RS90LV047 3.3V LVDS Quad CMOS Differential Line Driver

1 FEATURES

- **Conforms to TIA/EIA-644 Standard**
- **＞400Mbps (200MHz) Switching Rates**
- **400ps Maximum Differential Skew**
- **1.7ns Maximum Propagation Delay**
- **3.3V Power Supply**
- **±350mV Differential Signaling**
- **Low Power Dissipation (13mW at V_{CC}=3.3V Typical)**
- **TSSOP16 Package**
- **Industrial Temperature Operating Range (-40°C ~85°C)**

2 APPLICATIONS

- **Multifunction Printers**
- **LVDS-LVCMOS Translation**

3 ADVANTAGES

>200MHz Switching Rates.

13mW low power dissipation.

TSSOP16 Package.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE(NOM)
RS90LV047	TSSOP16	5.00mm×4.40mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

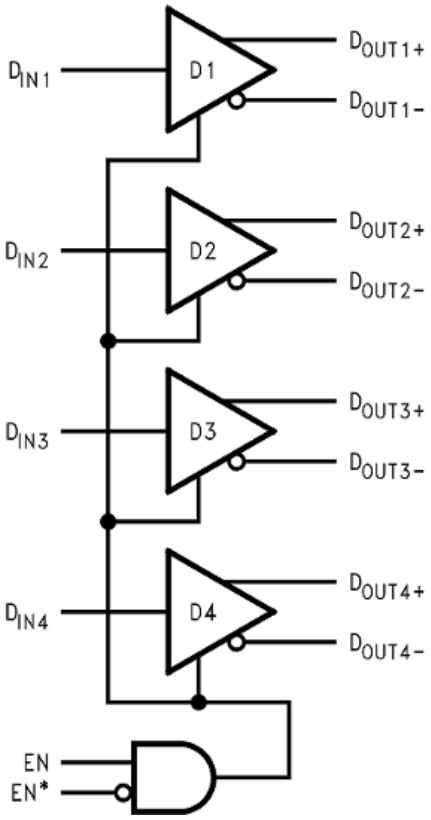


Figure 1. Functional Diagram

Table of Contents

4 REVISION HISTORY

Note: Page numbers for previous revisions may different from page numbers in the current version.

VERSION	Change Date	Change Item
A.0	2024/10/15	Initial version
A.1	2024/11/12	Add Min and Max measurement results and Typical Characteristic
A.2	2024/12/05	Add machine test results

5 PACKAGE/ORDERING INFORMATION (1)

PRODUCT	ORDERING NUMBER	PACKAGE LEAD	TEMPERATURE RANGE	PACKAGE MARKING (2)	MSL (3)	PACKAGE OPTION
RS90LV047	RS90LV047YTSS16	TSSOP16	-40°C ~85°C	RS90LV047	MSL1	Tape and Reel, 4000

NOTE:

(1) 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 right-hand navigation.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) RUNIC classify the MSL level with using the common preconditioning setting in our assembly factory conforming to the JEDEC industrial standard J-STD-20F, Please align with RUNIC if your end application is quite critical to the preconditioning setting or if you have special requirement.

