TGA2502-GSG

3.6 Watt 13-16 GHz Power Amplifier

Applications

- Ku-band communications
- Ku-band VSAT
- Point-to-point radio

Product Features

- Frequency Range: 13 - 16 GHz
- Saturated Output Power: 35.6 dBm
- Small Signal Gain: 26 dB
- Bias: Vd = 7 V, Idq = 1.3 A, Vg = -0.6 V typical

General Description

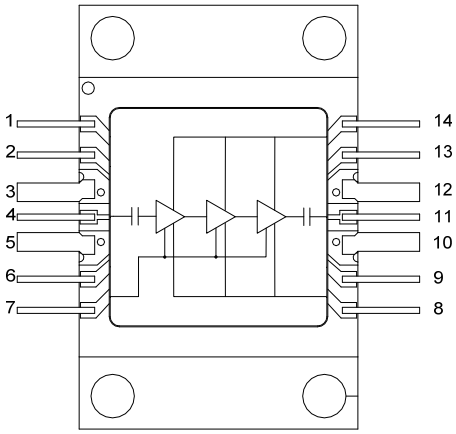
The TriQuint TGA2502-GSG provides 26 dB of small signal gain and 3.6 W of output power across 13-16 GHz. The TGA2502-GSG is designed using TriQuint's proven standard 0.25µm gate pHEMT production process.

The TGA2502-GSG features low loss ground-signal-ground (GSG) RF transitions designed to interface with a coplanar waveguide multilayer board.

Fully matched to 50 ohms and with integrated DC blocking capacitors on both I/O ports, the TGA2502 -GSG is ideally suited to support both commercial and defense related applications

Lead-free and RoHS compliant.

Functional Block Diagram



Pin Configuration

Pin #	Symbol
1,2,6,9,13	N/C
3,5,10,12	Gnd
4	RF In
7	Vg
8,14	Vd
11	RF Out

Ordering Information

Part No.	ECCN	Description
TGA2502-GSG	3A001.b.2b	Ku-band Power Amplifier

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage,Vd	9 V
Gate Voltage,Vg	-5 to 0 V
Drain Current, Id	3 A
Gate Current range, Ig	-18 to 18 mA
RF Input Power, CW, 50Ω,T = 25ºC	18 dBm
Channel Temperature, Tch	200°C
Mounting Temperature (30 Seconds)	260 °C
Storage Temperature	-40 to 150 °C

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Vd		7		V
Idq (no RF drive)		1.3		A
Id_drive (under RF drive)		2.0		A
Vg		-0.6		V

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions

Electrical Specifications

Test conditions unless otherwise noted: 25ºC, Vd = 7 V, Idq = 1.3 A, Vg = -0.6 V, CW, typical

