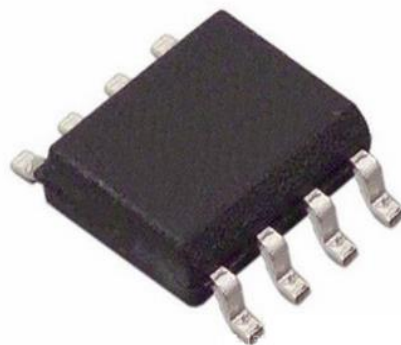


FEATURES

- 3.0V~5.5V supply, full-duplex
- 1/8 unit load, allow up to 256 transceivers on the bus
- Driver short-circuit output protection
- Strong anti-noise ability
- Integrated transient voltage suppression function
- The data transmission rate up to 14Mbps in electric noise environment
- ESD protection for RS-485 I/O pins $\pm 15\text{kV}$, HBM

PRODUCT APPEARANCE



Provide green and environmentally friendly lead-free package

DESCRIPTION

KRN3085E is a 3.0V~5.5V powered, full-duplex, low power dissipation RS-485 transceiver fully meeting the requirements of RS-485/RS-422 standard.

KRN3085E contains one driver and one receiver, both can transmit signals independently. The KRN3085E has a 1/8-unit-load. It allows up to 256 transceivers on the bus and error-free data transmission up to 14Mbps.

KRN3085E has a working voltage range of 3.0V~5.5V, with the functions of current-limiting protection, over-voltage protection, control port hot plug input, etc. KRN3085E has excellent ESD release capability, and HBM reaches $\pm 15\text{kV}$.

PIN CONFIGURATION

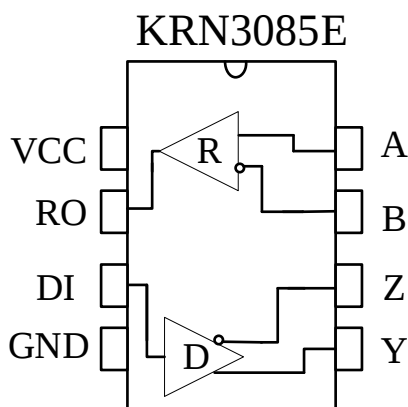


Fig 1 KRN3085E Pin Configuration

PIN DESCRIPTION

PIN	SYMBOL	DESCRIPTION
1	VCC	Positive Supply.
2	RO	Receiver Output. If $A-B \geq +200\text{mV}$, RO will be high; If $A-B \leq -200\text{mV}$, RO will be low.
3	DI	Driver Input. A low on DI forces output Y low and output Z high. A high on DI forces output Y high and output Z low.
4	GND	Ground.
5	Y	Non-inverting Driver Output.
6	Z	Inverting Driver Output.
7	B	Inverting Receiver Input.
8	A	Non-inverting Receiver Input.

LIMITING VALUES

PARAMETER	SYMBOL	VALUE	UNIT
Supply voltage	VCC	+7	V
Driver Input Voltage	DI	-0.3~VCC+0.3	V
Receiver Input Voltage	A, B	-8~13	V
Receiver Output Voltage	RO	-0.3~VCC+0.3	V
Ambient Temperature Ranges	T _{amb}	-40~125	°C
Storage Temperature Range	T _{stg}	-60~150	°C
Lead Temperature		300	°C
Continuous Power Dissipation	SOP8	400	mW
	DIP8	700	mW

The maximum limit parameters mean that exceeding these values may cause irreversible damage to the device. Under these conditions, it is not conducive to the normal operation of the device. The continuous operation of the device at the maximum allowable rating may affect the reliability of the device. The reference point for all voltages is ground.

