概述

HSN65HVD12DR 是用于 RS-485 与 RS-422 通信的低功耗收发器，其中包含一个驱动器和一个接收器，且 HSN65HVD12DR 的驱动器摆率不受限制，可 以实现最高 2.5Mbps 的传输速率，属于半双工应用设计。

HSN65HVD12DR 工作在 5V 单电源下，另外，HSN65HVD12DR 有驱动使能 (DE) 和接收使能 (RE) 管脚，其驱动器具有短路电流限制，并可以通过热关断电路将驱动器输出置为高阻状态，防止过度的功率损耗。接收器输入具有失效保护特性，当输入开路时， 可以确保逻辑高电平输出。

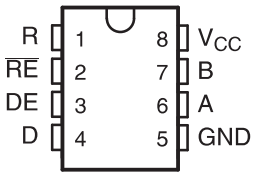
特点

- 三态输出。
- 半双工设计。
- 汇流排允许多达 256 个收发器。
- SOP-8 封装

应用领域

- 低功耗 RS-485 收发器。
- 低功耗 RS-422 收发器。
- 电平转换器。
- 用于 EMI 敏感应用的收发器。
- 工业控制局域网

引脚定义



SOP-8

引脚描述

序号	符号	功能描述
1	RO	接收器输出:若VA>VB 200mV时,RO为高电平，若VA<VB 200mV时，RO为低电平
2	$\overline{RE}$	接收器输出使能端：低电平有效， $\overline{RE}$ 为高时，接收输出为高阻
3	DE	发送使能端：高电平有效，DE为低电平时，发送输出为高阻。DE为高电平时，晶片工作在发送状态，DE为低电平且 RE 为低电平时晶片工作在接收状态。
4	DI	驱动器输入端：DI为低电平时，A输出高电平B输出低电平，DI为高电平时正好相反。
5	GND	地，电源负端
6	A	接收器同相输入端和驱动器同相输出端
7	B	接收器反相输入端和驱动器反相输出端
8	VCC	电源正端

电气特性参数(注 1)

参数	名称	测试条件		最小	典型	最大	单位
发送器							
差分信号输出	V_{OD1}	无负载				5	V
差分信号输出	V_{OD2}	Fig.1, R_L= 27Ω		1.5			V
差分信号输出变化幅度	ΔV_{OD}	Fig.1, R_L= 27Ω				0.2	V
共模输出电压	V_{OC}	Fig.1, R_L= 27Ω				3	V
共模电压输出变化幅度	ΔV_{OC}	Fig.1, R_L= 27Ω				0.2	V
输入信号高电平	V_{IH}	DE, DI, REB		2.0			V
输入信号低电平	V_{IL}	DE, DI, REB				0.8	V
控制引脚输入电流	I_{IN1}	DE, DI, REB				±2	μA
A/B引脚输入电流	I_{IN2}	DE=0, Vcc=0V or 5.25V	V_{IN}=12V			1.0	mA
			V_{IN}=-7V			-0.8	
输出短路电流	I_{OSD}	-7V ≤ V_{OUT} ≤ 12V		-250		250	mA
接收器							
接收器差分信号阈值电压	V_{TH}			-200		200	mV
接收器输入迟滞	ΔV_{TH}				30		mV
接收器输出高电平	V_{OH}	Io= -4mA, VID= 200mV		Vcc-1.5			V
接收器输出低电平	V_{OL}	Io= 4mA, VID= -200mV				0.4	V
接收器三态输出电流	I_{OZR}	0.4V ≤ V_{CM} ≤ 2.4V				±1	μA
接收器输入阻抗 接收器短路电流	R_{IN} I_{OSR}	-7V ≤ V_{CM} ≤ +12V Fig. 6, 0V ≤ V_{RO} ≤ Vcc		32 ±7		 ±95	kΩ m A
供电电流							
供电电流	Icc	无负载, /RE=GND, DI= Vcc or GND.	DE= Vcc		155	900	μA
			DE= GND		160	600	μA

注1：所有输入到管脚的电流为正，所有从管脚输出的电流为负；如无特别指出，则电压指对地电压，TA=25℃，VCC=5V。

极限参数(注 2)

