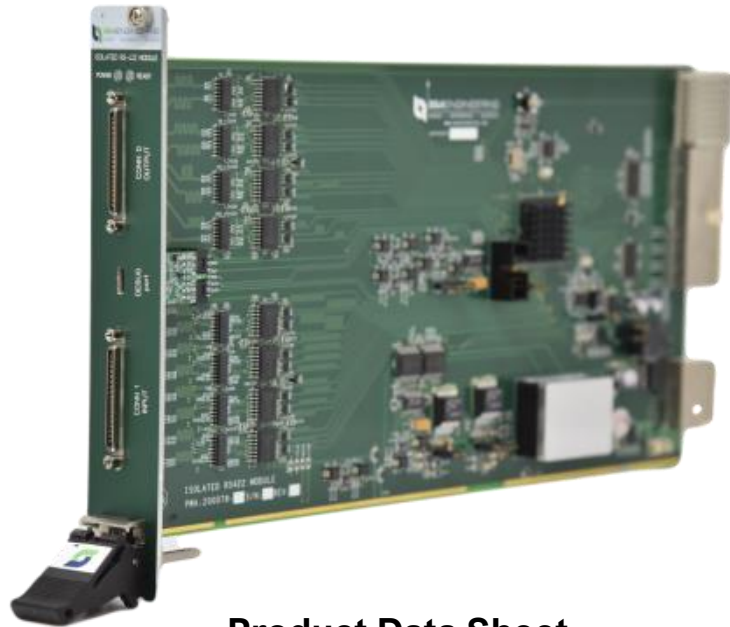


Isolated High-Voltage Single-Ended Module



Product Data Sheet
B&A Document 110041_B

Part No.
200140



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ISOLATED HIGH-VOLTAGE SINGLE-ENDED MODULE



INTRODUCTION

This document contains technical specifications for the Isolated High-Voltage Single-Ended Module (B&A Part No. 200140). Specifications are shown at 25 °C temperature, unless otherwise noted. The main features of the module are listed below:

- Separate 32 Transmit and 32 Receive High-Voltage Single-Ended channels⁽¹⁾
- Configurable grounding
- On-board Isolated voltage regulation
- Internal House Keeping / Health Monitoring
- User-controlled Flight interface power on/off
- Built-in LabVIEW FPGA Debugging Port
- Safe to connect to Flight hardware, FMEA approved
- LabVIEW drivers



SAFETY

The following items must be considered for safety:

- Using the Isolated High-Voltage Single-Ended Module in a manner not described within this document may impair the protection of the Isolated High-Voltage Single-Ended Module provides.
- The SLSC-12001 chassis and the SLSC Modules **do not support** hot plug-in. The entire chassis must be powered down when a module is installed.
- Sense lines **do not support** reverse polarity.
- Always follow ESD procedures for handling.
- If cleaning is required, wipe with dry and clean towel.
- Installation of the Isolated High-Voltage Single-Ended Module must be performed in accordance with “B&A SLSC Module User Manual” (Document No. 140040).



INTERFACES



SPECIFICATIONS⁽³⁾

Front panel Connectors	2 x VHDCI (Pages 6 & 7)	Channels Per Connector ⁽²⁾	32
Backplane Connectors	3 x SLSC (Pages 8 & 9)	Number Of Single-ended Channels	32
Power Up State	Drivers and receivers disabled	Termination Impedance	Optional 4.7 kΩ Pull-Up and Pull-Down Resistors
I/O Compatibility	Single-Ended Signaling	In-Line Series Resistance	25 Ω nominal
Number of on-card Temperature Sensors	4	Properties	See Page 10
LabVIEW FPGA Debug Interface	Micro-USB	Register Mapping	See Page 11
Grounding Configuration	See Page 4	Configuration Option	See Page 12 (Tables 1 & 2)

Note:

(1) All 32 channels (TX and RX) are length-matched and have the same delay on the board.

