



PART NUMBER	DESCRIPTION
CCT-38S	Commercial Normally Open Multi-throw, DC-12 GHz
CT-38S	Elite Normally Open Multi-throw, DC-12 GHz

The CCT-38S is a broadband, multi-throw, electromechanical coaxial switch designed to switch a microwave signal from a common input to any of 7 or 8 outputs. The characteristic impedance is 50 Ohms. The switches are small using the popular connector spacing on a 1.540" dia. circle. Each position has an individual actuator mechanism allowing random position selection. This also gives the minimum switching time.  
With the normally open actuator, all paths are open when the switch is de-energized.



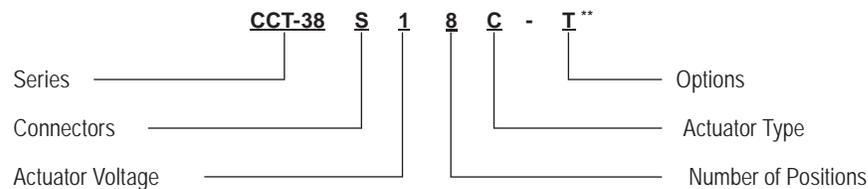
ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS	
Operating Temperature	
Commercial Model, CCT-38S	-25°C to 65°C
Elite Model, CT-38S	-40°C to 85°C
Vibration (MIL-STD-202 Method 214, Condition D, non-operating)	10 g's RMS
Shock (MIL-STD-202 Method 213, Condition D, non-operating)	500 g's
Standard Actuator Life	3,000,000 cycles
Actuator Life w/ Additional Features	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	DC–12 GHz
Characteristic Impedance	50 Ohms
Operate Time	20 ms (max.)
Release Time	20 ms (max.)
Actuation Voltage Available	12 15 24 28 V
Actuation Current, max. @ ambient	560 750 345 435 mA

RF PERFORMANCE SPECIFICATIONS		
Frequency	DC–6 GHz	6–12 GHz
Insertion Loss, dB, max.	0.20	0.40
Isolation, dB, min.	70	60
VSWR, max.	1.30:1	1.40:1

For maximum limits, please see charts on page 7

### PART NUMBERING SYSTEM



CONNECTOR	ACTUATOR VOLTAGE	NUMBER OF POSITIONS	ACTUATOR TYPE	OPTIONS
S: SMA FEMALE	1: 28 VDC NORMALLY OPEN 2: 15 VDC NORMALLY OPEN 3: 12 VDC NORMALLY OPEN 4: 24 VDC NORMALLY OPEN	7: SP7T 8: SP8T	0: NO INDICATOR CONTACTS C: INDICATOR CONTACTS	T: TTL DRIVERS WITH DIODES D: COIL TRANSIENT SUPPRESSION DIODES R: POSITIVE + COMMON S: D-SUB CONNECTOR* TD: DECODERS AND TTL DRIVERS WITH DIODES M: MOISTURE SEAL

\*\*SEE PARTS LIST ON PAGE 10-11

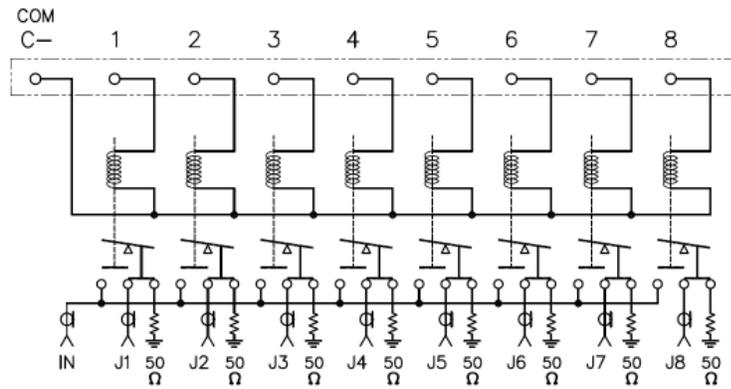
For additional options, please contact factory.

