TELEDYNE COAX SWITCHES
Everywhere**you**look™

Series CCT-58S
SP12T, DC–18 GHz
Terminated, Normally Open
Coaxial Switch

PART NUMBER	DESCRIPTION
CCT-58S	Terminated, SP12T, Normally Open Coax Switch, DC-18GHz
CT-58S	Elite Terminated, SP12T, Normally Open Coax Switch, DC-18GHz

The CCT/CT-58S is an internally terminated, broadband, multi-throw, electromechanical coaxial switch designed to switch a microwave signal from a common input to any of 12 outputs. The characteristic impedance is 50 Ohms. Internal terminations provide an impedance match for unselected ports. Each position has an individual actuator mechanism allowing random position selection. This also minimizes the switching time. The CCT/CT-58S comes with a normally open actuator with all ports are terminated in 50 Ohms, except the common input port which is open when the switch is de-energized.

RoHS Compliant

ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS

Storage Temperature	–55°C to 90°C
Operating Temperature CCT-58S CT-58S CT-58S w/ indicator contacts	 –25°C to 65°C –55°C to 85°C –45°C to 85°C
Vibration[1] , 10 ~ 2000 Hz, 300 s MIL-STD-202 Method 204, Condition C	10 G peak
Shock, Half-Sine Pulse MIL-STD-202 Method 213, Condition D	500 G peak
Moisture Resistance[2]	95% RH Non-condensing
Mechanical Life	5,000,000 cycles (min)
RF Contacts Life	1,000,000 cycles (min)
Connector Type	SMA
Weight	15.9 oz. approx. (450g)

1. Non-operating
2. When moisture seal option is selected

ELECTRICAL CHARACTERISTICS

RF Contacts	Break before make
Frequency Range	DC–18 GHz
Characteristic Impedance	50 Ω
Terminations	50 Ω, 2 Watts CW max
Switching Time	20 ms (max.)
Actuation Voltage (Vdc) 20°C	12 15 24 28 V
Actuation Current, max. @ ambient	560 700 345 405 mA
TTL/Decoders Voltage/Current[1] Low Level (Logic 0) High Level (Logic 1)	 0.0 ~ 0.7 V / 3.2 mA (max.) @ 0.7 V 2.4 ~ 5.5 V / 80 µA (max.) @ 2.4 V
Indicator Contact Rating[2]	30 Vdc, 50 mA (max.)
Magnetic Sensitivity	5 Gauss, 0.5 inch (max.)

1. For switches with TTL driver or decoder
2. For switches with indicator

RF SPECIFICATIONS

Frequency	DC-3GHz	3-6GHz	6–12GHz	12-18GHz
Insertion Loss, max.	0.3dB	0.5 dB	0.6 dB	0.6 dB
Isolation, min.	80dB	70 dB	70 dB	70 dB
VSWR , max.	1.20:1	1.40:1	1.50:1	1.50:1

Please see charts on page 3

PART NUMBERING SYSTEM

CCT-58   S   1   C   C   -   S

Series
Connectors
Actuator Voltage

Options
Actuator Type
Number of Positions
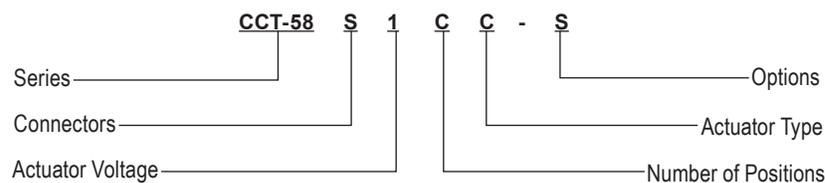
CONNECTOR	ACTUATOR VOLTAGE	NUMBER OF POSITIONS	ACTUATOR TYPE	OPTIONS
S: SMA Female	1: 28 Vdc Normally Open	C: SP12T	0: No Indicator Contacts	T: TTL Drivers with Diodes
	2: 15 Vdc Normally Open		C: Indicator Contacts	D: Coil Transient Suppression Diodes
	3: 12 Vdc Normally Open			S: D-Sub Connector (Male)*
	4: 24 Vdc Normally Open			TD: Decoders and TTL Drivers with Diodes
				M: Moisture Seal
				R: Positive (+) Common

*D-Sub connector will come standard for every part number
(Solder Pins available upon request)
For additional options, please contact factory.

