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Tudi Semiconductor

TUDI-SN65HVD1785/1786/1787

Fault-protected RS-485 transceivers with extended common mode range

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semiconductor device manufacturer

- Design
- research and development
- production
- and sales

FEATURES

- Bus pin fault protection
- Bus I/O protection
  – 16kV JEDEC Human Body Model (HBM)protection
- Reduced load unit for up to 256 nodes
- Fault-tolerant receiver open, shorted, and idle bus conditions
- Low power consumption
- No glitchy pulse operation on power up or power down

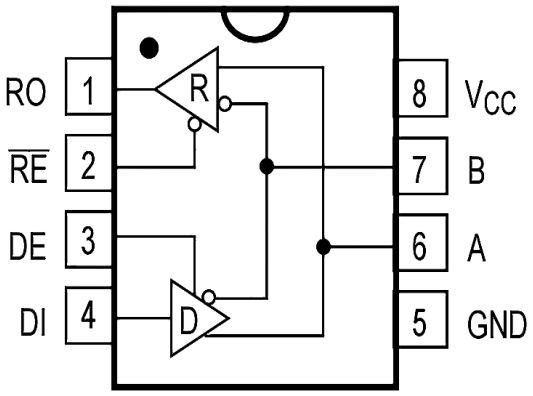


Figure 1. Pin Diagram

Description

These devices can withstand damage in the event of overvoltage faults (e.g., direct short of the power supply, miswiring faults, faults, cable crush, and misuse of tools). They also feature advanced ESD model protection specifications that remain stable in the event of a static discharge (ESD) event

These devices combine a differential driver and a differential receiver, both powered by a single supply. The driver's differential output and the receiver's differential input are internally connected to a bus port suitable for half-duplex (two-wire bus) communication . These ports all have a wide common mode voltage range, making the devices applicable for multi-point over long cables. The rated operating temperature range of these devices is from -40°C to 105°C.

Application

- Designed for RS-485 and RS-422 networks

Pin description

Pin Number	Pin Name	FUNCTION
1	RO	Receiver Output.When enabled,ifA-B≥-10mV,then RO=high.IfA-B ≤-200 mV,then RO=low
2	/RE	Receiver Output Enable.Alow level enables the RO;a high level places it in a high impedance state.
3	DE	Driver Output Enable.A high level enables the driver differential outputs,Pin A and Pin B;a low level places the driver in a high impedance state.
4	DI	Driver Input.When the driver is enabled,a logic low on DI forces Pin A low and Pin B high;a logic high on DI forces PinA high and Pin B low.
5	GND	Ground Connection (0V).

Driver Output Voltage	A、B	-7~13	V
Receiver Output Voltage	RO	-0.3~VCC+0.3	V
Supply Voltage	VCC	+7	V
Continuous Power Dissipation	MSOP8.SOP8.DIP8	830	mW
Soldering Temperature (reflow)		300	℃
Storage Temperature Range		-60~150	℃
Temperature Range		-40~85	℃

Stresses beyond those listed under “Parameter limit” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SWITCHING CHARACTERISTICS OF RECEIVER						
Receiver Enable to Output Low	tRZL	CL=100 pF, S1closed		20	50	ns
Receiver Enable to Output High	tRZH	CL=100 pF, S2 closed		20	50	ns
Receiver Disable Time from Low	tRLZ	CL=100 pF,		20	50	ns
Receiver Disable Time from High	tRHZ	CL=100pF, S2 closed		20	50	ns
Receiver Propagation Delay						
Driver Disable Time from High	tDHZ	(Fig 5,6)			70	ns
Driver Propagation Delay(low to high)	tDPLH	RDIFF=54Ω, CLi=CL₂=100pF (Fig 3,4)		60		ns
Driver Propagation Delay (high to low)	tDPHL			60		ns
|tDPLH-tDPHL	tsKEW1			5	±10	ns
Driver Differential Output Rise or Fall Time	tDR,tDF			40		ns

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY CURRENT						
Supply Current	Icc1	/RE=0V or VCC, DE=0V		200	500	uA
	Icc2	/RE=VCC, DE=VCC		300	600	uA
	Icc_3	/RE=0, DE=VCC		0.5	10	uA
DC ELECTRICAL CHARACTERISTICS OF RECEIVER						
Receiver Input Resistance	RN	-7V≤VcM≤12V	12			kΩ
Input Current(A,B)	IN2	VCC=0 or 5V				
		DE=0V, VCC=0 or 5V	0.8			mA

