

## 2W GaN Power Transistor 20 MHz to 5.0 GHz

### Features

- 2 W GaN Driver stage
- 28 V typical operation
- Frequency Range 20 MHz to 5.0 GHz
- Small signal gain @ 1000 MHz: 20 dB
- Gain at  $P_{3dB}$  @ 1000 MHz: 15 dB
- PAE @  $P_{3dB}$  @ 1000 MHz: 45%

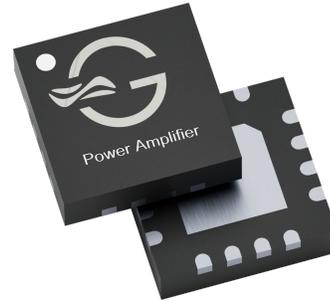


Figure 1: TA9010K in 3.0 x 3.0 mm<sup>2</sup> QFN 16-pin package.

### Applications

- Private mobile and defense radios
- Public safety handsets
- Cellular infrastructure
- Satellite terminals
- Datalinks

### General Description

The TA9010K is a broadband GaN power transistor capable of delivering 2 W CW from 20 MHz to 5.0 GHz frequency band. The input and output can be matched for best power and efficiency for the desired band. This GaN RF transistor can be used as a driver stage in 28V rail to avoid adding 12V rail for Power Amplifier driver stage.

The TA9010K is packaged in a compact, low-cost Quad Flat No lead (QFN) 3.0 x 3.0 x 0.75 mm<sup>3</sup>, 8 leads plastic package.

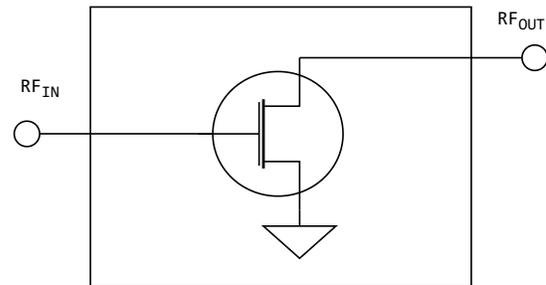


Figure 2: TA9010K RF GaN transistor functional diagram



RoHS/Reach/Halogen free

## Absolute Maximum Ratings

Table 1: Absolute Maximum Ratings  $T_A \leq +25^\circ\text{C}$  unless otherwise specified<sup>1</sup>.

Parameter	Symbol	Value	Unit
<b>Electrical Ratings</b>			
Breakdown voltage	$V_{DS}$	+120	V
Gate voltage	$V_{GS}$	-10...+2.0	V
Breakdown current	$I_{DS}$	0.5	A
Gate current	$I_{GS}$	1.5	mA
Power dissipation CW	$P_{diss}$	6	W
RF input power CW, 20-1000MHz	$P_{RFIN}$	21	dBm
Storage Temperature Range	$T_{st}$	-55...+150	$^\circ\text{C}$
Operating Temperature Range	$T_{op}$	-40...+85	$^\circ\text{C}$
Maximum Junction Temperature	$T_j$	+225	$^\circ\text{C}$
<b>Thermal Ratings</b>			
Thermal Resistance (junction-to-case) – Bottom side	$R_{\theta jc}$	8.9	$^\circ\text{C}/\text{W}$
Soldering Temperature	$T_{solder}$	+260	$^\circ\text{C}$
<b>ESD Ratings</b>			
Human Body Model (HBM)	Level 1A	250...<500	V
Charged Device Model (CDM)	Level C1	250...<500	V
<b>Moisture Rating</b>			
Moisture Sensitivity Level	MSL	1	

<sup>1</sup> Maximum ratings are absolute ratings. Exposure to absolute maximum rating conditions for extended periods may affect device reliability and can cause permanent damage to the device. Exceeding one or a combination of the absolute maximum ratings may cause permanent and irreversible damage to the device and/or to surrounding circuit. Functional operation of the device is not implied in any conditions above those indicated in the Electrical Specifications section.

