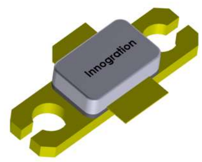
Innogration (Suzhou) Co., Ltd.

Document Number: STAH58051GX
Preliminary Datasheet V1.1

Gallium Nitride 28V 50W, RF Power Transistor

STAH58051GX



Description

The STAH58051GX is a 50W 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 performance (on narrow band fixture with device soldered)

V_{DD}=28V I_{DQ}=10mA, CW

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)
5700	37.77	48	63.10	3.62	10.23	62.25
5800	37.05	47.75	59.57	3.39	10.7	62.75
5900	37.67	47.35	54.33	3.1	9.68	62.59

• Typical performance (on broadband fixture with device soldered)

V_{DD}=28V I_{DQ}=100mA, CW

FREQ (MHZ)	P1dB(dBm)	P1dB(W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB(dBm)	P3dB(W)	P3dB Eff(%)
5100	45.92	39.1	52.5	11.56	47.6	57.5	59.8
5200	45.95	39.4	51.6	11.4	47.56	57.1	58.4
5300	46	39.9	52.9	11.68	47.7	58.9	60.4
5400	46.08	40.6	53.0	11.82	47.8	60.2	60.8
5500	46.05	40.3	51.5	11.83	47.77	59.9	59.0
5600	46.11	40.8	51.9	12.06	47.92	62.0	59.8
5700	46.06	40.3	50.6	12.04	47.97	62.7	58.8
5800	45.96	39.4	49.6	11.84	47.9	61.6	57.8
5900	45.7	37.2	50.6	11.72	47.7	58.9	59.3

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

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 @ Tc = 25°C	Igmax	12.5	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	75	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	RθJC	1.8	C/W

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

DC Characteristics

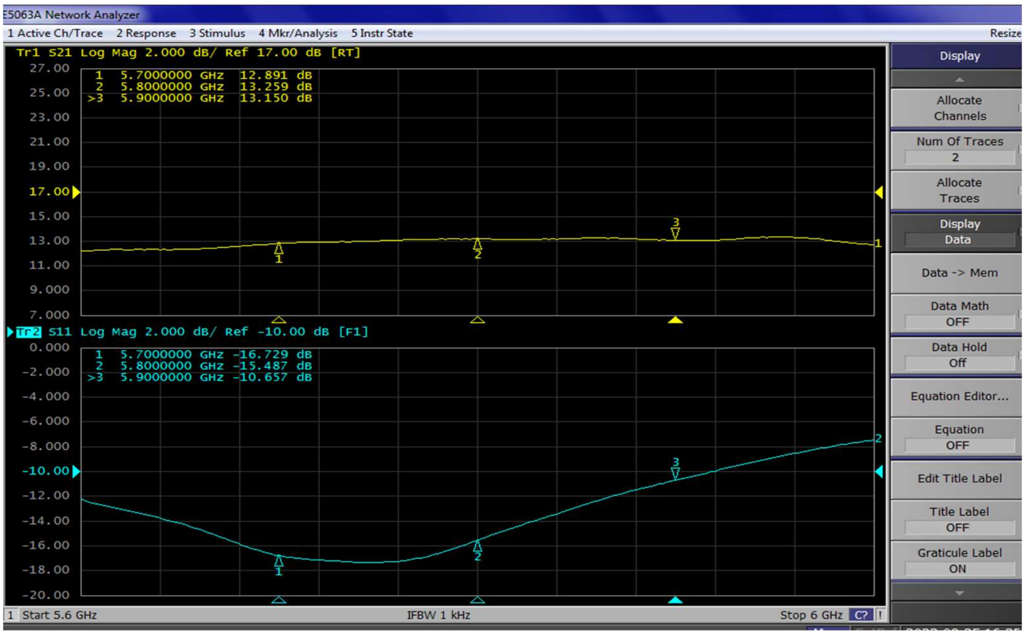
Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=12.6mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =12.6mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		-3.16		V

