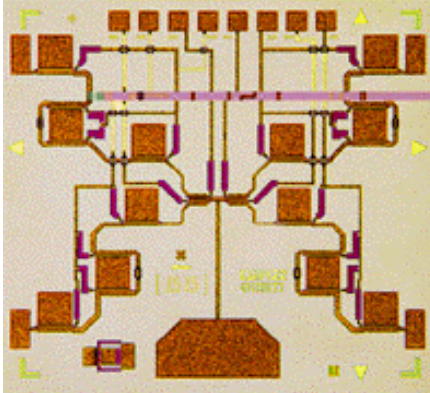


## SP4T FET Switch

## TGS8422-SCC



### Key Features and Performance

- DC to 18 GHz Frequency Range
- 2.5 dB Insertion Loss at Midband
- 37 dB Isolation at Midband
- Typical Input Power of 19 dBm at 1 dB Gain Compression
- Typical SWR of 1.6:1
- 2.286 x 2.057 x 0.150 mm (0.090 x 0.081 x 0.006 in.)

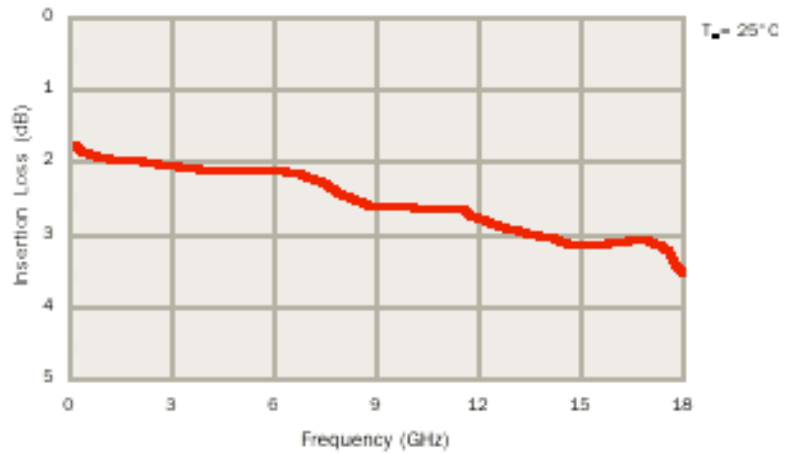
### Description

The TriQuint TGS8422-SCC is a GaAs MMIC SP4T FET switch which operates from DC to 18 GHz. RF Output arm selection is made through 8 control lines. Control bias voltages are 0 V and -5 V. Typical insertion loss is 2.5 dB at 9 GHz. Isolation is typically 37 dB from RF Input to RF Outputs 0, 3 and 47 dB from RF Outputs 1 and 2. The input and output return loss is typically 13 dB.

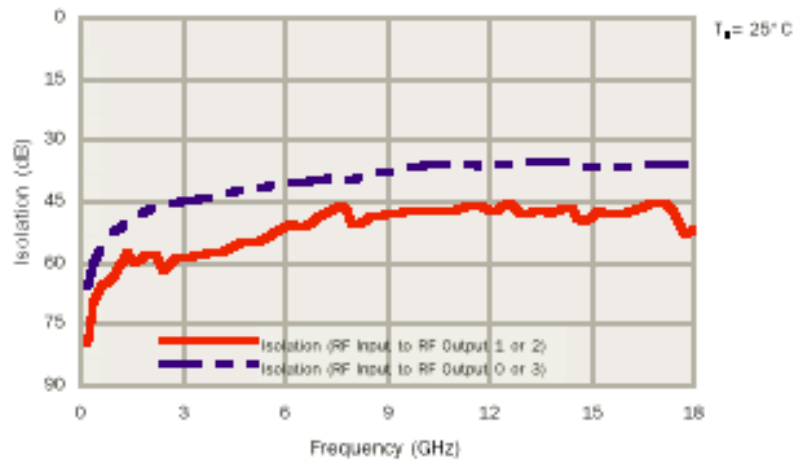
The reflective, single-pole, four-throw design utilizes one series and four shunt FETs in each RF Output arm to produce a broadband, low-loss, high-isolation switch. The monolithic construction simplifies the assembly process and makes this device useful for electronic warfare, radar and telecommunication applications.

Bond pad and backside metallization is gold plated for compatibility with eutectic alloy attachment methods as well as thermocompression and thermosonic wire-bonding processes. Ground is provided to the circuitry through vias to the backside metallization.

