SN65MLVD048 クワッド チャネル M-LVDS レシーバ

1 特長

- 250Mbps までの信号速度、125MHz までのクロック周波数に対する低電圧差動 30Ω～55Ω ラインレシーバ [1]
- Type-1 レシーバは、25mV の入力スレッショルド ヒステリシス付き
- Type-2 レシーバは、断線およびアイドル バス条件を検出するための 100mV のオフセット スレッショルドを提供
- レシーバ入力同相電圧範囲が –1V～3.4V と広いため、2V のグランド ノイズを許容
- マルチポイント トポロジで M-LVDS 規格 TIA/EIA-899 に適合またはそれを上回る性能
- V_{cc} ≤ 1.5V のとき高入力インピーダンス
- 強化 ESD 保護機能：すべてのピンで 7kV HBM
- 48 ピン 7 X 7 QFN (RGZ)

2 アプリケーション

- バックプレーンとケーブルを介した並列マルチポイント データおよびクロック伝送
- 携帯基地局
- 中央局向けスイッチ
- ネットワーク スイッチおよびルータ

3 概要

SN65MLVD048 は、クワッド チャネル M-LVDS レシーバです。このデバイスは、最高 250Mbps の信号速度で動作するよう最適化された TIA/EIA-899 (M-LVDS) 規格に完全準拠して設計されています。各レシーバ チャネルは、受信イネーブル ($\overline{RE}$) によって制御され ます。$\overline{RE}$ = LOW のとき、対応するチャネルがイネーブルになり、$\overline{RE}$ = HIGH のとき、対応するチャネルがディセーブルになります。

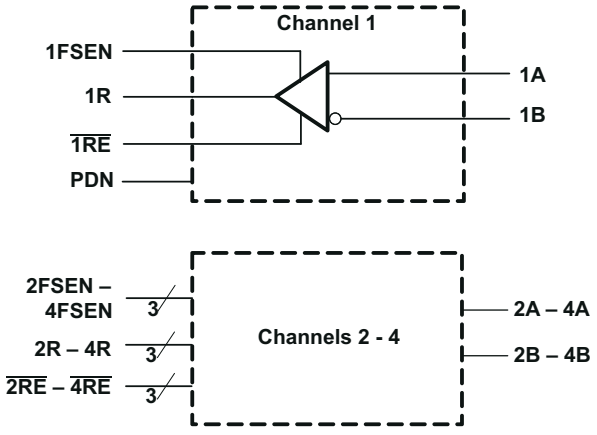
M-LVDS 規格では、Type-1 および Type-2 という 2 種類のレシーバが定義されています。Type-1 レシーバは、ゼロを中心とするスレッショルドで、25mV のヒステリシスを設けて、入力が失われた場合の出力発振を防止します。Type-2 レシーバは、オフセット スレッショルドを使用してフェイルセーフを実装しています。レシーバ出力はスルーレート制御されているため、大きな電流サージに伴う EMI およびクロストークの影響を低減できます。

これらのデバイスは、-40℃～85℃での動作が規定されています。

パッケージ情報

部品番号	パッケージ (1)	パッケージ サイズ(2)
SN65MLVD048	VQFN (RGZ、48)	7mm × 7mm

(1) 詳細については、セクション 10 を参照してください。
(2) パッケージ サイズ (長さ × 幅) は公称値であり、該当する場合はピンも含まれます。



論理図 (正論理)

[1] ラインの信号速度とは、1 秒あたりの電圧遷移回数。単位は bps (ビット毎秒)

Table of Contents

4 Pin Configuration and Functions

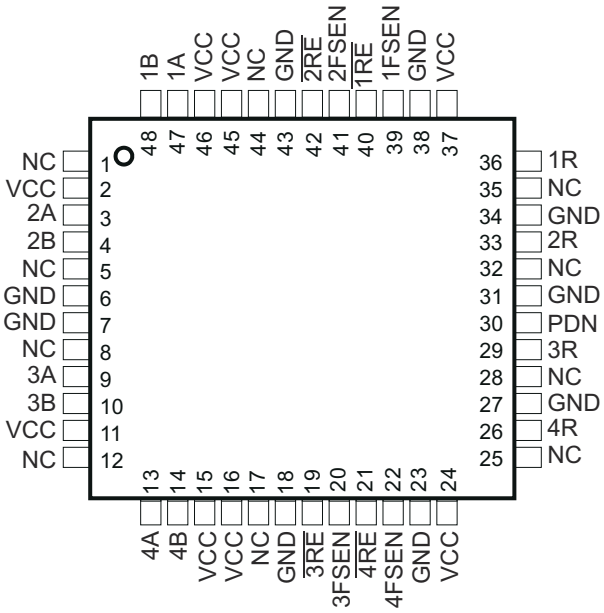


図 4-1. RGZ Package (Top View)

PIN		I/O[1]	DESCRIPTION
NAME	NO.		
1R—4R	36, 33, 29, 26	O	Data output from receivers
1A–4A	47, 3, 9, 13	I/O	M-LVDS bus non-inverting input/output
1B–4B	48, 4, 10, 14	I/O	M-LVDS bus inverting input/output
GND	6, 7, 18, 23, 27, 31, 34, 38, 43	I	Circuit ground. **ALL GND pins must be connected to ground.**
V_{CC}	2, 11, 15, 16, 24, 37, 45, 46	I	Supply voltage. **ALL VCC pins must be connected to supply.**
$\overline{1RE}$– $\overline{4RE}$	40, 42, 19, 21	I	Receiver enable, active low, enables individual receivers. When this pin is left floating, internally this pin will be pulled to logic HIGH.
1FSEN–4FSEN	39, 41, 20, 22	I	Failsafe enable pin. When this pin is left floating, internally this pin will be pulled to logic HIGH. This pin enables the Type 2 receiver for the respective channel. xFSEN = L → Type 1 receiver inputs xFSEN = H → Type 2 receiver inputs
PDN	30		Power Down pin. When this pin is left floating, internally this pin will be pulled to logic LOW. When PDN is HIGH, the device is powered up. When PDN is LOW, the device overrides all other control and powers down. All outputs are Hi-Z
NC	1, 5, 8, 12, 17, 25, 28, 32, 35		Not Connected
NC	44		Not Connected. Internal TI Test pin. **This pin must be left unconnected.**
PowerPAD™	–		Connected to GND

(1) Signal Types: I = Input, O = Output, I/O = Input or Output.

5 Specifications

5.1 Absolute Maximum Ratings

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

			MIN	TYP	MAX	UNIT
V_{CC}	Supply voltage range(2)		–0.5		4	V
	Input voltage range	$\overline{RE}$, FSEN	–0.5		4	V
		A or B	–1.8		4	V
	Output voltage range	R	–0.3		4	V
P_D	$\overline{RE}$ at 0V, C_L = 15pF, V_{ID} = 400mV, 125MHz				339	mW
T_{stg}	Storage Temperature		–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 voltage values, except differential I/O bus voltages, are with respect to network ground terminal.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±7000	V
		Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002(2)	±1500	

(1) JEDEC document JEP155 states that 500V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250V CDM allows safe manufacturing with a standard ESD control process.

5.3 Recommended Operating Conditions

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

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	3	3.3	3.6	V
V_{IH}	High-level input voltage	2		V_{CC}	V
V_{IL}	Low-level input voltage	GND		0.8	V
V_A or V_B	Voltage at any bus terminal	–1.4		3.8	V
$\lvert V_{ID}\rvert$	Magnitude of differential input voltage	0.05		V_{CC}	V
V_{IC}	Differential common-mode input voltage	–1		3.4	V
R_L	Differential load resistance	30	50		Ω
$1/t_{UI}$	Signaling rate			250	Mbps
T_A	Operating free-air temperature	–40		85	°C

5.4 Package Dissipation Ratings

PACKAGE(1)	PCB TYPE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR(2) ABOVE $T_A = 25°C$	$T_A = 85°C$ POWER RATING
48-Pin QFN (RGZ)	Low-K	1298 mW	12.98 mW/°C	519 mW
	High-K	3448 mW	34.48 mW/°C	1379 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.

