



PART NUMBER	DESCRIPTION
CCR-33S	Commercial Latching SPDT, DC-18GHz
CR-33S	Elite Latching SPDT, DC-22GHz

The CCR-33S/CR-33S is a broadband, SPDT, electromechanical, coaxial switch designed to switch a microwave signal from a common input to either of two outputs. The characteristic impedance is 50 Ohms. The small switches incorporate SMA connectors.

The CCR-33S/CR-33S series switch is offered with a latching actuator. This design is compatible with the two most common mounting hole patterns. The CCR-33S/CR-33S series switch is interchangeable with a variety of switches.

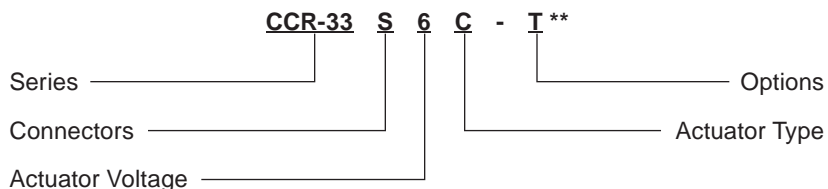


ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS	
Operating Temperature	
Commercial Model, CCR-33S	-40°C to 65°C
Elite Model, CR-33S	-55°C to 85°C
Vibration (MIL-STD-202 Method 214, Condition D, non-operating)	10 g's RMS
Shock (MIL-STD-202 Method 213, Condition D, non-operating)	500 g's
Standard Actuator Life	5,000,000 cycles
Actuator Life w/ Additional Features	1,000,000 cycles
Connector Type	SMA
Humidity (Moisture Seal)	Available
Weight	1.65 oz. (46.78g) (max.)

ELECTRICAL CHARACTERISTICS	
Form Factor	SPDT, break before make
Frequency Range	
CCR-33S	DC-18 GHz
CR-33S	DC-22 GHz
Characteristic Impedance	50 Ohms
Operate Time	10 ms (max.)
Actuation Voltage Available	12 15 24 28 V
Actuation Current, max. @ ambient	140 170 90 65 mA

PERFORMANCE CHARACTERISTICS						
Frequency	DC-4 GHz	4-8 GHz	8-12 GHz	12-16 GHz	16-20 GHz	20-22 GHz
Insertion Loss, dB, max.	0.1	0.2	0.2	0.3	0.4	0.4
Isolation, dB, min.	90	90	80	70	65	65
VSWR, max.	1.1:1	1.1:1	1.1:1	1.2:1	1.2:1	1.2:1

PART NUMBERING SYSTEM



Connector
S: SMA Female

Actuator Voltage
6: 28 Vdc Latching
7: 15 Vdc Latching
8: 12 Vdc Latching
9: 24 Vdc Latching

Actuator Type
O: Standard Contacts
C: Indicator Contacts
D: Self Cutoff Only
E: Indicators and Self Cutoff

Options
T: TTL Drivers with Diodes
D: Transient Suppression Diodes
R: Positive + Common
N: Narrow Body
M: Moisture Seal
S: 9 Pin D-Sub Connector

**SEE PARTS LIST ON PAGES 8-9

For other options, contact factory.

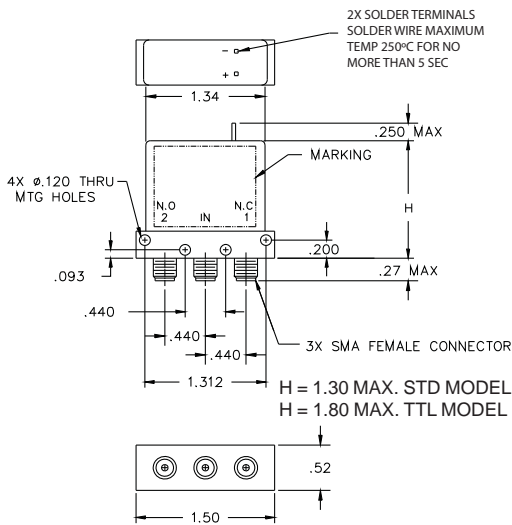
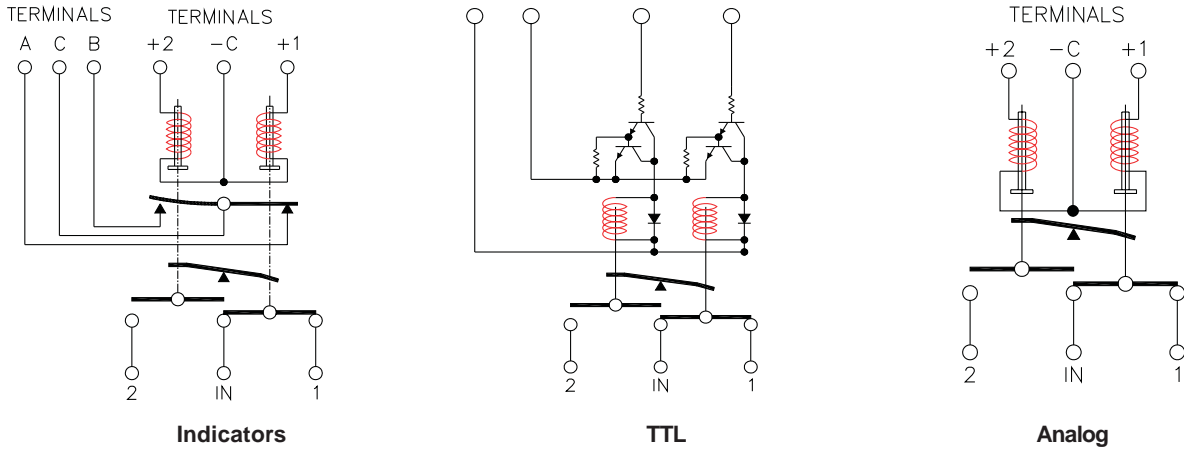
Series CCR-33S/CR-33S