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

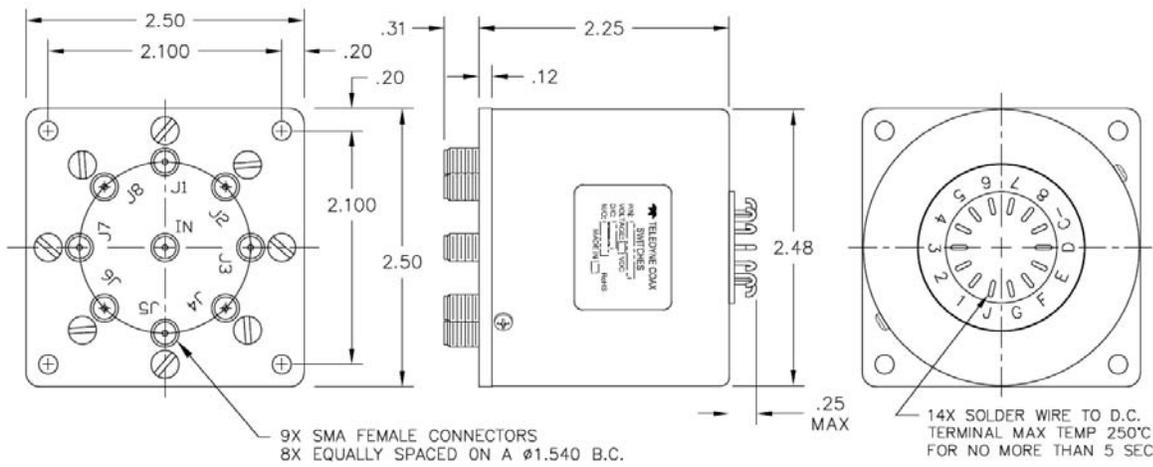
**Series CCT-38S/CT-38S**  
 Multi-Throw DC-12 GHz, SP7T & SP8T  
 Normally Open Coaxial Switch



**SCHEMATICS AND MECHANICAL OUTLINE**

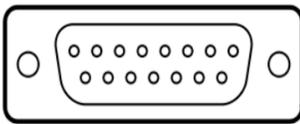


TERMINATIONS ON EACH UNUSED POSITION

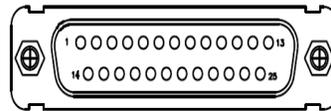


“-S OPTION” 15-PIN D-SUB OR 26-PIN D-SUB CONNECTOR (EXAMPLE: CCT-38S180-S)

CONNECTOR PINOUT FOR NORMALLY OPEN SP7T MULTI-THROW SWITCHES						
EXAMPLE	CCT-38S170-S	CCT-38S17C-S	CCT-38S170-TS	CCT-38S17C-TS	CCT-38S170-TDS	CCT-38S17C-TDS
PIN NO	15-PINS	25-PINS	15-PINS	25-PINS	15-PINS	25-PINS
INDICATOR		YES		YES		YES
TTL			YES	YES		
DECODERS & TTL					YES	YES
1	PORT 1	PORT 1	TTL 1	TTL 1	LOGIC 1	LOGIC 1
2	PORT 2	PORT 3	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		
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						
9						
10						
11			Vsw	Vsw	Vsw	Vsw
12						
13	COMMON	COMMON	COMMON	COMMON	COMMON	COMMON
14						
15		D INDICATOR (COM)		D INDICATOR (COM)		D INDICATOR (COM)
16		E INDICATOR		E INDICATOR		E INDICATOR
17		F INDICATOR		F INDICATOR		F INDICATOR
18		G INDICATOR		G INDICATOR		G INDICATOR
19		H INDICATOR		H INDICATOR		H INDICATOR
20		K INDICATOR		K INDICATOR		K INDICATOR
21		L INDICATOR		L INDICATOR		L INDICATOR
22		M INDICATOR		M INDICATOR		M INDICATOR
23						
24						
25						



**15-PIN D-SUB CONNECTOR**



**25-PIN D-SUB CONNECTOR**

**Series CCT-38S/CT-38S**  
**Multi-Throw DC–12 GHz, SP7T & SP8T**  
**Normally Open Coaxial Switch**



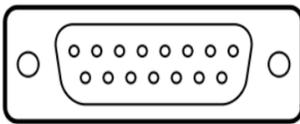
**SP7T TRUTH TABLE Normally Open**  
**CCT-38SX7C-T**