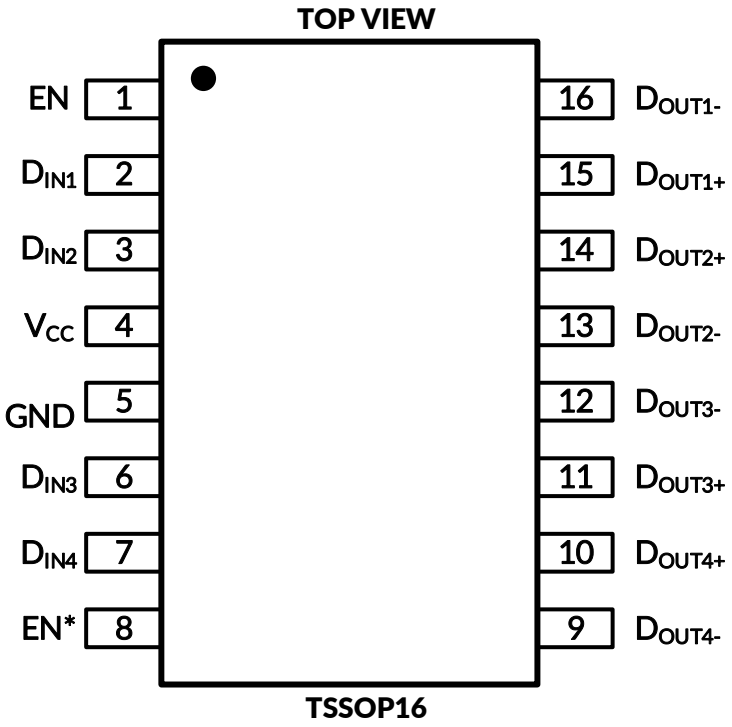
6 DESCRIPTION

The RS90LV047 device is a quad CMOS flow through differential line driver designed for applications requiring ultra-low power dissipation and high data rates. The device is designed to support data rates in excess of 400 Mbps (200 MHz) using Low Voltage Differential Signaling (LVDS) technology.

The RS90LV047 accepts low voltage TTL/CMOS input levels and translates them to low voltage (350 mV) differential output signals. In addition, the driver supports a TRI-STATE function that may be used to disable the output stage, disabling the load current, and thus dropping the device to an ultra low idle power state of 13mW typical. The RS90LV047 has a flow-through pinout for easy PCB layout.

The EN and EN* inputs are ANDed together and control the TRI-STATE outputs. The enables are common to all four drivers. The RS90LV047 and companion line receiver (RS90LV048) provide a new alternative to high power psuedo-ECL devices for high speed point-to-point interface applications.

7 PIN CONFIGURATIONS



PIN DESCRIPTIONS

Name	PIN	DESCRIPTION
DIN	2，3，6，7	Driver input pin，TTL/CMOS compatible
DOUT+	10，11，14，15	Non-inverting driver output pin, LVDS levels
DOUT-	9，12，13，16	Inverting driver output pin, LVDS levels
EN	1	Driver enable pin: When EN is low, the driver is disabled. When EN is high and EN* is low or open, the driver is enabled. If both EN and EN* are open circuit, then the driver is disabled.
EN*	8	Driver enable pin: When EN* is high, the driver is disabled. When EN* is low or open and EN is high, the driver is enabled. If both EN and EN* are open circuit, then the driver is disabled.
GND	5	Group pin
V_{CC}	4	Power supply pin, +3.3 V ± 0.3 V

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	-0.3	4	V
Input voltage (D_{IN})	-0.3	V_{CC}+0.3	V
Enable input voltage (EN, EN*)	-0.3	V_{CC}+0.3	V
Output voltage (D_{OUT+}, D_{OUT-})	-0.3	3.9	V
Storage Temperature	-65	150	°C
Maximum Junction Temperature		150	°C

Note: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be specified. They are not meant to imply that the devices should be operated at these limits.

8.2 Recommended Operating Conditions

	MIN	TYP	MAX	UNIT
Supply Voltage (V_{CC})	3	3.3	3.6	V
Temperature (T_A)	-40	25	85	°C

8.3 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

		VALUE	UNIT
$V_{(ESD)}$	Human-Body Model (HBM)	≥8000	V
	Charged-Device Model (CDM)	≥2000	V
	Latch-Up (LU)	≥400	mA

Electric devices and circuit boards may discharge undetected. Although this product has a patented or proprietary protection circuit, the device may be damaged when exposed to high energy ESD. Therefore, appropriate ESD prevention measures should be taken to avoid device performance degradation or loss of function.

8.4 Electrical Characteristics

V_{CC}=+3.3V±10%, T_A= -40°C to 85°C.

