Preliminary

GaN Solid State Power Amplifier RCP25400-20L

Product Features

- 2400 ~ 2500MHz (ISM band)
- 400W CW Peak Power @ 50V
- 63% Drain Efficiency @ 50V
- Low Cost, Light Weight, Compact
- Using GaN-on-SiC HEMT Transistor
- Excellent Thermal Stability and Ruggedness
- Two Transistors are Combined in Parallel
- Externally 50Ω Matched
- Circulator Included

Applications

- High Power Industry
- Microwave CVD Reactor
- Medical Therapy
- Plasma Generator
- Plasma Lighting
- Food Science
- MW Heating and Drying
- Automotive Ignition



Description

CW 400W Pallet Amplifier using GaN-on-SiC transistors is designed for industrial, scientific, medical (ISM) and Plasma applications at 2450MHz. RCP25400-20L is the world's smallest 400W class high efficiency power amplifier with the compact size of 106 x 43 x 12 mm. This amplifier is suitable for use in CW and pulse applications. This high efficiency rugged device is targeted to replace industrial magnetrons and other vacuum tubes which are currently applying into high power industrial applications, semiconductor equipments, plasma and medical systems.

Electrical Specifications @ I_{DQ} = 50mA, V_{DS} = 50V, T_C = 25°C, 50Ω System

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Operating Frequency	MHz	2400	-	2500	F_O
Operating Bandwidth	MHz	-	100	-	OBW
CW Output Power	W	-	420	-	P_O
Efficiency	%	-	63	-	E_{ff}
Input Power	dBm	-	42.4	-	P_I
Power Gain @ Peak Power	dB	13.3	13.8	-	G_P
Gain Flatness	dB	-	1.0	1.5	ΔG_P

