

## 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

- Radio System



Package Type : NP-1E

## Description

The HM0005-10A is designed for Radio system application frequencies from 20 ~ 520MHz. This amplifier uses GaN HEMT technology which performs high breakdown voltage, high efficiency. High In/Output impedance, high power density.

## Electrical Specifications @ $V_{ds} = 28V, T_a = 25^\circ C$

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Frequency Range	MHz	20	-	520	ZS = ZL = 50 ohm
Power Gain	dB	-	30	-	Amp : Idq1 = 50mA Idq2 = 250mA  Input Power = 10dBm
Gain Flatness		-	$\pm 1$	-	
Input Return Loss		-	-	-8	
Pout @ Psat	dBm	39	40	-	
PAE	%	30	45	-	
Ids	mA	-	-	1100	
Supply Voltage	V	-3.5	-3	-2	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

HM 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	-

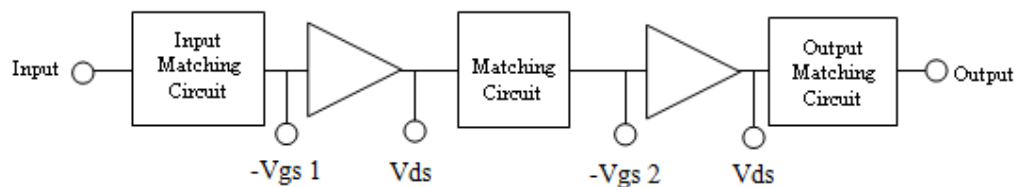
## Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	Vgs1 Vgs2
Drain-Source Voltage	V	50	Vds
Gate Current	mA	5.7	Ig
Operating Junction Temperature	°C	225	T <sub>J</sub>
Operating Case Temperature	°C	-40 ~ 85	T <sub>C</sub>
Storage Temperature	°C	-40 ~ 100	T <sub>STG</sub>

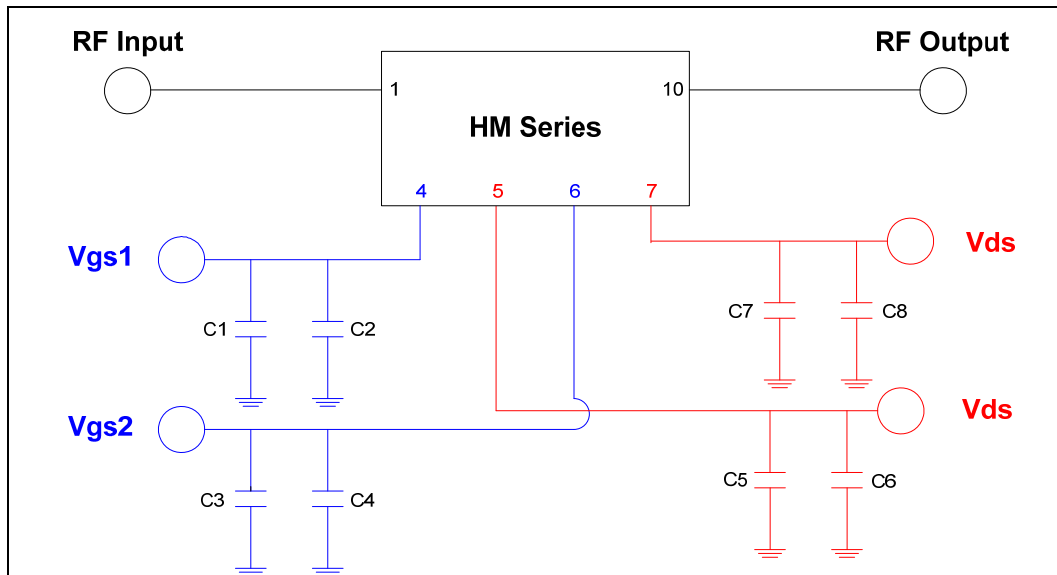
## Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V		28	-	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

