RS90LV012 3.3V LVDS Single CMOS Differential Line Receiver

1 FEATURES

- **Compatible with ANSI TIA/EIA-644-AStandard**
- **>400Mbps (200MHz) switching rates**
- **100ps differential skew (typical)**
- **3.5ns maximum propagation delay**
- **Single 3.3V power supply design (2.7 to 3.6V range)**
- **Power down high impedance on LVDS inputs**
- **Accepts small swing (350mV typical) differential signal levers**
- **LVDS receiver inputs accept LVDS/BLVDS/LVPECL inputs**
- **Supports open, short and terminated input fail-safe**
- **Pinout simplifies PCB layout**
- **Low Power Dissipation (10mW typical@ 3.3V static)**
- **SOT23-5 lead package**
- **Industrial temperature operating range (-40°C to +85°C)**

2 APPLICATIONS

- **Multifunction Printers**
- **LVCMOS-LVDS Translation**
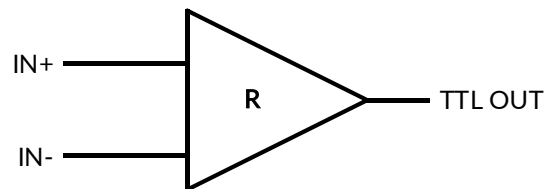- **Building and Factory Automation**
- **Grid Infrastructure**

3 ADVANTAGES

>400Mbps Switching Rates
Accept small input swing (±350mV typically) support open, shorted, and terminated (100Ω) input fail-safe.
SOT23-5 Lead Package.

Device Information [1]

PART NUMBER	PACKAGE	BODY SIZE(NOM)
RS90LV012	SOT23-5	2.92mm×1.60mm

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

Figure 1. Functional Diagram

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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	2023/08/14	Initial version
A.1	2024/03/25	1. Added Min and Max measurement results 2. Added PACKAGE/ORDERING INFORMATION and TAPE AND REEL INFORMATION
A.2	2024/07/29	1. Update product to: RS90LV012 2. Update MSL

5 PACKAGE/ORDERING INFORMATION [1]

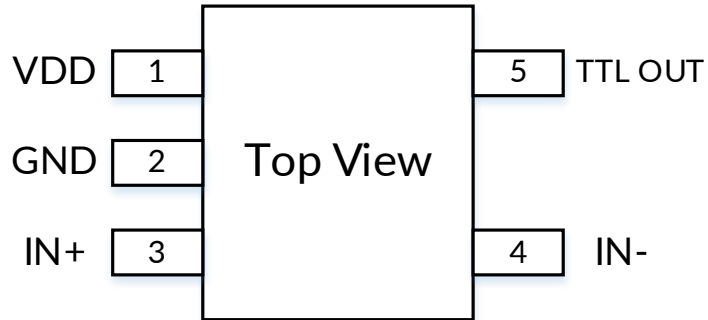| PRODUCT	ORDERING NUMBER	PACKAGE LEAD	TEMPERATURE RANGE	PACKAGE MARKING [2]	MSL [3]	PACKAGE OPTION
RS90LV012	RS90LV012YF5	SOT23-5	-40℃ ~+85℃	LV012	MSL3	Tape and Reel,3000

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 DESCRIPTIONS

The RS90LV012 is positioned as a single-channel LVDS receiver for high-speed, low-power application scenarios. RS90LV012 accept low voltage (350mV typical) differential input signals and translates them to 3V CMOS output levels. The devices are designed to support data rates in excess of 400Mbps (200MHz). RS90LV012 support open, shorted, and terminated (100Ω) input fail-safe. The target markets for this product are communications and industrial.

7 PIN CONFIGURATIONS

Figure 2. Pin Definition

Pin Descriptions

PIN SOT23-5	NAME	FUNCTION
5	TTL OUT	Receiver output pin
4	IN-	Inverting receiver input pin
3	IN+	Non-inverting receiver input pin
2	GND	Ground pin
1	VDD	Power supply pin, +3.3±0.3V

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (VDD)	-0.3	4	V
LVCMOS input voltage (TTL IN)	-0.3	3.9	V
LVDS output voltage (OUT±)	-0.3	$(V_{DD} + 0.3)$	V
Output Short Circuit Current		-100	mA
Thermal Resistance (θ_{JA})		138.5	°C/W
Storage Temperature	-65	150	°C
Maximum Junction Temperature		150	°C

Note:
1. "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 (VDD)	2.7	3.3	3.6	V
Operating Free Air 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
$V_{(ESD)}$	HBM(1.5kΩ,100pF)	≥5000	V
	CDM(0Ω,0pF)	≥2000	V
	LATCH UP	≥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

