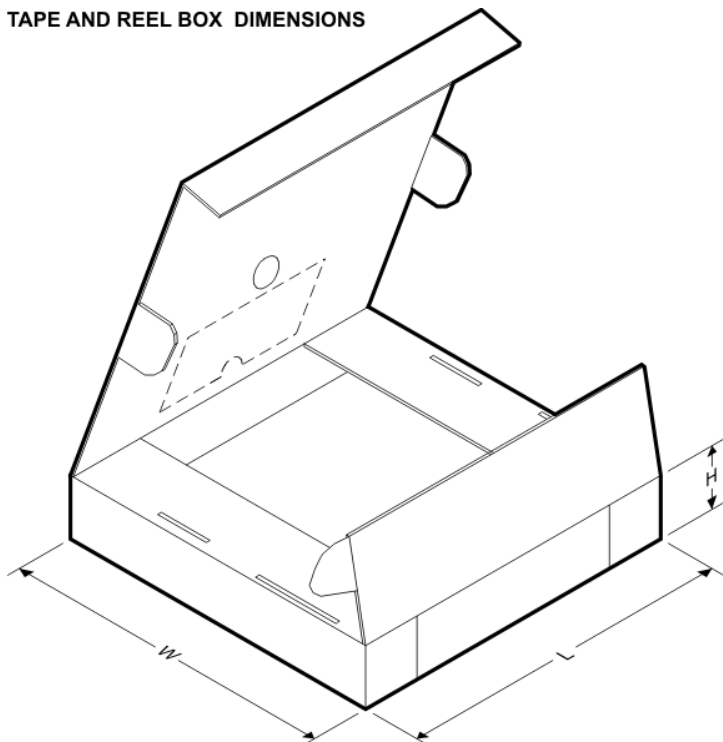
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**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
SN65MLVD2DRBR	SON	DRB	8	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
SN65MLVD2DRBT	SON	DRB	8	250	180.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
SN65MLVD3DRBR	SON	DRB	8	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
SN65MLVD3DRBT	SON	DRB	8	250	180.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2

**TAPE AND REEL BOX DIMENSIONS**



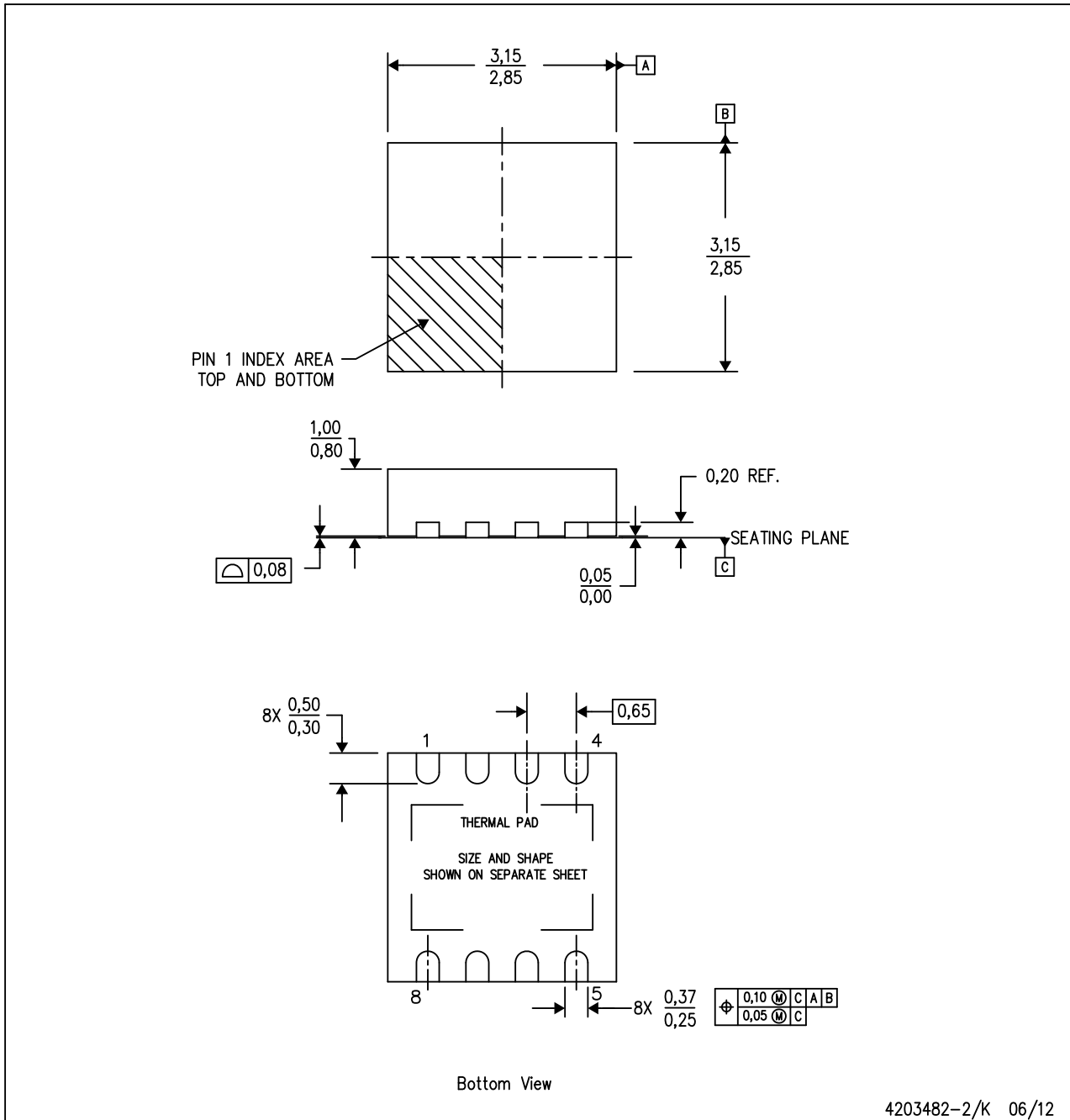
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN65MLVD2DRBR	SON	DRB	8	3000	367.0	367.0	35.0
SN65MLVD2DRBT	SON	DRB	8	250	210.0	185.0	35.0
SN65MLVD3DRBR	SON	DRB	8	3000	367.0	367.0	35.0
SN65MLVD3DRBT	SON	DRB	8	250	210.0	185.0	35.0

