NOVOSENSE

NSI83086C
High Reliability Isolated Full-Duplex RS-485 Transceivers
Datasheet (EN) 1.1

Product Overview

NSI83086C is a high reliability isolated full duplex RS-485 transceiver based on NOVOSENSE digital isolation technology. The devices safety certified by UL1577 support 5kV$_{rms}$ insulation withstand voltages, while providing high electromagnetic immunity and low emissions at low power consumption.

The Bus pins of NSI83086C are protected from ±8kV system level ESD to GND$_2$ on Bus side. These devices feature fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. The devices have a 1/8-unit-load receiver input impedance that allows up to 256 transceivers on the bus.

The data rate of NSI83086C is 16Mbps. The device is slew limited to reduce EMI and reflections with improperly terminated transmission line.

Key Features

- Up to 5000V$_{rms}$ Insulation voltage
- Bus side power supply voltage: 3.0V to 5.5V
- VDD$_1$ supply voltage: 2.5V to 5.5V
- High CMTI: ±150kV/μs
- High system level EMC performance:
  - Bus Pins meet IEC61000-4-2 ±8kV ESD
- Fail-safe protection receiver
- Up to 256 transceivers on the bus
- Operation temperature: -40°C ~ 125°C
- RoHS-compliant packages:
  - SOP16(300mil)

Safety Regulatory Approvals

- UL recognition:
  - SOP16(300mil): 5000V$_{rms}$ for 1 minute per UL1577
- CQC certification per GB4943.1
- CSA component notice 5A
- DIN EN IEC 60747-17 (VDE 0884-17)

Applications

- Industrial automation system
- Isolated RS-485 communication
- Smart electric meter and water meter
- Security and protection monitoring

Device Information

Part Number	Package	Body Size
NSI83086C-DSWR	SOP16(300mil)	10.30mm × 7.50mm

Functional Block Diagrams

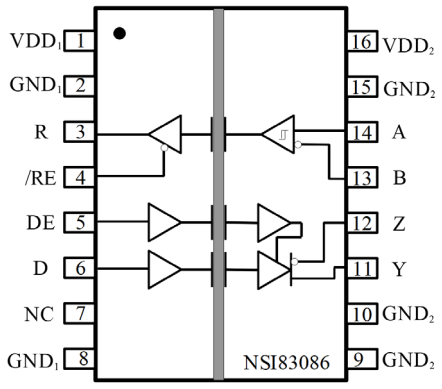

Figure 1. NSI83086C Block Diagrams

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1. Pin Configuration and Functions

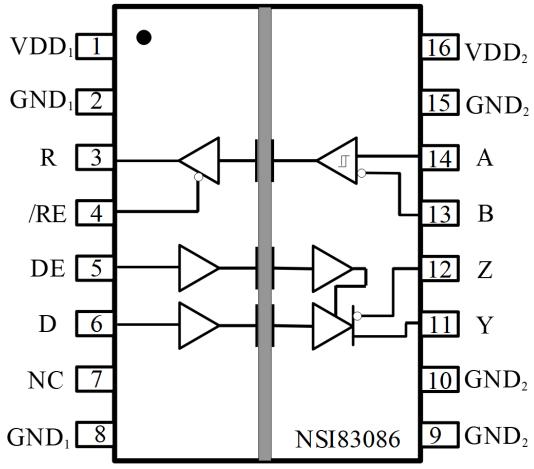


Figure 1.1 NSI83086C Package

Table1.1 NSI83086C Pin Configuration and Description

NSI83086C PIN NO.	SYMBOL	FUNCTION
1	VDD_1	Power Supply for Isolator Side 1
2	GND_1	Ground 1, the ground reference for Isolator Side 1
3	R	Receive output
4	/RE	Receive enable input. This is an active low input.
5	DE	Driver enable input. This is an active high input
6	D	Driver transmit data input.
7	NC	No Connection.
8	GND_1	Ground 1, the ground reference for Isolator Side 1
9	GND_2	Ground 2, the ground reference for Isolator Side 2
10	GND_2	Ground 2, the ground reference for Isolator Side 2
11	Y	Noninverting Driver Output. When the driver is disabled, or when VDD_1 or VDD_2 is powered down, Pin Y is put into a high impedance state to avoid overloading the bus.
12	Z	Inverting Driver Output. When the driver is disabled, or when VDD_1 or VDD_2 is powered down, Pin Z is put into a high impedance state to avoid overloading the bus.
13	B	Inverting Receiver Input.
14	A	Noninverting Receiver Input.
15	GND_2	Ground 2, the ground reference for Isolator Side 2
16	VDD_2	Power Supply for Isolator Side 2

2. Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)(1)(2)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Power Supply Voltage	VDD_1, VDD_2	-0.5		6	V	VDD_1 to GND_1, VDD_2 to GND_2
Logic voltage level	R, /RE, DE, D	-0.4		VDD_1+0.4(3)	V	
Driver Output/Receiver Input Voltage	V_A, V_B, V_Y, V_Z	-18		18	V	A, B, Y, Z with respect to GND_2
Differential input voltage, A with respect to B	V_{ID}	-18		18	V	V_A-V_B
Receiver Output Current	I_O	-15		15	mA	On pin R
Junction Temperature	T_J	-40		150	°C	
Storage Temperature	T_{stg}	-65		150	°C	

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

(2) All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND_1 or GND_2) and are peak voltage values.

(3) Maximum voltage must not exceed 6 V.

3. ESD Ratings (1)

Parameters	Ratings	Value	Unit
Electrostatic discharge (ESD)	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(2) ● All pins	±8000	V
	Charged device model (CDM), per JEDEC specification JESD22-C101(3) ● All pins	±2000	V

(1) Though this device features proprietary protection circuitry, proper ESD precautions should be considered to avoid performance degradation of damage due to high energy ESD event. Charged devices and circuit boards may discharge without detection.

(2) Safe manufacturing requires 500-V HBM and standard ESD precautions, per JEDEC document JEP155.

(3) Safe manufacturing requires 250-V CDM and standard ESD precautions, per JEDEC document JEP157.

4. Recommended Operating Conditions

Parameters	Symbol	min	typ	max	unit	Comments
Power Supply Voltage	VDD_1	2.5		5.5	V	VDD_1 to GND_1
	VDD_2	3.0		5.5	V	VDD_2 to GND_2

Parameters	Symbol	min	typ	max	unit	Comments
Voltage at bus pins (separately or common mode)	V_I	-7		12	V	A, B, Y, Z with respect to GND_2
Differential input voltage	V_{ID}	-12		12	V	
High Level Input Voltage	V_{IH}	2		VDD_1	V	on pins D, DE
		0.7*VDD_1		VDD_1		on pin RE
Low Level Input Voltage	V_{IL}	0		0.8	V	on pins D, DE
		0		0.3* VDD_1		on pin RE
Output current	I_O	-4		4	mA	on pin R
Operating ambient temperature	T_A	-40		125	°C	
Data Rate	DR			16	Mbps	

5. Thermal Information

Parameters	Symbol	SOP16(300mil)	Unit
IC Junction-to-Air Thermal Resistance	θ_{JA}	67.9	°C /W
Junction-to-case (top) thermal resistance	$\theta_{JC(top)}$	27.7	
Junction-to-board thermal resistance	θ_{JB}	29.4	
Junction-to-top characterization parameter	Ψ_{JT}	7.0	
Junction-to-board characterization parameter	Ψ_{JB}	18	

6. Specifications

6.1. DC Electrical Characteristics

(VDD_1=2.5V~5.5V, VDD_2=3.0V~5.5V, T_A=-40°C to 125°C. Unless otherwise noted, Typical values are at VDD_1 = 5V, VDD_2 = 5V, T_A = 25°C)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Power supply voltage	VDD_1	2.5		5.5	V	VDD_1 to GND_1
	VDD_2	3.0		5.5	V	VDD_2 to GND_2
Logic-side supply current	I_{DD1}		3.53	5	mA	VDD_1=3V, DE=high, /RE=D =low, no load
			3.60	5	mA	VDD_1=5V, DE=high, /RE=D =low, no load
Bus-side supply current	I_{DD2}		4.02	5	mA	VDD_2=5V, DE=high, /RE=D =low, no load

