



# TGA2583-SM

## 2.7 to 3.7 GHz, 10 W GaN Power Amplifier

### General Description

Qorvo's TGA2583-SM is a packaged MMIC power amplifier which operates from 2.7 to 3.7 GHz. The TGA2583-SM is designed using Qorvo's production 0.25  $\mu\text{m}$  GaN on SiC process (QGaN25).

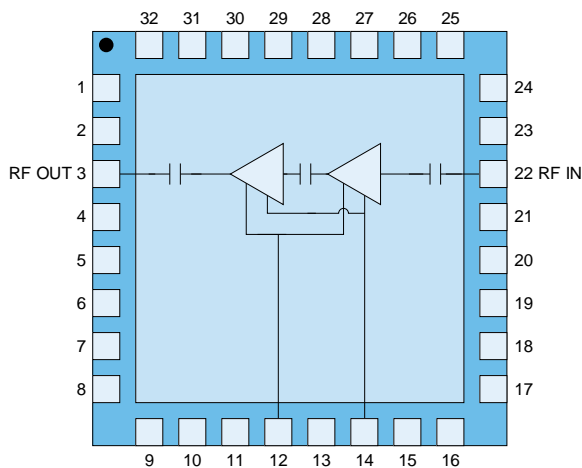
The TGA2583-SM typically provides 41.4 dBm of saturated output power, > 50% power-added efficiency, and 33 dB small signal gain. It can operate under both pulse and CW conditions.

The TGA2583-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

### Product Features

- Frequency Range: 2.7–3.7 GHz
- $P_{SAT}$ : 41.4 dBm
- PAE: > 50 %
- Small Signal Gain: 33 dB
- Return Loss: > 12 dB
- Bias:  $V_D = 25\text{--}32$  V (CW or Pulsed),  $I_{DQ} = 175$  mA
- Pulsed  $V_D$ : PW = 100  $\mu\text{s}$ , DC = 10 %
- Package Dimensions: 5.0 x 5.0 x 1.45 mm

### Applications

- Commercial and Military Radar

### Ordering Information

Part	Description
TGA2583-SM	2.7–3.7 GHz, 10 W GaN Power Amplifier
TGA2583-SM EVB	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 ( $I_G$ )	-5.4 to 11.5 mA
Power Dissipation ( $P_{DISS}$ ), 85 °C	27 W
Input Power ( $P_{IN}$ ), CW, 50 $\Omega$ , 85 °C	30 dBm
Input Power ( $P_{IN}$ ), CW, $V_{SWR}$ 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 ( $V_D$ )	25–32 V
Drain Current ( $I_{DQ}$ )	175–350 mA
Drain Current Under RF Drive ( $I_{D\_DRIVE}$ )	See plots pg. 6
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 are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

