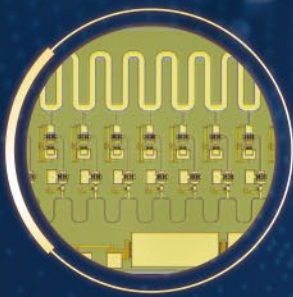


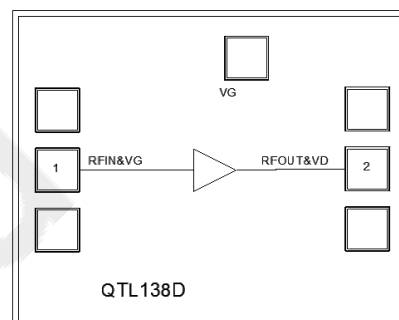
Wideband GaAs & GaN MMIC



Features

- ◆ Ultra Wideband Performance
- ◆ Low Noise, High Gain
- ◆ Low Current Consumption
- ◆ Excellent Temperature Performance

Functional Block Diagram



Description

The QTL138D is a broadband GaAs low noise amplifier MMIC. It operates from 0.1 to 18 GHz and provides gain of 15.5 dB, 1.5 dB typical noise figure and P1dB of +17 dBm. The input and output are both fully matched to 50Ω, and it is equipped with a passivation layer.

Electrical Specifications :TA = +25°C, VD = +5 V , VG = +0.5 V , IDQ = 37 mA Typical

Parameters	Min	Typ	Max	Units
Frequency	0.1		18	GHz
Small Signal Gain	13	15.5		dB
Gain Flatness		±1.0		dB
Noise Figure		1.5	2.0	dB
Input Return Loss		-17		dB
Output Return Loss		-15		dB
P1dB	15	17		dBm
PSAT		19		dBm
OIP3		28		dBm

Absolute Maximum Ratings

Parameter	Rating
Drain Bias Voltage (VD)	+7V
Gate Bias Voltage (VG)	+1V
RF Input Power (RFIN)	+20dBm
Channel Temperature	150°C
Continuous P _{diss} (T = 85 °C)(derate 5.5mW/°C above 85 °C)	0.5W
Thermal Resistance(channel to die bottom)	105.6°C/W
Operating Temperature	-55°C to +85 °C
Storage Temperature	-65°C to +150 °C

