NOVOSENSE

NSI1050

Isolated CAN Transceiver

Datasheet (EN) 1.6

Product Overview

The NSI1050 is an isolated CAN transceiver which fully compatible with the ISO11898-2 standard. The NSI1050 integrated two channel digital isolators and a high reliability CAN transceiver. The digital isolator is silicon oxide isolation based on Novosense capacity isolation technology. The high integrated solution can help to simplify system design and improve reliability. The NSI1050 device is safety certified by UL1577 support 5kV$_{rms}$ insulation withstand voltages, while providing high electromagnetic immunity and low emissions. The data rate of the NSI1050 is up to 1Mbps. The NSI1050 provides thermal protection and transmit data dominant time out function.

Key Features

- Fully compatible with the ISO11898-2 standard
- Up to 5000Vrms Insulation voltage
- Power supply voltage
  VDD1: 2.5V to 5.5V
  VDD2: 4.5V to 5.5V
- Bus fault protection of -40V to +40V
- Transmit data (TXD) dominant time out function
- Over current and over temperature protection
- Data rate: up to 1Mbps
- High CMTI: 100kV/μs
- Low loop delay: <200ns
- High system level EMC performance:
  Enhanced system level ESD, EFT, Surge immunity
- Operation temperature: -40°C ~125°C
- RoHS-compliant packages:
  -SOW16: Wide body (SOP16 300mil)
  -DUB8

Safety Regulatory Approvals

- UL recognition:
  - SOP16(300mil) 5000V$_{rms}$ for 1 minute per UL1577
  - DUB8: 3000V$_{rms}$ 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 CAN Bus
- Telecom

Device Information

Part Number	Package	Body Size
NSI1050-DDBR	DUB8	9.30mm ×6.40mm
NSI1050-DSWR	SOP16(300mil)	10.30mm × 7.50mm

Functional Block Diagrams

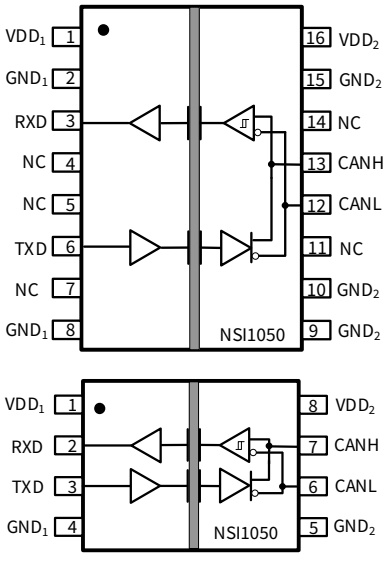


Figure 1. NSI1050 Block Diagram

INDEX

1. Pin Configuration and Functions

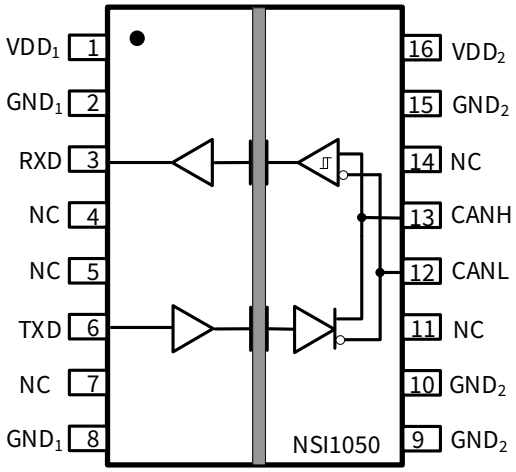


Figure 1.1 NSI1050-DSWR Package

Table1.1 NSI1050-DSWR Pin Configuration and Description

NSI1050-DSWR PIN NO.	*SYMBOL*	*FUNCTION*
1	VDD_1	Power Supply for Side 1
2	GND_1	Ground 1, the ground reference for Isolator Side 1
3	RXD	CAN receive data output (LOW for dominant and HIGH for recessive bus states)
4	NC	No Connection
5	NC	No Connection
6	TXD	CAN transmit data input (LOW for dominant and HIGH for recessive bus states)
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 Bus Side
10	GND_2	Ground 2, the ground reference for Isolator Bus Side
11	NC	No Connection
12	CANL	Low-level CAN bus line
13	CANH	High-level CAN bus line
14	NC	No Connection
15	GND_2	Ground 2, the ground reference for Isolator Bus Side
16	VDD_2	Power supply for Bus Side

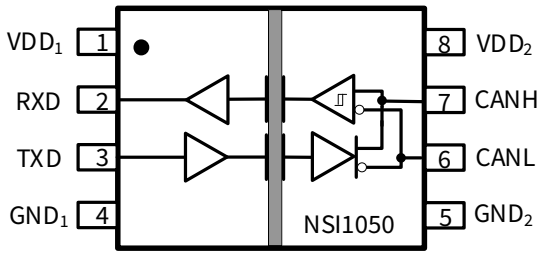


Figure 1.2 NSI1050-DDBR Package

Table1.2 NSI1050-DDBR Pin Configuration and Description

NSI1050-DDBR PIN NO.	*SYMBOL*	*FUNCTION*
1	VDD_1	Power Supply for Side 1
2	RXD	CAN receive data output (LOW for dominant and HIGH for recessive bus states)
3	TXD	CAN transmit data input (LOW for dominant and HIGH for recessive bus states)
4	GND_1	Ground 1, the ground reference for Isolator Side 1
5	GND_2	Ground 2, the ground reference for Isolator Bus Side
6	CANL	Low-level CAN bus line
7	CANH	High-level CAN bus line
8	VDD_2	Power supply for Bus Side

2. Absolute Maximum Ratings

Parameters	*Symbol*	*Min*	*Typ*	*Max*	*Unit*	*Comments*
Power Supply Voltage	VDD_1, VDD_2	-0.5		6.5	V	
Maximum Input Voltage	V_{TXD}	-0.4		VDD_1+0.4	V	
Maximum BUS Pin Voltage	V_{CANH}, V_{CANL}	-40		+40	V	
Output current	I_o	-15		15	mA	
Operating Temperature	T_{opr}	-40		125	°C	
Storage Temperature	T_{stg}	-40		150	°C	

3. ESD Ratings

Ratings		Value	Unit
Electrostatic discharge	Human body model (HBM), per AEC-Q100-002-RevD All pins	±6000	V
	Charged device model (CDM), per AEC-Q100-011-RevB All pins	±2000	V

4. Recommended Operating Conditions

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Supply voltage, controller side	V_{CC1}	2.5		5.5	V	
Supply voltage, bus side	V_{CC2}	4.5	5	5.5	V	
Voltage at bus pins (separately or common mode)	V_I or V_{IC}	-12		12	V	
High-level input voltage	V_{IH}	2		5.5	V	TXD pin
Low-level input voltage	V_{IL}	0		0.8	V	TXD pin
High-level output current	I_{OH}	-70			mA	CANH or CANL pin
		-4			mA	RXD pin
Low-level output current	I_{OL}			70	mA	CANH or CANL pin
				4	mA	RXD pin
Ambient Temperature	T_A	-40		125	°C	
Junction temperature	T_J	-40		150	°C	

5. Thermal Information

Parameters	Symbol	DUB8	SOW16	Unit
Junction-to-ambient thermal resistance	θ_{JA}	73.3	76.0	°C/W
Junction-to-case(top) thermal resistance	$\theta_{JC(top)}$	63.2	41	
Junction-to-board thermal resistance	θ_{JB}	43.0	47.7	