Logic Input							RF Path							Indicator Switches						
1	2	3	4	5	6	7	J1	J2	J3	J4	J5	J6	J7	E	F	G	H	K	L	M
1	0	0	0	0	0	0	On	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0
0	1	0	0	0	0	0	Off	On	Off	Off	Off	Off	Off	0	C	0	0	0	0	0
0	0	1	0	0	0	0	Off	Off	On	Off	Off	Off	Off	0	0	C	0	0	0	0
0	0	0	1	0	0	0	Off	Off	Off	On	Off	Off	Off	0	0	0	C	0	0	0
0	0	0	0	1	0	0	Off	Off	Off	Off	On	Off	Off	0	0	0	0	C	0	0
0	0	0	0	0	1	0	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	C	0
0	0	0	0	0	0	1	Off	Off	Off	Off	Off	Off	On	0	0	0	0	0	0	C

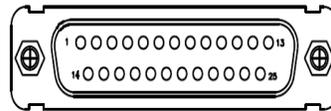
**TRUTH TABLE Normally Open**  
**CCT-38SX7C-TD**

Logic Input			RF Path							Indicator Switches						
1	2	3	J1	J2	J3	J4	J5	J6	J7	E	F	G	H	K	L	M
0	0	0	On	Off	Off	Off	Off	Off	Off	C	0	0	0	0	0	0
1	0	0	Off	On	Off	Off	Off	Off	Off	0	C	0	0	0	0	0
0	1	0	Off	Off	On	Off	Off	Off	Off	0	0	C	0	0	0	0
1	1	0	Off	Off	Off	On	Off	Off	Off	0	0	0	C	0	0	0
0	0	1	Off	Off	Off	Off	On	Off	Off	0	0	0	0	C	0	0
1	0	1	Off	Off	Off	Off	Off	On	Off	0	0	0	0	0	C	0
0	1	1	Off	Off	Off	Off	Off	Off	On	0	0	0	0	0	0	C
1	1	1	Off	Off	Off	Off	Off	Off	Off	0	0	0	0	0	0	0

CONNECTOR PINOUT FOR NORMALLY OPEN SP8T MULTI-THROW SWITCHES						
EXAMPLE	CCR-38S180-S	CCR-38S18C-S	CCR-38S180-TS	CCR-38S18C-TS	CCR-38S180-TDS	CCT-38S18C-TDS
PIN NO	15-PINS	25-PINS	15-PINS	25-PINS	15-PINS	25-PINS
INDICATOR		YES		YES		YES
TTL			YES	YES		
DECODERS & TTL					YES	YES
1	PORT 1	PORT 1	TTL 1	TTL 1	LOGIC 1	LOGIC 1
2	PORT 2	PORT 3	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						
10						
11			Vsw	Vsw	Vsw	Vsw
12						
13	COMMON	COMMON	COMMON	COMMON	COMMON	COMMON
14						
15		D INDICATOR (COM)		D INDICATOR (COM)		D INDICATOR (COM)
16		E INDICATOR		E INDICATOR		E INDICATOR
17		F INDICATOR		F INDICATOR		F INDICATOR
18		G INDICATOR		G INDICATOR		G INDICATOR
19		H INDICATOR		H INDICATOR		H INDICATOR
20		K INDICATOR		K INDICATOR		K INDICATOR
21		L INDICATOR		L INDICATOR		L INDICATOR
22		M INDICATOR		M INDICATOR		M INDICATOR
23		N INDICATOR		N INDICATOR		N INDICATOR
24						
25						