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
$\|V_{OD}\|$	Differential output voltage	R_L=100Ω	250	350	450	mV
V_{OS}	Offset voltage		1.125	1.23	1.375	V
V_{OH}	Output high voltage			1.41	1.6	V
V_{OL}	Output low voltage		0.92	1.06		V
V_{IH}	Input high voltage		2		V_{CC}	V
V_{IL}	Input low voltage		GND		0.8	V
I_{IH}	Input high current	V_{IN}=3.3V or 2.5V		5.1	±10	μA
I_{IL}	Input low current	V_{IN}=0 or 0.4V		0	±10	μA
I_{OS}	Output short-circuit current	ENABLED, D_{IN}=V_{CC}, D_{OUT+}=0V or D_{IN}=GND, D_{OUT-}=0V		-6.2	-9	mA
I_{OSD}	Differential output short-circuit	ENABLED, V_{OD}=0V		-4.4	-9	mA
I_{OFF}	Power-off leakage	V_{OUT}=0 or 3.6V, V_{CC}=0V or Open		0	20	μA
I_{OZ}	Output TRI-STATE current	EN=0.8V and EN*=2V V_{OUT}=0V or V_{CC}		0	10	μA
I_{CC}	No load supply current drivers enabled	D_{IN}=V_{CC} or GND		3.8	8	mA
I_{CCL}	Loaded supply current drivers enabled	R_L=100Ω all channels, D_{IN}=V_{CC} or GND (all input)		26.4	30	mA
I_{CCZ}	No load supply current drivers disabled	D_{IN}=V_{CC} or GND, EN=GND, EN*=V_{CC}		3.8	6	mA

Note:

1.Current into device pins is defined as positive. Current out of device pins is defined as negative.

2.All typical are given for: V_{CC}=3.3V and T_A=25°C.

8.5 Switching Characteristics

V_{CC}=+3.3V±10%, T_A= -40°C to 85°C.

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
t_{PHLD}	Differential propagation delay high to low	R_L=100Ω	0.7	0.8	1.15	ns
t_{PLHD}	Differential propagation delay low to high		0.9	1	1.26	ns
t_{SKD1}	Differential pulse skew|t_{PHLD}- t_{PLHD}|			0.2	0.375	ns
t_{TLH}	Rise time			0.6	1.2	ns
t_{THL}	Fall time			0.5	1.2	ns
t_{PHZ}	Disable time high to Z			2.2	4	ns
t_{PLZ}	Disable time low to Z			2.2	4	ns
t_{PZH}	Enable time Z to high			3	4	ns
t_{PZL}	Enable time Z to low			3	4	ns
f_{MAX}	Maximum operating frequency		200	250		MHz

Note:

1. Generator waveform for all tests unless otherwise specitied: f=1MHz, Zo=50Ω, t_r≤1ns, t_f≤1ns (10%-90%);

2. f_{MAX} generator input conditions: t_r=t_f＜1 ns (0%-100%), 50%, 0 to 3V.Output criteria: duty cycle = 45%-55%, V_{OD}＞250mV.

8.6 Typical Characteristics

NOTE: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only.

