RS-485 Interface Circuit

PRODUCT DESCRIPTION

The MS3485/MS3485M/MS3485D is a RS-485 transceiver. The bus pins are robust to electrostatic discharge (ESD) events, with high levels of protection to Human-Body Model (HBM, ±20kV), Air-Gap Discharge, and Contact Discharge specifications, the Data Rate can transmit up to 10Mbps. The driver differential outputs and the receiver differential inputs are connected internally to form a bus port suitable for half-duplex communication.

SOP8

MSOP8

DIP8

FEATURES

- Bus-Pin Protection:
  ±20kV HBM Protection
  ±12kV IEC61000-4-2 Contact Discharge
  +4kV IEC61000-4-4 Fast Transient Burst
- Up to 256 Nodes on a Bus
- Data Rate: 300 bps to 10Mbps(@5V)
- Power Supply Range: 2.5V-6.0V
- Three State Output
- Power Range: 4.5V-6.0V

APPLICATIONS

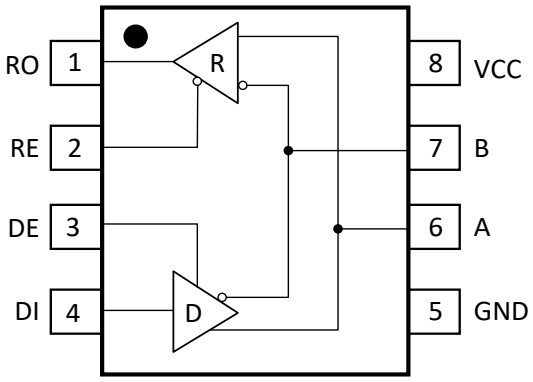
- E-Metering Networks
- Industrial Automation
- HVAC Systems
- Process Control
- Motion Control
- RS-485 Interface

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS3485	SOP8	MS3485
MS3485M	MSOP8	MS3485M
*MS3485D	DIP8	MS3485D

*The package is not available temporarily. If necessary, please contact Hangzhou Ruimeng Sales Department Center.

PIN CONFIGURATIONS



PIN DESCRIPTION

Pin	Name	Type	Description
1	RO	O	Receive Data Output
2	RE	I	Receiver Enable, Active Low
3	DE	I	Driver Enable, Active High
4	DI	I	Driver Data Input
5	GND	-	Ground
6	A	I/O	Driver Output or Receiver Input (Complementary to B)
7	B	I/O	Driver Output or Receiver Input (Complementary to A)
8	VCC	-	Supply

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
Supply voltage	VCC	-0.5～+7	V
Input voltage at control pin	VDE, VRE	-0.5～+7	V
Driver Input Voltage	VDI	-0.5～+7	V
Driver Output Voltage	VA , VB	-0.5～+7	V
Receiver Input Voltage	VA, VB	-7～+12	V
Receiver Output Voltage	VRO	-0.5～+7	V
Continuous Power Dissipation(at 70°C)	PC	470(SOP8)	mW
		725(DIP8)	
Storage temperature	TSTORE	-60～+150	°C
Lead Temperature(10s)	TSOLDERING	+260	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC	+2.5		+6	V
Input Voltage on DI, DE, RE	VDE, VRE	-0.5		VCC	V
Bus Voltage	VA, VB	-7		+12	V
Operating Temperature Range	TWORK	-40		+120	°C

ELECTRICAL CHARACTERISTICS(VCC=5V)

