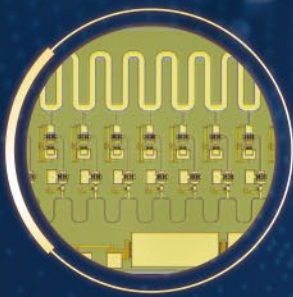


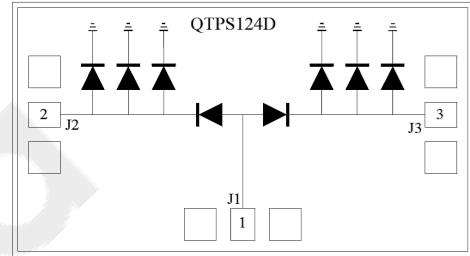
Wideband GaAs & GaN MMIC



Features

- ◆ Low Insertion Loss
- ◆ High Isolation
- ◆ Fast Switching Speed

Functional Block Diagram



Description

The QTPS124D is a GaAs PIN reflective SP2T switch, operating from DC to 67 GHz. It features low insertion loss of 1.7 dB, high isolation of 45 dB, and excellent linearity with a P1dB of 30 dBm and an IIP3 of 40 dBm. The device offers low drive current, low power consumption, and fast switching speed. All RF ports are internally matched to 50 Ω , and the die surface is protected by a passivation layer.

Electrical Specifications :TA = +25°C, +13mA/+2.5V (Isolation), -18mA/-1.4V (Low Loss) Typical

Parameters	Min	Typ	Max	Min	Typ	Max	Units
Frequency	DC		30	30		67	GHz
Insertion Loss		1.3			1.7		dB
Isolation		45			43		dB
Input Return Loss		-12			-8		dB
Output Return Loss		-15			-8		dB
P1dB-Output 1dB Compression		30			30		dBm
IIP3-Input Third Order Intercept		40			40		dBm
Switching Speed		10			10		ns

Absolute Maximum Ratings

Parameter	Rating
Max Incident C.W. RF Power	+23dBm
DC Reverse Voltage	25V
Bias Current	±30mA
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature to Maintain 1,000,000 Hour Mean Time to Failure (MTTF)	+125°C
Maximum Channel Temperature	+175°C

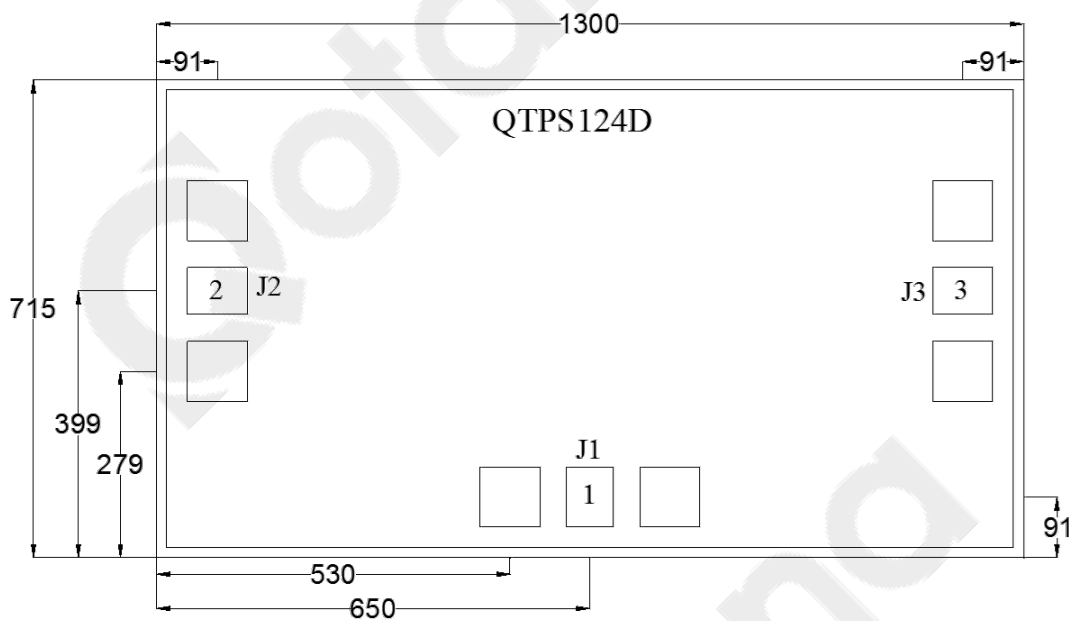
ESD Caution

	ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS
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Ordering Information

