

KEY FEATURES

- ▶ 16 bidirectional DUT RF ports/numberDutPorts x 3 DC LOAD ports
- ▶ 16 x 3 DC LOAD ports
- ▶ Integrated DC tests: OPEN, LOAD to GND (ESD/A/B/C), SHORT to GND, SHORT to VBAT
- ▶ remote controllable

TYPICAL APPLICATIONS

- ▶ RF tests of multimedia components
- ▶ EOL test
- ▶ RF signal routing
- ▶ Broadcast, GNSS, Cellular, 5G, Wi-Fi, UWB, Wireless



AT A GLANCE

The RF switch RSWU-SP16T-CSR is a universal, bi-directional RF switch for multi signal routings in mass production of components with one or more antenna ports. With the RSWU-SP16T-CSR switch, up to 16 DUT (Device under Test) ports can be routed to a common port for i.e. measuring instruments. All RF ports on the instrument and the DUT side are non-reflective, so they are matched to 50 ohms in the case of non-routing. Due to the wide frequency range the switch is compatible with almost all common communication standards: Broadcast signals such as FM and DAB, mobile signals such as GSM900, GSM1800, UMTS, LTE and 5G, wireless communication such as the standards IEEE 802.11 a/b/g/n/ac/ax/be, WiMAX 802.16 and UWB as well as automotive specific standards such as KeylessGo.

SP8T / SP16T Variants

The RF switch is available as either as a SP8T (single pole 8 throw) variant or a SP16T variant to ensure full flexibility for customer requirements. Both switch variants are available in the same form factor. An upgrade from SP8T to SP16T is feasible.

Variant with COM Splitter and switchable LNA

RSWU-SP16T-CSR is typically used together with common SDR measurement equipment to test a variety of signals and protocols within a single setup. To accommodate different instrument topologies — whether the generator and analyzer ports are combined or separate — RSWU-SP16T-CSR is also available as a variant featuring a COM (common port) splitter

that separates the SA (Spectrum Analyzer) and SG (Signal Generator) paths. This variant additionally includes a switchable LNA in the SA path.

Extensive DC Test Possibilities

The RSWU-SP16T-CSR switch offers versatile test and simulation functions for DC tests of the DUTs. Each DUT channel is equipped with wear free, solid state DC power switches which allows the simulation of an open circuit and four load conditions. (LOAD ESD/A/B/C, SHORT) LOAD A, B and C can be configured by the operator from the outside of the device. Depending on the order volume, the internal load can be configured customer-specifically.

Alternatively, LOAD A, B and C connectors can be used to feed in the DUT supply voltage to enable a SHORT to VBAT test

condition. An overload circuit protects the module against damages caused by current overloads.

Volt and Ampere Meter

Via the internal volt and ampere meter, the phantom DC voltage and the current flow can be measured simultaneously on all DUT channels. The volt and ampere meter have high impedance inputs and thereby have a negligible influence in the current flow in the BIAS-Ts.

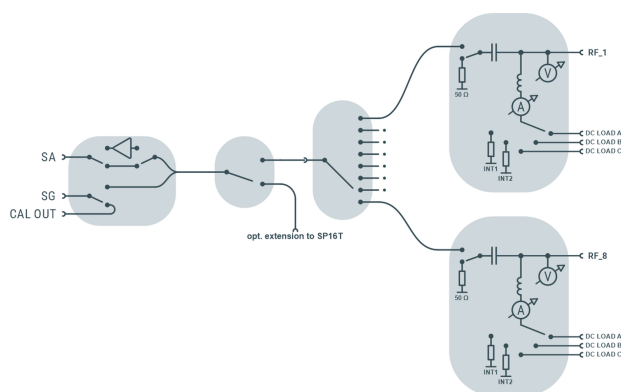
There are two current measurement modes. In the first case, the current flow from the DUT via the load into the RSWU-

SP16T-CSR is measured. In the second case, a current flow from the device into the DUT can be measured, for example to simulate a battery voltage. The measuring circuits are equipped with overload protection if limit values are exceeded.

Rugged Design

The RSWU-SP16T-CSR is housed in rugged aluminum case with a compact form factor.