名称	信号参数	范围	单位
电源电压	Vcc	-0.3 to 8.0	V
控制输入信号电压	/RE, DE	-0.3 to (Vcc+ 0.3)	V
接收器输入信号电压	A, B	±13	V
接收器输出电压	RO	-0.3 to (Vcc+ 0.3)	V
发送器输出电压	A, B	±13	V
发送器输入电压	DI	-0.3 to (Vcc+ 0.3)	V
工作温度	T_{OP}	0 to +85	ºC
储存温度	T_{STO}	-65 to +150	ºC

注2：最大允许额定值是指超过这些值可能会使器件发生不可恢复的损坏。在这些条件之下是不利于器件正常运作的，器件连续工作在最大允许额定值下可能影响器件可靠性，所有的电压的参考点为地。

电气特性参数

如无特别说明：TA=25℃，VCC=5V。

符号	参数说明	测试条件	最小	典型	最大	单位
t_{PLH}	驱动输入到输出	RDIFF=50Ω，CL1=CL2=100pF	40	70	90	ns
t_{PLL}			10	40	60	ns
t_{SKEW}	驱动输出压摆到输出		-	30	-	ns
t_R	驱动上升与下降时间		-	40	60	ns
t_F			-	40	60	ns
t_{PLH}	接收输入到输出	RDIFF=50Ω CL1=CL2=100pF	20	60	200	ns
t_{PHL}			20	40	200	ns
t_{SKD}	$\lvert t_{PLH}- t_{PHL}\rvert$ 差分接收		-	20	-	ns
t_{ZL}	接收使能到输出为低	见图 1，图 5，CL=15pF，S2 关闭	-	50	80	ns
t_{ZH}	接收使能到输出为高	见图 1，图 5，CL=15pF，S1 关闭	-	60	90	ns
t_{LZ}	接收从低到关闭	见图 1，图 5，CL=15pF，S2 关闭	-	50	80	ns
t_{HZ}	接收从高到关闭	见图 1，图 5，CL=15pF，S1 关闭	-	60	90	ns
f_{MAX}	最高传输速率	-	2.5			Mbps