DC Electrical Characteristics

VCC=5.0V, TA = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Driver Differential Output Voltage	V_{OD}	No load		4	4.5		V
		R_L=50Ω		2	2.5		
Change in Magnitude of Driver Differential Output	ΔV_{OD}	R_L=50Ω				0.2	V
driver Common-mode Output Voltage	V_{OC}	R_L=50Ω				3	V
Change in Magnitude of Driver Common-mode Output	ΔV_{OC}	R_L=50Ω				0.2	V
Input High Voltage	V_{IH}	DE,RE,DI		2			V
Input Low Voltage	V_{IL}	DE,RE,DI				0.8	V
Logic Input Current	$I_{IN,LOGIC}$	DE,RE,DI				±2	μA
input Current(A, B)	$I_{IN,BUS}$	DE=0V, V_{CC}=5V	V_{IN}=5V		40	90	μA
			V_{IN}=0V		60	100	
Receiver Differential Threshold Voltage	V_{TH}	-7V≤V_{CM}≤12V			-0.1	0	V
Receiver Input Hysteresis	ΔV_{TH}	V_{CM}=0V			25		mV
Receiver Output High Voltage	V_{OH}	I_{OUT}=-1.5mA, V_{ID}=200mV		4.2	4.8		V
Receiver Output Low Voltage	V_{OL}	I_{OUT}=-1.5mA, V_{ID}=200mV			0.1	0.2	V
Three-State Output Current at Receiver	I_{OSR}	V_{CC}=5V, 0V≤V_{OUT}≤V_{CC}				±1	μA
Receiver Input Resistance	R_{IN}	-7V≤V_{CM}≤12V			100		kΩ
Supply Current	I_{CC}	No load, RE=DE=DI=0V or V_{CC}			0.48	0.9	mA
Driver Short-Circuit Current	I_{OSD}	V_{OUT} = -7V		25			mA
		V_{OUT} = 12V		25			
Receiver Short-Circuit Current	I_{OSR}	0V≤V_{RO}≤V_{CC}		7			mA
ESD Protection(A,B)	V_{ESD}	HBM			±20		kV

Switching Characteristics

VCC=5.0V, TA = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Driver Input to Output	t_{PLH}	R_{DIFF}=50Ω, C_{LA}=C_{LB}=100pF	10	35	70	ns
	t_{PHL}		10	50	90	
Driver Input to Output	t_{PDS}	R_{DIFF}=50Ω, C_{LA}=C_{LB}=100pF		30		ns
Driver Rise l Time	t_{TTR}	R_{DIFF}=50Ω, C_{LA}=C_{LB}=100pF		40	70	ns
Driver Fall Time	t_{TTF}	R_{DIFF}=50Ω, C_{LA}=C_{LB}=100pF		40	70	ns
Driver Enable to Output High	t_{PZH}	C_L=100pF		30	70	ns
Driver Enable to Output Low	t_{PZL}	C_L=100pF		30	70	ns
Driver Disable Time from Low	t_{PHZ}	C_L=100pF		90	110	ns
Driver Disable Time from High	t_{PLZ}	C_L=100pF		100	120	ns
Receiver Input to Output	t_{PLH}	C_L=15pF	20	60	200	ns
	t_{PHL}		20	40	200	
Differential Receiver Skew	t_{PDS}	C_L=15pF, | t_{PLH} –t_{PHL}|		20		ns
Receiver Enable to Output High	t_{PZH}	C_L=15pF		50	80	ns
Receiver Enable to Output Low	t_{PZL}	C_L=15pF		60	90	ns
Receiver Disable Time from High	t_{PHZ}	C_L=15pF		50	80	ns
Receiver Disable Time from Low	t_{PLZ}	C_L=15pF		60	90	ns
Maximum Data Rate	f_{MAX}				10	Mbps

ELECTRICAL CHARACTERISTICS(VCC=3.3V)

DC Electrical Characteristics

VCC=3.3V, TA = 25°C, unless otherwise noted.

