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1 Electrical data

1.1 Maximum ratings

($T_{CASE} = 25\text{ °C}$).

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|---------------------|--|-------------|--------------------|
| $V_{(BR)DSS}^{(1)}$ | Drain source voltage | 125 | V |
| V_{DGR} | Drain-gate voltage ($R_{GS} = 1\text{ M}\Omega$) | 125 | V |
| V_{GS} | Gate-source voltage | ± 20 | V |
| I_D | Drain current | 20 | A |
| P_{DISS} | Power dissipation | 389 | W |
| T_J | Max. operating junction temperature | 200 | $^{\circ}\text{C}$ |
| T_{STG} | Storage temperature | -65 to +150 | $^{\circ}\text{C}$ |

1. $T_J = 150\text{ }^{\circ}\text{C}$

1.2 Thermal data

Table 3. Thermal data

| Symbol | Parameter | Value | Unit |
|------------|------------------------------------|-------|----------------------|
| R_{thJC} | Junction - case thermal resistance | 0.45 | $^{\circ}\text{C/W}$ |

2 Electrical characteristics

($T_{CASE} = 25\text{ }^{\circ}\text{C}$).

2.1 Static

Table 4. Static (per side)

| Symbol | Test conditions | | | Min | Typ | Max | Unit |
|-------------------|------------------------|--------------------------|--------------------|-----------------|-----|-----|---------------|
| $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}$ | $I_{DS} = 100\text{ mA}$ | | 125 | | | V |
| I_{DSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 50\text{ V}$ | | | | 50 | μA |
| I_{GSS} | $V_{GS} = 20\text{ V}$ | $V_{DS} = 0\text{ V}$ | | | | 250 | nA |
| $V_{GS(Q)}^{(1)}$ | $V_{DS} = 10\text{ V}$ | $I_D = 250\text{ mA}$ | | See table below | | | V |
| $V_{DS(ON)}$ | $V_{GS} = 10\text{ V}$ | $I_D = 10\text{ A}$ | | | | 3.0 | V |
| G_{FS} | $V_{DS} = 10\text{ V}$ | $I_D = 5\text{ A}$ | | 5 | 6 | | mho |
| C_{ISS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 50\text{ V}$ | $f = 1\text{ MHz}$ | | 480 | | pF |
| C_{OSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 50\text{ V}$ | $f = 1\text{ MHz}$ | | 190 | | pF |
| C_{RSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 50\text{ V}$ | $f = 1\text{ MHz}$ | | 18 | | pF |

1. $V_{GS(Q)}$ sorted with alpha/numeric code marked on unit.

2.2 Dynamic

Table 5. Dynamic

| Symbol | Test conditions | | | Min | Typ | Max | Unit |
|---------------|------------------------|--------------------------|--------------------------|------|-----|-----|------|
| P_{OUT} | $V_{DD} = 50\text{ V}$ | $I_{DQ} = 250\text{ mA}$ | $f = 175\text{ MHz}$ | 150 | | | W |
| G_{PS} | $V_{DD} = 50\text{ V}$ | $I_{DQ} = 250\text{ mA}$ | $P_{OUT} = 150\text{ W}$ | 14 | 15 | | dB |
| η_D | $V_{DD} = 50\text{ V}$ | $I_{DQ} = 250\text{ mA}$ | $P_{OUT} = 150\text{ W}$ | 55 | 65 | | % |
| Load mismatch | $V_{DD} = 50\text{ V}$ | $I_{DQ} = 250\text{ mA}$ | $P_{OUT} = 150\text{ W}$ | 10:1 | | | VSWR |
| | All phase angles | | | | | | |

Table 6. V_{GS} sorts

| Symbol | Value | Symbol | Value |
|--------|-----------|--------|-----------|
| A | 2.0 - 2.1 | K | 2.9 - 3.0 |
| B | 2.1 - 2.2 | L | 3.0 - 3.1 |
| C | 2.2 - 2.3 | M | 3.1 - 3.2 |
| D | 2.3 - 2.4 | N | 3.2 - 3.3 |
| E | 2.4 - 2.5 | P | 3.3 - 3.4 |
| F | 2.5 - 2.6 | Q | 3.4 - 3.5 |
| G | 2.6 - 2.7 | R | 3.5 - 3.6 |
| H | 2.7 - 2.8 | S | 3.6 - 3.7 |
| J | 2.8 - 2.9 | | |