NOTE
If no special situation occurs，VCC=5V±5% ,Temp=T^{MIN}~T^{MAX}，typically VCC=+5V，Temp＝25℃

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC ELECTRICAL CHARACTERISTICS OF DRIVER						
Input High Voltage	VH	DE,DI,/RE	2.0			V
Input Low Voltage	Vn	DE,DI,/RE			0.8	V
Input Current (RE,DI,/RE)	IN1	DE,DI,/RE	-2		2	uA
Thermal-Shutdown Threshold				150		℃
Thermal-Shutdown Hysteresis				20		℃
Differential Driver Output(no load)	VoD1			5		V

TEST CIRCUIT

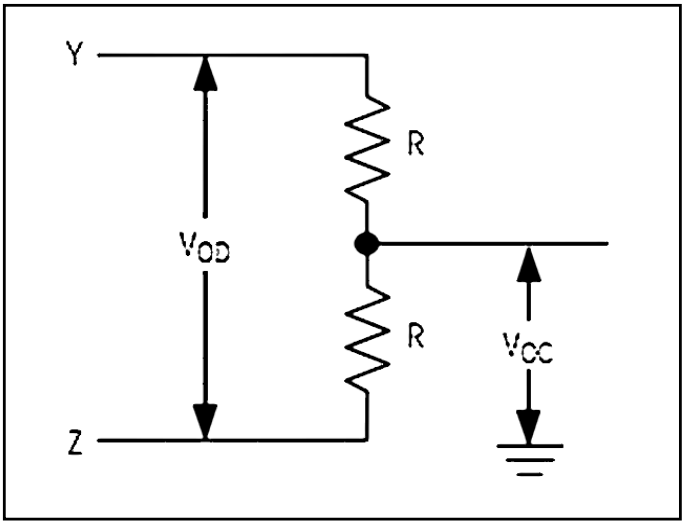


Fig 2 Driver DC Test Load

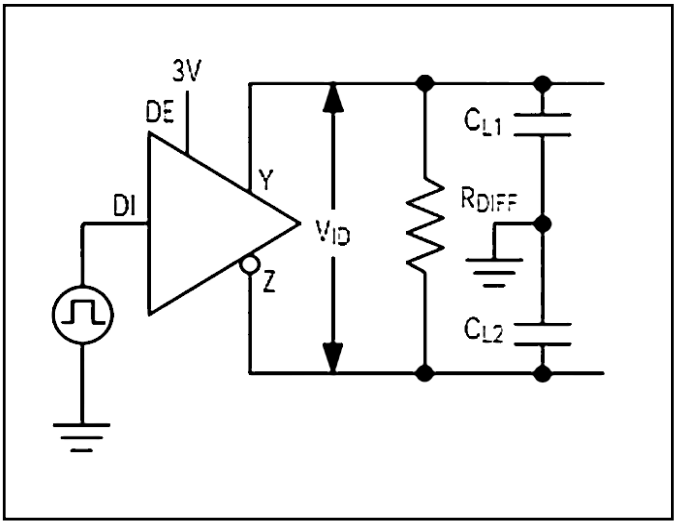
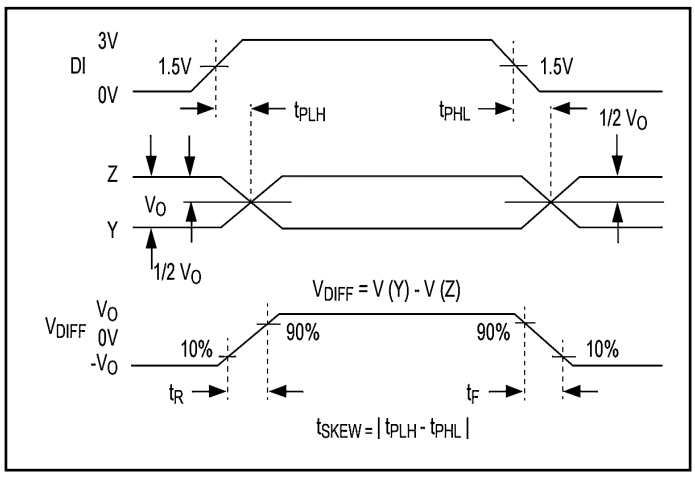
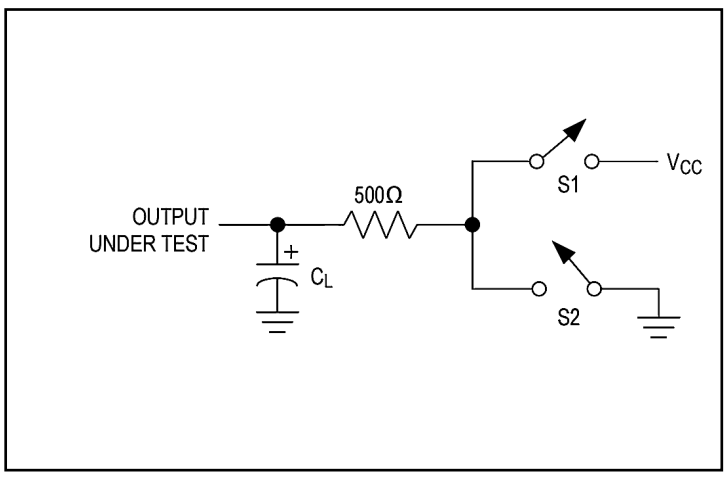


