Gallium Nitride 28V 15W, General purpose RF Power Transistor

GTAH10015P3

DFN 6*5mm

Description

The GTAH10015P3 is a 15W Psat, 50Ω-input matched discrete GaN on SiC HEMT which operates from 30MHz to 1GHz. The integrated input matching network enables wideband gain and power performance, while the output can be matched on board to optimize power and efficiency for any region within the band.The device is housed in a 6 x 5 mm leadless SMT package that saves real estate of already space-constrained handheld radios.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical Performance of class AB circuit (On Innogration 30-678MHz fixture):

V_{DD} =28V, I_{DQ} =50 mA, CW, **high efficiency tuning**

Freq(MHz)	Pin(dBm)	Psat(dBm)	Psat(W)	Ids(A)	Gain(dB)	Eff(%)
30	27.5	40.1	10.2	0.42	12.6	86
100	26.7	40.1	10.2	0.44	13.2	83
200	26	40.3	10.7	0.48	14.3	79
300	25.8	40.4	11	0.51	14.2	76
400	26.2	40.5	11.2	0.54	14.3	74
500	27.5	40.5	11.2	0.57	13	70
600	27.2	40.5	11.2	0.62	13.3	65
678	27	40.7	11.7	0.67	13.7	62

Applications and Features

- Suitable for wireless communication infrastructure, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

Note: Proper Biasing Sequence for GaN HEMT Transistors

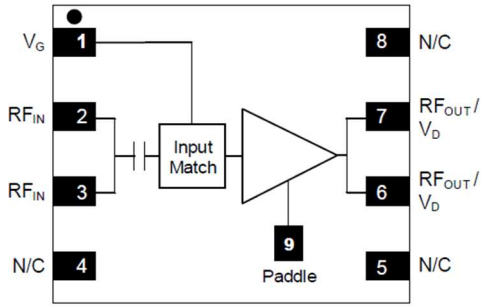
Turning the device ON

1. Set VGS to the pinch—off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage (28V)
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce VGS down to VP, typically –5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

Pin Configuration and Description(Top view)



Pin No.	Symbol	Description
1	VG	Gate Bias
2, 3	RF IN	RF Input
6, 7	RF OUT /VDS	RF Output, Drain Bias
4, 5, 8	NC	No connection
9	GND	DC/RF Ground. Must be soldered to EVB ground plane over array of vias for thermal and RF performance. Solder voids under Pkg Base will result in excessive junction temperatures causing permanent damage.

Table 1. Maximum Ratings (Not simultaneous, TC = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	40	Vdc
Maximum Forward Gate Current	Igmax	4	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+225	°C

1. **Continuous operation at maximum junction temperature will affect MTTF**
2. **Bias Conditions should also satisfy the following expression: Pdiss < (Tj – Tc) / RJC and Tc = Tcase**

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, DC Power Dissipation, FEA (See note 1)	$R_{\theta JC\text{-}DC}$	3.5	C/W

1. **$R_{\theta JC\text{-}DC}$ is tested at only DC condition, it is related to the highest thermal resistor value among all test conditions. It might be differently lower in different RF operation conditions like CW signal ,pulsed RF signal etc.**

Table 3. Electrical Characteristics (T_C = 25℃ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=4mA	V_{DSS}		150		V
Gate Threshold Voltage	V_{DS} = 28V, I_D = 4mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =32V, I_{DS}=50mA, Measured in Functional Test	$V_{GS(Q)}$	——	-2.35	——	V