3 Transient thermal impedance

Figure 2. Transient thermal impedance

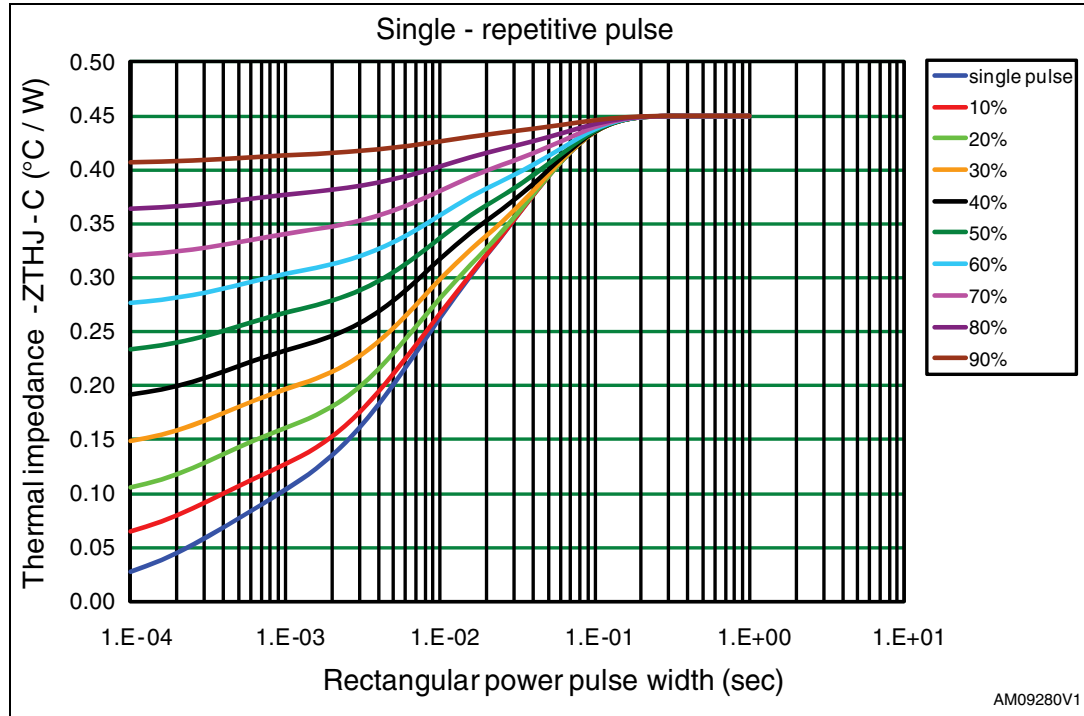
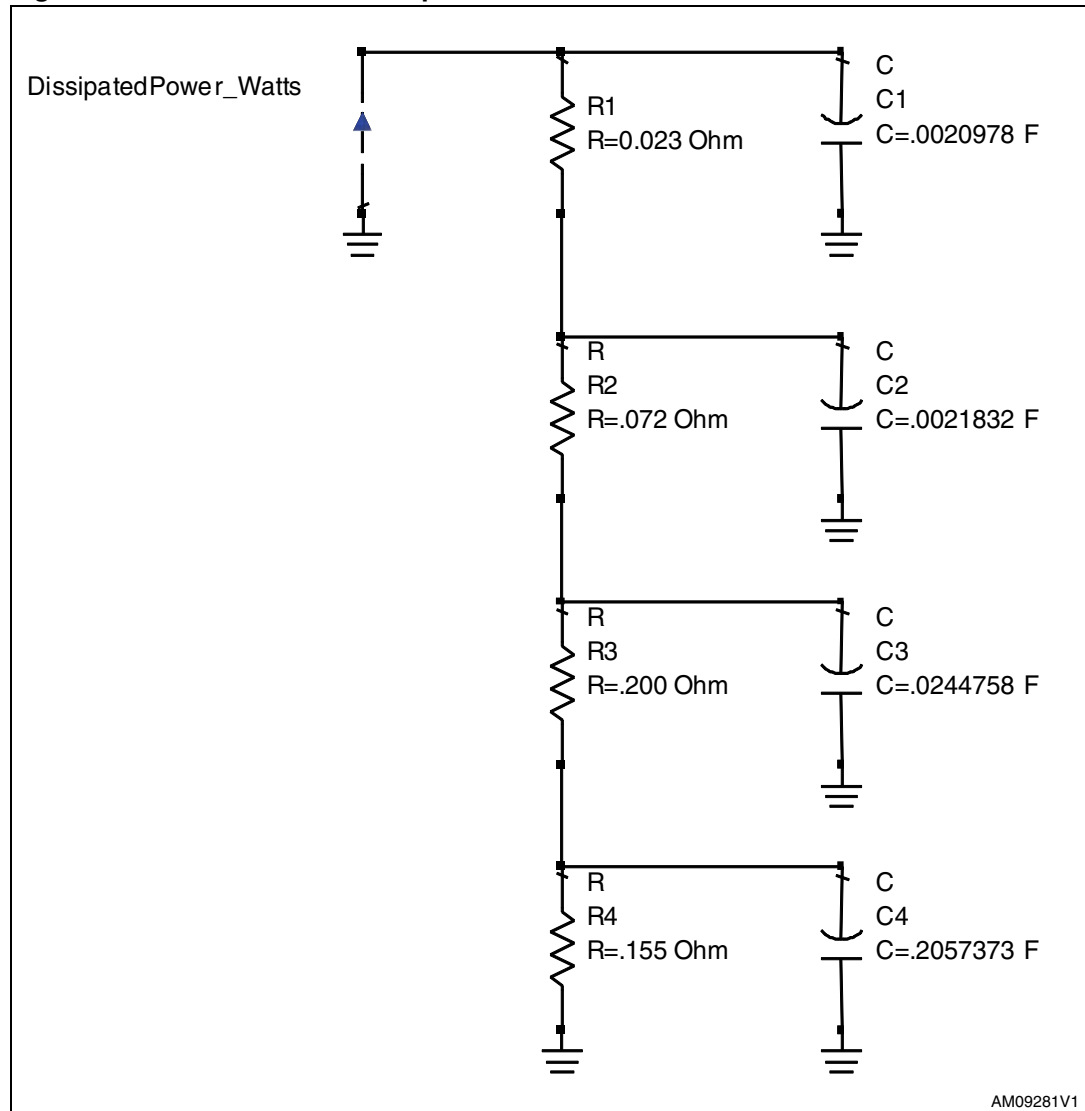


