TGA2585-SM

2.7 to 3.7 GHz, 18 W GaN Power Amplifier

Product Overview

Qorvo's TGA2585-SM is a packaged MMIC power amplifier which operates from 2.7 to 3.7 GHz. The TGA2585-SM is designed using Qorvo's production 0.25-µm GaN on SiC process.

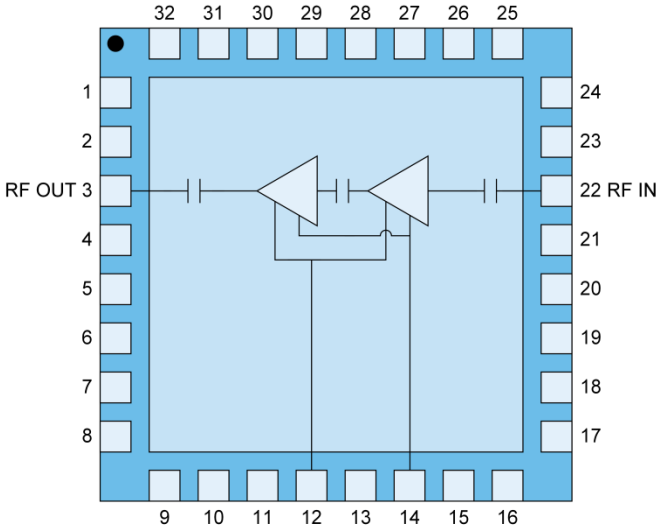
The TGA2585-SM typically provides 42.5 dBm of saturated output power, > 50% power-added efficiency, and 32 dB small signal gain. It can operate under both pulse and CW conditions.

The TGA2585-SM is available in a low-cost, surface mount 32 lead 5 x 5 AIN QFN. It is ideally suited to support both commercial and defense related radar applications.

Both RF ports have integrated DC blocking capacitors and are fully matched to 50 ohms.

Lead-free and RoHS compliant

Functional Block Diagram



Air Cavity Package

Key Features

- Frequency Range: 2.7 - 3.7 GHz
- P_{SAT}: 42.5 dBm
- PAE: > 50 %
- Small Signal Gain: 32 dB
- Return Loss: > 10 dB
- Bias: V_D = 28 V (CW or Pulsed), I_{DQ} = 225 mA,
- Package Dimensions: 5.0 x 5.0 x 1.45 mm

Applications

- Commercial and Military Radar

Ordering Information

Part	Description
TGA2585-SM	2.7−3.7 GHz, 18 W GaN Power Amplifier
TGA2585-SMEVBP01	Evaluation Board

Absolute Maximum Ratings

Parameter	Value/Range
Drain Voltage (V_D)	40 V
Gate Voltage Range (V_G)	−8 to 0 V
Drain Current (I_D)	1530 mA
Gate Current (I_G)	−7 to 11.5 mA
Power Dissipation (P_{DISS}), 85 °C	35 W
Input Power (P_{IN}), CW, 50 Ω, 85 °C	30 dBm
Input Power (P_{IN}), CW, VSWR 10:1, V_D = 28 V, 85 °C	23 dBm
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/Range
Drain Voltage (V_D)	28 V
Drain Current (I_{DQ})	225 mA
Drain Current Under RF Drive (I_{D_DRIVE})	See plots p. 7
Gate Voltage Range (V_G)	−2.8 to −2.0 V
Gate Current Under RF Drive (I_{G_DRIVE})	See plots p. 7

Electrical Specifications

Test conditions unless otherwise noted: 25 °C, V_D = 28 V, I_{DQ} = 225 mA, Pulsed V_D: PW = 100 us, DC = 10 %

Parameter	Min	Typ	Max	Units
Operational Frequency Range	2.7		3.7	GHz
Small Signal Gain		32		dB
Input Return Loss		> 15		dB
Output Return Loss		> 10		dB
Output Power at Saturation (P_{IN} = 18 dBm)	41.8	42.5		dBm
Power-Added Efficiency (P_{IN} = 18 dBm)	45	> 50		%
Gain Temperature Coefficient		−0.05		dB/°C
Power Temperature Coefficient		−0.005		dBm/°C
Gate Leakage (Vd=10V, Vg=−3.7V)	−7.83	−0.1	−0.0001	mA

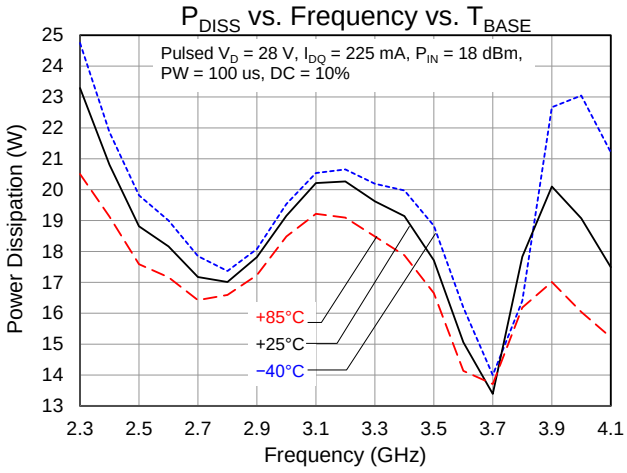
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC})[1]	T_{BASE} = 85 °C, V_D = 28 V, Pulse: PW = 100 us, DC = 10%, Freq = 3 GHz, P_{IN} = 18 dBm: I_{DQ} = 225 mA, I_{D_Drive} = 1330 mA, P_{OUT} = 42.7 dBm, P_{DISS} = 18.6 W	2.50	°C/W
Channel Temperature (T_{CH}) (Under RF drive)[2]		131.5	°C

Notes:
1. Thermal resistance referenced to the back of the package.
2. IR scan equivalent. Refer to the following document: GaN Device Channel Temperature, Thermal Resistance, and Reliability Estimates

