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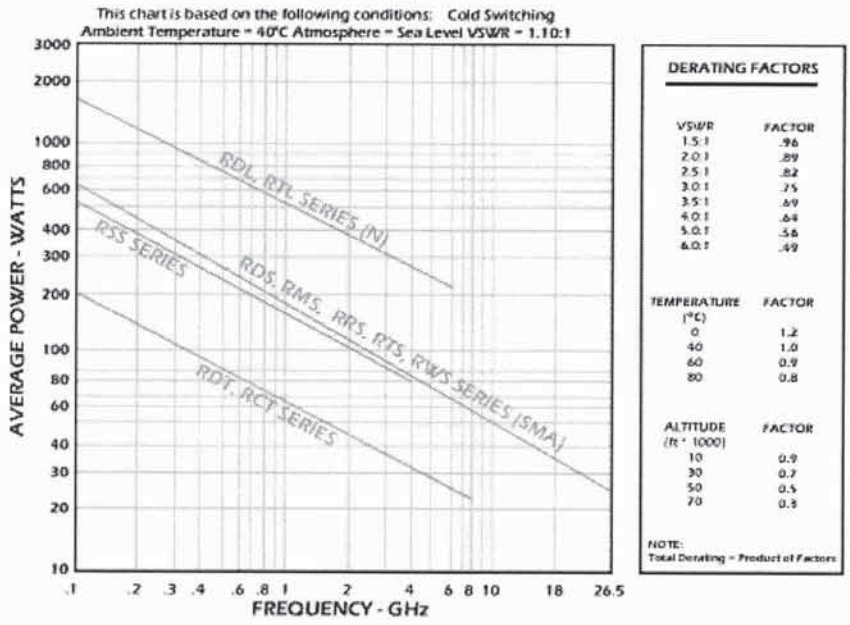
TYPICAL CHARACTERISTICS

Nominal Impedance (Ohm)	50						
Frequency Range (GHz)	DC - 1	1 - 2	2 - 4	4 - 8	8 - 12	12 - 18	18 - 26.5
VSWR (maximum)	1.1:1	1.15:1	1.2:1	1.3:1	1.4:1	1.5:1	1.6:1
Insertion Loss (dB max)	0.1	0.15	0.20	0.3	0.4	0.5	0.6
Isolation (dB minimum)	80	75	70	70	60	60	50

Operating Temp. Range	-30 to +85°C
Storage Temp. Range	-55 to +100°C
Nominal Operating Coil Voltages	5, 12, 15, 24, 28 VDC

Materials/Finish:	
Housing	Aluminum/Nickel
Cover	Aluminum/Black Anodized
Pin Outs	Brass/Gold
Insulation	Teflon
Contacts	Beryllium Copper/Gold

RF Power Rating Chart



Click here for a printable power chart.

[Home] [Products]

EXCELLENCE BY DESIGN

RELAIS COAXIAUX ET GUIDE D'ONDE

SMA - SMA 2.9 SPDT jusqu'à 40 GHz

RELAIS COAXIAUX MINIATURES :

R565 . . . . . .

CONNECTEUR HF
- 4 : SMA *18 GHz*
- 5 : SMA 2.9 - *26,5 GHz*
- 7 : SMA 2.9 - *40 GHz*
- x : Autres (1)

OPTIONS
- 000 : Sans option
- 129 : Avec commande TTL
- xxx : Autres (1)

TYPE
- 1 : Monostable
- 2 : Monostable avec circuit de recopie
- 3 : Bistable
- 4 : Bistable avec circuit de recopie
- 5 : Bistable avec auto-coupure
- 6 : Bistable avec circuit de recopie et auto-coupure
- x : Autres (1)

ALIMENTATION
- 2 : 12 Vdc
- 3 : 28 Vdc
- x : Autres (1)

(1) *x ou xxx : numéros réservés à des demandes spécifiques.*

CARACTERISTIQUES GENERALES :

CARACTERISTIQUES HYPERFREQUENCES

Bande de fréquence *(GHz)*	CC - 18 / CC - 26.5				CC - 40	
	CC - 6	6 - 12	12 - 18	18 - 26,5	CC - 18	18 - 40
R.O.S.	≤ 1,25	≤ 1,40	≤ 1,50	≤ 1,60	≤ 1,50	≤ 1,90
Pertes d'insertion *(dB)*	≤ 0,20	≤ 0,40	≤ 0,50	≤ 0,70	≤ 0,50	≤ 1,0
Isolation *(dB)*	≥ 70	≥ 60	≥ 60	≥ 50	≥ 60	≥ 50
Impédance *(Ω)*	50					
Séquence de commutation	Break Before Make					

AUTRES CARACTERISTIQUES

Type d'utilisation	Monostable ou Bistable	
Alimentation nominale *(Vdc)*	12	28
Résistance bobine (± 10%) *(Ω)*	90	520
Consommation à 23°C *(mA)*	133	55
Puissance moyenne	Voir courbe de puissance page 9	
Puissance crête *(kW)*	5 (1 µs, 1‰)	
Temps de commutation *(ms)*	20	
Pouvoir de coupure du circuit de recopie	1 W - 30 V - 100 mA	
Endurance	10^6 manœuvres	
Connecteurs	**SMA - SMA 2.9**	
Bornes de sortie d'alimentation et recopie	Sortie à souder	
Poids *(g)*	Sans option : 35	Avec toutes options : 45

Des produits de ce catalogue sont couverts par des brevets et/ou des demandes de brevets Français et étrangers

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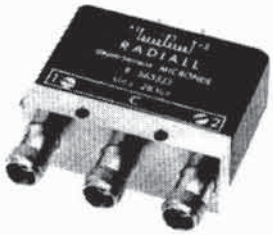
SERIE

R 565 - - -

18 GHz

RELAIS INVERSEUR DE PUISSANCE TNC -

Ce relais coaxial inverseur bistable a été conçu spécialement pour des applications de puissance. Le matériau à haute conductibilité thermique utilisé pour la réalisation des embases TNC-P a permis d'obtenir un compromis puissance, fréquence, volume très intéressant.
Sa bande d'utilisation s'étend du continu à 18 GHz avec une puissance transportable de 100 W CW aux fréquences supérieures dans les conditions d'environnement les plus sévères.



CARACTÉRISTIQUES HYPERFRÉQUENCES

RELAIS INVERSEUR DE PUISSANCE BISTABLE

Fréquence GHz ⩽	6	12	18
Pertes dB ⩽	0,2	0,4	0,6
R.O.S. ⩽	1,25	1,40	1,5
Isolation dB ⩾	70	60	60

CARACTÉRISTIQUES ÉLECTRIQUES

- Impédance caractéristique : 50 Ω
- Fréquence : 0 - 18 GHz
- Connecteurs : TNC P
- Alimentation U : 24 - 30 V par bornes soudables
- Moteur : bistable
- Consommation sous 28 V à 23°C : 190 mA max.

CARACTÉRISTIQUES MÉCANIQUES

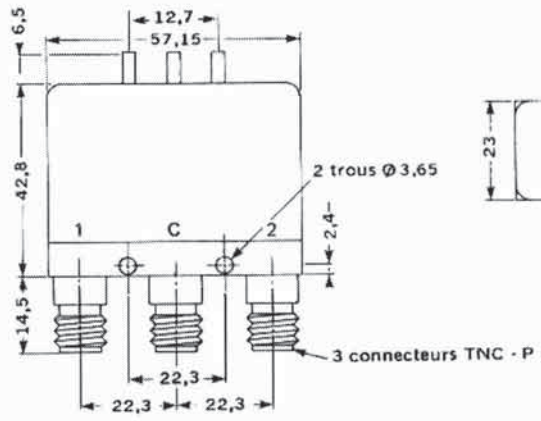
- Construction : étanche
- Temps de commutation : ⩽ 20 ms
- Endurance : 10^6 manœuvres
- Masse : 150 g max.
- Tolérances générales : ± 0,5 mm

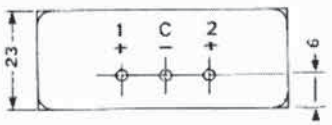
CARACTÉRISTIQUES D'ENVIRO

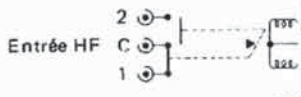
- Température d'utilisation : -
- Vibrations : 20 g (1
- Brouillard salin :

Norme NFC 20 600

DIMENSIONS MÉCANIQUES ET SCHÉMA ÉLECTRIQUE DU RELAIS INVERSEUR DE PUISSANCE BISTABLE







Référence : R 565 333 121

RADIALL département MICRONDE

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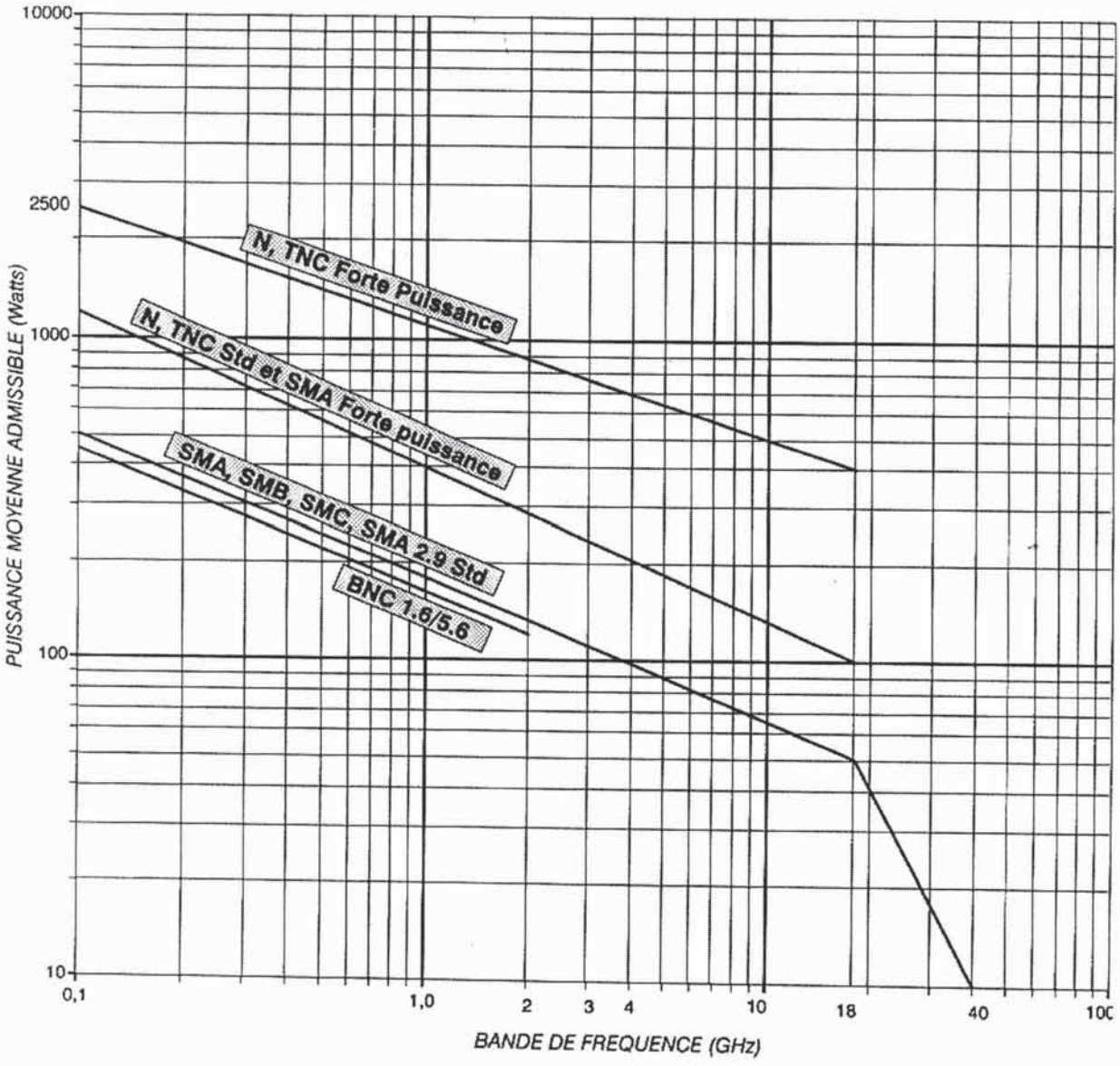
Téléphone : (1) 854.80.40 - Télex : RADIA A 220 673 F

INFORMATIONS TECHNIQUES

IV COURBES DE PUISSANCE :

Ces courbes sont données pour une température ambiante de 25°C, au niveau de la mer, et en puissance transportable.

COURBE de REDUCTION de la PUISSANCE EN FONCTION de la FREQUENCE



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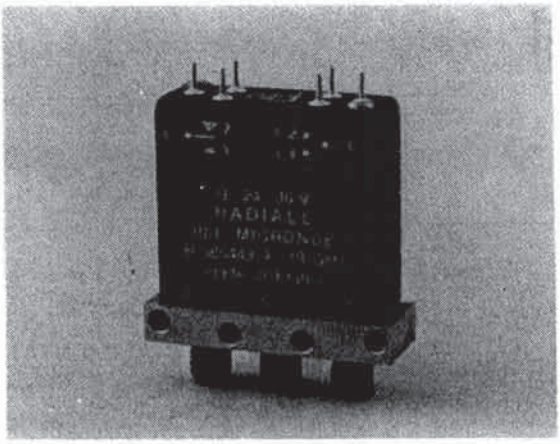
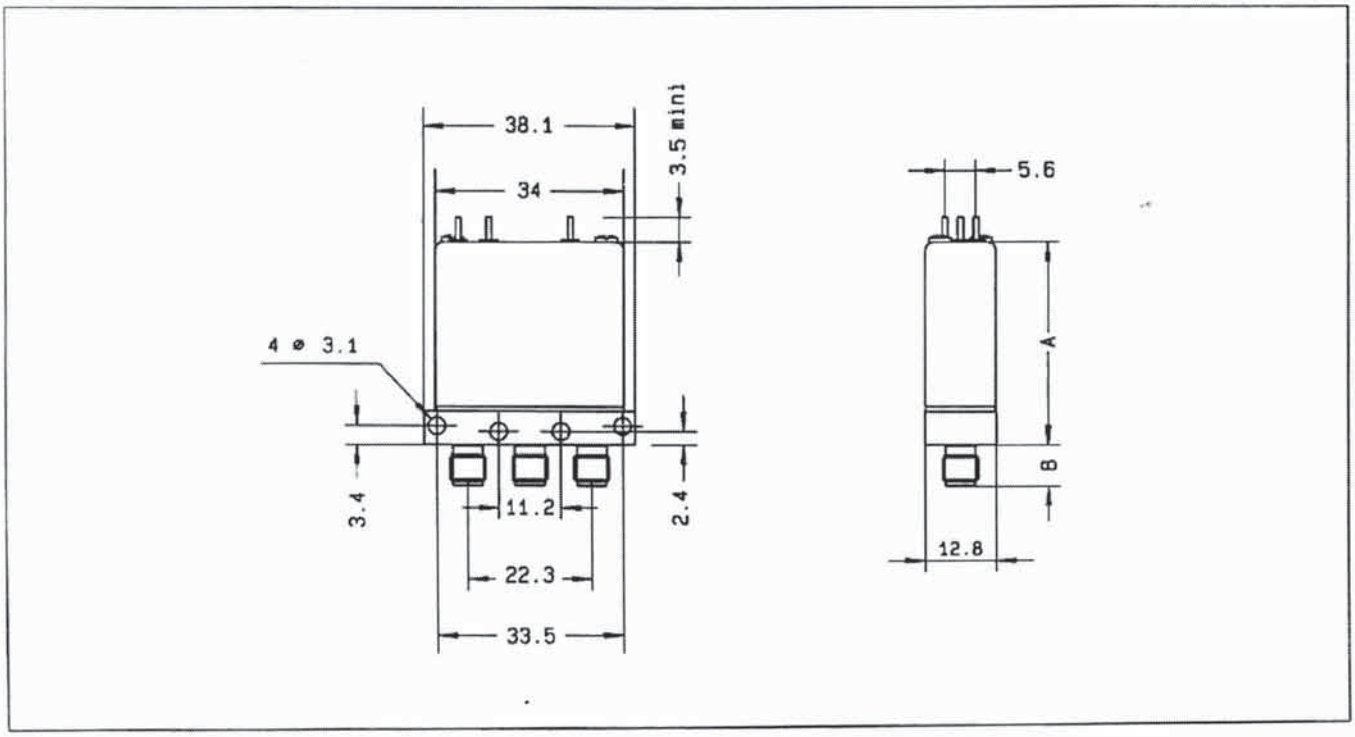
RELAIS COAXIAUX ET GUIDE D'ONDE

SMA - SMA 2.9 SPDT jusqu'à 40 GHz

RELAIS COAXIAUX MINIATURES :



DIMENSIONS MECANIQUES



	A max (mm)
Sans option	28,5
Avec toutes options	38

	B max (mm)
SMA	7,7
SMA 2.9	6,4

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(F6CIS) Doc Relais “Hyper/power”

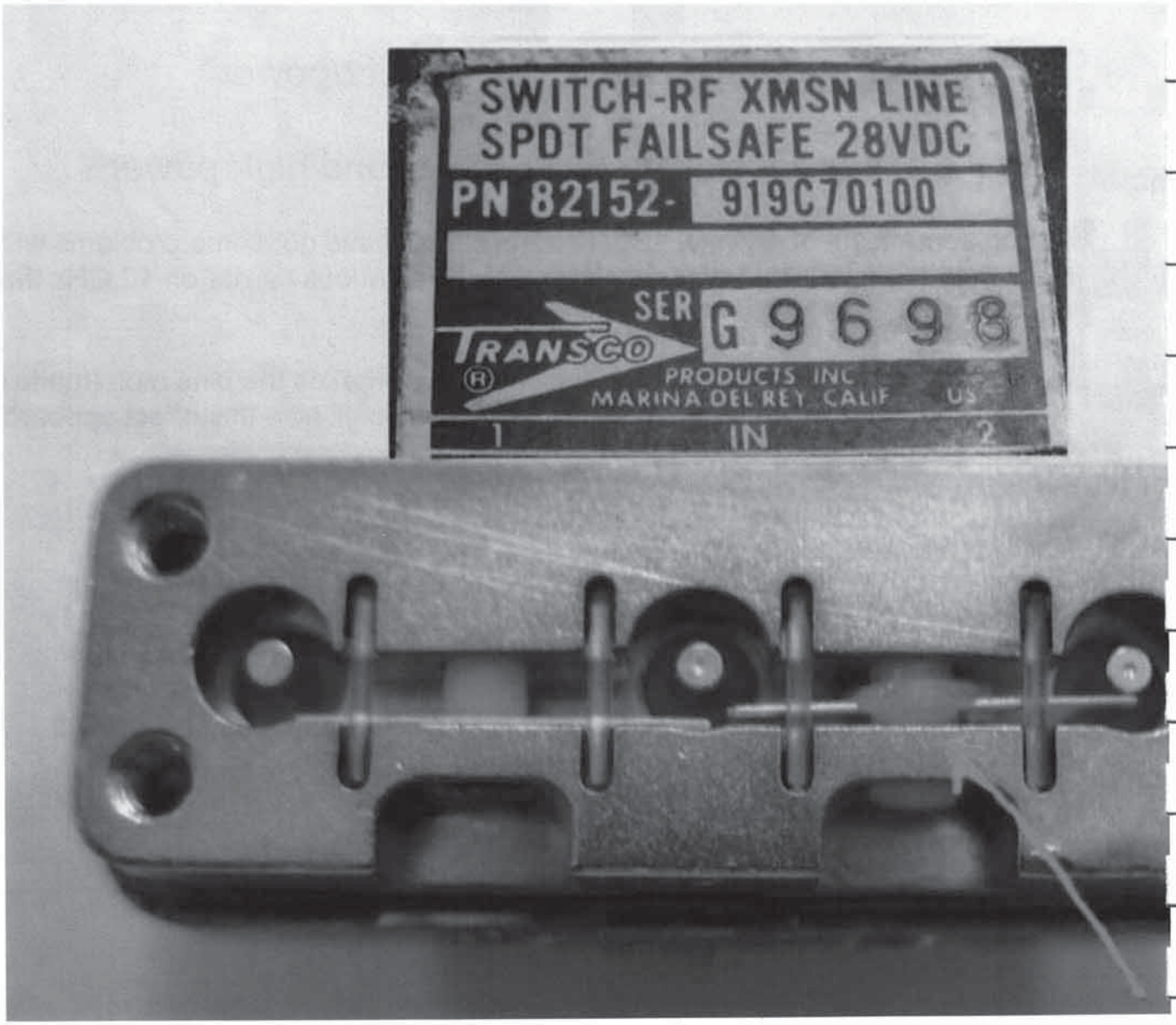
experiences with SMA relays and high power

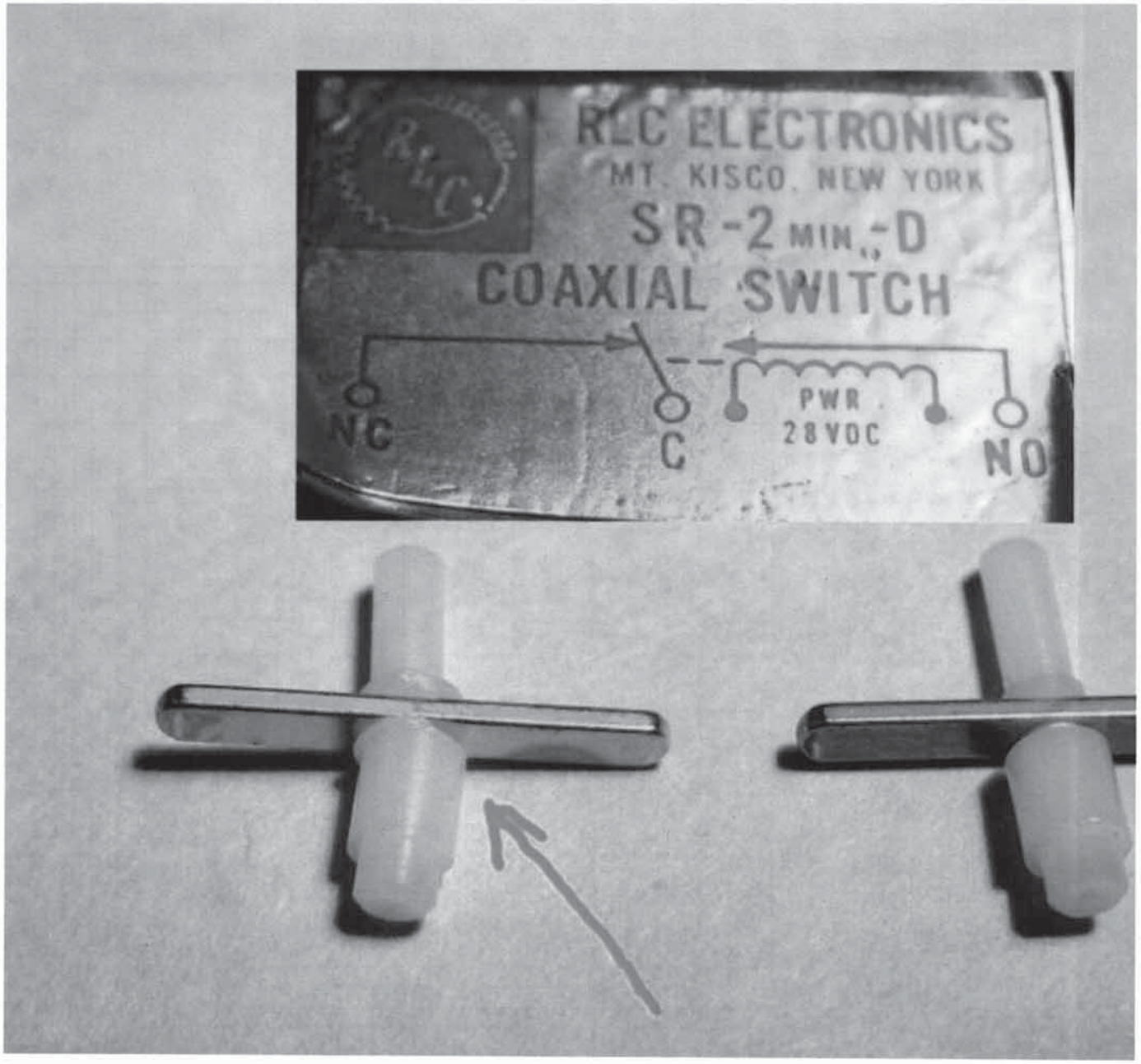
During some tests of my new 10GHz transverter I have got some problems with the antenna relay. After some time with 22 W continuous carrier on 10 GHz the actuator pins have melted (see pictures).