Figure 3. Transient thermal impedance model



4 Impedance data

Figure 4. Impedance data

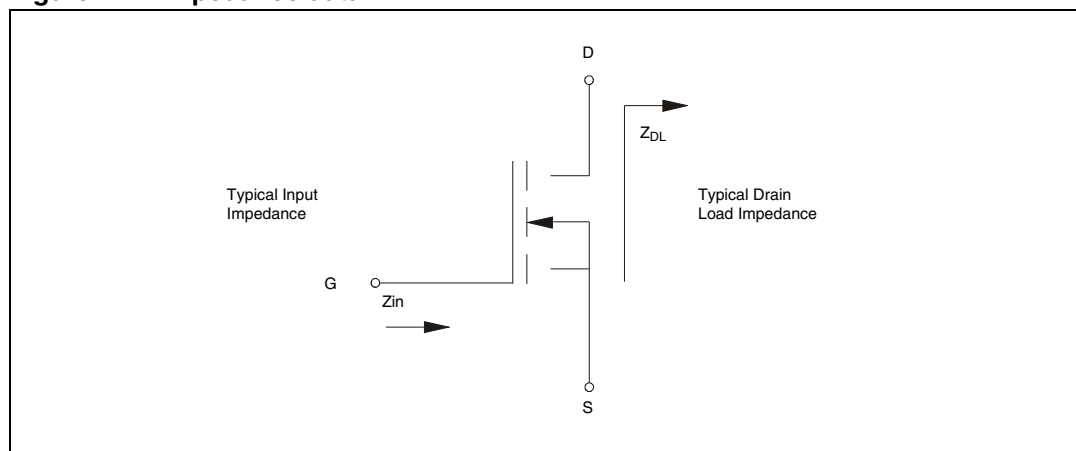


Table 7. Impedance data

| Freq | $Z_{IN} (\Omega)$ | $Z_{DL} (\Omega)$ |
|---------|-------------------|-------------------|
| 30 MHz | $1.7 - j 5.7$ | $6.8 + j 0.9$ |
| 175 MHz | $1.2 - j 2.0$ | $2.0 + j 2.4$ |

