



GaN HEMT 50V, 140W, 758-960MHz full band Doherty Transistor

Description

The STBV10W140B4C is a 140 watt capable, GaN HEMT, ideal for 4G/5G cellular applications from 758 to 960MHz full band Doherty operation.

It can be configured as Asymmetrical Doherty delivering 20-25W 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 **758-960MHz full band symmetrical Doherty** with device soldered

$V_{DS}=50V$, $I_{DQM}=40mA$ ($V_{GS}M=-3V$), $V_{GS}P=-5.3V$

Freq (MHz)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)	P1dB Gain(dB)	P4dB (dBm)	P4dB (W)	P4dB Eff(%)
758	51.58	144.0	72.0	15.55	51.71	148.2	72.2
800	51.49	140.9	70.0	16.03	51.51	141.7	69.8
860	52.23	167.3	71.3	16.41	52.27	168.8	70.5
900	51.46	140.1	72.1	16.68	51.77	150.3	69.4
960	51.46	139.9	70.8	16.09	51.48	140.6	70.0

ACPR @43.5dBm_1C-WCDMA

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
758	43.53	8.79	52.32	170.5	-27.3	15.1	52.2
800	43.51	8.69	52.20	165.9	-32.4	16.2	55.0
860	43.48	9.24	52.72	187.2	-33.3	16.1	57.9
900	43.48	8.68	52.16	164.6	-32.0	16.3	59.1
960	43.51	8.51	52.03	159.5	-28.5	16.6	52.7

Applications

- Asymmetrical wideband Doherty amplifier within 0.6-1GHz
- UHF TV
- P 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

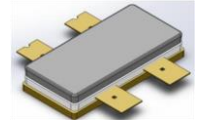
Turning the device OFF

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

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}	33.6	mA
Storage Temperature Range	T_{stg}	-65 to +150	°C

STBV10W140B4C





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 $P_d = 25\text{W}$, on Doherty application board	$R_{\theta JC}$	3.0	°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	$V_{GS} = -8\text{V}$; $I_{DS} = 7.5\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 7.5\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 40\text{mA}$, 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	$V_{GS} = -8\text{V}$; $I_{DS} = 15\text{mA}$	V_{DSS}		200		V
Gate Threshold Voltage	$V_{DS} = 10\text{V}$, $I_D = 15\text{mA}$	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	$V_{DS} = 50\text{V}$, $I_{DS} = 80\text{mA}$, Measured in Functional Test	$V_{GS(Q)}$		-3.0		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	960MHz, $P_{out} = 25\text{W}$ WCDMA 1 Carrier in Doherty circuit All phase, No device damages	VSWR		10:1		



