URS6C58
mmWave SPDT Switch

UltrabandTech

Product overview

The URS6C58 is a high power and high linearity GaN-on-SiC MMIC reflective type SPDT switch in die form, covering 5G 28GHz mmWave n257, n258 and n261 bands.

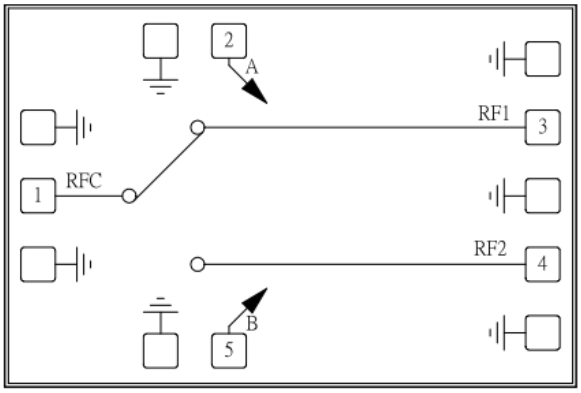
Key Features

- High power handling capability
- Fast Switching speed
- Built-in DC blocks and bias networks
- Die size : 1116 µm X 1669 µm

Applications

- 5G FR2 Antenna Modules
- Point-to-Point Wireless
- Radiometer
- Test and Instrumentation

Functional Block Diagram



Ordering Information

Part Number	Package
URS6C58	Die

Control Voltages

State	V_bias
On	0V
Off	-5V ~ -20V

Absolute Maximum Ratings

Parameters	Absolute Maximum	Unit
DC Bias Voltage	30	V
CW Incident Power (Low Loss Port)	>33@ +25˚C >33@ +85˚C	dBm
Operating Temperature	-40˚C to +85˚C	˚C
Storage Temperature	-65˚C to +150˚C	˚C

Truth Table

Low Insertion Loss Path	Vbias	
	A	B
RFC to RF1	Off	On
RFC to RF2	On	Off

Electrical Performance (TA = +25 ˚C, Vbias = -10 V/ 0 V, Z_0 = 50 Ω，F = 24 GHz)

Parameters	Min.	Typ.	Max.	Unit
Insertion Loss		2.0		dB
Isolation		26		dB
RFC Return Loss		14		dB
RF1 & 2 Return Loss ON		15		dB
Input $P_{0.1dB}$		28@28 GHz		dBm
Input IP_3		38@28 GHz		dBm
Rise Time - T_{RISE}		5(1)		ns
Fall Time - T_{FALL}		50(2)		ns

Note:
(1) Rise Time - T_{RISE} at 10% to 90% RF
(2) Fall Time - T_{FALL} at 90% to 10% RF

Electrical Performance (TA = +25˚C, Vbias = -5V/ 0V, Z_0 = 50 Ω ，F = 24GHz)

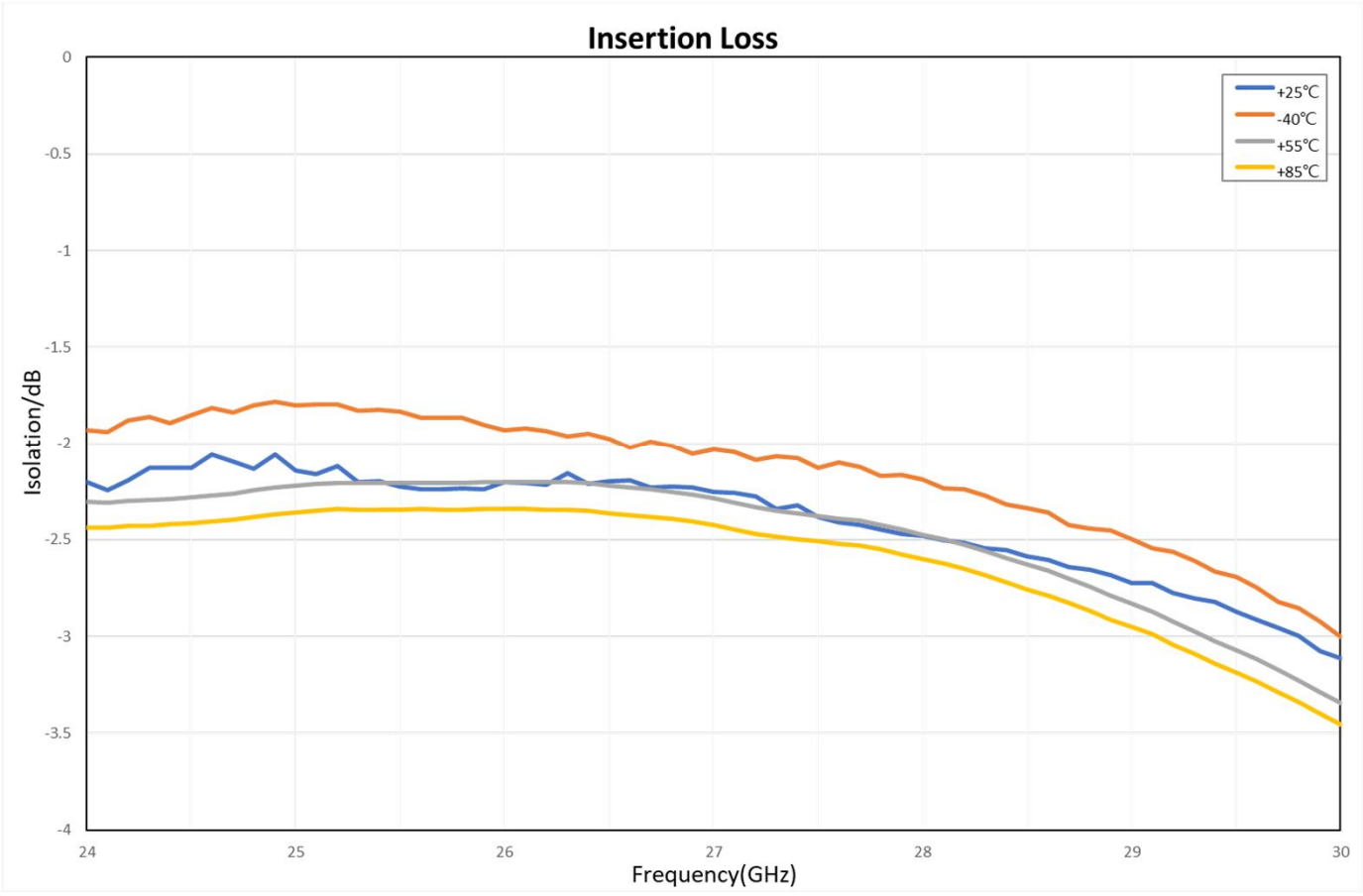
Parameters	Min.	Typ.	Max.	Unit
Insertion Loss		2.0		dB
Isolation		26		dB
RFC Return Loss		15		dB
RF1 & RF2 Return Loss ON		15		dB