5 Typical performance

Figure 5. Capacitance vs drain-source voltage

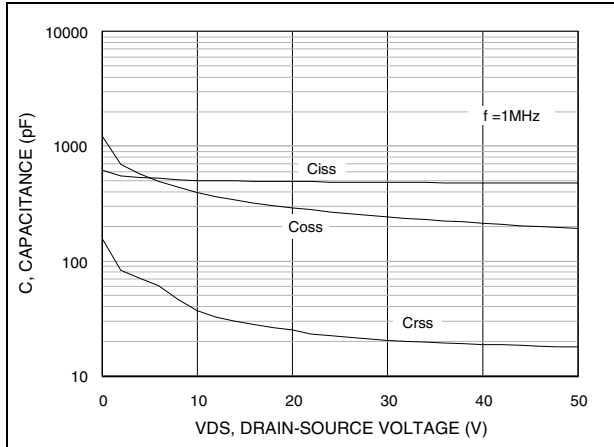


Figure 6. Drain current vs gate voltage

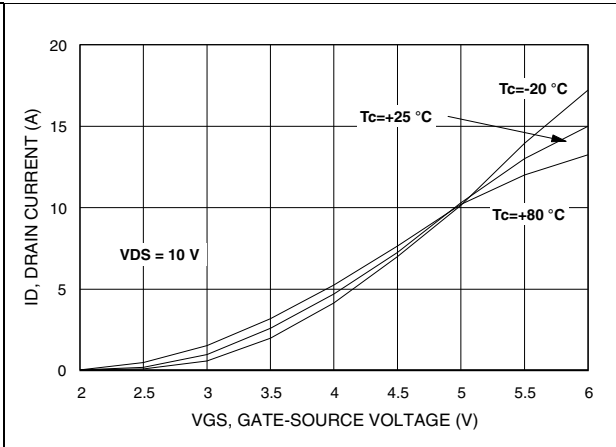


Figure 7. Gate-source voltage vs case temperature

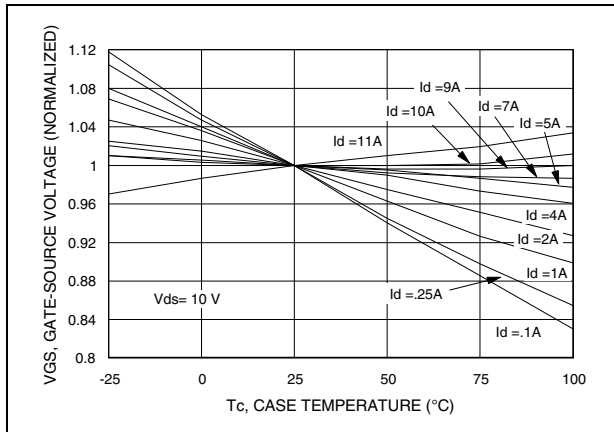


Figure 8. Maximum thermal resistance vs case temperature

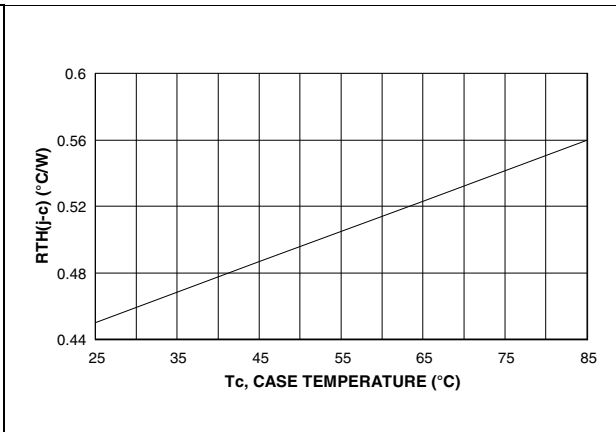
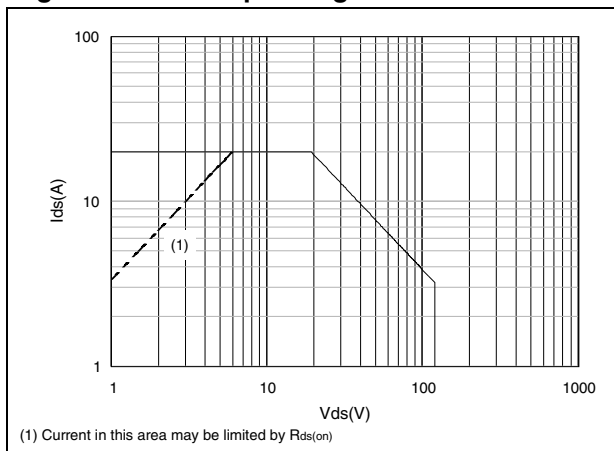


