

# STAH42100F4 GaN TRANSISTOR

Document Number: STAH42100F4  
Preliminary Datasheet V1.0

## GaN HEMT 28V 100W, RF Power Transistor

### Description

The STAH42100F4 is a 100W internally matched, GaN HEMT, designed from HF to 4.2GHz, especially 5G NR or LTE application, as well as either Pulse or CW application. In typical broadband application, it can deliver >60W within 0.5-4GHz at 28V, while >70W at 32V.

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

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

- Typical **CW** performance (on 0.5-4GHz wideband fixture with device soldered):

$V_{DD}=28V$   $I_{DQ}=300mA$ , cycle.  $T_C=25^\circ C$

Freq(MHz)	Pin(dBm)	Pout(dBm)	Pout(W)	IDS(A)	Gain(dB)	Eff(%)	2th	3rd
400	38.57	48.13	65.01	5.47	9.56	42.45	-6.40	-10.6
500	36.5	49.28	84.72	6.07	12.78	49.85	-9.60	-11.6
1000	39.75	49.75	94.41	5.3	10.00	63.62	-15.70	-14.1
1100	39.63	50.43	110.41	6.68	10.80	59.03	-18.90	-14.8
1500	39.5	48.15	65.31	3.44	8.65	67.81	-23.00	-20.0
2000	39.45	49.09	81.10	4.86	9.64	59.59		
2500	40.3	48.4	69.18	6.28	8.10	39.34		
3000	39.44	48.82	76.21	5.82	9.38	46.76		
3500	40.57	48.61	72.61	5.59	8.04	46.39		
4000	38.57	48.51	70.96	5.75	9.94	44.07		

### 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 @ $T_C = 25^\circ C$	$I_{gmax}$	25.2	mA
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ C$



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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)	$P_{diss}$	140	W

Note: 1. Continuous operation at maximum junction temperature will affect MTTF  
2. Bias Conditions should also satisfy the following expression:  $P_{diss} < (T_j - T_c) / R_{\theta JC}$  and  $T_c = T_{case}$

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_c = 85^\circ\text{C}$ , $T_j = 200^\circ\text{C}$ , RF CW operation	$R_{\theta JC}$	0.95	C/W

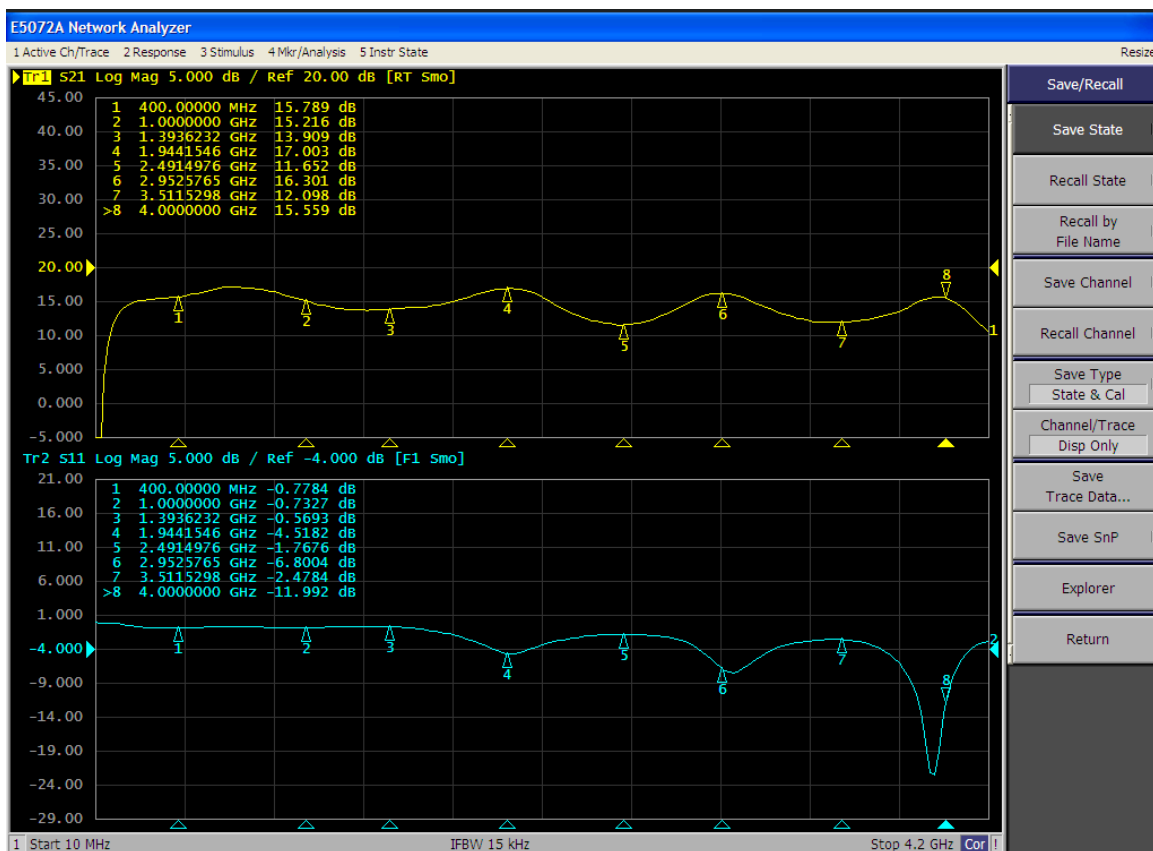
**Table 3. Electrical Characteristics** ( $T_c = 25^\circ\text{C}$  unless otherwise noted)

