

# GTAH58140F4 GaN TRANSISTOR

Document Number: GTAH58140F4  
Preliminary Datasheet V1.1

## Gallium Nitride 28V 140W, C band RF Power Transistor

### Description

The GTAH58140F4 is a 140W internally matched, GaN HEMT, designed from 5.2GHz to 6GHz, 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.

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

- Typical **Pulsed CW** performance (on 5.7-5.9GHz fixture with device soldered):

$I_{DQ}=200\text{mA}$ , pulse width 100 us, 10% duty cycle.  $T_c=25\text{ }^\circ\text{C}$

Voltage(V)	Psat(W)	Eff(%)@Psat	Gain @Psat (dB)
28	153-160	45-50	9.4-9.8
32	175-180	43-47	10-10.4

- Typical **CW** performance (on 5.7-5.9GHz fixture with device soldered):

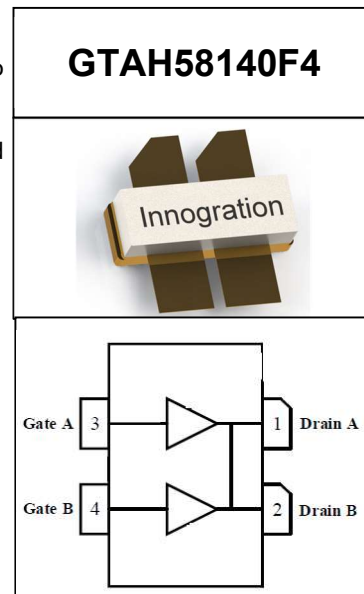
$I_{DQ}=200\text{mA}$ ,  $T_c=25\text{ }^\circ\text{C}$

Voltage(V)	Psat(W)	Eff(%)@Psat	Gain @Psat (dB)
28	135-140	44-49	9.3-9.8
32	145-155	42-46	9.7-10.3

- Typical **CW** performance (on 5.0-6.0GHz fixture with device soldered):

$I_{DQ}=200\text{mA}$ ,  $T_c=25\text{ }^\circ\text{C}$

Voltage(V)	Psat(W)	Eff(%)@Psat	Gain @Psat (dB)
28	100-125	47-49	8.2-9.8
32	115-150	43-48	8.5-10.3



### 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

# GTAH58140F4 GaN TRANSISTOR

Document Number: GTAH58140F4  
Preliminary Datasheet V1.1

Operating Voltage	$V_{DD}$	40	Vdc
Maximum Forward Gate Current @ $T_C = 25^\circ\text{C}$	$I_{gmax}$	36	mA
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Case Operating Temperature	$T_C$	+150	$^\circ\text{C}$
Operating Junction Temperature(See note 1)	$T_J$	+225	$^\circ\text{C}$
Total Device Power Dissipation (Derated above $25^\circ\text{C}$ , see note 2)	$P_{diss}$	150	W

Note: 1. Continuous operation at maximum junction temperature will affect MTTF  
2. Bias Conditions should also satisfy the following expression:  $P_{diss} < (T_J - T_C) / R_{JC}$  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	$R_{\theta JC}$	0.8	C/W

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

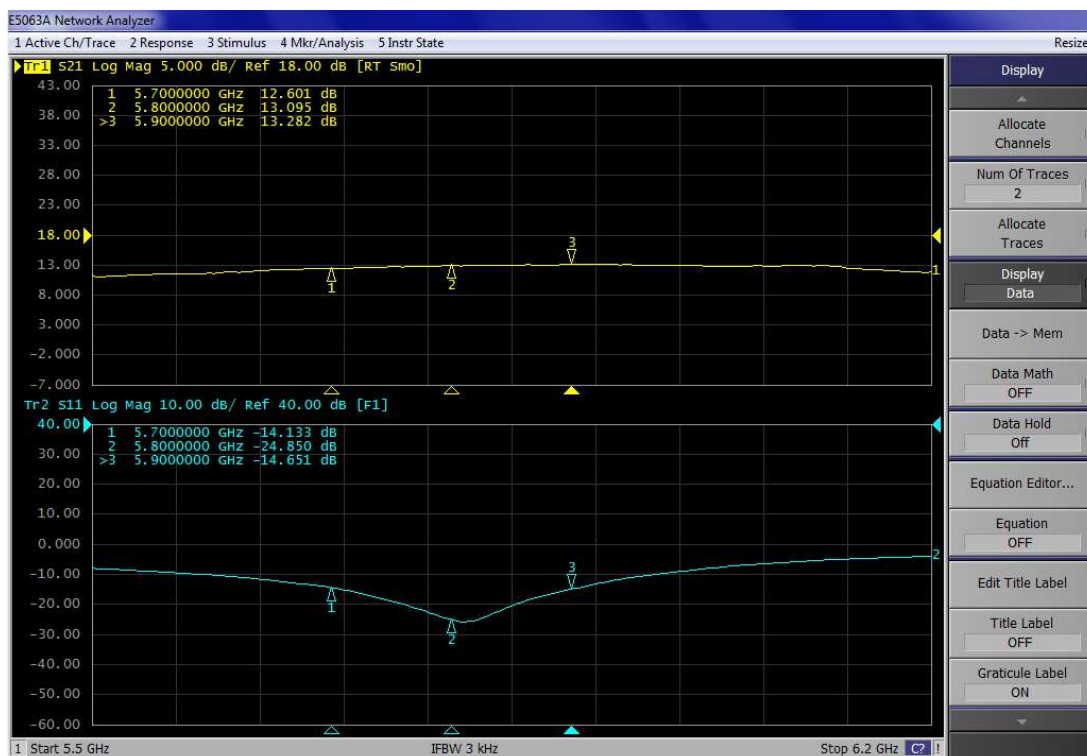
**DC Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{V}$ ; $I_{DS} = 36\text{mA}$	$V_{DSS}$	150			V
Gate Threshold Voltage	$V_{DS} = 28\text{V}$ , $I_D = 36\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 28\text{V}$ , $I_{DS} = 200\text{mA}$ , Measured in Functional Test	$V_{GS(Q)}$		-2.66		V