Figure 9. Safe operating area



6 Typical performance @ 175 MHz

Figure 10. Output power vs input power

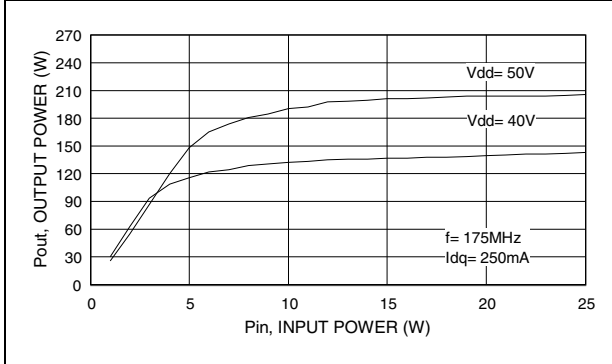


Figure 11. Output power vs input power

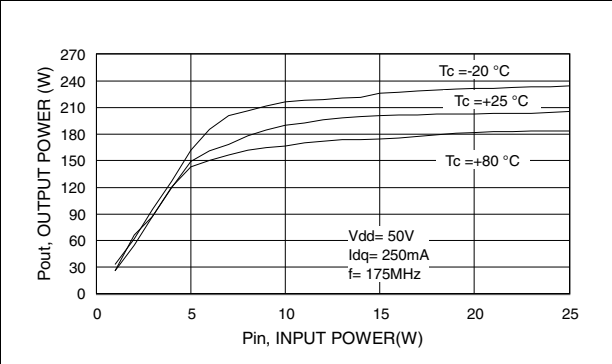


Figure 12. Power gain vs output power

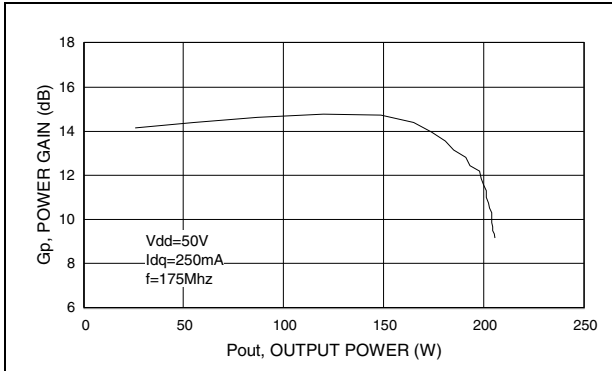


Figure 13. Efficiency vs output power

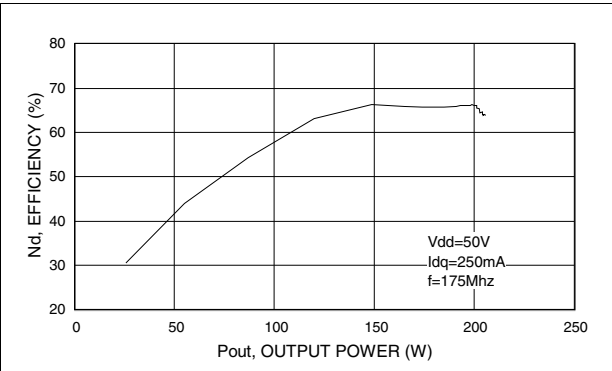


Figure 14. Output power vs supply voltage

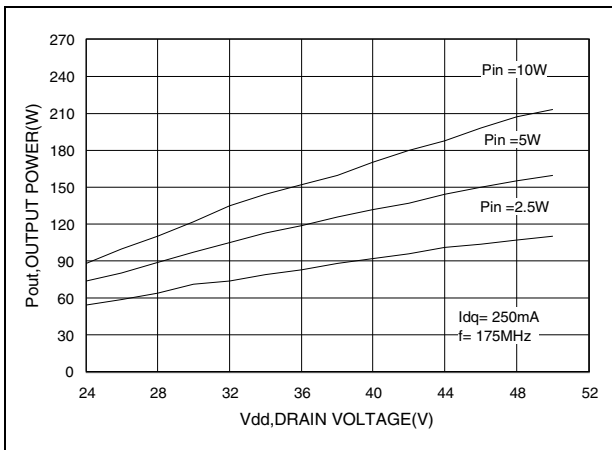
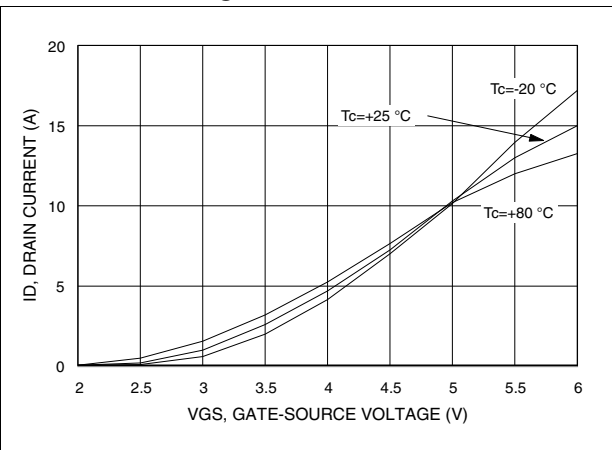


Figure 15. Drain current vs gate-source voltage



7 Test circuit

Figure 16. 175 MHz schematic (production test circuit)

