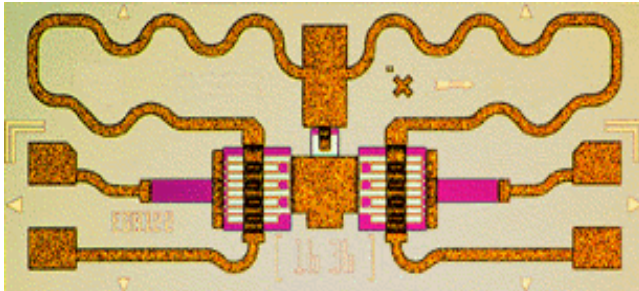


## SPDT FET Switch

## TGS8122-SCC



### Key Features and Performance

- 8 to 11 GHz Frequency Range
- 0.9 dB Typical Insertion Loss
- 40 dB Typical Isolation at 9 GHz
- 1.5:1 Typical Input SWR at Midband
- 1.4:1 Typical Output SWR at Midband
- Less Than 2 ns Rise/Fall Time
- 1.7018 x 0.7112 x 0.152 mm (0.067 x 0.028 x 0.006 in.)

### Description

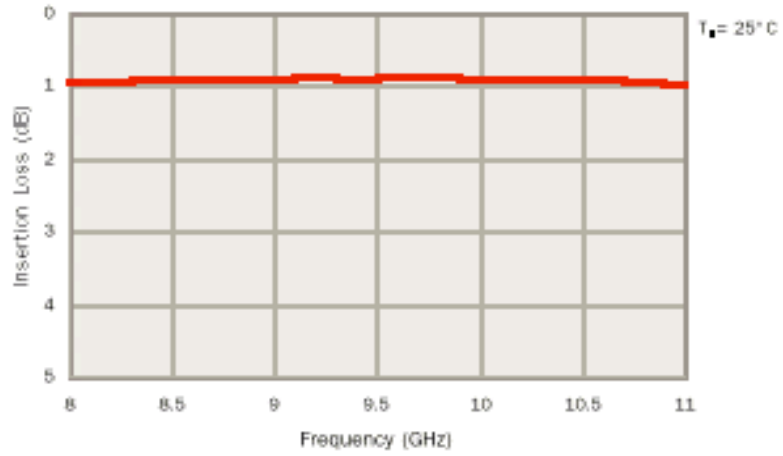
The TriQuint TGS8122-SCC is a monolithic single-pole, double-throw (SPDT) GaAs FET switch designed for 8 to 11 GHz. This device has low insertion loss, low current consumption of less than 50 mA with control voltages of -7 V and 0 V, and rise and fall times are less than 2 ns. Ground is provided to the circuitry through vias to the backside metallization.

This switch is ideal for use in high-speed switching radar and communication systems.

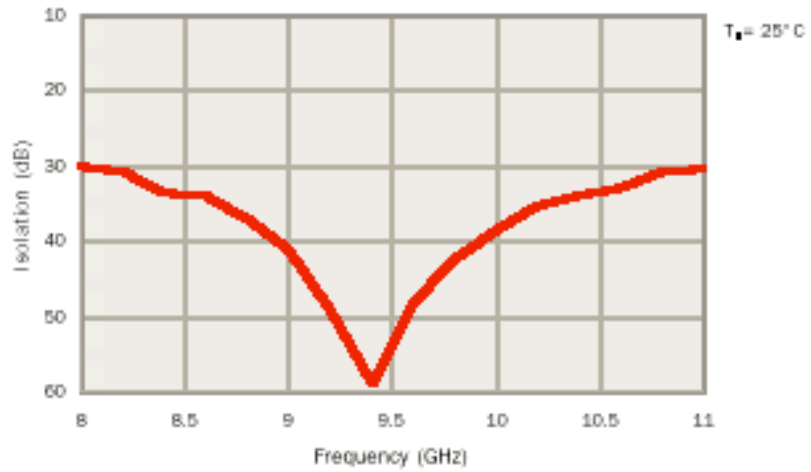
Bond pad and backside metallization is gold plated for compatibility with eutectic alloy attachment methods as well as the thermocompression and thermosonic wire-bonding processes.

The TGS8122-SCC is supplied in chip form and is readily assembled using automated equipment.

