

Xtra Long Life 100 million cycles

USB RF-SPDT Switch

USB-2SPDT-A18XL

50Ω DC to 18GHz

The Big Deal

- Capable of 100 million cycles
- Wide frequency (DC to 18GHz)
- High power, 10W
- 2 SPDT electromechanical, absorptive, RF switches (Isolation 85 dB typ.) configurable into a SP3T switch
- USB HID device, includes control software with a GUI and an API DLL com object compatible with 32/64 Bit operating systems



Case Style: LM1581



Installation CD with Software included

Product Overview

Mini Circuits' USB-2SPDT-A18XL is a general purpose USB controlled RF switch box containing two electro-mechanical SPDT, absorptive failsafe RF switches constructed in break-before-make configuration and powered by +24V_{DC} with a switching time of 25 mSec typical. The RF switches can be set as two independent SPDT switches, or a single DPDT or SP3T switch (see page 6 for details). The RF switches can be operated in all these configurations remotely using the supplied GUI program, or programmed by the user using the included API DLL com object. The RF switches operate over a wide frequency band from DC to 18GHz, have low insertion loss (0.2 dB typical) and high isolation (85dB typical) making the switch box perfectly suitable for a wide variety of RF applications.

The USB-2SPDT-A18XL is constructed in a plastic case (size of 4.26" X 6.08" X 2.25") with 6 SMA(F) connectors (IN, J1, J2 for each switch), a 2.1mm DC socket, and a USB type B port. The model is supplied along with a CD containing a graphical user interface program featuring an API DLL com object. Also included is a 2.7ft. USB cable, and a power adapter suitable for both US and EU systems. Longer USB cables and SMA Male/ SMA Male coaxial semiflex cables for configuring the switch box are available as additional options.

Key Features

Feature	Advantages
USB HID (Human Interface Device)	Plug-and-Play (no need to install a driver for the device).
RF SPDT Electromechanical switch	Wideband (DC to 18GHz) with low insertion loss (0.2 dB typ.), very high isolation (85dB typ.), and high power rating (10W cold switching)
24V _{DC} Operating voltage	The USB-2SPDT-A18XL requires 24V/500mA to power the RF switches, supplied from the included power adapter.
32/64 Bit operating systems	Compatible with Windows® and Linux® operating systems using 32 and 64 bit architecture.
Software CD, USB cable, and 24V _{DC} Power adapter included	A CD containing a programing manual for Linux® and Windows® operating systems (32 and 64 bit systems) and a Windows® GUI program containing an API DLL com object is included with the USB-3SPDT-A18XL. A 2.7ft. USB cable and a power adapter with both US and EU connectors, are also included.



For detailed performance specs & shopping online see web site

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Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp.

Xtra Long Life 100 million cycles USB RF-SPDT Switch

50Ω DC to 18GHz

Features

- Capable of 100 million cycles
- Two DC to 18GHz SPDT absorptive failsafe RF switches in break-before-make configuration
- Electromechanical switching (Isolation 85 dB typ.)
- High power handling, 10W
- Greatly simplifies complex switching and timing setups
- Easy installation and operation
- Compatible with 32/64-bit Windows® or Linux® operating systems, as well as LabVIEW®, Delphi®, C++, C#, Visual Basic®, and .NET software ¹
- Friendly Windows® Graphical User Interface
- Mounting bracket (Optional)
- protected by US Patents 5,272,458; 6,414,577; 6,650,210; 7,633,361 and 7,843,289

Applications

- Lab
- Test equipment
- Control systems
- Switching a device in and out of a signal path

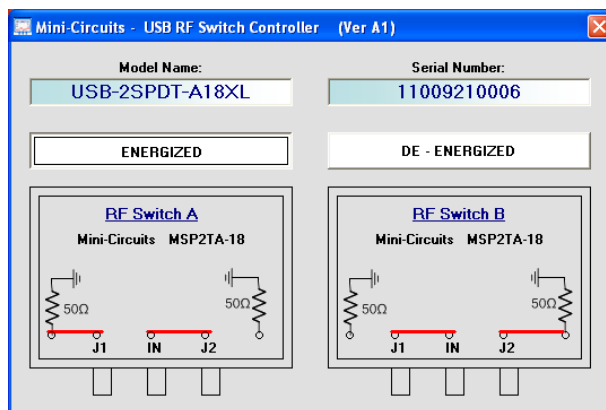


Installation CD with
Software included

USB-2SPDT-A18XL

Order P/N	Description	Price	Qty.
USB-2SPDT-A18XL	USB RF SPDT Switch	\$685.00 ea.	(1-9)
RFSW-CD	Software CD	Included	1
USB-CBL-AB-3+	2.7ft. USB cable	Included	1
AC/DC-24	AC/DC 24V _{DC} Adapter	Included	1
BKT-301-01+	Bracket accessory ²	\$14.95 ea.	(+1)

Mini-Circuits RF Switch Control Program for USB RF Switch



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Note 2: Bracket ordered separately.

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Rev. C
M131695
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USB-2SPDT-A18XL
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Electrical Specifications

Parameter	Port	Conditions	Min.	Typ.	Max.	Units
Rated Voltage	24V _{DC} IN	provided via external power adapter	23	24	25	V
	USB Port	–	–	5	–	
Rated Current	24V _{DC} IN	Both switches Energized		400	500	mA
		Both switches De-Energized	–	15	25	
	USB Port	Both switches Energized		50	75	
		Both switches De-Energized	–	50	75	
Switching Time	RF Ports	–	–	25	–	mS
Life (per switch)		@ 100 mW (hot switching)	10	–	–	million switching cycles
		@ 1 W (hot switching)	–	3	–	
RF Power (cold switching) ³		–	–	–	10	W
RF Power (hot switching) ³			–	–	1	
VSWR		DC to 1 GHz	–	1.05	1.10	:1
		1 GHz to 8 GHz	–	1.20	1.30	
		8 GHz to 12 GHz	–	1.2	1.35	
		12 GHz to 18 GHz	–	1.25	1.40	
Insertion Loss		DC to 1 GHz	–	0.1	0.15	dB
		1 GHz to 8 GHz	–	0.15	0.30	
		8 GHz to 12 GHz	–	0.25	0.40	
		12 GHz to 18 GHz	–	0.30	0.5	
Isolation		DC to 1 GHz	85	100	–	dB
		1 GHz to 8 GHz	75	90	–	
		8 GHz to 12 GHz	70	80	–	
		12 GHz to 18 GHz	60	66	–	

Note 3: Power handling is specified with RF applied to the IN port and output load connected to either J1 or J2 of the respective switch.

Electrical Specifications (Continued)

Minimum System Requirements

Parameter	Requirements
Interface	USB HID
Host operating system	32 Bit operating system: Windows 98®, Windows XP®, Windows Vista®, Windows 7® 64 Bit operating system: Windows Vista®, Windows 7® Linux® support: 32/64 Bit operating system
Hardware	Pentium® II or better

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	0°C to 45°C
Storage Temperature	-15°C to 45°C
DC Voltage max.	26V
RF power (at IN port of each switch)*	10W
RF power (at J1 and J2 of each switch)*	1W

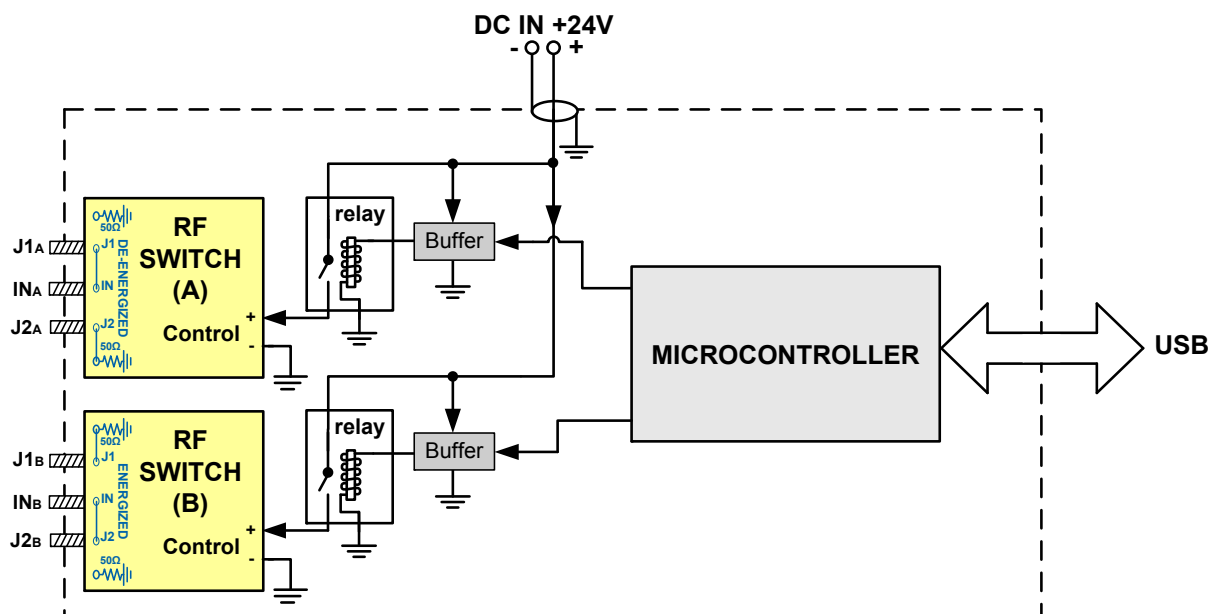
Permanent damage may occur if any of these limits are exceeded.

*See page 3 for hot switching life. Exceeding the limits noted will result in reduced life

Connections

24V _{DC} IN	(2.1mm center positive DC Socket)
RF Switch A (J1, IN, J2)	(SMA female)
RF Switch B (J1, IN, J2)	(SMA female)
USB	(USB type B receptacle)

Block Diagram



Accessories Included



USB Cable: USB type A plug to USB type B plug

- MCL P/N: USB-CBL-AB-3+ (2.7ft.)



