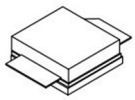
Gallium Nitride 50V, 170W, 3.3-3.8GHz RF Power Transistor

STAV36171AY2



Description

The STAV36171AY2 is an internally matched, single ended 170watt, GaN HEMT, ideal for 5G applications from 3.3 to 3.8GHz.

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

- WCMDA 3GPP TM1 64 DPCH 9.9 dB PAR @ 0.01% CCDF. VDS = 50 V, IDQ = 200 mA,
  (On innogration **3.3-3.6GHz Class AB** application board with device soldered)

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3300	45.00	8.06	53.06	202.5	-35.7	16.3	29.4
3450	45.00	7.76	52.74	188.0	-35.5	16.8	31.4
3600	45.00	7.64	52.64	183.5	-27.7	15.5	32.2

- WCMDA 3GPP TM1 64 DPCH 9.9 dB PAR @ 0.01% CCDF. VDS = 50 V, IDQ-main = 200 mA, Vpeak=-4.5V
  (On innogration **3.4-3.6GHz 3 devices Asymmetrical Doherty** application board with device soldered)

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3400	48.5	8.55	57	500	-26	13.5	44.5
3500	48.5	8.45	56.9	490	-31	13.1	42.7
3600	48.5	7.85	56.3	430	-30	12	41

- WCMDA 3GPP TM1 64 DPCH 9.9 dB PAR @ 0.01% CCDF. VDS = 50 V, IDQ = 200 mA,
  (On innogration **3.6-3.8GHz Class AB** application board with device soldered)

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3600	45.00	8.11	53.09	203.9	-30.7	14.7	30.5
3700	45.00	7.91	52.86	193.4	-34.5	14.8	30.7
3800	45.00	7.74	52.68	185.2	-35.4	14.5	30.7

Applications

- Sub-4GHz pulse or CW amplifier
- 5G base station amplifier
- Doherty power amplifier

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

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)

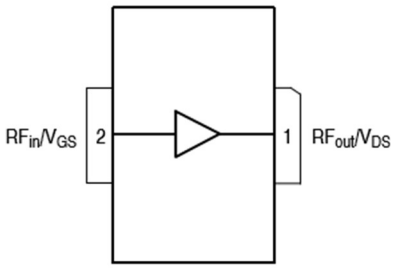


Table 1. Maximum Ratings

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	Igs	21.6	mA
Storage Temperature Range	Tstg	-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°C, at Pd=70W	$R_{\theta JC}$	TBD	°C /W

Table 3. Electrical Characteristics (TA = 25℃ unless otherwise noted)

DC Characteristics (Each path, measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=21.6mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 21.6mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=200mA, Measured in Functional Test	$V_{GS(Q)}$		-2.87		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.5GHz, Pout=170W pulse CW for each path All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

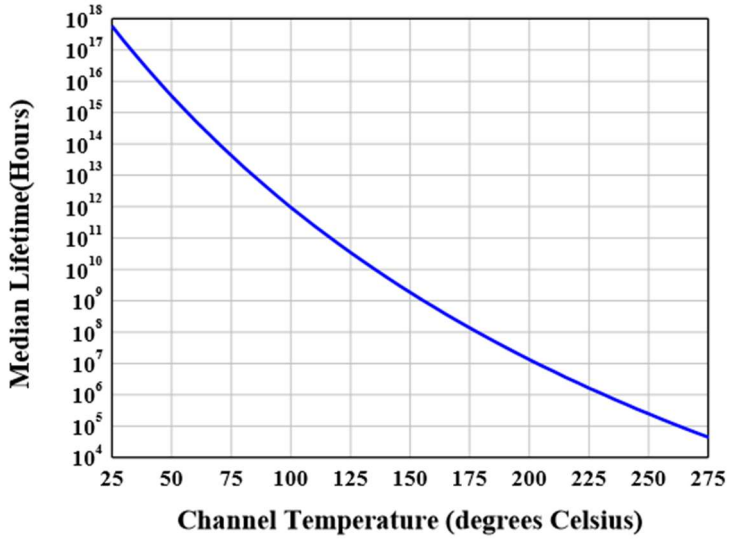


Figure 3: Efficiency and power gain as function of Pout

(VDD = 50Vdc, IDQ = 200 mA, Pulse width=20us, duty cycle=10%)