Part No.	Package	Description
QTPS124D	Die	DC-67GHz GaAs PIN Diode MMIC SP2T Reflective Switch

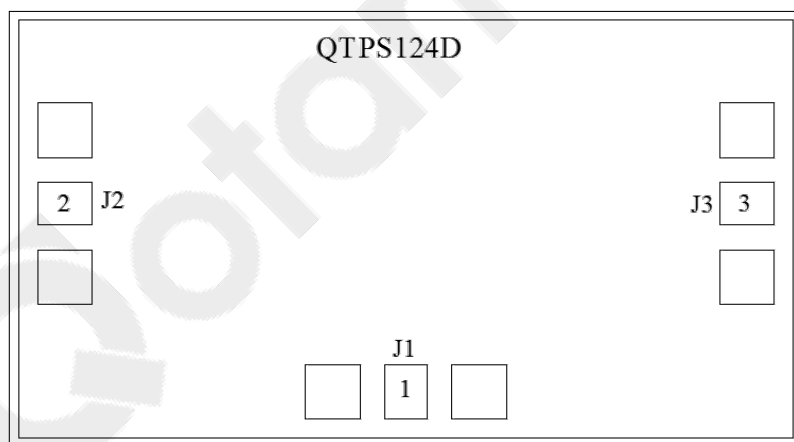
Outline Drawing: All Dimensions in μm



Notes:

- ◆ 1. Die is 100 microns thick
- ◆ 2. RF bond pads are 90*90microns

Pad Description



Notes:

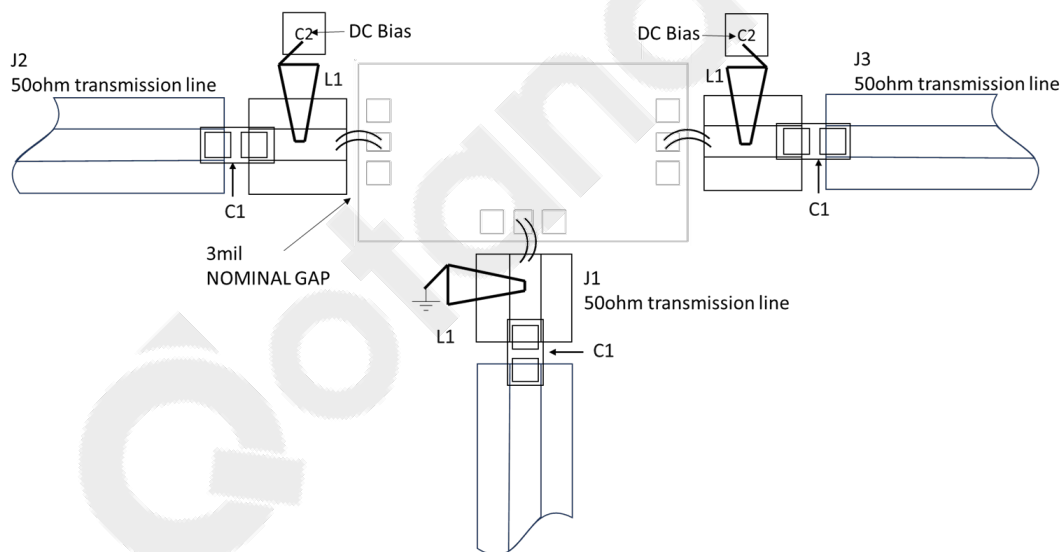
- ◆ 1. No connection required for unlabeled pads
- ◆ 2. Backside and bond pad metal: Gold

Pad	Function	Description
1	J1	RF signal input terminal
2, 3	J2, J3	RF signal output terminal
Backside	Ground	Connect to RF / DC ground

Assembly Drawing

Direct Biasing Without Voltage-Dividing Resistor

low loss state (-18mA/-1.4V Typical)
Isolation state(+13mA /+2.5V Typical)