6. Specifications

6.1. Electrical Characteristics

(VDD_1=2.5V~5.5V, VDD_2=4.5V~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
Supply Voltage	VDD_1	2.5		5.5	V	
	VDD_2	4.5	5	5.5	V	
Logic side supply current	IDD_1		1.97	3.00	mA	VDD_1=3.3V, V_{TXD}= 0V
			0.97	1.50	mA	VDD_1=3.3V, V_{TXD}=VDD_1
			2.02	3.00	mA	VDD_1=5V, V_{TXD}=0V
			1.02	1.50	mA	VDD_1=5V, V_{TXD}= VDD_1
Bus side supply current	IDD_2		46	70	mA	V_{TXD}= 0V, R_{Load} =60Ω
			4.45	10	mA	V_{TXD}= VDD_1
Thermal-Shutdown Threshold	T_{TS}	155	165	180	°C	
Common Mode Transient Immunity	CMTI	±80	±100		kV/μs	See Figure 6.12
Logic Side						
High level input voltage	V_{IH}	2			V	TXD pin
Low level input voltage	V_{IL}			0.8	V	TXD pin
High level input current	I_{IH}			10	μA	TXD pin
Low level input current	I_{IL}	-10			μA	TXD pin
Output Voltage High	V_{OH}	VDD_1-0.4			V	I_{OH} = -4mA, RXD pin
Output Voltage Low	V_{OL}			0.4	V	I_{OL} = 4mA, RXD pin
Input Capacitance	C_{IN}		2		pF	TXD pin
Driver						
CANH output voltage (Dominant)	$V_{OH(D)}$	2.8	3.44	4	V	V_{TXD}=0V, R_{Load} =60Ω, see Figure 6.1
CANL output voltage (Dominant)	$V_{OL(D)}$	0.8	1.33	2	V	V_{TXD}=0V, R_{Load} =60Ω, see Figure 6.1
CAN bus output voltage (Recessive)	$V_{O(R)}$	2	2.5	3	V	V_{TXD}=VDD_1, R_{Load} =60Ω
Differential output voltage (Dominant)	$V_{OD(D)}$	1.5		3	V	V_{TXD}=0V, R_{Load} =60Ω, see Figure 6.1
		1		3		V_{TXD}=0V, R_{Load} =45Ω, see Figure 6.1

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Differential output voltage (Recessive)	$V_{OD(R)}$	-0.12		0.012	V	V_{TXD}=VDD_1, R_{Load} =60Ω, see Figure 6.1
		-0.5		0.05	V	V_{TXD}=VDD_1, NO Load, see Figure 6.1
Common-mode output voltage	V_{OC}	2	2.5	3	V	See Figure 6.7
Peak-to-peak Common-mode output voltage	$V_{OC(PP)}$		250		mV	See Figure 6.7
Short- circuit output current	I_{OS}	-105	-44.1		mA	V_{CANH}=-12V, CANL open, see Figure 6.10
			0.28	1	mA	V_{CANH} =12V, CANL open, see Figure 6.10
		-1	-0.44		mA	V_{CANL} =-12V, CANH open, see Figure 6.10
			42.5	105	mA	V_{CANL} =12V, CANH open, see Figure 6.10
Receiver						
Positive-going bus input threshold voltage	V_{IT+}		750	900	mV	
Negative-going bus input threshold voltage	V_{IT-}	500	650		mV	
Hysteresis voltage	V_{HYS}		100		mV	
Input capacitance to ground	C_I		13		pF	CANH or CANL
Differential input capacitance	C_{ID}		5		pF	
Differential input resistance	R_{ID}	30		80	kΩ	
Input resistance	R_{IN}	15	30	40	kΩ	
Input resistance matching	RI_{match}	-3		+3	%	CANH=CANL
Common-mode voltage range	V_{COM}	-12		+12	V	

6.2. Switching Electrical Characteristics

(VDD_1=2.5V~5.5V, VDD_2=4.5V~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
Loop delay1	T_{loop1}	100	165	210	ns	Driver input to receiver output, Recessive to Dominant, see Figure 6.8
Loop delay2	T_{loop2}	80	125	170	ns	Driver input to receiver output, Dominant to Recessive, see Figure 6.8
Driver						
Propagation delay time, dominant -to- recessive output	t_{PLH}		53	140	ns	See Figure 6.4
Propagation delay time, recessive -to- dominant output	t_{PHL}		78	110	ns	See Figure 6.4
Differential output signal rise time	t_r		42		ns	See Figure 6.4
Differential output signal fall time	t_f		32		ns	See Figure 6.4
Bus dominant time-out time	t_{TXD_DTO}	300	468	700	μs	See Figure 6.9
Receiver						
Propagation delay time, low-to-high-level output	t_{PLH}	65	80	150	ns	See Figure 6.6
Propagation delay time, high-to-low-level output	t_{PHL}	80	100	150	ns	See Figure 6.6
RXD signal rise time	t_r		3		ns	See Figure 6.6
RXD signal fall time	t_f		3		ns	See Figure 6.6
Fail-Safe output delay time from bus-side power loss	t_{fs}		4.2		μs	See Figure 6.11

6.3. Parameter Measurement Information

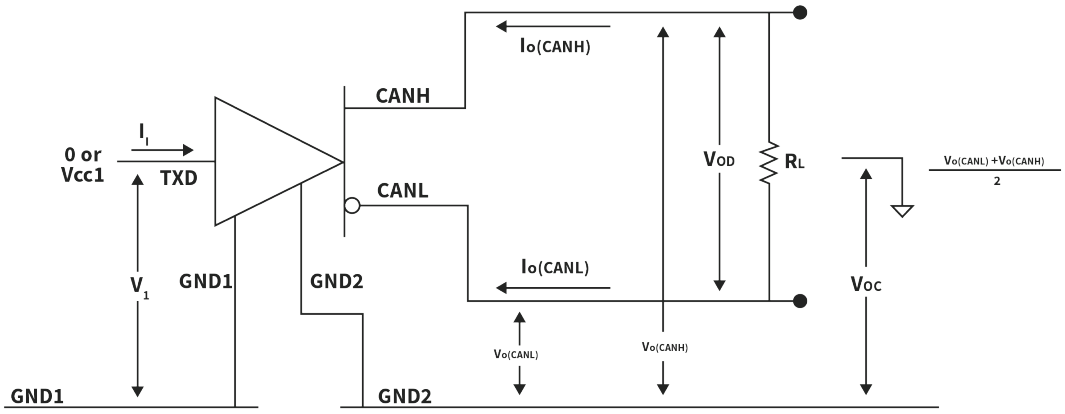


Figure 6.1. Driver Voltage, Current and Test Definitions

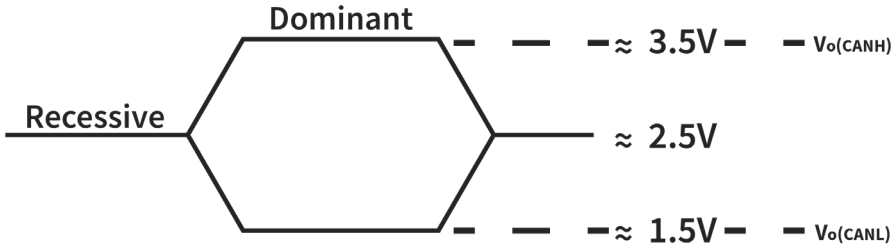


Figure 6.2. Bus Logic State Voltage Definitions

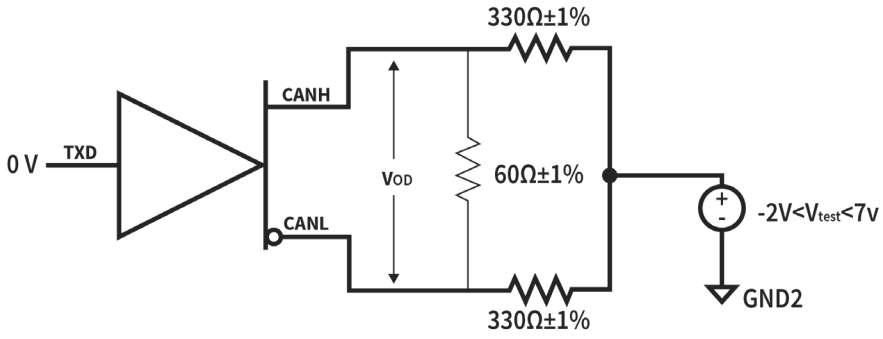
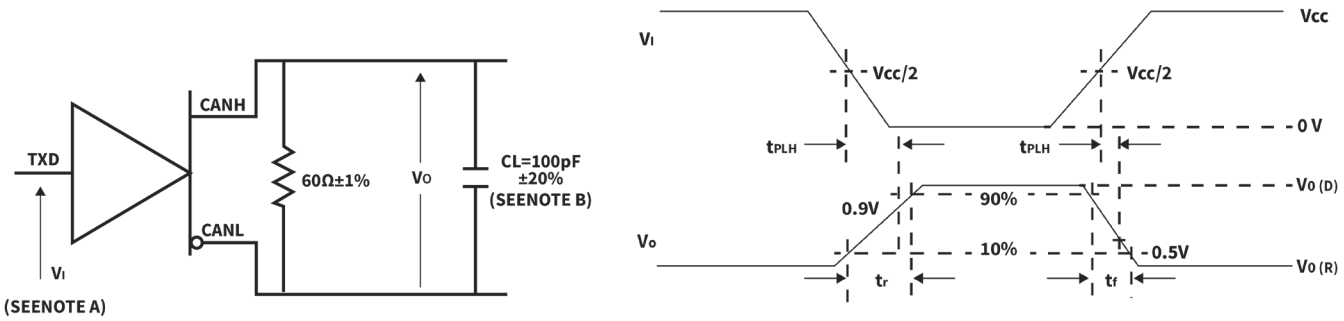


Figure 6.3. Driver VOD With Common-Mode Loading Test Circuit



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 125 kHz, 50% duty cycle, t_r ≤ 6 ns, t_f ≤ 6 ns, Z_O = 50 Ω.

