TELEDYNE COAX SWITCHES
### Everywhere**you**look™

RoHS Compliant

PART NUMBER	DESCRIPTION
CCR-39S	Commercial Latching Multi-throw, DC-10GHz

The CCR-39Sis a broadband, multi-throw, electromechanical coaxial switch designed to switch a microwave signal from a common input to any of 9 or 10 outputs. The characteristic impedance is 50 Ohms. Each position has an individual actuator mechanism allowing random position selection. This also minimizes switching time.

The CCR-39S comes with a latching actuator. The latching switch remains in the last position selected when the switch is de-energized. STD dual command requires a reset pulse before a new selected position. A separate reset circuit allows all positions to be set to an open position. User must provide both reset (clear) and set (select new position) commands.
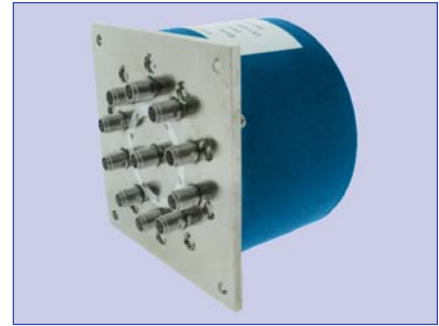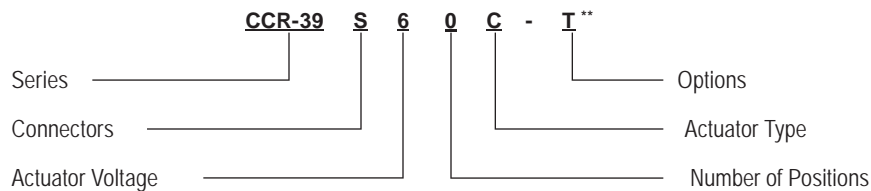
ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS

Operating Temperature Commercial Model, CCR-39S	−40°C to 65°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 Actuator Life w/ Additional Features	3,000,000 cycles 1,000,000 cycles
Connector Type	SMA
Humidity (Moisture Seal)	Available
Weight	9 oz. (255.2g) (max.)

ELECTRICAL CHARACTERISTICS

Form Factor	Multi-Throw, break before make				
Frequency Range CCR-39S	DC–10 GHz				
Characteristic Impedance	50 Ohms				
Operate Time	20 ms (max.)				
Actuation Voltage Available	12	15	24	28	V
Actuation Current	110	105	90	105	mA
Reset Current (# of Positions)					
(9)	990	945	810	945	mA
(10)	1100	1050	900	1050	mA

PERFORMANCE CHARACTERISTICS

Frequency	DC–2.3 GHz	2.3-3.0 GHz	3.0-6.0 GHz	6.0-8.0 GHz	8.0-10.0 GHz
Insertion Loss, dB, max.	0.2	0.25	0.30	0.40	0.6
Isolation, dB, min.	80	70	65	60	60
VSWR , max.	1.15:1	1.20:1	1.30:1	1.40:1	1.60:1

PART NUMBERING SYSTEM

CCR-39 **S** **6** **0** **C** - **T****

- Series
- Connectors
- Actuator Voltage
- Number of Positions
- Actuator Type
- Options