## Electrical Specifications

### Recommended DC Operating Conditions

Table 2: Recommended Operating Conditions  $T_A = +25^\circ\text{C}$  Unless Otherwise Specified

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Drain Voltage	$V_{DD}$		+28		V
Gate Voltage	$V_{GG}$	-3.3	-2.75	-2.1	V
Drain Bias Currents	$I_{DQ}$		tbd		mA
Drain Current	$I_{DS}, P_{OUT} = 33 \text{ dBm}, 1000 \text{ MHz}$		tbd		mA
Power Dissipation CW <sup>1</sup>	$P_{diss}, P_{OUT} = 33 \text{ dBm}, 1000 \text{ MHz}$		6		W
Operating Temperature Range	$T_{OP}$	-40	+25	+85	$^\circ\text{C}$

<sup>1</sup> Max continuous power the device can handle at  $85^\circ\text{C}$  [ $T_C=85^\circ\text{C}$ ] case temperature.

### RF Electrical Specifications

Table 3: RF Electrical Specifications  $T_A = +25^\circ\text{C}$  Unless Otherwise Specified

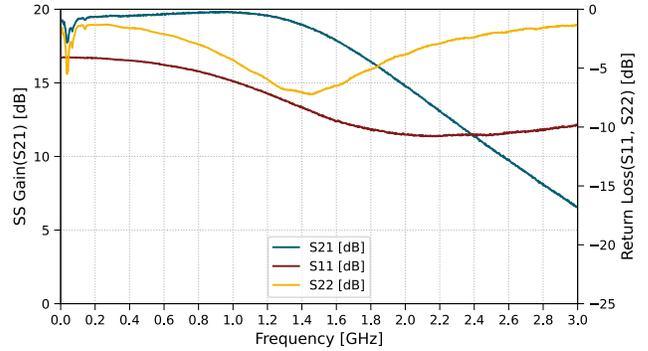
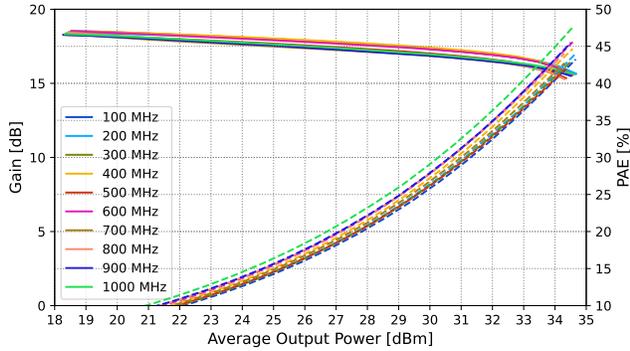
Parameter <sup>1</sup>	Test Condition	Minimum	Typical	Maximum	Unit
Small Signal Gain	1000 MHz		20		dB
Large Signal Gain	$P_{OUT} = 33 \text{ dBm}, 1000 \text{ MHz}$		15		dB
$P_{3dB}$	1000 MHz		33		dBm
Power Added Efficiency (PAE)	$P_{OUT} = 33 \text{ dBm}$		45		%
Drain Voltage			28		V
Ruggedness	All phases, $P_{OUT} = 33 \text{ dBm}, 1000 \text{ MHz}$		VSWR 10:1		

<sup>1</sup> Data taken from 20 – 1000 MHz broadband reference design (EVB),  $V_D = +28 \text{ V}$ ;  $I_{DQ} = 20 \text{ mA}$ , CW

