



GaN 50V, 500W,758-960MHz full band Doherty Transistor

Description

The STDV10500BY4V is a 500watt Doherty pair capable, GaN HEMT, ideal for full band 4G/5G Cellular applications from 758-960MHz..

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

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

- Typical Pulse CW/WCDMA performance on 758-960MHz Doherty

V_{DD} = 50 Vdc, I_{DQ_main} = 100mA, V_{gs_peak}=-6.8V, Pulse condition: 100us 10%

| Freq (MHz) | P5dB (dBm) | P5dB (W) | P5dB Eff(%) |
|------------|------------|----------|-------------|
| 758 | 57.96 | 625.8 | 73.9 |
| 810 | 57.27 | 533.8 | 76.0 |
| 860 | 57.36 | 544.6 | 73.9 |
| 910 | 57.66 | 583.4 | 77.5 |
| 960 | 57.18 | 522.7 | 79.8 |

V_{DD} = 50 Vdc, I_{DQ_main} = 100mA, V_{gs_peak}=-6.8V, 1C WCDMA

| ACPR @49.1dBm_1C-WCDMA | | | | | | | |
|------------------------|------------|-----------|-------------|-----------|------------|-----------|----------------|
| Freq (MHz) | Pout (dBm) | CCDF (dB) | Ppeak (dBm) | Ppeak (W) | ACPR (dBc) | Gain (dB) | Efficiency (%) |
| 758 | 49.09 | 8.82 | 57.91 | 617.5 | -33.2 | 17.6 | 55.5 |
| 810 | 49.09 | 8.17 | 57.26 | 531.6 | -28.3 | 19.3 | 61.5 |
| 860 | 49.09 | 7.93 | 57.02 | 503.1 | -28.5 | 20.1 | 61.8 |
| 910 | 49.09 | 8.97 | 58.06 | 639.6 | -35.6 | 19.6 | 57.1 |
| 960 | 49.07 | 8.52 | 57.59 | 574.3 | -32.3 | 18.1 | 54.7 |

Applications

- symmetrical 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

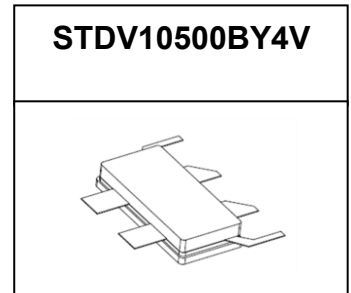
1. Set V_{GS} to the pinch--off (V_P) voltage, typically -5 V
2. Turn on V_{DS} to nominal supply voltage
3. Increase V_{GS} until I_{DS} current is attained
4. Apply RF input power to desired level

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)



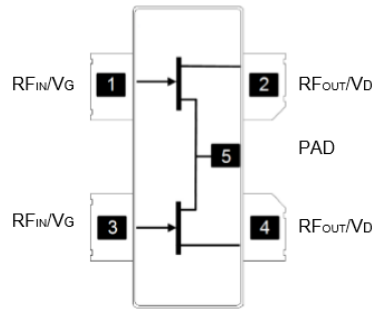


Table 1. Maximum Ratings

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------------|------|
| Drain--Source Voltage | V_{DS} | +200 | Vdc |
| Gate--Source Voltage | V_{GS} | -8 to +0.5 | Vdc |
| Operating Voltage | V_{DD} | 55 | Vdc |
| Maximum gate current | I_{gs} | 62 | 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 $T_c = 85^\circ\text{C}$, at $P_d = 55\text{W}$, on Doherty application board | $R_{\theta JC}$ | 1.6 | °C /W |

Table 3. Ruggedness Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------|--|--------|-----|------|-----|------|
| Load mismatch capability | 800MHz, $P_{out} = 80\text{W}$ pulse CW for All phase, No device damages | VSWR | | 10:1 | | |

Figure 2: Median Lifetime vs. Channel Temperature

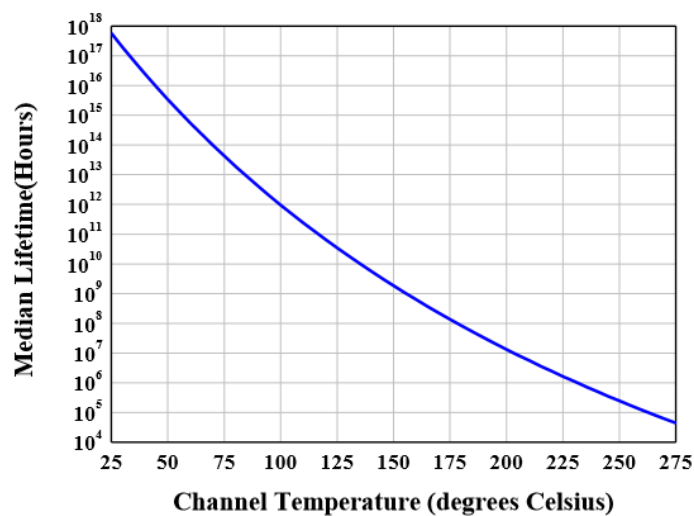




Figure 3: Efficiency and power gain as function of Pout (758-960MHz Doherty)