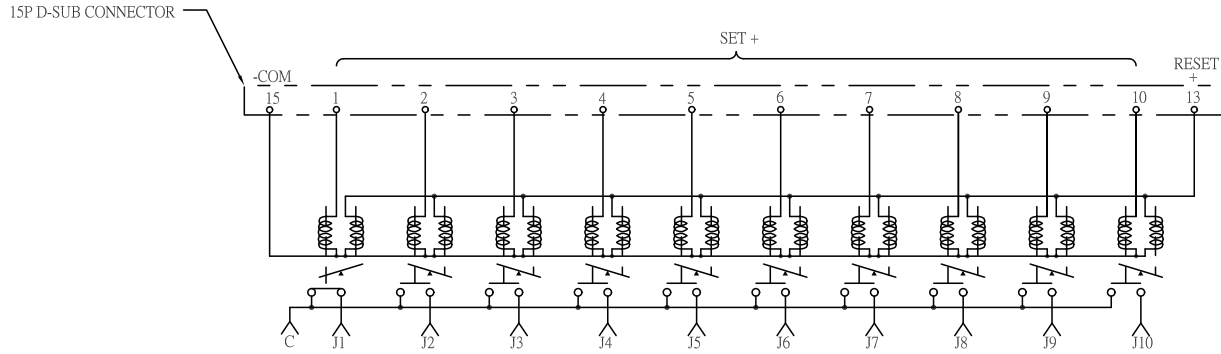| CONNECTOR	ACTUATOR VOLTAGE	NUMBER OF POSITIONS	ACTUATOR TYPE	OPTIONS
S: SMA FEMALE	6: 28 VDC LATCHING	9: SP9T	0: NO INDICATOR CONTACTS	T: TTL DRIVERS WITH DIODES
	7: 15 VDC LATCHING	0: SP10T	C: INDICATOR CONTACTS	D: COIL TRANSIENT SUPPRESSION DIODES
	8: 12 VDC LATCHING			R: POSITIVE + COMMON
	9: 24 VDC LATCHING			TD: DECODERS AND TTL DRIVERS WITH DIODES
		**SEE PART NUMBER ON PAGE 10-11		M: MOISTURE SEAL
				S: D-SUB CONNECTOR*

* D-Sub Connector may be 15 or 26 pin depending on number of throws. (See Connector Pinout page)

**1 D-Sub Connectors is standard configuration on all models unless otherwise specified

For additional options, please contact factory.

Series CCR-39S
Multi-Throw DC-10 GHz, SP9T & SP10T
Latching Coaxial Switch

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SCHEMATICS AND MECHANICAL OUTLINE

SCHEMATIC
COIL 1 SHOWN LAST ENERGIZE

DIMENSIONS ARE IN INCHES:

4X Ø.149 THRU

11X SMA FEMALE CONNECTORS
10X EQUALLY SPACED 0N A Ø1.740 [Ø44.20] B.C.

LABEL

PIN #1

15 PIN D-SUB CONNECTOR
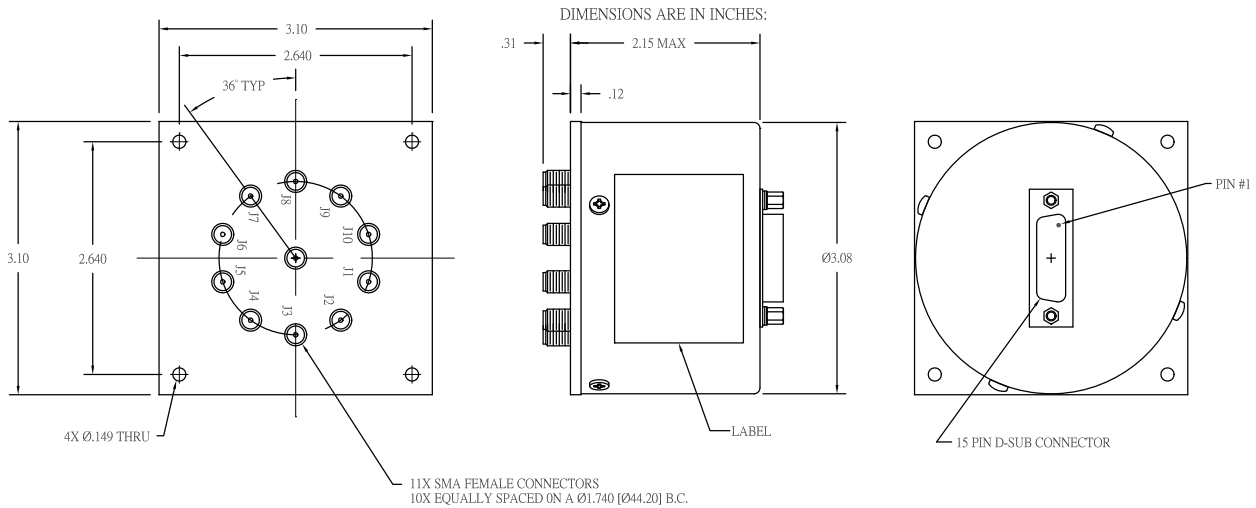
"-S OPTION" 15-PIN D-SUB OR 26-PIN D-MICRO CONNECTOR (EXAMPLE: CCR-39S690-S)

