GaN 28V 100W,S band RF Power Transistor

XTAH31121A2C

Description

The XTAH31121A2C is a 100W internally matched, GaN HEMT, designed from 2.6 to 3.2GHz, 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}=32V I_{DQ}=100mA, CW，2.6-3.0GHz fixture 1

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
2600	50.4	109.6	53.8	13.81	51.88	154.1	63.2
2700	50.49	112.0	56.7	14.52	51.88	154.2	65.7
2800	50.17	104.0	56.2	15.38	51.77	150.2	66.2
2900	49.7	93.4	53.0	15.18	51.66	146.5	64.2
3000	49.33	85.7	48.8	13.99	51.57	143.5	61.5

V_{DD}=32V I_{DQ}=100mA, CW，3-3.2GHz fixture 2

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
3000	50.3	107.1	58.4	15.66	51.5	141.1	65.9
3100	49.78	95.0	56.8	16.05	51.28	134.2	65.6
3200	49.16	82.4	52.6	15.65	51.24	131.1	63.5

Recommended driver: GTAH35012PD or ITEH38012C6

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	27.2	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

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	1.7	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}=27.2mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D =27.2mA	V_{GS}(th)	-4		-2	V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=120mA, Measured in Functional Test	$V_{GS(Q)}$		-2.4		V

