GaN Hybrid Power Amplifier TG520-10

Product Features

- GaN on SiC HEMT
- In/Out 50Ω Impedance Matching
- Surface Mount Hybrid Type
- Small Size & Weight
- High Efficiency
- Low Cost
- Custom design available

Applications

- Radio System
- TRS(Trunked Radio System)
- RF Sub-Systems
- Base Station

Package Type : NP-18

Description

The power amplifier module is designed for TETRA (Terrestrial Trunked Radio, formerly known as Trans European Trunked Radio) applications. TETRA networks are already operational in all the traditional PMR market segments, such as Public Safety, Transportation, Utilities, Government, PAMR, Commercial & Industry and Oil & Gas. GaN HEMT technology is used and attached on a copper sub carrier. It is connected by using bias and in/out matching circuit method with gold wire bonding.

Electrical Specifications @ V_{ds}=28V, V_{gs} @Idq, Ta=25℃

PARAMETER	UNIT	MIN	TYP	MAX	CONDITION
Frequency Range	MHz	30	-	520	ZS = ZL = 50 ohm
Power Gain @ P1dB	dB	13	16	-	Vds = +28V Vgs @Idq Idq = 5mA
Pout @ P1dB	dBm	37	39	-	
Efficiency @ P1dB	%	40	60	-	
Ids @ P1dB	mA	-	500	700	
Pout @ P3dB	dBm	39	40	-	
Input Return Loss	dB	-	-10	-5	Vds=+28V, Idq=150mA
Supply Voltage	V	Vgs@Idq=1mA	Vgs@Idq	Vgs@Idq=5mA	Vgs
		-	28	-	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

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

Mechanical Specifications

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

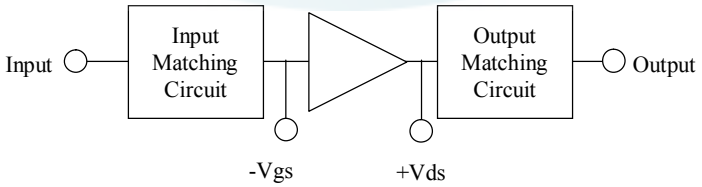
Absolute Maximum Ratings

PARAMETER	UNIT	RATING	SYMBOL
Gate-Source Voltage	V	-10 ~ 0	Vgs
Drain-Source Voltage	V	50	Vds
Gate Current	mA	3.6	Ig
Operating Junction Temperature	℃	225	T_J
Operating Case Temperature	℃	-40 ~ 85	T_C
Storage Temperature	℃	-40 ~ 100	T_{STG}
Load Mismatch		5:1 (all load phase)	

Operating Voltages

PARAMETER	UNIT	MIN	TYP	MAX	SYMBOL
Drain Voltage	V	-	+28	-	Vds
Gate Voltage (on-state)	V	-	Vgs@Idq	-2	Vgs
Gate Voltage (off-state)	V	-	-8	-	Vgs

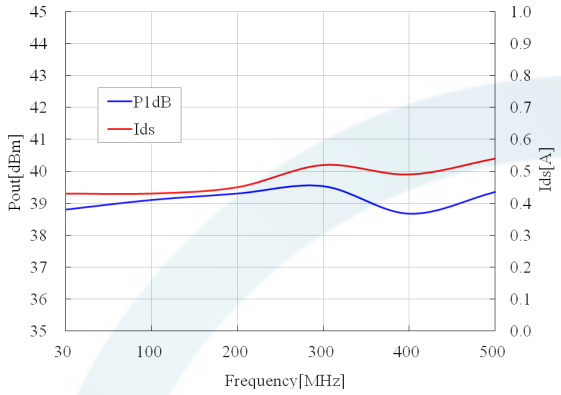
Block Diagram



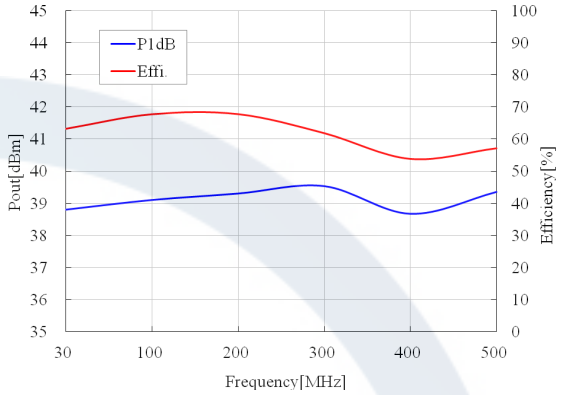
Performance Charts

*** Bias condition** @ Idq=5mA, Vgs@Idq, Vds =+28V, Ta=25℃

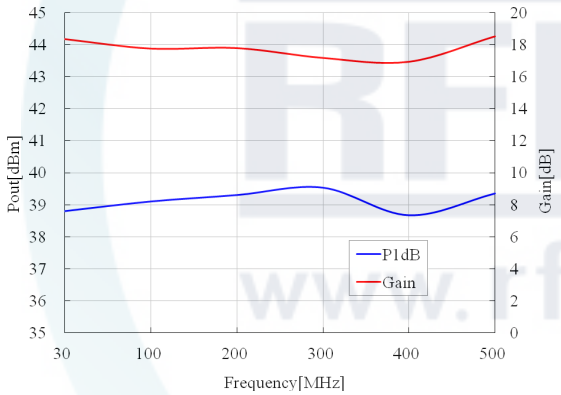
Ids vs. Frequency (@P1dB)