Typical performance

5.7-5.9GHz

Figure 2: Small singal gain and return loss Vs Frequency

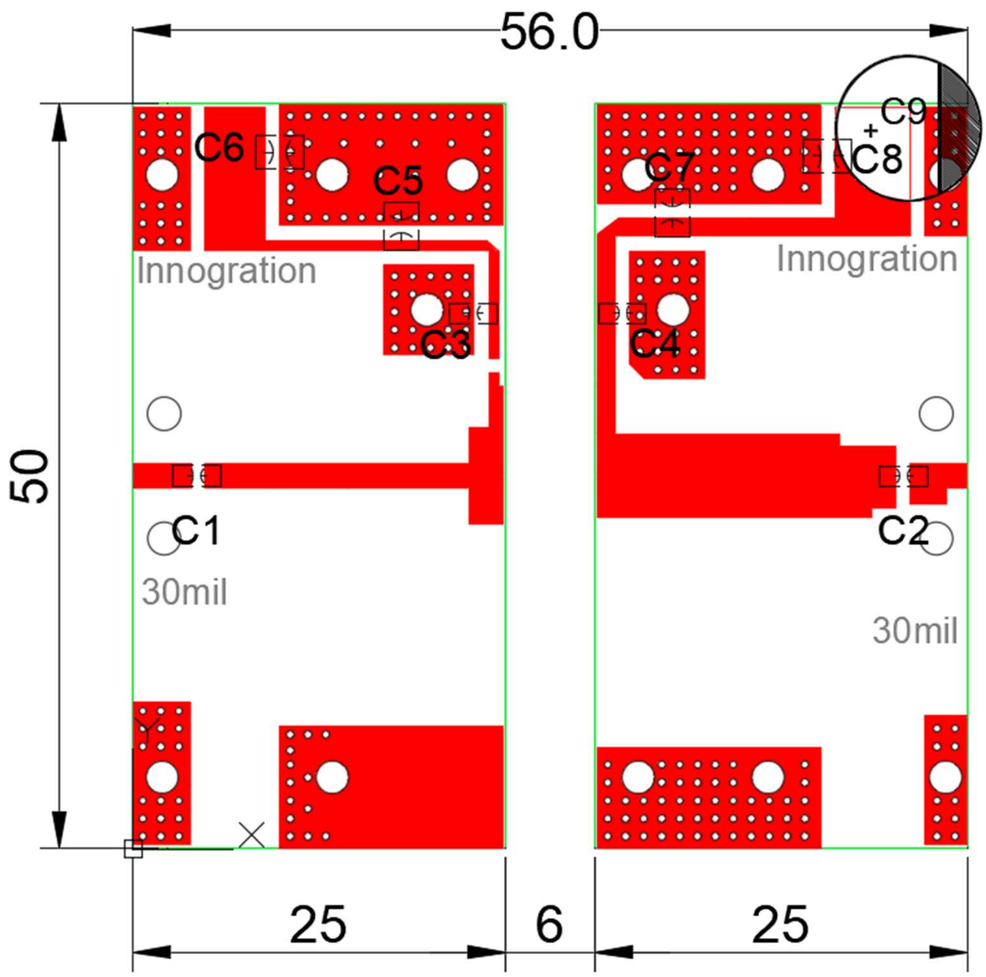
Vds=28V, Idq=100mA, input power=0dBm



Subject to change without notice

Figure 3: Picture and Bill of materials of 5.7-5.9GHz wide band application circuit

(Layout Gerber file upon request)



Component	Description	Suggestion
C9	470uF/63V	
C5-C8	10uF	1210
C1-C4	3pF	MQ300805C0G2E3R0BNDR
R1	Chip Resistor,10Ω	0805
PCB	Rogers 4350B, Er = 3.48, thickness 30 mils, 1oz copper	