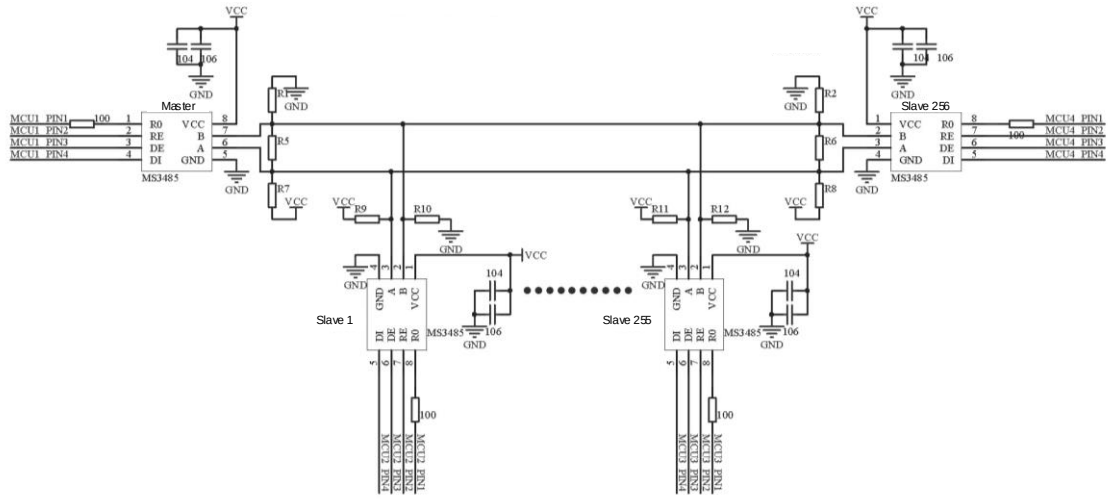
Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Driver Differential Output Voltage	V_{OD}	No load		2.5	2.8		V
		R_L=50Ω			1.35		
Change in Magnitude of Driver Differential Output	ΔV_{OD}	R_L=50Ω				0.2	V
Driver Common-mode Output Voltage	V_{OC}	R_L=50Ω			1.65	3	V
Change in Magnitude of Driver Common-mode Output	ΔV_{OC}	R_L=50Ω				0.2	V
Input High Voltage	V_{IH}	DE, RE, DI		2			V
Input Low Voltage	V_{IL}	DE, RE, DI				0.8	V
logic input current	$I_{IN,LOGIC}$	DE, RE, DI				±2	μA
input Current(A, B)	$I_{IN,BUS}$	DE=0V, V_{CC}=3.3V	V_{IN}=3.3V		40	90	μA
			V_{IN}=0V		60	100	
Receiver Differential Threshold Voltage	V_{TH}	-7V≤V_{CM}≤12V			-0.1	0	V
Receiver Input Hysteresis	ΔV_{TH}	V_{CM}=0V			25		mV
Receiver Output High Voltage	V_{OH}	I_{OUT}=-1.5mA, V_{ID}=200mV		VCC-0.4			V
Receiver Output Low Voltage	V_{OL}	I_{OUT}=-1.5mA, V_{ID}=200mV				0.4	V
Three-StateOutput Current at Receiver	I_{OSR}	V_{CC}=5V, 0V≤V_{OUT}≤V_{CC}				±1	μA
Receiver Input Resistance	R_{IN}	-7V≤V_{CM}≤12V			100		kΩ
Supply Current	I_{CC}	No load, RE=DE=DI=0V or V_{CC}			0.2		mA
Driver Short-Circuit Current,	I_{OSD}	V_{OUT} = -7V			133		mA
		V_{OUT} = 12V			80		
Receiver Short-Circuit Current	I_{OSR}	0V≤V_{RO}≤V_{CC}			98		mA
ESD Protection(A,B)	V_{ESD}	HBM			±20		kV

Switching Characteristics

VCC=3.3V, TA = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Driver Input to Output	tPLH	RL=27Ω, CLA=CLB=15pF	7	22	35	ns
	tPHL		7	22	35	
Driver Input to Output	tPDS	RL=27Ω, CLA=CLB=15pF			8	ns
Driver Enable to Output High	tPZH	RL=110Ω, CLA=CLB=15pF		45	90	ns
Driver Enable to Output Low	tPZL	RL=110Ω, CLA=CLB=15pF		45	90	ns
Driver Disable Time from Low	tPHZ	RL=110Ω, CLA=CLB=15pF		40	80	ns
Driver Disable Time from High	tPLZ	RL=110Ω, CLA=CLB=15pF		40	80	ns
Receiver Input to Output	tPLH	CL=15pF	25	65	90	ns
	tPHL		25	75	120	
Differential Receiver Skew	tPDS	CL=15pF, | tPLH –tPHL|			10	ns
Receiver Enable to Output High	tPZH	CL=15pF		25	50	ns
Receiver Enable to Output Low	tPZL	CL=15pF		25	50	ns
Receiver Disable Time from High	tPHZ	CL=15pF		25	45	ns
Receiver Disable Time from Low	tPLZ	CL=15pF		25	45	ns
Maximum Data Rate	fMAX	VCC=3.3V			6	Mbps