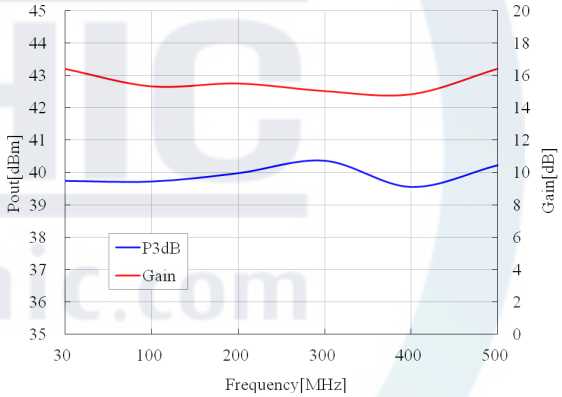
Efficiency vs. Frequency (@P1dB)



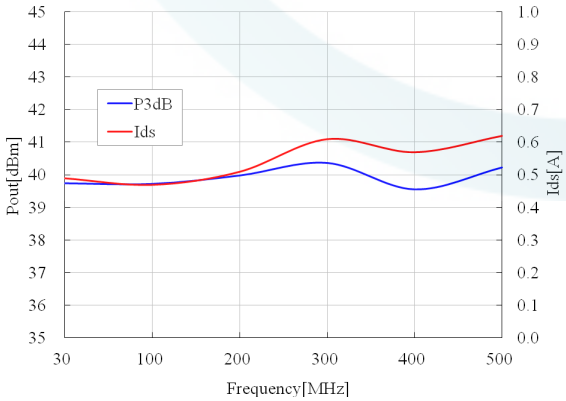
Gain vs. Frequency (@P1dB)



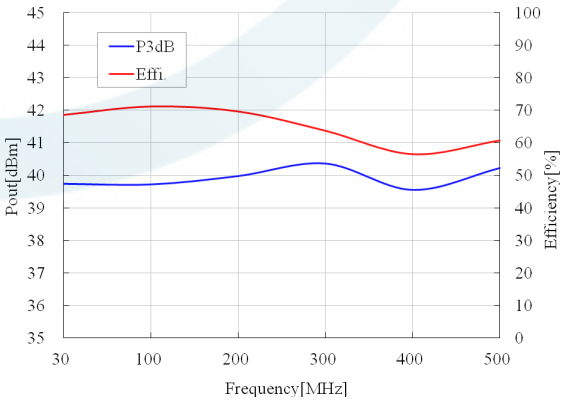
Gain vs. Frequency (@P3dB)



Ids vs. Frequency (@P3dB)

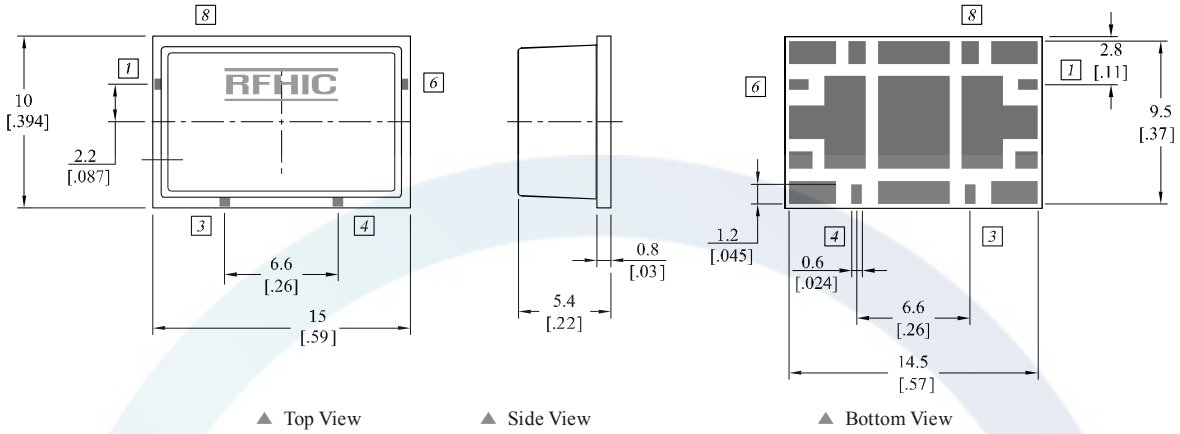


Efficiency vs. Frequency (@P3dB)



