



Gallium Nitride 50V, 600W,0.6-1GHz RF Power Transistor

Description

The STCV10600RBY4 is a 600watt Doherty pair capable, GaN HEMT, ideal for for 4G/5G cellular applications up to 1GHz.

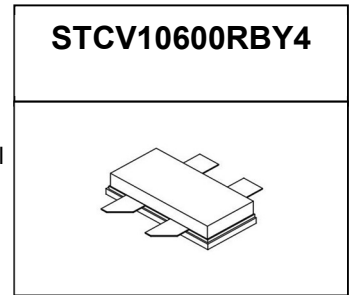
It can be configured as asymmetrical Doherty delivering 80-100W average power, according to normal 8-9dB back off.

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

- Typical RF performance on 578-678MHz Doherty

V_{DD} = 50 Vdc, I_{DQ_main} = 100mA, V_{gs_peak}=-4.9V, 1 carrier WCDMA signal PAR=10.5dB

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Eff (%)
578	50	7.91	57.94	623.0	-28.6	17.3	61.5
628	50	7.70	57.70	589.2	-30.0	17.8	60.0
678	50	8.08	58.07	641.9	-31.8	16.9	60.1



Applications

- Asymmetrical Doherty amplifier within <1GHz
- UHF TV
- P band communication

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set V_{GS} to the pinch-off (V_P) voltage, typically -5 V
2. Turn on V_{DS} to nominal supply voltage
3. Increase V_{GS} until I_{DS} current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce V_{GS} down to V_P, typically -5 V
3. Reduce V_{DS} down to 0 V
4. Turn off V_{GS}

Figure 1: Pin Connection definition

Transparent top view (Backside grounding for source)

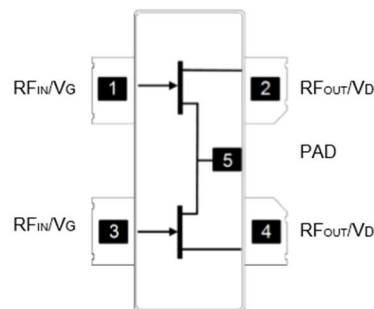


Table 1. Maximum Ratings

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	I _{gs}	82	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=60W, on Doherty application board	R _{θJC}	1.5	°C /W

Table 3. Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	700MHz, P _{out} =100W pulse CW for All phase, No device damages	VSWR		10:1		

Figure 2: Median Lifetime vs. Channel Temperature

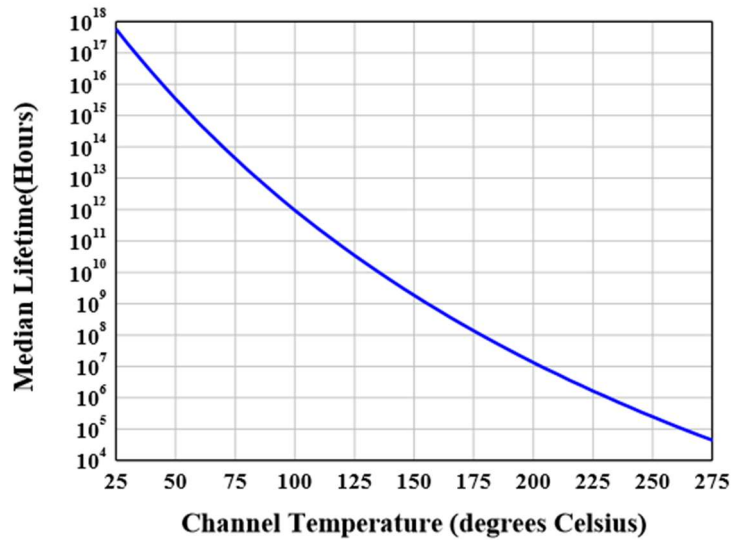




Figure 3: Efficiency and power gain as function of Pout (578-678MHz Doherty)

