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

RoHS Compliant

| PART NUMBER	DESCRIPTION
CCR-50U	Commercial Latching SPDT, DC-53GHz, 2.4mm.
CR-50U	Elite Latching SPDT, DC-53GHz, 2.4mm.

The CCR-50U/CR-50U 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. These small switches incorporate 2.4mm high performance connectors.
The CCR-50U/CR-50U series switch is offered with a latching actuator. The CCR-50U/CR-50U series is compatible with the two most common mounting hole patterns making it interchangeable with a variety of switches.
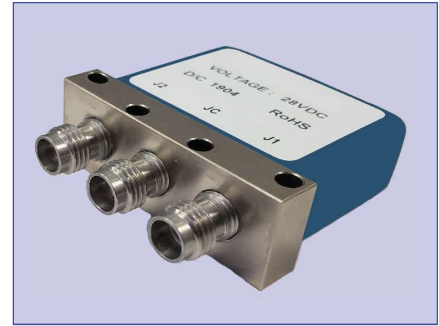
ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS

Operating Temperature	
Commercial Model, CCR-50U	–25°C to 65°C
Elite Model, CR-50U	–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	2.4 mm
Humidity (Moisture Seal)	Available
Weight	1.65 oz. (46.78g) (max.)

ELECTRICAL CHARACTERISTICS

Form Factor	SPDT, break before make				
Frequency Range	DC–53 GHz				
Characteristic Impedance	50 Ohms				
Operate Time	15 ms (max.)				
Actuation Voltage Available	12	15	24	28	V
Actuation Current, max. @ ambient temp.	140	170	90	65	mA

RF PERFORMANCE CHARACTERISTICS

Frequency	DC–6 GHz	6–18 GHz	18–40 GHz	40-52 GHz	52-53 GHz
Insertion Loss, dB, max.	0.2	0.3	0.45	0.8	1.0
Isolation, dB, min.	80	70	70	50	50
VSWR , max.	1.3:1	1.30:1	1.50:1	1.80:1	2.0:1

For maximum limits, please see charts on page 3

PART NUMBERING SYSTEM

CCR-50 U 6 C - T *

- Series
- Connectors
- Actuator Voltage
- Actuator Type
- Options
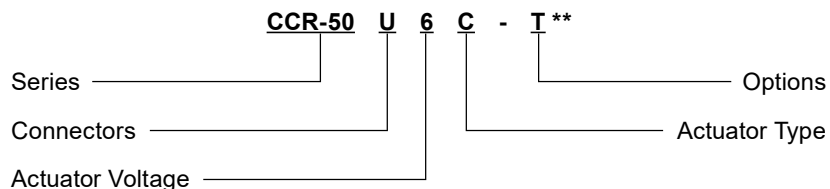
Connector
U: 2.4mm Female

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

Actuator Type
0: Standard Contacts
C: Indicator Contacts***
D: Self Cutoff Only
E: Indicators and Self Cutoff***
**SEE PARTS LIST ON PAGE 6

Options
T: TTL Drivers with Diodes
D: Transient Suppression Diodes
R: Positive + Common
S: 9-Pin D-Sub Connector

