

**Product Features**

- GaN on SiC HEMT
- Surface Mount Hybrid Type
- Compact Size & Mass
- High Efficiency
- Low Cost
- Custom design available

**Applications**

- Radar Systems
- Pulse amplifier application



Package Type : NP-36

**Description**

The HR5459-25B is designed for Radar system application frequencies from 5.4GHz to 5.9GHz and GaN HEMT technology has been used that performs high breakdown voltage, wide bandwidth and high efficiency. HR5459-25B has been designed 2 stages to have higher Gain at the wide frequency range of 5.4GHz ~5.9GHz. GaN HEMT technology has been used to every amplifier in it for better reliability. Since it is high efficiency amplifier, it can perform at max 10% duty cycle and 50us of pulse width.

**Electrical Specifications @ V<sub>ds</sub> =50V, T<sub>a</sub>=25°C**

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Frequency Range	MHz	5400	-	5900	ZS = ZL = 50 ohm
Power Gain	dB	-	20	-	Amp : Idq1 = 10mA Idq2 = 10mA
Power Flatness		-	-	1	
Input Return Loss		-	-8	-	
Pout @ Psat	W	20	25	-	
Harmonics 1 to N	dBc		-25		
Pulse Droop	dB		0.5		
Pulse Response	Fall Time	ns		200	
	Rise Time	ns		200	
Drain Efficiency	%	-	40	-	Pout @ Peak
Ids	A	-	1.25		
Supply Voltage	V	-3.5	-3.3	-2.7	Gate Bias (Vgs1 and Vgs2)
	V	-	50		Main Bias(Vds)

**Caution**

The drain voltage must be supplied to the device after the gate voltage is supplied  
 Turn on : Turn on the Gate Voltage supply and last turn On the Drain voltage supplies  
 Turn off : Turn off the Drain Voltage and last turn off the Gate voltage  
 Test condition = 50us (pulse width), 10%(duty cycle), Pin=25.5dBm

**Note**

HR Series have internal DC blocking capacitors at the RF input and output ports

**Mechanical Specifications**

PARAMETER	UNIT	TYP	REMARK
Mass	g	2	-
Dimension	mm	20.5 x 12.5 x 4.8	-

## Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	Vgs1 Vgs2
Drain-Source Voltage	V	84	Vds
Gate Current	mA	5.7	Ig
Operating Junction Temperature	°C	225	T <sub>J</sub>
Operating Case Temperature	°C	-20 ~ 85	T <sub>C</sub>
Storage Temperature	°C	-40 ~ 100	T <sub>STG</sub>

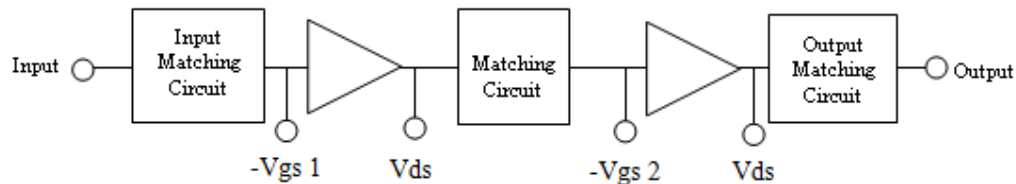
## Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V	-	45	-	Vds
Gate Voltage (on-stage)	V	-	Vgs1@Idq1	-2	Vgs 1
Gate Voltage (on-stage)	V	-	Vgs2@Idq2	-2	Vgs 2
Gate Voltage (off-stage)	V	-	-8	-	Vgs 1
Gate Voltage (off-stage)	V	-	-8	-	Vgs 2