Recommended Operating Conditions

VD (V)	VG (V)	IDQ (mA)
+5	+0.5	37
+5	+0.6	59
+6	+0.5	41
+6	+0.6	63

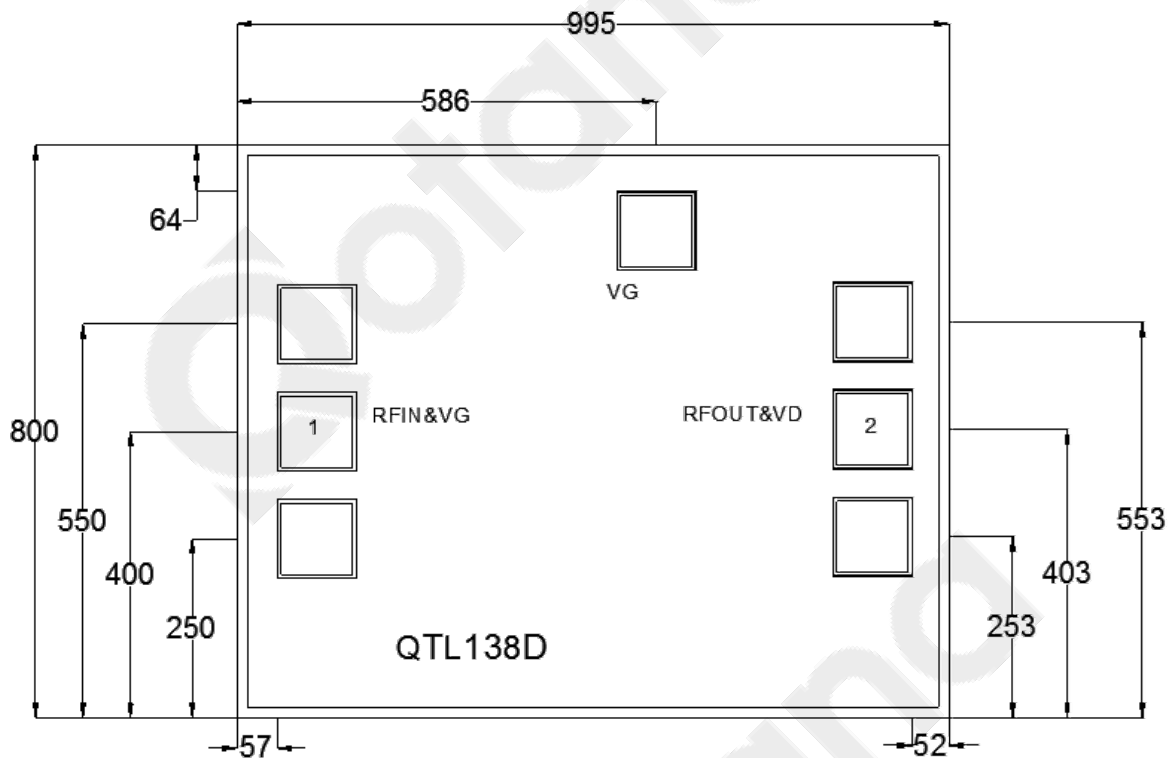
ESD Caution

	ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS
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Ordering Information

Part	Package	Description
QTL138D	Die	0.1-18GHz GaAs LNA

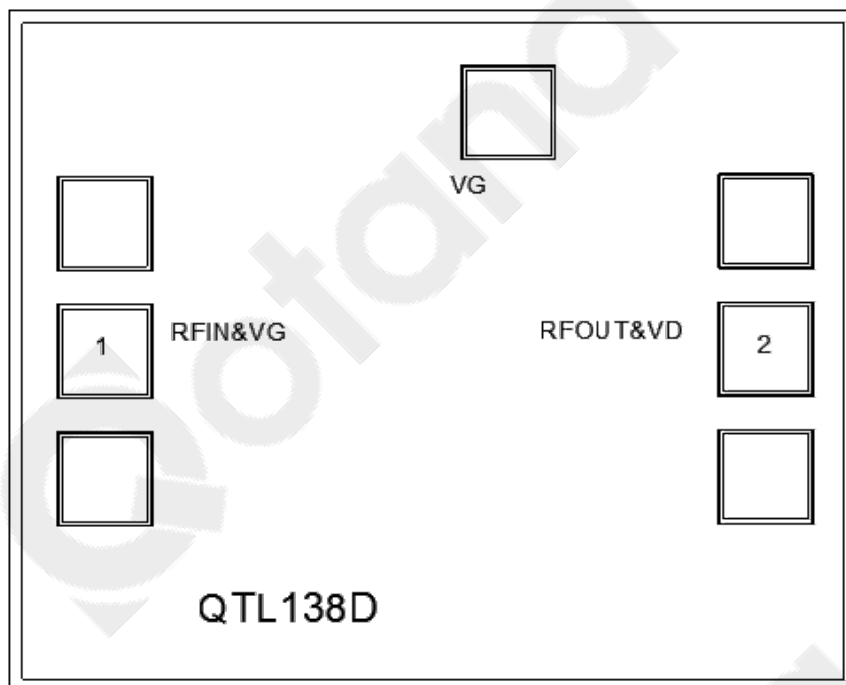
Outline Drawing: All Dimensions in μm



Notes:

- ◆ 1. Die is 100 microns thick
- ◆ 2. DC bond pads are 100 x 100 microns
- ◆ 3. RF bond pads are 100 x 100 microns