**MECHANICAL DATA**

DRB (S-PVSON-N8)

PLASTIC SMALL OUTLINE NO-LEAD



- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - Small Outline No-Lead (SON) package configuration.
  - The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

**THERMAL PAD MECHANICAL DATA**

DRB (S-PVSON-N8)

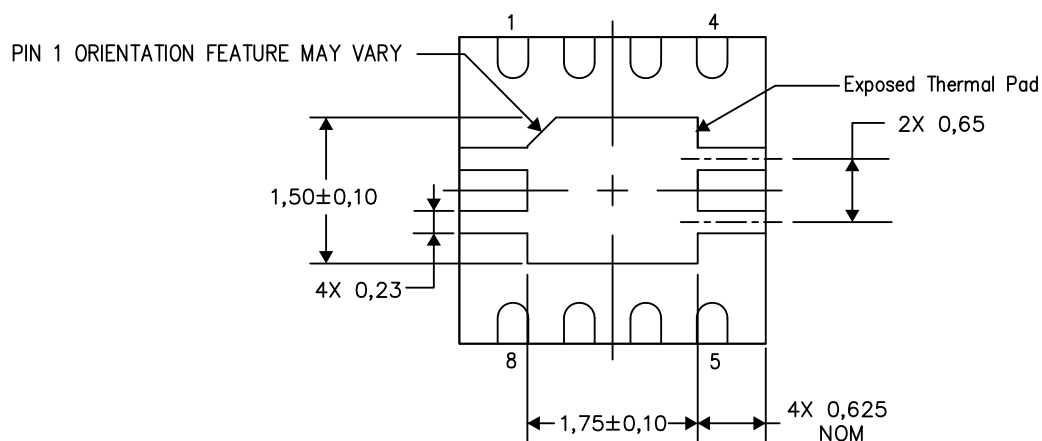
PLASTIC SMALL OUTLINE NO-LEAD

**THERMAL INFORMATION**

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at [www.ti.com](http://www.ti.com).