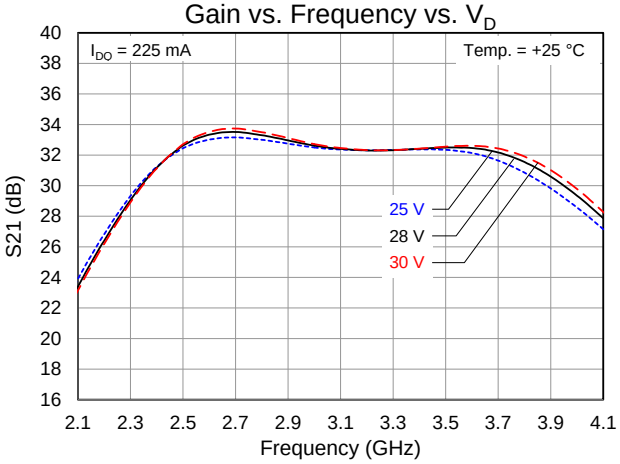
Power Dissipation



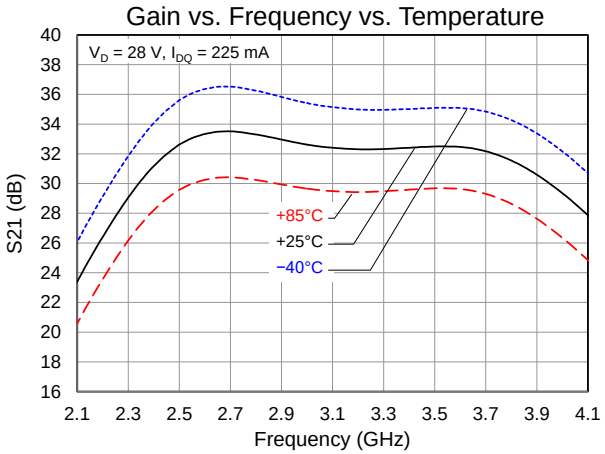
Typical Performance: Small Signal

Condition: CW

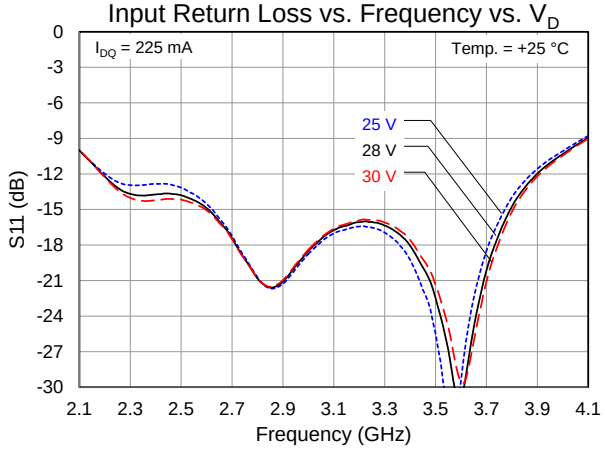
Gain vs. Frequency vs. V_D



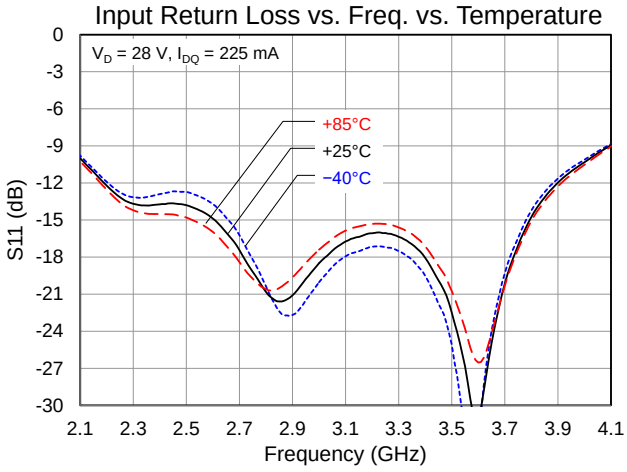
Gain vs. Frequency vs. Temperature



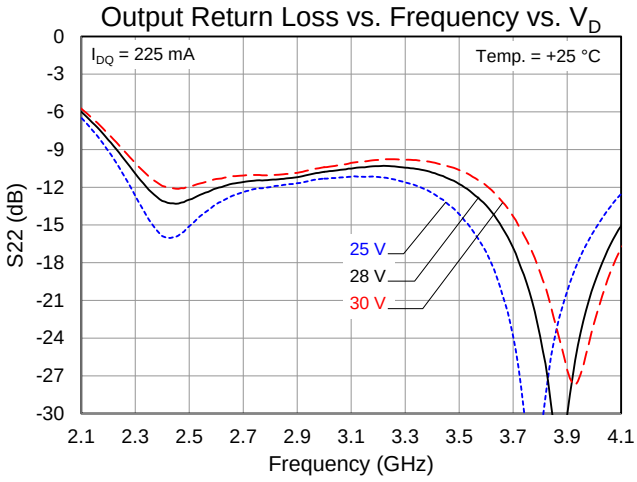
Input Return Loss vs. Frequency vs. V_D



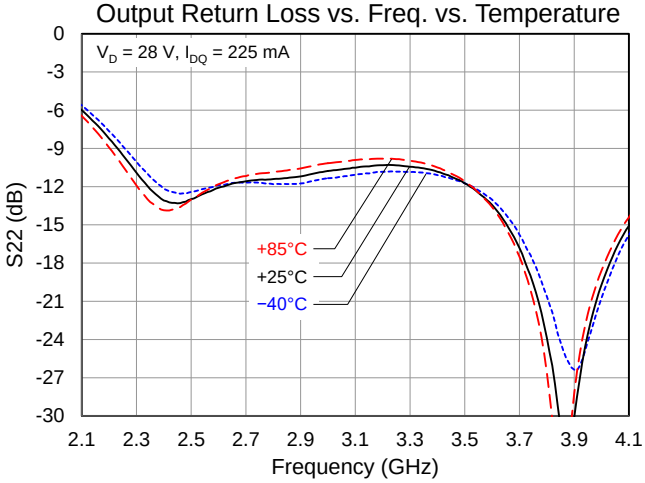
Input Return Loss vs. Freq. vs. Temperature