DRIVER DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Differential Driver Output (No load)	V_{OD1}	$V_{CC}=5V$		5		V
Differential Driver Output	V_{OD2}	Fig 2 , $RL=54\Omega$	1.5		V_{CC}	V
		Fig 2 , $RL=100\Omega$	1.5		V_{CC}	
Change in Magnitude of Driver Differential Output Voltage (NOTE1)	ΔV_{OD}	Fig 2 , $RL=54\Omega$			0.2	V
Driver Common-Mode Output Voltage	V_{OC}	Fig 2 , $RL=54\Omega$			3	V
Change in Magnitude of Common-Mode Output Voltage (NOTE1)	ΔV_{OC}	Fig 2 , $RL=54\Omega$			0.2	V
Input High Voltage	V_{IH}	DI	2.0			V
Input Low Voltage	V_{IL}	DI			0.8	V
Logic Input Current	I_{IN1}	DI	-2		2	μA
Output short-circuit current, short-circuit to high	I_{OSD1}	short-circuit to 0V~12V	35		250	mA
Output short-circuit current, short-circuit to low	I_{OSD2}	short-circuit to -7V~0V	-250		-35	mA

(Unless otherwise noted, $V_{CC}=3V\sim 5V$, $-40^{\circ}C \leq T_{amb} \leq 125^{\circ}C$, typical values are at $V_{CC}=+3.3V$, $T_{amb}=25^{\circ}C$).

NOTE1: ΔV_{OD} and ΔV_{OC} are the changes in V_{OD} and V_{OC} , respectively, when the DI input changes state.

RECEIVER DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Input current (A, B)	I_{IN2}	$V_{CC}=0$ or $3.3V$ $V_{IN}=12V$			125	μA
		$V_{CC}=0$ or $3.3V$ $V_{IN}=-7V$	-100			μA
Positive input threshold voltage	V_{IT+}	$-7V \leq V_{CM} \leq 12V$			+200	mV

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Reverse input threshold voltage	V_{IT-}	$-7V \leq V_{CM} \leq 12V$	-200			mV
Input hysteresis voltage	V_{hys}	$-7V \leq V_{CM} \leq 12V$	10	30		mV
Receiver Output High Voltage	V_{OH}	$I_{OUT} = -4mA$, $V_{ID} = +200mV$	$V_{CC} - 1.5$			V
Receiver Output Low Voltage	V_{OL}	$I_{OUT} = +4mA$, $V_{ID} = -200mV$			0.4	V
Three-State Output Current at Receiver	I_{OZR}	$0.4V < V_O < 2.4V$			± 1	μA
Receiver Input Resistance	R_{IN}	$-7V \leq V_{CM} \leq 12V$	96			$k\Omega$
Receiver Short-Circuit Output Current	I_{OSR}	$0V \leq V_O \leq V_{CC}$	± 7		± 95	mA

(Unless otherwise noted, $V_{CC} = 3V \sim 5V$, $-40^\circ C \leq T_{amb} \leq 125^\circ C$, typical values are at $V_{CC} = +3.3V$, $T_{amb} = 25^\circ C$).

SUPPLY CURRENT

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Supply Current	I_{CC}	DI=0 or VCC		240	400	μA

ESD PROTECTION

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
A, B, Y, Z		HBM		± 15		kV
Other ports		HBM		± 6		kV

DRIVER SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Driver Propagation Delay, Low-to-High Level	t_{PLH}	$R_L = 54\Omega$, $C_L = 100pF$ Fig 4		15	35	ns
Driver Propagation Delay, High-to-Low Level	t_{PHL}	$R_L = 54\Omega$, $C_L = 100pF$ Fig 4		15	35	ns

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
$ t_{PLH} - t_{PHL} $	t_{SKEW1}	$R_L = 54\Omega$, $C_L = 100pF$ Fig 3 & Fig 4		7	10	ns
Differential output delay / Transition time	t_{DD}, t_{TD}			10	25	ns

RECEIVER SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Receiver Propagation Delay, Low-to-High Level	t_{RPLH}	Fig 5 $V_{ID} \geq 2.0V$; Rising and falling edge time $V_{ID} \leq 15ns$	20	60	90	ns
Receiver Propagation Delay, High-to-Low Level	t_{RPHL}		20	60	90	ns
$ t_{RPLH} - t_{RPHL} $	t_{SKEW2}			7	10	ns

FUNCTION TABLE

Driver Function

INPUT	OUTPUT	
DI	Y	Z
1	H	L
0	L	H
-	-	-
-	-	-

Receiver Function

INPUT	OUTPUT
A-B	RO
$\geq +200mV$	H
$\leq -200mV$	L
Open/Short	H
$\leq +200mV$ & $\geq -200mV$	?