测试电路图

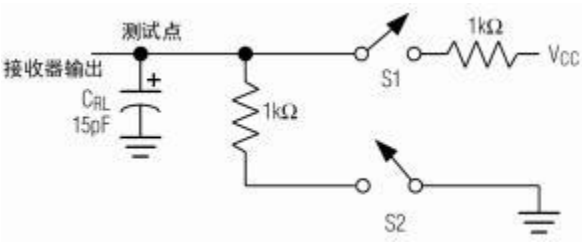


图1：接收器时序测试电路

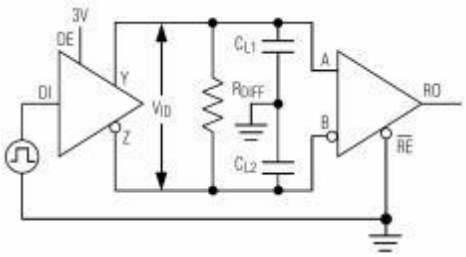


图2：驱动器/接收器时序测试电路

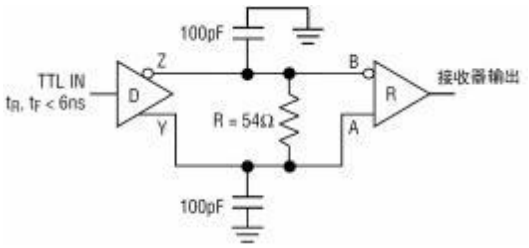


图3：接收器传输延迟测试电路

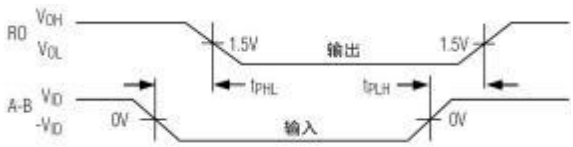


图4：接收器传输延迟

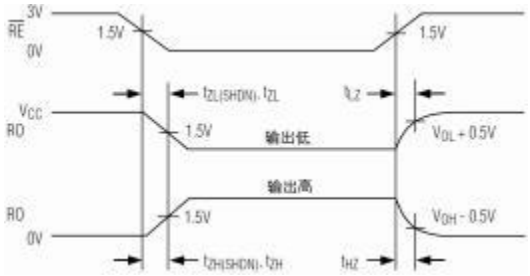


图5：接收器开启与关闭时序

功能说明

传输距离与数据速率

RS-485/RS-422标准覆盖最大4000英尺的传输距离。图6给出了器件以110KHz驱动4000英尺26AWG双绞线、120Ω负载时的系统差分电压。

驱动器输出波形

HVD12 发送150kHz信号时的傅里叶分析，有明显的大幅度高频谐波。如图7

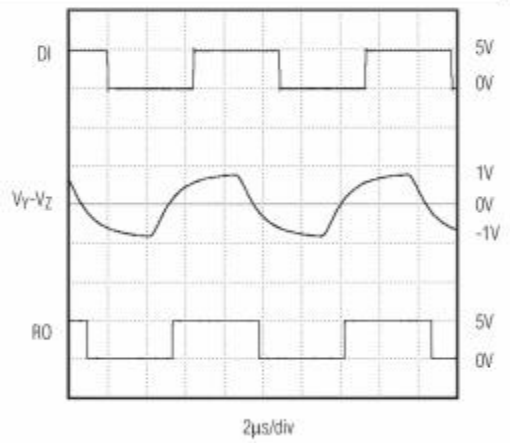


图6：110KHz下驱动4000英尺电缆

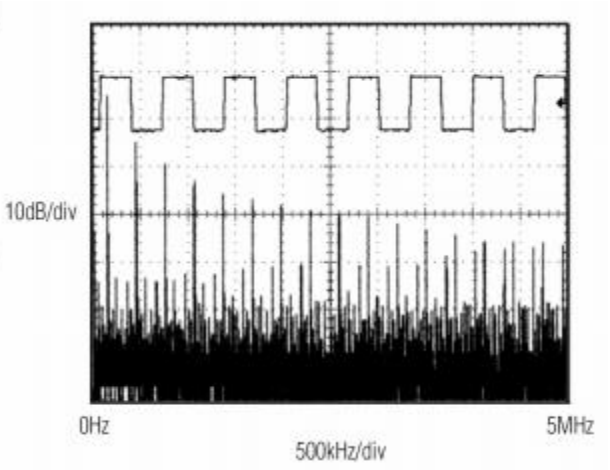


图7：发送150KHz信号时的驱动器输出波形

驱动器输出保护

可以通过两种机制避免由故障或总线冲突引起的过高的输出电流与功耗。输出级的折返式电流限制在整个共模电压范围内提供短路保护。另外，当管芯温度上升过高时，热关断电路强制驱动器输出进入高阻态。