Output Return Loss vs. Frequency vs. V_D

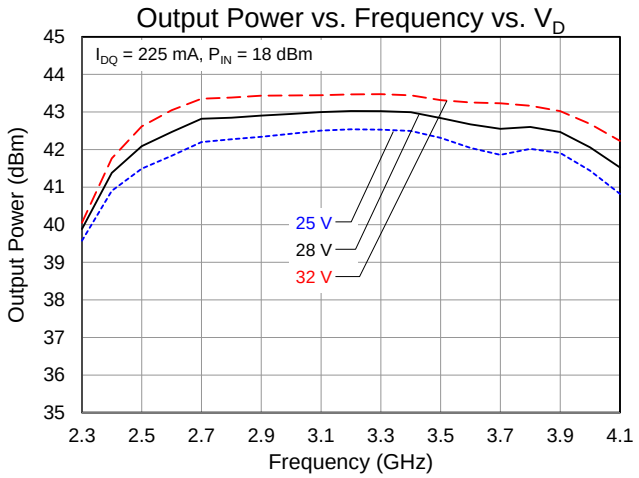


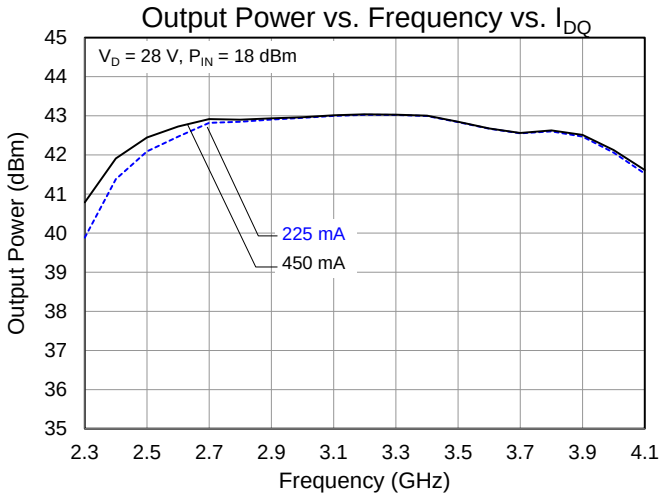
Output Return Loss vs. Freq. vs. Temperature

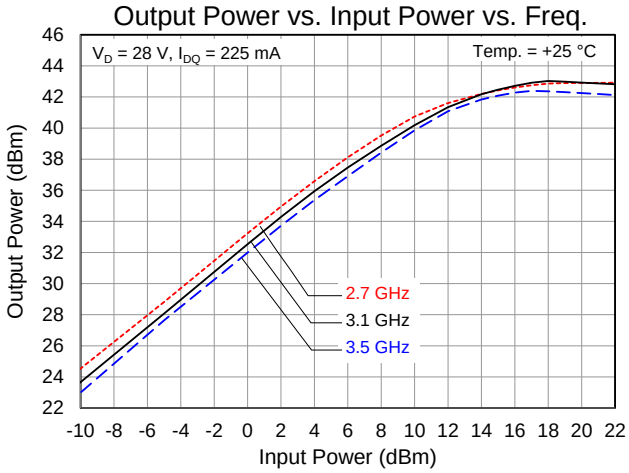


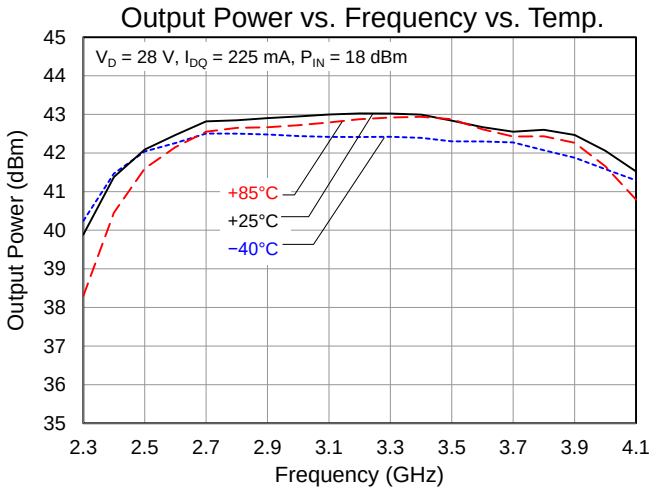
Typical Performance: Large Signal

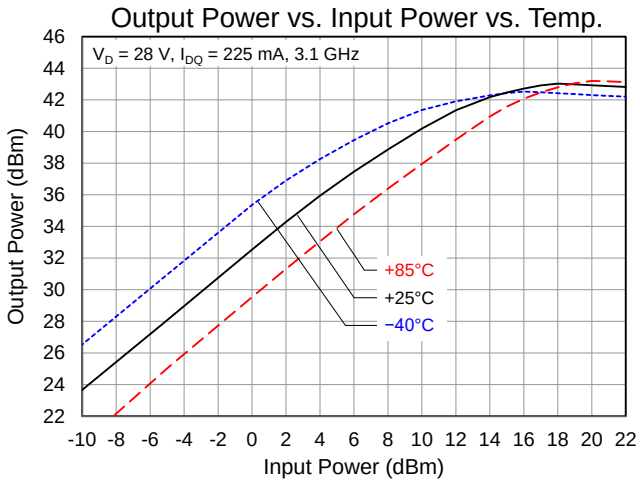
Condition: Pulsed V_D, Pulse Width = 100 us, Duty Cycle = 10%