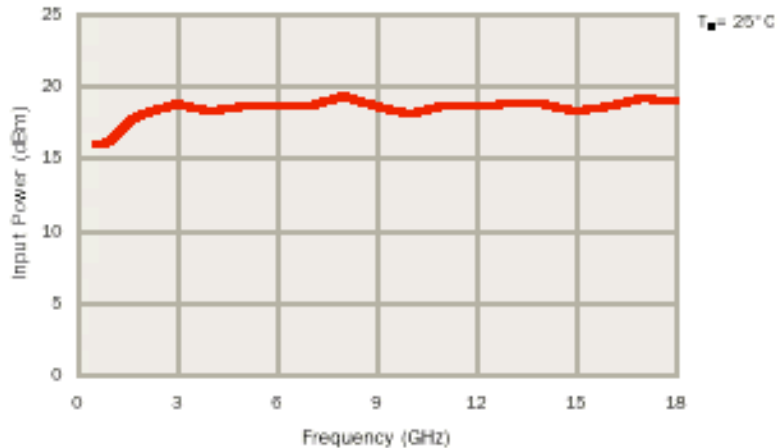
**TYPICAL  
INSERTION LOSS**



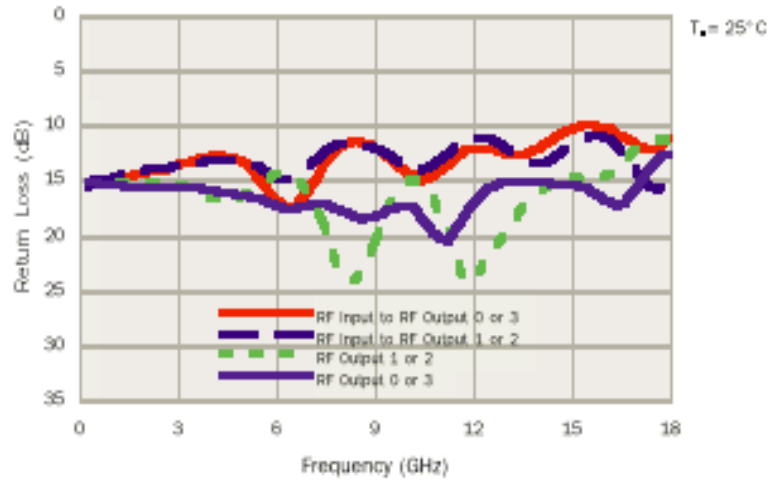
**TYPICAL  
ISOLATION**



**TYPICAL  
INPUT POWER  
P<sub>1dB</sub>**



**TYPICAL  
RETURN LOSS**



**ABSOLUTE  
MAXIMUM RATINGS**

Input continuous wave power, $P_{IN}$ .....	1 W
Control voltage range, $V_1, V_2, V_3, V_4, V_5, V_6, V_7, V_8$ .....	-10 V to 0 V
Operating channel temperature, $T_{CH}^*$ .....	150°C
Mounting temperature (30 sec), $T_M$ .....	320°C
Storage temperature range, $T_{STG}$ .....	-65 to 150°C

**Ratings over channel temperature range,  $T_{CH}$  (unless otherwise noted)**

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "RF Characteristics" is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

\* Operating channel temperature,  $T_{CH}$ , will directly affect the device MTTF. For maximum life, it is recommended that channel temperature be maintained at the lowest possible level.