AC/DC 24V_{DC} Power Adaptor with US and EU two pin power connectors

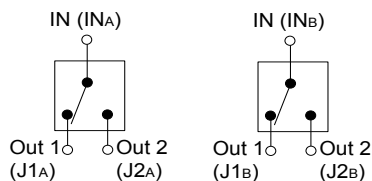
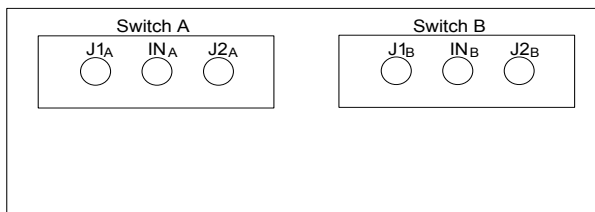
($I_{max}=0.83A$, Operating Temp. 0°C to +40°C)

- MCL P/N: AC/DC-24

Configuration options

- Power handling is specified with RF applied to the IN port and output load connected to either J1 or J2 of the respective switch.
- When connecting a coaxial semiflex cable, tighten connectors alternately using an 8in/lb torque wrench to insure proper contact at each end.

Config. A



SPDT: Switch A, or B Logic

IN $\leftrightarrow$ Out1 : 0

IN $\leftrightarrow$ Out2 : 1

Switches move independently.

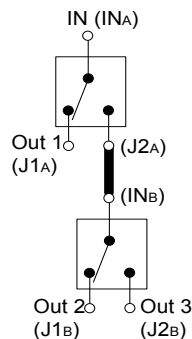
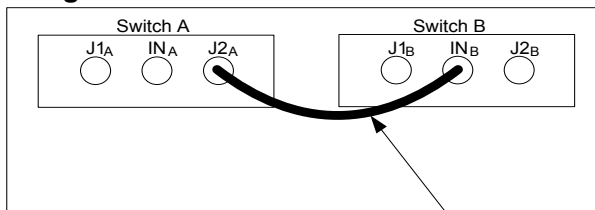
DPDT: Switch A & B Logic

IN $\leftrightarrow$ Out1 : 0, 0

IN $\leftrightarrow$ Out2 : 1, 1

Both switches move together as one.

Config. B



SP3T:

Switch A & B Logic

IN $\leftrightarrow$ Out1 : 0, $\emptyset$

IN $\leftrightarrow$ Out2 : 1, 0

IN $\leftrightarrow$ Out3 : 1, 1

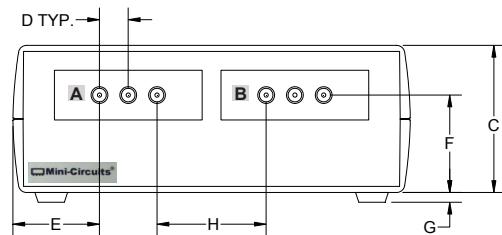
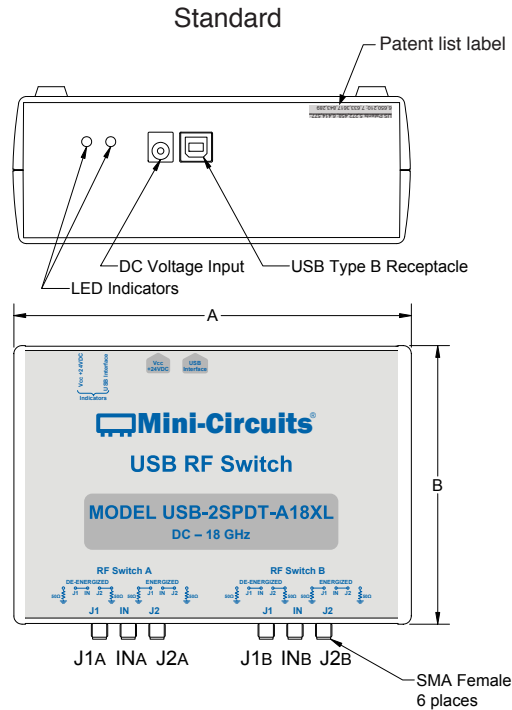
Both switches move together as one.

4 inch coaxial, semiflex
SMA(M)-SMA(M) RF cable
MCL P/N: 141U-4SM+

USB SPDT RF Switch

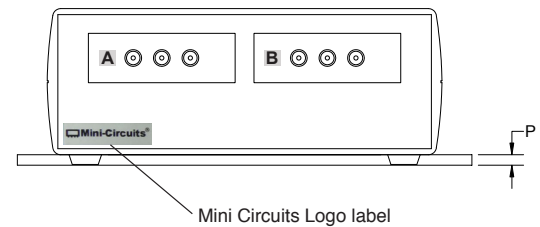
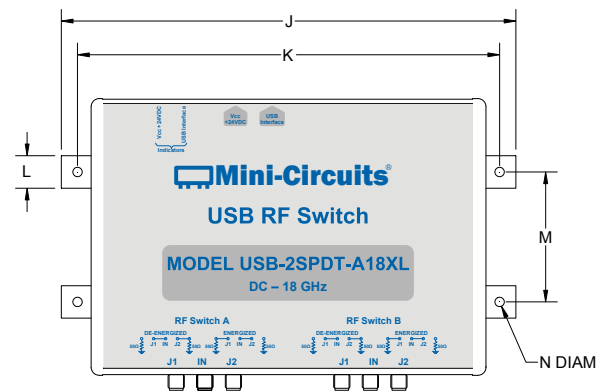
USB-2SPDT-A18XL

Outline Drawing: LM1581



With bracket accessory

Bracket ordered separately. For bracket ordering information see Accessories information table on page 8.



Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT. GRAMS
6.08	4.26	2.25	.440	1.32	1.49	.15	1.670	7.00	6.500	.50	2.000	.144	.160	560
154.4	108.2	57.2	11.18	33.6	37.8	3.8	42.4	177.8	165.1	12.7	50.8	3.66	4.06	

Ordering Information

Model Number	Description	Quantity Min. No. of Units	Price \$ Ea.
USB-2SPDT-A18XL	USB RF SPDT Switch	1-9	685.00
USB-CBL-AB-3+	2.7 ft. USB Cable	1	Included
RFSW-CD	Installation CD	1	
AC/DC-24	AC/DC 24V _{DC} power adapter with US and EU two pin power connectors	1	

Accessories Information

Model Number	Description	Quantity Min. No. of Units	Price \$ Ea.
AC/DC-24	AC/DC 24V _{DC} power adapter with US and EU two pin power connectors	1	19.95
141U-4SM+ ⁴	4 inch coaxial, SMA(M)-SMA(M) RF semiflex cable	1	8.95
USB-CBL-AB-3+	2.7 ft. USB Cable	1	7.95
USB-CBL-AB-7+	6.8 ft. USB Cable	1	9.95
USB-CBL-AB-11+	11 ft. USB Cable	1	11.95
BKT-301-01+	Bracket	1	14.95

Note 4: RF cables used for additional configurations only, see page 6 for details.

Xtra Long Life

USB RF SPDT Switch A

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = 0degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.00	0.03	66.47	58.00	1.01	1.02	1.00	1.01	1.01	1.00
20	0.01	0.02	86.71	74.34	1.00	1.01	1.00	1.01	1.01	1.00
30	0.02	0.03	75.20	81.79	1.01	1.00	1.00	1.00	1.00	1.00
40	0.02	0.03	83.17	84.92	1.01	1.01	1.00	1.01	1.01	1.00
50	0.02	0.01	81.87	85.48	1.01	1.01	1.00	1.01	1.01	1.00
60	0.02	0.01	89.13	100.00	1.01	1.01	1.01	1.01	1.01	1.00
70	0.02	0.01	90.24	89.73	1.01	1.01	1.01	1.01	1.01	1.00
80	0.02	0.00	106.15	95.21	1.01	1.01	1.01	1.01	1.01	1.00
90	0.02	0.00	83.46	88.55	1.01	1.01	1.01	1.01	1.01	1.00
100	0.02	0.01	94.99	95.58	1.01	1.01	1.01	1.01	1.01	1.00
200	0.02	0.01	89.41	91.38	1.01	1.00	1.02	1.00	1.00	1.01
300	0.03	0.00	110.14	99.39	1.00	1.01	1.02	1.01	1.02	1.02
400	0.03	0.01	122.36	96.19	1.01	1.02	1.02	1.02	1.02	1.02
500	0.03	0.01	104.38	99.51	1.02	1.01	1.01	1.01	1.01	1.02
600	0.04	0.01	105.57	98.70	1.02	1.01	1.01	1.01	1.01	1.02
700	0.04	0.02	102.50	99.69	1.01	1.01	1.02	1.01	1.01	1.02
800	0.04	0.02	108.28	102.50	1.01	1.01	1.02	1.02	1.02	1.02
900	0.04	0.02	102.62	104.87	1.01	1.02	1.02	1.02	1.02	1.03
1000	0.05	0.02	104.67	101.83	1.01	1.01	1.02	1.02	1.02	1.03
1200	0.05	0.02	100.28	106.54	1.01	1.01	1.03	1.01	1.01	1.03
1400	0.05	0.02	119.75	106.41	1.02	1.01	1.03	1.01	1.01	1.04
1600	0.05	0.03	106.48	103.81	1.01	1.02	1.04	1.02	1.02	1.04
1800	0.05	0.03	112.91	103.24	1.02	1.03	1.04	1.02	1.02	1.04
2000	0.06	0.03	104.08	107.47	1.02	1.03	1.05	1.02	1.02	1.04
2200	0.06	0.03	103.11	100.85	1.03	1.02	1.05	1.02	1.02	1.05
2400	0.06	0.04	108.97	103.07	1.03	1.04	1.06	1.03	1.04	1.06
2600	0.06	0.04	96.38	96.77	1.03	1.05	1.07	1.04	1.05	1.06
2800	0.06	0.04	118.33	103.19	1.04	1.04	1.08	1.04	1.05	1.07
3000	0.07	0.04	98.89	103.06	1.05	1.04	1.08	1.04	1.04	1.08
3200	0.08	0.05	102.33	101.24	1.05	1.06	1.09	1.06	1.06	1.08
3400	0.07	0.05	105.38	106.43	1.06	1.09	1.11	1.08	1.08	1.10
3600	0.08	0.05	103.90	99.97	1.08	1.08	1.11	1.07	1.08	1.10
4000	0.08	0.06	94.49	98.21	1.11	1.12	1.13	1.11	1.12	1.12
4500	0.10	0.07	107.75	97.44	1.15	1.13	1.14	1.13	1.13	1.13
5000	0.12	0.10	110.57	100.39	1.16	1.20	1.16	1.20	1.20	1.14
5500	0.15	0.11	98.96	98.82	1.22	1.21	1.14	1.20	1.21	1.13
6000	0.15	0.12	96.72	100.63	1.19	1.24	1.14	1.24	1.23	1.14
6500	0.14	0.11	95.37	94.39	1.19	1.21	1.11	1.21	1.21	1.12
7000	0.13	0.12	96.77	100.38	1.18	1.17	1.09	1.18	1.18	1.10
7500	0.13	0.12	99.27	96.75	1.12	1.14	1.07	1.15	1.14	1.09
8000	0.13	0.11	93.55	96.34	1.14	1.11	1.06	1.12	1.11	1.08
8500	0.15	0.13	99.85	93.57	1.10	1.11	1.07	1.12	1.11	1.09
9000	0.16	0.13	93.49	94.68	1.09	1.06	1.06	1.07	1.07	1.07
9500	0.18	0.14	98.09	89.52	1.07	1.09	1.08	1.11	1.11	1.08
10000	0.20	0.15	92.91	97.43	1.05	1.10	1.09	1.09	1.08	1.08
12000	0.28	0.19	92.17	86.14	1.09	1.08	1.12	1.07	1.09	1.08
13000	0.31	0.23	89.54	87.24	1.14	1.10	1.20	1.07	1.11	1.14
14000	0.33	0.27	87.65	83.67	1.11	1.09	1.26	1.12	1.15	1.21
15000	0.38	0.35	83.89	81.38	1.18	1.24	1.30	1.25	1.25	1.26
16000	0.40	0.43	81.89	80.41	1.14	1.25	1.26	1.27	1.22	1.24
17000	0.35	0.37	82.24	79.81	1.13	1.04	1.18	1.03	1.07	1.16
18000	0.36	0.43	79.85	78.41	1.07	1.18	1.27	1.11	1.14	1.17