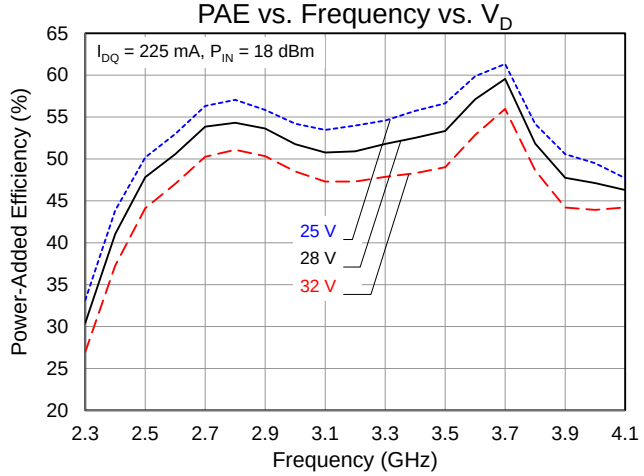




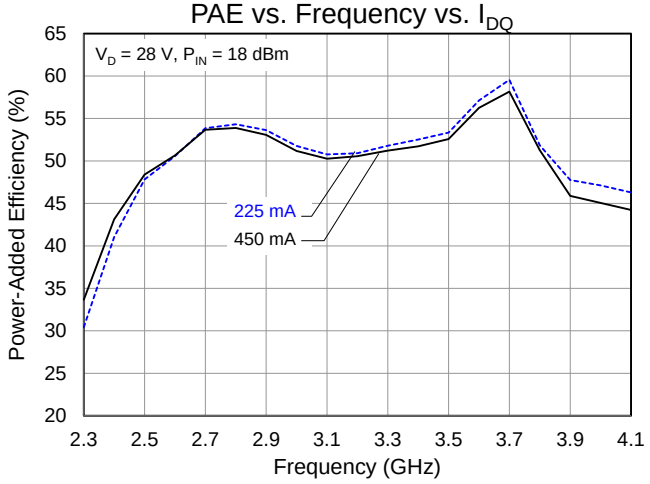
Typical Performance: Large Signal

Condition: Pulsed V_D, Pulse Width = 100 us, Duty Cycle = 10%

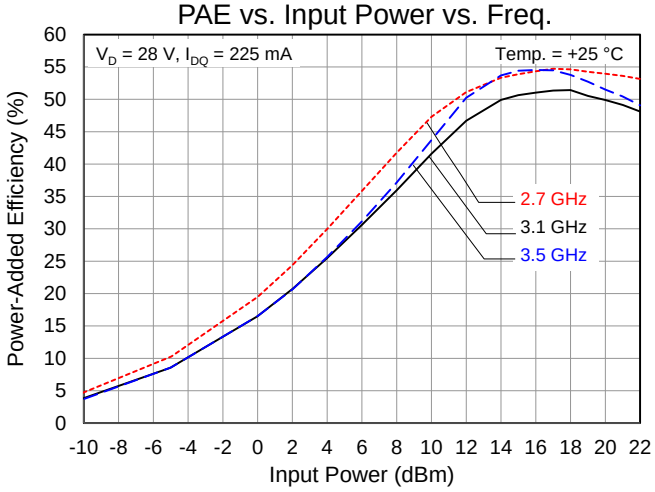
PAE vs. Frequency vs. V_D



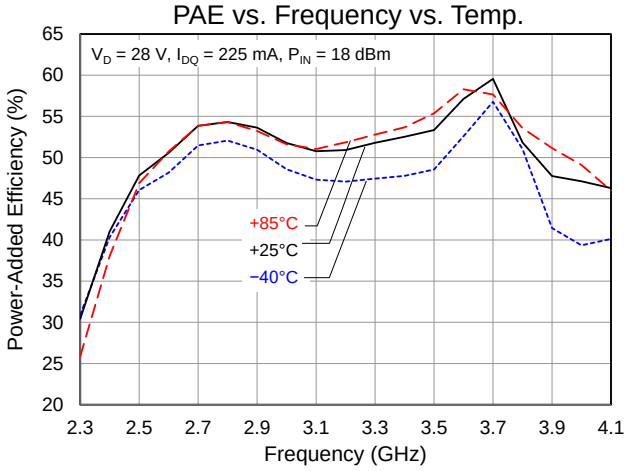
PAE vs. Frequency vs. I_{DQ}



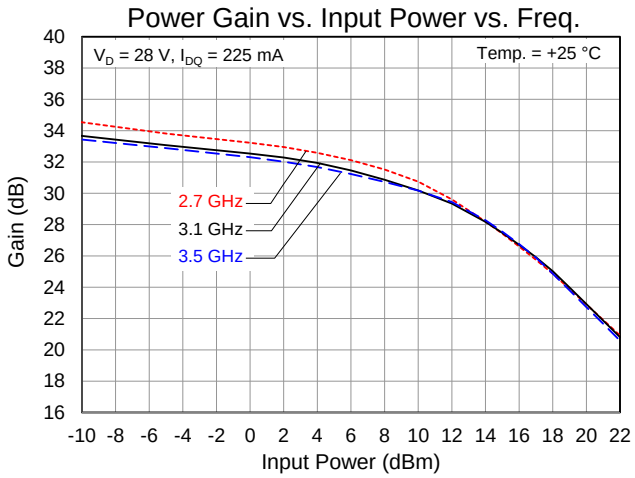
PAE vs. Input Power vs. Freq.



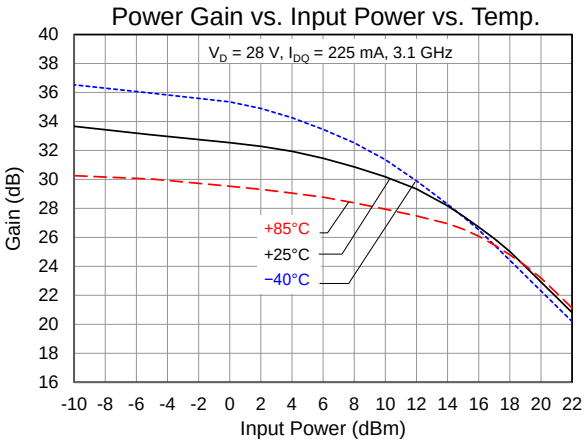
PAE vs. Frequency vs. Temp.



Power Gain vs. Input Power vs. Freq.