### TYPICAL S-PARAMETERS

RF Input to RF Output 3

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		Insertion Loss (dB)
	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	
0.5	0.18	-3	0.805	-9	0.806	-8	0.17	-1	1.9
1.0	0.18	-13	0.801	-16	0.802	-15	0.17	-5	1.9
2.0	0.20	-30	0.797	-30	0.798	-30	0.17	-21	2.0
3.0	0.21	-44	0.790	-45	0.791	-45	0.17	-38	2.0
4.0	0.22	-51	0.784	-59	0.785	-59	0.16	-45	2.1
5.0	0.22	-56	0.784	-74	0.786	-74	0.15	-53	2.1
6.0	0.18	-78	0.791	-89	0.793	-89	0.14	-87	2.0
7.0	0.21	-124	0.776	-106	0.778	-106	0.14	-141	2.2
8.0	0.26	-139	0.749	-121	0.751	-121	0.13	-162	2.5
9.0	0.25	-132	0.742	-135	0.743	-135	0.12	-146	2.6
10.0	0.20	-131	0.746	-150	0.746	-150	0.14	-148	2.5
11.0	0.22	-167	0.747	-166	0.748	-166	0.10	164	2.5
12.0	0.27	161	0.721	178	0.723	178	0.14	112	2.8
13.0	0.25	151	0.706	163	0.707	163	0.18	119	3.0
14.0	0.21	162	0.700	148	0.702	148	0.18	137	3.1
15.0	0.26	170	0.697	134	0.698	134	0.17	156	3.1
16.0	0.28	159	0.707	118	0.709	119	0.14	156	3.0
17.0	0.19	137	0.709	101	0.708	101	0.17	110	3.0
18.0	0.18	115	0.673	83	0.674	83	0.24	93	3.4

T<sub>A</sub> = 25°C

### TYPICAL S-PARAMETERS

RF Input to RF Output 2

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		Insertion Loss (dB)
	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	
0.5	0.18	-3	0.803	-9	0.804	-9	0.17	1	1.9
1.0	0.18	-12	0.798	-16	0.800	-16	0.18	5	2.0
2.0	0.19	-27	0.794	-32	0.796	-31	0.18	18	2.0
3.0	0.21	-40	0.788	-47	0.789	-47	0.17	31	2.1
4.0	0.23	-49	0.784	-62	0.785	-62	0.15	40	2.1
5.0	0.21	-56	0.783	-78	0.785	-77	0.15	60	2.1
6.0	0.14	-71	0.783	-93	0.785	-93	0.19	90	2.1
7.0	0.16	-110	0.774	-110	0.776	-109	0.15	110	2.2
8.0	0.25	-128	0.753	-125	0.755	-125	0.07	126	2.5
9.0	0.25	-125	0.738	-140	0.739	-140	0.09	140	2.6
10.0	0.19	-118	0.739	-155	0.738	-155	0.18	146	2.6
11.0	0.19	-146	0.735	-171	0.738	-171	0.13	164	2.7
12.0	0.25	177	0.725	173	0.727	173	0.07	145	2.8
13.0	0.23	169	0.712	157	0.713	158	0.10	148	3.0
14.0	0.25	-179	0.704	142	0.706	142	0.16	169	3.0
15.0	0.30	179	0.695	127	0.695	127	0.19	174	3.2
16.0	0.31	170	0.697	111	0.701	111	0.18	158	3.1
17.0	0.25	160	0.698	93	0.694	94	0.25	129	3.1
18.0	0.28	133	0.664	75	0.665	76	0.27	125	3.6

T<sub>A</sub> = 25°C

Reference planes for S-parameter data include bond wires as specified in "Recommended Bias Network".