Maybe it's a small transition resistance which then makes the pins melt (made of synthetic material) at the high power on 10 GHz. Up till now this effect appeared only at "second-hand" SMA relays.

Note for new and used coaxial relays

Clean the relay-contacts after a longer storage.
Switch the relay for some hours with a generator or other suitable circuit.
You should connect the contacts with current (2mA - 100mA) or RF (50 - 250mW).The value of the chosen current or the RF depends on the contact material (e.g. AgNi+Au of approximately 2 mA -100 mA).

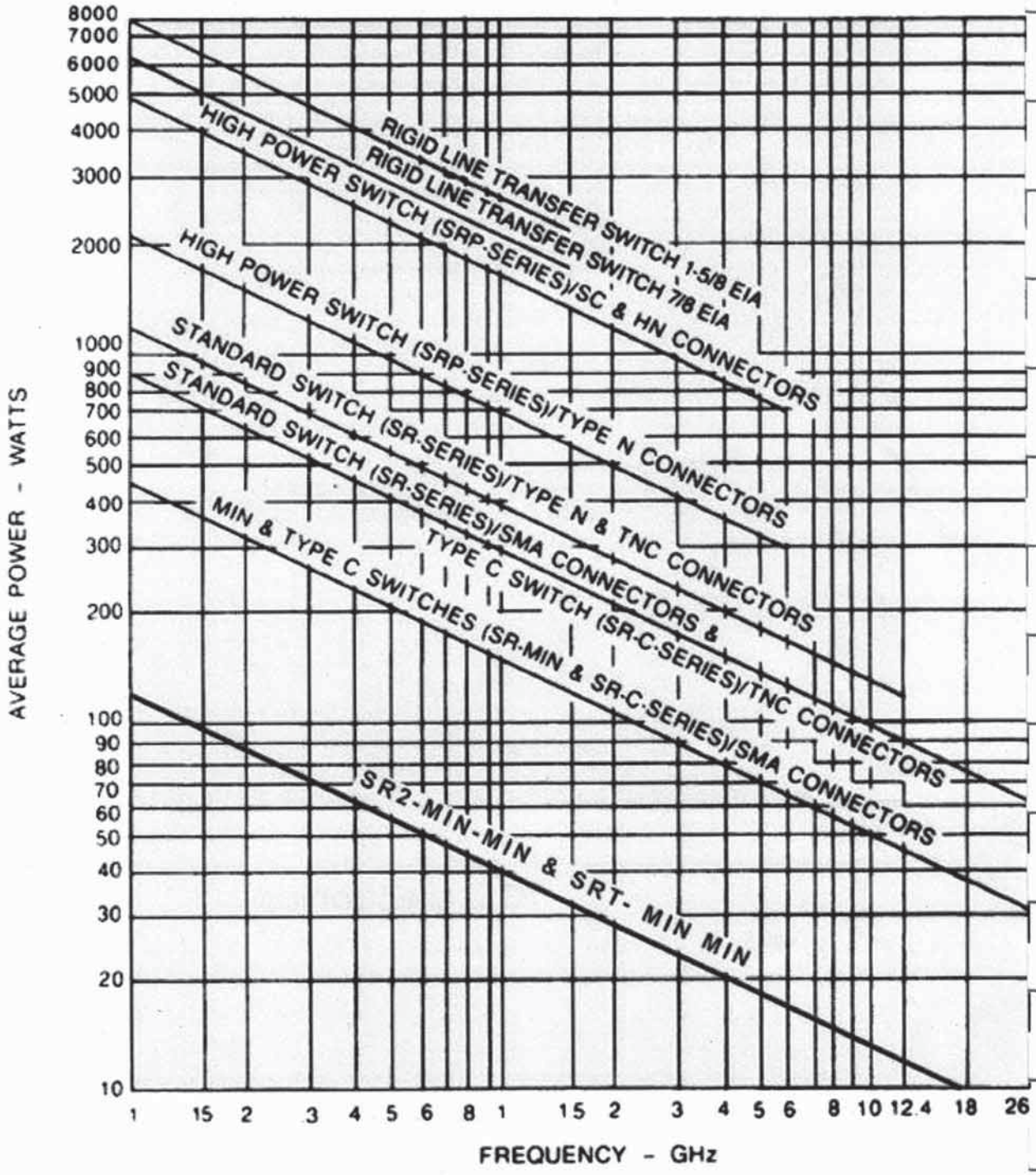

SWITCH-RF XMSN LINE
SPDT FAILSAFE 28VDC
PN 82152- 919C70100
SER G 9698
TRANSCO
PRODUCTS INC
MARINA DEL REY CALIF US
1
IN
2



RLC electronics

Power Rating vs Frequency

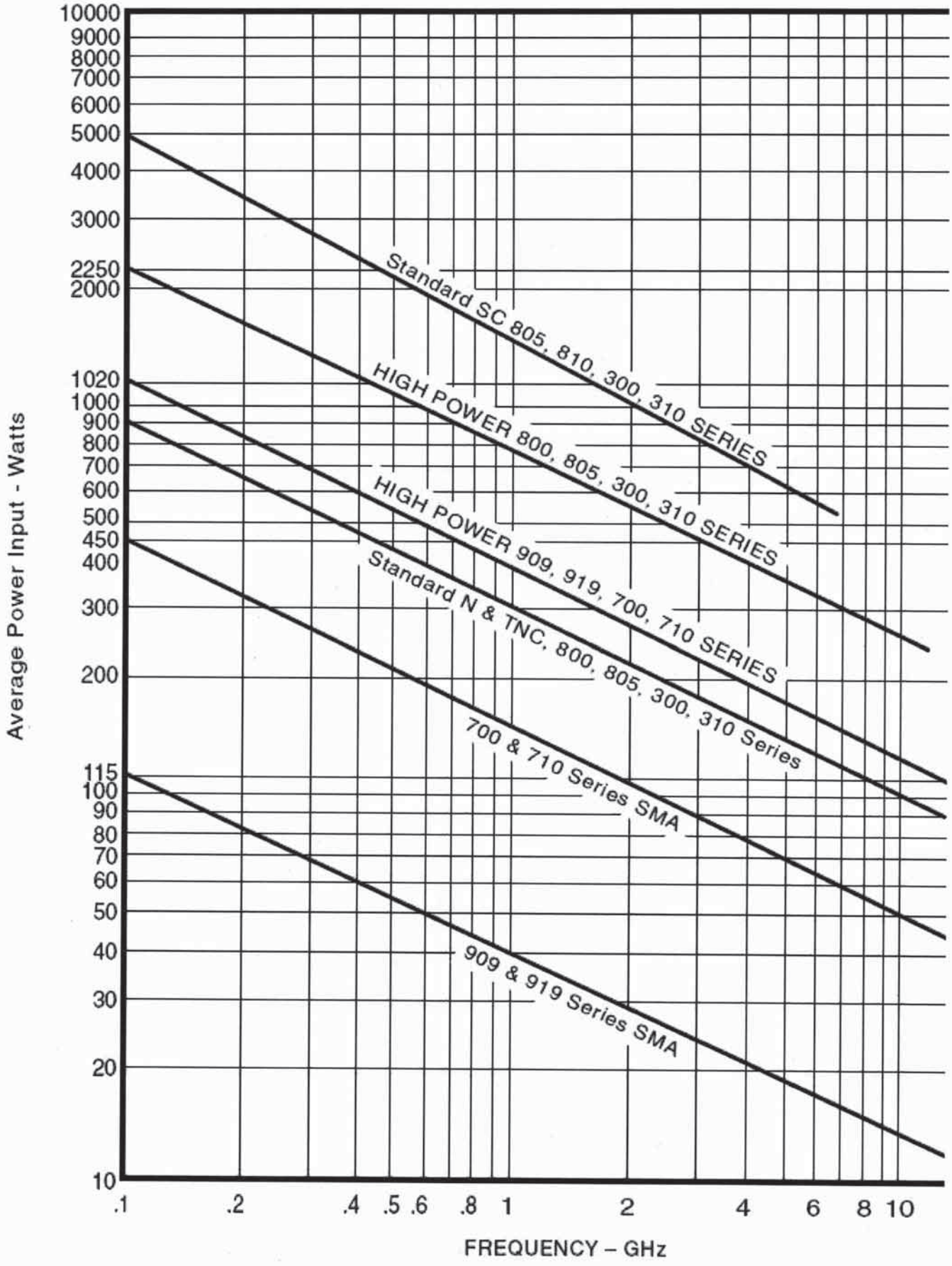
Rating stated for 25°C ambient temperature, matched 50 ohm system sea level and cold switching.



Power level ratings are given for switches equipped with temperature construction (which must be specified when

maximum power handling capacity is required switches should be derated to 75% of indicat

TRANSCO/ DOW-KEY



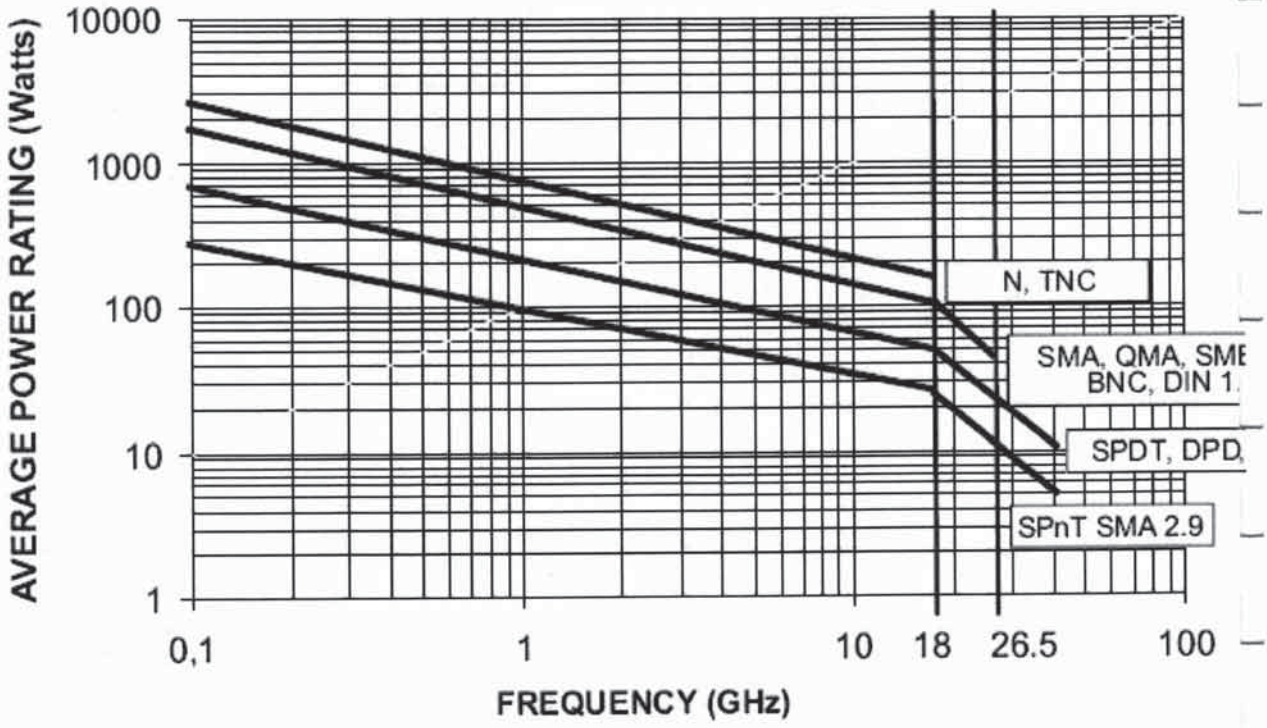
GLOSSARY (continued)

RF POWER RATING

The RF power rating is the capability of handling RF power (CW power) through closed contacts. The RF power s removed during switching. Power ratings assume unity V.S.W.R. (matched load) at room temperature (25°C), pressure (14.7 p.s.i.) and cold switching. See below the CW power capability Vs. Frequency Chart. Changes specifications require power derating (see derating factor versus V.S.W.R.).

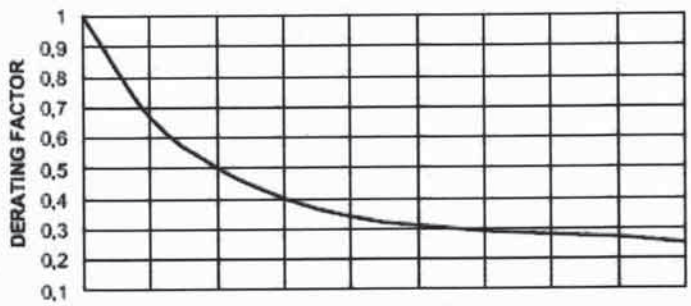
This graph is based on the following conditions :

- Ambient temperature : +25°C
- Sea level
- V.S.W.R : 1:1 and cold switching



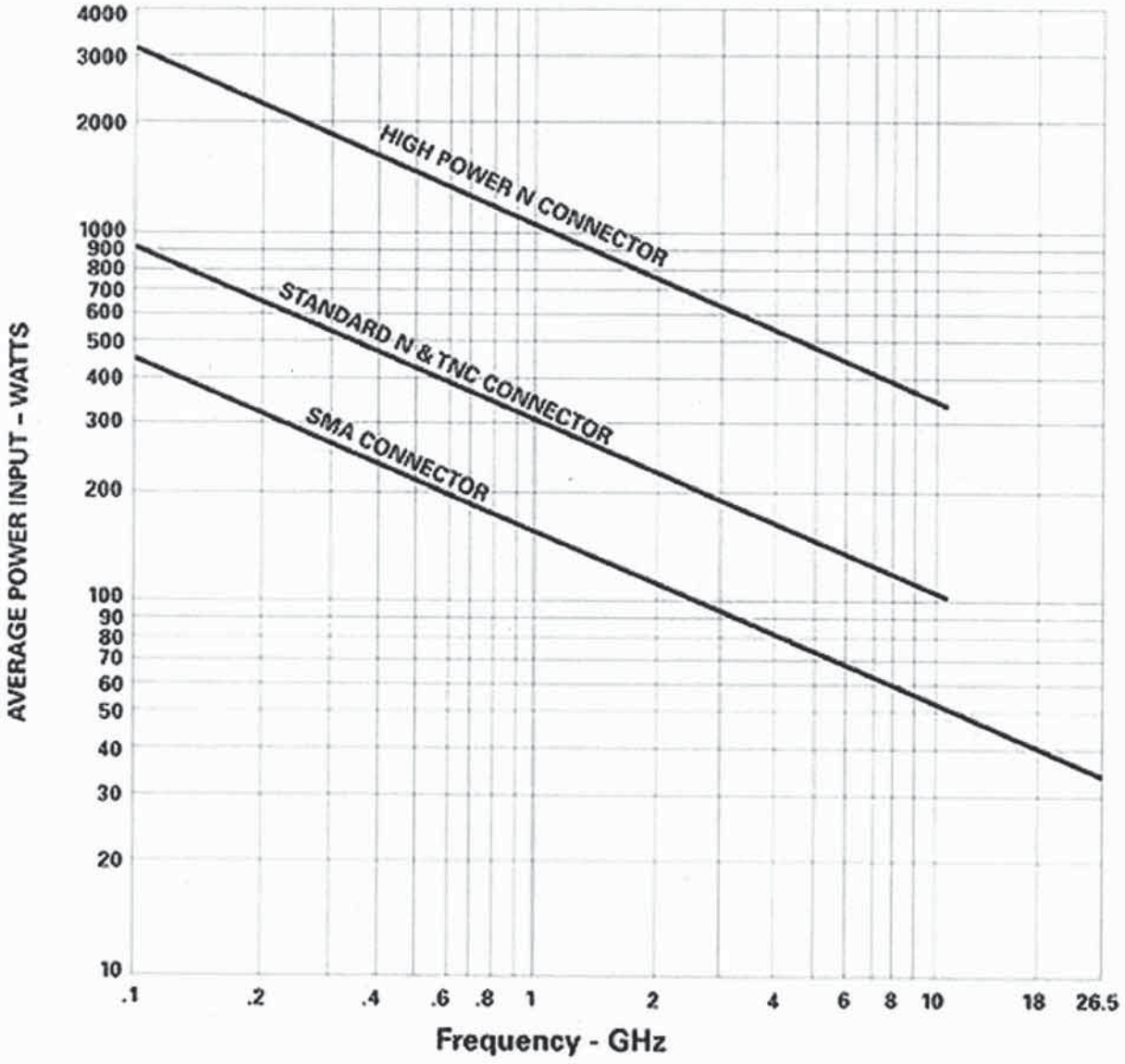
DERATING FACTOR VERSUS VSWR

The average power input must be reduced for load V.S.W.R above 1:1



CW POWER CAPACITY VS. FREQUENCY

Note: This graph is intended to provide an estimate of the CW power handlir capacity of DBP Microwave's switches. In the absence of actual test data, D Microwave recommends leaving a 3dB margin between the CW power obtaine the graph and the actual CW power. Please consult the factory before speci products in applications with less than the recommended 3dB margin.



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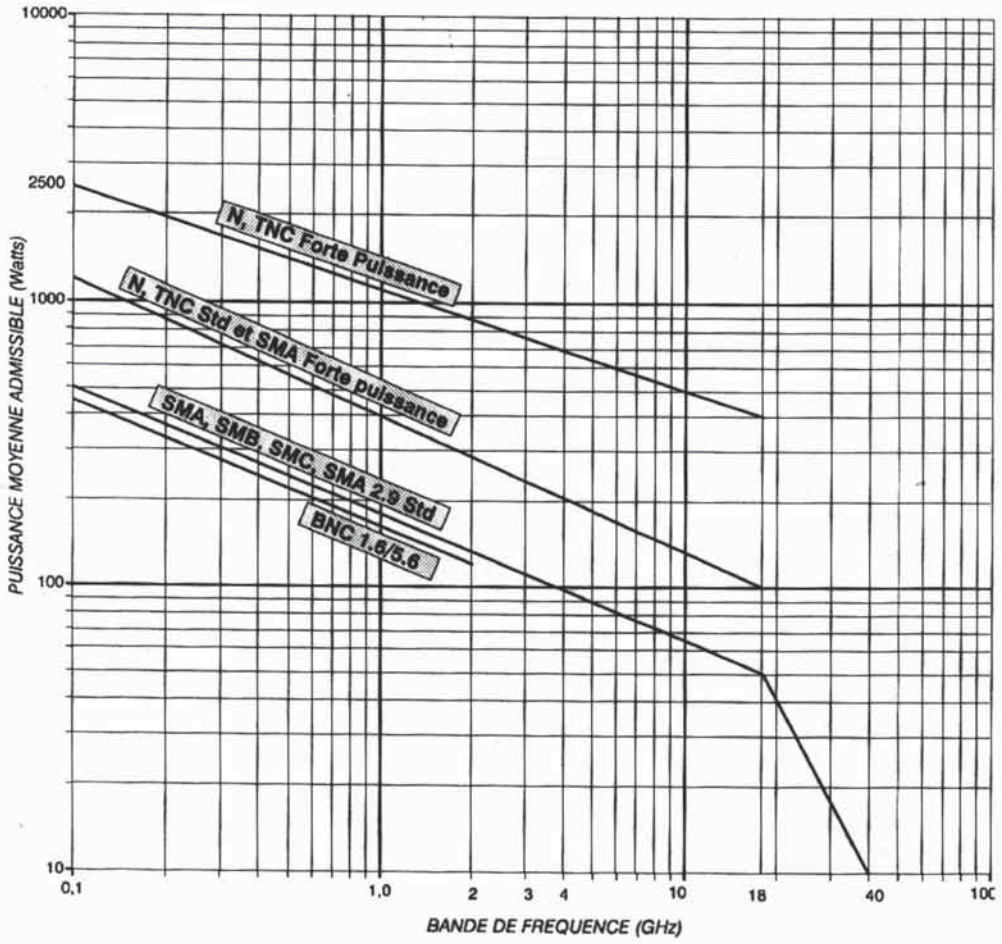

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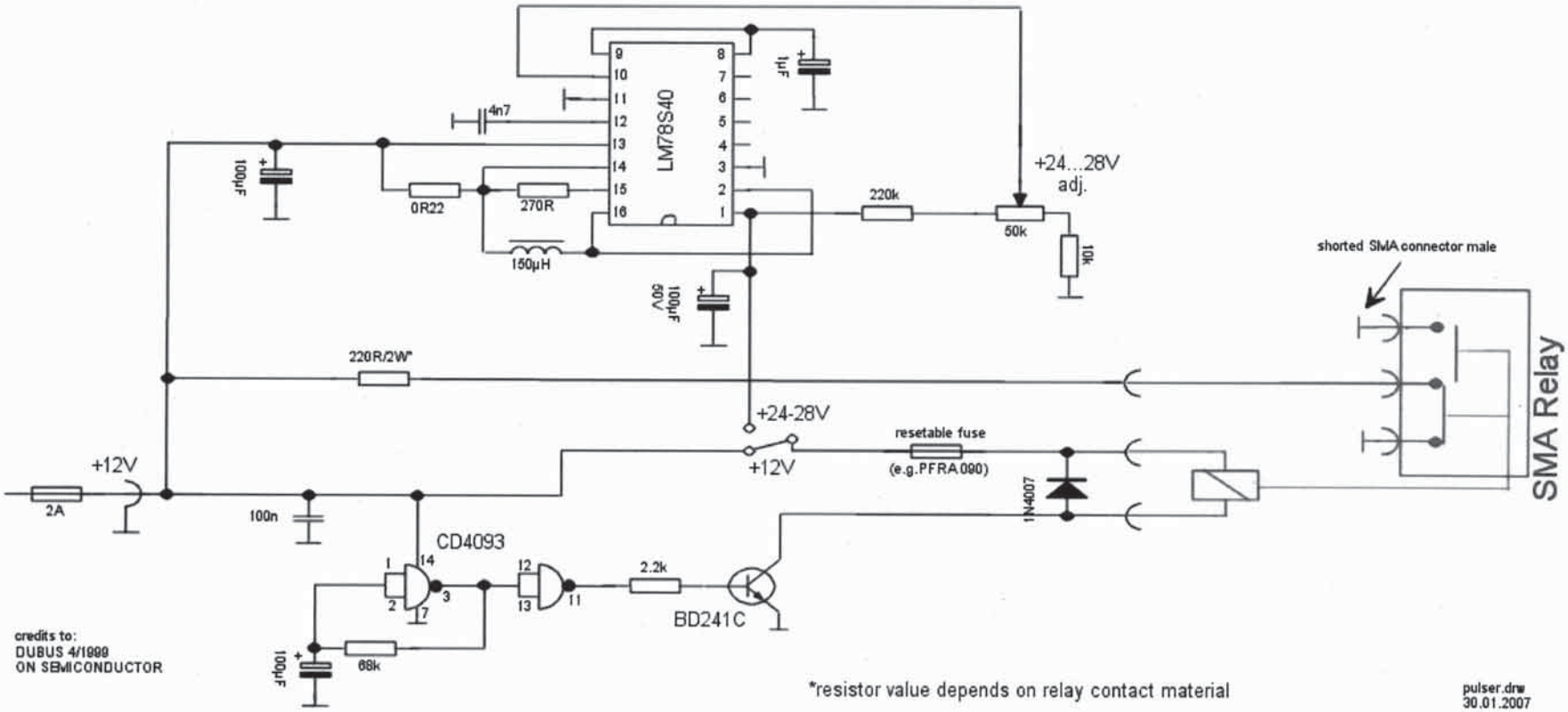
relay-contact-cleaner circuit diagram (click to enlarge)

coaxial relay contact-cleaner

Some types of coaxial-relays have an transition resistance on the contacts after long storage time.
High power warms the contacts, what has the consequence that the actuator pins melt (made of synthetic material).
The circuit is designed for SPDT (Single Pole Double Through) failsafe relay versions.
The Failsafe position is a Normally Closed contact that does not require actuator
power to remain closed. It is only closed when no other switch position is selected. When an
alternate position is selected by applying current to the appropriate actuator, the Failsafe contact
opens and does not close again until current is removed from the selected position.
Unselected inputs are directed to an open load (NON-TERMINATED.)
Actuating voltage 12V or 24-28V.
Note: For relays with LATCHING (self cut-off/ pulse latching) or LOGIC driver you must insert a suitable interface.