Fig 3 Driver Timing Test Circuit





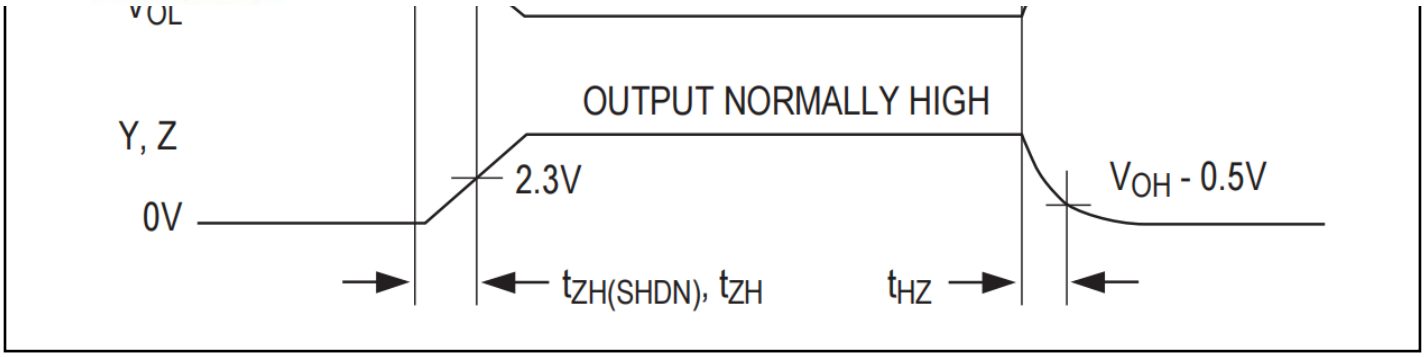


Fig 6 Driver Enable and Disable Times

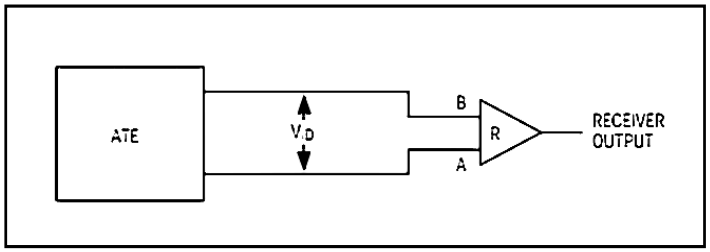