REV. X1

USB-2SPDT-A18XL

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IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

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Xtra Long Life USB RF SPDT Switch B

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = 0degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.01	0.00	55.10	56.47	1.01	1.01	1.01	1.01	1.01	1.01
20	0.02	0.01	73.18	77.42	1.00	1.00	1.00	1.01	1.01	1.01
30	0.03	0.01	75.85	76.46	1.00	1.01	1.00	1.00	1.00	1.01
40	0.03	0.02	89.59	84.17	1.01	1.01	1.00	1.01	1.01	1.01
50	0.00	0.01	78.52	76.87	1.01	1.01	1.00	1.01	1.01	1.01
60	0.01	0.02	86.67	93.60	1.01	1.01	1.00	1.01	1.01	1.01
70	0.00	0.02	86.13	105.32	1.01	1.01	1.00	1.01	1.01	1.01
80	0.00	0.02	91.81	91.77	1.01	1.01	1.00	1.01	1.01	1.01
90	0.01	0.02	91.66	83.50	1.01	1.01	1.01	1.01	1.01	1.00
100	0.00	0.01	85.19	93.82	1.01	1.01	1.01	1.01	1.01	1.00
200	0.00	0.02	92.10	102.85	1.01	1.01	1.01	1.01	1.00	1.01
300	0.00	0.03	100.28	102.69	1.01	1.01	1.02	1.01	1.01	1.02
400	0.01	0.03	95.76	94.49	1.01	1.01	1.02	1.02	1.02	1.02
500	0.01	0.03	109.12	116.46	1.02	1.02	1.02	1.02	1.01	1.02
600	0.01	0.03	100.90	108.20	1.01	1.01	1.01	1.01	1.01	1.02
700	0.02	0.03	116.31	121.52	1.01	1.01	1.02	1.01	1.01	1.02
800	0.02	0.04	110.03	97.18	1.01	1.01	1.02	1.02	1.01	1.02
900	0.02	0.03	108.98	103.99	1.01	1.01	1.03	1.02	1.02	1.03
1000	0.02	0.04	106.35	121.29	1.01	1.01	1.03	1.02	1.02	1.03
1200	0.02	0.04	103.47	102.22	1.02	1.01	1.03	1.01	1.01	1.03
1400	0.02	0.04	101.98	104.06	1.02	1.01	1.04	1.02	1.01	1.04
1600	0.03	0.05	96.41	101.06	1.02	1.01	1.04	1.02	1.01	1.04
1800	0.02	0.05	100.83	112.65	1.02	1.02	1.04	1.03	1.02	1.04
2000	0.03	0.05	101.45	99.34	1.03	1.01	1.05	1.03	1.02	1.04
2200	0.03	0.06	113.29	102.68	1.03	1.02	1.05	1.02	1.02	1.05
2400	0.04	0.06	104.81	92.73	1.03	1.02	1.06	1.03	1.03	1.05
2600	0.04	0.06	99.62	100.57	1.03	1.03	1.07	1.05	1.04	1.06
2800	0.04	0.06	110.09	106.20	1.04	1.03	1.08	1.04	1.04	1.07
3000	0.04	0.06	103.39	104.23	1.05	1.04	1.09	1.04	1.04	1.07
3200	0.05	0.07	102.59	111.71	1.05	1.05	1.09	1.06	1.06	1.08
3400	0.06	0.07	101.92	107.63	1.06	1.07	1.11	1.08	1.08	1.09
3600	0.06	0.07	111.01	99.24	1.08	1.08	1.11	1.07	1.08	1.10
4000	0.06	0.08	101.05	98.32	1.11	1.11	1.13	1.11	1.12	1.11
4500	0.07	0.09	94.42	113.13	1.15	1.15	1.14	1.12	1.14	1.12
5000	0.09	0.11	97.06	96.49	1.16	1.20	1.15	1.19	1.21	1.14
5500	0.11	0.13	98.76	93.61	1.22	1.23	1.14	1.19	1.21	1.12
6000	0.12	0.13	95.96	98.43	1.18	1.22	1.13	1.22	1.24	1.13
6500	0.11	0.13	99.65	103.35	1.18	1.22	1.11	1.21	1.22	1.11
7000	0.11	0.12	95.79	96.78	1.17	1.19	1.09	1.17	1.18	1.09
7500	0.11	0.12	97.32	95.44	1.11	1.15	1.08	1.15	1.15	1.08
8000	0.10	0.12	95.12	97.93	1.13	1.12	1.07	1.13	1.12	1.08
8500	0.12	0.13	97.74	94.74	1.09	1.11	1.09	1.12	1.11	1.09
9000	0.13	0.14	93.42	98.17	1.07	1.07	1.08	1.05	1.06	1.09
9500	0.13	0.14	93.39	92.86	1.07	1.06	1.09	1.07	1.06	1.10
10000	0.14	0.15	91.41	91.96	1.04	1.07	1.10	1.06	1.07	1.12
12000	0.21	0.20	88.35	87.13	1.14	1.13	1.14	1.08	1.15	1.11
13000	0.23	0.25	88.31	86.97	1.17	1.16	1.23	1.09	1.15	1.18
14000	0.25	0.28	86.34	84.87	1.11	1.14	1.30	1.11	1.17	1.26
15000	0.31	0.34	84.64	82.50	1.14	1.25	1.33	1.22	1.25	1.31
16000	0.38	0.35	82.89	80.79	1.09	1.20	1.26	1.20	1.21	1.27
17000	0.34	0.31	81.15	79.04	1.08	1.03	1.18	1.07	1.05	1.15
18000	0.37	0.36	77.96	76.83	1.05	1.17	1.29	1.19	1.17	1.17

