



Gallium Nitride 50V, 450W, 2.5-2.7GHz RF Power Transistor

Description

The STBV27450B4VC is a 450-watt, internally matched GaN HEMT, designed for 5G cellular applications with frequencies from 2.5-2.7GHz, **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 55W average power, according to normal 9dB 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:

$V_{DD} = 50 \text{ Vdc}$, $I_{DQA} = 280 \text{ mA}$, $V_{GSB} = -4.9 \text{ Vdc}$,

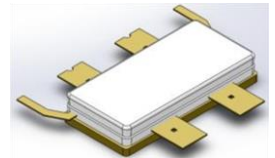
(1) Pulsed condition: 20us and 10%

(2) 1C WCDMA; Signal PAR = 10 dB @ 0.01% Probability on CCDF.

Freq (GHz)	Pulse CW Signal ⁽¹⁾				$P_{avg}=47.5\text{dBm}$ WCDMA Signal ⁽²⁾		
	P3 (dBm)	P3 (W)	P4 (dBm)	P4 (W)	Gp (dB)	η_D (%)	ACPR _{5M} (dBc)
2.5	57.00	500	57.20	524	15.13	54.60	-28.02
2.6	56.62	457	57.01	500	15.29	54.10	-28.58
2.7	56.10	407	56.35	430	15.20	53.80	-28.12

Recommended driver: Doherty 2 stages MCM SMAV2527-60

STBV27450B4VC



Applications

- Asymmetrical Doherty amplifier within N41 5G band and B41 4G band
- S band power amplifier

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

- Set VGS to the pinch-off (VP) voltage, typically -5 V
- Turn on VDS to nominal supply voltage
- Increase VGS until IDS current is attained
- Apply RF input power to desired level

Turning the device OFF

- Turn RF power off
- Reduce VGS down to VP, typically -5 V
- Reduce VDS down to 0 V
- Turn off VGS

Pin Connection definition

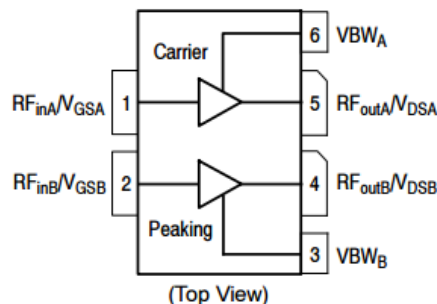




Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+200	Vdc
Gate--Source Voltage	V_{GS}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	55	Vdc
Maximum gate current	I _{gs}	57.6	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°C, at Pd=50W, on Doherty application board	R _{θJC}	1.2	°C /W

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

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{GS} =-8V; I _{DS} =21mA	V_{DSS}		200		V
Gate Threshold Voltage	V _{DS} =10V, I _D = 21mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	V _{DS} =50V, I _{DS} =250mA, Measured in Functional Test	$V_{GS(Q)}$		-3.0		V

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{GS} =-8V; I _{DS} =36mA	V_{DSS}		200		V
Gate Threshold Voltage	V _{DS} =10V, I _D = 36mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	V _{DS} =50V, I _{DS} =250mA, Measured in Functional Test	$V_{GS(Q)}$		-3.1		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	2.GHz, P _{out} =60W WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		



Figure 3: Efficiency and power gain as function of Pout (2.5-2.7GHz Doherty)