5.5 Thermal Information

THERMAL METRIC[1]		RGZ	UNIT
		48-Pins	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	25.4	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	15.1	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	8.7	°C/W
ψ_{JT}	Junction-to-top characterization parameter	0.2	°C/W
ψ_{JB}	Junction-to-board characterization parameter	8.7	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	1.4	°C/W

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

5.6 Device Electrical Characteristics

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP[1]	MAX	UNIT
I_{CC}	Supply current	$\overline{RE}$ at 0V for all channels C_L = 15pF, V_{ID} = 400mV, 125MHz		86	94	mA
	Power down	PDN = L		0.75	1.5	mA

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

5.7 Receiver Electrical Characteristics

over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP[1]	MAX	UNIT
V_{IT+}	Positive-going differential input voltage threshold	Type 1	See 表 6-1 and 表 6-2			35	mV
		Type 2				135	
V_{IT-}	Negative-going differential input voltage threshold	Type 1		–35			mV
		Type 2		65			
V_{HYS}	Differential input voltage hysteresis ($V_{IT+} – V_{IT-}$)	Type 1			25		mV
		Type 2			0		
V_{OH}	High-level output voltage		I_{OH} = –8mA	2.4			V
V_{OL}	Low-level output voltage		I_{OL} = 8mA			0.4	V
I_{IH}	High-level input current		V_{IH} = 2V to V_{CC}	–10			µA
I_{IL}	Low-level input current		V_{IL} = GND to 0.8V	–10			µA
I_{OZ}	High-impedance output current		V_O = 0V or V_{CC}	–10		15	µA
I_A or I_B	Receiver input current		One input (V_A or V_B) = –1.4V or 3.8V, Other input = 1.2V	–20		20	µA
I_{AB}	Receiver differential input current ($I_A – I_B$)		V_A = V_B = –1.4V or 3.8V	–4		4	µA
$I_{A(OFF)}$ or $I_{B(OFF)}$	Receiver input current		One input (V_A or V_B) = –1.4V or 3.8V, Other input = 1.2V, V_{CC} = GND or 1.5V	–32		32	µA
$I_{AB(OFF)}$	Receiver power-off differential input current ($I_A – I_B$)		V_A = V_B = –1.4V or 3.8V, V_{CC} = GND or 1.5V	–4		4	µA
C_A or C_B	Input capacitance		V_I = 0.4sin(30E6πt) + 0.5V,[2] Other input at 1.2V		5		pF
C_{AB}	Differential input capacitance		V_{AB} = 0.4sin(30E6πt) + 0.5V[2]			3	pF
$C_{A/B}$	Input capacitance balance, (C_A/C_B)			0.99		1.01	

(1) All typical values are at 25°C and with a 3.3V supply voltage.
(2) HP4194A impedance analyzer (or equivalent)

5.8 Receiver Switching Characteristics

over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP(1)	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output		C_L = 15pF, See 図 6-2	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			35	270	ps
		Type 2			150	460	
$t_{sk(pp)}$	Part-to-part skew					800	ps
$t_{jit(per)}$	Period jitter, rms (1 standard deviation)(2)		All channels switching, 125MHz clock input(3), See 図 6-4			6	ps
$t_{jit(c-c)}$	Cycle-to-cycle jitter, rms(2)					13	ps
$t_{jit(det)}$	Deterministic jitter(2)	Type 1	All channels switching, 250Mbps 2^{15}-1 PRBS input(3), See 図 6-4			800	ps
		Type 2				945	ps
$t_{jit(ran)}$	Random jitter(2)	Type 1				9	ps
		Type 2				8	ps
t_{PZH}	Enable time, high-impedance-to-high-level output		C_L = 15pF, See 図 6-3			15	ns
t_{PZL}	Enable time, high-impedance-to-low-level output		C_L = 15pF, See 図 6-3			15	ns
t_{PHZ}	Disable time, high-level-to-high-impedance output		C_L = 15pF, See 図 6-3			10	ns
t_{PLZ}	Disable time, low-level-to-high-impedance output		C_L = 15pF, See 図 6-3			10	ns

(1) All typical values are at 25°C and with a 3.3V supply voltage.
(2) Jitter is ensured by design and characterization. Stimulus jitter has been subtracted from the numbers.
(3) $t_r = t_f$ = 0.5ns (10% to 90%)