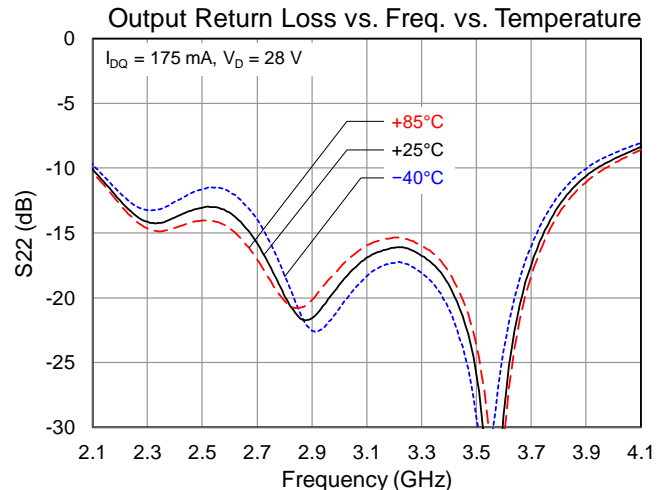
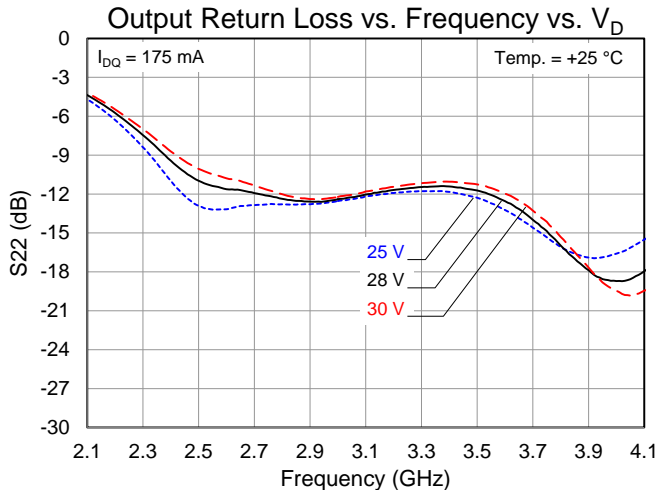
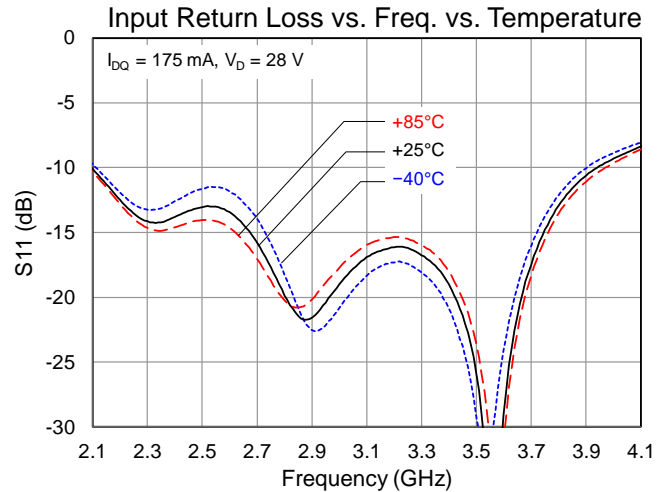
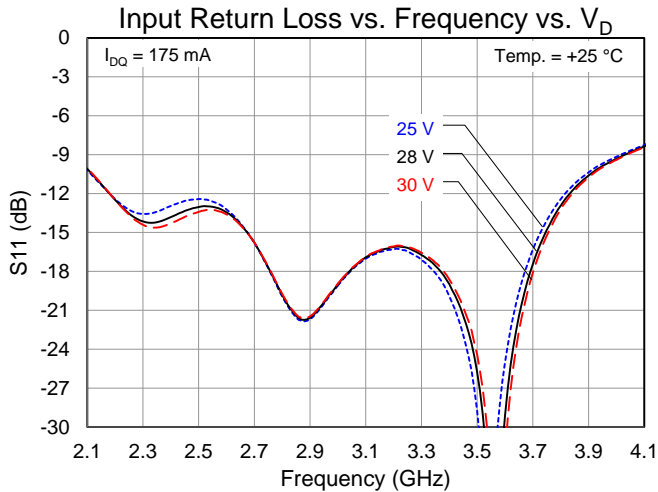
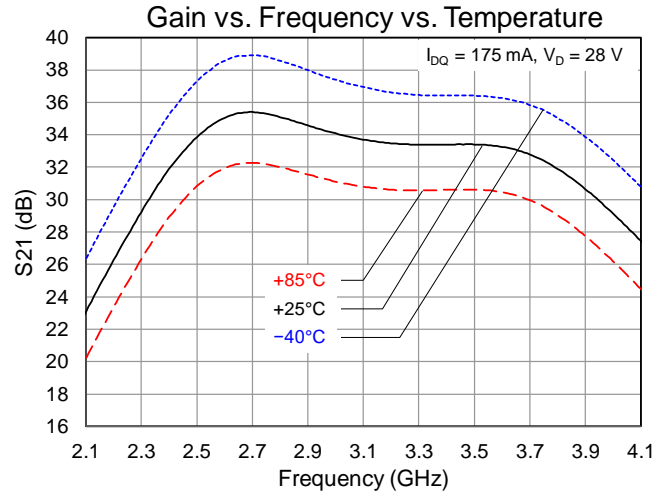
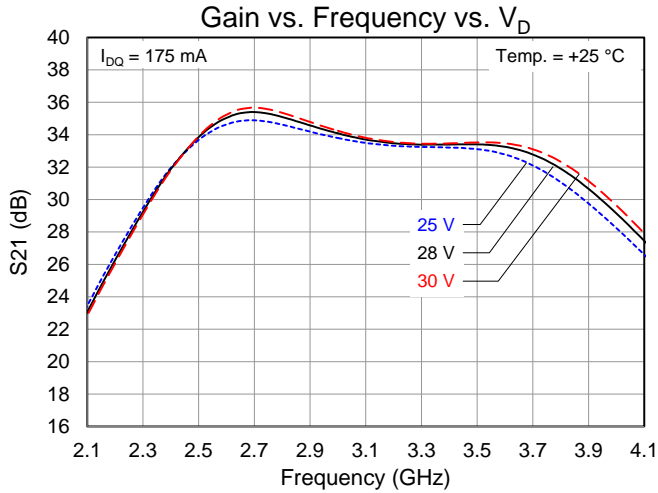
## Electrical Specifications

Test conditions unless otherwise noted: 25 °C,  $V_D = 28$  V,  $I_{DQ} = 175$  mA, Pulsed  $V_D$ : PW = 100  $\mu$ s, DC = 10 %

Parameter	Min	Typical	Max	Units
Operational Frequency Range	2.7		3.7	GHz
Small Signal Gain (CW)		>33		dB
Input Return Loss (CW)		>16		dB
Output Return Loss (CW)		>11		dB
Output Power at Saturation ( $P_{IN} = 16$ dBm)	40.5	41.6		dBm
Power-Added Efficiency ( $P_{IN} = 16$ dBm)	50	54		%
Gate Leakage ( $V_D = 10$ V, $V_G = -3.7$ V)	-5.98		-0.0001	mA
Gain Temperature Coefficient		-0.05		dB/°C
Power Temperature Coefficient		-0.005		dBm/°C