PRINCIPLE BLOCK DIAGRAM



Block Diagram

RF SPECIFICATIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
impedance	Z	–	50	–	Ω	
number of COM ports	n_{COM}	–	2	–		2 instrument ports (SA/SG)
number of THROW ports	n_{THROW}	–	16	–		DUT ports
low frequency	f_{MIN}	–	10	100	MHz	
	f_{MIN}	–	100	–	MHz	variant with LNA, LNA ON
high frequency	f_{MAX}	12	–	–	MHz	
SA insertion loss	$S_{21,SA}$	-14.0	-12.0	-10.0	dB	variant with LNA, LNA OFF, @ 2 GHz
	$S_{21,SA}$	-16.0	-14.0	-10.0	dB	variant with LNA, LNA OFF, @ 4 GHz
	$S_{21,SA}$	-18.0	-16.0	-10.0	dB	variant with LNA, LNA OFF, @ 6 GHz
SG insertion loss	$S_{21,SA}$	-22.0	-20.0	-19.0	dB	@ 2 GHz

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
	$S_{21,SA}$	-23.0	-22.0	-21.0	dB	@ 6 GHz
SA to SG isolation	$S_{SA,SG}$	–	-25.0	–	dB	connected to the same RF port
channel isolation	S_{32}	–	-70.0	–	dB	DUT to DUT, ≤ 6 GHz, d=1
	S_{32}	–	-40.0	–	dB	DUT to DUT, @ 12 GHz
load isolation	S_{LOAD}	–	-50.0	–	dB	“LOAD_A/B/C”, f > 1 MHz
RF power THROW ports	P_{DUT}	–	–	23	dBm	DUT ports, device OFF
	P_{DUT}	–	–	27	dBm	DUT ports, CW/PEP, hot switching
	P_{DUT}	–	–	30	dBm	DUT ports, CW/AVG, ON/OFF state
	P_{DUT}	–	–	35	dBm	DUT ports, Peak, DC ≤ 5% T ≤ 230 ms
	P_{DUT}	–	–	30	dBm	DUT ports, CW/AVG, hot switching
	P_{DUT}	–	–	35	dBm	DUT ports, PEP, hot switching
	P_{DUT}	–	–	20	dBm	DUT ports, CW/AVG
RF power COM ports	P_{DUT}	–	–	20	dBm	CW/AVG
linear gain LNA	$S_{21,LNA}$	16	15	19	dB	variant with LNA, referred to LNA OFF, @ 2 GHz
	$S_{21,LNA}$	16	18	19	dB	variant with LNA, referred to LNA OFF, @ 6 GHz
	$S_{21,LNA}$	13	15	16	dB	variant with LNA, referred to LNA OFF, @ 12 GHz
noise figure LNA	$NF_{SA,LNA}$	–	15	17	dB	variant with LNA, @ 2 GHz
	$NF_{SA,LNA}$	–	18	21	dB	variant with LNA, @ 6 GHz
	$NF_{SA,LNA}$	–	26	28	dB	variant with LNA, @ 12 GHz
P1dB (SA direction)	$P1dB_{SA,LNA}$	10	17	–	dBm	variant with LNA, @ 2 GHz
	$P1dB_{SA,LNA}$	10	15	–	dBm	variant with LNA, @ 6 GHz
	$P1dB_{SA,LNA}$	8	12	–	dBm	variant with LNA, @ 12 GHz
IP3 (SA direction)	$OIP3_{SA,LNA}$	20	30	–	dBm	variant with LNA, @ 2 GHz
	$OIP3_{SA,LNA}$	20	26	–	dBm	variant with LNA, @ 6 GHz
	$OIP3_{SA,LNA}$	18	24	–	dBm	variant with LNA, @ 12 GHz
DC voltage	U_{DC}	–	–	20	V	COM ports
ESD discharge resistor	R_{ESD}	–	4.7	–	kΩ	COM ports
RF connector type	X_{RF}	SMA female				front panel