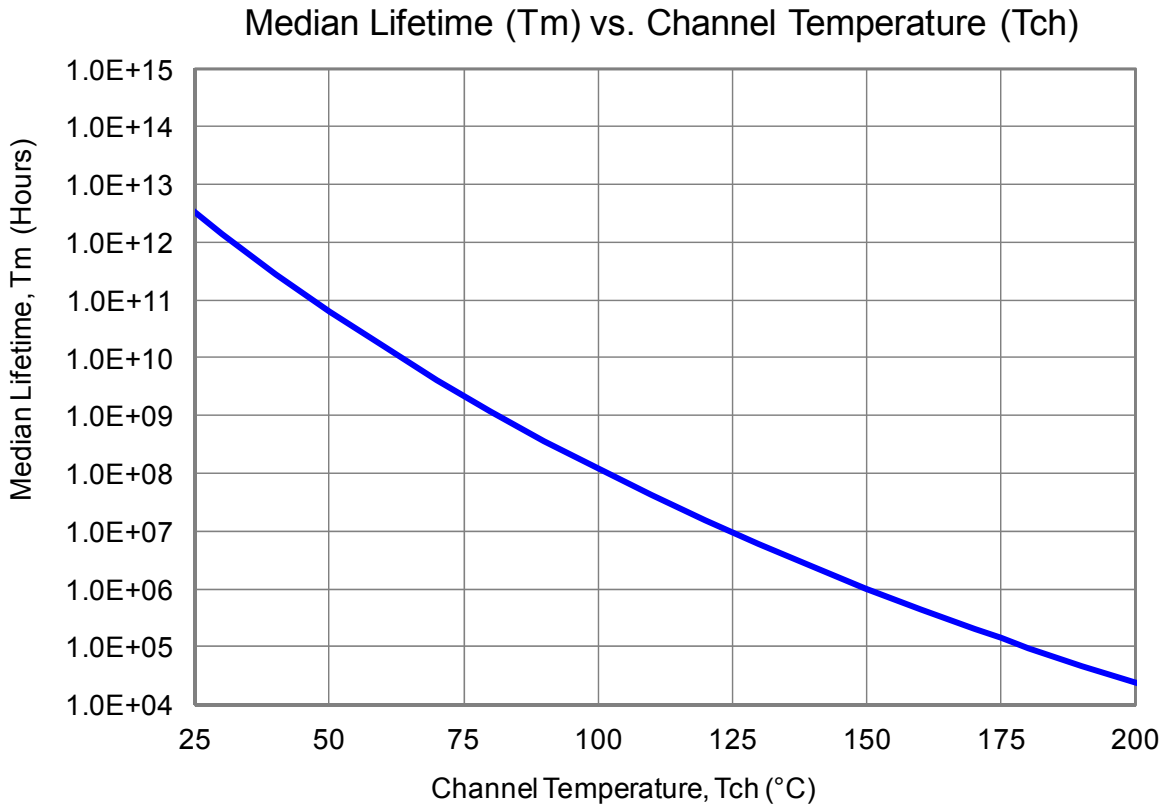
Parameter	Min	Typ	Max	Units
Operational Frequency Range	13		16	GHz
Small Signal Gain		26		dB
Output Power @ Saturation		35.6		dBm
Power-added Efficiency @ Saturation		27		%
Power Temperature Coefficient		-0.0065		dB/°C

Specifications (cont'd)

Thermal and Reliability Information

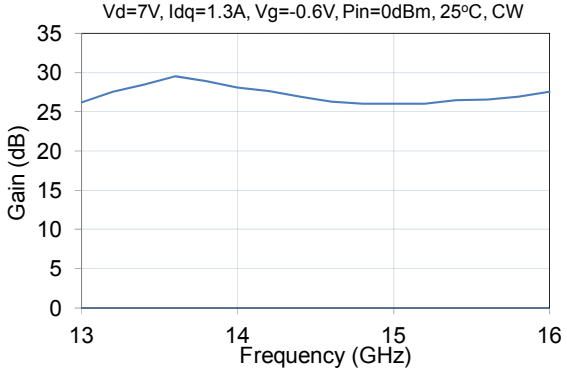
Parameter	Condition	Rating
Channel Temperature (Tch), Median Lifetime (Tm), Thermal Resistance*, no RF Drive	Tbase = 85 °C, Vd = 7V, Idq = 1.3 A, Pdiss = 9.1 W , CW	Tch = 147°C Tm = 1.4E+6 Hours θJC = 6.8 °C/W
Channel Temperature (Tch), Median Lifetime (Tm), Thermal Resistance*, under RF Drive	Tbase = 85 °C, Vd = 7V, Id = 2.1 A, Pout = 36.1 dBm, Pdiss = 10.6 W, CW	Tch = 158 °C Tm = 5.5E+5 Hours θJC = 6.9°C/W