Item	Value	Part No	Manuf.
C1	0.1 μ F	550Z104MTT	KYOCERA AVX
C2	100pF	CSM-140-15X15X4-G-101-K	Knowles Dielectric Labs
L1	0.84 μ H	CC45T47K240G5	Piconics

Truth Table

Bias Current / Voltage		States	
J2	J3	J2→J1	J3→J1
-18mA/-1.4V	+13mA/+2.5V	IL	ISO
+13mA/+2.5V	-18mA/-1.4V	ISO	IL

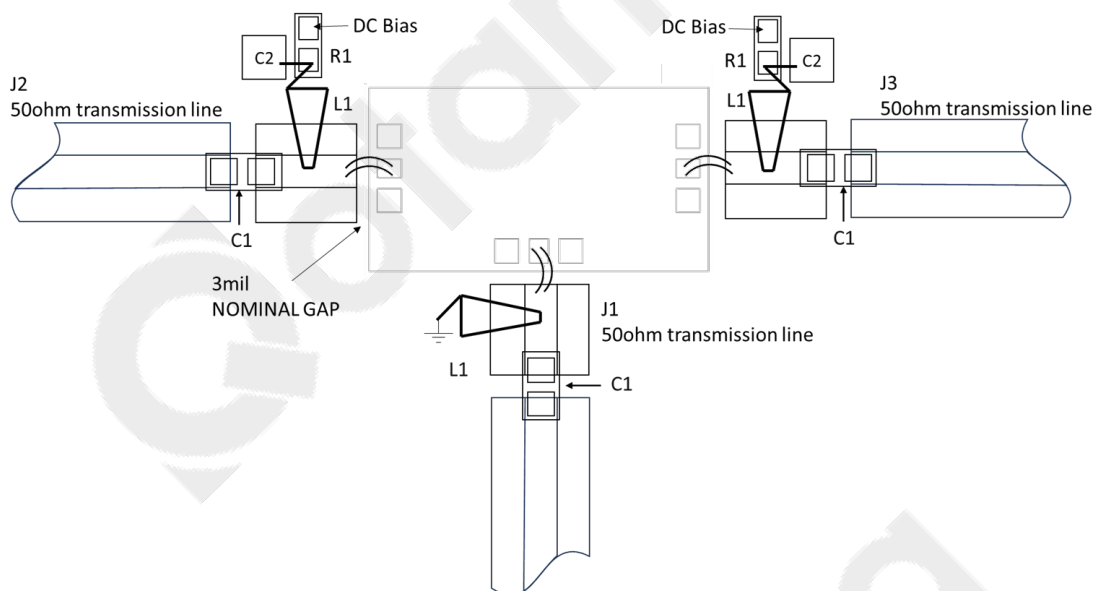
Notes:

Typical switching speed is measured from 10% to 90% of the detected RF voltage driven by a TTL compatible driver. Driver output parallel RC network uses a capacitor between 390 pF - 560 pF and a resistor between 20 - 50 Ohms to achieve 10 ns rise and fall times.

Assembly Drawing

Typical application circuit of bias+5V/-5V (With Voltage-Dividing Resistor)

low loss state (-18mA/-5V Typical)
Isolation state(+13mA /+5V Typical)

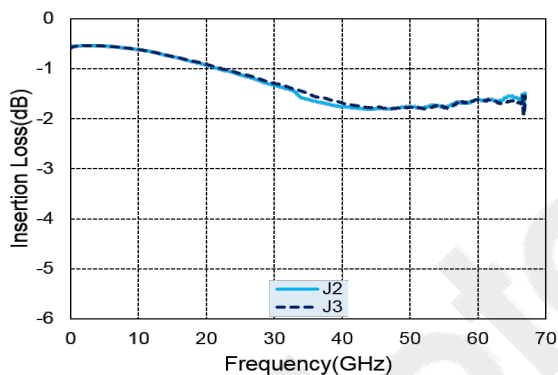


Item	Value	Part No	Manuf.
C1	0.1 μ F	550Z104MTT	KYOCERA AVX
C2	100pF	CSM-140-15X15X4-G-101-K	Knowles Dielectric Labs
L1	0.84 μ H	CC45T47K240G5	Piconics
R1	100 Ω	RC1206JR-07100RL	YAGEO

