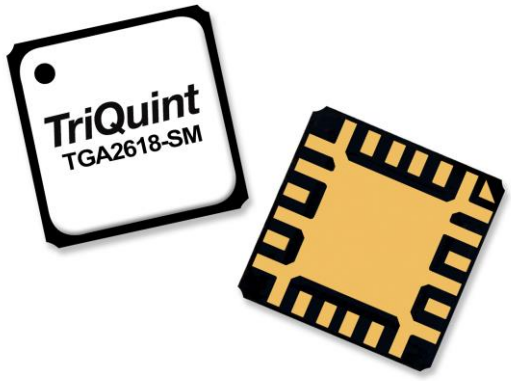
TGA2618-SM

16 - 18 GHz GaAs LNA

Applications

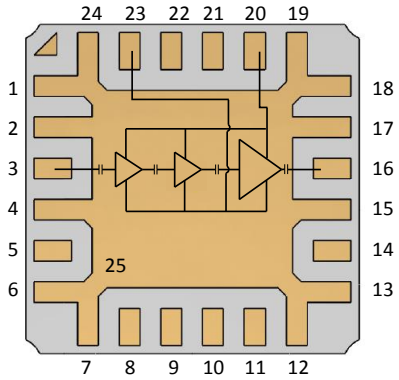
- Commercial and Military Radar
- Satellite Communications



Product Features

- Frequency Range: 16 - 18 GHz
- NF: 2.3 dB
- Small Signal Gain: 28 dB
- Return Loss: >10 dB
- Output P1dB: 6 dBm
- P_{SAT} = 10 dBm at P_{IN} = -13 dBm
- OTOI: 12 dBm (P_{OUT} = -2.5 dBm)
- Bias: V_D = 3 V, I_{DQ} = 30 mA, V_G = -0.6 V
- Package Dimensions: 4.0 x 4.0 x 1.5 mm

Functional Block Diagram



General Description

TriQuint's TGA2618-SM is a packaged Ku-band Low Noise Amplifier fabricated on TriQuint's TQPHT15 0.15 µm GaAs pHEMT process. The TGA2618-SM operates from 16 to 18 GHz and typically provides 28 dB of small signal gain with 2.3 dB of noise figure.

The TGA2618-SM is available in a low cost, 4x4 mm air-cavity ceramic QFN. It is ideally suited to support both radar and satellite communications as either an LNA or a general purpose gain block.

Both RF ports have intergraded DC blocking caps and are fully matched to 50 ohms allowing for simple system integration.

Lead-free and RoHS compliant

Evaluation Boards are available upon request.

Pad Configuration

Pad No.	Symbol
1, 2, 4, 6,7,12,13,15,17-19,24,25	Gnd
3	RF_{IN}
5,8-11,14,21,22	N/C
16	RF_{OUT}
20	V_D
23	V_G

Ordering Information

Part	ECCN	Description
TGA2618-SM	EAR99	16 - 18 GHz GaAs LNA

Absolute Maximum Ratings

Parameter	Value
Drain Voltage (V_D)	6 V
Gate Voltage Range (V_G)	-2 to 0 V
Drain Current (I_D)	70 mA
Gate Current (I_G)	-0.5 to 6 mA
Power Dissipation, 85 °C (P_{DISS})	0.3 W
Input Power, CW, 50 Ω, (P_{IN})	-4 dBm
Channel temperature (T_{CH})	200 °C
Mounting Temperature (30 Seconds)	260 °C
Storage Temperature	-55 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	Value
Drain Voltage (V_D)	3 V
Drain Current (I_{DQ})	30 mA
Gate Voltage (V_G)	-0.6 V Typical
Temperature (T_{BASE})	-40 to 85 °C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed overall operating conditions.

Electrical Specifications

Test conditions unless otherwise noted: 25 ^{0}C, V_D = 3V, I_{DQ} = 30mA, V_G = -0.6V, CW

