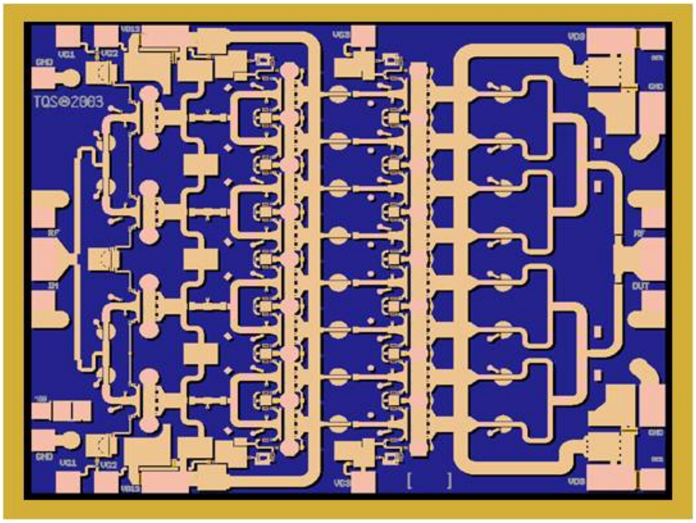
TriQuint SEMICONDUCTOR

Ka-Band 2W Power Amplifier TGA4516-TS



Key Features

- 30 - 40 GHz Bandwidth
- > 33 dBm Nominal Psat @ Pin = 20dBm
- 18 dB Nominal Gain
- Bias: 6 V, 1050 mA Idq (1.9A under RF Drive)
- 0.15 um 3MI MMW pHEMT Technology
- Thermal Spreader Dimensions:
  2.921 x 2.438 mm

Primary Applications

- Military Radar Systems
- Ka-Band Sat-Com
- Point to Point Radio

Product Description

The TriQuint TGA4516 is a High Power MMIC Amplifier for Ka-band applications. The part is designed using TriQuint's 0.15um power pHEMT process and is soldered to a CuMo thermal spreader. The small chip size is achieved by utilizing TriQuint's 3 metal layer interconnect (3MI) design technology that allows compaction of the design over competing products.

The TGA4516 provides >33 dBm saturated output power, and has typical gain of 18 dB at a bias of 6V and 1050mA (Idq). The current rises to 1.9A under RF drive.

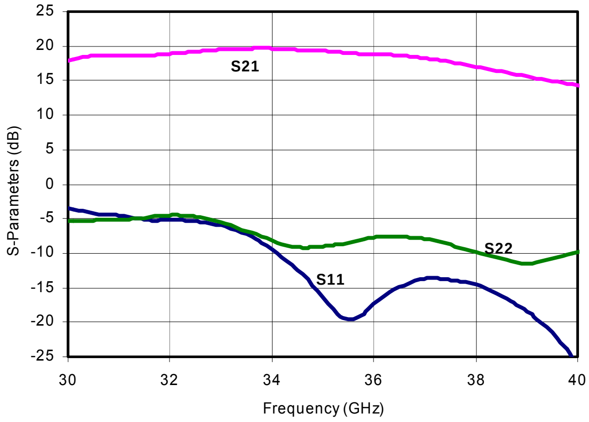
This HPA is ideally suited for many applications such as Military Radar Systems, Ka-band Sat-Com, and Point-to-Point Radios.

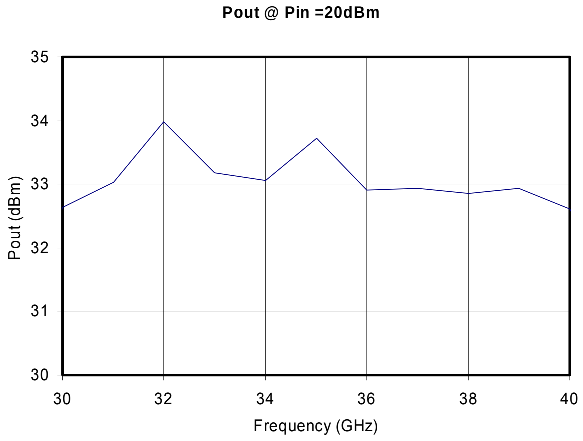
The TGA4516 is 100% DC and RF tested on-wafer to ensure performance compliance.

