

Package Type : NP-1E

Product Features

- GaN on SiC HEMT
- In/Out Impedance Matching
- Surface Mount Hybrid Type
- Small Size & Mass
- High Efficiency
- Low Cost
- 2W Average Output Power

Applications

- RF Sub-Systems
- Base Station
- Repeater
- LTE system

Description

The HT2121-15A is designed for LTE Repeater & RF Sub-systems application frequencies from 2110 ~ 2170MHz. This amplifier uses GaN HEMT technology which performs high breakdown voltage, high efficiency. High In/Output impedance, High power density.

Electrical Specifications @ V_{ds} =28V, Ta=25 °C

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Frequency Range	MHz	2110	-	2170	Z _S = Z _L = 50 ohm
Power Gain	dB	31.5	33	34.5	Amp : Idq1 = 47mA Idq2 = 103mA
Gain Flatness		-	0.8	-	
Input Return Loss		-6	-10	-	
Pout @ Average	dBm	-	33	-	
Pout @ Psat	dBm	40.5	42	-	Pulse Width=20us, Duty10%
ACLR* @ BW 10MHz LTE (PAPR 7.5dB)	dBc	-	-36	-33	Non DPD
		-	-55	-	With DPD
Drain Efficiency	%	-	24.5	-	Pout @ Average
Ids	mA	-	290	-	
Supply Voltage	V	-	-3.0	-2.0	Gate Bias (Vgs1 and Vgs2)
	V	-	28	-	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

1. ACLR Measured Pout=33dBm @ fc± 10MHz / 9.015MHz
 LTE 10MHz 1FA PAPR=7.5dB @ 0.01% probability on CCDF
2. HT 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 15 x 4.8	-

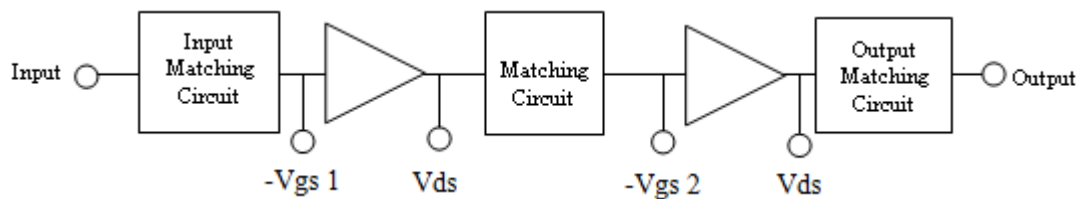
Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	V _{gs1} V _{gs2}
Drain-Source Voltage	V	50	V _{ds}
Gate Current	mA	5.7	I _g
Operating Junction Temperature	°C	225	T _J
Operating Case Temperature	°C	-30 ~ 85	T _C
Storage Temperature	°C	-40 ~ 100	T _{STG}

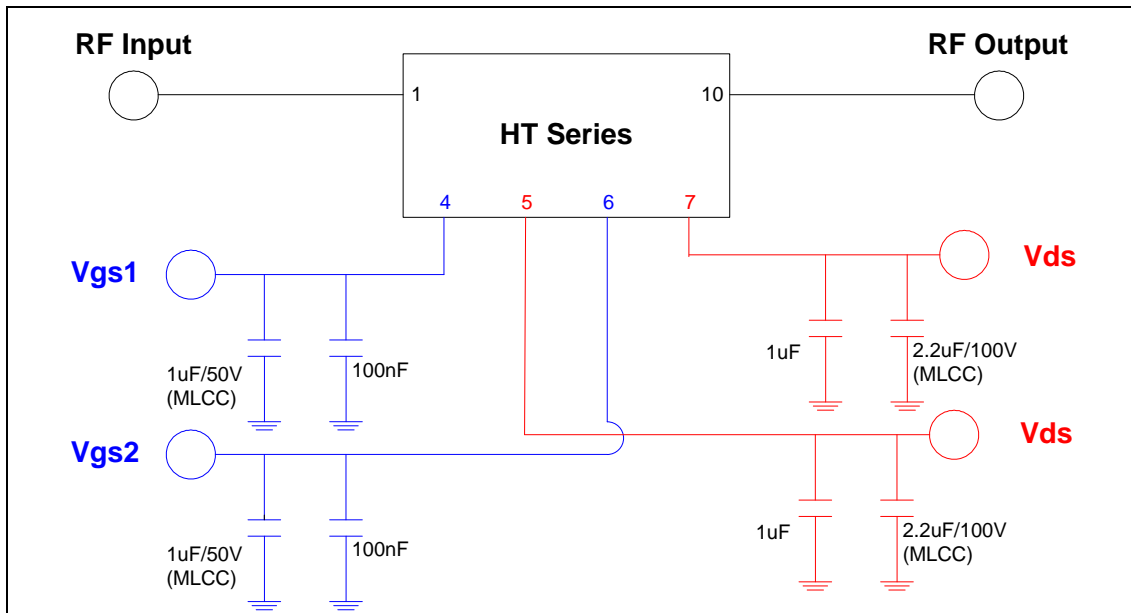
Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V	-	28	-	V _{ds}
Gate Voltage (on-stage)	V	-	V _{gs1@Idq1}	-2	V _{gs 1}
Gate Voltage (on-stage)	V	-	V _{gs2@Idq2}	-2	V _{gs 2}
Gate Voltage (off-stage)	V	-	-8	-	V _{gs 1}
Gate Voltage (off-stage)	V	-	-8	-	V _{gs 2}