(2) For further specification details, please contact support@baengineering.com

DATASHEET



STANDARD CONFIGURATIONS SPECIFICATIONS

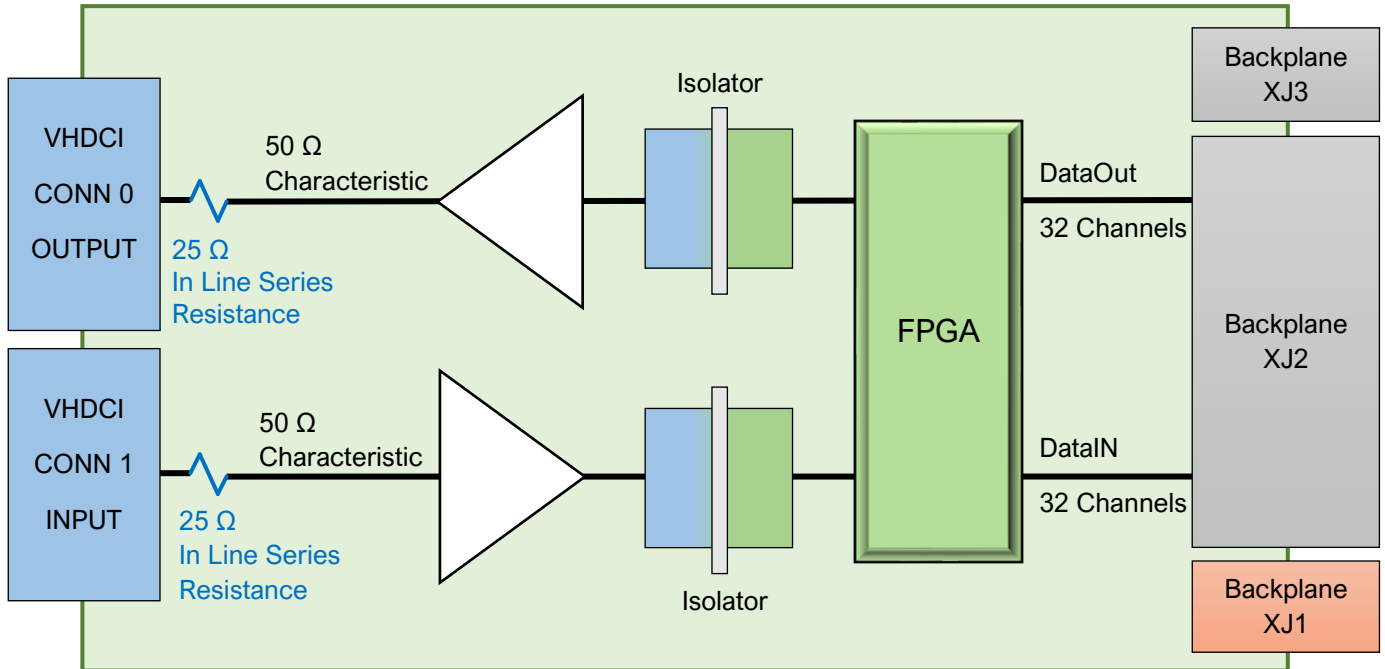
Available Part No.	Physical Protocol	Isolated Domain Voltage	Drive Series Resistance	Receiver Series Resistance	Receiver Pull-up Resistance	Receiver Pull-down Resistance	Ground Scheme
200140-00	CMOS	10 V	25 Ω	25 Ω	Open	Open	2.2 M Ω 100 nF
200140-01	CMOS	12 V	25 Ω	25 Ω	Open	Open	2.2 M Ω 100 nF
200140-XX	Customizable based on customer requests. (See the last page for ordering instructions)						

Standard Configurations Specifications				
Physical Protocol	LVTTTL		LVTTTL	
Isolated Domain Voltage (V)	10V		12V	
	Min	Max	Min	Max
Operational Voltage Range (V)	18	40	18	40
TX HL Propagation Delay (ns)	146.9	298.7	146.9	298.7
TX LH Propagation Delay (ns)	176.9	358.7	176.9	358.7
RX HL Propagation Delay (ns)	191.9	388.7	191.9	388.7
RX LH Propagation Delay (ns)	281.9	568.7	281.9	568.7
Output High Voltage (V)	9.95	10	11.95	12
Output Low Voltage (V)	0	0.05	0	0.05
Maximum Nominal Data Rate of TX and RX Channels (MHz)	40		40	
Input Voltage (V)	10		12	
Input High Voltage (mV)	5.5		6.5	
Input Low Voltage (mV)	4.5		5.5	
High Output Current (mA)	-2.25		-2.25	
Low Output Current (mA)	2.25		2.25	
Input Capacitance (pF)	7.5		7.5	
Rise Time (ns)	100		100	
Fall Time (ns)	100		100	



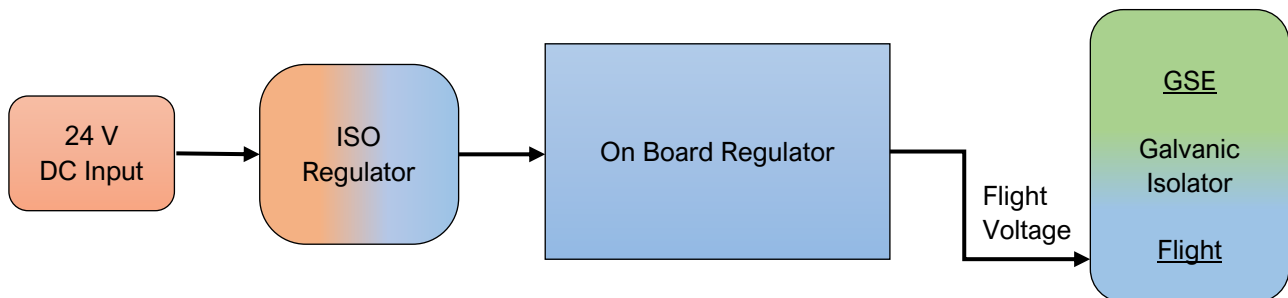
FUNCTIONAL BLOCK DIAGRAM

The functional block diagram is shown below:



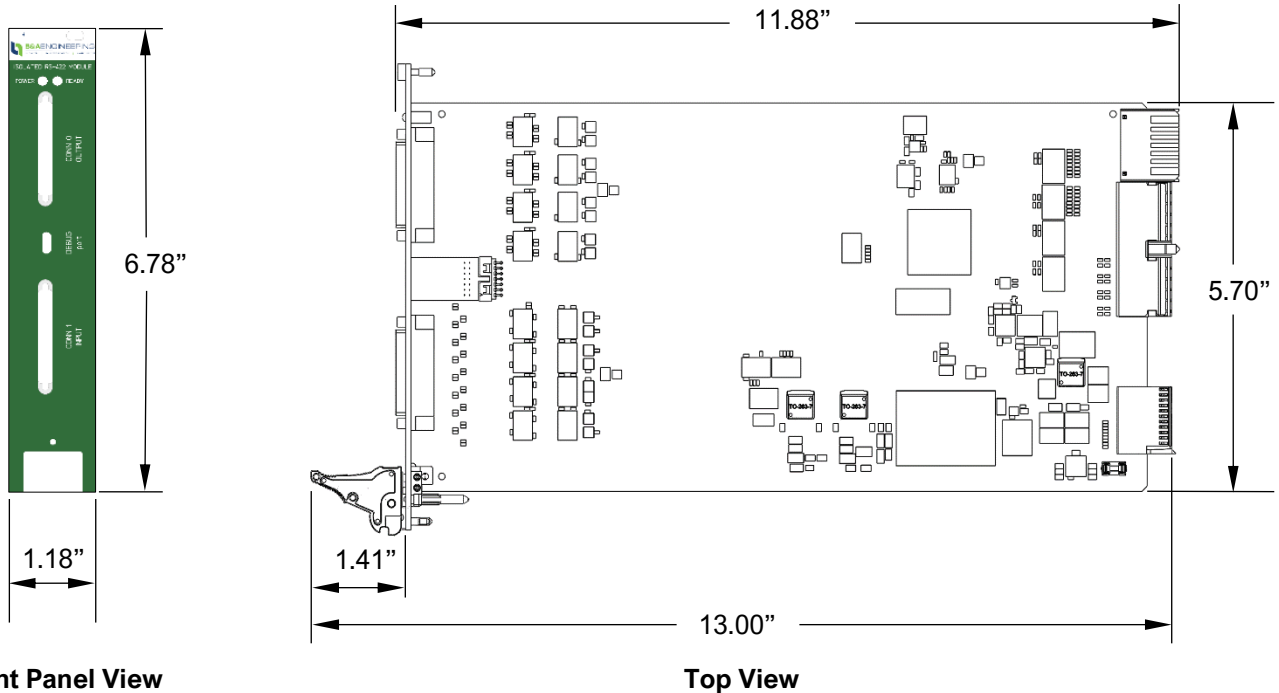
ISOLATED VOLTAGE REGULATION

The Isolated Voltage Regulation block diagram is shown below:





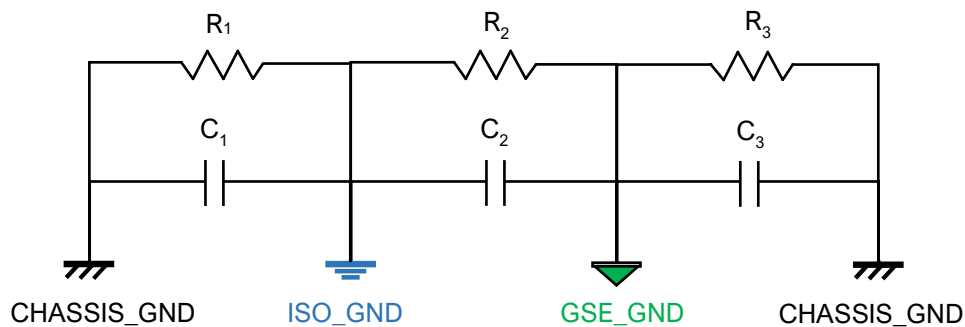
PHYSICAL DIMENSIONS



CONFIGURABLE GROUNDING

Three different groundings are provided: **Chassis Ground**, **ISO Ground**, and **GSE Ground**.

