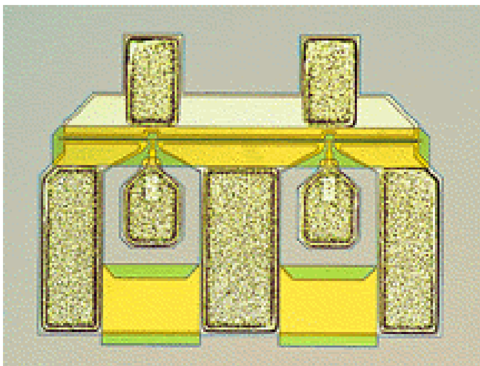
TriQuint SEMICONDUCTOR®

Product Data Sheet

Discrete MESFET

TGF1350-SCC



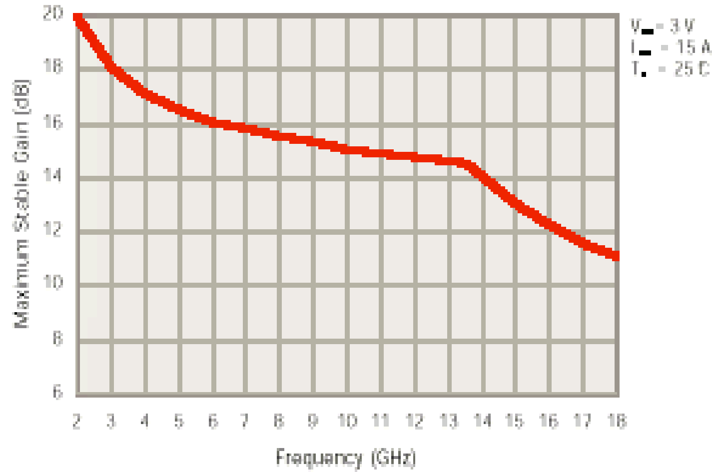
Key Features and Performance

- 0.5 um x 300 um FET
- 1.5 dB Noise Figure with 11dB Associated Gain at 10 GHz
- 2.5 dB Noise Figure with 7 dB Associated Gain at 18 GHz
- All-gold Metallization for High Reliability
- Recessed Gate Structure

Description

The TriQuint TGF1350-SCC is a single-gate GaAs field-effect transistor (FET) used for low-noise applications DC to 18 GHz. Bond pad is gold plated for compatibility with thermocompression and thermosonic compatibility wire-bonding processes. The TGF1350-SCC is readily assembled using automated equipment. Die attach should be accomplished with conductive epoxy only. Eutectic attach is not recommended .

TYPICAL MAXIMUM STABLE GAIN



ABSOLUTE MAXIMUM RATINGS

Drain-to-source voltage, V_{DS}	8 V
Drain-to-source voltage, V_{GS}	0 V to - 6 V
Drain-to-source voltage, V_{GD}	0 V to - 6 V
Power dissipation, P_D*	0.7 W
Operating channel temperature, T_{CH}**	150 ℃
Mounting temperature (30 sec), T_M	320 ℃
Storage temperature range, T_{STG}	- 65 ℃ to 150 ℃

Ratings over operating channel temperature range, T

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.

* Power dissipation, P_D at (or below) 25 ℃ base-plate temperature. For operation above 25 ℃ base-plate temperature, derate linearly at the rate of 1.4 mW/ ℃.

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

TYPICAL S-PARAMETERS

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG	ANG (°)	MAG	ANG (°)	MAG	ANG (°)	MAG	ANG (°)
2.0	0.98	-28	3.22	157	0.03	75	0.71	-12
2.5	0.96	-36	3.17	151	0.04	71	0.71	-14
3.0	0.93	-44	3.07	146	0.04	68	0.71	-14
3.5	0.93	-51	2.99	141	0.05	65	0.69	-16
4.0	0.90	-56	2.88	137	0.05	62	0.68	-17
4.5	0.89	-60	2.78	133	0.05	61	0.68	-19
5.0	0.88	-64	2.73	129	0.06	60	0.67	-24
5.5	0.87	-67	2.65	125	0.06	58	0.66	-28
6.0	0.85	-70	2.55	121	0.06	56	0.66	-30
6.5	0.83	-74	2.46	118	0.06	55	0.66	-31
7.0	0.82	-77	2.36	116	0.06	54	0.66	-32
7.5	0.82	-80	2.28	113	0.06	54	0.66	-32
8.0	0.81	-82	2.22	110	0.06	53	0.66	-33
8.5	0.81	-85	2.15	107	0.06	52	0.65	-34
9.0	0.80	-88	2.12	104	0.06	51	0.65	-38
9.5	0.79	-92	2.08	101	0.06	51	0.65	-40
10.0	0.78	-96	2.05	98	0.06	51	0.65	-43
10.5	0.78	-99	2.02	95	0.06	50	0.65	-45
11.0	0.77	-103	2.00	92	0.06	48	0.65	-48
11.5	0.78	-106	1.96	88	0.06	46	0.65	-51
12.0	0.77	-110	1.90	84	0.06	44	0.65	-54
12.5	0.77	-114	1.84	81	0.06	42	0.64	-56
13.0	0.76	-117	1.79	79	0.06	39	0.64	-58
13.5	0.75	-120	1.74	76	0.06	37	0.64	-60
14.0	0.75	-123	1.69	73	0.07	35	0.64	-64
14.5	0.74	-125	1.64	69	0.07	32	0.64	-69
15.0	0.74	-128	1.56	65	0.07	29	0.65	-74
15.5	0.74	-131	1.49	61	0.07	25	0.66	-78
16.0	0.73	-133	1.43	59	0.08	23	0.65	-81
16.5	0.72	-136	1.38	57	0.08	21	0.65	-81
17.0	0.73	-139	1.36	54	0.08	21	0.66	-81
17.5	0.73	-140	1.31	52	0.09	22	0.66	-82
18.0	0.74	-142	1.26	50	0.09	22	0.66	-83

