GTAH58120F4C GaN TRANSISTOR

Document Number: GTAH58120F4C
Preliminary Datasheet V1.0

Gallium Nitride 28V 120W, C band RF Power Transistor

GTAH58120F4C

Description

The GTAH58120F4C is a 120W internally matched, GaN HEMT, designed from 5.0 to 6.0GHz, especially 5G NR or LTE application, as well as either Pulse or CW application There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical **CW** performance (on 5.1-5.9GHz fixture with device soldered)：

Vds=28V, I_{DQ}=300mA, Tc=25 °C

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
5000	48.71	74.3	50.6	10.49	50.36	108.6	57.4
5100	49.02	79.9	52.1	10.83	50.43	110.5	57.3
5200	49.35	86.1	53.7	11.19	50.58	114.3	57.8
5300	49.56	90.3	52.9	11.38	50.76	119.0	57.3
5400	49.72	93.8	52.8	11.4	50.96	124.7	57.8
5500	49.71	93.5	52.9	11.31	51.07	128.0	58.2
5600	49.84	96.3	53.9	11.1	51.14	130.0	58.4
5700	49.72	93.8	54.6	11.19	51.1	128.9	59.5
5800	49.34	85.9	53.8	11.45	50.85	121.7	59.1
5900	49.31	85.3	53.6	11.73	50.78	119.7	58.6
6000	49.09	81.2	53.0	12.07	50.65	116.0	58.4

Recommended driver：GTAH58018C6

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

Important 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

Figure 1: Pin definitions (Top view)

Because of internal configuration, it must be used as single ended device.

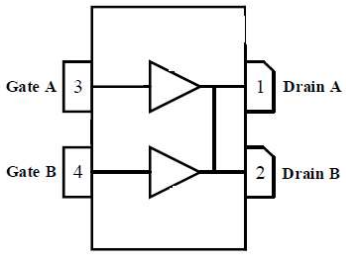


Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	36	Vdc
Maximum Forward Gate Current @ T_C = 25°C	Igmax	28.8	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
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	150	W

Note: 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, RF CW operation	$R_{\theta JC}$	0.85	C/W

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}=28.8mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =28.8mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=300mA, Measured in Functional Test	$V_{GS(Q)}$		-2.5		V