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**TRUTH TABLE, SCHEMATICS AND MECHANICAL OUTLINE**

Schematic for switch with D-Sub Connector and Indicator Contacts

Outline Drawing

4X Ø.149 THRU

13X SMA FEMALE CONNECTORS
12X EQUALLY SPACED ON A Ø2.03 [Ø51.56] B.C.

37-PIN SUB-D CONNECTOR

*D-Sub with Indicator Contacts= 2.26 MAX
*D-Sub with additional option = 3.20 MAX

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TRUTH TABLE & PINOUT

TTL DECODER TRUTH TABLE

Logic 1	Logic 2	Logic 3	Logic 4	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
LOGIC INPUT				**RF POSITION**											
0	0	0	0	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	0	0	0	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
0	1	0	0	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	1	0	0	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
0	0	1	0	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	0	1	0	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
0	1	1	0	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
1	1	1	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
0	0	0	1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
1	0	0	1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
0	1	0	1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
1	1	0	1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
1	1	1	1	ALL COILS OFF											

37 PIN D-SUB PINOUT

Pin No.	Standard	Indicator	TTL	TTL + IND	TTL + Decoder	TTL + DEC+ IND
			OPTIONS			
1	POS 1	POS 1	TTL 1	TTL 1	LOGIC 1	LOGIC 1
2	POS 2	POS 2	TTL 2	TTL 2	LOGIC 2	LOGIC 2
3	POS 3	POS 3	TTL 3	TTL 3	LOGIC 3	LOGIC 3
4	POS 4	POS 4	TTL 4	TTL 4	LOGIC 4	LOGIC 4
5	POS 5	POS 5	TTL 5	TTL 5		
6	POS 6	POS 6	TTL 6	TTL 6		
7	POS 7	POS 7	TTL 7	TTL 7		
8	POS 8	POS 8	TTL 8	TTL 8		
9	POS 9	POS 9	TTL 9	TTL 9		
10	POS 10	POS 10	TTL 10	TTL 10		
11	POS 11	POS 11	TTL 11	TTL 11		
12	POS 12	POS 12	TTL 12	TTL 12		
13			Vsw	Vsw	Vsw	Vsw
14						
15	COM	COM	COM	COM	COM	COM
16						
17		IND COM		IND COM		IND COM
18		IND J1		IND J1		IND J1
19		IND J2		IND J2		IND J2
20		IND J3		IND J3		IND J3
21		IND J4		IND J4		IND J4
22		IND J5		IND J5		IND J5
23		IND J6		IND J6		IND J6
24		IND J7		IND J7		IND J7
25		IND J8		IND J8		IND J8
26		IND J9		IND J9		IND J9
27		IND J10		IND J10		IND J10
28		IND J11		IND J11		IND J11
29		IND J12		IND J12		IND J12
30						
.						
.						
37						

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RF PERFORMANCE CURVES

Insertion Loss vs. Frequency
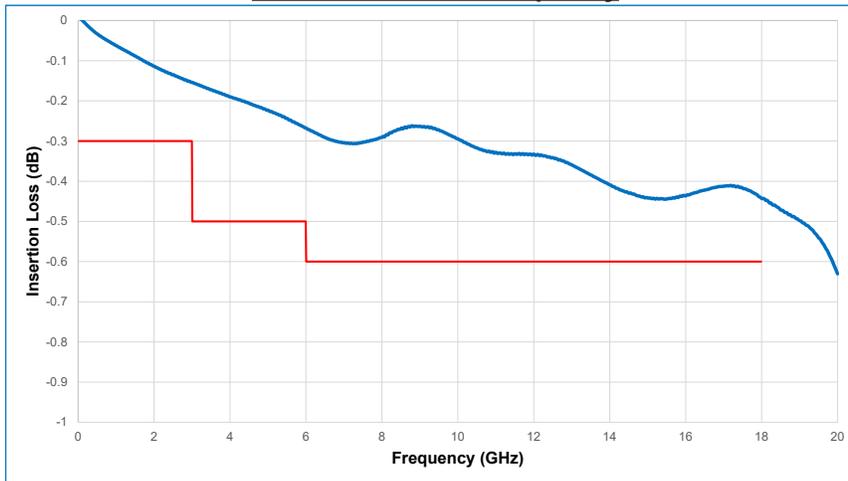
Isolation vs. Frequency