**15-PIN D-SUB CONNECTOR**



**25-PIN D-SUB CONNECTOR**

**Series CCT-38S/CT-38S**  
**Multi-Throw DC–12 GHz, SP7T & SP8T**  
**Normally Open Coaxial Switch**



**SP8T TRUTH TABLE Normally Open**  
**CCT-38SX8C-T**

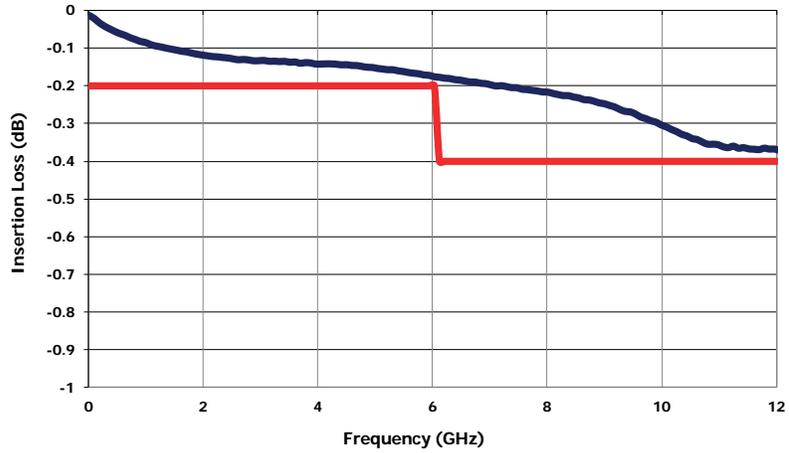
Logic Input								RF Path								Indicator Switches							
1	2	3	4	5	6	7	8	J1	J2	J3	J4	J5	J6	J7	J8	E	F	G	H	K	L	M	N
1	0	0	0	0	0	0	0	On	Off	C	0	0	0	0	0	0	0						
0	1	0	0	0	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0
0	0	1	0	0	0	0	0	Off	Off	On	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0
0	0	0	1	0	0	0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

**TRUTH TABLE Normally Open**  
**CCT-38SX8C-TD**

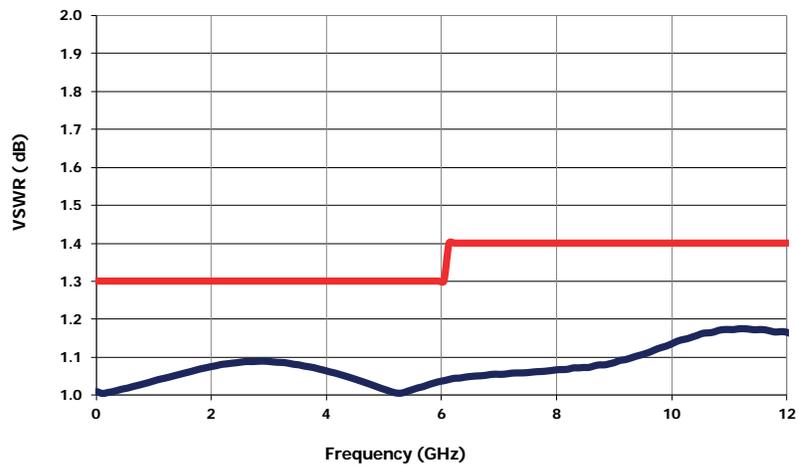
Logic Input				RF Path								Indicator Switches							
1	2	3	4	J1	J2	J3	J4	J5	J6	J7	J8	E	F	G	H	K	L	M	N
0	0	0	0	On	Off	C	0	0	0	0	0	0	0						
1	0	0	0	Off	On	Off	Off	Off	Off	Off	Off	0	C	0	0	0	0	0	0
0	1	0	0	Off	Off	On	Off	Off	Off	Off	Off	0	0	C	0	0	0	0	0
1	1	0	0	Off	Off	Off	On	Off	Off	Off	Off	0	0	0	C	0	0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

