DMXU-D4-A

Differential High Frequency Multiplexer

- Dual pole four throw multiplexer (DP4T / 2:8)
- Differential high-speed signal switching
- 10GHz frequency bandwidth (3dB bandwidth 8GHz)
- Differential 100Ω or single-ended 50Ω
- 1 billion switching cycles
- Internal ESD protection
- Starts in *not connected* state
- Phase matched signal paths
- Utilizes high-performance RF-MEMS
- USB controlled & powered
- Programming interface available

The Sequid DMXU multiplexer family offers highest performance from DC to the Gigahertz frequency range. The DMXU-D4-A is a DP4T RF-switch for switching differential signals to one of four output ports.

The DMXU-D4-A internally applies microelectromechanical system switch technology, accessible to the user via front panel coaxial connectors. The device is programmed and supplied via the USB 2.0 port, thus no further external power supply is required. If the USB cable is not connected or directly after connecting, all channels are disconnected.

The multiplexer sections for both channels (CH1/2) are physically separated, guaranteeing a high isolation. The channels exhibit a high degree of parallelism thus the phase equality for the differential channels is ensured. The DMXU-D4-A can either be used as differential or as a single-ended switch.

The multiplexer can easily be controlled by using the included software tools. A simple graphical tool can be used for manual switching and testing purpose. A software library (API) for controlling the DMXU from most relevant software environments is also included.

Typical Applications

- Automatic test & measurement systems
- RF, digital, & mixed signal testing
- Multi-channel cable testing
- High-speed digital data transmission
- Ultra-wideband (UWB) signal switching
- Multiplexing in TDR and VNA environments

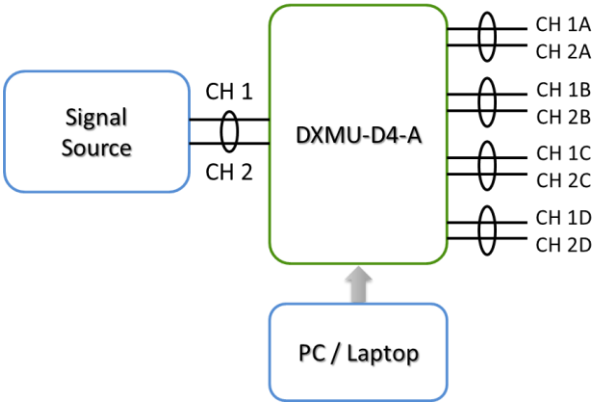

Fig. 1: Typical application of the DMXU-D4-A in a differential switching scenario.

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Simplified Functional Diagram

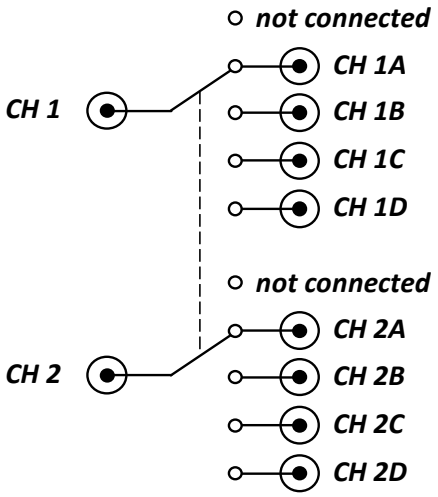

Fig. 2: Simplified functional diagram showing input ports CH1 and CH2 to the left and the blocks of four output ports for each input port. Alternatively, the input can be set to an unconnected state.

Specification & Conditions

Electrical specifications

Operating frequency	0 – 10GHz (3dB bandwidth: 8GHz)
RF max. power ratings	30dBm (50Ω load)
	24dBm (open)
RF input voltage range (DC)	±6V
RF input current range (DC)	±200mA
Contact resistance (ON)	1.8Ω (typ.)
	3.5Ω (max.)
Contact resistance (OFF)	> 1GΩ (@ ±6V)
Hardware switching time (without software latency)	< 100µs
Switching time (with software latency*)	< 10ms
Switching cycles (min. operations, mechanical)	10^9
Switching cycles (min. operations, electrical)	$500 \cdot 10^6$ (hot switching, 10dBm in 50Ω)

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Power Requirements	
Power supply voltage	5V (via USB)
Power supply current	< 12mA
Electrostatic Discharge (ESD)	
RF (in/out), human body model (HBM)	5kV
Dimensions	
With connectors	49×108×180mm³
Without connectors	49×108×165mm³
Operating Conditions	
Temperature	0 – 55°C
Humidity	5% - 85% (R.H., without condensation)