Over Supply Voltage and Operating Temperature ranges, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{TH}	Differential Input High Threshold	V_{CM} dependant on V_{DD}		-25	0	mV
V_{TL}	Differential Input Low Threshold		-100	-25		mV
V_{CM}	Common-Mode Voltage	V_{DD} = 2.7V, V_{ID} = 100mV	0.05		2.35	V
		V_{DD} = 3 to 3.6V, V_{ID} = 100mV	0.05		VDD-0.3	V
I_{IN}	Input Current	V_{IN} = 2.8 or 0V, V_{DD} = 3.6 or 0V	-10	±4	+10	uA
I_{IND}	Differential Input Current	V_{IN+} = 0.4V, V_{IN-} = 0V	3	3.9	4.4	mA
C_{IN}	Input Capacitance	IN+ = IN- = GND		3		pF
V_{OH}	Output High Voltage	I_{OH} = -0.4mA, V_{ID} = 200mV	2.4	3.2		V
		I_{OH} = -0.4mA, Inputs terminated	2.4	3.2		V
		I_{OH} = -0.4mA, Inputs shorted	2.4	3.2		V
V_{OL}	Output Low Voltage	I_{OH} = 2mA, V_{ID} = -200mV		0.1	0.5	V
I_{OS}	Output Short Circuit Current	V_{OUT} = 0V	-15	-50	-100	mA
I_{DD}	No Load Supply Current	Inputs Open		4.2	8	mA

Note:

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

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

8.5 Switching Characteristics

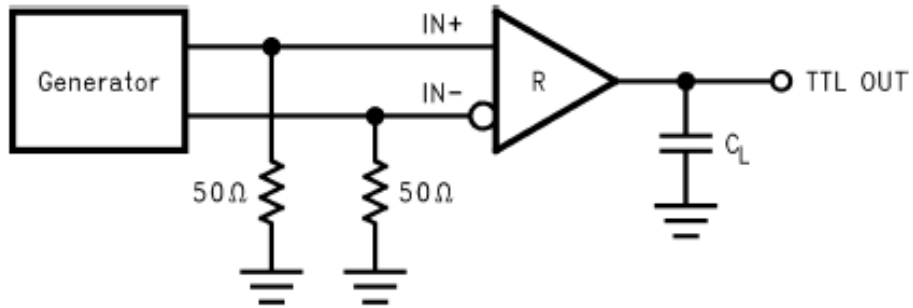Over Supply Voltage and Operating Temperature ranges, unless otherwise specified.

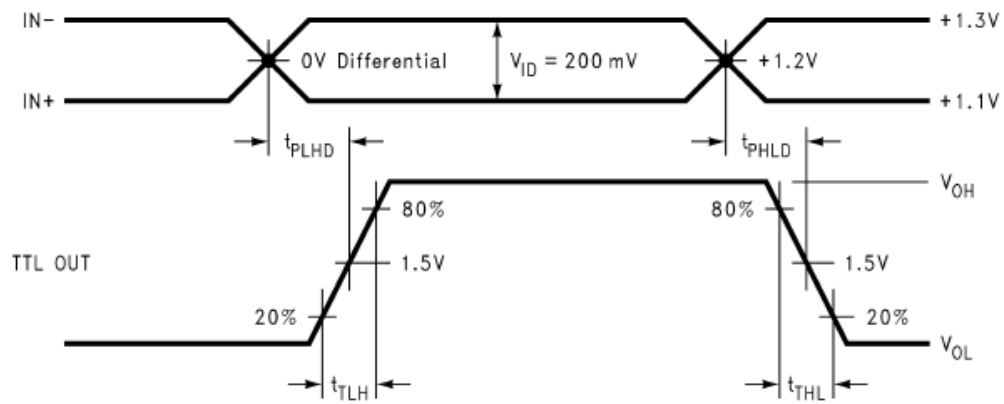| SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHLD}	Differential Propagation Delay High to Low	R_L=100Ω (Figure 3 and Figure 4)	1	1.8	3.5	ns
t_{PLHD}	Differential Propagation Delay Low to High		1	1.7	3.5	ns
t_{SKD1}	Differential Pulse Skew $\vert t_{PHLD} - t_{PLHD} \vert$		0	0.1	0.4	ns
t_{TLH}	Rise Time			0.5	0.8	ns
t_{THL}	Fall Time			0.3	0.8	ns
f_{MAX}	Maximum Operating Frequency		200	250		MHz

Note:

1. Generator waveform for all tests unless otherwise specified: f = 1MHz, Z_O=50Ω, t_r and t_f (0% to 100%) ≤ 3 ns for IN±.

2. f_{MAX} generator input conditions: t_r = t_f<1ns (0%-100%), 50% duty cycle, differential (1.05 to 1.35V peak to peak). Output criteria: 60%/40% duty cycle, V_{OL} (max 0.4V), V_{OH} (min 2.4V).