Figure 2: Network analyzer output, S11 and S21

$V_{DS} = 50V$, $I_{DQM} = 40mA$ ($V_{GS} = -3.0V$), $V_{GS} = -5.3V$

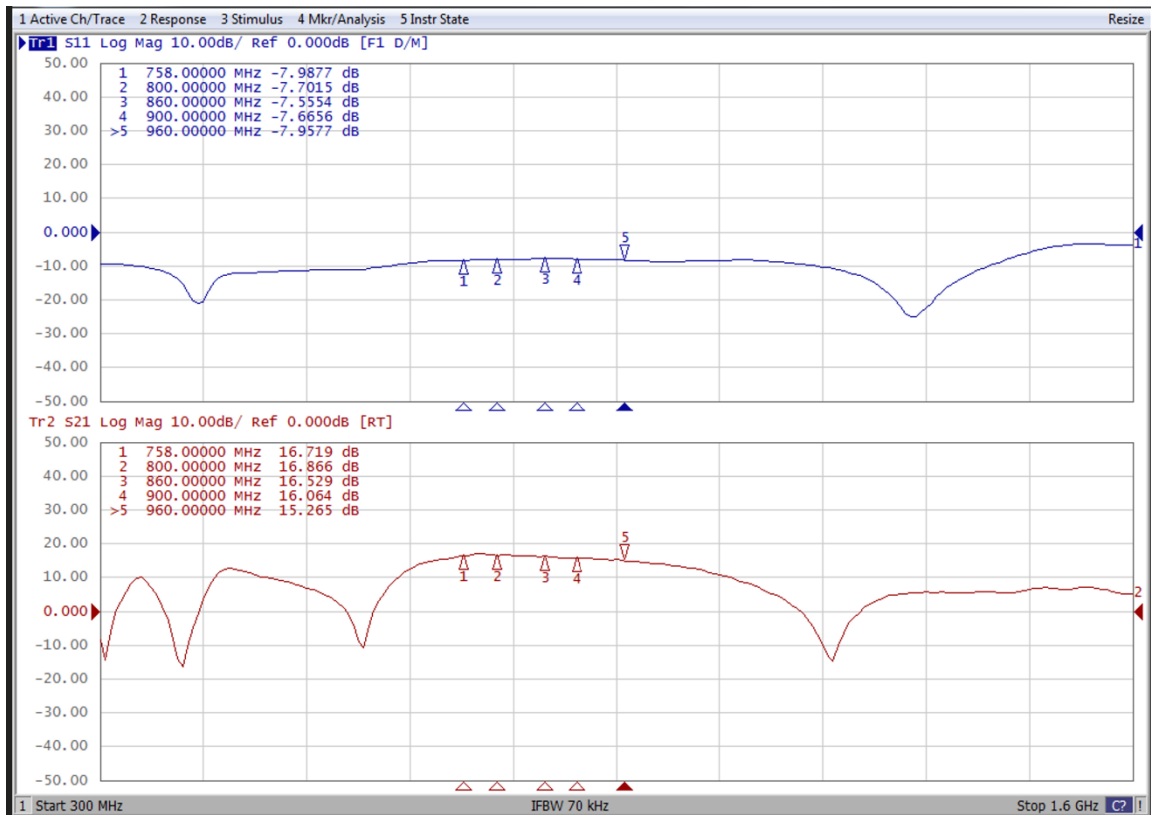


