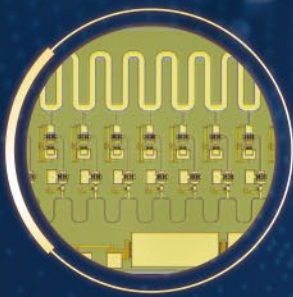


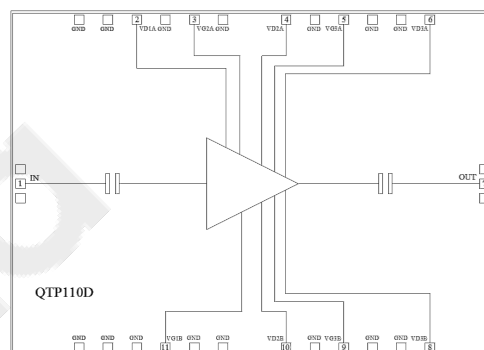
Wideband GaAs & GaN MMIC



Features

- ◆ High Power Gain
- ◆ High Linearity
- ◆ High Power-Added Efficiency
- ◆ Excellent Temperature Stability

Functional Block Diagram



Description

The QTP110D is a 16W GaN power amplifier MMIC. It operates from 8 to 12 GHz and provides a gain of 39 dB, a saturated output power of 42 dBm, and 35% power-added efficiency. The input and output are both fully matched to 50Ω.

Electrical Specifications :TA = +25°C, VD = +26V, VG = -2.69V, IDQ = 720mA Typical

Parameters	Min	Typ	Max	Units
Frequency	8		12	GHz
Small Signal Gain	35	39		dB
Power Gain		34		dB
Gain Flatness		±1.0		dB
Input Return Loss		-18		dB
Output Return Loss		-8		dB
P1dB		34		dB
PSAT		42		dBm
PAE		35		%

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage	+28V
Gate Voltages Range(VG)	-5V to 0V
Drain Current(ID)	1.9A
Gate Current(IG)	See plot on page 8
Input Power(PIN) ,50Ω,Vswr 3:1, VD=+26V,IDQ=0.72A , 85°C , CW	+16dBm
Thermal Resistance(Channel to die bottom)	2.21°C/W
Maximum Channel Temperature	+200°C
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

*Thermal resistance measured to back of carrier plate. MMIC mounted on 18mm x 10mm x 1mm Ag - diamond carrier using eutectic die attach.