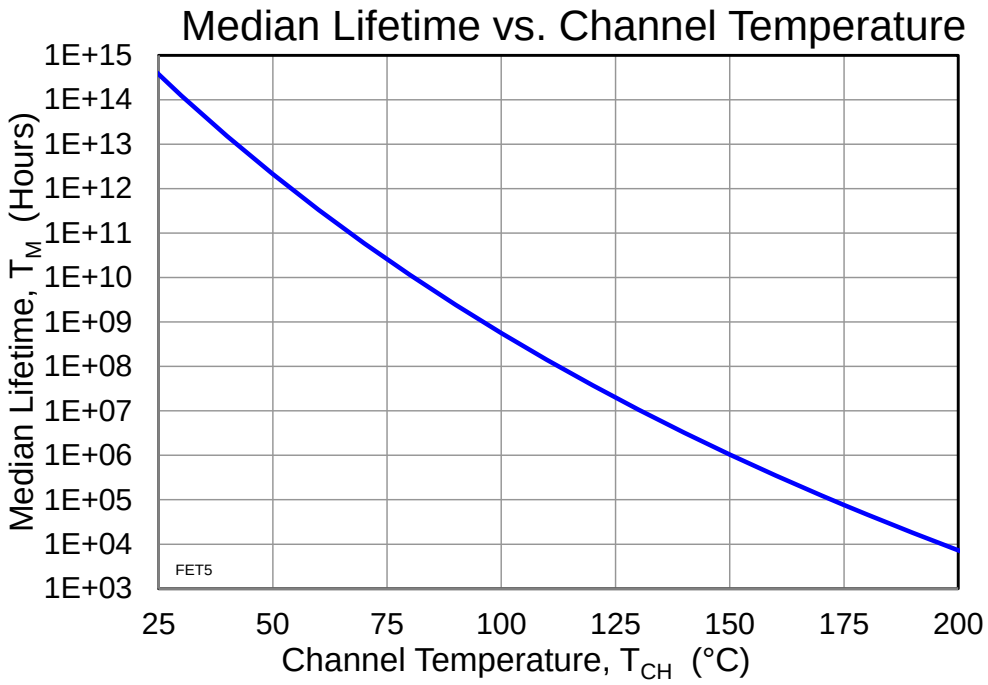
Parameter	Min	Typical	Max	Units
Operational Frequency Range	16		18	GHz
Small Signal Gain		28		dB
Noise Figure		2.3		dB
Input Return Loss		>13		dB
Output Return Loss		>10		dB
Output Power at 1 dB Gain Compression		6		dBm
Output TOI (P_{OUT} = -2.5 dBm, 10 MHz spacing)		12		dBm
Gain Temperature Coefficient		-0.02		dB/°C
Noise Figure Temperature Coefficient		0.008		dB/°C

Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{base} = 85 °C, V_D = 3 V (CW) I_{DQ} = 30 mA, P_{DISS} = 0.09 W	200	ºC/W
Channel Temperature (T_{CH}) (Without RF)		103	°C
Median Lifetime (T_M)		3.7 x 10^8	Hrs
Thermal Resistance (θ_{JC}) (1)	T_{base} = 85 °C, V_D = 3 V (CW) I_{DQ} = 30 mA, I_{D_Drive} = 52 mA P_{IN} = -10 dBm, P_{OUT} = 11 dBm, Freq = 17 GHz, P_{DISS} = 0.15 W	200	ºC/W
Channel Temperature (T_{CH}) (Under RF drive)		115	°C
Median Lifetime (T_M)		7.2 x 10^7	Hrs

Notes:
1. Thermal resistance measured at back of the package.

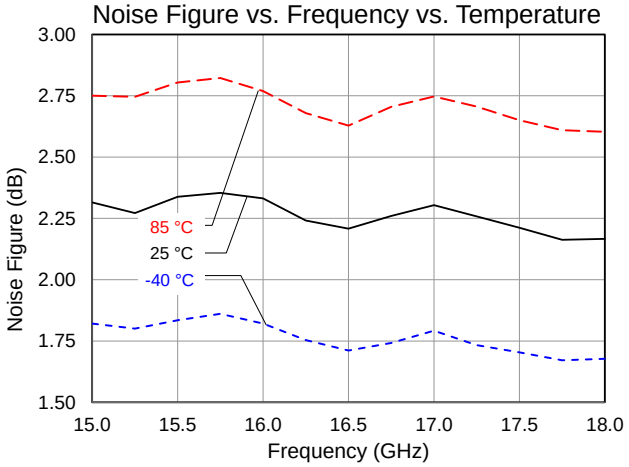
Test Conditions: V_D = 6 V; Failure Criteria is 10% reduction in I_{D_MAX}



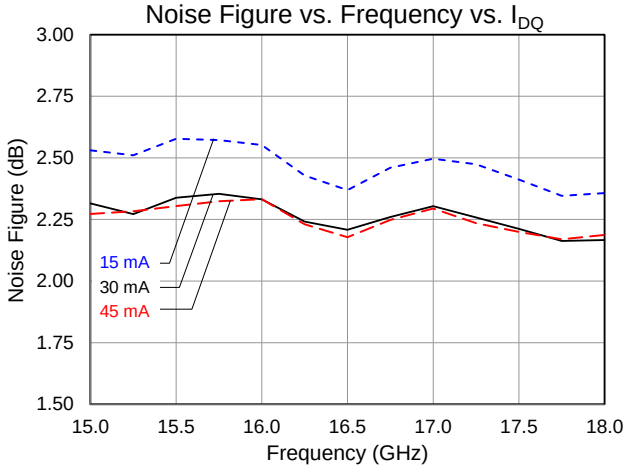
Typical Performance: Small Signal

Conditions unless otherwise specified: V_D = 3 V, I_{DQ} = 30 mA, V_G = -0.6 V, CW