T_A = 25°C, V_{DS} = 3 V, I_{DS} = 15mA

Reference planes for S-parameter data are located at center of gate and drain bond pads. Three 0.7 mil diameter wires, approximately 13 mils long, are bonded from the center of each of the source pads to ground. The S-parameters are also available on floppy disk and the world wide web.

RF CHARACTERISTICS

PARAMETER		TEST CONDITIONS	TYP	UNIT
NF_{MIN}	Minimum noise figure	10 GHz	1.5	dB
		18 GHz	2.5	
G_A	Associated gain	10 GHz	11	
		18 GHz	7	

V_{DS} = 3 V, I_{DS} = 15mA, T_A = 25°C

DC CHARACTERISTICS

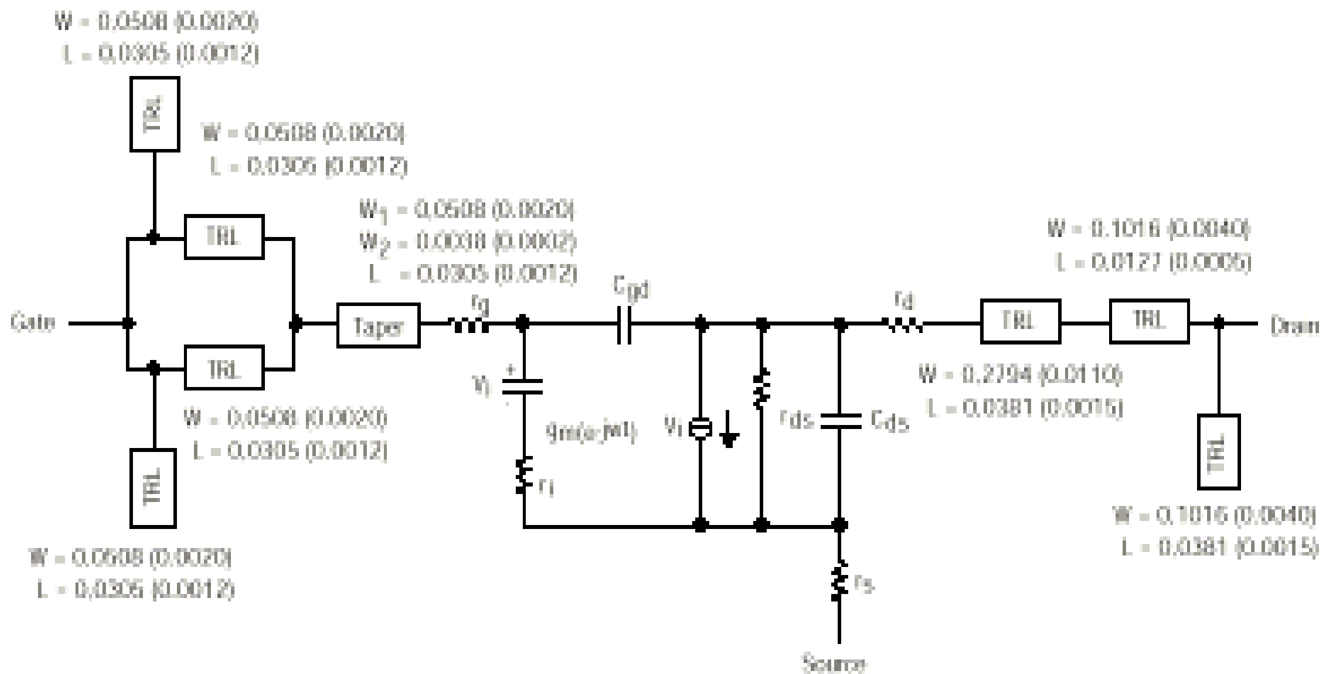
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{(BR)GDO}$	Gate–drain breakdown voltage	I_{GS} = 1.0mA per mm	- 6			V
$V_{(BR)GSO}$	Gate–source breakdown voltage	I_{GD} = 1.0mA per mm	- 6			V
$V_{GS(OFF)}$	Gate–source cutoff (pinch–off) voltage	V_{DS} = V_{DSS}* I_D = 0.5mA per mm	- 0.5	- 1.2	- 3	V
I_{DSS}	Zero–gate–voltage drain current at saturation	V_{DS} = 0.5 V to 3.5V** V_{GS} = 0	30	50	100	mA
G_M	DC transconductance	V_{DS} = 0.5 V to V_{DSS}* V_{GS} = - 0.25V	40	50	78	mA

