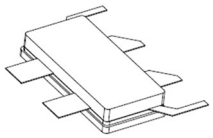
Gallium Nitride 50V, 600W,3.3-3.6GHz RF Power Transistor

Description

STCV36600BY4V



The STCV36600BY4V is a 600-watt, internally matched GaN HEMT, designed for 5G cellular applications with frequencies from 3.3-3.6GHz, enabled by wide band VBW capability to support IBW up to 200MHz.

It can be configured as asymmetrical Doherty for 4G or 5G application, delivering 70 to 85 W average power, according to normal 8.5 to 9.5 dB back off.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical Doherty Pulsed CW and 1C W--CDMA Characterization Performance:

V_{DD} = **50** Vdc, I_{DQA} = 260 mA, V_{GSB} = –5.5 Vdc,

Freq (GHz)	Pulse CW Signal(1)			P_{avg}=48.5dBm WCDMA Signal(2)		
	P1-Gain (dB)	P3 (dBm)	P3 (W)	Gp (dB)	η_D (%)	$ACPR_{5M}$ (dBc)
3.3	11.15	58.45	700.1	11.61	43.36	-31.32
3.4	11.73	58.44	697.6	12.07	44.45	-31.15
3.5	12.49	58.10	645.8	12.04	44.76	-34.14
3.6	11.76	57.97	625.8	11.68	42.60	-38.74

Notes:
(1) Pulse Width=100 us, Duty cycle=20%
(2) WCDMA signal: 3GPP test model 1; 1 to 64 DPCH; Channel Bandwidth=3.84MHz,PAR =10.5 dB at 0.01 % probability on CCDF.

Applications

- Asymmetrical Doherty amplifier within N78/N77 5G band and B42 4G band
- S band 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

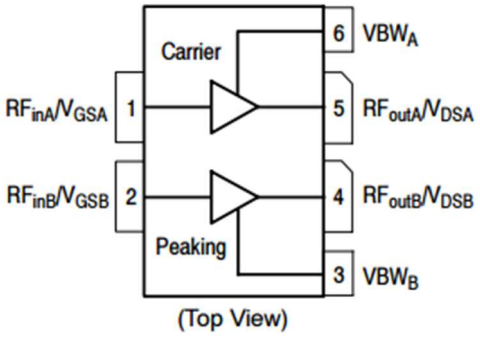


Table 1. Maximum Ratings

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	77	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, Pout=100W, 3.6GHz Doherty application board	$R_{\theta JC}$	1.05	°C /W

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

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=30mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 30mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=350mA, Measured in Functional Test	$V_{GS(Q)}$		-3.23		V

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=47mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 47mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =50V, IDS=530mA, Measured in Functional Test	$V_{GS(Q)}$		-3.23		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	3.6GHz, Pout=70W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		

Figure 3: Efficiency and power gain as function of Pout (3.3-3.6GHz Doherty)

