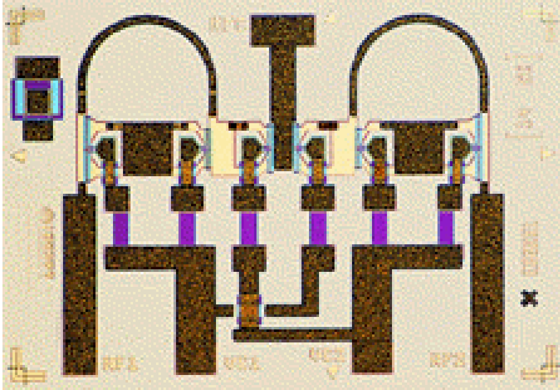
TriQuint SEMICONDUCTOR®

Product Data Sheet

SPDT FET Switch

TGS8250-SCC



Key Features and Performance

- DC to 18 GHz Frequency Range
- 2 dB Typical Insertion Loss
- 39 dB Typical Isolation Across Band
- 2 ns Rise/Fall Time
- 50 uA Typical Current Consumption with Control Voltage of -7 V, 0 V
- 1.8034 x 1.2700 x 0.1016 mm (0.071 x 0.050 x 0.004 in.)

Description

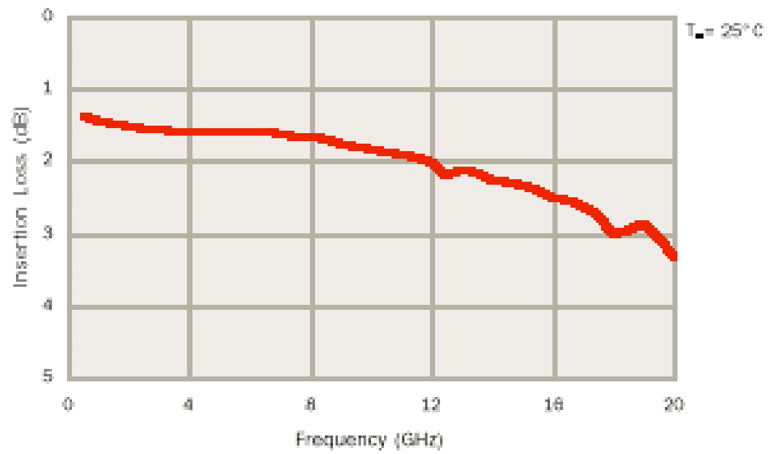
The TriQuint TGS8250-SCC is a GaAs single-pole, double-throw (SPDT) FET monolithic switch designed to operate over the DC to 18 GHz frequency range.

This switch not only maintains a high isolation loss and a low insertion loss across a wide bandwidth, but also has very low power consumption and attains a rise/fall time of less than 2 ns. These advantages, along with the small size of the chip, make the TGS8250-SCC ideal for use in high-speed radar and communication applications.

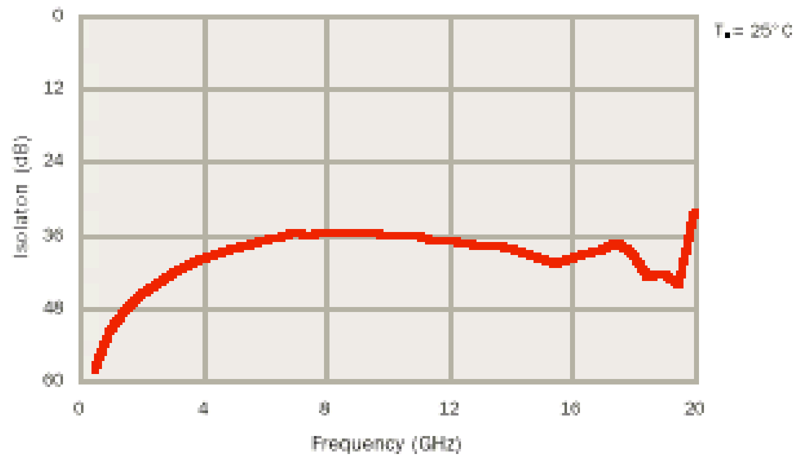
Bond pad and backside metallization are gold plated for compatibility with eutectic alloy attachment methods as well as the thermocompression and thermosonic wire bonding processes.