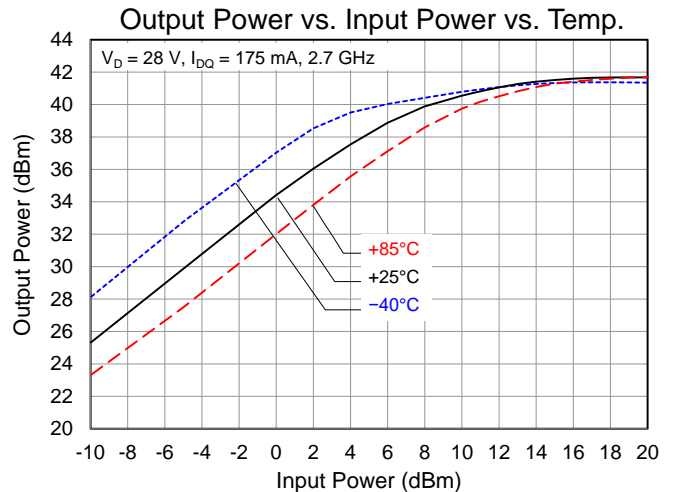
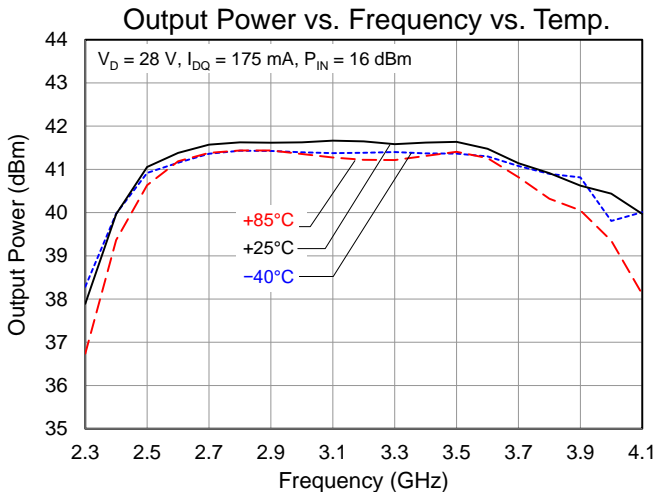
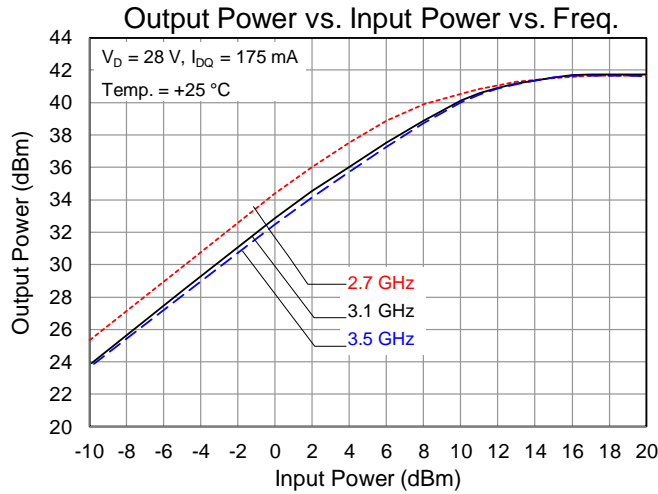
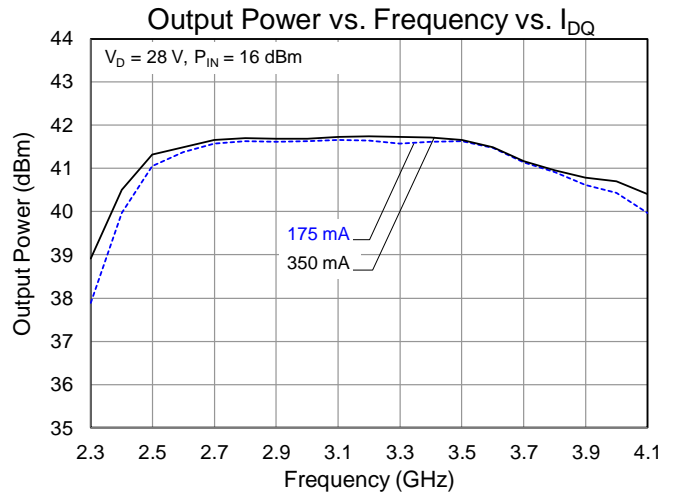
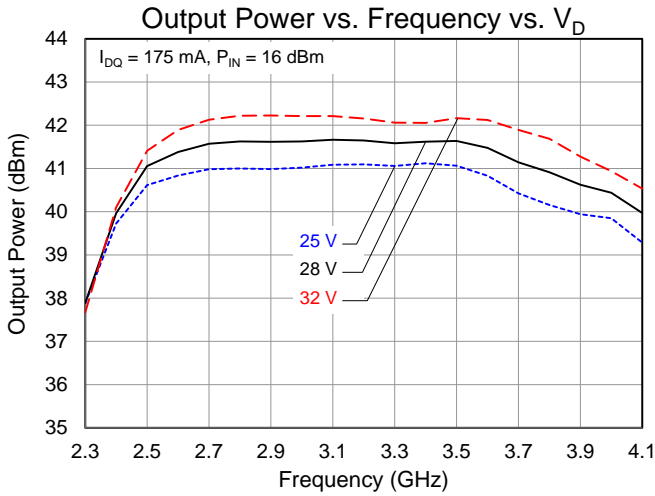
**Typical Performance: Small Signal**

