



## Gallium Nitride 50V, 65W, 0.1-3.8GHz RF Power Transistor

### Description

The STAV38065C6 is a 65watt, GaN HEMT, ideal for general applications from 0.1 to 3.8GHz. It features high gain, wide band and low cost, in 10\*6mm plastic open cavity package, enabling surface mounted on PCB through grounding vias or soldered on heatsink directly.

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

- Typical Class AB RF performance across 3.4-3.8GHz with device soldered through grounding vias  
Pulsed CW: 20us, 20%



FREQ (MHZ)	P1dB(dBm)	P1dB(W)	P1dB Eff(%)	P1dB Gain(dB)	P5dB(dBm)	P5dB(W)	P5dB Eff(%)
3400	47.31	53.9	50.0	16.61	48.94	78.3	57.1
3500	47.06	50.8	51.9	17.04	48.77	75.3	59.6
3600	46.95	49.6	53.0	17.04	48.75	75.1	61.5
3700	46.67	46.4	56.7	17.17	48.57	72.0	66.3
3800	46.04	40.2	57.8	16.92	48.2	66.1	69.0

WCDMA signal: 1 Carrier,

Freq (MHz)	Pavg(dBm)	Gain (dB)	EFF (%)	ACPR (dBc)
3400	36.00	16.8	16.1	-43.4
3500	35.99	17.4	17.1	-43.7
3600	36.00	17.3	18.0	-43.5
3700	35.99	16.8	18.5	-42.8
3800	36.00	16.4	18.8	-42.5

### Applications

- 5G, 4G wireless infrastructure
- Wideband or narrowband 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 <sub>DSS</sub>	+200	Vdc
Gate--Source Voltage	V <sub>GS</sub>	-8 to +0.5	Vdc
Operating Voltage	V <sub>DD</sub>	55	Vdc
Maximum gate current	I <sub>gs</sub>	8	mA



Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C
Case Operating Temperature	T <sub>c</sub>	+150	°C
Operating Junction Temperature	T <sub>J</sub>	+225	°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case by FEA T <sub>c</sub> = 85°C, at P <sub>avg</sub> =4W WCDMA 1 carrier	R <sub>θJC</sub>	3.7	°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	V <sub>GS</sub> =-8V; I <sub>DS</sub> =8mA	V <sub>DSS</sub>		200		V
Gate Threshold Voltage	V <sub>DS</sub> =10V, I <sub>D</sub> = 8mA	V <sub>GS(th)</sub>	-4	-3	-2	V
Gate Quiescent Voltage	V <sub>DS</sub> =50V, I <sub>DS</sub> =80mA, Measured in Functional Test	V <sub>GS(Q)</sub>		-3		V

**Ruggedness Characteristics**

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.8GHz, P <sub>out</sub> =65W pulse CW All phase, No device damages	VSWR		10:1		

**Figure 1: Pin Definition (Top view)**

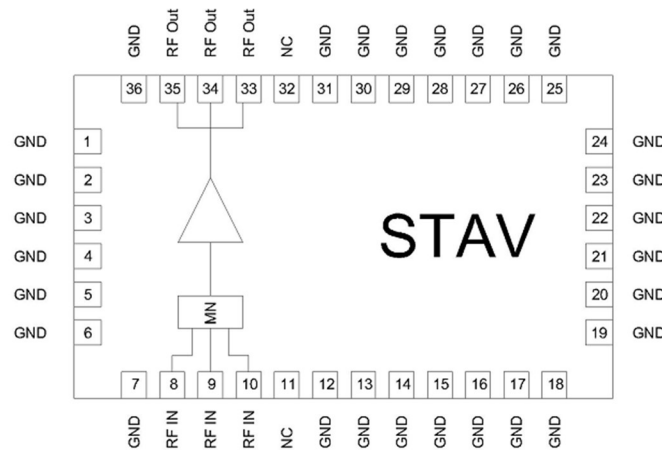




Figure 2: Efficiency and power gain as function of Pout (Measured on 3.4-3.8GHz application board)