Typical performance

5.1-5.9GHz

Figure 2: Small singal gain and return loss Vs Frequency

Vds=28V, Idq=300mA, input power=0dBm

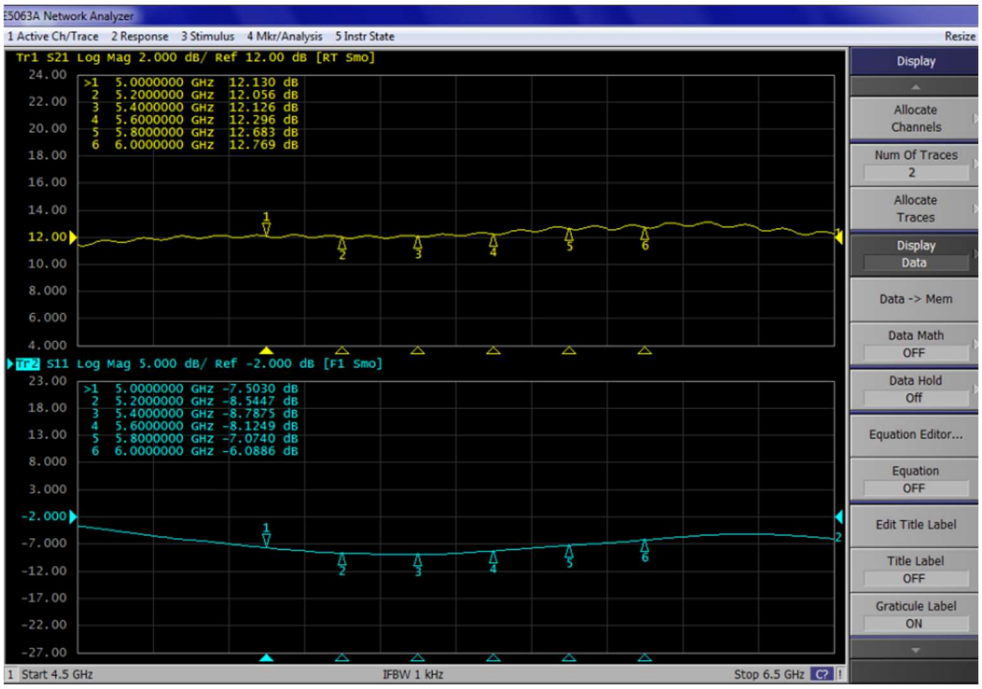
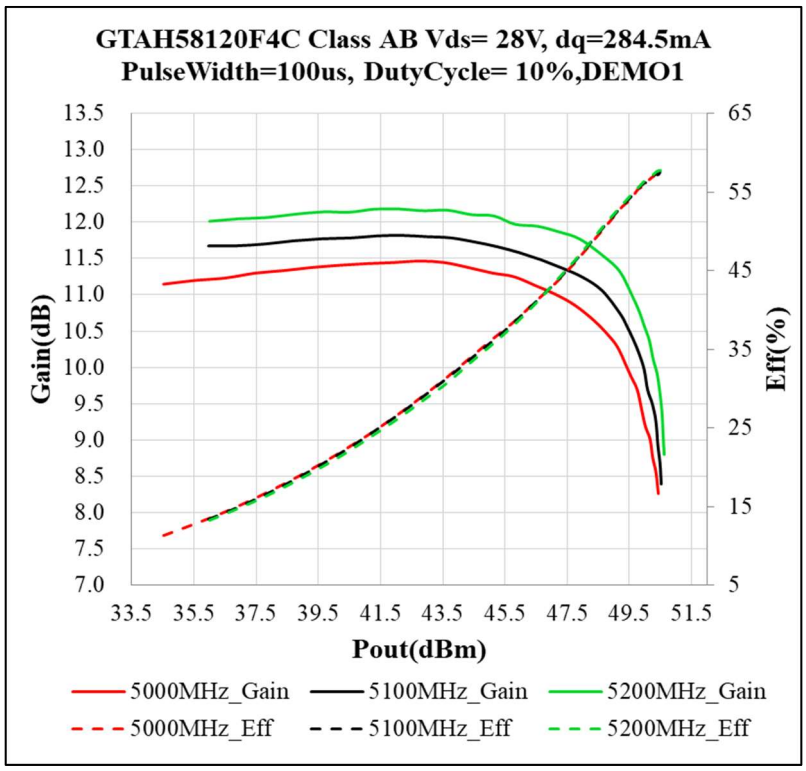
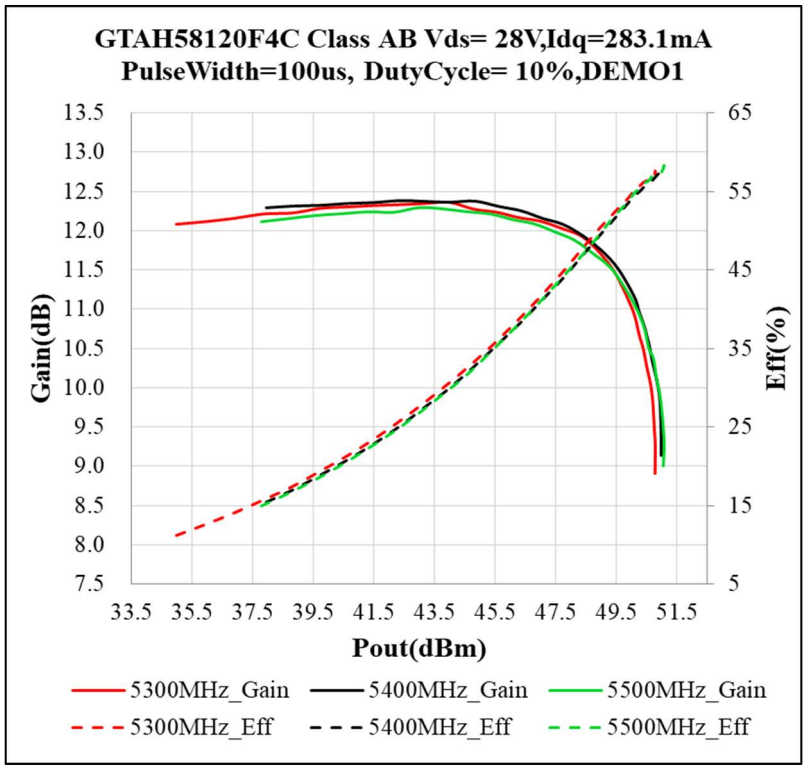
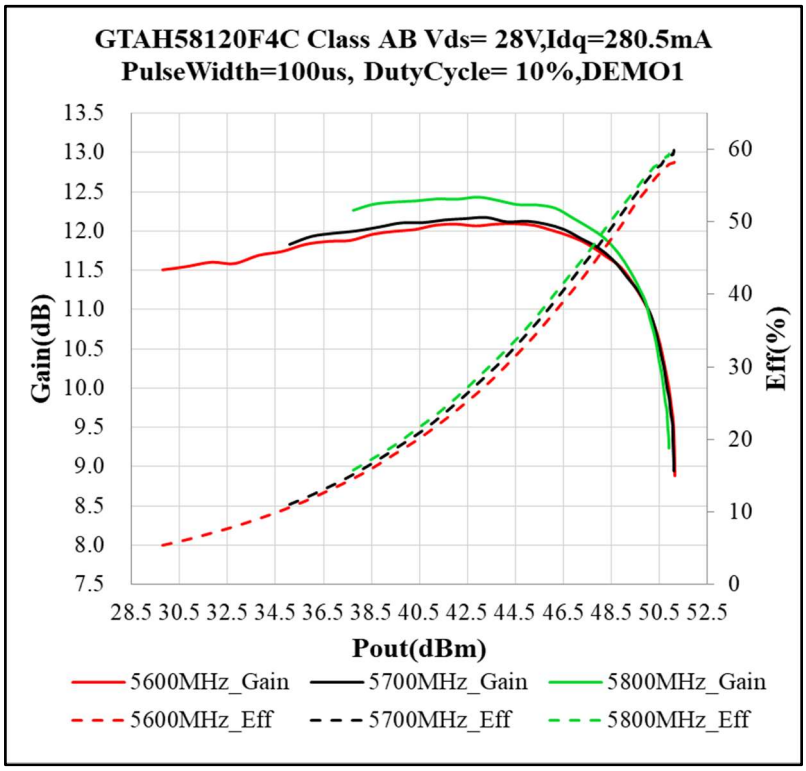


