Tagore Technology

# TA9210D

12.5W CW 0.03 – 4.0 GHz GaN Power Transistor

**Application Note: TA9210D EVB D**

## Application Note

30MHz~1000MHz

28V 50mA

Rev-1.4

## List of Contents

## 1. General Description

The TA9210D is a broadband capable 12.5W GaN power transistor covering 30MHz to 2.7GHz frequency band with a single match. TA9210D is usable up to 4GHz. The input and output can be matched for best power and efficiency for the desired band.

The TA9210D is packaged in a compact, low-cost Quad Flat No lead (QFN) 3x6x0.75mm, 32 leads plastic package. TA9210D-EVB-D is tuned from 30MHz to 1000MHz.

## 2. TA9210D-EVB-D Board Details

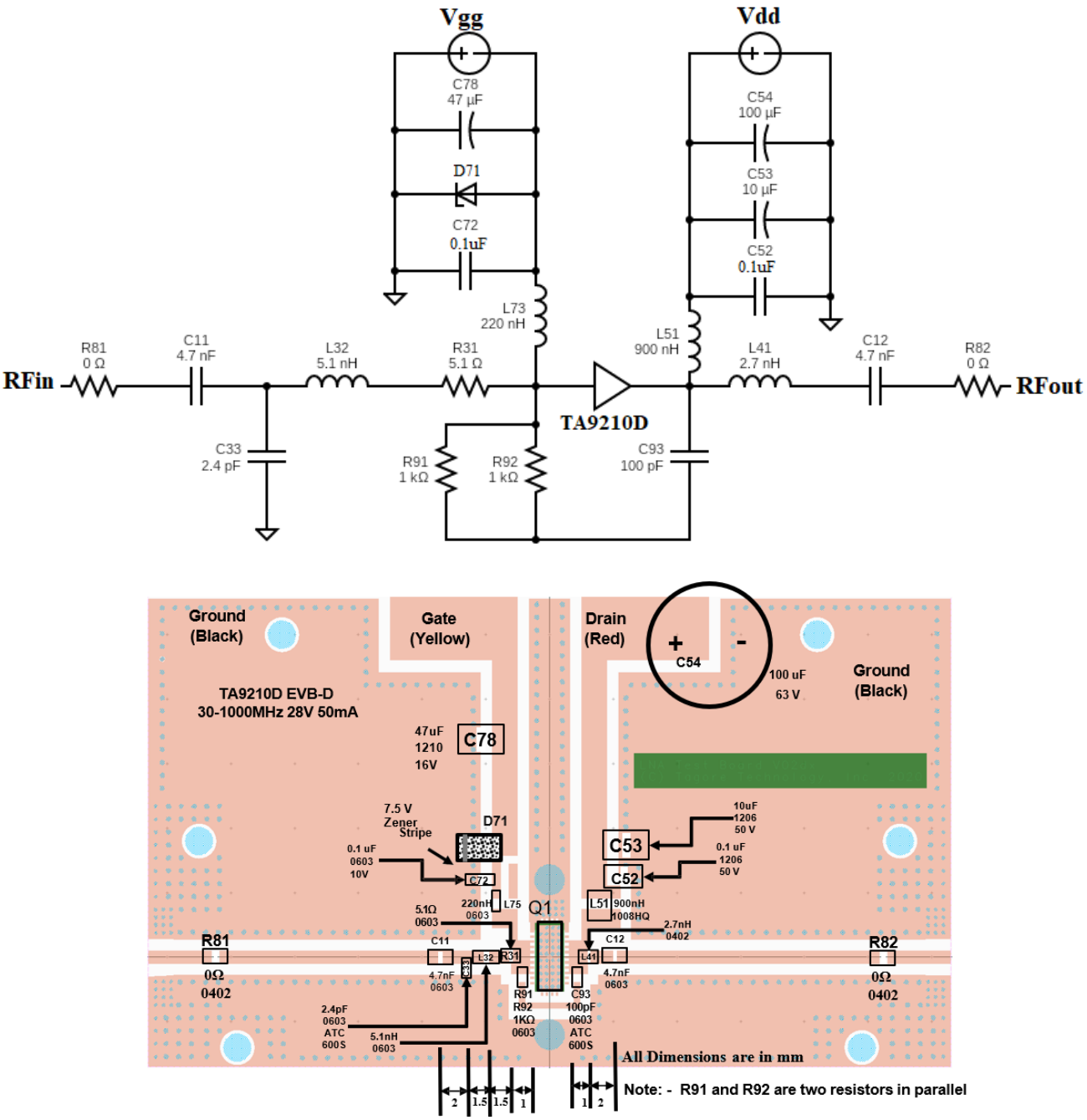


**Figure 2.1 TA9210D-EVB-D 30MHz ~ 1000MHz Schematic and EVB Layout**

## 3. TA9210D-EVB-D Bill of Material

| Component ID | Value | Manufacturer | Recommended Part Number |
|---|---|---|---|
| C11,C12 | 4.7nF, 50V | Murata | GRM1885C1H472JA01D |
| R31 | 5.1Ω | Vishay | CRCW06035R10FKEAHP |
| L32 | 5.1nH | Coil craft | 0603HP-5N1XGRW |
| C33 | 2.4pF | AVX | 600S2R4CT250XT |
| L41 | 2.7nH | Coil craft | 0402HP-2N7XGRW |
| L51 | 900nH | Coil craft | 1008AF-901XJRC |
| C52 | 0.1µF, 50V | Murata | GRM31C5C1H104JA01L |
| C53 | 10µF,50V | Murata | GRM32ER71H106KA12L |
| C54 | 100µF,63V | Nichicon | UPW1J101MPD1TD |
| D71 | 7.5 V Zener | On Semiconductor | SZMMSZ5236BT1G |
| C72 | 0.1µF, 10V | AVX | 0603ZC104K4T2A |