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Thermal-Shutdown Threshold	T_{TS}		165		°C	
Thermal-Shutdown Hysteresis	T_{TSH}		15		°C	
Common Mode Transient Immunity	CMTI	±100	±150		kV/μs	See Figure 6.13, V_{CM}=1200V, V_D=VDD_1 or GND_1
Logic Side electrical characteristics; pins R, /RE, DE and D						
Rising input switching threshold	V_{IT+}			2	V	On pins DE, D,
				0.7*VDD_1		On pin /RE
Falling input switching threshold	V_{IT-}	0.8			V	On pins DE, D
		0.3*VDD_1				On pin /RE
Input Pull up Current	I_{PU}			20	μA	On pins DE, /RE
Input Pull down Current	I_{PD}	-20			μA	On pin D
Output Voltage High	V_{OH}	VDD_1-0.3			V	I_{OH} = -4mA, on pin R
Output Voltage Low	V_{OL}			0.3	V	I_{OL} = 4mA, on pin R
Output Short-Circuit Current	I_{OSR}			150	mA	0 ≤ V_R ≤VDD_1
Three-State Output Current	I_{OZ}	-15			μA	0 ≤ V_R ≤ VDD1, /RE = high
Input Capacitance	C_{IN}		2		pF	On pins DE, D, /RE
Driver electrical characteristics; pins Y and Z						
Differential Output Voltage	| V_{OD} |			VDD_2	V	No Load
		2.7			V	See Figure 6.7, R_L=100Ω (RS-422), VDD2=5V
		1.5			V	See Figure 6.7, R_L=100Ω (RS-422), VDD_2=3.3V
		2.1			V	See Figure 6.7, R_L=54Ω (RS-485), VDD_2=5V
		2.1	3.3		V	See Figure 6.8, R_L=60Ω, 375Ω on each output to -7V to 12V, VDD_2=5V
		1.5			V	See Figure 6.7, R_L=54Ω (RS-485), VDD_2=3.3V
Change in magnitude of the differential output voltage	Δ|V_{OD} |			0.2	V	See Figure 6.7, R_L=100Ω or R_L=54Ω
Common-Mode Output Voltage	V_{OC}		VDD_2/2	3.5	V	See Figure 6.7, R_L=100Ω or R_L=54Ω

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Change in Magnitude of Common-Mode Voltage	$\Delta V_{OC(SS)}$	-200		200	mV	See Figure 6.7, R_L=100Ω or R_L=54Ω
Peak-to-peak driver common mode output voltage	$V_{OC(PP)}$		450		mV	See Figure 6.7, R_L=54Ω
Driver Short-Circuit Output Current	I_{OSD}			250	mA	0 ≤ V_{OUT} ≤ +12 V
		-250			mA	−7V ≤ V_{OUT} ≤ VDD_2
Output Leakage Current	I_O			200	μA	DE=GND, VIN=12V
		-150			μA	DE=GND, VIN=-7V
Receiver electrical characteristics; pins A and B						
Input Current (A and B)	I_A, I_B			200	μA	DE=GND_1, VDD_2=GND_1, V_{IN}=12V
		-200			μA	DE=GND_1, VDD_2=GND_1, V_{IN}=-7V
Receiver Differential Threshold Voltage	V_{TH}	-200	-132	-10	mV	−7V ≤ V_{CM} ≤ 12V
Receiver Input Hysteresis	ΔV_{TH}		41		mV	V_A+V_B=0
Receiver Input Resistance	R_{IN}	96			kΩ	−7V ≤ V_{CM} ≤ 12V, DE=low

6.2. Switching Electrical Characteristics

(VDD_1=2.5V~5.5V, VDD_2=3.0V~5.5V, T_A=-40°C to 125°C. Unless otherwise noted, Typical values are at VDD_1 = 5V, VDD_2 = 5V, T_A = 25°C)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Driver						
Driver Propagation Delay	t_{PLH}		14	50	ns	See Figure 6.9, R_L=54Ω, C_L=50pF
	t_{PHL}		16	50	ns	See Figure 6.9, R_L=54Ω, C_L=50pF
Driver Pulse Width Distortion, $\lvert t_{PHL} - t_{PLH} \rvert$	PWD		2	10	ns	See Figure 6.9, R_L=54Ω, C_L=50pF
Driver Output Falling Time or Rising time	t_F		9	16	ns	See Figure 6.9, R_L=54Ω, C_L=50pF
	t_R		9	14	ns	See Figure 6.9, R_L=54Ω, C_L=50pF
Driver Enable to Output High	t_{ZH}		18	60	ns	See Figure 6.10, R_L=110Ω, C_L=50pF
Driver Enable to Output Low	t_{ZL}		15	60	ns	See Figure 6.10, R_L=110Ω, C_L=50pF
Driver Disable to Output High	t_{HZ}		26	60	ns	See Figure 6.10, R_L=110Ω, C_L=50pF
Driver Disable to Output Low	t_{LZ}		16	60	ns	See Figure 6.10, R_L=110Ω, C_L=50pF
Receiver						
Receiver Propagation Delay	t_{PLH}		72	140	ns	See Figure 6.11, C_L=15pF
	t_{PHL}		75	140	ns	See Figure 6.11, C_L=15pF
Receiver Pulse Width Distortion, $\lvert t_{PHL} - t_{PLH} \rvert$	PWD		3	25	ns	See Figure 6.11, C_L=15pF
Receiver Output Falling Time or Rising time	t_F		2	5	ns	See Figure 6.11, C_L=15pF
	t_R		2	7	ns	See Figure 6.11, C_L=15pF
Receiver Enable to Output High	t_{ZH}		17	60	ns	See Figure 6.12, R_L=1kΩ, C_L=15pF
Receiver Enable to Output Low	t_{ZL}		16	60	ns	See Figure 6.12, R_L=1kΩ, C_L=15pF

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Receiver Disable to Output High	t_{HZ}		17	60	ns	See Figure 6.12, R_L=1kΩ, C_L=15pF
Receiver Disable to Output Low	t_{LZ}		15	60	ns	See Figure 6.12, R_L=1kΩ, C_L=15pF