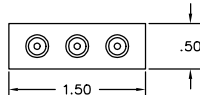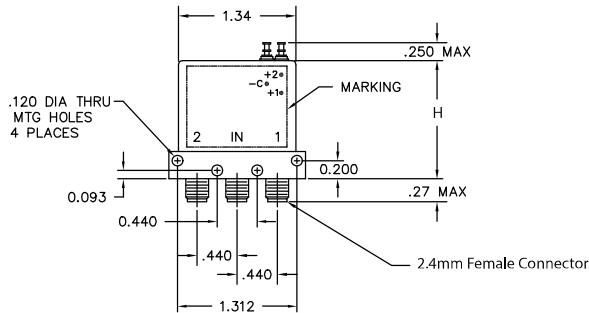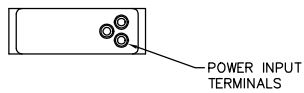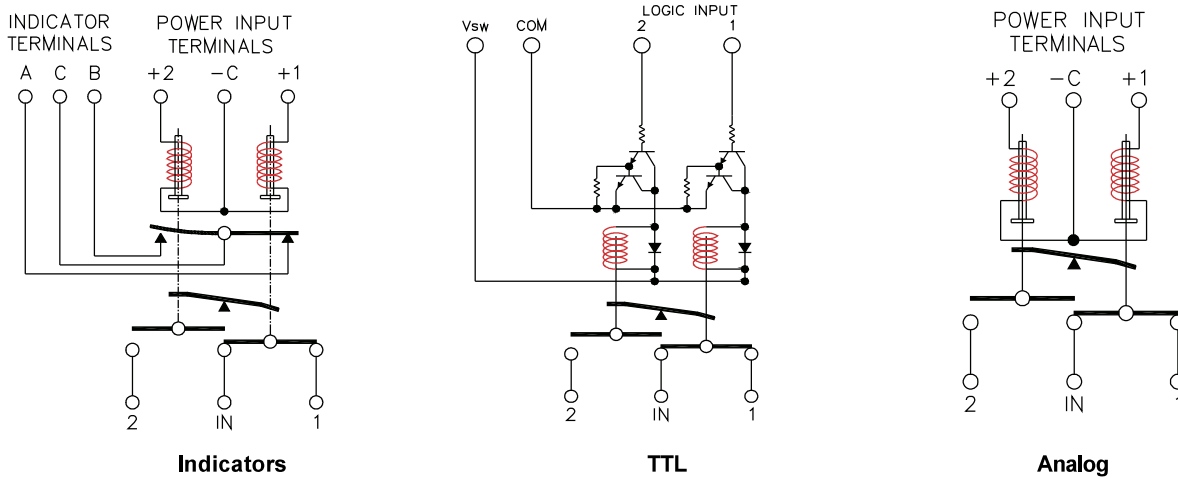**For other options, contact factory.**

*** Indicator Contacts Operating Temperature
-50°C to 85°C (Elite Model Only)

Series CCR-50U/CR-50U
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Latching SPDT Coaxial Switch

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SCHEMATICS AND MECHANICAL OUTLINE

Indicators

TTL

Analog

POWER INPUT TERMINALS

H = 1.45 MAX. STD MODEL
H = 1.80 MAX. TTL MODEL OR SUB-D
H = 2.20 MAX. TTL + SUB-D

Standard Width Body
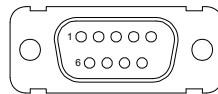
"-S OPTION" 9-PIN D-SUB CONNECTOR (EXAMPLE: CCR-50U60-s)