| L73 | 220nH | Coil craft | 0603CS-R22XGRW |
| C78 | 47µF, 16V | Murata | GRM32ER61C476ME15L |
| R81,R82 | 0Ω | Panasonic | ERJ-2GE0R00X |
| R91,R92 | 1kΩ, 1.5W | Vishay | RCP0603W1K00GEB |
| C93 | 100pF | AVX | 600S300JT250XT |
| Q1 | 12.5Watt power transistor | Tagore Technology | TA9210D |
| PCB | Rogers RO4350B, 20 mils, 2 oz copper | | |

**Table 3.1 TA9210D-EVB-D BOM**

## 4. TA9210D-EVB-D Biasing Sequence

| Turn ON Device | Turn OFF Device |
|---|---|
| 1. Set $V_G$ to -5V<br>2. Set $V_D$ to +28V<br>3. Adjust $V_G$ to reach required $I_{DQ}$ current<br>4. Apply RF power | 1. Turn RF power off<br>2. Turn off $V_D$<br>3. Turn off $V_G$ |

**Table 4.1 TA9210D-EVB-D Bias and Sequencing**

## 5. TA9210D-EVB-D Board Measurement Summary

| Frequency (MHz) | S21 Gain(dB) | S11 (dB) | S22 (dB) | Noise Figure(dB) | Pout (dBm) | ACPR & AACPR |
|---|---|---|---|---|---|---|
| 30 | 20.9 | -26.7 | -8.2 | 2.1 | 40.0 | ACPR less than -30dBc & AACPR less than -45dBc for Average power up to 36dBm With LTE 8dB PAPR 4.515MHz BW |
| 100 | 21.0 | -26.4 | -6.7 | 1.2 | 40.7 | |
| 250 | 20.7 | -26.6 | -7.3 | 1.2 | 40.2 | |
| 500 | 19.6 | -27.0 | -8.8 | 1.4 | 40.3 | |
| 750 | 18.7 | -27.2 | -9.1 | 1.4 | 40.5 | |
| 1000 | 17.3 | -27.6 | -7.7 | 1.5 | 40.0 | |

**Table 5.1 TA9210D-EVB-D 28V 50mA Electrical Characteristics Summary**

# 6. TA9210D-EVB-D Test Results

All the tests are carried out at room temperature.