Miniature DC-18 GHz/DC-22 GHz

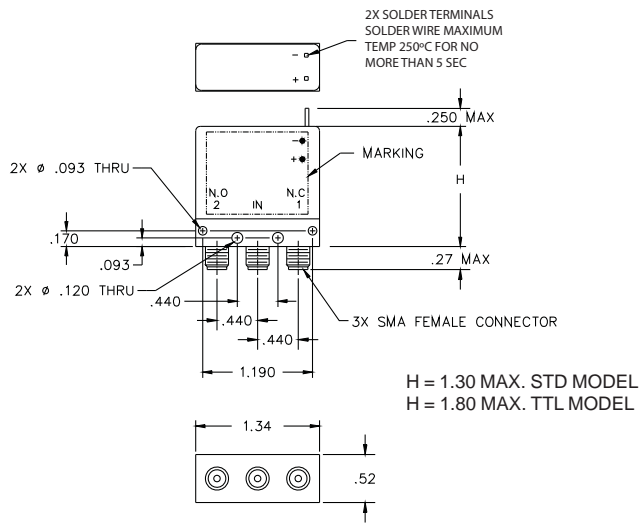
Latching SPDT Coaxial Switch



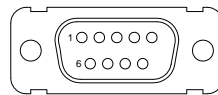
SCHEMATICS AND MECHANICAL OUTLINE



Standard Width Body



Optional Narrow Width Body

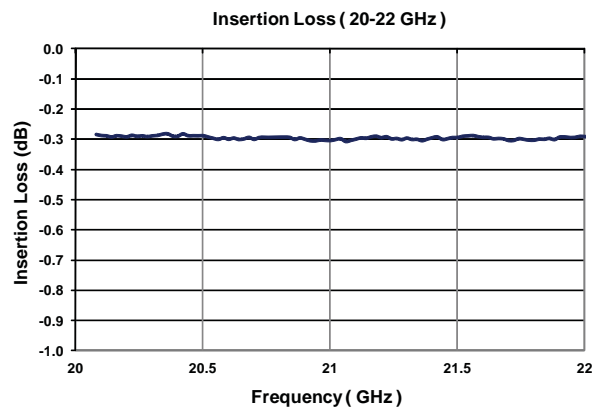
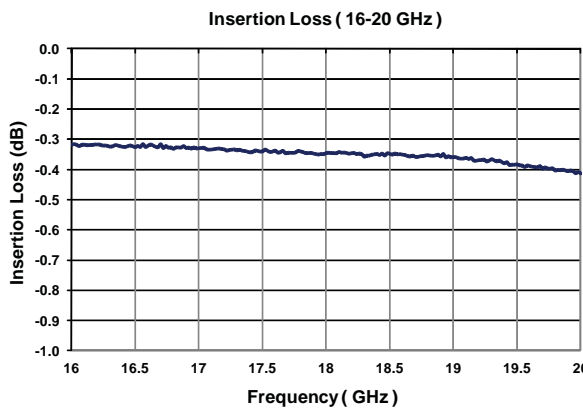
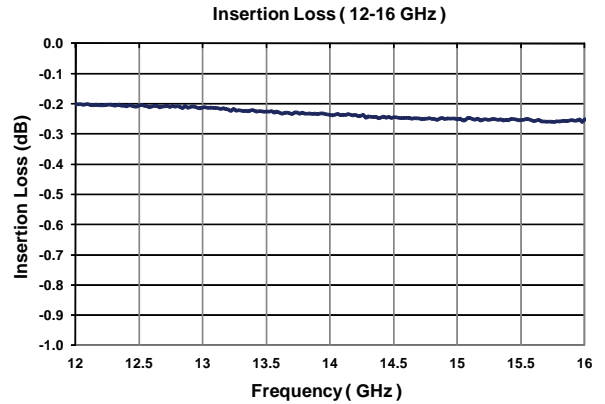
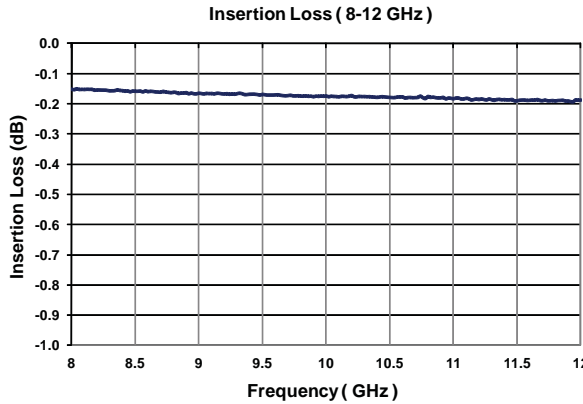
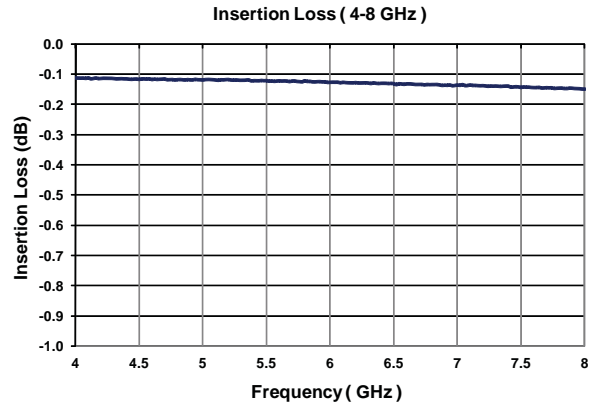
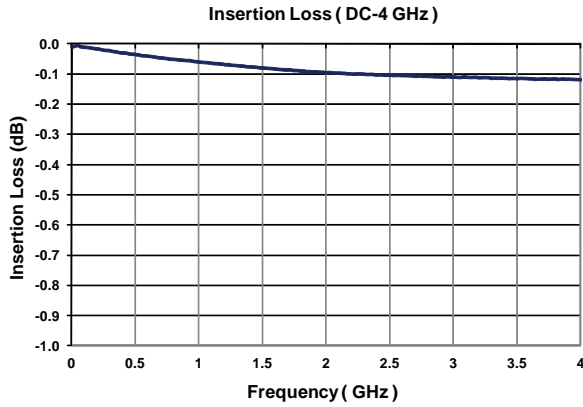