Figure 3: Efficiency and power gain as function of Pout

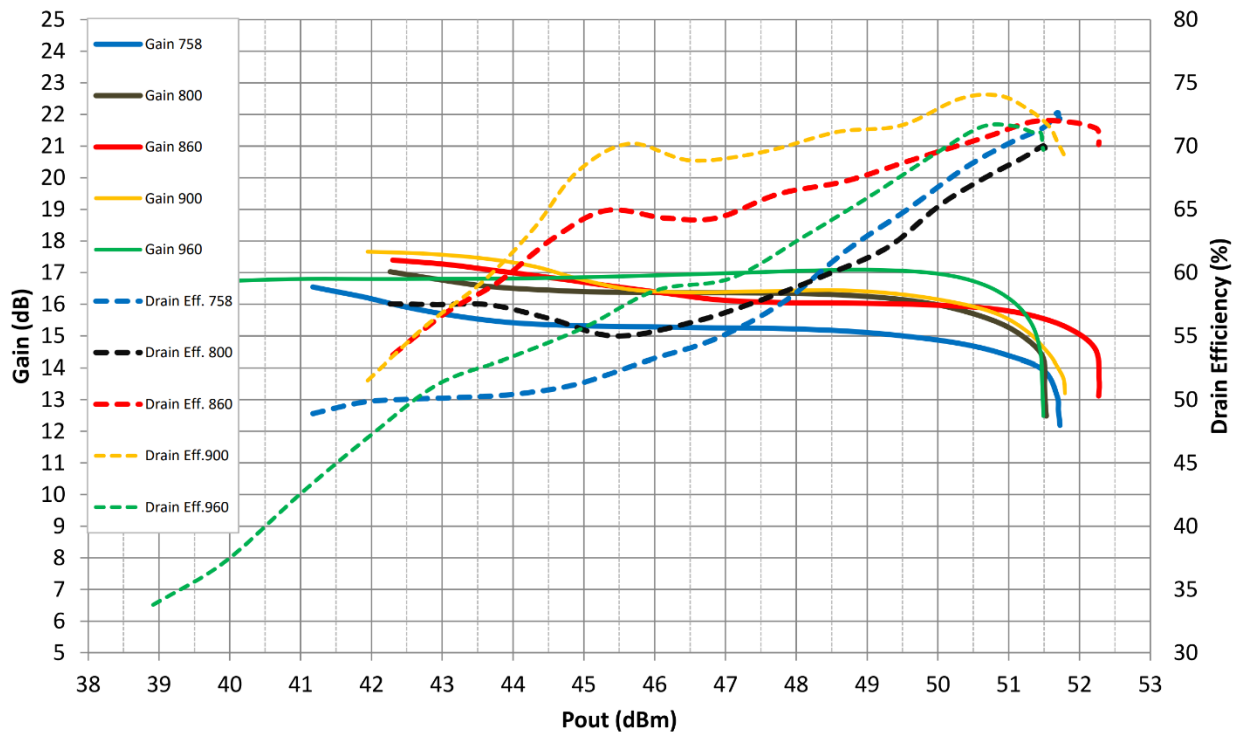
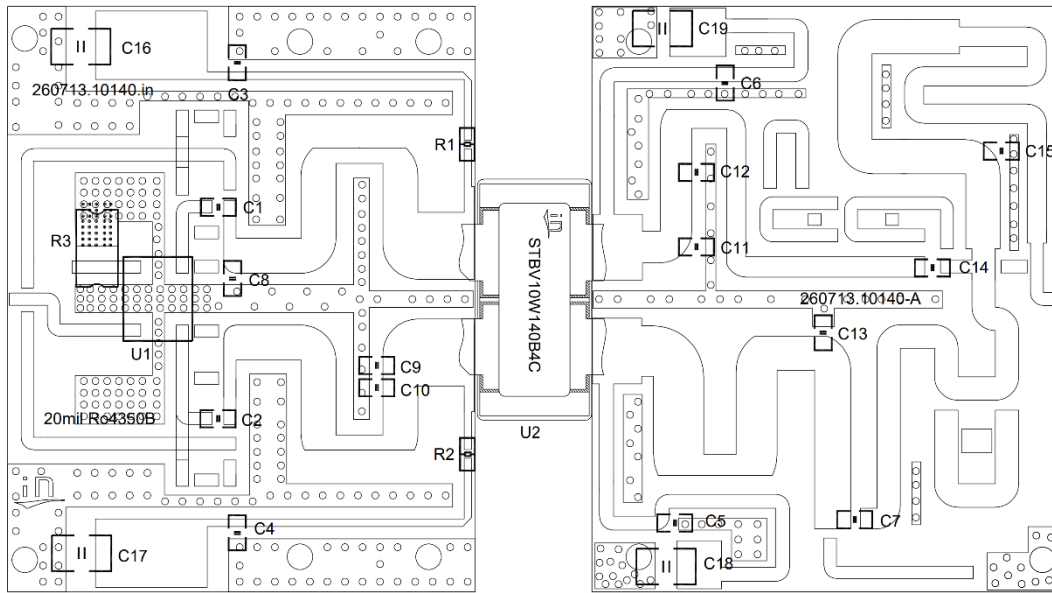


