RS-485 Interface Circuit - HM3085EESA

■ General Description

The HM3085EESA for RS-485 communication is an interface transceiver for half-duplex communication, which includes a receiver and a driver. HM3085EESA use a low-swing rate driver with small EMI, and error-free data transmission.

■ Features

* Receiver failure protection
* Up to 256 transceivers are allowed on the bus
* High ESD protection capability
* Allow Up to 256 Transceivers on the Bus
* 8-pin sop

■ ESD Protect

IEC 61000-4-2 （Contact discharge）：15kV（pin：A、B）

JEDEC JESD22-A114D（HBM） All pin ±8kV

JEDEC JESD22-A114D（MM） All pin ±800V

■ Application

* Meter
* Level Switch
* Safety Protection System
* EMI Sensitive Transceiver Applications
* Industrial Control
* Lighting System

■ Functional logic diagram

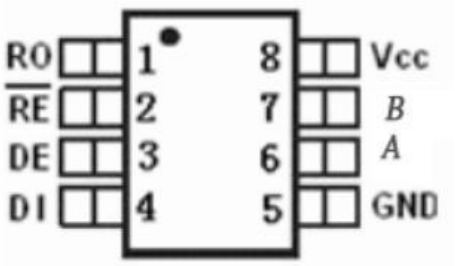


Figure 1 Pin Description

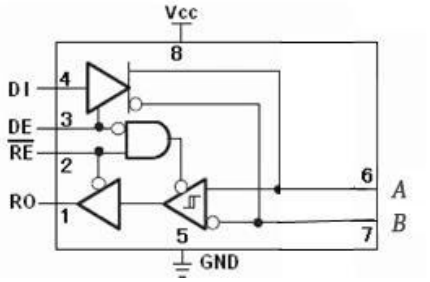


Figure 2 Functional logic diagram

■ Pin Description

PIN NO.	NAME	FUNCTION
1	RO	Receiver Output.
2	/RE	Receiver Output Enable.Drive /RE low to enable RO; RO is high impedance when /RE is high.
3	DE	Driver Output Enable. Drive DE high to enable driver outputs. These outputs are high impedance when DE is low.
4	DI	Driver Input.
5	GND	Ground.
6	A	Receiver input and Driver output.
7	B	Receiver input and Driver output.
8	V_{CC}	Power input.

■ Absolute Maximum Ratings

Parameters	Symbol	Range of parameters	Units
Supply Voltage	V_{CC}	0～7	V
Control Input Voltage	/RE, DE	-0.3 to V_{CC}+0.3	V
Driver Input Voltage	DI	-0.3 to V_{CC}+0.3	V
Driver Output Voltage	A, B	±13	V
Receiver Input Voltage	A, B	±13	V
Receiver Output Voltage	RO	-0.3～V_{CC}+0.3	V
Operating Temperature Ranges		-55～+125	℃
Storage Temperature Range		-55～+150	℃
Lead Temperature		300	℃

■ DC Electrical Specifications

(VCC = +5V ±5%, TA = TMIN to TMAX, unless otherwise noted. Typical values are at VCC = +5V and TA = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
DRIVER							
Differential Driver Output (No Load)	V_{OD1}	Figure 3		4.5		5	V
Differential Driver Output	V_{OD2}	Figure 3,R=54Ω		1.5		5	V
Change-in-Magnitude of Differential Output Voltage (Note 2)	ΔV_{OD}	Figure 3,R=54Ω				0.2	V
Driver Common-Mode Output Voltage	V_{OC}	Figure 4,R=27Ω		1		3	V
Change-in-Magnitude of Common-Mode Voltage (Note 2)	ΔV_{OC}	Figure 4,R=27Ω				0.2	V
Input High Voltage	V_{IH1}	DE,DI,/RE		2.0			V
Input Low Voltage	V_{IL1}	DE,DI,/RE				0.8	V
Driver Short-Circuit Output Current (Note 3)	I_{OSD}	/RE=DE=DI=VCC A and B short circuit currents			80	100	mA
RECEIVER							
Receiver Differential Threshold Voltage	V_{TH}	Figure 5		-200		-50	mV
Receiver Output High Voltage	V_{OH}	/RE,DE=0,I_O=-8mA		4			V
Receiver Output Low Voltage	V_{OL}	/RE,DE=0,I_O=8mA				0.4	V
Three-State Output Current at Receiver	I_{OZR}	/RE,DE=1,DI=0, RO and GND short circuit currents				1	μA
Receiver Input Resistance	R_{IN}	-7V≦V_{CM}≦12V		96			k Ω
Receiver Output Short-Circuit Current	I_{OSR}	/RE,DE=0 RO and GND short circuit currents			35	95	mA
SUPPLY CURRENT							
Supply Current	I_{CC}	RE=DI=GND or VCC (No Load)	DE=V_{CC}		400	600	μA
			DE=GND		350	600	μA
SUPPLY VOLTAGE							
Supply Voltage	VCC			4.5	5.0	5.5	V
TRANSMISSION SPEESD							
Transmission Speed	F			250			kbps

Note 1: All currents into the device are positive; all currents out of the device are negative. All voltages are referred to device ground unless otherwise noted.