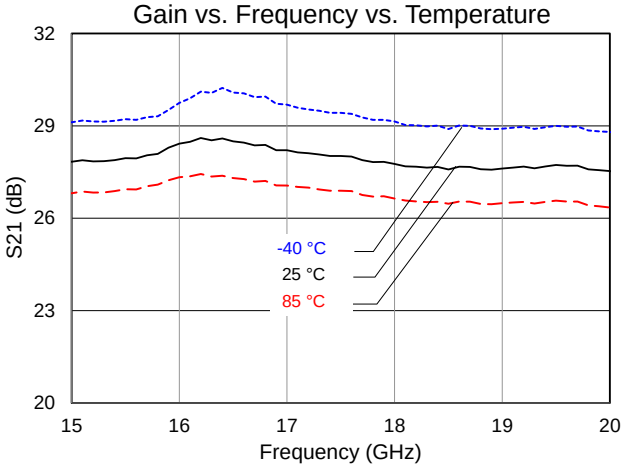
Noise Figure vs. Frequency vs. Temperature



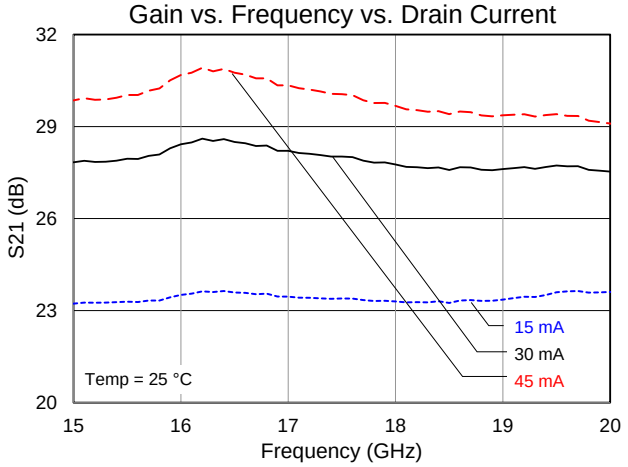
Noise Figure vs. Frequency vs. I_{DQ}



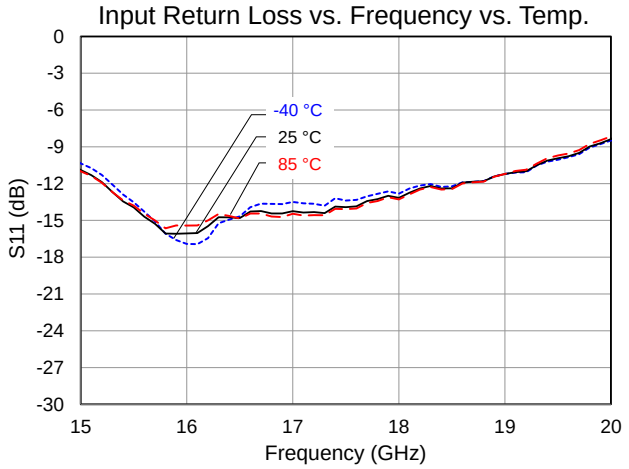
Gain vs. Frequency vs. Temperature



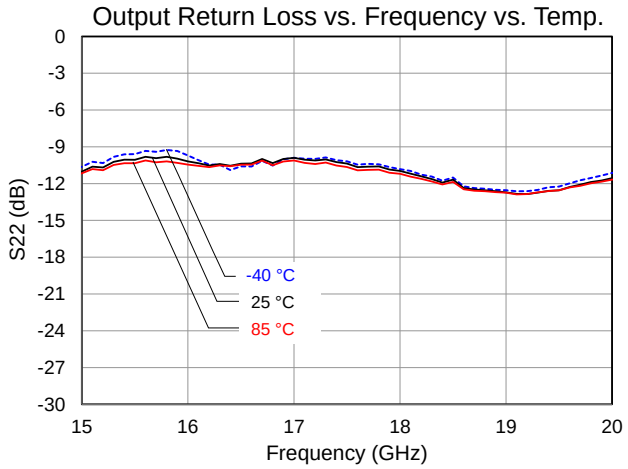
Gain vs. Frequency vs. Drain Current



Input Return Loss vs. Frequency vs. Temp.



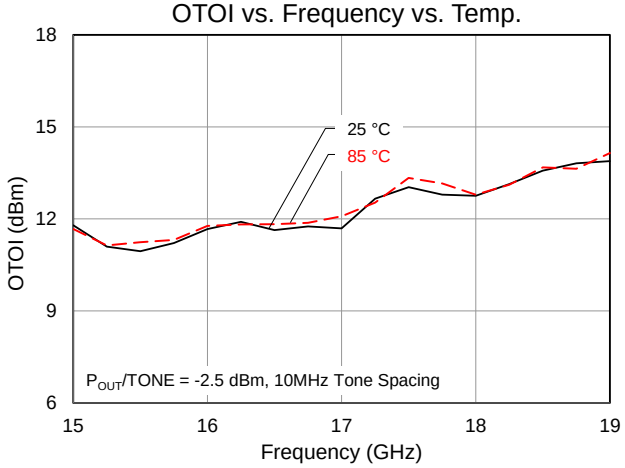
Output Return Loss vs. Frequency vs. Temp.