## Block Diagram



## Application Circuit



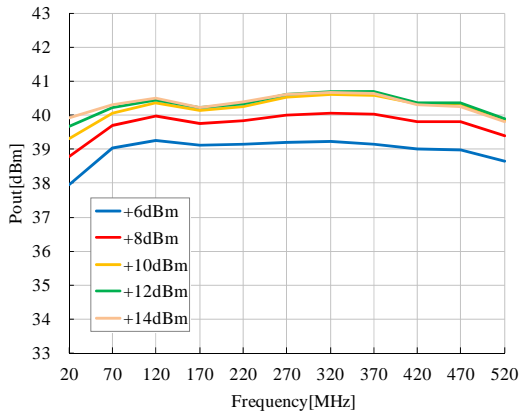
## Part List

Location	Model No.	Spec.	Maker
C6, C8	1812C225K101CT	2.2uF / 100V	WALSIN
C1, C3	C3216X7R1C106K	10uF / 16V	TDK
C2, C4, C5, C7	201CHA101JSLE	100pF	TEMEX
Evaluation Board	RO4350B	2Layer, 30mil	ROGERS

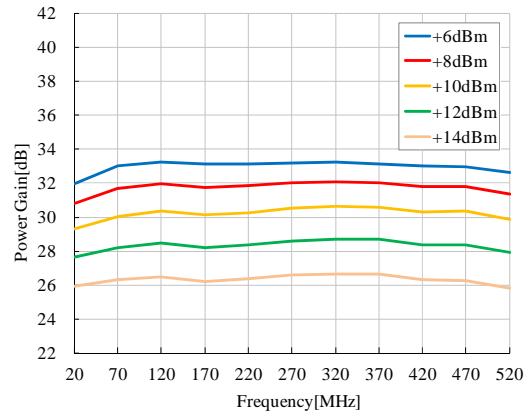
Performance Charts

\* Bias condition  $V_{gs1}@I_{dq1}=50mA$ ,  $V_{gs2}@I_{dq2}=250mA$ ,  $V_{ds}=+28V$ ,  $T_a=25^\circ C$

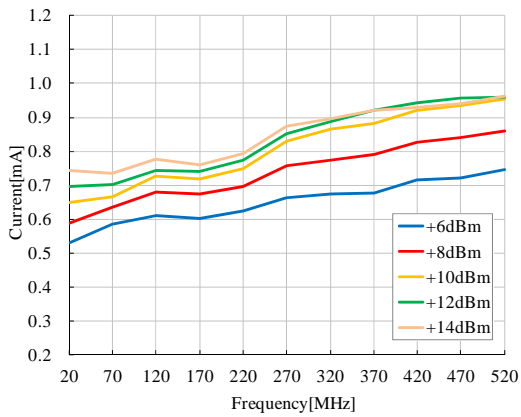
Output Power vs. Input Power



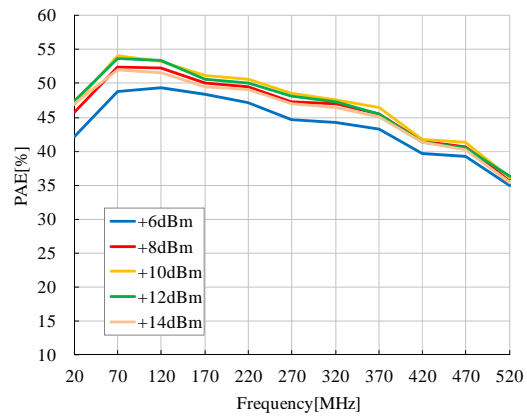
Power Gain vs. Input Power



Ids vs. Input Power

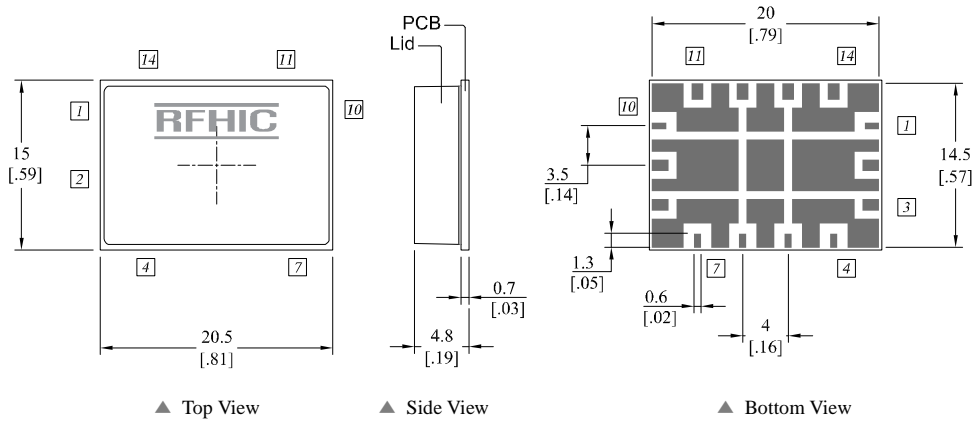


PAE vs. Input Power



Package Dimensions (Type: NP-1E)