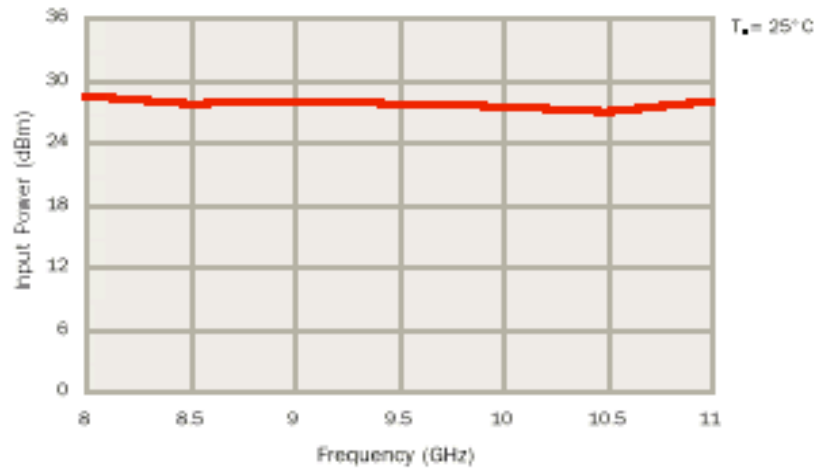
**TYPICAL  
INSERTION LOSS**



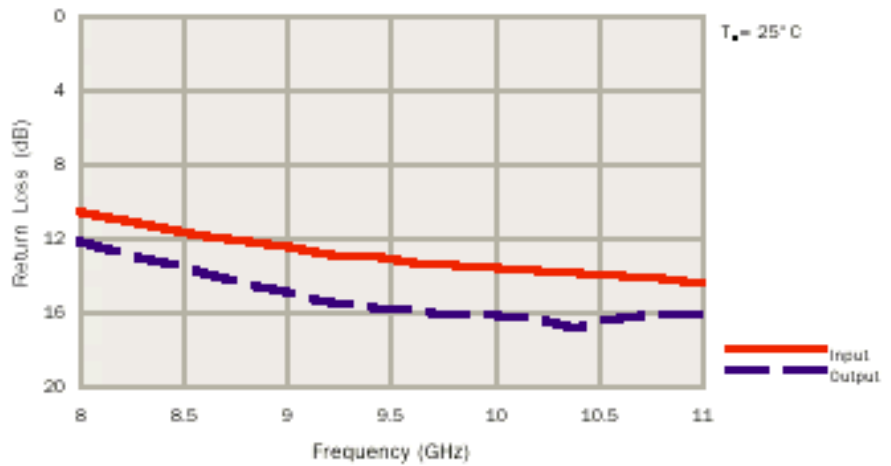
**TYPICAL  
ISOLATION**



**TYPICAL  
INPUT POWER**  
 $P_{1dB}$



**TYPICAL  
RETURN LOSS**



**ABSOLUTE  
MAXIMUM RATINGS**

Input continuous-wave power, $P_{in}^{*}$ .....	3 W
Control voltage range, $V_{ctrl, 2}$ .....	-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 operating 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.

\* DC blocks are not provided at RF ports.

\*\* Operating channel temperature directly affects the device MTTF. For maximum life, it is recommended that channel temperature be maintained at the lowest possible level.