DowKey® Microwave CORPORATION

C	M	A	S
Commercial	Military	Avionics	Space

RF Characteristics

Frequency GHz	VSWR (max)	Isolation dB (min)	Ins. Loss dB (max)
0-1	1.10	85	0.10
1-4	1.15	80	0.15
4-8	1.20	70	0.20
8-12	1.30	65	0.30
12-18	1.35	60	0.35
*18-26.5	1.50	55	0.50

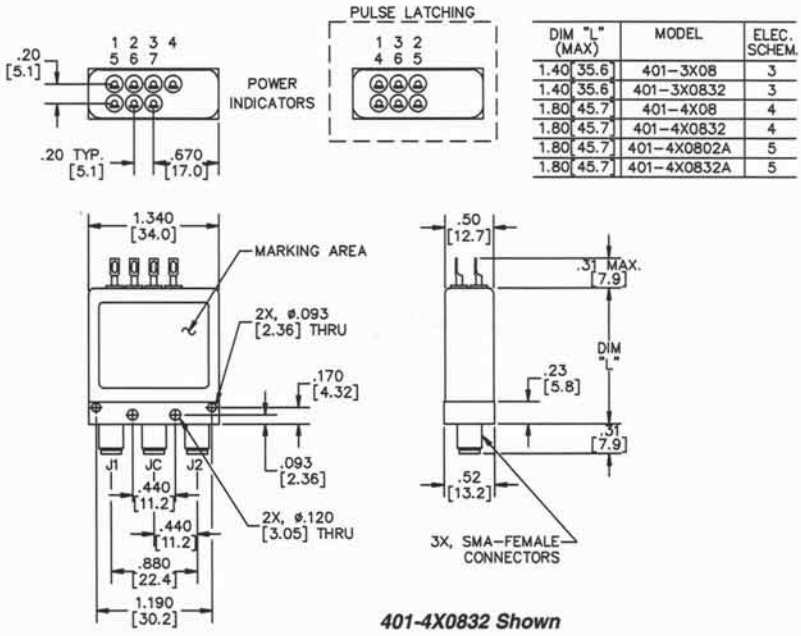
** "K" option only. Ex: 401K-3208*
Note: Typical performance dependent on selected options

401 Series SPDT Latching,SMA

Specifications

Operating Voltage:
(across temperature range)
12 Vdc (11-14 Vdc)
28 Vdc (24-32 Vdc)
Coil Current (max @ nom.Vdc & 20°C):
12 Vdc 230 mA
28 Vdc 120 mA
Switching Time:
15 mS maximum
Operating Temperature:
-25°C to +65°C (Standard)
-55°C to +85°C (Extended "T" Option)
Mechanical Life, Cycles:
1,000,000 minimum
Vibration, Operating:
10G RMS, 20-2000 Hz
Mechanical Shock, Non-Operating:
50G, 1/2 Sine, 11mS
Nominal Weight:
2.5 oz., (71g.)

Mechanical



DIM "L" (MAX)		MODEL	ELEC. SCHEM.
1.40	35.6	401-3X08	3
1.40	35.6	401-3X0832	3
1.80	45.7	401-4X08	4
1.80	45.7	401-4X0832	4
1.80	45.7	401-4X0802A	5
1.80	45.7	401-4X0832A	5

401-4X0832 Shown

For Electrical Schematic see page # 1-5

Part Number Selection

401 [J] - [4] [2] [08] [02] [A]

Special Options
A = High Power
I = Immersion Seal
J = 'D' Connector
K = 26.5 GHz
M = 5mS
R = (+) Com
S = Epoxy Seal
T = -55°C to + 85°C

Actuator
3 = Pulse Latching
4 = Latching Self Cutoff
7 = Pulse Latching with Suppression Diodes

Coil Voltage
2 = 12Vdc
3 = 28Vdc
7 = 20Vdc
8 = 24Vdc
9 = 15Vdc

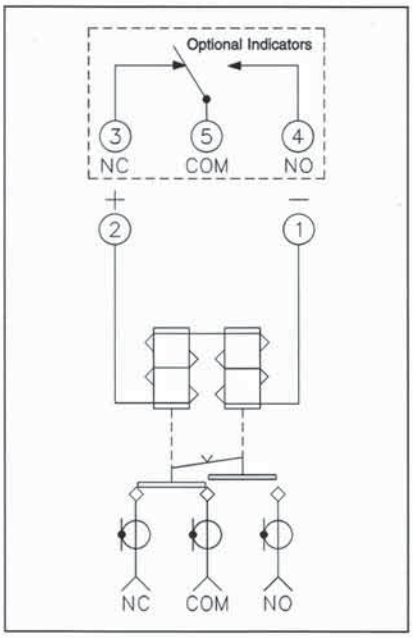
Connectors
08 = SMA Female
19 = Pins, PC Board Mount

Indicators
02 = No Indicators
32 = Indicators

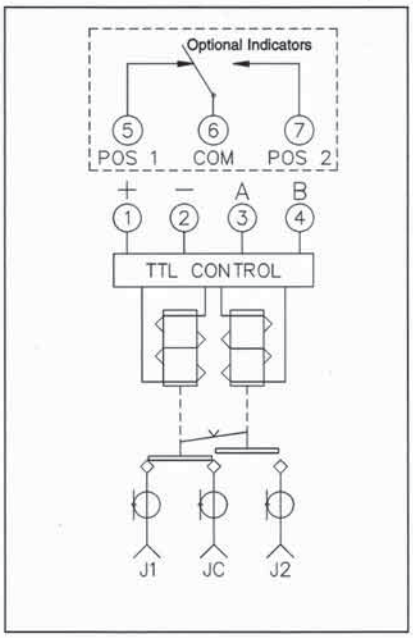
Circuit Options
A = TTL High
L = TTL Low

DowKey® Microwave CORPORATION

1 401/403 Failsafe



2 401/403 Failsafe TTL



LOGIC TRUTH TABLE

FAILSAFE TTL - SCH #2

LOGIC TRUTH TABLE		
RF PATH	INDICATOR PATH	LOGIC INPUT "A"
NC–COM	NC–COM	0
NO–COM	NO–COM	1

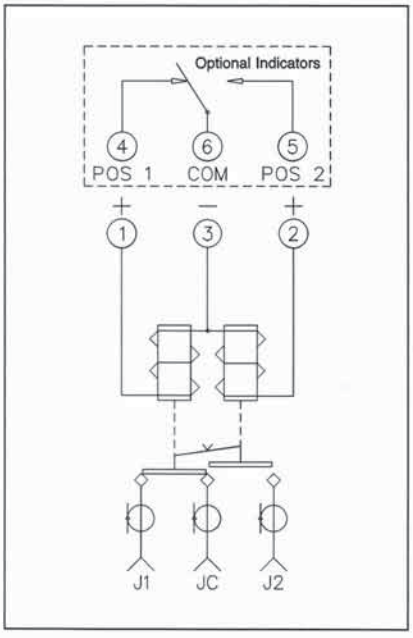
"0" = 0.0V–0.8V
"1" = 2.4V–5.5V

SELF CUTOFF TTL - SCH #5

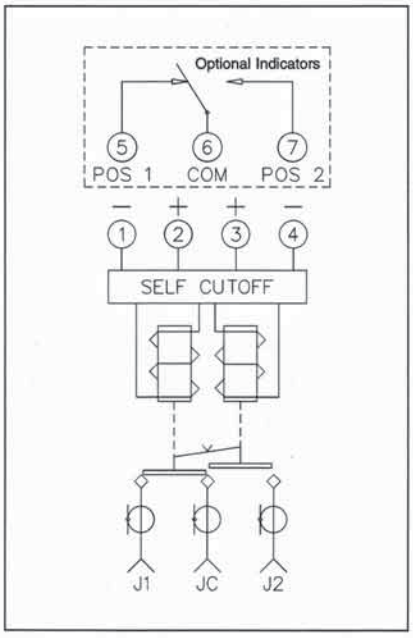
LOGIC TRUTH TABLE			
RF PATH	INDICATOR PATH	LOGIC INPUT "A"	LOGIC INPUT "B"
JC–J1	COM–1	1	0
JC–J2	COM–2	0	1

"0" = 0.0V–0.8V
"1" = 2.4V–5.5V

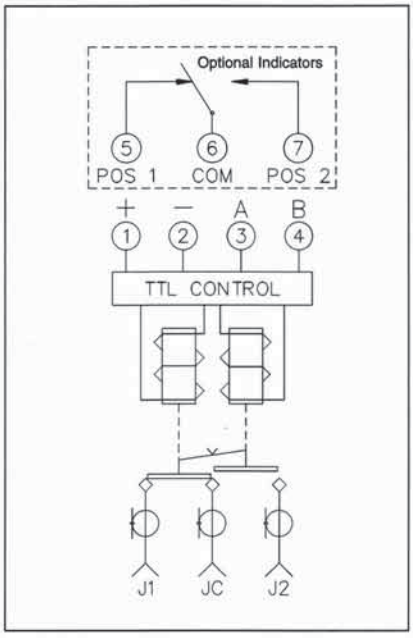
3 401 Pulse Latch



4 401 Self Cutoff



5 401 Self Cutoff TTL



TELEDYNE MICROWAVE

Ordering Information

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Microwave components and subsystems can be built to specification. Contact Teledyne Microwave Marketing with your requirements.

Terms

Net 30 days from date of invoice.

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All orders are FOB, Mountain View, CA and shipped via UPS surface unless otherwise specified.

Customer Service

1-800-832-6869 (Outside CA)
1-415-960-8613 (Inside CA)

Our dedicated Customer Service Department can be contacted for:

- Delivery status
- Order expediting
- Returns and repairs

Please contact Customer Service prior to returning any material.

Coaxial Switch Part Numbers

CS - 33 S 1 C - T (Example)

Switch (2 or 3 characters)

CR	Coaxial Switch – Reduced Height
CS	Coaxial Switch – Standard Height
CT	Internally Terminated Coaxial Switch
SA	Switch Attenuator
SM	Switch Matrix

Series Type (2 characters)

33	Miniature SPDT DC – 22.0 GHz Designate inboard mount (21 GHz Max) with the letter I (Example: CRI-33)
32	Standard SPDT DC – 12.4 GHz
53	Miniature SPDT DC – 26.5 GHz
35	Miniature DPDT DC – 18.0 GHz
37	Miniature Transfer DC – 18.0 GHz
47	Standard Transfer DC – 12.4 GHz
38	Miniature Multi-Throw DC – 18.0 GHz
18	Standard Multi-Throw DC – 12.4 GHz
58	Miniature Multi-Throw DC – 26.5 GHz
39	Latching Multi-Throw DC – 18.0 GHz

Connector Type

S	SMA Female	**B**	BNC Female	**6**	Mixed Connectors
N	N Female	**T**	TNC Female	**X**	SC Connectors

Actuator Voltage (1 character)

1	28 VDC Failsafe
2	115 VAC Failsafe
5	Special Voltage – Failsafe
6	28 VDC Latching
7	115 VAC Latching
9	Special Voltage – Latching

Actuator Type (1 or 2 characters)

O	No cutoff or indicators
C	Indicator contacts only
D	Self cutoff only
E	Self cutoff and indicators
3-8	Indicates no. of positions on Multi-throw Switches

Dash Number (1 or more characters)

	Number denotes special and additional customer requirements
T	TTL Driver
D	Decoders and TTL Driver

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TTL Switch Driver Option

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

VCC Input

The V_{CC} may or may not have to be connected to 5 volts as follows:

1. For a low current interface, connect V_{CC} to 5 volts. All units are provided with a 5 volt (V_{CC}) connection and internal pull up resistor (R1). With a 5 volt connection made, the logic input current drain is compatible with two low power Schottky TTL loads. (40 μA, high current)

2. For a high current interface, the V_{CC} connection is optional. If a high level logic input current drive (450 μA @ 2.4 volts) is available, the 5 volt (V_{CC}) connection need not be made.

Multi-Throw

Teledyne Microwave has two options available for TTL compatible drivers on multi-throw switches:

T-Option

This option uses a circuit similar to the SPDT and Transfer circuit. There is one control input for each position.

D-Option

This option includes a decoder. The control input is a 3-bit parallel word that is decoded to internally select the appropriate position.

Performance Parameters vs Frequency

Generally speaking, the performance of coaxial switches degrades with increasing frequency i.e., the VSWR and insertion loss increase and the isolation decreases. All Teledyne Microwave data sheets specify these three parameters as "worst case" at the highest operating frequency, either 12.4 GHz or 18 GHz depending on the type of switch used. If the switch is used only over a band whose upper limit is limited, much better specifications can be achieved. Special applications such as this, should be called out so that better performance can be offered.

Actuator Current vs Temperature

Due to the fact that actuator coil resistance will vary as a function of temperature, there is a resultant inverse relationship between switch operating temperature and actuator drive current. For switches operating at 28 volts D.C., the approximate actuator drive current at temperature, T, can be calculated from the equation:

$$I_T = \frac{28}{\frac{28}{I_A}\,[1 + .00385\,(T - 20)]}$$

Where:

I_T = Actuator current at temperature T

I_A = Room temperature actuator current—see catalog specification page

T = Temperature of interest in degrees celsius

Truth Tables

SPDT Failsafe

Logic Input	RF Path	
1	IN to 1	IN to 2
	Normally Closed	Normally Open
0	On	Off
1	Off	On

SPDT Latching

Logic Input		RF Path	
1	2	IN to 1	IN to 2
0	0	No Change	
1	0	On	Off
0	1	Off	On
1	1	Forbidden	

Transfer Failsafe
CS-37S10-T or CS-47N10-T

Logic Input	RF Path			
1	1-2	3-4	1-3	2-4
0	On	On	Off	Off
1	Off	Off	On	On

Transfer Latching
CS-37S60-T or CS-47N60-T

Logic Input		RF Path			
1	2	1-2	3-4	1-3	2-4
0	0	No Change			
1	0	Off	Off	On	On
0	1	On	On	Off	Off
1	1	Forbidden			

Multithrow
CS-38S16-D

Logic Input			RF Position					
1	2	3	1	2	3	4	5	6
0	0	0	On	Off	Off	Off	Off	Off
1	0	0	Off	On	Off	Off	Off	Off
0	1	0	Off	Off	On	Off	Off	Off
1	1	0	Off	Off	Off	On	Off	Off
0	0	1	Off	Off	Off	Off	On	Off
1	0	1	Off	Off	Off	Off	Off	On

Pin C	Common
Pin J	Vsw +28 Vdc
Pin 4 & 5	Spares

Multithrow
CS-38S16-T

Logic Input						RF Position					
1	2	3	4	5	6	1	2	3	4	5	6
1	0	0	0	0	0	On	Off	Off	Off	Off	Off
0	1	0	0	0	0	Off	On	Off	Off	Off	Off
0	0	1	0	0	0	Off	Off	On	Off	Off	Off
0	0	0	1	0	0	Off	Off	Off	On	Off	Off
0	0	0	0	1	0	Off	Off	Off	Off	On	Off
0	0	0	0	0	1	Off	Off	Off	Off	Off	On

Pin C	Common
Pin J	Vsw +28 Vdc
Pin B	Vcc +5 Vdb
Pin 7, 8, D, E, F	Spares

Applications

The transfer switch, whether it is adapted to coaxial or waveguide transmission lines is basically a modified double-pole-double-throw (DPDT) device. A true DPDT switch is a six port device that contains two completely independent transmission paths. In a transfer switch the two transmission paths are provided but are not totally independent as shown in Fig. 1.

Figure 1

The transfer switch has several interesting applications as follows:

Two Transmitters to Either of Two Antennas

Two microwave transmitters can be connected to either of two alternate antennas as shown in Fig. 2.

Figure 2

Circuit Insertion

A complete microwave circuit or circuit element can be inserted into a transmission line by using a transfer switch as shown in Fig. 3.

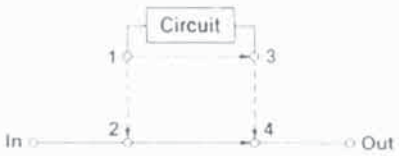
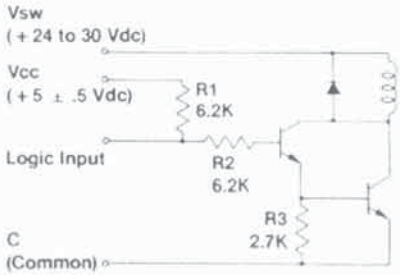


Figure 3

In the event that the 1-3 shorting of the microwave circuit is undesirable, this leg can be left out.

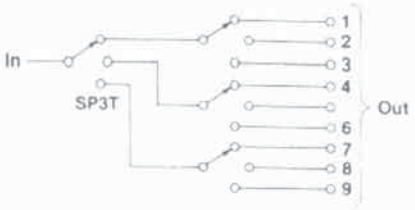
Basic Driver Schematic
SPDT and Transfer Switches



Failsafe uses 1 circuit
Latching uses 2 circuits
(Vsw, Vcc, & C are common to both circuits)

Series Application of Multi-Throw Switches

Many times requirements for greater than six position switches are encountered. Since it is difficult to design a high performance unit that has more than eight throws or positions, one solution is as shown.

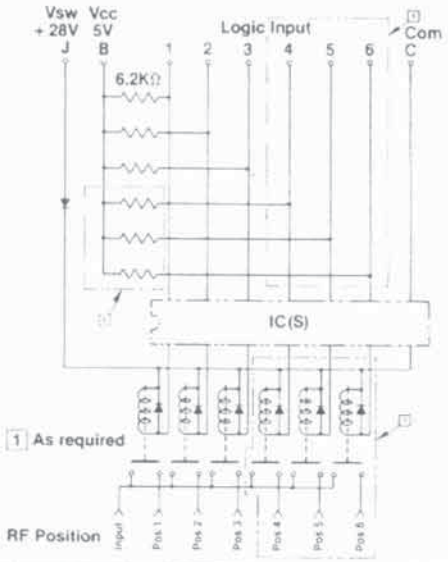


The example shows a single-pole-9-throw unit made up of 4 three-throw switches. The number of throws possible using this technique is essentially unlimited and is equal to the total number of throws available in the output stage. If a 2 stage unit were set up using 6 position switches, the resultant would be a total of 36 outputs or a SP36T switch bank.

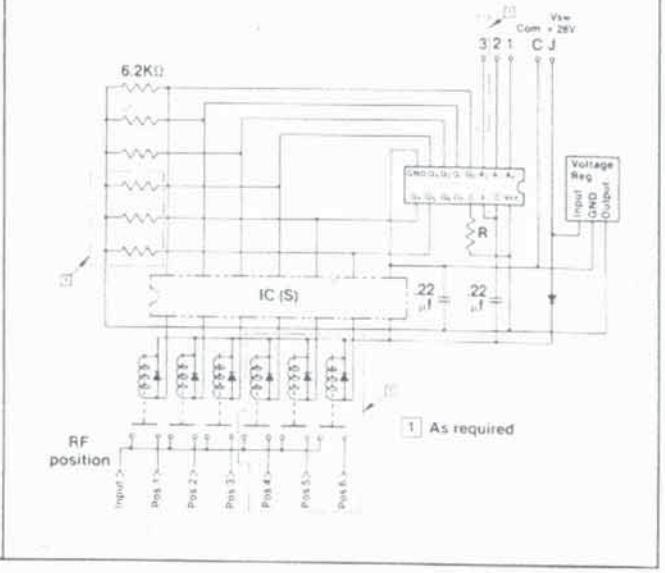
Magnetic Sensitivity

The switch can be sensitive to ferrous materials or external magnetic fields. Neighboring ferrous materials should be no closer than 0.5 inches and external magnetic field should have a flux density less than 5 gauss.

Basic T Schematic



Basic D Schematic



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Glossary of Switching Terms

Failsafe
A switch with an actuator that contains a spring return mechanism that provides RF connection to one selected position when no voltage is applied to the power terminals. This type of switch requires continuous voltage to maintain RF connection to any other position. For multi-position switches, the no voltage condition is all RF connections open.

Latching
A switch with an actuator that contains a mechanism, either mechanical or magnetic, that will maintain a chosen RF contact path whether or not voltage is maintained after switching is accomplished.

Self-Deenergizing/Self-Cutoff
Applies to latching switches only. A switch that has the ability to disconnect the actuator drive circuit so that D.C. current will not be consumed after switching has been accomplished. Self-cutoff can be accomplished either by using mechanical contacts or IC drive circuits.

Indicator Contacts
A set of internally mounted D.C. contacts that are mechanically connected to the actuator and transfer in one-to-one correspondence with the RF contacts. These contacts are usually wired to indicator lights to remotely show switch position, but in many cases, can also be used as interlock contacts. Indicator contact rating (max.) is 30 VDC, 50 mA, or 1.5 watts resistive load.

Switching Time
The total amount of time between application of voltage to the actuator terminals and completion of switching including all contact bounce, if any. Total switching time is made up of three parts, namely (1) inductive delay in the actuator coil, (2) transfer time of the RF contacts, and (3) bounce time of the RF contacts.

Actuator
The electromechanical mechanism that transfers the RF contacts from one position to another. Most Teledyne Microwave actuators use either linear or rotary solenoids acting on mechanical linkage to the RF contacts.

SPDT Switch
Single-Pole-Double-Throw. A switch with one input and two output ports.

Multi-Throw Switch
A switch with one input and more than two outputs. Standard Teledyne Microwave switches (CS-38, CS-58, CS-18 and CS-39) provide up to 8 outputs operating from a single input.

Transfer Switch
A four-port switch that provides two independent pairs of RF paths through it. These pairs are actuated simultaneously, such actuation being similar to that of a double-pole-double-throw switch. See application notes as to typical usage.

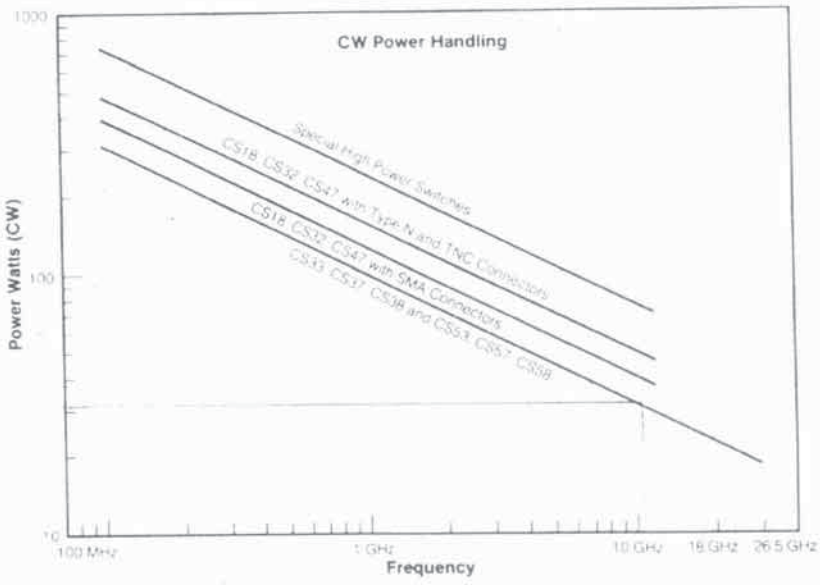
Isolation
The measure of the power level at the output connector of an unconnected RF channel as referenced to the power at the input connector. Specified in dB below input power level.

Internal Termination
Applies to SPDT and Multi-Throw switches. An unselected input or output port will be connected to an internal 50 ohm termination. Switches without internal termination will open circuit the unselected ports and the VSWR will be infinite.

Attenuator Switch
A two state switch that has a low loss and a high loss state. The low loss state insertion loss is typically 0.5 dB or less. The high loss state is precision level of attenuation such as 10, 20, 30 dB.

Arc Suppression Diode
A diode connected in parallel with the coil. The diode will clip the back emf spike to 0.7 volts when the coil is de-energized. The diode cathode is connected to the positive side of the coil and the diode anode is connected to the negative side.

Date Code
Either serial numbers or date codes are marked on the switches. The date code is in accordance with MIL-STD-1285A and consists of four digits. The first two digits are the year, and the last two digits are the week of that year (YYWW). Thus, 8604 will be switches which went through final inspection during the fourth week of 1986.



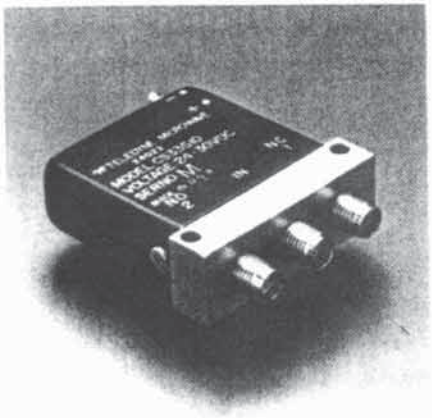
Power Handling Capability (watts cw)

There are several factors which determine the power handling capability of a given switch design. The following graph, however, may be used as a baseline for selecting an appropriate switch model.

Notes:
1. This graph is based on the following reference conditions:
   - A/ Ambient temperature 40°C
   - B/ Sea Level operating
   - C/ 1.2 VSWR load
   - D/ Non Switching

2. For applications calling for low pressure, high altitude or severe temperature requirements, the above power ratings would be derated. Please contact factory for specific information.