Pad Description

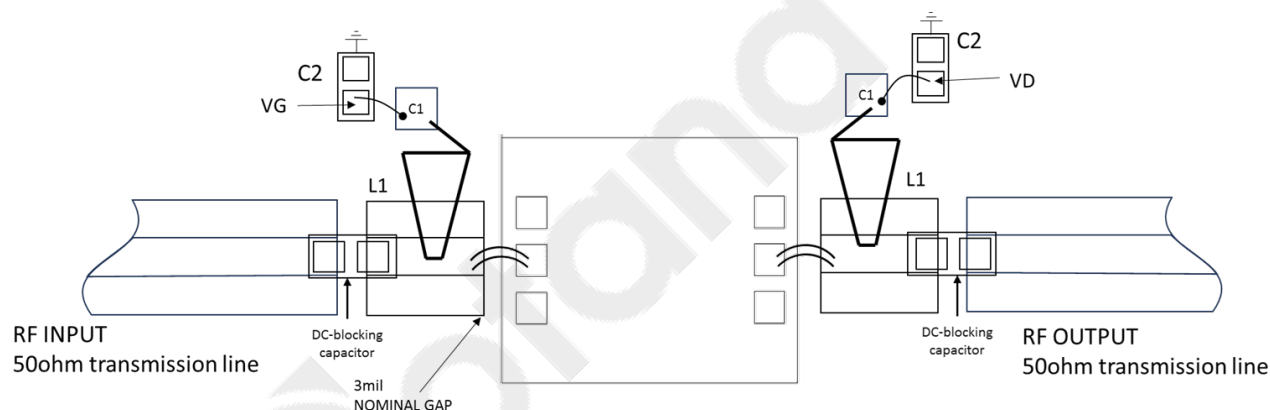


Notes:

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

Pad	Function	Description
1	RF IN &VG	RF signal input terminal; blocking capacitor required; external DC biasing network required; Gate current provided.
2	RF OUT &VD	RF signal output terminal; blocking capacitor required; external DC biasing network required; Drain current provided.
Backside	Ground	Connect to RF / DC ground

Assembly Drawing



Item	Value	Part No	Manuf.
C1	100 pF	SC10002430	Skyworks
C2	2.2 μ F	C1005X5R1V225K050BC	Murata Electronics
L1	0.220 μ H	CC19T40K240G5	Piconics

Turn ON procedure

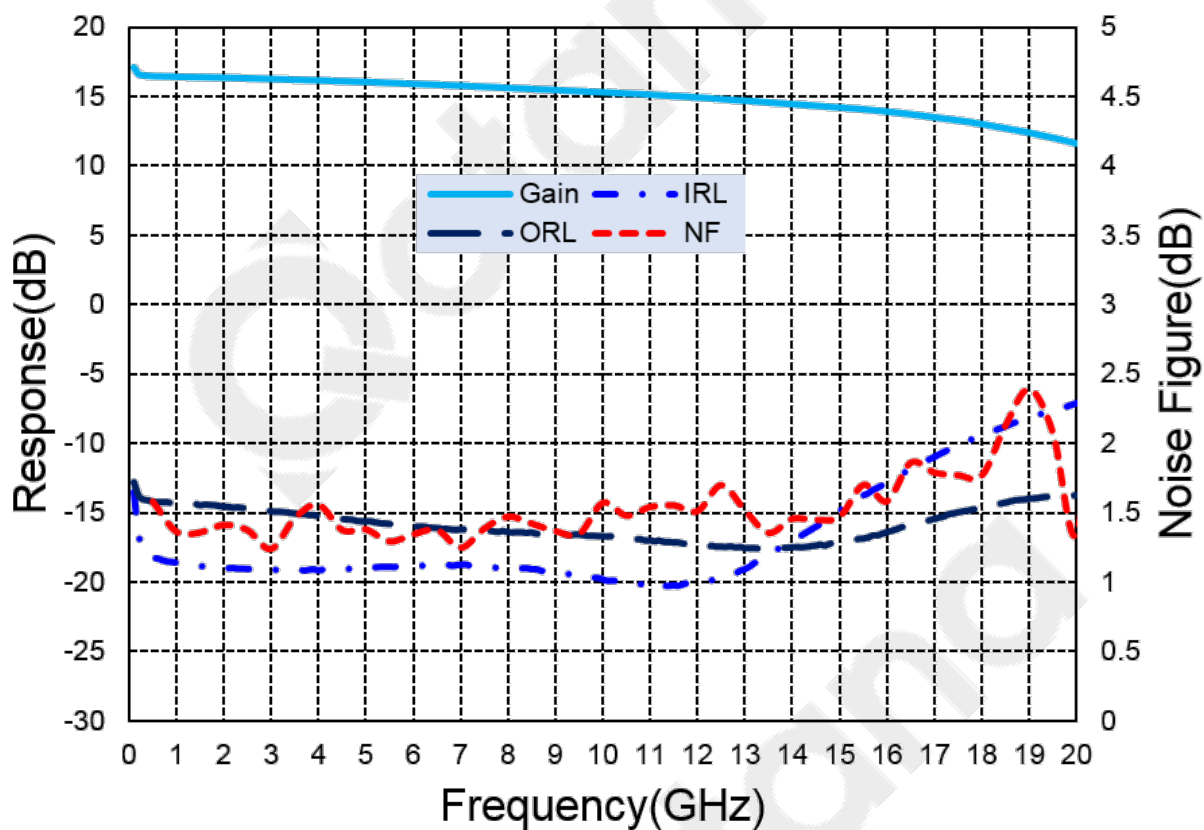
Step 1	Connect GND to RF and dc ground.
Step 2	Set the gate bias voltages, VG to +0V.
Step 3	Set the drain bias voltages VD to +5V .
Step 4	Increase the gate bias voltages to achieve a quiescent supply current of 37 mA.
Step 5	Apply RF signal.