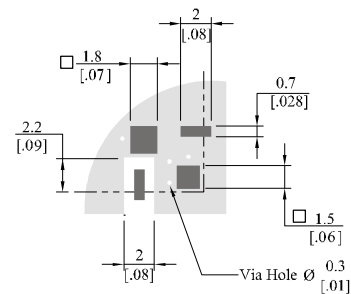
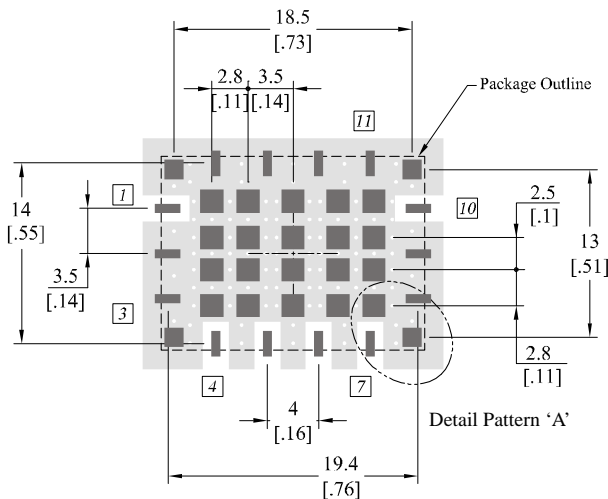
\* Unit: mm[inch] | Tolerance: ±0.15[.006]



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.

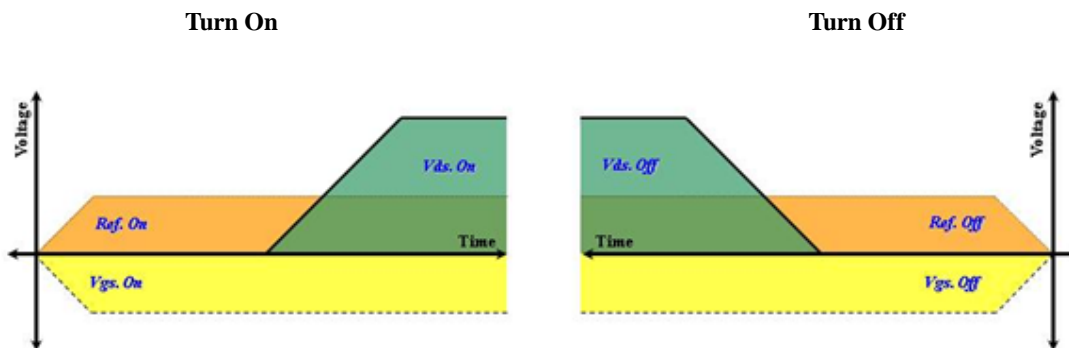
The required sequence for power supply is as follows.

## 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.



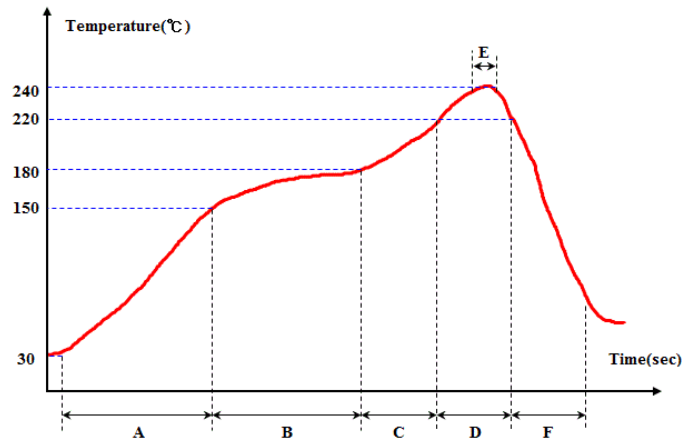
- Sequence Timing Diagram -

## 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
HM0005-10A	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

## Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
HM0005-10A	2012.11.28	1.0	Newly created & New datasheet format.	-
HM0005-10A	2012.03.06	0.2	Change by Recommended Pattern	Preliminary

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