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Xtra Long Life

USB RF SPDT Switch A

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = +25degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.00	0.00	62.10	56.85	1.01	1.00	1.01	1.00	1.00	1.01
20	0.00	0.01	77.02	79.34	1.00	1.00	1.01	1.00	1.00	1.01
30	0.01	0.01	80.16	72.74	1.00	1.00	1.01	1.00	1.01	1.01
40	0.01	0.01	78.78	81.72	1.00	1.00	1.01	1.01	1.01	1.01
50	0.01	0.00	78.46	82.83	1.00	1.00	1.01	1.00	1.00	1.01
60	0.01	0.00	85.82	94.69	1.00	1.00	1.01	1.00	1.00	1.01
70	0.00	0.00	102.87	87.08	1.00	1.00	1.01	1.00	1.00	1.01
80	0.00	0.00	89.48	87.52	1.00	1.00	1.01	1.00	1.01	1.01
90	0.00	0.00	83.40	88.02	1.00	1.00	1.01	1.00	1.00	1.01
100	0.00	0.00	93.52	91.50	1.00	1.00	1.01	1.00	1.01	1.01
200	0.00	0.01	106.18	91.55	1.00	1.00	1.01	1.00	1.00	1.01
300	0.01	0.01	90.63	95.48	1.00	1.00	1.02	1.01	1.01	1.01
400	0.01	0.02	102.38	104.45	1.00	1.00	1.02	1.00	1.01	1.01
500	0.01	0.02	105.62	107.76	1.00	1.01	1.02	1.01	1.01	1.01
600	0.02	0.02	105.68	98.90	1.01	1.00	1.02	1.01	1.01	1.01
700	0.02	0.02	115.10	98.08	1.01	1.00	1.02	1.01	1.01	1.01
800	0.03	0.03	102.93	98.57	1.01	1.01	1.02	1.01	1.01	1.02
900	0.03	0.03	117.17	104.20	1.01	1.01	1.03	1.01	1.01	1.02
1000	0.03	0.03	106.40	105.98	1.01	1.01	1.03	1.01	1.01	1.02
1200	0.03	0.04	112.69	110.27	1.01	1.01	1.03	1.01	1.01	1.03
1400	0.04	0.04	104.16	98.33	1.01	1.01	1.04	1.01	1.01	1.03
1600	0.04	0.04	103.60	114.63	1.01	1.01	1.04	1.01	1.01	1.04
1800	0.04	0.04	118.04	108.79	1.02	1.02	1.05	1.02	1.02	1.05
2000	0.05	0.05	101.34	106.06	1.02	1.02	1.05	1.02	1.02	1.05
2200	0.05	0.05	100.29	106.05	1.02	1.02	1.06	1.02	1.02	1.06
2400	0.05	0.06	96.36	107.82	1.03	1.03	1.06	1.03	1.03	1.06
2600	0.05	0.06	115.88	98.69	1.03	1.04	1.07	1.04	1.04	1.07
2800	0.06	0.06	96.27	99.53	1.04	1.04	1.08	1.04	1.04	1.08
3000	0.06	0.06	104.94	104.37	1.05	1.04	1.08	1.05	1.04	1.09
3200	0.06	0.07	106.37	109.97	1.05	1.06	1.08	1.06	1.06	1.09
3400	0.07	0.08	101.01	97.96	1.07	1.08	1.09	1.08	1.07	1.10
3600	0.07	0.08	104.17	107.77	1.09	1.09	1.10	1.09	1.08	1.11
4000	0.08	0.09	98.07	98.02	1.11	1.12	1.10	1.12	1.11	1.12
4500	0.10	0.11	104.85	97.62	1.16	1.15	1.12	1.16	1.15	1.14
5000	0.11	0.12	98.74	100.22	1.19	1.17	1.11	1.19	1.18	1.14
5500	0.12	0.14	98.01	107.61	1.22	1.19	1.11	1.21	1.20	1.14
6000	0.13	0.15	95.10	99.02	1.22	1.21	1.11	1.22	1.21	1.13
6500	0.13	0.15	96.56	98.15	1.21	1.19	1.10	1.21	1.19	1.12
7000	0.13	0.15	98.11	98.17	1.20	1.19	1.08	1.19	1.17	1.10
7500	0.13	0.15	92.97	103.61	1.17	1.16	1.07	1.17	1.16	1.08
8000	0.13	0.15	94.86	95.93	1.15	1.14	1.08	1.16	1.14	1.07
8500	0.14	0.16	93.99	94.88	1.12	1.12	1.08	1.13	1.12	1.06
9000	0.13	0.15	94.07	94.79	1.10	1.09	1.09	1.11	1.10	1.07
9500	0.13	0.15	91.99	92.59	1.06	1.07	1.09	1.07	1.07	1.08
10000	0.14	0.16	89.93	92.53	1.05	1.06	1.11	1.07	1.06	1.09
12000	0.17	0.20	86.12	89.27	1.08	1.08	1.15	1.07	1.08	1.12
13000	0.19	0.22	84.19	87.92	1.07	1.10	1.20	1.08	1.10	1.16
14000	0.19	0.23	82.61	87.45	1.04	1.08	1.24	1.05	1.07	1.20
15000	0.21	0.25	78.53	82.92	1.03	1.05	1.24	1.02	1.04	1.21
16000	0.21	0.26	77.05	81.74	1.05	1.04	1.21	1.02	1.05	1.18
17000	0.21	0.26	77.46	80.97	1.11	1.05	1.19	1.08	1.10	1.17
18000	0.21	0.26	75.93	78.52	1.08	1.05	1.25	1.02	1.06	1.24

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Xtra Long Life USB RF SPDT Switch B

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = +25degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.00	0.00	60.36	54.64	1.00	1.00	1.01	1.00	1.00	1.01
20	0.01	0.00	68.54	69.26	1.00	1.00	1.01	1.00	1.00	1.02
30	0.02	0.01	72.63	93.61	1.00	1.00	1.01	1.00	1.00	1.02
40	0.02	0.01	81.53	79.28	1.01	1.00	1.01	1.01	1.01	1.02
50	0.00	0.01	82.68	90.91	1.00	1.00	1.01	1.00	1.00	1.02
60	0.00	0.01	83.39	85.29	1.00	1.00	1.01	1.00	1.00	1.02
70	0.00	0.00	92.76	93.80	1.00	1.00	1.01	1.00	1.00	1.02
80	0.00	0.00	88.29	88.92	1.00	1.00	1.01	1.00	1.00	1.02
90	0.00	0.00	93.15	87.04	1.00	1.00	1.01	1.00	1.00	1.02
100	0.00	0.00	86.76	87.01	1.00	1.00	1.01	1.00	1.00	1.02
200	0.00	0.00	91.33	91.49	1.00	1.00	1.01	1.00	1.00	1.02
300	0.01	0.01	99.07	99.76	1.00	1.00	1.01	1.01	1.00	1.02
400	0.01	0.01	97.42	100.56	1.00	1.01	1.01	1.00	1.00	1.02
500	0.02	0.01	94.63	99.35	1.00	1.01	1.02	1.01	1.01	1.02
600	0.02	0.02	107.87	104.16	1.01	1.00	1.02	1.01	1.01	1.02
700	0.02	0.02	106.79	101.52	1.01	1.01	1.02	1.01	1.01	1.02
800	0.03	0.02	98.96	107.07	1.01	1.01	1.02	1.01	1.01	1.02
900	0.03	0.02	98.57	102.17	1.00	1.01	1.02	1.01	1.01	1.03
1000	0.03	0.03	103.84	105.08	1.00	1.01	1.02	1.01	1.01	1.03
1200	0.03	0.03	104.39	103.71	1.00	1.01	1.03	1.01	1.01	1.03
1400	0.04	0.04	108.43	103.24	1.00	1.01	1.03	1.01	1.01	1.03
1600	0.04	0.04	104.33	104.07	1.00	1.01	1.03	1.01	1.01	1.04
1800	0.04	0.04	101.50	106.50	1.01	1.01	1.04	1.02	1.02	1.04
2000	0.05	0.05	106.33	98.89	1.01	1.02	1.05	1.02	1.02	1.05
2200	0.05	0.05	104.38	105.50	1.02	1.02	1.05	1.02	1.02	1.05
2400	0.05	0.05	100.20	105.22	1.02	1.02	1.06	1.02	1.02	1.05
2600	0.05	0.06	101.22	96.49	1.03	1.03	1.06	1.03	1.03	1.06
2800	0.06	0.06	100.66	100.52	1.04	1.04	1.07	1.04	1.04	1.07
3000	0.06	0.06	113.93	100.28	1.04	1.04	1.08	1.04	1.03	1.08
3200	0.06	0.06	103.51	114.85	1.05	1.05	1.08	1.05	1.05	1.08
3400	0.07	0.07	103.07	98.24	1.07	1.07	1.09	1.07	1.06	1.09
3600	0.07	0.07	106.49	99.98	1.09	1.08	1.10	1.08	1.07	1.10
4000	0.08	0.08	105.17	106.44	1.11	1.10	1.11	1.12	1.10	1.11
4500	0.10	0.10	108.28	99.81	1.16	1.14	1.13	1.16	1.15	1.14
5000	0.11	0.12	106.56	100.37	1.19	1.17	1.13	1.19	1.17	1.14
5500	0.12	0.13	103.62	101.94	1.22	1.19	1.13	1.21	1.20	1.15
6000	0.13	0.13	94.74	97.50	1.22	1.20	1.12	1.21	1.21	1.14
6500	0.13	0.13	108.06	98.99	1.20	1.20	1.11	1.19	1.20	1.13
7000	0.13	0.13	94.28	101.12	1.18	1.19	1.09	1.17	1.18	1.12
7500	0.13	0.13	93.30	93.47	1.15	1.17	1.08	1.13	1.17	1.09
8000	0.13	0.13	91.10	95.74	1.13	1.15	1.08	1.12	1.16	1.09
8500	0.14	0.13	95.53	97.82	1.09	1.12	1.07	1.09	1.13	1.06
9000	0.13	0.13	90.68	93.46	1.08	1.09	1.08	1.08	1.10	1.06
9500	0.13	0.13	93.52	92.28	1.05	1.06	1.09	1.05	1.06	1.05
10000	0.13	0.13	92.92	90.47	1.06	1.05	1.10	1.06	1.06	1.06
12000	0.16	0.17	88.79	88.10	1.14	1.10	1.10	1.13	1.10	1.13
13000	0.19	0.20	88.25	88.91	1.14	1.13	1.16	1.16	1.13	1.18
14000	0.20	0.20	85.64	84.94	1.12	1.13	1.22	1.13	1.13	1.21
15000	0.22	0.21	82.28	81.89	1.13	1.13	1.25	1.11	1.13	1.21
16000	0.22	0.23	80.93	80.37	1.14	1.11	1.24	1.13	1.11	1.22
17000	0.21	0.23	80.58	80.28	1.12	1.06	1.23	1.15	1.11	1.25
18000	0.21	0.26	78.87	78.31	1.14	1.07	1.29	1.21	1.07	1.29