Figure 3:Power gain， Efficiency as function of output power







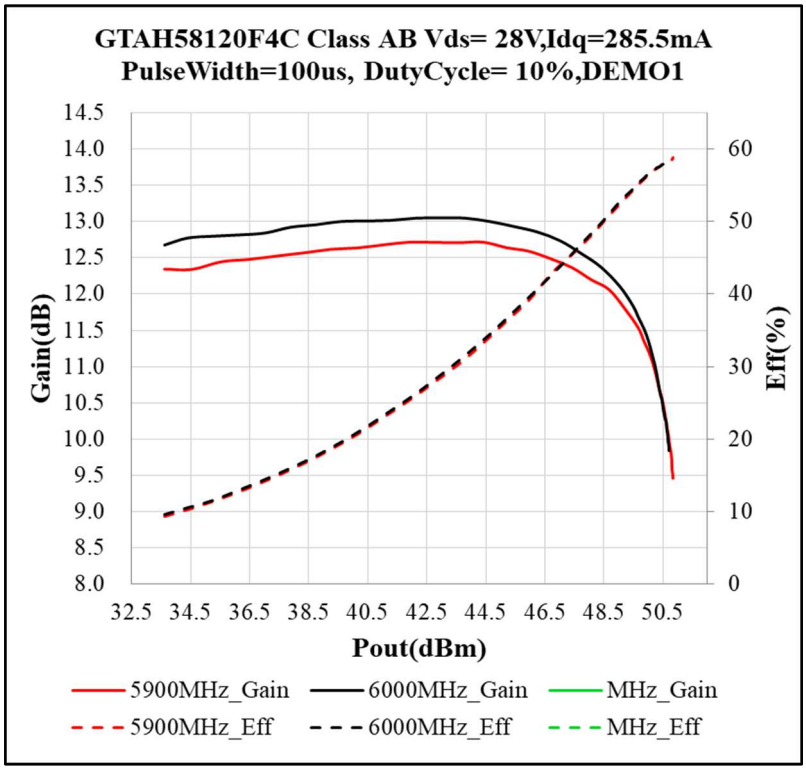
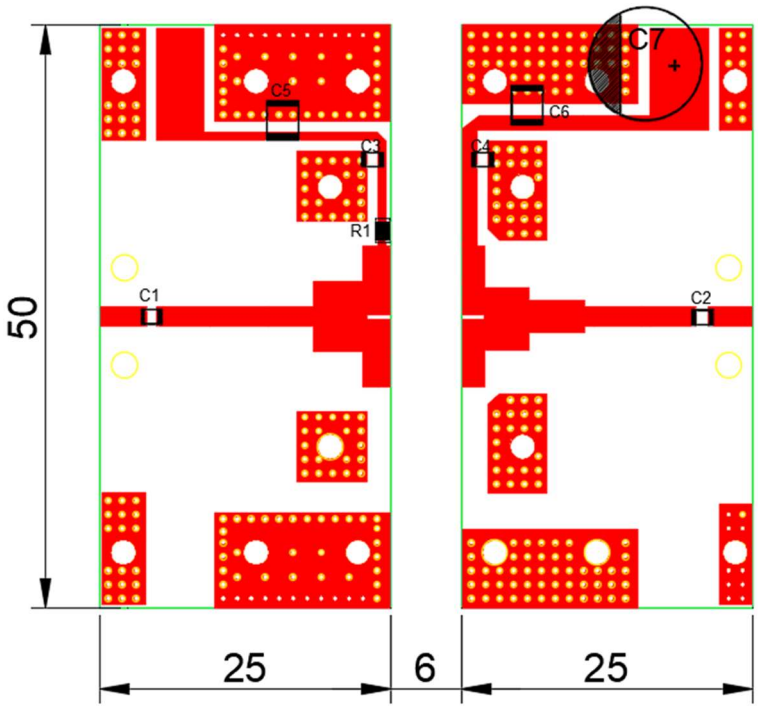