B. C_L includes instrumentation and fixture capacitance within ±20%.

Figure 6.4. Driver Test Circuit and Voltage Waveform

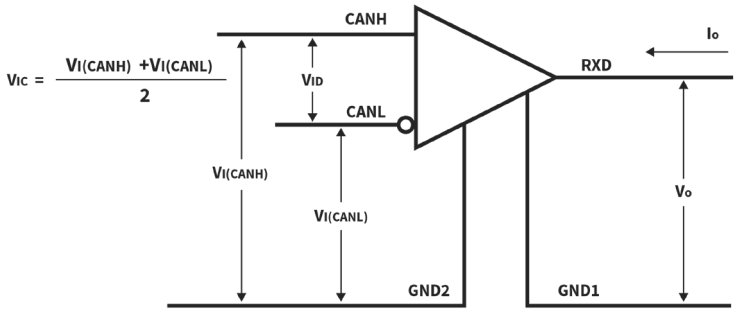
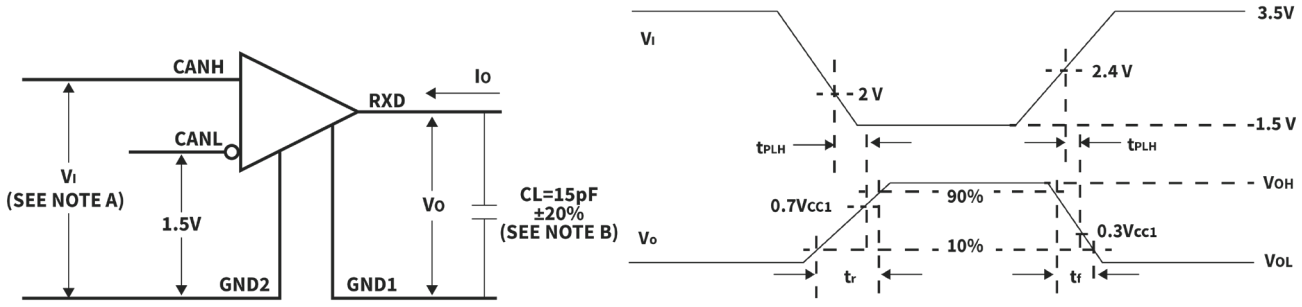


Figure 6.5. Receiver Voltage and Current Definitions



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 125 kHz, 50% duty cycle, t_r ≤ 6 ns, t_f ≤ 6 ns, Z_O = 50 Ω.

B. C_L includes instrumentation and fixture capacitance within ±20%.

Figure 6.6. Receiver Test Circuit and Voltage Waveform

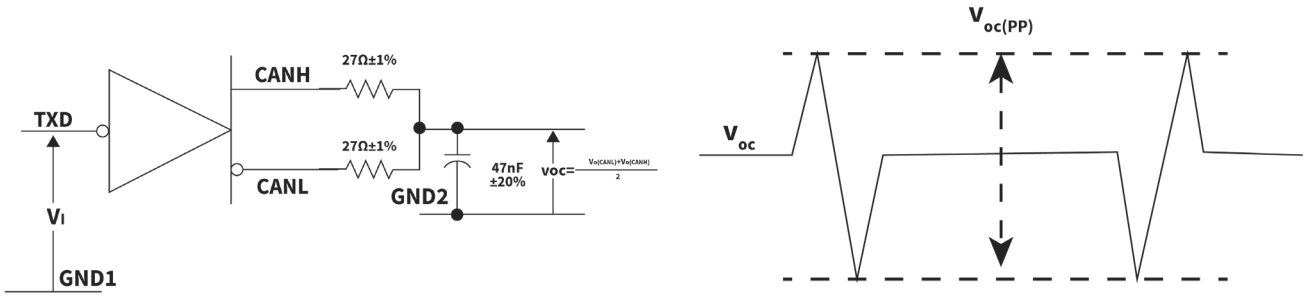


Figure 6.7. Peak-to-Peak Output Voltage Test Circuit and Waveform

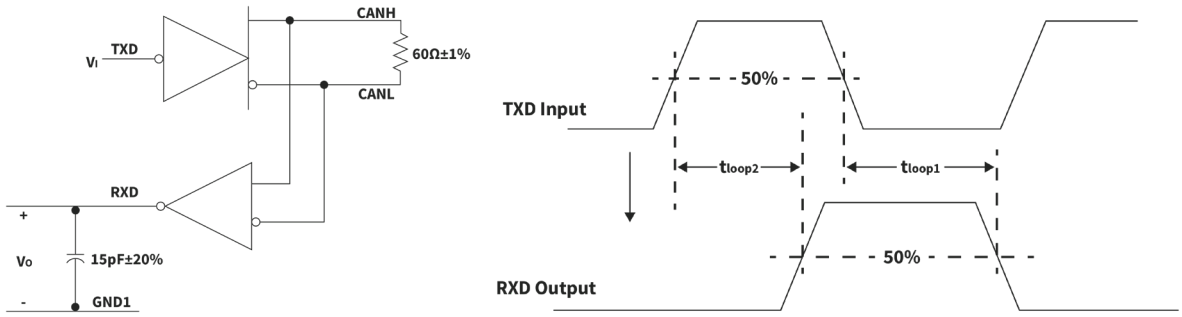
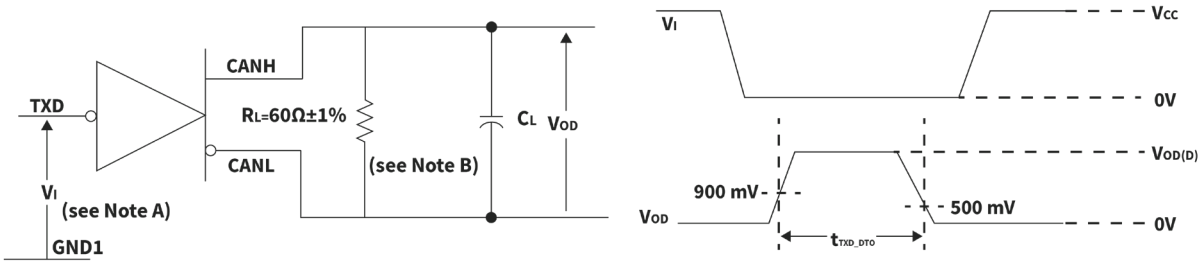


Figure 6.8. t_{LOOP} Test Circuit and Voltage Waveform



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 125 kHz, 50% duty cycle, t_r ≤ 6 ns, t_f ≤ 6 ns, Z_O = 50 Ω.