** Latency introduced by internal programming. This latency can increase with large data traffic on the USB port.*

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RF Characteristics

Single-ended characteristics

Parameter	min.	typ.	max.	Frequency
Insertion loss		< 0.4dB	0.5dB	DC – 0.3GHz
		< 1dB	1.2dB	0.3GHz – 2GHz
		< 3dB	3.5dB	2GHz – 8GHz
		< 5dB	6.0dB	8GHz – 10GHz
Return loss (CH1/CH2 input)	20dB	> 25dB		DC – 0.3GHz
	16dB	> 18dB		0.3GHz – 2GHz
	13dB	> 15dB		2GHz – 8GHz
	8dB	> 10dB		8GHz – 10GHz
Isolation between contacts of same channel	40dB	> 45dB		DC – 0.3GHz
	30dB	> 32dB		0.3GHz – 2GHz
	25dB	> 27dB		2GHz – 10GHz

Differential characteristics [(1)]

Parameter	min.	typ.	max.	Frequency
Isolation between CH1 & CH2	55dB	> 60dB		DC – 10GHz
Group delay deviation between CH1 & CH2		± 5ps	± 10ps	DC – 10GHz

[(1)] Measured between same paths (A,B,C,D) of CH1 & CH2

Typical RF-Performance Plots

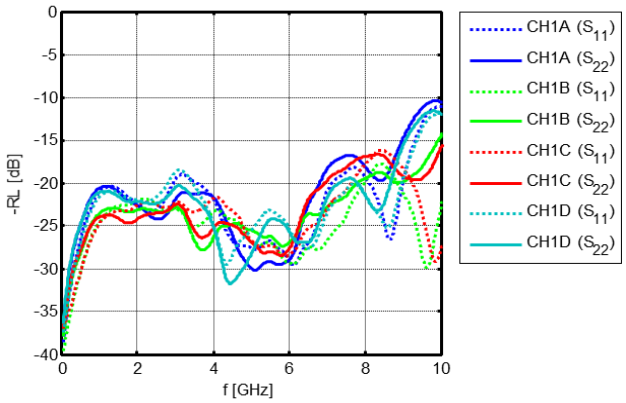

Fig. 3: Return loss (RL) of CH1-input (S11) when routed to 50Ω–terminated output CH1<X> port (S22).

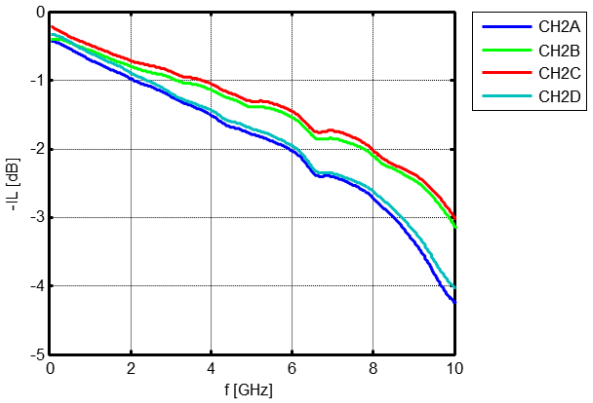

Fig. 4: Insertion loss (IL) between CH1-input and CH1<X>-output ports.

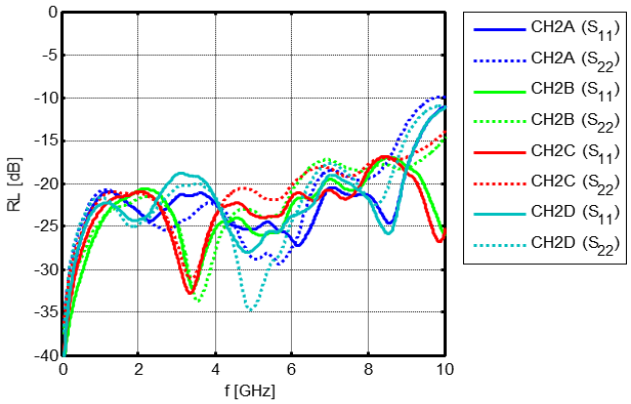

Fig. 5: Return loss (RL) of CH2-input (S11) when routed to 50Ω–terminated output CH2<X> port (S22).

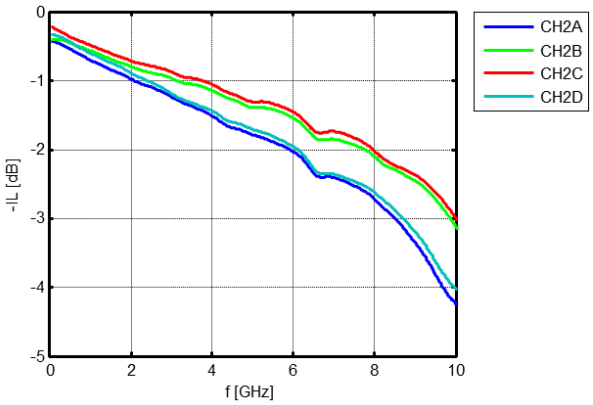

Fig. 6: Insertion loss (IL) between CH2-input and CH2<X>-output ports.