5.9 Typical Characteristics

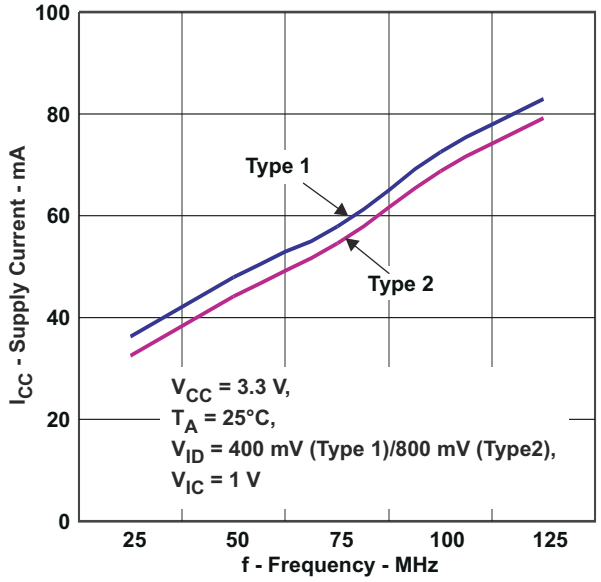


図 5-1. Supply Current vs Frequency

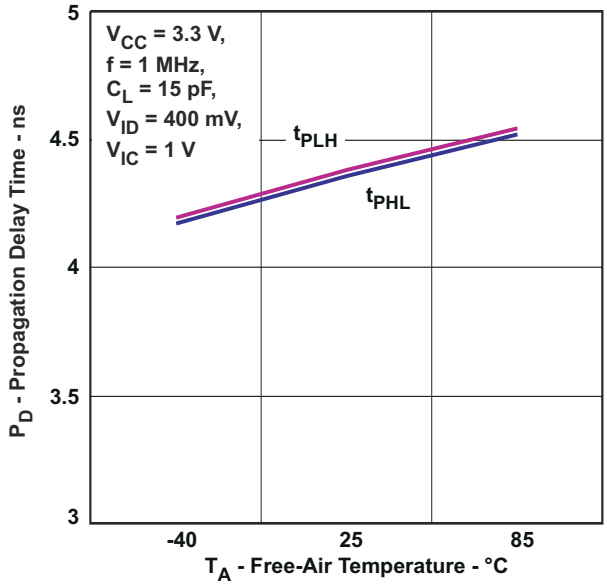


図 5-2. Receiver (Type-1) Propagation Delay Time vs Free-Air Temperature

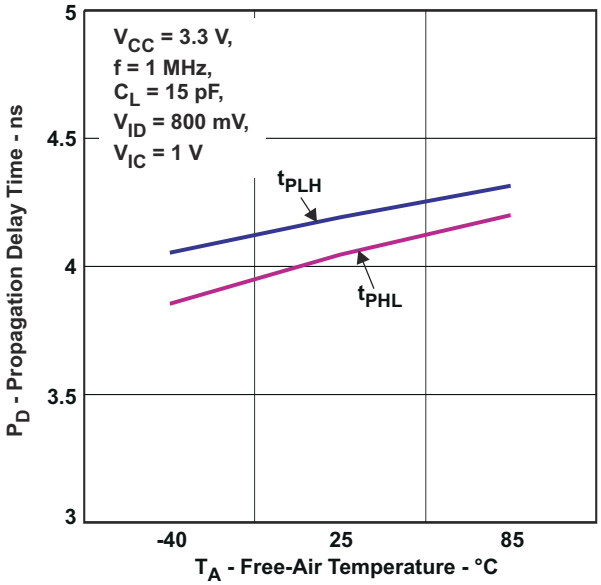


図 5-3. Receiver (Type-2) Propagation Delay Time vs Free-Air Temperature

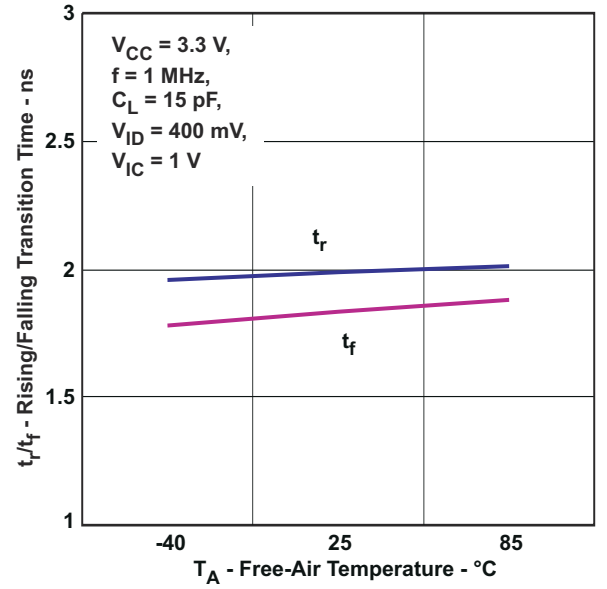


図 5-4. Receiver (Type-1) Transition Time vs Free-Air Temperature

5.9 Typical Characteristics (continued)

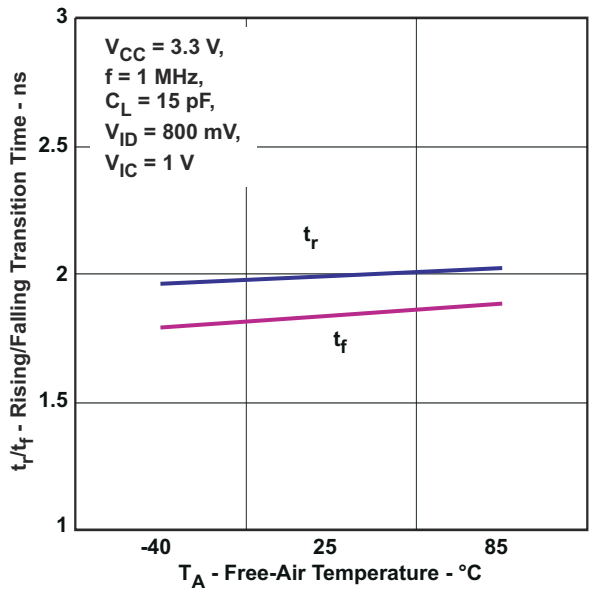


図 5-5. Receiver (Type-2) Transition Time vs Free-Air Temperature

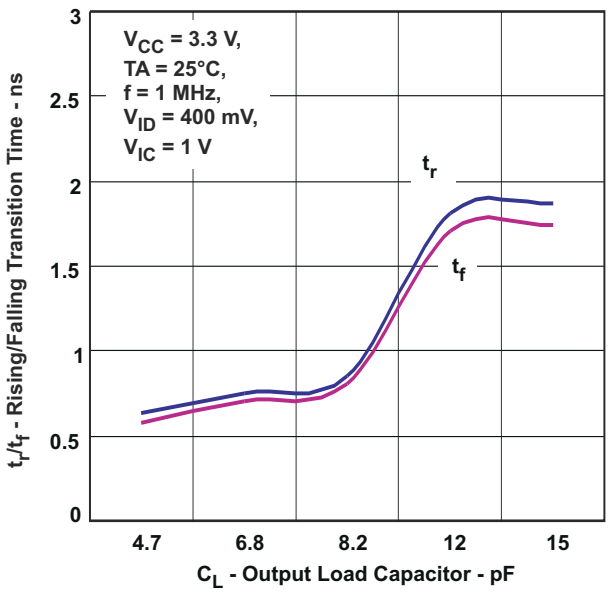


図 5-6. Receiver (Type-1) Transition Time vs Output Load Capacitor

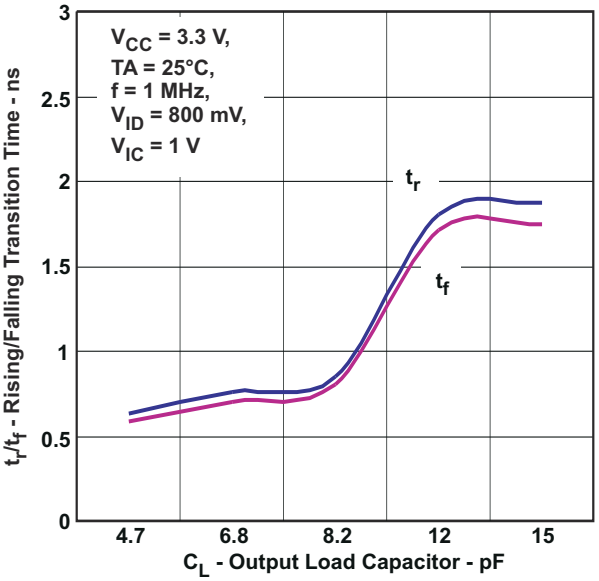


図 5-7. Receiver (Type-2) Transition Time vs Output Load Capacitor

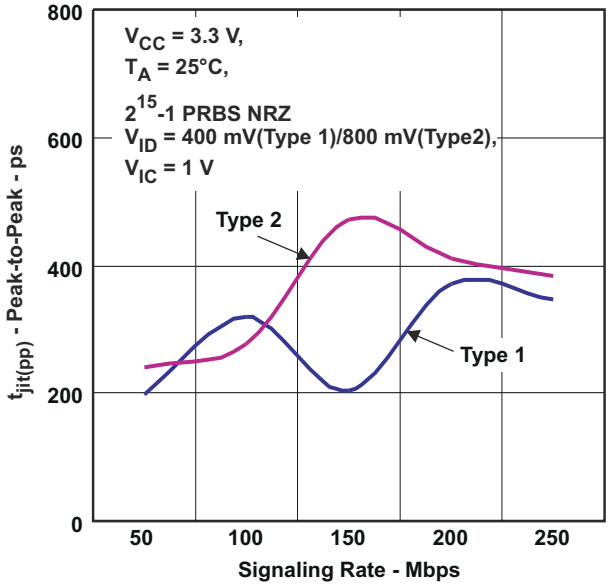


図 5-8. Added Receiver Peak-to-Peak Jitter vs Signaling Rate

5.9 Typical Characteristics (continued)

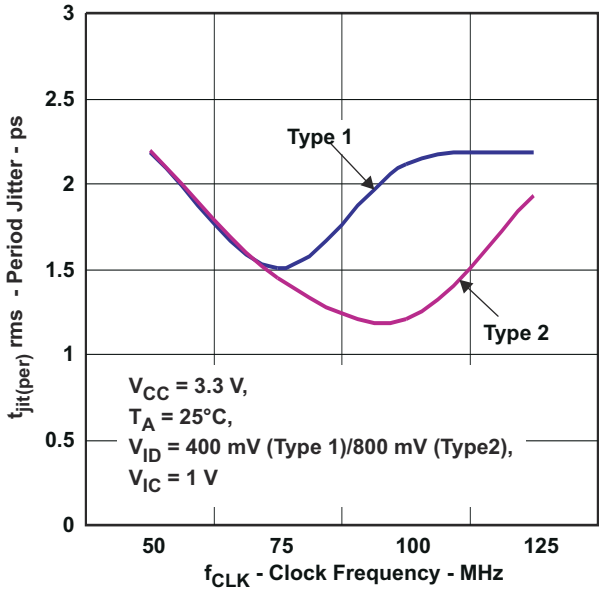