The TGS8250-SCC is supplied in chip form and is engineered for high-volume automated assembly.

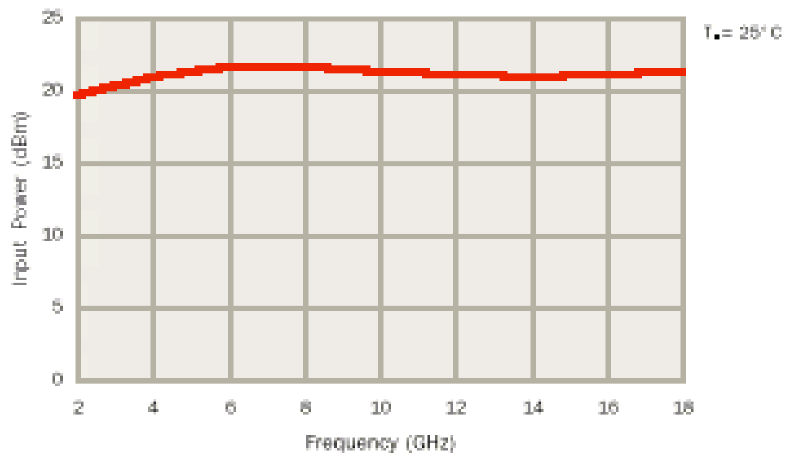
TYPICAL INSERTION LOSS



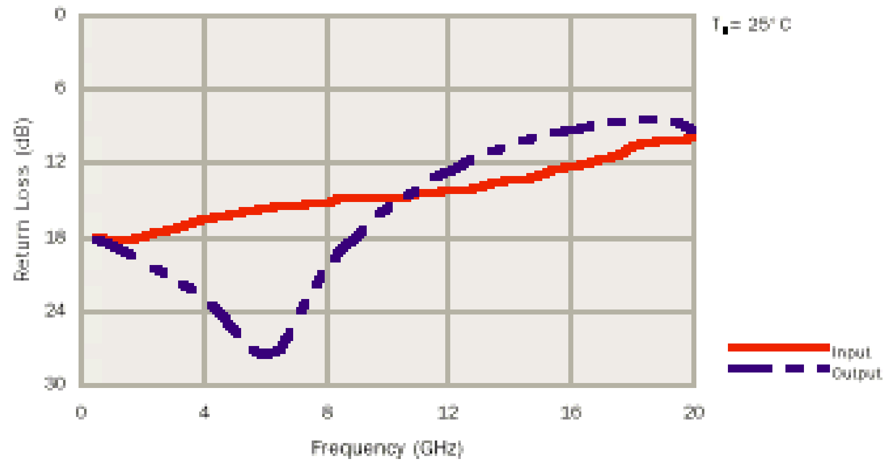
TYPICAL ISOLATION



TYPICAL INPUT POWER
P_{1dB}



TYPICAL RETURN LOSS



ABSOLUTE MAXIMUM RATINGS

Input signal power, P_{IN},*	1 W
Control voltage range, $V_{CTRL1,2}$	-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 (T_{CH}) directly affects the device MTTF. For maximum life, it is recommended that channel temperature be maintained at the lowest possible level.