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

Exposed Thermal Pad Dimensions

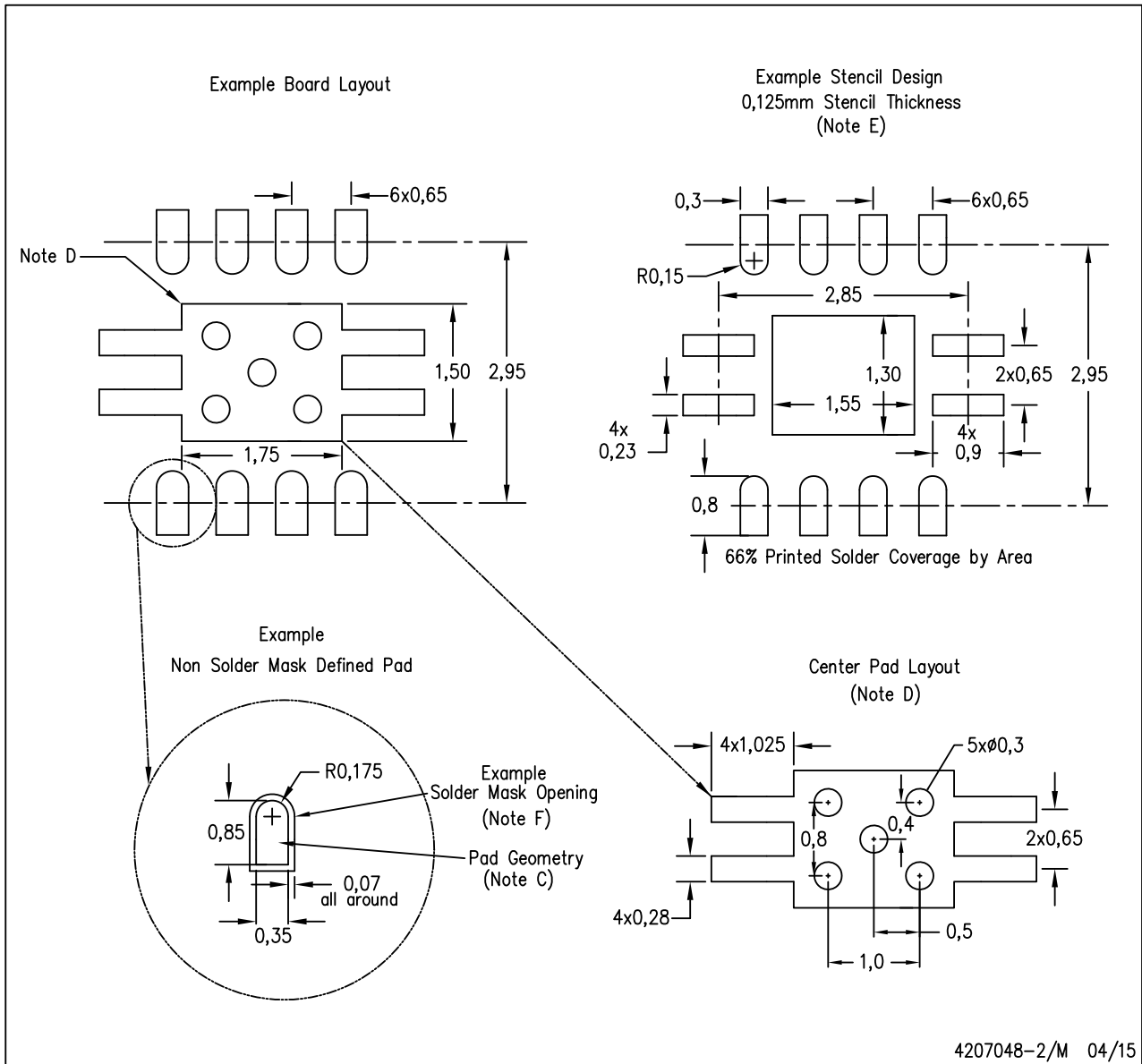
4206340-2/Q 04/15

NOTE: All linear dimensions are in millimeters

**LAND PATTERN DATA**

DRB (S-PVSON-N8)

PLASTIC SMALL OUTLINE NO-LEAD



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, QFN Packages, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at [www.ti.com](http://www.ti.com) <<http://www.ti.com>>.
  - 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 stencil design considerations.
  - Customers should contact their board fabrication site for solder mask tolerances.

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