B. C_L includes instrumentation and fixture capacitance within ±20%.

Figure 6.9. Dominant Time-out Test Circuit and Voltage Waveform

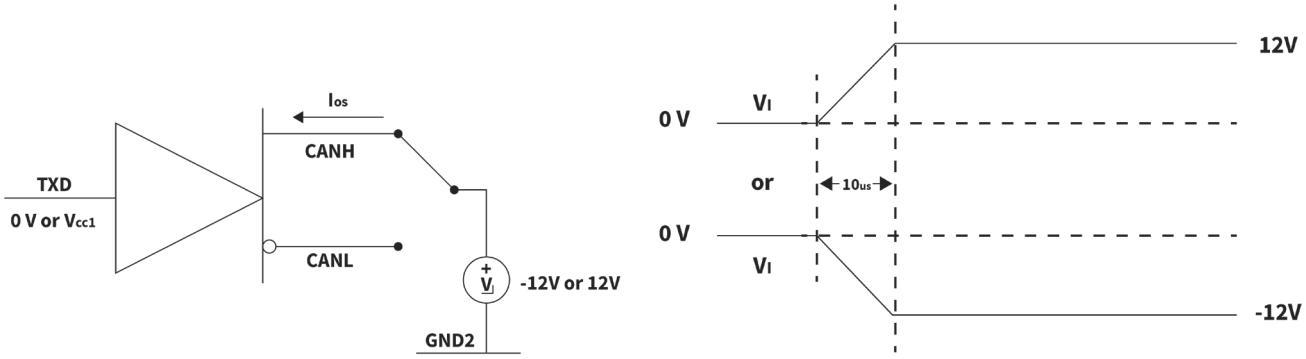


Figure 6.10. Driver Short-Circuit Current Test Circuit and Waveform

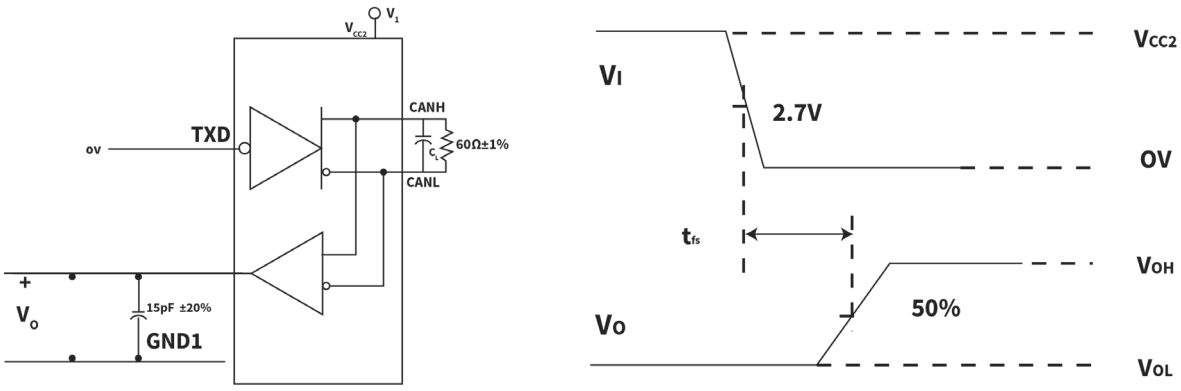


Figure 6.11. Fail-Safe Delay Time Test Circuit and Voltage Waveform

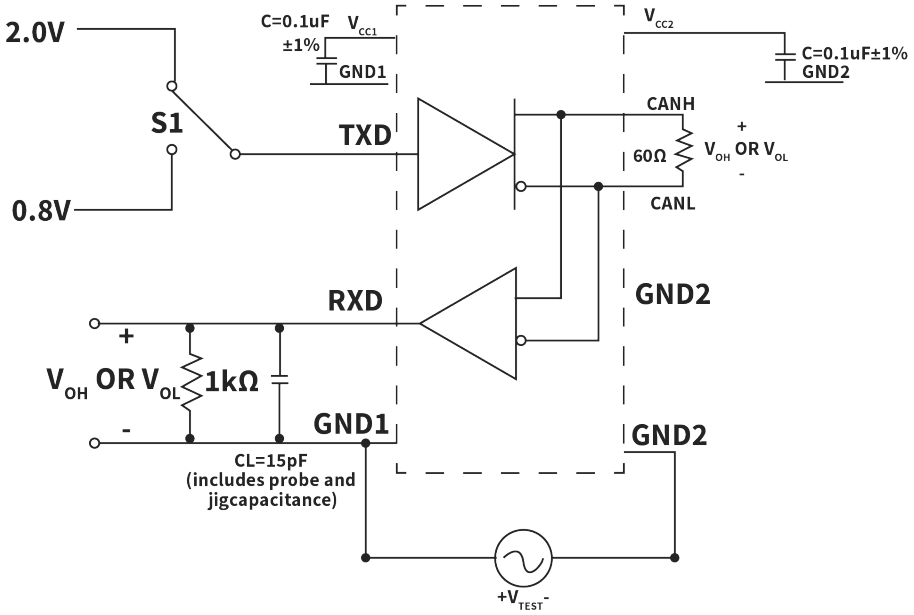


Figure 6.12. Common-Mode Transient Immunity Test Circuit

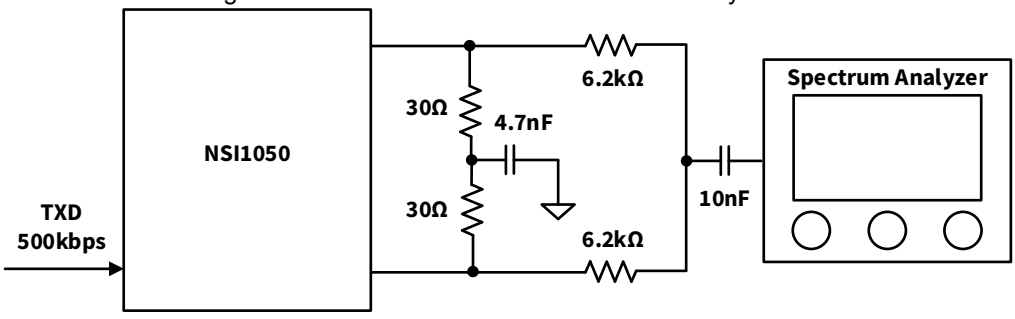


Figure 6.13. Electromagnetic Emissions Measurement Setup

7. High Voltage Feature Description

7.1. Insulation and Safety Related Specifications

Description	Symbol	Value		Unit	Comments
		DUB8	SOP16(300mil)		
Minimum External Clearance	CLR	6.5	8	mm	IEC 60664-1:2007
Minimum External Creepage	CPG	6.5	8	mm	IEC 60664-1:2007
Distance Through Insulation	DTI	20		μm	
Tracking Resistance (Comparative Tracking Index)	CTI	>600	>600	V	DIN EN 60112 (VDE 0303-11); IEC 60112
Material Group		I	I		IEC 60664-1

Description	Test Condition	Value	
		DUB8	SOP16(300mil)
Overvoltage Category per IEC60664-1	For Rated Mains Voltage ≤ 150Vrms	I to IV	I to IV
	For Rated Mains Voltage ≤ 300Vrms	I to III	I to IV
	For Rated Mains Voltage ≤ 600Vrms	/	I to IV
	For Rated Mains Voltage ≤ 1000Vrms	/	I to III
Climatic Classification		40/125/21	40/125/21
Pollution Degree per DIN VDE 0110		2	2

7.2. Insulation Characteristics

Description	Test Condition	Symbol	Value		Unit
			DUB8	SOW16	
Maximum Working Isolation Voltage	AC voltage	V_{IOWM}	400	1500	V_{RMS}
	DC voltage		565	2121	V_{DC}
Maximum Repetitive Isolation Voltage		V_{IORM}	565	2121	V_{PEAK}
Apparent Charge	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.	q_{pd}	/	≤5	pC
	Method a, after environmental tests subgroup 1, $V_{ini}=V_{IOTM}$, t_{ini}=60s, $V_{pd(m)}=1.6*V_{IORM}$, t_m=10s				
	Method b, routine test (100% production) and preconditioning (type test);				

Description	Test Condition	Symbol	Value		Unit
	V_{ini}=1.2*V_{IOTM}, t_{ini}=1s $V_{pd\ (m)}$=1.875*V_{IORM}, t_m=1s（method b1）or $V_{pd(m)}$=V_{ini}, t_m=t_{ini}(method b2)				
Apparent Charge	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.	q_{pd}	≤5	/	pC
	Method a, after environmental tests subgroup 1, V_{ini}=V_{IOTM}, t_{ini}=60s, $V_{pd(m)}$=1.3*V_{IORM}, t_m=10s				
	Method b, routine test (100% production) and preconditioning (type test); V_{ini}=1.2*V_{IOTM}, t_{ini}=1s $V_{pd\ (m)}$=1.5*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}	4240	8000	V_{PEAK}
Maximum impulse voltage	Tested in air, 1.2/50μs waveform per IEC62368-1	V_{IMP}	5384	6250	V_{PEAK}
Maximum Surge Isolation Voltage	Test method per IEC62368-1, 1.2/50μs waveform, V_{IOSM}≥V_{IMP} × 1.3	V_{IOSM}	7000	10000	V_{PEAK}
Isolation Resistance	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	f = 1MHz	C_{IO}	1.2		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}	3000	5000	V_{RMS}

1) 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

Basic isolation safety-limiting values as outlined in VDE-0884-17 of NSI1050-DDBR

Description	Test Condition	Value	Unit
Safety Supply Power	$R_{\theta JA}$ = 73.3 °C/W, T_J = 150 °C, T_A = 25 °C	1705	mW
Safety Supply Current	$R_{\theta JA}$ = 73.3 °C/ W, V_I = 5V, T_J = 150 °C, T_A = 25 °C	341	mA
Safety Temperature[2)]		150	°C

1) Calculate with the junction-to-air thermal resistance, $R_{\theta JA}$, of DUB8 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.