Note 2: ΔVOD and ΔVOC are the changes in VOD and VOC, respectively, when the DI input changes state.

Note 3: Maximum current level applies to peak current just prior to foldback-current limiting; minimum current level applies during current limiting.

■ Test Connection

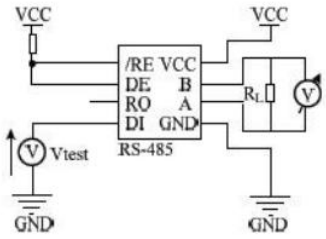


Figure 3

Driver Differential Output Voltage Test

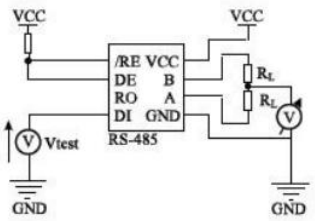


Figure 4

Driver Common Mode Output Voltage Test

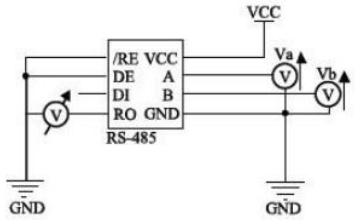


Figure 5

Receiver differential threshold voltage test

■ 典型电气特性曲线

SUPPLY CURRENT vs. TEMPERATURE

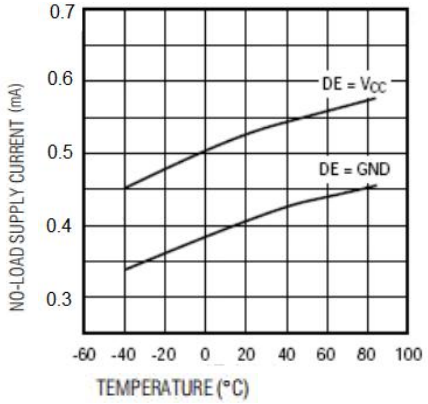


Figure 6

OUTPUT CURRENT vs. RECEIVER OUTPUT LOW VOLTAGE

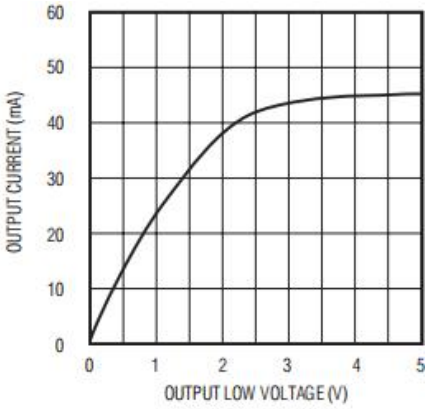


Figure 7

OUTPUT CURRENT vs. RECEIVER OUTPUT HIGH VOLTAGE

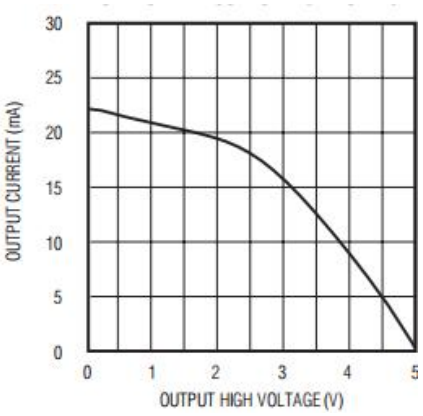


Figure 8

RECEIVER OUTPUT LOW VOLTAGE

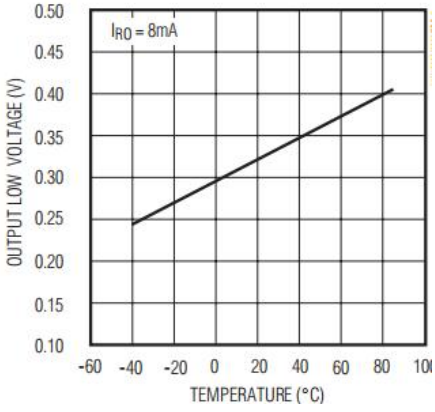


Figure 9

RECEIVER OUTPUT HIGH VOLTAGE vs. TEMPERATURE

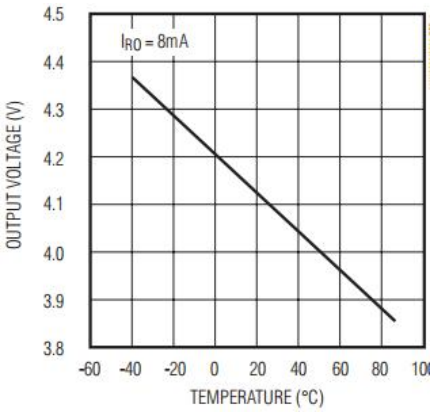


Figure 10

DRIVER OUTPUT CURRENT vs. DIFFERENTIAL OUTPUT VOLTAGE

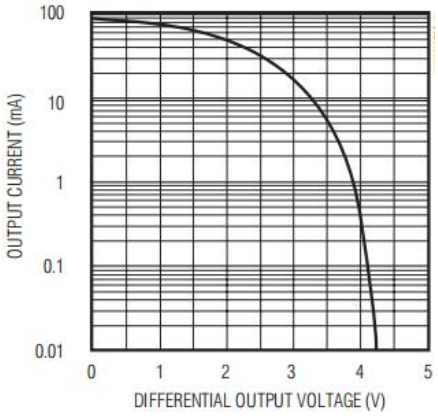


Figure 11

■ Function Tables

TRANSMITTING

INPUTS		OUTPUTS	
DI	DE	A	B
H	H	H	L
L	H	L	H
X	L	Z	Z

RECEIVING

INPUTS			OUTPUTS
/RE	DE	A X B	RO
L	X	>-50MV	H
L	X	< -200MV	L
L	X	Open	H
L	X	Short	H