Failsafe DC-22 GHz Miniature SPDT Switches



CS-33S10

CS-33 Series

DC-22 GHz*
SMA Connectors

Description

The Type CS-33 Failsafe Switch is a broadband SPDT electro-mechanical switch designed to switch microwave signals from a common input to either of two outputs. Designed for 50 ohm transmission lines, the unit is set up for minimum size compatible with SMA connector spacing. Two different mounting hole configurations are offered: standard and optional inboard mounting.

The failsafe switches on this page are provided with a spring operated actuator which is particularly desirable in applications where the switch is connected to one position (normally closed) most of the time and only periodically is switched to the alternate position. In this type of application, holding power is required only when operating in the alternate position. Also, switching circuitry is simplified, since only one d-c circuit is required.

Specifications

RF Contacts:
Break before make

Actuator Voltage:
24–30 VDC, 12, 15, 20 VDC, and 115 VAC on special order

Actuator Current:
80 mA @ 28 VDC and 20°C

Switching Time:
20 msec

Weight:
1.65 oz. max.

Temperature Range:
– 54°C to + 85°C

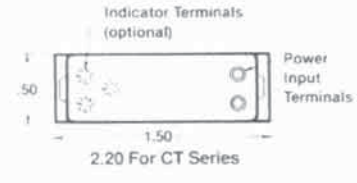
Life:
1 million cycles

RF Power Handling:
See graph in front of brochure

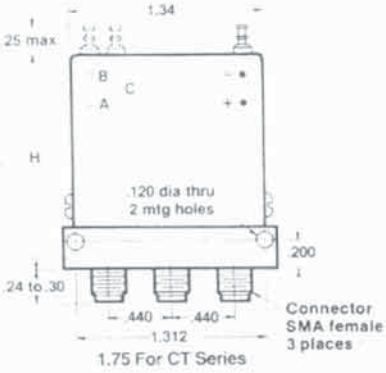
Optional Features

- Indicator Circuits
- Special Actuator Voltages
- TTL Compatible Drivers
- Arc Suppression Diodes
- Power Connectors
- Inboard Mounting

Outboard Mounting



2.20 For CT Series



1.75 For CT Series

H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

RF Performance

Frequency	DC–6 GHz	6–12 GHz	12–18 GHz	18–22 GHz*
VSWR (maximum)	1.25:1	1.40:1	1.50:1	1.70:1
Insertion Loss (maximum)	0.2 dB	0.4 dB	0.5 dB	0.8 dB
Isolation (minimum)	70 dB	60 dB	60 dB	50 dB

* Outboard Mounts To 22 GHz
Inboard Mounts To 21 GHz

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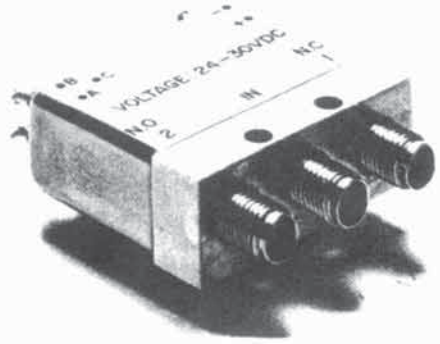
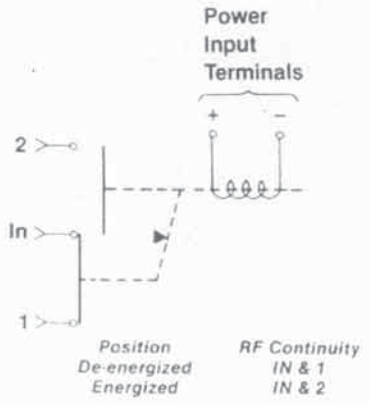
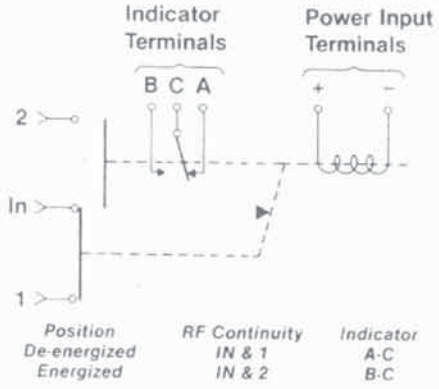


CR33S1C-99

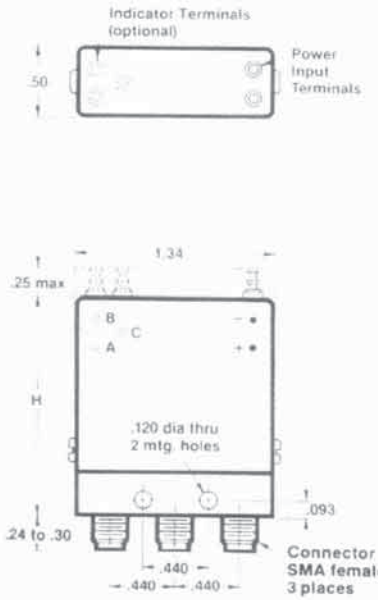
CS-33S10



CS-33S1C



Inboard Mounting



H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

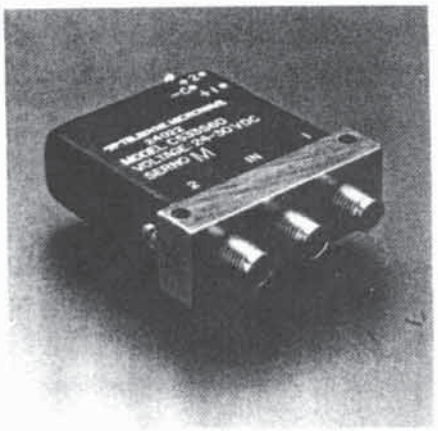
Part Number Table

All units have SMA-Female connectors

For TTL Drivers add -T to Part No.

Actuator Type	Without Indicators	With Indicators
Failsafe	CS-33S10	CS-33S1C

Latching DC-22 GHz Miniature SPDT Switches



CS-33S60

CS-33 Series
DC-22 GHz*
SMA Connectors

Description

The Type CS-33 Latching Switch is a broadband SPDT electro-mechanical switch designed to switch microwave signals from a common input to either of two outputs. Designed for 50 ohm transmission lines, the unit is set up for minimum size compatible with SMA connector spacing.

The switches on this page are provided with a magnetic latching actuator which is particularly desirable in applications where actuator power consumption must be kept to an absolute minimum. The latching type actuator requires less switching current than the failsafe type. In the self-cutoff version, power is applied only for the very short duration (approximately 50 msec. max.) of the actuator transfer from one position to the other. This makes this type of actuator especially suitable for space vehicles or portable battery operated systems.

Specifications

RF Contacts:
Break before make

Actuator Voltage:
24–30 VDC, 12, 15, 20 VDC, and 115 VAC on special order

Actuator Current:
60 mA @ 28 VDC and 20°C

Switching Time:
10 msec.

Weight:
1.65 oz.

Temperature Range:
– 54°C to + 85°C

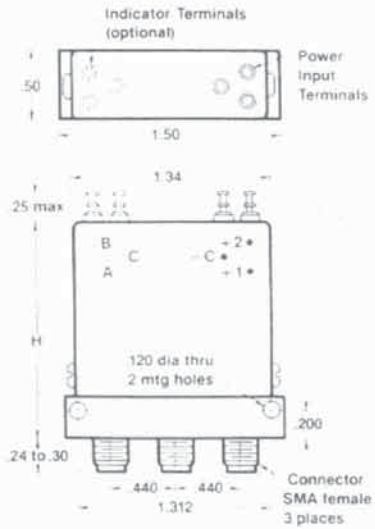
Life:
1 million cycles

RF Power Handling:
See graph in front of brochure

Optional Features

- Indicator Circuits
- Special Actuator Voltages
- TTL Compatible Drivers
- Arc Suppression Diodes
- Power Connectors
- Inboard Mounting

Outboard Mounting



H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

RF Performance

Frequency	DC–6 GHz	6–12 GHz	12–18 GHz	18–22 GHz*
VSWR (maximum)	1.25:1	1.40:1	1.50:1	1.70:1
Insertion Loss (maximum)	0.2 dB	0.4 dB	0.5 dB	0.8 dB
Isolation (minimum)	70 dB	60 dB	60 dB	50 dB

* Outboard Mounts To 22 GHz
Inboard Mounts To 21 GHz

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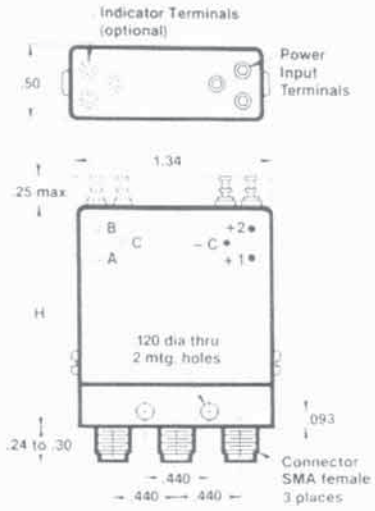
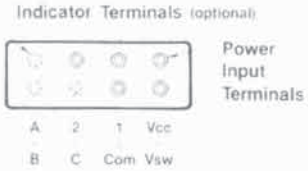
Inboard Mounting



H = 1.20 max CR Model
options may add height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

TTL Option



Part Number Table

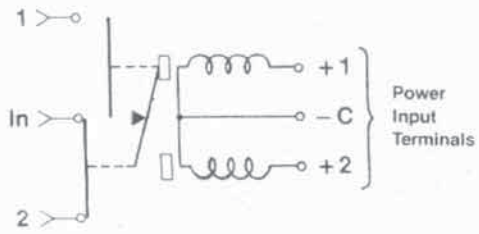
All units have SMA-Female connectors

For TTL Drivers add -T to Part No.

Actuator Type	Without Indicators	With Indicators
Latching without Self-Cutoff	CS-33S60	CS-33S6C
Latching with Self-Cutoff	CS-33S6D	CS-33S6E

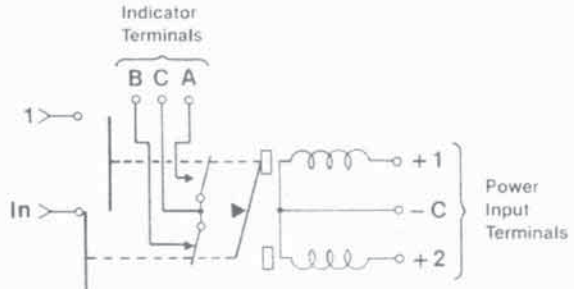
For Models CS-33S60 and CS-33S6C power is applied in a pulse form of sufficient duration (20 msec. min.) to cause switching. For Models CS-33S6D and CS-33S6 steady voltage may be applied continuously, but switch only draws current during the actual switching cycle.

CS-33S60



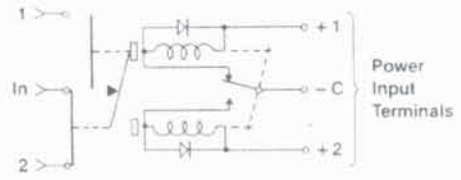
Position	Voltage	RF continuity
1	+1 & −C	IN & 1
2	+2 & −C	IN & 2

CS-33S6C



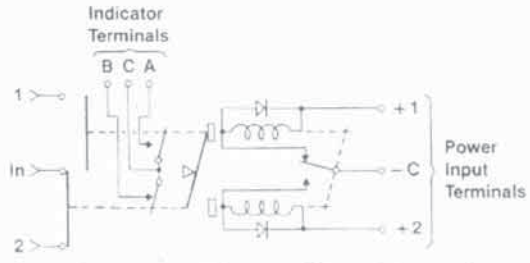
Position	Voltage	RF continuity	Indicator
1	+1 & −C	IN & 1	A & C
2	+2 & −C	IN & 2	B & C

CS-33S6D

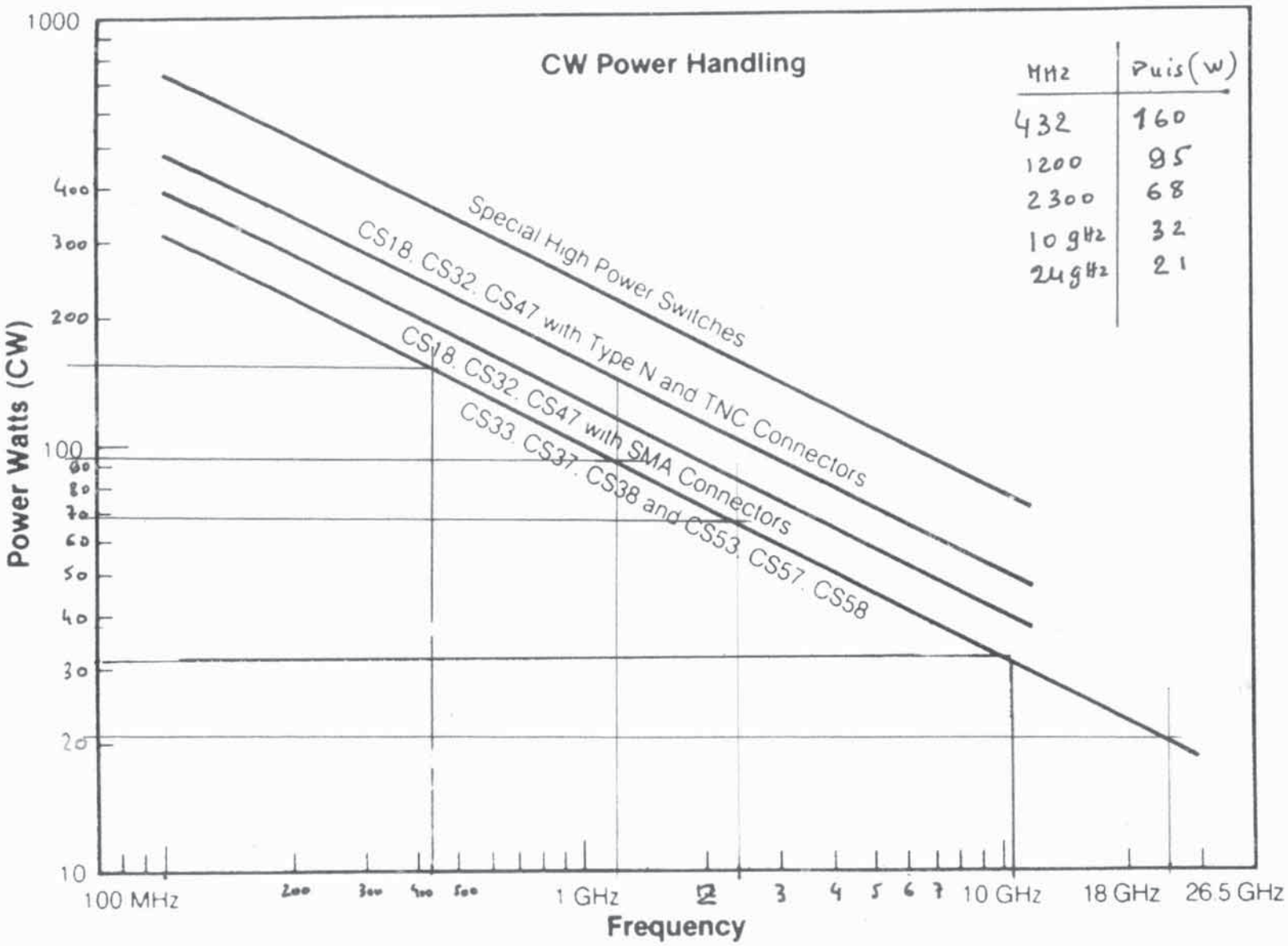


Position	Voltage	RF continuity
1	+1 & −C	IN & 1
2	+2 & −C	IN & 2

CS-33S6E



Position	Voltage	RF continuity	Indicator
1	+1 & −C	IN & 1	A & C
2	+2 & −C	IN & 2	B & C



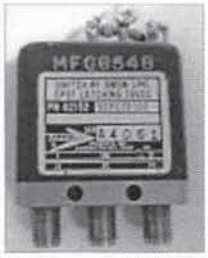
Notes:

1. This graph is based on the following reference conditions:
   A/ Ambient temperature 40°C
   B/ Sea Level operating

2. For applications calling for low pressure, high altitude or severe temperature requirements, the above power ratings would be derated. Please contact factory for specific

Transco 909C70100 Latching SPDT DC-18 GHz Switch
This type DO Latching SPDT Switch has RF geometry optimized for SMA connectors and operates over a 0-18 GHz frequency band. It is magnetically latched; no holding power is required to maintain a position.

Operates on 20 to 30 VDC.
Coil Resistance 310 Ohms min.
Current: 95 mA max @ 28 VDC and 20 deg. C
Switching time 20 milliseconds
RF Contacts are break-before-make
Impedance is 50 Ohms nominal



Dynatech/U-Z D3-413M30LL Specifications:

* Frequency Range: DC to 18.0 GHz

* VSWR, DC-3 GHz: 1.15:1

* VSWR, 3-8 GHz: 1.3:1

* VSWR, 8-12.4 GHz: 1.4:1

* VSWR, 12.4-18 GHz: 1.5:1

* Insertion Loss (Max), DC-3 GHz: 0.2 dB

* Insertion Loss (Max), 3-8 GHz: 0.3 dB

* Insertion Loss (Max), 8-12.4 GHz: 0.4 dB

* Insertion Loss (Max), 12.4-18 GHz: 0.5 dB

* Isolation (Min), DC-3 GHz: 80 dB

* Isolation (Min), 3-8 GHz: 70 dB

* Isolation (Min), 8-12.4 GHz: 60 dB

* Isolation (Min), 12.4-18 GHz: 60 dB

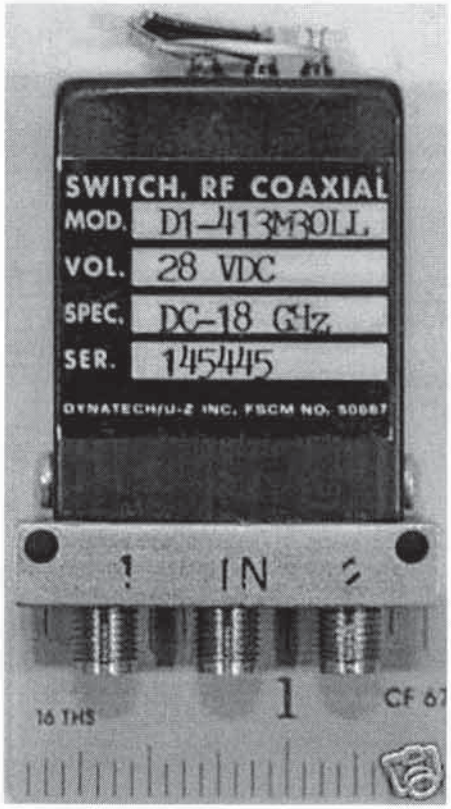
* Switching Time: 15 mS Maximum

* Actuating Voltage: 24-30 Vdc (28 Vdc nominal)

* Actuating Current: 140 mA Maximum at 28 Vdc and 72°

* Operating Mode: Failsafe with suppression diodes

- Special Option: Low Logic



Please wait
Image not available

SPDT Switch Picture | Transfer Switch Picture | SP6T Switch

We can now offer a wide array of electromechanical RF switches, from DC to 40 GHz. The table below shows some of our standard products. Custom products are also available. We can quote in accordance with other manufacturers' part numbers as well. If you don't see it on this page, please call or e-mail us for a rapid quotation.

Standard Electromechanical RF Switches

Model Number/ Configuration	Frequency Range (GHz)	Insertion Loss (dB max)	Isolation (dB min)	VSWR (max)	Current (mA max @ 28VDC)
S2-6 SPDT	.01-12.4	0.40	70	1.4	75
S2-8 SPDT	.01-18.0	0.50	60	1.5	75
S2-9 SPDT	.01-26.5	0.60	50	1.6	75
S22-6 Transfer	.01-12.4	0.40	70	1.4	125
S22-8 Transfer	.01-18.0	0.50	60	1.5	125
S22-9 Transfer	.01-26.5	0.60	50	1.6	125
S4-6 SP4T	.01-12.4	0.40	70	1.4	125
S4-8 SP4T	.01-18.0	0.50	60	1.5	125
S4-9 SP4T	.01-26.5	0.60	50	1.6	125
S6-6 SP6T	.01-12.4	0.40	70	1.4	125
S6-8 SP6T	.01-18.0	0.50	60	1.5	125
S6-9 SP6T	.01-26.5	0.60	50	1.6	125

We have a number of options available for our switches, including coil voltage, failsafe, latching, indicator, suppression diodes, etc. Please call or e-mail us with your exact requirement. We can also quote to a particular outline requirement.

Techlock Distributing

270 Regency Ridge, Ste 206
Dayton, OH 45459
Phone 513-434-5078
Fax 513-434-5079
VISA/Mastercard Accepted

Miniature Coaxial Switches

This RLC Electronics' Miniature Coaxial Switch is a single pole, two position type. The switch provides extremely high reliability, long life and excellent electrical performance characteristics over the frequency range of DC-65 GHz.

The miniature package utilizes high density packaging techniques, hence the overall volume of the switch is less than 3/4 cubic inch.

Specifications

S¹-2 MIN[2-3-4-5-6-7-8]

Switch Type	SINGLE POLE TWO POSITION										
Frequency Range	DC-18.0 GHz			26.5 GHz Opt	40.0GHz Option					50.0GHz Opt.	65.0GHz Opt.
Frequency (GHz)	DC-4.0	4.0-12.4	12.4-18.0	18-26.5	DC-6	6-12	12-18	18-26.5	26.5-40	40-50	50-65
Insertion Loss (Max dB)	0.1	0.2	0.3	0.5	0.2	0.4	0.5	0.7	0.9	1.1	1.1
VSWR (Max)	1.2:1	1.3:1	1.5:1	1.5:1	1.3:1	1.4:1	1.5:1	1.7:1	1.9:1	1.9	1.9
Isolation (Min)	80	70	60	60	70	60	60	55	50	50	50

Power Rating, RF Cold Switching: See page 5.
Impedance: 50 Ohms
Operating Power 25°C:
(Failsafe): 12Vdc at 250 ma nom.
28Vdc at 140 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 120 ma nom. 28 Vdc at 60 ma nom. 115 Vac at 43 ma nom. Current applied 10 ms min. cutthroat circuitry(standard), recovery time 100 ms nom.

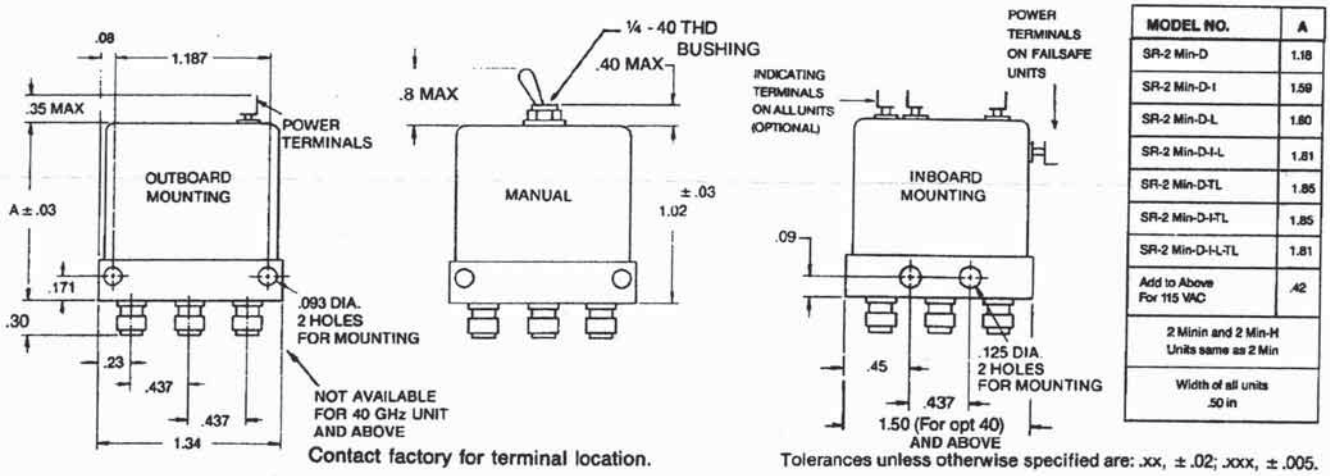
Connectors, RF: SMA Female (40 GHz - 2.92 mm) (50 GHz - 2.4 mm) (65 GHz - 1.85 mm)
Connectors, Power: Feed through solder lugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max.
Weight: 2 oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the switch desired use:

(1) "M" for Manual, "R" for Remote.
(2) "Min" for outboard mountings or "Minin" for inboard mountings.40 GHz is inboard only.
(3) "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
(4) "I" for indicators if desired.
(5) "L" for latching cutthroat if desired.
(6) "TL" for TTL Driver if desired
(7) "26" for 26.5 GHz option., "40" for 40 GHz option, "50" for 50 GHz option, "65" for 65 GHz option
(8) "Arc" for Arc Suppression diodes (N/A with TTL and Latching)

Example: SR-2 MIN-D is a remote, outboard mounting, 28 Vdc; Failsafe switch, for DC to 18 GHz use.

