TGA4532-SM

K-Band Power Amplifier

Product Overview

The TriQuint TGA4532-SM is a K-Band Power Amplifier. The TGA4532-SM operates from 17.7 - 19.7 GHz and is designed using TriQuint's power pHEMT production process.

The TGA4532-SM typically provides 32.5 dBm of saturated output power with small signal gain of 23 dB.

The TGA4532-SM is available in a low-cost, surface mount 20 lead 4x4 QFN package and is ideally suited for Point-to-Point Radio.

Lead-free and RoHS compliant

Evaluation Boards are available upon request.

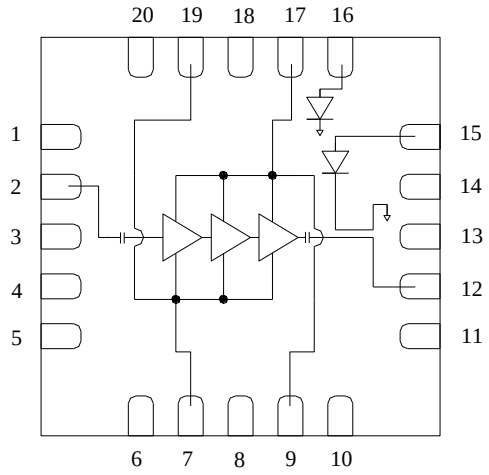
QFN 20 lead 4.0 x 4.0 mm

Key Features

- Frequency Range: 17.7 – 19.7 GHz
- Power: 32.5 dBm Psat, 31 dBm P1dB
- Gain: 23 dB
- TOI: 41 dBm at 20 dBm/tone
- NF: 7 dB
- Integrated Power Detector
- Bias: Vd = 6 V, Idq = 900 mA, Vg = -0.68 V Typical
- Package Dimensions: 4.0 x 4.0 x 0.85 mm

Performance is typical across frequency. Please reference electrical specification table and data plots for more details.

Functional Block Diagram



Applications

- Point-to-Point Radio
- K-band Sat-Com

Ordering Information

Part No.	ECCN	Description
TGA4532-SM	EAR99	K-Band Power Amplifier

Standard T/R size = 500 pieces on a 7" reel

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vd	+6.5 V
Gate Voltage, Vg	-4 to 0 V
Drain to Gate Voltage, Vd – Vg	10 V
Drain Current, Id	1960 mA
Gate Current, Ig	-8.2 to 113 mA
Power Dissipation, Pdiss	12.7 W
RF Input Power, CW, T = 25ºC	26 dBm
Channel Temperature, Tch	200 ºC
Mounting Temperature (30 Seconds)	260 ºC
Storage Temperature	-40 to 150 ºC

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Drain Voltage (V_D)		6		V
I_{DQ}		900		mA
I_{D_Drive} (Under RF)		1200		mA
V_G		-0.68		V

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

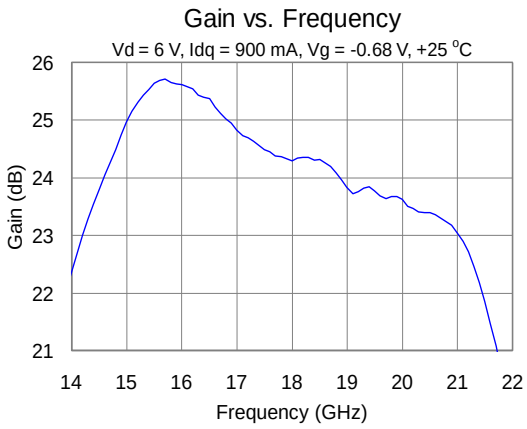
Electrical Specifications

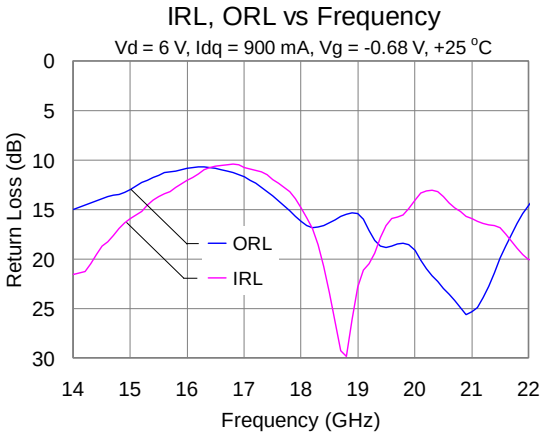
Parameter	Conditions (1)	Min	Typ	Max	Units
Operational Frequency Range		17.7		19.7	GHz
Gain		19	23		dB
Input Return Loss		10	12		dB
Output Return Loss		10	15		dB
Output Power at Saturation, Psat			32.5		dBm
Output Power at 1dB Gain Compression		29.5	31		dBm
Output TOI		38	41		dBm
Noise Figure			7		Db
Gain Temperature Coefficient			-0.023		dB/°C
Power Temperature Coefficient			-0.005		dBm/°C