传输延时

许多数字编码方案都取决于驱动器与发送器传输延时的差别。见图3、图8、图9

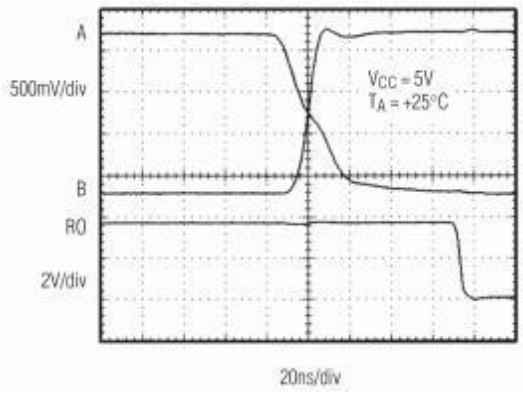


图8：接收器的t_{PHL}

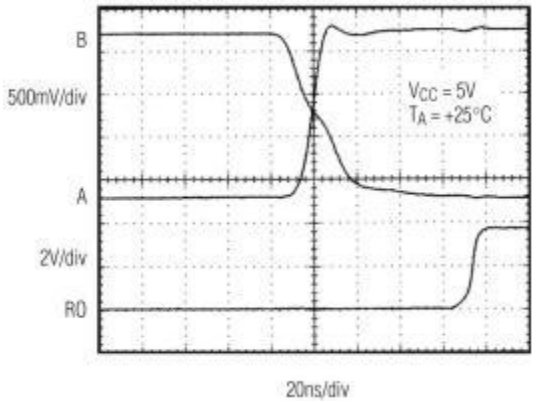


图9：接收器的t_{PLH}

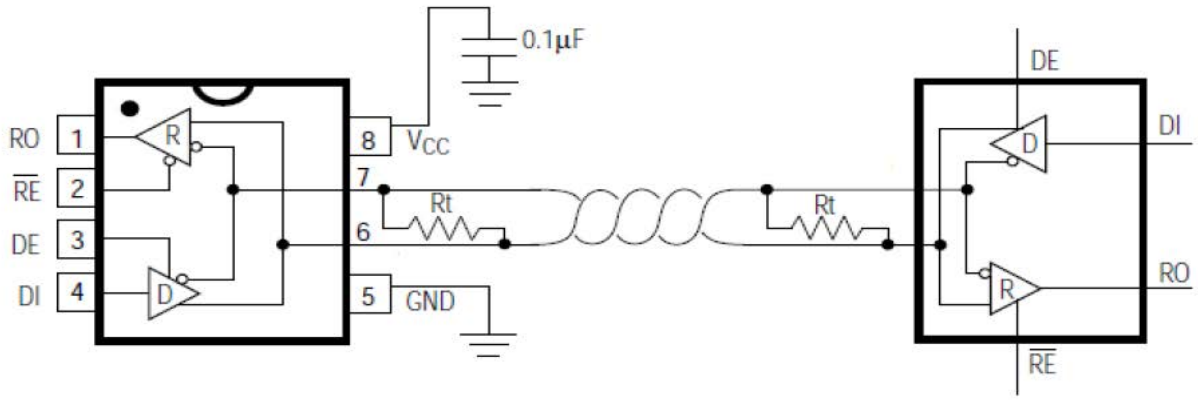
功能表

TRANSMITTING				
INPUTS			OUTPUTS	
/RE	DE	DI	A	B
X	1	0	0	1
X	1	1	1	0
X	0	X	高阻	高阻

RECEIVING			
INPUTS			OUTPUTS
/RE	DE	A - B	RO
0	0	≥ 0.2V	1
0	0	≤ −0.2V	0
0	0	Open/Shorted	不确定状态
1	0	X	高阻

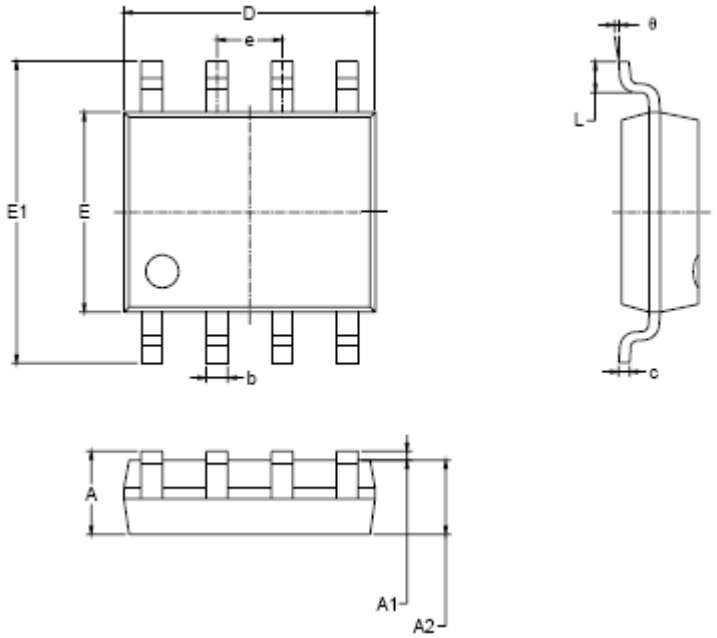
X=任意状态

典型半双工应用电路



封装信息

SOP-8



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°	8°	0°	8°

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