

Product Features

- GaN on SiC HEMT
- In/Out Impedance Matching
- Surface Mount Hybrid Type
- Small Size & Mass
- High Efficiency
- Low Cost

Applications

- Point to Point
- Radio system



Package Type : NP-18

Description

The HS139142-18A is designed for Radio system application frequencies from 13900 ~ 14200MHz. This amplifier uses GaN HEMT technology which performs high breakdown voltage, high efficiency. High In/Output impedance, high power density.

Electrical Specifications @ Vgs,Idq=150mA, Vds =40V, Ta=25 °C, 50ohm System

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Operating Frequency	MHz	13900	-	14200	ZS = ZL = 50ohm
Operating Bandwidth	MHz	-	300	-	-
Input Return Loss	dB	-	-10	-	-
Output Pulse Power @ P _{3dB}	dBm	-	42.5	-	Pulse Width =100us, 10%Duty
Input Pulse Power	dBm	-	36.5	-	
Power Gain @ P _{3dB}	dB	-	6	-	
Gain Flatness	dB	-	1.5	-	
IMD	dBc	-	30	-	30dBm@2tone
Duty Cycle	%	-	10	-	-
Pulse Width	us	-	100	-	-
Efficiency	%	-	35	-	-

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

Note

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

Mechanical Specifications

PARAMETER	UNIT	TYP	REMARK
Mass	g	1	-
Dimension	mm	15 x 10 x 5.4	-

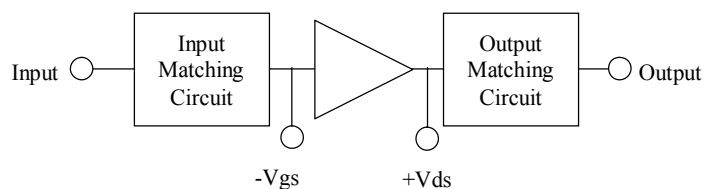
Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	V _{gs}
Drain-Source Voltage	V	50	V _{ds}
Gate Current	mA	4.8	I _g
Operating Junction Temperature	°C	225	T _J
Operating Case Temperature	°C	-40 ~ 65	T _C
Storage Temperature	°C	-40 ~ 100	T _{STG}

Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V	-	40	-	V _{ds}
Gate Voltage (on-stage)	V	-	V _{gs@I_{dq}}	-2	V _{gs}
Gate Voltage (off-stage)	V	-	-8	-	V _{gs}

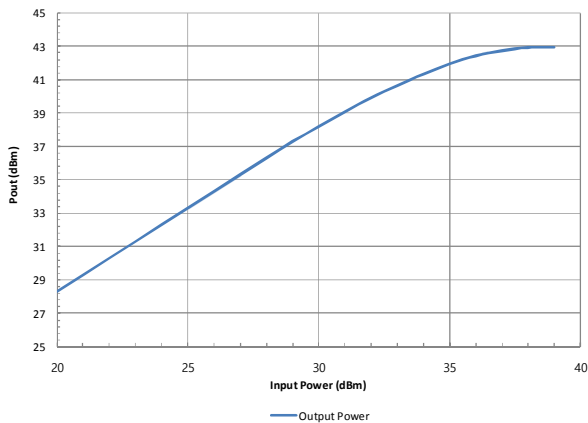
Block Diagram



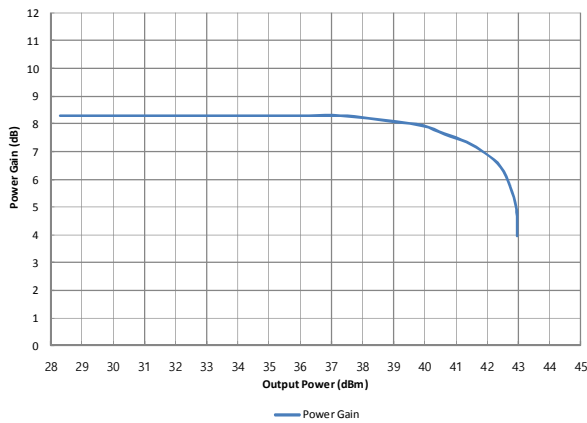
Performance Charts

* **Test condition:** Test Frequency = 14.1GHz, $V_{gs}@I_{dq}=150mA$, $V_{ds}=+40V$, $T_a=25^\circ C$