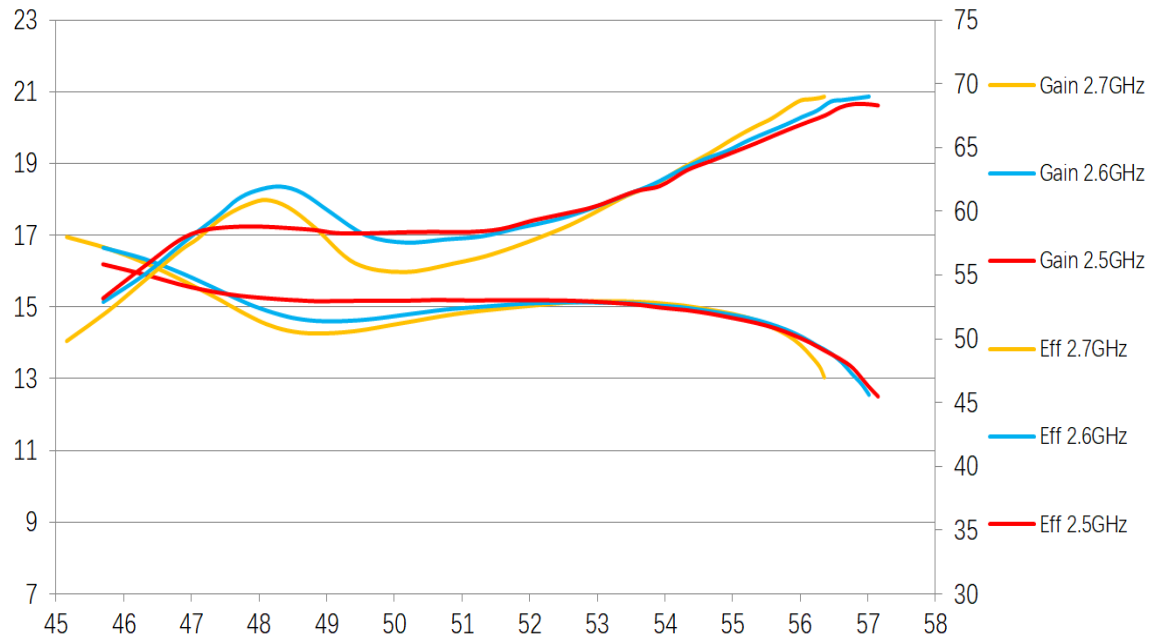


Figure 4: Network analyzer output, S11 and S21 (2.5-2.7GHz Doherty)