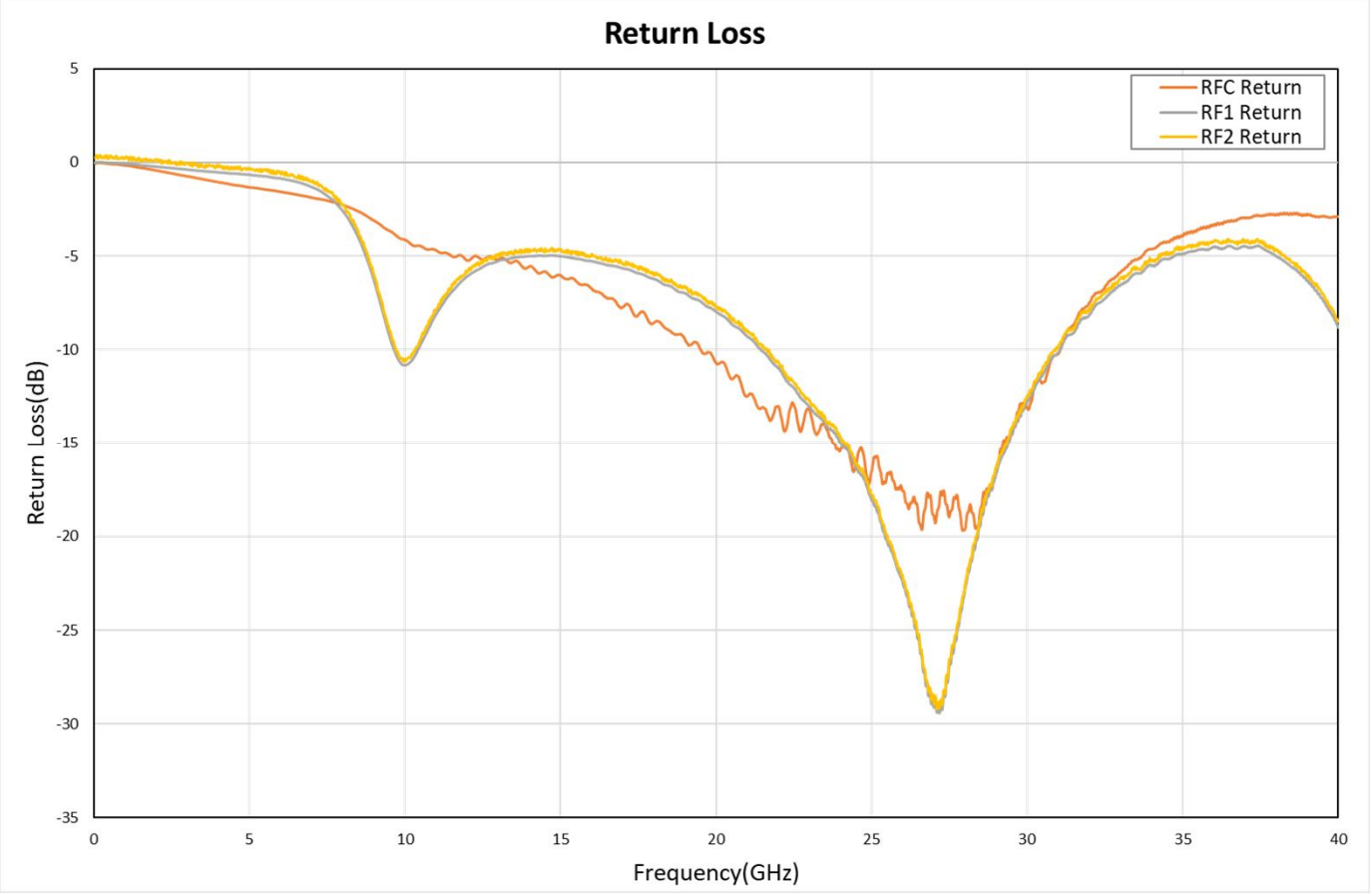
Electrical Specifications (TA = +25°C, Vbias = -10V/ 0V, Z_0 = 50Ω)