6.3. Typical Performance Characteristics

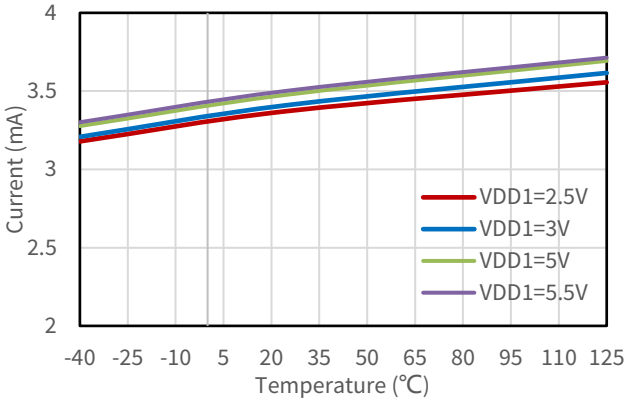


Figure 6.1 NSI83086C VDD_1 supply current vs Temperature

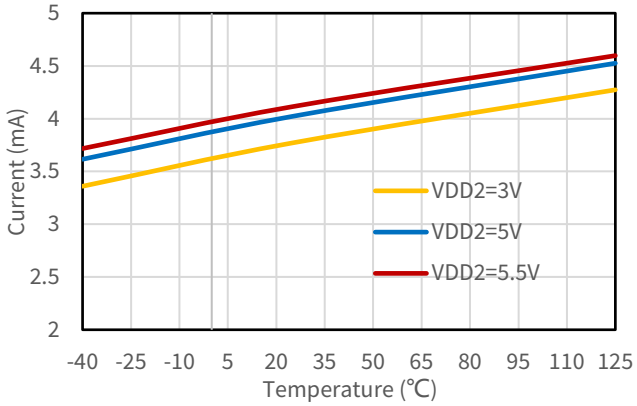


Figure 6.2 NSI83086C VDD_2 supply current vs Temperature

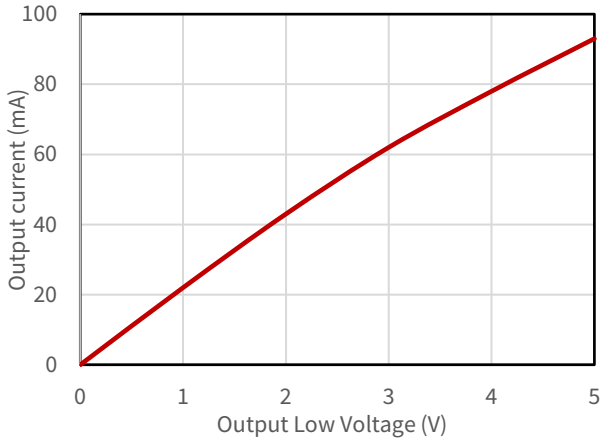


Figure 6.3 Receiver output current vs Output low voltage

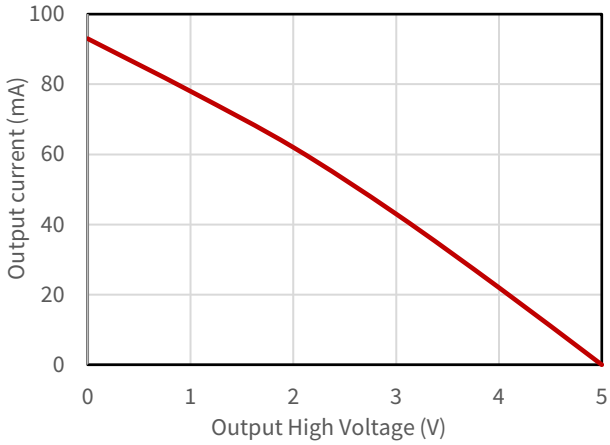


Figure 6.4 Receiver output current vs Output High voltage

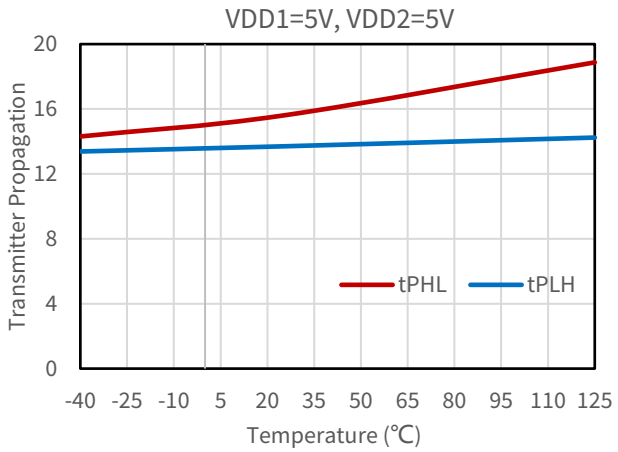


Figure 6.5 NSI83086C Transmitter Propagation Delay vs Temperature

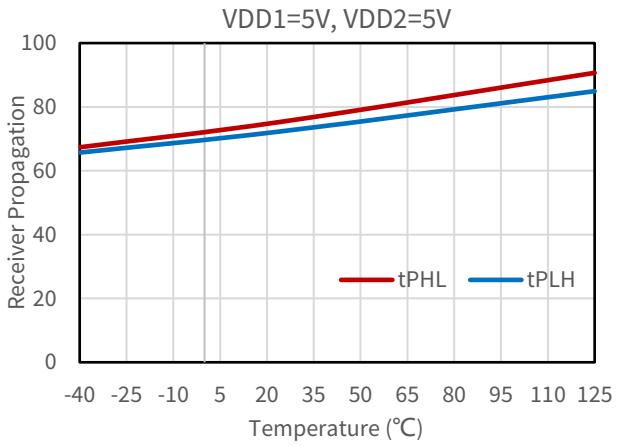


Figure 6.6 NSI83086C Receiver Propagation Delay vs Temperature

6.4. Parameter Measurement Information

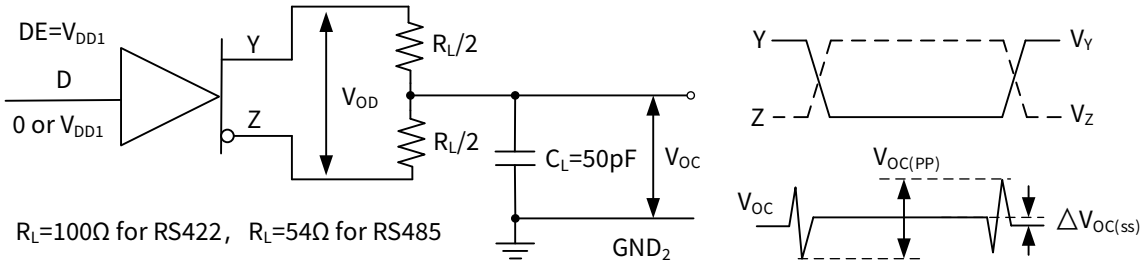


Figure 6.7 Measurement of Driver Common-Mode Output Voltage

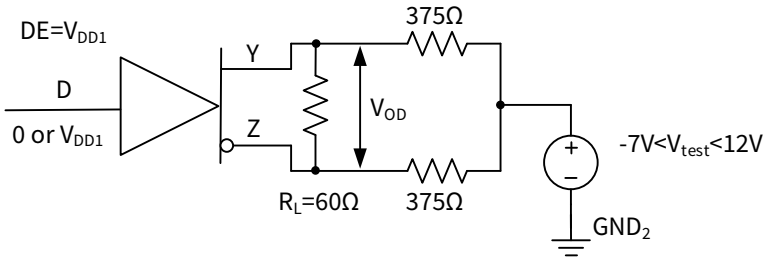
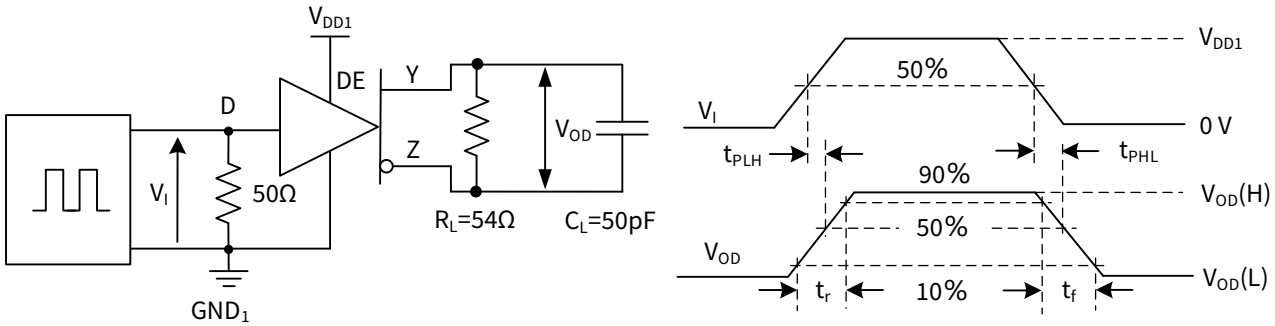
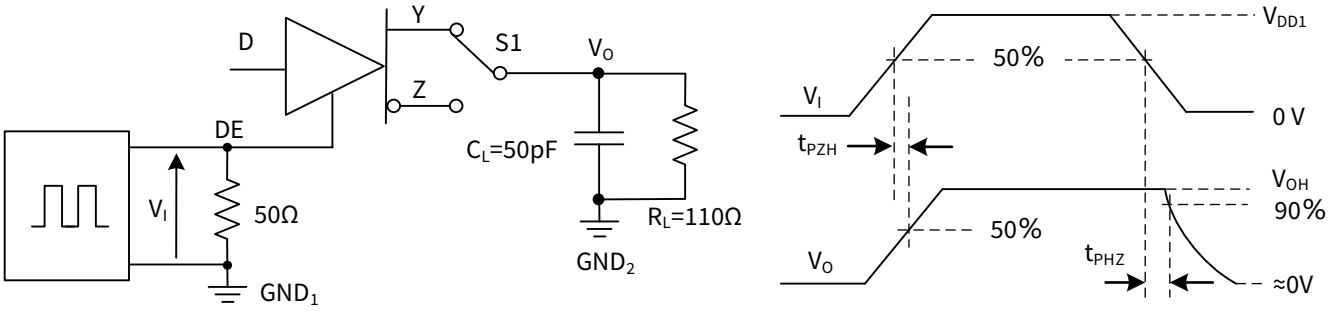