“-S OPTION” 9-PIN D-SUB CONNECTOR (EXAMPLE: CCR-33S60-S)

9 PIN D-SUB PINOUT FOR LATCHING SPDT				
Pin No.	OPTIONS			
	Basic	Indicators	TTL	Indicators & TTL
1	1	1		
2	2	2		
3	C	C	Common	Common
4			1	1
5			2	2
6			Vsw	Vsw
7		A		A
8		B		B
9		C		C

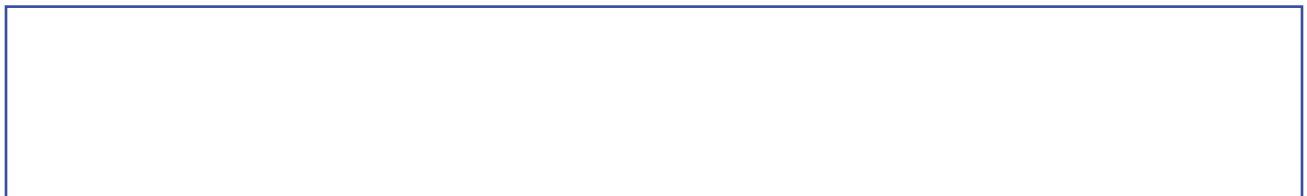
TRUTH TABLE (with TTL option)					
Logic Input		RF Path		Indicator (if applicable)	
1	2	IN to 1	IN to 2	A	B
0	0	No Change			
1	0	On	Off	C	0
0	1	Off	On	0	C
1	1	Forbidden			

TYPICAL NARROWBAND RF INSERTION LOSS PERFORMANCE CURVES



RF NOTES

ELITE MODEL ONLY



Series CCR-33S/CR-33S

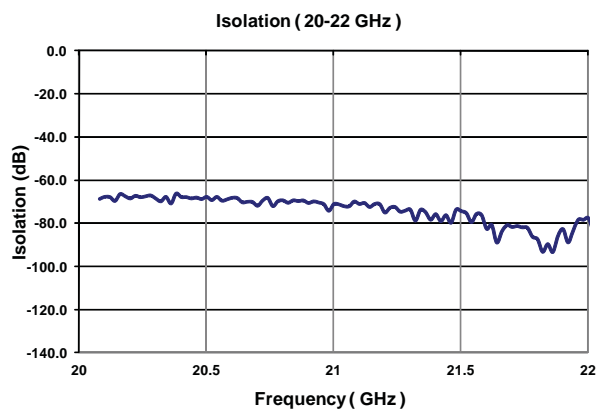
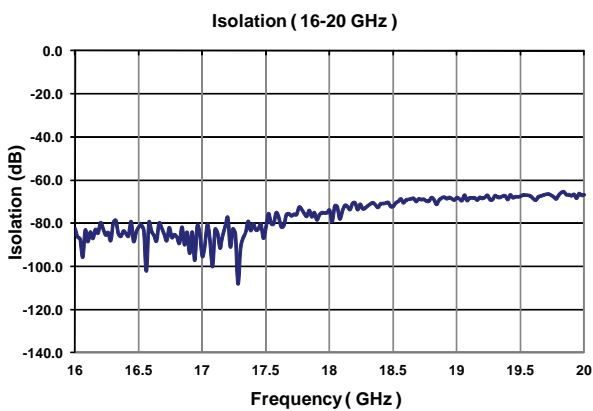
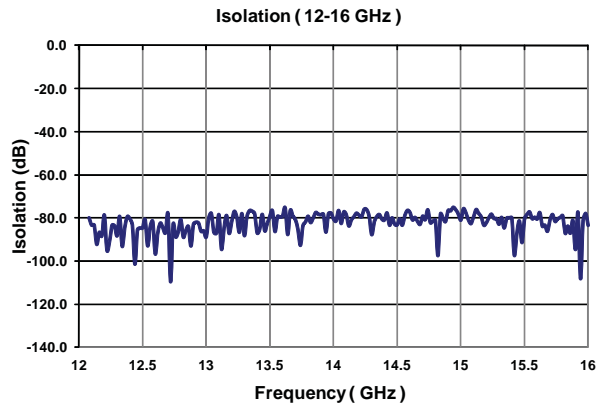
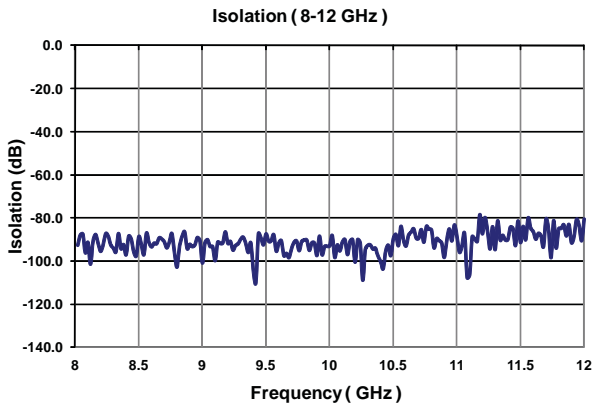
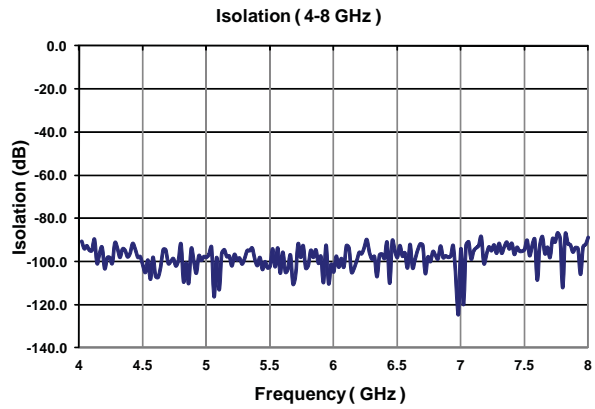
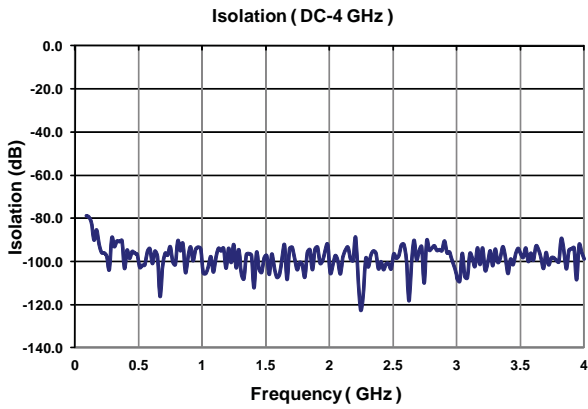
Miniature DC-18 GHz/DC-22 GHz