Outline Drawing



Contact factory for terminal location.

MODEL NO.	A
SR-2 Min-D	1.18
SR-2 Min-D-I	1.59
SR-2 Min-D-L	1.60
SR-2 Min-D-I-L	1.81
SR-2 Min-D-TL	1.85
SR-2 Min-D-I-TL	1.85
SR-2 Min-D-I-L-TL	1.81
Add to Above For 115 VAC	.42
2 Minin and 2 Min-H Units same as 2 Min	
Width of all units .50 in	

Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

RLC ELECTRONICS, INC.
83 Radio Circle, Mount Kisco, New York 10549 • Telephone: 914-241-1334 • Fax: 914-241-1753
e-mail: sales@rlcelectronics.com • www.rlcelectronics.com

TELEDYNE MICROWAVE

Ordering Information

All Teledyne Microwave products can be ordered by contacting an authorized factory representative or directly from Teledyne Microwave (415) 968-2211. Inventory stock is normally delivered within two weeks.

Custom Engineering

Microwave components and subsystems can be built to specification. Contact Teledyne Microwave Marketing with your requirements.

Terms

Net 30 days from date of invoice.

Shipping

All orders are FOB, Mountain View, CA and shipped via UPS surface unless otherwise specified.

Customer Service

1-800-832-6869 (Outside CA)
1-415-960-8613 (Inside CA)

Our dedicated Customer Service Department can be contacted for:

- Delivery status
- Order expediting
- Returns and repairs

Please contact Customer Service prior to returning any material.

Coaxial Switch Part Numbers

CS - 33 S 1 C - T (Example)

Switch (2 or 3 characters)

CR	Coaxial Switch – Reduced Height
CS	Coaxial Switch – Standard Height
CT	Internally Terminated Coaxial Switch
SA	Switch Attenuator
SM	Switch Matrix

Series Type (2 characters)

33	Miniature SPDT DC – 22.0 GHz Designate inboard mount (21 GHz Max) with the letter I (Example: CRI-33)
32	Standard SPDT DC – 12.4 GHz
53	Miniature SPDT DC – 26.5 GHz
35	Miniature DPDT DC – 18.0 GHz
37	Miniature Transfer DC – 18.0 GHz
47	Standard Transfer DC – 12.4 GHz
38	Miniature Multi-Throw DC – 18.0 GHz
18	Standard Multi-Throw DC – 12.4 GHz
58	Miniature Multi-Throw DC – 26.5 GHz
39	Latching Multi-Throw DC – 18.0 GHz

Connector Type

S	SMA Female	**B**	BNC Female	**6**	Mixed Connectors
N	N Female	**T**	TNC Female	**X**	SC Connectors

Actuator Voltage (1 character)

1	28 VDC Failsafe
2	115 VAC Failsafe
5	Special Voltage – Failsafe
6	28 VDC Latching
7	115 VAC Latching
9	Special Voltage – Latching

Actuator Type (1 or 2 characters)

O	No cutoff or indicators
C	Indicator contacts only
D	Self cutoff only
E	Self cutoff and indicators
3-8	Indicates no. of positions on Multi-throw Switches

Dash Number (1 or more characters)

	Number denotes special and additional customer requirements
T	TTL Driver
D	Decoders and TTL Driver

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TTL Switch Driver Option

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

VCC Input

The V_{cc} may or may not have to be connected to 5 volts as follows:

1. For a low current interface, connect V_{cc} to 5 volts. All units are provided with a 5 volt (V_{cc}) connection and internal pull up resistor (R1). With a 5 volt connection made, the logic input current drain is compatible with two low power Schottky TTL loads (40 μA, high current).
2. For a high current interface, the V_{cc} connection is optional. If a high level logic input current drive (450 μA @ 2.4 volts) is available, the 5 volt (V_{cc}) connection need not be made.

Multi-Throw

Teledyne Microwave has two options available for TTL compatible drivers on multi-throw switches:

T-Option

This option uses a circuit similar to the SPDT and Transfer circuit. There is one control input for each position.

D-Option

This option includes a decoder. The control input is a 3-bit parallel word that is decoded to internally select the appropriate position.

Performance Parameters vs Frequency

Generally speaking, the performance of coaxial switches degrades with increasing frequency i.e., the VSWR and insertion loss increase and the isolation decreases. All Teledyne Microwave data sheets specify these three parameters as "worst case" at the highest operating frequency, either 12.4 GHz or 18 GHz depending on the type of switch used. If the switch is used only over a band whose upper limit is limited, much better specifications can be achieved. Special applications such as this, should be called out so that better performance can be offered.

Actuator Current vs Temperature

Due to the fact that actuator coil resistance will vary as a function of temperature, there is a resultant inverse relationship between switch operating temperature and actuator drive current. For switches operating at 28 volts D.C., the approximate actuator drive current at temperature, T, can be calculated from the equation:

$$I_T = \frac{28}{\frac{28}{I_A}\,[1 + .00385\,(T - 20)]}$$

Where:

I_T = Actuator current at temperature T

I_A = Room temperature actuator current—see catalog specification page

T = Temperature of interest in degrees celsius

Truth Tables

SPDT Failsafe

Logic Input	RF Path	
1	IN to 1	IN to 2
	Normally Closed	Normally Open
0	On	Off
1	Off	On

SPDT Latching

Logic Input		RF Path	
1	2	IN to 1	IN to 2
0	0	No Change	
1	0	On	Off
0	1	Off	On
1	1	Forbidden	

Transfer Failsafe
CS-37S10-T or CS-47N10-T

Logic Input	RF Path			
1	1-2	3-4	1-3	2-4
0	On	On	Off	Off
1	Off	Off	On	On

Transfer Latching
CS-37S60-T or CS-47N60-T

Logic Input		RF Path			
1	2	1-2	3-4	1-3	2-4
0	0	No Change			
1	0	Off	Off	On	On
0	1	On	On	Off	Off
1	1	Forbidden			

Multithrow
CS-38S16-D

Logic Input			RF Position					
1	2	3	1	2	3	4	5	6
0	0	0	On	Off	Off	Off	Off	Off
1	0	0	Off	On	Off	Off	Off	Off
0	1	0	Off	Off	On	Off	Off	Off
1	1	0	Off	Off	Off	On	Off	Off
0	0	1	Off	Off	Off	Off	On	Off
1	0	1	Off	Off	Off	Off	Off	On

Pin C	Common
Pin J	Vsw +28 Vdc
Pin 4 & 5	Spares

Multithrow
CS-38S16-T

Logic Input						RF Position					
1	2	3	4	5	6	1	2	3	4	5	6
1	0	0	0	0	0	On	Off	Off	Off	Off	Off
0	1	0	0	0	0	Off	On	Off	Off	Off	Off
0	0	1	0	0	0	Off	Off	On	Off	Off	Off
0	0	0	1	0	0	Off	Off	Off	On	Off	Off
0	0	0	0	1	0	Off	Off	Off	Off	On	Off
0	0	0	0	0	1	Off	Off	Off	Off	Off	On

Pin C	Common
Pin J	Vsw +28 Vdc
Pin B	Vcc +5 Vdb
Pin 7,8,D,E,F	Spares

Applications

The transfer switch, whether it is adapted to coaxial or waveguide transmission lines is basically a modified double-pole-double-throw (DPDT) device. A true DPDT switch is a six port device that contains two completely independent transmission paths. In a transfer switch the two transmission paths are provided but are not totally independent as shown in Fig. 1.

Figure 1

The transfer switch has several interesting applications as follows:

Two Transmitters to Either of Two Antennas

Two microwave transmitters can be connected to either of two alternate antennas as shown in Fig. 2.

Figure 2

Circuit Insertion

A complete microwave circuit or circuit element can be inserted into a transmission line by using a transfer switch as shown in Fig. 3.

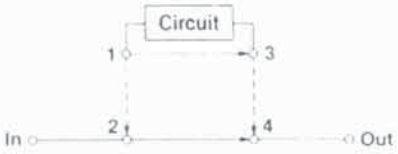
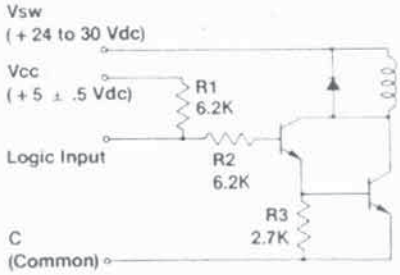


Figure 3

In the event that the 1-3 shorting of the microwave circuit is undesirable, this leg can be left out.

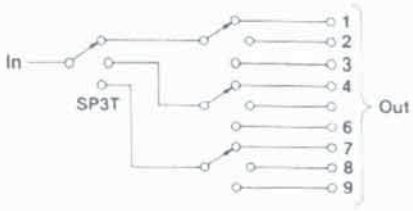
Basic Driver Schematic
SPDT and Transfer Switches



Failsafe uses 1 circuit
Latching uses 2 circuits
(Vsw, Vcc, & C are common to both circuits)

Series Application of Multi-Throw Switches

Many times requirements for greater than six position switches are encountered. Since it is difficult to design a high performance unit that has more than eight throws or positions, one solution is as shown:

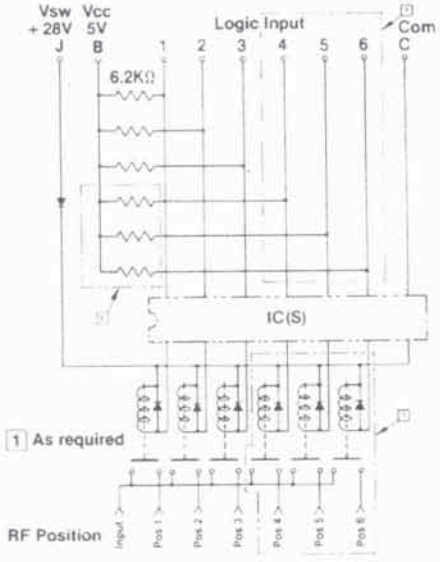


The example shows a single-pole-9-throw unit made up of 4 three-throw switches. The number of throws possible using this technique is essentially unlimited and is equal to the total number of throws available in the output stage. If a 2 stage unit were set up using 6 position switches, the resultant would be a total of 36 outputs or a SP36T switch bank.

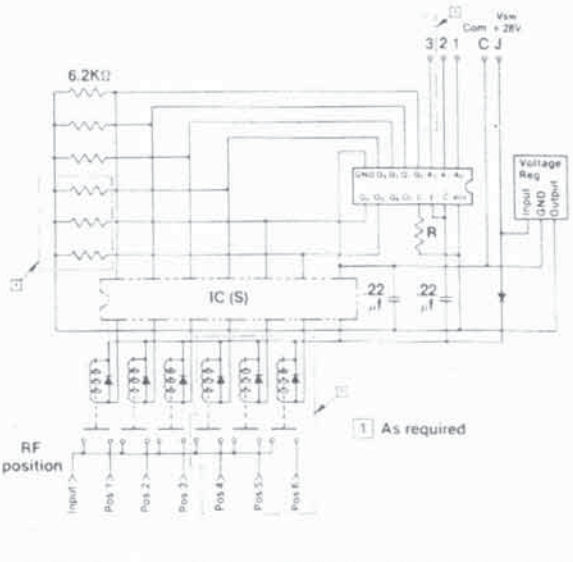
Magnetic Sensitivity

The switch can be sensitive to ferrous materials or external magnetic fields. Neighboring ferrous materials should be no closer than 0.5 inches and external magnetic field should have a flux density less than 5 gauss.

Basic T Schematic



Basic D Schematic



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Glossary of Switching Terms

Failsafe

A switch with an actuator that contains a spring return mechanism that provides RF connection to one selected position when no voltage is applied to the power terminals. This type of switch requires continuous voltage to maintain RF connection to any other position. For multi-position switches, the no voltage condition is all RF connections open.

Latching

A switch with an actuator that contains a mechanism, either mechanical or magnetic, that will maintain a chosen RF contact path whether or not voltage is maintained after switching is accomplished.

Self-Deenergizing/Self-Cutoff

Applies to latching switches only. A switch that has the ability to disconnect the actuator drive circuit so that D.C. current will not be consumed after switching has been accomplished. Self-cutoff can be accomplished either by using mechanical contacts or IC drive circuits.

Indicator Contacts

A set of internally mounted D.C. contacts that are mechanically connected to the actuator and transfer in one-to-one correspondence with the RF contacts. These contacts are usually wired to indicator lights to remotely show switch position, but in many cases, can also be used as interlock contacts. Indicator contact rating (max.) is 30 VDC, 50 mA, or 1.5 watts resistive load.

Switching Time

The total amount of time between application of voltage to the actuator terminals and completion of switching including all contact bounce, if any. Total switching time is made up of three parts, namely (1) inductive delay in the actuator coil, (2) transfer time of the RF contacts, and (3) bounce time of the RF contacts.

Actuator

The electromechanical mechanism that transfers the RF contacts from one position to another. Most Teledyne Microwave actuators use either linear or rotary solenoids acting on mechanical linkage to the RF contacts.

SPDT Switch

Single-Pole-Double-Throw. A switch with one input and two output ports.

Multi-Throw Switch

A switch with one input and more than two outputs. Standard Teledyne Microwave switches (CS-38, CS-58, CS-18 and CS-39) provide up to 8 outputs operating from a single input.

Transfer Switch

A four-port switch that provides two independent pairs of RF paths through it. These pairs are actuated simultaneously, such actuation being similar to that of a double-pole-double-throw switch. See application notes as to typical usage.

Isolation

The measure of the power level at the output connector of an unconnected RF channel as referenced to the power at the input connector. Specified in dB below input power level.

Internal Termination

Applies to SPDT and Multi-Throw switches. An unselected input or output port will be connected to an internal 50 ohm termination. Switches without internal termination will open circuit the unselected ports and the VSWR will be infinite.

Attenuator Switch

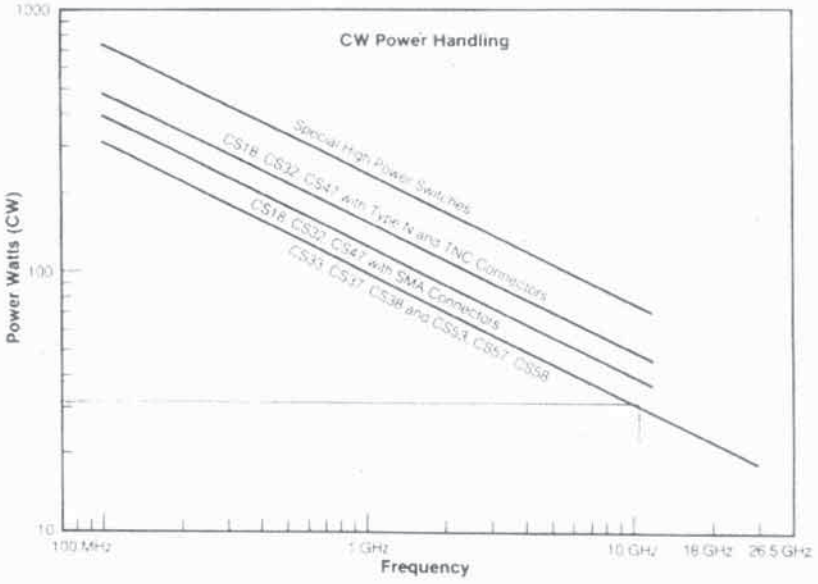
A two state switch that has a low loss and a high loss state. The low loss state insertion loss is typically 0.5 dB or less. The high loss state is precision level of attenuation such as 10, 20, 30 dB.

Arc Suppression Diode

A diode connected in parallel with the coil. The diode will clip the back emf spike to 0.7 volts when the coil is de-energized. The diode cathode is connected to the positive side of the coil and the diode anode is connected to the negative side.

Date Code

Either serial numbers or date codes are marked on the switches. The date code is in accordance with MIL-STD-1285A and consists of four digits. The first two digits are the year, and the last two digits are the week of that year (YYWW). Thus, 8604 will be switches which went through final inspection during the fourth week of 1986.



Power Handling Capability (watts cw)

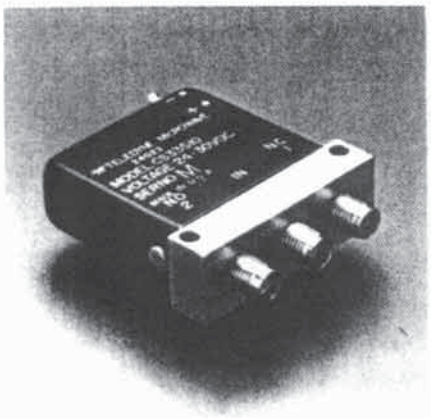
There are several factors which determine the power handling capability of a given switch design. The following graph, however, may be used as a baseline for selecting an appropriate switch model.

Notes:

1. This graph is based on the following reference conditions:
   - A/ Ambient temperature 40°C
   - B/ Sea Level operating
   - C/ 1.2 VSWR load
   - D/ Non Switching

2. For applications calling for low pressure, high altitude or severe temperature requirements, the above power ratings would be derated. Please contact factory for specific information.

Failsafe DC-22 GHz Miniature SPDT Switches



CS-33S10

CS-33 Series

DC-22 GHz*
SMA Connectors

Description

The Type CS-33 Failsafe Switch is a broadband SPDT electro-mechanical switch designed to switch microwave signals from a common input to either of two outputs. Designed for 50 ohm transmission lines, the unit is set up for minimum size compatible with SMA connector spacing. Two different mounting hole configurations are offered: standard and optional inboard mounting.

The failsafe switches on this page are provided with a spring operated actuator which is particularly desirable in applications where the switch is connected to one position (normally closed) most of the time and only periodically is switched to the alternate position. In this type of application, holding power is required only when operating in the alternate position. Also, switching circuitry is simplified, since only one d-c circuit is required.

Specifications

RF Contacts:
Break before make

Actuator Voltage:
24-30 VDC, 12, 15, 20 VDC, and 115 VAC on special order

Actuator Current:
80 mA @ 28 VDC and 20°C

Switching Time:
20 msec

Weight:
1.65 oz. max.

Temperature Range:
– 54°C to + 85°C

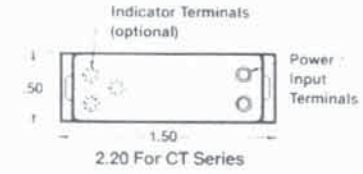
Life:
1 million cycles

RF Power Handling:
See graph in front of brochure

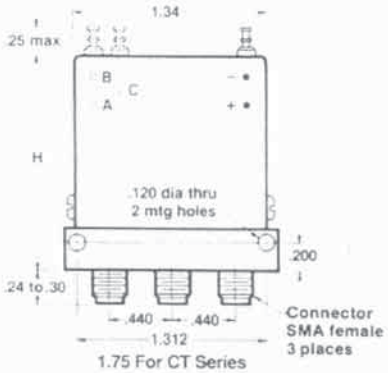
Optional Features

- Indicator Circuits
- Special Actuator Voltages
- TTL Compatible Drivers
- Arc Suppression Diodes
- Power Connectors
- Inboard Mounting

Outboard Mounting



2.20 For CT Series



1.75 For CT Series

H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

RF Performance

Frequency	DC–6 GHz	6–12 GHz	12–18 GHz	18–22 GHz*
VSWR (maximum)	1.25:1	1.40:1	1.50:1	1.70:1
Insertion Loss (maximum)	0.2 dB	0.4 dB	0.5 dB	0.8 dB
Isolation (minimum)	70 dB	60 dB	60 dB	50 dB

* Outboard Mounts To 22 GHz
Inboard Mounts To 21 GHz

Rev 9 • 12/90

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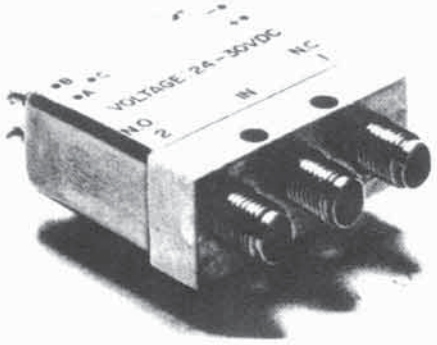
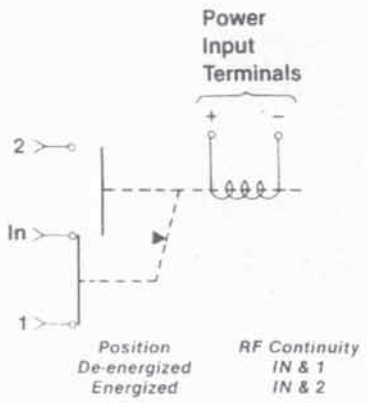
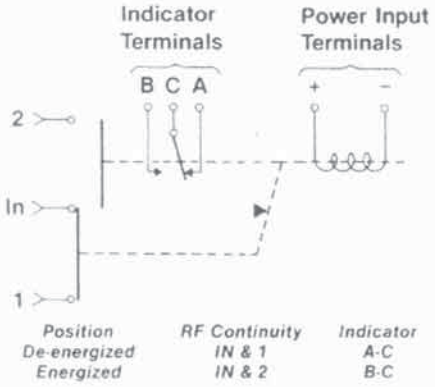


CR33S1C-99

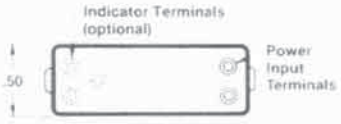
CS-33S10

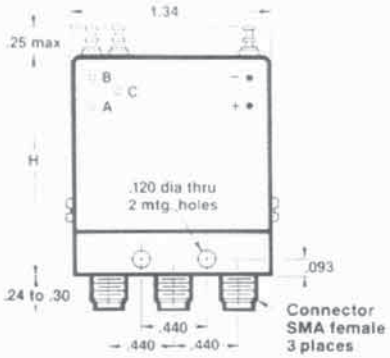


CS-33S1C



Inboard Mounting





H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

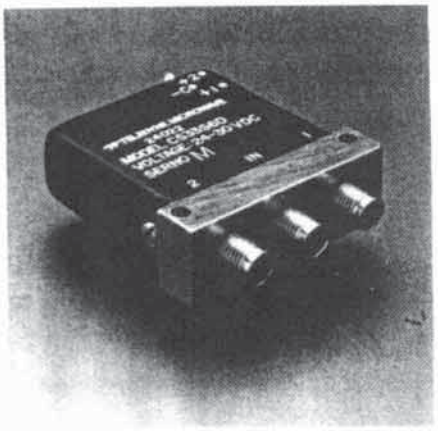
Part Number Table

All units have SMA-Female connectors

For TTL Drivers add -T to Part No.

Actuator Type	Without Indicators	With Indicators
Failsafe	CS-33S10	CS-33S1C

Latching DC-22 GHz Miniature SPDT Switches



CS-33S60

CS-33 Series

DC-22 GHz*

SMA Connectors

Description

The Type CS-33 Latching Switch is a broadband SPDT electro-mechanical switch designed to switch microwave signals from a common input to either of two outputs. Designed for 50 ohm transmission lines, the unit is set up for minimum size compatible with SMA connector spacing.

The switches on this page are provided with a magnetic latching actuator which is particularly desirable in applications where actuator power consumption must be kept to an absolute minimum. The latching type actuator requires less switching current than the failsafe type. In the self-cutoff version, power is applied only for the very short duration (approximately 50 msec. max.) of the actuator transfer from one position to the other. This makes this type of actuator especially suitable for space vehicles or portable battery operated systems.

Specifications

RF Contacts:
Break before make

Actuator Voltage:
24–30 VDC, 12, 15, 20 VDC, and 115 VAC on special order

Actuator Current:
60 mA @ 28 VDC and 20°C

Switching Time:
10 msec.

Weight:
1.65 oz.