Insertion Path

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(°)	
7.0	0.30	106	0.88	-73	0.876	-73	0.25	-53	1.2
7.1	0.29	106	0.88	-75	0.880	-75	0.24	-57	1.1
7.2	0.28	106	0.88	-77	0.882	-77	0.23	-61	1.1
7.3	0.27	106	0.88	-79	0.885	-79	0.22	-66	1.1
7.4	0.27	106	0.89	-81	0.886	-81	0.22	-71	1.0
7.5	0.26	107	0.89	-83	0.887	-83	0.21	-76	1.0
7.6	0.26	108	0.89	-85	0.888	-85	0.20	-81	1.0
7.7	0.25	108	0.89	-87	0.890	-87	0.20	-86	1.0
7.8	0.25	109	0.90	-89	0.891	-89	0.19	-91	1.0
7.9	0.24	110	0.90	-91	0.893	-91	0.19	-96	0.9
8.0	0.24	110	0.90	-93	0.894	-93	0.18	-101	1.0
8.1	0.23	112	0.90	-95	0.896	-95	0.18	-106	0.9
8.2	0.23	112	0.90	-97	0.897	-97	0.17	-112	0.9
8.3	0.23	113	0.90	-99	0.897	-99	0.17	-118	0.9
8.4	0.22	114	0.90	-101	0.898	-101	0.17	-123	0.9
8.5	0.22	115	0.90	-103	0.899	-103	0.16	-129	0.9
8.6	0.22	117	0.90	-105	0.899	-105	0.16	-135	0.9
8.7	0.22	117	0.90	-107	0.899	-107	0.16	-140	0.9
8.8	0.21	118	0.90	-109	0.902	-108	0.16	-145	0.9
8.9	0.21	119	0.90	-111	0.902	-110	0.16	-151	0.9
9.0	0.21	120	0.90	-112	0.903	-112	0.16	-156	0.9
9.1	0.21	121	0.90	-114	0.903	-114	0.16	-162	0.9
9.2	0.21	122	0.90	-116	0.903	-116	0.15	-167	0.9
9.3	0.20	123	0.90	-118	0.904	-118	0.15	-172	0.9
9.4	0.20	123	0.90	-120	0.904	-120	0.15	-177	0.9
9.5	0.20	124	0.90	-122	0.904	-122	0.15	179	0.9
9.6	0.20	124	0.90	-124	0.904	-124	0.15	174	0.9
9.7	0.20	125	0.90	-126	0.904	-126	0.16	170	0.9
9.8	0.20	125	0.90	-128	0.904	-128	0.16	165	0.9
9.9	0.19	125	0.90	-130	0.904	-130	0.16	160	0.9
10.0	0.19	126	0.90	-132	0.902	-132	0.16	156	0.9
10.1	0.19	127	0.90	-134	0.902	-134	0.15	152	0.9
10.2	0.19	128	0.90	-136	0.901	-136	0.15	148	0.9
10.3	0.18	128	0.90	-138	0.902	-138	0.15	144	0.9
10.4	0.18	128	0.90	-140	0.901	-140	0.15	141	0.9
10.5	0.18	129	0.90	-142	0.899	-142	0.15	137	0.9
10.6	0.17	130	0.90	-144	0.898	-144	0.15	133	0.9
10.7	0.17	132	0.90	-147	0.898	-146	0.15	129	0.9
10.8	0.17	133	0.90	-149	0.895	-148	0.15	125	1.0
10.9	0.17	134	0.90	-151	0.896	-151	0.14	120	1.0
11.0	0.16	135	0.89	-153	0.895	-153	0.14	115	1.0
11.1	0.16	137	0.89	-155	0.893	-155	0.14	110	1.0
11.2	0.16	140	0.89	-157	0.892	-157	0.13	105	1.0
11.3	0.15	142	0.89	-159	0.891	-159	0.13	100	1.0
11.4	0.15	146	0.89	-161	0.887	-161	0.12	94	1.0
11.5	0.15	149	0.88	-163	0.885	-163	0.12	89	1.1
11.6	0.16	152	0.88	-165	0.883	-165	0.11	83	1.1
11.7	0.16	154	0.88	-167	0.882	-167	0.11	77	1.1
11.8	0.17	156	0.88	-169	0.881	-169	0.10	69	1.1
11.9	0.17	157	0.88	-171	0.878	-171	0.09	62	1.1
12.0	0.17	158	0.88	-173	0.878	-173	0.09	55	1.1

T<sub>A</sub> = 25°C

Reference planes for S-parameter data include bond wires as specified in the "Recommended Assembly Diagram". The S-parameters are also available on floppy disk and the world wide web.