* Custom design available

Typical CW Performance Charts

*** Bias condition** (I_{DQ} = 50mA, V_{DS} = 50V, Tc = 25℃)

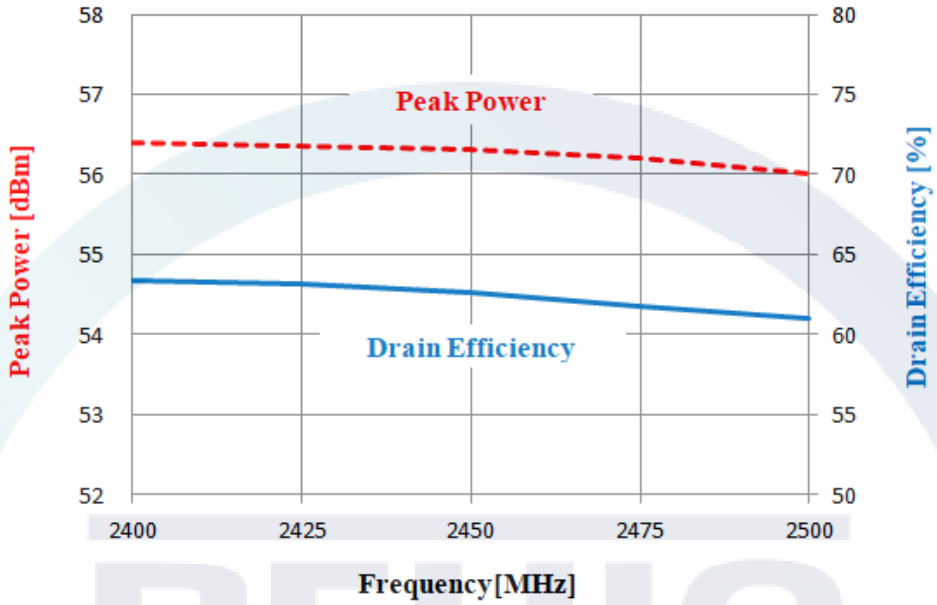


Fig.1 Peak Power, Drain Efficiency vs. Frequency

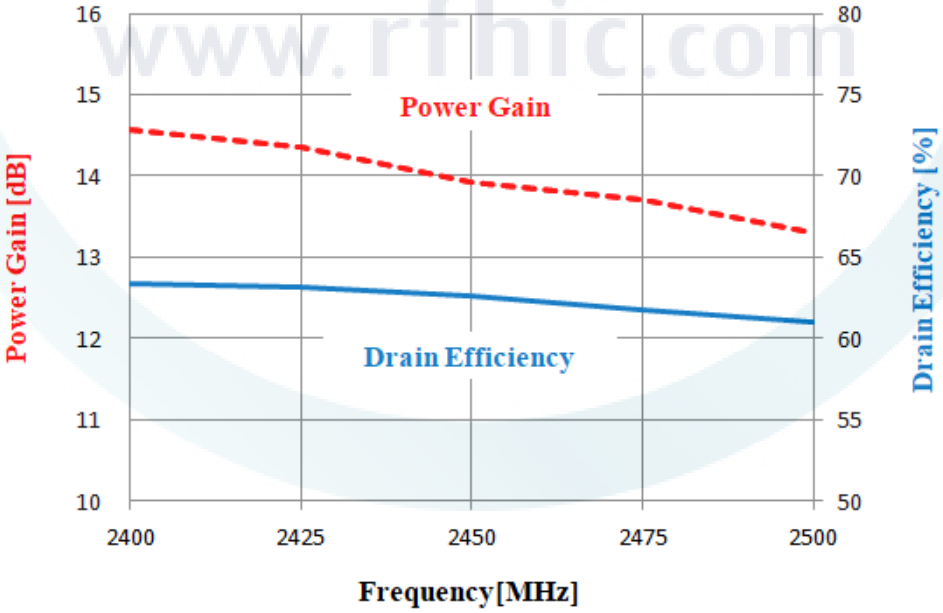


Fig.2 Power Gain, Drain Efficiency vs. Frequency

Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 , +2	V_{GS}
Drain- Source Voltage	V	150	V_{DS}
Operating Voltage	V	50	V_{DC}
Operating Junction Temperature	℃	225	T_J
Operating Flange Temperature	℃	0 ~ 60	T_C
Storage Temperature	℃	-50 ~ 150	T_{STG}

Operating Voltages

PARAMETER	UNIT	NOMINAL VOLTAGE	VOLTAGE ACCURACY	SYMBOL
Drain-Source Voltage	V	50	± 2%	V_{DS}
Gate-Source Voltage	V	-3.2	± 2%	V_{GS}

Power Supply (I_{DQ} = 50mA, V_{DS} = 50V, Tc=25℃)

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Current(AVG)	A	-	13.5	14.5	I_{DD}