Condition: CW



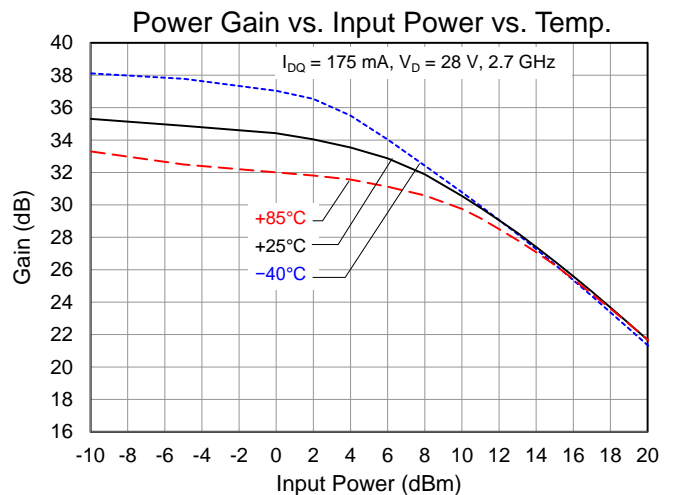
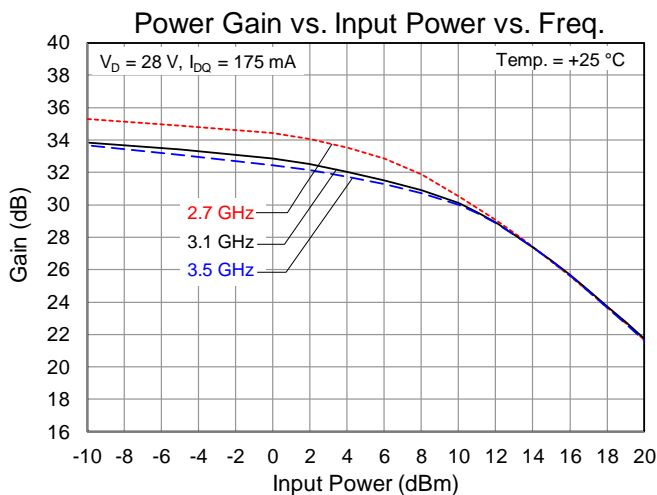
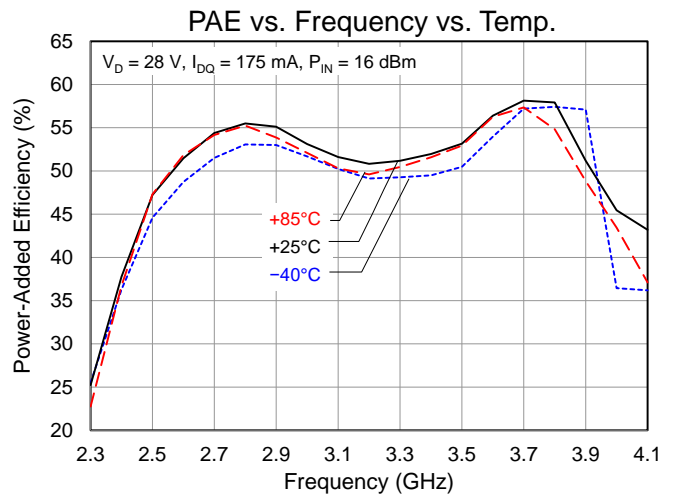
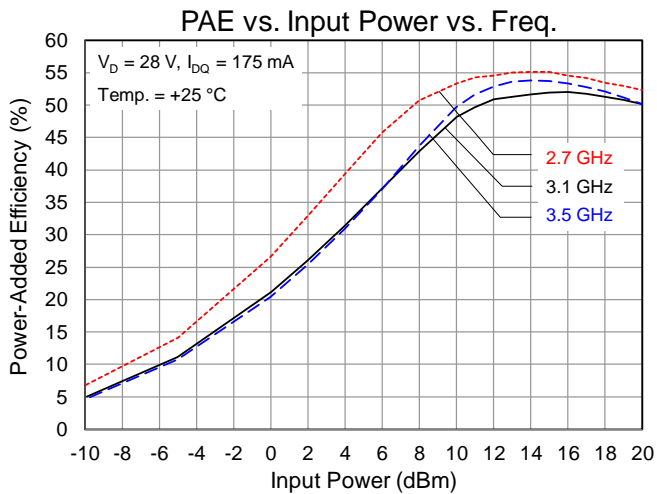
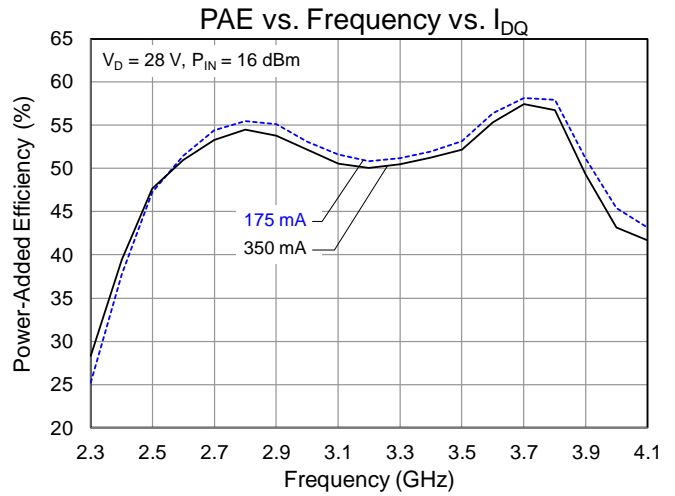
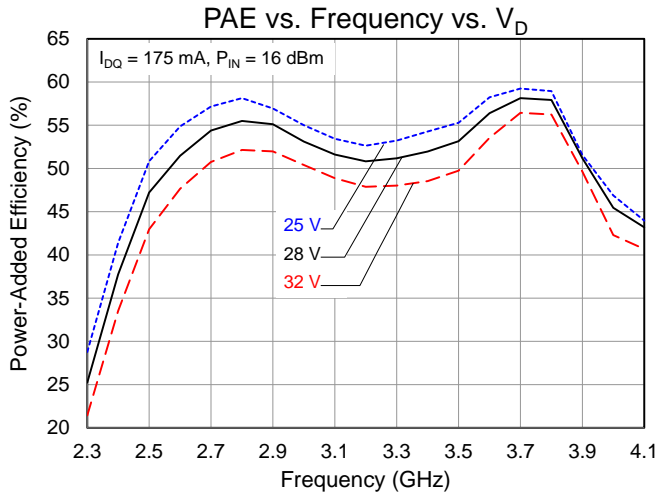
Typical Performance: Large Signal