CONNECTOR PINOUT FOR LATCHING SP9T MULTI-THROW SWITCHES

| EXAMPLE	CCR-39S690-S	CCR-39S69C-S	CCR-39S690-TS	CCR-39S69C-TS	CCR-39S690-TDS	CCR-39S69C-TDS
INDICATOR		YES		YES		YES
TTL			YES	YES		
DECODERS & TTL					YES	YES
PIN NO.	15-PIN	26-PIN	15-PIN	26-PIN	15-PIN	26-PIN
1	PORT 1	PORT 1	TTL 1	TTL 1	LOGIC 1	LOGIC 1
2	PORT 2	PORT 2	TTL 2	TTL 2	LOGIC 2	LOGIC 2
3	PORT 3	PORT 3	TTL 3	TTL 3	LOGIC 3	LOGIC 3
4	PORT 4	PORT 4	TTL 4	TTL 4	LOGIC 4	LOGIC 4
5	PORT 5	PORT 5	TTL 5	TTL 5		
6	PORT 6	PORT 6	TTL 6	TTL 6		
7	PORT 7	PORT 7	TTL 7	TTL 7		
8	PORT 8	PORT 8	TTL 8	TTL 8		
9	PORT 9	PORT 9	TTL 9	TTL 9		
10						
11						
12						
13			Vsw	Vsw	Vsw	Vsw
14	Reset	Reset	Reset	Reset		
15	COMMMON	COMMMON	COMMMON	COMMMON	COMMMON	COMMMON
16		D Indicator (COM)		D Indicator (COM)		D Indicator (COM)
17		E Indicator		E Indicator		E Indicator
18		F Indicator		F Indicator		F Indicator
19		G Indicator		G Indicator		G Indicator
20		H Indicator		H Indicator		H Indicator
21		K Indicator		K Indicator		K Indicator
22		L Indicator		L Indicator		L Indicator
23		M Indicator		M Indicator		M Indicator
24		N Indicator		N Indicator		N Indicator
25		P Indicator		P Indicator		P Indicator
26						

15-PIN D-SUB CONNECTOR
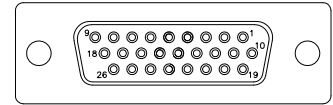
26-PIN D-SUB CONNECTOR

Series CCR-39S
Multi-Throw DC-10 GHz, SP9T & SP10T
Latching Coaxial Switch

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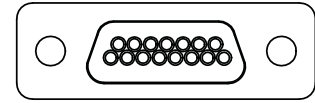Everywhereyoulook™

SP9T TRUTH TABLE Latching CCR-39SX9C-T

Logic Input										RF Path										Indicator Switches								
1	2	3	4	5	6	7	8	9	R	J1	J2	J3	J4	J5	J6	J7	J8	J9	Reset	E	F	G	H	K	L	M	N	O
1	0	0	0	0	0	0	0	0	0	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	0	0	0	C	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	0	0	0	0	C	0	0	0	0
0	0	0	0	0	1	0	0	0	0	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	0	0	0	0	0	C	0	0	0
0	0	0	0	0	0	1	0	0	0	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	0	0	0	0	0	0	C	0	0
0	0	0	0	0	0	0	1	0	0	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	0	0	0	0	0	0	0	C	0
0	0	0	0	0	0	0	0	1	0	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	0	0	0	C