COMMON SPECIFICATIONS

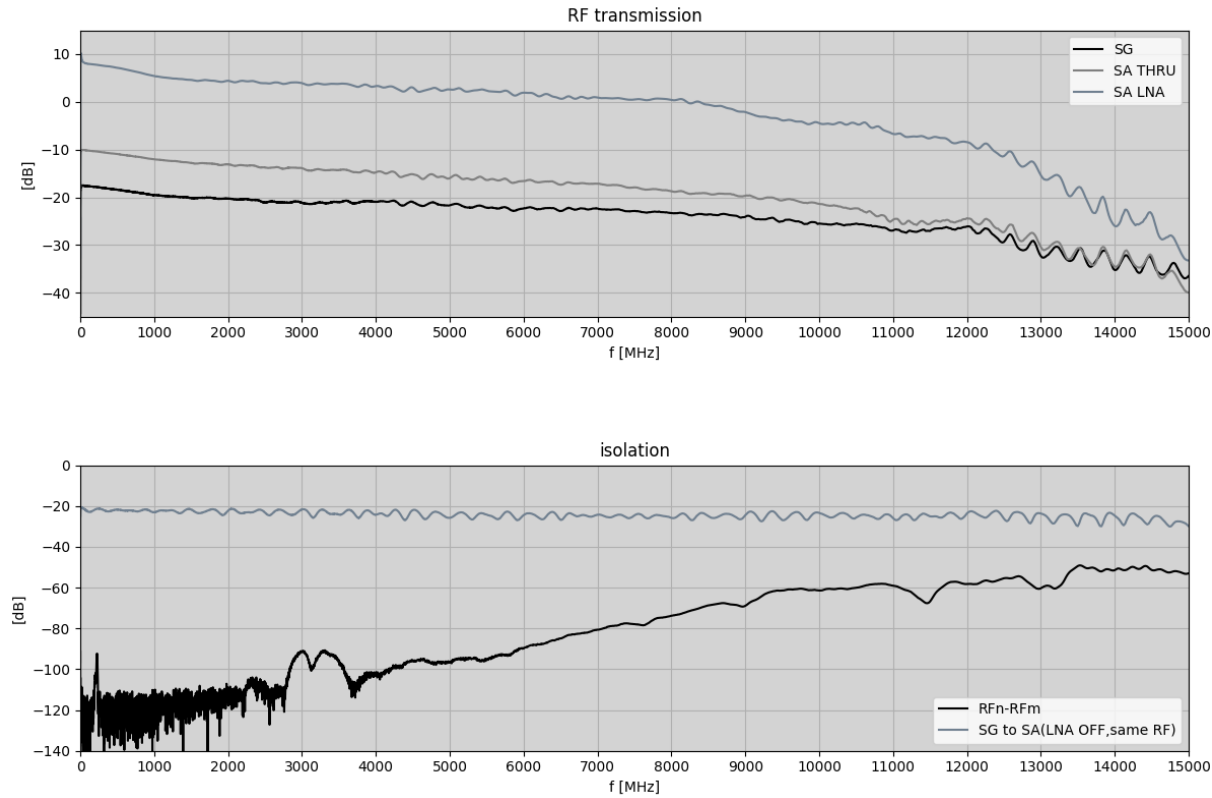
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
dimensions	$W \times H \times D$	approx. 483 x 45 x 265			mm	19", 1 U
weight	m	–	3.6	–	kg	
operating temp. range	T_O	5	–	45	°C	

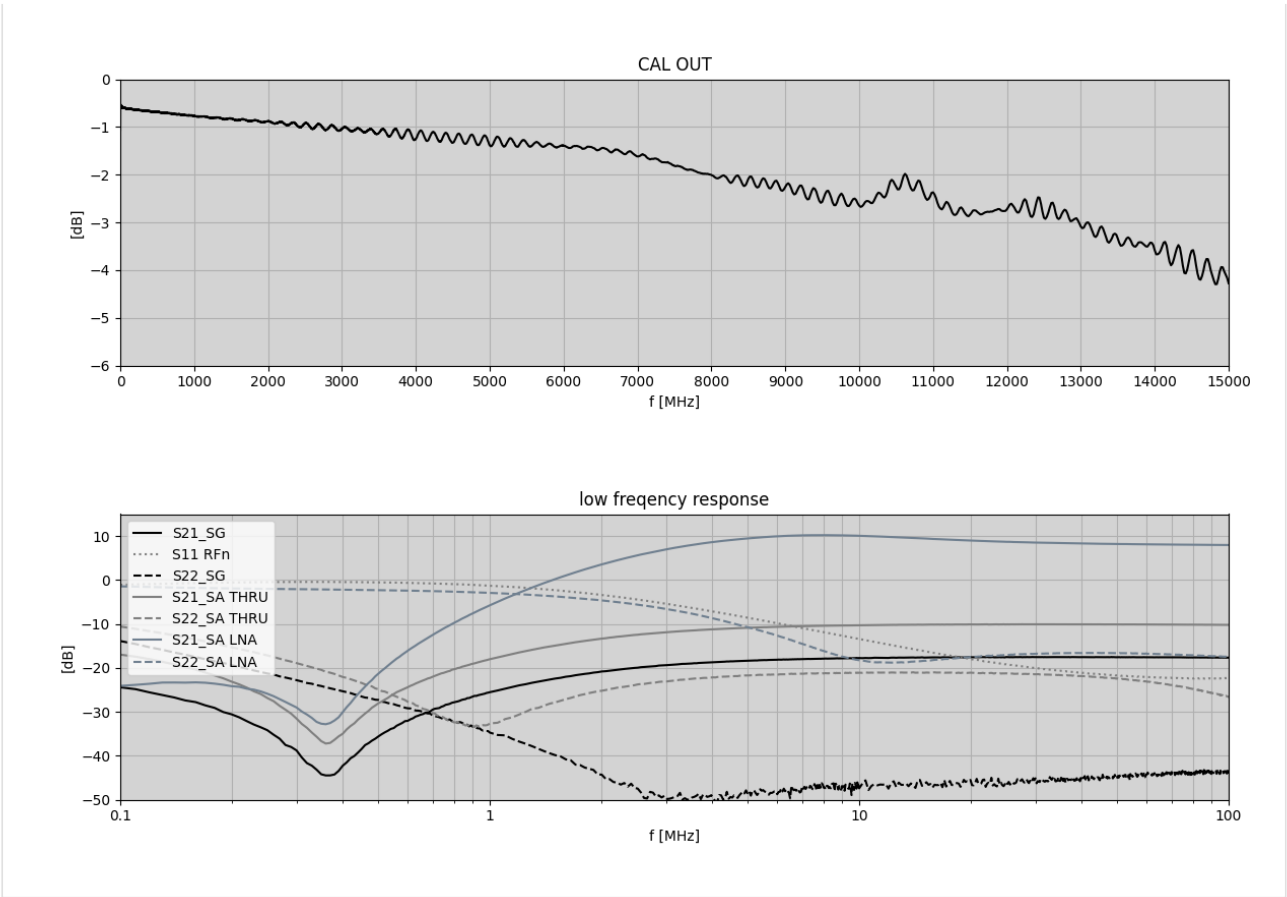
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
storage temp. range	T_S	-40	–	70	°C	