Latching SPDT Coaxial Switch



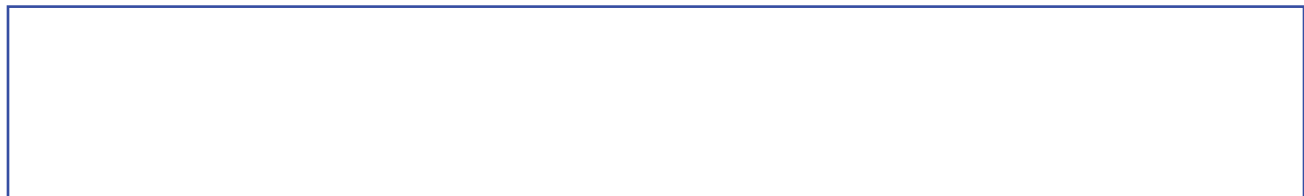
TELEDYNE
COAX SWITCHES
Everywhere you look™

TYPICAL NARROWBAND RF ISOLATION PERFORMANCE CURVES

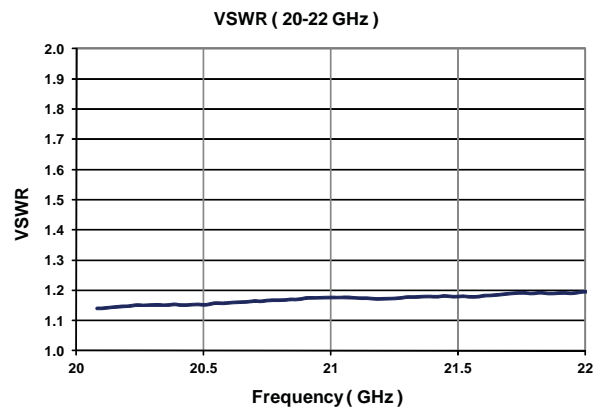
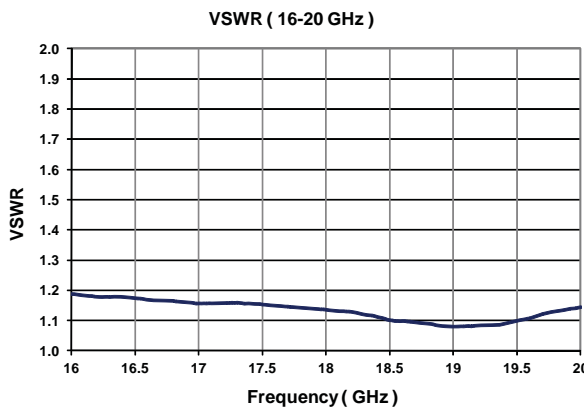
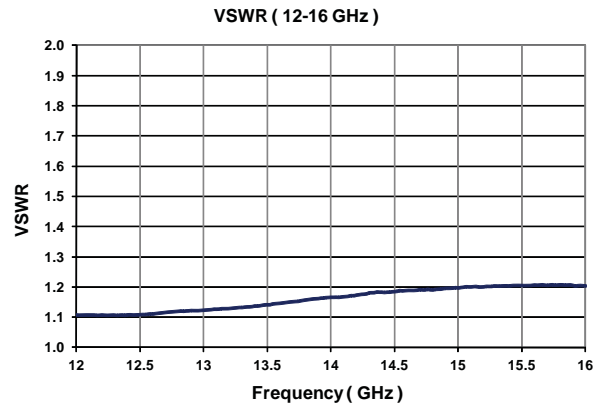
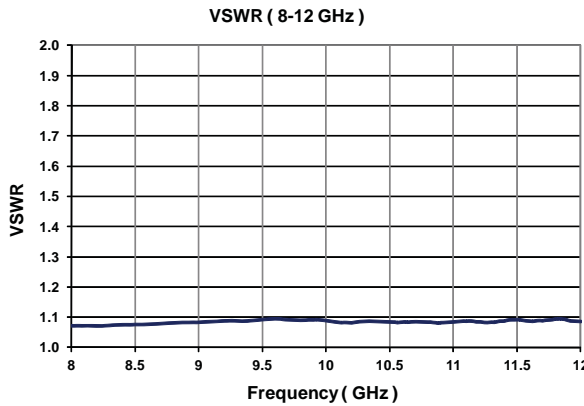
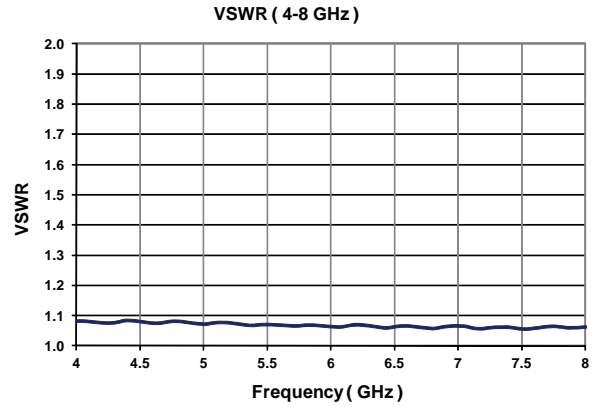
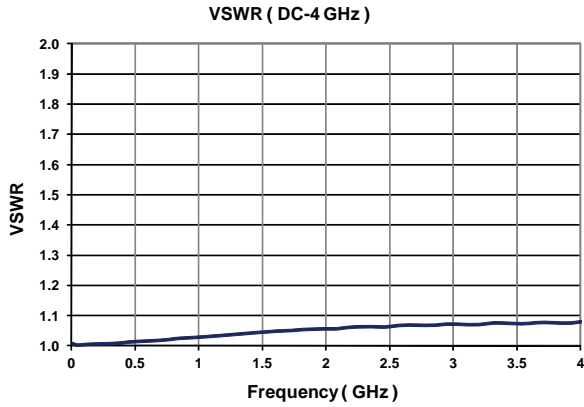


