



# Gallium Nitride 50V, 130W, 0.1-3.8GHz RF Power Transistor

## Description

The STBV38130E2 is a 130watt, GaN HEMT, ideal for general applications from 0.1 to 3.8GHz.

It can support CW, pulse or any modulated signal.

It features high gain, wide band and low cost, in 6.5\*6.5mm ceramic package with copper flange.

Its gullwing leads enable surface mounted on PCB through grounding vias or soldered on heatsink

There is no guarantee of performance when this part is used outside of stated frequencies.

- Typical Class AB performance 3.4-3.8GHz: (On application board with device soldered)

$V_{DD} = 50$  Vdc,  $I_{DQ} = 150$  mA, 1 Carrier WCDMA signal



Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3400	43.14	8.87	52.01	158.8	-39.3	13.2	24.3
3500	43.16	8.73	51.89	154.5	-38.6	13.6	25.3
3600	43.17	8.55	51.72	148.6	-37.5	13.7	26.3
3700	43.15	8.45	51.60	144.6	-36.6	13.7	27.2
3800	43.17	8.22	51.39	137.8	-35.9	13.1	27.3

## Applications

- 5G, 4G wireless infrastructure
- S band power amplifier
- Test instruments
- Jammer

### 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
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	$V_{DSS}$	+200	Vdc
Gate--Source Voltage	$V_{GS}$	-8 to +0.5	Vdc
Operating Voltage	$V_{DD}$	55	Vdc
Maximum gate current	$I_{GS}$	16.8	mA
Storage Temperature Range	$T_{stg}$	-65 to +150	°C
Case Operating Temperature	$T_C$	+150	°C
Operating Junction Temperature	$T_J$	+225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case by FEA $T_C = 85^\circ\text{C}$ , at $P_{avg} = 25\text{W}$ WCDMA 1 carrier	$R_{\theta JC}$	2.2	°C /W



**Table 3. Electrical Characteristics (TA = 25°C unless otherwise noted)**

**DC Characteristics (measured on wafer prior to packaging)**

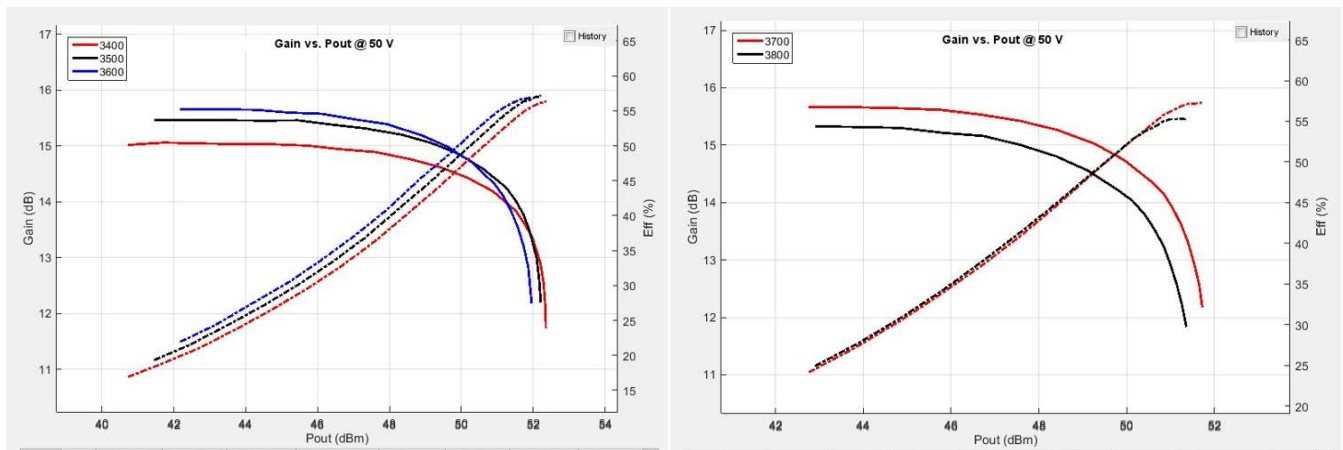
Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=16.8mA	V <sub>DSS</sub>		200		V
Gate Threshold Voltage	VDS =10V, ID = 16.8mA	V <sub>GS(th)</sub>	-4	-3	-2	V
Gate Quiescent Voltage	VDS =50V, IDS=150mA, Measured in Functional Test	V <sub>GS(Q)</sub>		-3.2		V

**Ruggedness Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.6GHz, Pout=130W pulse CW All phase, No device damages	VSWR		10:1		