Package Dimensions (Type: NP-18)

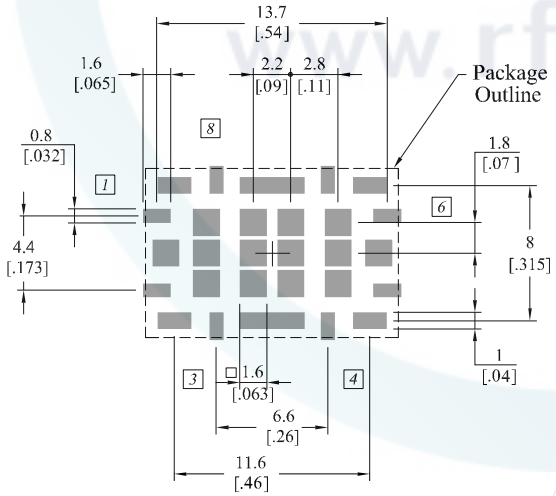
* Unit: mm[inch] | Tolerance: ±0.15[.006]



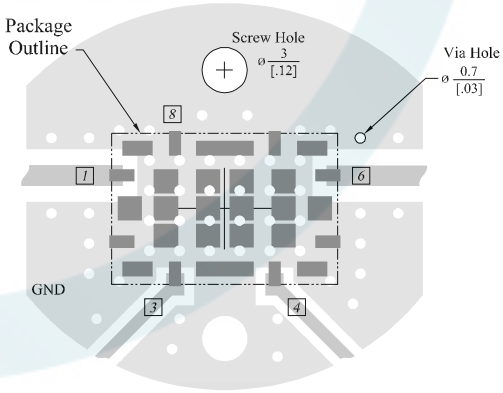
▲ Top View ▲ Side View ▲ Bottom View

Pin Description							
Pin No	**Function**	**Pin No**	**Function**	**Pin No**	**Function**	**Pin No**	**Function**
1	RF Input	3	Gate Bias (-Vgs)	5	GND	7	GND
2	GND	4	Drain Bias (+Vds)	6	RF Output	8	GND

Recommended Pattern



Recommended Mounting Configuration



*** 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.

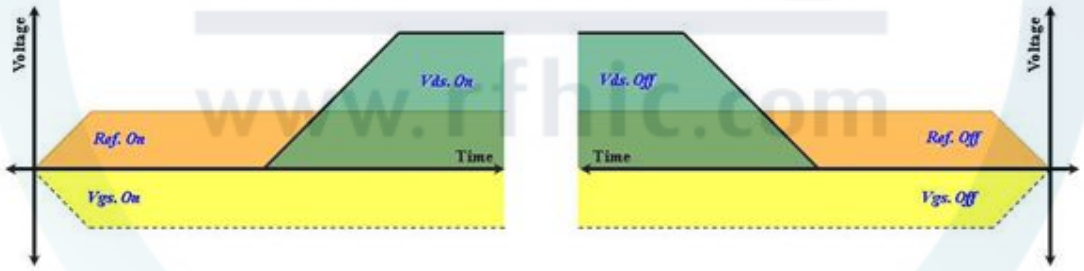
During Turn-On

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



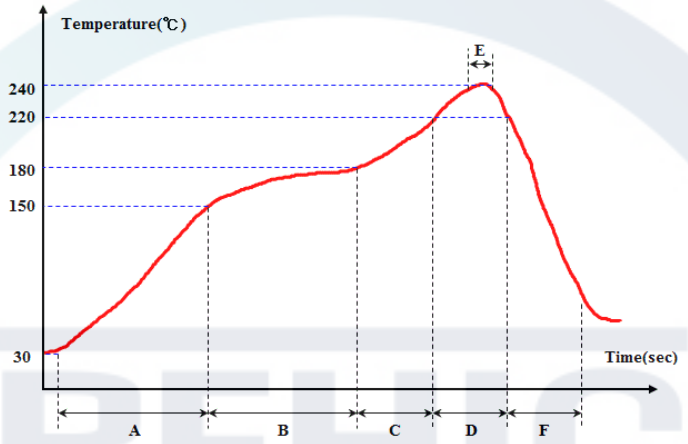
- Sequence Timing Diagram -

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
TG520-10	-R (Reel)
	-B (Bulk)
	-EVB (Evaluation Board)

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
TG520-10	2014.06.26	1.1	▪ A mass of mechanical specification is changed.	-
TG520-10	2013.01.18	1.0	▪ This is formally released. ▪ A Format is changed at Parameters of Specification. ▪ Performance graphs of P3dB are added to 'Chart' part.	-
TG520-10	2013.01.08	0.7	▪ Parameters of Specifications are changed.	Preliminary