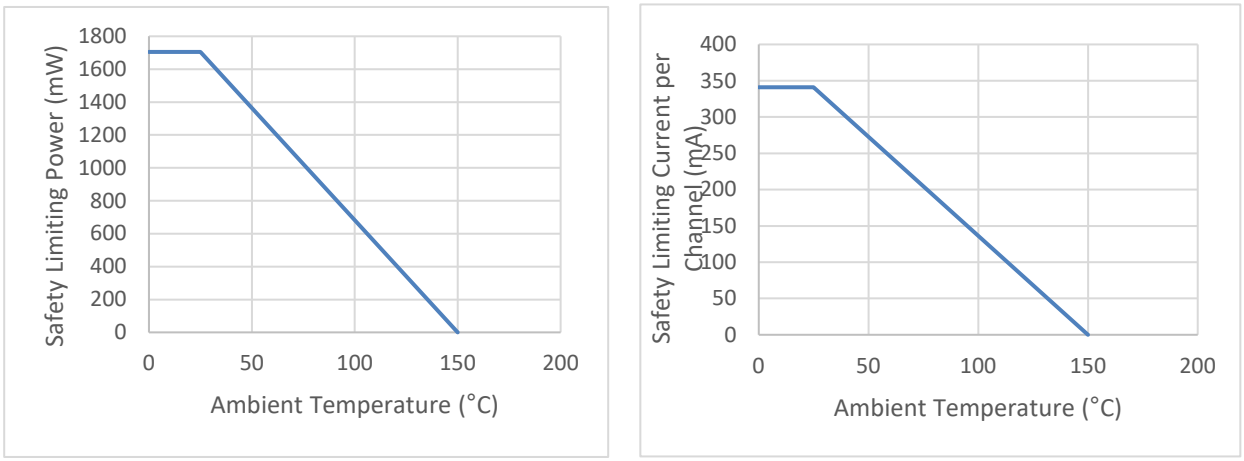


Figure 7.1 NSI1050-DDBR Thermal derating Curve, Dependence of Safety Limiting Values with Case Temperature per DIN EN IEC 60747-17 (VDE 0884-17)

Reinforced isolation safety-limiting values as outlined in VDE-0884-17 of NSI1050-DSWR

Description	Test Condition	Value	Unit
Safety Supply Power	$R_{\theta JA}$ = 76 °C/W, T_J = 150 °C, T_A = 25 °C	1645	mW
Safety Supply Current	$R_{\theta JA}$ = 76 °C/ W, V_I = 5V, T_J = 150 °C, T_A = 25 °C	329	mA
Safety Temperature[2)]		150	°C

1) Calculate with the junction-to-air thermal resistance, $R_{\theta JA}$, 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.

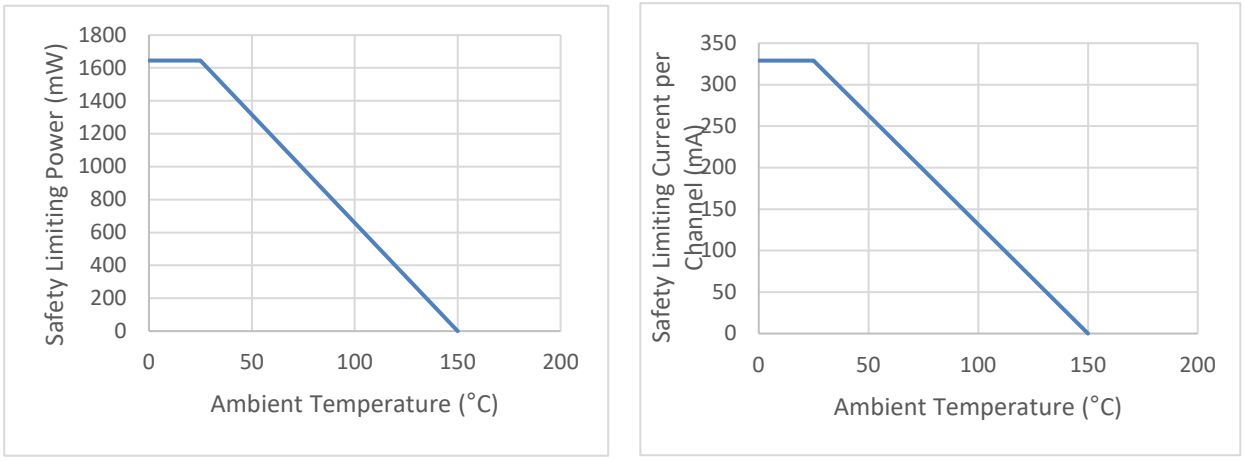


Figure 7.2 NSI1050-DSWR Thermal derating Curve, Dependence of Safety Limiting Values with Case Temperature per DIN EN IEC 60747-17 (VDE 0884-17)

7.4. Regulatory information

The NSI1050-DDBR is approved 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, 3000V_{rms} Isolation voltage	Single Protection, 3000V_{rms} Isolation voltage	Basic Insulation 565Vpeak, V_{IOSM}=7000 V_{peak}	Basic insulation	5000Vrms for 1min
E500602	E500602	40050121	CQC20001263786	R50574061

The NSI1050-DSWR is approved 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, 5000Vrms Isolation voltage	Single Protection, 5000Vrms Isolation voltage	Reinforced Insulation 2121Vpeak, V_{IOSM}=10000 V_{peak}	Reinforced insulation	5000Vrms for 1min
E500602	E500602	40052820	CQC20001264939	R50574061

8. Function Description

The NSI1050 is a isolated CAN transceiver which fully compatible with the ISO11898-2 standard. The NSI1050 integrated two channel digital isolators and a high reliability CAN transceiver. The digital isolator is silicon oxide isolation based on Novosense capacity isolation technology. The high integrated solution can help to simplify system design and improve reliability. The NSI1050-DSWR device is safety certified by UL1577 support 5kV$_{rms}$ insulation withstand voltages, while the NSI1050-DDBR device is safety certified by UL1577 support 3kV$_{rms}$ insulation withstand voltages. The NSI1050 is providing high electromagnetic immunity and low emissions. The data rate of the NSI1050 is up to 1Mbps. The NSI1050 provides thermal protection and transmit data dominant time out function.

8.1. Device Functional Modes

Table 8.1. Driver Function Table

TXD	*CANH*	*CANL*	*BUS STATE*
L	H	L	Dominant
H	Z	Z	Recessive
Open	Z	Z	Recessive

[1] H= high level; L=low level; Z= common mode(recessive) bias to V_{CC}/2

Table 8.2. Receiver Function Table

V_{ID}=CANH-CANL	*RXD*	*BUS STATE*
V_{ID} ≥0.9V	L	Dominant
0.5< V_{ID} <0.9V	X	Uncertain
V_{ID} ≤0.5V	H	Recessive
Open	H	Recessive

[1] H= high level; L=low level; X= uncertain

8.2. TXD dominant time-out function

A 'TXD dominant time-out' timer circuit prevents the bus lines from being driven to a permanent dominant state (blocking all network communication) if pin TXD is forced permanently LOW by a hardware and/or software application failure. The timer is triggered by a negative edge on pin TXD.