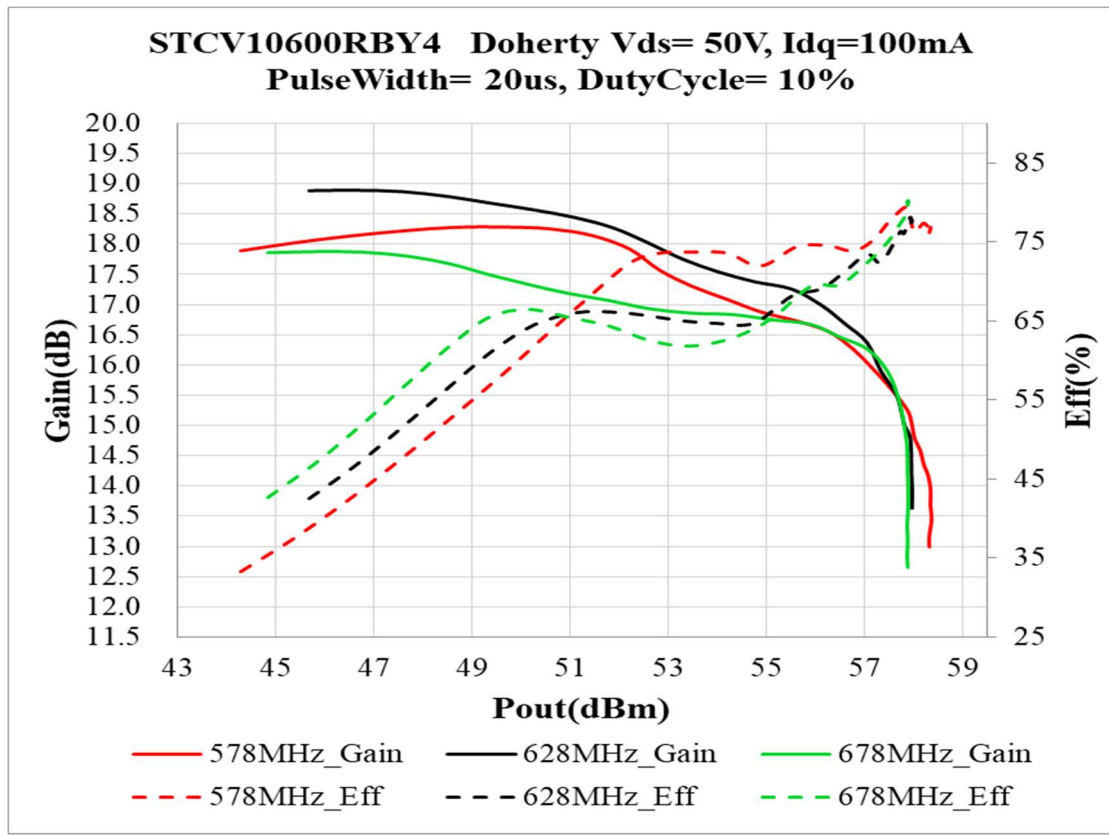


Figure 4: Network analyzer output, S11 and S21 (578-678MHz Doherty)

