



Gallium Nitride 50V, 80W, 0.1-3.8GHz RF Power Transistor

Description

The STAV38080C6 is a 80watt, GaN HEMT, ideal for general applications from 0.1 to 3.8GHz.

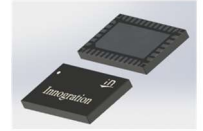
It features high gain, wide band and low cost, in 10*6mm plastic open cavity package, enabling surface mounted on PCB through grounding vias or soldered on heatsink directly.

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

- Typical Class AB pulse CW performance across 3.3-3.6GHz:

Pulse width=50us, duty cycle=20% (On innogrator wideband application board with device soldered)

STAV38080C6



$V_{DS}=50V$, $I_{DQ}=120mA$, $V_{GS}=-3.26V$

FREQ (MHZ)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3300	48.79	75.60	52.57	17.05	50.11	102.5	56.50
3400	48.93	78.20	56.22	16.70	49.99	99.70	59.33
3500	48.33	68.01	55.96	16.66	49.58	90.84	59.67
3600	47.95	62.30	55.25	16.63	49.17	82.68	58.59

$V_{DS}=50V$, $I_{DQ}=120mA$, $V_{GS}=-3.26V$

FREQ (MHZ)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3400	48.31	67.7	51.1	17.17	49.88	97.3	57.6
3500	48.12	64.9	52.4	16.98	49.35	86.1	55.5
3600	47.33	54.1	50.6	16.98	49.29	84.9	58.7
3700	47.24	53.0	52.8	16.57	49.42	87.5	63.6

Other application result upon request: 1.8-2.2, 2.3-2.7GHz etc

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_{DSS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	I_{gs}	10	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 $P_{avg} = 5\text{W}$ WCDMA 1 carrier	$R_{\theta JC}$	2.9	°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	$V_{GS} = -8\text{V}$; $I_{DS} = 10\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 10\text{mA}$	$V_{GS(th)}$	-4	-3	-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 100\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.2		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.8GHz, $P_{out} = 80\text{W}$ pulse CW All phase, No device damages	VSWR		10:1		

Figure 1: Pin Definition (Top View)



Pin No.	Symbol	Description
8,9,10,11,14,15,16,17	Vgs/RF In	Vgs and RF input
26,27,28,29,32,33,34,35	Vds/RF out	Vds and RF output
2,5,7,12,13,18,20,23,25,30,31,36	GND	DC/RF Ground
Others	NC	No connection
Package Base	GND	DC/RF Ground.



3.3-3.6GHz

Figure 2: Efficiency and power gain as function of Pout (Measured on 3.3-3.6GHz application board)