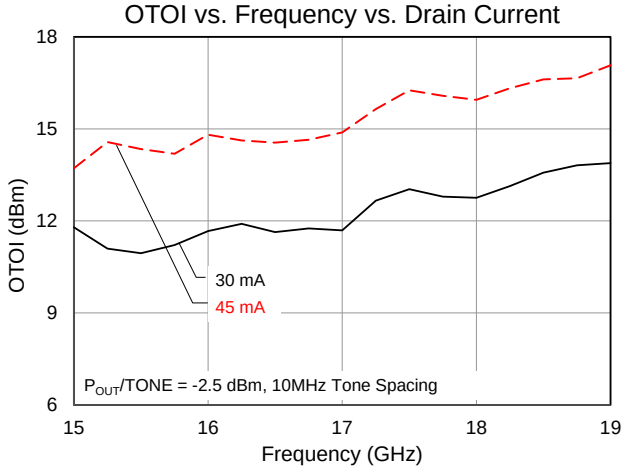
Typical Performance: Linearity

Conditions unless otherwise specified: V_D = 3 V, I_{DQ} = 30 mA, V_G = -0.6 V, CW

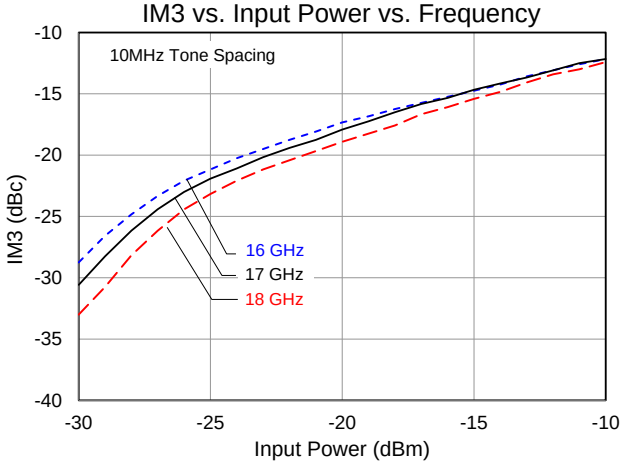
OTOI vs. Frequency vs. Temp.



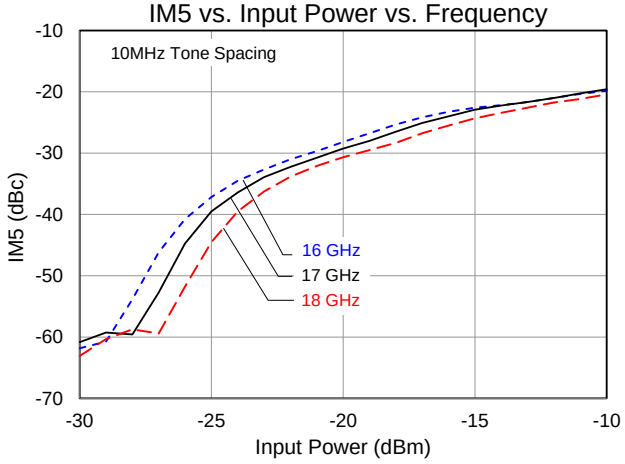
OTOI vs. Frequency vs. Drain Current



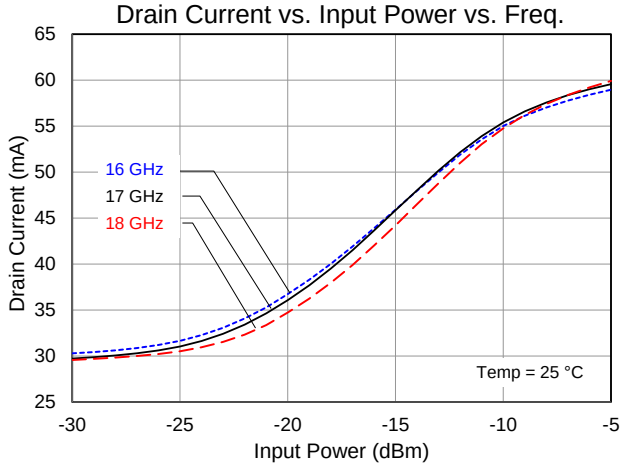
IM3 vs. Input Power vs. Frequency



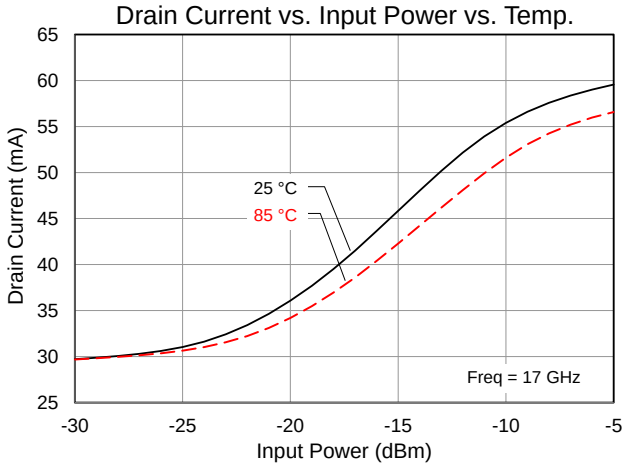
IM5 vs. Input Power vs. Frequency



Drain Current vs. Input Power vs. Freq.