Figure 4: Picture of application board Doherty circuit

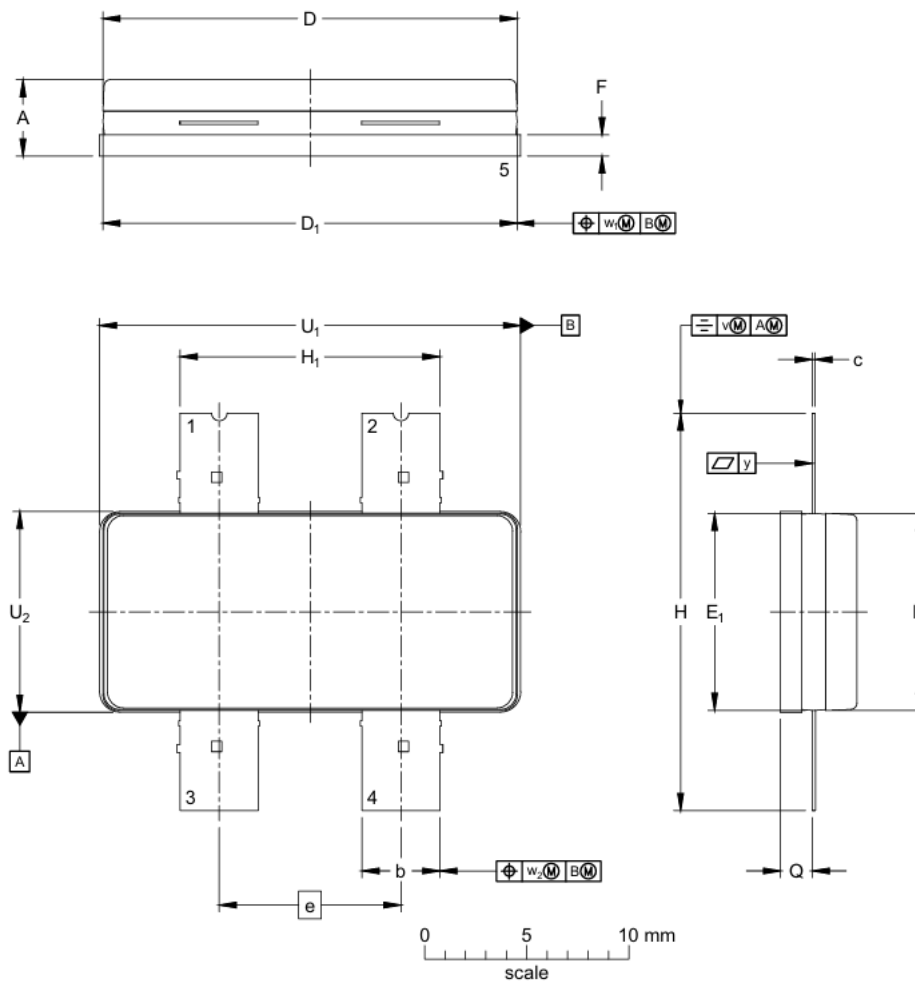


BOM of Test Circuit

Reference	Footprint	Value	Quantity
C1, C2	0603	10pF/250V	2
C3, C4, C5, C6, C7	0603	47pF/250V	5
C8, C11, C12, C13	0603	1.1pF/250V	4
C9, C10	0603	2.2pF/250V	2
C14	0603	12pF/250V	1
C15	0603	0.8pF/250V	1
C16, C17, C18, C19	1210	10uF/100V	4
R1, R2	0603	10R	2
R3	2512	51R	1
U1	3.18*5.08mm	DC07F02	1
U2	B4C	STBV10W140B4C ^{V0}	1



Earless Flanged Plastic Air Cavity Package; 4 leads



Dimensions																			
	Unit	A	b	c	D	D ₁	E	E ₁	e	F	H	H ₁	Q ⁽¹⁾	U ₁	U ₂	v	w ₁	w ₂	y
mm	max	4.01	3.91	0.18	20.42	20.37	9.80	9.75	8.89	1.14	19.53	12.83	1.68	20.70	9.91	0.50	0.50	0.50	0.10
	nom min	3.40	3.71	0.13	20.12	20.17	9.50	9.55		0.94	19.33	12.57	1.45	20.50	9.70				

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2026/7/31	V1.0	Preliminary datasheet creation

Application data based on: ZBB-26-13

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