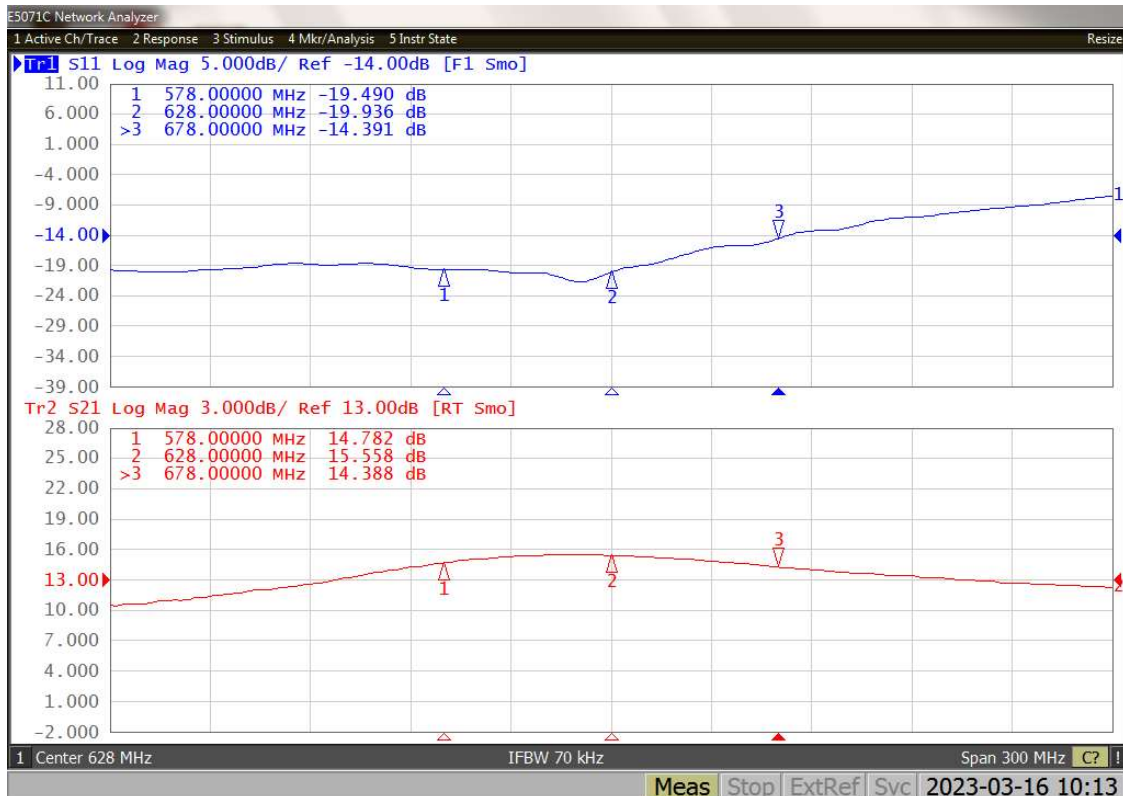


Figure 5: Picture of application board Doherty circuit for 578-678MHz

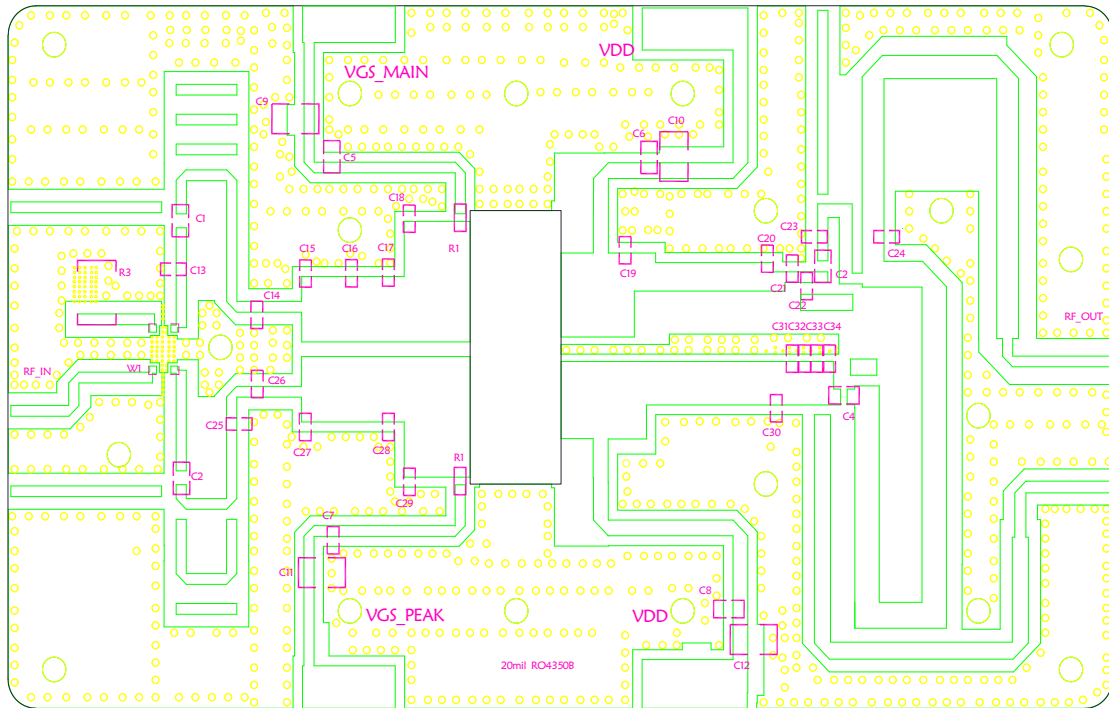
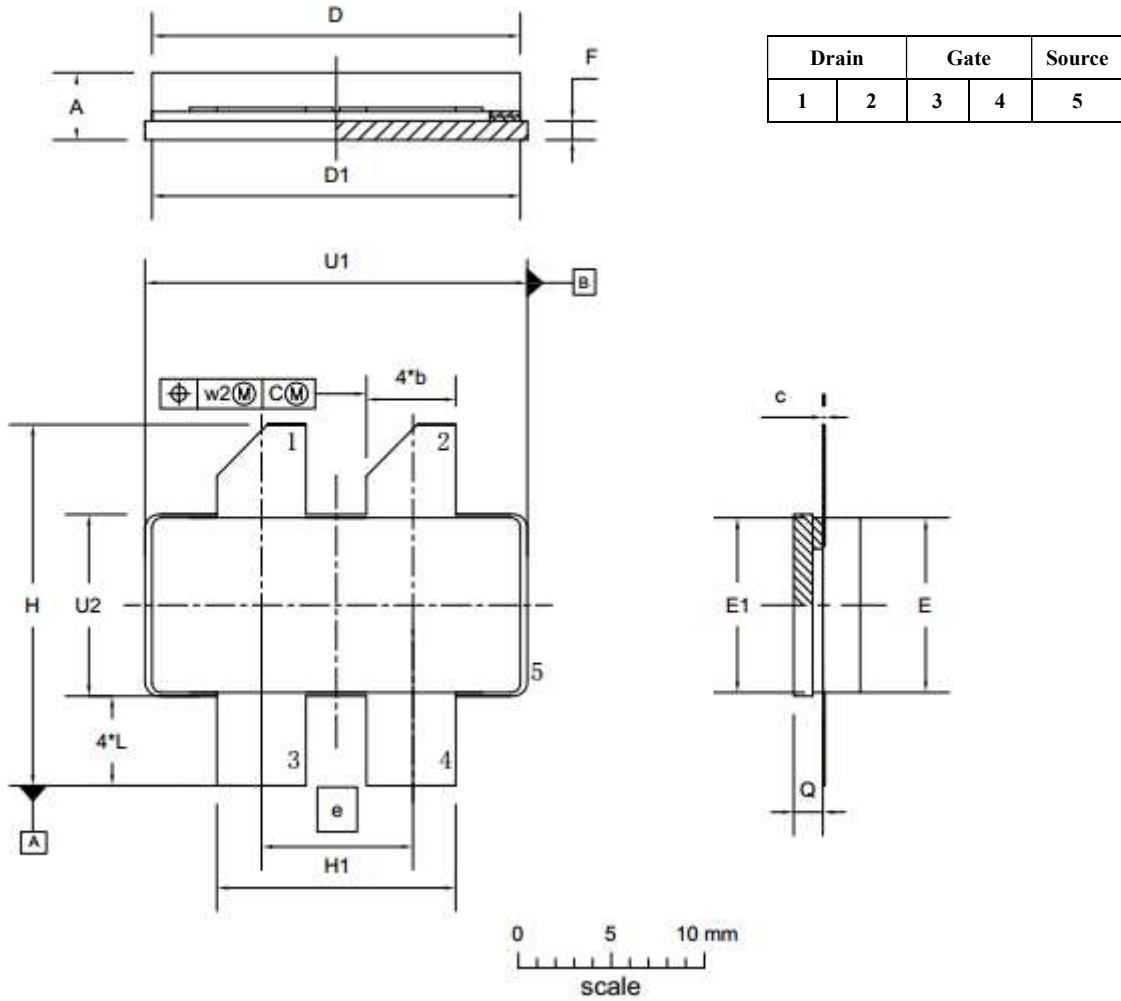