TYPICAL S-PARAMETERS

Insertion Path

Frequency	S_{11}		S_{21}		S_{12}		S_{22}		Insertion Loss
(GHz)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	(dB)
0.5	0.13	-4	0.85	-6	0.855	-6	0.12	-8	1.4
1.0	0.12	-4	0.85	-12	0.850	-11	0.12	-12	1.5
1.5	0.12	-4	0.84	-17	0.844	-17	0.11	-16	1.5
2.0	0.13	-5	0.84	-22	0.840	-22	0.10	-19	1.5
2.5	0.13	-7	0.84	-28	0.839	-27	0.09	-23	1.5
3.0	0.13	-10	0.84	-33	0.837	-32	0.09	-28	1.6
3.5	0.14	-13	0.83	-39	0.837	-38	0.08	-33	1.6
4.0	0.15	-18	0.83	-44	0.835	-43	0.07	-42	1.6
4.5	0.15	-23	0.83	-50	0.834	-49	0.06	-51	1.6
5.0	0.16	-29	0.83	-55	0.834	-54	0.05	-65	1.6
5.5	0.16	-35	0.83	-61	0.835	-60	0.05	-85	1.6
6.0	0.17	-42	0.83	-66	0.833	-65	0.04	-112	1.6
6.5	0.17	-50	0.83	-72	0.830	-71	0.04	-135	1.6
7.0	0.17	-58	0.83	-78	0.830	-77	0.06	-155	1.6
7.5	0.17	-66	0.83	-84	0.830	-82	0.08	-175	1.7
8.0	0.17	-74	0.83	-89	0.827	-88	0.09	171	1.7
8.5	0.18	-83	0.82	-95	0.824	-94	0.11	158	1.7
9.0	0.18	-92	0.82	-101	0.820	-100	0.13	149	1.8
9.5	0.18	-101	0.81	-107	0.814	-105	0.15	142	1.8
10.0	0.18	-109	0.81	-112	0.807	-111	0.17	134	1.9
10.5	0.18	-115	0.81	-118	0.808	-116	0.18	127	1.9
11.0	0.19	-125	0.80	-124	0.808	-122	0.20	122	1.9
11.5	0.19	-134	0.80	-129	0.801	-127	0.22	116	2.0
12.0	0.19	-143	0.79	-135	0.793	-133	0.23	111	2.0
12.5	0.20	-151	0.79	-140	0.789	-138	0.25	106	2.1
13.0	0.20	-159	0.78	-146	0.787	-144	0.27	101	2.1
13.5	0.21	-168	0.78	-151	0.779	-149	0.28	96	2.2
14.0	0.21	-177	0.77	-157	0.769	-154	0.29	93	2.3
14.5	0.21	175	0.77	-162	0.771	-159	0.31	88	2.3
15.0	0.22	167	0.76	-167	0.768	-165	0.33	83	2.3
15.5	0.24	158	0.76	-173	0.757	-171	0.34	79	2.4
16.0	0.24	151	0.75	-179	0.747	-176	0.34	75	2.5
16.5	0.25	143	0.75	176	0.744	178	0.35	71	2.6
17.0	0.26	135	0.74	170	0.742	172	0.36	68	2.6
17.5	0.27	131	0.73	163	0.732	166	0.37	63	2.7
18.0	0.29	124	0.71	158	0.708	161	0.36	60	3.0
18.5	0.30	118	0.71	152	0.718	155	0.37	53	3.0
19.0	0.31	112	0.72	145	0.721	148	0.37	46	2.9
19.5	0.31	108	0.71	138	0.709	140	0.37	37	3.0
20.0	0.32	108	0.68	131	0.679	134	0.34	25	3.3
20.5	0.36	106	0.68	125	0.687	127	0.30	15	3.3