3. Figure 3 shows the test circuits used for switching characteristics. Figure 4 shows the timing diagram between input and output of the recever, it also shows the rise and fall time of the output.
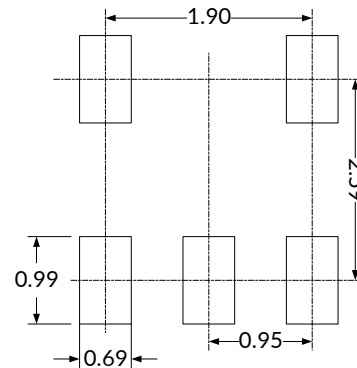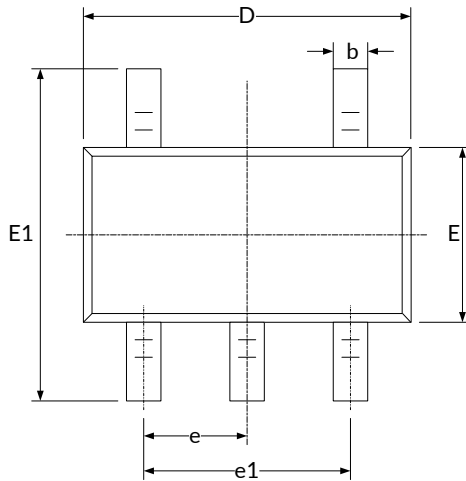
9 PARAMETER MEASUREMENT INFORMATION

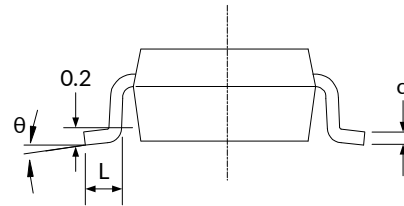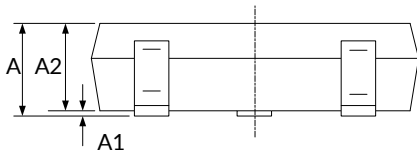**Figure 3. Receiver Propagation Delay and Transition Time Test Circuit**

Figure 4. Receiver Propagation Delay and Transition Time Waveforms

10 PACKAGE OUTLINE DIMENSIONS
SOT23-5 [3]

RECOMMENDED LAND PATTERN (Unit: mm)

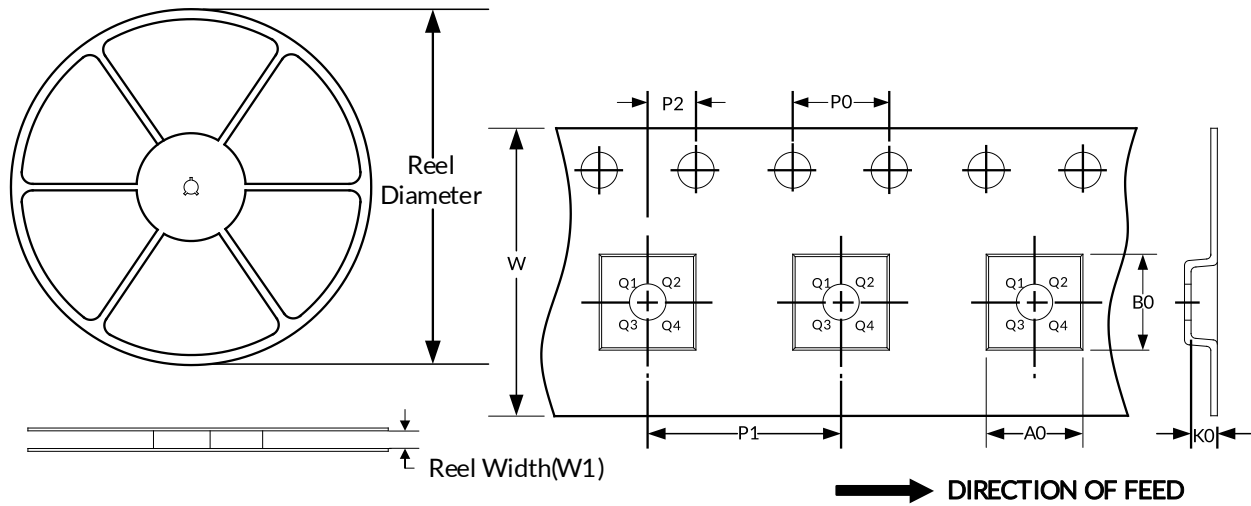| Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A [1]	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D [1]	2.820	3.020	0.111	0.119
E [1]	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC) [2]		0.037(BSC) [2]	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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.

11 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
SOT23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3

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

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