Block Diagram



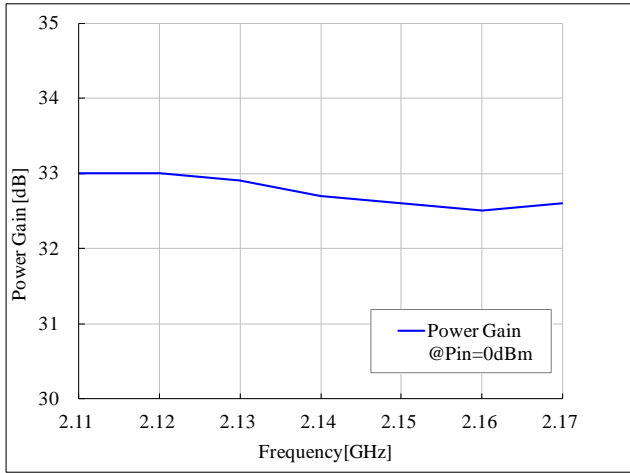
Application Circuit



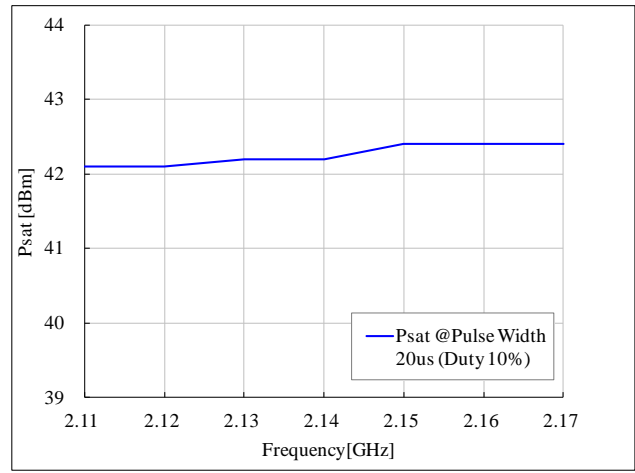
Performance Charts

* **Bias condition** @ $I_{dq1}=47\text{mA}$, $I_{dq2}=103\text{mA}$, $V_{ds}=+28\text{V}$, $T_a=25^\circ\text{C}$