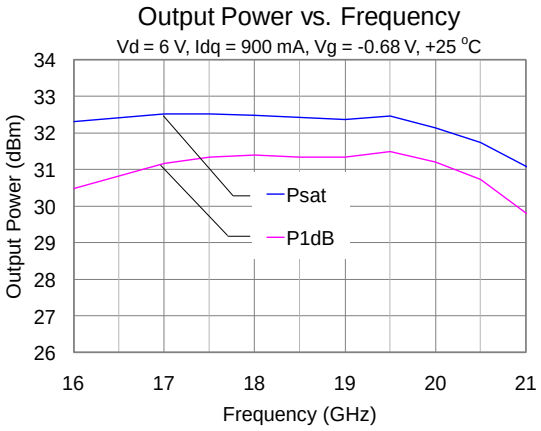
Notes:
1. Test conditions unless otherwise noted: VD=6V, IDQ=900mA, VG=-0.68V typical, Temp = +25 °C

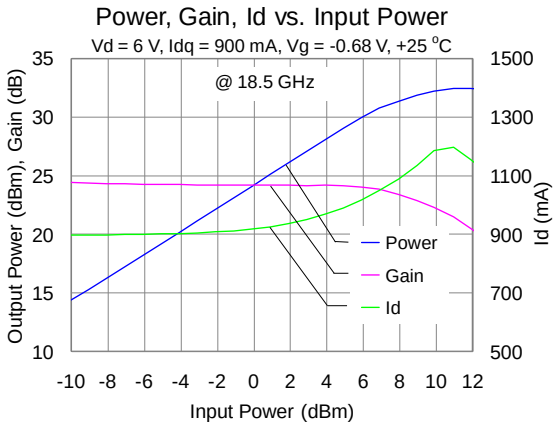
Performance Plots

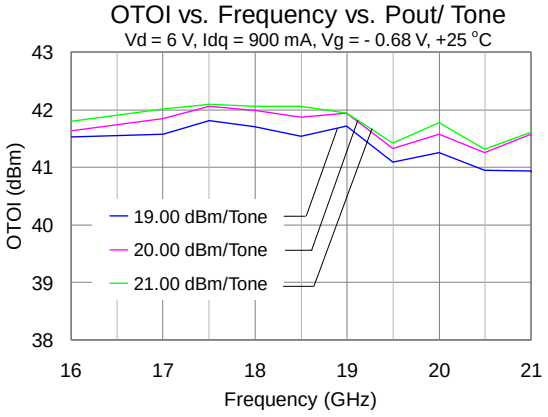
Test conditions unless otherwise noted: VD=6V, IDQ=900mA, VG=-0.68V typical, Temp = +25 °C

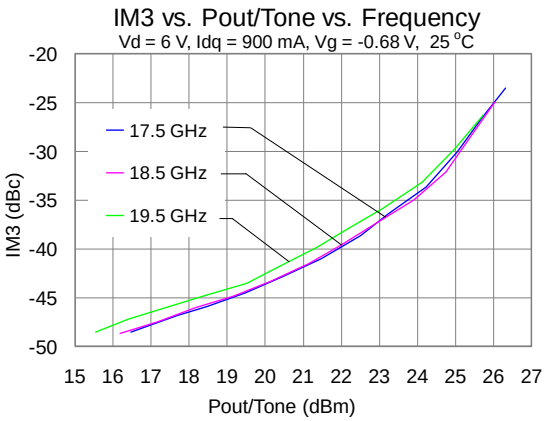












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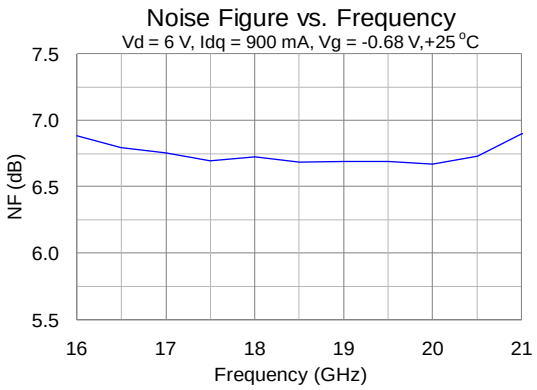

