

Single-Channel LVDS Differential Line Receiver

FEATURES

- 500Mbps (250MHz) Data Rate
- Propagation Delay Time 2.4ns (Typ.)
- 3.3V Power Supply
- Support Open-circuit, Short-circuit and Terminate Failure Safe
- SOT23-5 Package

APPLICATIONS

- Multi-function Printer
- Flat Panel Display Interface
- Monitoring Camera

PRODUCT DESCRIPTION

The MS21112S is a single-channel, low-voltage LVDS differential line receiver. Differential receiver can transform 100mV differential input voltage to effective logical output within input common-mode voltage range. The MS21112S can be applied to point-to-point base-band data transmission through 100Ω controlled impedance media. The transmission media can be PCB, backplane or cable. The data rate and distance depend on the media attenuation characteristic, the noise environment and other system characteristics. The operating temperature range is from -40°C to 125°C.

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS21112S	SOT23-5	21112S

BLOCK DIAGRAM

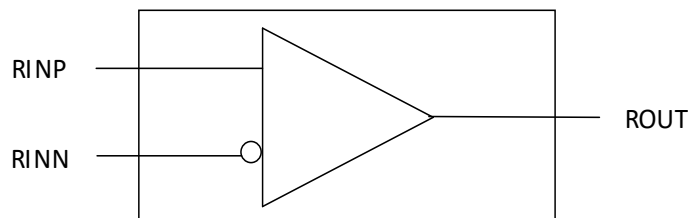
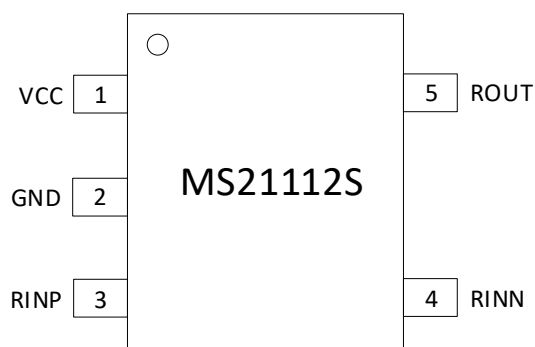


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PIN CONFIGURATION



PIN DESCRIPTION

Pin	Name	Type	Description
1	VCC	-	Power Supply
2	GND	-	Ground
3	RINP	I	Positive Input, LVDS Level
4	RINN	I	Negative Input, LVDS Level
5	ROUT	O	Data Output, CMOS Logical Level

Note: Unused input pins are floating.

ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

Parameter		Symbol	Ratings	Unit
Power Supply		V_{CC}	-0.5 ~ +4	V
All Input and Output Pins Voltage		V_{CCIO}	-0.5 ~ ($V_{CC}+0.3$)	V
Operating Temperature		T_A	-40 ~ +125	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C
Soldering Temperature (10s)		T_{SOLDER}	260	°C
ESD (HBM)	All pins	V_{ESD}	≥8	kV
	Input pins (RINP, RINN)		>15	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply	V_{CC}	3	3.3	3.6	V
Receiver Input Voltage	V_{IN}	GND		V_{CC}	V
Common-mode Input Voltage	V_{ICMR}	0.05		2.6	V
Signal Rate				500	Mbps
Operating Temperature	T_A	-40		125	°C

ELECTRICAL CHARACTERISTICS

$V_{CC} = 3.0V$ to $3.6V$. Typical values are in $V_{CC} = 3.3V$, $T_A = 25^\circ C$. Unless otherwise noted.

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Conversion Differential Input Voltage Threshold	V_{IT+}	Common-mode Input $V_{CM}=0.05V, 1.2V, 2.35V$			100	mV
Reverse Conversion Differential Input Voltage Threshold	V_{IT-}	Common-mode Input $V_{CM}=0.05V, 1.2V, 2.35V$	-100			mV
Input Common-mode Voltage ¹	V_{ICMR}	$ V_{ID} =100mV$, $V_{CC}=3.3V$	0.05		2.6	V
High-level Output Voltage	V_{OH}	$I_{OH}=-0.4mA$	2.7	3.2		V
Low-level Output Voltage	V_{OL}	$I_{OL}=2mA$		0.05	0.25	V
RIN Input Current ²	I_{IRIN}	$V_{IN}=0V$, $V_{CC}=3.6V$	-12	-8	+12	μA
		$V_{IN}=2.8V$, $V_{CC}=3.6V$	-12	-4	+12	μA
No-load Current	I_{CC}	Input open-circuit, no-load stable state		13	20	mA

Note:

1. The input common-mode voltage V_{ICMR} , relates to differential input voltage V_{ID} , and it decreases along with $|V_{ID}|$ increasing.
2. +/- of input current represents the current flow direction.