H	H	X	Z
H	L	X	Z

■ 256 Transceivers on the Bus

The standard RS-485 receiver input impedance is 12kΩ (one-unit load), and the standard driver can drive up to 32 unit loads. The HM305EESA family of transceivers have a 1/8-unit-load receiver input impedance (96kΩ), allowing up to 256 transceivers to be connected in par┐allel on one communication line. Any combination of these devices and/or other RS-485 transceivers with a total of 32 unit loads or less can be connected to the line.

■ Adaptive function

HM3085EESA transceiver is designed for bidirectional data communication on multi-point bus transmission lines. Figure 12 shows a typical network application circuit. These devices can also be used as linear transponders for cables longer than 4000 feet, as shown in figure 12. In order to reduce reflection, terminal matching should be carried out at both ends of the transmission line with its.

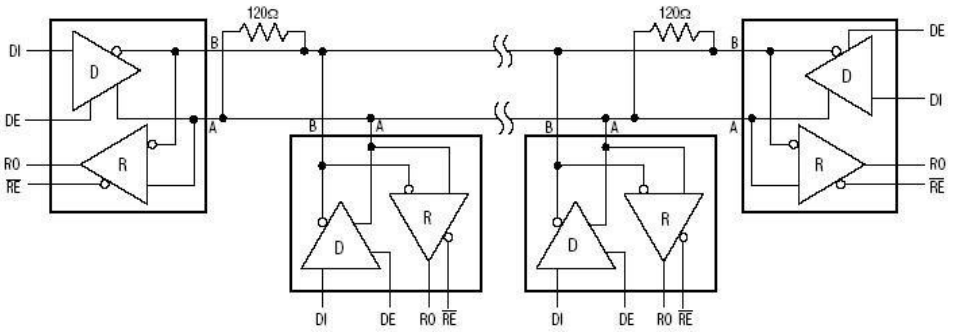
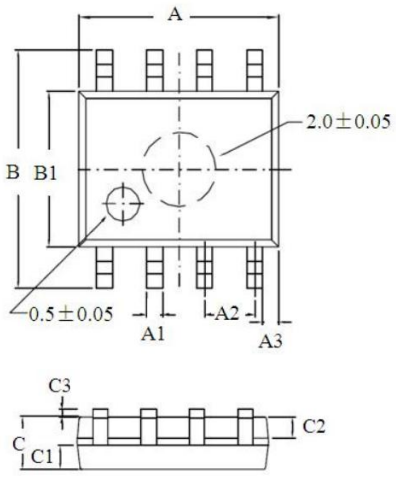


Figure 12: Typical adaptive RS-485 network application diagram

■ OUTLINE DIMENSIONAL DRAWING

SOP8 Package



SYMBOL	MIN (mm)	MAX (mm)	SYMBOL	MIN (mm)	MAX (mm)
A	4.95	5.15	C	1.30	1.50
A1	0.37	0.47	C1	0.55	0.65
A2	1.27 TYP		C2	0.55	0.65
A3	0.41 TYP		C3	0.10	0.2
B	5.80	6.20	C4	0.20 TYP	
B1	3.80	4.00	D	1.05 TYP	
B2	5.0 TYP		D1	0.50 TYP	