Temperature Range:
– 54°C to + 85°C

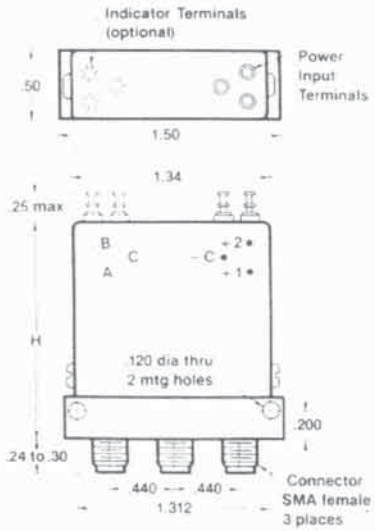
Life:
1 million cycles

RF Power Handling:
See graph in front of brochure

Optional Features

- Indicator Circuits
- Special Actuator Voltages
- TTL Compatible Drivers
- Arc Suppression Diodes
- Power Connectors
- Inboard Mounting

Outboard Mounting



H = 1.20 max CR Model
options may add
height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

RF Performance

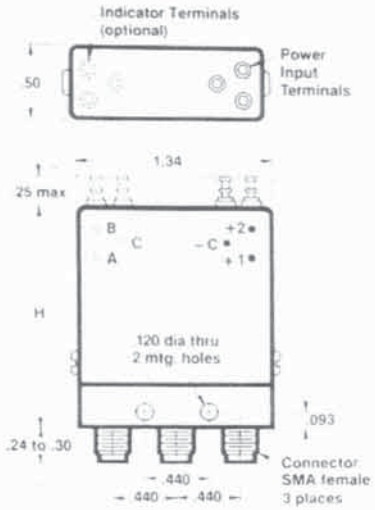
Frequency	DC–6 GHz	6–12 GHz	12–18 GHz	18–22 GHz*
VSWR (maximum)	1.25:1	1.40:1	1.50:1	1.70:1
Insertion Loss (maximum)	0.2 dB	0.4 dB	0.5 dB	0.8 dB
Isolation (minimum)	70 dB	60 dB	60 dB	50 dB

* Outboard Mounts To 22 GHz
Inboard Mounts To 21 GHz

Rev.9 • 12/90

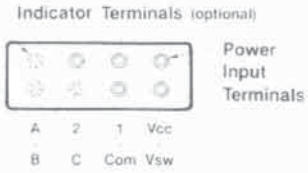
TELEDYNE MICROWAVE • 1290 Terra Bella Ave. • Mountain View, CA 94043 • 415-968-2211 • FAX 415-966-1521

Inboard Mounting



H = 1.20 max CR Model options may add height. Consult factory
H = 1.55 max STD Model
H = 2.10 max TTL Model

TTL Option



Part Number Table

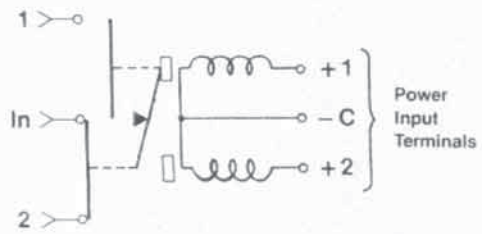
All units have SMA-Female connectors

For TTL Drivers add -T to Part No.

Actuator Type	Without Indicators	With Indicators
Latching without Self-Cutoff	CS-33S60	CS-33S6C
Latching with Self-Cutoff	CS-33S6D	CS-33S6E

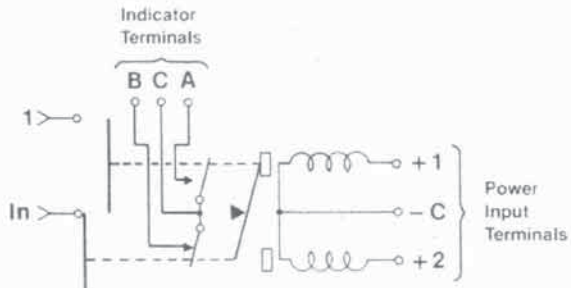
For Models CS-33S60 and CS-33S6C power is applied in a pulse form of sufficient duration (20 msec. min.) to cause switching. For Models CS-33S6D and CS-33S6 steady voltage may be applied continuously, but switch only draws current during the actual switching cycle.

CS-33S60



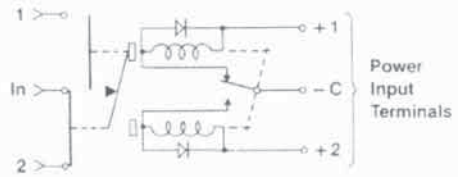
Position	Voltage	RF continuity
1	+1 & -C	IN & 1
2	+2 & -C	IN & 2

CS-33S6C



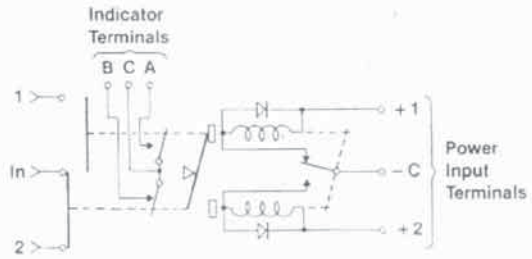
Position	Voltage	RF continuity	Indicator
1	+1 & -C	IN & 1	A & C
2	+2 & -C	IN & 2	B & C

CS-33S6D

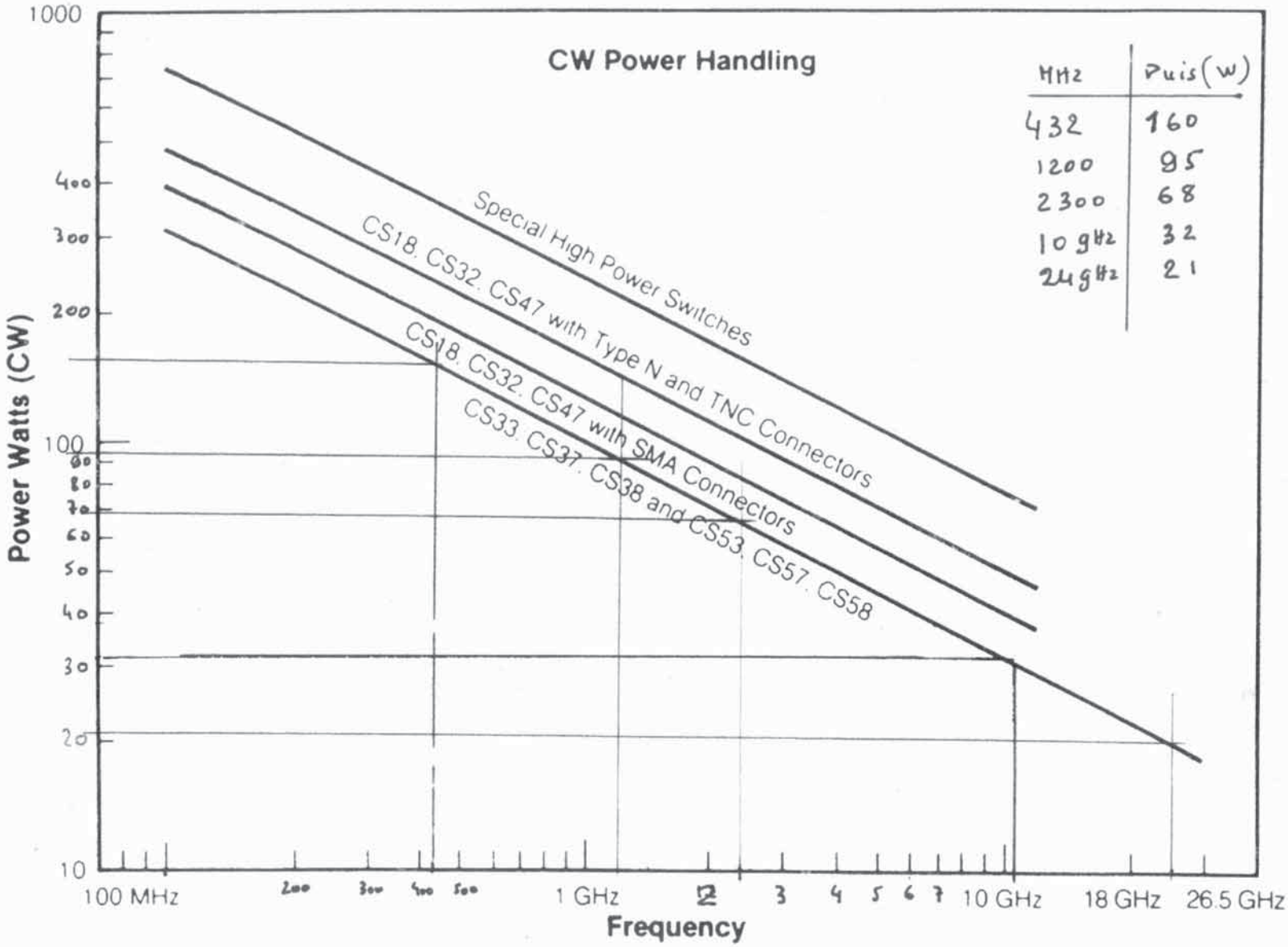


Position	Voltage	RF continuity
1	+1 & -C	IN & 1
2	+2 & -C	IN & 2

CS-33S6E



Position	Voltage	RF continuity	Indicator
1	+1 & -C	IN & 1	A & C
2	+2 & -C	IN & 2	B & C



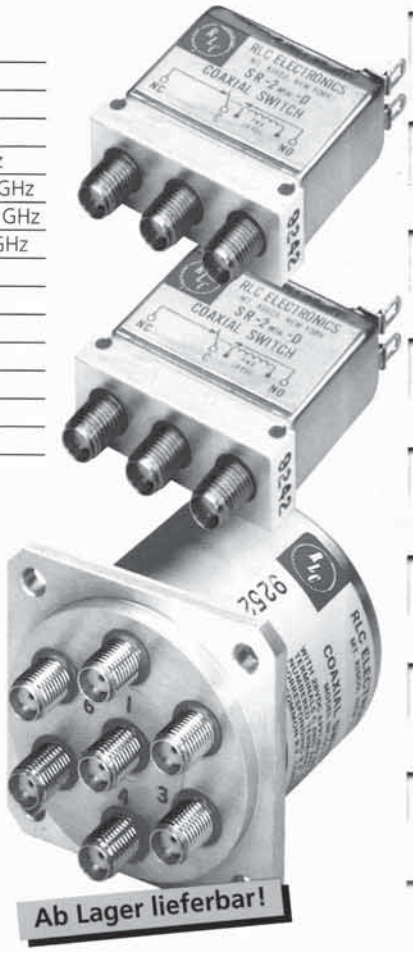
Notes:

1. This graph is based on the following reference conditions:
   A/ Ambient temperature 40°C
   B/ Sea Level operating

2. For applications calling for low pressure, high altitude or severe temperature requirements, the above power ratings would be derated. Please contact factory for specific

2-weg-Relais (SPDT)

Modell	SR-2MIN-D	SR-2MIN-H	STR-2-D	SR-2-N-D	SR-2-N-H
Konfiguration	2-weg	2-weg	2-weg m. Termin.	2-weg	2-weg
Schalterart	failsafe	failsafe	failsafe	failsafe	failsafe
Frequenzbereich	DC–18 GHz	DC–18 GHz	DC–18 GHz	DC–12,4 GHz	DC–12,4 GHz
Isolation	60 dB / 18 GHz	60 dB / 18 GHz	60 dB / 18 GHz	60 dB / 12,4 GHz	60 dB / 12,4 GHz
Einfügungsdämp.	0,3 dB / 18 GHz	0,3 dB / 18 GHz	0,3 dB / 18 GHz	0,6 dB / 12,4 GHz	0,6 dB / 12,4 GHz
VSWR	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,6:1 / 12,4 GHz	1,6:1 / 12,4 GHz
Impedanz	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω
HF-Belastbarkeit*	150 W CW	150 W CW	2 W CW	350 W CW	350 W CW
HF-Anschlüsse	SMA weibl.	SMA weibl.	SMA weibl.	N weibl.	N weibl.
Steuerspannung	28 V DC	12 V DC	28 V DC	28 V DC	12 V DC
Artikel-Nr.	27/10	27/11	27/3	27/281	27/191
Stückpreis (D) **	US$ 112,00	US$ 112,00	DM 675,00	DM 319,00	DM 319,00
Stückpreis (CH) ***	US$ 129,00	US$ 129,00	CHF 641,50	CHF 303,50	CHF 303,50



Mehrwege- und Transferrelais

Modell	SR-6C-D	SR-6C-H	SR-T-N-D	SR-T-N-H
Konfiguration	6-weg (SP6T)	6-weg (SP6T)	Transfer (DPDT)	Transfer (DPDT)
Schalterart	failsafe	failsafe	failsafe	failsafe
Frequenzbereich	DC–18 GHz	DC–18 GHz	DC–12,4 GHz	DC–12,4 GHz
Isolation	60 dB / 18 GHz	60 dB / 18 GHz	55 dB / 12,4 GHz	55 dB / 12,4 GHz
Einfügungsdämp.	0,5 dB / 18 GHz	0,5 dB / 18 GHz	0,6 dB / 12,4 GHz	0,6 dB / 12,4 GHz
VSWR	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,6:1 / 12,4 GHz	1,6 / 12,4 GHz
Impedanz	50 Ω	50 Ω	50 Ω	50 Ω
HF-Belastbarkeit*	150 W CW	150 W CW	350 W CW	350 W CW
HF-Anschlüsse	SMA weiblich	SMA weiblich	N weiblich	N weiblich
Steuerspannung	28 V DC	12 V DC	28 V DC	12 V DC
Artikel-Nr.	27/6	27/18	27/289	27/421
Stückpreis (D) **	US$ 364,00	US$ 364,00	US$ 539,00	DM 655,00
Stückpreis (CH) ***	US$ 419,00	US$ 419,00	US$ 620,00	CHF 622,50

* Bei 1 GHz, leistungslos geschaltet (+25 °C, bei Seehöhe, an 50 Ω)
** Ab Donauwörth, Preise solange Vorrat reicht, zzgl. gesetzl. MWSt., bei 1–9 Stück, unverpackt
*** Ab Ellighausen, Preise solange Vorrat reicht, zzgl. gesetzl. MWSt., bei 1–9 Stück, verpackt

= neue Modelle

Hotline 09 06/7 06 93-55 Kennziffer 1308

www.telemeter.de/go/RLC

50-W-Leistungsverstärker 1800-2200 MHz

Das Verstärkermodell RF18002200-50 liefert über einen Frequenzbereich von 1800–2200 MHz eine HF-Ausgangsleistung von 50 W und ist damit besonders für Anwendungen im Bereich des Mobilfunks geeignet. Typische Anwendungen sind z. B. Prüffeld oder Qualitätssicherung.
Der Verstärker ist mit einem 230-V-Netzteil ausgerüstet und in einem 19"-Einschub untergebracht. Das Gehäuse beinhaltet neben der notwendigen Kühleinrichtung auch diverse Schutzschaltungen, die einen sicheren und störungsfreien Betrieb gewährleisten.
Neben den ansprechenden Eigenschaften überrascht auch der äußerst günstige Preis dieser Leistungsverstärker.

Frequenzbereich	1800–2200 MHz
HF-Ausgangsleistung	50 W CW
Impedanz	50 Ω
Verstärkung	43 dB min.
Klasse	A
HF-Anschlüsse	N weibl.
Max. Last-VSWR	5 : 1
Kühlung	Lüfter
Versorgung	230 V AC, 50 Hz
Abmessungen	19" x 4 HE x 460 mm
CE-Zeichen	ja
Artikel-Nr.	111/319

Weitere Informationen erhalten Sie unter entsprechender Hotline oder Kennziffer.

Hotline 09 06/7 06 93-55 Kennziffer 1309

VSWR-Messung leicht gemacht

- Frequenzbereich 20–2700 MHz
- Selektive VSWR-Messung
- Problemlose Bandbreitenermittlung bei Antennen
- Eingebauter, durchstimmbarer HF-Generator
- Einfache Handhabung
- Netzunabhängig
- Ideal für Installation und Wartung beliebiger Funkanlagen
- Schnelle Messung von Antennen „aus der Hand"

Immer häufiger besteht bei Wartung und Installation von Funkantennen der Bedarf, das Stehwellenverhältnis zu überprüfen und zu vermessen. Diesem Wunsch trägt das neue VSWR-Messgerät Rechnung.

Modell SWR ONE	Artikel-Nr. 617/1

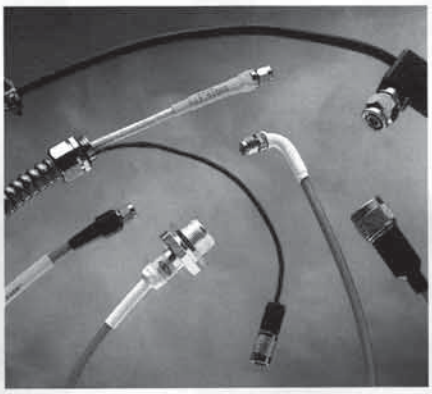
Hotline 09 06/7 06 93-55 Kennziffer 1313

Systeme zur Geschwindigkeitsmessung

Zur Geschwindigkeitsmessung im Bereich von 2 bis 350 km/h fertigt die Firma Avitronics kundenspezifische Dopplerbaugruppen mit Antenne im ISM-Frequenzbereich bei 24,125 sowie im Frequenzbereich bei 18 GHz.
Die Sensoren können beispielsweise für einen variablen Abstand der Boden-Messeinrichtung bis 50 cm gefertigt werden und einen Messfehler von < 2% aufweisen. Literatur hierüber ist leider nicht verfügbar, da ausnahmslos Systeme nach Kundenvorgaben realisiert werden. (Bitte Spezifikationen zusenden).
Übrigens – Ausführungen nach Kundenwunsch sind unsere Spezialität!

Hotline 09 06/7 06 93-55 Kennziffer 1310

Neue dämpfungsarme Mikrowellenkabel bis 40 GHz



Um Ihnen die Auswahl des Kabels zu erleichtern, haben wir die Eigenschaften der verschiedenen konfektionierten Mikrowellenkoaxialkabel zusammengefasst.

Hotline 09 06/7 06 93-55 Kennziffer 1311

AXOWAVE®	3S	4H	5C
Elektrische Eigenschaften			
Charakteristischer Widerstand (Ω)	50 ±1	50 ±1	50 ±1
Nutzfrequenz (GHz)	0–18	0–40	0–26,5
Grenzfrequenz (GHz)	42	42	29
Nennkapazität (pF/m)	87	85	87
Signalfortpflanzungsgeschwindigkeit (%)	76	76	76
Dämpfungsverluste (dB) (1 m langes konfekt. Kabel – bei max. Frequenz)	2,10	2,95	2,10
Max. Stehwellenverhältnis (VSWR) (in der Frequenzbreite) (Für Kabellängen >10 m, bitte anfragen.)	1,25 gerade SMA-Stecker	1,35 K-kompatible Stecker	1,25 vo 1,35 vo gerade
Schirmdämpfung (dB) bei 1 GHz	<-100	<-100	<-110
Physikalische und mechanische Eigenschaften			
Kabelaußendurchmesser (mm)	3,7	4,1	5,3
Min. Biegeradius, Festverlegung (mm)	20	20	25
Min. Biegeradius, dynamischer Einsatz (mm)	40	50	50
Außenmantelmaterial	FEP	FEP	FEP

* Richtwert

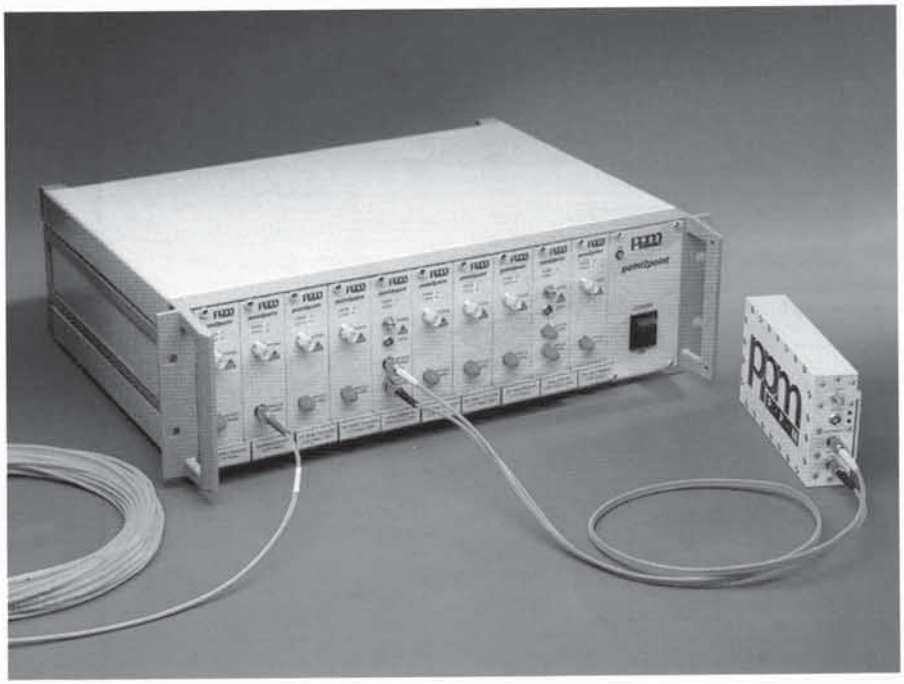
Erweiterte Point2point-Fibre-Optik-Link-Systeme

Dieses neue point2point-Fibre-Optik-Link-System ist ein modular aufgebautes optisches Übertragungssystem für Analog- und Datensignale auf LWL-Basis.
Ein typisches point2point-System besteht aus einem Sender, der über ein Glasfaserkabel mit einem Empfänger verbunden ist. Der Sender wandelt das am Eingang anliegende elektrische Signal in ein optisches, welches über ein Lichtwellenleiter-Kabel an den Empfänger übertragen wird. Im Empfänger wird das optische Signal wieder in ein elektrisches Signal umgewandelt.
Sender und Empfänger werden als einzelne Module, als abgeschirmte Module oder als Kassetten-Module für den Einbau in einen 19"-Überrahmen angeboten.
Viele Übertragungssysteme können mit einer RS232-Schnittstelle bestellt werden. Diese Option ermöglicht dem Anwender über die optische LWL-Strecke RS232-Daten zu senden, um damit auch andere Mess- und Testeinrichtungen zu steuern und/oder zu überwachen.

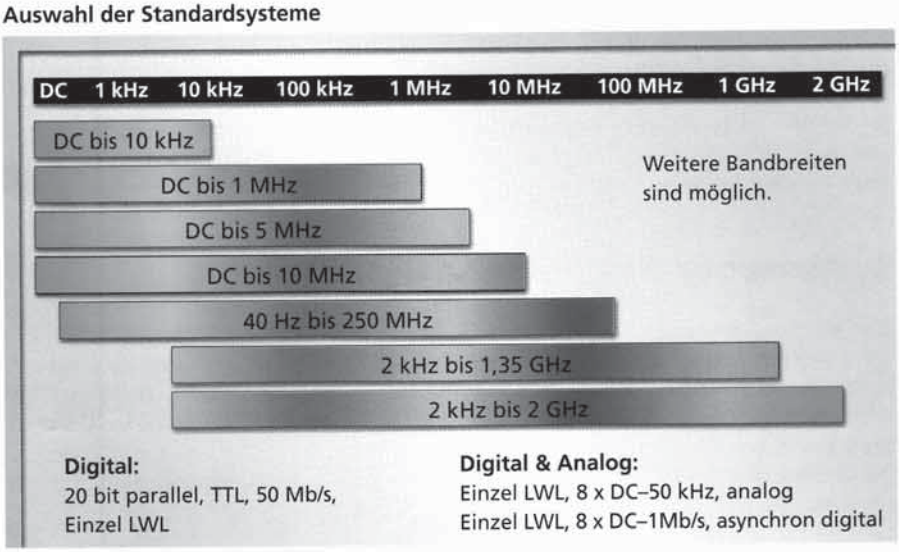
Anwendungen:

- Fernbedienung von Antennen und Positionierern
- Messung hoher Impulsleistungen in der HF- und Mikrowellentechnik
- Signalübertragung aus Räumen oder in Räume mit starken elektromagnetischen Störfeldern (EMV-Messtechnik).
- Übertragung breitbandiger Videosignale aus Räumen mit hohen elektromagnetischen Feldern (EMV-Messtechnik).
- Gefahrlose Signalübertragung aus Räumen oder in Räume mit hohen elektrischen Spannungen.
- Serielle oder parallele Übertragung digitaler Daten mit hoher Geschwindigkeit.

Hotline 09 06/7 06 93-55 Kennziffer 1312



Auswahl der Standardsysteme



Tel. (09 06) 7 06 93-0, Fax (09 06) 7 06 93-50 Tel. (0 71) 6 99 20 20, Fax (0 71) 6 99 20 24

Type C Multi-Position Coaxial Switches (3 to 6 Position)

This RLC Electronics' Basic Mid-Size Multi-Position Coaxial Switch line provides up to 6 positions with extremely high reliability, long life and outstanding electrical performance. It features extremely low insertion loss and VSWR over the entire frequency range, while maintaining high isolation.