$T_A = 25^0C$

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	S_{11}		S_{21}		S_{12}		S_{22}		Isolation
(GHz)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	MAG	ANG(°)	(dB)
0.5	0.15	1	0.001	92	0.001	92	0.74	175	58.4
1.0	0.15	-1	0.002	89	0.002	89	0.74	170	52.0
1.5	0.16	-1	0.004	89	0.004	89	0.74	165	48.6
2.0	0.17	-4	0.005	87	0.005	88	0.73	160	45.9
2.5	0.18	-7	0.006	85	0.006	86	0.73	155	44.2
3.0	0.19	-12	0.007	84	0.007	84	0.73	150	42.5
3.5	0.20	-17	0.009	83	0.009	84	0.73	146	41.3
4.0	0.21	-23	0.010	82	0.010	82	0.73	141	40.2
4.5	0.22	-31	0.011	80	0.011	81	0.72	136	39.2
5.0	0.23	-38	0.012	78	0.012	78	0.72	132	38.3
5.5	0.24	-45	0.013	76	0.013	77	0.72	128	37.7
6.0	0.25	-54	0.014	73	0.014	74	0.71	124	37.1
6.5	0.27	-64	0.015	71	0.015	72	0.70	120	36.5
7.0	0.27	-74	0.017	66	0.016	67	0.70	117	35.7
7.5	0.27	-84	0.016	60	0.016	62	0.71	114	36.0
8.0	0.28	-92	0.016	58	0.016	60	0.72	110	35.8
8.5	0.29	-102	0.016	55	0.017	56	0.71	105	35.7
9.0	0.30	-112	0.016	50	0.016	51	0.69	102	35.8
9.5	0.30	-123	0.016	47	0.016	48	0.69	101	35.9
10.0	0.29	-132	0.016	41	0.016	44	0.70	99	36.0
10.5	0.30	-140	0.015	39	0.015	41	0.71	95	36.3
11.0	0.31	-150	0.015	31	0.015	32	0.70	92	36.3
11.5	0.31	-160	0.014	23	0.015	24	0.69	90	36.8
12.0	0.31	-170	0.014	18	0.014	19	0.69	89	37.2
12.5	0.31	-179	0.013	11	0.013	13	0.69	87	37.7
13.0	0.31	171	0.013	4	0.013	5	0.70	84	37.9
13.5	0.31	161	0.013	-6	0.013	-4	0.70	83	37.9
14.0	0.31	150	0.012	-17	0.012	-14	0.70	82	38.5
14.5	0.30	141	0.011	-25	0.011	-23	0.72	81	39.2
15.0	0.30	131	0.010	-31	0.010	-29	0.73	78	39.8
15.5	0.29	121	0.009	-32	0.009	-30	0.71	76	40.7
16.0	0.29	111	0.010	-30	0.010	-28	0.70	76	39.9
16.5	0.28	101	0.011	-36	0.011	-34	0.70	76	39.0
17.0	0.26	90	0.011	-40	0.012	-37	0.72	76	38.8
17.5	0.24	81	0.013	-43	0.013	-42	0.73	73	37.5
18.0	0.22	73	0.011	-103	0.011	-101	0.71	74	38.9
18.5	0.20	62	0.007	-29	0.007	-26	0.74	72	43.1
19.0	0.15	46	0.007	-26	0.007	-22	0.77	70	42.7
19.5	0.08	23	0.006	47	0.006	49	0.78	64	44.2
20.0	0.06	-135	0.024	13	0.024	15	0.75	61	32.5
20.5	0.17	166	0.033	-18	0.033	-15	0.73	58	29.7

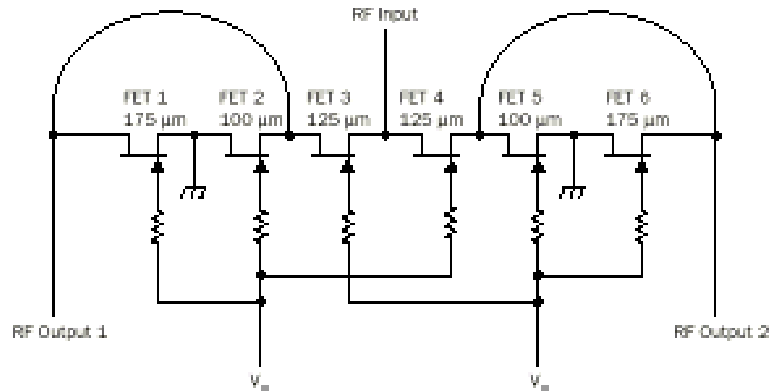
T_A = 25°C

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.

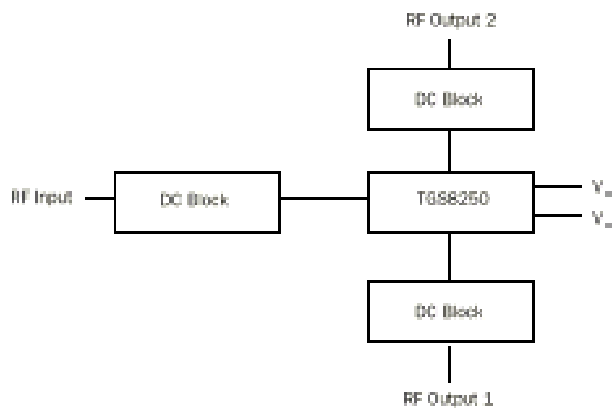
RF CHARACTERISTICS

PARAMETER		TEST CONDITIONS	TYP	UNIT
IL	Insertion loss	f = DC to 18 GHz	2	dB
ISO	Isolation	f = DC to 18 GHz	39	dB
SWR(in)	Input standing–wave ratio	f = DC to 18 GHz	1.5:1	—
SWR(out)	Output standing–wave ratio	f = DC to 18 GHz	1.5:1	—
P_{1dB}(in)	Input power at 1–dB gain compression	f = 2 to 18 GHz	21	dBm
t_r	Rise time	P_{IN} = 8 dBm, f = 10 GHz	<2	ns
t_f	Fall time			