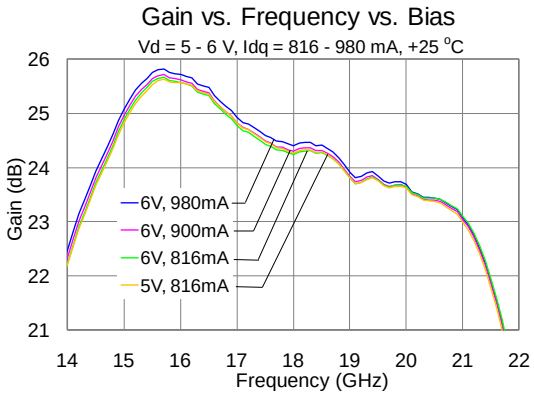

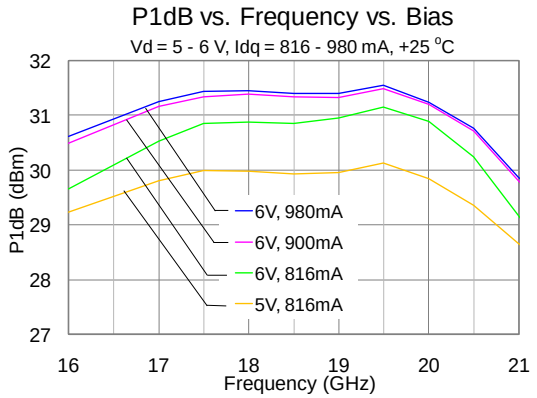

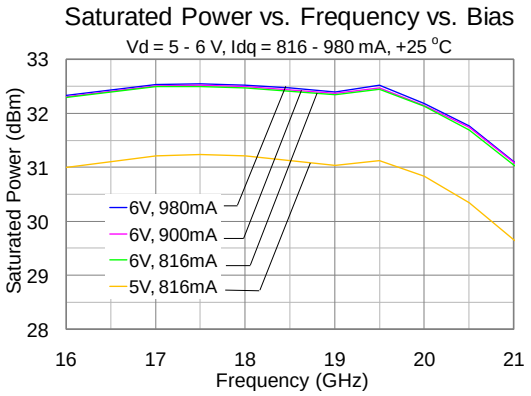

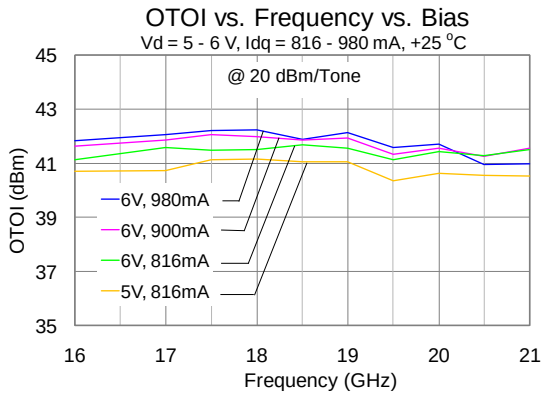

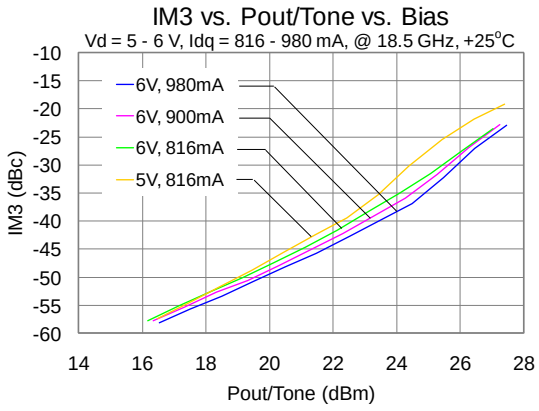

Performance Plots

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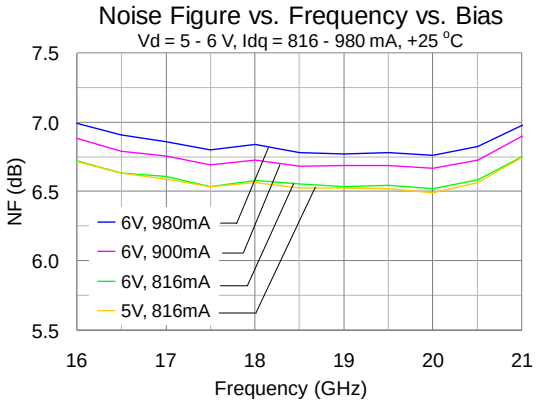
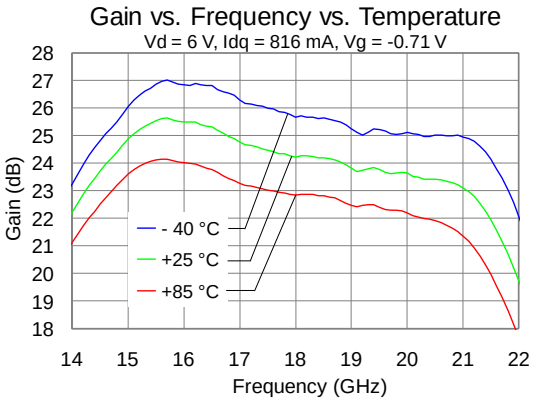
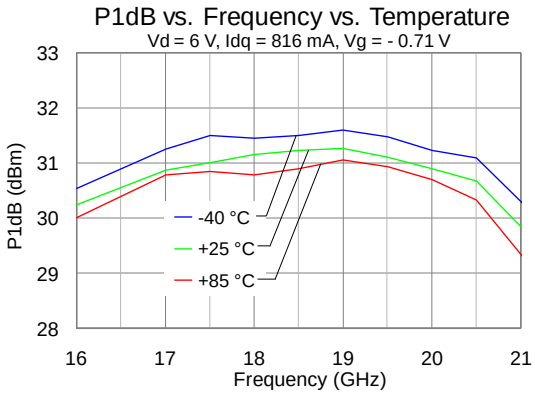
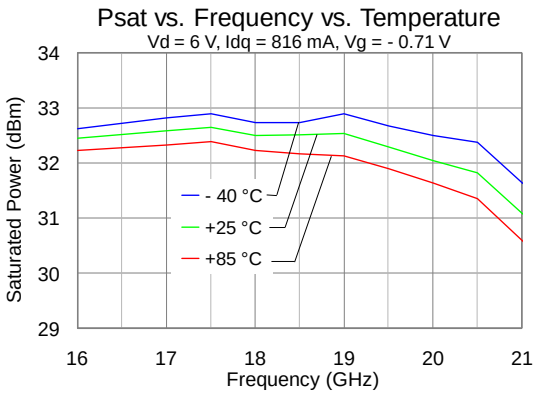
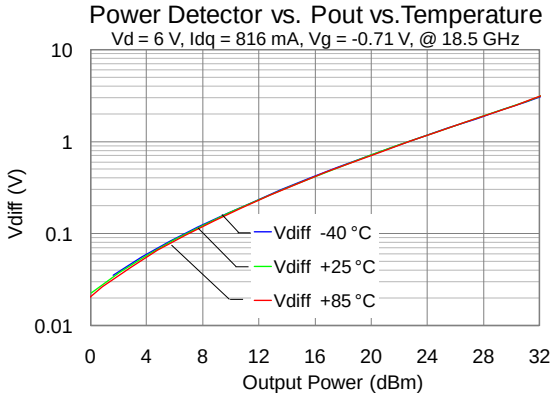