* Thermal Resistance, θJC, measured to center bottom of package

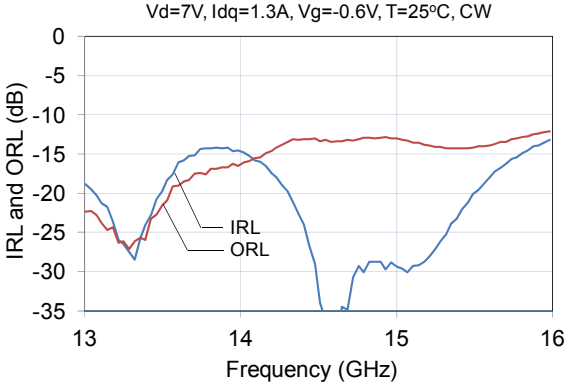


Typical Performance

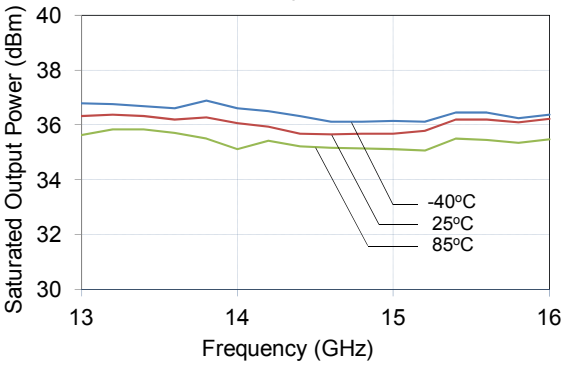
Gain vs. Frequency
Vd=7V, Idq=1.3A, Vg=-0.6V, Pin=0dBm, 25°C, CW



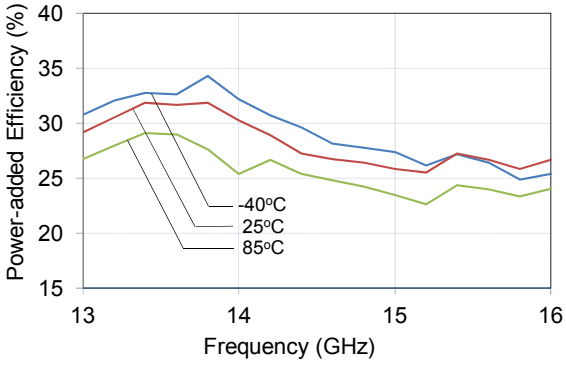
Return Loss vs. Frequency
Vd=7V, Idq=1.3A, Vg=-0.6V, T=25°C, CW



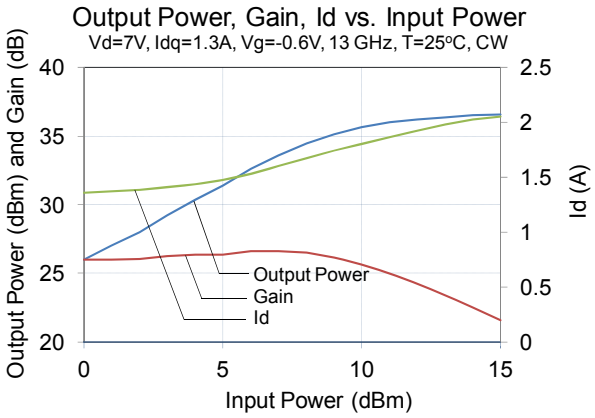
Saturated Output Power vs. Frequency
Vd=7V, Idq=1.3A, Vg=-0.6V, Pin=15dBm,CW

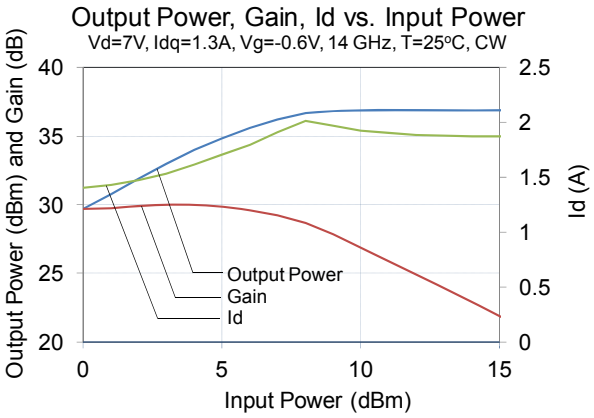


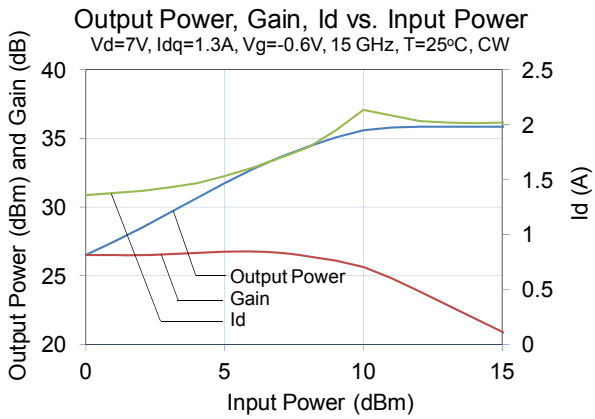
Power-added efficiency vs. Frequency
Vd=7V, Idq=1.3A, Vg=-0.6V, Pin=15dBm, CW