Block diagram

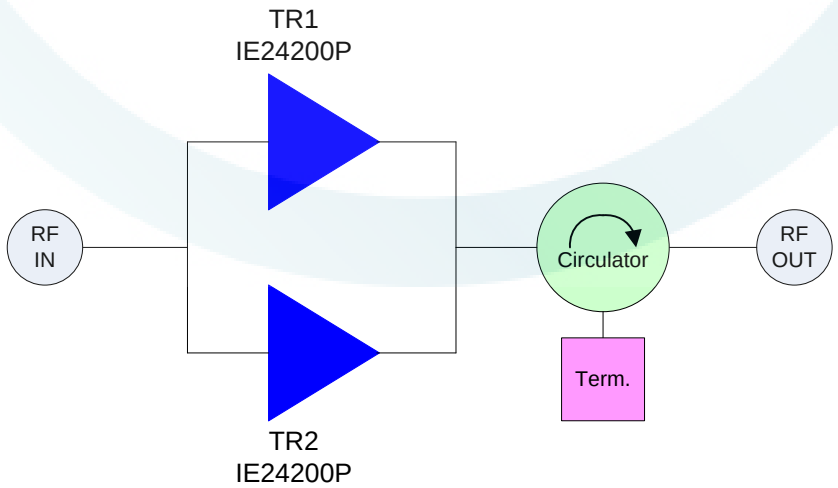


Fig.3 RCP25400-20L Block Diagram

Precautions

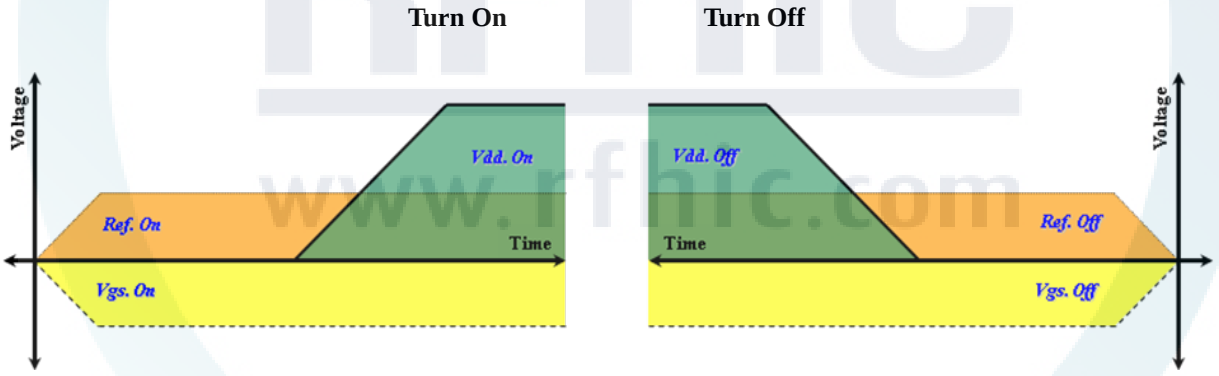
This product is a CW Amplifier based on a Gallium Nitride Transistor.
The Gallium Nitride Transistor requires a Negative Voltage Bias which operates alongside a Positive Voltage Bias. These Biases are applied in accordance to the Sequence during Turn-On and Turn-Off.
The Pallet Amplifier does not have 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 -4.5V to V_{GS}.
3. Apply 50V to V_{DS}.
4. Turn on the V_{GS}, and then, turn on the V_{DS}.
5. Apply the RF Power.

During Turn-Off

1. Turn off RF power.
2. Turn off V_{DS}, and then, turn off the V_{GS}.
3. Remove all connections.

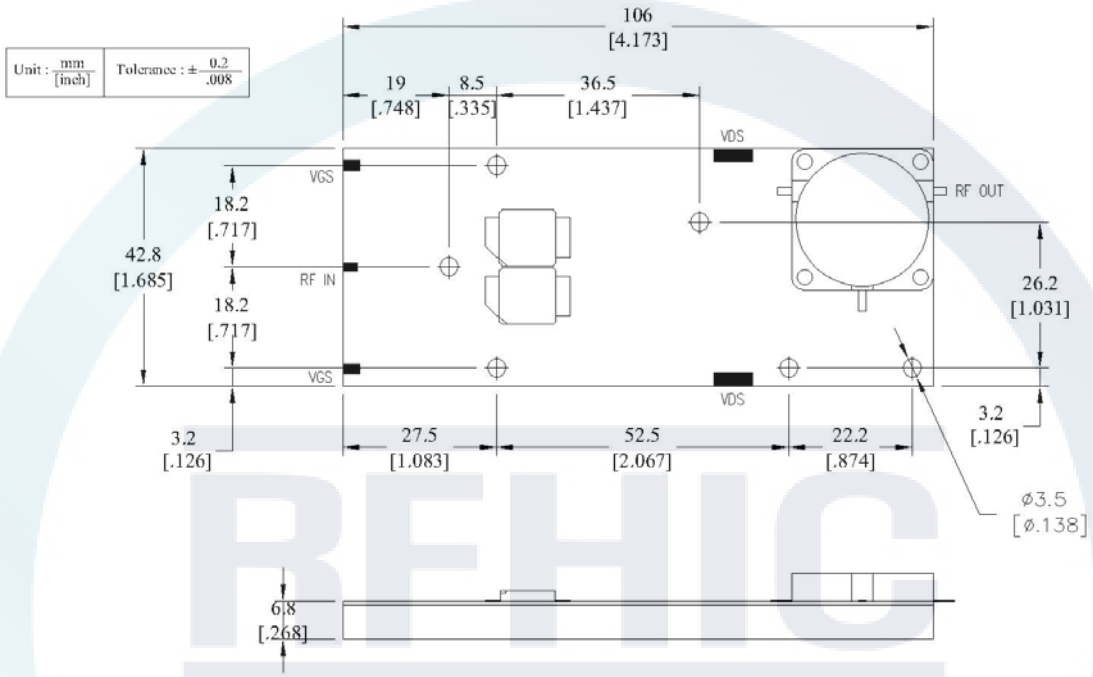


- Sequence Timing Diagram -

Mechanical Specifications

PARAMETER	UNIT	TYP
Mass	g	270
Dimension	mm	106 x 43 x 12
RF Connector	-	50 ohm Pad : RF Input
		Circulator Pin : RF Output
DC Connector	-	Gate Pads (2EA), Drain Pads (2EA)

Outline Drawing



Pin Description

in Name	Description	Pin Name	Description
V_{GS}	V_{GS} (2 x 1.6mm)	V_{DS}	V_{DS} (2 x 7mm)
RF IN	50 ohm Micro strip line (1 x 1.6mm)	RF OUT	Circulator Pin (1 x 1mm)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
RCP25400-20L	May, 2018	0.1	Initial release of datasheet	Preliminary

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