図 5-9. Added Receiver Period Jitter vs Clock Frequency

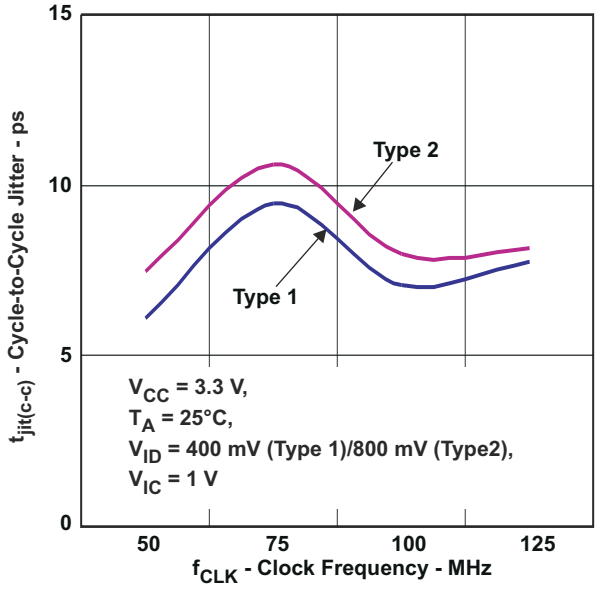


図 5-10. Added Receiver Cycle-to-Cycle Jitter vs Clock Frequency

5.9.1 Eye Patterns

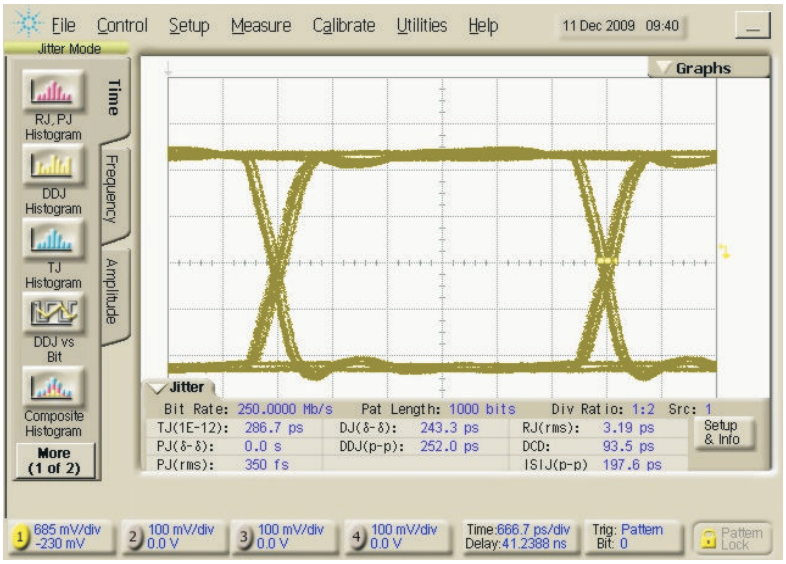


図 5-11. Output (V_{CC} = 3.3V, V_{ID} = 400mV) 250Mbps 2^{15}–1PRBS, Receiver Type 1

5.9.1 Eye Patterns (continued)

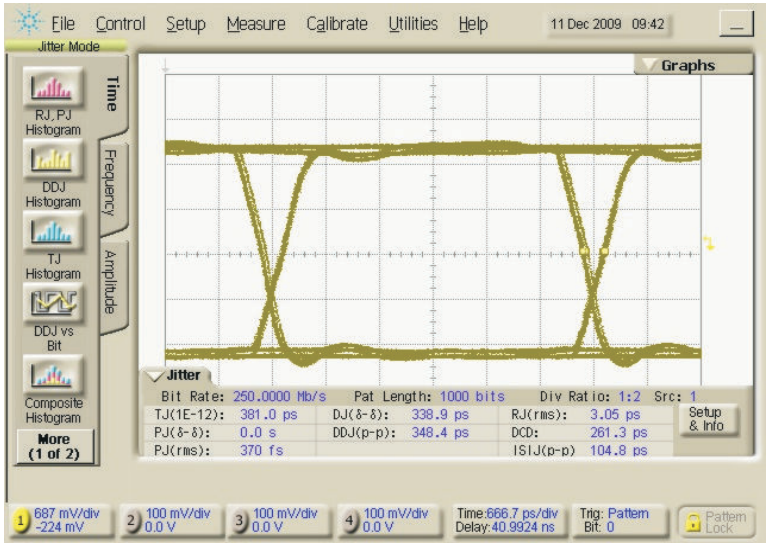


図 5-12. Output (V_{CC} = 3.3V, V_{ID} = 800mV) 250Mbps 2^{15}–1PRBS, Receiver Type 2

6 Parameter Measurement Information

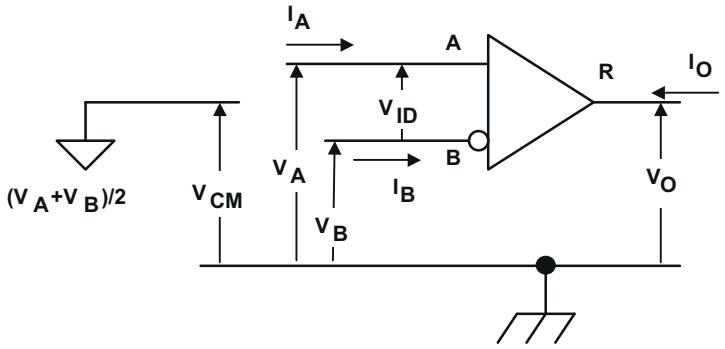


図 6-1. Receiver Voltage and Current Definitions

表 6-1. Type-1 Receiver Input Threshold Test Voltages

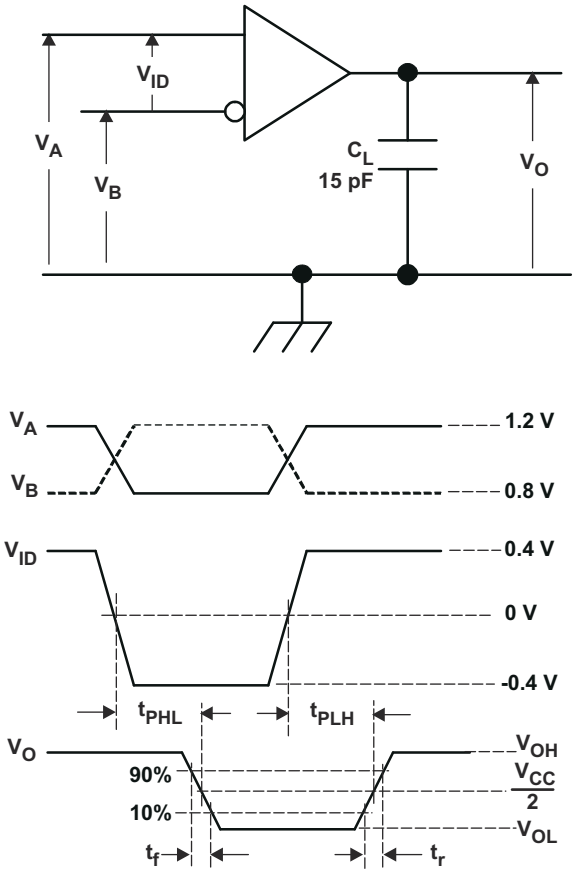
APPLIED VOLTAGES		RESULTING DIFFERENTIAL INPUT VOLTAGE	RESULTING COMMON-MODE INPUT VOLTAGE	RECEIVER OUTPUT(1)
V_{IA}	V_{IB}	V_{ID}	V_{IC}	
2.400	0.000	2.400	1.200	H
0.000	2.400	–2.400	1.200	L
3.400	3.365	0.035	3.3825	H
3.365	3.400	–0.035	3.3825	L
–0.965	–1	0.035	–0.9825	H
–1	–0.965	–0.035	–0.9825	L