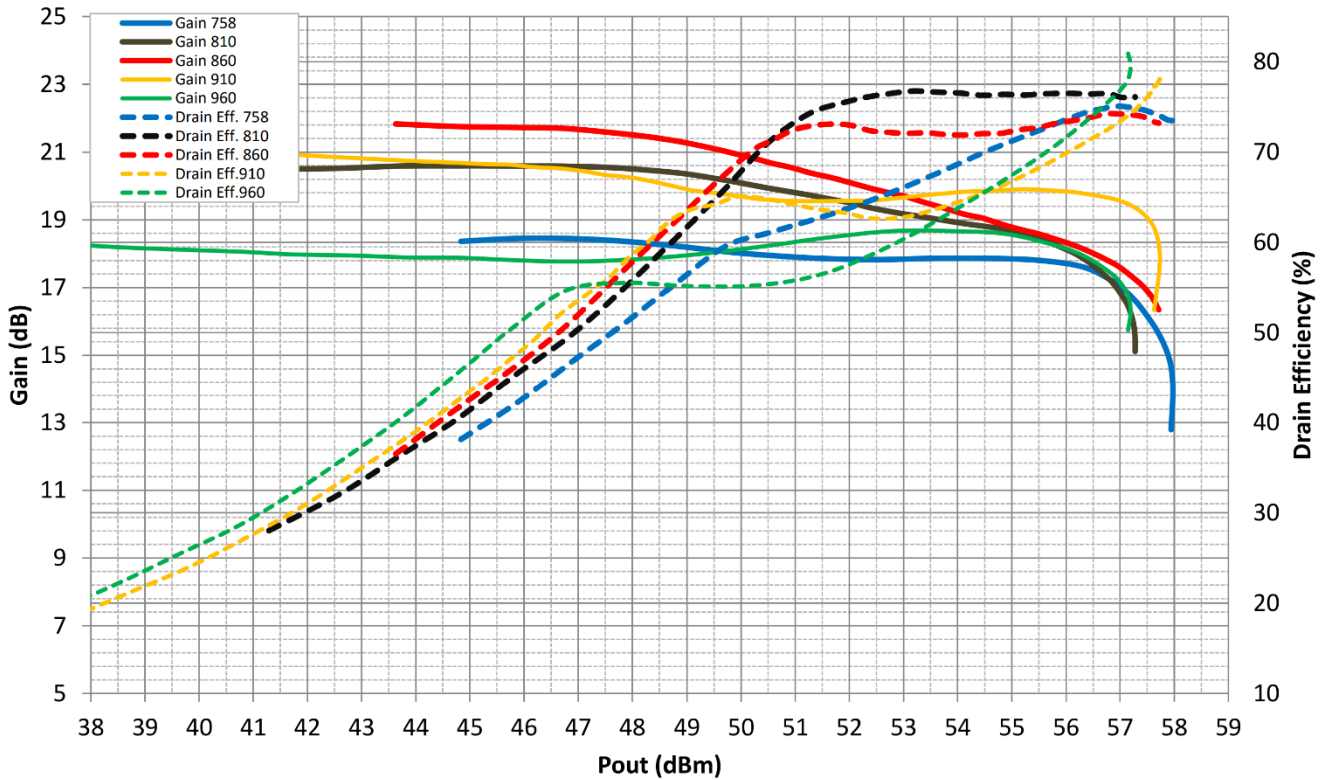


Figure 4: Network analyzer output, S11 and S21 (758-960MHz Doherty)