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Xtra Long Life

USB RF SPDT Switch A

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = +45degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.00	0.00	58.55	76.13	1.01	1.01	1.00	1.00	1.03	1.00
20	0.02	0.01	80.75	64.08	1.00	1.00	1.00	1.00	1.01	1.00
30	0.01	0.02	73.74	81.46	1.00	1.00	1.00	1.00	1.00	1.00
40	0.02	0.02	80.03	83.46	1.00	1.01	1.00	1.00	1.01	1.00
50	0.03	0.01	86.76	87.61	1.00	1.00	1.00	1.00	1.00	1.00
60	0.03	0.01	83.54	85.89	1.00	1.00	1.00	1.01	1.00	1.00
70	0.03	0.01	81.45	87.50	1.01	1.00	1.00	1.01	1.00	1.00
80	0.03	0.01	85.84	88.31	1.01	1.00	1.00	1.01	1.01	1.00
90	0.03	0.01	87.92	85.22	1.01	1.01	1.00	1.01	1.01	1.01
100	0.03	0.01	86.13	88.64	1.01	1.01	1.00	1.01	1.01	1.01
200	0.03	0.01	96.32	89.20	1.00	1.00	1.00	1.01	1.01	1.01
300	0.01	0.02	103.43	97.79	1.00	1.00	1.00	1.00	1.01	1.01
400	0.01	0.02	92.09	97.00	1.01	1.01	1.00	1.01	1.01	1.01
500	0.01	0.03	98.51	99.82	1.01	1.01	1.01	1.01	1.01	1.01
600	0.00	0.03	100.83	97.87	1.01	1.00	1.01	1.01	1.01	1.01
700	0.00	0.04	111.89	102.10	1.01	1.01	1.01	1.01	1.01	1.01
800	0.01	0.04	104.33	112.55	1.01	1.01	1.01	1.01	1.01	1.01
900	0.01	0.04	110.10	100.77	1.01	1.01	1.01	1.01	1.01	1.02
1000	0.01	0.05	98.33	101.99	1.01	1.01	1.01	1.01	1.01	1.02
1200	0.01	0.05	113.65	102.23	1.01	1.00	1.02	1.00	1.01	1.02
1400	0.02	0.05	109.57	103.23	1.01	1.01	1.02	1.00	1.01	1.03
1600	0.02	0.06	107.03	103.80	1.01	1.01	1.03	1.01	1.00	1.03
1800	0.02	0.06	102.75	103.81	1.01	1.02	1.04	1.02	1.01	1.04
2000	0.03	0.06	97.66	98.82	1.02	1.02	1.05	1.01	1.02	1.04
2200	0.03	0.07	104.18	101.49	1.03	1.02	1.05	1.01	1.02	1.05
2400	0.03	0.07	109.05	98.05	1.03	1.03	1.05	1.03	1.03	1.06
2600	0.03	0.08	99.34	99.83	1.03	1.04	1.07	1.04	1.04	1.06
2800	0.03	0.08	112.58	100.46	1.05	1.05	1.08	1.04	1.05	1.07
3000	0.04	0.08	105.02	100.75	1.06	1.05	1.08	1.04	1.05	1.07
3200	0.04	0.09	102.57	102.36	1.07	1.06	1.08	1.06	1.06	1.08
3400	0.05	0.10	108.69	111.88	1.08	1.08	1.10	1.09	1.08	1.09
3600	0.05	0.10	105.09	108.11	1.09	1.10	1.11	1.08	1.10	1.09
4000	0.06	0.11	97.42	95.32	1.13	1.11	1.11	1.12	1.11	1.10
4500	0.08	0.12	99.71	101.22	1.17	1.16	1.14	1.13	1.16	1.11
5000	0.09	0.15	94.23	99.61	1.17	1.18	1.13	1.18	1.17	1.13
5500	0.10	0.15	102.91	94.28	1.21	1.19	1.15	1.18	1.19	1.12
6000	0.10	0.16	98.75	96.86	1.20	1.19	1.13	1.20	1.19	1.14
6500	0.11	0.17	98.05	99.51	1.18	1.18	1.12	1.19	1.18	1.13
7000	0.11	0.18	99.76	93.51	1.18	1.17	1.11	1.17	1.17	1.11
7500	0.12	0.18	95.18	100.18	1.14	1.16	1.08	1.17	1.16	1.10
8000	0.12	0.17	97.38	99.68	1.16	1.17	1.09	1.13	1.18	1.09
8500	0.12	0.19	96.04	96.46	1.11	1.13	1.07	1.15	1.12	1.09
9000	0.12	0.19	90.72	92.14	1.09	1.11	1.07	1.09	1.11	1.07
9500	0.12	0.18	97.14	92.87	1.08	1.08	1.08	1.07	1.06	1.07
10000	0.13	0.19	93.08	89.62	1.03	1.08	1.07	1.07	1.08	1.07
12000	0.16	0.24	93.32	86.87	1.14	1.15	1.15	1.10	1.14	1.11
13000	0.18	0.27	87.24	87.98	1.17	1.16	1.21	1.12	1.16	1.15
14000	0.18	0.29	84.70	85.74	1.10	1.13	1.26	1.10	1.12	1.19
15000	0.18	0.31	82.39	82.93	1.02	1.07	1.26	1.09	1.06	1.20
16000	0.18	0.34	81.36	79.86	1.04	1.07	1.22	1.07	1.09	1.19
17000	0.17	0.34	78.55	80.54	1.08	1.05	1.27	1.10	1.11	1.21
18000	0.17	0.38	77.29	78.02	1.23	1.19	1.35	1.17	1.22	1.22

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USB-2SPDT-A18XL

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Xtra Long Life USB RF SPDT Switch B

USB-2SPDT-A18XL

Typical Performance Data

TEST CONDITIONS: @Temperature = +45degC

FREQUENCY (MHz)	INSERTION LOSS ON (dB)		ISOLATION OFF (dB)		VSWR IN (:1)		VSWR ENERGIZED (:1)		VSWR DE-ENERGIZED (:1)	
	IN-J1	IN-J2	IN-J1	IN-J2	ON	OFF	J1	J2	J1	J2
10	0.03	0.01	82.00	66.48	1.01	1.00	1.00	1.01	1.01	1.01
20	0.01	0.01	73.10	65.54	1.00	1.00	1.00	1.00	1.00	1.01
30	0.02	0.02	77.10	74.10	1.00	1.00	1.00	1.00	1.00	1.01
40	0.02	0.02	87.44	77.32	1.00	1.00	1.00	1.00	1.00	1.01
50	0.01	0.01	85.52	82.13	1.00	1.00	1.00	1.00	1.00	1.01
60	0.00	0.01	90.49	83.10	1.00	1.00	1.00	1.00	1.00	1.01
70	0.01	0.01	90.31	94.05	1.00	1.01	1.00	1.01	1.01	1.01
80	0.01	0.01	93.43	86.17	1.01	1.01	1.00	1.01	1.01	1.01
90	0.01	0.01	94.17	86.73	1.01	1.01	1.01	1.01	1.01	1.01
100	0.01	0.01	91.90	89.83	1.01	1.01	1.01	1.01	1.01	1.01
200	0.01	0.01	98.26	103.68	1.00	1.00	1.01	1.01	1.00	1.01
300	0.01	0.02	116.76	95.71	1.01	1.01	1.00	1.00	1.01	1.01
400	0.02	0.03	99.93	105.84	1.01	1.01	1.00	1.01	1.01	1.01
500	0.02	0.03	106.09	102.44	1.01	1.01	1.01	1.01	1.01	1.01
600	0.03	0.03	112.09	103.42	1.01	1.01	1.01	1.01	1.01	1.01
700	0.03	0.03	109.00	104.63	1.01	1.01	1.01	1.01	1.01	1.01
800	0.03	0.04	108.70	102.11	1.01	1.01	1.01	1.01	1.01	1.01
900	0.03	0.04	100.99	97.92	1.01	1.01	1.01	1.01	1.01	1.02
1000	0.04	0.04	100.51	103.60	1.01	1.01	1.02	1.01	1.01	1.02
1200	0.04	0.04	106.98	101.11	1.01	1.01	1.02	1.00	1.01	1.02
1400	0.05	0.05	102.33	112.25	1.01	1.01	1.03	1.00	1.01	1.03
1600	0.05	0.05	105.28	100.38	1.01	1.00	1.04	1.01	1.01	1.03
1800	0.05	0.05	98.73	107.35	1.01	1.01	1.04	1.01	1.01	1.04
2000	0.06	0.06	115.46	117.46	1.02	1.01	1.05	1.02	1.01	1.04
2200	0.06	0.06	103.28	108.02	1.03	1.01	1.06	1.01	1.01	1.05
2400	0.07	0.07	101.81	102.85	1.03	1.03	1.06	1.03	1.03	1.06
2600	0.07	0.07	103.07	96.44	1.03	1.04	1.07	1.04	1.04	1.06
2800	0.07	0.07	105.69	102.56	1.04	1.03	1.08	1.04	1.04	1.07
3000	0.07	0.08	98.32	99.97	1.05	1.04	1.09	1.04	1.05	1.08
3200	0.08	0.08	93.90	99.83	1.06	1.07	1.09	1.06	1.07	1.08
3400	0.09	0.09	109.17	105.95	1.07	1.09	1.11	1.08	1.09	1.09
3600	0.09	0.09	95.19	113.30	1.09	1.08	1.11	1.07	1.09	1.09
4000	0.10	0.10	99.68	98.18	1.12	1.13	1.12	1.11	1.14	1.11
4500	0.11	0.11	101.53	99.11	1.15	1.14	1.12	1.12	1.15	1.11
5000	0.14	0.13	99.42	101.94	1.16	1.20	1.14	1.17	1.20	1.13
5500	0.14	0.14	100.62	95.58	1.20	1.19	1.13	1.16	1.20	1.12
6000	0.15	0.15	94.60	100.65	1.18	1.20	1.13	1.18	1.20	1.13
6500	0.15	0.15	98.83	97.47	1.15	1.18	1.11	1.17	1.18	1.12
7000	0.15	0.15	96.84	95.86	1.16	1.14	1.10	1.15	1.15	1.11
7500	0.16	0.16	99.59	95.52	1.10	1.15	1.08	1.14	1.14	1.10
8000	0.15	0.16	100.42	100.22	1.12	1.09	1.07	1.11	1.10	1.08
8500	0.17	0.17	95.86	97.28	1.08	1.10	1.08	1.11	1.09	1.09
9000	0.17	0.18	99.29	91.93	1.06	1.10	1.07	1.07	1.07	1.08
9500	0.17	0.18	92.32	94.80	1.08	1.04	1.06	1.03	1.04	1.08
10000	0.18	0.19	100.99	93.19	1.03	1.10	1.07	1.06	1.08	1.09
12000	0.23	0.25	88.28	90.17	1.19	1.18	1.18	1.15	1.19	1.15
13000	0.26	0.28	89.01	88.66	1.23	1.23	1.26	1.18	1.23	1.21
14000	0.26	0.28	86.21	87.49	1.12	1.18	1.29	1.15	1.16	1.25
15000	0.26	0.28	84.10	86.03	1.01	1.11	1.25	1.10	1.09	1.23
16000	0.28	0.32	81.63	84.68	1.04	1.08	1.21	1.08	1.08	1.18
17000	0.27	0.32	80.37	84.83	1.05	1.07	1.30	1.11	1.11	1.20
18000	0.30	0.35	79.19	82.41	1.24	1.14	1.37	1.15	1.18	1.22