Fig 7Receiver Propagation Delay Test Circuit

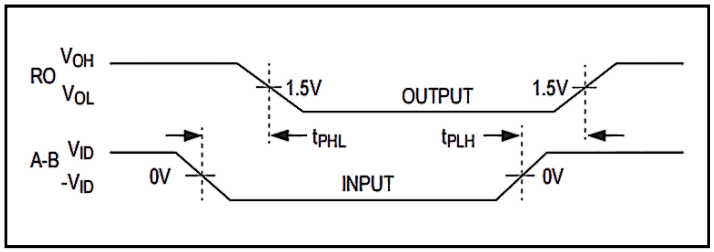


Fig 8 Receiver Propagation Delays

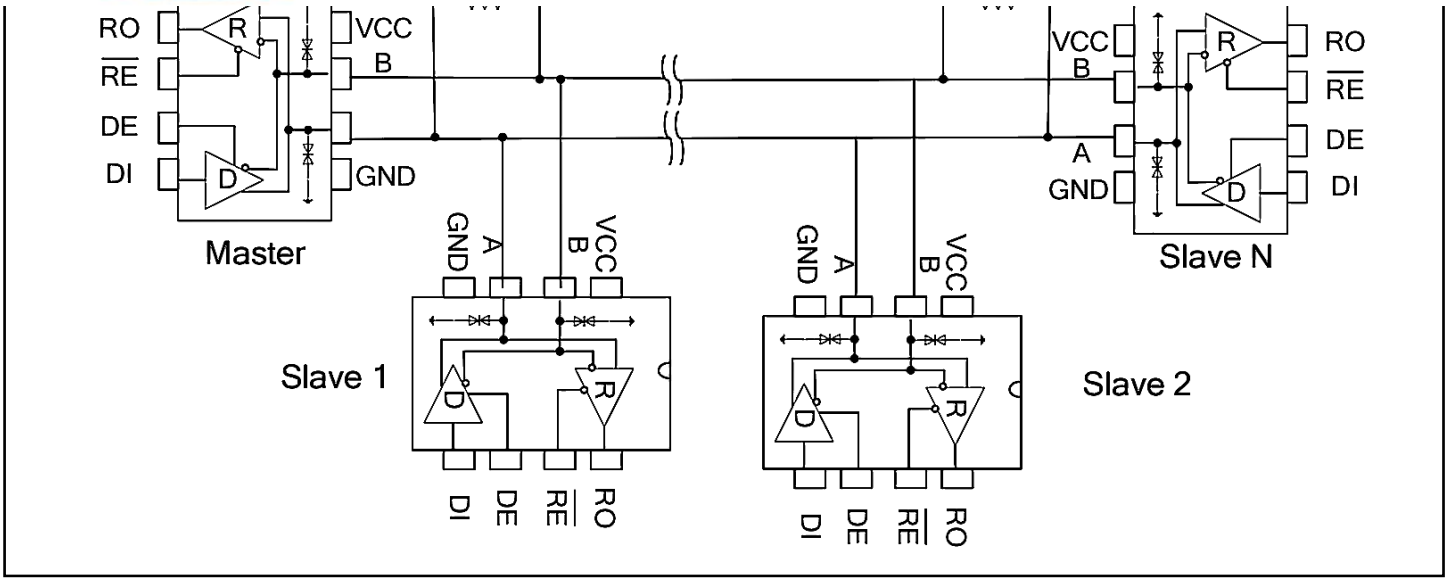
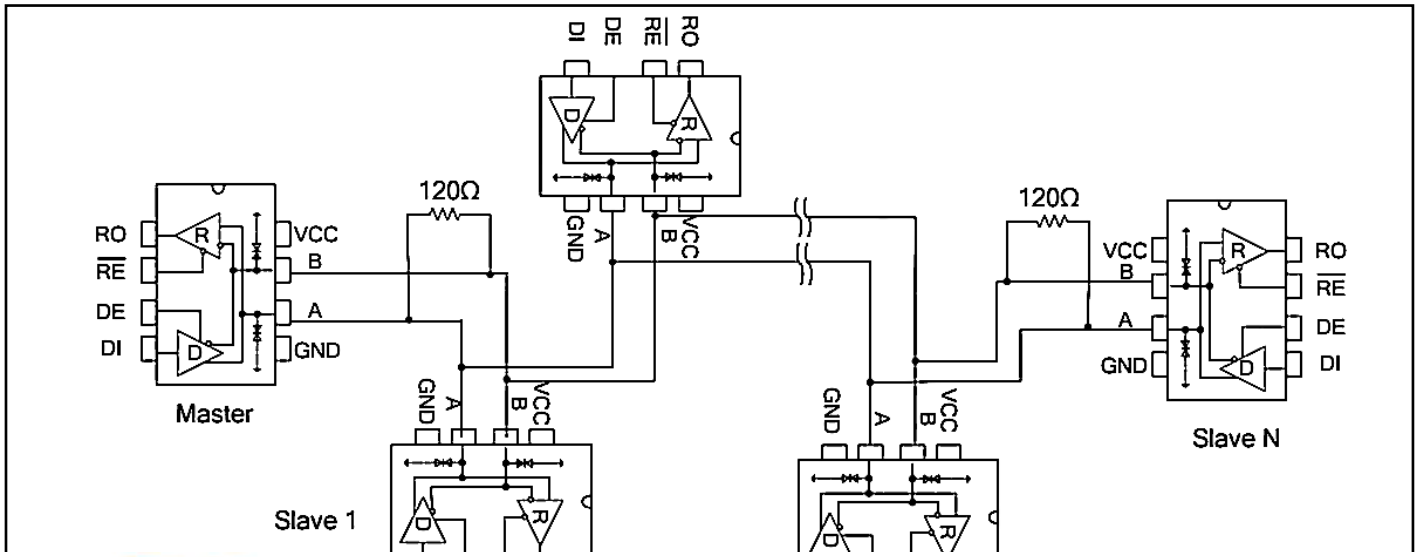