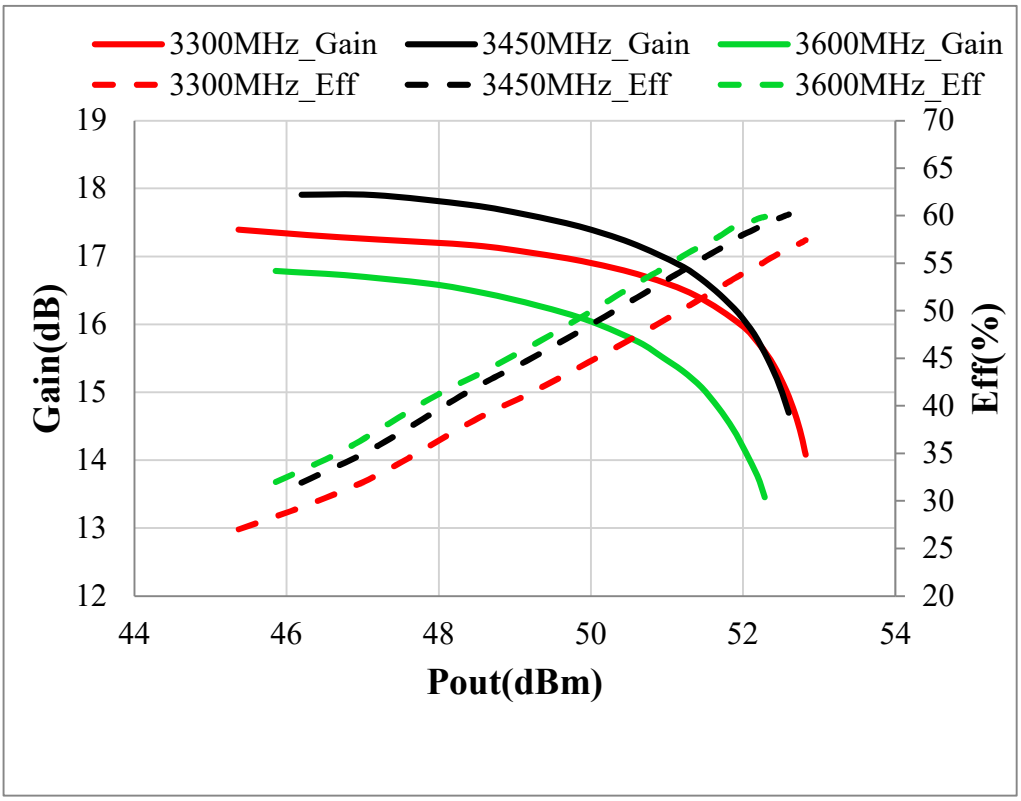


Figure 4: S11 / S21 output from network analyzer

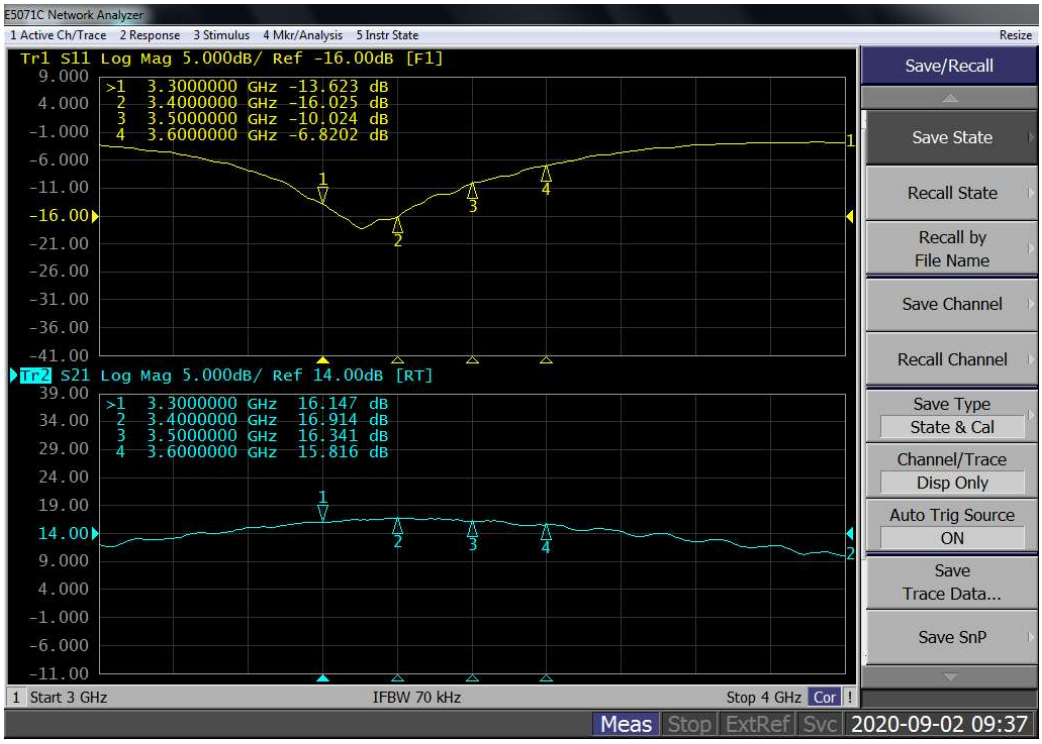
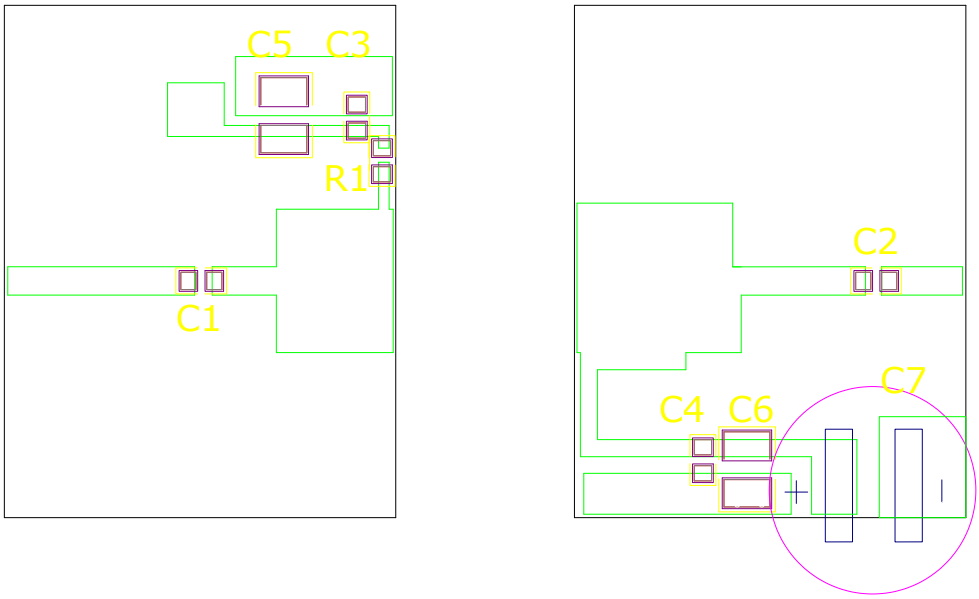


Figure 5: Layout and BOM of Application board 3.3-3.6GHz Class AB



Designator	Comment	Footprint	Quantity
C1, C2, C3, C4	8.2pF	0805	4
C5, C6	10uF/100V	1210	2
C7	100uF/63V		
R1	10ohm	0603	1

Figure 6: Efficiency and power gain as function of Pout

(VDD = 50Vdc, IDQ = 200 mA, Pulse width=20us, duty cycle=10%)