(1) H=High level; L=Low level; ? = uncertain。

TEST CIRCUIT

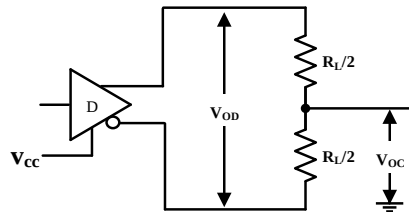


Fig 2 Driver DC test load

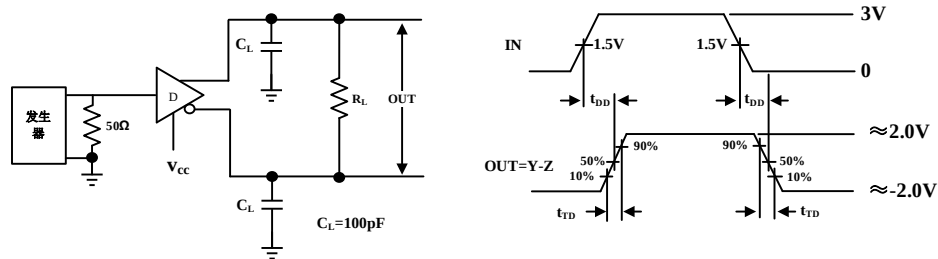


Fig 3 Driver differential output delay and transition times

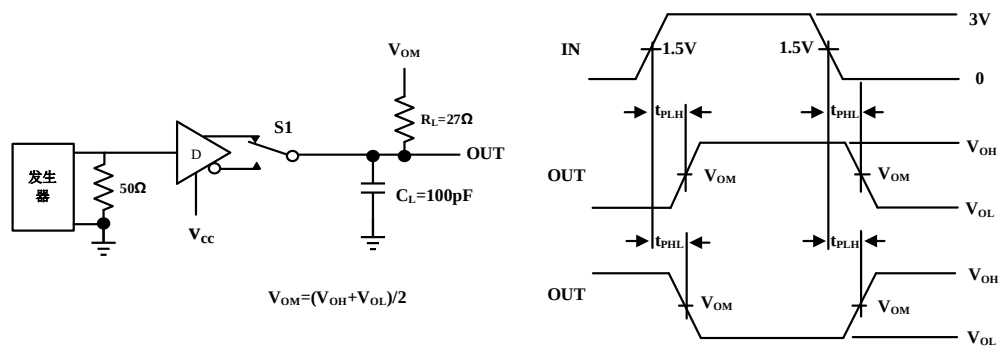


Fig 4 Driver propagation times

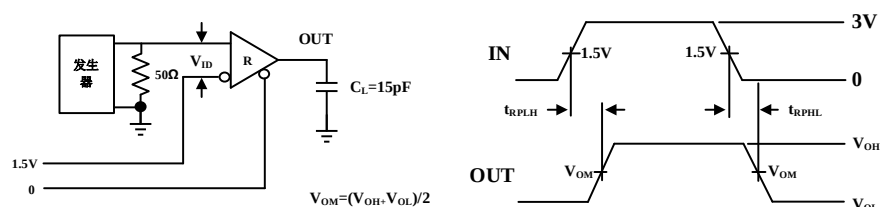


Fig 5 Receiver propagation delay

ADDITIONAL DESCRIPTION

1 Sketch

KRN3085E is a full -duplex high-speed transceiver for RS-485/RS-422 communication, which includes a driver and a receiver. It has failure safety, over-voltage protection and over-current protection.

KRN3085E realizes error-free data transmission up to 14Mbps.

2 Allowing up to 256 transceivers on the bus

The input impedance of the standard RS485 receiver is $12k\Omega$ (1 unit load), and the standard driver can drive up to 32 unit loads. The receiver of KRN3085E transceiver has $1/8$ unit load input impedance ($96k\Omega$), which allows up to 256 transceivers to be connected on the same communication bus in parallel. These devices can be combined arbitrarily or with other RS485 transceivers. 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.