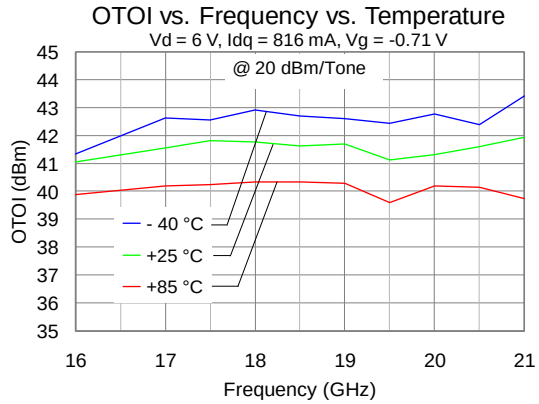












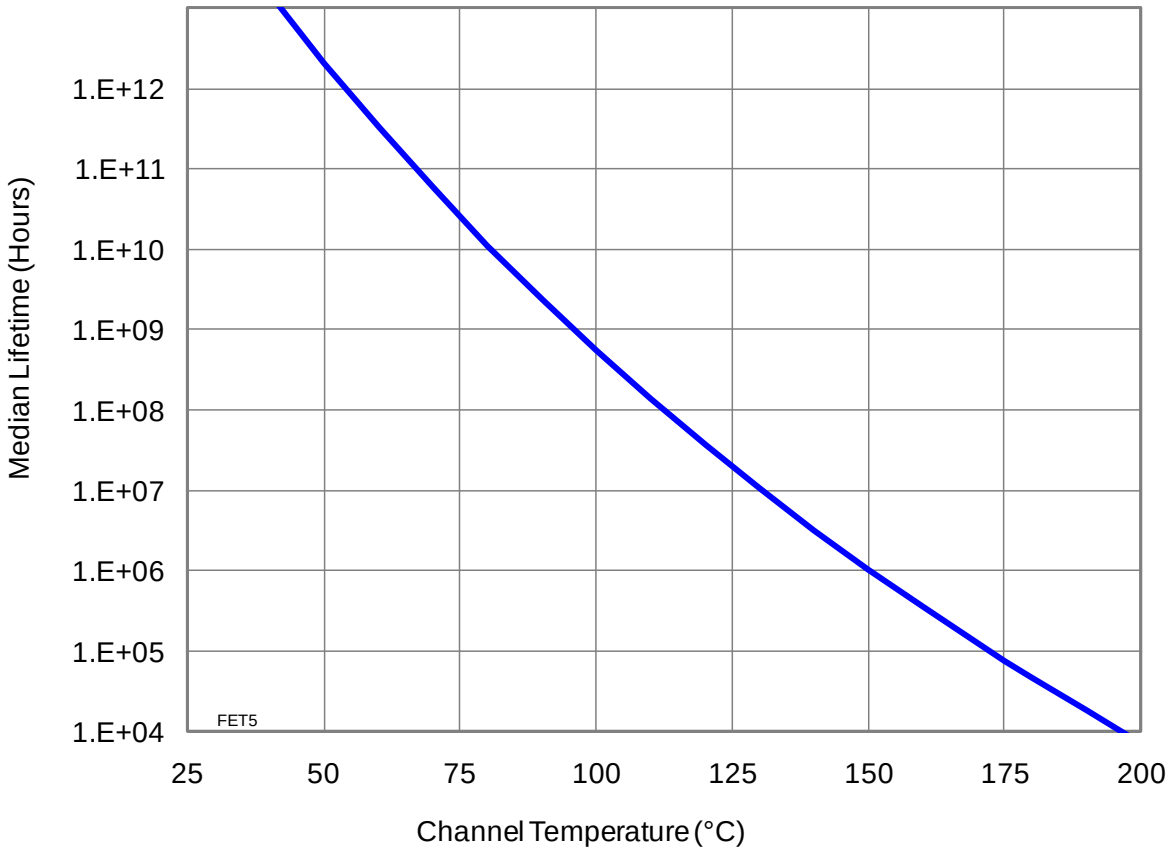
Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	CW $T_{baseplate}$ = +85 °C, V_D = +6 V, I_{DQ} = 900 mA, P_{DISS} = 5.4 W	8.51	ºC/W
Channel Temperature, T_{CH}		131	°C
Median Lifetime (T_M)		9.5×10^6	Hrs
Thermal Resistance (θ_{JC}) (1)	CW $T_{baseplate}$ = +85 °C, V_D = +6 V, I_D = 1200 mA, P_{OUT} = 32.5 dBm, P_{DISS} = 5.4 W	4.17	ºC/W
Channel Temperature, T_{CH} (Under RF)		131	°C
Median Lifetime (T_M)		9.5×10^6	Hrs