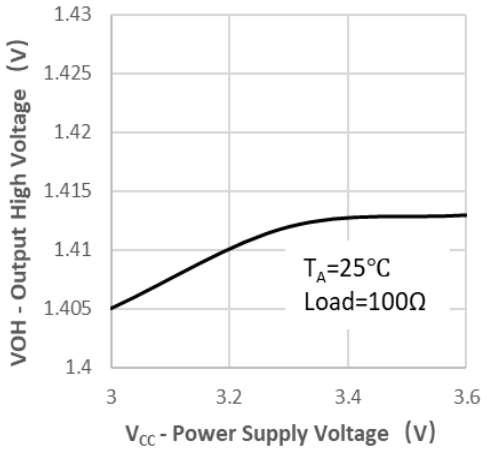


Figure 2. Output High Voltage vs Power supply voltage

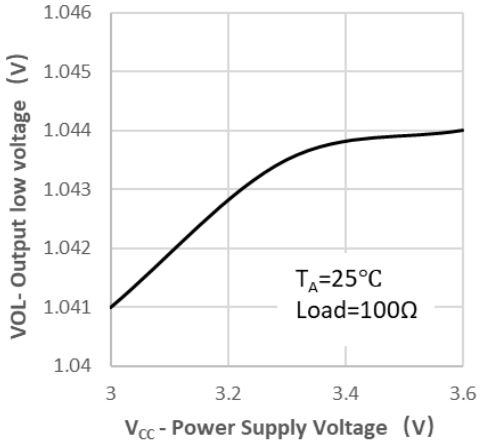


Figure 3. Output Low Voltage vs Power supply voltage

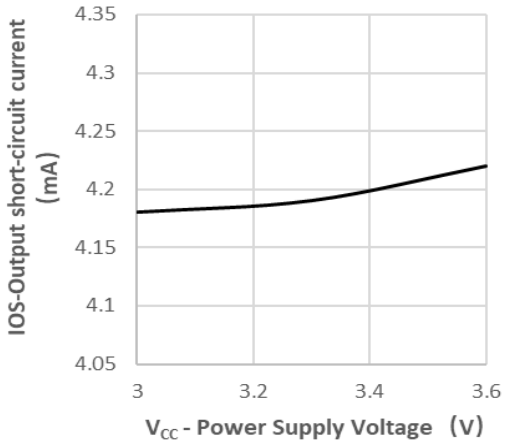


Figure 4. Output Short circuit Current vs Power Supply Voltage

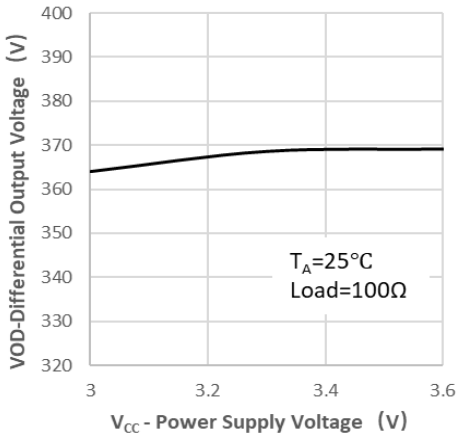


Figure 5. Differential Output Voltage vs Power Supply Voltage