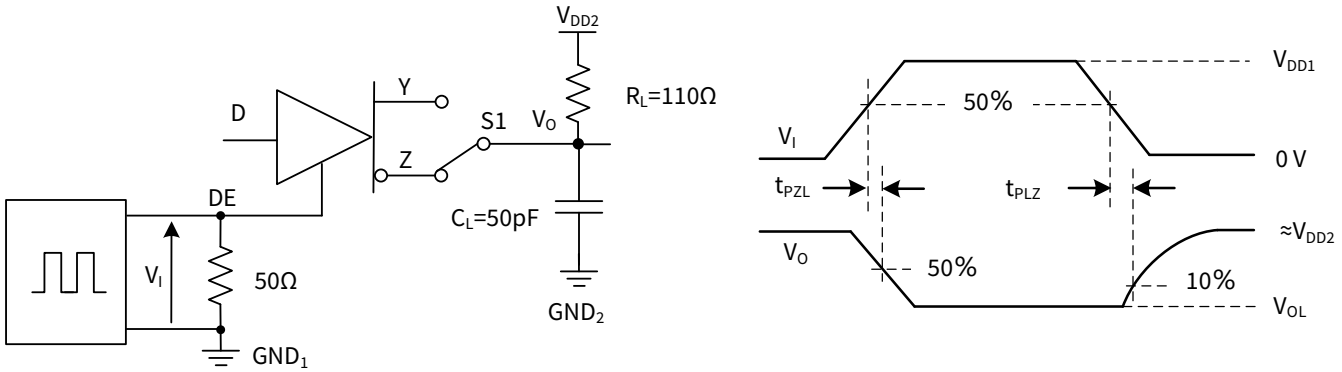
Figure 6.8 Measurement of Driver Differential Output Voltage with Common-Mode Load



(1) Input Generator Characteristics: PRR≤50kHz, tr≤3ns, tf≤3ns, Duty cycle=50%, Zo=50Ω

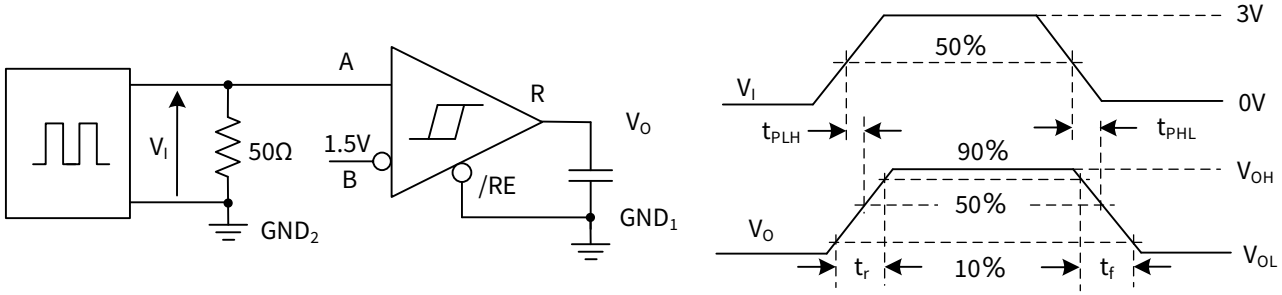
Figure 6.9 Driver Timing Test Circuit and waveform





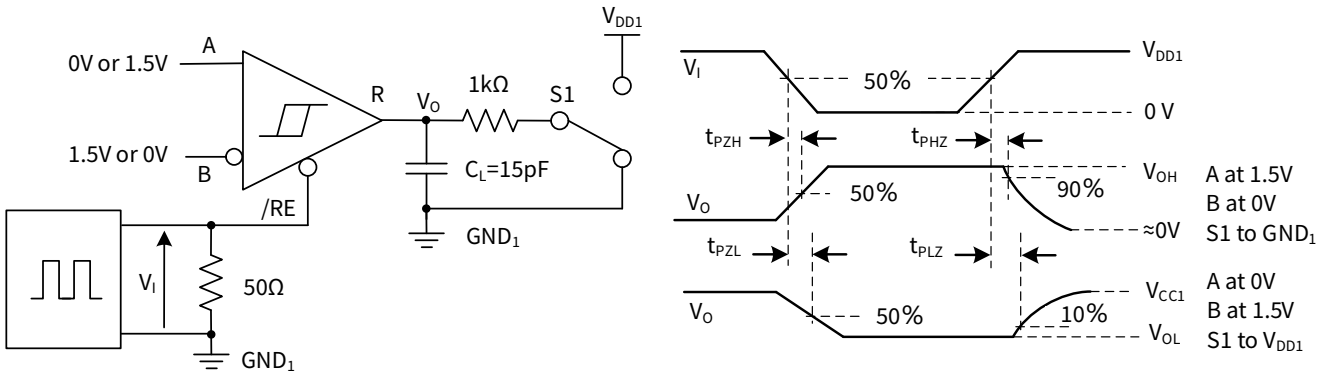
(1) Input Generator Characteristics: PRR≤50kHz, tr≤3ns, tf≤3ns, Duty cycle=50%, Zo=50Ω

Figure 6.10 Driver Enable Disable Timing Test Circuit and waveform



(1) Input Generator Characteristics: PRR≤50kHz, tr≤3ns, tf≤3ns, Duty cycle=50%, Zo=50Ω

Figure 6.11 Receiver Propagation Delay Test Circuit and waveform



(1) Input Generator Characteristics: PRR≤50kHz, tr≤3ns, tf≤3ns, Duty cycle=50%, Zo=50Ω

Figure 6.12 Receiver Enable Disable Timing Test Circuit and waveform

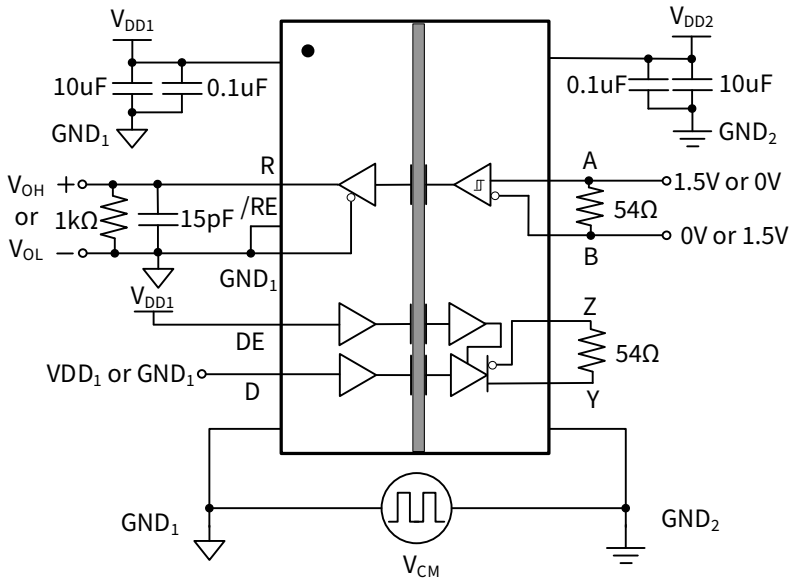


Figure 6.13 Common-Mode Transient Immunity Test Circuit

7. High Voltage Feature Description

7.1. Insulation and Safety Related Specifications

Parameters	Symbol	Value	Unit	Comments
Minimum External Clearance	CLR	8	mm	IEC 60664-1:2007
Minimum External Creepage	CPG	8	mm	IEC 60664-1:2007
Distance Through Insulation	DTI	28	μm	Distance through insulation
Tracking Resistance (Comparative Tracking Index)	CTI	>600	V	DIN EN 60112 (VDE 0303-11); IEC 60112
Material Group		I		IEC 60664-1