## Typical performance

5.7-5.9GHz

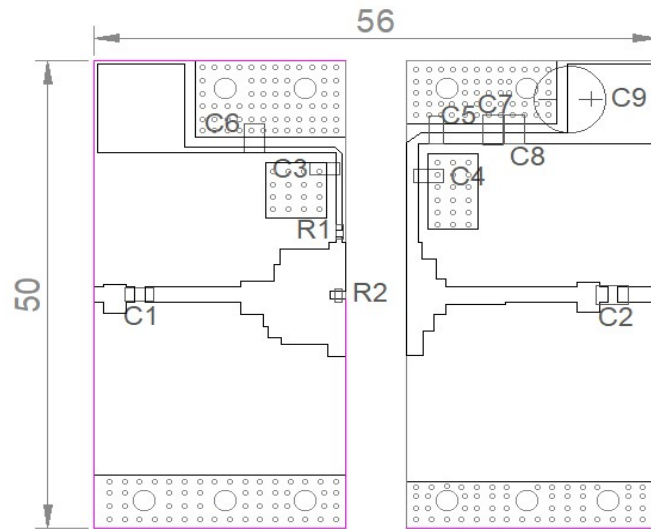
**Figure 1: Small signal gain and return loss Vs Frequency**  
 $V_{gs} = -2.59\text{V}$ ,  $V_{ds} = 28\text{V}$ ,  $I_{dq} = 500\text{mA}$ , input power = 0dBm



# GTAH58140F4 GaN TRANSISTOR

Document Number: GTAH58140F4  
Preliminary Datasheet V1.1

Figure 3: Picture and Bill of materials of 5.7-5.9GHz wide band application circuit  
(Layout Gerber file upon request)



Component	Description	Suggestion
C1,C2,C3,C4	3.9pF	DLC70B
C5	0.5pF	DLC70B
C6,C7,C8	10uF	10uF/50V
C9	470uF	63V/470uF
R1, R2	9.1Ω	1206
PCB	Rogers 4350B, $\epsilon_r = 3.5$ , thickness 30 mils, 1oz copper	

## Typical performance

5.0-6.0GHz

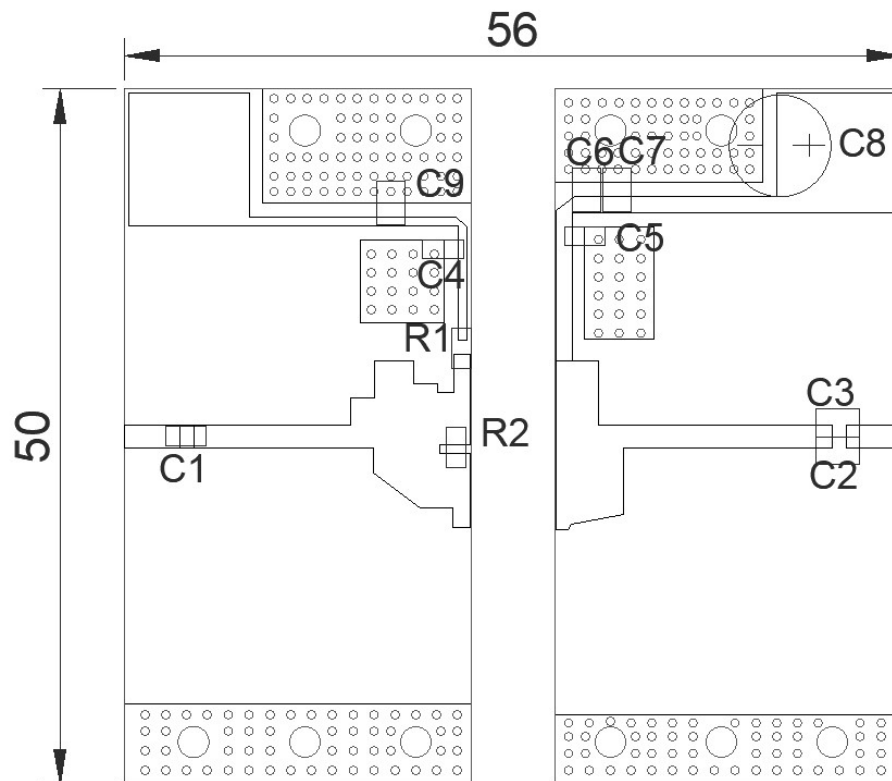
Figure 4: Small signal gain and return loss Vs Frequency  
 $V_{gs} = -2.59V$ ,  $V_{ds} = 28V$ ,  $I_{dq} = 500mA$ , input power = 0dBm



# GTAH58140F4 GaN TRANSISTOR

Document Number: GTAH58140F4  
Preliminary Datasheet V1.1

**Figure 5: Picture and Bill of materials of 5.0-6.0GHz wide band application circuit**  
(Layout Gerber file upon request)



Component	Description	Suggestion
C1、C4、C5	3.9pF	DLC70B
C2、C3、	1.8pF	0805
C6、C7、C9	10uF/50V	1210
C8	470uF/63V	
R1、R2	10Ω	1206
PCB	30Mil Rogers 4350B	