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 30mils)

Designator	Footprint	Description	Manufacture	Quantity
C1, C2, C3, C4, C5, C6, C7, C8	0603/0805	100pF High Q Capacitor	TEMEX/ATC	8
C9, C10, C11, C12	1210	100uF/100V	Maruata	4
C13, C19, C23, C32	0603/0805	2.0pF High Q Capacitor	TEMEX/ATC	4
C14, C15, C17, C18, C25, C27, C28, C29	0603/0805	10pF High Q Capacitor	TEMEX/ATC	8
C16, C21, C22, C33, C34	0603/0805	6.8pF High Q Capacitor	TEMEX/ATC	5
C26	0603/0805	2.2 pF High Q Capacitor	TEMEX/ATC	1
C20, C24	0603/0805	1.0 pF High Q Capacitor	TEMEX/ATC	2
C30, C31	0603/0805	3.3 pF High Q Capacitor	TEMEX/ATC	2
R1,R2	0603	10Ω		2
R3	2512	51 Ω power resistor		1
W1		2 dB Bridge X3C07F1-02S	Anaren	1



Earless Flanged Ceramic Package; 4 leads



UNIT	A	b	c	D	D ₁	e	E	E ₁	F	H	H ₁	L	Q	U ₁	U ₂	W ₁	W ₂
mm	4.72	4.67	0.15	20.02	19.96	7.90	9.50	9.53	1.14	19.94	12.98	5.33	1.70	20.70	9.91	0.25	0.51
	3.43	4.93	0.08	19.61	19.66		9.30	9.25	0.89	18.92	12.73	4.32	1.45	20.45	9.65		
inches	0.186	0.194	0.006	0.788	0.786	0.311	0.374	0.375	0.045	0.785	0.511	0.210	0.067	0.815	0.390	0.01	0.02
	0.135	0.184	0.003	0.772	0.774		0.366	0.364	0.035	0.745	0.501	0.170	0.057	0.805	0.380		

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-B4					03/12/2013



Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2023/3/16	V1.0	Preliminary Datasheet Creation
2023/6/9	V1.1	Combined version to support 1GHz

Application data based on:LSM-23-10

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