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

表 6-2. Type-2 Receiver Input Threshold Test Voltages

APPLIED VOLTAGES		RESULTING DIFFERENTIAL INPUT VOLTAGE	RESULTING COMMON-MODE INPUT VOLTAGE	RECEIVER OUTPUT(1)
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	0.05065	3.3675	L
–0.865	–1	0.135	–0.9325	H
-0.935	–1	0.065	–0.9675	L

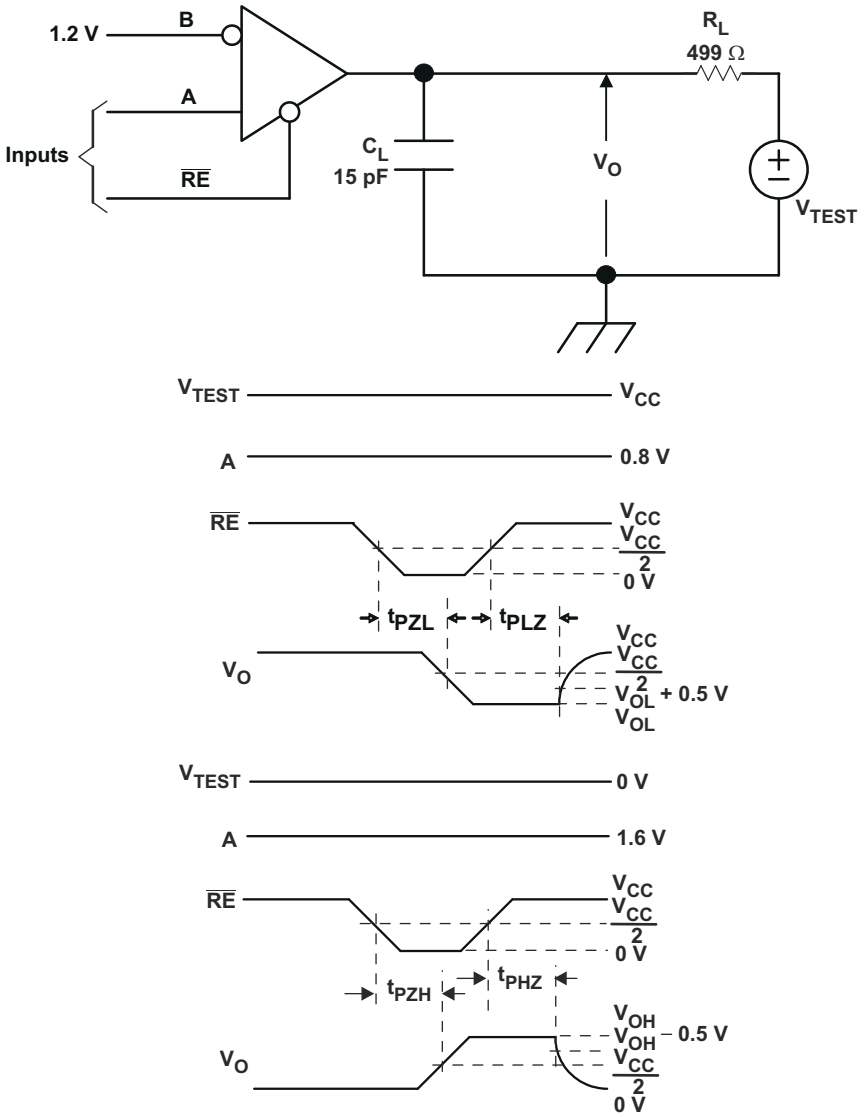
(1) H= high level, L = low level, output state assumes receiver is enabled ($\overline{RE}$ = L)



A. All input pulses are supplied by a generator having the following characteristics: t_r or t_f ≤ 1ns, Frequency = 1MHz, duty cycle = 50 ± 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.

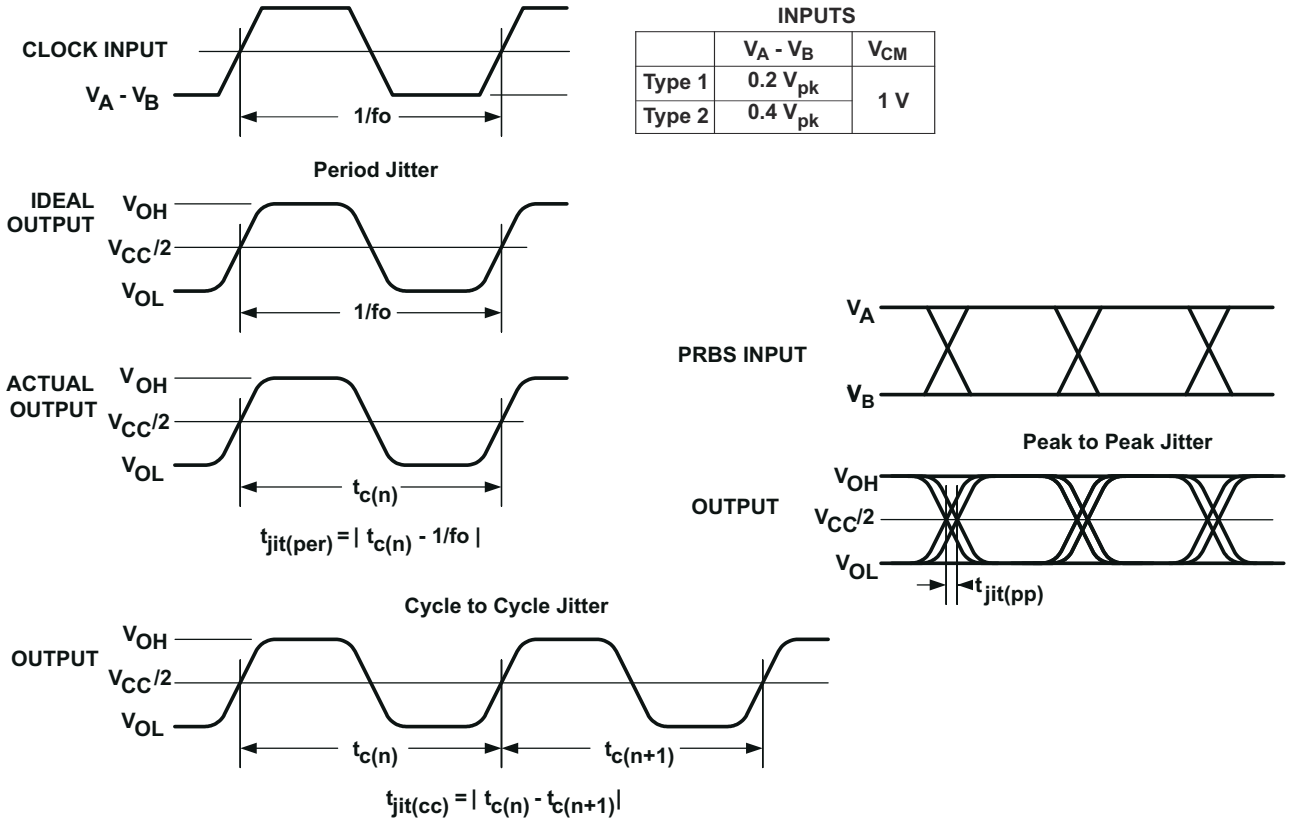
B. The measurement is made on test equipment with a –3dB bandwidth of at least 1GHz.