TRUTH TABLE Latching CCR-39SX9C-TD

Logic Input				RF Path										Indicator Switches								
1	2	3	4	J1	J2	J3	J4	J5	J6	J7	J8	J9	Reset	E	F	G	H	K	L	M	N	O
0	0	0	0	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0	0	0
1	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0	0
0	1	0	0	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0	0
1	1	0	0	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	0	0	0	C	0	0	0	0	0
0	0	1	0	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	0	0	0	0	C	0	0	0	0
1	0	1	0	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	0	0	0	0	0	C	0	0	0
0	1	1	0	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	0	0	0	0	0	0	C	0	0
1	1	1	0	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	0	0	0	0	0	0	0	C	0
0	0	0	1	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	0	0	0	C
1	0	0	1	Off	Off	Off	Off	Off	Off	Off	Off	Off	Reset	0	0	0	0	0	0	0	0	0
1	1	1	1	COIL OFF										0	0	0	0	0	0	0	0	0

CCR-39S\072013\Q3

CONNECTOR PINOUT FOR LATCHING SP10T MULTI-THROW SWITCHES						
EXAMPLE	CCR-39S600-S	CCR-39S60C-S	CCR-39S600-TS	CCR-39S60C-TS	CCR-39S600-TDS	CCR-39S60C-TDS
INDICATOR		YES		YES		YES
TTL			YES	YES		
DECODERS & TTL					YES	YES
PIN NO.	15-PIN	26-PIN	15-PIN	26-PIN	15-PIN	26-PIN
1	PORT 1	PORT 1	TTL 1	TTL 1	LOGIC 1	LOGIC 1
2	PORT 2	PORT 2	TTL 2	TTL 2	LOGIC 2	LOGIC 2
3	PORT 3	PORT 3	TTL 3	TTL 3	LOGIC 3	LOGIC 3
4	PORT 4	PORT 4	TTL 4	TTL 4	LOGIC 4	LOGIC 4
5	PORT 5	PORT 5	TTL 5	TTL 5		
6	PORT 6	PORT 6	TTL 6	TTL 6		
7	PORT 7	PORT 7	TTL 7	TTL 7		
8	PORT 8	PORT 8	TTL 8	TTL 8		
9	PORT 9	PORT 9	TTL 9	TTL 9		
10	PORT 10	PORT 10	TTL 10	TTL 10		
11						
12						
13			Vsw	Vsw	Vsw	Vsw
14	Reset	Reset	Reset	Reset		
15	COMMON	COMMON	COMMON	COMMON	COMMON	COMMON
16		D Indicator (COM)		D Indicator (COM)		D Indicator (COM)
17		E Indicator		E Indicator		E Indicator
18		F Indicator		F Indicator		F Indicator
19		G Indicator		G Indicator		G Indicator
20		H Indicator		H Indicator		H Indicator
21		K Indicator		K Indicator		K Indicator
22		L Indicator		L Indicator		L Indicator
23		M Indicator		M Indicator		M Indicator
24		N Indicator		N Indicator		N Indicator
25		P Indicator		P Indicator		P Indicator
26		T Indicator		T Indicator		T Indicator

15-PIN D-SUB CONNECTOR
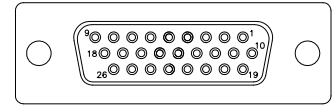
26-PIN D-SUB CONNECTOR