Specifications

$S^{1-2}\ C^{-3-4-5-6-7}$

RF Positions	3-6	3-6	3 to 6 for OPTION 40	
Switch Type:	SP-3T...6T	SP-3T...6T	SP-3T-40	SP-6T-40
Frequency Range:(GHz)	DC-18	DC-26.5	DC-40	
Insertion Loss (Max dB)			Ins. Loss: (dB Max)	
DC-4.0 GHz	0.20	0.20	DC-6.0	0.25
4.0-12.4 GHz	0.30	0.30	6.0-12	0.40
12.4-18 GHz	0.50	0.50	12-18.5	0.50
18-26.5 GHz (option 26)	–	0.75	18.5-26.5	0.75
			26.5-40	0.90
VSWR (Max)			VSWR: (Max)	
DC-4 GHz	1.25	1.25	DC-6.0	1.30
4.0-12.4 GHz	1.40	1.40	6.0-12	1.40
12.4-18 GHz	1.50	1.50	12-18.5	1.50
18-26.5 GHz (option 26)	–	1.80	18.5-26.5	1.70
			26.5-40	2.00
Isolation (dB Min)			Insolation: (dB Min)	
			DC-18.5	60
DC-18 GHz	60	60	18.5-26.5	55
18-26.5 GHz (option 26)	–	40	26.5-40	45

Power Rating, RF Cold Switching: See page 5.
Impedance: 50 Ohms
Operating Power 25°C:
(Failsafe): 12Vdc at 400 ma nom.
28Vdc at 150 ma nom. 115 Vac at 50 ma nom.
(Latching): 12 Vdc at 462 ma nom.
28 Vdc at 400 ma nom. 115 Vac at 225 ma nom.
Cutthroat circuitry (standard), recovery time 100ms nom.

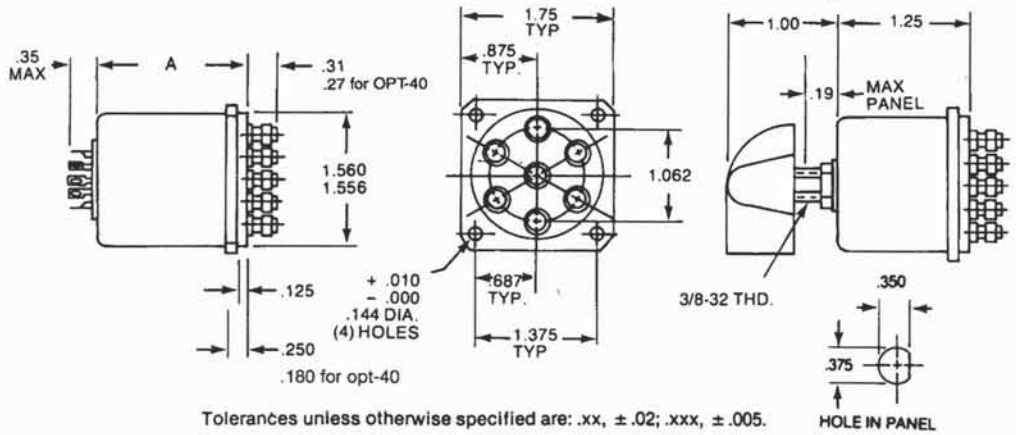
Connectors, RF: SMA Female (40 GHz 2.92 mm)
Connectors, Power: Feed through solderlugs.
Life: 1,000,000 operations.
Switching Time: 15 mS Max. Failsafe 125mS latching
Weight: 10oz.
Environmental Conditions: MIL-S-3928
Operating Mode: Manual, failsafe or latching.
Switching Sequence: Break before make.

To designate the switch desired use:

(1) "M" for Manual, "R" for Remote.
(2) "3C", "4C", "5C" or "6C" throw operation
(3) "A" for 115 Vac, "D" for 28 Vdc or "H" for 12 Vdc.
(4) "I" for indicators if desired.
(5) "L" for latching cutthroat if desired
(6) "TL" for TTL Driver if desired
(7) "26" for the 26.5GHz option "40" for the 40GHz option

Example: SR-6C-D-I-L is a remote, 6 position, 28 Vdc; with indicators, latching cutthroat switch.

Outline Drawing



Tolerances unless otherwise specified are: .xx, ± .02; .xxx, ± .005.

MODEL NO.	A
SR-•C-D	1.58
SR-• C-D-I	2.25
SR-• C-D-L	3.73
SR-• C-D-I-L	4.00
SR-• C-D-TL	2.25
SR-• C-D-I-TL	2.25
SR-• C-D-L-TL	4.40
SR-• C-D-I-L-TL	4.40
SR-• C-H same as SR-• C-D	

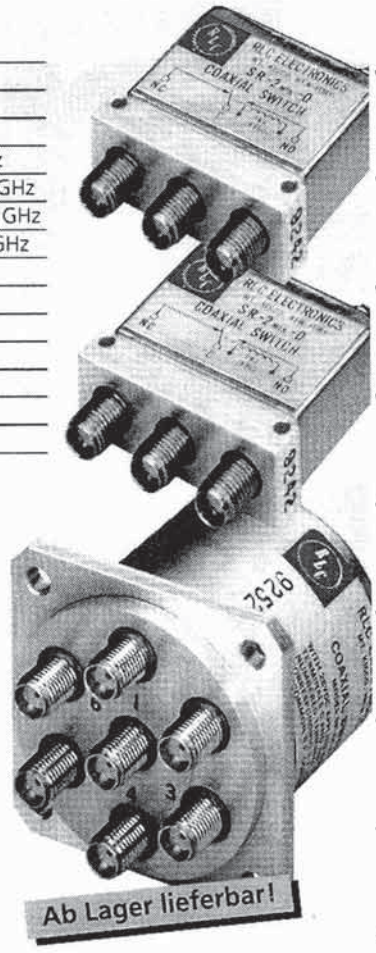
RLC ELECTRONICS, INC.
83 Radio Circle, Mount Kisco, New York 10549 • Telephone: 914-241-1334 • Fax: 914-241-1753
e-mail: sales@rlcelectronics.com • www.rlcelectronics.com

2-weg-Relais (SPDT)

Modell	SR-2MIN-D	SR-2MIN-H	STR-2-D	SR-2-N-D	SR-2-N-H
Konfiguration	2-weg	2-weg	2-weg m. Termin.	2-weg	2-weg
Schalterart	failsafe	failsafe	failsafe	failsafe	failsafe
Frequenzbereich	DC–18 GHz	DC–18 GHz	DC–18 GHz	DC–12,4 GHz	DC–12,4 GHz
Isolation	60 dB / 18 GHz	60 dB / 18 GHz	60 dB / 18 GHz	60 dB / 12,4 GHz	60 dB / 12,4 GHz
Einfügungsdämp.	0,3 dB / 18 GHz	0,3 dB / 18 GHz	0,3 dB / 18 GHz	0,6 dB / 12,4 GHz	0,6 dB / 12,4 GHz
VSWR	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,6:1 / 12,4 GHz	1,6:1 / 12,4 GHz
Impedanz	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω
HF-Belastbarkeit*	150 W CW	150 W CW	2 W CW	350 W CW	350 W CW
HF-Anschlüsse	SMA weibl.	SMA weibl.	SMA weibl.	N weibl.	N weibl.
Steuerspannung	28 V DC	12 V DC	28 V DC	28 V DC	12 V DC
Artikel-Nr.	27/10	27/11	27/3	27/281	27/191
Stückpreis (D) **	US$ 112,00	US$ 112,00	DM 675,00	DM 319,00	DM 319,00
Stückpreis (CH) ***	US$ 129,00	US$ 129,00	CHF 641,50	CHF 303,50	CHF 303,50

Mehrwege- und Transferrelais

Modell	SR-6C-D	SR-6C-H	SR-T-N-D	SR-T-N-H
Konfiguration	6-weg (SP6T)	6-weg (SP6T)	Transfer (DPDT)	Transfer (DPDT)
Schalterart	failsafe	failsafe	failsafe	failsafe
Frequenzbereich	DC–18 GHz	DC–18 GHz	DC–12,4 GHz	DC–12,4 GHz
Isolation	60 dB / 18 GHz	60 dB / 18 GHz	55 dB / 12,4 GHz	55 dB / 12,4 GHz
Einfügungsdämp.	0,5 dB / 18 GHz	0,5 dB / 18 GHz	0,6 dB / 12,4 GHz	0,6 dB / 12,4 GHz
VSWR	1,5:1 / 18 GHz	1,5:1 / 18 GHz	1,6:1 / 12,4 GHz	1,6 / 12,4 GHz
Impedanz	50 Ω	50 Ω	50 Ω	50 Ω
HF-Belastbarkeit*	150 W CW	150 W CW	350 W CW	350 W CW
HF-Anschlüsse	SMA weiblich	SMA weiblich	N weiblich	N weiblich
Steuerspannung	28 V DC	12 V DC	28 V DC	12 V DC
Artikel-Nr.	27/6	27/18	27/289	27/421
Stückpreis (D) **	US$ 364,00	US$ 364,00	US$ 539,00	DM 655,00
Stückpreis (CH) ***	US$ 419,00	US$ 419,00	US$ 620,00	CHF 622,50



* Bei 1 GHz, leistungslos geschaltet (+25 °C, bei Seehöhe, an 50 Ω)
** Ab Donauwörth, Preise solange Vorrat reicht, zzgl. gesetzl. MWSt., bei 1–9 Stück, unverpackt
*** Ab Ellighausen, Preise solange Vorrat reicht, zzgl. gesetzl. MWSt., bei 1–9 Stück, verpackt

= neue Modelle

Hotline 09 06/7 06 93-55 Kennziffer 1308

www.telemeter.de/go/RLC

TYPE D3: SPDT up to 22 GHz

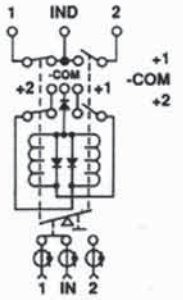
Standard Connectors:
SMA

Specifications:

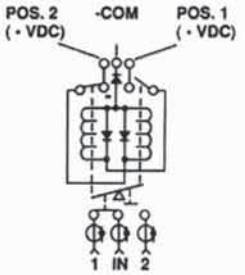
Operating Frequency	DC-3GHz	3-8GHz	8-12.4GHz	12.4-18GHz	18-22GHz
V.S.W.R. (maximum)	1.15:1	1.3:1	1.4:1	1.5:1	1.6:1
Insertion loss (max.)	0.2 dB	0.3 dB	0.4 dB	0.5dB	0.6 dB
Isolation (minimum)	80 dB	70 dB	60 dB	60 dB	60 dB
Actuating voltage	24-30 Vdc (28 Vdc nominal)				
Actuating current	140 milliamps maximum at 28 Vdc and 72°				
Impedance	50 ohms				
Switching Time	15 milliseconds maximum				
R.F. Power	See Power Chart Page 12				
Operating Mode	Failsafe				
Operating Temp.	-35°C to +85°C				
Operating Life	1,000,000 cycles minimum				
Environmental	Designed to meet MIL-E-5400 and MIL-S-3928				
Finish	Switch	Aluminum, electroless nickel plated per MIL-C-26074			
	Connector Contact	Beryllium copper, gold plated per MIL-G-45204			
	Cover	Aluminum, Black			

SCHEMATICS

Latching

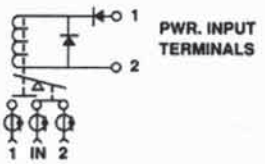


Latching with indicator circuitry, self de-energizing circuitry and suppression diodes.

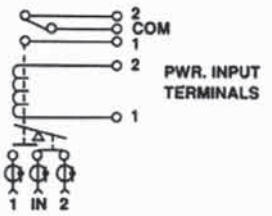


Latching with self de-energizing circuitry and suppression diodes.

Failsafe



Failsafe with suppression diodes



Failsafe, SPDT indicating circuitry

26655 W. AGOURA RD. • CALABASAS, CA 91302-1921 • Tel. 818-880-6100 • FAX 818-880-5941

DYNATECH MICROWAVE TECHNOLOGY, INC.

ORDERING INFORMATION

HOW TO ORDER:

Dynatech Microwave Technology's standard options allow customers to specify switches to their own hardware requirements. For example, D1-413C38T is a SPDT switch with SMA connectors, solder terminals, 28 Vdc, latching, DC to 18 GHz, polarity: common plus and external terminations in each positon.

D1-413C38T

SERIES:

R.F. CONNECTORS

- **1** N
- **2** BNC
- **3** TNC
- **4** SMA
- **5** SC
- **6** APC 3.5
- **7** Other (Specify)
- **8** Quick Disconnect
- **9** K

POWER TERMINALS

- **0** None
- **1** Solder
- **2** Pygmy, Bendix Type or Equivalent
- **3** Other (Specify)

VOLTAGE

- **1** 6 Vdc + 10%
- **2** 12 Vdc + 10%
- **3** 24 to 30 Vdc
- **4** 48 Vdc + 10%
- **5** 110 Vac + 10%
- **6** 12-15 Vdc
- **7** 18-20 Vdc
- **8** 20-24 Vdc
- **9** Other (Specify)

SPECIAL OPTIONS

- **1** Bracket
- **F** Flange
- **LL** Low Logic
- **L** Logic Driver (High)
- **M** Manual Override
- **P** High Power Handling
- **R** Reset (Latching Only
- **T** Termination, (50Ω)

POLARITY

- **0** Not Applicable
- **8** Common Plus (+)
- **9** Common Minus (-)

FREQUENCY RANGE

- **1** DC TO 3 GHz
- **2** DC to 12.4 GHz
- **3** DC to 18 GHz
- **4** Other (Specify)
- **5** DC to 22 GHz
- **6** DC to 26.5 GHz
- **7** DC to 40 GHz

CIRCUIT OPTIONS

- **A** Failsafe
- **B** Failsafe, SPDT indicating circuitry
- ***C** Latching
- ***D** Latching with self de-energizing circuitry, and suppression diodes
- ***E** Latching with SPDT indicator circuitry, self de-energizing circuitry, and suppression diodes
- ***F** Latching with SPDT indicating circuitry
- ***G** Normally open with indicator circuitry and suppression diodes
- **H** Normally open with indicator circuitry
- ***J** Normally open with suppression diodes
- **K** Normally open
- **M** Failsafe with suppression diodes
- **N** Normally open with failsafe to Pos. 1
- **P** Manual
- **Q** Failsafe, SPDT indicating circuitry and suppression diodes
- ***R** Normally open with failsafe to Pos. 1 and suppression diodes
- ***S** Normally open with failsafe to Pos. 1, suppression diodes and indicator circuitry
- **X** Other (specify)

***must specify polarity, i.e., common (-) or (+)**

NOTE: Polarity not applicable on switches with logic.

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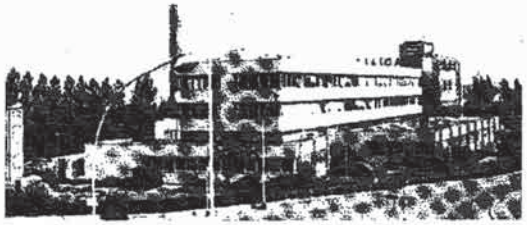
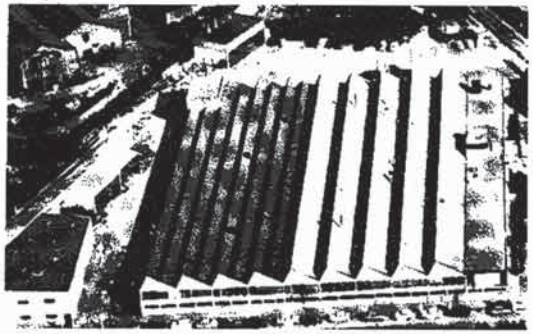
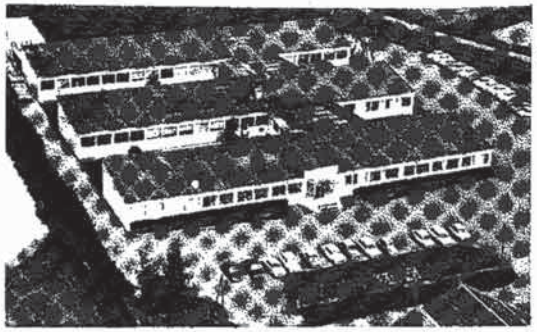


VOIRON



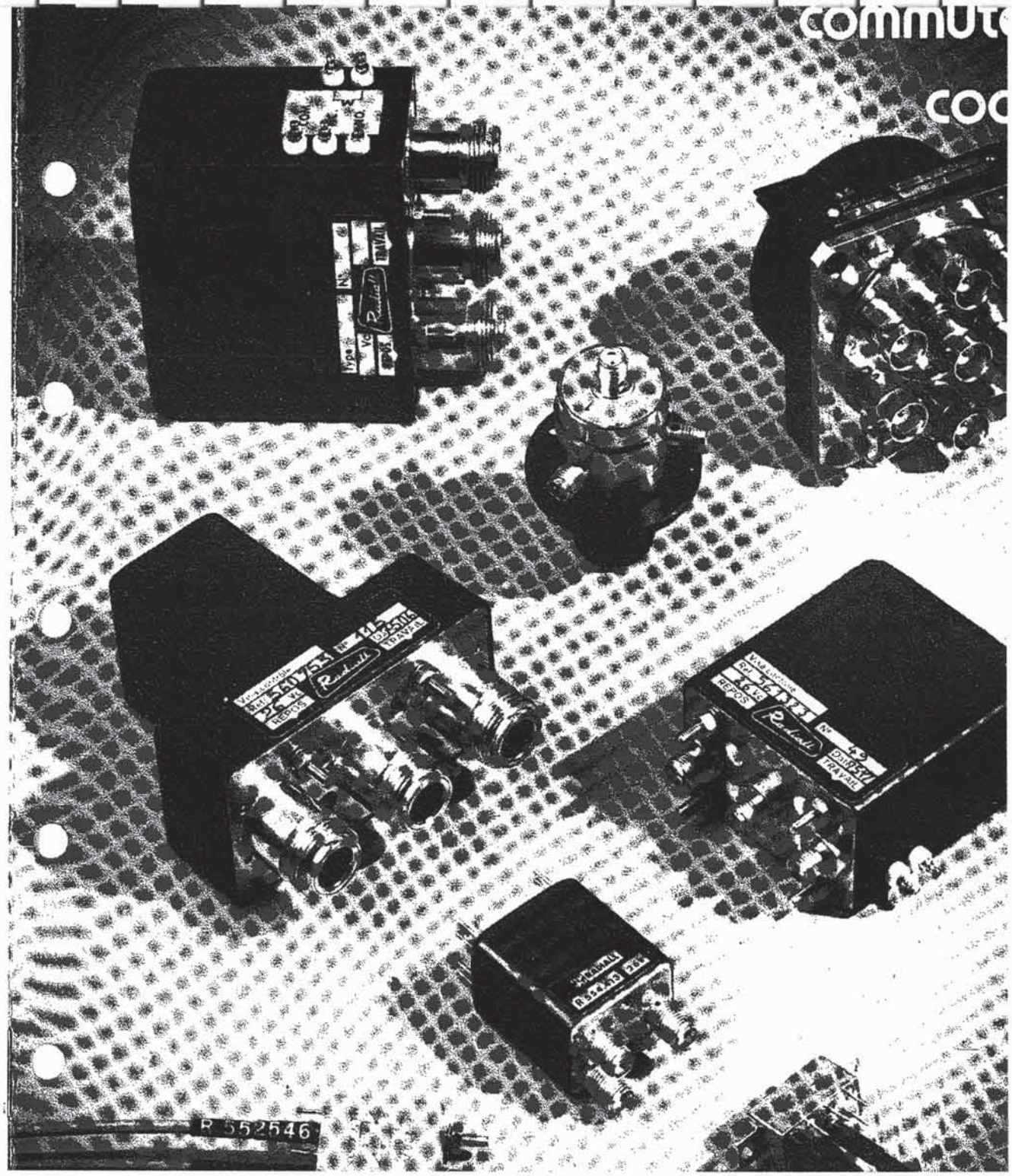
CHATEAU-RENAULT



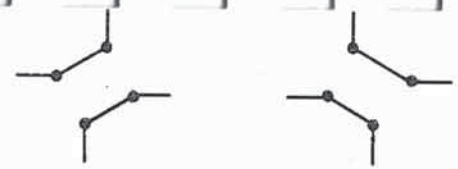
ADIALL G.m.b.H.
1 - Postfach 2206
DEUTSCHLAND
l. : 06103/ * 1027
: 417955 RADIA

OMPONENTS Ltd
seway - STAINES
esex - ENGLAND
: STAINES 59991
Tlx : 934 853

RADIALL
ibert Hoffmann



TYPE	COMMANDE	TAILLE	CONNECTEURS
SPDT	ELECTRIQUE	Quartz	
		1/2 Quartz	
		Miniature	RIM (SMA)
			SUBVIS (SMC)
			SUBCLIC (SMB)
			RIM (SMA)
		Standard	N - C - HN - BNC - TNC
			mQ - RIM (SMA)
			SUBVIS (SMC)
			SUBCLIC (SMB)
			N 75 Ω - BNC 75 Ω
			N BNC SUBCLIC (SMB)
			N 75 Ω - BNC 75 Ω
	MANUEL	Standard	N - C - BNC - TNC - mQ
			SUBVIS (SMC)
			SUBCLIC (SMB)
			RIM (SMA)
			N 75 Ω - BNC 75 Ω
DPDT	ELECTRIQUE	Standard	N - BNC
SP 3 T - SP 4 T	MANUEL	Standard	N - BNC
SP 6 T - SP 12 T			TNC - mQ
SP 3 T - SP 6 T	MANUEL	Miniature	RIM (SMA)
SP 3 T - SP 4 T	ELECTRIQUE	Standard	N - BNC
SP 6 T - SP 12 T			TNC - mQ



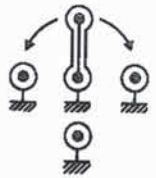
Ces relais assurent la permutation de connexion de quatre lignes coaxiales deux à deux.

Ils permettent par exemple l'insertion de quadripoles dans une ligne coaxiale, ou la permutation de deux émetteurs sur deux antennes.

Dans ce type de relais, seul le conducteur central est commuté. Le conducteur extérieur est commun aux quatre lignes et sa conception permet d'assurer la conservation des impédances caractéristiques.

- COMMUTATEURS 3, 4, 6 ou 12 POSITIONS

Ils assurent la connexion d'une ligne coaxiale avec l'une des 3, 4, 6 ou 12 autres lignes. (Le conducteur de masse n'est pas commuté, seul le conducteur intérieur l'est). Les lignes non connectées restent en circuit ouvert.



MODES DE COMMANDE

Les accessoires de commutation précédents peuvent être commandés manuellement ou électriquement. Seul le dernier mode appelle queiques précisions :

- ALIMENTATION

Les valeurs indiquées sont les valeurs nominales

nominale.

- RELAIS ELECTROMAGNETIQUES :

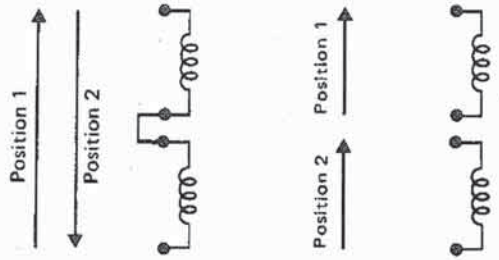
Selon les types, les relais sont présentés en deux versions : monostables ou bistables.

Moteurs monostables :

La position travail n'est maintenue que pendant l'impulsion de commande. En l'absence de tension de commande, le relais reprend toujours sa position initiale appelée position repos.

Moteurs bistables :

Les deux positions sont stables, en l'absence de tension de commande. Le changement de position peut être obtenu de deux façons différentes :



Inversion de tension sur une même bobine

Alimentation des deux bobines différentes

L'avantage essentiel de ce type de moteur réside dans le fait qu'il peut rester indifféremment alimenté ou non, sans que la position des contacts coaxiaux en soit modifiée. Il permet d'intéressantes réductions de consommation d'énergie.