Lead-Free & RoHS compliant.

Fixtured Data

V_D = 6V, I_D = 1050mA





Datasheet subject to change without notice.

TABLE I
MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
V^+	Positive Supply Voltage	6.5 V	2/
V^-	Negative Supply Voltage Range	-5 TO 0 V	
I^+	Positive Supply Current	3 A	2/ 3/
$\lvert I_G \rvert$	Gate Supply Current	85 mA	3/
P_{IN}	Input Continuous Wave Power	24 dBm	
P_D	Power Dissipation	12.7 W	2/
T_{CH}	Operating Channel Temperature	200 °C	4/
T_M	Mounting Temperature (30 Seconds)	320 °C	
T_{STG}	Storage Temperature	-65 to 150 °C	

1/ These ratings represent the maximum operable values for this device.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

3/ Total current for the entire MMIC.

4/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

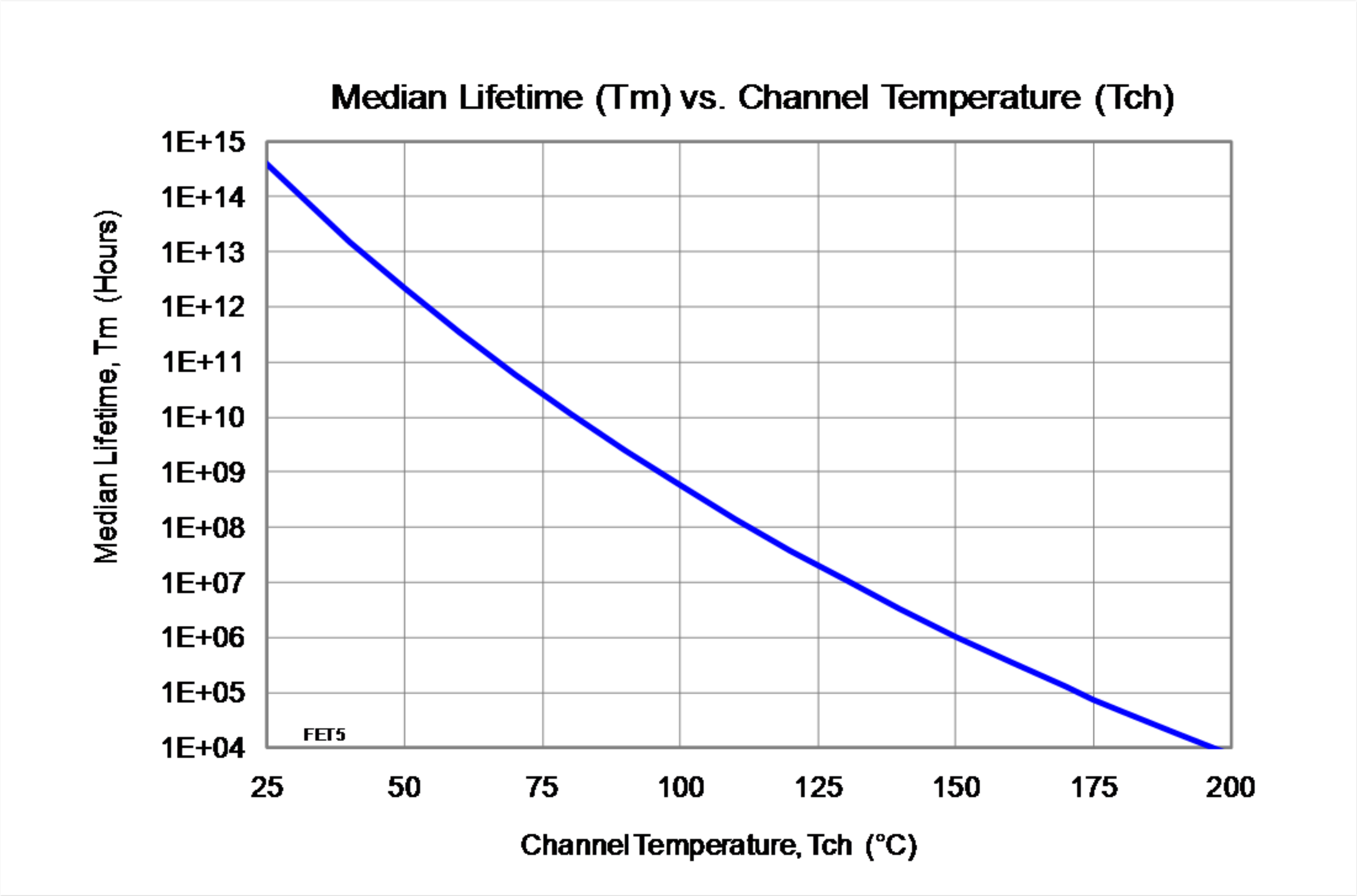
TABLE II
ELECTRICAL CHARACTERISTICS
(Ta = 25 °C, Nominal)