RF NOTES

ELITE MODEL ONLY

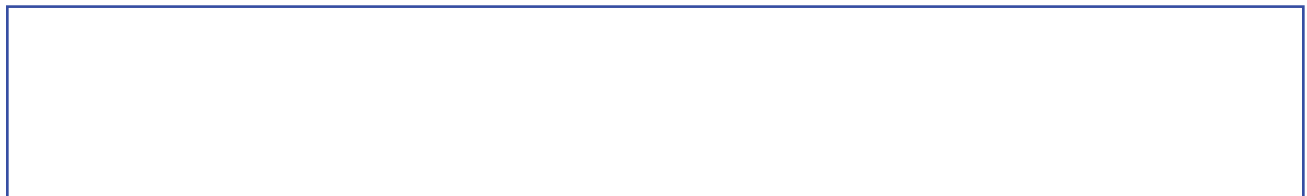


TYPICAL NARROWBAND RF VSWR PERFORMANCE CURVES



RF NOTES

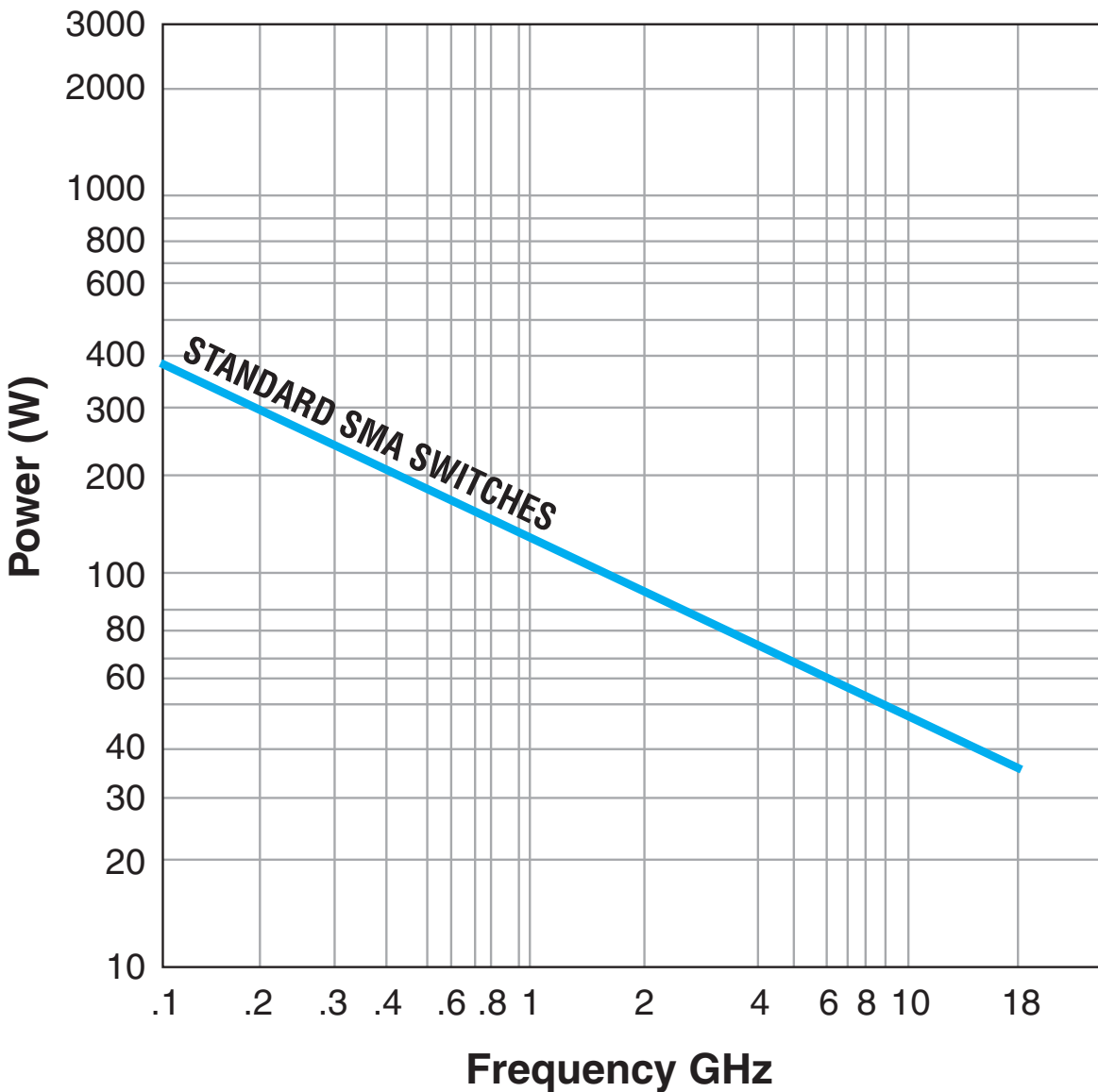
ELITE MODEL ONLY





TYPICAL POWER PERFORMANCE CURVE

Power Handling vs. Frequency



Estimates based on the following reference conditions:

- Ambient temperature of 40°C or less
- Sea level operation
- Load VSWR of 1.20:1 maximum
- No high-power (hot) switching

Please contact Teledyne Coax Switches for derating factors when applications do not meet the foregoing reference conditions.

GLOSSARY

Actuator

An actuator is the electromechanical mechanism that transfers the RF contacts from one position to another upon DC command.

Arc Suppression Diode

A diode is connected in parallel with the coil. This diode limits the “reverse EMF spike” generated when the coil de-energizes to 0.7 volts. The diode cathode is connected to the positive side of the coil and the anode is connected to the negative side.

Date Code

All switches are marked with either a unique serial number or a date code. Date codes are in accordance with MIL-STD-1285 Paragraph 5.2.5 and consist of four digits. The first two digits define the year and the last two digits define the week of the year (YYWW). Thus, 1032 identifies switches that passed through final inspection during the 32nd week of 2010.

Latching

A latching switch remains in the selected position whether or not voltage is maintained. This can be accomplished with either a magnetic or mechanical latching mechanism.

Indicator

Indicators tell the system which position the switch is in. Other names for indicators are telemetry contacts or tellback circuit. Indicators are usually a set of internally mounted DC contacts linked to the actuator. They can be wired to digital input lines, status lights, or interlocks. Unless otherwise specified, the maximum indicator contact rating is 30 Vdc, 50 mA, or 1.5 Watts into a resistive load.

Isolation

Isolation is the measure of the power level at the output connector of an unconnected RF channel as referenced to the power at the input connector. It is specified in dB below the input power level.

Self-Cutoff

The self-cutoff option disables the actuator current on completion of actuation. Either a series contact (linked to the actuator) or an IC driver circuit provides the current cutoff. This option results in minimum power consumption by the RF switch. Cutthroat is another name used in the industry for this option. Pulse latching is a term used to describe a switch without this feature.