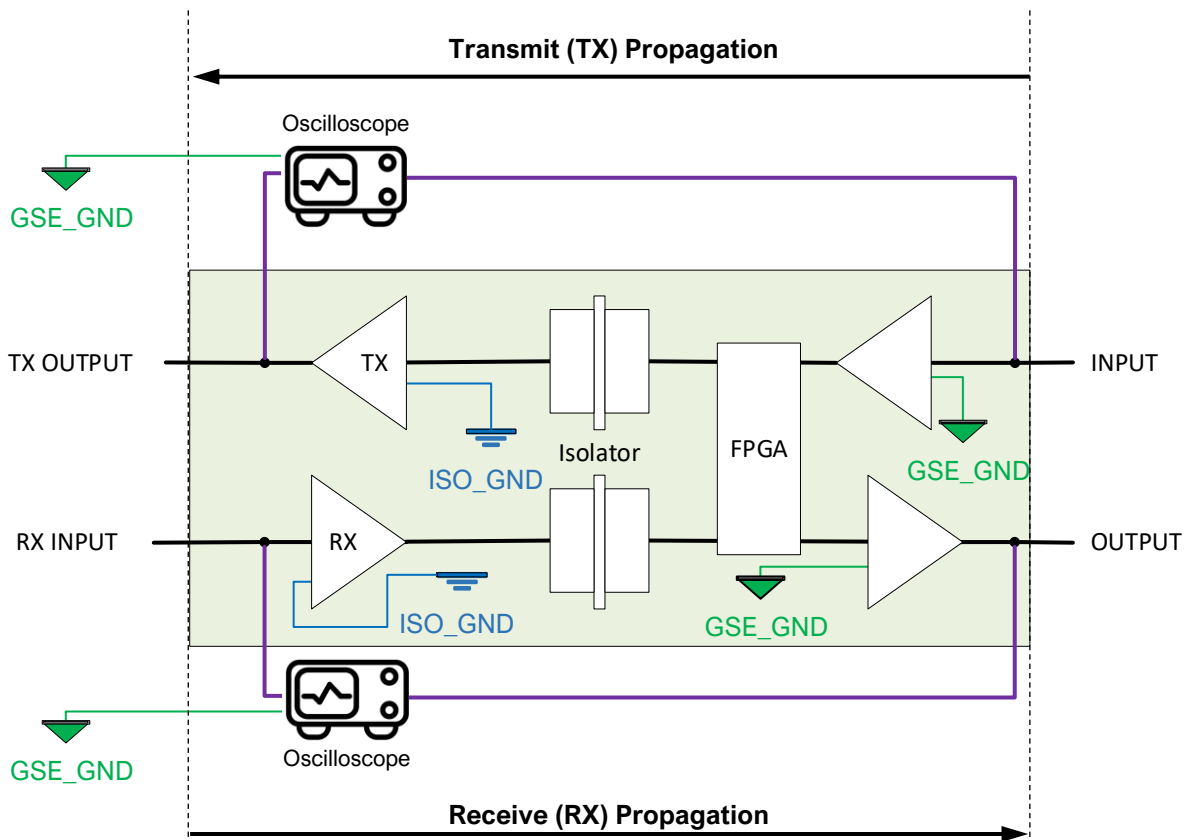
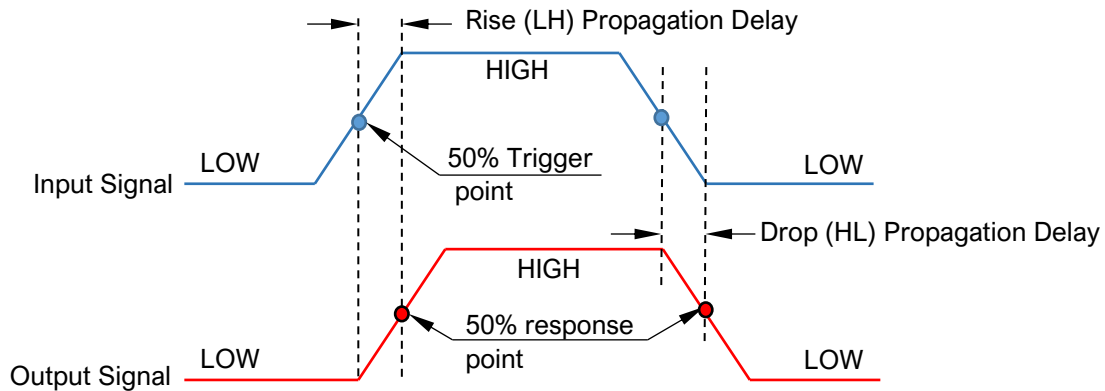
- The module allows customizable grounding schemes by shorting the on-board resistors; R_1 , R_2 and R_3 .
- Capacitors C_1 , C_2 , and C_3 are used to implement RC filters.
- Isolated resistors and capacitors are installed on the module by default. ($R_1 = R_2 = R_3 = 2.2 \text{ M}\Omega$, $C_1 = C_2 = C_3 = 100 \text{ nF}$)
- Resistor and capacitor values can be configured based on users' requirements upon order. Online customization tools are available on the B&A website.