Recommended Operating Conditions

VD (V)	VD (V)	IDQ (mA)
+26	-2.69	720

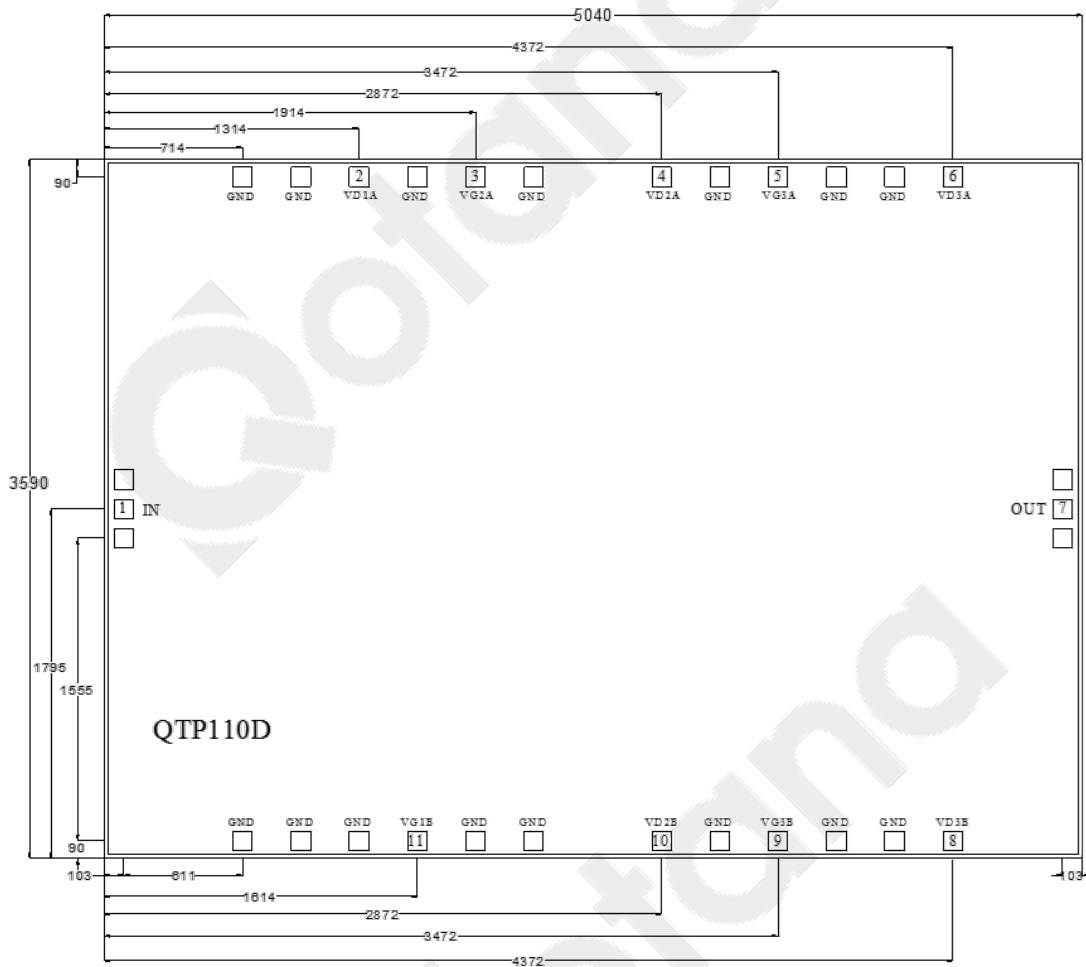
ESD Caution

	ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS
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Ordering Information

Part No.	Package	Description
QTP110D	Die	8-12GHz GaN Power Amplifier

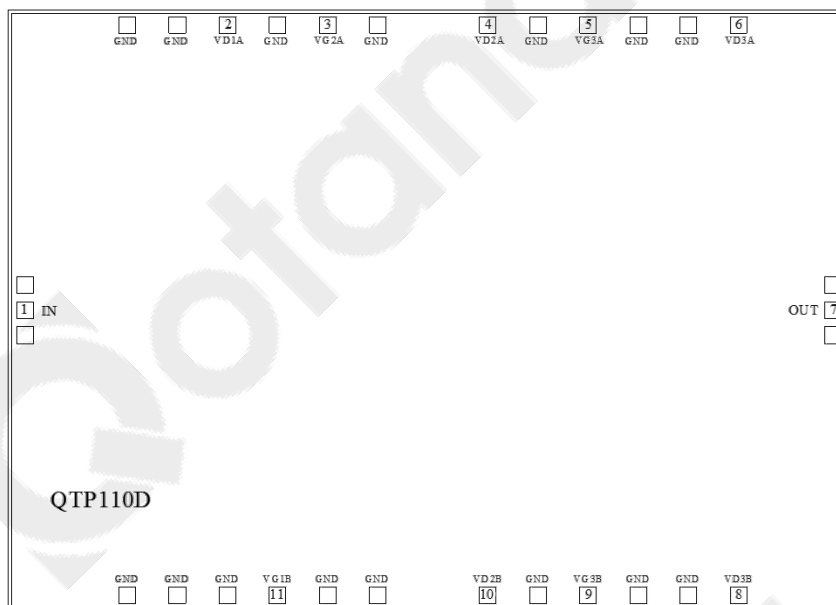
Outline Drawing: All Dimensions in μm



Notes:

- ◆ 1. Die is 80 microns thick
- ◆ 2. VD,VG bonds pad are 100 x 100 microns
- ◆ 3. RF bond pads are 100 x 100 microns