## 6.1. S parameters

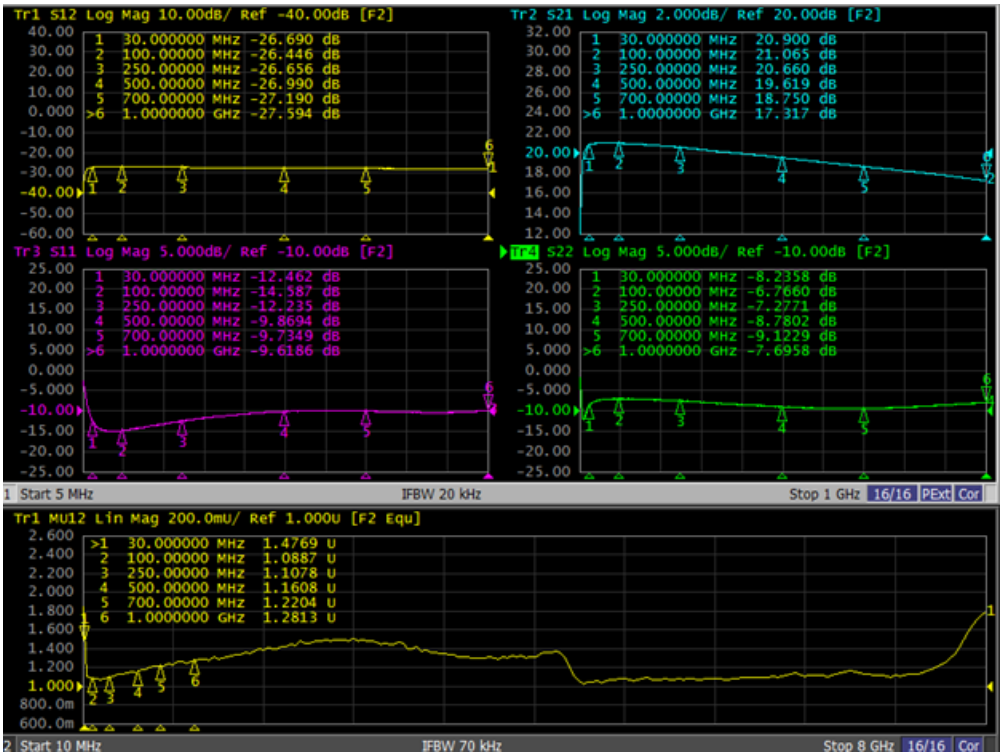


**Figure 6.1.1. S parameters of TA9210D-EVB-D 28V 50mA**

## 6.2. Large Signal Test Results

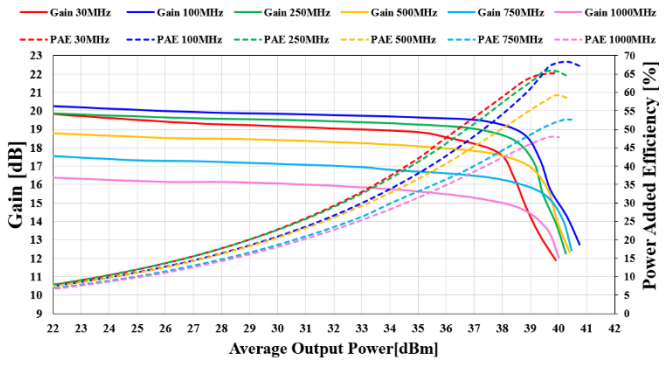


**Figure 6.2.1. Gain and PAE vs $P_{OUT}$ over temperature of TA9210D-EVB-D for 28V 50mA**

**For 30-1000MHz**

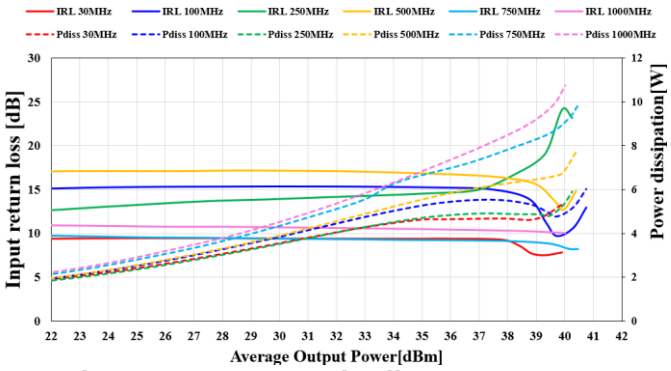


**Figure 6.2.2. IRL and Pdiss vs $P_{OUT}$ over temperature of TA9210D-EVB-D for 28V 50mA**

**For 30-1000MHz**

## 6.3. ACPR & AACPR Test Results

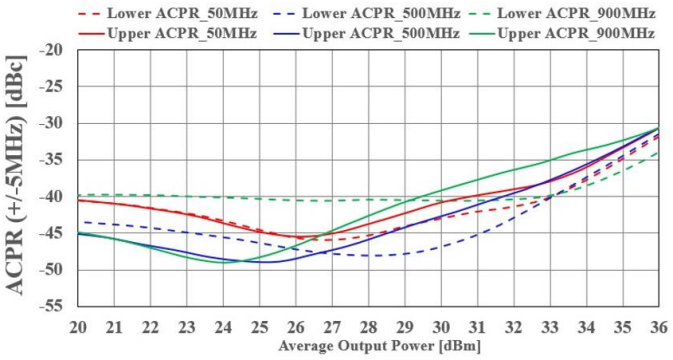


**Figure 6.3.1 ACPR Vs $P_{OUT}$ Of TA9210D-EVB-D, VD=28V, IDQ=50mA, LTE, PAPR = 8dB, 4.515MHz BW, TA=+25°C**

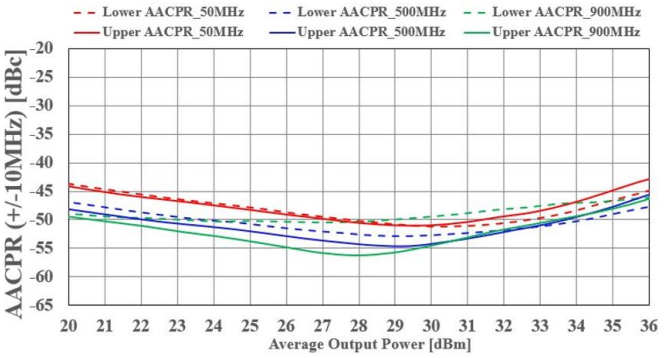


**Figure 6.3.2 AACPR Vs $P_{OUT}$ Of TA9210D-EVB-D, VD=28V, IDQ=50mA, LTE, PAPR = 8dB, 4.515MHz BW, TA=+25°C**

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