PROPAGATION DELAY

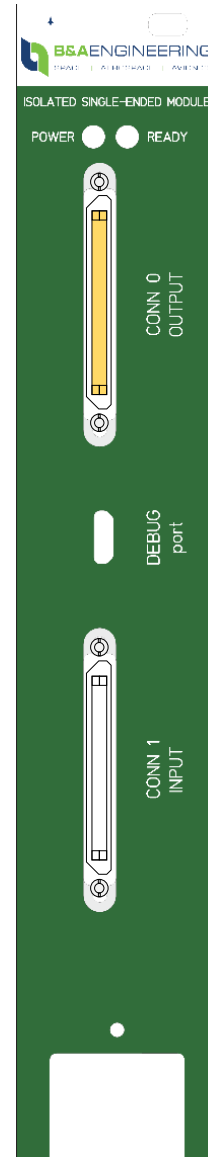
The propagation delay is defined as the delay between the 50% trigger point and the 50% response point. The figure below illustrates two different propagation delays: The LOW to HIGH signal rise phase (LH) and the HIGH to LOW signal Drop phase (HL). The signal rise and drop measurement is performed bi-directional for the TX and RX propagation direction. An Oscilloscope is required to perform testing. The signal data is measured with the oscilloscope at the board INPUT, TX output, RX input, and board OUTPUT. For delay measurements, **ISO_GND** and **GSE_GND** are connected.





FRONT CONNECTOR 0 PINOUT

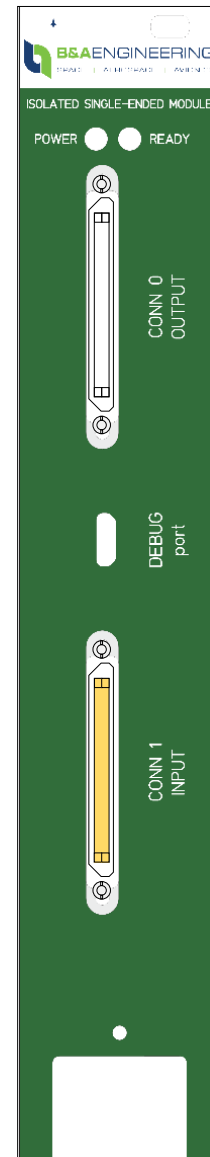
ISO_GND	68	34	ISO_GND
TX_31	67	33	TX_15
ISO_GND	66	32	ISO_GND
TX_30	65	31	TX_14
ISO_GND	64	30	ISO_GND
TX_29	63	29	TX_13
ISO_GND	62	28	ISO_GND
TX_28	61	27	TX_12
ISO_GND	60	26	ISO_GND
ISO_GND	59	25	ISO_GND
TX_27	58	24	TX_11
ISO_GND	57	23	ISO_GND
TX_26	56	22	TX_10
ISO_GND	55	21	ISO_GND
TX_25	54	20	TX_9
ISO_GND	53	19	ISO_GND
TX_24	52	18	TX_8
ISO_GND	51	17	ISO_GND
TX_23	50	16	TX_7
ISO_GND	49	15	ISO_GND
TX_22	48	14	TX_6
ISO_GND	47	13	ISO_GND
TX_21	46	12	TX_5
ISO_GND	45	11	ISO_GND
TX_20	44	10	TX_4
ISO_GND	43	9	ISO_GND
ISO_GND	42	8	ISO_GND
TX_19	41	7	TX_3
ISO_GND	40	6	ISO_GND
TX_18	39	5	TX_2
ISO_GND	38	4	ISO_GND
TX_17	37	3	TX_1
ISO_GND	36	2	ISO_GND
TX_16	35	1	TX_0

