becker nachrichtentechnik

BSWM-4X32CSR

Universal, non-reflective 4X32 RF Switch Matrix 100 kHz … 8000 MHz

Features

- compact 19”, 2 U design
- 32 bi-directional DUT RF ports
- 4 instrument-ports
- 2 x 32 DC/LF ports
- 32 DC voltage and ampere meters
- LAN remote interface
- Trigger input for synchronous switching applications

Applications

- MIMO testing
- RF multimedia component testing
- End-of-Line testing
- Product validation
- RF signal routing

At a Glance

BSWM-4X32CSR is a universal, bi-directional RF switch matrix for multi signal routings. Common applications for this product are product validation tests for DUTs (Device Under Test) with multiple antenna ports, known from automotive or MIMO modules.

The device offers 4 ports for measurement instruments. All 4 non-reflective instrument ports can be routed to 32 DUT ports. In the case of non-routing, the ports are matched to 50 ohms of impedance.

For each available DUT port there is also a corresponding DC functionality to allow simulating a load or injecting phantom DC supply.

Due to its high bandwidth from the BSWM-4X32CSR is capable to route signals of almost all current broadcast and communication standards like AM, FM, DAB3 like GSM900, GSM1800, UMTS, LTE 4G, LTE 5G FR1, IEEE 802.11a/b/g/n/ac/ax (Wi-Fi 6E), 802.11be (Wi-Fi 7) and WiMAX 802.16.

Parallel Testing

Due to its good isolation properties, the matrix allows time efficient testing of versatile signals in level and frequency on multiple channels at the same time without influence to each other.

Extensive DC tests possibilities

The BSWM-4X32CSR offers versatile test and simulation functions for DC tests of the DUTs. Each of the 32 channels are equipped with wear free, solid state DC power switches. This allows the insertion of stimulation voltages (14V/18V) and tones (22 kHz) to control the DUT switching state and also the simulation of LNB (Low Noise Blocks) loads. With internal switches a DC short (coaxial cable is shorted) or open state (coaxial cable is broken) can be simulated. An overload protection circuit prevents damage to the module from excessive current loads.

Internal Volt and Ampere Meters

Via the integrated volt and ampere meters, the (14V/18V) control voltage and the current flow can be measured simultaneously in all 32 channels. The volt and ampere meters have high impedance inputs and thereby are negligible in influence on the current flow in the BIAS-Ts.

The current measurement range is ± 500 mA. By application of the 14V/18V control voltage the current flows into the DUT via the BSWM-4X32CSR. In the case LNB simulation the current flow comes out of the matrix.

If the current exceeds the maximum value of ±500 mA, the SHORT, LOAD A and LOAD B switch will be opened automatically. After a RESET by software the SHORT and LOAD switches will be closed again.

Wear free RF switching

Modern fast responding solid state RF switches with high RF power capability are used in the BSWM-4X32CSR matrix. This allows reproducible tests with a huge number of switching cycles and fast switching times of few microseconds.