Typical performance

2.6-3.0GHz

Figure 2: Small singal gain and return loss Vs Frequency

Vds=32V, Idq=200mA, input power=0dBm

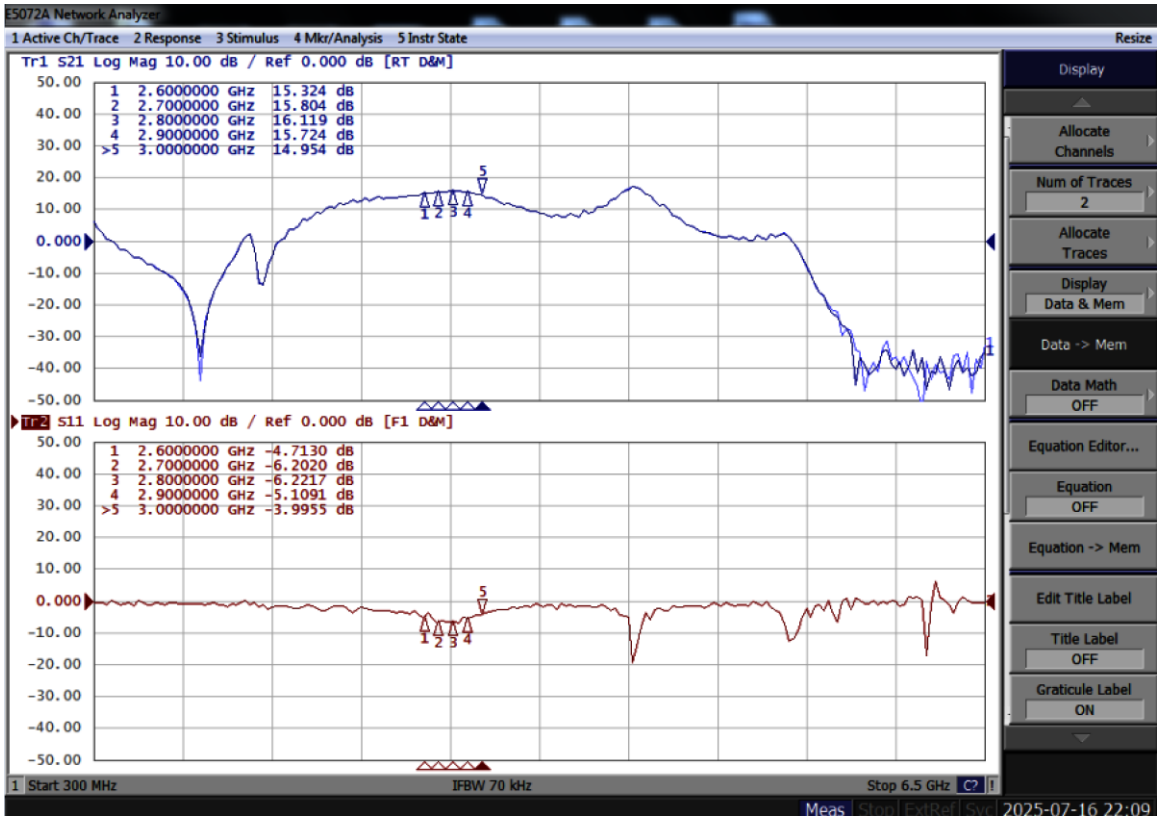


Figure 3: Efficiency and power gain as function of Pout

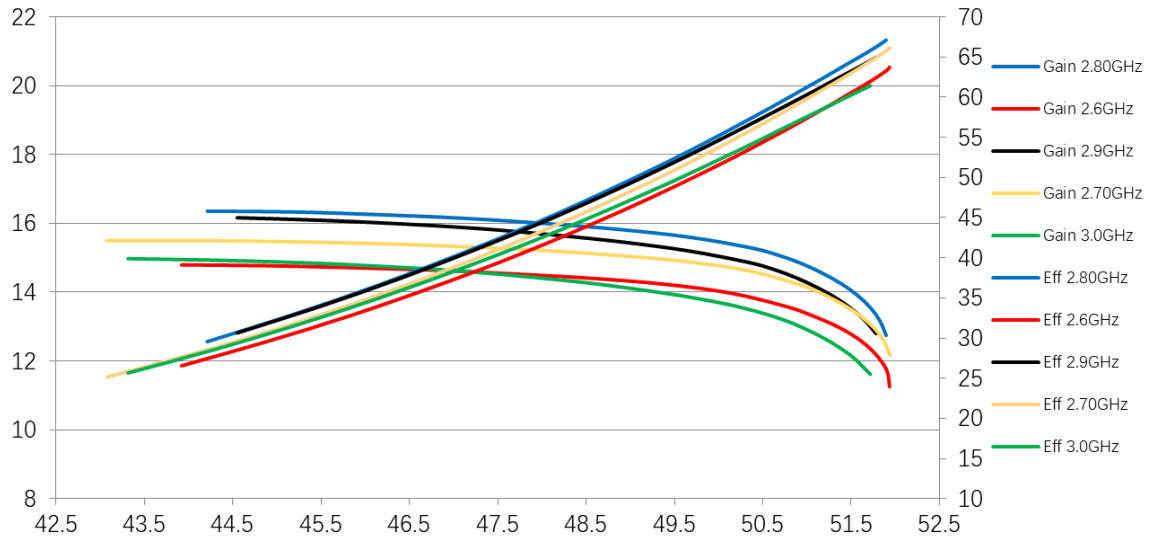
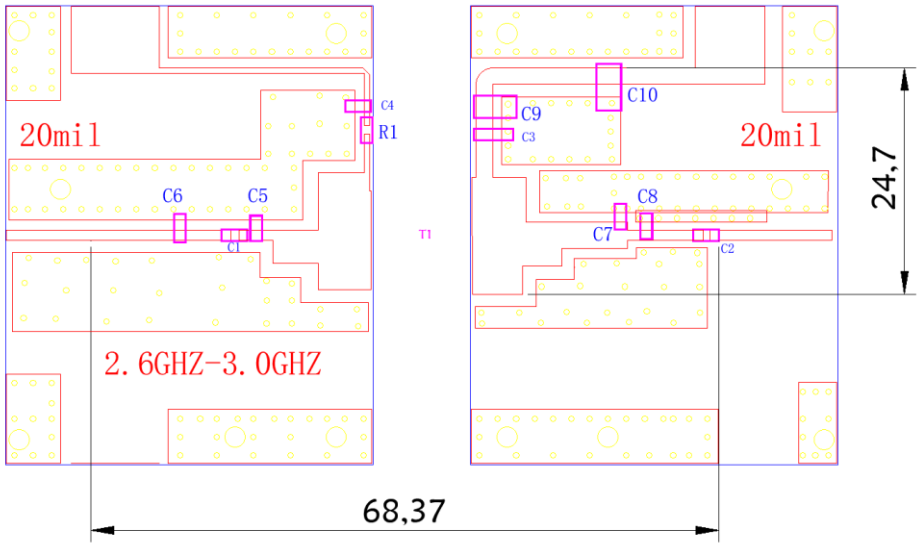


Figure 4: Picture and Bill of materials of application circuit

(Layout Gerber file upon request，20mils RO4350B)



Part	Quantity	Description	Part Number	Manufacture
C1,C2,C3,C4	4	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C5	1	0.4pFHigh Q Capacitor	251SHS0R4BSE	TEMEX
C6	1	0.9pFHigh Q Capacitor	251SHS0R9BSE	TEMEX
C7	1	0.2pFHigh Q Capacitor	251SHS0R2BSE	TEMEX
C8	1	0.3pFHigh Q Capacitor	251SHS0R3BSE	TEMEX