- COMMUTATEURS ELECTRIQUES :

Ils sont commandés par un système pas à pas. Un positionnement très précis est assuré par un indexage mécanique. Les recommandations de branchement sont indiquées dans les pages correspondantes. Après que le sélecteur ait atteint la position choisie, l'ali-

CONDITIONS D'

Sauf indications co
tation fonctionnent
chéité leur assure u
conditions les plus s

MATERIAUX et

Sauf indications co
coaxial :

- Pièces élastiques
- Contacts électriq
- Autres pièces mé
- Isolant

Protection :

- Modèles BNC - T
  RiM
- mΩ

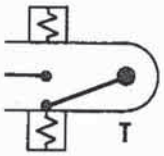
présentés dans ce
milles de fonctions

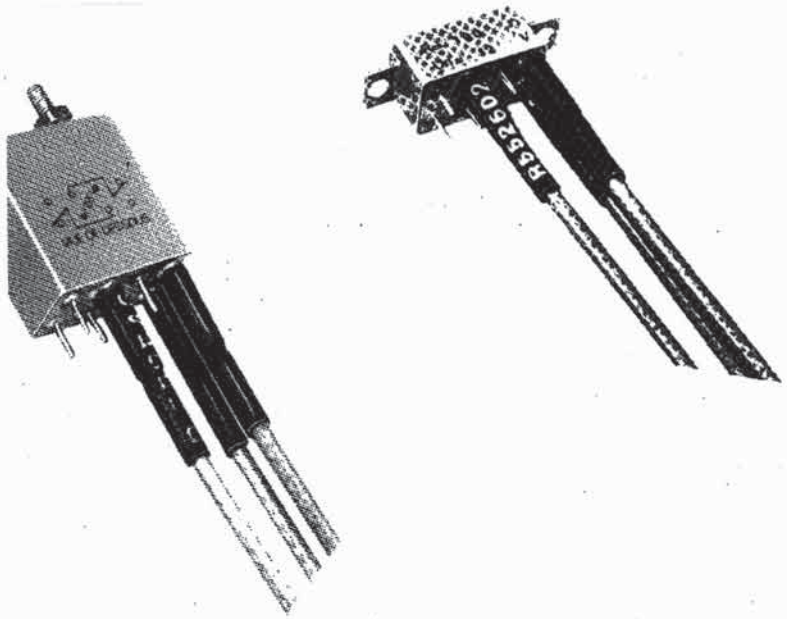
ou SPDT (une

utation d'une ligne
hoisie parmi deux.

n'est pas commuté,

nmuté peut être,
, en circuit ouvert

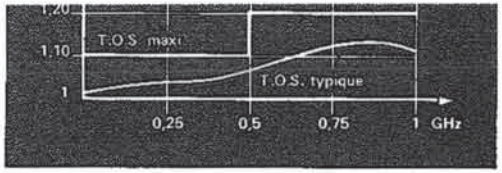


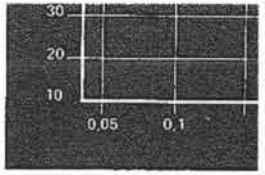


ance caractéristique	:	50 Ω
ence d'utilisation	:	0 à 1 000 MHz
nce HF admissible	:	60 W à 10 MHz - 20 W à 1 GHz
d'insertion (câble compris)	:	⩽ 0,3 dB de 0 à 500 MHz ⩽ 0,5 dB de 500 à 1000 MHz
n d'alimentation	:	12 - 26 V continu
mmation	:	taille Quartz : 170 mW taille 1/2 Quartz : 0,8 mW
ance de contact	:	75 mΩ sans câble
n de tenue au sol	:	500 V. eff. - 50 Hz
ance d'isolement sous 500 Vcc		⩾ 100 MΩ
ir de coupure	:	2 A continu sur circuit résistif
de réponse établissement	:	6 ms (travail et repos)

ions : suivant NF - C - 20 616 sévérité 2000 Hz - 10 g : câbles coaxiaux bridés à maxi. de la platine

	:	suivant NF - C 20 608 sévérité 50 g câbles coaxiaux bridés à 30 mm maxi de la platine
ance de fonctionnement	:	100 000 manoeuvres mini.
rature d'utilisation	:	− 55 +100° C
coaxiaux 50 Ω	:	KX 22A ou RG 316/U (autres câbles par exemple 75 Ω : nous consulter)



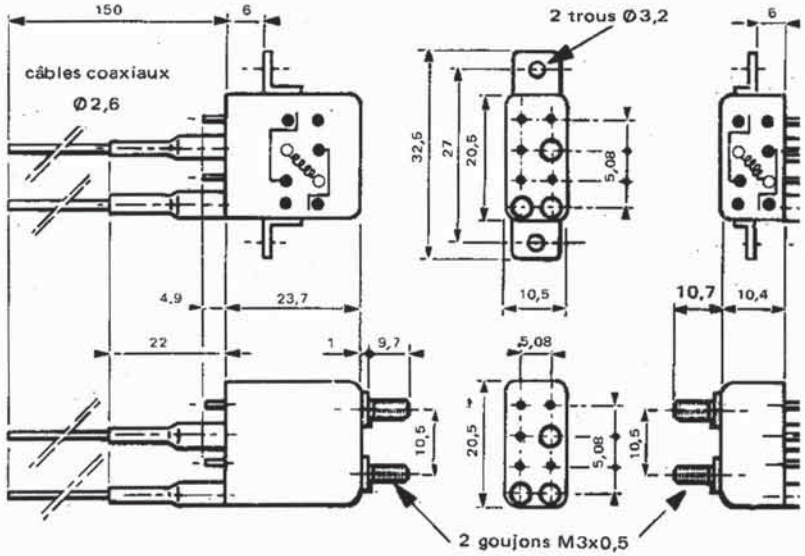


TAILLE QUARTZ

TAI

FIXATION par EQUERRES

FIXATION par GOUJONS



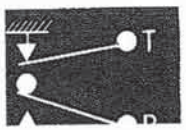
Taille	QUARTZ		1/2 QUAR	
Fixation	équerres	goujons	équerres	
12 V	R. 552 502	R. 552 522	R. 552 602	R
26 V	R. 552 503	R. 552 523	R. 552 603	R

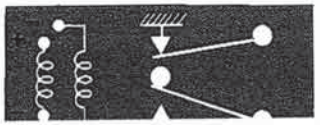
ont une fonction d'inverseurs simples. Ils sont équipés de 3 connecteurs minia- et présentent un encombrement très réduit. Ils existent en version monostable ions de contacts auxiliaires sont en développement.

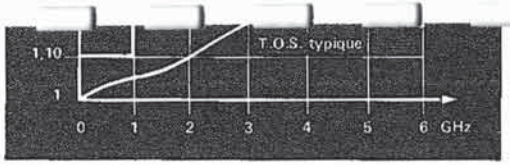
tion	:	inverseur simple
iecteurs coaxiaux	:	RiM femelle (MIL - C - 39 012 - SMA)
dance caractéristique	:	50 Ω
uence d'utilisation	:	0 - 6 GHz
s	:	⩽0,2 dB à 2 GHz
		⩽0,3 dB à 6 GHz
tance de contact	:	< 50 mΩ
ion d'alimentation	:	6 - 12 - 26 - 48 V continu
ommation	:	environ 2 W pour monostable et 4 W pour bistable
de moteur	:	Monostable ou Bistable
entation par bornes soudables		
tance d'isolement sous 500 Vcc		
bobine et masse	:	> 1 000 MΩ
voie HF et masse	:	> 1 000 MΩ
ion de tenue au sol		
bobine et masse	:	500 V. eff. - 50 Hz
voie HF et masse	:	750 V. eff. - 50 Hz
rance de fonctionnement	:	200 000 manoeuvres
s de réponse	:	< 20 ms
itions	:	conformes à NFC20616 Sévérité : 2000 Hz - 10 g
s	:	conformes à NFC20608 Sévérité : 30 g
pérature d'utilisation	:	− 40° C +85° C
truction	:	Etanche

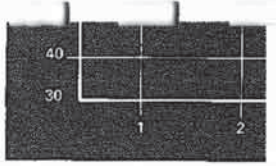
nes d'alimentation. Ce schéma lorsque le relais est sur la voie nuter sur la voie travail (T), ivant la polarité indiquée. La e est mise à la masse.

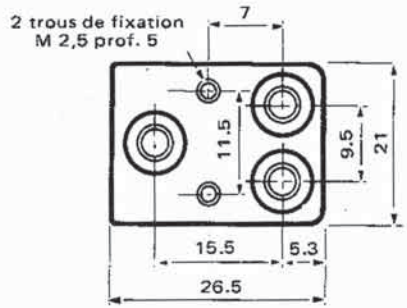
Vue extérieure côté bornes d'alimentation. Ce schéma représente la position des contacts lorsqu'une bobine est alimentée suivant la polarité indiquée. Pour commuter, inverser la polarité sur l'une des bobines. La voie coax non commutée est mise à la masse. Le relais pourra rester alimenté en permanence à condition que les 2 bobines soient montées en série, sinon le relais devra être utilisé avec un facteur de fonctionnement de 0,5.

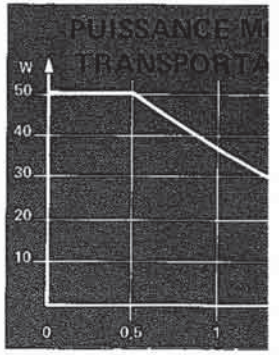




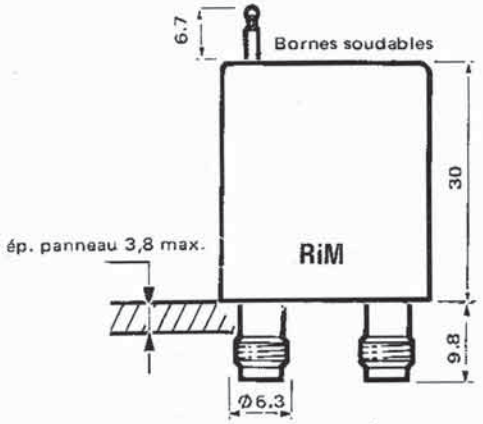


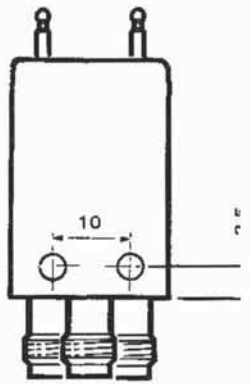






MONOSTABLE

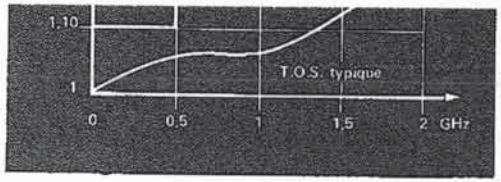


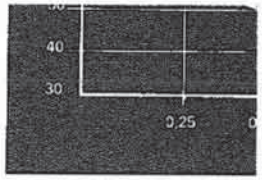


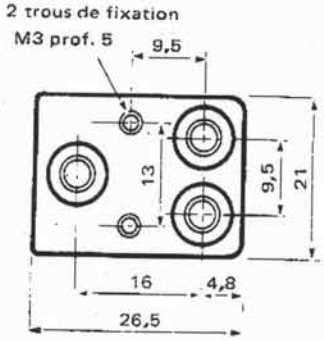
MONOSTABLE		BISTABLE	
Tension	Code	Tension	Code
6 V	R 554 411	6 V	R 554 4
12 V	R 554 412	12 V	R 554 4
26 V	R 554 413	26 V	R 554 4
48 V	R 554 414	48 V	R 554 4

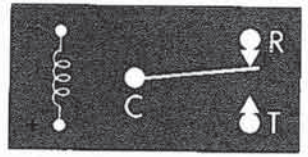
ont une fonction d'inverseurs simples. Ils sont équipés de 3 connecteurs minia-
un encombrement très réduit. Ils sont équipés d'un moteur monostable. Cette
ble avec l'ancienne série mH.

ance caractéristique	:	50 Ω
ence d'utilisation	:	0 - 2 GHz
d'insertion	:	< 0,2 dB
nce HF moyenne trans-	:	40 W à 500 MHz
le à 25° C		25 W à 1 GHz
		15 W à 2 GHz
rature d'utilisation	:	− 20 +70° C
ance de fonctionnement	:	100 000 manoeuvres
ntation	:	par bornes soudables
n d'alimentation	:	6 - 12 - 26 - 48 V continu









Vue ext
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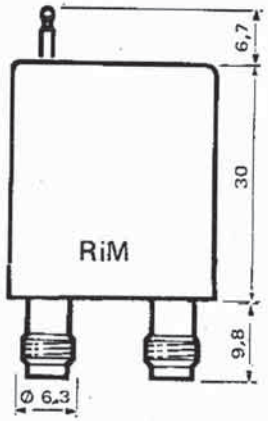
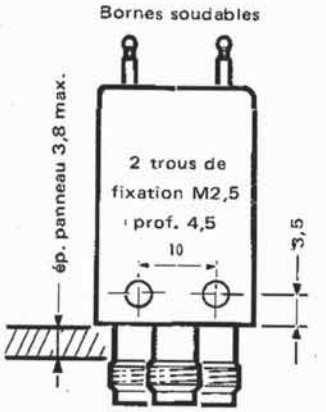
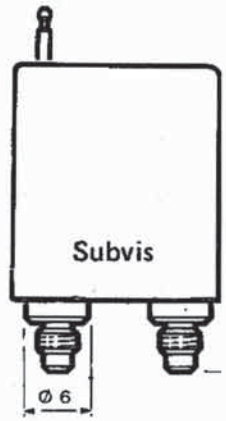
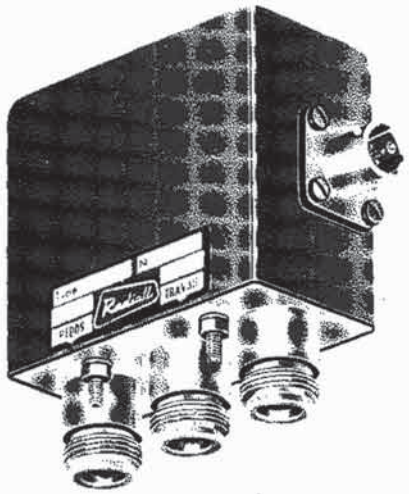
Pour co
alimente
indiquée







Tension	SUBVIS(SMC)	SUBCLIC (SMB)	RI
6 V	R 553 051	R 553 251	R 5
12 V	R 553 052	R 553 252	R 5
26 V	R 553 053	R 553 253	R 5
48 V	R 553 054	R 553 254	R 5



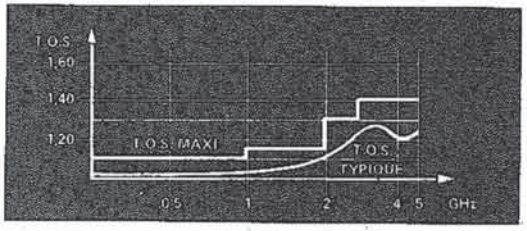
onction d'inverseurs coaxiaux. Ils sont équipés de 3 connecteurs qui s'accou-
e leur série correspondante.
ditions climatiques et mécaniques les plus sévères et peuvent être utilisés sur
portés. (Norme AIR Catégorie III C).

rature d'utilisation	:	− 40 +85° C
r humide	:	95 % HR à 55° C
ression	:	85 mb = 64 mm Hg = 17 000 m
ions dans les 3 axes	:	10 - 55 Hz - 1,5 mm d'amplitude 55 - 500 Hz - 10 g
	:	30 g - 11 ms
ance de fonctionnement	:	500 000 manoeuvres

TATION : par bornes soudables ou par embase multibroche (NF - C 93 422
E 301 B - brochage 8 - 3A - P) *

n d'alimentation	:	6 - 12 - 26 - 48 - 120 V continu
nmation	:	2 W
n de tenue au sol entre bobine se	:	1 500 V eff. - 50 Hz
nce d'isolement entre bobine se sous 500 Vcc	:	> 100 MΩ
de réponse sous tension nominale	:	établissement travail ⩽ 20 ms établissement repos ⩽ 12 ms

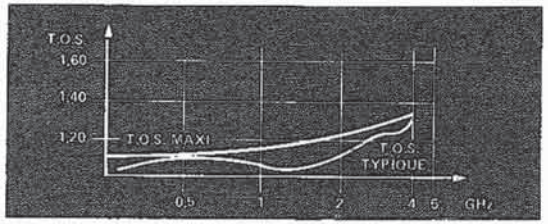
Puissance HF transportable à 200 MHz	500 W	500 W	500 W	80 W
Tension de tenue au sol - 50 Hz entre sortie HF utilisée et masse	1500 V eff.	1500 V eff.	1500 V eff.	1000 V eff.
Résistance d'isolement mini entre voies HF et masse sous 500 V cc	100 MΩ	100 MΩ	100 MΩ	100 MΩ

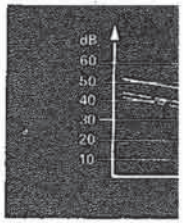


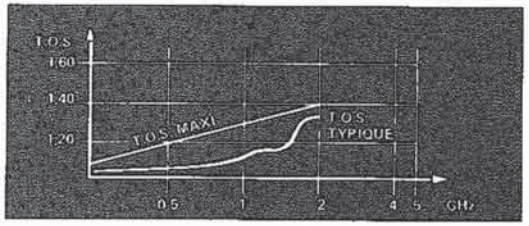
T.O.S. N

T.O.S. C

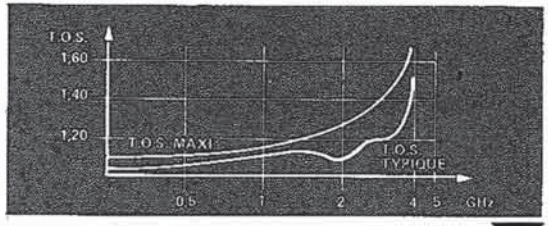
AFFAIBLIS
N - C - HN





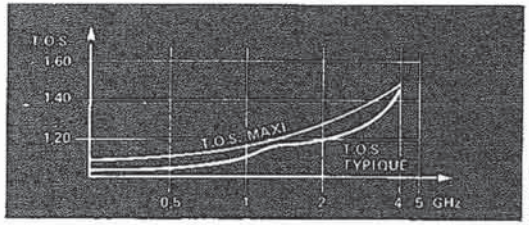


T.O.S. HN

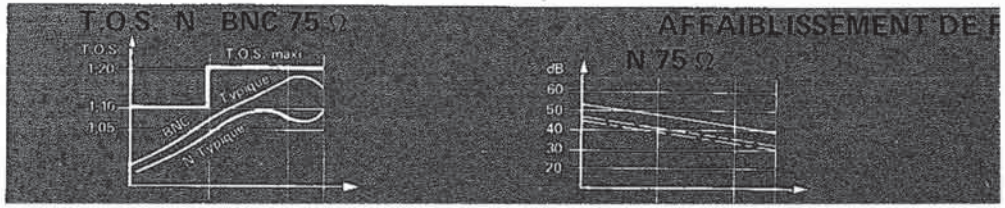


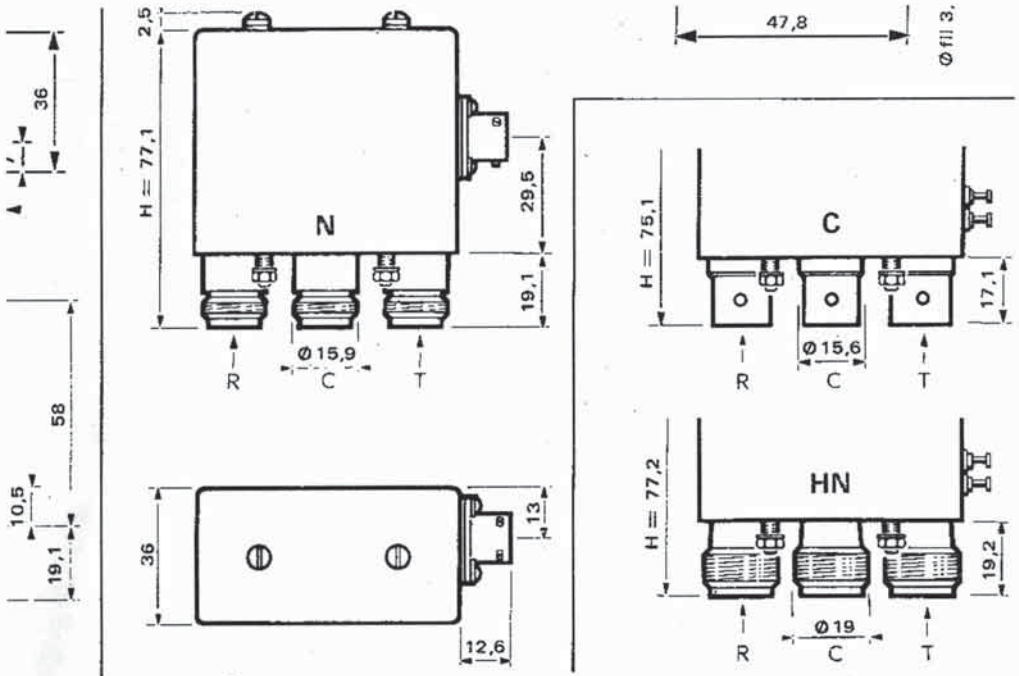
T.O.S. BNC-
TNC-mQ

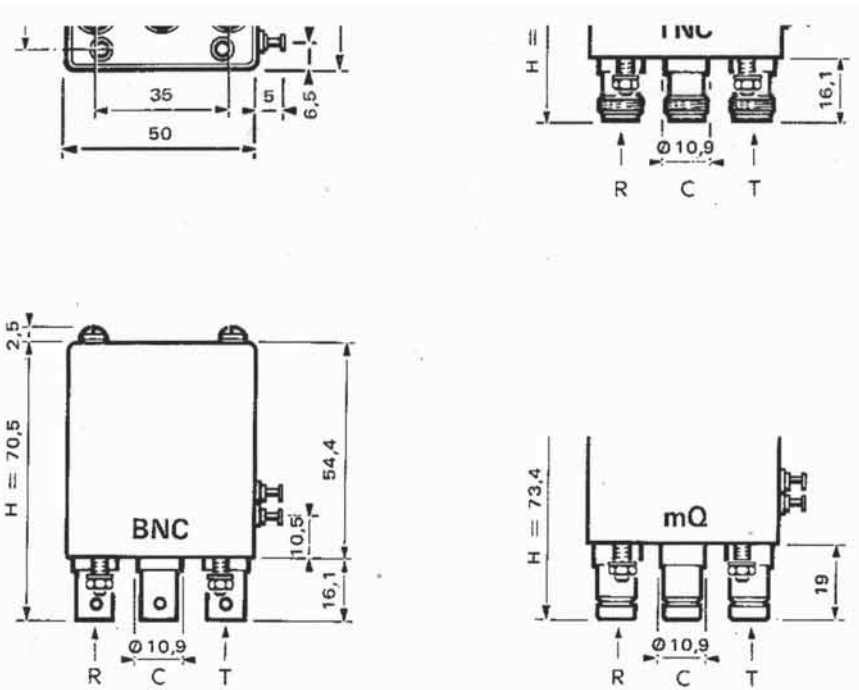
AFFAIBLIS
BNC-TNC-m



T.O.S. RiM-Subvis-Subclic







Le dernier chiffre du N° de Code est caractéristique de la tension d'alimentation de
ıléter ce N° de Code en remplaçant ● par le chiffre 1, 2, 3, 4 ou 5 suivant tableau :

nsion	6 V	12 V	26 V	48 V	120 V
●	1	2	3	4	5

Connecteurs coaxiaux	Poids g	CODE sans contact de masse Fig. 1	CODE avec contact de masse Fig. 2	CODE avec charge 1/4 W Fig. 3
SUHV	290	R 562 70 ●	R 562 71 ●	R 562 72 ●
SUHC	290	R 562 80 ●	R 562 81 ●	R 562 82 ●
RIM	290	R 562 90 ●	R 562 91 ●	
BNC	280	R 562 60 ●	R 562 61 ●	R 562 62 ●
TNC	300	R 562 73 ●	R 562 74 ●	R 562 75 ●
mQ	285	R 562 83 ●	R 562 84 ●	R 562 85 ●
BNC 75 Ω	290	R 562 93 ●	R 562 94 ●	

FIGURE 1

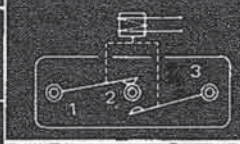


FIGURE 2

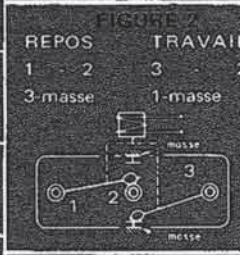
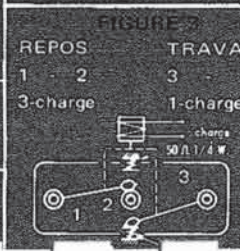


FIGURE 3



ATTENTION : Le dernier chiffre du N° de Code est caractéristique de la tensio
la bobine, compléter ce N° de Code en remplaçant ● par le chiffre 1, 2, 3, 4 ou

Tension	6 V	12 V	26 V	48 V
●	1	2	3	4

Connecteurs coaxiaux	Poids g	CODE sans contact de masse Fig. 1	CODE avec contact de masse Fig. 2	CODE avec charge 1/4 W Fig. 3
SUHV	180	R 561 10 ●	R 561 11 ●	R 561 12 ●
SUHC	180	R 561 20 ●	R 561 21 ●	R 561 22 ●
RIM	180	R 561 30 ●	R 561 31 ●	R 561 32 ●
BNC	185	R 561 40 ●	R 561 41 ●	R 561 42 ●
TNC	185	R 561 50 ●	R 561 51 ●	R 561 52 ●
mQ	190	R 561 60 ●	R 561 61 ●	R 561 62 ●
BNC 75 Ω	185	R 561 75 ●	R 561 76 ●	R 561 77 ●