**TYPICAL S-PARAMETERS**

Isolation Path

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		Isolation (dB)
	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	
7.0	0.17	85	0.053	-84	0.055	-85	0.89	122	25.5
7.1	0.16	86	0.053	-87	0.052	-87	0.90	121	25.5
7.2	0.14	88	0.049	-89	0.050	-88	0.89	120	26.2
7.3	0.13	92	0.050	-88	0.049	-91	0.90	120	26.0
7.4	0.11	96	0.045	-95	0.046	-93	0.90	119	26.9
7.5	0.10	103	0.045	-96	0.044	-96	0.90	118	26.9
7.6	0.09	112	0.041	-101	0.042	-97	0.90	118	27.7
7.7	0.09	122	0.036	-100	0.040	-100	0.90	117	28.9
7.8	0.09	133	0.037	-100	0.038	-103	0.90	116	28.6
7.9	0.09	141	0.039	-106	0.035	-104	0.90	115	28.2
8.0	0.10	151	0.032	-100	0.032	-108	0.90	114	29.9
8.1	0.10	158	0.030	-107	0.030	-109	0.90	114	30.5
8.2	0.12	163	0.029	-114	0.028	-110	0.90	113	30.8
8.3	0.13	167	0.025	-116	0.025	-114	0.90	112	32.0
8.4	0.14	169	0.021	-114	0.023	-117	0.90	111	33.6
8.5	0.15	171	0.019	-120	0.020	-117	0.90	111	34.4
8.6	0.17	173	0.020	-114	0.017	-120	0.90	110	34.0
8.7	0.19	173	0.015	-114	0.015	-120	0.90	109	36.5
8.8	0.20	173	0.014	-116	0.012	-122	0.90	108	37.1
8.9	0.21	173	0.012	-122	0.011	-126	0.90	108	38.4
9.0	0.23	172	0.009	-115	0.008	-127	0.90	107	40.9
9.1	0.24	171	0.006	-121	0.007	-117	0.90	106	44.4
9.2	0.25	170	0.004	-74	0.004	-112	0.89	105	49.0
9.3	0.27	169	0.004	-117	0.002	-93	0.90	105	48.0
9.4	0.28	168	0.001	23	0.001	-65	0.90	104	58.9
9.5	0.29	166	0.002	10	0.002	18	0.90	103	54.0
9.6	0.30	165	0.004	1	0.004	13	0.89	103	48.5
9.7	0.31	164	0.004	14	0.007	22	0.90	102	48.0
9.8	0.32	162	0.008	21	0.009	28	0.90	101	42.4
9.9	0.33	160	0.013	28	0.010	26	0.89	100	37.7
10.0	0.33	159	0.012	22	0.013	23	0.89	100	38.4
10.1	0.34	157	0.016	27	0.015	21	0.90	99	35.9
10.2	0.35	155	0.017	19	0.017	18	0.90	98	35.4
10.3	0.35	153	0.020	16	0.018	17	0.90	98	34.0
10.4	0.36	152	0.020	12	0.020	16	0.89	97	34.0
10.5	0.36	151	0.020	10	0.021	13	0.90	96	34.0
10.6	0.37	149	0.023	9	0.024	11	0.89	95	32.8
10.7	0.37	147	0.025	9	0.025	8	0.88	95	32.0
10.8	0.38	145	0.028	6	0.027	7	0.89	95	30.9
10.9	0.38	144	0.031	6	0.030	5	0.89	94	30.2
11.0	0.38	142	0.030	2	0.031	2	0.89	93	30.5
11.1	0.38	140	0.033	-1	0.033	-1	0.89	92	29.6
11.2	0.38	138	0.036	-5	0.035	-5	0.89	91	28.9
11.3	0.38	136	0.036	-4	0.037	-7	0.89	91	28.9
11.4	0.38	134	0.039	-13	0.038	-9	0.89	90	28.2
11.5	0.37	132	0.042	-12	0.041	-12	0.88	90	27.5
11.6	0.37	130	0.043	-13	0.042	-15	0.88	89	27.3
11.7	0.37	128	0.043	-16	0.044	-19	0.88	88	27.3
11.8	0.36	125	0.045	-23	0.046	-23	0.88	87	26.9
11.9	0.35	122	0.049	-27	0.048	-27	0.88	87	26.2
12.0	0.34	119	0.049	-31	0.048	-31	0.87	86	26.2

T<sub>A</sub> = 25°C

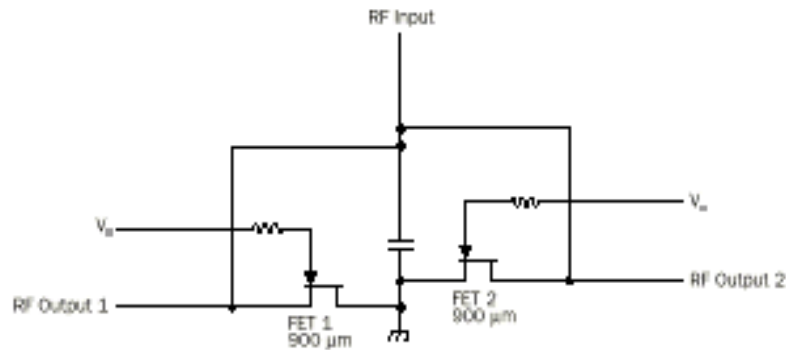
Reference planes for S-parameter data include bond wires as specified in the "Recommended Assembly Diagram". The S-parameters are also available on floppy disk and the world wide web.