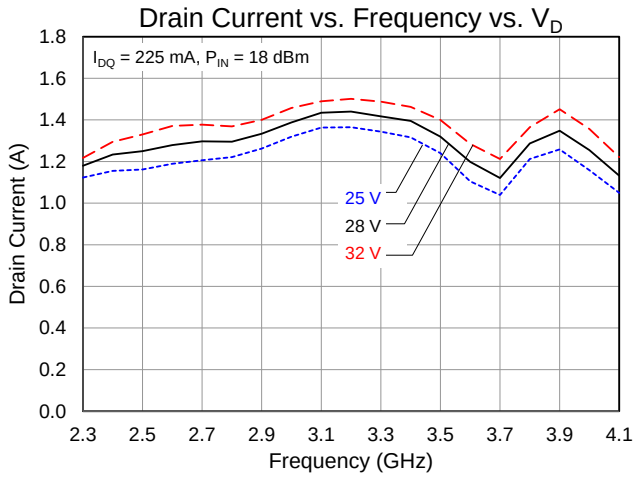


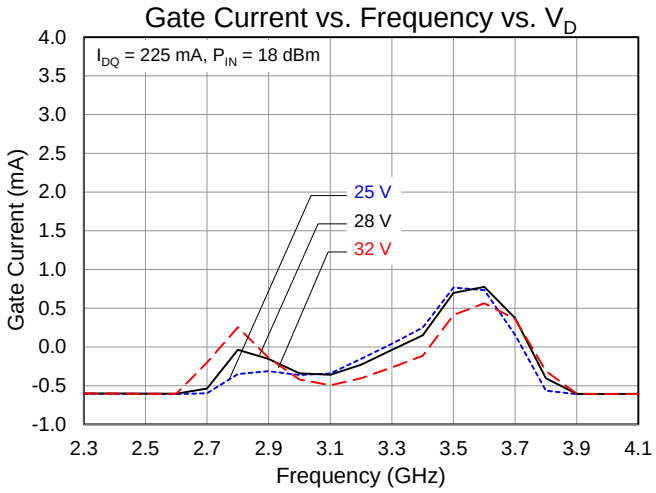
Power Gain vs. Input Power vs. Temp.

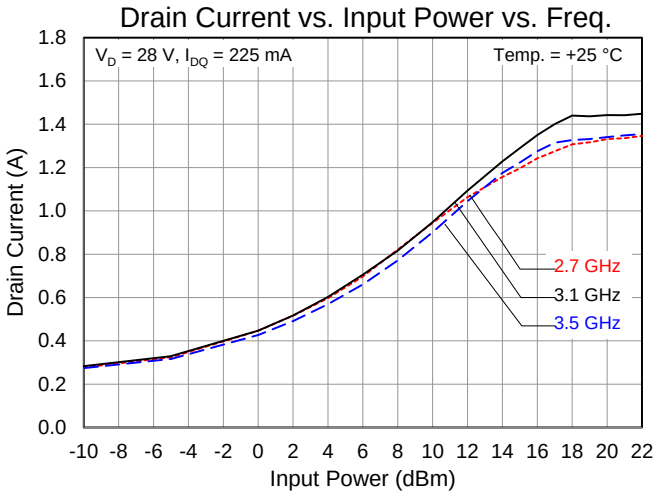


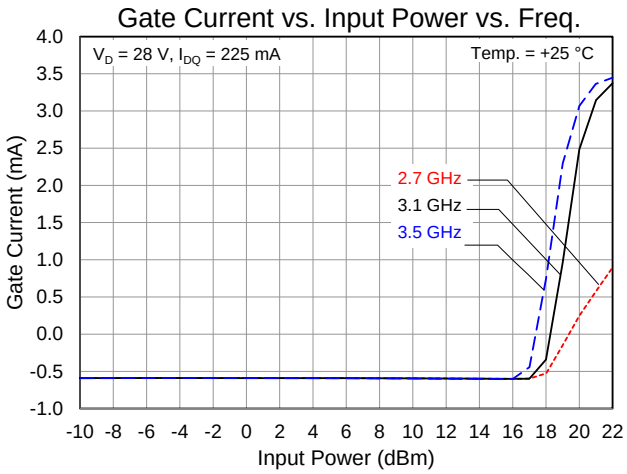
Typical Performance: Large Signal

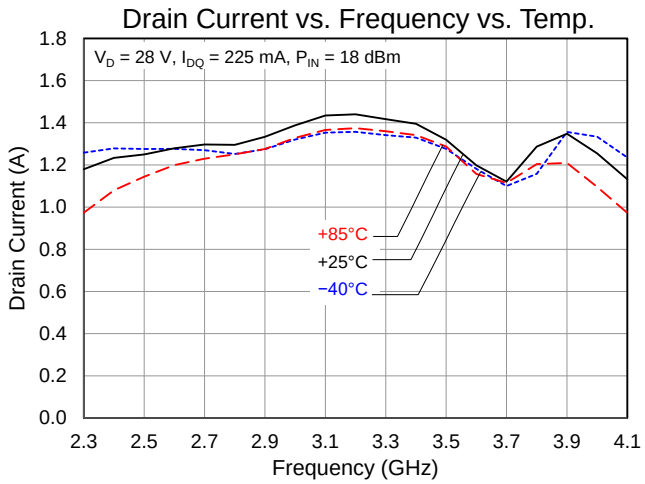
Condition: Pulsed V_D, Pulse Width = 100 us, Duty Cycle = 10%

