Preliminary

GaN Hybrid Power Amplifier HS7179-20A

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 HS7179-20A is designed for Radio system application frequencies from 7100MHz to 7900MHz. 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℃, 50ohm System

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Operating Frequency	MHz	7100	-	7900	ZS = ZL = 50ohm
Operating Bandwidth	MHz	-	800	-	-
Input Return Loss	dB	-	-6	-	-
Output Pulse Power @ P_{4dB}	dBm	-	44.5	-	Pulse Width =100us Duty cycle = 10%
Input Pulse Power	dBm	-	34	-	
Power Gain @ P_{4dB}	dB	-	10.5	-	
Gain Flatness	dB	-	1.5	-	
Efficiency	%	-	45	-	
IMD	dBc	-	30	-	Δf=1MHz, IM3 test @Pout=34dBm (*S.C.L) Idq=50mA

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

*S.C.L : Single Carrier Level

Mechanical Specifications

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

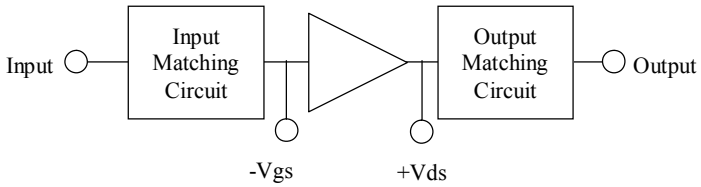
Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	Vgs
Drain-Source Voltage	V	50	Vds
Gate Current	mA	4.8	Ig
Operating Junction Temperature	°C	250	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	-	Vds
Gate Voltage (on-stage)	V	-	Vgs@Idq	-2	Vgs
Gate Voltage (off-stage)	V	-	-8	-	Vgs