5.1-5.9GHz

Figure 4: Small singal gain and return loss Vs Frequency

Vds=28V, Idq=100mA, input power=0dBm

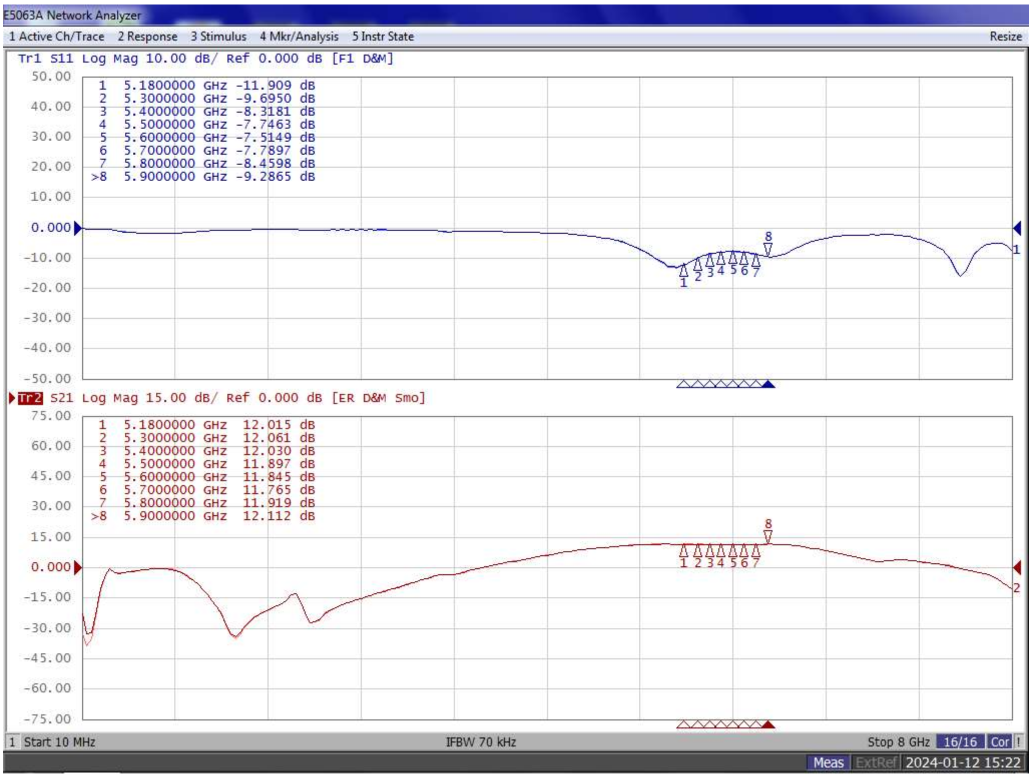


Figure 5: Efficiency and power gain as function of Pout

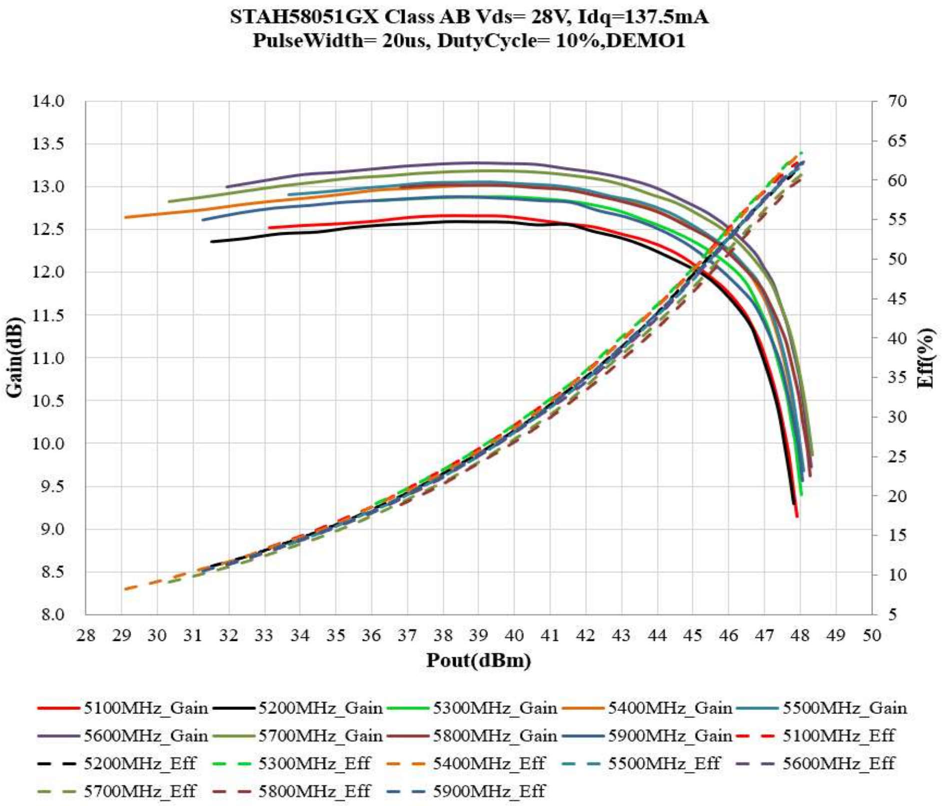
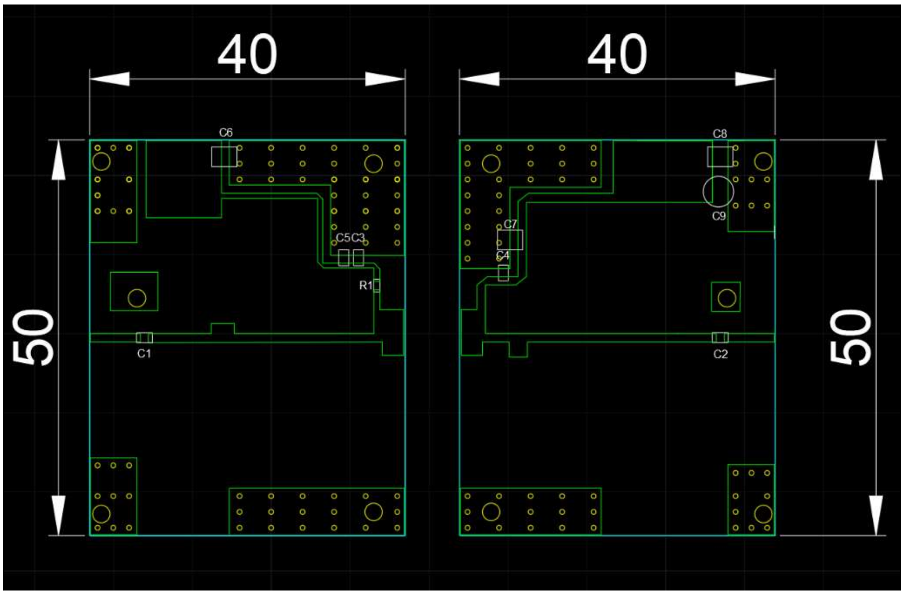