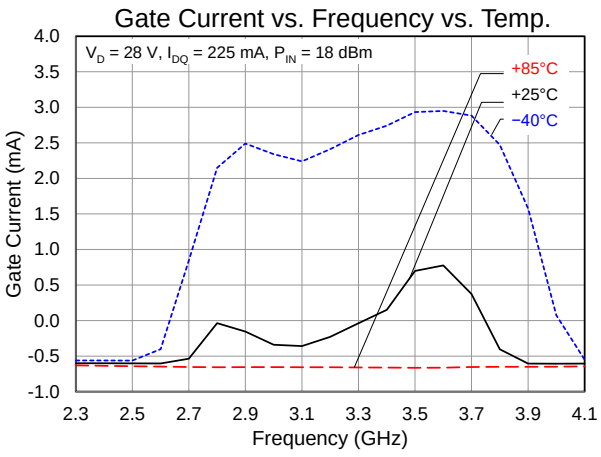




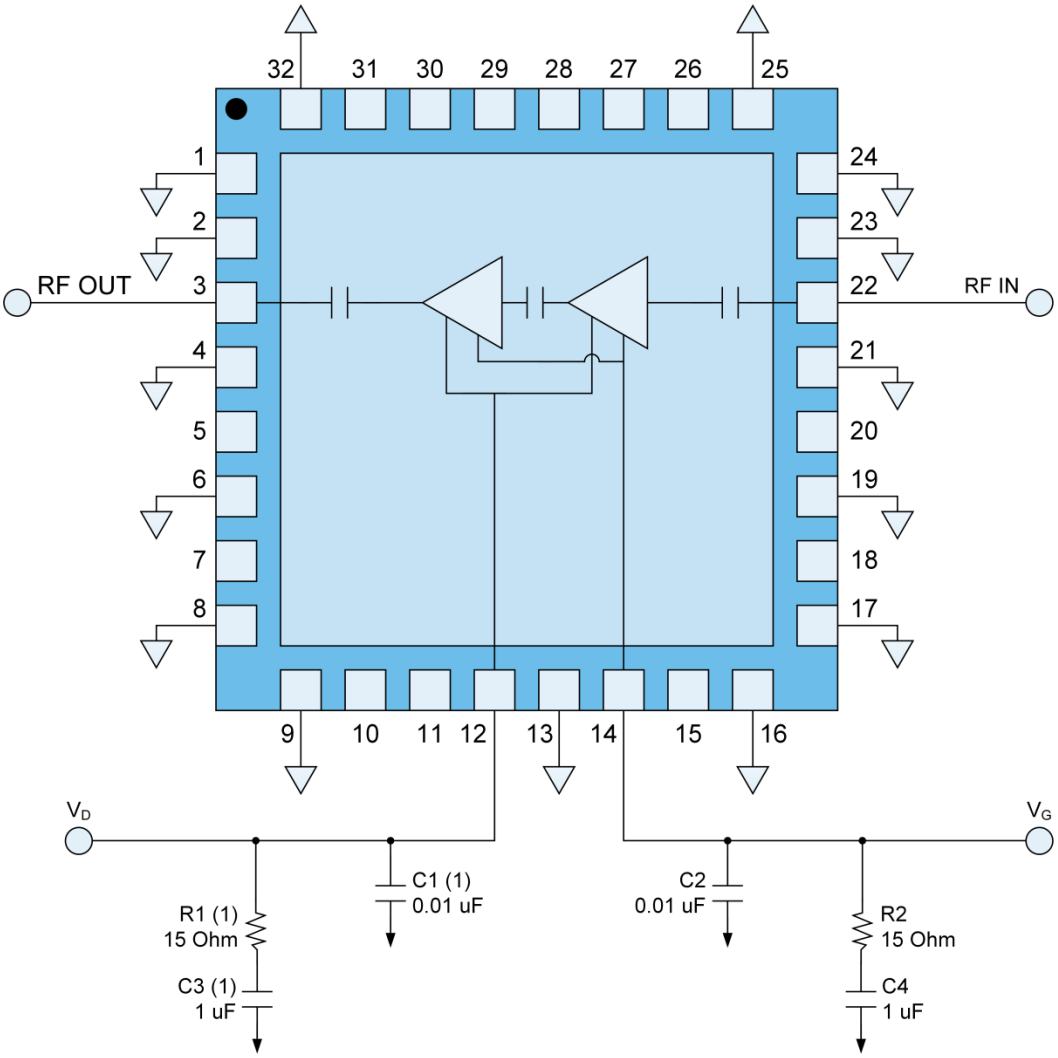








Applications Information



Notes:

1. Remove if pulsing on drain

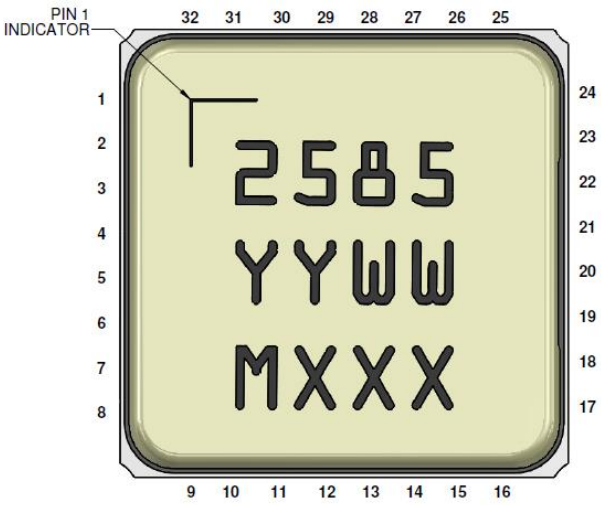
Bias-up Procedure

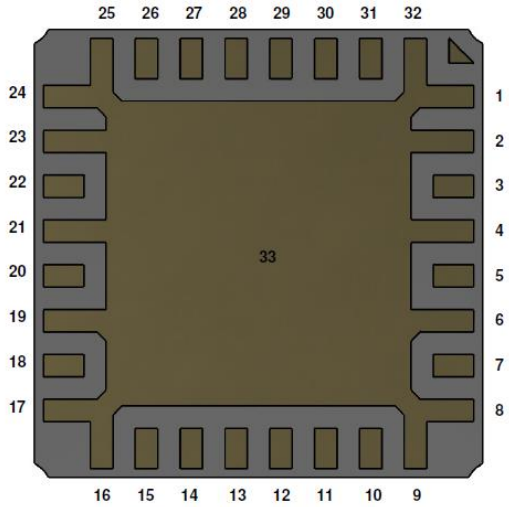
1. Set I_D limit to 1.53 A, I_G limit to 8 mA
2. Apply −5 V to V_G
3. Apply +28 V to V_D; ensure I_{DQ} is approx. 0 mA
4. Adjust V_G until I_{DQ} = 225 mA (V_G ~ −2.5 V Typ.).
5. Turn on RF supply