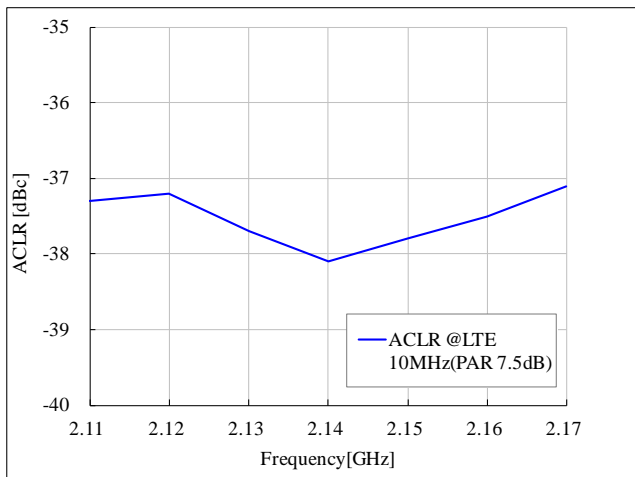
Power Gain vs. Frequency



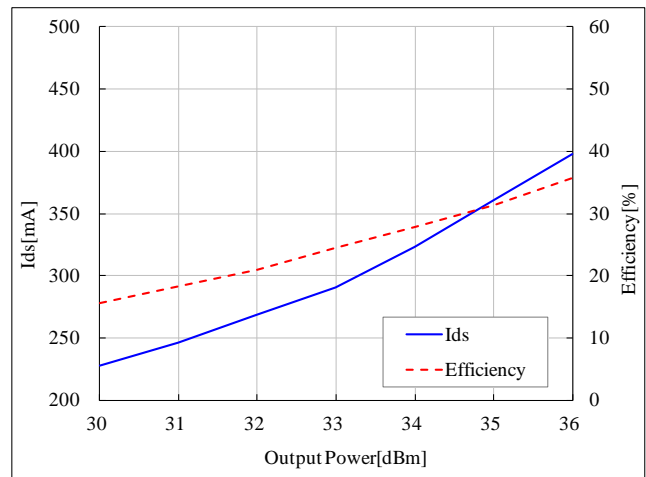
Psat vs. Frequency



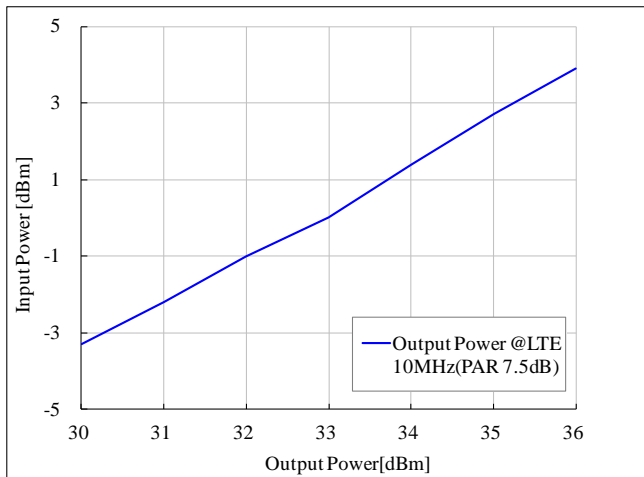
ACLR vs. Frequency



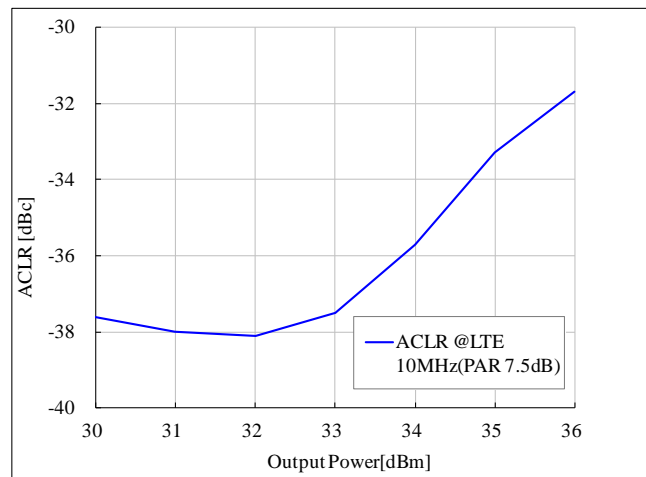
Ids vs. Efficiency vs. Pout



Input Power vs. Pout

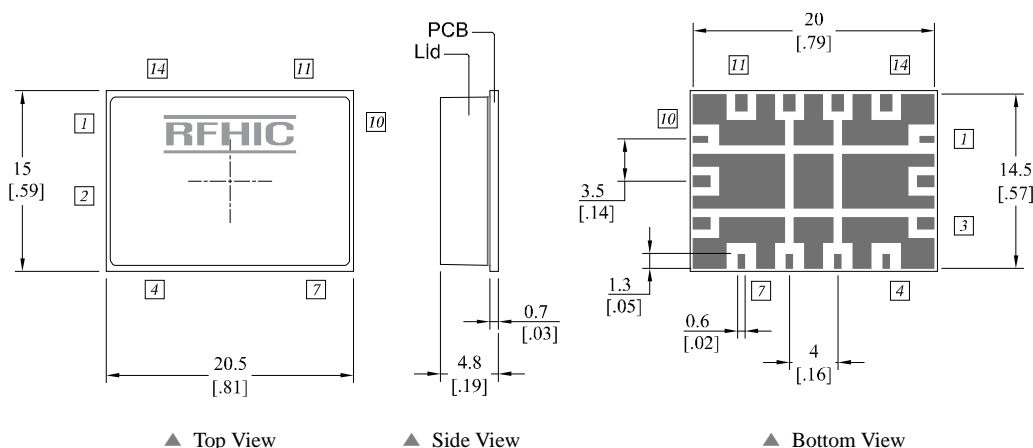


ACLR vs. Pout



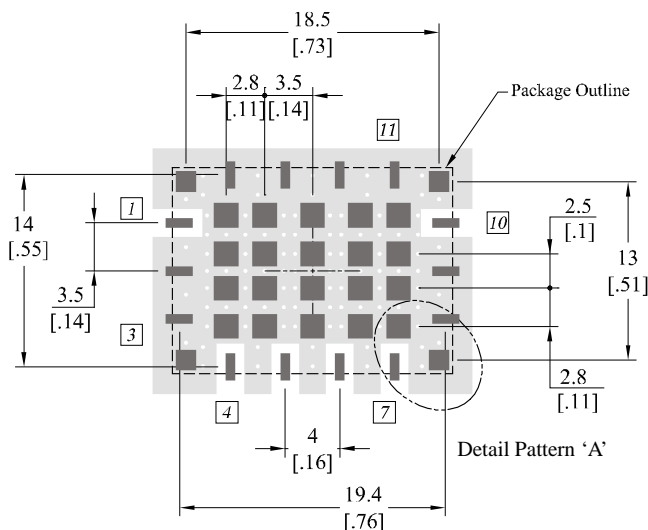
Package Dimensions (Type: NP-1E)

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

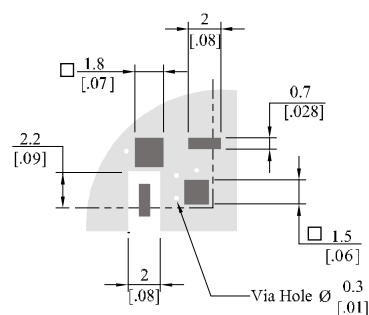


Pin Description							
Pin No	Function	Pin No	Function	Pin No	Function	Pin No	Function
1	RF Input	4	Vgs1	8	GND	11	GND
2	GND	5	Vds	9	GND	12	GND
3	GND	6	Vgs2	10	RF Output	13	GND