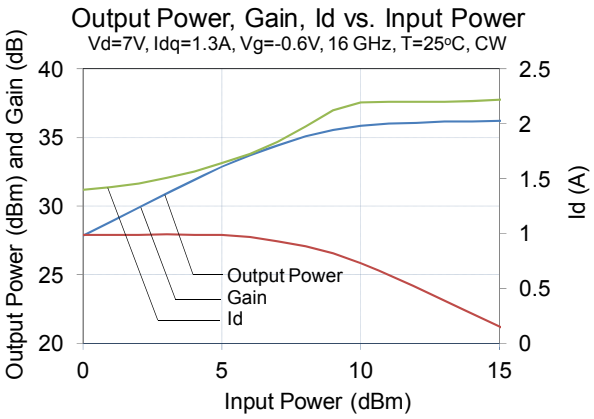


Typical Performance

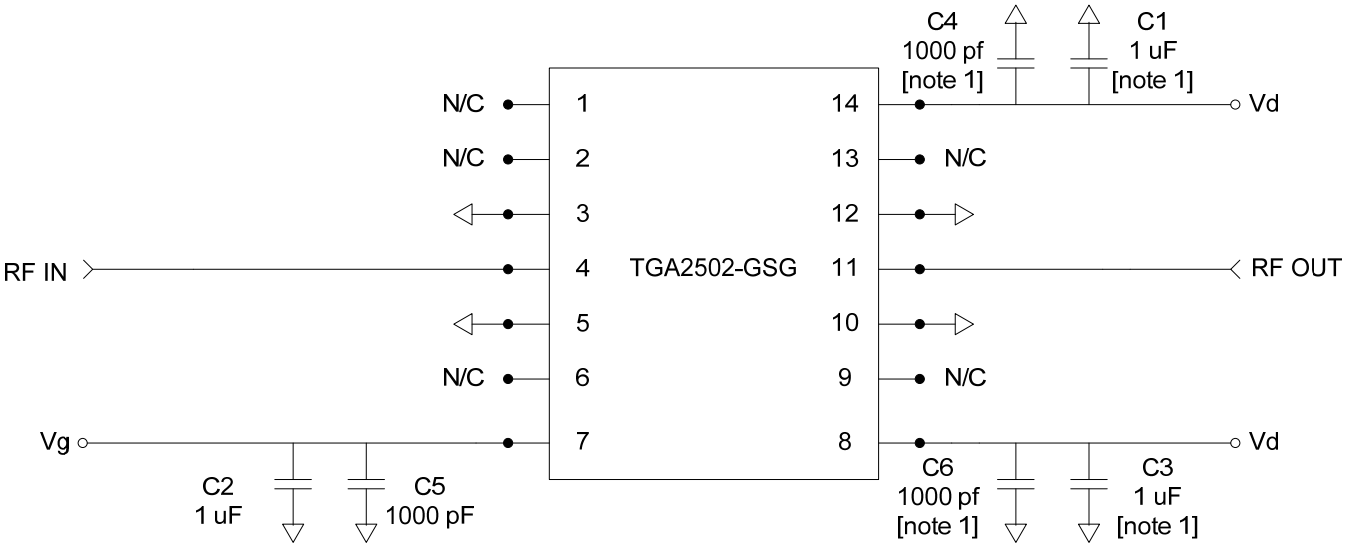








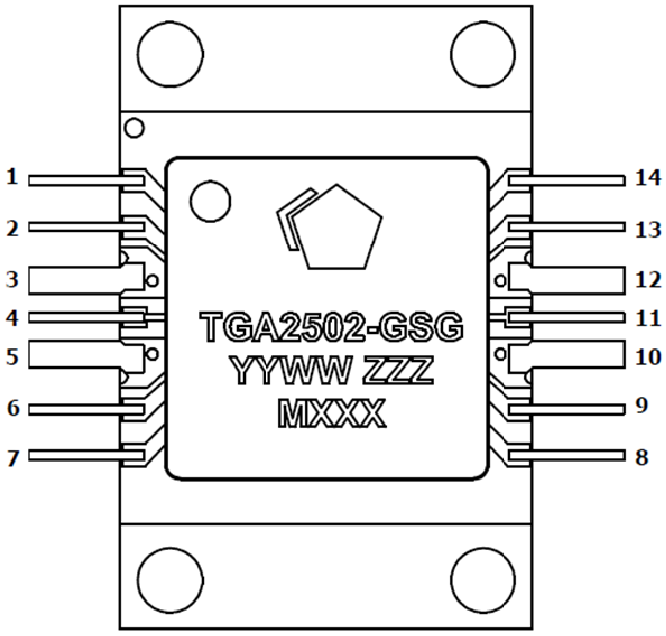
Application Circuit



Note 1: Remove cap for pulsed drain operation

Bias-up Procedure	Bias-down Procedure
Turn Vg to –2 V	Turn off RF signal
Turn Vd to 7 V	Reduce Vg to –2 V. Ensure Id ~ 0 mA
Adjust Vg more positive until quiescent Id is 1.3 A. This will be Vg ~ -0.6 V typical	Turn Vd to 0 V
Apply RF signal	Turn Vg to 0 V