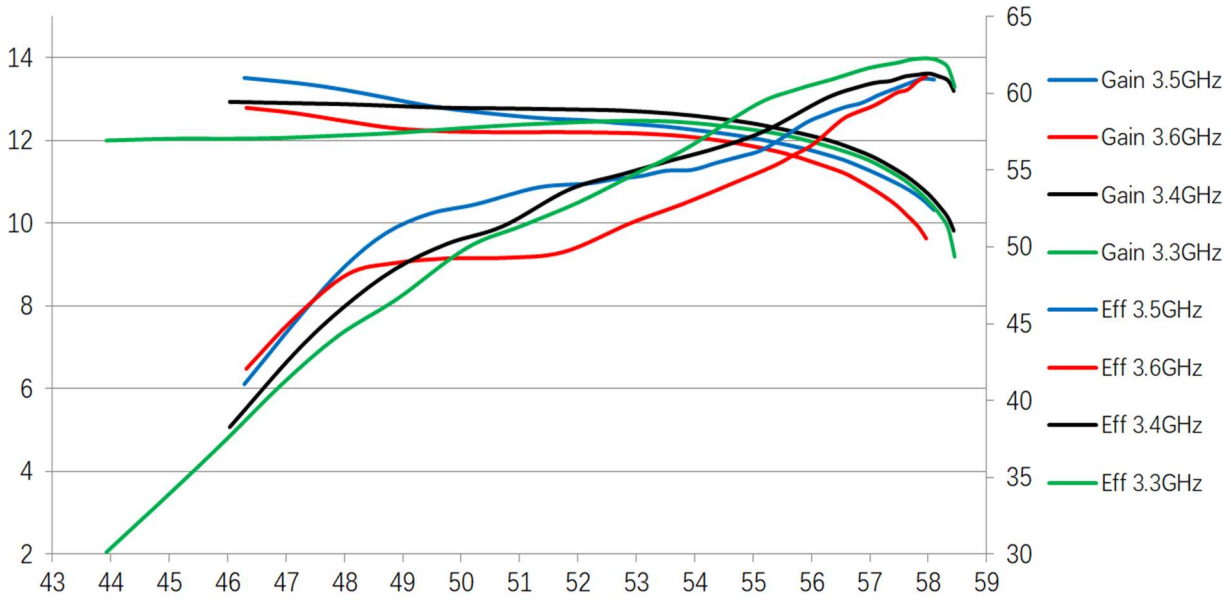


Figure 4: Network analyzer output, S11 and S21

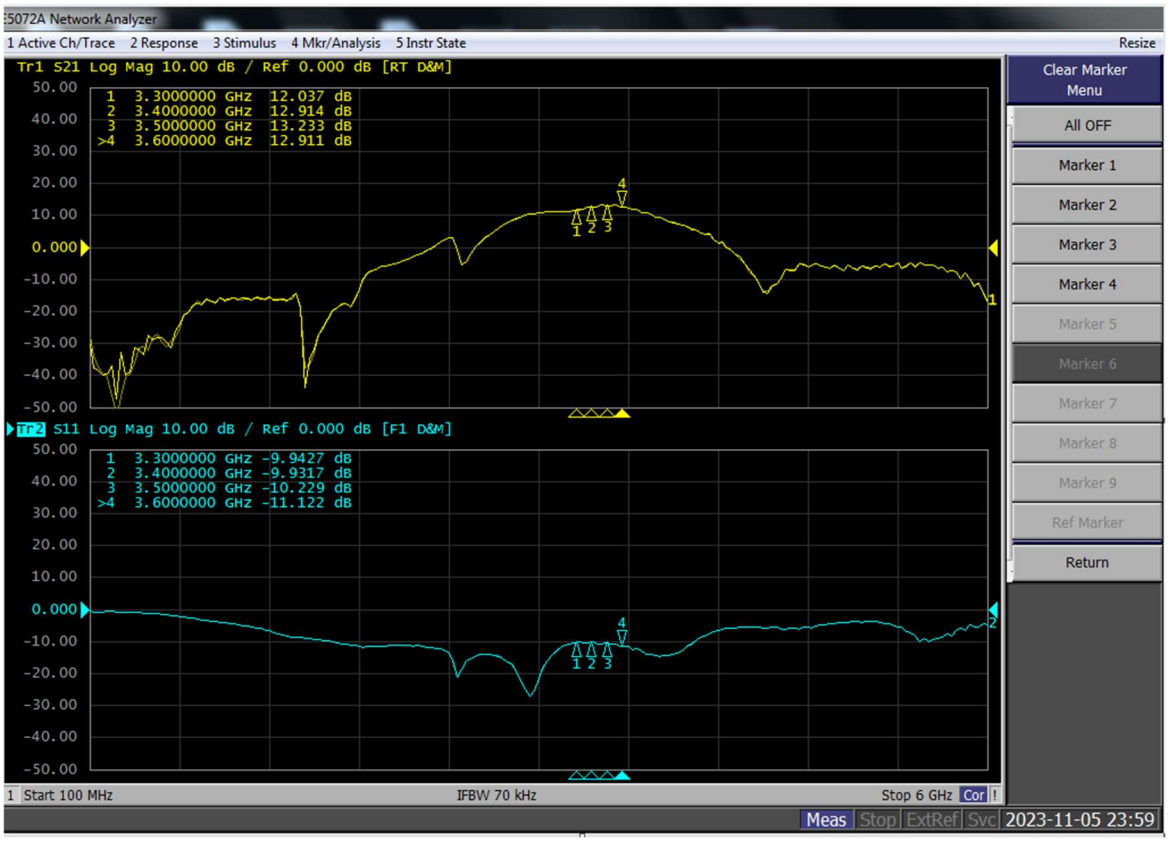


Figure 5: Picture of application