Condition: Pulsed  $V_D$ , Pulse Width = 100  $\mu$ s, Duty Cycle = 10%



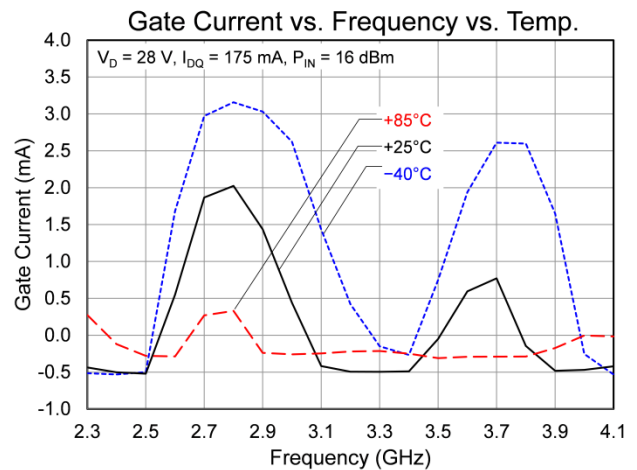
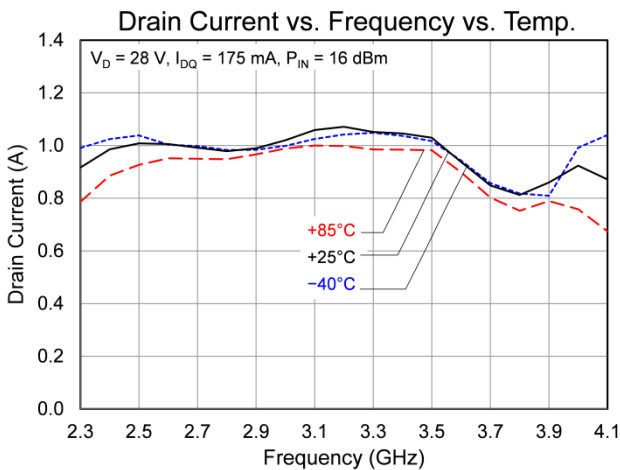
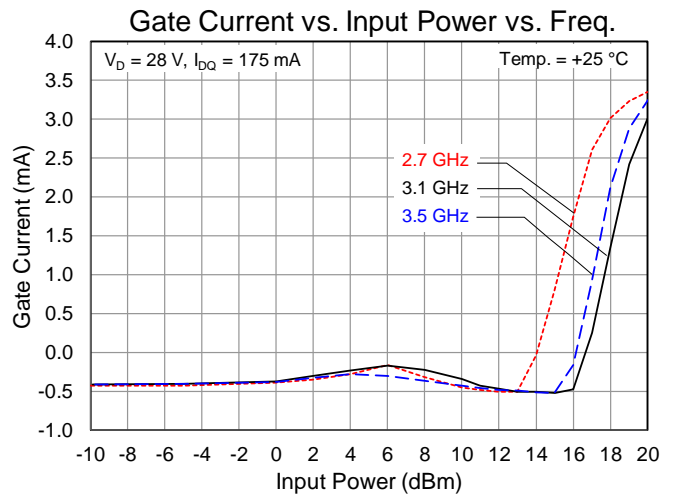
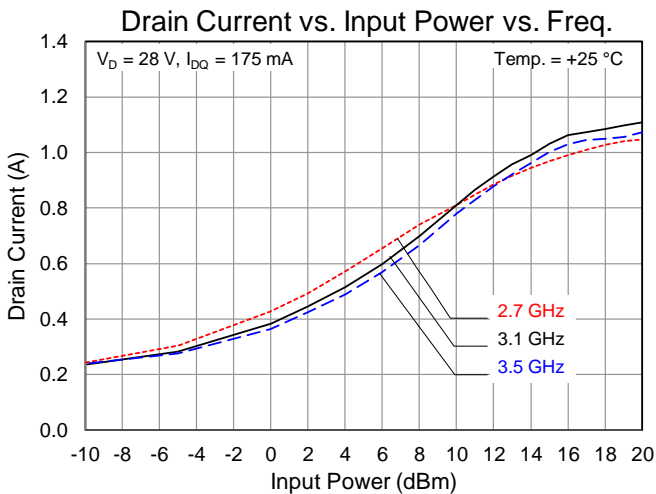
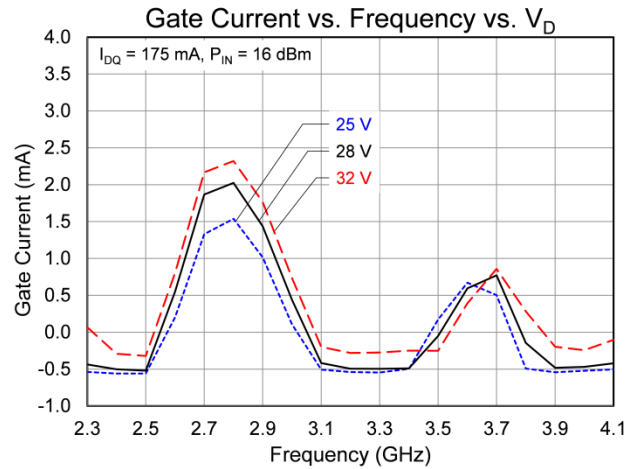
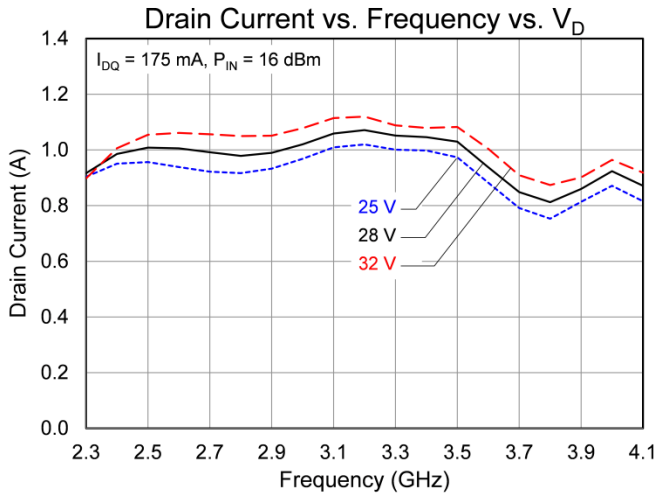
## Typical Performance: Large Signal