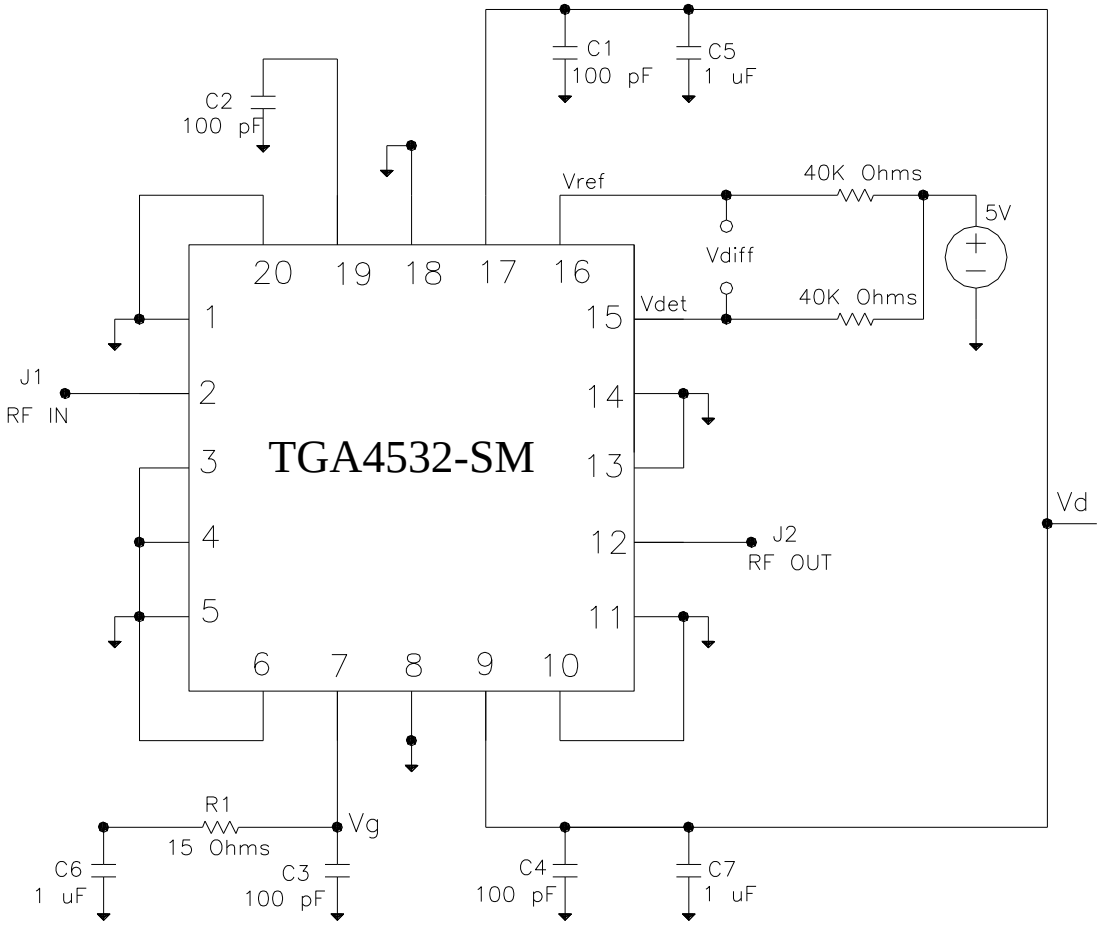
Notes:
1. Channel operating temperature will directly affect the device median lifetime (Tm). For maximum life, it is recommended that the channel temperatures be maintained at the lowest possible levels. Thermal resistance measured at back of package.