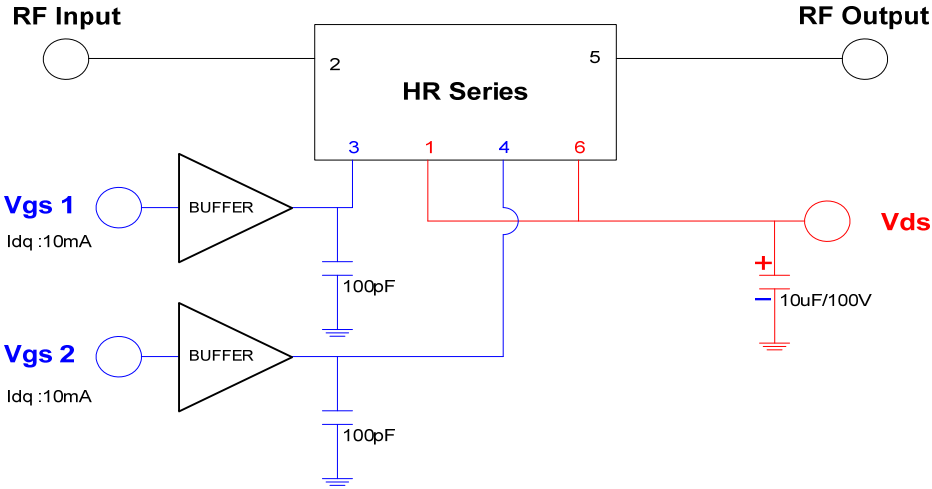
## Power Supply

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain-Source current	A	-	-	2	Ids
Gate-Source Current (on-stage)	mA	-	-	20	Igs
Gate-Source Current (off-stage)	mA	-	-	0.04	Igs

## Block Diagram

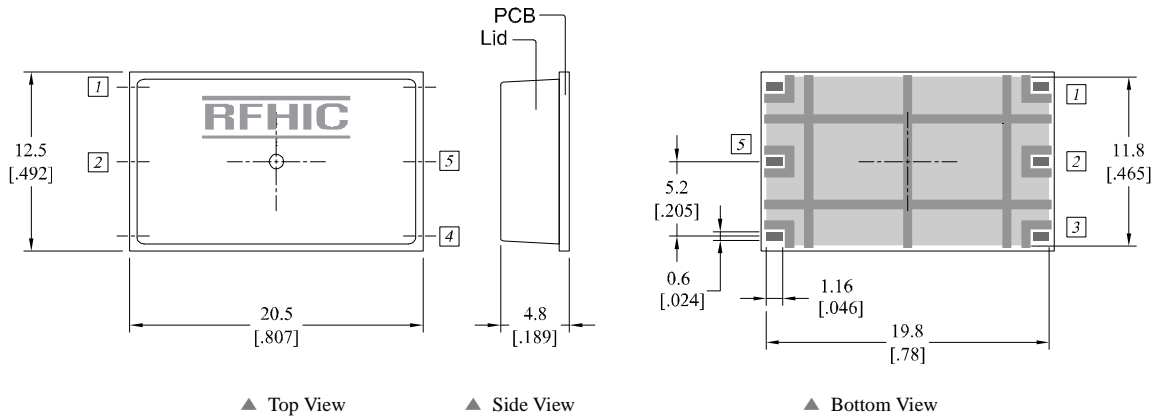


Application Circuit



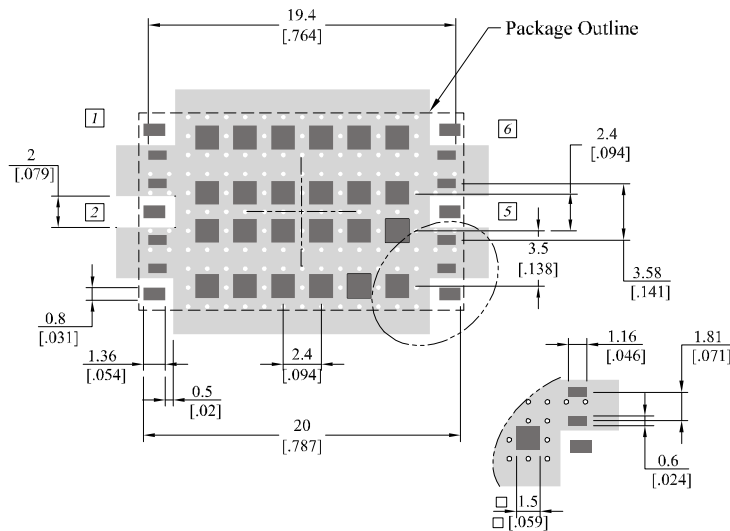
**Package Dimensions (Type: NP-36)**

\* Unit: mm[inch] | Tolerance: ±0.15[.006]



Pin No	Function	Pin No	Function
1	Vds1	6	Vds2
2	RF input	5	RF output
3	Vgs1	4	Vgs2

**Recommended Pattern**



**\* Mounting Configuration Notes**

1. For the proper performance of the device, Ground / Thermal via holes must be designed to remove heat.
2. To properly use heatsink, ensure the ground/thermal via hole region to contact the heatsink. We recommend the mounting screws be added near the heatsink to mount the board
3. In designing the necessary RF trace, width will depend upon the PCB material and construction.
4. Use 1 oz. Copper minimum thickness for the heatsink.
5. Do not put solder mask on the backside of the PCB in the region where the board contacts the heatsink
6. We recommend adding as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.