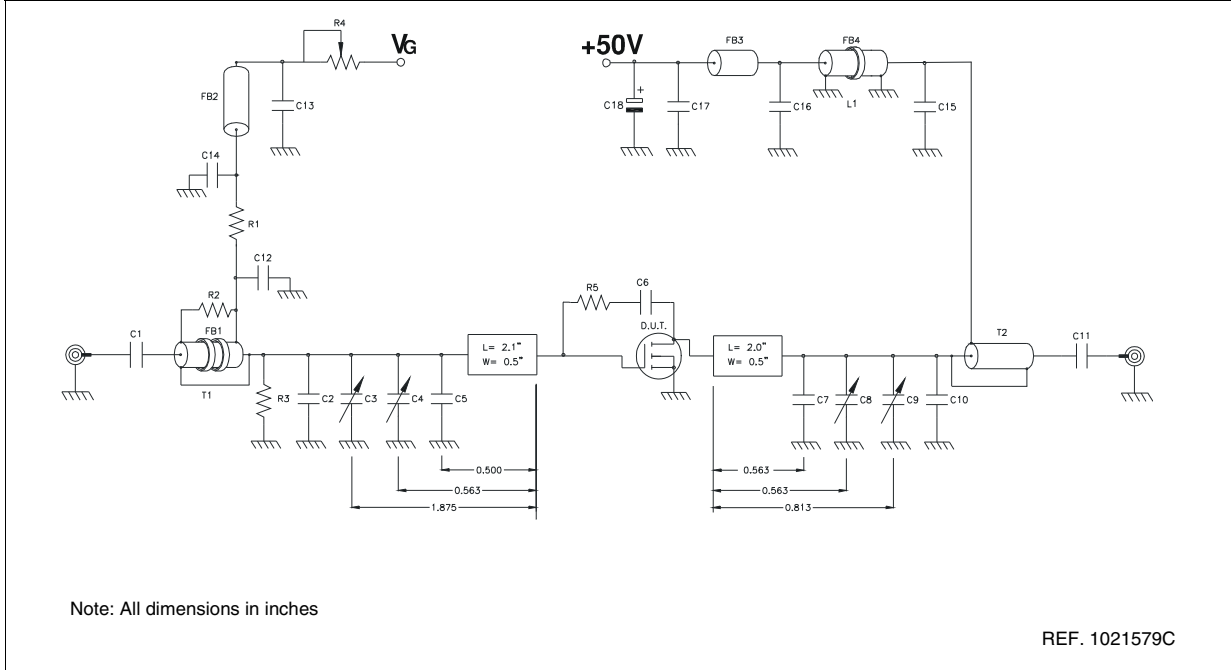


Table 8. Component part list

| Component | Description |
|------------|--|
| T1 | 4:1 transformer, 25 ohm flexible coax .090 OD 6" long |
| T2 | 1:4 transformer, 25 ohm semi-rigid coax .141 OD 6" long |
| FB1 | Toroid X 2, 0.5" OD .312" ID 850μ 2 turns |
| FB2, FB3 | VK200 |
| FB4 | Shield bead, 1" OD 0.5" ID 850μ 3 turns |
| L1 | 1/4 wave choke, 50 ohm semi-rigid coax .141 OD 12" Long |
| PCB | 0.62" woven fiberglass, 1 oz. copper, 2 sides, εr = 2.55 |
| R1, R3 | 470 ohm 1 W chip resistor |
| R2 | 360 ohm 1/2 W resistor |
| R4 | 20 Kohm 10 turn potentiometer |
| R5 | 560 ohm 1 W resistor |
| C1, C11 | 470 pF ATC chip cap |
| C2 | 43 pF ATC chip cap |
| C3, C8, C9 | Arco 404, 12-65 pF |
| C4 | Arco 423, 16-100 pF |

Table 8. Component part list (continued)

| Component | Description |
|--------------------|--|
| C5 | 120 pF ATC chip cap |
| C6 | 0.01 μ F ATC chip cap |
| C7 | 30 pF ATC chip cap |
| C10 | 91 pF ATC chip cap |
| C12, C15 | 1200 pF ATC chip cap |
| C13, C14, C16, C17 | 0.01 μ F / 500 V chip cap |
| C18 | 10 μ F 63 V electrolytic capacitor |