Figure 6: Picture and Bill of materials of 5.1-5.9GHz wide band application circuit

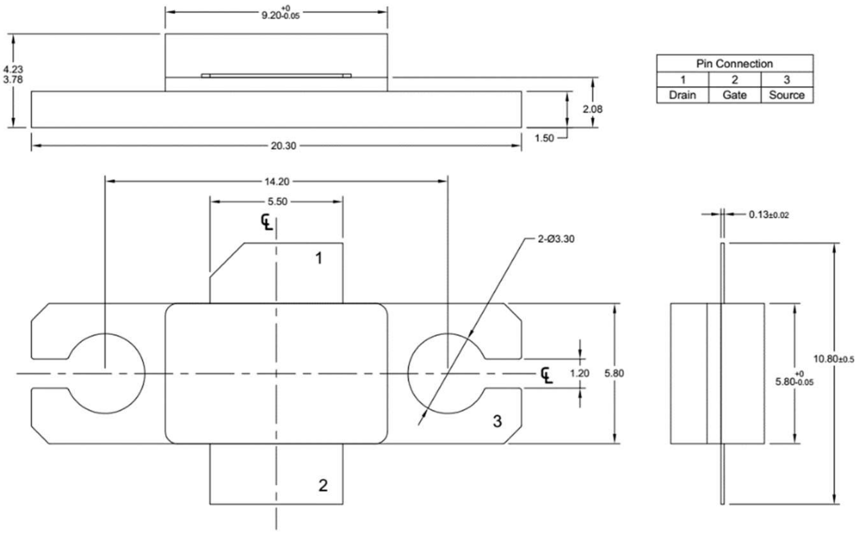
(Layout Gerber file upon request，20mils RO4350B)



Component	Value	Quantity
U1	STAH58051GX	1
C1、C2、C3、C4	3.9pF	4
C6、C7、C8	10uF/63V	3
C5	10uF/16V	1
R1	10Ω	1
C9	470uF/63V	1

Package Outline

Flanged ceramic package; 2 leads



Unit：mm
Tolerances(unless specified)：x.x ±0.1
x.xx ±0.05

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-GXB					**10/10/2017**

Figure 1. Package Outline PKG-G2E

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2023/9/25	V1.0	Preliminary Datasheet Creation
2024/1/14	V1.1	Add 5.1-5.9GHz data

Application data based on YHG-23-25/ZYX-24-01

Notice

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