Fig11 Backbone cable type RS485 communications network



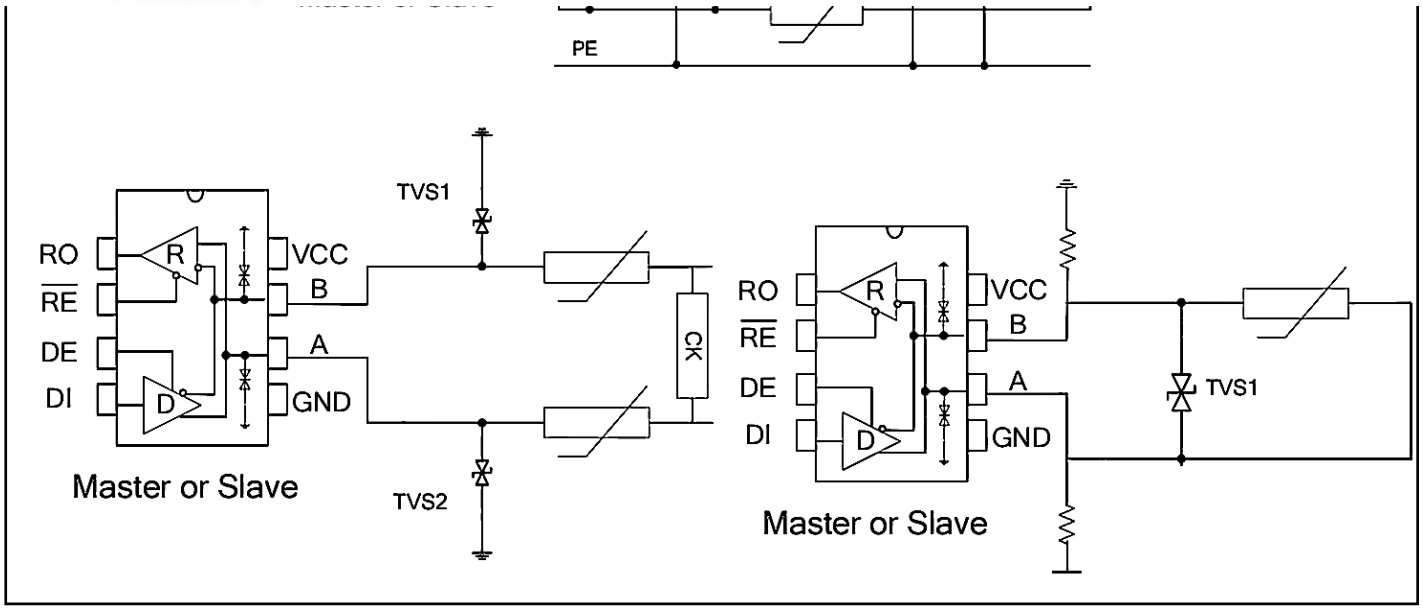
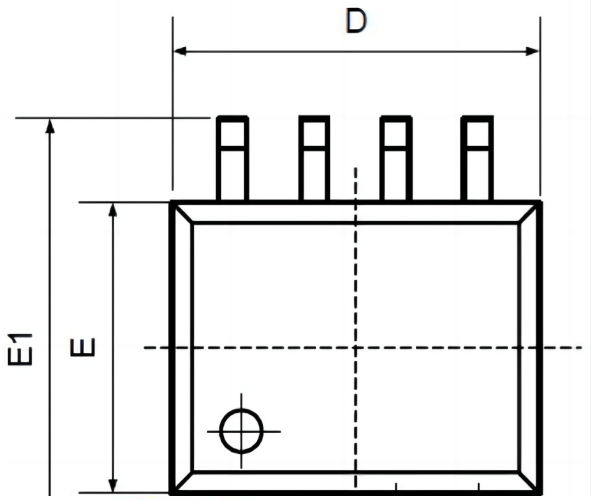
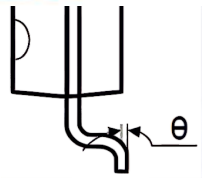