Description	Test Condition	Value
Overvoltage Category per IEC60664-1	For Rated Mains Voltage ≤ 150V_{rms}	I to IV
	For Rated Mains Voltage ≤ 300V_{rms}	I to IV
	For Rated Mains Voltage ≤ 600V_{rms}	I to IV
	For Rated Mains Voltage ≤ 1000V_{rms}	I to III
Climatic Classification		40/125/21
Pollution Degree per DIN VDE 0110,		2

7.2. Insulation Characteristics

Description	Test Condition	Symbol	Value	Unit
DIN EN IEC 60747-17 (VDE 0884-17)				
Maximum Working Isolation Voltage	AC voltage	V_{IOWM}	1500	V_{RMS}
	DC voltage		2121	V_{DC}
Maximum Repetitive Isolation Voltage		V_{IORM}	2121	V_{PEAK}
Apparent Charge [1]	Method a, after Input/output safety test subgroup 2/3, $V_{ini}=V_{IOTM}$, t_{ini} = 60 s, $V_{pd(m)}=1.2*V_{IORM}$, t_m=10s.		<5	V_{PEAK}
	Method a, after environmental tests subgroup 1, $V_{ini}=V_{IOTM}$, t_{ini}=60s, $V_{pd(m)}=1.6*V_{IORM}$, t_m=10s			V_{PEAK}
	Method b, routine test (100% production) and preconditioning (type test); $V_{ini}=1.2*V_{IOTM}$, t_{ini}=1s			V_{PEAK}

Description	Test Condition	Symbol	Value	Unit
	$V_{pd(m)}$=1.875*V_{IORM}, t_m=1s（method b1）or $V_{pd(m)}$=V_{ini}, t_m=t_{ini}(method b2)			
Maximum transient isolation voltage	t = 60 sec	V_{IOTM}	8000	V_{PEAK}
Maximum impulse voltage	Tested in air, 1.2/50μs waveform per IEC62368-1	V_{IMP}	6250	V_{PEAK}
Maximum Surge Isolation Voltage [2]	Test method per IEC62368-1, 1.2/50μs waveform, V_{IOSM}≥V_{IMP} × 1.3	V_{IOSM}	10000	V_{PEAK}
Isolation resistance [3]	V_{IO} =500V, T_A=25°C	R_{IO}	>10^{12}	Ω
	V_{IO} = 500 V, 100 °C ≤ T_A ≤ 125 °C		>10^{11}	Ω
	V_{IO} = 500 V, T_A = T_S		>10^{9}	Ω
Isolation capacitance [3]	f = 1MHz	C_{IO}	1.1	pF
Insulation Specification per UL1577				
Withstand Isolation Voltage	V_{TEST}= V_{ISO}, t=60 s (qualification), V_{TEST} = 1.2 × V_{ISO}, t = 1 sec, 100% production test	V_{ISO}	5000	V_{RMS}

[1] Apparent charge is electrical discharge caused by a partial discharge (pd).

[2] Testing is carried out in air or oil to determine the intrinsic surge immunity of the isolation barrier.

[3] The side 1 terminals as well as the side 2 terminals of the coupler are connected together forming a two-terminal device.

[4] This coupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

7.3. Safety-Limiting Values

Description	Test Condition	Value	Unit
Safety Supply Power	$R_{θJA}$ = 67.9 °C/W[1)], T_J = 150 °C, T_A = 25 °C	1840	mW
Safety Supply Current	$R_{θJA}$ = 67.9 °C/W[1)], V_I = 5V, T_J = 150 °C, T_A = 25 °C	368	mA
Safety Temperature[2)]		150	°C

1) Calculate with the junction-to-air thermal resistance, $R_{θJA}$, of SOP16(300mil) package (***Thermal Information Table***) which is that of a device installed on a low effective thermal conductivity test board (1s) according to JESD51-3.

2) The maximum safety temperature has the same value as the maximum junction temperature (T_J) specified for the device.

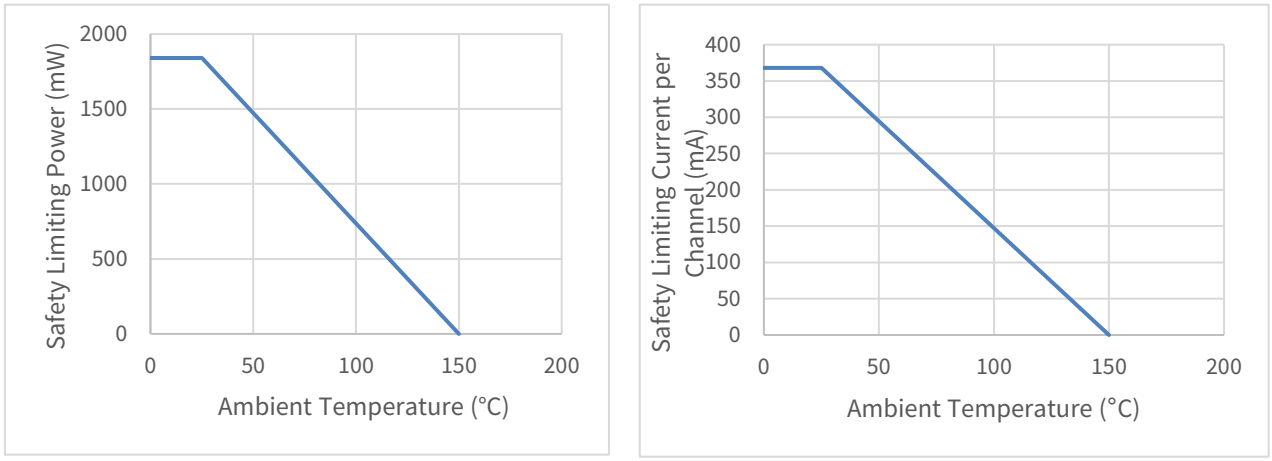


Figure 7.1 NSI83086C-DSWR Thermal Derating Curve, Dependence of Safety Limiting Values with Case Temperature per DIN EN IEC 60747-17 (VDE 0884-17)

7.4. Regulatory information

The NSI83086C-DSWR are approved or pending approval by the organizations listed in table.

UL		*VDE*	*CQC*	*TUV*
UL 1577 Component Recognition Program	Approved under CSA Component Acceptance Notice 5A	DIN EN IEC 60747-17 (VDE 0884-17)	Certified according to GB4943.1	Certified According to EN IEC 62368-1
Single Protection, 5000V_{RMS} Isolation voltage	Single Protection, 5000V_{RMS} Isolation voltage	Reinforced Insulation V_{IORM}=2121V_{PEAK} V_{IOTM}=8000V_{PEAK} V_{IOSM}=10000V_{PEAK}	Reinforced insulation	Reinforced insulation
E500602	E500602	40052820	CQC20001264939	R50574061

8. Function Description

8.1. Overview

NSI83086C is a high reliability isolated full duplex RS-485 transceiver. Data isolation is achieved using Novosense integrated capacitive isolation that allows data transmission between the logic side and the Bus side. Both devices are safety certified by UL1577 support 5kV$_{RMS}$ insulation withstand voltages.