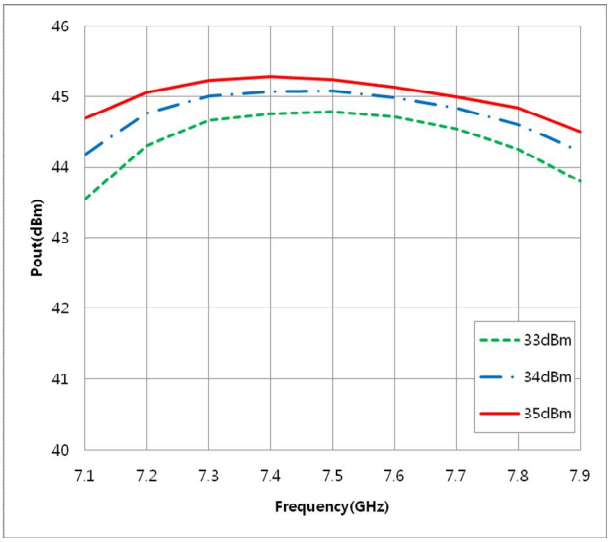
Block Diagram



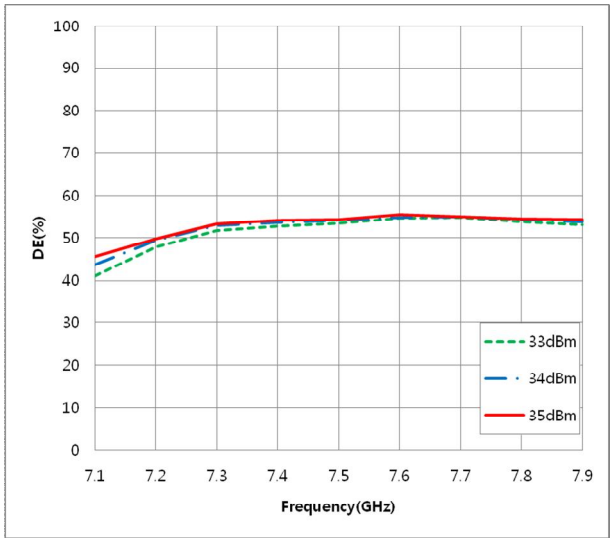
Performance Charts

*** Test condition:** Test Frequency = 7.1GHz - 7.9GHz, Vgs@Idq = 150mA, Vds = +40V, Ta = 25℃

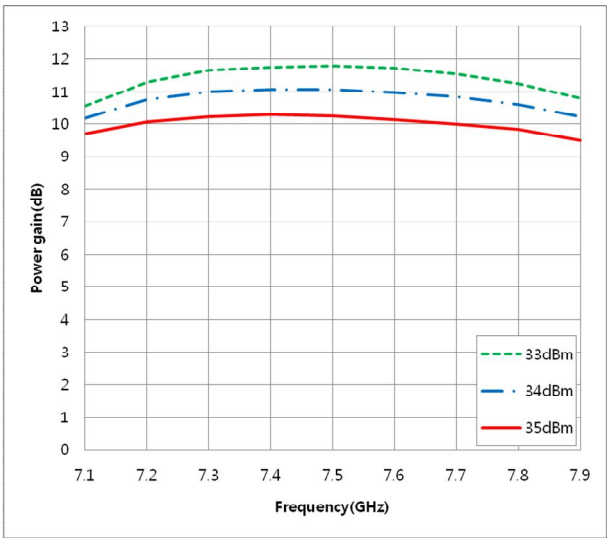
Output Power vs. Frequency



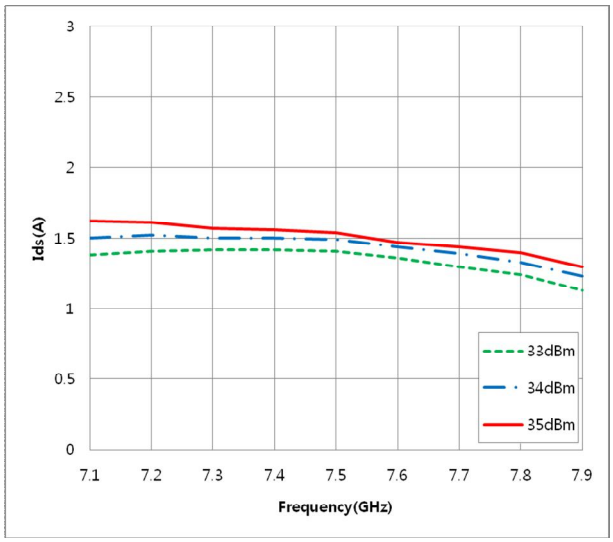
Drain Efficiency vs. Frequency



Power Gain vs. Frequency

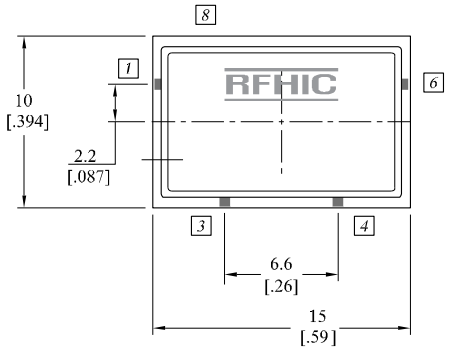


Current vs. Frequency

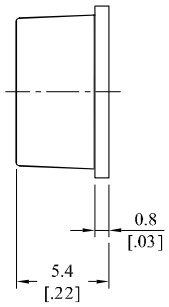


Package Dimensions (Type: NP-18)