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			

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

CCR-50U\CR-50U\052019\Q2

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TYPICAL RF INSERTION LOSS PERFORMANCE CURVES
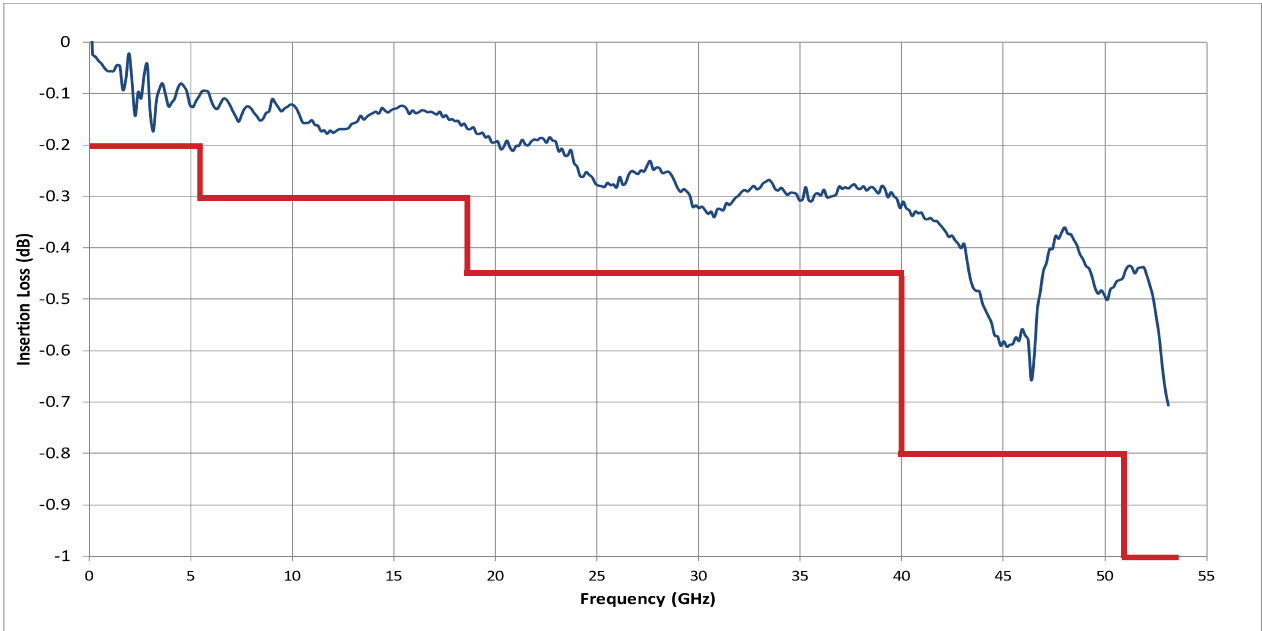
Insertion Loss

VSWR

——	**TYPICAL**
——	**MAXIMUM TEST LIMIT**

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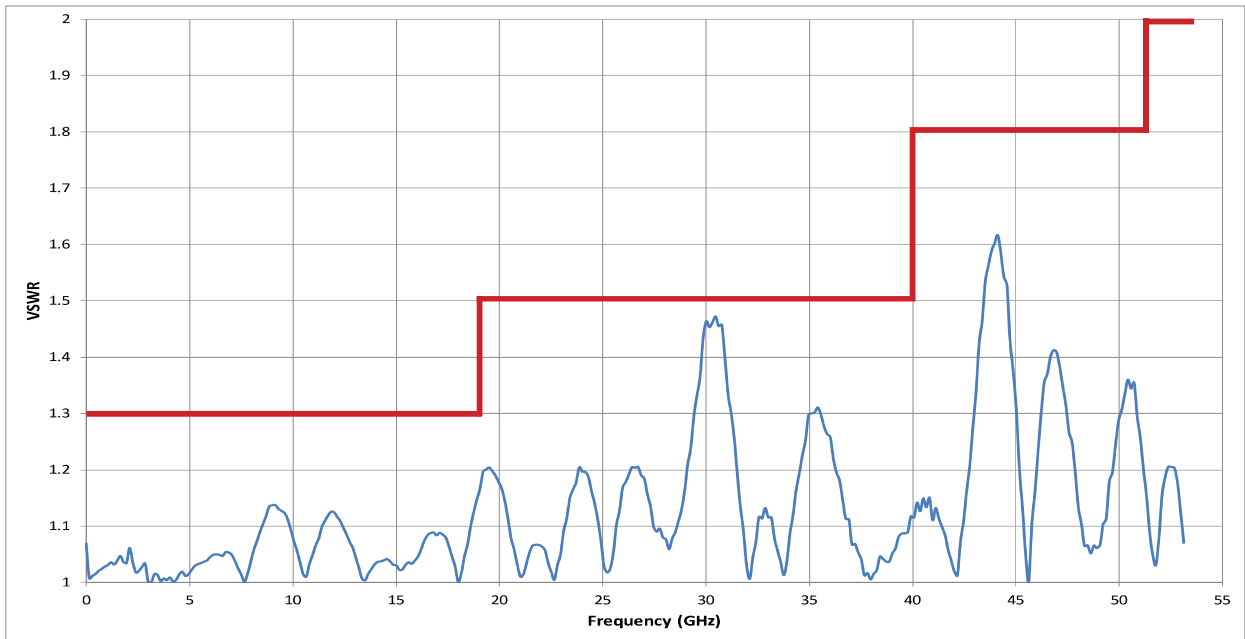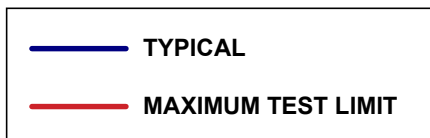
TYPICAL RF INSERTION LOSS PERFORMANCE CURVES