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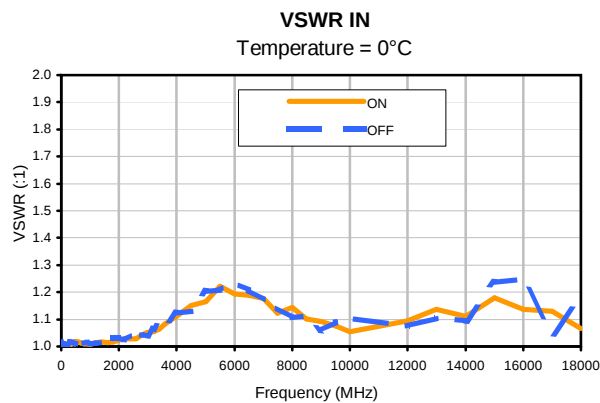
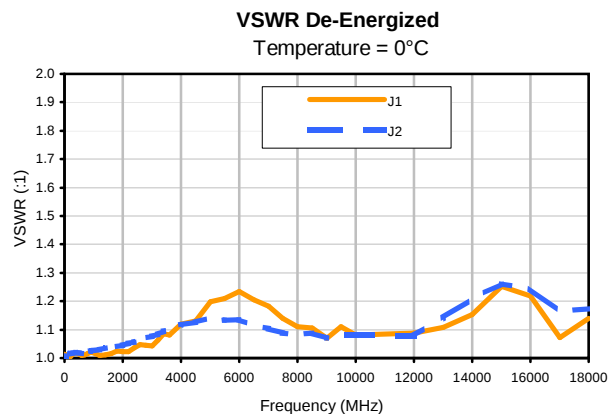
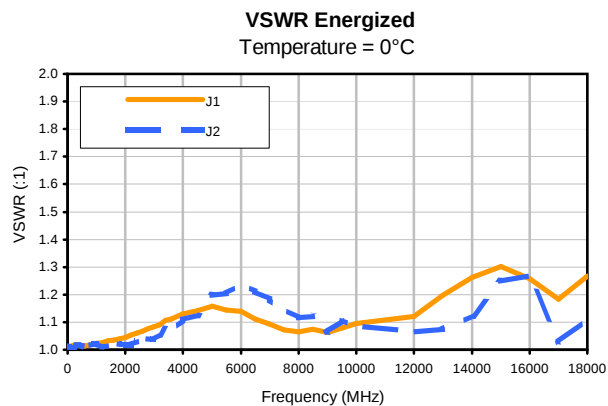
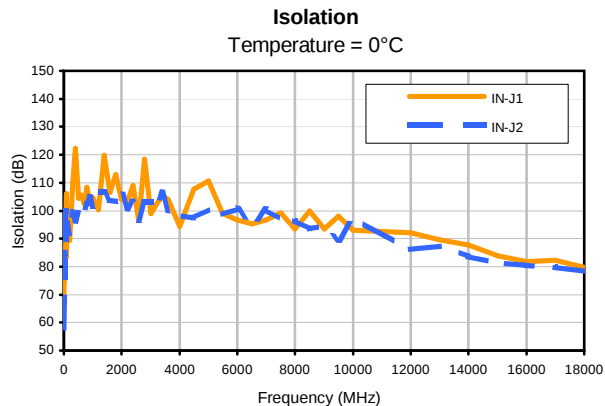
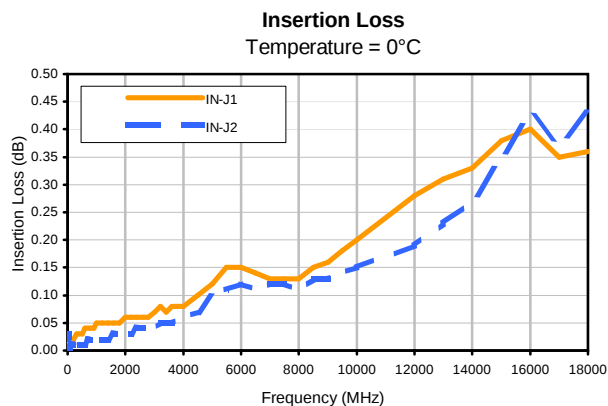


Xtra Long Life

USB RF SPDT Switch A

Typical Performance Curves

USB-2SPDT-A18XL



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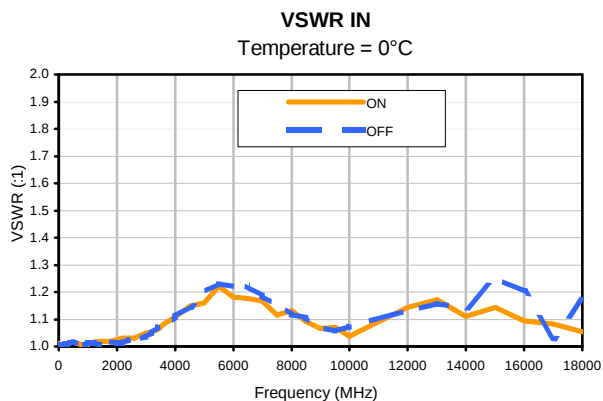
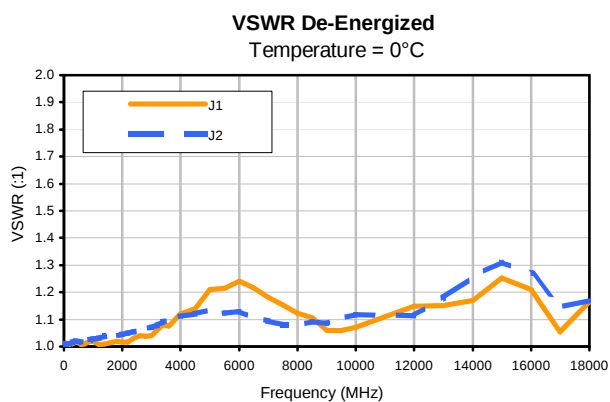
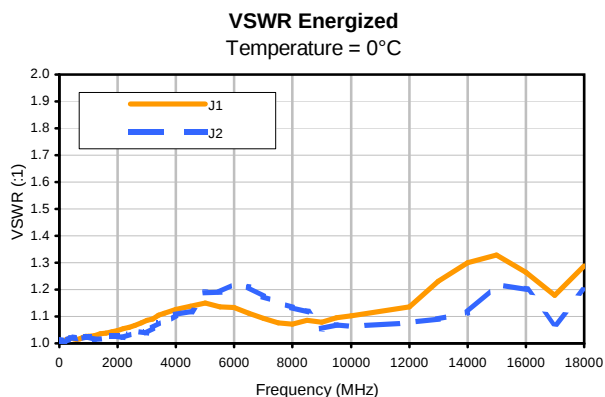
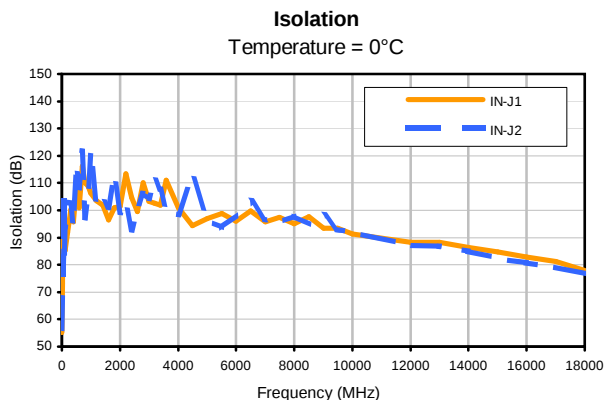
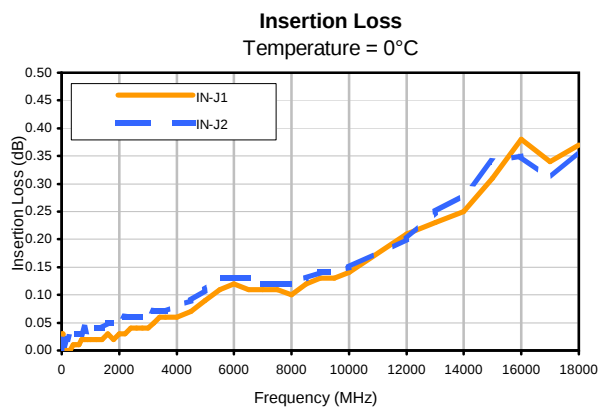