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

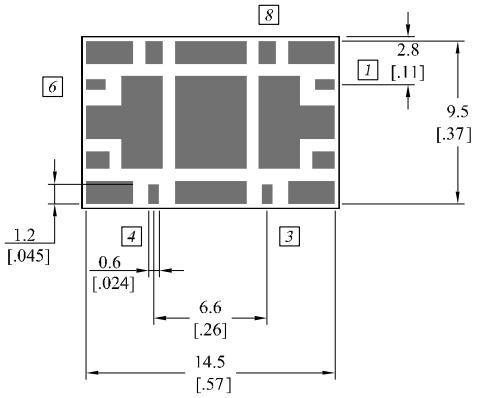


▲ Top View



▲ Side View

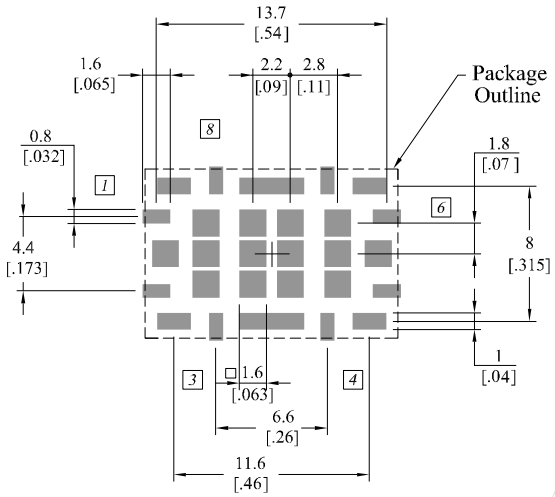
* Unit: mm[inch] | Tolerance: ±0.15[.006]



▲ 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.

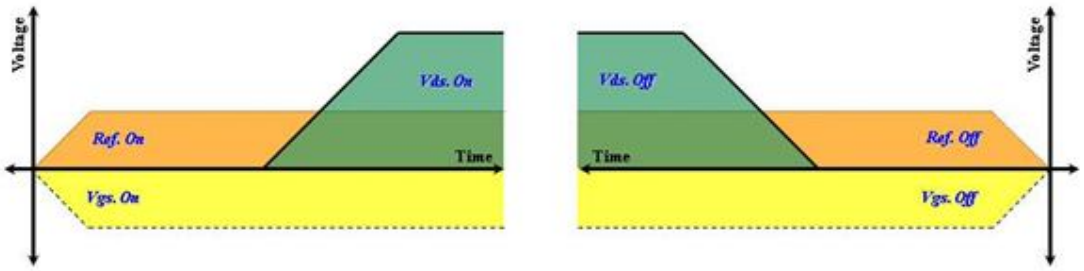
During Turn-On

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.

Turn On **Turn Off**



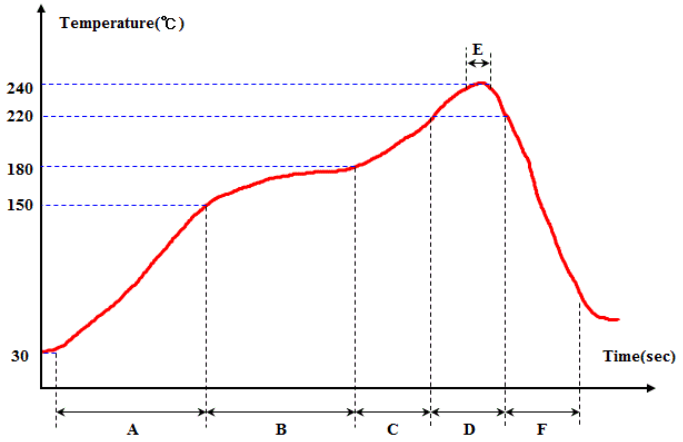
- Sequence Timing Diagram -

Reflow Profile

*** Reflow oven settings**

Zone	A	B	C	D	E	F
Temperature(℃)	30 ~ 150 ℃	150 ~ 180 ℃	180 ~ 220 ℃	220 ~ 220 ℃	235 ~ 240 ℃	2 ~ 6 ℃/ 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
HS7179-20A	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
HS7179-20A	2014.06.26	0.5	A mass of mechanical specification is changed.	Preliminary
HS7179-20A	2014.04.25	0.4	-	Preliminary
HS7179-20A	2013.08.29	0.3	-	Preliminary