SPDT Switch

A single-pole double-throw, bi-directional switch that can be used as having one input and two outputs or two inputs and one output.

Switching Time

Switching time is the total interval beginning with the arrival of the leading edge of the command pulse at the switch DC input and ending with the completion of the switch transfer,

including contact bounce. It consists of three parts: (1) inductive delay in the coil, (2) transfer time of the physical movement of the contacts, and (3) the bounce time of the RF contacts.

TTL Switch Driver Option

As a special option, switch drivers can be provided for both failsafe and latching switches, which are compatible with industry-standard low-power Schottky TTL circuits.

Performance Parameters vs Frequency

Generally speaking, the RF performance of coaxial switches is frequency dependent. With increasing frequency, VSWR and insertion loss increase while isolation decreases. All data sheets specify these three parameters as “worst case” at the highest operating frequency. If the switch is to be used over a narrow frequency band, better performance can be achieved.

Actuator Current vs Temperature

The resistance of the actuator coil varies as a function of temperature. There is an inverse relationship between the operating temperature of the switch and the actuator drive current. For switches operating at 28 VDC, the approximate actuator drive current at temperature, T, can be calculated using the equation:

$$I_T = \frac{I_A}{[1 + .00385 (T-20)]}$$

Where:

I_T = Actuator current at temperature, T

I_A = Room temperature actuator current – see data sheet

T = Temperature of interest in °C

Magnetic Sensitivity

An electro-mechanical switch can be sensitive to ferrous materials and external magnetic fields. Neighboring ferrous materials should be permitted no closer than 0.5 inches and adjacent external magnetic fields should be limited to a flux density of less than 5 Gauss.

SPECIAL FEATURE

Switching High-Power or Highly Sensitive Signals

Ensure the most linear response with the best galvanically matched contact system in the industry. Extremely low passive intermodulation is standard on all of our switches.