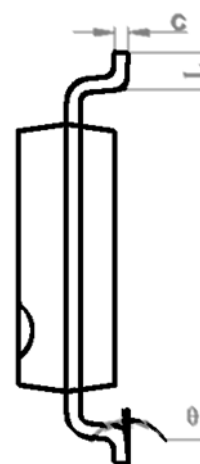
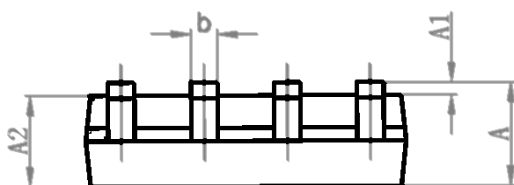
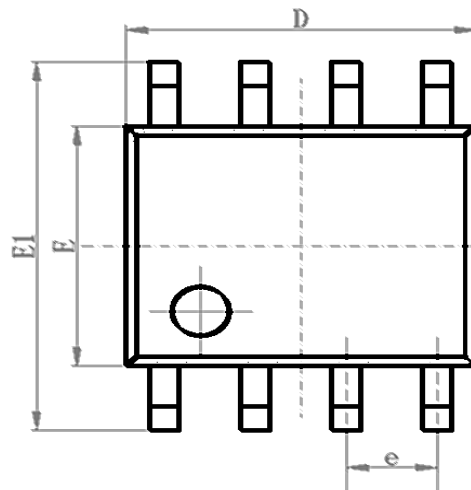
3 Driver output protection

By means of over-current and over-voltage protection mechanism, it can prevent excessive output current and power dissipation caused by faults or by bus contention, and fast short-circuit protection can be provided in the whole common mode voltage range (refer to typical working characteristics).

SOP8 DIMENSIONS

PACKAGE SIZE

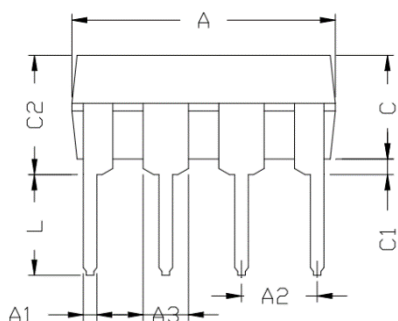
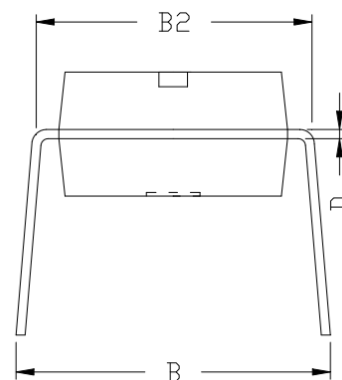
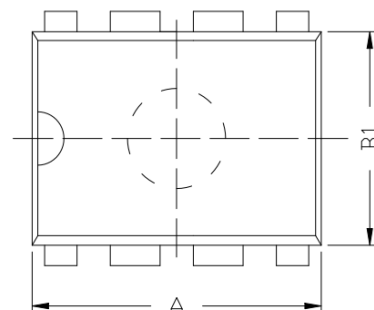
SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	1.40	-	1.80
A1	0.10	-	0.25
A2	1.30	1.40	1.50
b	0.38	-	0.51
D	4.80	4.90	5.00
E	3.80	3.90	4.00
E1	5.80	6.00	6.20
e		1.27BSC	
L	0.40	0.60	0.80
c	0.20	-	0.25
θ	0°	-	8°



DIP8 DIMENSIONS

PACKAGE SIZE

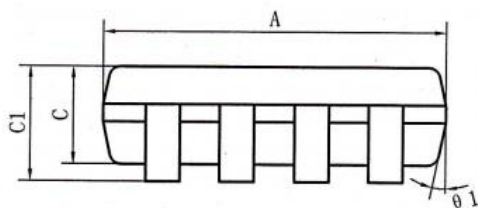
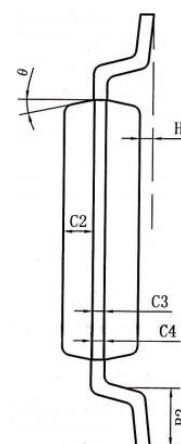
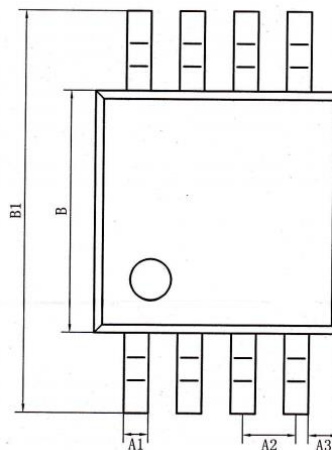
SYMBOL	MIN/mm	TYP/mm	MAX/mm
A	9.00	9.20	9.40
A1	0.33	0.45	0.51
A2	2.54TYP		
A3	1.525TYP		
B	8.40	8.70	9.10
B1	6.20	6.40	6.60
B2	7.32	7.62	7.92
C	3.20	3.40	3.60
C1	0.50	0.60	0.80
C2	3.71	4.00	4.31
D	0.20	0.28	0.36
L	3.00	3.30	3.60



