STAR-Dundee

SpaceWire and SpaceFibre Expertise

SpaceWire Isolator

The compact SpaceWire Isolator provides a protective barrier between SpaceWire test equipment and valuable SpaceWire flight hardware. The Isolator protects equipment from electrical surges and transient voltage spikes, and eliminates ground loop currents flowing between equipment which can cause damage to LVDS interfaces and poor equipment performance. The SpaceWire Isolator is designed specifically to protect expensive flight equipment but is suitable for all stages of SpaceWire equipment development: development, unit testing, integration support, and EGSE.

STAR-Dundee's SpaceWire Isolator is very easy to use. It operates transparently in-line with the SpaceWire links, with no additional software drivers or configuration required.

The Isolator provides two independent SpaceWire channels that operate at up to 150 Mbit/s between two SpaceWire devices which may not necessarily be at the same ground potential. The SpaceWire Isolator employs digital isolation components to overcome this requirement, providing protection for two independent SpaceWire links to be connected safely.

Key Features

Two independent links: isolates and protects two links between SpaceWire test equipment and SpaceWire flight equipment.

Isolation: tested to 60 V potential difference between ground reference planes; components rated to 100 V.

Link speed: both links are fully compatible with the SpaceWire standard and operate from 2 Mbit/s up to 150 Mbit/s.

Common mode filtering: on all data lines.

Software and configuration: none needed; works transparently.

Enclosure: compact size and rugged design.

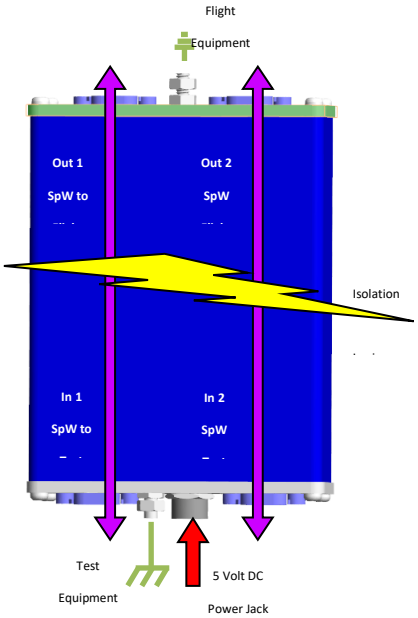
Test Panel

Flight Panel

Overview

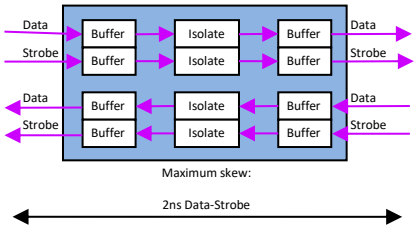
The SpaceWire Isolator has two channels which can independently transmit SpaceWire data from 2 Mbit/s up to 150 Mbit/s. These two channels can be used to provide nominal and redundant SpaceWire data paths between test and flight equipment. Alternatively, the two channels of the Isolator can be used to interface two separate test devices to separate flight instruments.

The Isolator device features one "Test" panel, designed to connect to ground support and test equipment. On the opposite side of the device, the "Flight" panel is designed to connect to flight hardware.



Performance

The SpaceWire Isolator buffers LVDS data, isolates the digital signal, and then re-transmits it as LVDS. There is no clock recovery, or data re-synchronisation that takes place in the Isolator. The configuration of an Isolator SpaceWire channel is shown below.



The devices used on the Isolator introduce data-strobe skew, and pulse width skew in each direction. A maximum of 2 ns of Data-Strobe (D-S) skew is introduced to the SpaceWire signal in each direction.

Therefore using an Isolator with a 10 meter STAR-Dundee SpaceWire Lab Cable (featuring a maximum D-S skew of 0.1 ns/m) would give a maximum D-S skew of 3 ns.

Electrical Characteristics of the Isolator

Electrical & Switching Characteristics	
LVDS input voltage	-0.3 Volts to +4.0 Volts
LVDS output voltage	-0.3 Volts to +3.9 Volts
LVDS output short circuit current (D+,D-)	-9 mA
LVDS output short circuit duration (D+,D-)	Continuous
Isolation between Flight and Test interface grounds	-100 to +100 Volts

Electrical & Switching Characteristics					
Description	**Conditions**	**Min**	**Typ**	**Max**	**Units**
Isolation Voltage between Flight and Test interface grounds		-60		60	V
LVDS Output DC Specifications					
Differential output Voltage		250	350	450	mV
Offset Voltage		1.125	1.2	1.375	V
LVDS Input DC Specifications					
Differential input high threshold	VCM= 1.2V,0.05V,2.35V			100	mV
Differential input low threshold		-100			mV
Common mode Voltage range		0.05		2.35	V
LVDS AC Specifications					
Data-Strobe Skew				2	ns

Specifications

Part Number	134
Size	85 x 66 x 19 mm (approx.)
Power	+5V DC, power brick supplied
SpW Ports	• Compliant to ECSS-E50-12A, ECSS-E-ST-50-12C and ECSS-E-ST-50-12C Rev.1 • Number of SpaceWire channels: 2 • Speed: 2 Mbit/s to 150 Mbit/s* • Connectors: 9-pin micro-miniature D-type
Isolation	Tested to 60 V, components rated to 100 V
LED Indicators	• Flight side: Blue LED indicates power to the flight side • Test side: Blue LED indicates power to the test side
Operating Temperature	-20°C to +60°C
EMC	CE/FCC Certified

FMECA report available on request

*Maximum link speed depends on link length and timing characteristics of interfaced devices. 200 Mbit/s has been tested at room temperature on a variety of cable lengths including a 10 metre cable on the flight interface and 2 metre on the test interface using STAR-Dundee SpaceWire Lab Cables.

Note: The SpaceWire Isolator is not rated for spaceflight use.

WARNING

The isolation must be connected to the Test equipment ground and Flight equipment ground before the SpaceWire links are connected.

STAR-Dundee

STAR-Dundee Ltd.
STAR House
166 Nethergate
Dundee
DD1 4EE
Scotland, UK

Tel: +44 1382 201755
Fax: +44 1382 388838
E-mail: enquiries@star-dundee.com
Web: www.star-dundee.com
Twitter: @STAR_Dundee
LinkedIn: STAR-Dundee