8.2. Data rate

The data rate of NSI83086C is up to 16Mbps. The device is slew limited to reduce EMI and reflections with improperly terminated transmission line.

8.3. True Fail-safe receiver inputs

The devices feature fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. The receiver threshold is fixed between -10mV and -200mV, which meets EIA/TIA-485 standard. If the differential input voltage (V_A-V_B) is greater than or equal to -50mV, receiver output R is logic high. In the case of a terminated bus with all transmitters disabled, the differential input voltage is pulled to zero by the termination resistors. Due to the receiver threshold, the receiver output R is logic high.

8.4. Truth tables

Table 8.1 Driver Function Table[1]

VDD1 status	*VDD2 status*	*Input (D)*	*Enable Input (DE)*	*Outputs[1]*	
				Y	*Z*
PU	PU	H	H	H	L
PU	PU	L	H	L	H
PU	PU	X	L	Z	Z
PU	PU	X	OPEN	Z	Z
PU	PU	OPEN	H	H	L
PD	PU	X	X	Z	Z
PU	PD	X	X	Z	Z
PD	PD	X	X	Z	Z

[1] PD= Powered down; PU= Powered up; H= Logic High; L= Logic Low; X= Irrelevant; Z= High Impedance; Driver output pins are Y and Z for NSI83086C.

Table 8.2 Receiver Function Table[1]

VDD1 status	*VDD2 status*	*Differential Input (V_A-V_B)*	*Enable Input (/RE)*	*Output (R)*
PU	PU	≥-10mV	L/Open	H
PU	PU	≤-200mV	L/Open	L
PU	PU	Open/Short	L/Open	H
PU	PU	X	H	Z
PU	PU	Idle	L	H

VDD1 status	*VDD2 status*	*Differential Input (V_A-V_B)*	*Enable Input (/RE)*	*Output (R)*
PD	PU	X	X	Z
PU	PD	X	L/Open	H
PD	PD	X	X	Z

[1] PD= Powered down; PU= Powered up; H= Logic High; L= Logic Low; X= Irrelevant; Z= High Impedance.

8.5. Thermal shutdown

The device is protected from over temperature damage by integrated thermal shutdown circuitry. When the junction temperature (T_J) exceeds +165°C (typ), the driver outputs go high-impedance. The device resumes normal operation when T_J falls below +145°C (typ).

9. Application Note

9.1. 256 transceivers on the bus

The devices have a 1/8-unit-load receiver input impedance (96kΩ) that allows up to 256 transceivers on the bus. Connect any combination of these devices, and/or other RS-485 devices, for a maximum of 32 unit-loads to the line.

9.2. ESD protection

ESD protection structures are enhanced on all pins to protect against electrostatic discharge encountered during handing and assembly. The Bus pins have extra protection against static electricity to both the logic side (VDD1 side) and bus side (VDD2 side).

ESD protection can be tested in various ways. Below is the ESD spec of the devices.

Bus pins:

- ±8kV HBM.
- ±8kV using the Contact Discharge method specified in IEC 61000-4-2

Other pins except bus pins:

- ±8kV HBM.
- ±8kV using the Contact Discharge method specified in IEC 61000-4-2

9.3. Layout considerations

The NSI83086C requires a 0.1 μF bypass capacitor between VDD and GND. The capacitor should be placed as close as possible to the package. To eliminate line reflections, each cable end is terminated with a resistor, whose value matches the characteristic impedance of the cable. It's good practice to have the bus connectors and termination resistor as close as possible to the A and B, Y and Z pins.

9.4. Typical application

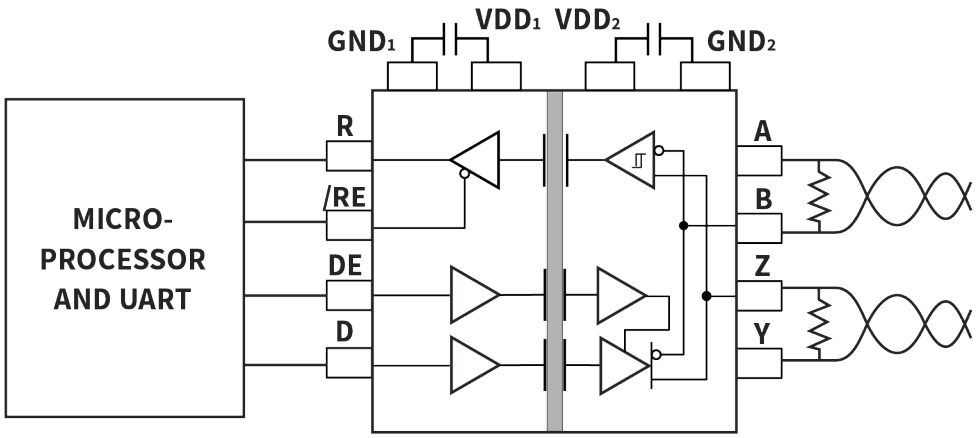


Figure 9.1 NSI83086C typical application circuit

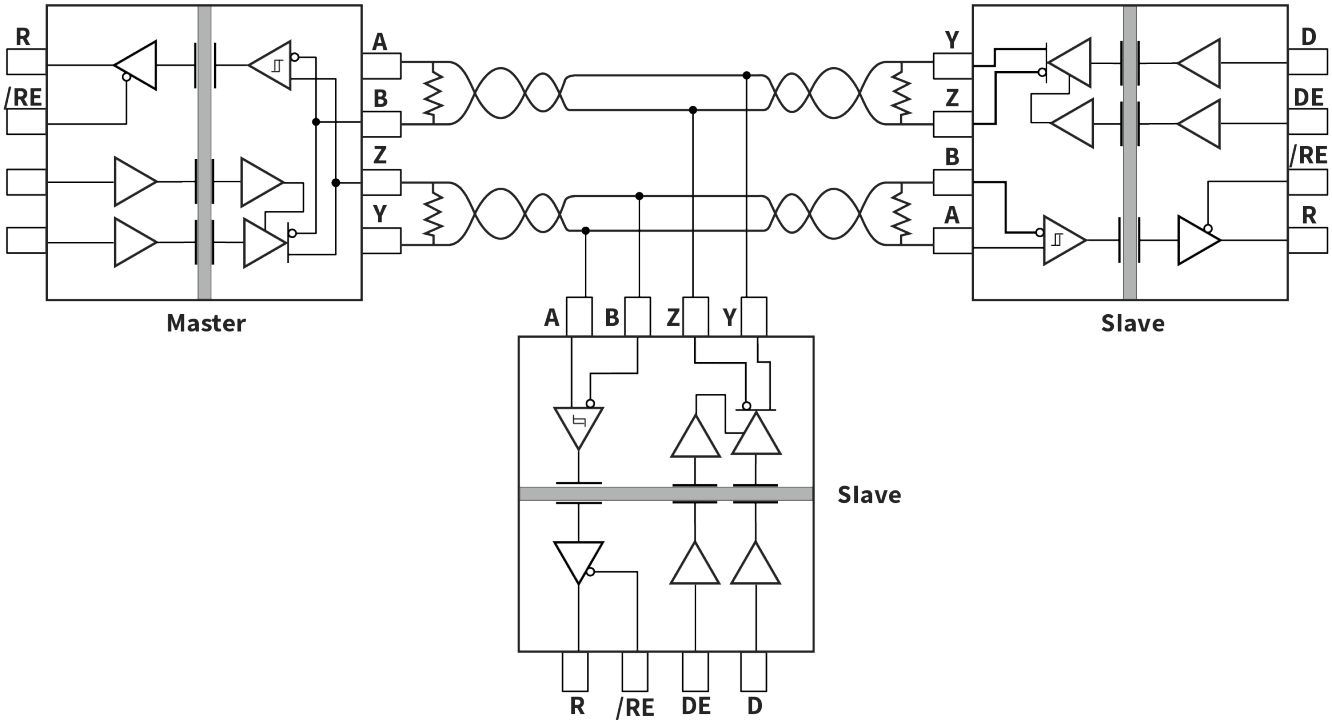
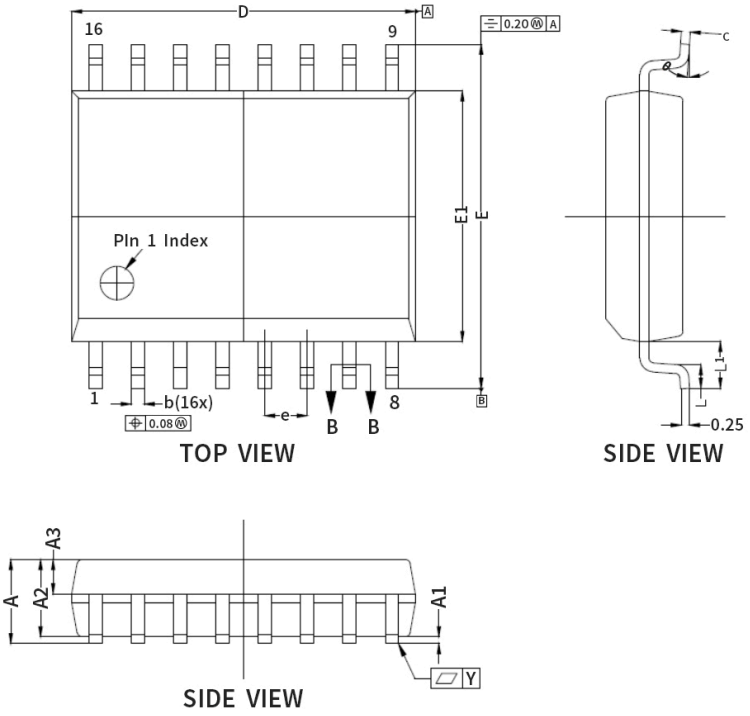