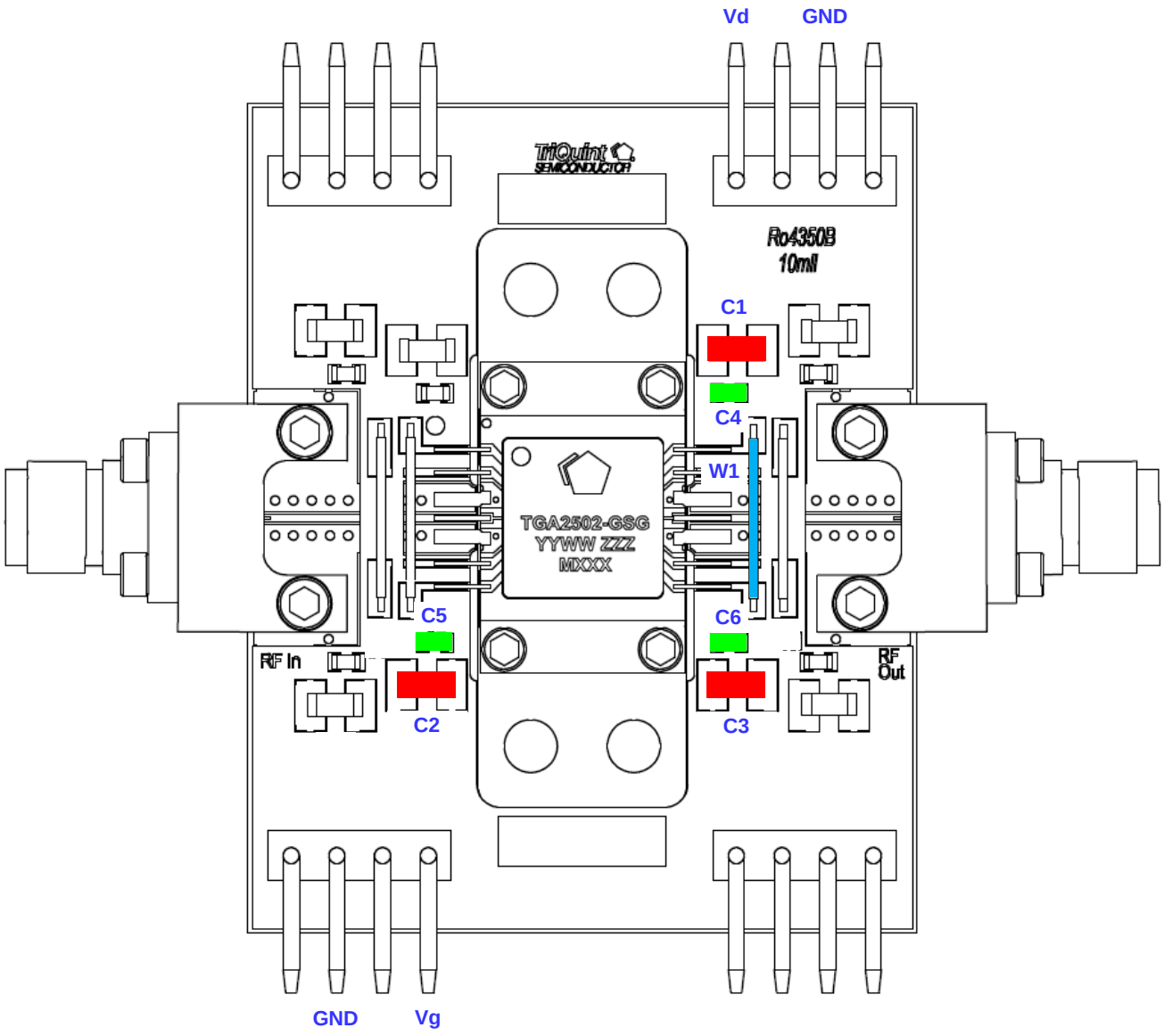
Pin Description



Pin #	Symbol	Description
1,2,6,9,13	N/C	No internal connection; may be left open
3,5,10,12	Gnd	Connect to Ground
4	RF In	Input, matched to 50Ω
7	Vg	Gate voltage. Bias network is required
8,14	Vd	Drain voltage. Bias network is required; all Drain voltage pins must be connected and biased
11	RF Out	Output, matched to 50Ω