Isolation

	TYPICAL
	MAXIMUM TEST LIMIT
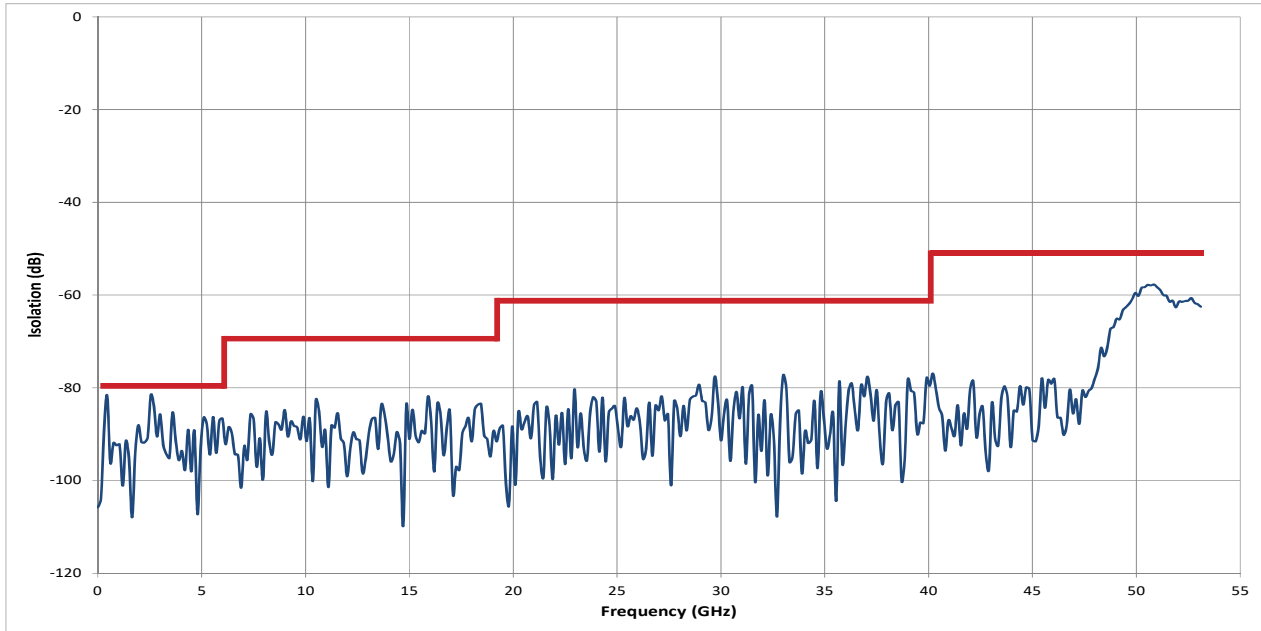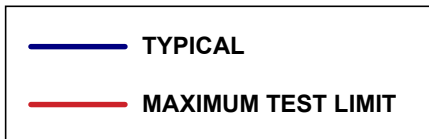
GLOSSARY

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.