C9,C10	2	10uF MLCC	GRM32EC72A106ME05	Murata
R1	1	10Ω Power Resistor	ESR03EZPF100	ROHM
T1	1	120W GaN Transistor	XTAH31121A2C	Innogration

3.0-3.2GHz

Figure 5: Small singal gain and return loss Vs Frequency

Vds=32V, Idq=200mA, input power=0dBm

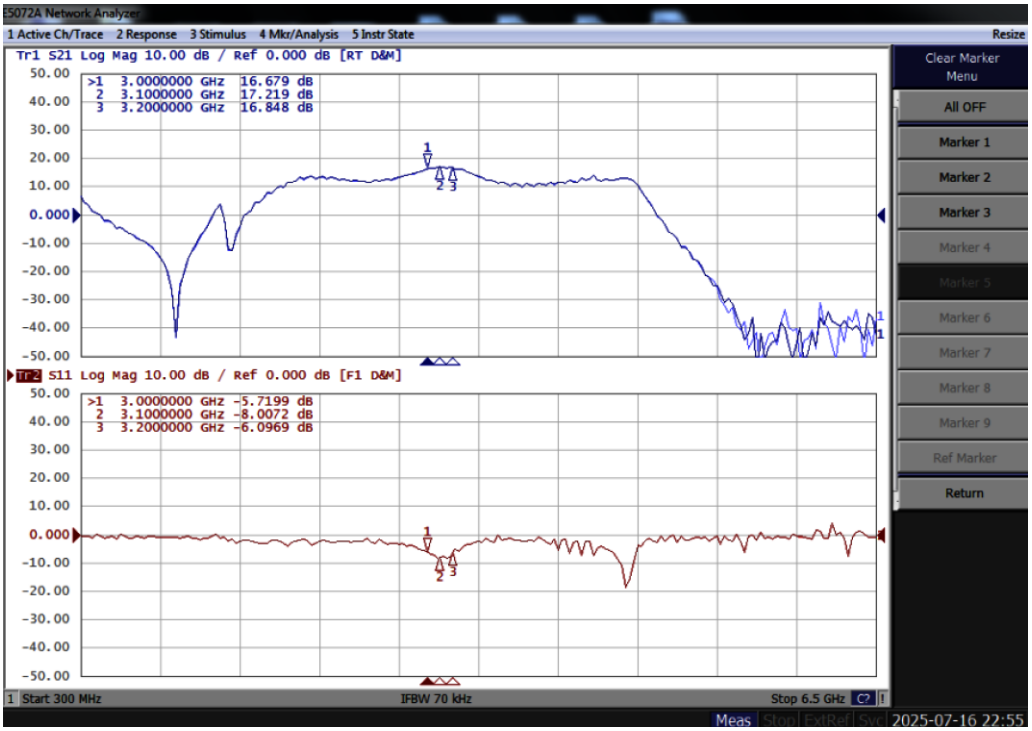


Figure 6: Efficiency and power gain as function of Pout

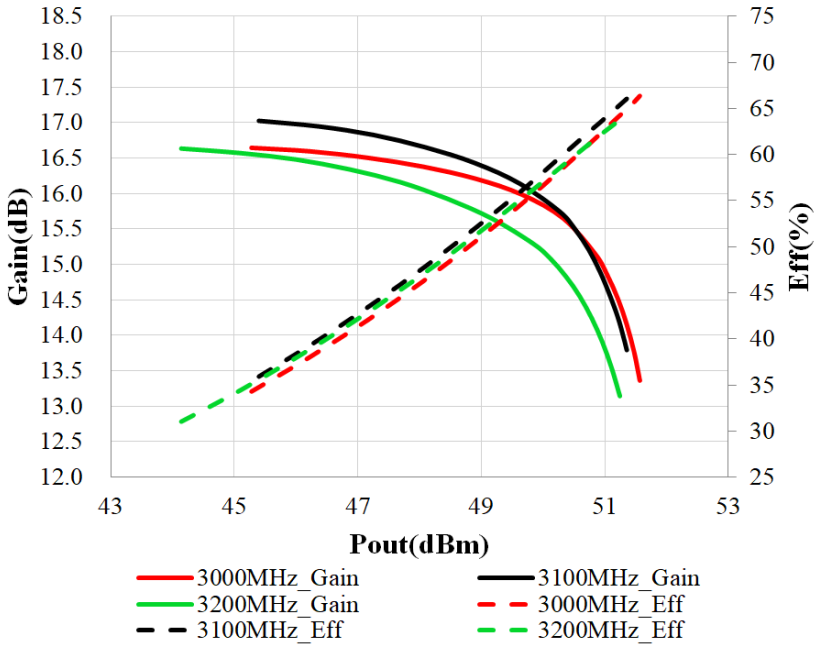
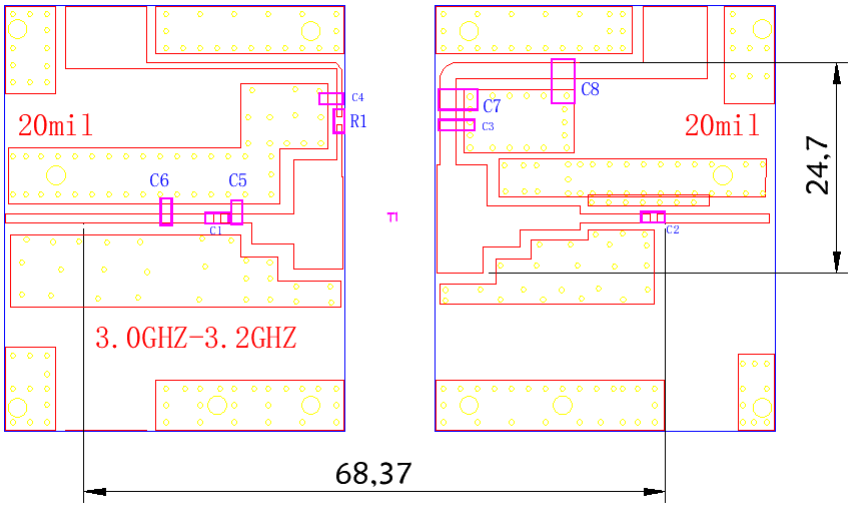