Note: See Application Circuit on page 6 as an example

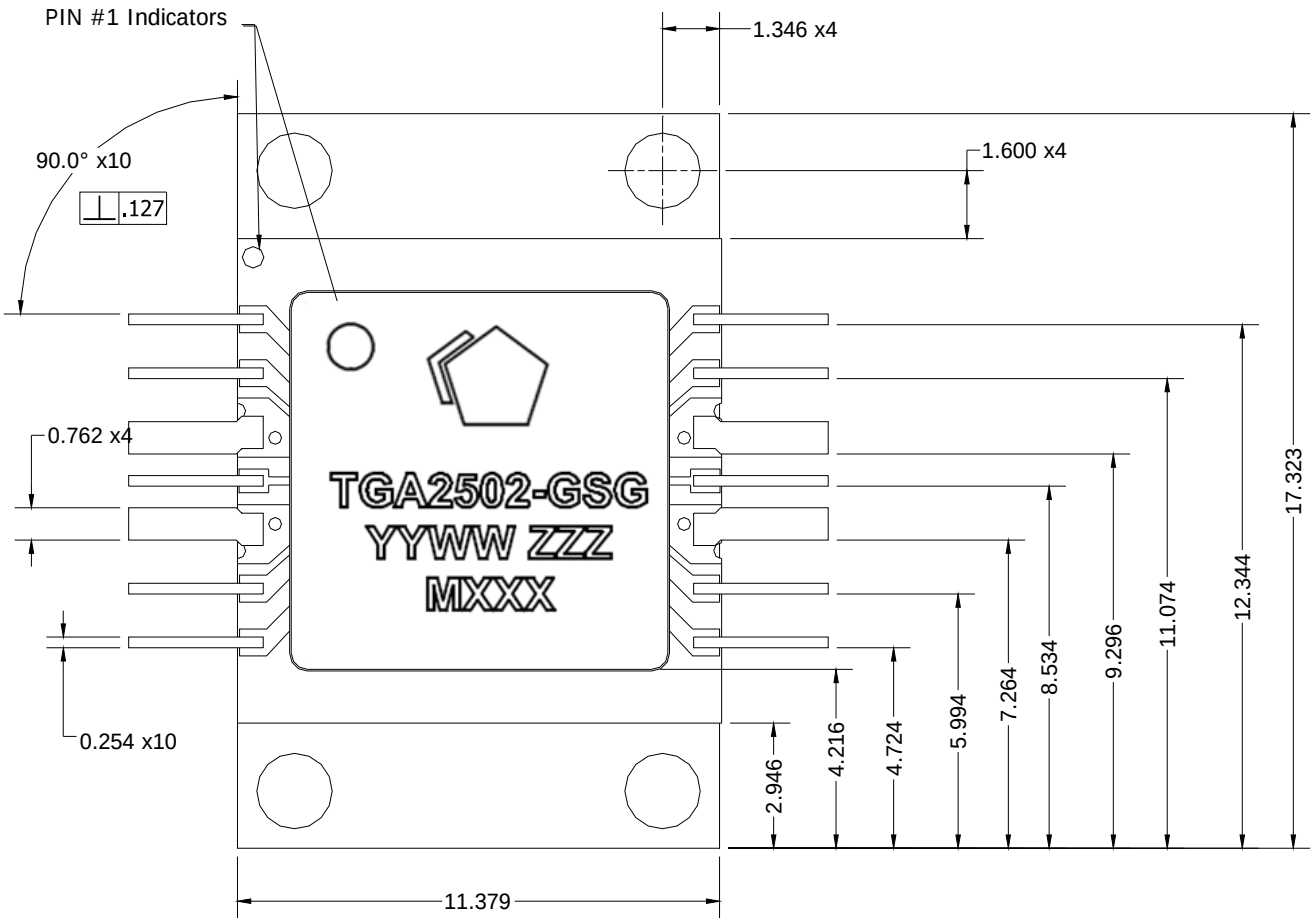
Evaluation Board Layout

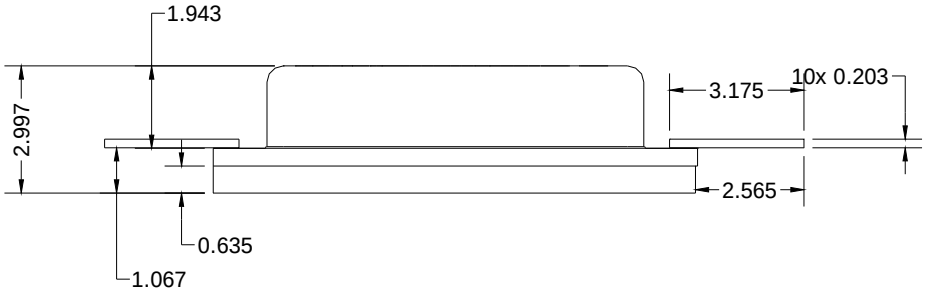


Bill of Material

Ref Des	Value	Description	Manufacturer	Part Number
C1-C3	1 uF	Cap, 1206, 50V, 10%, XR7	Panasonic	ECJ-3YX1H105K
C4-C6	1000 pF	Cap, 0603, 50V, 10%, XR7	Panasonic	ECJ-ZEB1H102K
W1		Jumper, 20 gauge wire	Various	

Mechanical Information





Unit: millimeters
Part marking:

YY	assembly lot start year
WW	assembly lot start week
ZZZ	part serial number

Product Compliance Information

ESD Information

Caution! ESD-Sensitive Device

ESD rating:	TBD
Value:	Passes ≥ TBD V min.
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114

Solderability

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_40_2$) Free
- PFOS Free

ECCN

US Department of Commerce: 3A001.b.2.b

Assembly Notes

1. Clean the board or module with alcohol. Allow it to fully dry
2. Nylock screws are recommended for mounting the TGA2502-GSG to the board
3. To improve the thermal and RF performance, we recommend a heat sink attached to the bottom of the board and/or apply thermal compound to the bottom of the TGA2502-GSG
4. Apply solder to each pin of the TGA2502-GSG.
5. Clean the assembly with alcohol.

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

Web:	**www.triquint.com**	**Tel:**	**+1.972.994.8465**
Email:	**info-products@tqs.com**	**Fax:**	**+1.972.994.8504**

For technical questions and application information:

Important Notice

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.