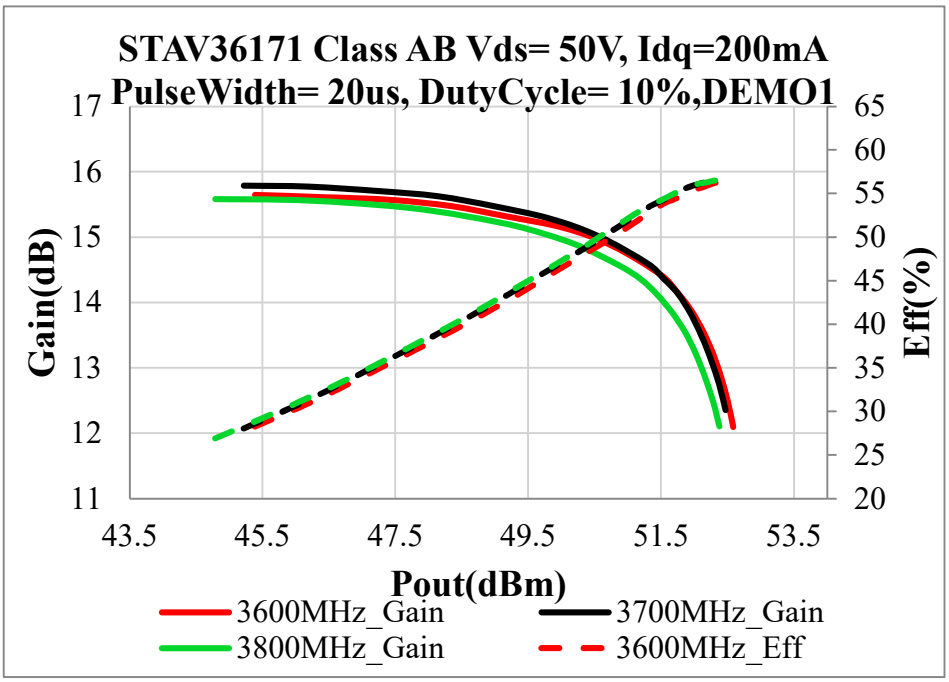


Figure 7: S11 / S21 output from network analyzer

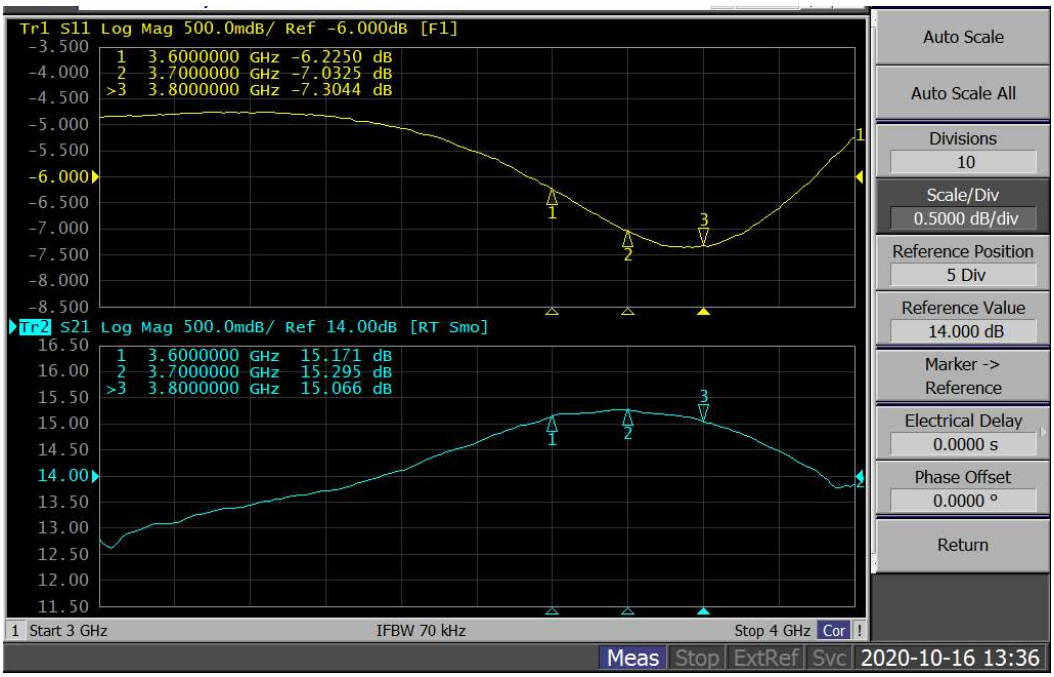
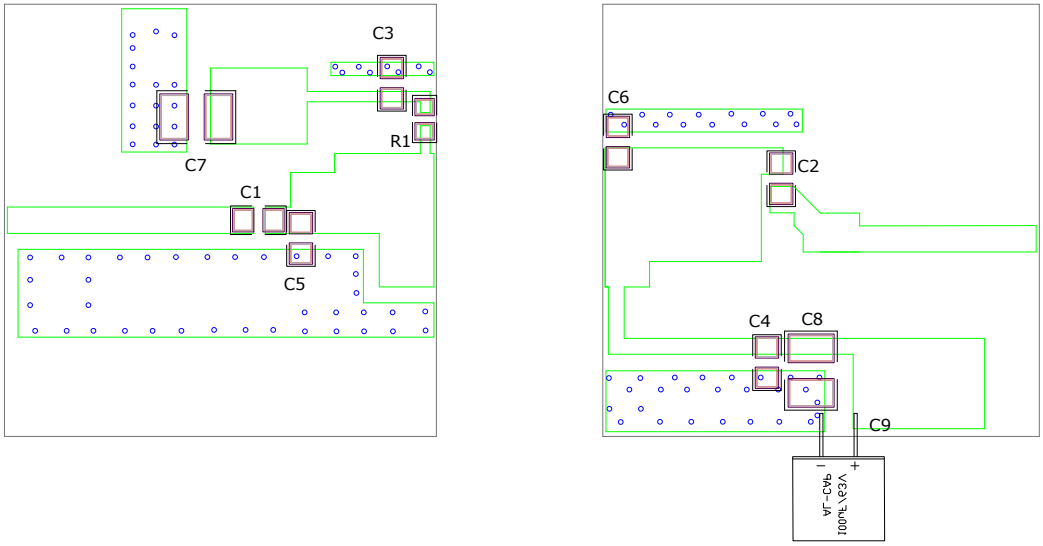
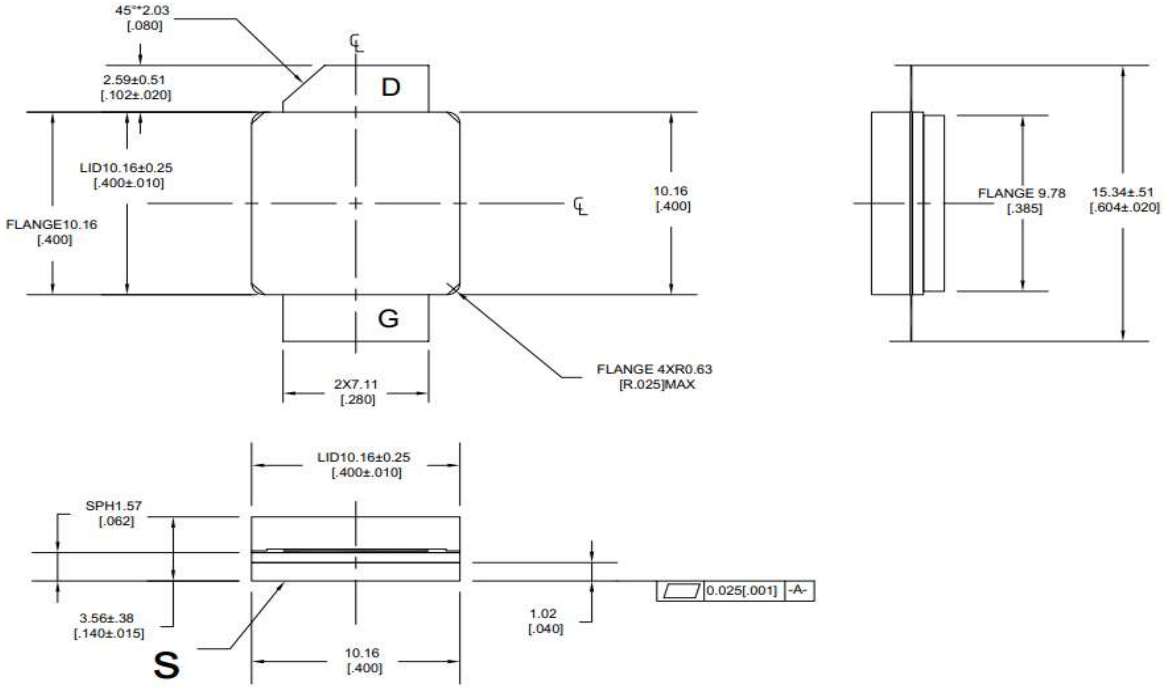


Figure 5: Layout and BOM of Application board 3.6-3.8GHz Class AB



Designator	Comment	Footprint	Quantity
C1, C2, C3, C4	6.8pF	0805	4
C5	0.5pF	0603	1
C6	0.2pF	0603	1
C7, C8	10uF/100V	1210	2
C9	100uF/63V		
R1	10ohm	0603	1

Earless Flanged Ceramic Package; 2 leads



Unit: mm [inch]

Tolerance .xx +/- 0.01 .xxx +/- 0.005 inches

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2020/9/2	V1.0	Preliminary Datasheet Creation
2020/10/16	V1.1	Add 3 devices asymmetrical Doherty result on 1st page, add 3.6-3.8G Class AB info

Application data based on: LSM-20-15/18/20

Notice