TYPICAL CHARACTERISTICS

High efficiency tuning

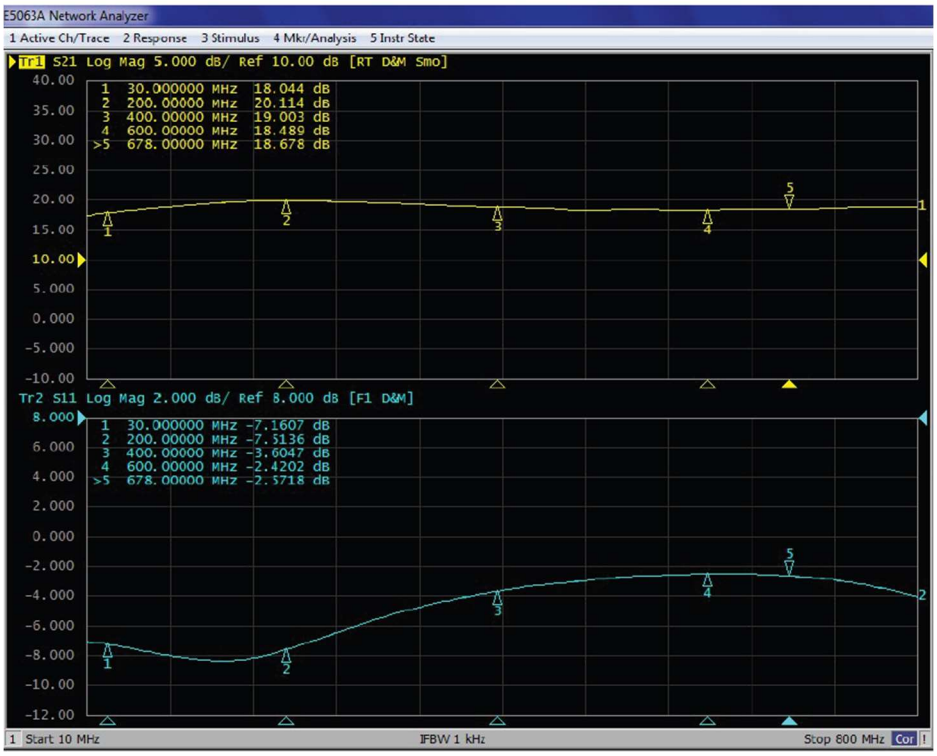


Figure 1. Network analyzer output S11/S21

Reference circuit of test fixture assembly diagram

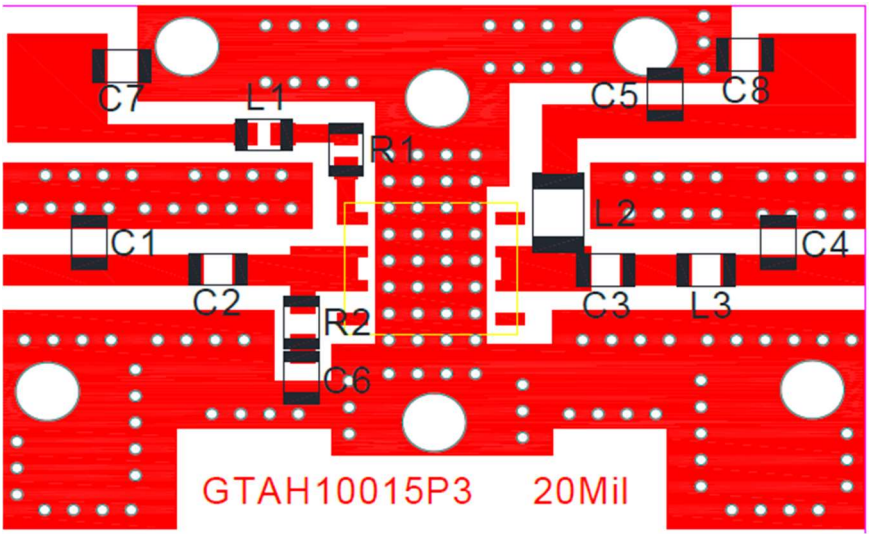


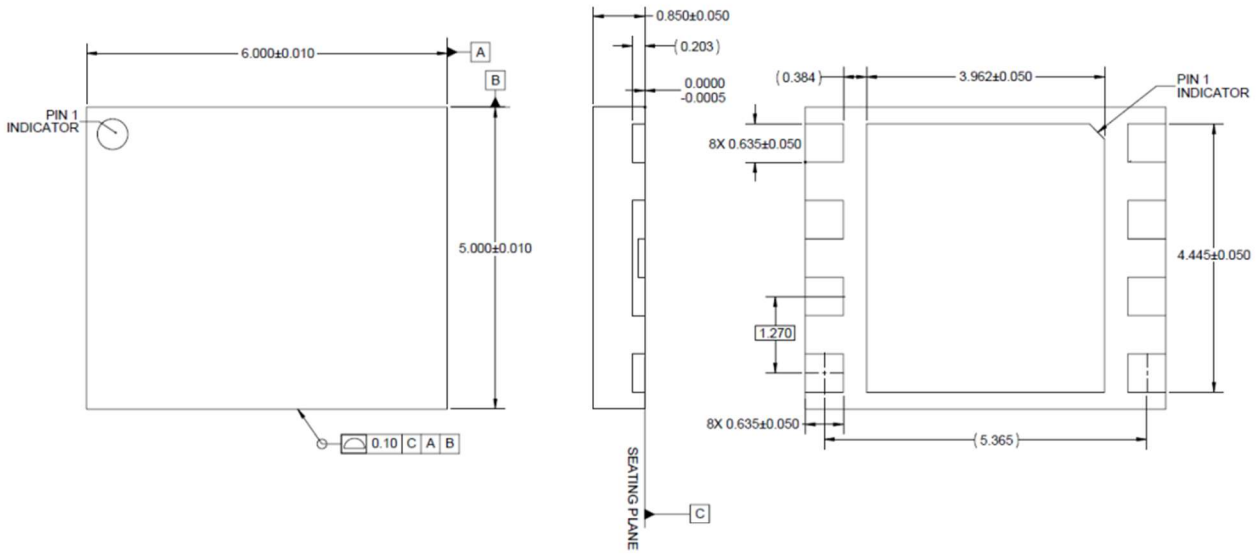
Figure 5. 30-678MHz fixture

Table 4: components designations and values of 30-678Mhz fixture

Component	Description	Suggested Manufacturer
C1	5.6pF	DLC75D
C2,C6	1uF	0603
C3	2200pF	ATC800B
C4	1.2pF	DLC75D
C5	100pF	DLC75D
C7,C8	10uF	10uF/50V
R1	22ohm	0603
R2	30ohm	0603
L1,L3	4.7nH	0805
L2	1.5mH	

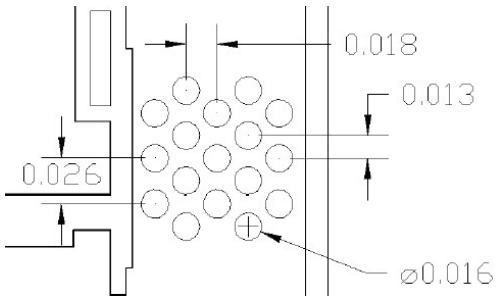
Package Dimensions

6*5 DFN Package



Notes:
1. All dimensions are in mm. Otherwise noted, the tolerance is ±0.1 mm.
2. Package leads are gold plated.
3. Part is mold encapsulated.

Recommended vias layout: (all in inches)



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2021/12/3	**V1.0**	**Preliminary Datasheet Creation based on high eff tuning**

Application data based on ZL-21-30

Notice