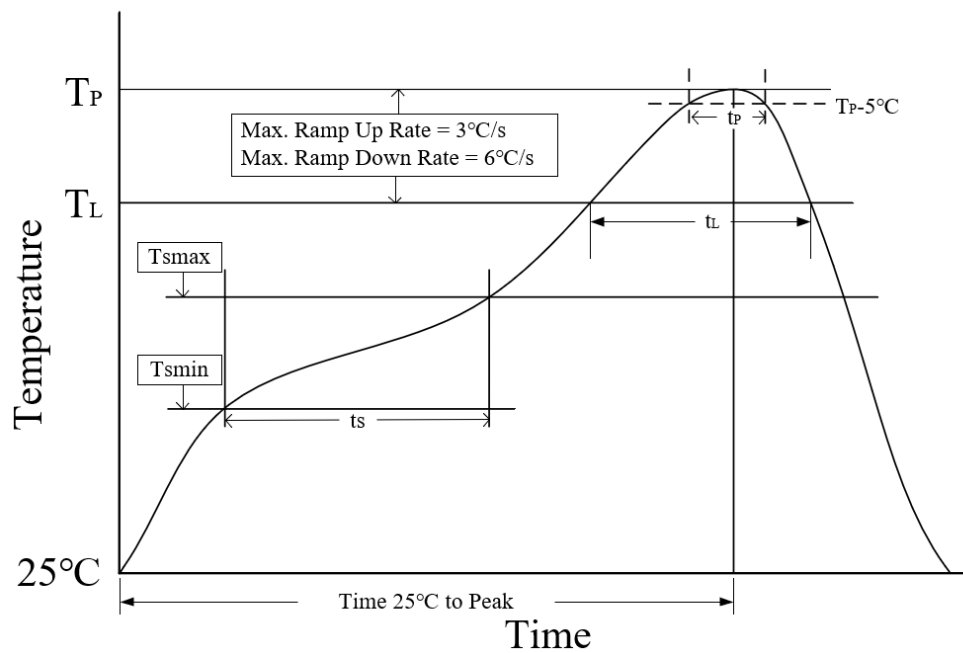
MSOP8/8 μ MAX/VSSOP8 DIMENSIONS

PACKAGE SIZE

SYMBOL	MIN./mm	TYP./mm	MAX./mm
A	2.90	3.0	3.10
A1	0.28		0.35
A2	0.65TYP		
A3	0.375TYP		
B	2.90	3.0	3.10
B1	4.70		5.10
B2	0.45		0.75
C	0.75		0.95
C1			1.10
C2	0.328 TYP		
C3	0.152		
C4	0.15		0.23
H	0.00		0.09
θ	12°TYP		



REFLOW SOLDERING



Parameter	Lead-free soldering conditions
Ave ramp up rate (T _L to T _P)	3 °C/second max
Preheat time t _s (T _{smin} =150 °C to T _{smax} =200 °C)	60-120 seconds
Melting time t _L (T _L =217 °C)	60-150 seconds
Peak temp T _P	260-265 °C
5°C below peak temperature t _p	30 seconds
Ave cooling rate (T _P to T _L)	6 °C/second max
Normal temperature 25°C to peak temperature T _P time	8 minutes max

ORDERING INFORMATION

TYPE NUMBER	PACKAGE	PACKING
KRN3085ESA	SOP8	Tape and reel
KRN3085EPA	DIP8	Tube
KRN3085EUA	MSOP8/VSSOP8/8μMAX	Tape and reel