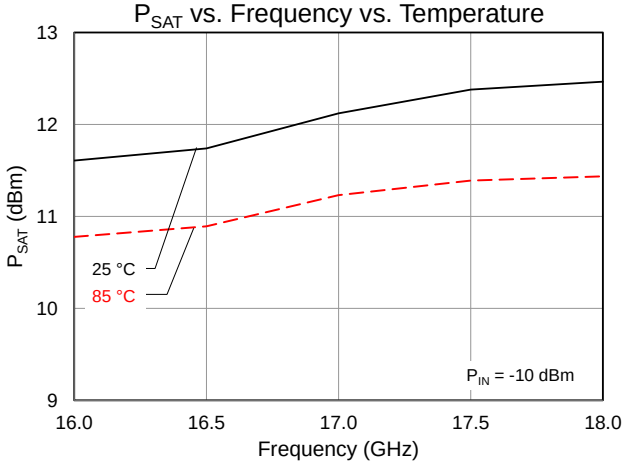
Drain Current vs. Input Power vs. Temp.



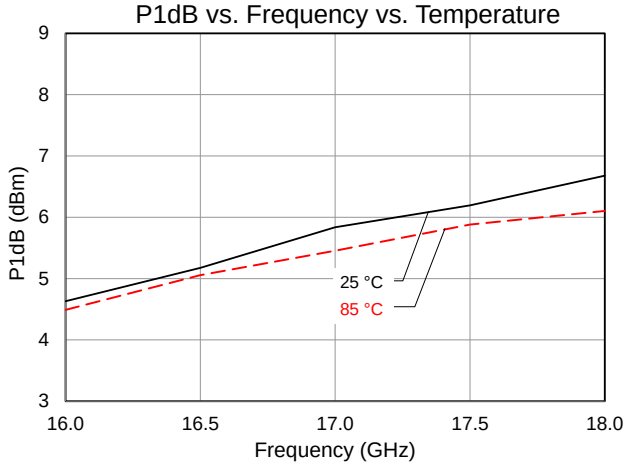
Typical Performance: Large Signal

Conditions unless otherwise specified: V_D = 3 V, I_{DQ} = 30 mA, V_G = -0.6 V, CW

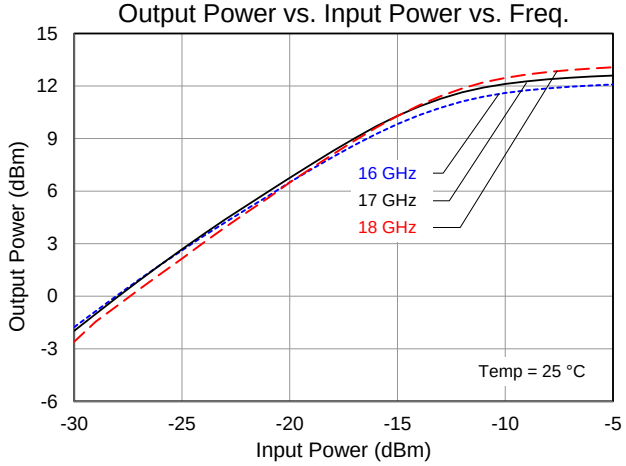
P_{SAT} vs. Frequency vs. Temperature



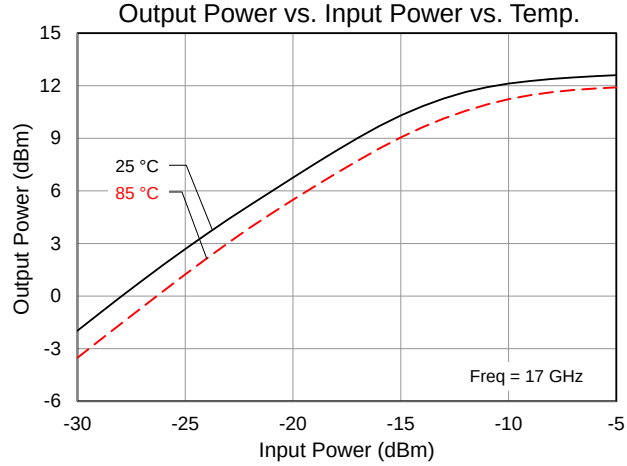
P1dB vs. Frequency vs. Temperature



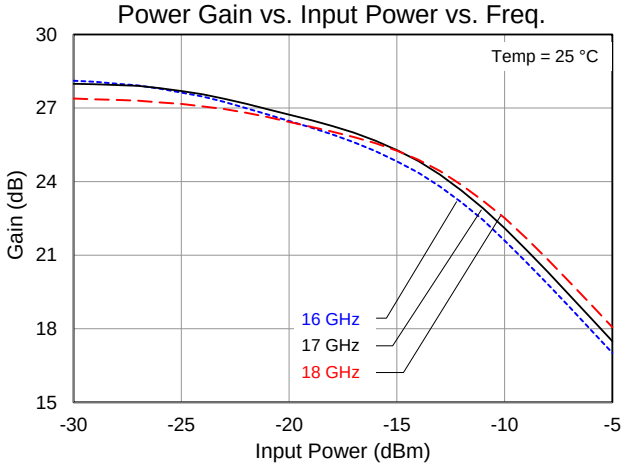
Output Power vs. Input Power vs. Freq.