PARAMETER	TYPICAL	UNITS
Drain Operating	6	V
Quiescent Current	1050	mA
Frequency Range	30 - 40	GHz
Small Signal Gain, S21	18	dB
Input Return Loss, S11	10	dB
Output Return Loss, S22	7	dB
Power @ saturated, Psat	33	dBm

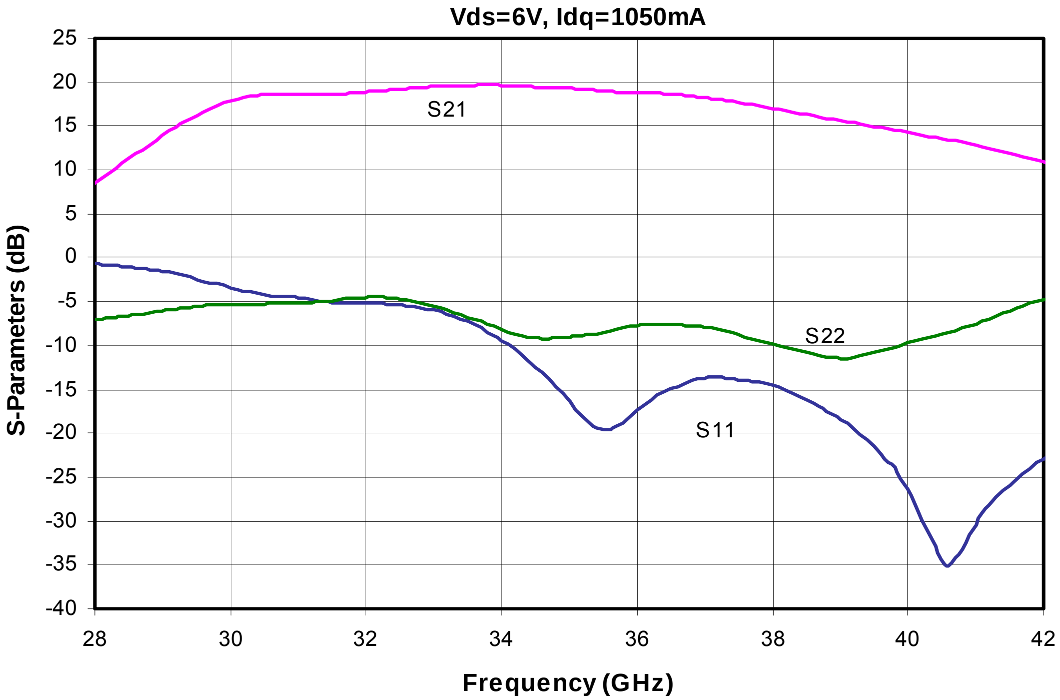
TABLE III
THERMAL INFORMATION

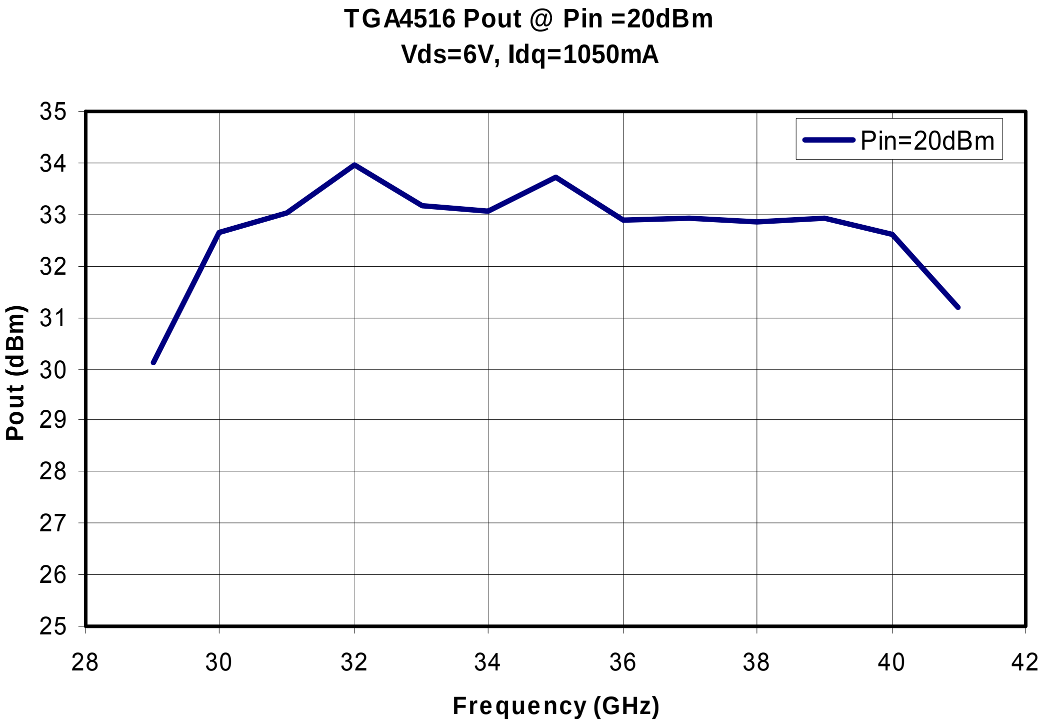
Parameter	Condition	Rating
Thermal Resistance, θ_{JC}, to back of thermal spreader 1/	Tbase = 70 °C	θ_{JC} = 8.3 °C/W
Channel Temperature (Tch), and Median Lifetime (Tm)	Tbase = 70 °C, Vd = 6 V, Id = 1.050 A, Pdiss = 6.3 W	Tch = 122 °C Tm = 2.9 E+7 Hours
Channel Temperature (Tch), and Median Lifetime (Tm) Under RF Drive	Tbase = 70 °C, Vd = 6 V, Id = 1.9 A, Pout = 33 dBm, Pdiss = 9.4 W	Tch = 148 °C Tm = 1.3E+6 Hours