TYPICAL RF PERFORMANCE CURVES

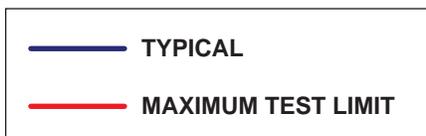
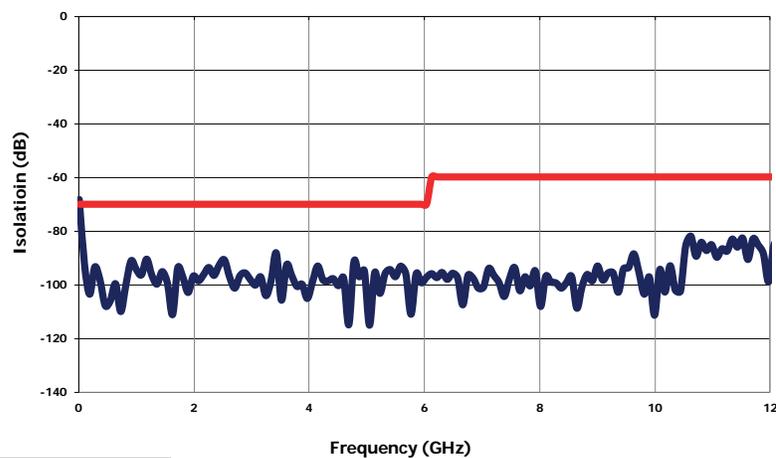
Insertion Loss (DC-12 GHz)



VSWR (DC-12 GHz)