If the duration of the LOW level on pin TXD exceeds the internal timer value (t_{TXD_DTO}), the transmitter is disabled, driving the bus lines into a recessive state. The timer is reset by a positive edge on pin TXD.

8.3. Current Protection

A current-limiting circuit protects the transmitter output stage from damage caused by accidental short-circuit to either positive or negative supply voltage, although power dissipation increases during this fault condition.

8.4. Over Temperature Protection

The output drivers are protected against over-temperature conditions. If the virtual junction temperature exceeds the shutdown junction temperature TTS, the output drivers will be disabled until the virtual junction temperature becomes lower than TTS and TXD becomes recessive again.

By including the TXD condition, the occurrence of output driver oscillation due to temperature drifts is avoided.

9. Application Note

9.1. Typical Application

The NSI1050 requires a 0.1 μF bypass capacitors between VDD1 and GND1, VDD2and GND2. The capacitor should be placed as close as possible to the package. The figure5.1 is the basic schematic of NSI1050.

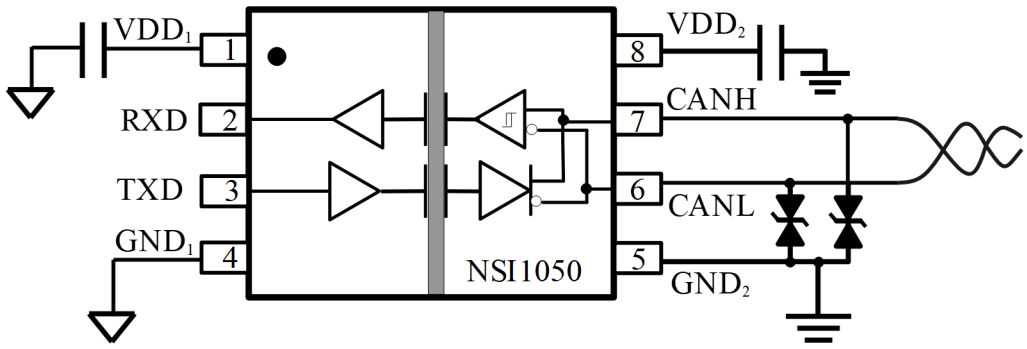


Figure 9.1 Basic schematic of NSI1050

9.2. PCB Layout

The recommended PCB layout shown below.

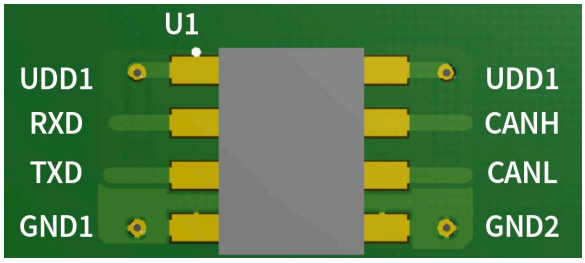
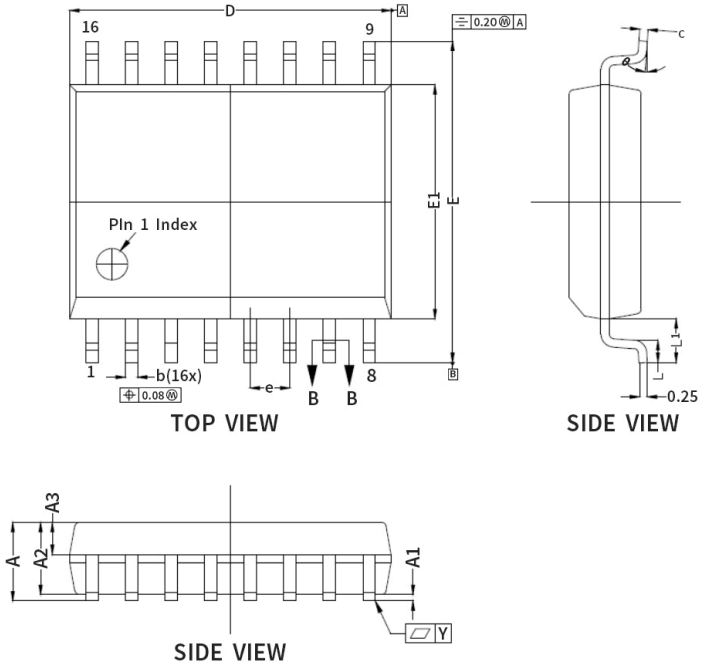


Figure 9.2 Recommended PCB Layout — Top Layer

Figure 9.3 Recommended PCB Layout — Bottom Layer

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°

Figure 10.1 SOW16 Package Shape and Dimension in millimeters

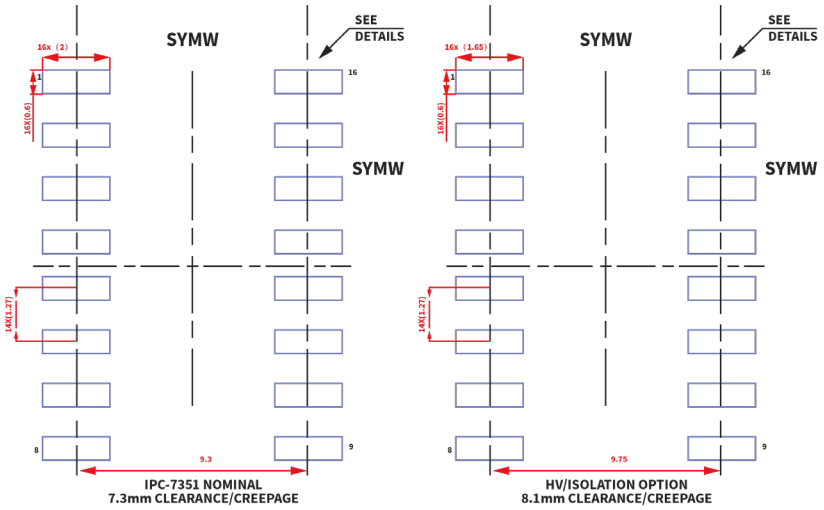
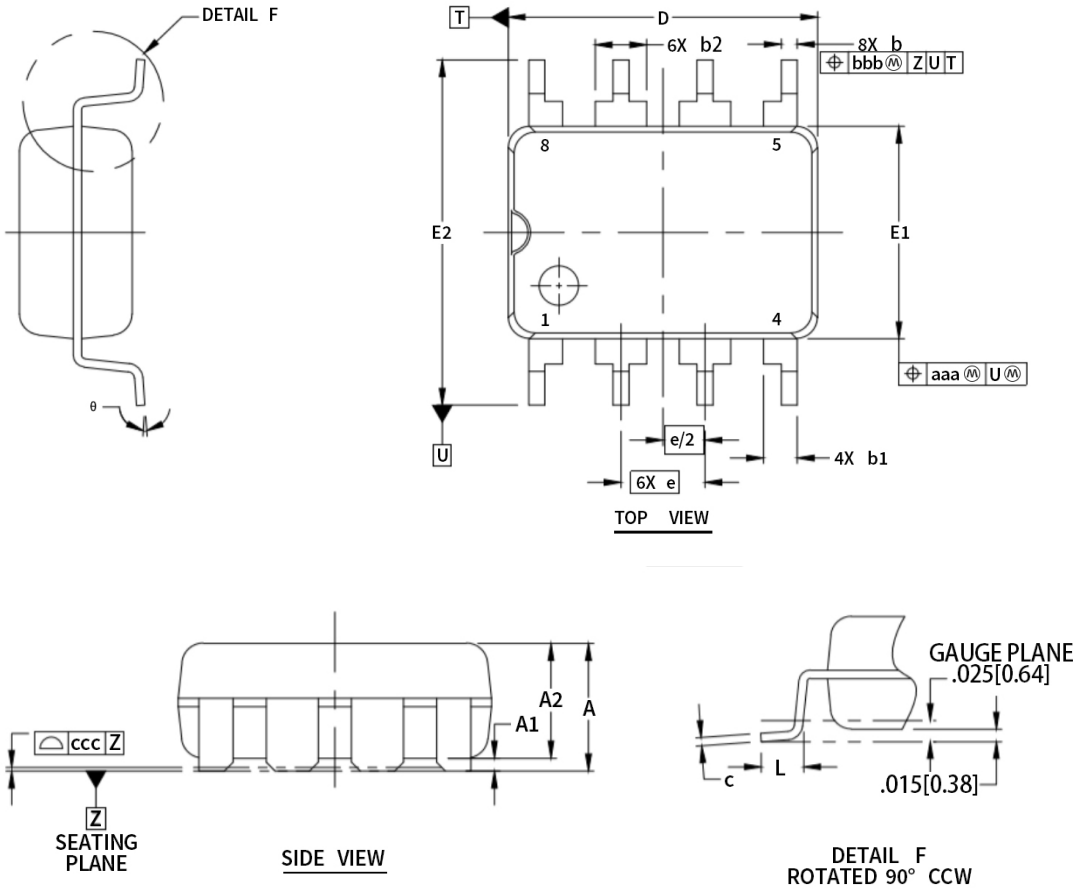