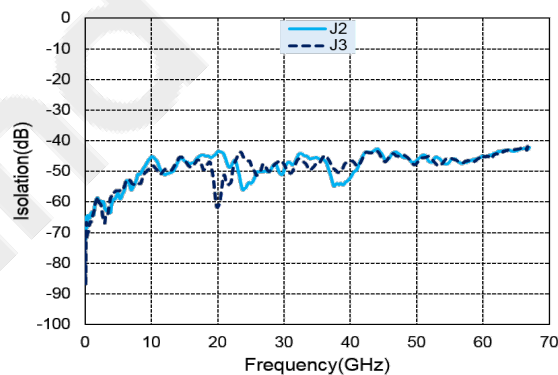
Typical Performance Plots

 $T_A = +25^{\circ}\text{C}$

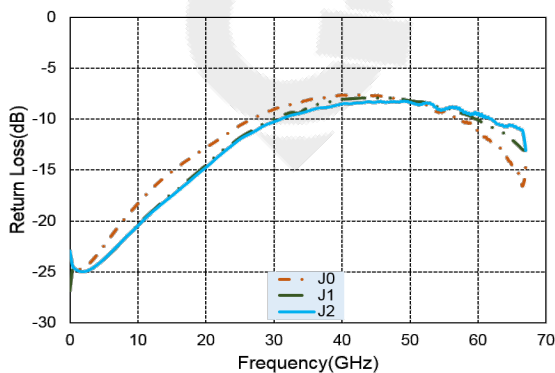
Insertion Loss



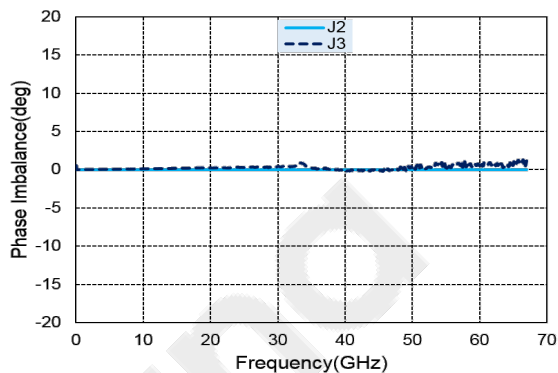
Isolation



Return Loss



Phase Imbalance



Assembly Instructions

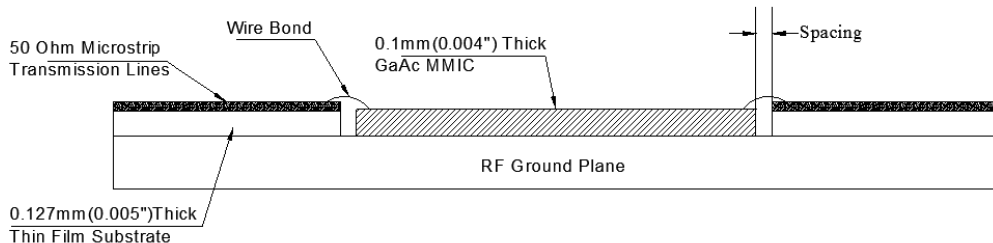


Figure1

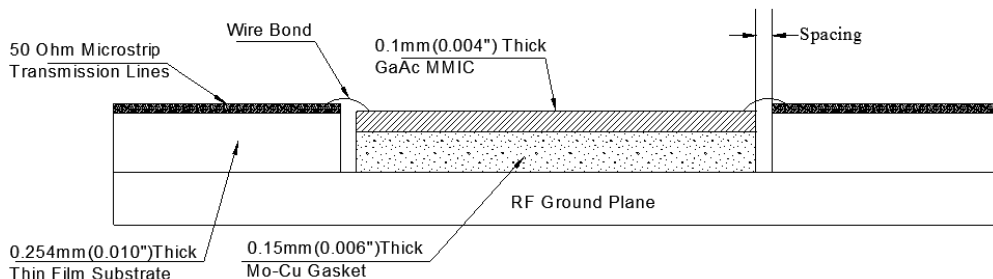


Figure2

- ◆ 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.