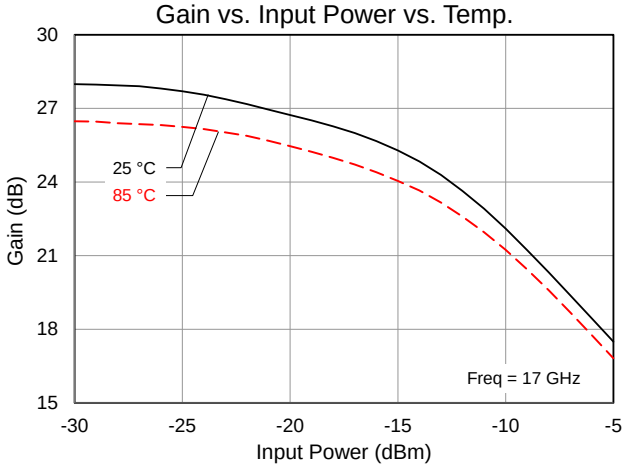
Output Power vs. Input Power vs. Temp.



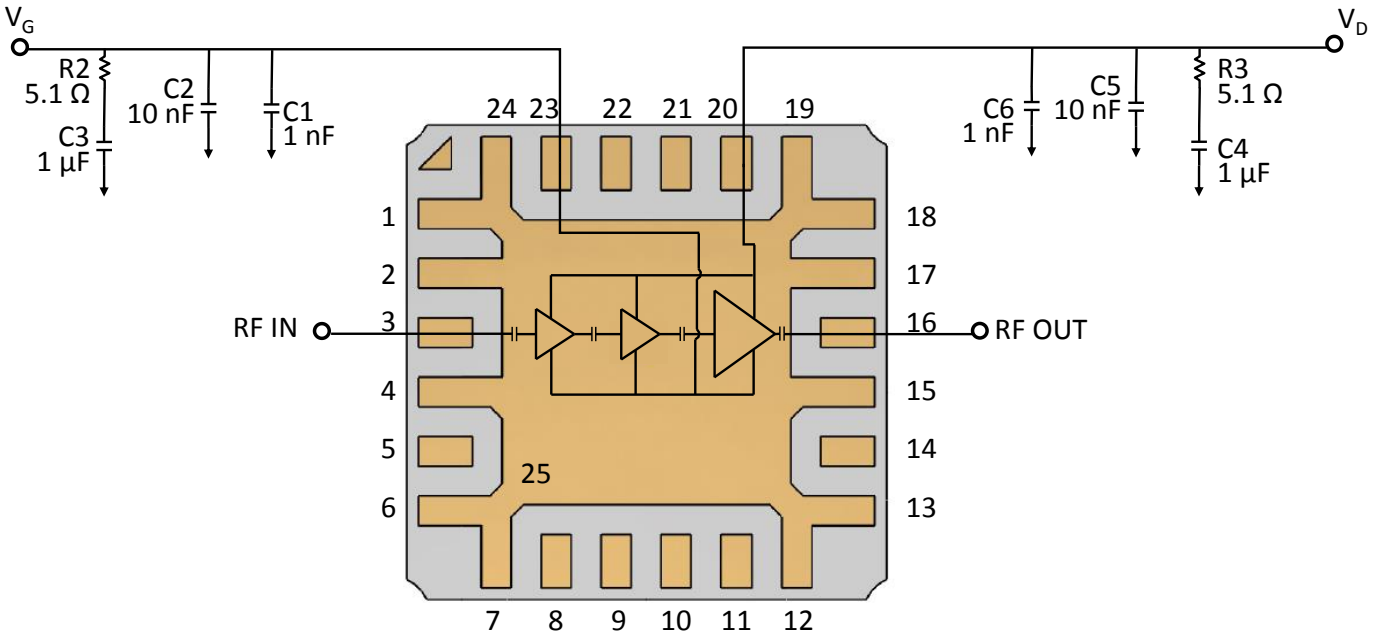
Power Gain vs. Input Power vs. Freq.



Gain vs. Input Power vs. Temp.