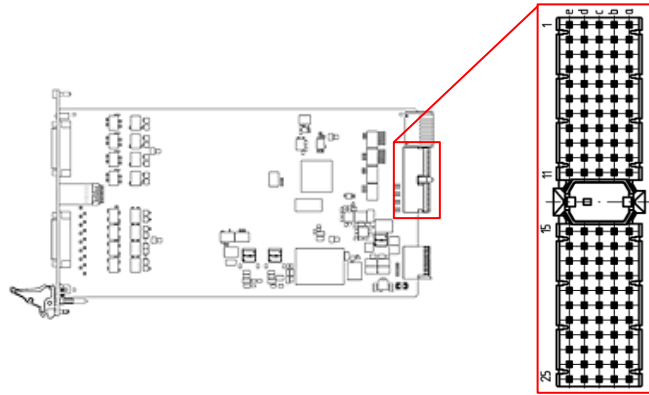




FRONT CONNECTOR 1 PINOUT

ISO_GND	68	34	ISO_GND
RX_31	67	33	RX_15
ISO_GND	66	32	ISO_GND
RX_30	65	31	RX_14
ISO_GND	64	30	ISO_GND
RX_29	63	29	RX_13
ISO_GND	62	28	ISO_GND
RX_28	61	27	RX_12
ISO_GND	60	26	ISO_GND
ISO_GND	59	25	ISO_GND
RX_27	58	24	RX_11
ISO_GND	57	23	ISO_GND
RX_26	56	22	RX_10
ISO_GND	55	21	ISO_GND
RX_25	54	20	RX_9
ISO_GND	53	19	ISO_GND
RX_24	52	18	RX_8
ISO_GND	51	17	ISO_GND
RX_23	50	16	RX_7
ISO_GND	49	15	ISO_GND
RX_22	48	14	RX_6
ISO_GND	47	13	ISO_GND
RX_21	46	12	RX_5
ISO_GND	45	11	ISO_GND
RX_20	44	10	RX_4
ISO_GND	43	9	ISO_GND
ISO_GND	42	8	ISO_GND
RX_19	41	7	RX_3
ISO_GND	40	6	ISO_GND
RX_18	39	5	RX_2
ISO_GND	38	4	ISO_GND
RX_17	37	3	RX_1
ISO_GND	36	2	ISO_GND
RX_16	35	1	RX_0

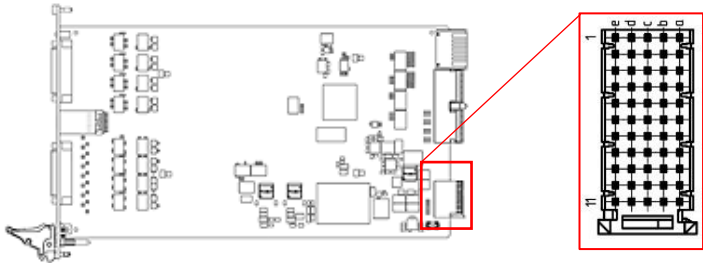


**BACKPLANE 110P XJ2 CONNECTOR PINOUT**

	e	d	c	b	a
1	OUT_3	OUT_2	N/C	OUT_1	OUT_0
2	OUT_7	OUT_6	N/C	OUT_5	OUT_4
3	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
4	OUT_11	OUT_10	N/C	OUT_9	OUT_8
5	OUT_15	OUT_14	N/C	OUT_13	OUT_12
6	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
7	OUT_19	OUT_18	N/C	OUT_17	OUT_16
8	OUT_23	OUT_22	N/C	OUT_21	OUT_20
9	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
10	OUT_27	OUT_26	N/C	OUT_25	OUT_24
11	OUT_31	OUT_30	N/C	OUT_29	OUT_28
12	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
13	N/C	N/C	N/C	N/C	N/C
14	N/C	N/C	N/C	N/C	N/C
15	IN_3	IN_2	N/C	IN_1	IN_0
16	IN_7	IN_6	N/C	IN_5	IN_4
17	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
18	IN_11	IN_10	N/C	IN_9	IN_8
19	IN_15	IN_14	N/C	IN_13	IN_12
20	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
21	IN_19	IN_18	N/C	IN_17	IN_16
22	IN_23	IN_22	N/C	IN_21	IN_20
23	GSE_GND	GSE_GND	GSE_GND	GSE_GND	GSE_GND
24	IN_27	IN_26	N/C	IN_25	IN_24
25	IN_31	IN_30	N/C	IN_29	IN_28



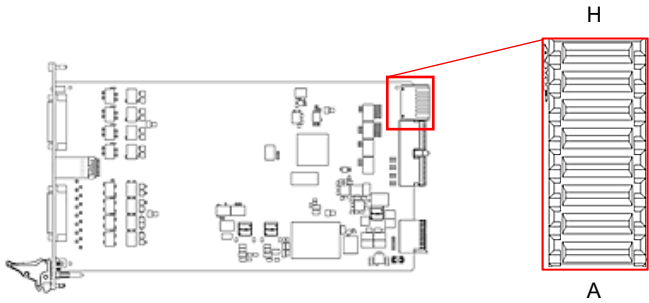
BACKPLANE 55P XJ1 CONNECTOR PINOUT



	e	d	c	b	a
1	N/C	N/C	N/C	N/C	N/C
2	N/C	N/C	N/C	N/C	N/C
3	N/C	N/C	N/C	N/C	N/C
4	N/C	N/C	N/C	N/C	N/C
5	N/C	N/C	N/C	N/C	N/C
6	N/C	N/C	N/C	N/C	N/C
7	GSE_GND	N/C	GSE_GND	N/C	GSE_GND
8	SLSC_SpiMOSI	GSE_GND	SLSC_SpiCLK	GSE_GND	SLSC_IntIn#
9	GSE_GND	SLSC_Trig_To_Mod	GSE_GND	SLSC_Trig_From_Mod	GSE_GND
10	N/C	GSE_GND	SLSC_SpiMISO	GSE_GND	SLSC_ED_SS#
11	24 V	SLSC_Rdy/Rst#	3.3 V	SLSC_ID_SS#	24 V