EQUIVALENT SCHEMATIC



RECOMMENDED ASSEMBLY DIAGRAM

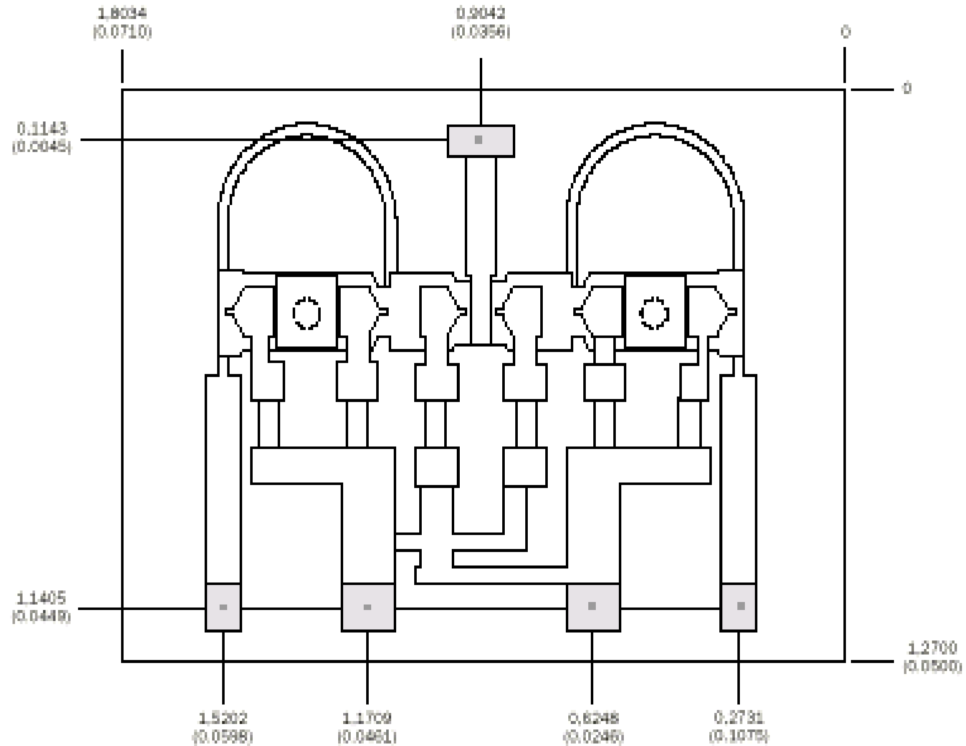


RF connections: Bond using 1-mil diameter, 20 to 25-mil length gold wire at both RF Input and RF Output ports for optimum RF performance.

Low-loss path is RF Input to RF Output 1 for V_1 = -7 V and V_2 = 0. Low-loss path is RF Input to RF Output 2 for V_1 = 0 V and V_2 = -7 V.

DC blocks are not provided at RF ports.

MECHANICAL DRAWING



Units: millimeters (inches)
Thickness: 0,1016 (0.004) (reference only)
Chip-size-to-bond-pad dimensions are shown to center of bond pad.
Chip size tolerance: ± 0,0508 (0.002)

Bond pad #1 (RF Input):	0,1651 x 0,1016 (0.0065 x 0.0040)
Bond pad #2 (RF Output 2):	0,0889 x 0,1016 (0.0035 x 0.0040)
Bond pad #3 (V_2):	0,0127 x 0,1016 (0.0050 x 0.0040)
Bond pad #4 (V_1):	0,0127 x 0,1016 (0.0050 x 0.0040)
Bond pad #5 (RF Output 1):	0,0889 x 0,1016 (0.0035 x 0.0040)

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