Series CCR-39S
Multi-Throw DC-10 GHz, SP9T & SP10T
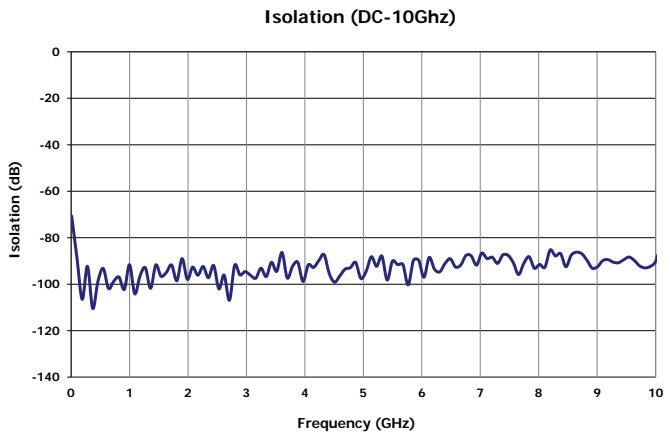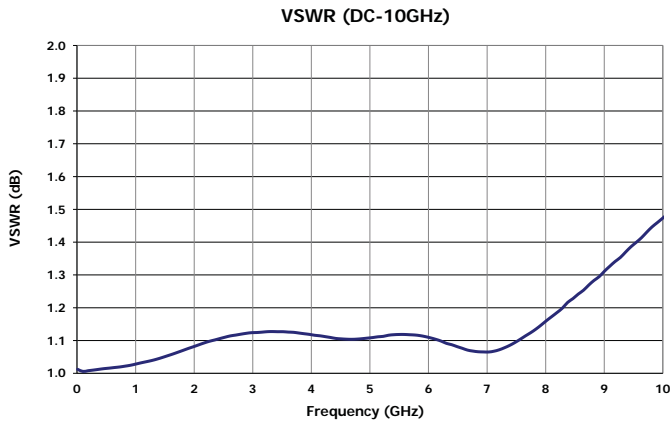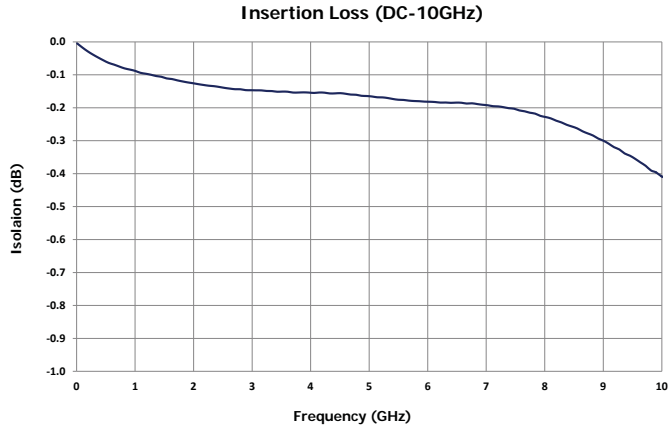**Latching Coaxial Switch**

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SP10T TRUTH TABLE Latching
CCR-39SX0C-T

1	2	3	4	5	6	7	8	9	10	R	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	Reset	E	F	G	H	K	L	M	N	O	P
1	0	0	0	0	0	0	0	0	0	0	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	0	0	0	C	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	0	0	0	0	C	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	0	0	0	0	0	C	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	0	0	0	0	0	0	C	0	0	0
0	0	0	0	0	0	0	1	0	0	0	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	0	0	0	0	0	0	0	C	0	0
0	0	0	0	0	0	0	0	1	0	0	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	0	0	0	0	0	0	0	0	C	0
0	0	0	0	0	0	0	0	0	1	0	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	0	0	0	0	C

TRUTH TABLE Latching
CCR-39SX0C-TD

1	2	3	4	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	Reset	E	F	G	H	K	L	M	N	O	P
0	0	0	0	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0	0	0	0
1	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0	0	0
0	1	0	0	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0	0	0
1	1	0	0	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	Off	0	0	0	C	0	0	0	0	0	0
0	0	1	0	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	Off	0	0	0	0	C	0	0	0	0	0
1	0	1	0	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	Off	0	0	0	0	0	C	0	0	0	0
0	1	1	0	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	Off	0	0	0	0	0	0	C	0	0	0
1	1	1	0	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	Off	0	0	0	0	0	0	0	C	0	0
0	0	0	1	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	Off	0	0	0	0	0	0	0	0	C	0
1	0	0	1	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	0	0	0	0	C
0	1	0	1	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Reset	0	0	0	0	0	0	0	0	0	0
1	1	1	1	COIL OFF											0	0	0	0	0	0	0	0	0	0

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TYPICAL RF PERFORMANCE CURVES

Insertion Loss (DC-10GHz)

VSWR (DC-10GHz)

Isolation (DC-10Ghz)

Series CCR-39S
Multi-Throw DC-10 GHz, SP9T & SP10T
Latching Coaxial Switch

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TYPICAL POWER PERFORMANCE CURVE