Carrier Frequency 1	Carrier Frequency 2	PIM 3rd Order Frequency	PIM 5th Order Frequency
870 MHz	893 MHz	847 MHz	824 MHz

	3rd Order Intermodulation	5th Order Intermodulation
SPDT	–91 dBm	–110 dBm
	–134 dBc	–153 dBc

Series CCR-33S/CR-33S

Miniature DC-18 GHz/DC-22 GHz

Latching SPDT Coaxial Switch



TELEDYNE
COAX SWITCHES
Everywhereyoulook™

LATCHING CCR-33S/CR-33S PART NUMBER LIST

	PART No.		PART No.		PART No.		PART No.
1	CCR-33SXC	43	CCR-33SXD-DMS	85	CCR-33SXE-DNMS	127	CCR-33SXO-DRM
2	CCR-33SXC-D	44	CCR-33SXD-DN	86	CCR-33SXE-DNS	128	CCR-33SXO-DRMS
3	CCR-33SXC-DM	45	CCR-33SXD-DNM	87	CCR-33SXE-DR	129	CCR-33SXO-DRN
4	CCR-33SXC-DMS	46	CCR-33SXD-DNMS	88	CCR-33SXE-DRM	130	CCR-33SXO-DRNMS
5	CCR-33SXC-DN	47	CCR-33SXD-DNS	89	CCR-33SXE-DRMS	131	CCR-33SXO-DRNS
6	CCR-33SXC-DNM	48	CCR-33SXD-DR	90	CCR-33SXE-DRN	132	CCR-33SXO-DRS
7	CCR-33SXC-DNMS	49	CCR-33SXD-DRM	91	CCR-33SXE-DRNMS	133	CCR-33SXO-DS
8	CCR-33SXC-DNS	50	CCR-33SXD-DRMS	92	CCR-33SXE-DRNS	134	CCR-33SXO-M
9	CCR-33SXC-DR	51	CCR-33SXD-DRN	93	CCR-33SXE-DRS	135	CCR-33SXO-MS
10	CCR-33SXC-DRM	52	CCR-33SXD-DRNMS	94	CCR-33SXE-DS	136	CCR-33SXO-N
11	CCR-33SXC-DRMS	53	CCR-33SXD-DRNS	95	CCR-33SXE-M	137	CCR-33SXO-NM
12	CCR-33SXC-DRN	54	CCR-33SXD-DRS	96	CCR-33SXE-MS	138	CCR-33SXO-NMS
13	CCR-33SXC-DRNMS	55	CCR-33SXD-DS	97	CCR-33SXE-N	139	CCR-33SXO-NS
14	CCR-33SXC-DRNS	56	CCR-33SXD-M	98	CCR-33SXE-N	140	CCR-33SXO-R
15	CCR-33SXC-DRS	57	CCR-33SXD-MS	99	CCR-33SXE-NM	141	CCR-33SXO-RM
16	CCR-33SXC-DS	58	CCR-33SXD-N	100	CCR-33SXE-NMS	142	CCR-33SXO-RMS
17	CCR-33SXC-M	59	CCR-33SXD-N	101	CCR-33SXE-NS	143	CCR-33SXO-RN
18	CCR-33SXC-MS	60	CCR-33SXD-NM	102	CCR-33SXE-R	144	CCR-33SXO-RNM
19	CCR-33SXC-N	61	CCR-33SXD-NMS	103	CCR-33SXE-RM	145	CCR-33SXO-RNMS
20	CCR-33SXC-NM	62	CCR-33SXD-NS	104	CCR-33SXE-RMS	146	CCR-33SXO-RNS
21	CCR-33SXC-NMS	63	CCR-33SXD-R	105	CCR-33SXE-RN	147	CCR-33SXO-RS
22	CCR-33SXC-NS	64	CCR-33SXD-RM	106	CCR-33SXE-RNM	148	CCR-33SXO-S
23	CCR-33SXC-R	65	CCR-33SXD-RMS	107	CCR-33SXE-RNMS	149	CCR-33SXO-T
24	CCR-33SXC-RM	66	CCR-33SXD-RN	108	CCR-33SXE-RNS	150	CCR-33SXO-TM
25	CCR-33SXC-RMS	67	CCR-33SXD-RNM	109	CCR-33SXE-RS	151	CCR-33SXO-TMS
26	CCR-33SXC-RN	68	CCR-33SXD-RNMS	110	CCR-33SXE-S	152	CCR-33SXO-TN
27	CCR-33SXC-RNM	69	CCR-33SXD-RNS	111	CCR-33SXE-T	153	CCR-33SXO-TNM
28	CCR-33SXC-RNMS	70	CCR-33SXD-RS	112	CCR-33SXE-TM	154	CCR-33SXO-TNMS
29	CCR-33SXC-RNS	71	CCR-33SXD-S	113	CCR-33SXE-TMS	155	CCR-33SXO-TNS
30	CCR-33SXC-RS	72	CCR-33SXD-T	114	CCR-33SXE-TN	156	CCR-33SXO-TS
31	CCR-33SXC-S	73	CCR-33SXD-TM	115	CCR-33SXE-TNM	157	CR-33SXC
32	CCR-33SXC-T	74	CCR-33SXD-TMS	116	CCR-33SXE-TNMS	158	CR-33SXC-D
33	CCR-33SXC-TM	75	CCR-33SXD-TN	117	CCR-33SXE-TNS	159	CR-33SXC-DM
34	CCR-33SXC-TMS	76	CCR-33SXD-TNM	118	CCR-33SXO	160	CR-33SXC-DMS
35	CCR-33SXC-TN	77	CCR-33SXD-TNMS	119	CCR-33SXO-D	161	CR-33SXC-DN
36	CCR-33SXC-TNM	78	CCR-33SXD-TNS	120	CCR-33SXO-DM	162	CR-33SXC-DNM
37	CCR-33SXC-TNMS	79	CCR-33SXE	121	CCR-33SXO-DMS	163	CR-33SXC-DNMS
38	CCR-33SXC-TNS	80	CCR-33SXE-D	122	CCR-33SXO-DN	164	CR-33SXC-DNS
39	CCR-33SXC-TS	81	CCR-33SXE-DM	123	CCR-33SXO-DNM	165	CR-33SXC-DR
40	CCR-33SXD	82	CCR-33SXE-DMS	124	CCR-33SXO-DNMS	166	CR-33SXC-DRM
41	CCR-33SXD-D	83	CCR-33SXE-DN	125	CCR-33SXO-DNS	167	CR-33SXC-DRMS
42	CCR-33SXD-DM	84	CCR-33SXE-DNM	126	CCR-33SXO-DR	168	CR-33SXC-DRN