Median Lifetime

Test Conditions: V_D = +6 V; Failure Criteria is 10% reduction in I_{D_MAX}



Application Circuit



Notes:
1. Vg can be biased from either side (pin 7 or pin 19), and the non-biased side can be left open.
2. Vd must be biased from both sides (pin 9 and pin 17).

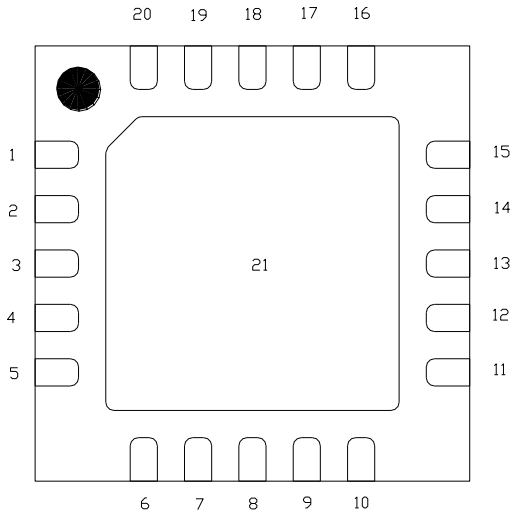
Bias Up Procedure

1. Apply −1.5 V to V_G
2. Apply +6 V to V_D; ensure I_{DQ} is approx. 0 mA
3. Adjust V_G until I_{DQ} = 900 mA (V_G ~ −0.68 V Typ.).
4. Turn on RF supply

Bias Down Procedure

1. Turn off RF supply
2. Reduce V_G to −1.5 V; ensure I_{DQ} is approx. 0 mA
3. Set V_D to 0 V
4. Turn off V_D supply
5. Turn off V_G supply