## Precautions

This product is a Gallium Nitride Transistor.

The Gallium Nitride Transistor requires a Negative Voltage Bias which operates alongside a Positive Voltage Bias. These Biases are applied in accordance to the Sequence during Turn-On and Turn-Off.

The Pallet Amplifier does not have a built-in Bias Sequence Circuit. Therefore, users need to either apply positive voltages and negative voltages in the required sequence, or add an external Bias Circuit to this Amplifier.

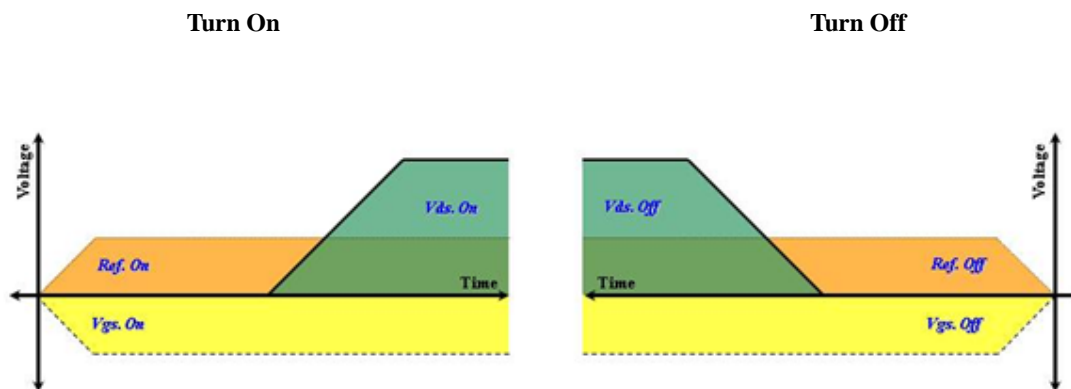
The required sequence for power supply is as follows.

## During Turn-On

1. Connect GND.
2. Apply Vgs1 and Vgs2.
3. Apply Vds.
4. Apply the RF Power.

## During Turn-Off

1. Turn off RF power.
2. Turn off Vds, and then, turn off the Vgs1 and Vgs2.
3. Remove all connections.



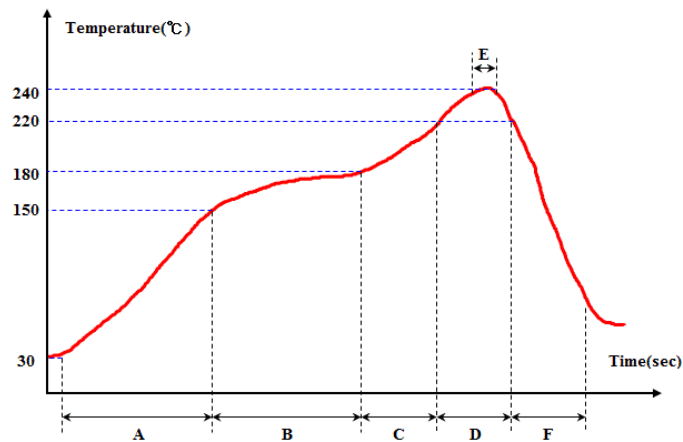
- Sequence Timing Diagram -

## Reflow Profile

### \* Reflow oven settings

Zone	A	B	C	D	E	F
Temperature(°C)	30 ~ 150 °C	150 ~ 180 °C	180 ~ 220 °C	220 ~ 220 °C	235 ~ 240 °C	2 ~ 6 °C/ Sec Drop
Belt speed	55 ~ 115 sec	55 ~ 75 sec	30 ~ 50 sec	30 ~ 50 sec	5 ~ 10 sec	60 ~ 90 sec

### \* Measured reflow profile



## Ordering Information

Part Number	Package Design
HR5459-25B	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

## Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
HR5459-25B	2013.04.02	1.0	Changed Specification	-
HR5459-25B	2013.03.15	0.4	The first written document	Preliminary

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