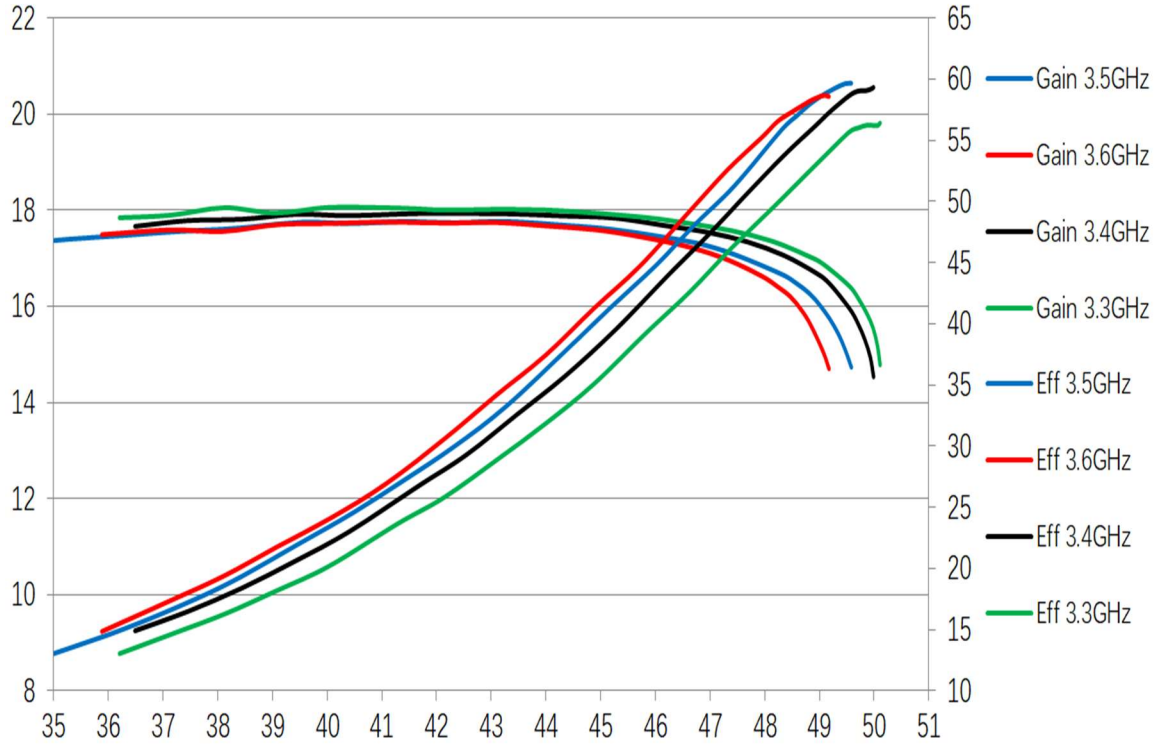


Figure 3: Network plot for S11/S21

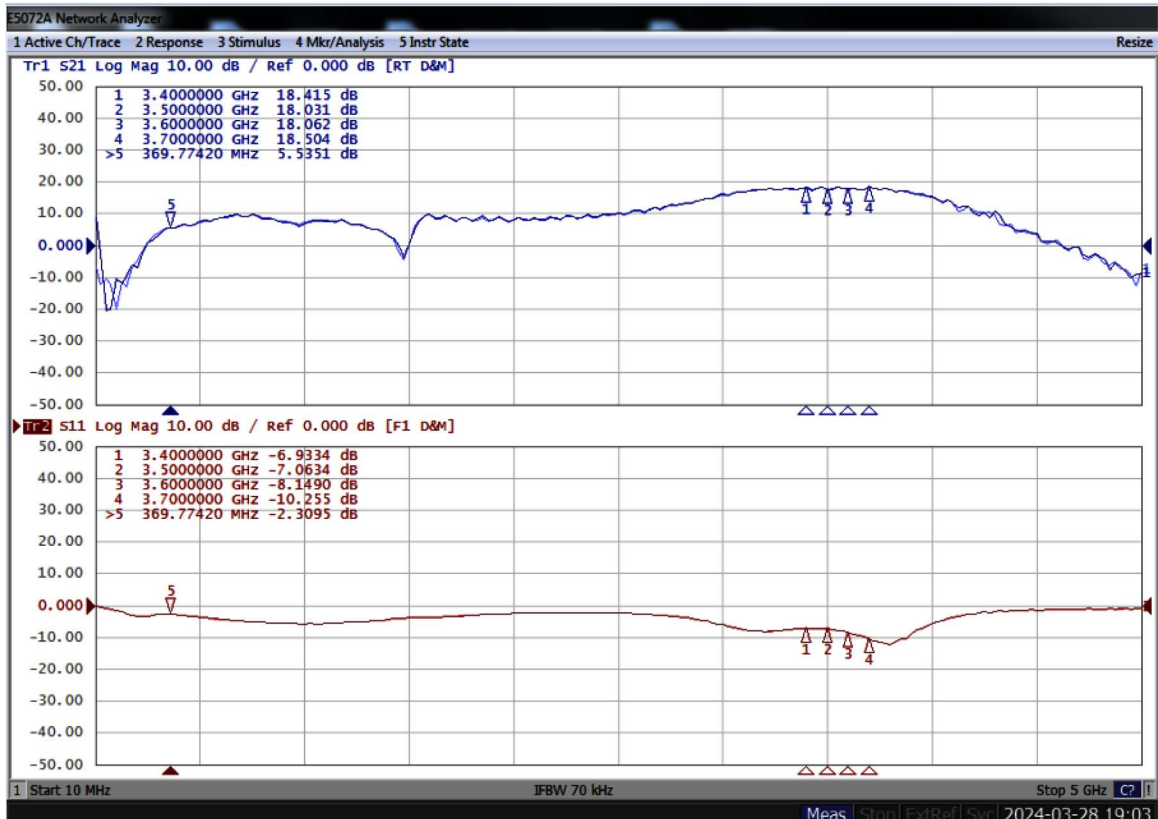


Figure 4: Picture of application board of 3.3-3.6GHz

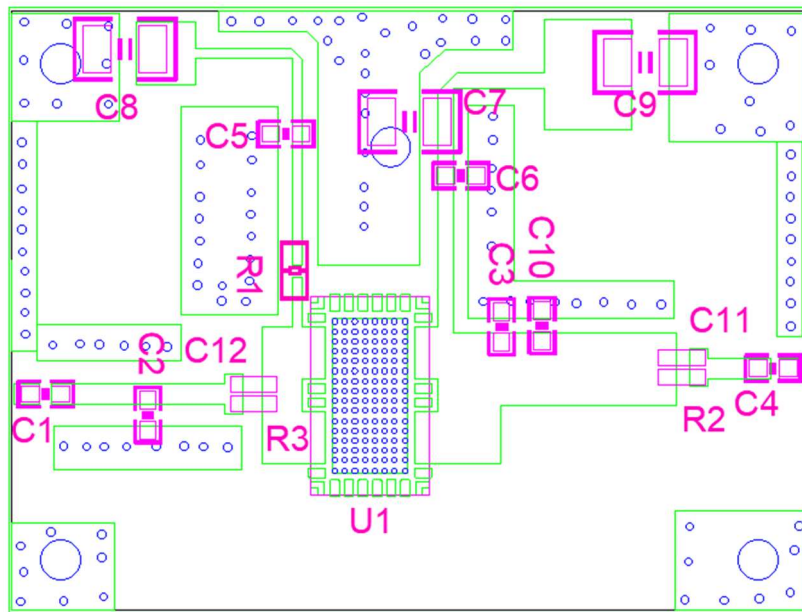


Table 4. Bill of materials of application board (PCB layout upon request)

Part	Quantity	Description	Part Number	Manufacture
C1,C4,C5,C6	4	8.2pF High Q Capacitor	251SHS8R2BSE	TEMEX
C2	1	0.7pF High Q Capacitor	251SHS0R7BSE	TEMEX
C3	1	0.5pF High Q Capacitor	251SHS0R5BSE	TEMEX
C10	1	0.2pF High Q Capacitor	251SHS0R2BSE	TEMEX
C11,C12	2	3.9pF High Q Capacitor	251SHS3R9BSE	TEMEX
C7,C8,C9	3	10uF MLCC	GRM32EC72A106M E05	Murata
R1	1	10 Ω Power Resistor	ESR03EZPF100	ROHM
R2,R3	2	51 Ω Power Resistor	0805	ROHM
U1	1	80W GaN Transistor	STAV38080C6	Innogrations



3.4-3.8GHz

Figure 5: Efficiency and power gain as function of Pout (Measured on 3.3-3.6GHz application board)