Remote control with Trigger

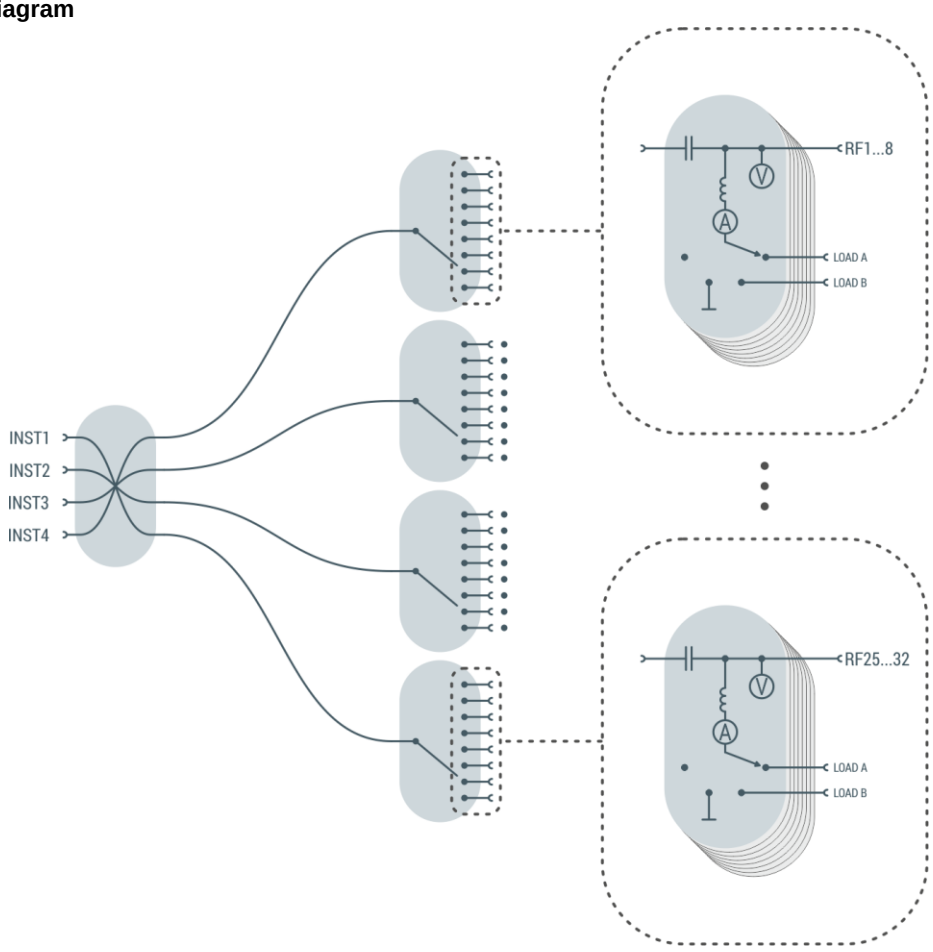
For remote control the BSWM-4X32CSR matrix offers a LAN interface and a trigger input. The matrix can be controlled via simple ASCII strings. A “queue” function allows preloading switching configurations to the matrix device and a triggered execution by trigger pulses. After a positive TTL trigger slope to the trigger input, the preloaded switch configuration will be executed only by hardware in micro seconds. While the trigger receiver is processing, the trigger signal is forced to LOW for a typical 10 ms and all subsequent trigger signals are ignored until the trigger receiver is ready again.

Variable mountable

The BSWM-4X32CSR is housed in a 19”, 2 U cover with variably mountable brackets for mounting in 19” racks. The brackets can be mounted on the front or the rear side of the device. This allows the BSWM-4X32CSR to be mounted front or back in 19" racks. The brackets can be mounted in ½ 19-inch grids over a range of approximately 15 cm, allowing the BSWM-4X32CSR enclosure to be moved in place.

All RF ports and the trigger input are located on the front panel to enable RF connections via short RF cables to the measurement equipment.

Principal Block Diagram



RF Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	Z_{in} / Z_{out}		50		Ohm	
number instrument ports	n_{INSTR}		4			bi-directional
number of RF ports	n_{RF}		32			4 SP8T module blocks
low frequency	f_{min}	100			kHz	
high frequency	f_{max}	7500	8000		MHz	
insertion loss	S_{21}		-9		dB	@2 GHz
			-10		dB	@3 GHz
			-15		dB	@6 GHz
instrument port isolation	S_{INSTR}		-100		dB	
RF to RF isolation	S_{RFRF}		-55		dB	within SP8Ts, d=1
RF to RF isolation	S_{RFRF}		-100		dB	between different SP8Ts
LOAD to RF isolation	S_{LOADRF}		-50		dB	“LOAD_A/B”
RF power instr. ports	$P_{SA/SG}$			+20	dBm	CW
RF power DUT ports	P_{RF}			+33	dBm	CW
maximum DC Voltage	U_{max}	-		±20	V	instrument ports
ESD discharge resistor	R_{ESD}		4.7		kΩ	instrument ports
RF connectors	X_{RF}		SMA female			instruments, RF
switching delay	t_{RFSW}		1		ms	command to execute
command sequence	t_{CMD}		10		ms	between command executions
number commands	n_{COM}			256		preloaded commands
trigger input connector	X_{TRIG}		SMA female			
trigger slope			positive			
trigger level	u_{TRIG}	0	3.3	5	V	TTL
switch delay	t_{50-50}		4		µs	50 % trigger to 50 % RF
switch on time	t_{10-90}		4		µs	10 % RF to 90 % RF
switch off time	t_{90-10}		2		µs	90 % RF to 10 % RF