COMPLIANCE SPECIFICATIONS

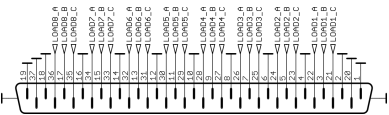
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
electrical safety		EU: in line with low voltage directive (2014/35/EC)				applied harmonized standard: EN 61010-1
electromagnetic compatibility		EU: in line with EMC directive (2014/30/EC)				applied harmonized standards: EN 61326-1 (for use in industrial environment), EN 61326-2-1, EN 55011 (class B), EN 61000-3-2, EN 61000-3-3
material compliance		RoHS compliant in accordance with EU Directive 2011/65/EU and 2015/863/EU				applied harmonized standards: EN 63000:2018

S-PARAMETERS (TYPICAL RESPONSES)





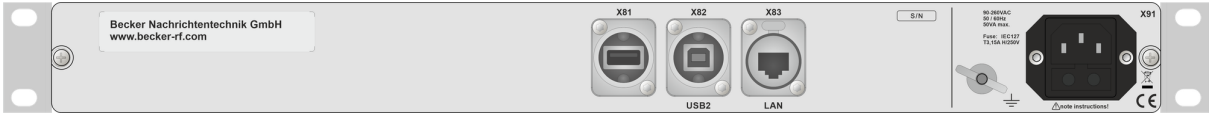
Pin Assignment DC Connectors



N (CHANNEL)	1	2	3	4	5	6	7	8
LOADnA	22	24	26	28	30	32	34	36
LOADnB	3	5	7	9	11	13	15	17
LOADnB	21	23	25	27	29	31	33	36
GND	2	4	6	8	10	12	14	16

Note: Also GND: 1,19,20,37 and fasting screws.

APPEARANCES



Rear View



Front View

ORDERING INFORMATION

PART NUMBER	VARIANT	DESCRIPTION
1901.4512.1	–	Non-reflective, Bidirectional, SP16T RF Switch with DC Load Simulation, 100 MHz... 12 GHz

RELATED PRODUCTS

PART NUMBER	PRODUCT	DESCRIPTION
2408.6002.1	BSDU-4X32PR	Universal Non-reflective 4 Channel RF Multi Power Attenuator 600 MHz ... 6000 MHz
1901.4112.1	BSWM-4X32CSR	Universal Non-reflective 4X32 RF Switch Matrix 100 kHz ... 8000 MHz
1810.6012.1	RSDU-2X4AR	2 Channel Radio Signal Conditioning and Distribution Unit, 100 kHz ... 2500 MHz
1811.4101.1	RSWU-8SPDT-CS	8 CH high isolation switch module with OPEN/LOAD/SHORT test function
1807.6302.1	WSDU-1X8AR	8-Way Wideband Signal Conditioning Multicoupler Unit, 100 kHz ... 4000 MHz