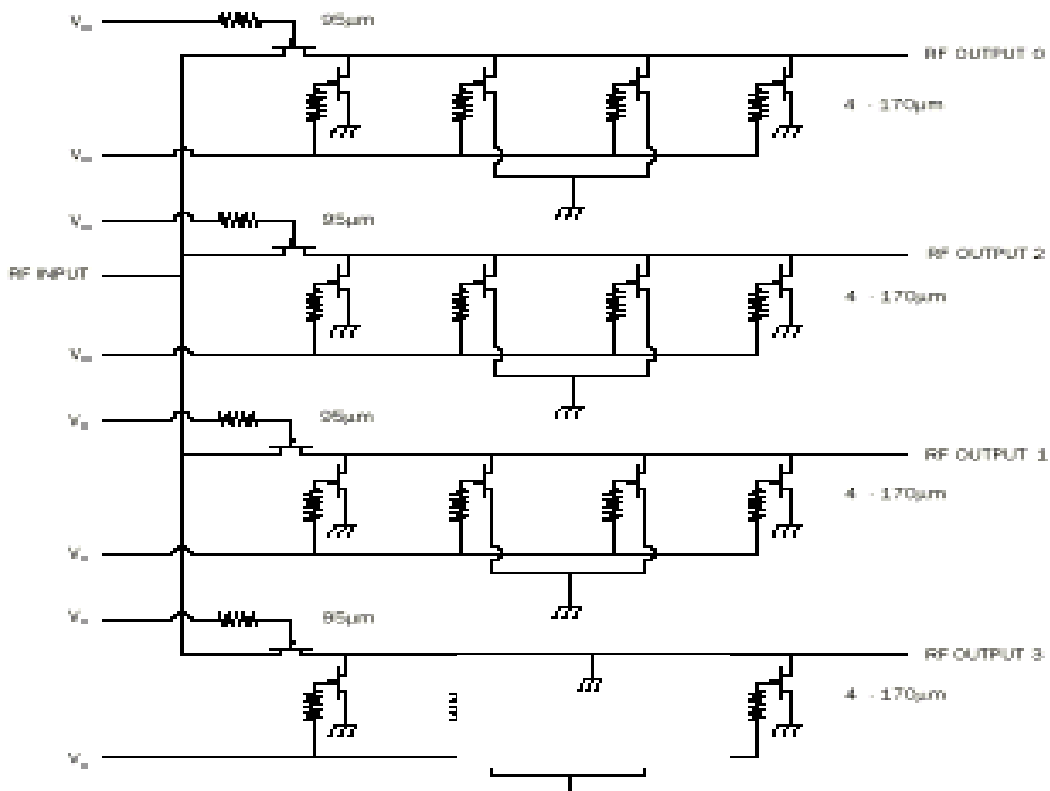
**RF CHARACTERISTICS**

PARAMETER	TEST CONDITIONS	TYP	UNIT
IL Insertion loss	midband	2.5	dB
ISO Isolation	midband	37	dB
SWR(in) Input standing wave ratio		1.6:1	-
SWR(out) Output standing wave ratio	through selected output arm	1.3:1	-
P <sub>1dB</sub> (in) Input power at 1dB gain compression		19	dBm

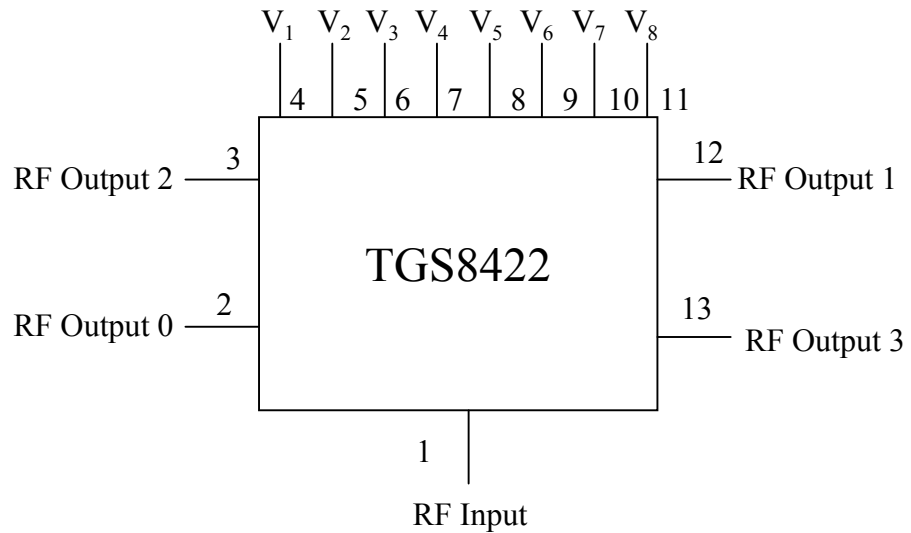
**TRUTH TABLE**

Selected RF Output	CONTROL VOLTAGES (VOLTS)							
	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>5</sub>	V <sub>6</sub>	V <sub>7</sub>	V <sub>8</sub>
RF Output 0	0	-5	-5	0	-5	0	-5	0
RF Output 1	-5	0	-5	0	0	-5	-5	0
RF Output 2	-5	0	0	-5	-5	0	-5	0
RF Output 3	-5	0	-5	0	-5	0	0	-5

**EQUIVALENT SCHEMATIC**



**RECOMMENDED BIAS NETWORK**



RF connections: Bond using two 1-mil diameter, 20 to 25-mil-length gold bond wires at RF Outputs and one 1-mil diameter, 20 to 25-mil-length gold bond wire at RF Input for optimum RF performance.

Close placement of external components is essential for resonant-free performance.

DC blocks are not provided at RF ports.

Refer to TriQuint *Gallium Arsenide Products Designers' Information* on TriQuint's web site.

**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**