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%



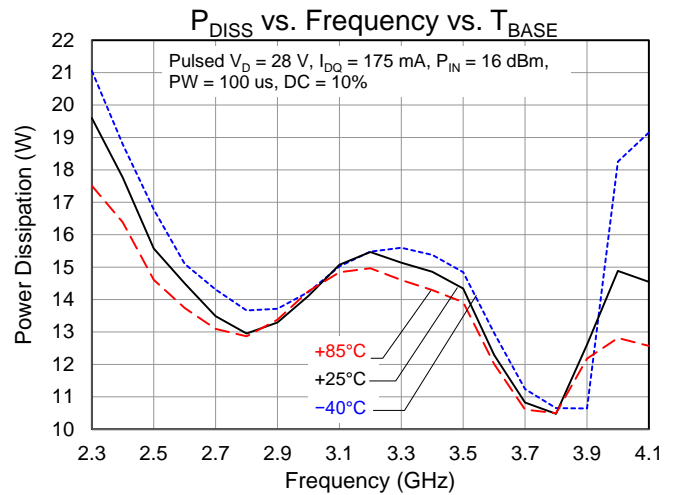
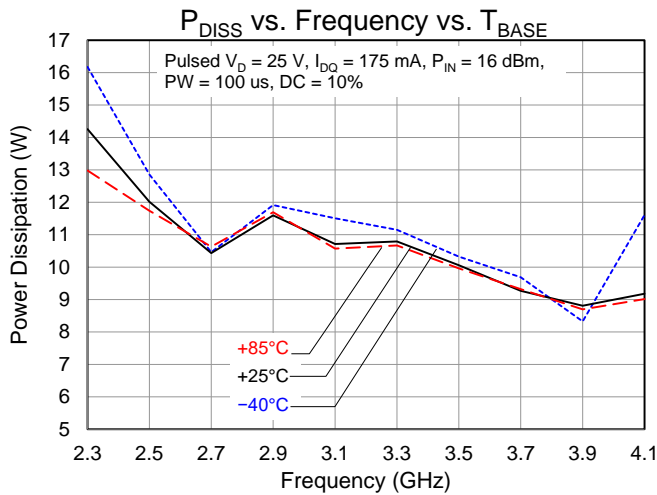
## Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$T_{BASE} = 85^{\circ}\text{C}$ , $V_D = 28\text{ V}$ , $PW = 100\text{ us}$ , $DC = 10\%$ , $Freq = 3.2\text{ GHz}$ , $P_{IN} = 16\text{ dBm}$ , $I_{DQ} = 175\text{ mA}$ ,	2.592	$^{\circ}\text{C/W}$
Channel Temperature ( $T_{CH}$ ) (Under RF drive) <sup>(2)</sup>	$I_{D\_Drive} = 999\text{ mA}$ , $P_{OUT} = 41.2\text{ dBm}$ , $P_{DISS} = 15.0\text{ W}$	124.2	$^{\circ}\text{C}$

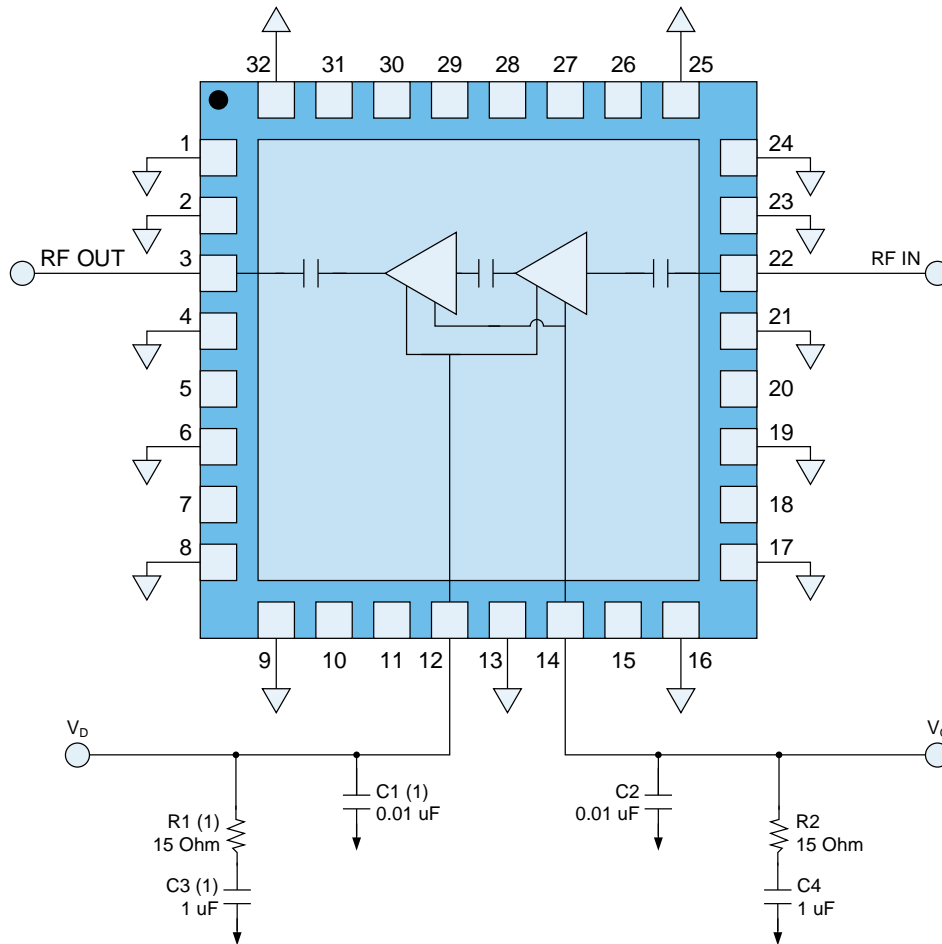
Notes:

1. Thermal resistance is determined 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



Applications Information



Notes:

1. Remove if pulsing on drain

**Bias-up Procedure**

Set  $I_D$  limit to 1.53 A,  $I_G$  limit to 8 mA

Apply -5 V to  $V_G$

Apply + 25 V to  $V_D$ ; ensure  $I_{DQ}$  is approx. 0 mA

Adjust  $V_G$  until  $I_{DQ} = 175$  mA

Turn on RF supply

**Bias-down Procedure**

Turn off RF signal

Reduce  $V_G$  to -5 V; ensure  $I_{DQ}$  is approx. 0 mA

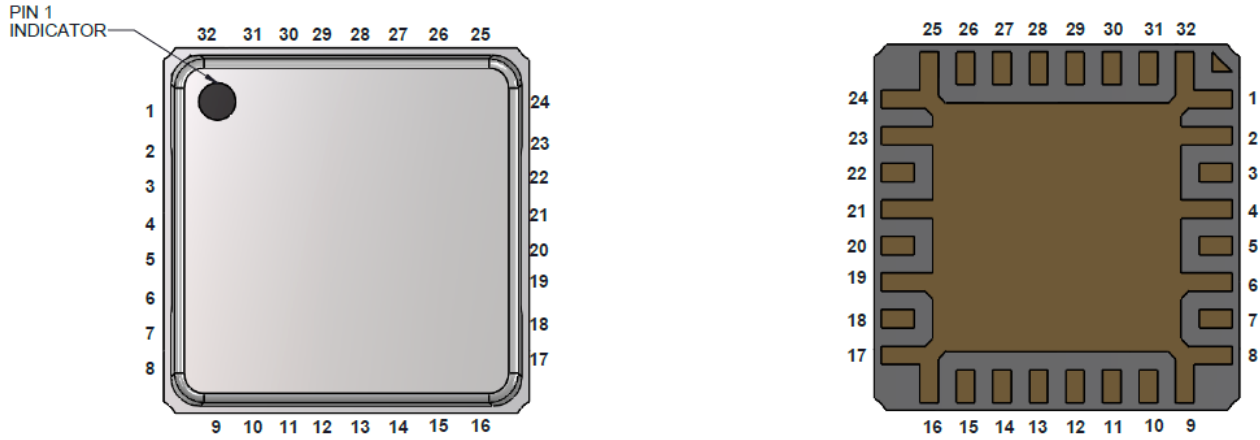
Set  $V_D$  to 0 V

Turn off  $V_D$  supply

Turn off  $V_G$  supply



## Pin Layout

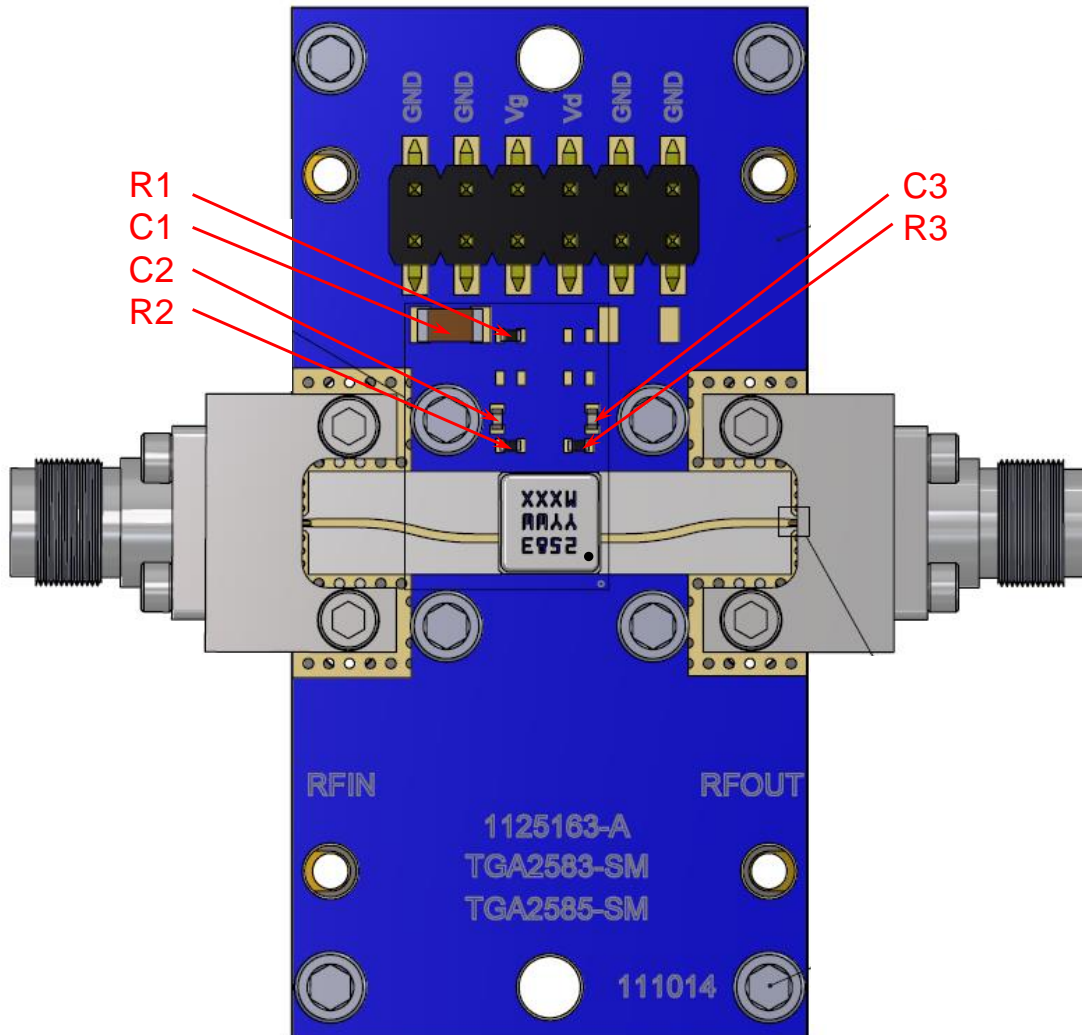


PIN ASSIGNMENT

## Pin Description

Pin No.	Symbol	Description
1, 2, 4, 6, 8-9, 13, 16-17, 19, 21, 23-25, 32	GND	Connected to ground paddle (pin 33); must be grounded on PCB
3	RF OUT	Output; matched to 50 $\Omega$ ; DC blocked
5, 7, 10, 11, 15, 18, 20, 26-31	NC	No connection; grounding of PCB pads recommended but not required.
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 $\Omega$ ; DC blocked
33	GND	Ground Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