* X = 6 (28Vdc), 7 (15Vdc), 8 (12Vdc) and 9 (24Vdc)

LATCHING CCR-33S/CR-33S PART NUMBER LIST

	PART No.		PART No.		PART No.		PART No.
169	CR-33SXC-DRNMS	211	CR-33SXD-DNS	253	CR-33SXE-DRMS	295	CR-33SXO-DRNS
170	CR-33SXC-DRNS	212	CR-33SXD-DR	254	CR-33SXE-DRN	296	CR-33SXO-DRS
171	CR-33SXC-DRS	213	CR-33SXD-DRM	255	CR-33SXE-DRNMS	297	CR-33SXO-DS
172	CR-33SXC-DS	214	CR-33SXD-DRMS	256	CR-33SXE-DRNS	298	CR-33SXO-M
173	CR-33SXC-M	215	CR-33SXD-DRN	257	CR-33SXE-DRS	299	CR-33SXO-MS
174	CR-33SXC-MS	216	CR-33SXD-DRNMS	258	CR-33SXE-DS	300	CR-33SXO-N
175	CR-33SXC-N	217	CR-33SXD-DRNS	259	CR-33SXE-M	301	CR-33SXO-NM
176	CR-33SXC-NM	218	CR-33SXD-DRS	260	CR-33SXE-MS	302	CR-33SXO-NMS
177	CR-33SXC-NMS	219	CR-33SXD-DS	261	CR-33SXE-N	303	CR-33SXO-NS
178	CR-33SXC-NS	220	CR-33SXD-M	262	CR-33SXE-N	304	CR-33SXO-R
179	CR-33SXC-R	221	CR-33SXD-MS	263	CR-33SXE-NM	305	CR-33SXO-RM
180	CR-33SXC-RM	222	CR-33SXD-N	264	CR-33SXE-NMS	306	CR-33SXO-RMS
181	CR-33SXC-RMS	223	CR-33SXD-N	265	CR-33SXE-NS	307	CR-33SXO-RN
182	CR-33SXC-RN	224	CR-33SXD-NM	266	CR-33SXE-R	308	CR-33SXO-RNM
183	CR-33SXC-RNM	225	CR-33SXD-NMS	267	CR-33SXE-RM	309	CR-33SXO-RNMS
184	CR-33SXC-RNMS	226	CR-33SXD-NS	268	CR-33SXE-RMS	310	CR-33SXO-RNS
185	CR-33SXC-RNS	227	CR-33SXD-R	269	CR-33SXE-RN	311	CR-33SXO-RS
186	CR-33SXC-RS	228	CR-33SXD-RM	270	CR-33SXE-RNM	312	CR-33SXO-S
187	CR-33SXC-S	229	CR-33SXD-RMS	271	CR-33SXE-RNMS		
188	CR-33SXC-T	230	CR-33SXD-RN	272	CR-33SXE-RNS		
189	CR-33SXC-TM	231	CR-33SXD-RNM	273	CR-33SXE-RS		
190	CR-33SXC-TMS	232	CR-33SXD-RNMS	274	CR-33SXE-S		
191	CR-33SXO-T	233	CR-33SXD-RNS	275	CR-33SXE-T		
192	CR-33SXO-TM	234	CR-33SXD-RS	276	CR-33SXE-TM		
193	CR-33SXO-TMS	235	CR-33SXD-S	277	CR-33SXE-TMS		
194	CR-33SXO-TN	236	CR-33SXD-T	278	CR-33SXE-TN		
195	CR-33SXO-TNM	237	CR-33SXD-TM	279	CR-33SXE-TNM		
196	CR-33SXO-TNMS	238	CR-33SXD-TMS	280	CR-33SXE-TNMS		
197	CR-33SXO-TNS	239	CR-33SXD-TN	281	CR-33SXE-TNS		
198	CR-33SXO-TS	240	CR-33SXD-TNM	282	CR-33SXO		
199	CR-33SXC-TN	241	CR-33SXD-TNMS	283	CR-33SXO-D		
200	CR-33SXC-TNM	242	CR-33SXD-TNS	284	CR-33SXO-DM		
201	CR-33SXC-TNMS	243	CR-33SXE	285	CR-33SXO-DMS		
202	CR-33SXC-TNS	244	CR-33SXE-D	286	CR-33SXO-DN		
203	CR-33SXC-TS	245	CR-33SXE-DM	287	CR-33SXO-DNM		
204	CR-33SXD	246	CR-33SXE-DMS	288	CR-33SXO-DNMS		
205	CR-33SXD-D	247	CR-33SXE-DN	289	CR-33SXO-DNS		
206	CR-33SXD-DM	248	CR-33SXE-DNM	290	CR-33SXO-DR		
207	CR-33SXD-DMS	249	CR-33SXE-DNMS	291	CR-33SXO-DRM		
208	CR-33SXD-DN	250	CR-33SXE-DNS	292	CR-33SXO-DRMS		
209	CR-33SXD-DNM	251	CR-33SXE-DR	293	CR-33SXO-DRN		
210	CR-33SXD-DNMS	252	CR-33SXE-DRM	294	CR-33SXO-DRNMS		

* X = 6 (28Vdc), 7 (15Vdc), 8 (12Vdc) and 9 (24Vdc)