1/ See Sheet 8, TGA4516 on Thermal Spreader, Note 5

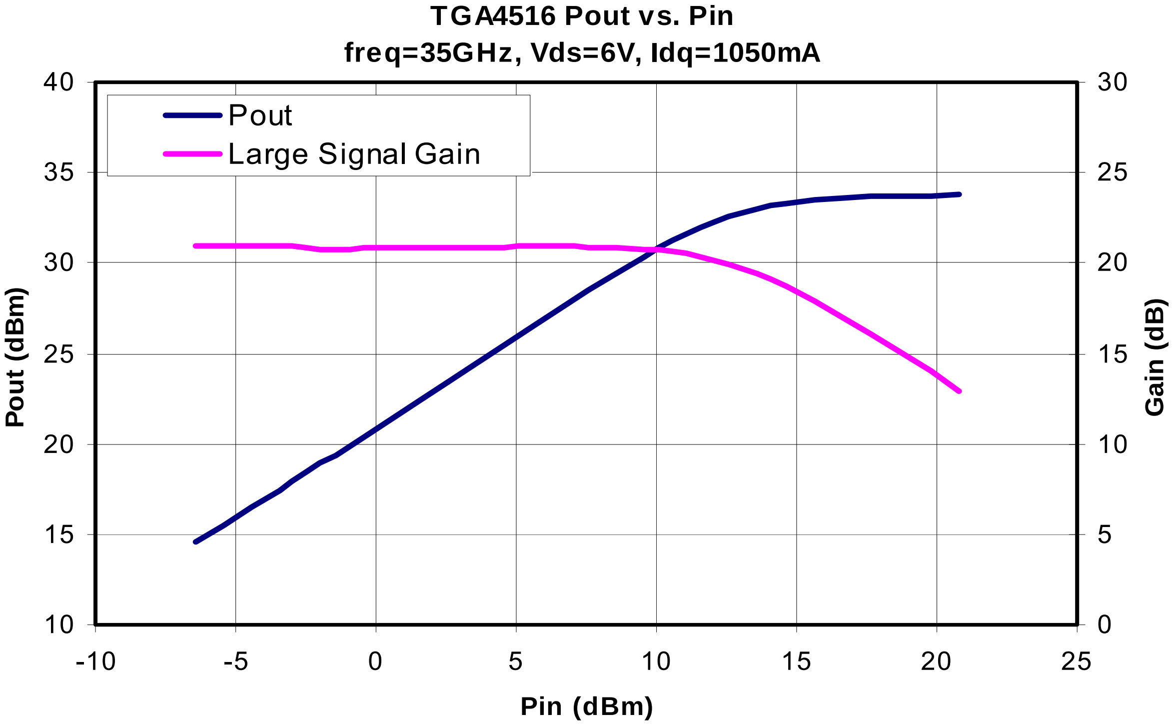


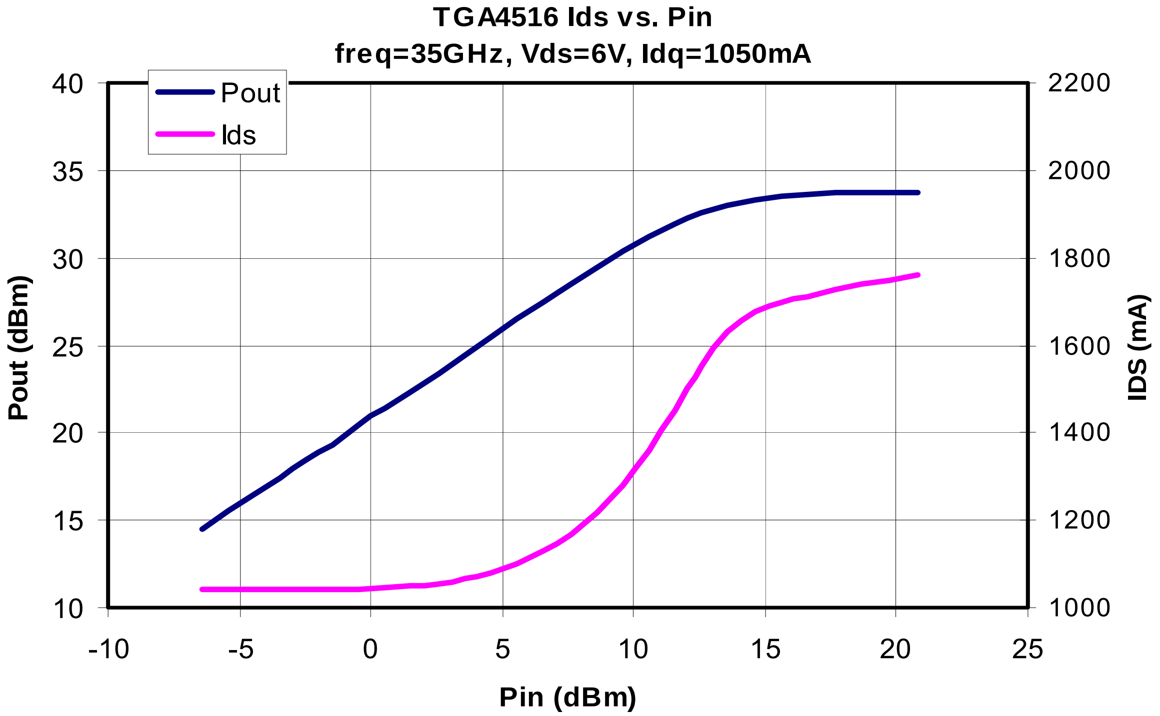
Fixtured Performance



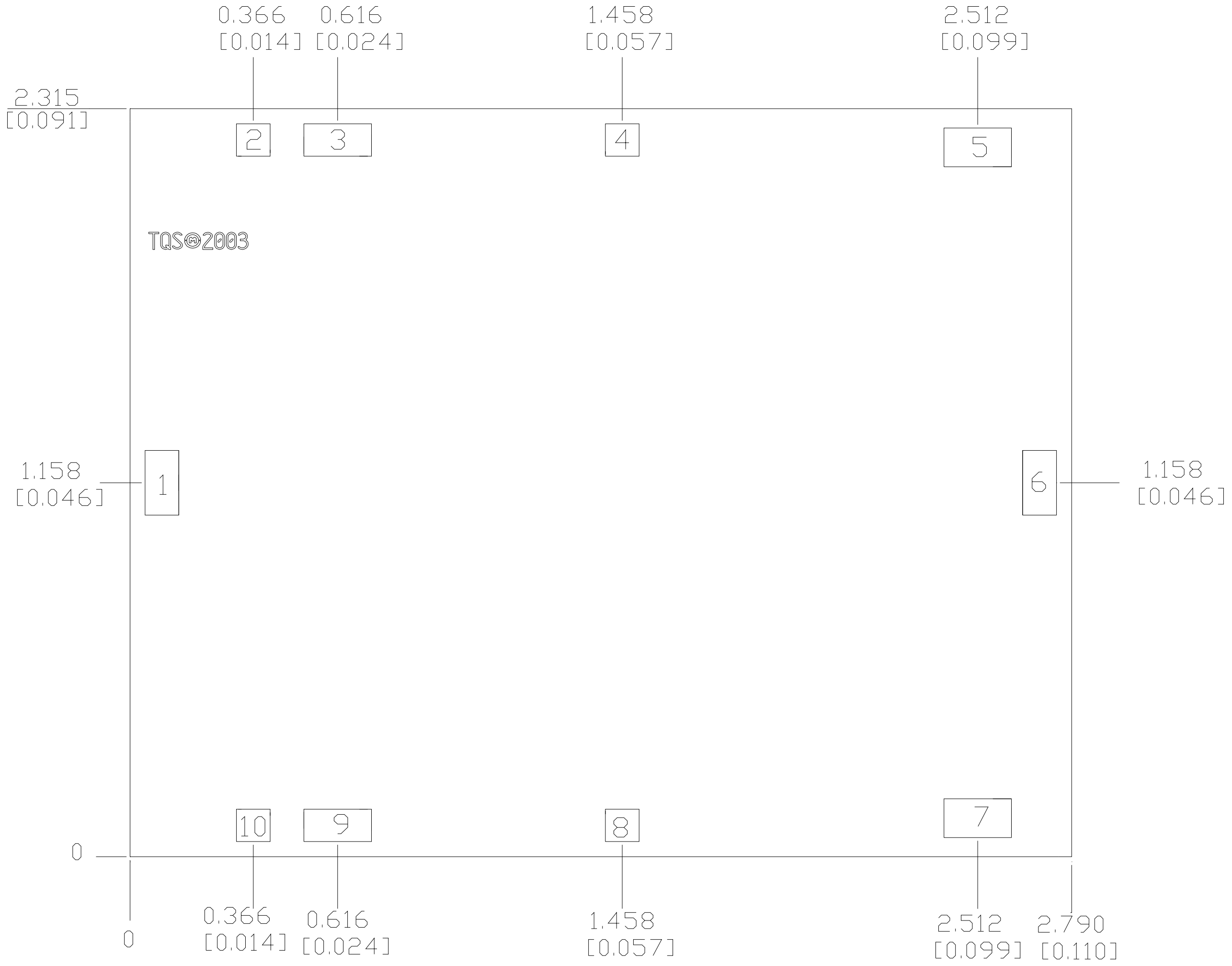


Fixtured Performance





Mechanical Drawing



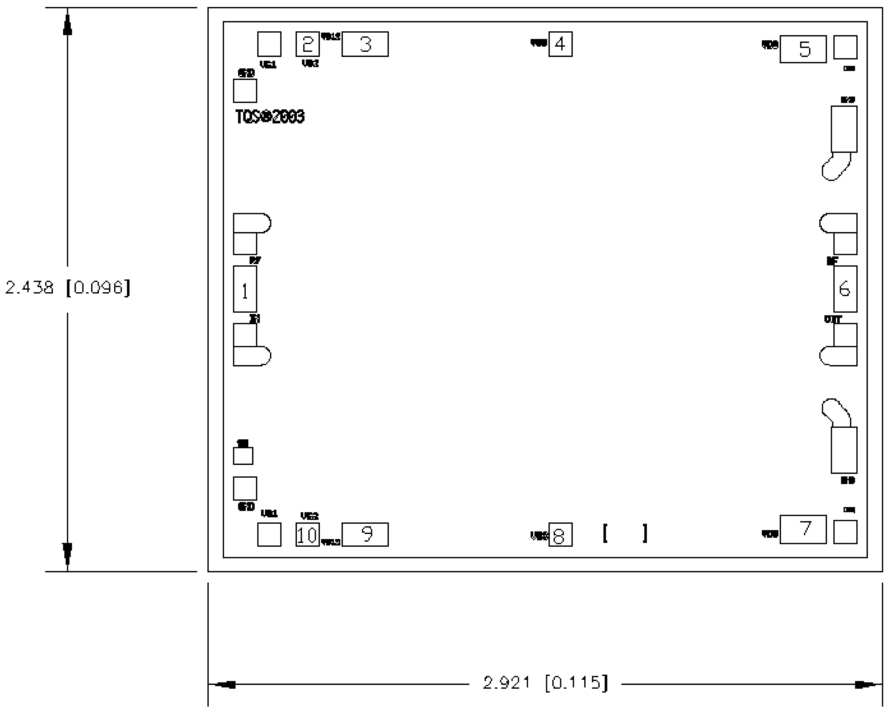
Units: Millimeters [inches]
Thickness: 0.100 [0.004] (reference only)