Application Information



Bias-up Procedure

1. Set I_D limit to 70 mA, I_G limit to 6 mA
2. Apply -2 V to V_G for pinch off
3. Apply +3 V to V_D
4. Adjust V_G more positive until I_{DQ} = 30 mA (V_G ~ -0.6 V Typical)
5. Apply RF signal

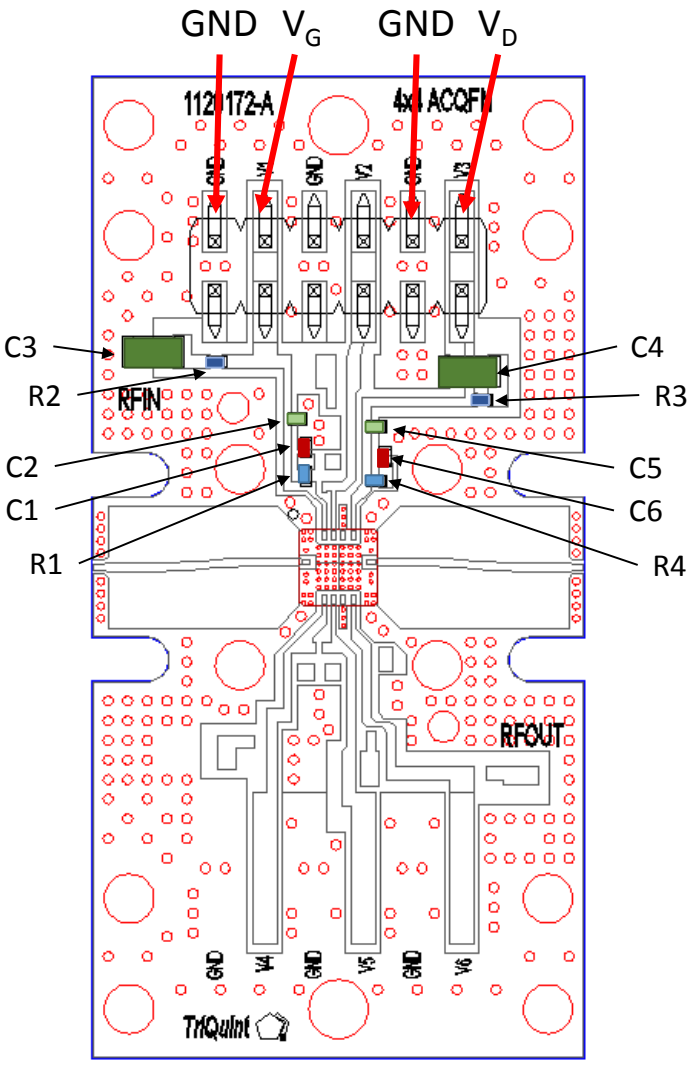
Bias-down Procedure

1. Turn off RF signal
2. Reduce V_G to -2 V. Ensure I_{DQ} ~ 0mA
3. Set V_D to 0 V
4. Turn off V_D supply
5. Turn off V_G supply

Pin Description

Pin No.	Symbol	Description
1, 2, 4, 6,7,12,13,15,17-19,24	Gnd	Recommend grounding on PCB
3	RF_{IN}	Input; matched to 50 Ω; DC blocked
5,8-11,14,21,22	N/C	No Internal Connection
16	RF_{OUT}	Output; matched to 50 Ω; DC blocked
20	V_D	Drain voltage; bias network is required; see recommended Application Information above.
23	V_G	Gate voltage; bias network is required; see recommended Application Information above.
25	Gnd	Ground Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