Figure 17. 175 MHz test circuit photomaster

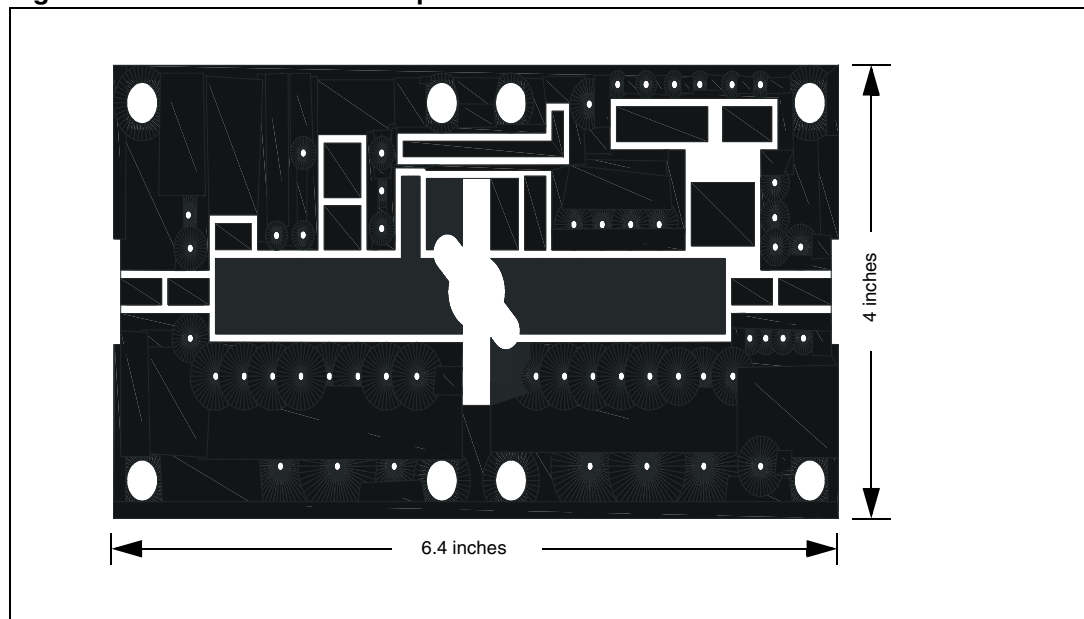
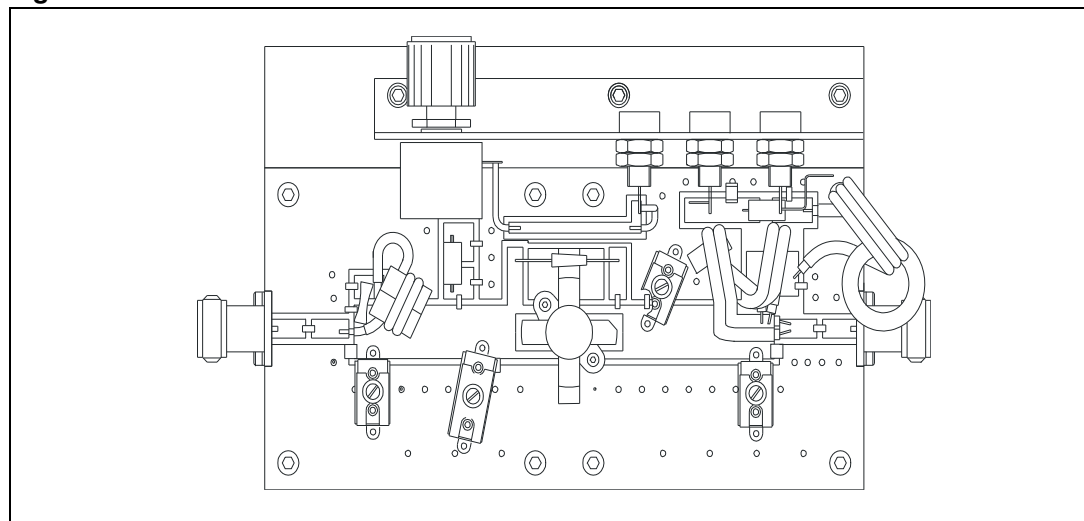