VSWR vs. Frequency

──────── **TYPICAL**

──────── **MAXIMUM TEST LIMIT**

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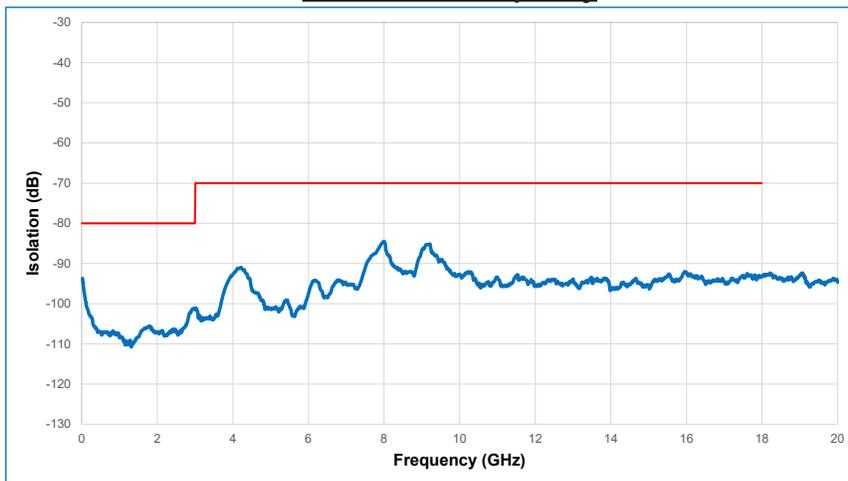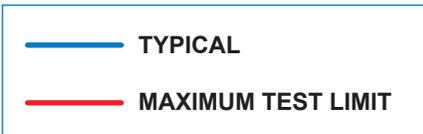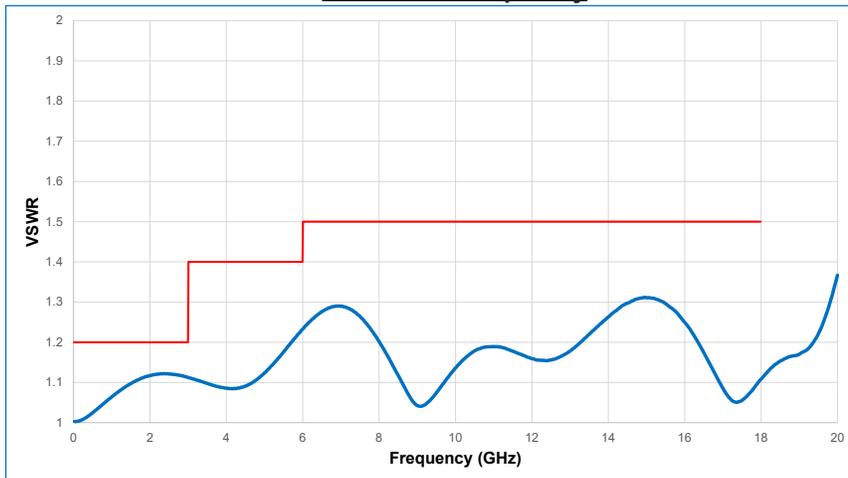
POWER PERFORMANCE CURVE