Switching Characteristics

$V_{CC}=3.3V$, $T_A=25^\circ C$ ³

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Differential Propagation Delay (High to Low)	t_{PHL}	Figure 1 and Figure 2		2.4		ns
Differential Propagation Delay (Low to High)	t_{PLH}			2.4		ns
Differential Propagation Delay Skew $ t_{PHL} - t_{PLH} $	t_{SKD}			0.2		ns
Rise Time	t_R			0.9		ns
Fall Time	t_F			0.75		ns
Maximum Operating Frequency	f_{MAX}			250		MHz

Note3: Input signal: $f=1MHz$, $Z_o=50\Omega$ in normal test.

Test Circuit

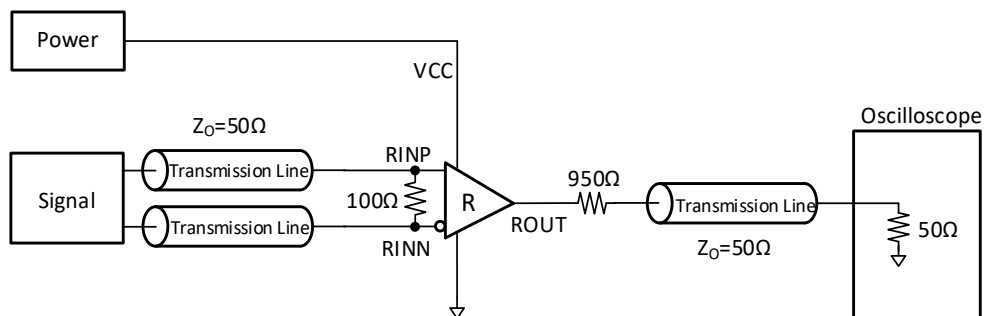


Figure 1. Propagation Delay and Transition Time Test Circuit

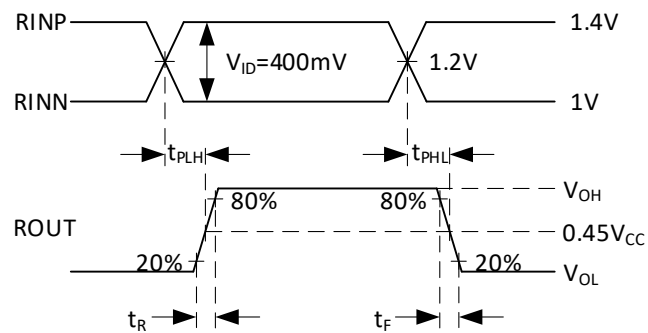


Figure 2. Propagation Delay and Transition Time Waveform

TYPICAL CHARACTERISTICS CURVE

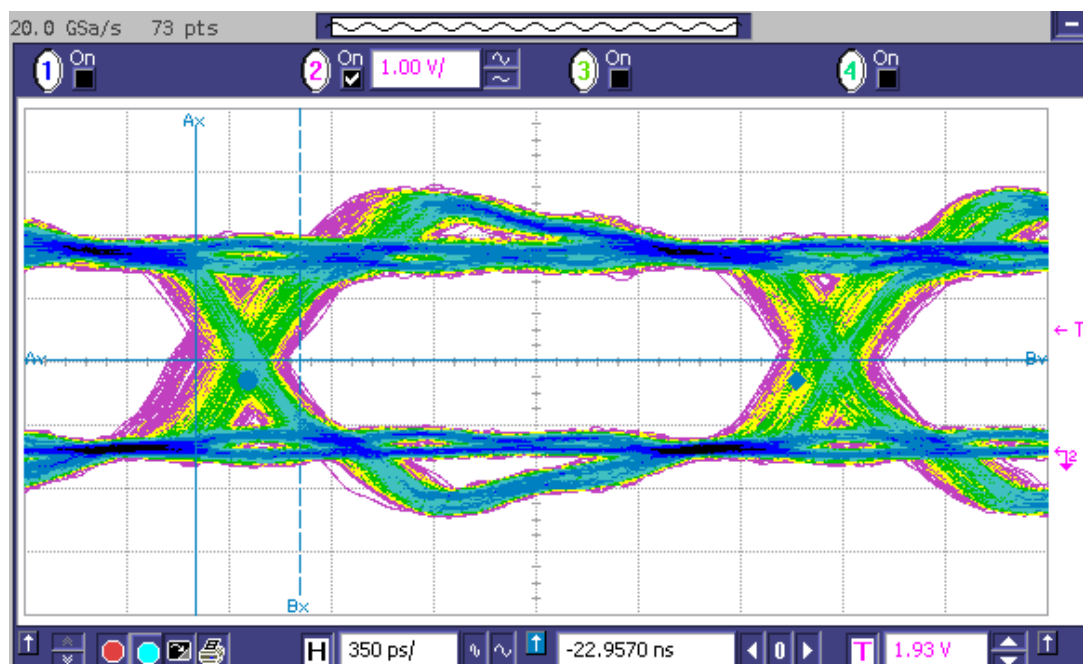


Figure 3. Typical Receiver Output Eye Diagram (500Mbps)

FUNCTION DESCRIPTION

The MS21112S is a single-channel LVDS differential line receiver, meeting the electrical characteristics of low voltage differential signaling (LVDS). The transmission media can be PCB, backplane or cable. The data rate and distance depend on the media attenuation characteristic, the noise environment and other system characteristics. The MS21112S can receive LVDS level, and transform it to CMOS logical level. The function table is shown in Table 1.

Table 1. MS21112S Function

Differential Input ($V_{ID} = V_{RINP} - V_{RINN}$)	Output (ROUT)
$V_{ID} \geq 100\text{mV}$	H
$V_{ID} \leq -100\text{mV}$	L
$-100\text{mV} < V_{ID} < 100\text{mV}$	X
Short-circuit, Open-circuit or Input Terminate	H

Note: H represents high-level, L represents low-level and X represents uncertain level.

The MS21112S has failure safe function. If the LVDS differential input terminals are in shorted or open condition, the output is high-level. In addition, if the input terminals of the MS21112S are terminated, for example, the driver output is in high impedance or without cable or power down, the output is high level as well.