Chip edge to bond pad dimensions are shown to center of bond pad
Chipsize: 2.79 x 2.315 [0.110 x 0.091] +/- 0.51 [0.002]
RF Ground is backside of MMIC

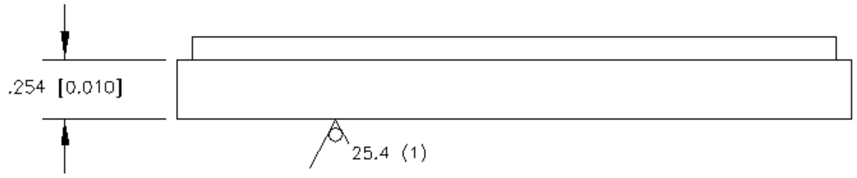
Bond pad #1	(RF Input)	0.100 x 0.200 [0.004 x 0.008]
Bond pad #2	(Vg2)	0.100 x 0.100 [0.004 x 0.004]
Bond pad #3	(Vd12)	0.100 x 0.200 [0.004 x 0.008]
Bond pad #4	(Vg3)	0.100 x 0.100 [0.004 x 0.004]
Bond pad #5	(Vd3)	0.100 x 0.100 [0.004 x 0.004]
Bond pad #6	(RF Output)	0.100 x 0.200 [0.004 x 0.008]
Bond pad #7	(Vd3)	0.100 x 0.200 [0.004 x 0.008]
Bond pad #8	(Vg3)	0.100 x 0.100 [0.004 x 0.004]
Bond pad #9	(Vd12)	0.100 x 0.200 [0.004 x 0.008]
Bond pad #10	(Vg2)	0.100 x 0.100 [0.004 x 0.004]