Turn OFF procedure

Step 1	Turn off the RF signal
Step 2	Decrease the gate bias voltages, VG to +0V to achieve a IDQ = 0 mA (approximately).
Step 3	Decrease the drain bias voltages to 0 V.

Typical Performance Plots

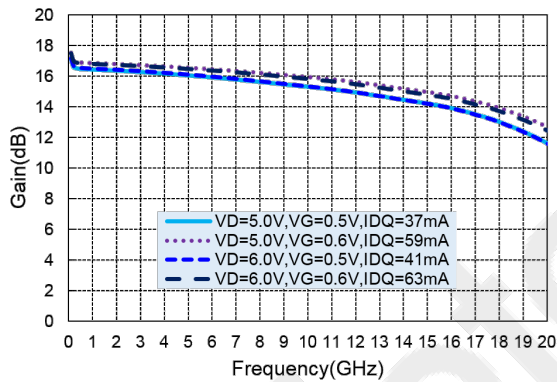
Broadband Performance, $T_A = +25\text{ }^{\circ}\text{C}$, $V_D = +5\text{V}$, $V_G = +0.5\text{V}$, $I_{DQ} = 37\text{mA}$



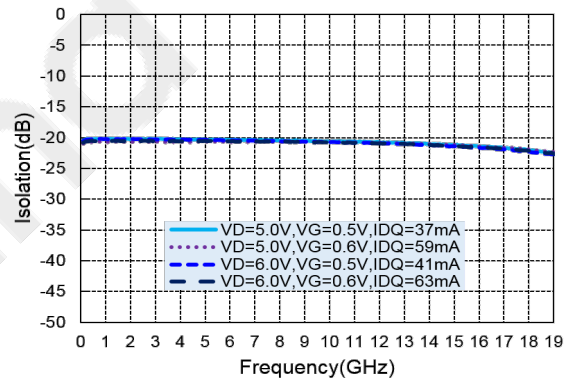
Typical Performance Plots

TA = +25°C

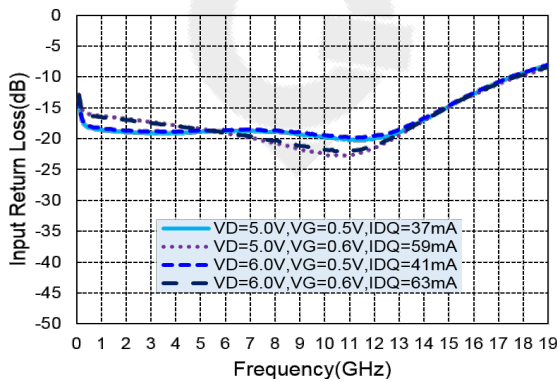