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USB RF SPDT Switch B

Typical Performance Curves

USB-2SPDT-A18XL

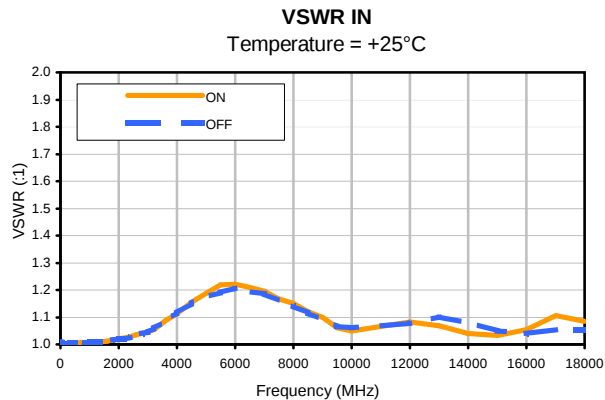
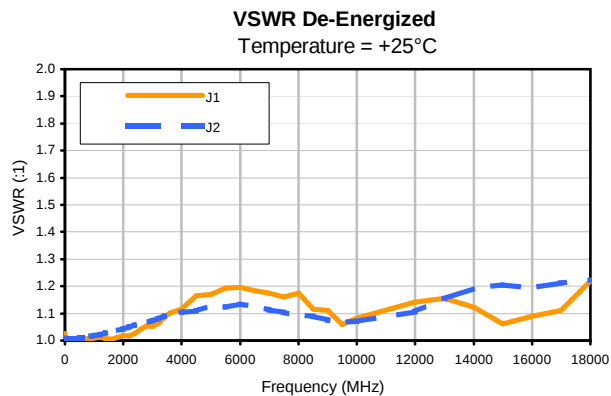
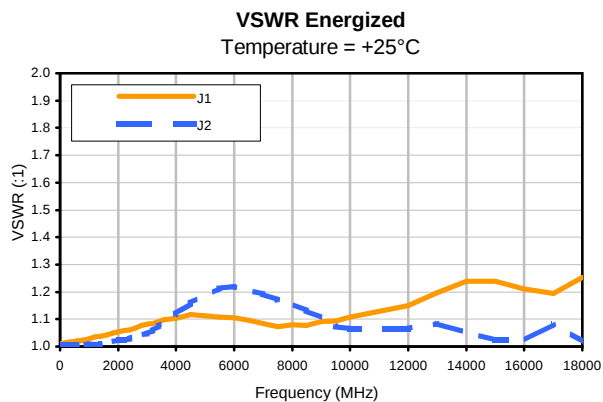
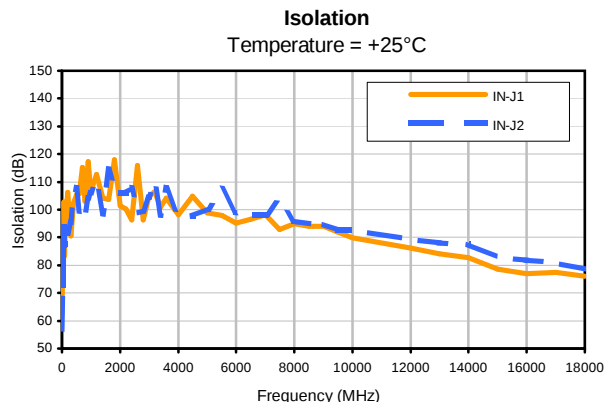
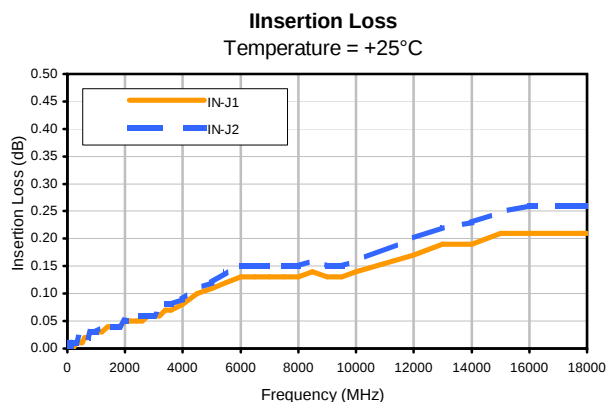


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USB RF SPDT Switch A

Typical Performance Curves

USB-2SPDT-A18XL

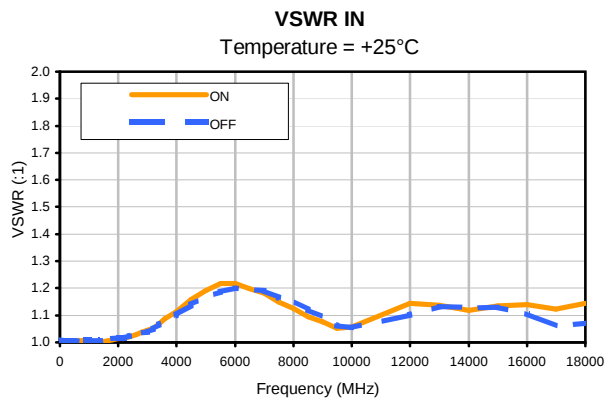
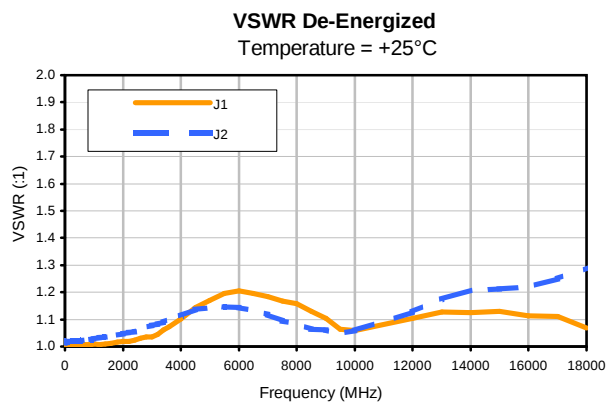
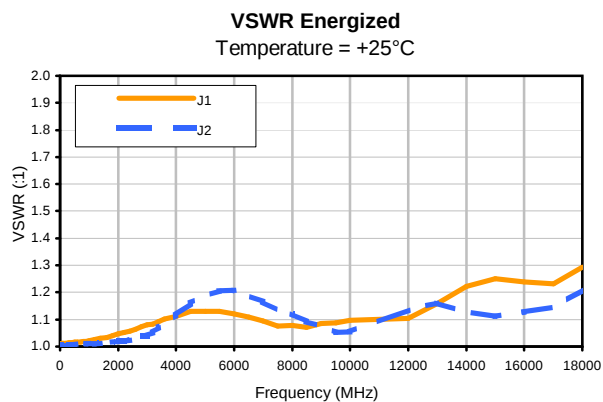
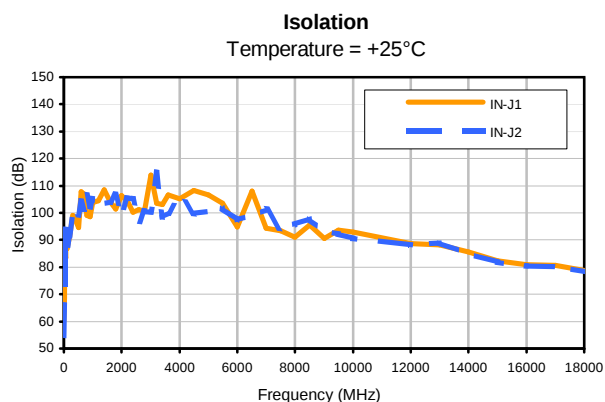
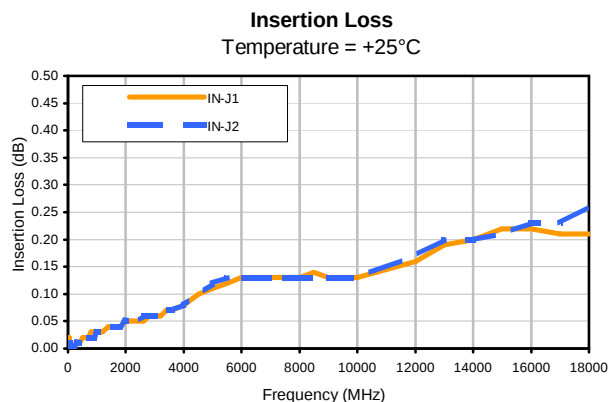


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USB RF SPDT Switch B

Typical Performance Curves

USB-2SPDT-A18XL



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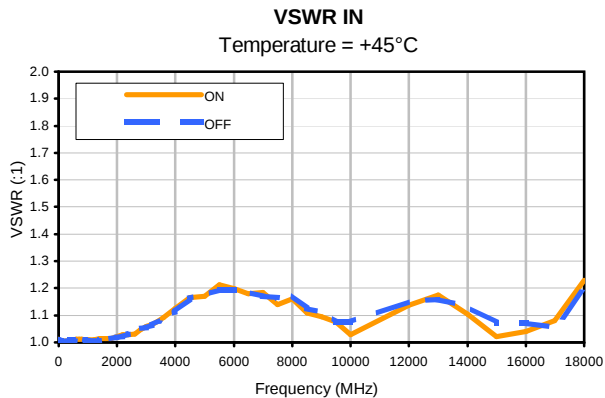
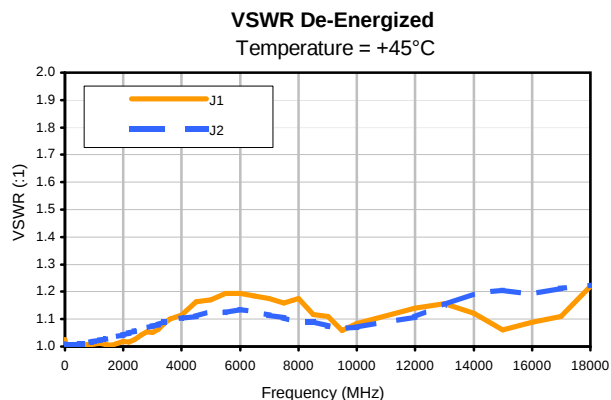
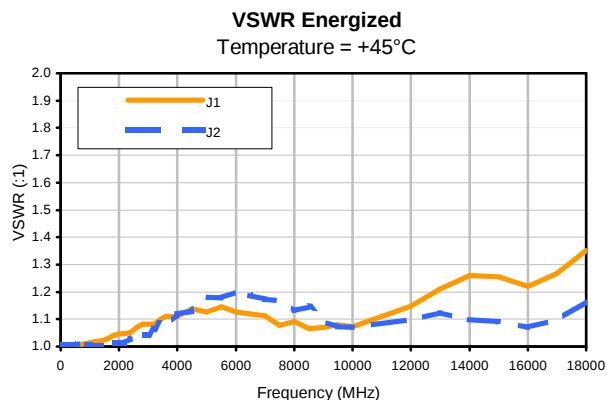
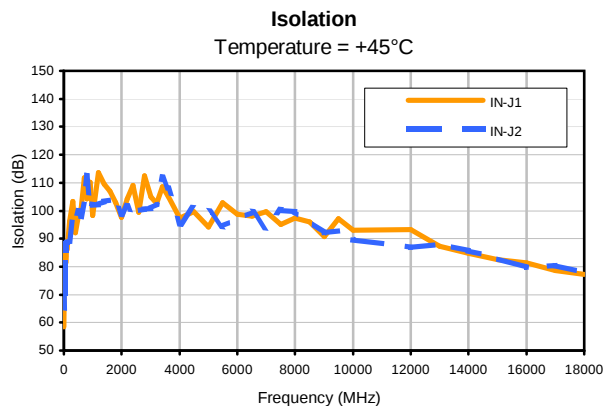
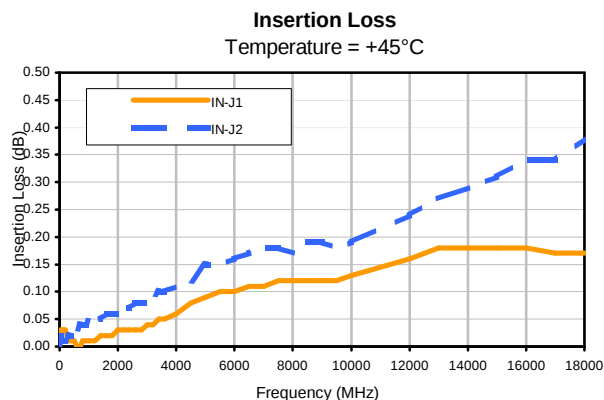