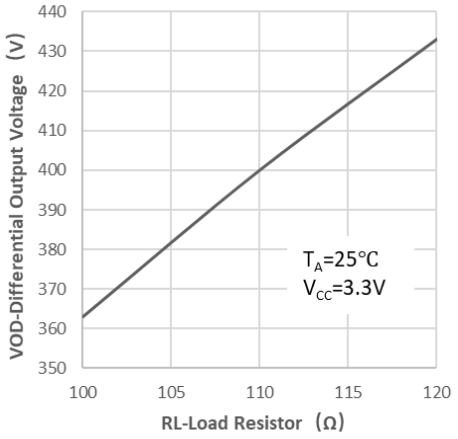


Figure 6. Differential Output Voltage vs Load Resistor

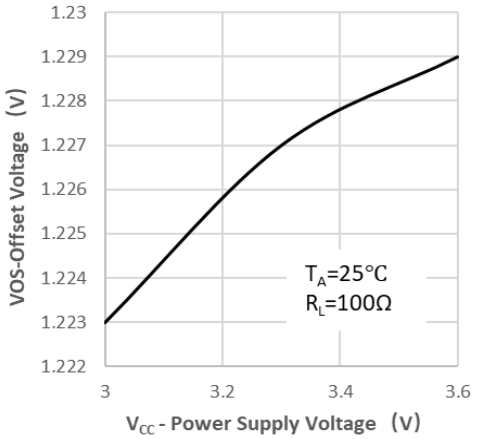


Figure 7. Offset Voltage vs Power Supply Voltage

9 TEST CIRCUITS AND TRANSITION TIME WAVEFORMS

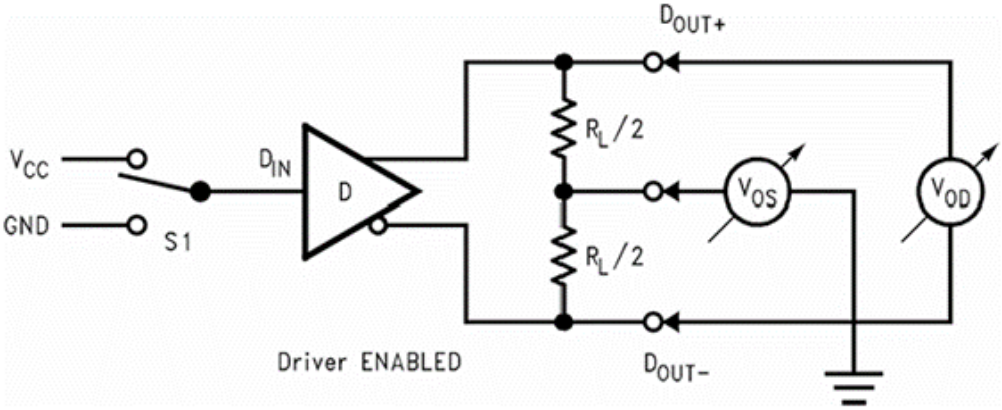


Figure 8. Differential Driver DC Test Circuit

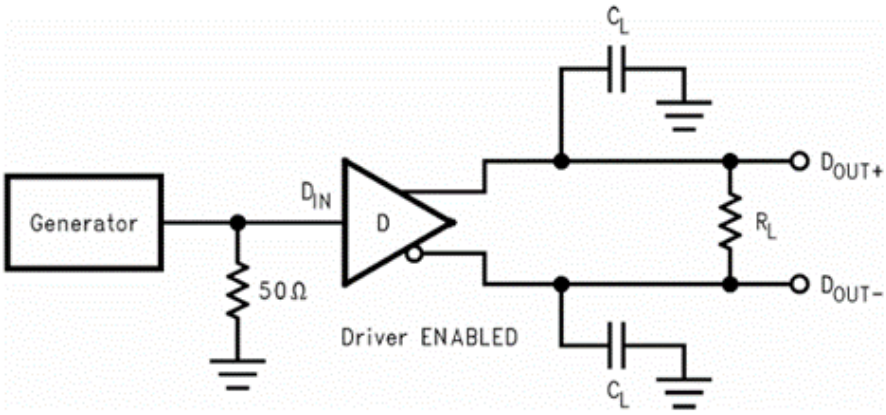


Figure 9. Differential Driver Propagation Delay and Transition Time Test Circuit