図 6-2. Receiver Timing Test Circuit and Waveforms



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

図 6-3. Receiver Enable/Disable Time Test Circuit and Waveforms



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. All other jitter measurements are made with an Agilent Infiniium DCA-J 86100C Digital Communications Analyzer.
D. Period jitter and cycle-to-cycle jitter are measured using a 125MHz 50 ± 1% duty cycle clock input. Measured over 75K samples.
E. Deterministic jitter and random jitter are measured using a 250Mbps $2^{15\ -1}$ PRBS input. Measured over BER = 10^{-12}

図 6-4. Receiver Jitter Measurement Waveforms

7 Device Functional Modes

表 7-1. Device Function Table

INPUTS(1)				RECEIVER TYPE	OUTPUT(1)
$V_{ID} = V_A - V_B$	PDN	FSEN	$\overline{RE}$		R
V_{ID} > 35mV	H	L	L	Type 1	H
–35mV ≤ V_{ID} ≤ 35mV	H	L	L	Type 1	?
V_{ID} < – 35mV	H	L	L	Type 1	L
V_{ID} > 135mV	H	H	L	Type 2	H
65mV ≤ V_{ID} ≤ 135mV	H	H	L	Type 2	?
V_{ID} < 65mV	H	H	L	Type 2	L
Open Circuit	H	L	L	Type 1	?
Open Circuit	H	H	L	Type 2	L
X	H	X	H	X	Z
X	H	X	OPEN	X	Z
X	L	X	X	X	Z

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

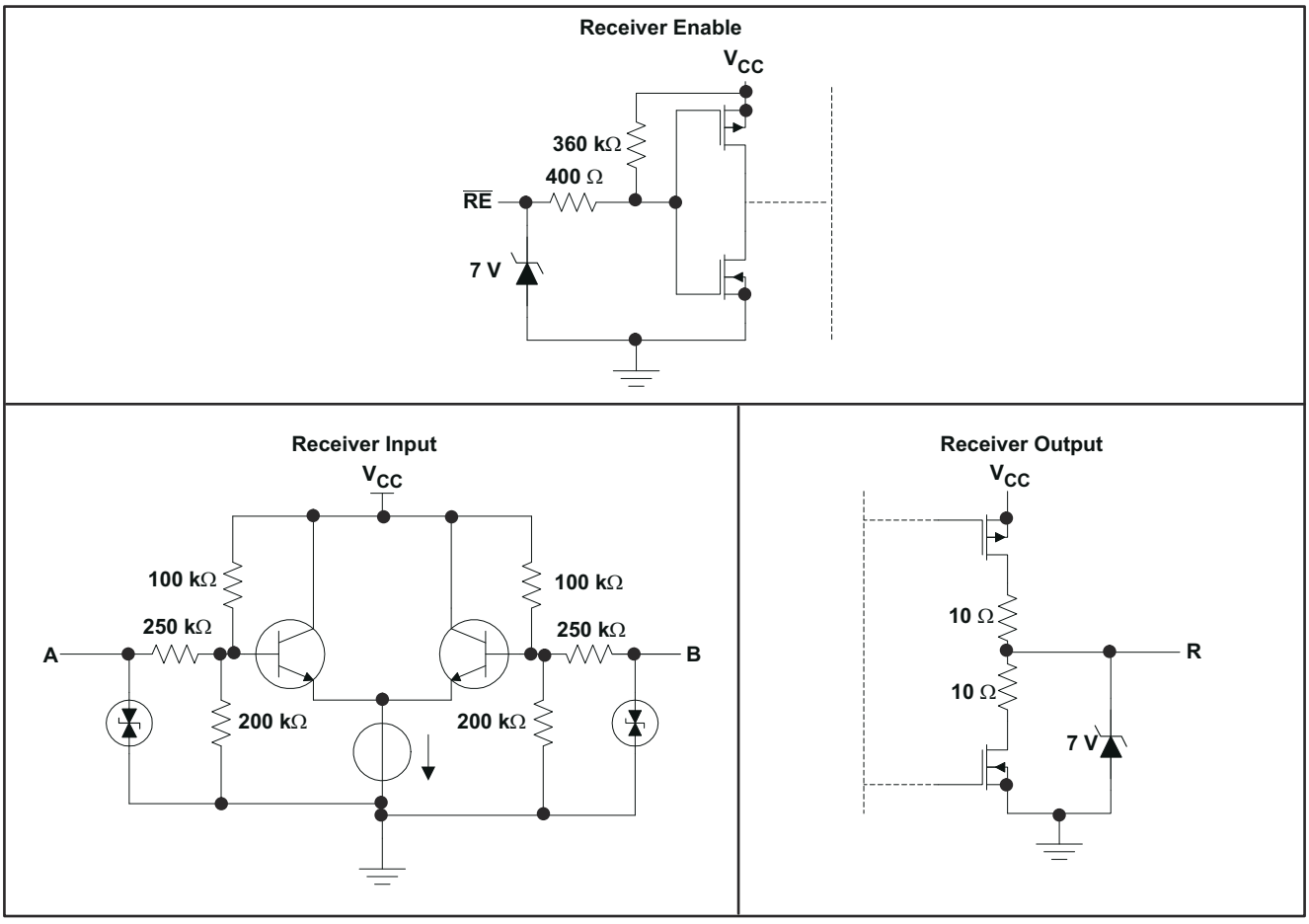


図 7-1. Equivalent Input and Output Schematic Diagrams

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 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、www.tij.co.jp のデバイス製品フォルダを開いてください。[通知] 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ることができます。変更の詳細については、改訂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。

8.2 サポート・リソース

テキサス・インスツルメンツ 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、設計で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、各寄稿者により「現状のまま」提供されるものです。これらはテキサス・インスツルメンツの仕様を構成するものではなく、必ずしもテキサス・インスツルメンツの見解を反映したものではありません。テキサス・インスツルメンツの使用条件を参照してください。

8.3 Trademarks

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8.4 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。

8.5 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。

9 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 * (December 2009) to Revision A (March 2024)	Page
• ドキュメント全体にわたって表、図、相互参照の採番方法を変更	1

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)
SN65MLVD048RGZR	Active	Production	VQFN (RGZ) | 48	2500 | LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048
SN65MLVD048RGZR.B	Active	Production	VQFN (RGZ) | 48	2500 | LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048
SN65MLVD048RGZT	Active	Production	VQFN (RGZ) | 48	250 | SMALL T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048
SN65MLVD048RGZT.B	Active	Production	VQFN (RGZ) | 48	250 | SMALL T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048
SN65MLVD048RGZTG4	Active	Production	VQFN (RGZ) | 48	250 | SMALL T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048
SN65MLVD048RGZTG4.B	Active	Production	VQFN (RGZ) | 48	250 | SMALL T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	MLVD048

(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.

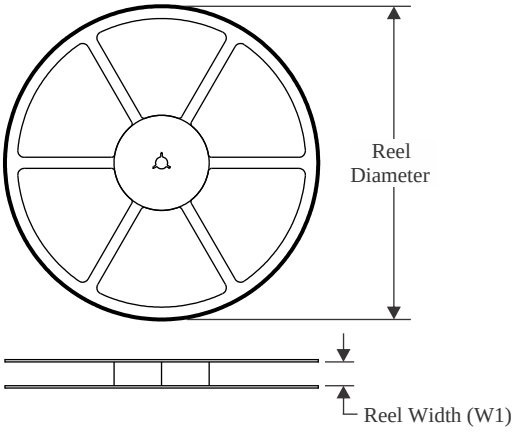
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

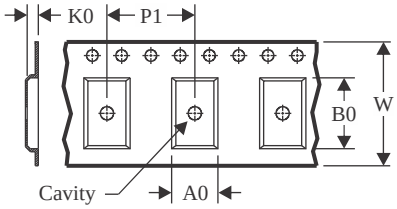
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

