Preliminary

GaN Hybrid Power Amplifier RNC16010-10

Product Features

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

Applications

- Satellite Communication System

Package Type : NP-1E

Description

The RNC16010-10 is designed for Satellite communication system application frequencies from 1615 ~ 1675MHz.
This amplifier uses GaN HEMT technology which performs high breakdown voltage, high efficiency.
High In/Output impedance, high power density.

Electrical Specifications @ Vds =32V, Ta=25℃

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Frequency Range	MHz	1615	-	1675	ZS = ZL = 50 ohm
Power Gain	dB	-	25	-	Amp : Idq1 = 300mA Idq2 = 100mA
Gain Flatness		-	±1	-	
Input Return Loss		-	-10	-	
Pout @ Psat	dBm	-	40	-	
PAE	%	-	45	-	
Ids	A	-	1.2	-	
Supply Voltage	V	-	+5	-	Drive Bias(Vdd)
	V		-V		Gate Bias (Vgs1)
	V	-	32	-	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

Note

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

Mechanical Specifications

PARAMETER	UNIT	TYP	REMARK
Mass	g	2	-
Dimension	㎜	20.5 x 15 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	10.8	Ig
Operating Junction Temperature	°C	225	T_J
Operating Case Temperature	°C	-40 ~ 85	T_C
Storage Temperature	°C	-40 ~ 100	T_{STG}

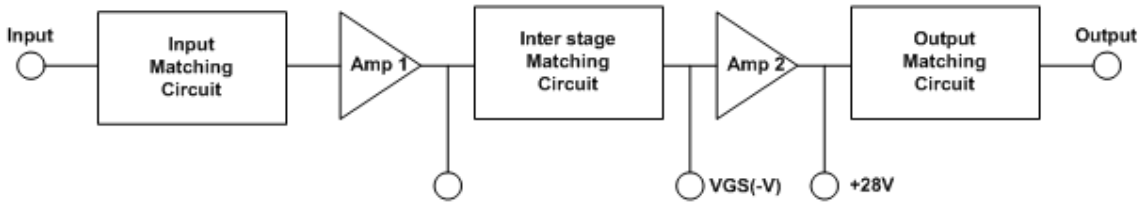
Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V		28		Vds
Gate Voltage (on-stage)	V	-	Vgs1@Idq1	-2	Vgs 1
Gate Voltage (off-stage)	V	-	-8	-	Vgs 1

Power Supply

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain-Source current	A	-	-	1.5	Ids
Gate-Source Current (on-stage)	mA	-	-	4	Igs
Gate-Source Current (off-stage)	mA	-	-	0.4	Igs

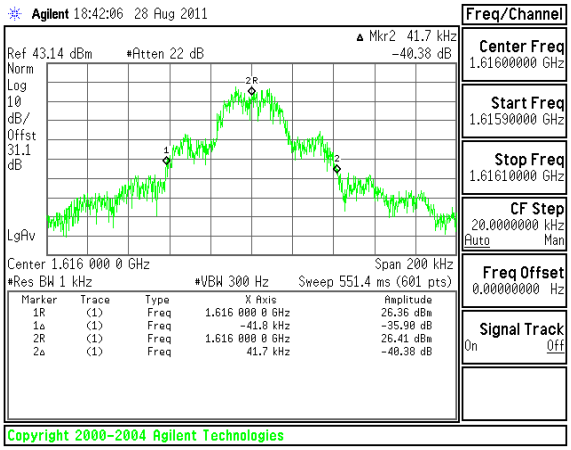
Block Diagram



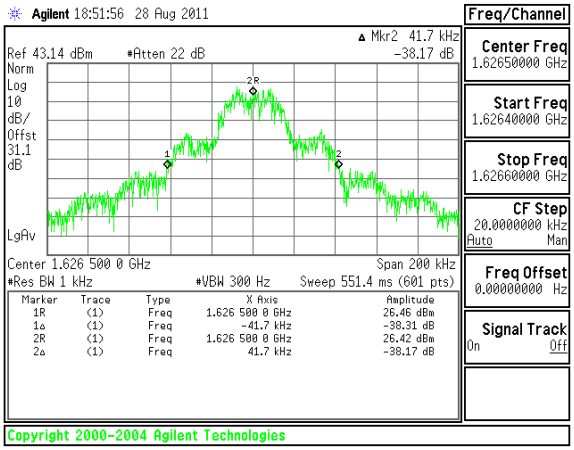
Performance Charts

* **Bias condition** @ Idq1 300mA, Idq2 100mA, Vds =+28V, Ta=25℃

Offset Freq : ±41.667KHz @ Output 39dBm, 1616MHz

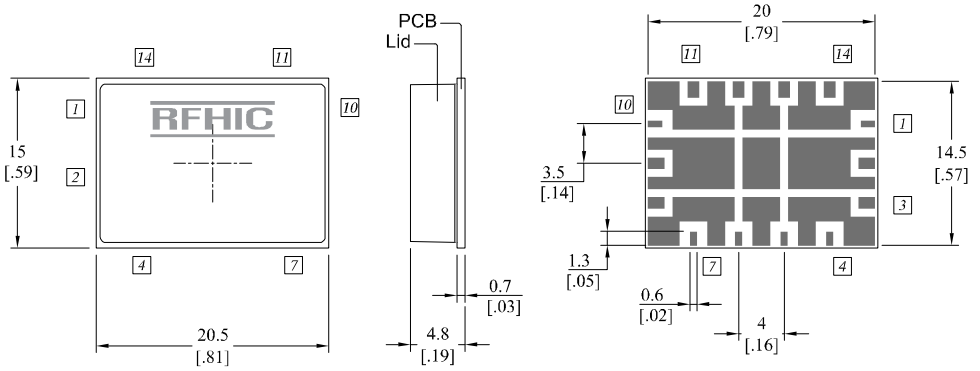


Offset Freq : ±41.667KHz @ Output 39dBm, 1626.5MHz



Package Dimensions (Type: NP-1E)