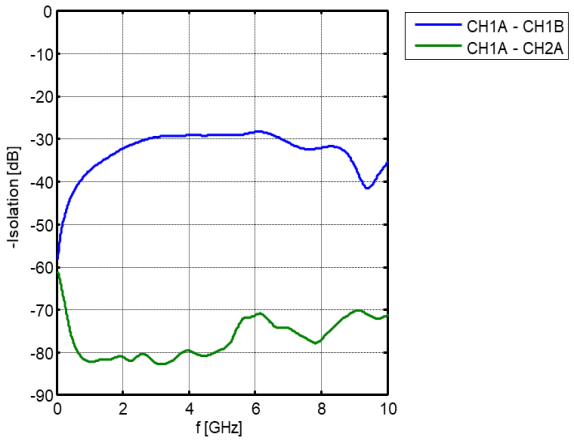

Fig. 7: Isolation between CH1B and CH1 (in), with the latter being routed to 50Ω-terminated CH1A port (blue). Isolation between CH2A and CH1 (in), with the latter being routed to 50Ω-terminated CH1A (green).

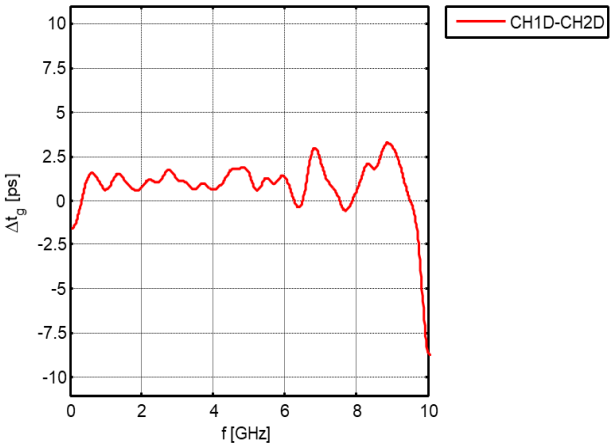

Fig. 8: Group delay difference between signals routed from CH1 input to CH1A output and CH2 input routed to CH2A output.

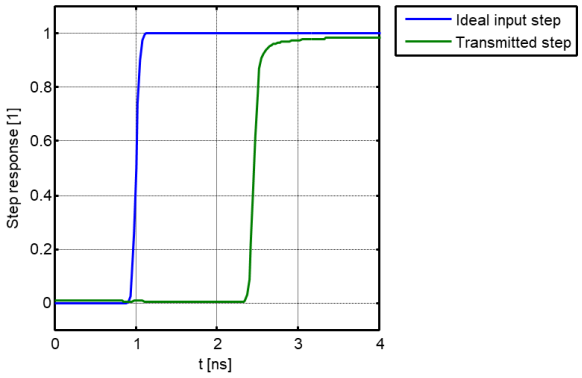

Fig. 9: Simulated step signal with a rise time of 90ps (10%-90%) transmitted from CH1A input to CH1A output port.

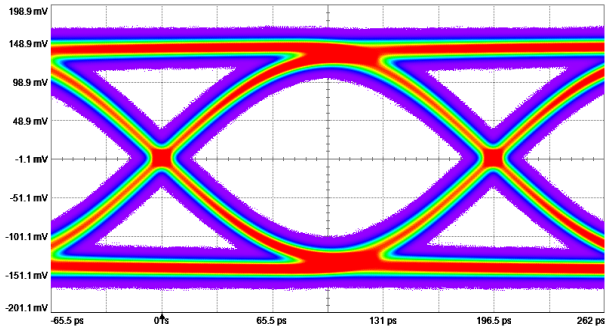

Fig. 10: Eye diagram of a simulated 5.1Gbps PRBS-15 signal pattern (NRZ, 300mV) transmitted from CH1A input to CH1A output port. The rise time is 90ps (10%-90%) and the signal bandwidth is limited to 8GHz.

Programming

For software integration a simple programming interface (API) is available. The software can be integrated into all common programming environments (e.g. LabView, C/C++, C#, Python, Matlab). For testing purpose and manual operation, a graphical user interface is provided.

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Sales Contact

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Complies with EU-directives
2014/35/EU, 2014/30/EU,
2011/65/EU, 2012/19/EU

Notes