Figure 10.2 SOW16 Package Board Layout Example



	SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
TOTAL THICKNESS	A	.141	---	.165	3.58	---	4.19
STAND OFF	A1	.015	---	.023	0.38	---	0.58
MOLD THICKNESS	A2	.126	---	.142	3.20	---	3.61
LEAD WIDTH	b	.014	---	.022	0.36	---	0.56
	b1	---	0.039 REF	---	---	0.99 REF	---
	b2	---	0.06 REF	---	---	1.524 REF	---
L/F THICKNESS	c	.008	---	.014	0.20	---	0.36
BODY SIZE	D	.365	---	.369	9.27	---	9.37
	E1	.244	---	.260	6.20	---	6.60
	E2	.398	---	.421	10.11	---	10.69
LEAD PITCH	e	100 BSC			2.54 BSC		
LEAD LENGTH	L	.0453	---	.0571	1.15	---	1.45
	θ	0°	---	8°	0°	---	8°
LEAD OFFSET	aaa	.010			0.254		

Figure 10.3 DUB8 Package Shape and Dimension in millimeters

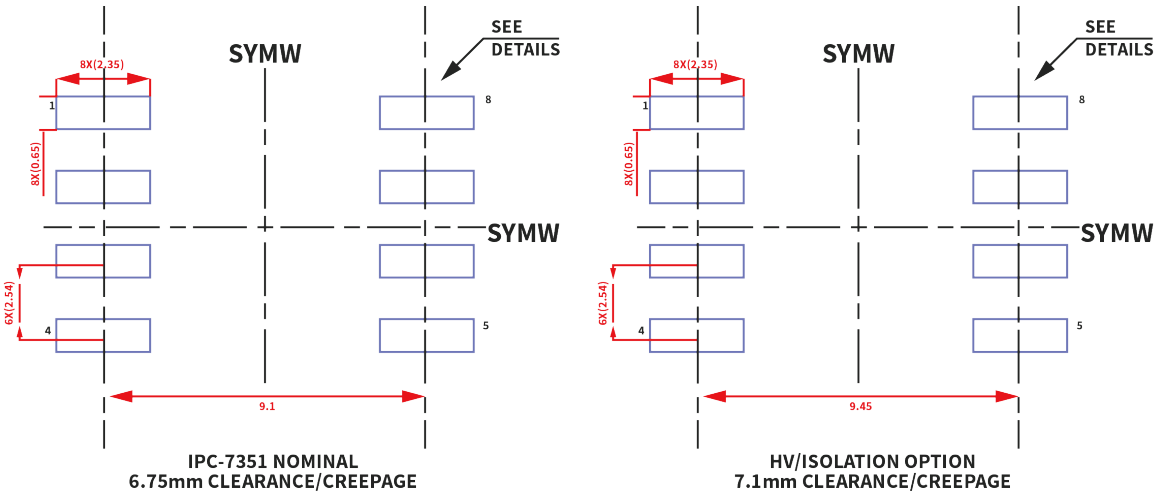


Figure 10.4 DUB8 Package Board Layout Example

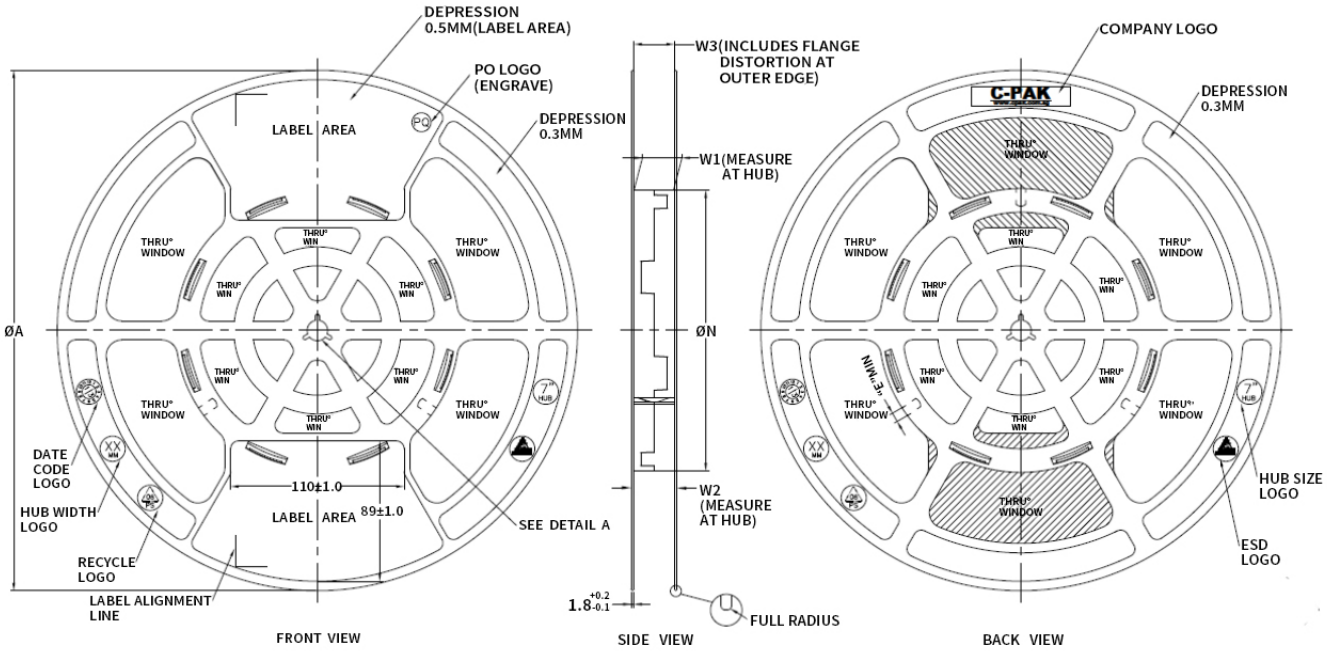
11. Order information

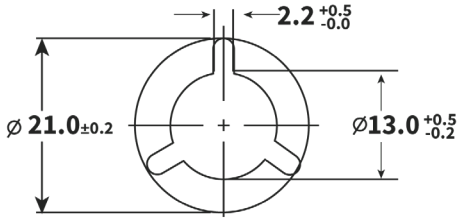
Part Number	*Isolation Rating (kV)*	*Max Data Rate (Mbps)*	*Temperature*	*MSL*	*Package Type*	*Package Drawing*	*SPQ*
NSI1050-DDBR	3	1	-40 to 125°C	3	DUB8	DUB8	800
NSI1050-DSWR	5	1	-40 to 125°C	2	SOP16(300mil)	SOW16	1000
NOTE: All packages are RoHS-compliant with peak reflow temperatures of 260 °C according to the JEDEC industry standard classifications and peak solder temperatures.							