APPLICATIONS INFORMATION



1. R1 resistance value ranges from (slave number+1)k to (slave number+1)×10k.

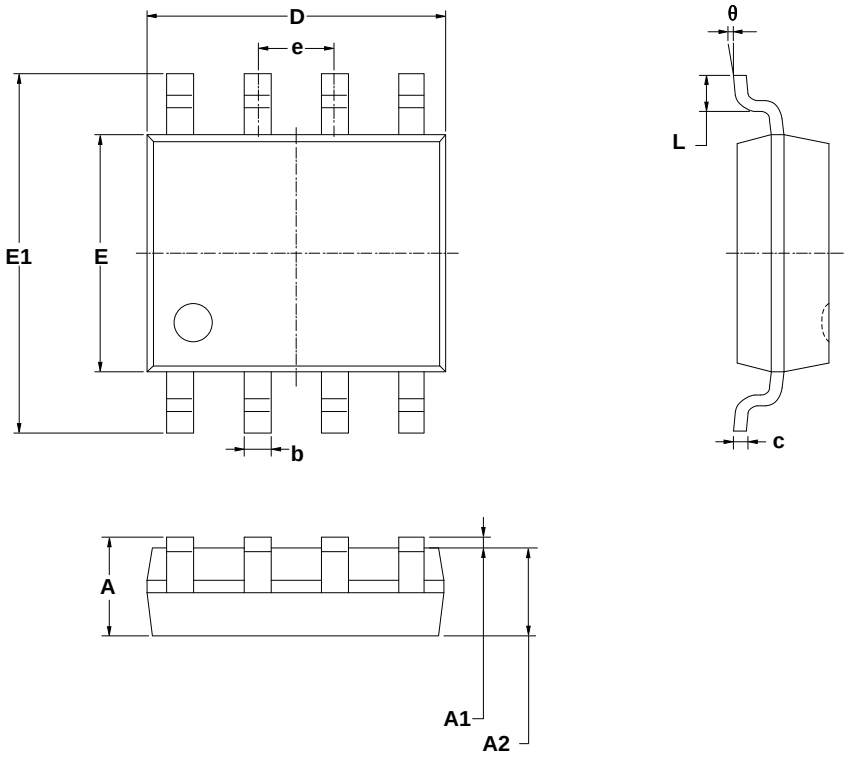
2. R5 resistance value ranges from 100 to 1k. R5 is only needed to connect on the MS3485 farthest to both ends, in order to reduce signal reflex, instead of connecting R5 on AB line of all masters.