Figure 9.2 Typical isolated Full-Duplex RS-485 application

10. Package Information



CONTROLLING DIMENSION:MM

Symbol	MILLIMETER		
	Min.	NOM.	Max.
A	---	---	2.65
A1	0.10	---	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
b	0.35	---	0.43
c	0.23	---	0.32
D	10.20	10.30	10.40
E	10.10	10.30	10.50
E1	7.40	7.50	7.60
e	1.27 bsc		
L1	1.40 bsc		
L	0.55	---	0.85
Y	---	0.10	---
θ	0°	---	8°

NOTE: This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.

Figure 10.1 SOW16 Package Shape and Dimension in millimeters

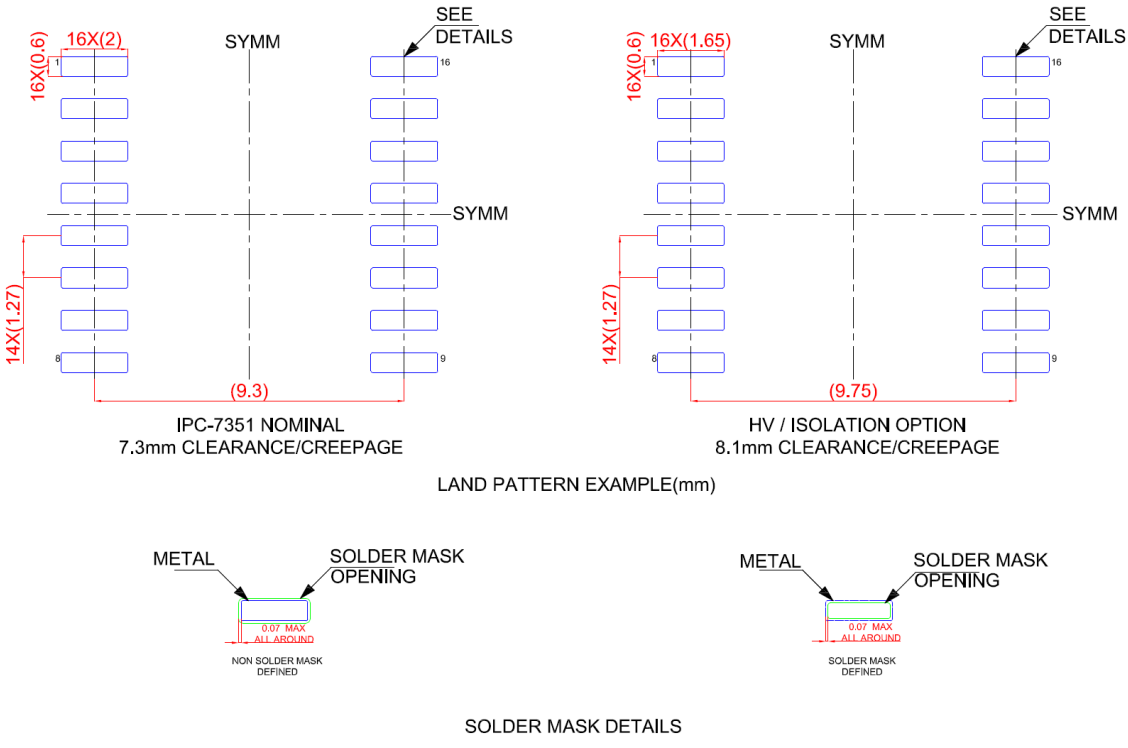
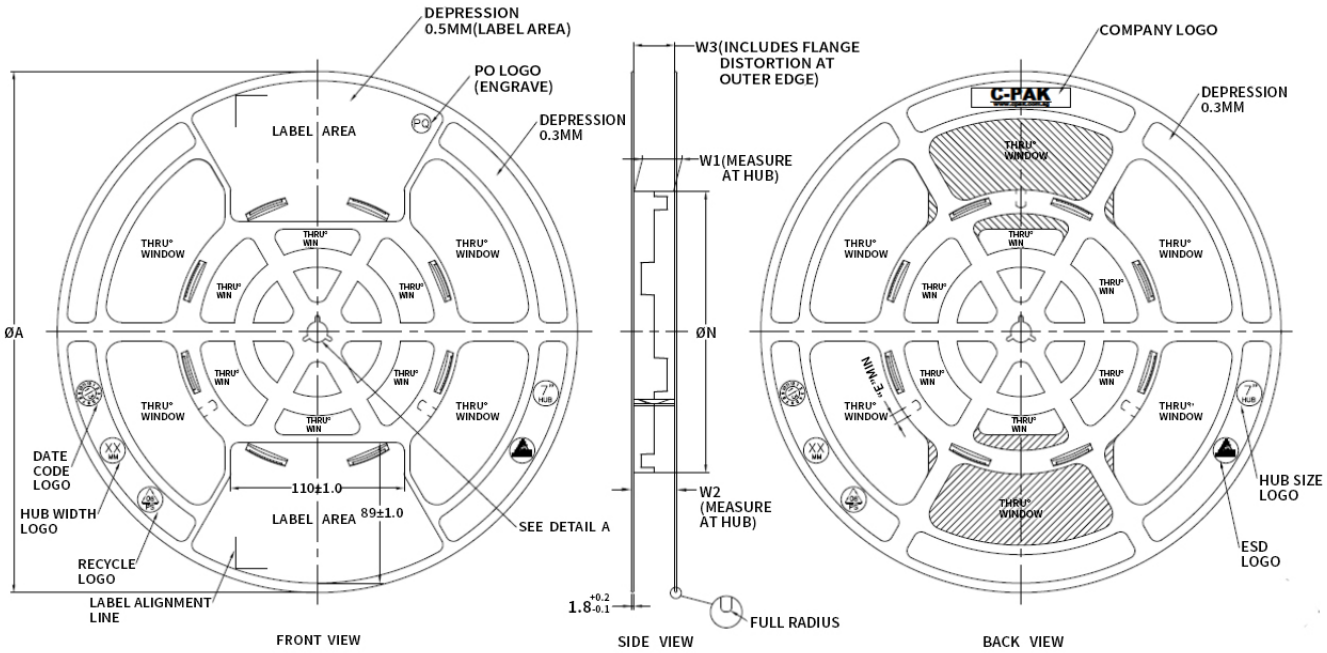