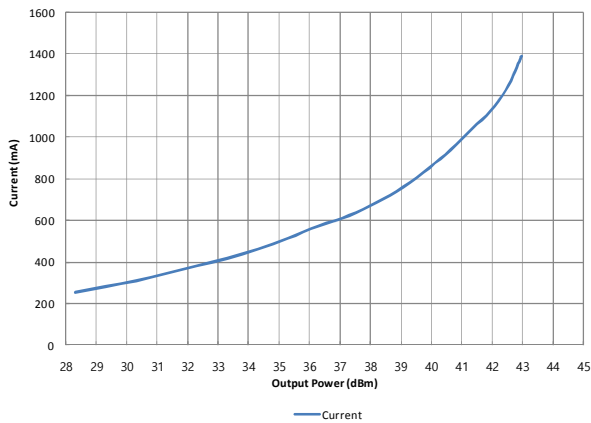
Output Power vs. Input Power



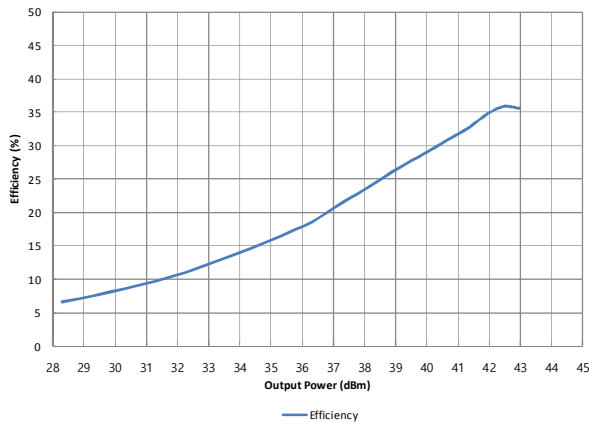
Power Gain vs. Output Power



Ids vs. Output Power

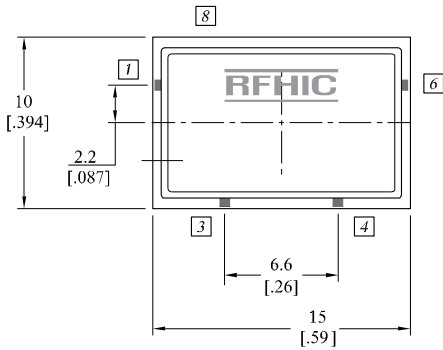


Efficiency vs. Output Power

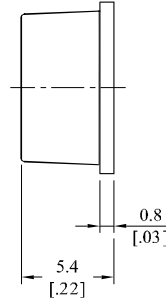


Package Dimensions (Type: NP-18)

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

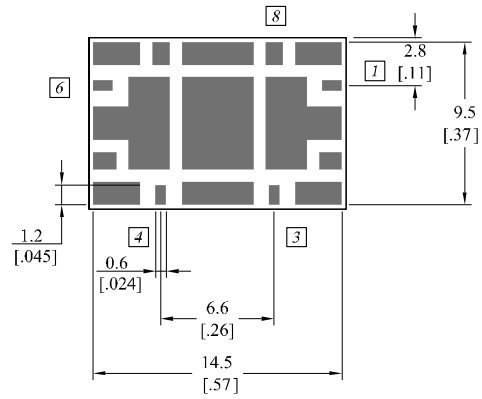


▲ Top View



▲ Side View

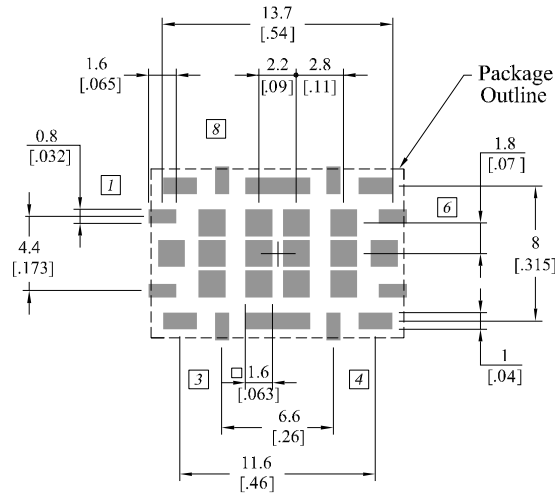
* Unit: mm[inch] | Tolerance: ±0.15[.006]



▲ Bottom View

Pin Description							
Pin No	Function	Pin No	Function	Pin No	Function	Pin No	Function
1	GND	3	GND	5	RF Output	7	Drain Bias (+Vds)
2	RF Input	4	GND	6	GND	8	Gate Bias (-Vgs)

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.