Power Handling vs. Frequency
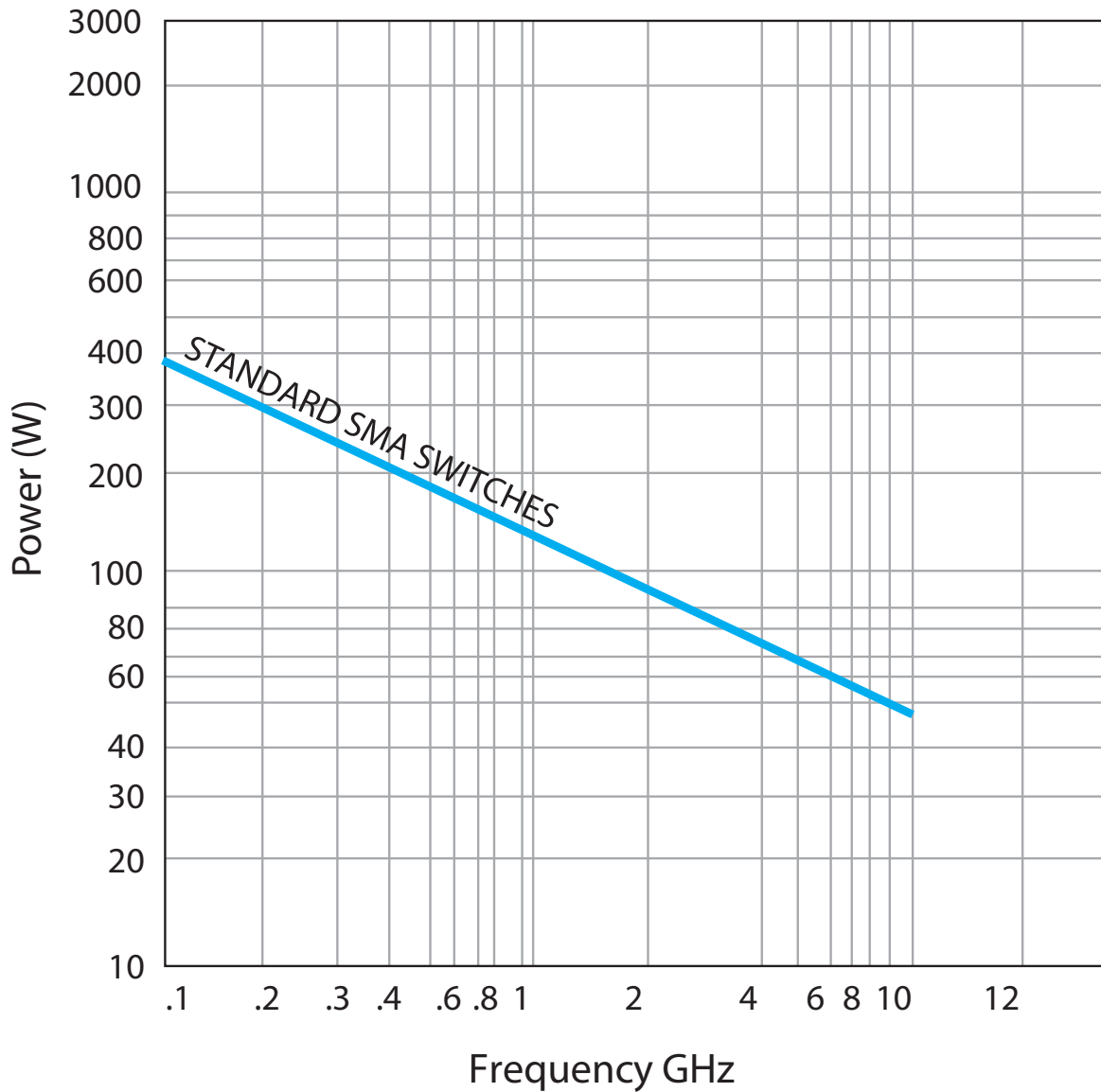
Estimates based on the following reference conditions:
- Ambient temperature of 40°C or less
- Sea level operation
- Load VSWR of 1.20:1 maximum
- No high-power (hot) switching

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

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE
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CCR-39S\072013\Q3

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.