Figure 3: Picture and Bill of materials of 5.1-5.9GHz wide band application circuit

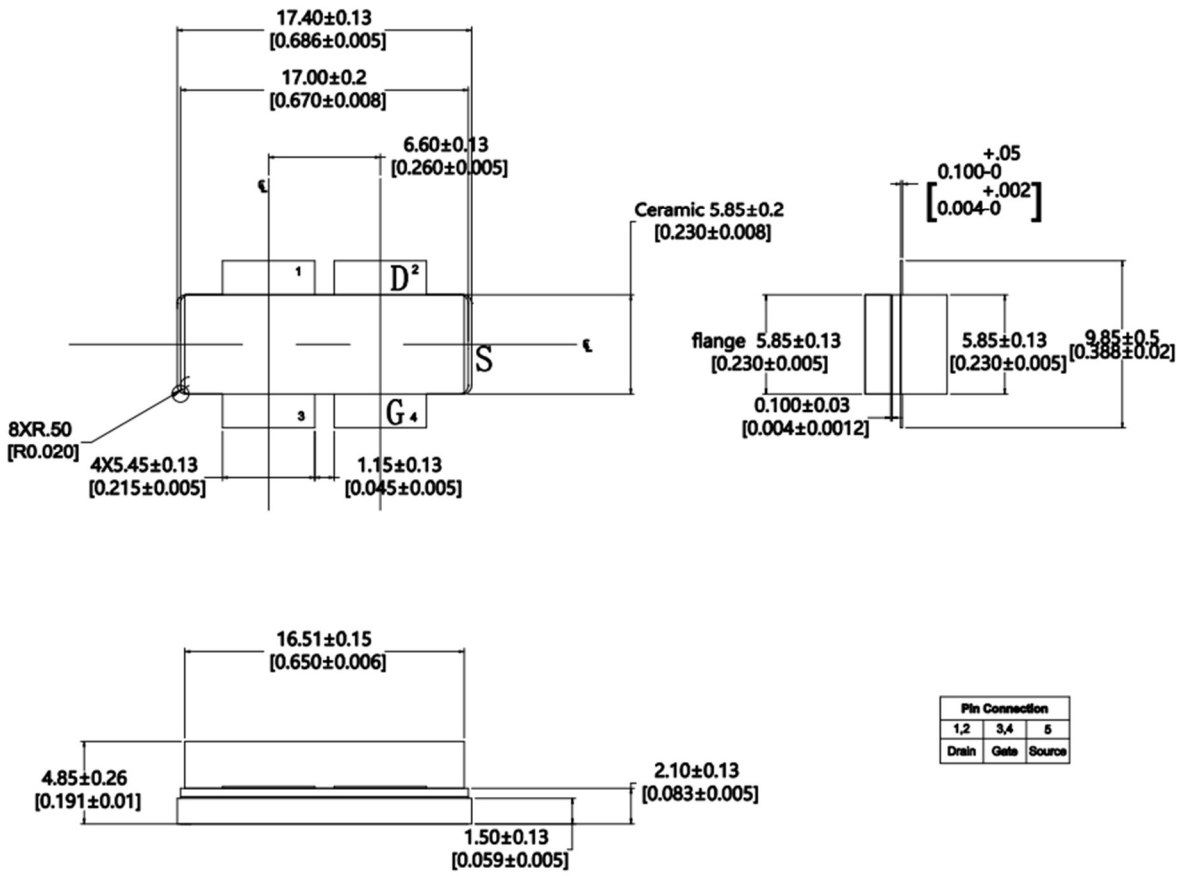
(Layout Gerber file upon request)



Component	Description	Suggestion
C7	470uF/63V	
C5-C6	10uF	1210
C1-C4	3.9pF	MQ300805C0G2E3R9BNDR
R1	Chip Resistor,10Ω	0805
PCB	Rogers 4350B, Er = 3.48, thickness 30 mils, 1oz copper	

Package Outline

Flangeless ceramic package; 4 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-LBS					07/31/2023

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/8/14	V1.0	Preliminary Datasheet Creation from NX5814H

Application data based on YHG-24-13