Bias-down Procedure

1. Turn off RF supply
2. Reduce V_G to −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

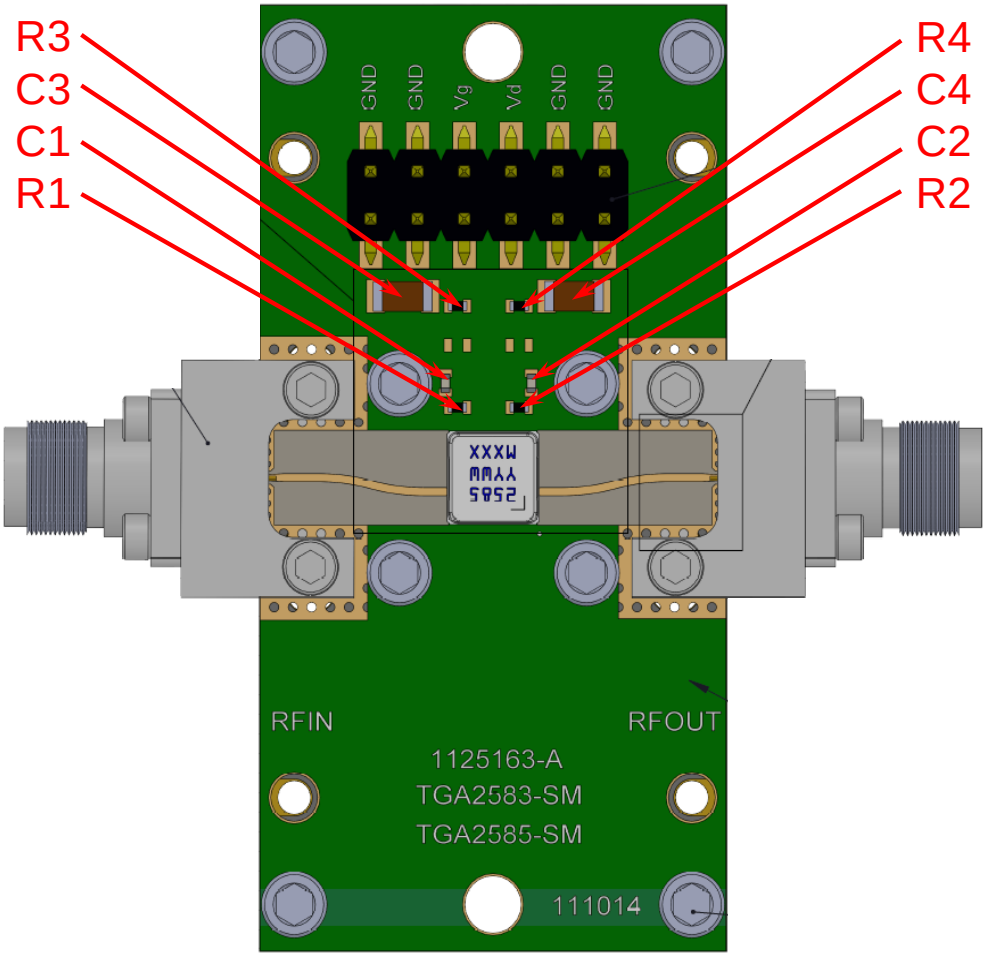
Pin Layout





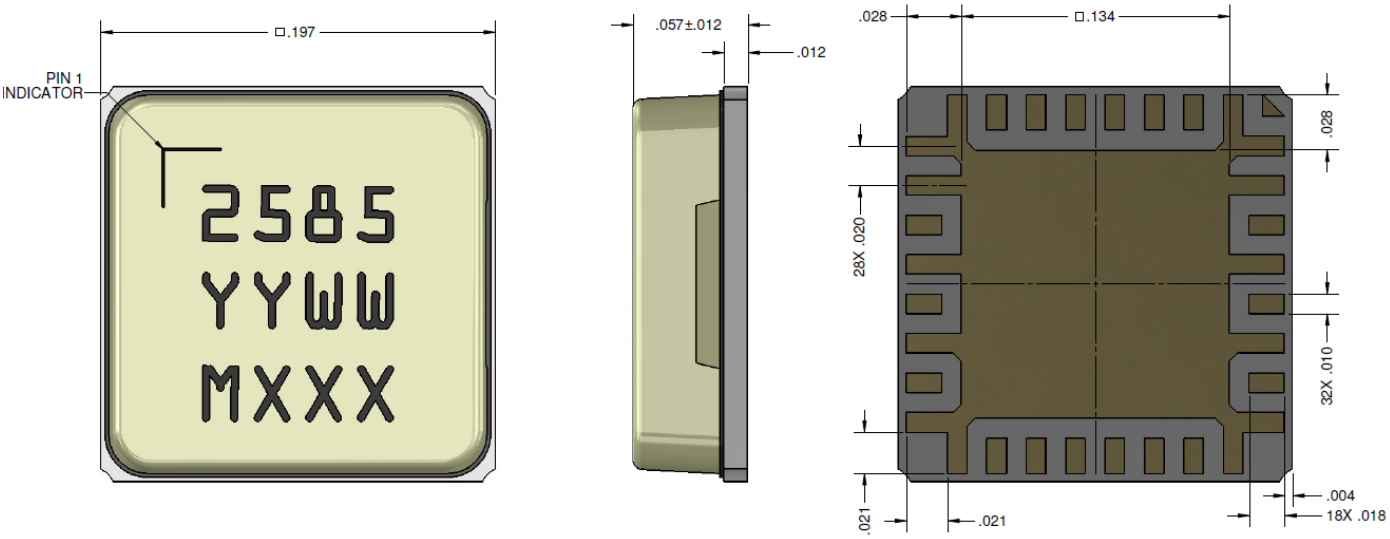
Pin Number	Symbol	Description
1, 2, 4, 6, 8, 9, 13, 16, 17, 19, 21, 23, 24, 25, 32	GND	Connected to ground paddle (pin 33); must be grounded on PCB.
3	RF OUT	Output; matched to 50 Ω; DC blocked.
5, 7, 10, 11, 15, 18, 20, 26-31	NC	No connection. May be grounded to PCB to improve package attachment.
12	DRAIN	Drain voltage; bias network is required; see recommended Application Information on page 8.
14	GATE	Gate voltage; bias network is required; see recommended Application Information on page 8.
22	RF IN	Input; matched to 50 Ω; DC blocked.
33	GND	Ground Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