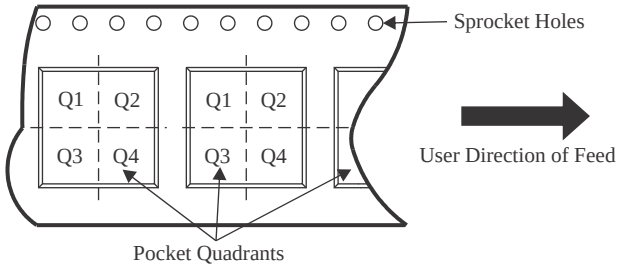


TAPE DIMENSIONS



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

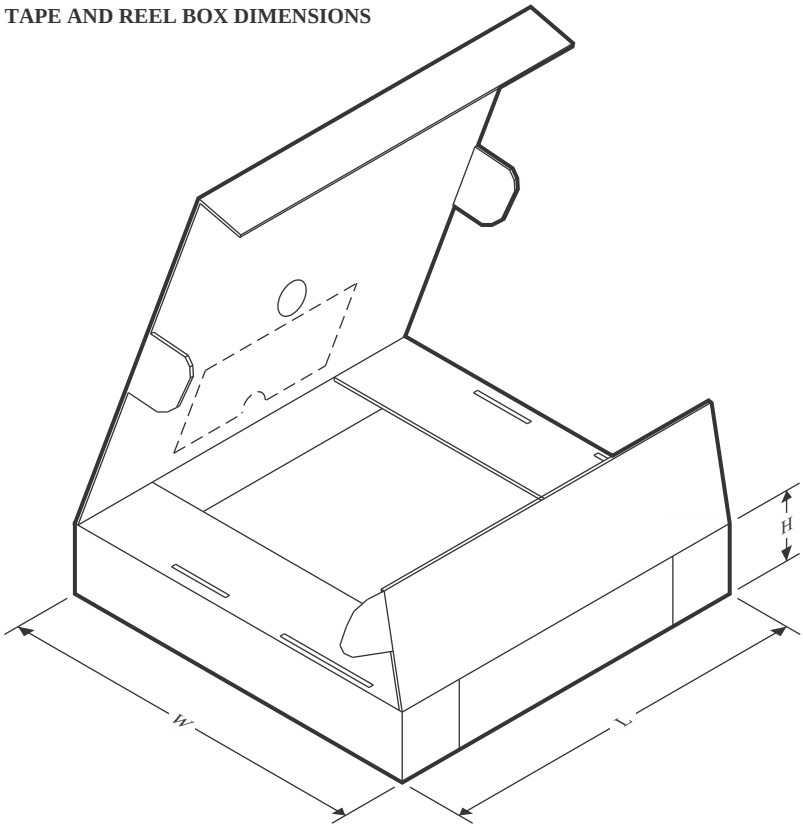
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN65MLVD048RGZR	VQFN	RGZ	48	2500	330.0	16.4	7.3	7.3	1.5	12.0	16.0	Q2
SN65MLVD048RGZT	VQFN	RGZ	48	250	180.0	16.4	7.3	7.3	1.5	12.0	16.0	Q2
SN65MLVD048RGZTG4	VQFN	RGZ	48	250	180.0	16.4	7.3	7.3	1.5	12.0	16.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN65MLVD048RGZR	VQFN	RGZ	48	2500	353.0	353.0	32.0
SN65MLVD048RGZT	VQFN	RGZ	48	250	213.0	191.0	35.0
SN65MLVD048RGZTG4	VQFN	RGZ	48	250	213.0	191.0	35.0