3. When many slaves are connected, adopt daisy chain rather than topology.

4. It is recommended to use twisted pair, and the farthest distance doesn't exceed 1.5km.

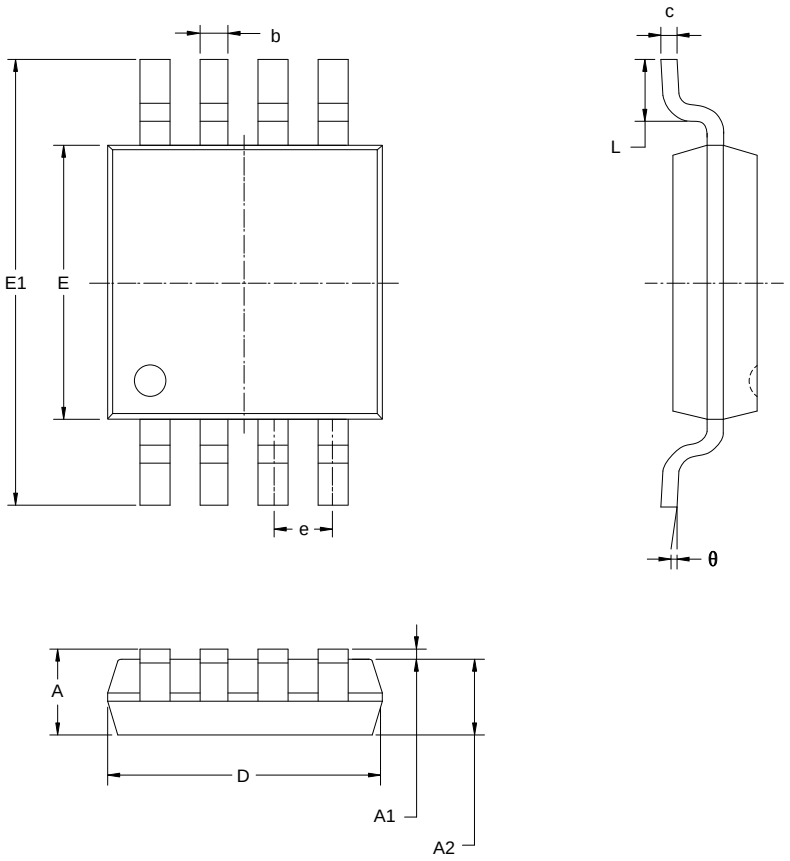
PACKAGE OUTLINE DIMENSIONS

SOP8



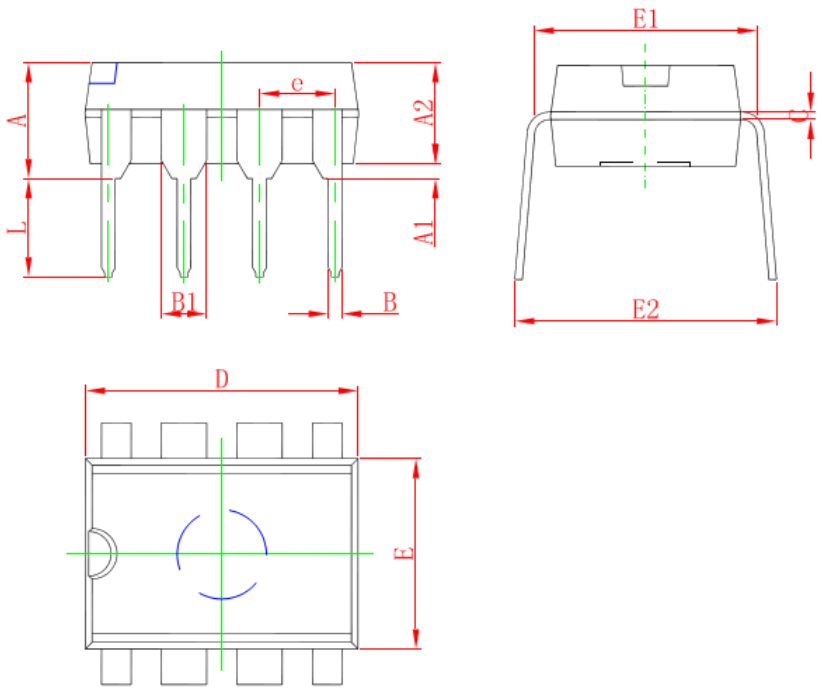
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0 º	8 º	0 º	8 º

MSOP8



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650BSC		0.026BSC	
L	0.400	0.800	0.016	0.031
θ	0º	6º	0º	6º

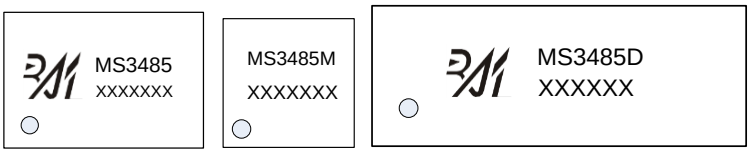
DIP8



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

MARKING and PACKAGING SPECIFICATION

1. **Marking Drawing Description**



Product Name : MS3485, MS3485M, MS3485D

Product Code : XXXXXX, XXXXXXX

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
MS3485	SOP8	2500	1	2500	8	20000
MS3485M	MSOP8	3000	1	3000	8	24000

Device	Package	Piece/Tube	Tube/Box	Piece /Box	Box/Carton	Piece/Carton
MS3485D	DIP8	50	40	2000	10	20000

STATEMENT

- All Revision Rights of Datasheets Reserved for Ruimeng. Don't release additional notice.

  Customer should get latest version information and verify the integrity before placing order.
- 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.

+86-571-89966911

Rm701, No.9 Building, No. 1 WeiYe Road, Puyan Street, Binjiang District, Hangzhou, Zhejiang

http:// www.relmon.com