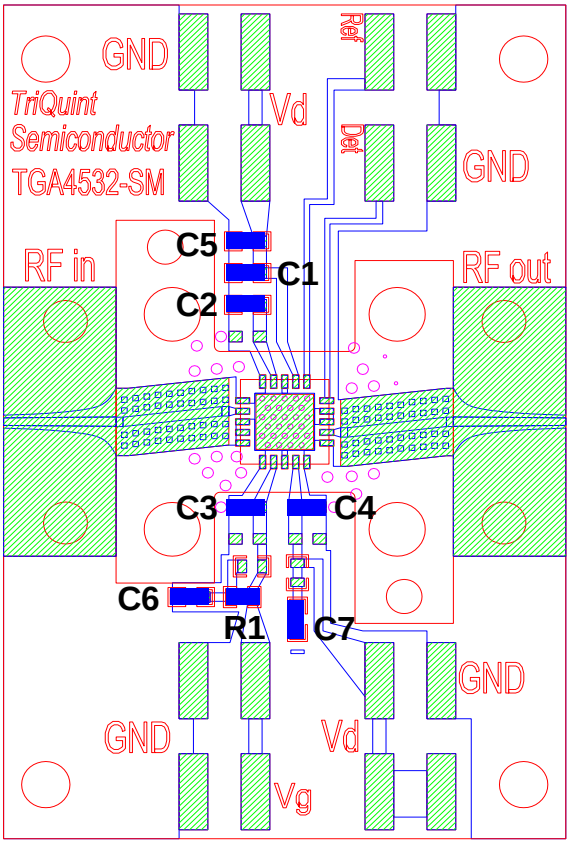
Pad Configuration and Description

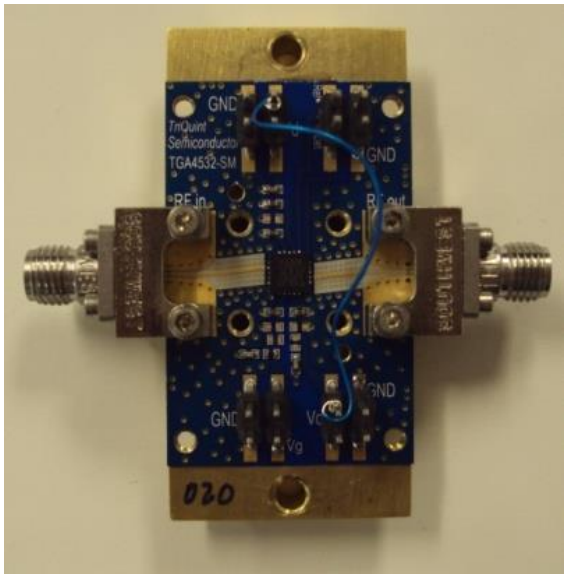


TOP VIEW

Pad No.	Label	Description
1, 3, 4, 5, 6, 10, 11, 13, 14, 20	N/C	No internal connection; must be grounded on PCB
2	RF IN	Input, matched to 50 ohms
7, 19	Vg	Gate voltage. Bias network is required; see Application Circuit on page 7 as an example. Can be biased from either pin.
8, 18	GND	Internal grounding; can be grounded or left open on PCB
12	RF OUT	Output, matched to 50 ohms
9, 17	Vd	Drain voltage. Bias network is required; see Application Circuit on page 7 as an example. Both pins must be biased.
15	Vdet	Detector diode output voltage. Varies with RF output power.
16	Vref	Reference diode output voltage.
21	GND	Backside Paddle. Multiple vias should be employed to minimize inductance and thermal resistance; see Mounting Configuration on page 11 for suggested footprint.

Evaluation Board (EVB) Layout Assembly





Note: PCB is a multilayer

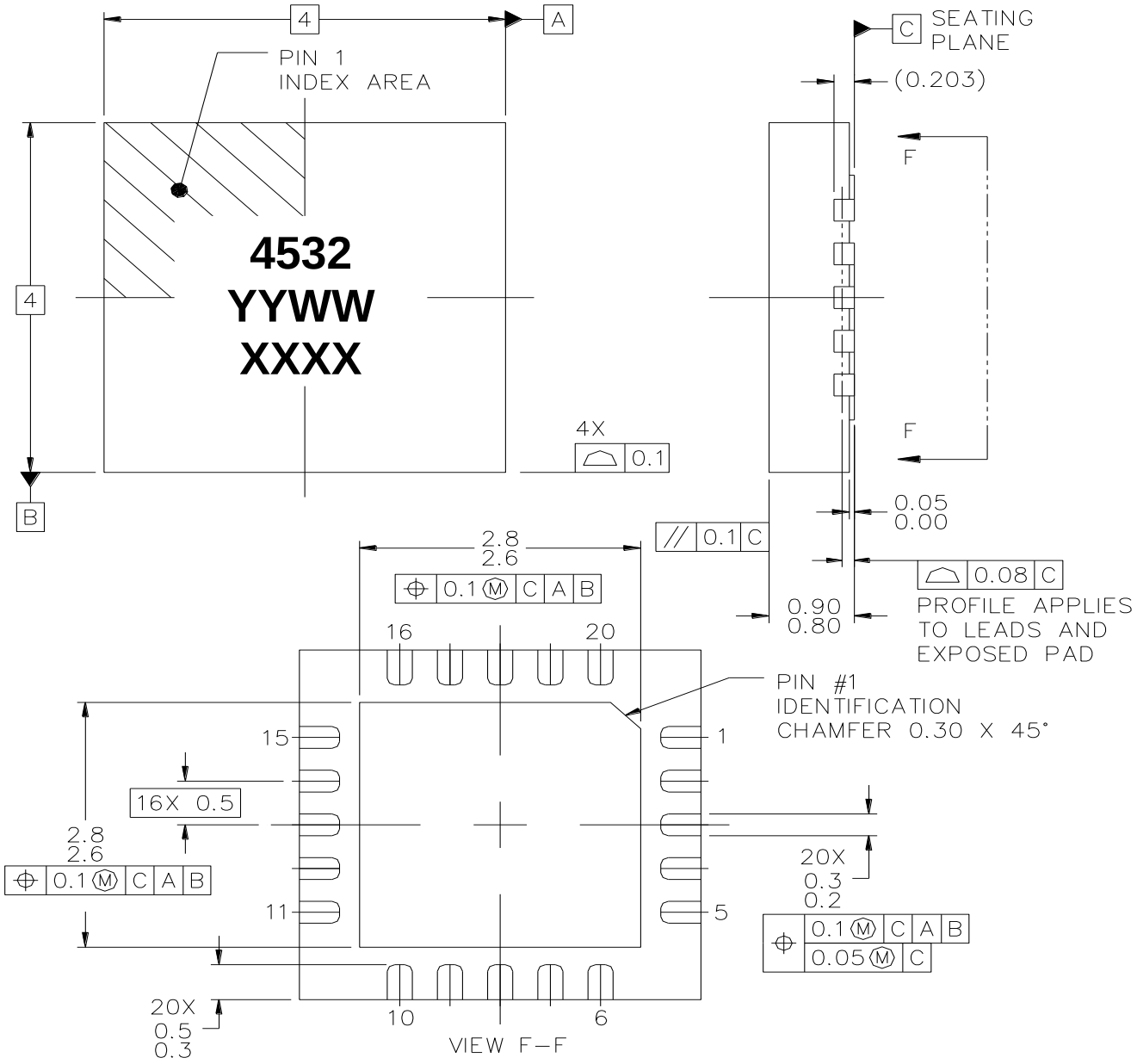
1. All 4 metal thicknesses are 0.5 oz
2. Upper core 1 is Rogers 4003C
3. Microstrip line width = 0.0175”