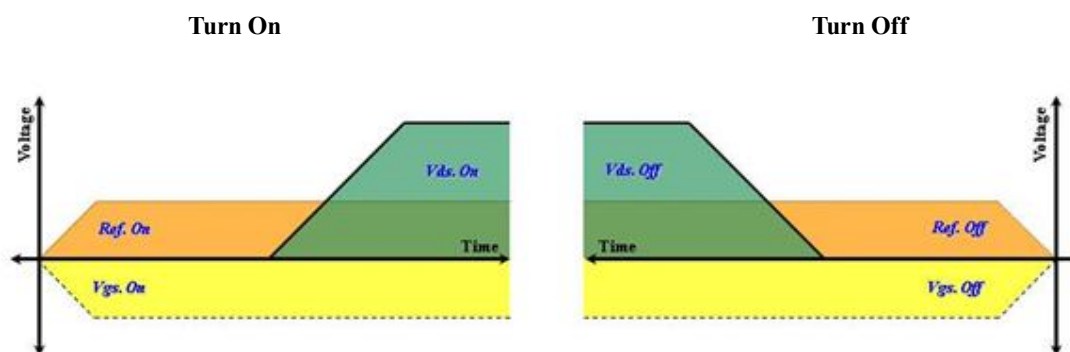
The required sequence for power supply is as follows.

During Turn-On

1. Connect GND.
2. Apply Vgs
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 Vgs
3. Remove all connections.



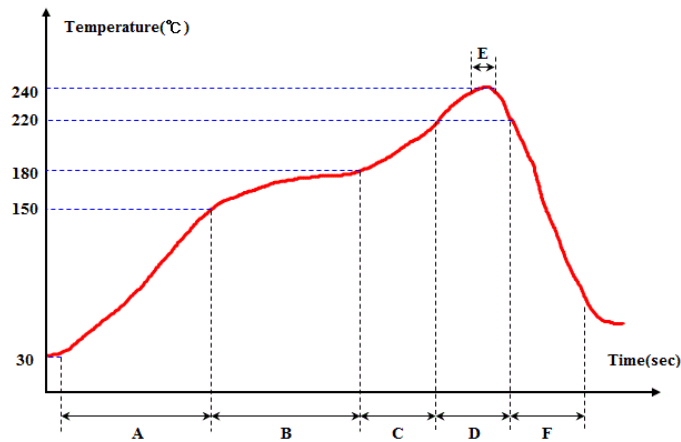
- Sequence Timing Diagram -

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
HS139142-18A	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
HS139142-18A	2014.06.26	0.2	A mass of mechanical specification is changed.	Preliminary
HS139142-18A	2013.04.12	0.11	IMD	Preliminary
HS139142-18A	2013.03.14	0.1	Newly created.	Preliminary

RFHIC Corporation reserves the right to make changes to any products herein or to discontinue any product at any time without notice. While product specifications have been thoroughly examined for reliability, RFHIC Corporation strongly recommends buyers to verify that the information they are using is accurate before ordering. RFHIC Corporation does not assume any liability for the suitability of its products for any particular purpose, and disclaims any and all liability, including without limitation consequential or incidental damages. RFHIC products are not intended for use in life support equipment or application where malfunction of the product can be expected to result in personal injury or death. Buyer uses or sells such products for any such unintended or unauthorized application, buyer shall indemnify, protect and hold RFHIC Corporation and its directors, officers, stockholders, employees, representatives and distributors harmless against any and all claims arising out of such unauthorized use.

Sales, inquiries and support should be directed to the local authorized geographic distributor for RFHIC Corporation. For customers in the US, please contact the US Sales Team at 919-677-8780. For all other inquiries, please contact the International Sales Team at 82-31-250-5078.