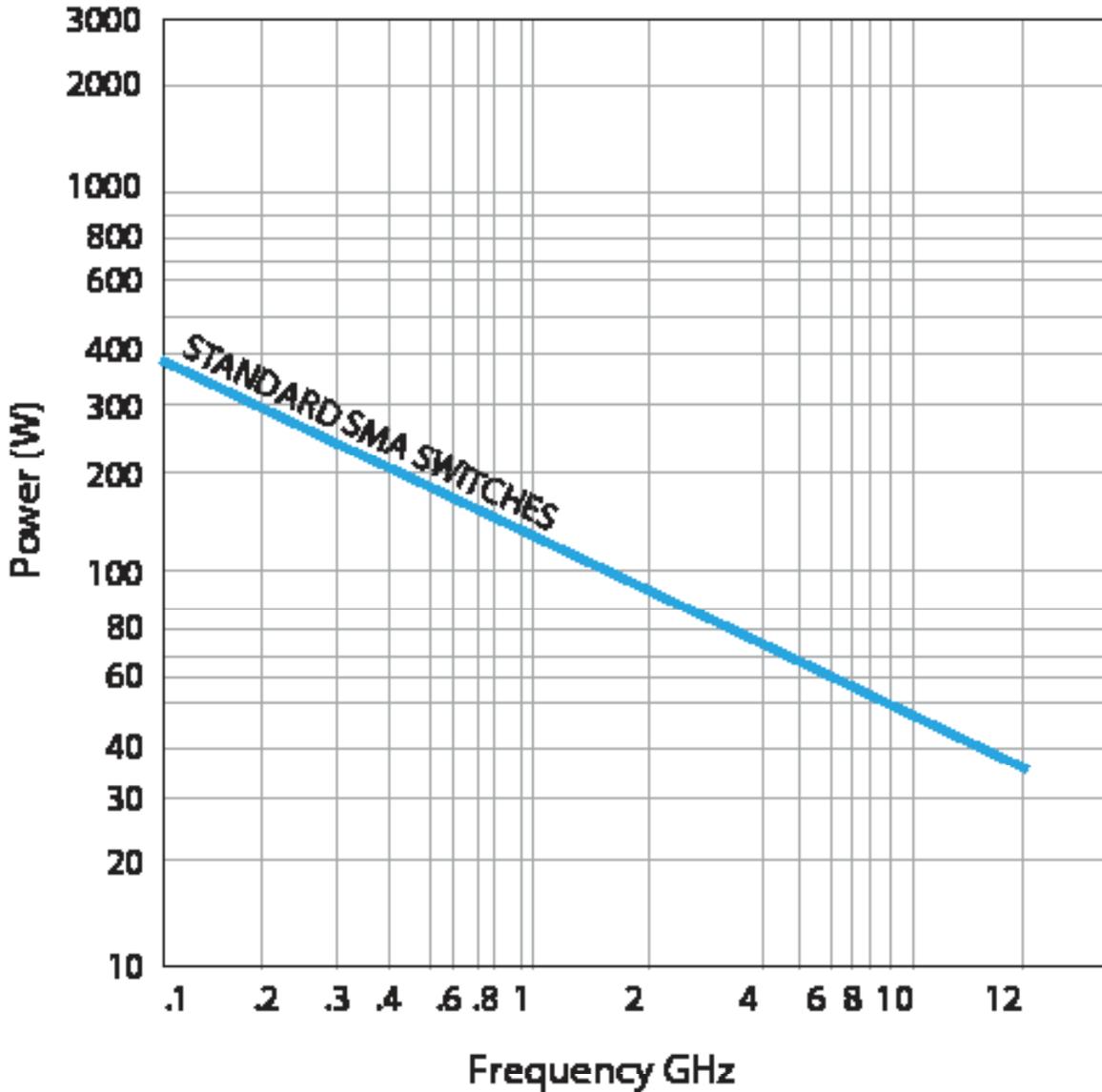


Isolation (DC-12 GHz)



**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.

**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 Switch**

A multi-throw switch is a switch with one input and three or more output ports. The CCT-38 can switch a microwave signal to any of 8 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. Arc suppression diodes are included in this interface circuit by design

**TD-Option**

This option includes a decoder. The 4-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 CCT-38S/CT-38S**  
**Multi-Throw DC–12 GHz, SP7T & SP8T**  
**Normally Open Coaxial Switch**



**NORMALLY OPEN CCT-38S PART NUMBER LIST**

	PART No.		PART No.		PART No.
1	CCT-38SX7C	43	CCT-38SX70-TMS	85	CCT-38SX80-TDS
2	CCT-38SX7C-D	44	CCT-38SX70-TS	86	CCT-38SX80-TM
3	CCT-38SX7C-DM	45	CCT-38SX8C	87	CCT-38SX80-TMS
4	CCT-38SX7C-DR	46	CCT-38SX8C-D	88	CCT-38SX80-TS
5	CCT-38SX7C-DRM	47	CCT-38SX8C-DM	89	CCT-38SX80-TDS
6	CCT-38SX7C-DRS	48	CCT-38SX8C-DR	90	CCT-38SX80-TM
7	CCT-38SX7C-DS	49	CCT-38SX8C-DRM	91	CCT-38SX80-TMS
8	CCT-38SX7C-M	50	CCT-38SX8C-DRS	92	CCT-38SX80-TS
9	CCT-38SX7C-MS	51	CCT-38SX8C-DS		
10	CCT-38SX7C-R	52	CCT-38SX8C-M		
11	CCT-38SX7C-RM	53	CCT-38SX8C-MS		
12	CCT-38SX7C-RMS	54	CCT-38SX8C-R		
13	CCT-38SX7C-RS	55	CCT-38SX8C-RM		
14	CCT-38SX7C-S	56	CCT-38SX8C-RMS		
15	CCT-38SX7C-T	57	CCT-38SX8C-RS		
16	CCT-38SX7C-TD	58	CCT-38SX8C-S		
17	CCT-38SX7C-TDM	39	CCT-38SX8C-T		
18	CCT-38SX7C-TDMS	60	CCT-38SX8C-TD		
19	CCT-38SX7C-TDS	61	CCT-38SX8C-TDM		
20	CCT-38SX7C-TM	62	CCT-38SX8C-TDMS		
21	CCT-38SX7C-TMS	63	CCT-38SX8C-TDS		
22	CCT-38SX7C-TS	64	CCT-38SX8C-TM		
23	CCT-38SX70	65	CCT-38SX8C-TMS		
24	CCT-38SX70-D	66	CCT-38SX8C-TS		
25	CCT-38SX70-DM	67	CCT-38SX80		
26	CCT-38SX70-DR	68	CCT-38SX80-D		
27	CCT-38SX70-DRM	69	CCT-38SX80-DM		
28	CCT-38SX70-DRS	70	CCT-38SX80-DR		
29	CCT-38SX70-DS	71	CCT-38SX80-DRM		
30	CCT-38SX70-M	72	CCT-38SX80-DRS		
31	CCT-38SX70-MS	73	CCT-38SX80-DS		
32	CCT-38SX70-R	74	CCT-38SX80-M		
33	CCT-38SX70-RM	75	CCT-38SX80-MS		
34	CCT-38SX70-RMS	76	CCT-38SX80-R		
35	CCT-38SX70-RS	77	CCT-38SX80-RM		
36	CCT-38SX70-S	78	CCT-38SX80-RMS		
37	CCT-38SX70-T	79	CCT-38SX80-RS		
38	CCT-38SX70-TD	80	CCT-38SX80-S		
39	CCT-38SX70-TDM	81	CCT-38SX80-T		
40	CCT-38SX70-TDMS	82	CCT-38SX80-TD		
41	CCT-38SX70-TDS	83	CCT-38SX80-TDM		
42	CCT-38SX70-TM	84	CCT-38SX80-TDMS		

