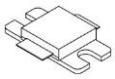
Gallium Nitride 28V 120W, RF Power Transistor

GTAH27120A2

GTAH27120A2E



Description

The GTAH27120A2 is a 120W internally matched, GaN HEMT, designed for multiple application especially MC-GSM/WCDMA/LTE, from 700 to 2700MHz

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

- Typical performance (on wide band 1.8-2.7GHz fixture with device soldered)

V_{DD}=28V I_{DQ}=1200mA, Test signal: WCDMA, 3GPP test model 1; 1 to 64 DPCH; Channel Bandwidth=3.84MHz,PAR =10.5 dB at 0.01 % probability on CCDF.

Frequency (MHz)	$P_{L(AV)}$ (W)	Gp (dB)	η_D (%)	$ACPR_{5M}$ (dBc)
1800	10	16.9	22.0	-42.4
1900	10	17. 7	21.6	-41.5
2000	10	18.8	22.9	-41.2
2100	10	18.8	21.5	-41.3
2200	10	18.3	22.0	-40.6
2300	10	18.0	21.3	-41.7
2400	10	17.8	20.1	-43.2
2500	10	18.3	20.3	-41.2
2600	10	18.3	21.1	-40.4
2700	10	17.4	23.5	-40.1

- Typical performance (on wide band 1.3-1.9GHz fixture with device soldered)

GTAH27120A2 V_{DD}=28V V_{gs}=-2.45V I_{dq}=200mA CW							Harmonic	
F (MHz)	Pin (dBm)	Psat (dBm)	Psat (W)	I (A)	Gain (dB)	Eff(%)	2nd	3th
1300	36.5	51.11	129.1	7.48	14.61	61.7	-43	-39
1400	36.5	51.25	133.4	6.98	14.75	68.2	-42	-40
1500	36.5	50.6	114.8	6.53	14.1	62.8	-34	-43
1600	36.5	50.6	114.8	6.31	14.1	65.0	-34	-35
1700	36.5	50.6	114.8	6.62	14.1	61.9	-29	-29
1800	36.5	50.5	112.2	6.4	14	62.6	-51	-29
1900	36.5	51.2	131.8	6.45	14.7	73.0	-36	-46
1950	36.5	50.8	120.2	5.9	14.3	72.8	-34	-51

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}	40	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 not2 1)	T_J	+200	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	125	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	1.44	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)		-2.7		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=1200mA, Measured in Functional Test	$V_{GS(Q)}$		-2.31		V

Functional Tests (In 2.3-2.7GHz Production fixture, 50 ohm system) :V_{DD} = 28 Vdc, I_{DQ} = 1200 mA, f = 2500 MHz, WCDMA signal,

Pout=24W

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain	Gp		17		dB
Drain Efficiency @ P_{out}	Eff		37		%
Saturated Power by CCDF test	P_{SAT}	120			W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

1.3-1.9GHz

Typical performance

Figure 1: Small singal gain and return loss Vs Frequency
Vgs=-2.45V, Vds=28V, Idq=300mA, input power=0dBm