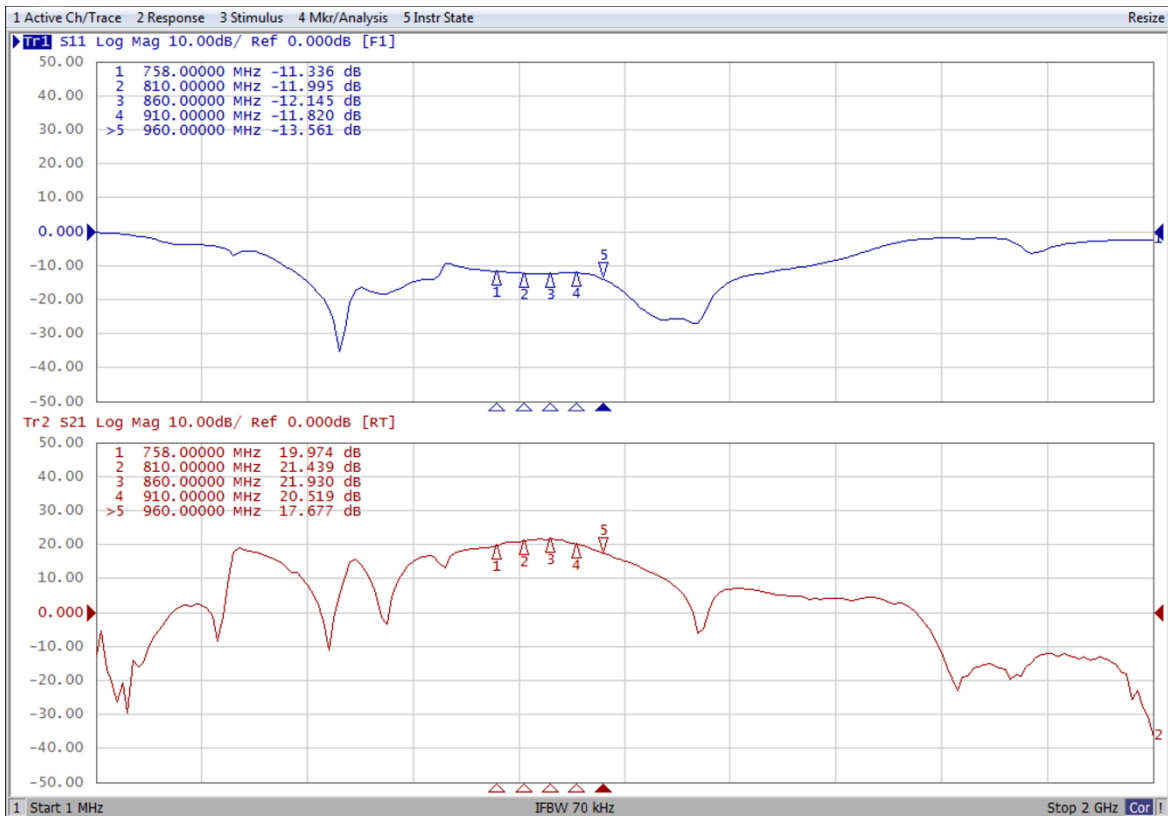


Figure 5: Picture of application board Doherty circuit for 758-960MHz

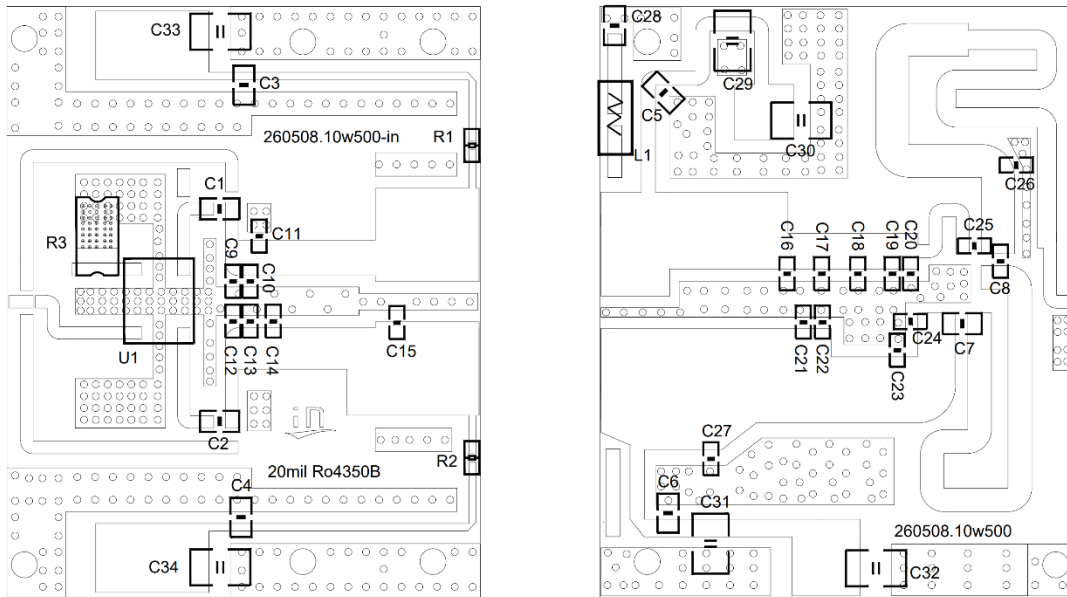
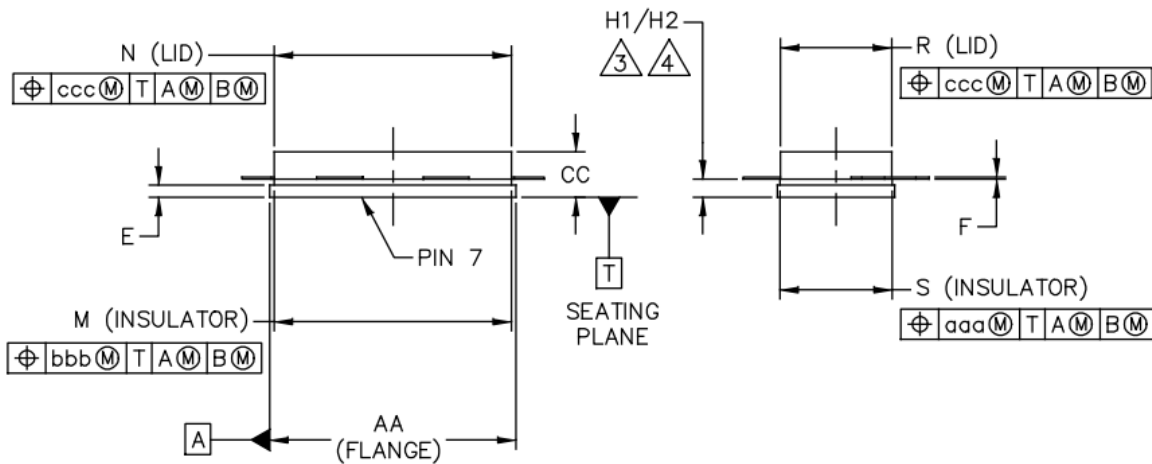
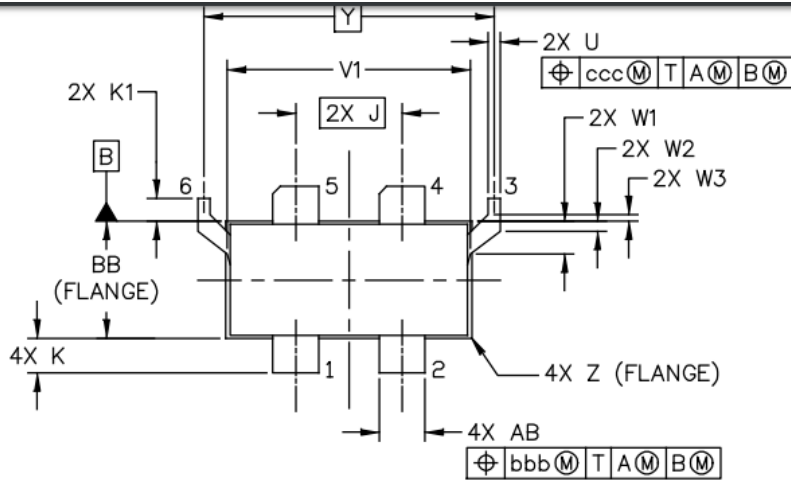


Table 4. Bill of materials of application board (PCB layout upon request, RO4350B 20mils)

| Reference | Footprint | Value | Quantity |
|------------------------------|-------------|----------------|----------|
| C1, C2 | 0603 | 10pF/250V | 2 |
| C3, C4, C5, C6, C7, C8 | 0603 | 47pF/250V | 6 |
| C9, C10, C12, C15, C24 | 0603 | 3.9pF/250V | 5 |
| C13, C16, C17, C18, C19 | 0603 | 2.2pF/250V | 5 |
| C14 | 0603 | 1.0pF/250V | 1 |
| C20 | 0603 | 1.5pF/250V | 1 |
| C21 | 0603 | 1.8pF/250V | 1 |
| C22 | 0603 | 5.1pF/250V | 1 |
| C23 | 0603 | 0.3pF/250V | 1 |
| C25 | 0603 | 15pF/250V | 1 |
| C26 | 0603 | 0.5pF/250V | 1 |
| C27 | 0603 | 3.0pF/250V | 1 |
| C28 | 0805 | 150pF/250V | 1 |
| L1 | 4.45X4.45mm | 5nH | 1 |
| C29, C30, C31, C32, C33, C34 | 0603 | 10uF/100V | 6 |
| R1, R2 | 0603 | 10R | 2 |
| R3 | 2512 | 51R | 1 |
| U1 | 3.18*5.08mm | DC07F02 | 1 |
| U2 | BY4V | STDV10W500BY4V | 1 |



Earless Flanged Ceramic Package; 6 leads- BY4V



| DIM | INCH | | MILLIMETER | | DIM | INCH | | MILLIMETER | |
|-----|----------|-------|------------|-------|-----|----------|-------|------------|-------|
| | MIN | MAX | MIN | MAX | | MIN | MAX | MIN | 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 |
|----------|----------|--------------------------------|
| 2026/5/9 | V1.0 | Preliminary Datasheet Creation |
| | | |

Application data based on: ZBB-26-07

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