\* X = 1 (28Vdc), 2 (15Vdc), 3 (12Vdc) and 4 (24Vdc)

**NORMALLY OPEN CCT-38S PART NUMBER LIST**

	<b>PART No.</b>		<b>PART No.</b>		<b>PART No.</b>
1	CT-38SX7C	43	CT-38SX70-TMS	85	CT-38SX80-TDS
2	CT-38SX7C-D	44	CT-38SX70-TS	86	CT-38SX80-TM
3	CT-38SX7C-DM	45	CT-38SX8C	87	CT-38SX80-TMS
4	CT-38SX7C-DR	46	CT-38SX8C-D	88	CT-38SX80-TS
5	CT-38SX7C-DRM	47	CT-38SX8C-DM	89	CT-38SX80-TDS
6	CT-38SX7C-DRS	48	CT-38SX8C-DR	90	CT-38SX80-TM
7	CT-38SX7C-DS	49	CT-38SX8C-DRM	91	CT-38SX80-TMS
8	CT-38SX7C-M	50	CT-38SX8C-DRS	92	CT-38SX80-TS
9	CT-38SX7C-MS	51	CT-38SX8C-DS		
10	CT-38SX7C-R	52	CT-38SX8C-M		
11	CT-38SX7C-RM	53	CT-38SX8C-MS		
12	CT-38SX7C-RMS	54	CT-38SX8C-R		
13	CT-38SX7C-RS	55	CT-38SX8C-RM		
14	CT-38SX7C-S	56	CT-38SX8C-RMS		
15	CT-38SX7C-T	57	CT-38SX8C-RS		
16	CCT-38SX7C-TD	58	CT-38SX8C-S		
17	CT-38SX7C-TDM	39	CT-38SX8C-T		
18	CT-38SX7C-TDMS	60	CT-38SX8C-TD		
19	CT-38SX7C-TDS	61	CT-38SX8C-TDM		
20	CT-38SX7C-TM	62	CT-38SX8C-TDMS		
21	CT-38SX7C-TMS	63	CT-38SX8C-TDS		
22	CT-38SX7C-TS	64	CT-38SX8C-TM		
23	CT-38SX70	65	CT-38SX8C-TMS		
24	CT-38SX70-D	66	CT-38SX8C-TS		
25	CT-38SX70-DM	67	CT-38SX80		
26	CT-38SX70-DR	68	CT-38SX80-D		
27	CT-38SX70-DRM	69	CT-38SX80-DM		
28	CT-38SX70-DRS	70	CT-38SX80-DR		
29	CT-38SX70-DS	71	CT-38SX80-DRM		
30	CT-38SX70-M	72	CT-38SX80-DRS		
31	CT-38SX70-MS	73	CT-38SX80-DS		
32	CT-38SX70-R	74	CT-38SX80-M		
33	CT-38SX70-RM	75	CT-38SX80-MS		
34	CT-38SX70-RMS	76	CT-38SX80-R		
35	CT-38SX70-RS	77	CT-38SX80-RM		
36	CT-38SX70-S	78	CT-38SX80-RMS		
37	CT-38SX70-T	79	CT-38SX80-RS		
38	CT-38SX70-TD	80	CT-38SX80-S		
39	CT-38SX70-TDM	81	CT-38SX80-T		
40	CT-38SX70-TDMS	82	CT-38SX80-TD		
41	CT-38SX70-TDS	83	CT-38SX80-TDM		
42	CT-38SX70-TM	84	CT-38SX80-TDMS		

\* X = 1 (28Vdc), 2 (15Vdc), 3 (12Vdc) and 4 (24Vdc)