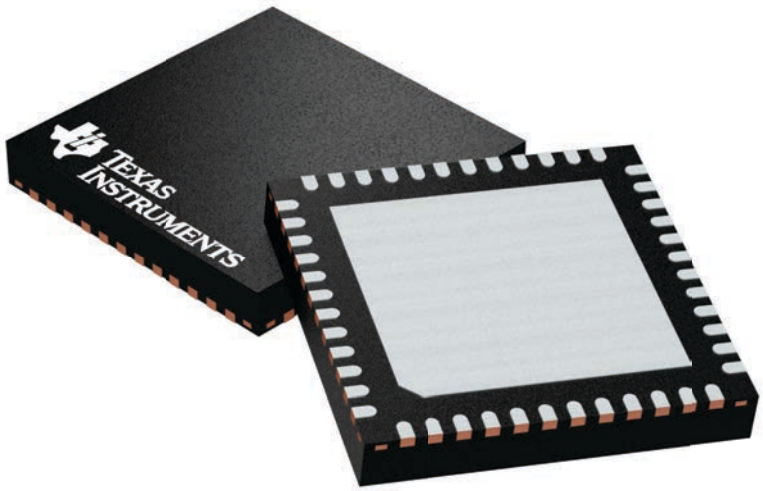
GENERIC PACKAGE VIEW

RGZ 48

VQFN - 1 mm max height

7 x 7, 0.5 mm pitch

PLASTIC QUADFLAT PACK- NO LEAD



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

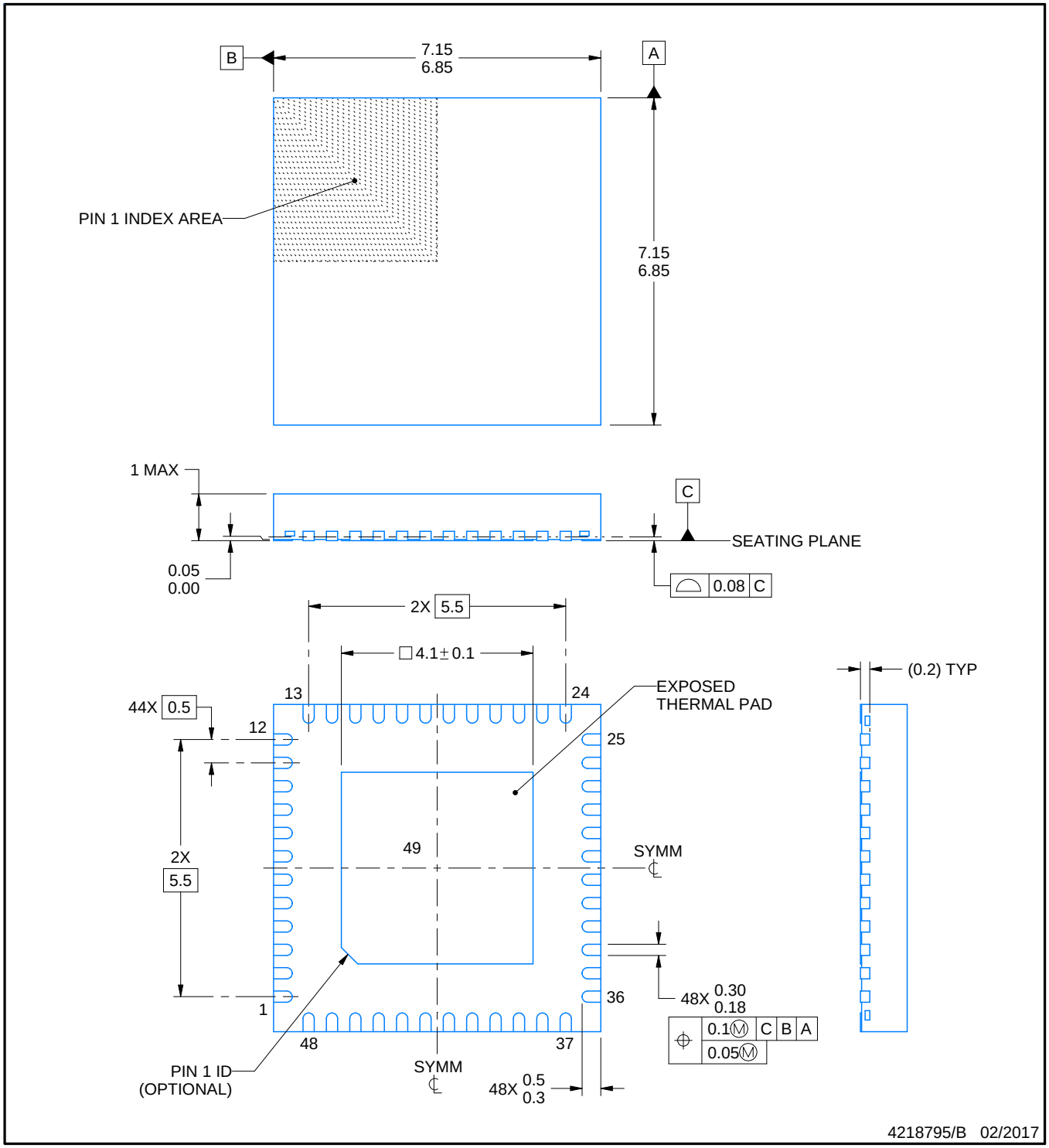
4224671/A

RGZ0048B

PACKAGE OUTLINE

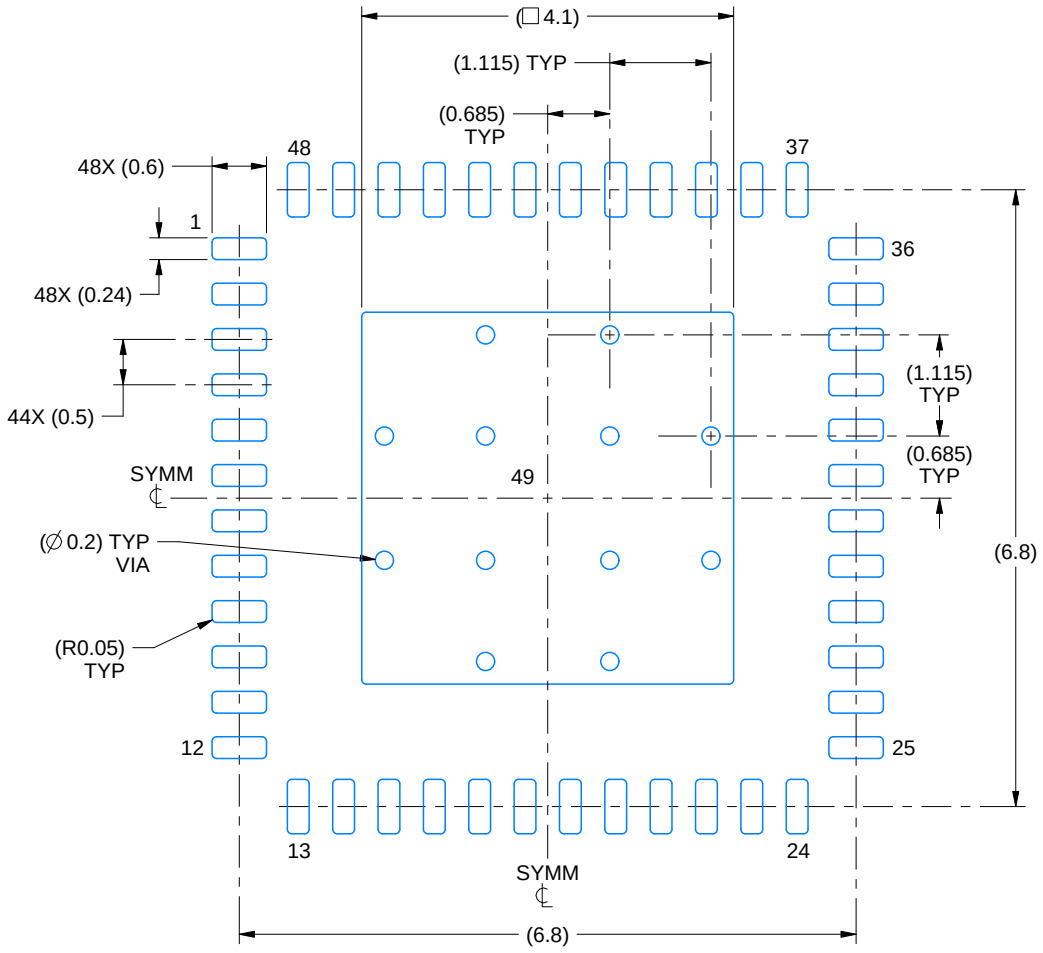
VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD

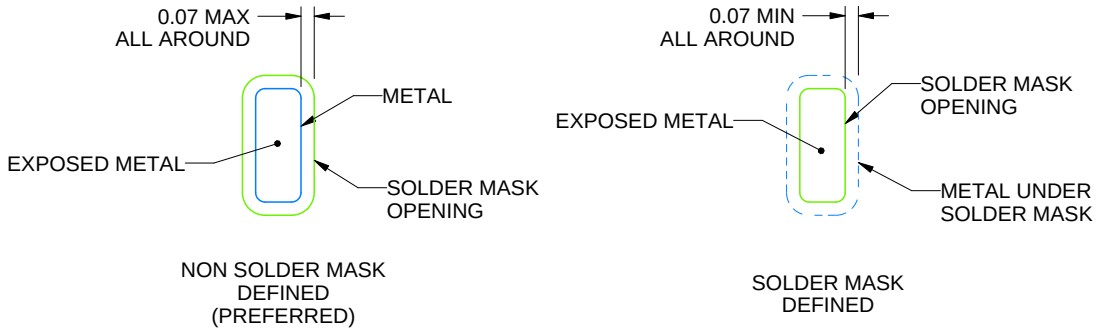


NOTES:

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. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:12X

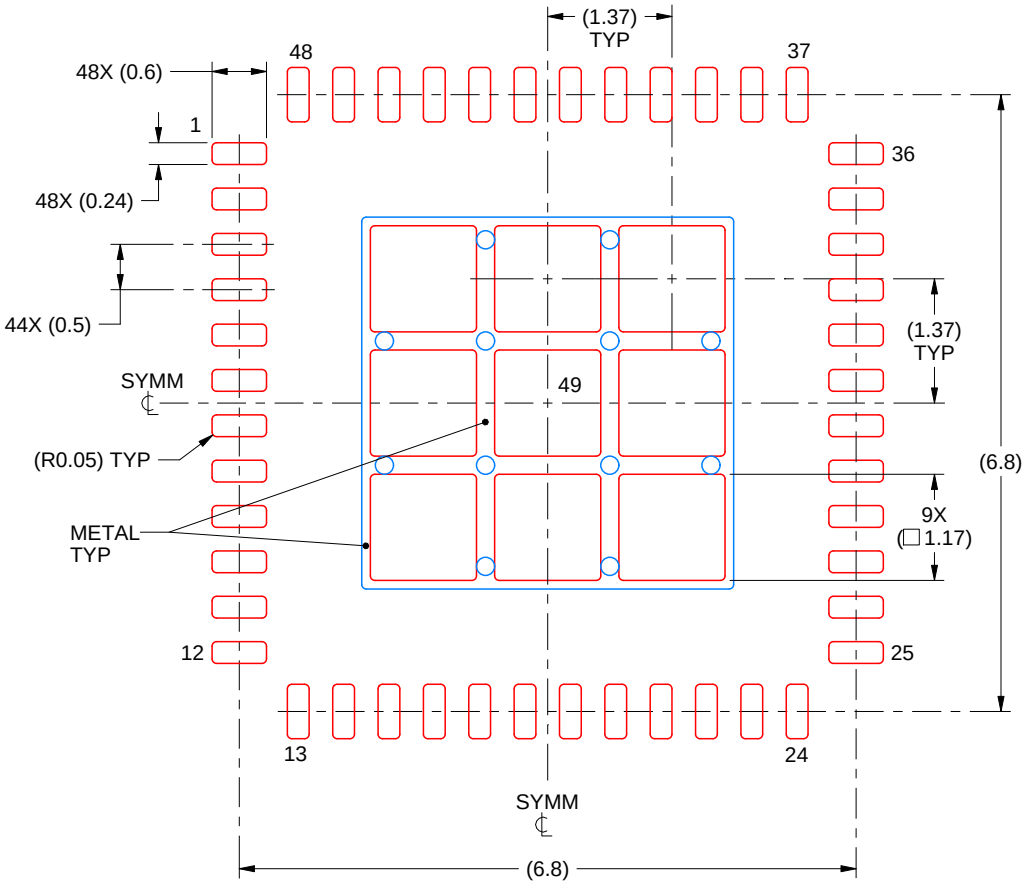


SOLDER MASK DETAILS

4218795/B 02/2017

NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 49
73% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE
SCALE:12X

4218795/B 02/2017

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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