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USB RF SPDT Switch A

Typical Performance Curves

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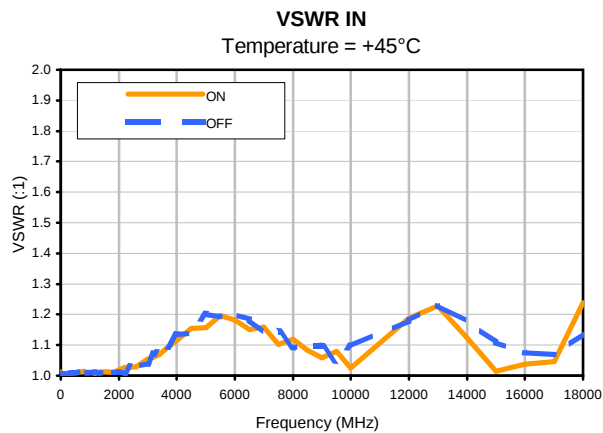
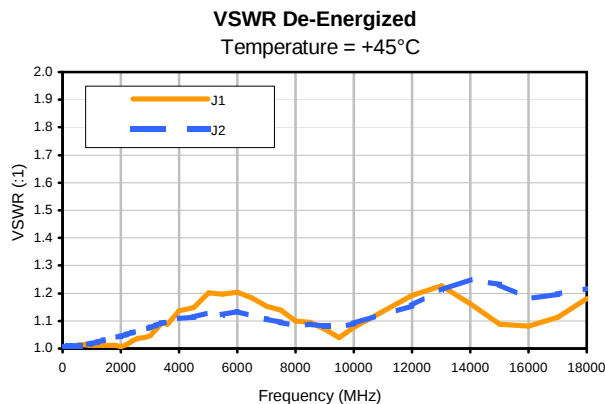
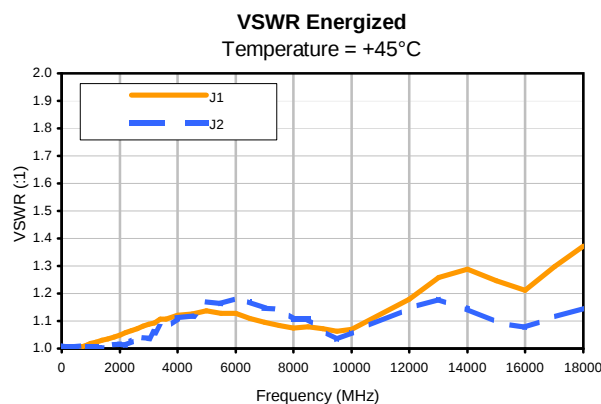
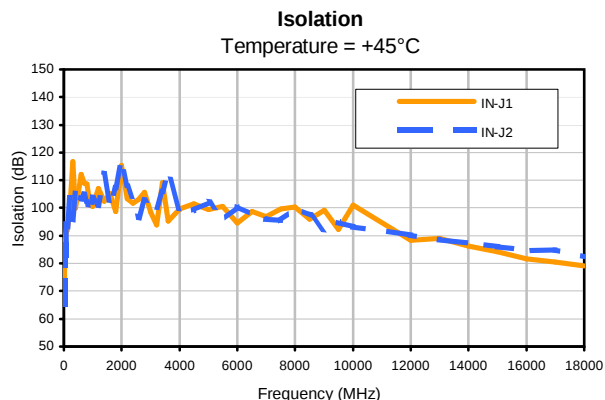
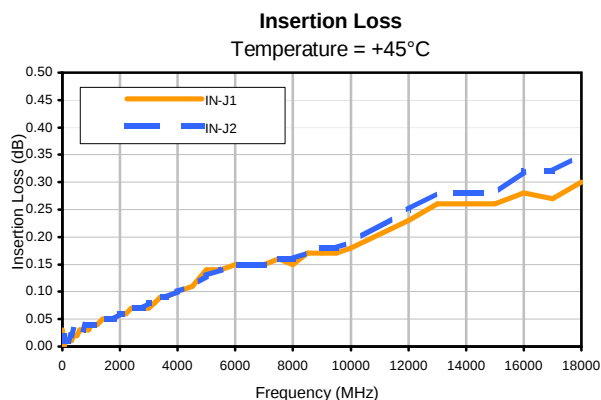


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USB RF SPDT Switch B

Typical Performance Curves

USB-2SPDT-A18XL



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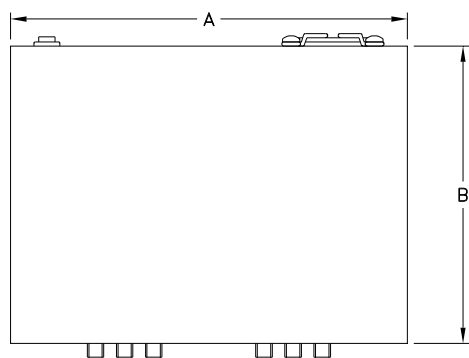


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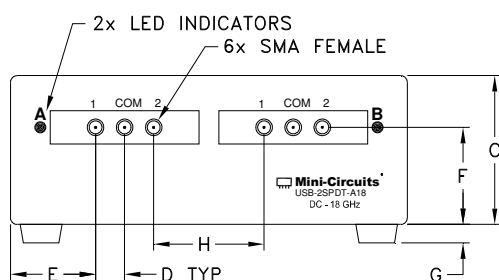
Outline Dimensions

LM1581

TOP VIEW

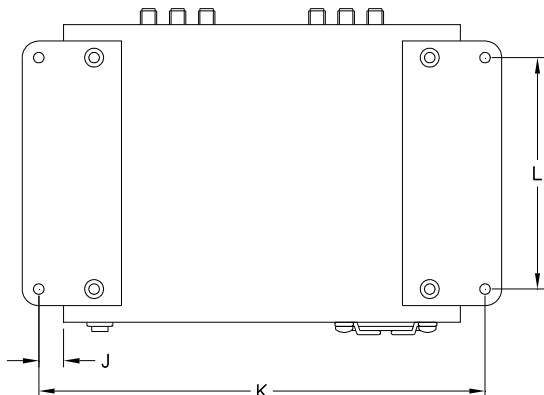


FRONT VIEW

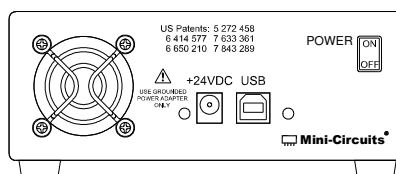


BOTTOM VIEW

Shown with Rubber feet removed and Brackets Installed.

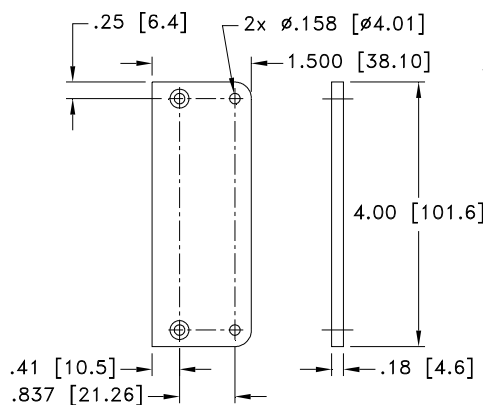


REAR VIEW



BRACKET OPTION

ONE SET OF 2 EACH.



TOLERANCE: $\pm .005$

INSTRUCTION FOR MOUNTING BRACKETS:
TOOL REQUIRED:

PHILLIPS HEAD SCREW DRIVER
STEP 1: REMOVE RUBBER FEET FROM THE BOTTOM OF THE UNIT. DO NOT DISCARD THE FASTENERS.

STEP 2: MOUNT THE BRACKETS WITH THE FASTENERS REMOVED IN STEP 1, USING THE COUNTER-BORE HOLES IN THE BRACKET.

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
LM1581	6.00 (152.4)	4.50 (114.3)	2.25 (57.2)	.440 (11.18)	1.28 (32.5)	1.47 (37.3)	.28 (7.1)	1.670 (42.4)	.375 (9.52)	6.75 (171.4)	3.500 (88.9)	980

Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

Notes:

1. Case and Bracket material: Aluminum Alloy.
2. Finish: For Case- Powder coating. Color: Blue, For Bracket- Clear Chemical conversion coating.



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RF/IF MICROWAVE COMPONENTS



Environmental Specifications ENV56

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-0° to 40° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-15° to 85° C Ambient Environment	Individual Model Data Sheet
Operating and Storage Humidity	5% to 85% RH (non-condensing)	Ambient
Bench Handling Test	Bench Top Tip 45° & Drop	MIL-PRF-28800F
Transit Drop Test	Free Fall Drop, 20 cm (7.9 inches)	MIL-PRF-28800F Class 3