Parameters	Frequency	Min.	Typ.	Max.	Unit
Insertion Loss	n257(26.5 - 29.5 GHz) n258(24.25 - 27.5 GHz) n261(27.5 - 28.35 GHz)		2.5 2.1 2.5	3.3 2.7 2.7	dB
Isolation	n257(26.5 - 29.5 GHz) n258(24.25 - 27.5 GHz) n261(27.5 - 28.35 GHz)	26 26 26	27 27 27		dB
RFC Return Loss	n257(26.5 - 29.5 GHz) n258(24.25 - 27.5 GHz) n261(27.5 - 28.35 GHz)	13 15.5 17	20.5 17.5 18.5		dB
RF1 & RF2 Return Loss ON	n257(26.5 - 29.5 GHz) n258(24.25 - 27.5 GHz) n261(27.5 - 28.35 GHz)	14 15 19.5	22 22 23		dB
Input $P_{0.1dB}$	28GHz		28		dBm
Input IP_3	28GHz		38		dBm
Rise Time - T_{RISE}	28GHz		5(1)		ns
Fall Time - T_{FALL}	28GHz		50(2)		ns

Note:
(1) Rise Time - T_{RISE} at 10% to 90% RF
(2) Fall Time - T_{FALL} at 90% to 10% RF

Typical Performance





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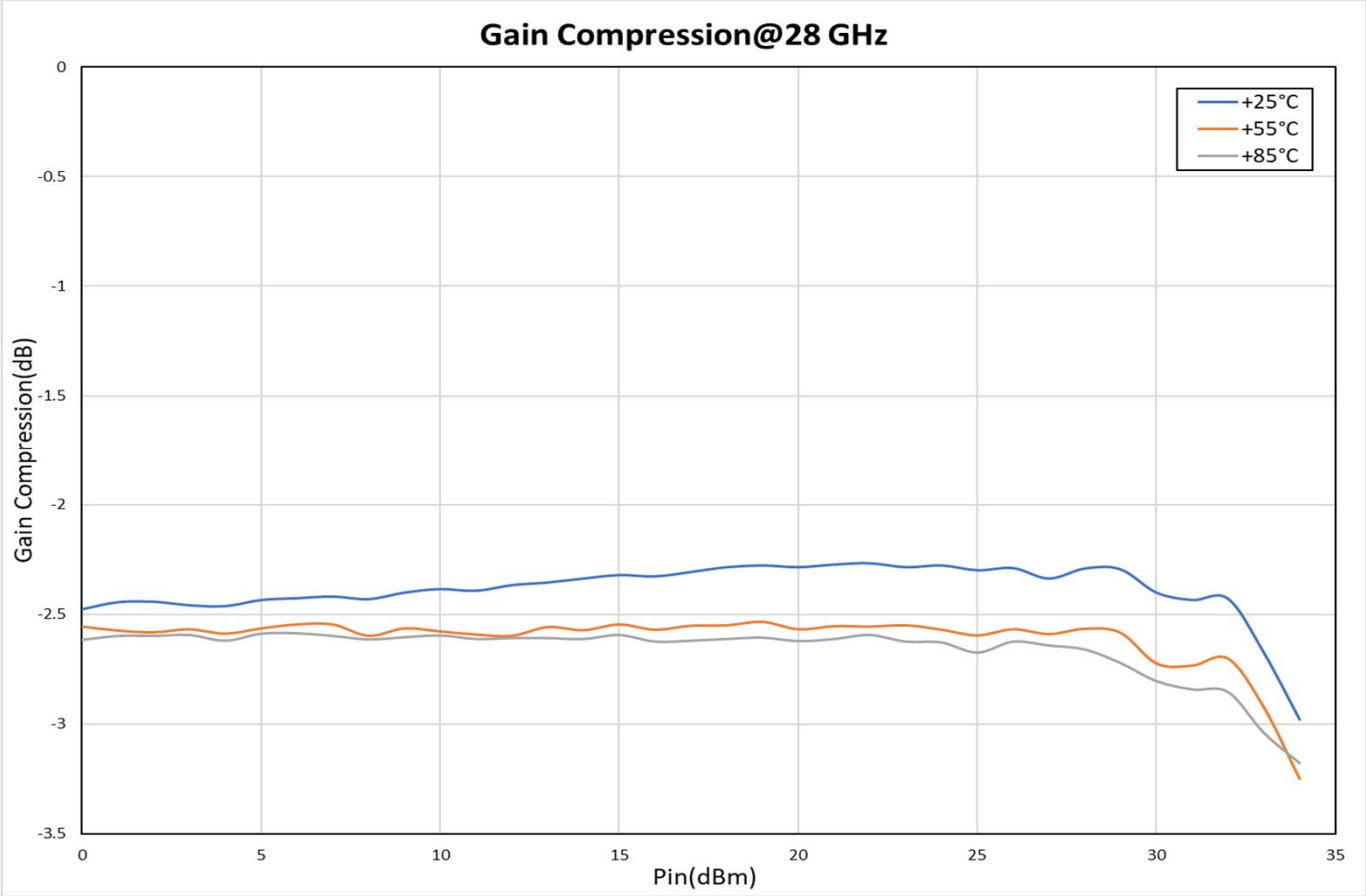
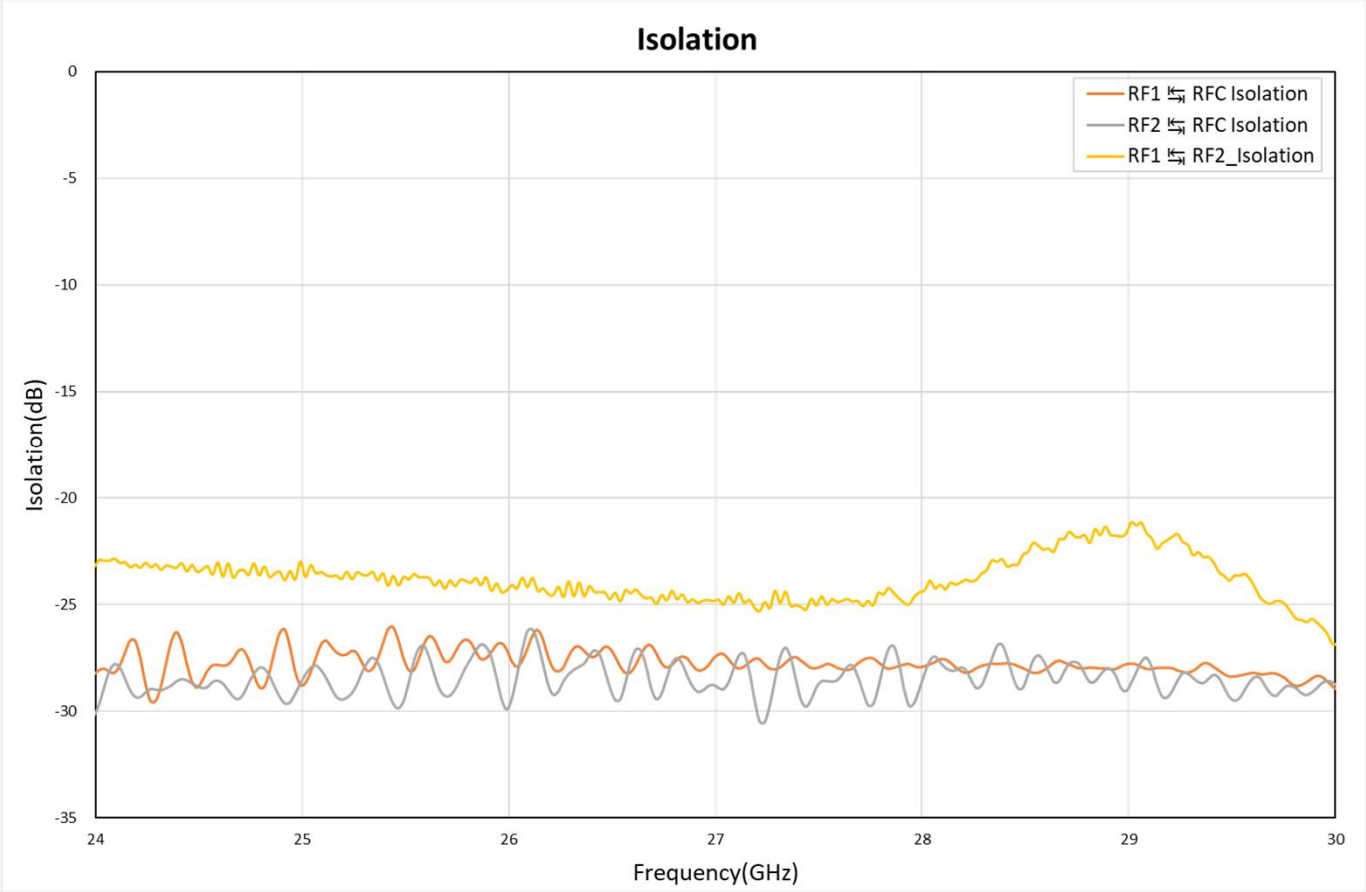
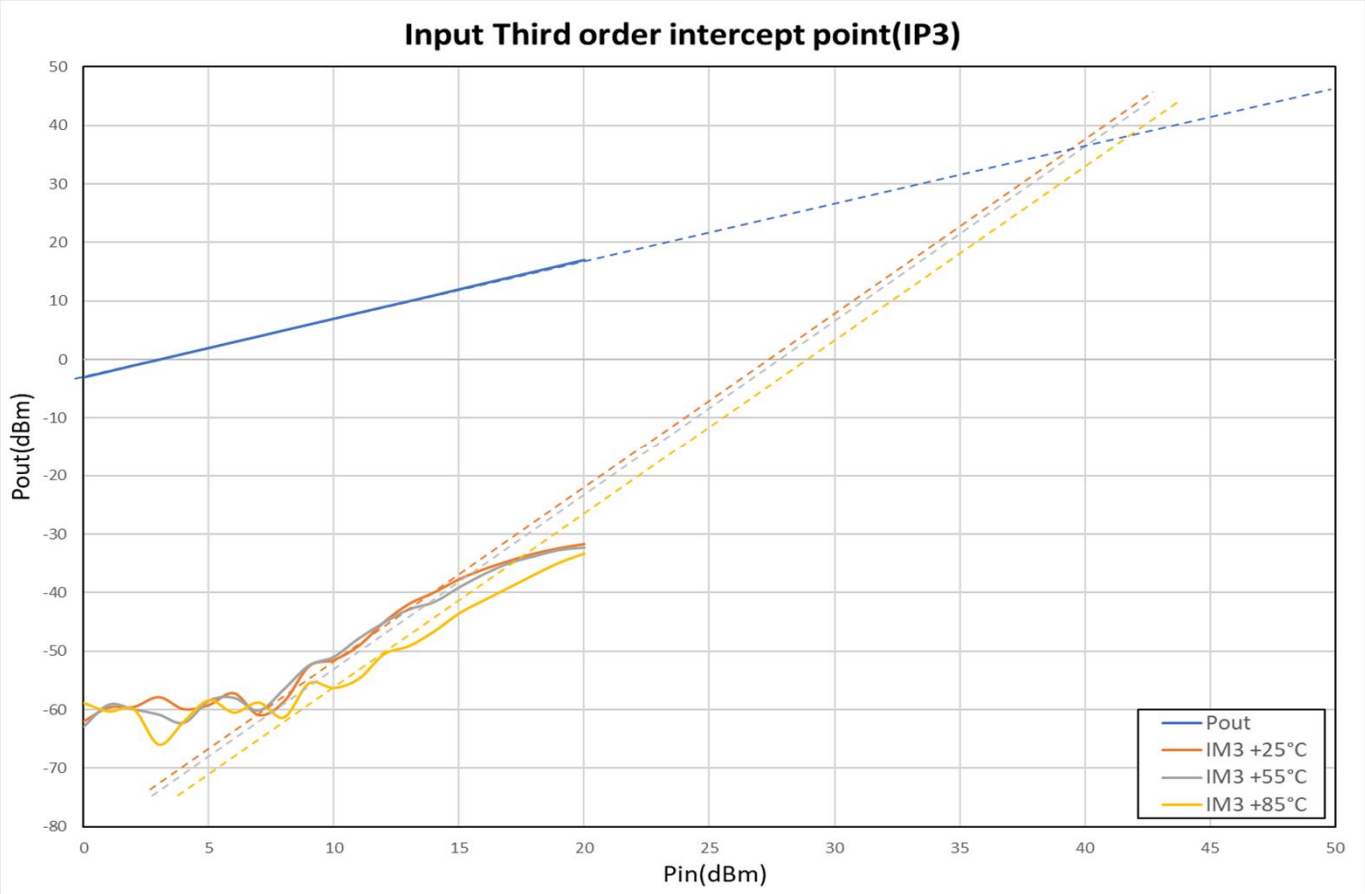
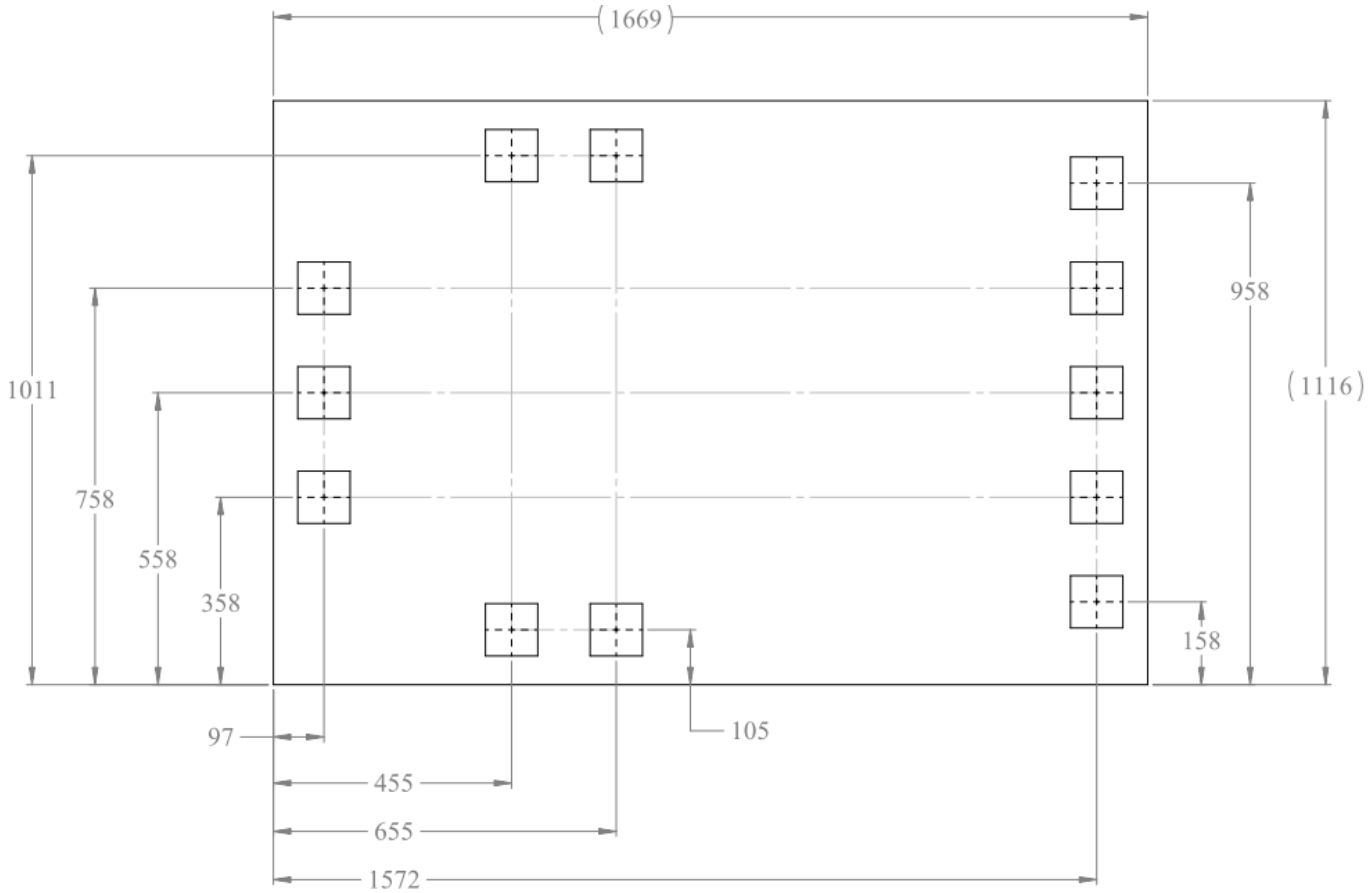




