STAR-Dundee
SpaceWire and SpaceFibre Expertise

SpaceWire Isolator Mk2

The compact SpaceWire Isolator Mk2 provides a protective barrier between SpaceWire test equipment and valuable SpaceWire flight hardware. The Isolator Mk2 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 Mk2 is designed specifically to protect expensive flight equipment but is suitable for all stages of SpaceWire equipment development: prototyping, implementation, unit testing, integration support, and EGSE.

STAR-Dundee's SpaceWire Isolator Mk2 is very easy to use. It operates transparently in-line with the SpaceWire links, with no additional software drivers or configuration required.

The Isolator Mk2 provides two independent SpaceWire channels that operate at up to 400 Mbit/s between two SpaceWire devices which may not necessarily be at the same ground potential. The SpaceWire Isolator Mk2 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.

Link speed: both links are fully compatible with the SpaceWire standard and operate up to 400 Mbit/s.

Common mode filtering: on all data lines.

Software and configuration: none needed; works transparently.

Enclosure: compact size and rugged design.

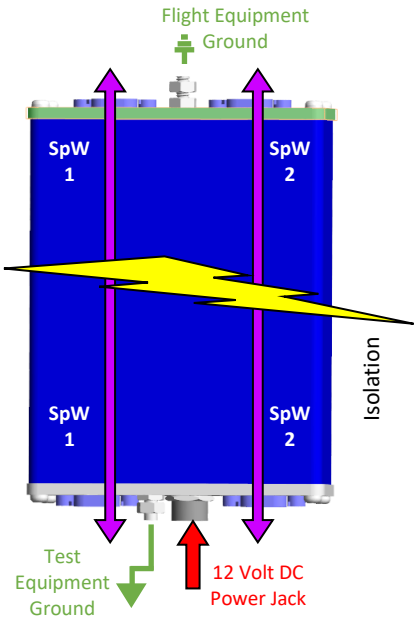
Test Panel

Flight Panel

Overview

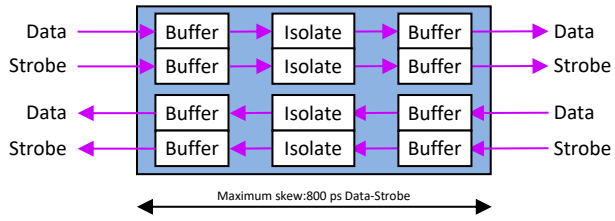
The SpaceWire Isolator Mk2 has two channels which can independently transmit SpaceWire signals from DC up to 400 Mbit/s. These two channels can be used to provide nominal and redundant SpaceWire data paths between test and flight equipment. Alternatively, the two channels of the Isolator Mk2 can be used to interface two separate test devices to separate flight instruments.

The Isolator Mk2 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 Mk2 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 Mk2. The configuration of an Isolator Mk2 SpaceWire channel is shown below.



The devices used on the Isolator Mk2 introduce a maximum 800 ps of data-strobe skew, in each direction. Therefore, using an Isolator Mk2 with a total length of 10 metres of STAR-Dundee Lab Cables for SpaceWire Equipment (featuring a maximum D-S skew of 0.1 ns/m) would give a maximum data-strobe skew of 1.8 ns.

Isolator Mk2 Electrical Characteristics

Absolute Maximum Specifications	
Voltage on LVDS inputs or outputs	-0.3 Volts to +3.6 Volts

Electrical & Switching Characteristics					
Description	**Conditions**	**Min**	**Typical**	**Max**	**Units**
Isolation Voltage between Flight and Test interface grounds		-60		60	V
LVDS Output DC Specifications					
Differential output Voltage	100 Ω differential termination at receiver	250	330	450	mV
Common-Mode Voltage (V_{CM})		1.125	1.230	1.375	V
LVDS Input DC Specifications					
Differential input (V_{ID}) high threshold	V_{CM}= 1.2V,0.05V, 2.35V			100	mV
Differential input (V_{ID}) low threshold		-100			mV
Input Voltage range	$V_{CM} + V_{ID}/2$	0		2.4	V
LVDS AC Specifications					
Data-Strobe Skew				800	ps

Specifications

Part Number	169
Size	86 x 67 x 19 mm (enclosure body) 102 x 67 x 20 mm (overall)
Power	+12V DC, mains 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: DC up to 400 Mbit/s* • Connectors: 9-pin micro-miniature D-type
Isolation	Tested to 60 V
LED Indicators	• Flight side: Green LED indicates power to the flight side • Test side: Green LED indicates power to the test side
Operating Temperature	+10°C to +40°C
EMC	CE/FCC Certified

*Maximum link speed depends on link length and timing characteristics of interfaced devices. 400 Mbit/s has been tested at room temperature on a variety of cable lengths including a 2 metre cable on the flight interface and 2 metre on the test interface using STAR-Dundee Lab Cables for SpaceWire Equipment.

The SpaceWire Isolator Mk2 builds upon the capabilities of the original SpaceWire Isolator product, providing operation at higher SpaceWire link speeds and enhanced FMECA protection.

A FMECA report is available on request.

Note: The SpaceWire Isolator Mk2 is designed for use in laboratory conditions. It is not rated for use in space or other extreme environments.

WARNING

The SpaceWire Isolator Mk2 must be connected to the Test equipment ground and Flight equipment ground before any equipment connected by SpaceWire is powered up.

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