DC Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
DC voltage	U_{DC}	0		20	V	DUT RF ports
DC current	I_{DC}			±500	mA	RF ports, short protected
internal DC resistance	R_{DC}		4		Ω	SHORT to GND
voltmeter range	U_{DC}	0		20	V	
resolution	ΔU_{DC}		5		mV	
accuracy	dU_{DC}		± 0.1	±2	%	$U_{DC} \geq 3$ V
	dU_{DC}		± 5	± 60	mV	$U_{DC} < 3$ V
ampere meter range	I_{DC}	0		± 500	mA	
resolution	ΔI_{DC}		± 320		µA	$I_{DC} \geq \pm 60$ mA
	ΔI_{DC}		± 32		µA	$I_{DC} < \pm 60$ mA
accuracy	dI_{DC}		± 0.3	±2	%	$I_{DC} \geq \pm 60$ mA
	dI_{DC}		± 0.1	±1.2	mA	$I_{DC} < \pm 60$ mA
DC connectors	X_{DC}		25pole SUB-D socket			front side
counter part	X_{DCP}		25 pole SUB-D plug			4 pcs are part of delivery

Common Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply	u_{AC}	90	230	260	V	50 / 60 Hz
power consumption	P_{AC}		10		W	
power socket	X_{AC}		IEC-60320 C14			
dimensions	WxHxD		approx. 483 x 89 x 265		mm	19”, 2 U, width without 19”-adapters
weight			7.2		kg	
remote interface	X_{REM}		RJ45 10/100BaseT			ASCII commands
operating temp. range	T_o	+ 5		+ 45	°C	
Electromagnetic compatibility	EU: in line with EMC directive (2014/30/EC)					applied harmonized standards: EN61326-2-1, (for use in control and laboratory environments), EN55024, EN55032, EN61000-3-2, EN61000-3-3
Electrical safety	EU: in line with low voltage directive (2014/35/EC)					applied harmonized standard: EN 61010-1
ordering information	BSWM-4X32CSR			P/N:		1901.4112.1

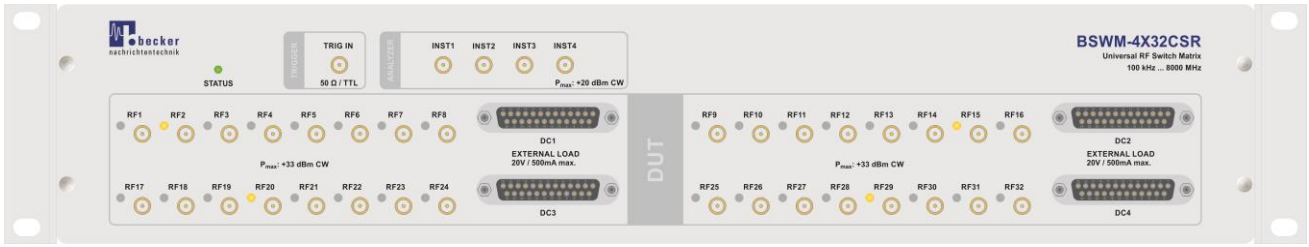
Pin Assignment DC Connectors

n (Channel)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
LOADnA	24	10	21	7	18	4	15	1
LOADnB	12	23	9	20	6	17	3	14
GND	13, 25	11	22	8	19	5	16	2

Note: Fastening screws are also connected to ground.

Appearances

Front View



Rear View