Typical Performance



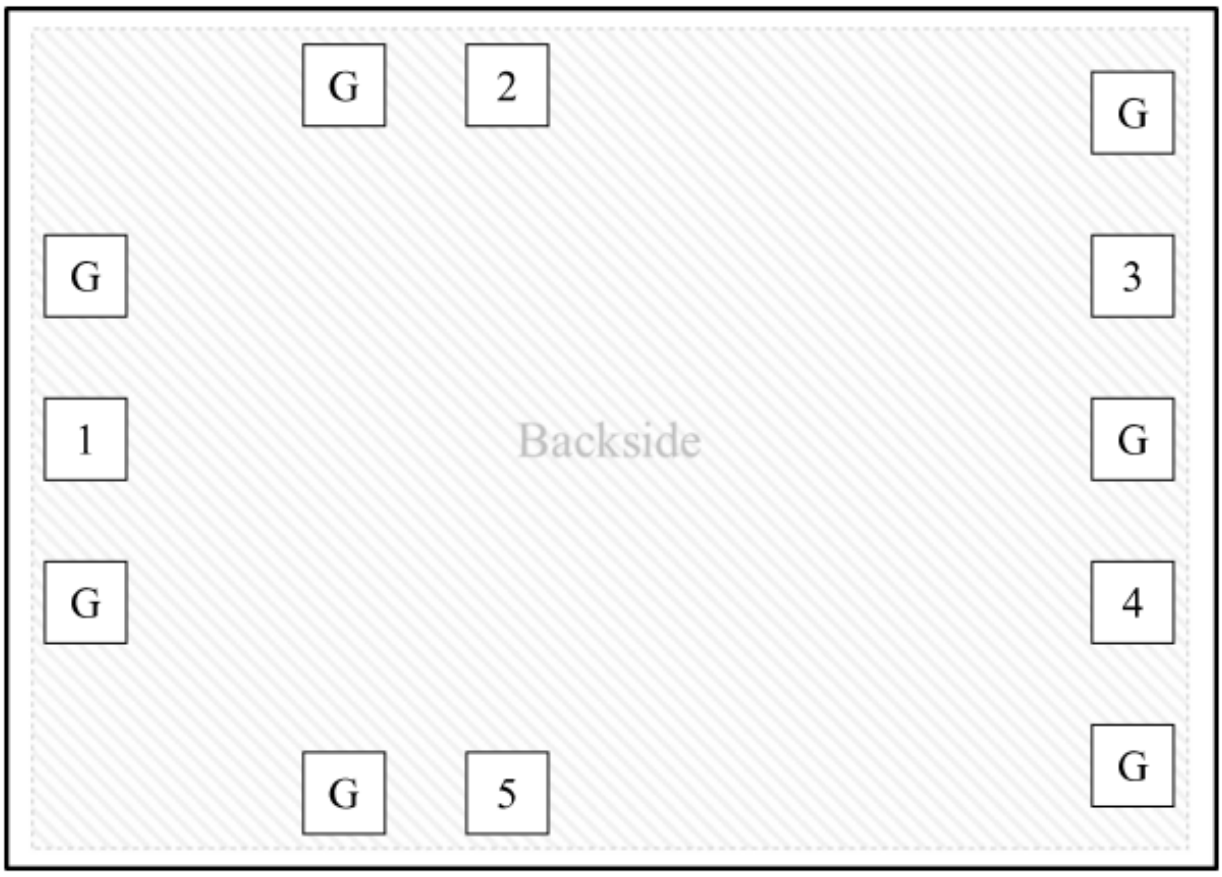
Mechanical Information



Notes:
1. PAD size: 100 µm X 100 µm
2. Die thickness: 100 µm
3. Backside and bond pad metal:Gold
4. Backside is RF and DC ground