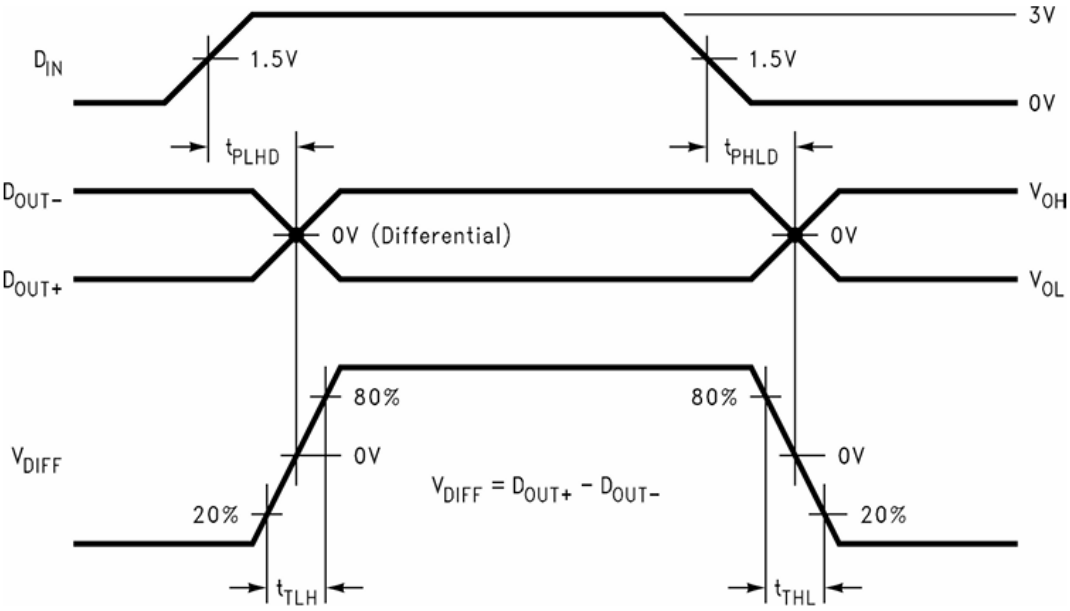


Figure 10. Differential Driver Propagation Delay and Transition Time Waveforms

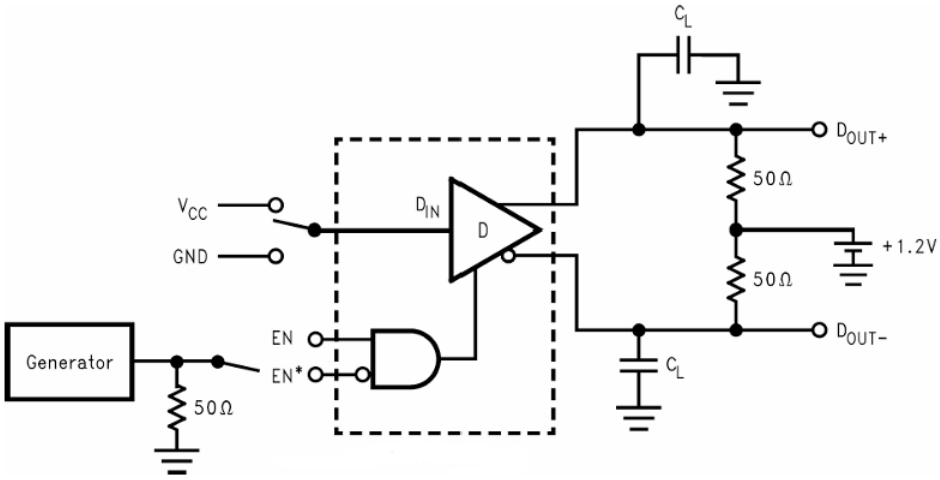


Figure 11. Driver TRI-STATE Delay Test Circuit

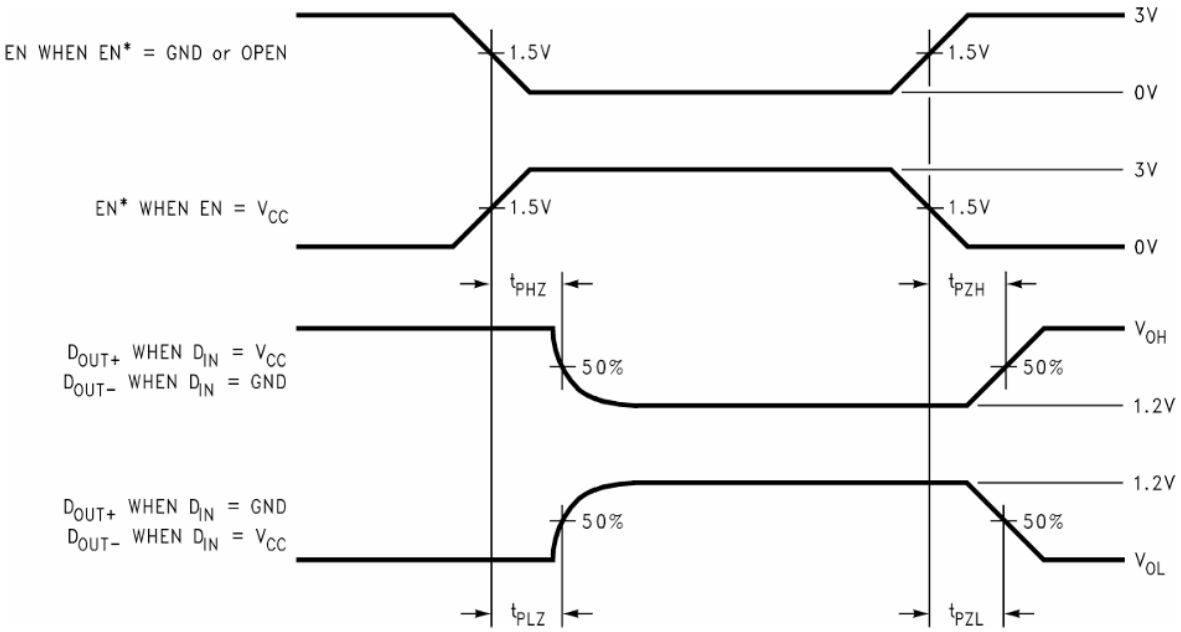


Figure 12. Driver TRI-STATE Delay Test Circuit

10 DEVICE FUNCTIONAL MODES

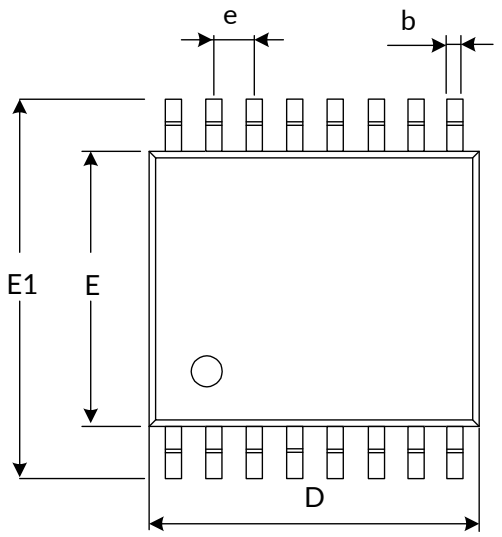
Table 1 lists the functional modes RS90LV047.