Pad Description

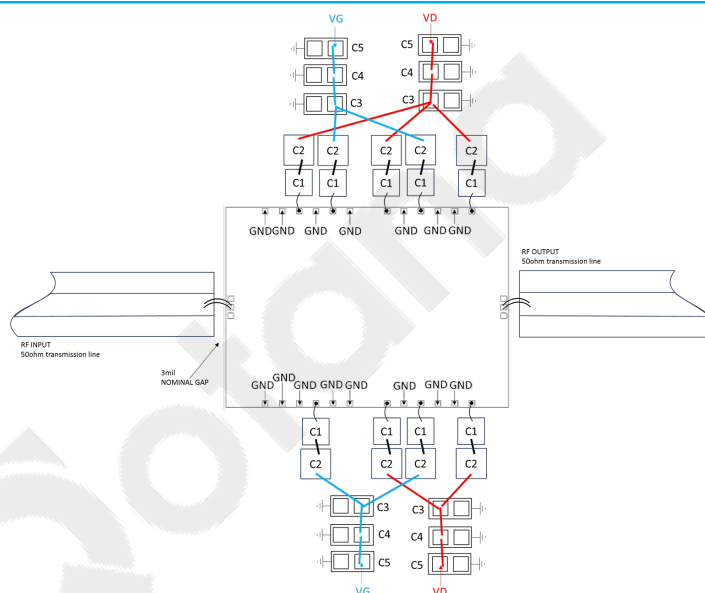


Notes:

- ◆ 1. No connection required for unlabeled pads
- ◆ 2. Backside and bond pad metal: Gold

Pad	Function	Description
1	IN	RF signal input terminal; no blocking capacitor required.
2,4,6,8,10	VD	Drain Biases for the Amplifier ; An external biasing circuit is required.
3,5,9,11	VG	Gate Biases for the Amplifier ; An external biasing circuit is required.
7	OUT	RF signal output terminal; no blocking capacitor required.
Backside	Ground	Connect to RF / DC ground

Assembly Drawing



Item	Value	Part No	Manuf.
C1	100pF	SC10002430	Skyworks
C2	1000pF	SC99906068	Skyworks
C3	0.1μF	C1005X7R1H104K050BB	TDK
C4	1μF	CGA3E1X7R1V105K080AE	TDK
C5	10μF	GRM21BC8YA106KE11L	Murata Electronics

Turn ON procedure

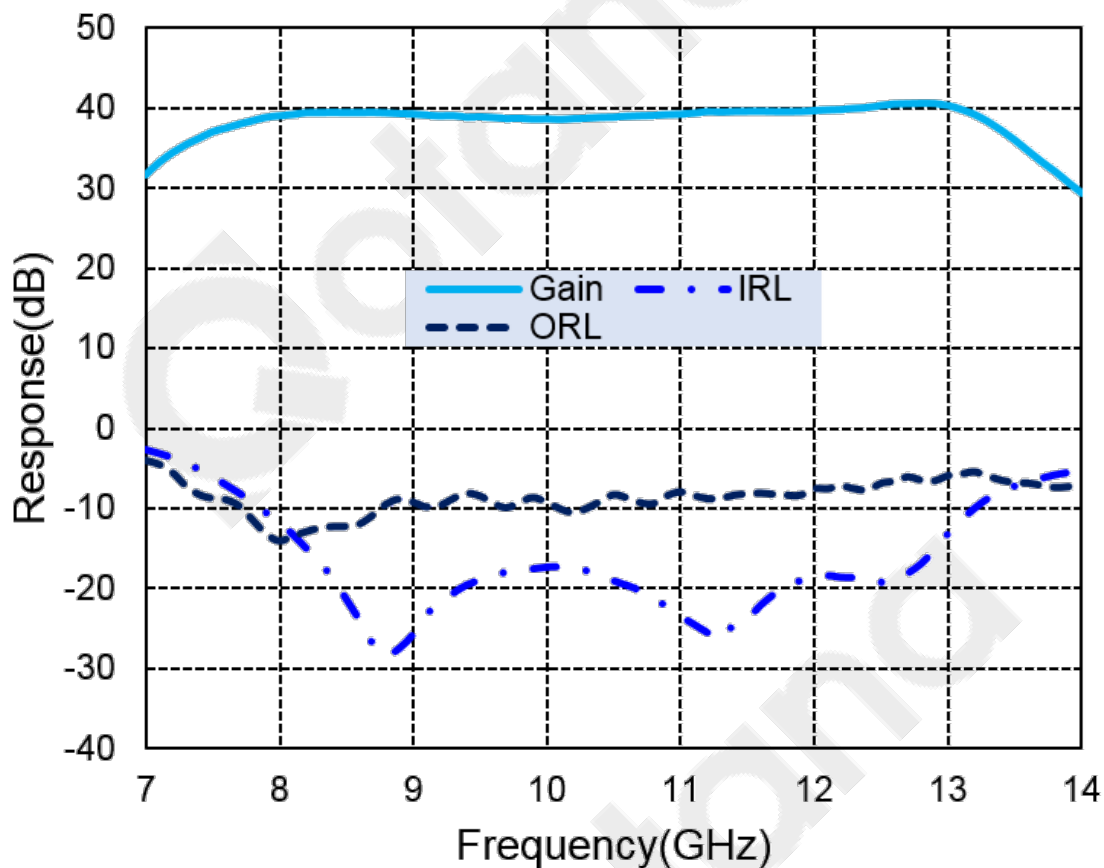
Step 1	Connect GND to RF and dc ground.
Step 2	Set the gate bias voltages V_G to $-5V$.
Step 3	Set the drain bias voltages V_D to $+26V$.
Step 4	Increase the gate bias voltages to achieve a quiescent supply current of $720mA$.
Step 5	Apply RF signal.