**RF CHARACTERISTICS**

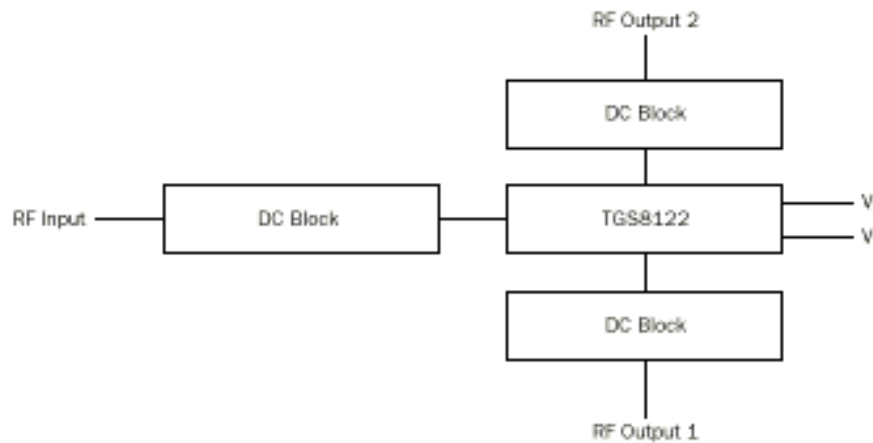
PARAMETER	TEST CONDITIONS	TYP	UNIT
IL Insertion loss	f = 8 to 11 GHz	0.9	dB
ISO Isolation	f = 8 GHz	30	dB
	f = 9 GHz	40	
	f = 10 GHz	42	
	f = 11 GHz	31	
SWR(in) Input standing-wave ratio	f = 8 to 11 GHz	1.5:1	
SWR(out) Output standing-wave ratio	f = 8 to 11 GHz	1.4:1	
P <sub>1dB(in)</sub> Input power at 1-dB gain compression	f = 8 to 11 GHz	27.5	dBm
t <sub>r</sub> Rise time, detected output voltage level	P <sub>IN</sub> = 8 dBm at 10 GHz	<2	ns
t <sub>f</sub> Fall time, detected output voltage level			

T<sub>A</sub> = 25°C

**EQUIVALENT SCHEMATIC**



**RECOMMENDED ASSEMBLY DIAGRAM**

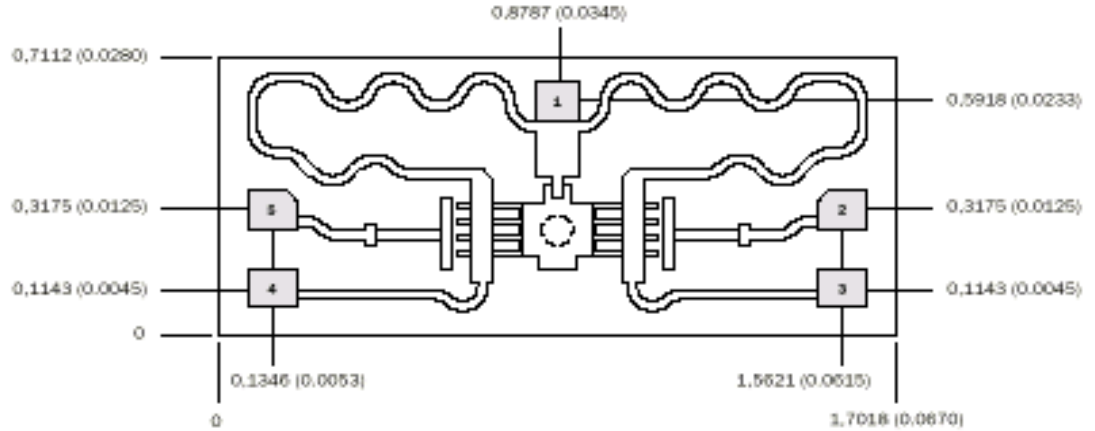


RF connections: bond using two 1-mil diameter, 20- to 25-mil-length gold wires at the RF Input and three 1-mil diameter, 20- to 25-mil-length gold wires at the RF Output port for optimum RF performance.

Low-loss path is RF Input to RF Output 1 for V<sub>1</sub> = -7 V and V<sub>2</sub> = 0. Low-loss path is RF Input to RF Output 2 for V<sub>1</sub> = 0 and V<sub>2</sub> = -7 V.

DC blocks are not provided at RF ports.

**MECHANICAL DRAWING**



Units: millimeters (inches)

Thickness: 0,1524 (0,006) (reference only)

Chip-edge-to-bond-pad dimensions are shown to center of bond pad.

Chip-size tolerance:  $\pm 0,0508$  (0,002)

Bond pad #1 (RF Input):	0,1118 x 0,0991 (0,0044 x 0,0039)
Bond pad #2 ( $V_{DD}$ ):	0,1219 x 0,0965 (0,0048 x 0,0038)
Bond pad #3 (RF Output 2):	0,1219 x 0,0965 (0,0048 x 0,0038)
Bond pad #4 (RF Output 1):	0,1219 x 0,0965 (0,0048 x 0,0038)
Bond pad #5 ( $V_{SS}$ ):	0,1219 x 0,0965 (0,0048 x 0,0038)

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