**DC Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$ ; $I_{DS} = 25.2\text{mA}$	$V_{DSS}$	150			V
Gate Threshold Voltage	$V_{DS} = 28\text{V}$ , $I_D = 25.2\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$ , $I_{DS} = 350\text{mA}$ , Measured in Functional Test	$V_{GS(Q)}$		-3		V

## 0.5-4GHz

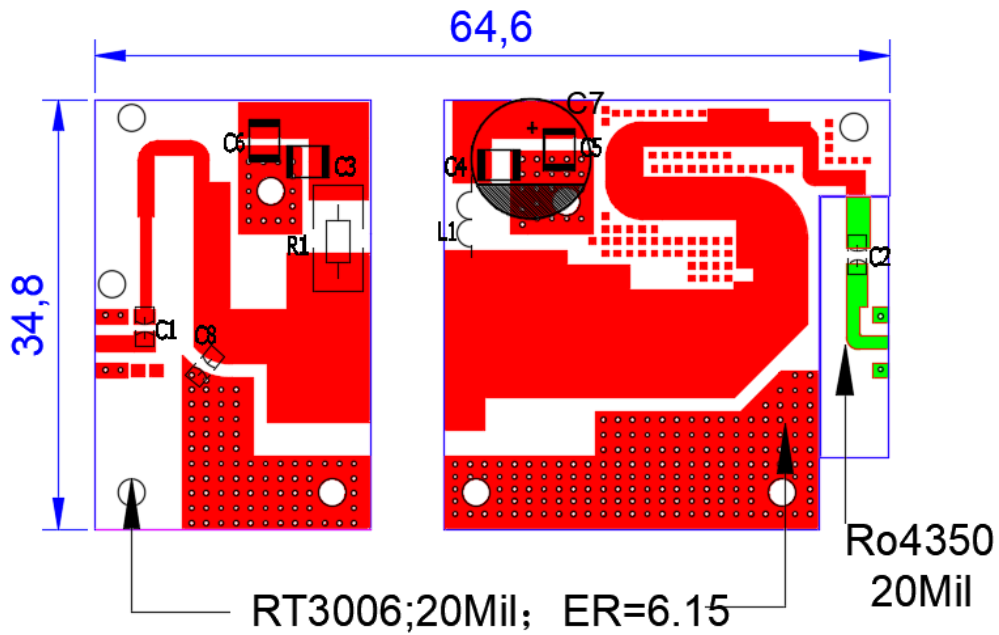
**Figure 1: Small signal gain and return loss Vs Frequency**  
 $V_{gs} = -2.4\text{V}$ ,  $V_{ds} = 28\text{V}$ ,  $I_{dq} = 500\text{mA}$ , input power = 0dBm



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Figure 2: Photo and Bill of materials



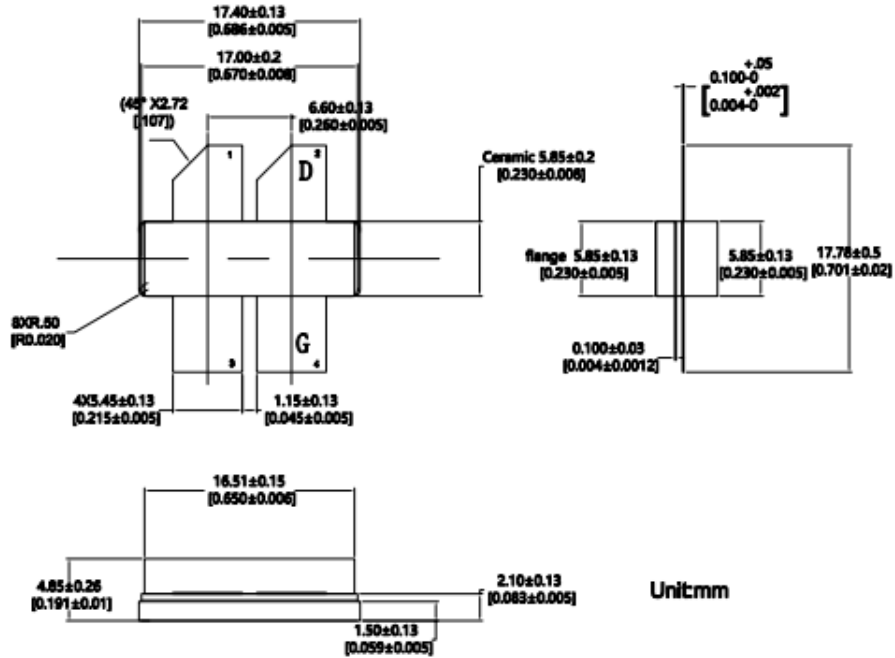
Component	Description	Suggestion
C7	470uF/63V	-
C5,C6	10uF (1210)	-
C1	15pF(MQ300805)	
C8	0.5pF(MQ300805)	
C2, C3, C4,	15pF(MQ301111)	
R1	Chip Resistor,10Ω (0805)	-
L1	1mm wire, 5mm diameter, 3turns	DIY
PCB	RT3006,ER=6.15,20mil / Rogers4350 20mil	-

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## Package Outline

Flanged ceramic package; 2 mounting holes; 4 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-LBS					03/12/2013

## Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2025/10/17	V1.0	Preliminary Datasheet Creation ,based on LBS

Application data based on YHG-25-35