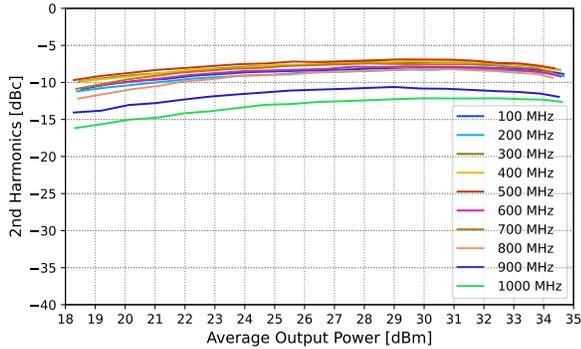
# Typical characteristics

## Standard EVB design

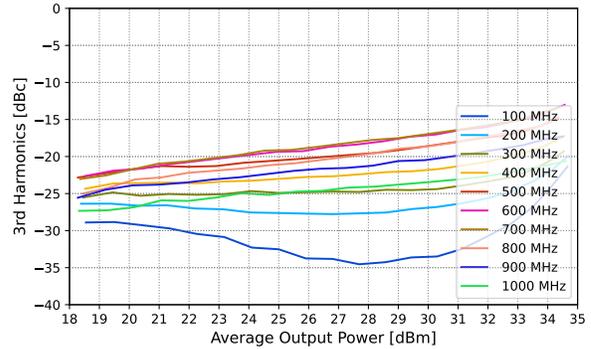
Data taken from EVB matched from 20 MHz to 1000 MHz.



Gain and Power Added Efficiency



Small Signal S-parameter plots

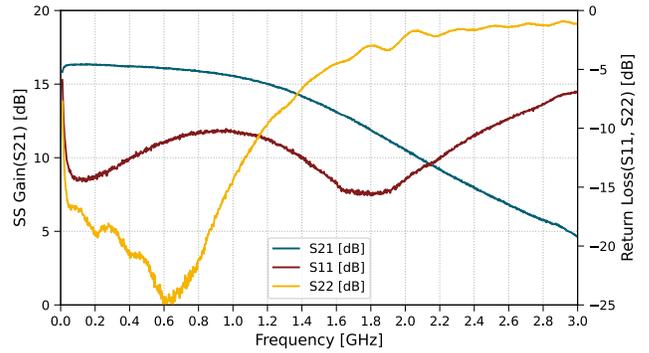
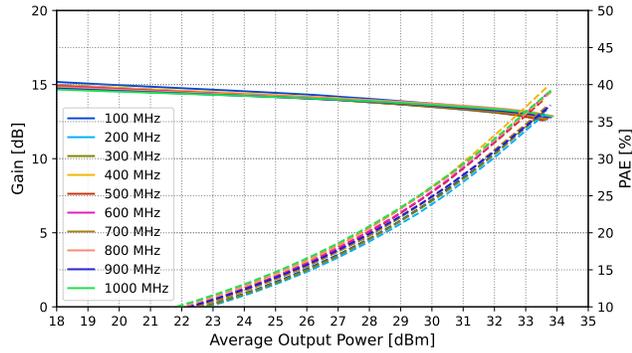


H2 vs. Frequency

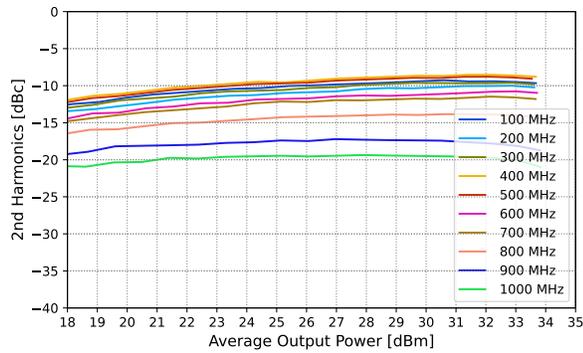
H3 vs. Frequency

## Feedback EVB design

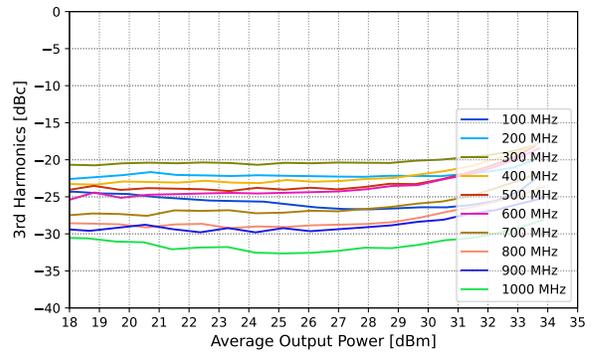
Data taken from EVB matched from 20 MHz to 1000 MHz.



Gain and Power Added Efficiency



Small Signal S-parameter plots



H2 vs. Frequency

H3 vs. Frequency

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### Changelog

Table 4: Changelog

Date	Revision	Notes
09/20/2025	0.1	First release of Product Brief