Fig13 RS485 bus ports Protection configuration

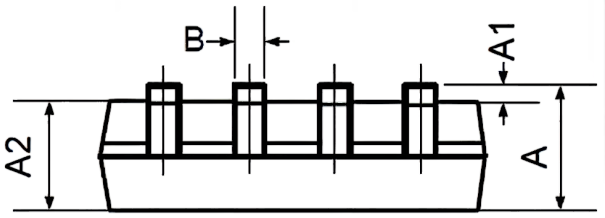
Package SOP8



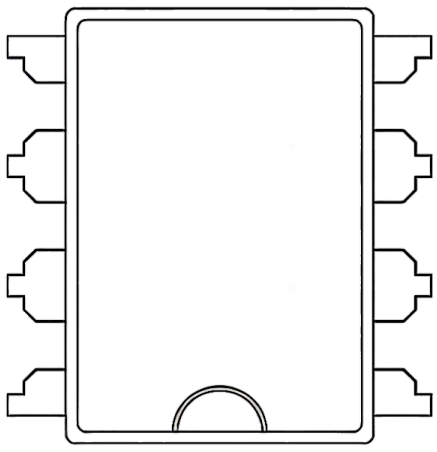
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069



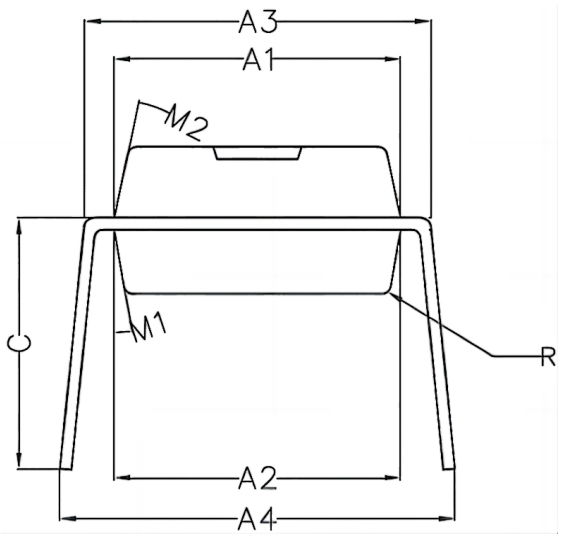
E1	3.800	4.000	0.220	0.240
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25



G		0.25	
H	1.54	1.59	1.64
工	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°

Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
SN65HVD1785DR-TUDI	SOP8	Tape,Reel,2500	VP1785	- 40°C to 105°C
SN65HVD1785P-TUDI	DIP8	Tube,50A box of 2000	65HVD1785	
SN65HVD1786DR-TUDI	SOP8	Tape,Reel,2500	VP1786	
SN65HVD1786P-TUDI	DIP8	Tube,50A box of 2000	65HVD1786	
SN65HVD1787DR-TUDI	SOP8	Tape,Reel,2500	VP1787	

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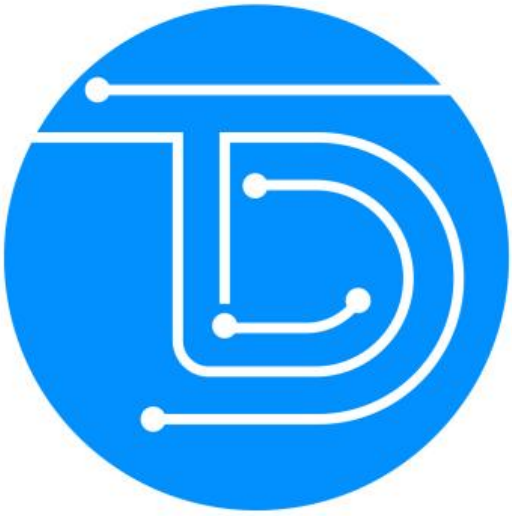

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