BACKPLANE XJ3 CONNECTOR PINOUT



H	ISO_GND
G	ISO_GND
F	EXT_CLK_IN
E	EXT_CLK_OUT
D	CHASSIS_GND
C	CHASSIS_GND
B	GSE_GND
A	GSE_GND

ISOLATED HIGH-VOLTAGE SINGLE-ENDED MODULE



PROPERTIES TABLE

For use with NI SLSC VI package

Signal Name	Description	Documentation	RW
BA.Isolated_Power_Supply_Switch	Output of the Isolated power supply	Lets you control the output of the Isolated power supply	RW
BA.DebugPort_Switch	Output of the Isolated power supply	Lets you control the output of the Isolated power supply	RW
BA.Discrete_Enable	Discrete Mode	Lets you control the Discrete Mode	RW
BA.Discrete_Inputs	Discrete Inputs	Read the Discrete Inputs	R
BA.Discrete_Outputs	Discrete Outputs	Read/Write the Discrete Outputs	RW
BA.ModuleControllerVersion	Module Controller Version	The version is the timestamp, in hexadecimal format, of the time the Module Controller was compiled	R
BA.Isolated_Power_Supply_Stage_2_Voltage	Isolated Power Supply Stage 2 Voltage	Reads Isolated power supply stage two's voltage	R
BA.Isolated_Power_Supply_Stage_2_Current	Isolated Power Supply Stage 2 Current	Reads Isolated power supply stage two's Current	R
BA.Isolated_Power_Supply_Stage_2_Temperature	Isolated Power Supply Stage 2 Temperature	Reads Isolated power supply stage two's temperature	R
BA.Isolated_Power_Supply_Stage_3_Voltage	Isolated Power Supply Stage 3 Voltage	Reads Isolated power supply stage three's voltage	R
BA.Isolated_Power_Supply_Stage_3_Current	Isolated Power Supply Stage 3 Current	Reads Isolated power supply stage three's Current	R
BA.Isolated_Power_Supply_Stage_3_Temperature	Isolated Power Supply Stage 3 Temperature	Reads Isolated power supply stage three's temperature	R
BA.SLSC_3p3_Voltage	Voltage of 3.3V line of SLSC Chassis	Reads the voltage of 3.3V line of SLSC Chassis	R
BA.SLSC_24V_Voltage	Voltage of 24V line of SLSC Chassis	Reads the voltage of 24V line of SLSC Chassis	R
BA.SLSC_24V_Current	Current of 24V line of SLSC Chassis	Reads the current of 24V line of SLSC Chassis	R
BA.GSE_3p3V_Voltage	Voltage of 3.3V line of GSE	Reads the voltage of 3.3V line of GSE	R
BA.GSE_3p3V_Current	Current of 3.3V line of GSE	Reads the current of 3.3V line of GSE	R
BA.GSE_1p5V_Voltage	Voltage of 1.5V line of GSE	Reads the voltage of 1.5V line of GSE	R
BA.GSE_1p5V_Current	Current of 1.5V line of GSE	Reads the current of 1.5V line of GSE	R
BA.GSE_Temperature_Sensor_1	Temperature Sensor 1	Reads the temperature reported by temperature sensor 1	R
BA.GSE_Temperature_Sensor_2	Temperature Sensor 2	Reads the temperature reported by temperature sensor 2	R
BA.GSE_Temperature_Sensor_3	Temperature Sensor 3	Reads the temperature reported by temperature sensor 3	R
BA.GSE_Temperature_Sensor_4	Temperature Sensor 4	Reads the temperature reported by temperature sensor 4	R