Gain



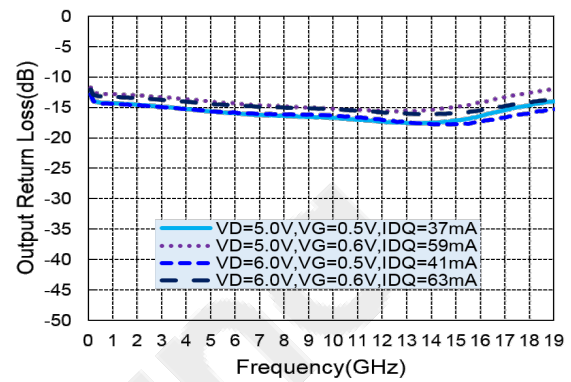
Isolation



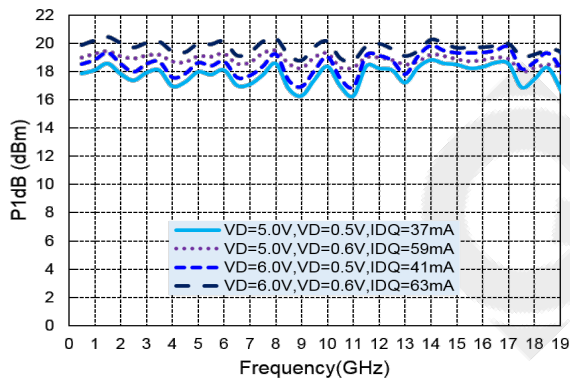
Input RL



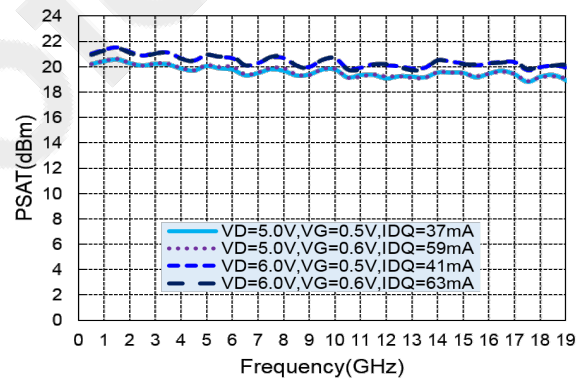
Output RL



P1dB



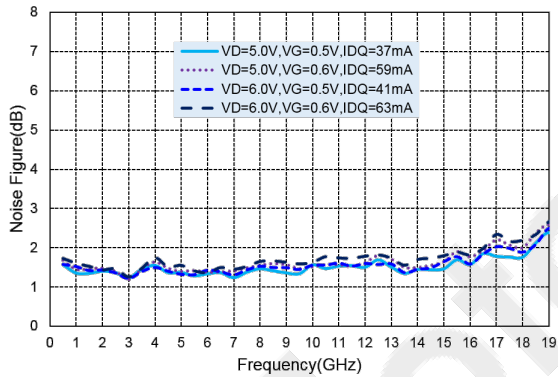
PSAT



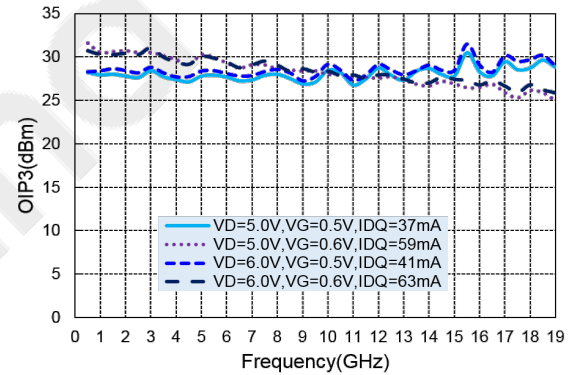
Typical Performance Plots

TA = +25°C

Noise Figure



OIP3



Assembly Instructions

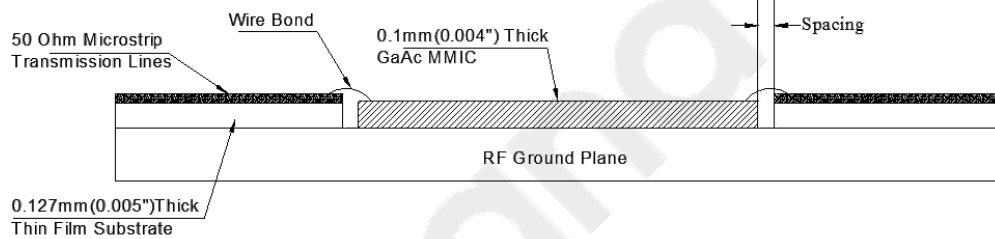


Figure1

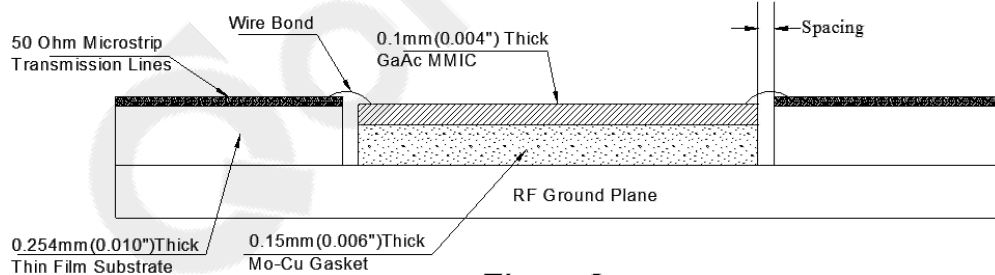


Figure2

- ◆ 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.