-	-	7	Vds	-	-	14	GND

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.

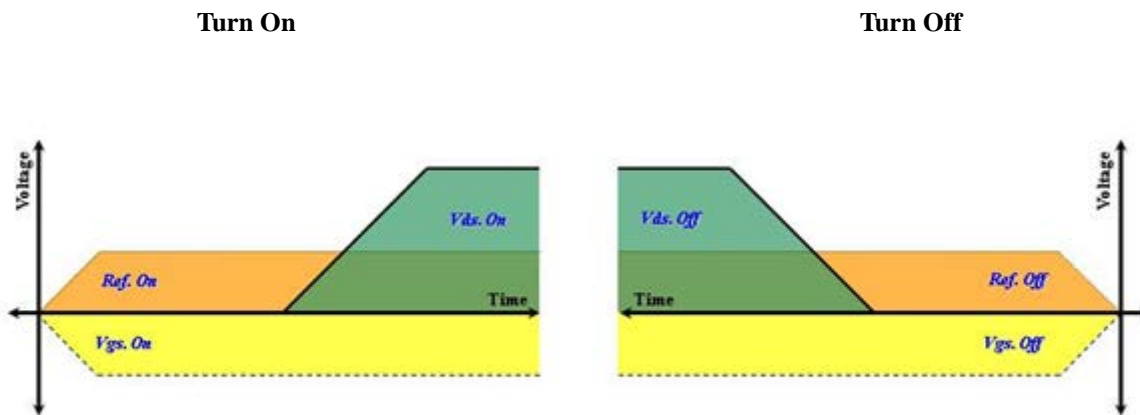
The required sequence for power supply is as follows.

During Turn-On

- 1. Connect GND.
- 2. Apply Vgs1 and 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.



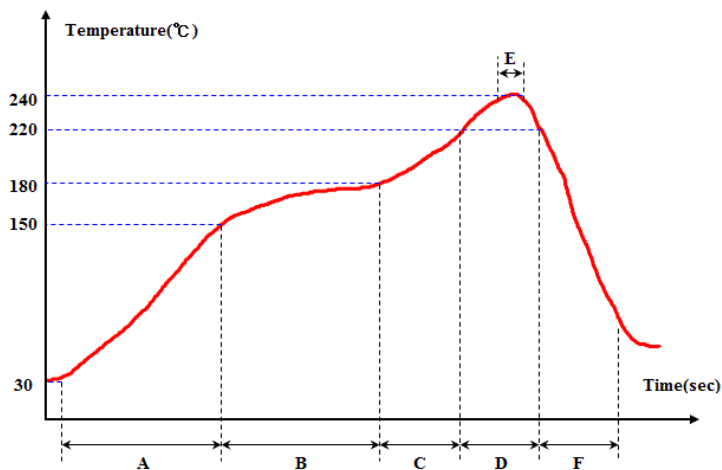
- Sequence Timing Diagram -

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
HT2121-15A	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
HT2121-15A	2012.12.27	0.4	Changed Frequency & Model Number	Preliminary
HT2008-15A	2012.11.21	0.3	Changed Document	Preliminary
HT2008-15A	2012.09.10	0.2	Changed Quiescent current	Preliminary

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