Evaluation Board Layout an Bill of Materials



Reference Des.	Value	Description	Manuf.	Part Number
C1, C2	0.01 µF	Cap, 0402, 50 V, 10%, X7R	Various	
C3, C4	1 µF	Cap, 0805, 50 V, 10%, X7R	Various	
R1, R2	0 Ohm	Res, 0402, 5%	Various	
R3. R4	15 Ohm	Res, 0402, 5%	Various	
J1, J2	2.92 mm F	RF Connector end launch	SW Microwave	1092-01A-5

Mechanical Information



Units: Inches
Tolerances: unless specified
x.xx = ± 0.01
x.xxx = ± 0.005
Materials:
Base: Ceramic
Lid: Plastic
All metalized features are gold plated
Part is epoxy sealed
Marking:
2585: Part number
YY: Part Assembly year
WW: Part Assembly week
MXXX: Batch ID

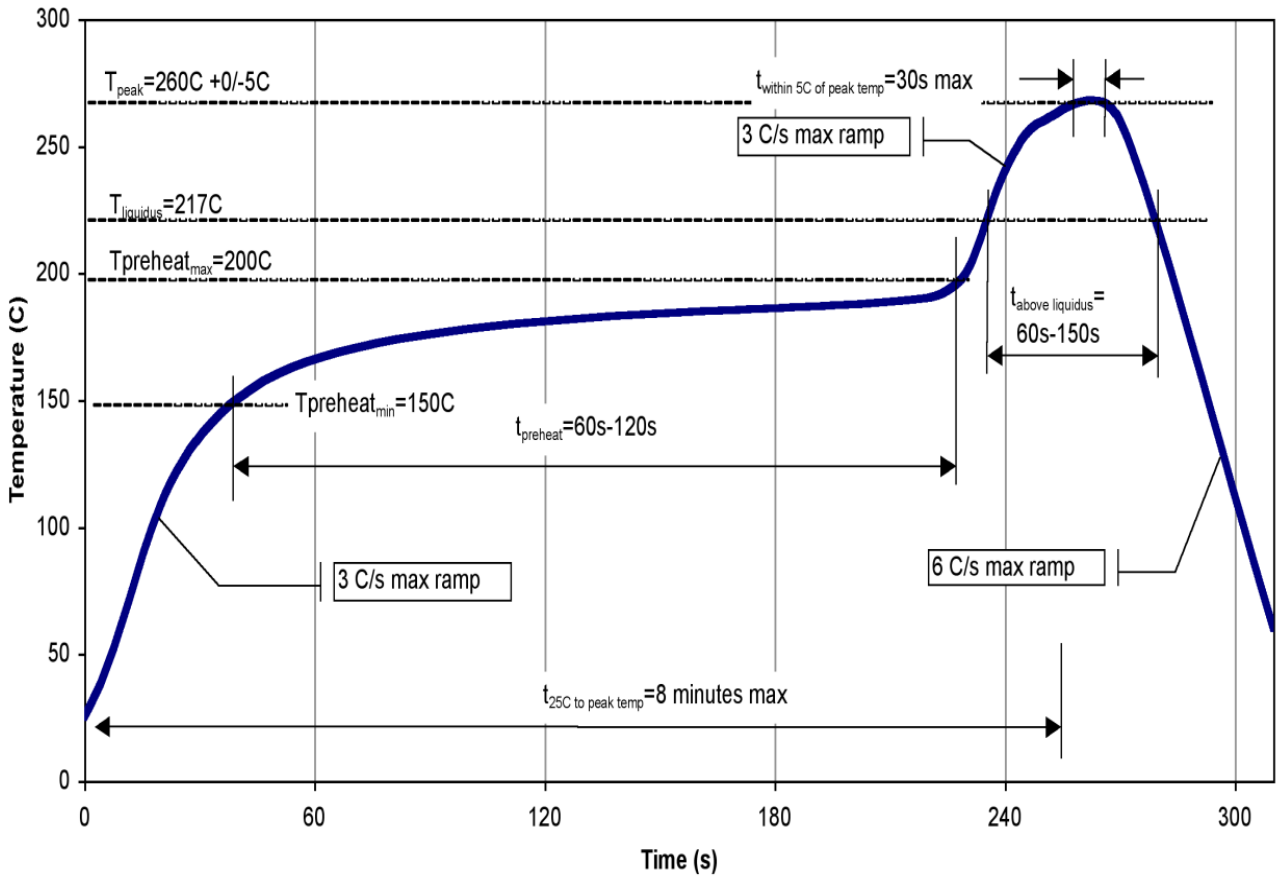
Recommended Soldering Temperature Profile

Compatible with lead-free soldering processes with 260°C peak reflow temperature.

This package is air-cavity and non-hermetic, and therefore cannot be subjected to aqueous washing. The use of no-clean solder to avoid washing after soldering is highly recommended.

Contact plating: Ni-Au.

Solder rework not recommended.



Recommended Soldering Temperature Profile

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1B	ANSI/ESD/JEDEC JS-001
ESD – Charge Device Model (CDM)	C3	ANSI/ESD/JEDEC JS-002
MSL – Moisture Sensitivity Level	MSL3	IPC/JEDEC J-STD-020

Caution!

ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A (C15H12Br402) Free
- PFOS Free
- Halogen Free
- SVHC Free

Contact Information

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

Web: www.qorvo.com

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Email: customer.support@qorvo.com

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