board Doherty circuit for 3.3-3.6GHz

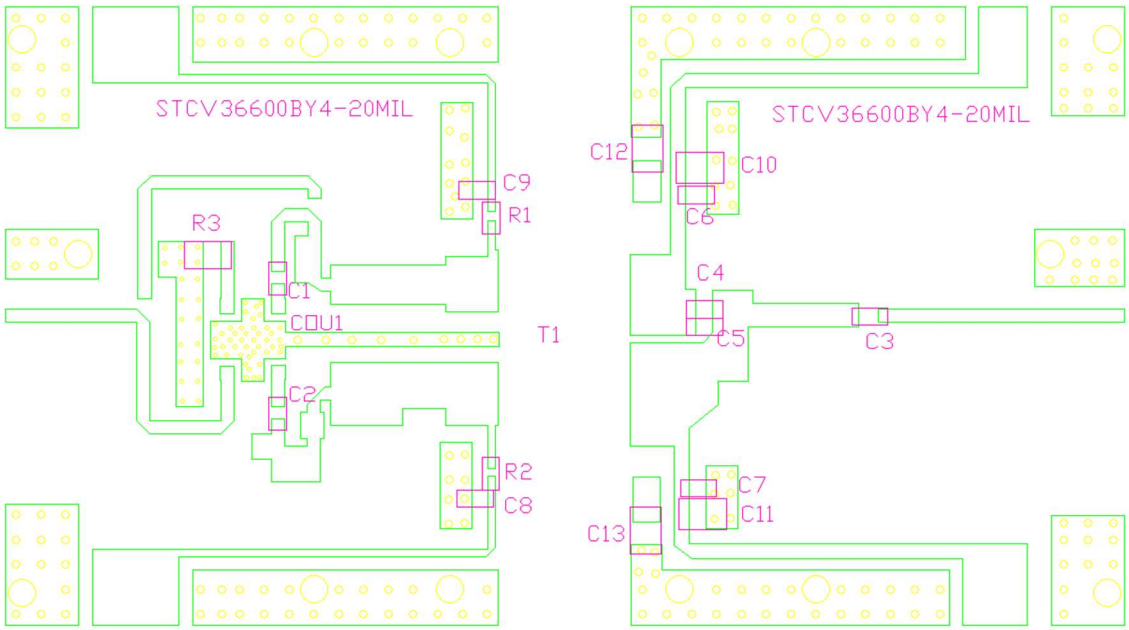
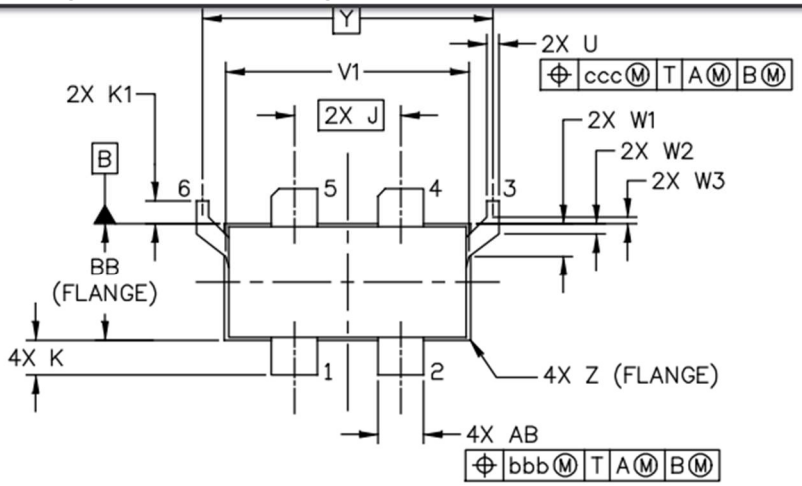
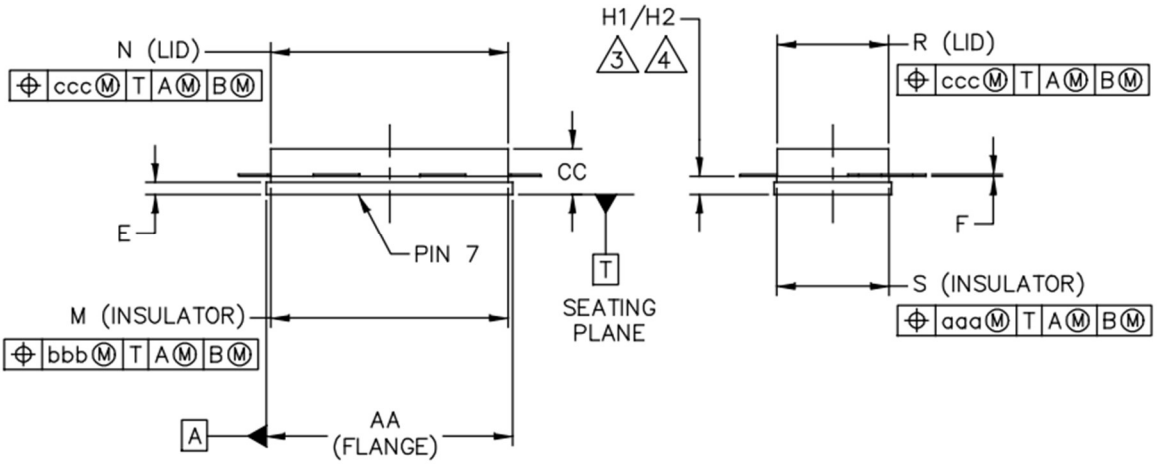