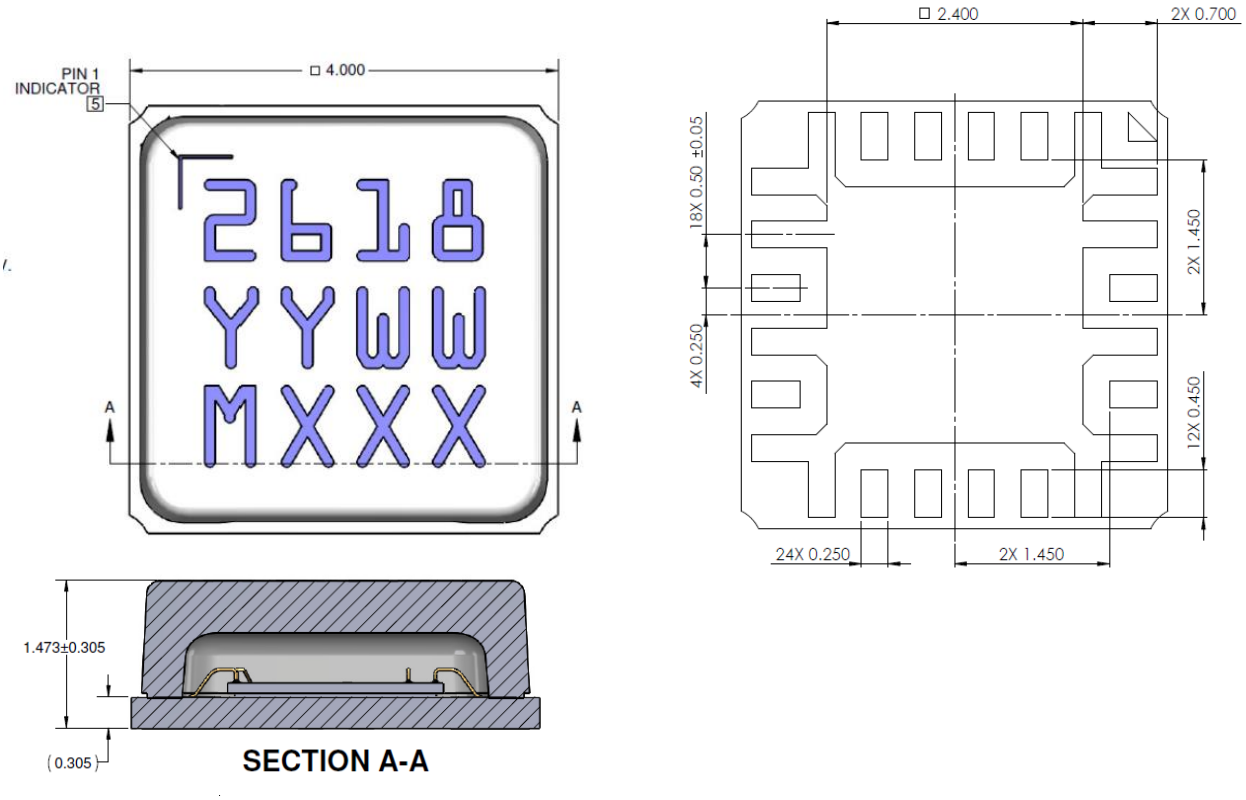
Evaluation Board



Bill of Material

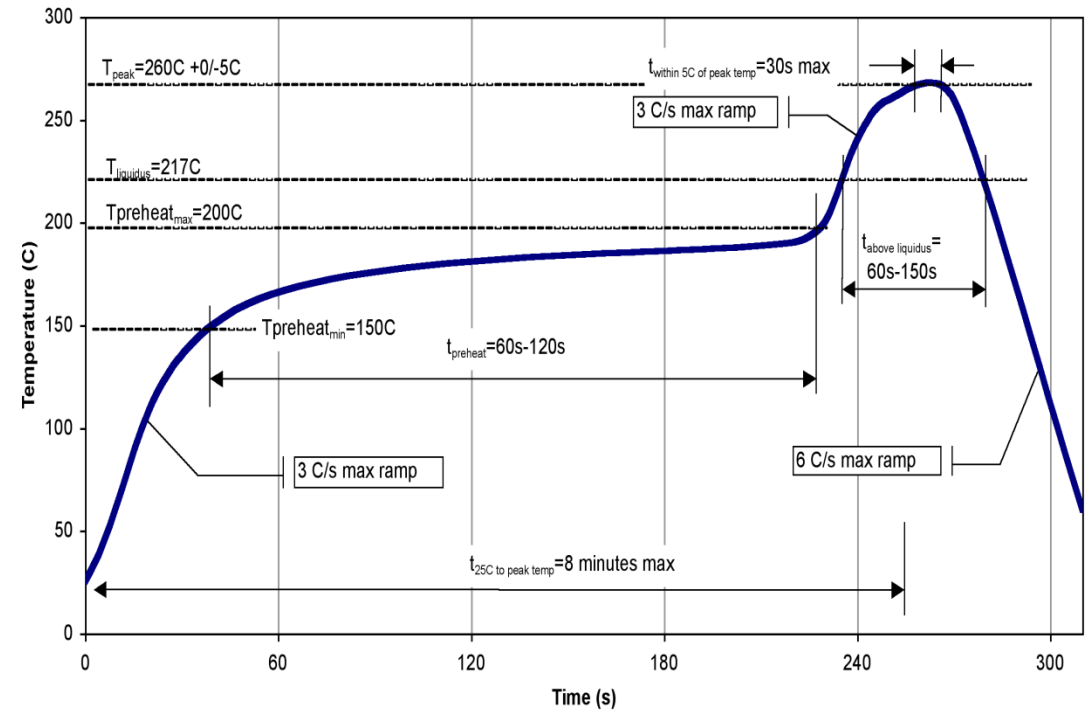
Reference Des.	Value	Description	Manuf.	Part Number
C1, C6	1 nF	Cap, 0402, X7R	Various	
C2, C5	10 nF	Cap, 0402, X7R	Various	
C3, C4	1 µF	Cap, 1206, X5R	Various	
R1, R4	0 Ohms	Res, 0402 (Jumper required for above EVB design)	Various	
R2, R3	5.1 Ohms	Res, 0402	Various	

Mechanical Information



Units: millimeters
Tolerances: unless specified
x.xx = ± 0.01
x.xxx = ± 0.005
Materials:
Base: Ceramic
Lid: Plastic
All metalized features are Au plated
Part is epoxy sealed
Marking:
2618: Part number
YY: Part Assembly year
WW: Part Assembly week
MXXX: Lot ID

Recommended Soldering Temperature Profile



Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

MSL Rating

Level TBD at TBD°C convection reflow
The part is rated Moisture Sensitivity Level TBD at TBD°C per JEDEC standard IPC/JEDEC J-STD-020.

ECCN

US Department of Commerce: EAR99

Solderability

Compatible with the latest version of J-STD-020, Lead-free solder, 260 °C.

RoHS Compliance

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 ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Contact Information

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