**Figure 1: Efficiency and power gain as function of Pout (Measured on 3.4-3.8GHz application board)**

VDD = 50 Vdc, IDQ = 150 mA, Pulse width=20us, duty cycle=20%



**Figure 2: Network plot for S11/S21**

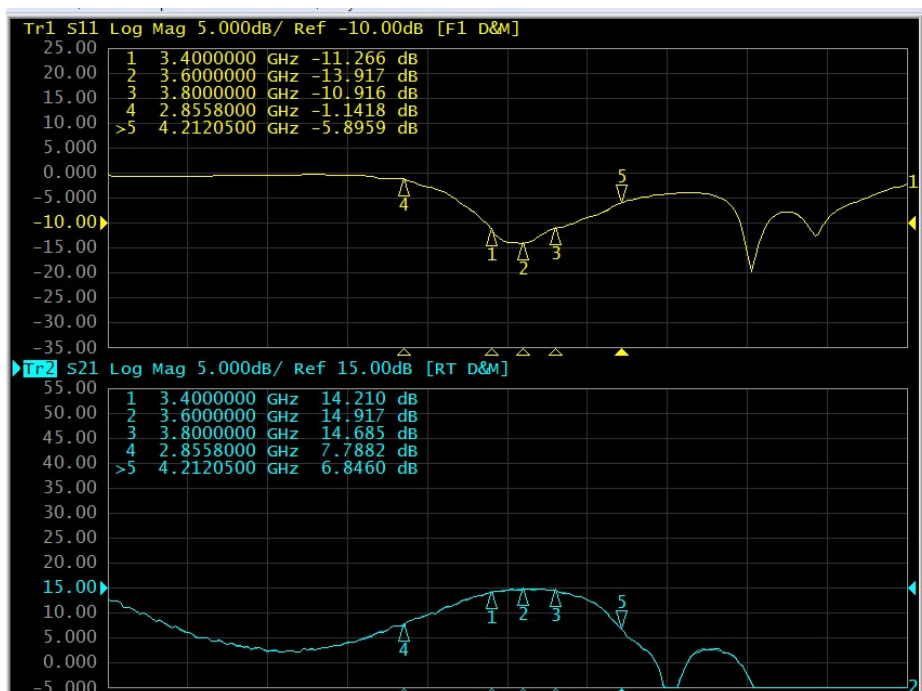


Figure 3: Picture of application board of 3.4-3.8GHz

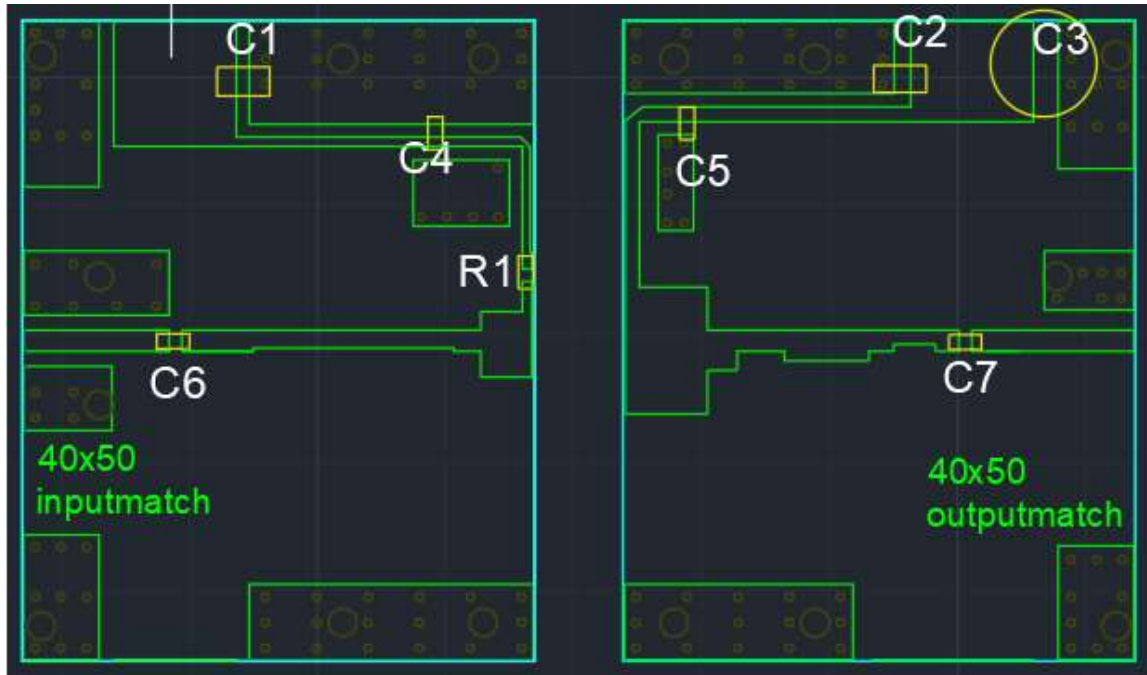


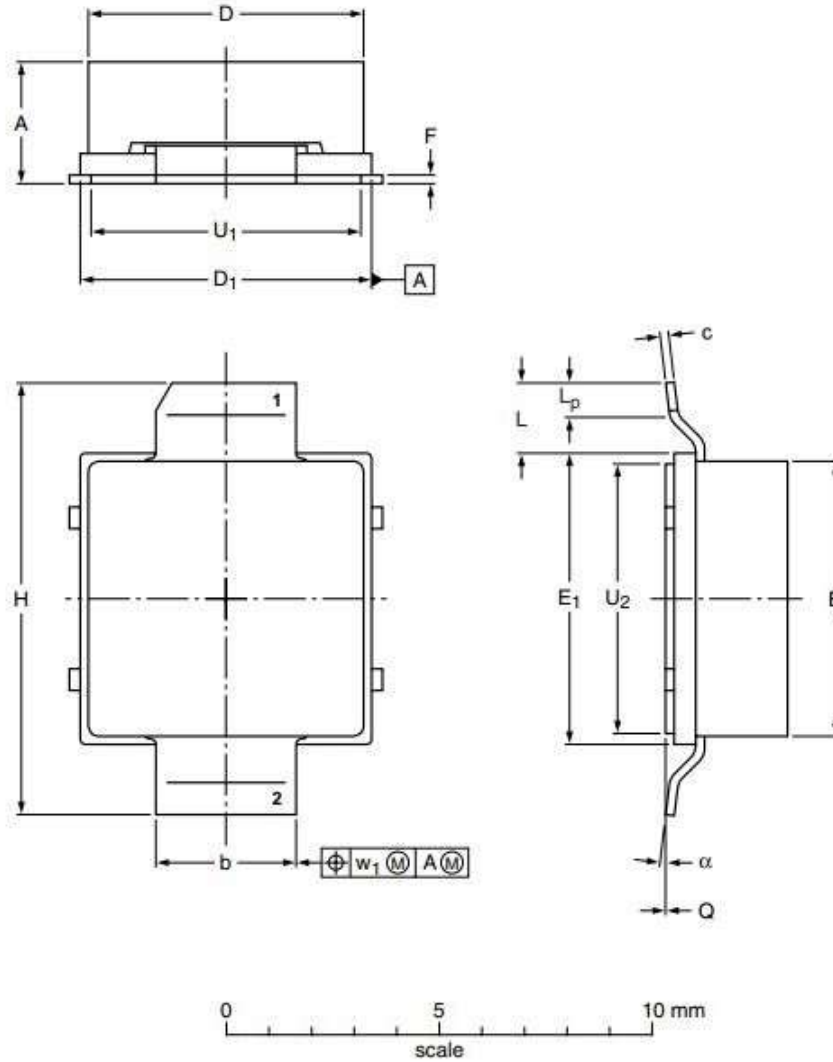
Table 4. Bill of materials of application board, RO4350B 30Mils (PCB layout upon request)

Designator	Comment	Footprint	Quantity
C1, C2	10uF/100V	1210	2
C3	470uF/63V		1
C4, C5, C6, C7	8.2 pF	0603	4
R1	10ohm	0603	1



## Package Outline

Earless Flanged ceramic package; 2 leads



UNIT	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	L	L <sub>p</sub>	Q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	α
mm	3.63	3.38	0.23	6.55	6.93	6.55	6.93	0.23	10.29	1.65	1.02	+0.05	6.43	6.43	0.51	7°
	3.05	3.23	0.18	6.40	6.78	6.40	6.78	0.18	10.03		0.51	-0.05	6.27	6.27		0°
inches	0.143	0.133	0.009	0.258	0.273	0.258	0.273	0.009	0.405	0.065	0.040	+0.002	0.253	0.253	0.02	7°
	0.120	0.127	0.007	0.252	0.267	0.252	0.267	0.007	0.395		0.020	-0.002	0.247	0.247		0°

OUTLINE VERSION	REFERENCE				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
PKG-E-A						10/22/2013



## Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2021/11/25	V1.0	Preliminary Datasheet Creation
2022/2/28	V1.1	Modification of frequency lower limits to 0.1GHz

Application data based on: ZXY-21

## Notice

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