DATASHEET

ISOLATED HIGH-VOLTAGE SINGLE-ENDED MODULE



REGISTER MAPPING TABLE
For developing custom SLSC drivers

Signal Name	Addr (x16)	RW	Length	Reset Value	Bits							
General Register	0025	RW	8	0	7	6	5	4	3	2	1	0
					X	X	X	Discrete Mode	Discrete Enable	X	DebugPort switch	Isolated Power Supply Switch
iDis Register (Input State)	0026	R	32		31	30	29	...	...	2	1	0
					Channel 31	Channel 30	Channel 29	Channel n	Channel n	Channel 2	Channel 1	Channel 0
oDis Register (Output State)	0027	RW	32	0	31	30	29	...	...	2	1	0
					Channel 31	Channel 30	Channel 29	Channel n	Channel n	Channel 2	Channel 1	Channel 0
oDis En Register (Discrete Enable)	0028	RW	32	0	31	30	29	...	...	2	1	0
					Channel 31	Channel 30	Channel 29	Channel n	Channel n	Channel 2	Channel 1	Channel 0
Miscellaneous	0004	RW	8	0	7	6	5	4	3	2	1	0
					X	X	X	X	X	X	X	Flash Write Protect
Version	0000	R	32		31	30	29	...	...	2	1	0
					Timestamp							
Isolated Power Supply Stage_2	0015	R	32		31	30	29	...	...	2	1	0
					Voltage							
Isolated Power Supply Stage_2	001F	R	32		31	30	29	...	...	2	1	0
					Current							
Isolated Power Supply Stage_2	001D	R	32		31	30	29	...	...	2	1	0
					Temperature							
Isolated Power Supply Stage_3	001B	R	32		31	30	29	...	...	2	1	0
					Voltage							
Isolated Power Supply Stage_3	0017	R	32		31	30	29	...	...	2	1	0
					Temperature							
Isolated Power Supply Stage_3	0019	R	32		31	30	29	...	...	2	1	0
					Current							
SLSC 24V Voltage	0005	R	32		31	30	29	...	...	2	1	0
					Voltage							
SLSC 24V Current	000D	R	32		31	30	29	...	...	2	1	0
					Current							
SLSC 3p3V Voltage	0007	R	32		31	30	29	...	...	2	1	0
					Voltage							
GSE 3p3V Voltage	0009	R	32		31	30	29	...	...	2	1	0
					Voltage							
GSE 3p3V Current	000E	R	32		31	30	29	...	...	2	1	0
					Current							
GSE 1p5V Voltage	000B	R	32		31	30	29	...	...	2	1	0
					Voltage							
GSE 1p5V Current	000F	R	32		31	30	29	...	...	2	1	0
					Current							
GSE Temperature Sensor_1	0011	R	32		31	30	29	...	...	2	1	0
					Temperature							
GSE Temperature Sensor_2	0012	R	32		31	30	29	...	...	2	1	0
					Temperature							
GSE Temperature Sensor_3	0013	R	32		31	30	29	...	...	2	1	0
					Temperature							
GSE Temperature Sensor_4	0014	R	32		31	30	29	...	...	2	1	0
					Temperature							

DATASHEET

ISOLATED HIGH-VOLTAGE SINGLE-ENDED MODULE



HOW TO ORDER

Table 1 shows the available configurations for immediate ordering.

Table 1. Available Configurations for Ordering

PWA	Physical Protocol	Isolated Domain Voltage	Drive Series Resistance	Receiver Series Resistance	Receiver Pull-up Resistance	Receiver Pull-down Resistance	Ground Scheme
200140-00	CMOS	10 V	25 Ω	25 Ω	Open	Open	2.2 M Ω 100 nF
200140-01	CMOS	12 V	25 Ω	25 Ω	Open	Open	2.2 M Ω 100 nF
200140-XX	Customizable based on customer requests.						

For the customized Isolated High-Voltage Single-Ended Module (200140-XX), please provide the parameters below utilizing Table 2. A dash number will be associated with the requested configuration.

- 1) Physical Protocol
- 2) Isolated Domain Supply Voltage
- 3) Driver Series Resistance
- 4) Receiver Termination Resistance
- 5) Receiver Termination Capacitance
- 6) Receiver Series Resistance
- 7) Ground Scheme
- 8) Modifier

Table 2. Configurable Isolated High-Voltage Single-Ended Module Parameters for Ordering

Isolated High-Voltage Single-Ended Module							
PWA	Physical Protocol	Isolated Domain Voltage	Drive Series Resistance	Receiver Series Resistance	Receiver Pull-up Resistance	Receiver Pull-down Resistance	Ground Scheme
200140	CMOS	10 V	0 Ω	0 Ω	Open	Open	2.2 M Ω 100 nF All Legs
		12 V	25 Ω	25 Ω	1 k Ω	1 k Ω	Open All Legs
			50 Ω	50 Ω	2 k Ω	2 k Ω	0 Ω Iso to Chassis, 2.2 M Ω 100 nF others
			100 Ω	100 Ω	4.7 k Ω	4.7 k Ω	0 Ω GSE to Chassis, 2.2 M Ω 100 nF others
			500 Ω	500 Ω	10 k Ω	10 k Ω	0 Ω Iso to GSE, 2.2 M Ω 100 nF others
			1 k Ω	1 k Ω	XX k Ω	XX k Ω	0 Ω All Legs
			2 k Ω	2 k Ω			
			4.7 k Ω	4.7 k Ω			
			10 k Ω	10 k Ω			

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