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Miniature DC–53 GHz
Latching SPDT Coaxial Switch

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LATCHING CCR-50U/CR-50U PART NUMBER LIST

	Part No.		Part No.		Part No.
1	CCR-50UXC	43	CCR-50UX0-D	85	CR-50UXC-TS
2	CCR-50UXC-D	44	CCR-50UX0-DM	86	CR-50UXD
3	CCR-50UXC-DM	45	CCR-50UX0-DMS	87	CR-50UXD-M
4	CCR-50UXC-DMS	46	CCR-50UX0-DR	88	CR-50UXD-MS
5	CCR-50UXC-DR	47	CCR-50UX0-DRM	89	CR-50UXD-R
6	CCR-50UXC-DRM	48	CCR-50UX0-DRMS	90	CR-50UXD-RM
7	CCR-50UXC-DRMS	49	CCR-50UX0-DRS	91	CR-50UXD-RMS
8	CCR-50UXC-DRS	50	CCR-50UX0-DS	92	CR-50UXD-RS
9	CCR-50UXC-DS	51	CCR-50UX0-M	93	CR-50UXD-S
10	CCR-50UXC-M	52	CCR-50UX0-MS	94	CR-50UXD-T
11	CCR-50UXC-MS	53	CCR-50UX0-R	95	CR-50UXD-TM
12	CCR-50UXC-RM	54	CCR-50UX0-RM	96	CR-50UXD-TMS
13	CCR-50UXC-RMS	55	CCR-50UX0-RMS	97	CR-50UXE
14	CCR-50UXC-RS	56	CCR-50UX0-RS	98	CR-50UXE-M
15	CCR-50UXC-S	57	CCR-50UX0-S	99	CR-50UXE-MS
16	CCR-50UXC-T	58	CCR-50UX0-T	100	CR-50UXE-R
17	CCR-50UXC-TM	59	CCR-50UX0-TM	101	CR-50UXE-RM
18	CCR-50UXC-TMS	60	CCR-50UX0-TMS	102	CR-50UXE-RMS
19	CCR-50UXC-TS	61	CCR-50UX0-TS	103	CR-50UXE-RS
20	CCR-50UXD	62	CR-50UXC	104	CR-50UXE-S
21	CCR-50UXD-M	63	CR-50UXC-D	105	CR-50UXE-T
22	CCR-50UXD-MS	64	CR-50UXC-DM	106	CR-50UXE-TM
23	CCR-50UXD-R	65	CR-50UXC-DMS	107	CR-50UXE-TMS
24	CCR-50UXD-RM	66	CR-50UXC-DR	108	CR-50UX0
25	CCR-50UXD-RMS	67	CR-50UXC-DRM	109	CR-50UX0-D
26	CCR-50UXD-RS	68	CR-50UXC-DRMS	110	CR-50UX0-DM
27	CCR-50UXD-S	69	CR-50UXC-DRS	111	CR-50UX0-DMS
28	CCR-50UXD-T	70	CR-50UXC-DS	112	CR-50UX0-DR
29	CCR-50UXD-TM	71	CR-50UXC-M	113	CR-50UX0-DRM
30	CCR-50UXD-TMS	72	CR-50UXC-MS	114	CR-50UX0-DRMS
31	CCR-50UXE	73	CR-50UXC-R	115	CR-50UX0-DRS
32	CCR-50UXE-M	74	CR-50UXC-RM	116	CR-50UX0-DS
33	CCR-50UXE-MS	75	CR-50UXC-RMS	117	CR-50UX0-M
34	CCR-50UXE-R	76	CR-50UXC-RS	118	CR-50UX0-MS
35	CCR-50UXE-RM	77	CR-50UXC-S	119	CR-50UX0-R
36	CCR-50UXE-RMS	78	CR-50UXC-T	120	CR-50UX0-RM
37	CCR-50UXE-RS	79	CR-50UXC-TM	121	CR-50UX0-RMS
38	CCR-50UXE-S	80	CR-50UXC-TMS	122	CR-50UX0-RS
39	CCR-50UXE-T	81	CR-50UX0-T	123	CR-50UX0-S
40	CCR-50UXE-TM	82	CR-50UX0-TM	124	
41	CCR-50UXE-TMS	83	CR-50UX0-TMS	125	
42	CCR-50UX0	84	CR-50UX0-TS	126	

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

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