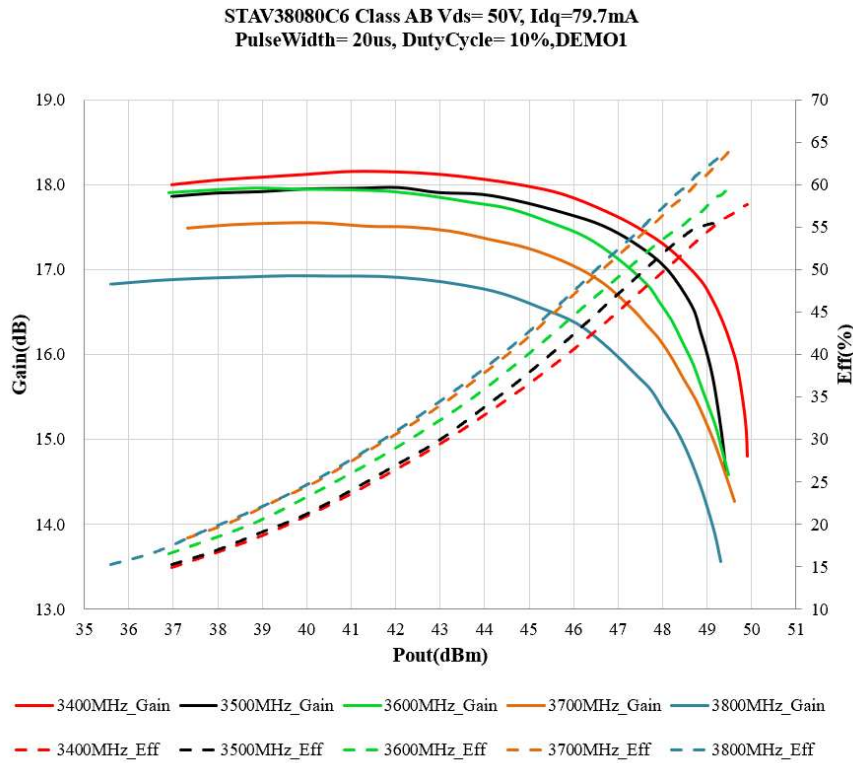


Figure 6: Network plot for S11/S21



Figure 7: Picture of application board of 3.4-3.8GHz

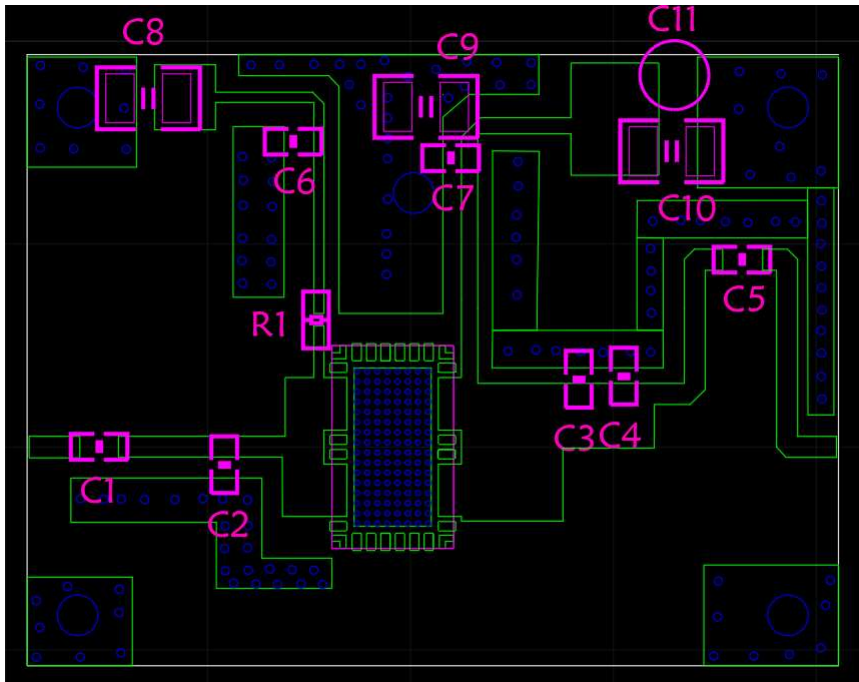


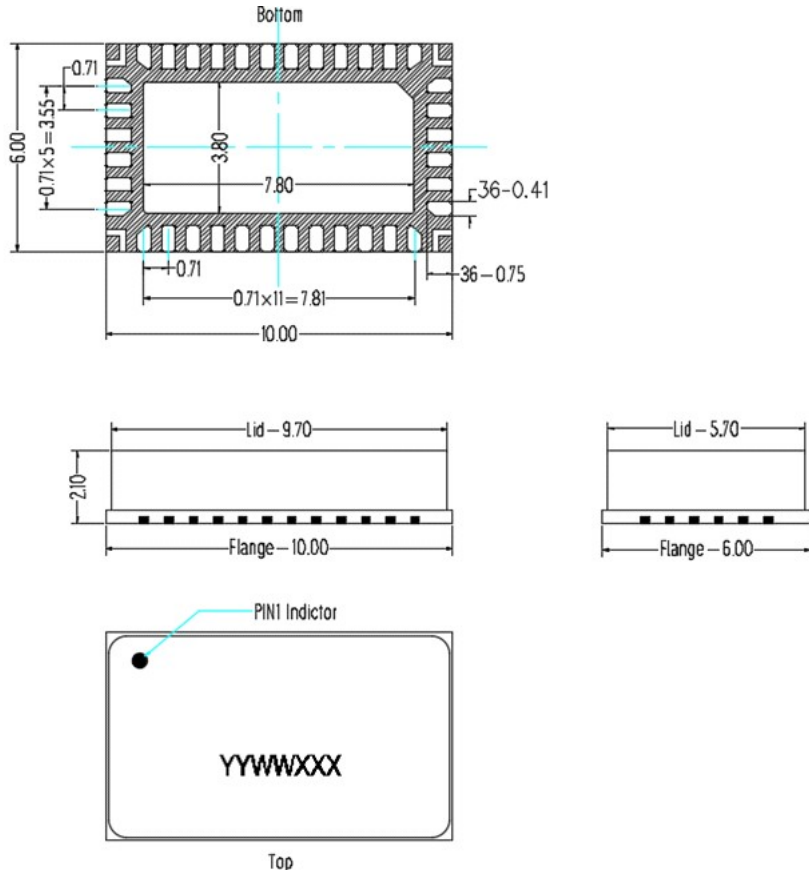
Table 5. Bill of materials of application board (PCB layout upon request)

Component	Value	Quantity
U1	STAV38080C6	1
C1	3pF	1
C2	1pF	1
C3	0.6pF	1
C4	0.3pF	1
C5、C6、C7	8.2pF	3
C8、C9、C10	10uF/63V	3
C11	470uF/63V	1
R1	10 Ω	1



Package Dimensions

10*6 Plastic Package



Notes:

- 1. All dimensions are in mm;
- 2. The tolerances unless specified are ±0.2mm.

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/3/29	V1.0	Preliminary Datasheet Creation from STBV38081C6 ,due to thermal optimization
2024/4/11	V1.1	Add 3.4-3.8GHz application data

Application data based on: HJ-21-07/Light-21-43/ZYX-24-03/LWH-24-11/ZYX-24-31

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