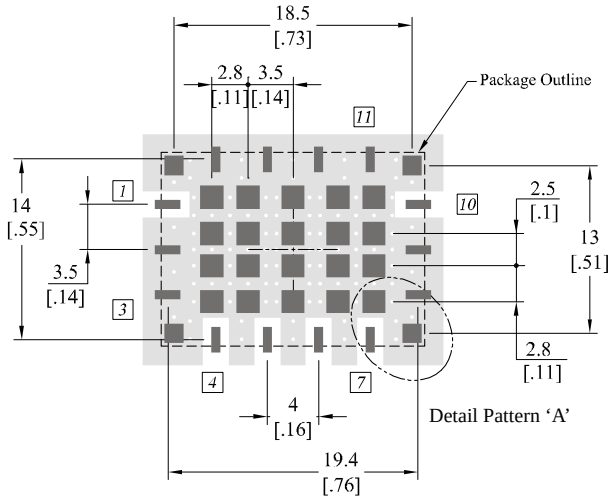
* Unit: mm[inch] | Tolerance: ±0.15[.006]



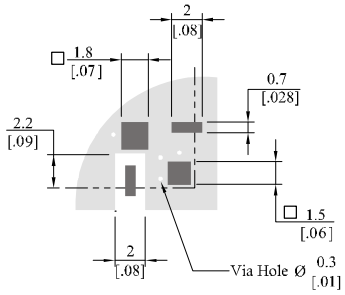
▲ Top View ▲ Side View ▲ Bottom View

Pin Description							
Pin No	**Function**	**Pin No**	**Function**	**Pin No**	**Function**	**Pin No**	**Function**
1	RF Input	4	N/A	8	GND	11	GND
2	GND	5	Vdd	9	GND	12	GND
3	GND	6	Vgs1	10	RF Output	13	GND
-	-	7	Vds	-	-	14	GND

Recommended Pattern



Recommended Pattern Detail 'A'



*** 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.

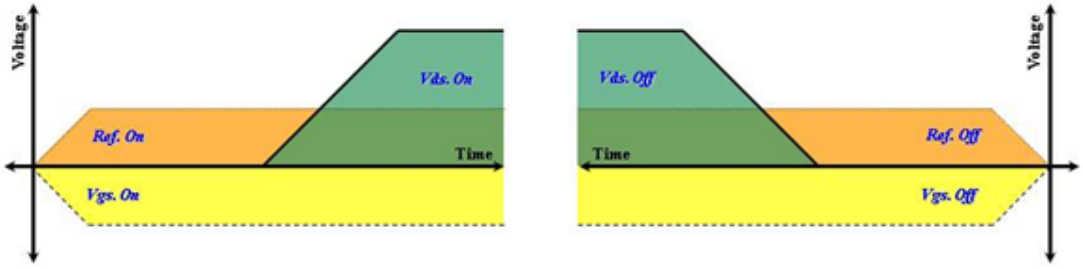
During Turn-On

1. Connect GND.
2. Apply Vgs1 and Vdd
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 Vdd and Vgs1.
3. Remove all connections.

Turn On **Turn Off**



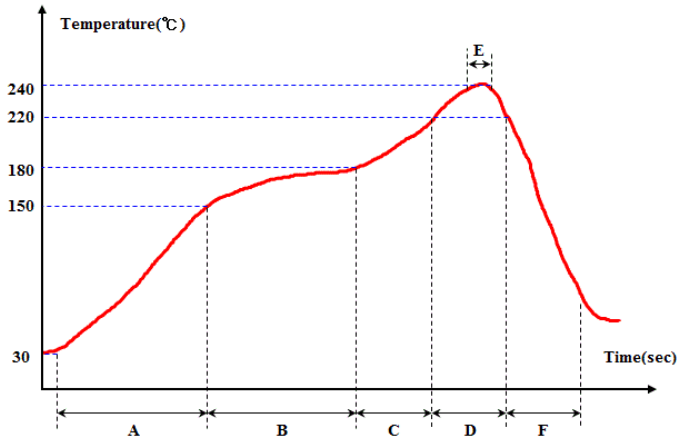
- Sequence Timing Diagram -

Reflow Profile

*** Reflow oven settings**

Zone	A	B	C	D	E	F
Temperature(°C)	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
RNC16010-10	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
RNC16010-10	2012.09.10	0.4	New datasheet format.	Preliminary
RNC16010-10	2012.02.29	0.3	Changed recommend pattern	Preliminary
RNC16010-10	2011.11.28	0.2	Changed specification(Gain, Pout)	Preliminary