Pinout and Function Description

Pad Diagram：

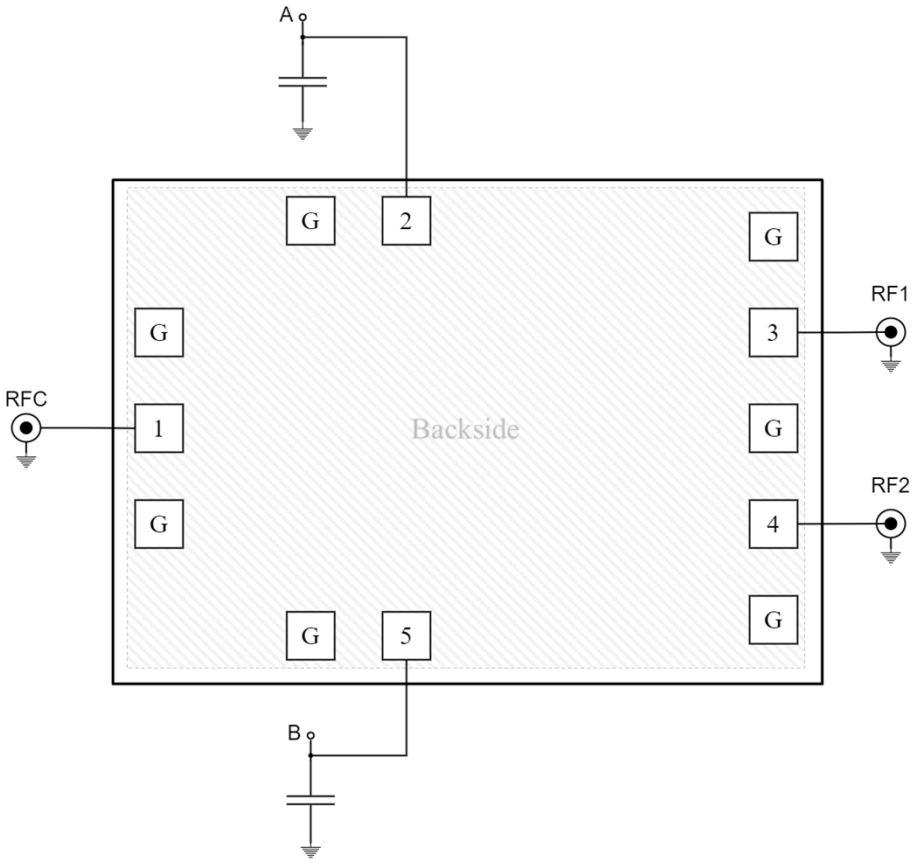


Pin Function Description：

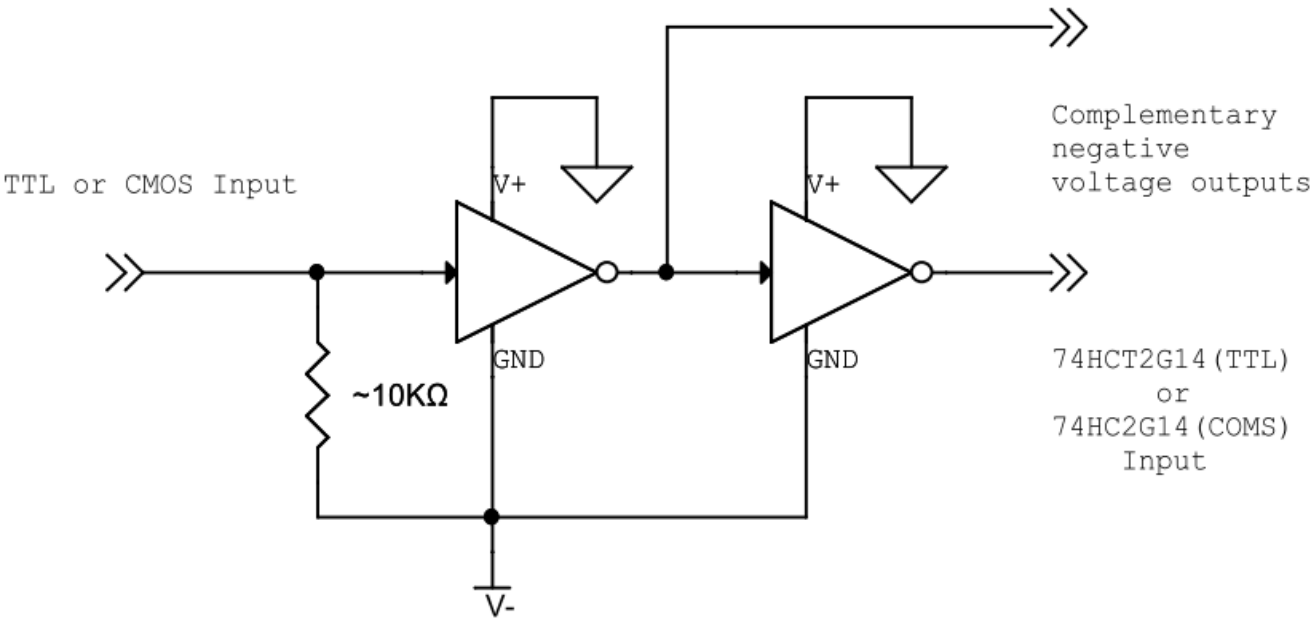
PIN#	Function	Notes
1	RFC	These pin are matched to 50 Ω and Built-in DC blocks
2	Control A	See truth Table and Vbias
3	RF1	These pin are matched to 50 Ω and Built-in DC blocks
4	RF2	These pin are matched to 50 Ω and Built-in DC blocks
5	Control B	See truth Table and Vbias
G	GND	Connect to RF and DC Ground
Backside	GND	Connect to RF and DC Ground