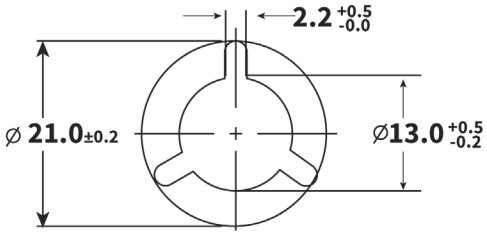
Figure 10.2 SOW16 Package Board Layout Example

11. Order Information

Part Number	*Isolation Rating (kV)*	*Duplex*	*Max Data Rate (Mbps)*	*No. of Nodes*	*Temperature*	*MSL*	*Package Type*	*Package Drawing*	*SPQ*
NSI83086C-DSWR	5	Full	16	256	-40 to 125°C	2	SOP16 (300mil)	SOW16	1000
NOTE: All packages are RoHS-compliant with peak reflow temperatures of 260 °C according to the JEDEC industry standard classifications and peak solder temperatures.									

12. Tape and Reel Information

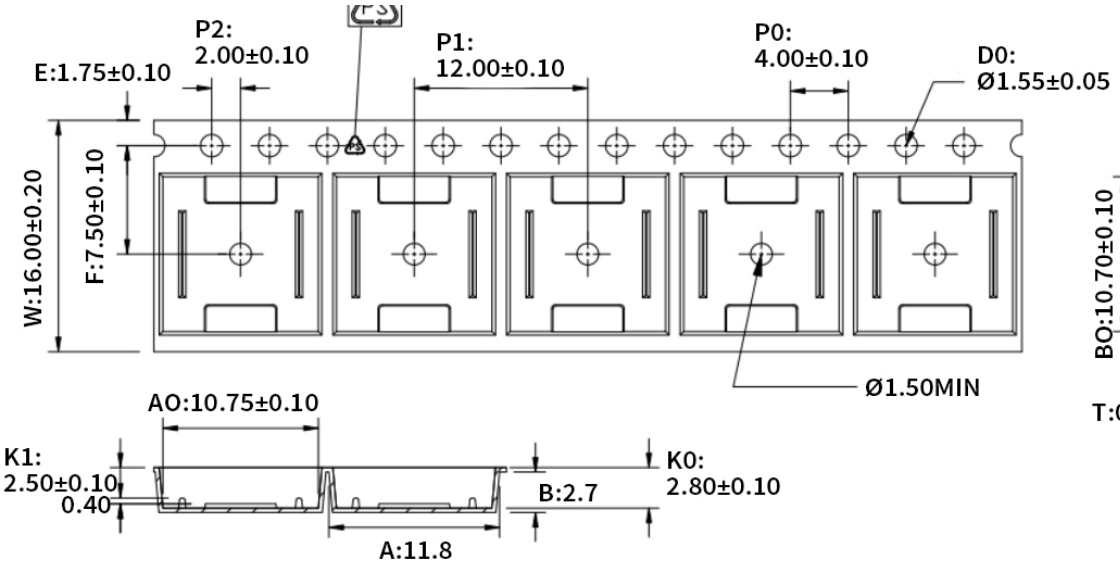




ARBOR HOLE
DETAIL A
SCALE: 3:1

PRODUCT SPECIFICATION						
TAPE WIDTH	ØA ±2.0	ØN ±2.0	W1	W2 (Max)	W3	E (MIN)
08MM	330	178	$8.4^{+1.5}_{-0.0}$	14.4	SHALL ACCOMMODATE TAPE WIDTH WITHOUT NTERFERENCE	5.5
12MM	330	178	$12.4^{+2.0}_{-0.0}$	18.4		5.5
16MM	330	178	$16.4^{+2.0}_{-0.0}$	22.4		5.5
24MM	330	178	$24.4^{+2.0}_{-0.0}$	30.4		5.5
32MM	330	178	$32.4^{+2.0}_{-0.0}$	38.4		5.5

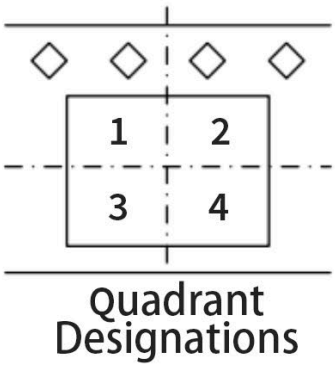
SURFACE RESISTIVITY			
LEGEND	SR RANGE	TYPE	COLOUR
A	BELOW 10^{12}	ANTISTATIC	ALL TYPES
B	10^{6} TO 10^{11}	STATIC DISSIPATIVE	BLACK ONLY
C	10^{5} & BELOW 10^{5}	CONDUCTIVE(GENERIC)	BLACK ONLY
E	10^{9} TO 10^{11}	ANTISTATIC(COATED)	ALL TYPES



1.10 sprocket hole pitch cumulative tolerance ±0.20.
2. Carrier camber is within 1 mm in 250 mm.
3. Material : Black Conductive Polystyrene Alloy.
4. All dimensions meet EIA-481 requirements.
5. Thickness: 0.30±0.05mm.
6. Packing length per 22" reel: 378 Meters.(復卷 N=122)
7. Component load per 13" reel: 1000 pcs.
8. Surface resistivity:10^5~ 10^{10}Ω/口

RoHS

W	16.00±0.20
A0	10.75±0.10
B0	10.70±0.10
K0	2.80±0.10
K1	2.50±0.10



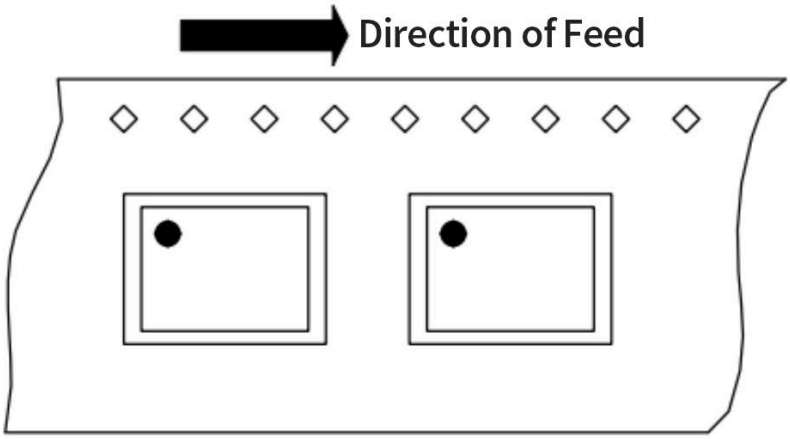


Figure 12.1 Tape and Reel Information of SOW16

13. Revision History

Revision	Description	Date
1.0	Initial version	2024/2/21
1.1	1.Updated the comment information for the AMR parameters. 2.Added Chapter 4 "Recommended Operating Conditions". 3.Modified 16Mbps to the maximum data rate. 4.Updated the comment information for VDD_1, VDD_2, and CMTI. 5.Revised the minimum Differential Output Voltage from 1.3 V to 1.5 V under 3.3 V with a 54Ω load. 6. Updated the test circuit and waveform diagrams in Section 6.4. 7.Added annotations for the relevant test items in Section 7.2. 8.Revised isolation capacitance to 1.1 pF.	2025/10/31

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