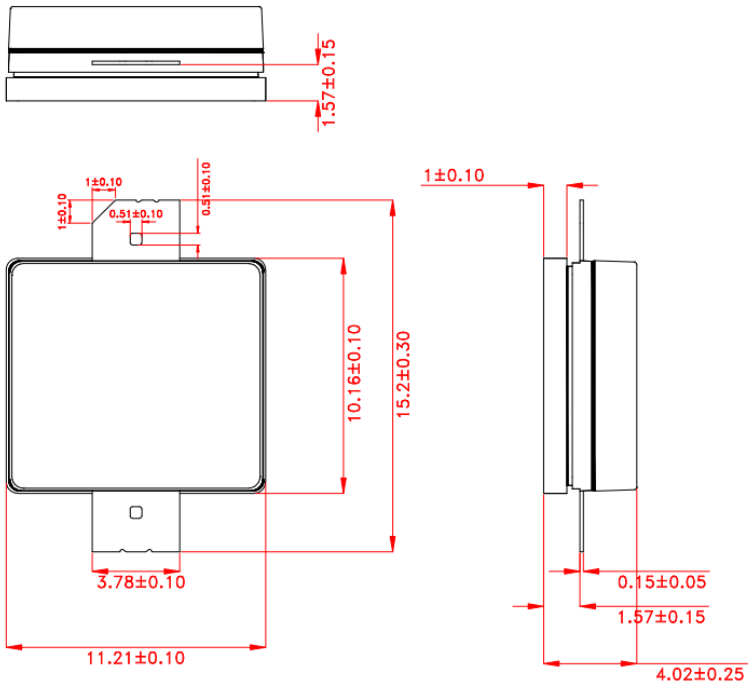
Figure 7: Picture and Bill of materials of application circuit

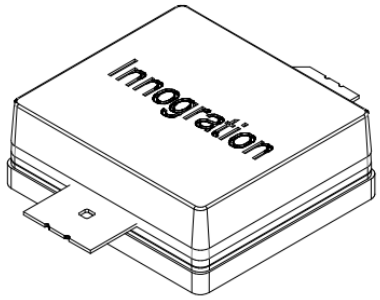
(Layout Gerber file upon request，20mils RO4350B)



Part	Quantity	Description	Part Number	Manufacture
C1,C2,C3,C4	4	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C5,C6	2	1.1pFHigh Q Capacitor	251SHS1R1BSE	TEMEX
C7,C8	2	10uF MLCC	GRM32EC72A106ME 05	Murata
R1	1	10Ω Power Resistor	ESR03EZPF100	ROHM
T1	1	120W GaN Transistor	XTAH31121A2C	Innogration

Package Dimensions （Unit:mm）





Unit:mm

Tolerance ±0.10mm,Except as Noted.

Revision history

Table 5. Document revision history

Date	Revision	Datasheet Status
2025/7/18	V1.0	Preliminary Datasheet Creation

Application data based on LWH-25-31/32

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