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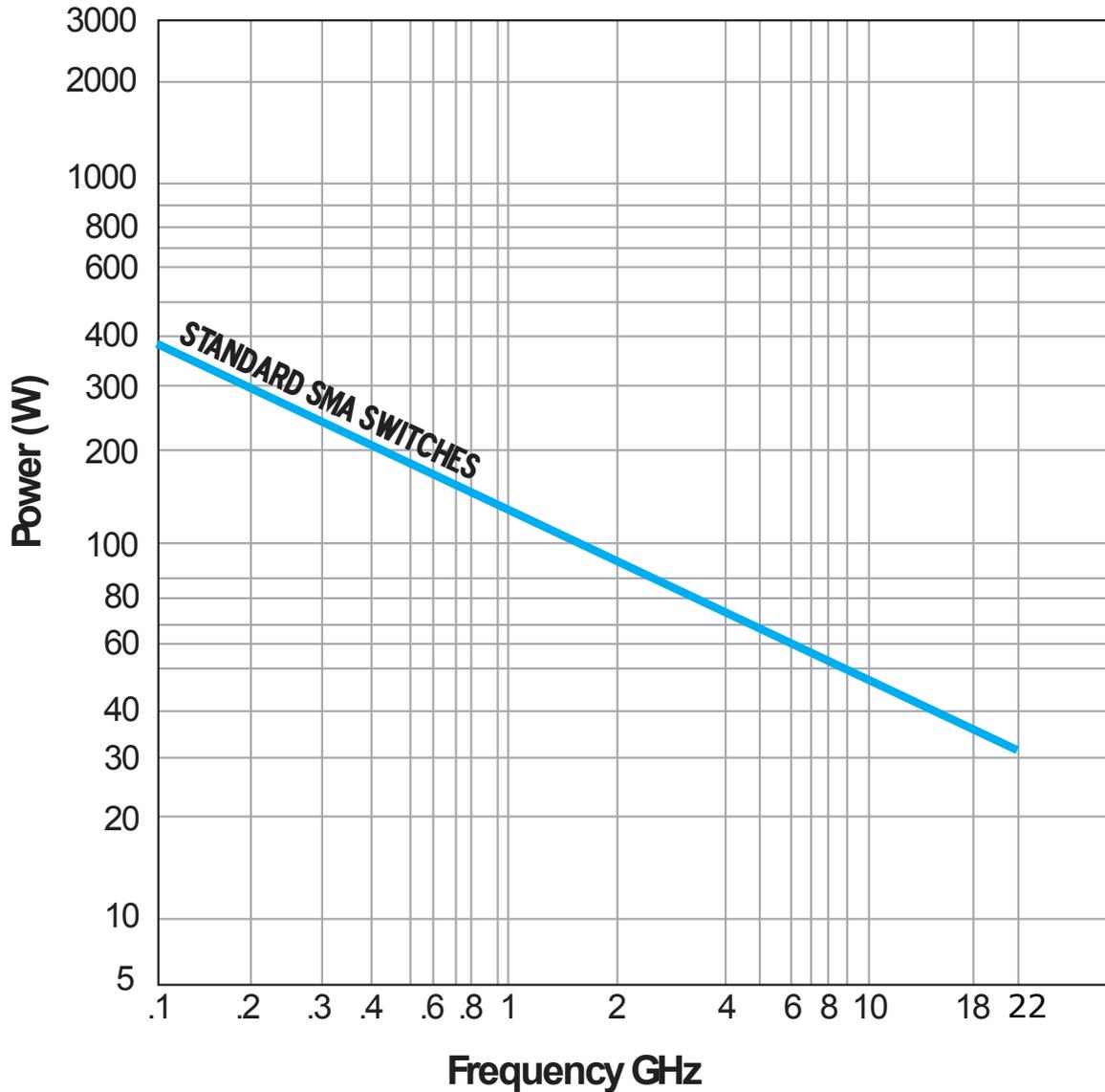
Estimates based on the following reference conditions:
• Ambient temperature of 40°C or less
• Sea level operation
• Load VSWR of 1.20:1 maximum
• No high-power (hot) switching

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

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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.

Fail-safe
A fail-safe switch reverts to the default or fail-safe position when actuating voltage is removed. This is realized by a return spring within the drive mechanism. This type of switch requires the continuous application of operating voltage to select and hold any position. (Multi-position switches are normally open with no voltage applied).

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 tell back 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.

Internal Termination
Unselected ports are internally terminated to a matched load. The load is 50Ω resistive device. The max RF power rating is 2 Watts CW. Without the internal termination option, the unselected ports are open circuits.

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, has one input and two output ports.

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 fail-safe 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 electromechanical 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.