TYPICAL APPLICATION DIAGRAM

Application 1

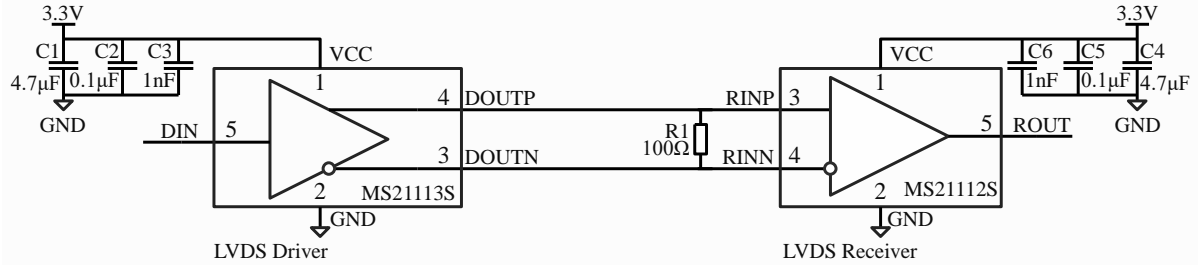


Figure 4. Point-to-Point Transmission Application Diagram 1

Application 2

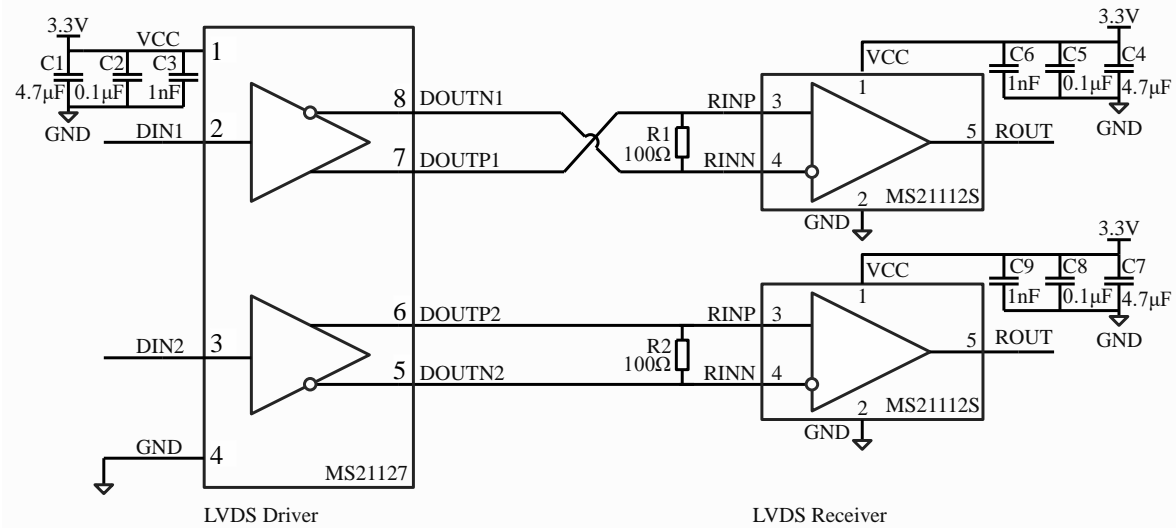
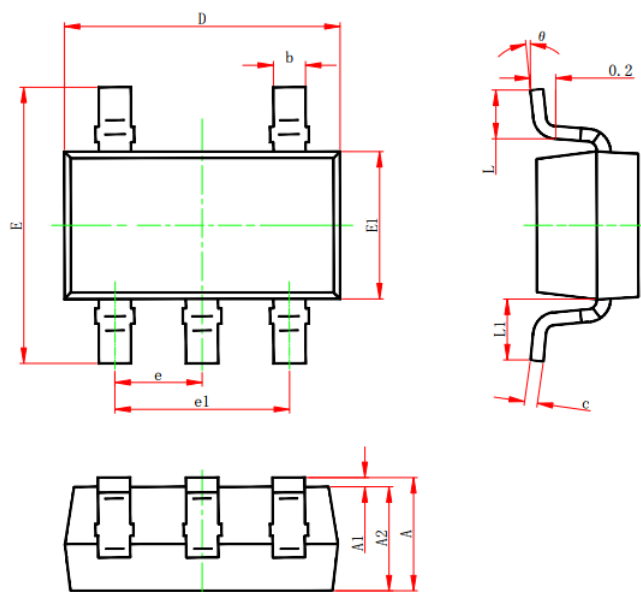


Figure 5. Point-to-Point Transmission Application Diagram 2

PACKAGE OUTLINE DIMENSIONS

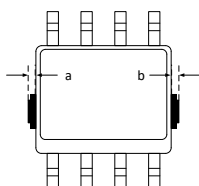
SOT23-5



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	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	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF		0.024REF	
θ	0°	8°	0°	8°

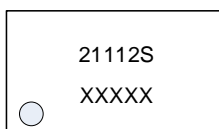
Note: In addition to the package size, a and b are allowed to have the maximum size of 0.15mm for waste glue simultaneously.

The diagram is as follows: taking SOP8 package as an example.



MARKING and PACKAGING SPECIFICATION

1. Marking Drawing Description



Product Name: 21112S

Product Code: XXXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specification

Device	Package	Piece/Reel	Reel/Box	Piece /Box	Box/Carton	Piece/Carton
MS21112S	SOT23-5	3000	10	30000	4	120000

STATEMENT

- All Revision Rights of Datasheets Reserved for Ruimeng. Don't release additional notice.
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- When using Ruimeng products to design and produce, purchaser has the responsibility to observe safety standard and adopt corresponding precautions, in order to avoid personal injury and property loss caused by potential failure risk.
- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

**MOS CIRCUIT OPERATION PRECAUTIONS**

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.



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