12. Documentation Support

Part Number	Product Folder	Datasheet	Technical Documents	Isolator selection guide
NSI1050	Click here	Click here	Click here	Click here

13. Tape and Reel Information

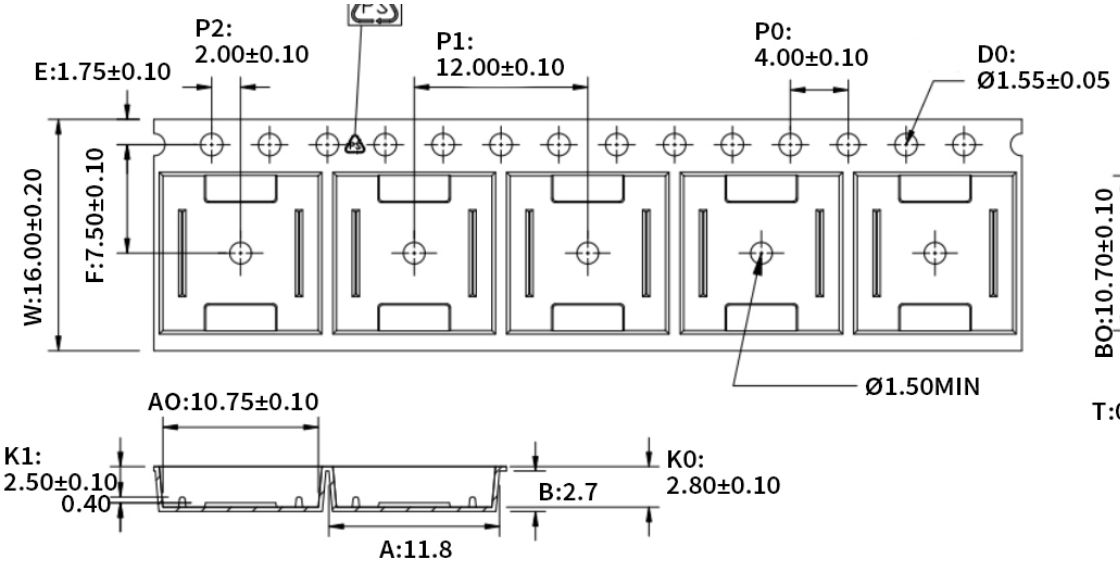




ARBOR HOLE
DETAIL A
SCALE: 3:1

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

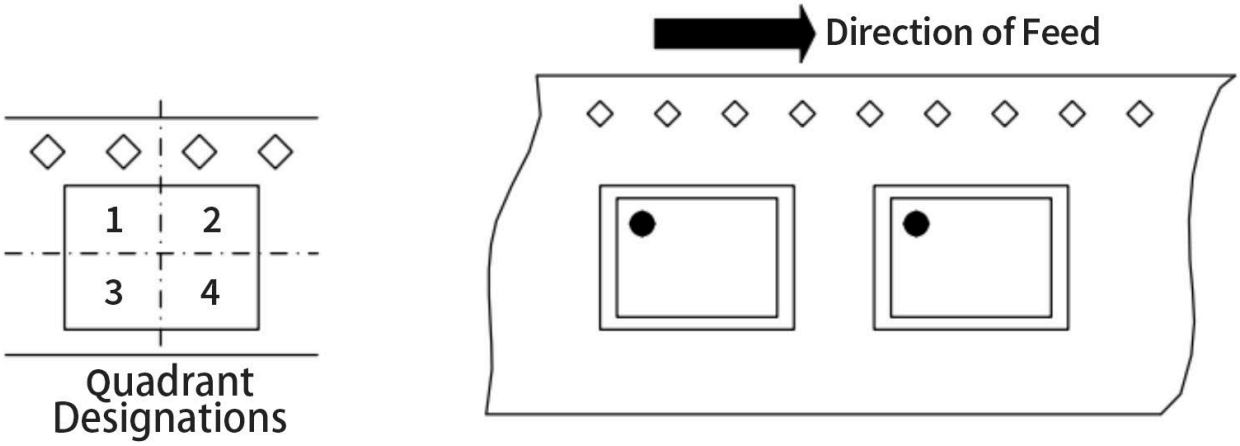
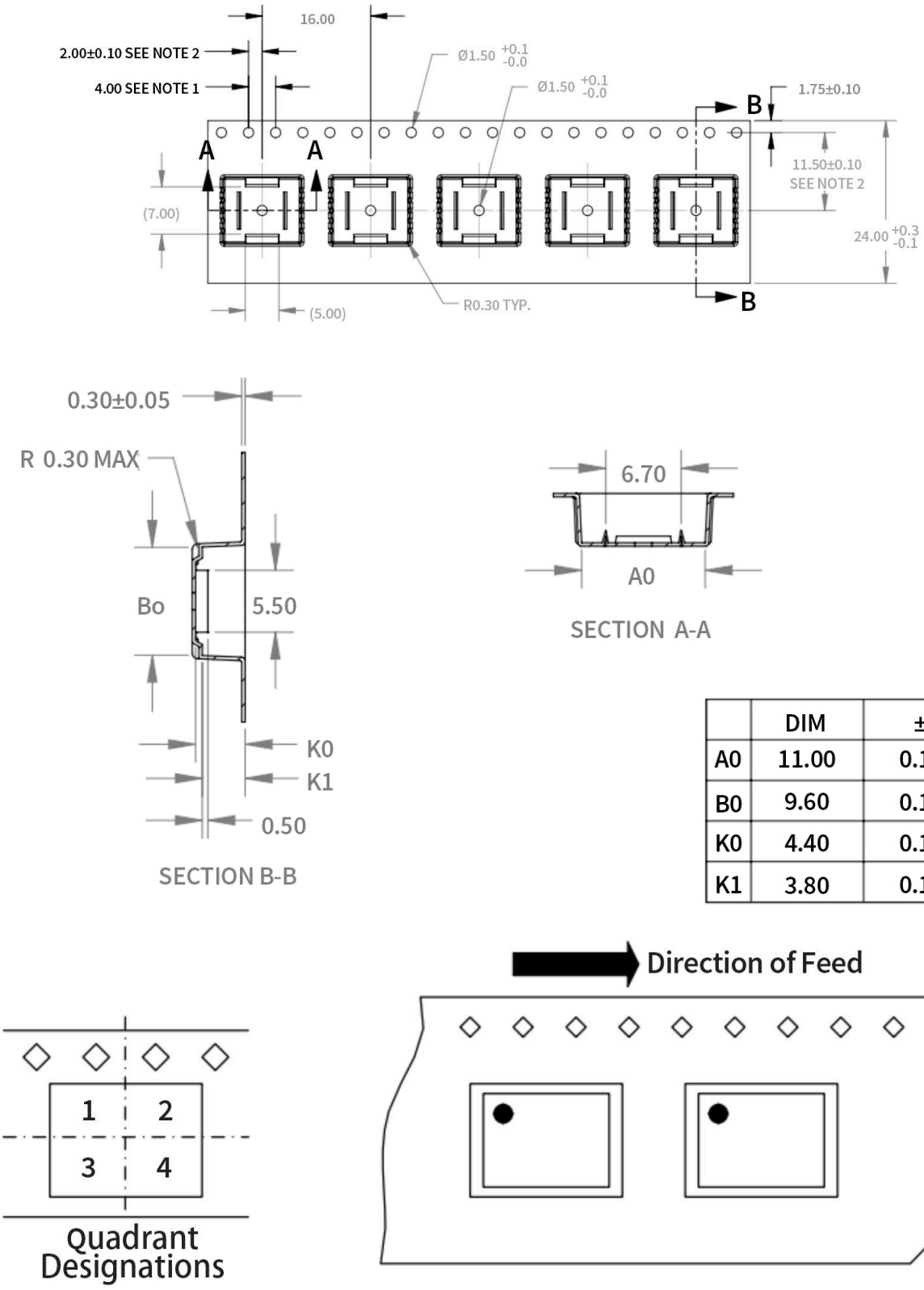


Figure 13.1 Tape and Reel Information of SOW16



	DIM	±
A0	11.00	0.10
B0	9.60	0.10
K0	4.40	0.10
K1	3.80	0.10

Figure 13.2 Tape and Reel Information of DUB8

14. Revision History

Revision	Description	Date
1.0	Initial version	2020/8/7
1.1	Changed tape and reel information	2020/12/20
1.2	Added DUB8 tape and reel information	2021/3/1
1.3	Update Regulatory information	2021/4/13
1.4	Added reel direction of feed, corrected driver and receiver delay and UL Isolation voltage	2022/6/7
1.5	Update DUB8 Package Board Layout Example	2022/8/26
1.6	Update Safety certification info throughout the document. Update comment in Specifications. Change “NSi” to “NSI”. Update NSI1050-DSWR Pin Configuration and Description.	2024/11/21

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