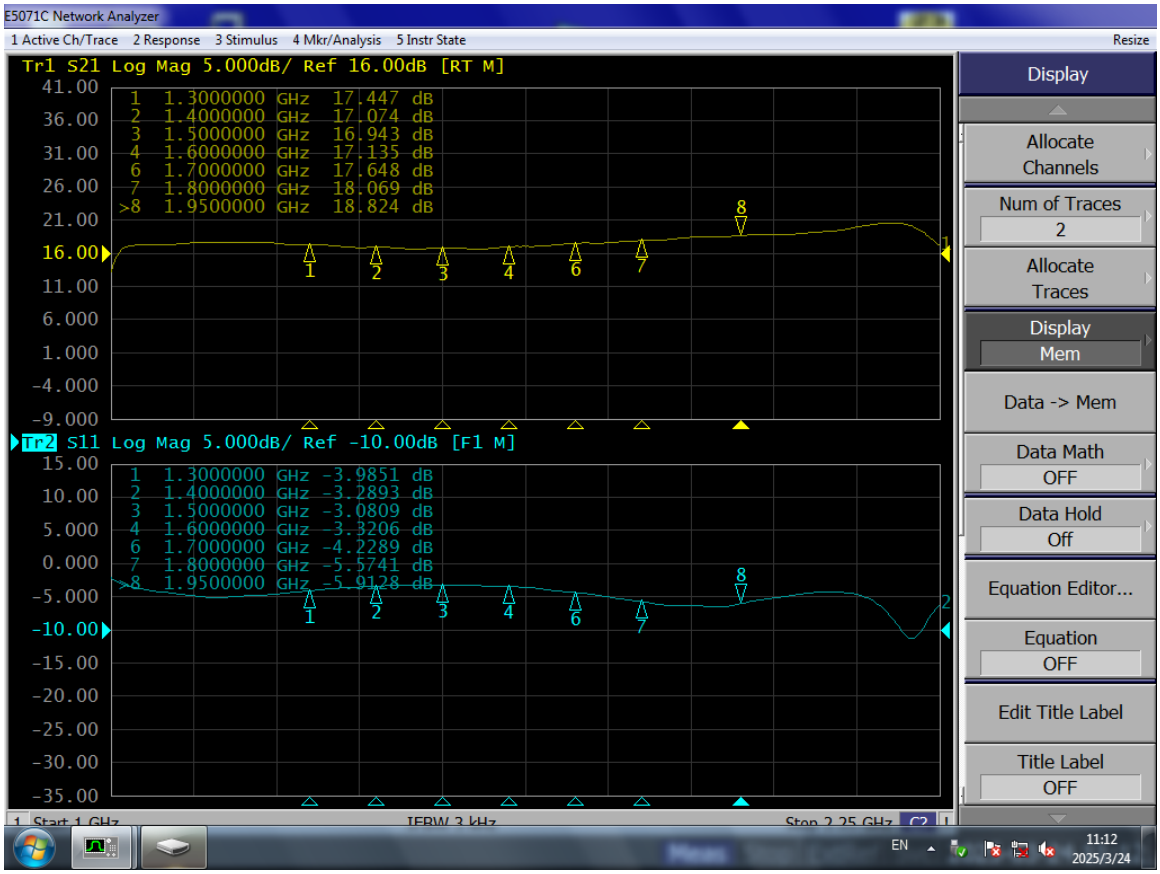
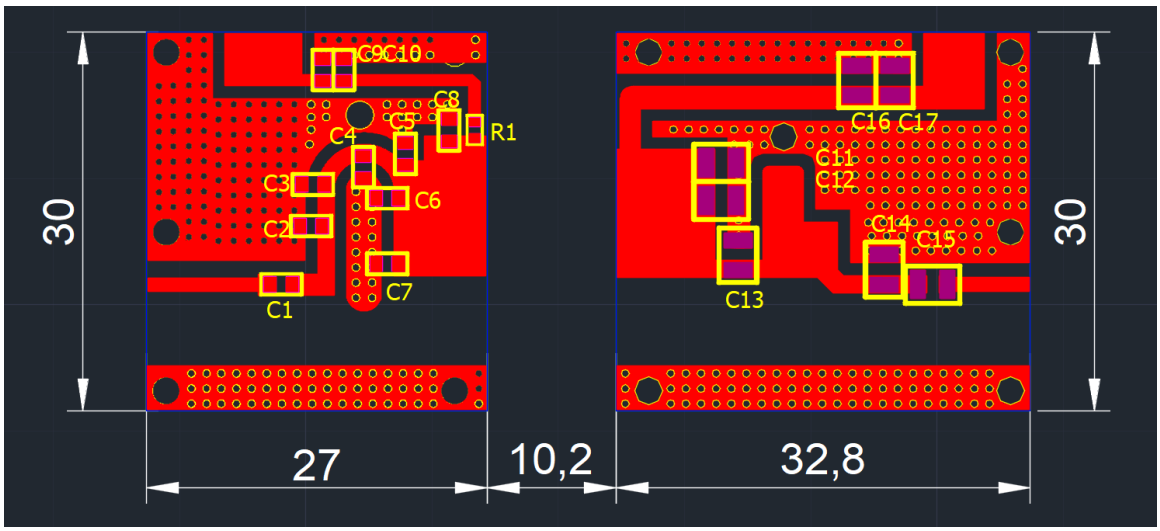


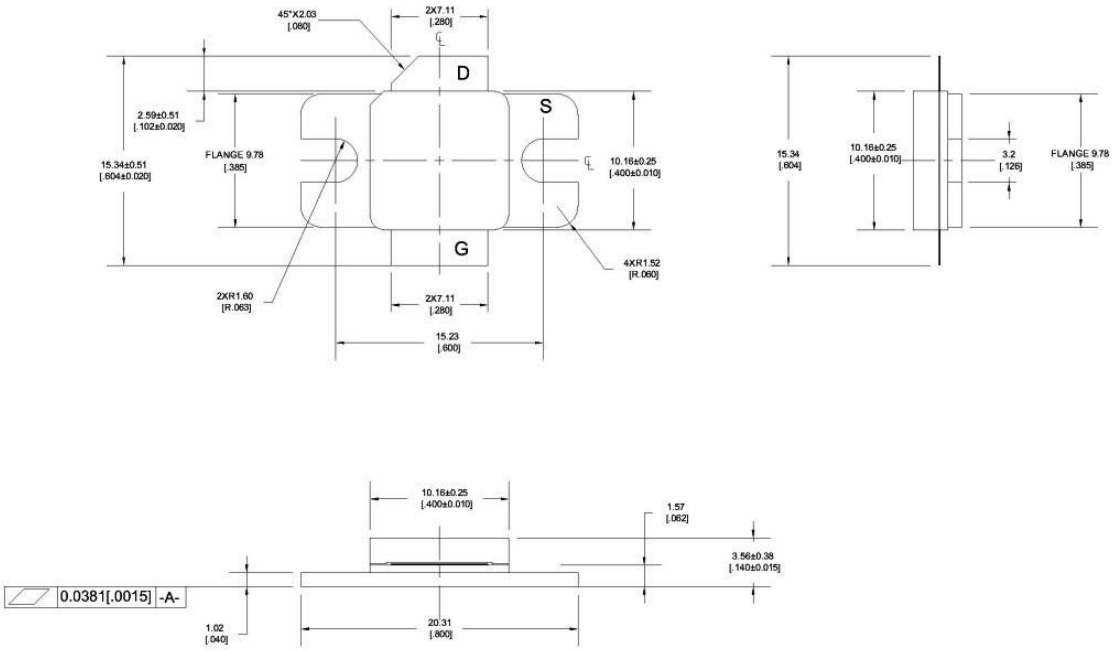
Figure 2: Picture and Bill of materials of 1.3-1.9GHz wide band application circuit (Layout Gerber file upon request)