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.

Multi-Throw Latching Switch
A multi-throw switch is a switch with one input and three or more output ports. The CCR-39 can switch a microwave signal to any of 10 outputs from a single common input.

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.

TD-Option
This option includes a decoder. The 3-bit parallel command is decoded to internally select the appropriate position. See the logic tables. The TD-Option increases the Vsw supply current demand by 50mA max at 28Vdc and +20°C.

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
Multiple Positions	−96 dBm	−115 dBm
	−139 dBc	−158 dBc

Series CCR-39S
Multi-Throw DC-10 GHz, SP9T & SP10T
Latching Coaxial Switch

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LATCHING CCR-39S PART NUMBER LIST

	PART No.		PART No.		PART No.
1	CCR-39SX9C	43	CCR-39SX90-TMS	85	CCR-39SX00-TDS
2	CCR-39SX9C-D	44	CCR-39SX90-TS	86	CCR-39SX00-TM
3	CCR-39SX9C-DM	45	CCR-39SX0C	87	CCR-39SX00-TMS
4	CCR-39SX9C-DR	46	CCR-39SX0C-D	88	CCR-39SX00-TS
5	CCR-39SX9C-DRM	47	CCR-39SX0C-DM		
6	CCR-39SX9C-DRS	48	CCR-39SX0C-DR		
7	CCR-39SX9C-DS	49	CCR-39SX0C-DRM		
8	CCR-39SX9C-M	50	CCR-39SX0C-DRS		
9	CCR-39SX9C-MS	51	CCR-39SX0C-DS		
10	CCR-39SX9C-R	52	CCR-39SX0C-M		
11	CCR-39SX9C-RM	53	CCR-39SX0C-MS		
12	CCR-39SX9C-RMS	54	CCR-39SX0C-R		
13	CCR-39SX9C-RS	55	CCR-39SX0C-RM		
14	CCR-39SX9C-S	56	CCR-39SX0C-RMS		
15	CCR-39SX9C-T	57	CCR-39SX0C-RS		
16	CCR-39SX9C-TD	58	CCR-39SX0C-S		
17	CCR-39SX9C-TDM	39	CCR-39SX0C-T		
18	CCR-39SX9C-TDMS	60	CCR-39SX0C-TD		
19	CCR-39SX9C-TDS	61	CCR-39SX0C-TDM		
20	CCR-39SX9C-TM	62	CCR-39SX0C-TDMS		
21	CCR-39SX9C-TMS	63	CCR-39SX0C-TDS		
22	CCR-39SX9C-TS	64	CCR-39SX0C-TM		
23	CCR-39SX90	65	CCR-39SX0C-TMS		
24	CCR-39SX90-D	66	CCR-39SX0C-TS		
25	CCR-39SX90-DM	67	CCR-39SX00		
26	CCR-39SX90-DR	68	CCR-39SX00-D		
27	CCR-39SX90-DRM	69	CCR-39SX00-DM		
28	CCR-39SX90-DRS	70	CCR-39SX00-DR		
29	CCR-39SX90-DS	71	CCR-39SX00-DRM		
30	CCR-39SX90-M	72	CCR-39SX00-DRS		
31	CCR-39SX90-MS	73	CCR-39SX00-DS		
32	CCR-39SX90-R	74	CCR-39SX00-M		
33	CCR-39SX90-RM	75	CCR-39SX00-MS		
34	CCR-39SX90-RMS	76	CCR-39SX00-R		
35	CCR-39SX90-RS	77	CCR-39SX00-RM		
36	CCR-39SX90-S	78	CCR-39SX00-RMS		
37	CCR-39SX90-T	79	CCR-39SX00-RS		
38	CCR-39SX90-TD	80	CCR-39SX00-S		
39	CCR-39SX90-TDM	81	CCR-39SX00-T		
40	CCR-39SX90-TDMS	82	CCR-39SX00-TD		
41	CCR-39SX90-TDS	83	CCR-39SX00-TDM		
42	CCR-39SX90-TM	84	CCR-39SX00-TDMS		

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