Turn OFF procedure

Step 1	Turn off the RF signal
Step 2	Decrease the gate bias voltages, V_G to $-5V$ to achieve a $I_{DQ} = 0$ mA(approximately).
Step 3	Decrease the drain bias voltages to 0 V.
Step 4	Increase the all gate bias voltages to 0 V.

Typical Performance Plots

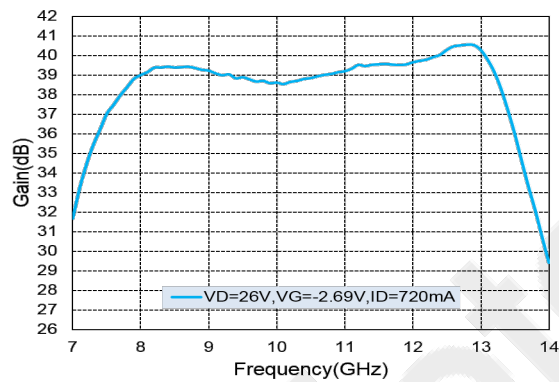
Broadband Performance, $T_A = +25^{\circ}\text{C}$, $V_D = +26\text{V}$, $V_G = -2.69\text{V}$, $I_{DQ} = 720\text{mA}$ Typical



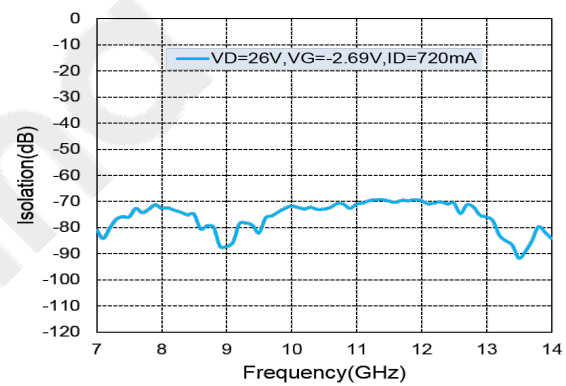
Typical Performance Plots

TA = +25°C

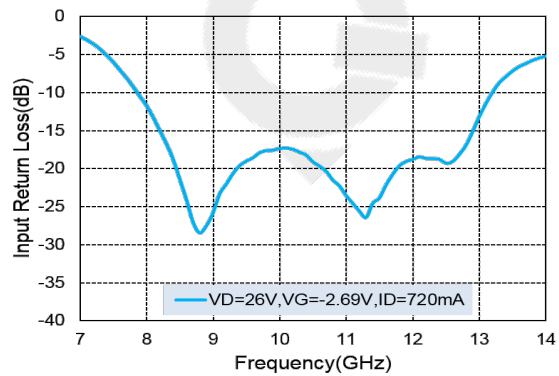
Gain



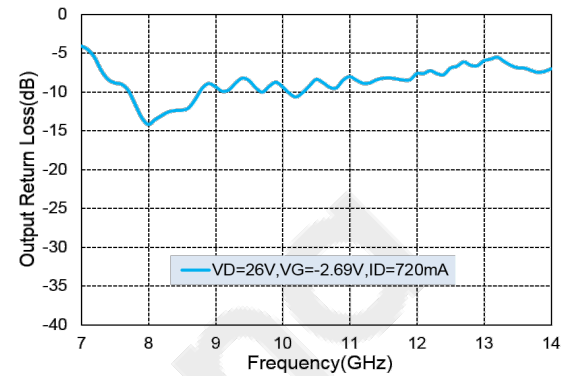
Isolation



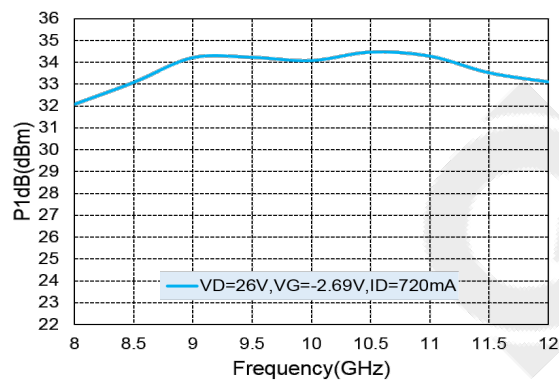
Input RL



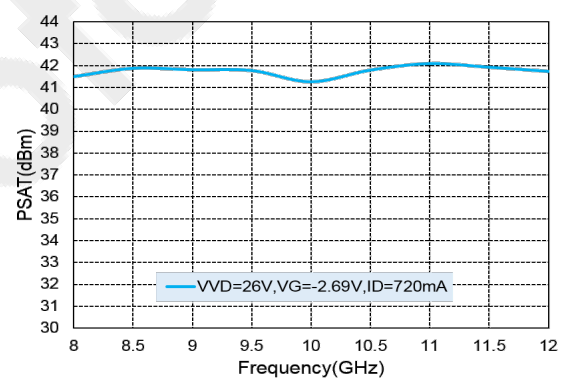
Output RL



P1dB (CW)



PSAT (CW)



Assembly Instructions

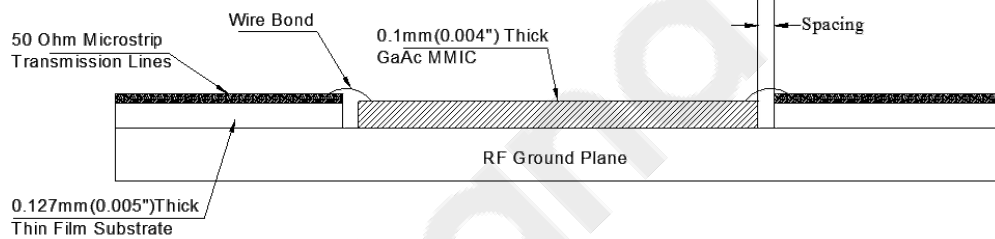


Figure1

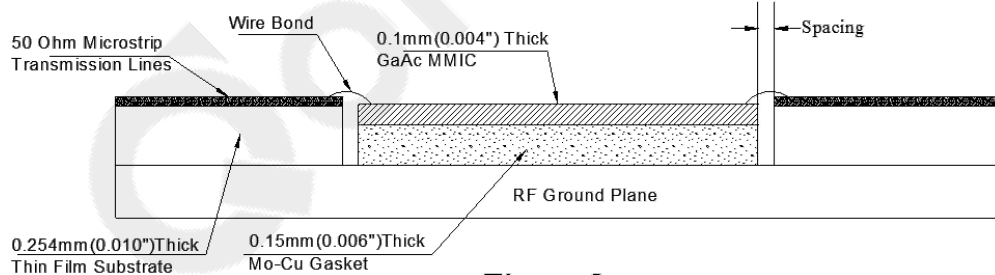


Figure2

- ◆ The small signal die can be bonded with conductive adhesive.
- ◆ It is recommended to use AuSn alloy for the power amplifier die, and weld it on a molybdenum copper substrate in the nitrogen or nitrogen-hydrogen atmosphere using the eutectic welding process. The time at temperatures above 320°C should not exceed 20 seconds.
- ◆ Thermosonic wedge bonding is an excellent interconnection technology.
- ◆ In general, the 25μm gold wire will be used to connect the die and microstrip lines. But if the pad size is less than 80μm, the 18μm gold wire is the best choice.
- ◆ During the process of assembling, the spacing should be between 0.06mm and 0.15mm when the frequency of the die is below 40GHz, but if the frequency is over 40GHz, the commend spacing is between 0.03mm and 0.06mm.
- ◆ You have to make sure that the surface of the die and microstrip line are almost keep in the same horizontal.