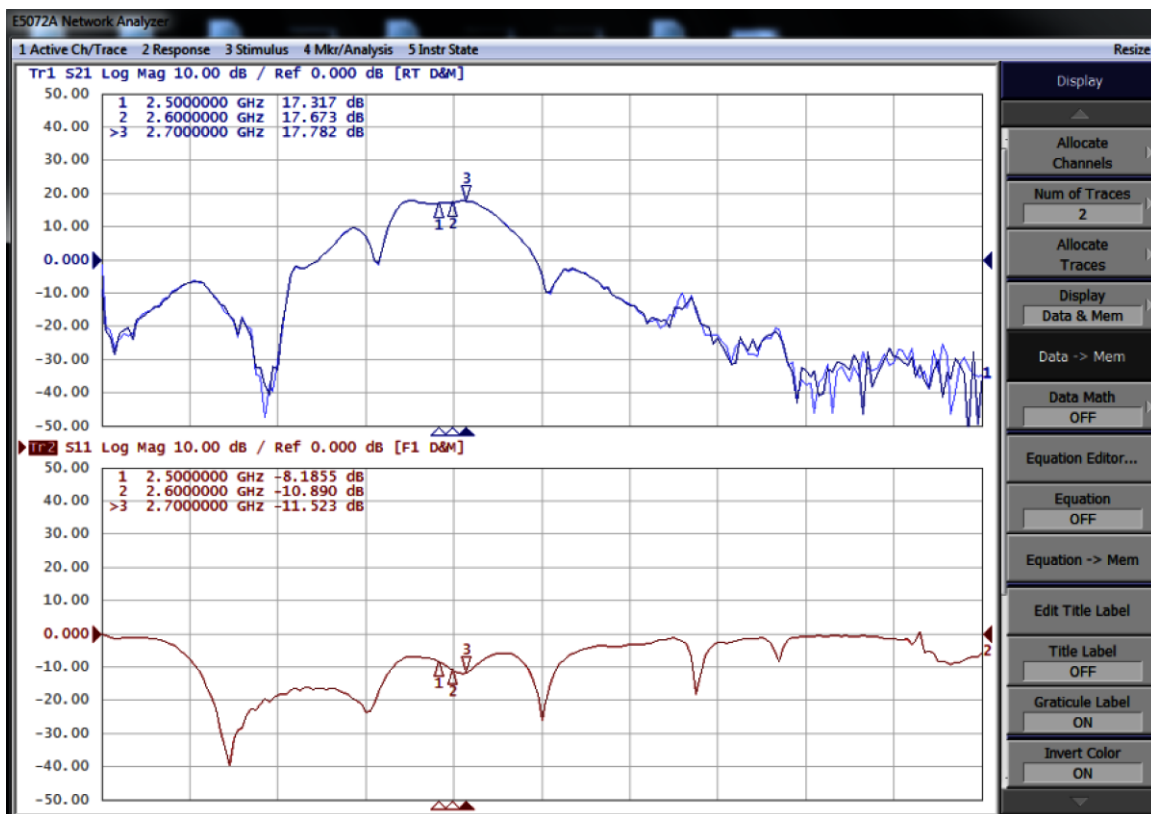


Figure 5: Picture of application board Doherty circuit for 2.5-2.7GHz

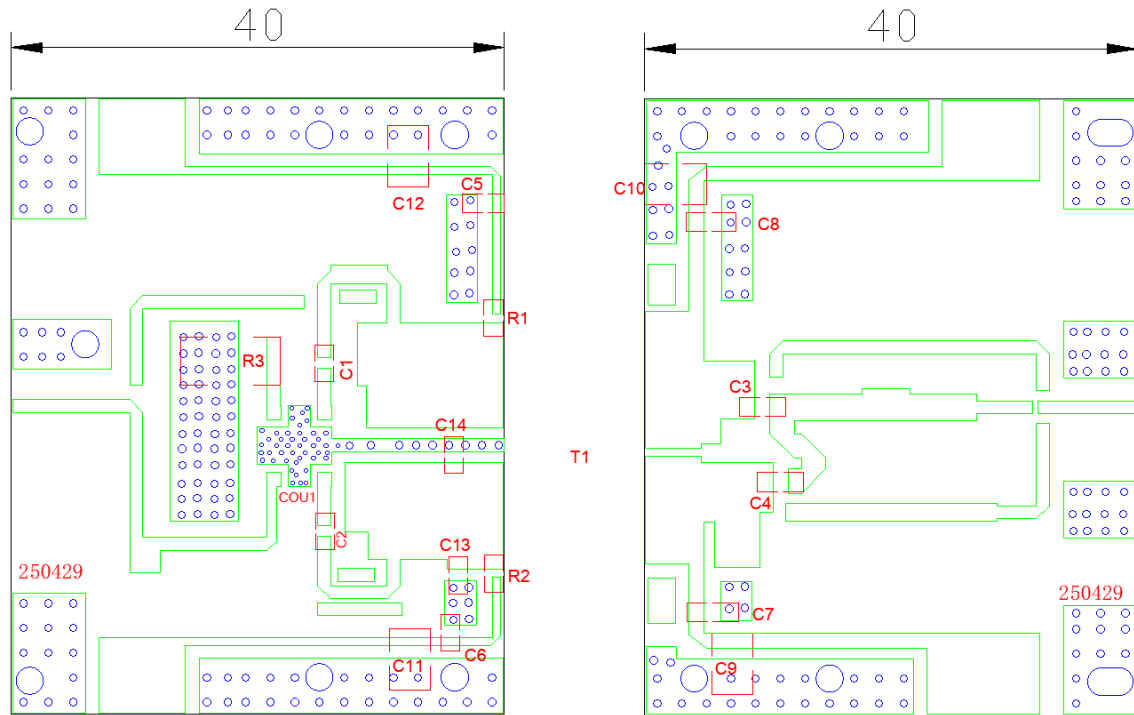
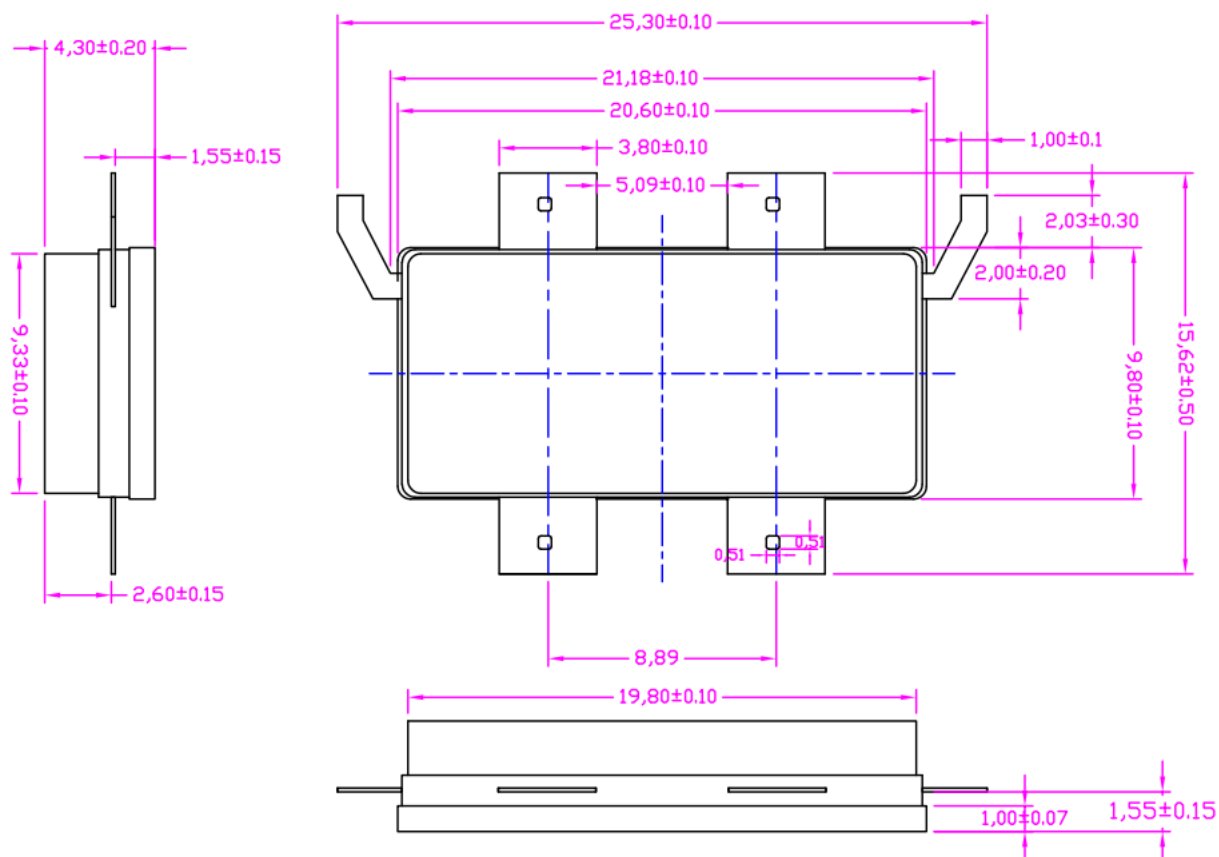


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

Part	Quantity	Description	Part Number	Manufacture
C1,C2 C5,C6,C7,C8	6	10pF High Q Capacitor	251SHS100BSE	TEMEX
C3	1	3.6pF High Q Capacitor	251SHS3R6BSE	TEMEX
C4	1	4.7pF High Q Capacitor	251SHS4R7BSE	TEMEX
C13	1	1.2pF High Q Capacitor	251SHS1R2BSE	TEMEX
C14	1	0.3pF High Q Capacitor	251SHS0R3BSE	TEMEX
C9,C10,C11,C12	4	10uF MLCC	GRM32EC72A10	Murata
R1,R2	2	10 Ω Power Resistor	ESR03EZPF100	ROHM
R3	1	50 Ω Power Resistor	S2512N	RN2
COU1	1	2 dB Bridge	DC2500P02	YT
T1	1	450W GaN Dual Transistor	STBV27450B4VC	Innogrations

Earless Flanged Ceramic Package; 6 leads- B4VC



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2025/4/29	V1.0	Preliminary Datasheet Creation

Application data based on LWH-25-16

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