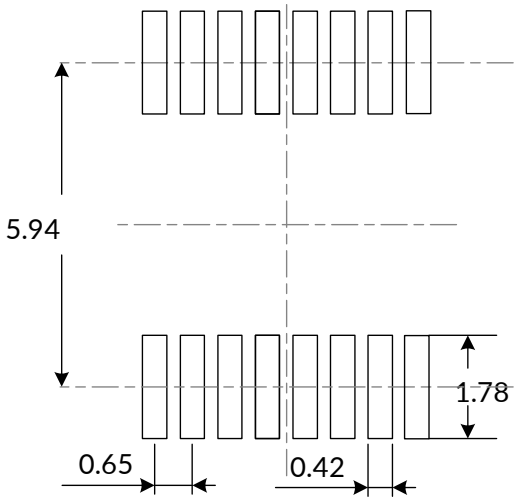
Table 1. Truth Table

		INPUT	OUTPUT	
EN	**EN***	**DIN**	**DOUT+**	**DOUT-**
H	L or Open	L	L	H
		H	H	L
Any other input combination		X	Z	Z

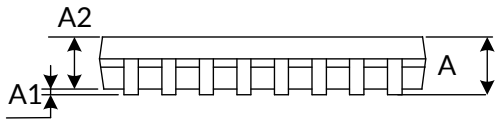
11 PACKAGE OUTLINE DIMENSIONS

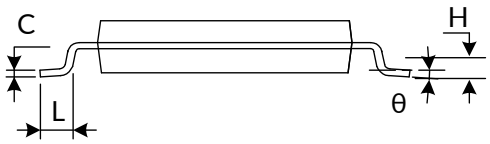
TSSOP16 (3)





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D (1)	4.860	5.100	0.191	0.201
E (1)	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650(BSC) (2)		0.026(BSC) (2)	
L	0.500	0.700	0.02	0.028
H	0.250 TYP		0.010 TYP	
θ	1°	7°	1°	7°

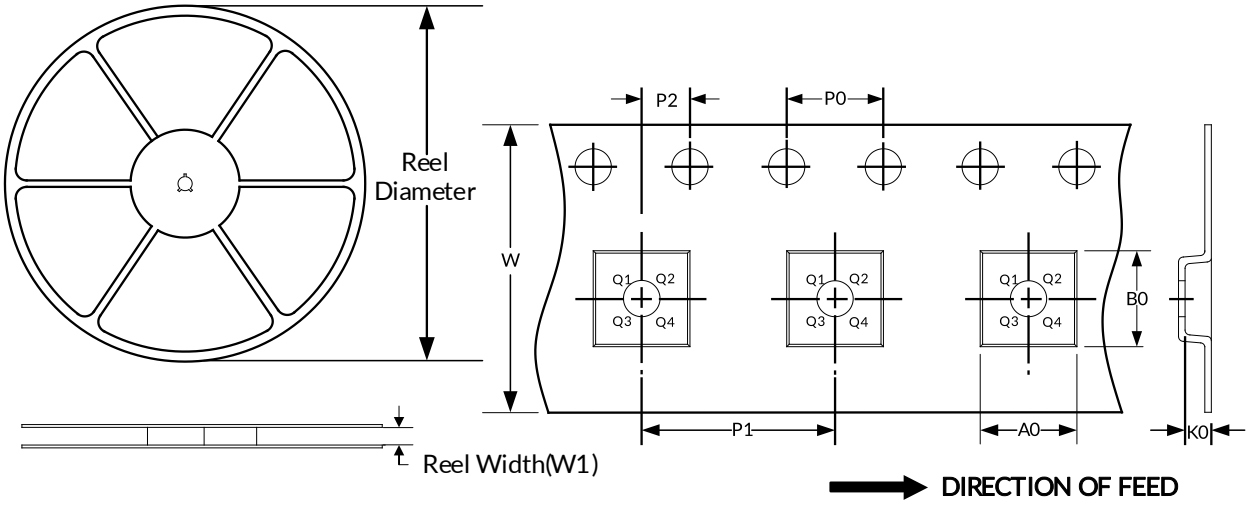
NOTE:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

12 TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP16	13"	12.4	6.90	5.60	1.20	4.0	8.0	2.0	12.0	Q1

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.

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