Component	Description	Suggestion
C9,C17	10uF	Ceramic Multilayer Capacitor
C1,C10	330p F/ MQ400805	
C2	1.2pF/ MQ400805	
C3~C7	1.2pF/ MQ400805	
C8	3.3pF/ MQ400805	
C11	3.6pF/ MQ301111	
C12	1.8pF/ MQ301111	
C13	2.0pF/ MQ301111	
C14	0.5pF/ MQ301111	
C15	22pF/ MQ300709	
C16	22pF/ MQ301111	
PCB	20Mil Rogers4350	

Package Outline

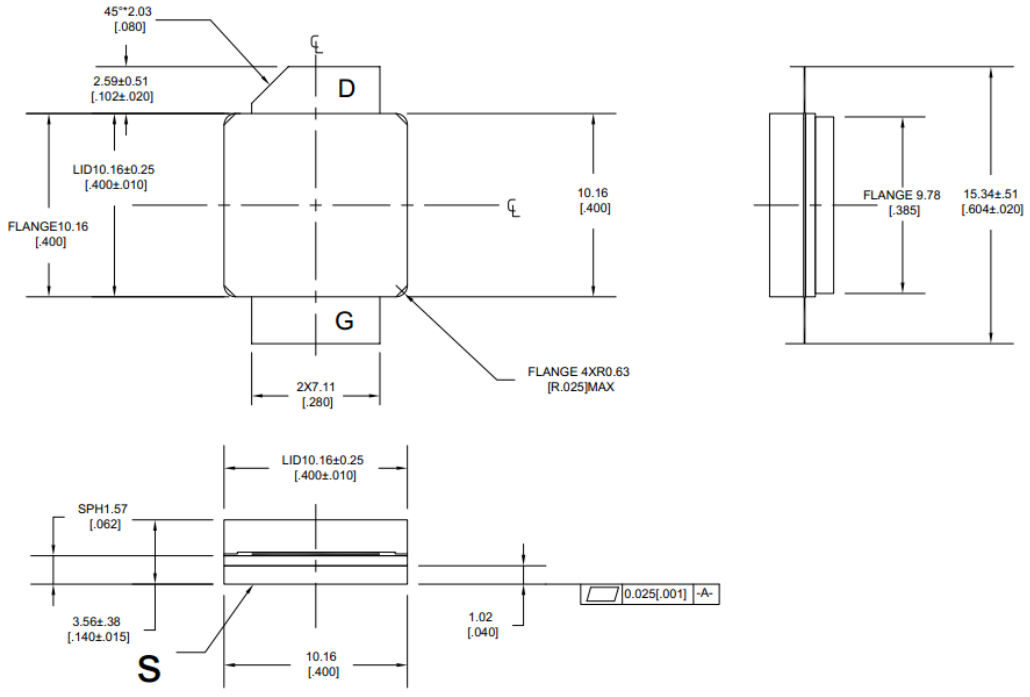
Eared Flanged ceramic package; 2 leads (A2E)



Unit：mm [inch]

Tolerance .xx +/- 0.01 .xxx +/- 0.005 inches

Earless Flanged ceramic package; 2 leads (A2)



Unit：mm [inch]

Tolerance .xx +/- 0.01 .xxx +/- 0.005 inches

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2017/5/27	V1.0	Preliminary Datasheet Creation
2017/6/20	V1.1	Maximum rating modified, function test condition modified
2017/7/27	V1.2	Maximum rating modified, function test data modified
2020/6/19	V1.3	Update on lower frequency limits
2025/3/24	V1.4	Add 1.3-1.95GHz as carrier application

Application data based on SYX-25-13

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