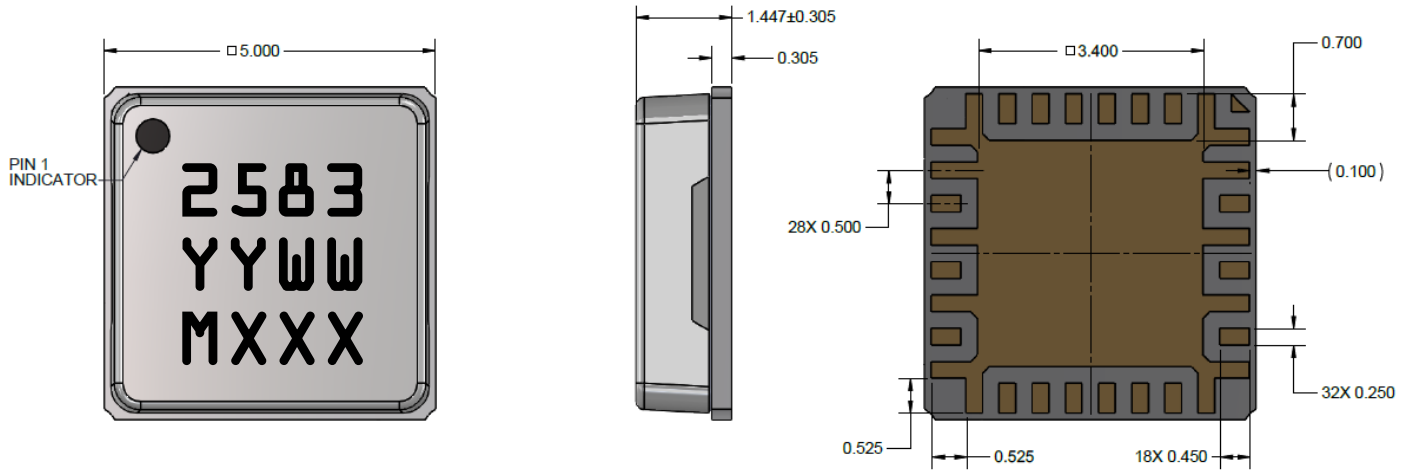
Evaluation Board



Bill of Material

Reference Des.	Value	Description	Manuf.	Part Number
C1	10 $\mu$ F	CAP, 10uF, 20%, 50V, 20%, X5R, 1206	Various	
C2, C3	0.01 $\mu$ F	CAP, 0.01uF, 10%, 50V, X7R, 0402	Various	
R1, R2	10 Ohm	RES, 10 OHM, 5%, 0.1W, 0402	Various	
J1, J2	2.92 mm	RF Connector, 2.92 mm, Female	Southwest Microwave	1092-01A-5

Mechanical Information



Units: millimeters

Tolerances: unless otherwise specified

x.xx = ± 0.25

x.xxx = ± 0.127

Materials:

Base: Ceramic

Lid: Plastic

All metalized features are gold plated

Part is epoxy sealed

Marking:

2583: Part number

YY: Part Assembly year

WW: Part Assembly week

MXXX: Batch ID

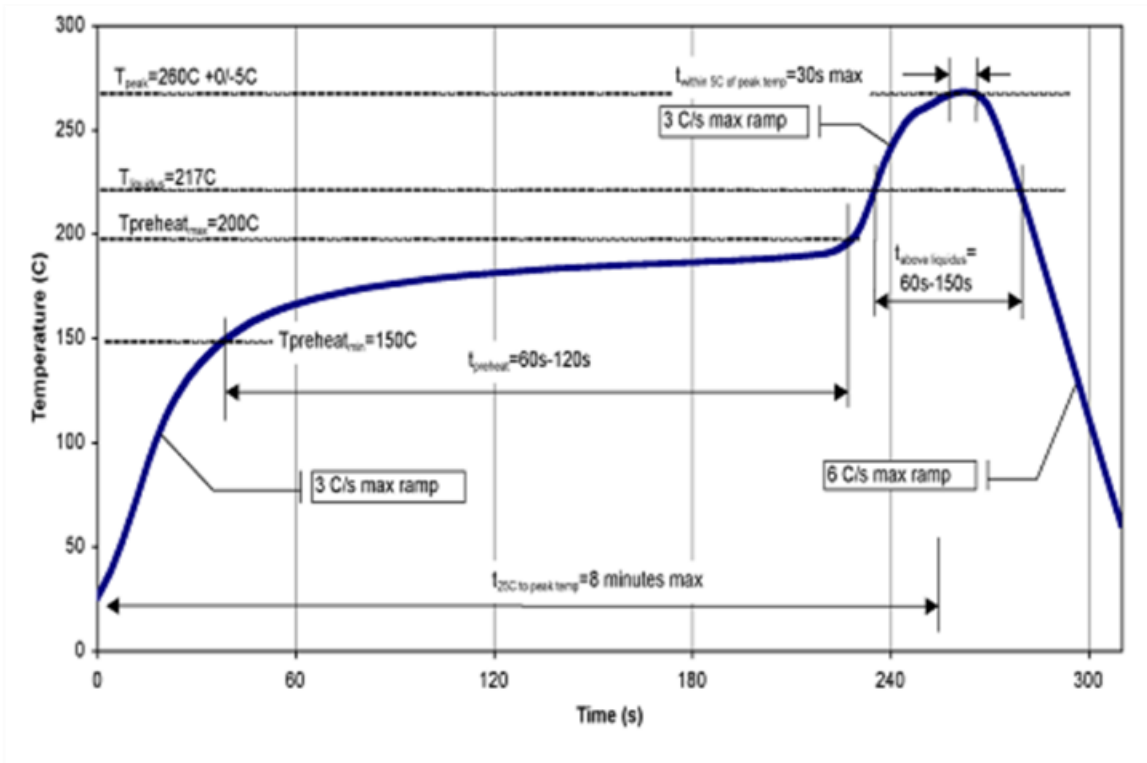
Assembly Notes

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	JEDEC/JESD22-A114
ESD – Charge Device Model (CDM)	C3	JEDEC/JESD22-C101
MSL – Moisture Sensitivity Level	MSL3	JEDEC/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
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free

## Contact Information

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

**Web:** [www.qorvo.com](http://www.qorvo.com)

**Tel:** 1-844-890-8163

**Email:** [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

## Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo 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. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo 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.

© 2020 Qorvo US, Inc. All rights reserved. This document is subject to copyright laws in various jurisdictions worldwide and may not be reproduced or distributed, in whole or in part, without the express written consent of Qorvo US, Inc.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.