Application Information

Application Schematic



Suggested Driver Circuit



Application Information

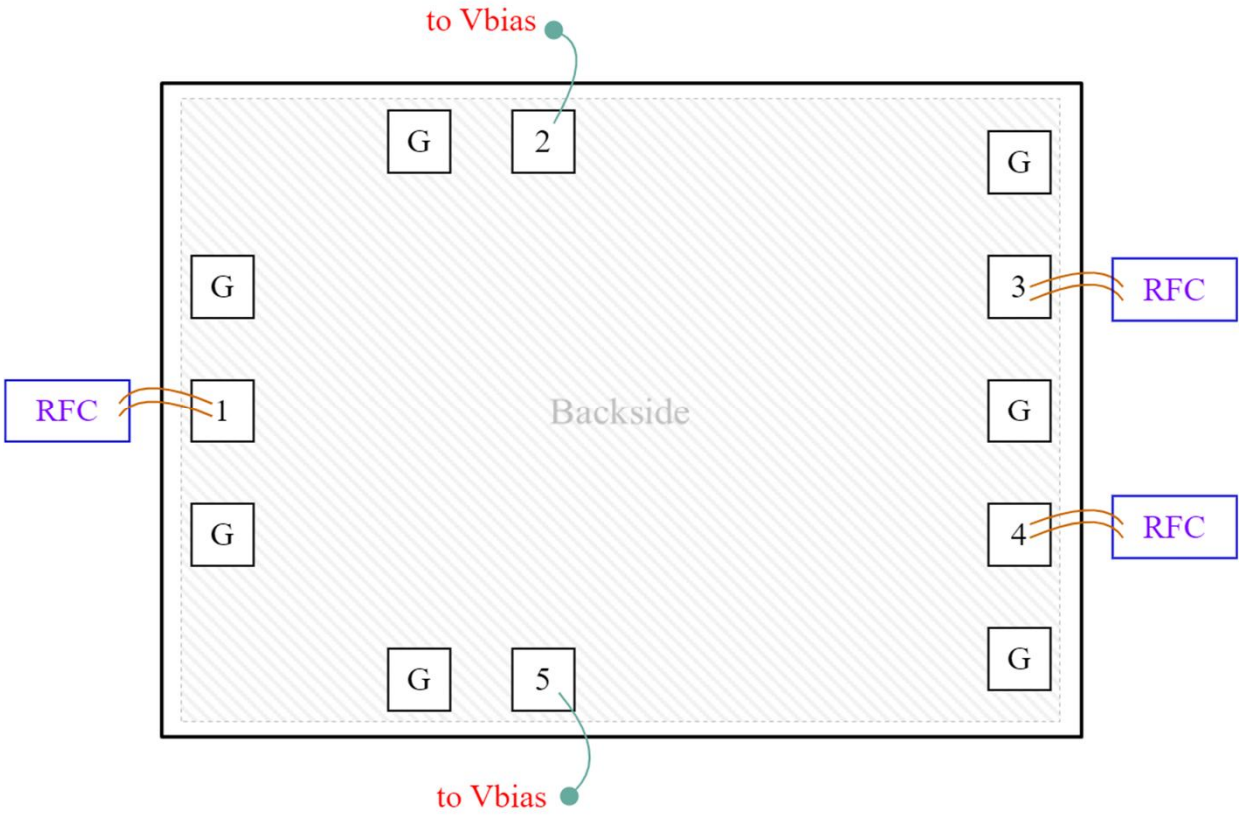
Assembly Guidelines

The URS6C58 backside pad is RF and DC ground, die assembly operations be performed under lamellar flow or in an environment maintained at Class 1000, or better. Die attach should be accomplished with electrically and thermally conductive epoxy only, Eutectic attach is not recommended. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines, and the RF decoupling capacitors placed in close proximity to the DC connections on chip.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire.

The semiconductor is 100µm thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram



Note: GaN dies are susceptible to chipping and cracking if not properly been handled, causing reliability concerns.

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1A devices

ESD Precaution:

Protection must be afforded for the personnel, equipment, and working environment. Employees handling die must wear static dissipative wrist straps. Both the worktables and floors (or local floor mats) must be grounded to allow for static dissipation as well. Work-in-process and finished goods must be stored in an ESD protected environment. Static induced failures are often latent. The damage may not be obvious at the time of exposure of the die to ESD. Therefore, it is a good practice to insure that both the working environment and the handling techniques are compliant with the requirements for handling devices which are sensitive to ESD.

RoHS Compliance

RoHS:	UltrabandTech defines “RoHS” to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, “RoHS” products are suitable for use in specified lead-free processes. UltrabandTech may reference these types of products as "Pb-Free".
RoHS Exempt:	UltrabandTech defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green:	UltrabandTech defines “Green” to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

Important Notice

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