VDD = 50 Vdc, Idq = 80mA, Pulse width=50us, duty cycle=20%

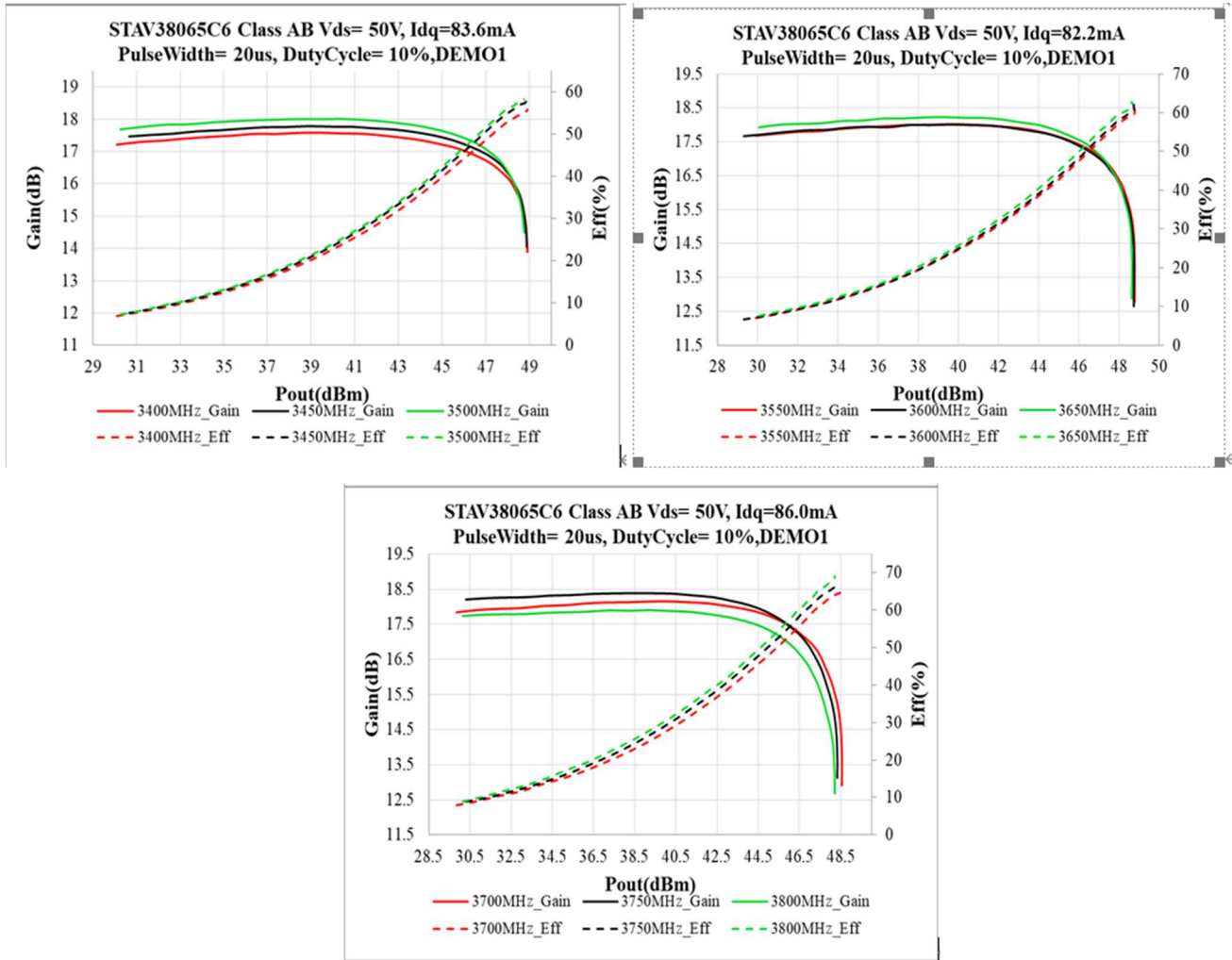


Figure 3: Network plot for S11/S21

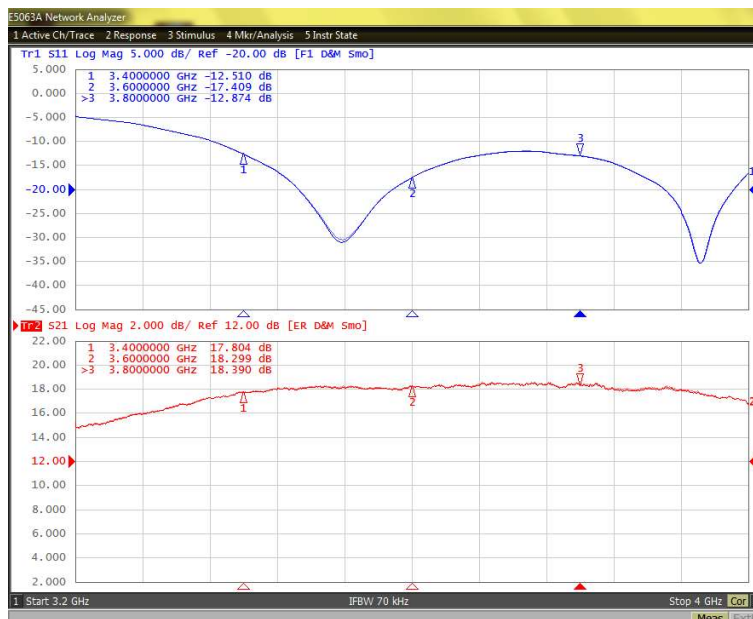


Figure 4: Picture of application board of 3.4-3.8GHz

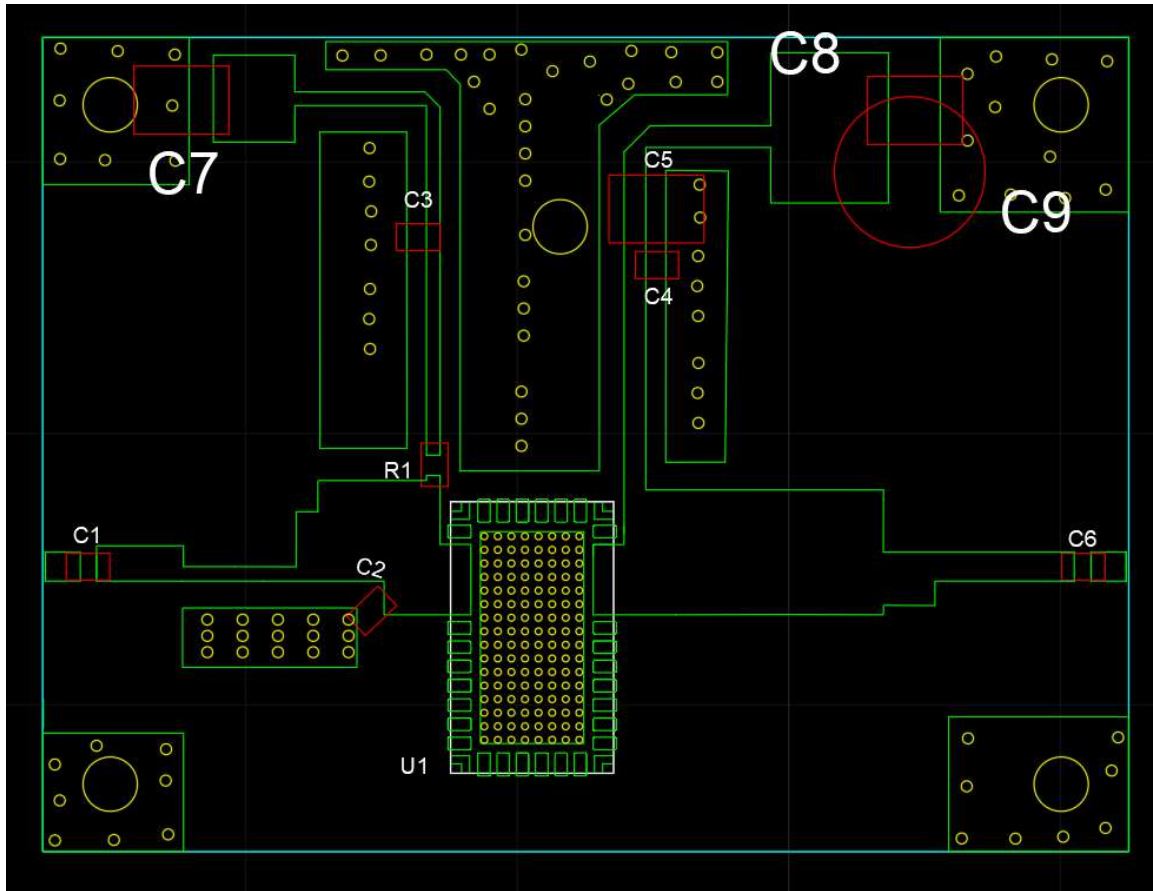


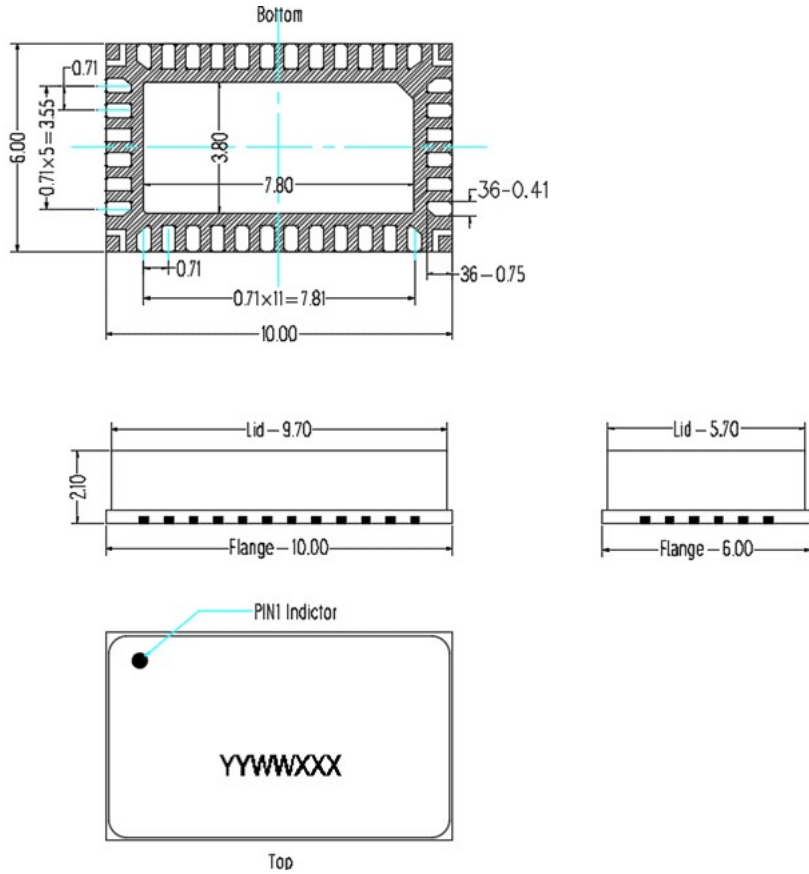
Table 4. Bill of materials of application board (RO4350B 20mils,PCB layout upon request)

Component	Value	Quantity
U1	STAV38065C6	1
C1、C3、C4、C6	8.2pF	4
C5、C7、C8	10uF/63V	3
C2	1pF	1
R1	10 Ω	1
C9	470uF/63V	1



### Package Dimensions

#### 10\*6 Plastic Package



Notes:

- 1. All dimensions are in mm;
- 2. The tolerances unless specified are  $\pm 0.2$ mm.

### Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/5/6	V1.0	Preliminary Datasheet Creation
2022/7/4	V1.1	Modify the upper frequency limits to 3.8GHz

Application data based on: LSM-22-05

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