Bill of Material – TGA4532 Evaluation board

Reference Des.	Value	Description	Manuf.	Part Number
n/a	n/a	Printed Circuit Board	Qorvo	
C1, C2, C3, C4	100 pF	Cap, 0402, 50V, 5%, NPO	various	
C5, C6, C7	1 uF	Cap, 0603, 50V, 5%, COG	various	
R1	15 Ohms	Res, 0402, 1/16W, 5%, SMD	various	

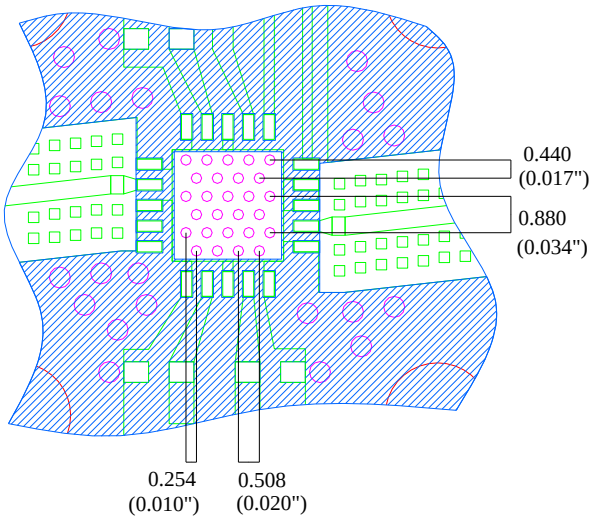
Package Marking and Dimensions

Marking: Part Number – TGA4532-SM
Vendor and Lot Code – "YY" is last two digits of manufacturing year, "WW" is the work week; "XXXX" is a generated number.



Notes:
This package is lead-free/RoHS-compliant with an embedded heat spreader, and the plating material on the leads is NiPdAu. It is compatible with both lead-free (maximum 260 °C reflow temperature) and tin-lead (maximum 245 °C reflow temperature) soldering processes.

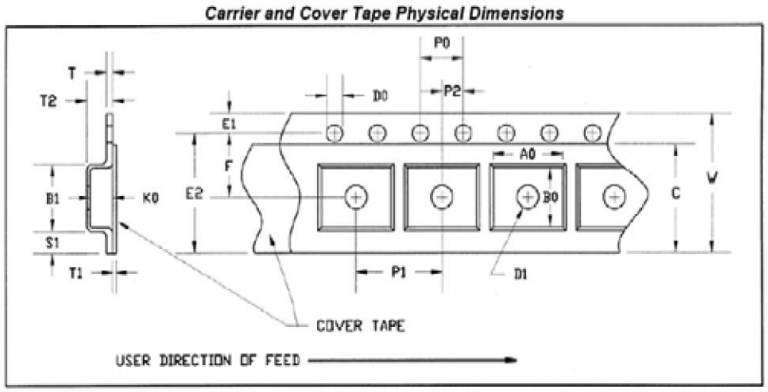
PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters (inches). Angles are in degrees.
2. Ground vias are critical for the proper performance of this device. Vias should have a final plated thru diameter of .2524 mm (.010").
3. A heatsink underneath the area of the PCB for the mounted device is recommended for proper thermal operation.
4. The pad pattern shown has been developed and tested for optimized assembly at Qorvo. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

Tape and Reel Information – Carrier and Cover Tape Dimensions



Feature	Measure	Symbol	Size (in)	Size (mm)
Cavity	Length	A0	0.171	4.35
	Width	B0	0.171	4.35
	Depth	K0	0.043	1.1
	Pitch	P1	0.315	8.0
Centerline Distance	Cavity to Perforation - Length Direction	P2	0.079	2.0
	Cavity to Perforation - Width Direction	F	0.217	5.5
Cover Tape	Width	C	0.362	9.2
Carrier Tape	Width	W	0.472	12.0

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	JEDEC JESD22-A114
MSL Rating	Level 1	JEDEC/IPC J-STD-020

Caution!
ESD-Sensitive Device

Solderability

Compatible with lead-free (260°C max. reflow temp.) soldering process.
Solder profiles available upon request. Use of no-clean solder to avoid washing after soldering is recommended.

Contact plating: NiAu

RoHS Compliance

This part is compliant with 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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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

Web: www.qorvo.com
Tel: 1-844-890-8163
Email: customer.support@qorvo.com

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