T_A = 25°C

*V_{DSS} = V_{DS} @ I_{DSS}

**V_{DS} for I_{DSS} is the drain voltage between 0.5V and 3.5V at which drain current is highest.

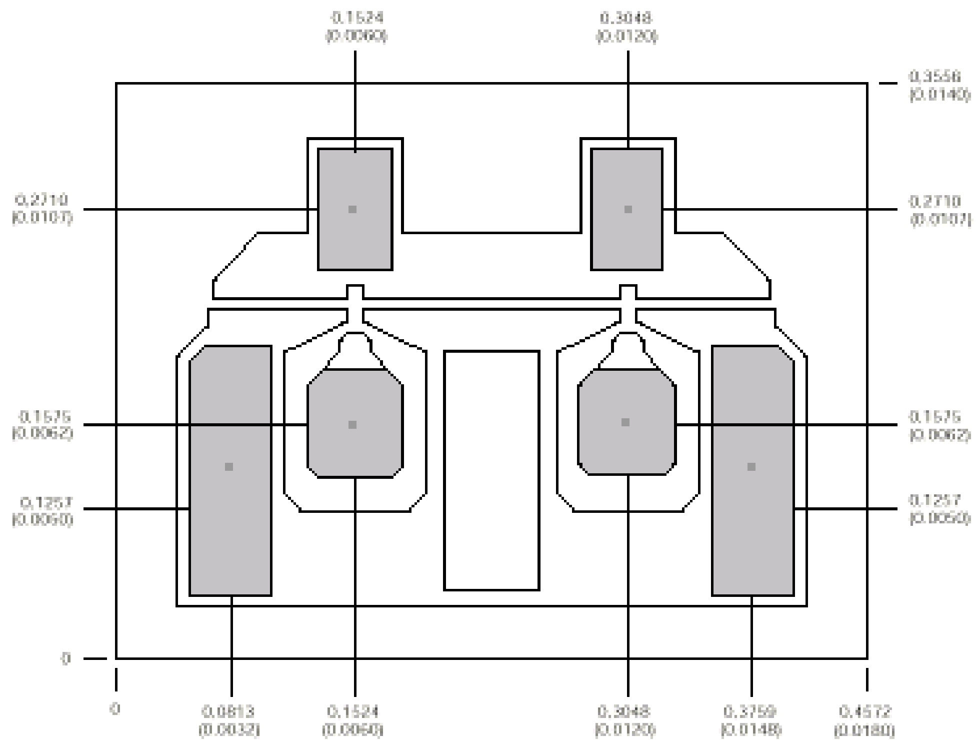
EQUIVALENT SCHEMATIC



TYPICAL MODEL PARAMETERS

	PARAMETER	VALUE	STANDARD DEVIATION	UNIT
r_s	Source resistance	5.62	0.6	Ω
r_d	Drain resistance	4.48	0.4	Ω
r_g	Gate resistance	4.68	0.5	Ω
g_m	Transconductance	52.32	6	mS
r_{ds}	Drain–to–source resistance	224	40	Ω
r_i	Input resistance	1.30	1	Ω
C_{gs}	Gate–to–source capacitance	0.351	0.027	pF
C_{gd}	Gate–to–drain capacitance	0.0159	0.0037	pF
C_{ds}	Drain–to–source capacitance	0.0877	0.0095	pF
τ	Time constant	2.33	0.1	ps

MECHANICAL DRAWING



Units: millimeters (inches)
Thickness: 0.1016 (0.004)
Chip size ± 0.0508 (0.002)

Bond pad #1 (source)	0.0508 x 0.1397 (0.0020 x 0.0055)
Bond pad #2 (gate)	0.0508 x 0.0610 (0.0020 x 0.0024)
Bond pad #3 (drain)	0.0508 x 0.0762 (0.0020 x 0.0030)
Bond pad #4 (drain)	0.0508 x 0.0762 (0.0020 x 0.0030)
Bond pad #5 (gate)	0.0508 x 0.0610 (0.0020 x 0.0024)
Bond pad #6 (source)	0.0508 x 0.1397 (0.0020 x 0.0055)

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