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Part	Quantity	Description	Part Number	Manufacture
C1,C2,C3,C6, C7,C8	6	8.2pFHigh Q Capacitor	251SHS8R2BSE	TEMEX
C4,C5	2	1.2pFHigh Q Capacitor	251SHS1R2BSE	TEMEX
C9	1	3.9pFHigh Q Capacitor	251SHS3R9BSE	TEMEX
C10,C11,C12,C13	4	10uF MLCC	GRM32EC72A106ME05	Murata
R1,R2	2	10Ω Power Resistor	MCR10EZHJ100	ROHM
R3	1	51Ω Power Resistor	S1206N	RN2
COU1	1	3 dB Bridge	XC3500P-03S	ANAREN
T1	1	600W GaN Dual Transistor	STCV36600BY4V	Innogration

Earless Flanged Ceramic Package; 6 leads- BY4V





DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX	DIM	INCH MIN	INCH MAX	MILLIMETER MIN	MILLIMETER MAX
AA	.805	.815	20.45	20.70	R	.365	.375	9.27	9.53
BB	.380	.390	9.65	9.91	S	.365	.375	9.27	9.53
CC	.125	.170	3.18	4.32	U	.035	.045	0.89	1.14
E	.035	.045	0.89	1.14	V1	.795	.805	20.19	20.45
F	.004	.007	0.10	0.18	W1	.0975	.1175	2.48	2.98
H1	.057	.067	1.45	1.70	W2	.0225	.0425	0.57	1.08
H2	.054	.070	1.37	1.78	W3	.0125	.0325	0.32	0.83
J	.350 BSC		8.89 BSC		Y	.956 BSC		24.28 BSC	
K	.0995	.1295	2.53	3.29	Z	R.000	R.040	R0.00	R1.02
K1	.070	.090	1.78	2.29	AB	.145	.155	3.68	3.94
M	.774	.786	19.66	19.96	aaa	.005		0.13	
N	.772	.788	19.61	20.02	bbb	.010		0.25	
					ccc	.015		0.38	

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/11/6	**V1.0**	**Preliminary Datasheet Creation**

Application data based on LWH-23-22

Notice

Specifications are subject to change without notice. Innogration believes the information within the data sheet to be reliable. Innogration makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose.
"Typical" parameter is the average values expected by Innogration in quantities and are provided for information purposes only. It can and do vary in different applications and related performance can vary over time. All parameters should be validated by customer's technical experts for each application.
Innogration products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogration product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.
For any concerns or questions related to terms or conditions, please check with Innogration and authorized distributors