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

Mechanical Drawing

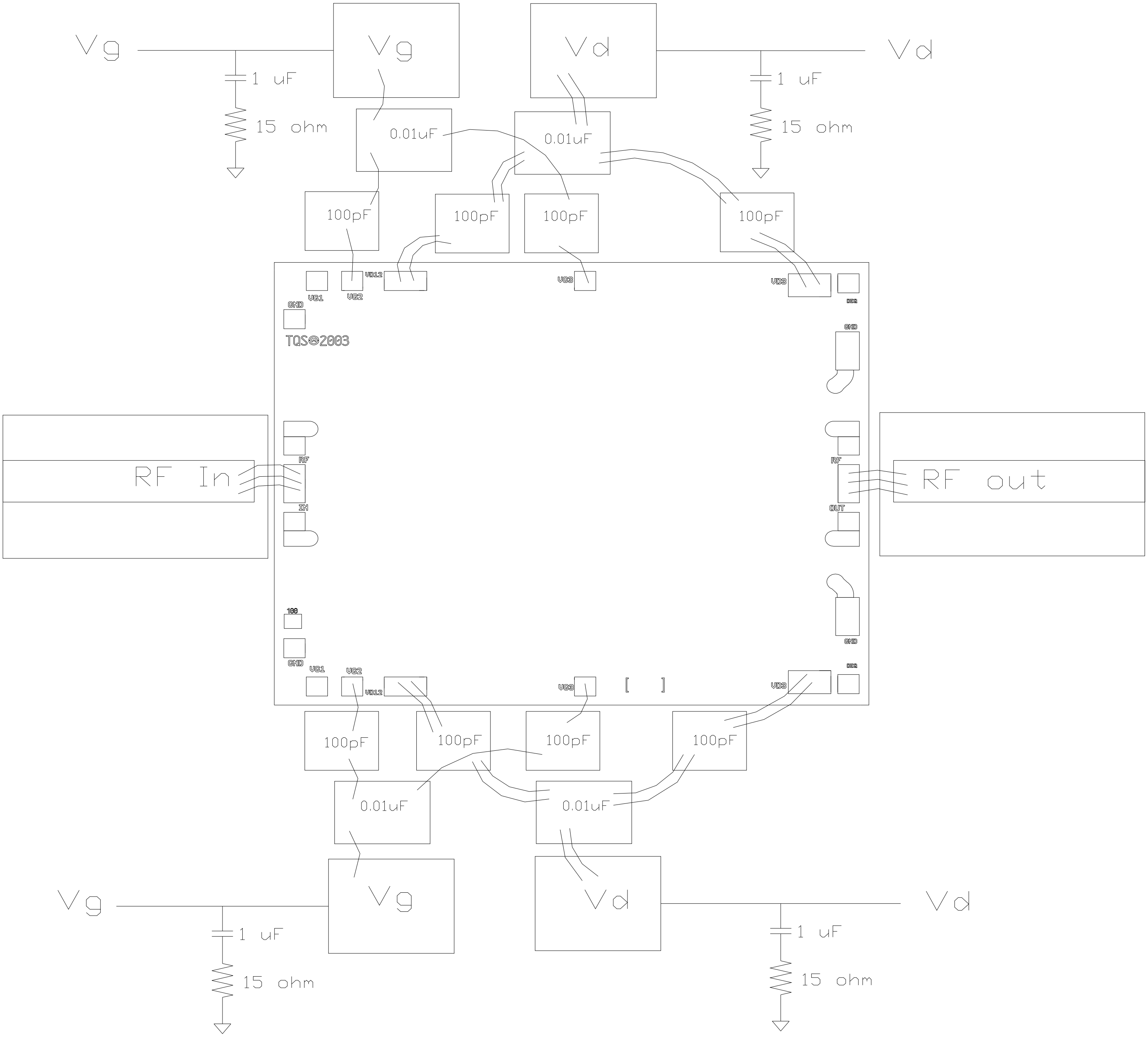
TGA4516 on Thermal Spreader





Notes:
1. Dimensions are in mm [inches].
2. Dimension limits apply after plating.
3. Dimension of surface roughness is in micrometer (microinch).
4. Tolerances unless otherwise stated +0.075, -0.025 [+0.003, -0.001]
5. Material:
    Copper and Molybdenum metal matrix material (AMC8515) with a CTE of 7.0 ppm/C.
6. Plating:
    Gold (Au) 1.27-2.54 um per ASTM B 488, Type 1, Code A.
    over
    Nickel (Ni) 2.5-7.5 um per QQ-N-290, Class 1.
7. MMIC is attached to thermal spreader using AuSn solder

Chip Assembly Diagram



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Assembly Process Notes

Component storage, placement, and adhesive attachment assembly notes:

- Devices must be stored in a dry nitrogen atmosphere.
- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Attachment of the thermal spreader should use an epoxy with high thermal conductivity.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

Ordering Information

Part	Package Style
TGA4516-TS	GaAs MMIC Die on Thermal Spreader

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