Figure 18. 175 MHz test circuit



8 Typical performance @ 30 MHz

Figure 19. Output power vs input power

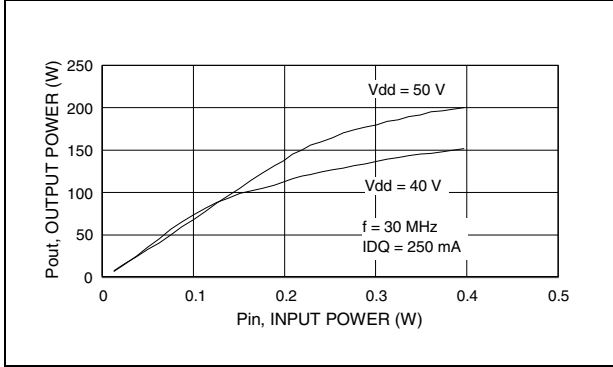


Figure 20. Power gain vs output power

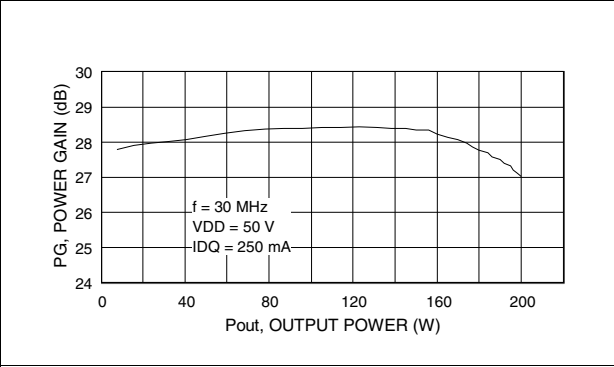


Figure 21. Efficiency vs output power

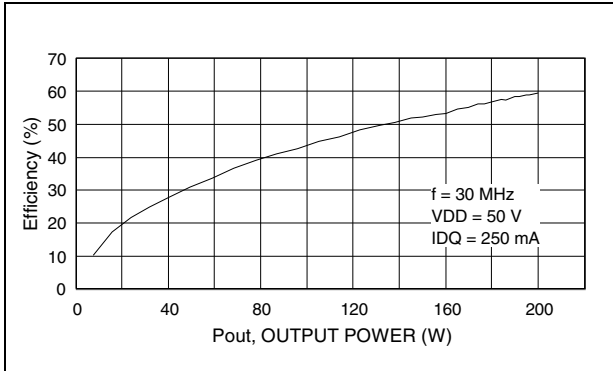


Figure 22. Output power vs supply voltage

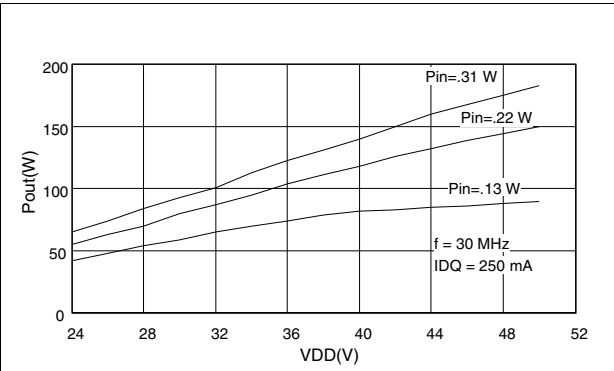
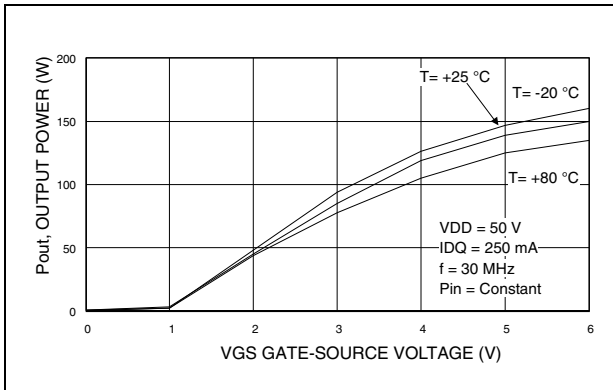


Figure 23. Output power vs gate voltage



9 Test circuit @ 30 MHz

Figure 24. 30 MHz test circuit schematic (engineering test circuit)

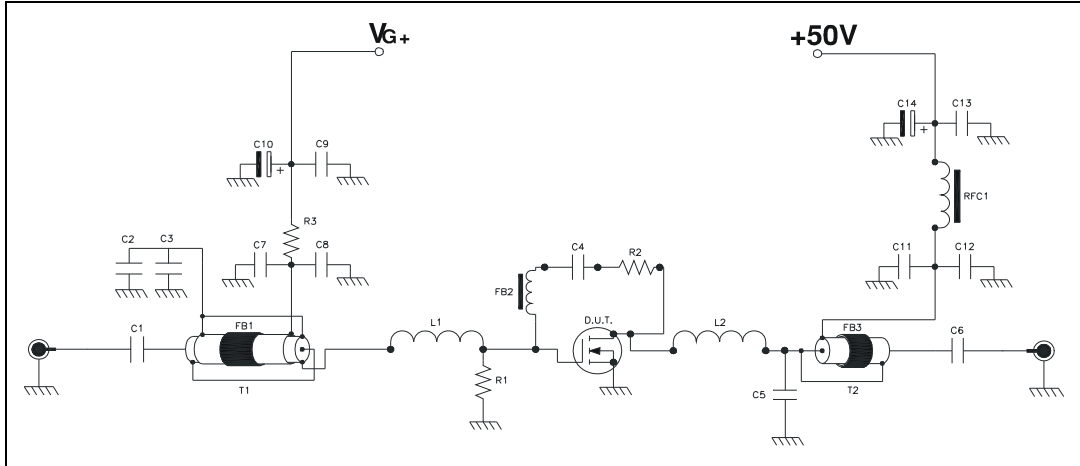


Figure 25. 30 MHz test circuit part list

| Symbol | Description |
|------------------------------------|--|
| T1 | 9:1 transformer, 25 Ω flexible coax with extra shield .090 OD 15" long |
| T2 | 1:4 transformer, 50 Ω flexible coax .225 OD 15" long |
| FB1 | Toroid 1.7" OD .30" ID 220 μ 4 turns |
| FB2 | Surface mount EMI shield bead |
| FB3 | Toroid 1.7" OD .300" ID 220μ 3 turns |
| RFC1 | Toroid 0.5" OD 0.30" ID 125μ 4 turns 12 awg wire |
| PCB | 0.62" woven fiberglass, 1 oz. Copper, 2 Sides, εr = 2.55 |
| R1, R3 | 1 KΩ 1 W chip resistor |
| R2 | 680 Ω 3 W wirewound resistor |
| C1,C4,C6,C7,C8, C9, C11,C12,C13 | 0.1 μF ATC chip cap |
| C2, C3 | 750 pF ATC chip cap |
| C5 | 470 pF ATC chip cap |
| C10 | 10 μF 63 V electrolytic capacitor |
| C14 | 100 μF 63 V electrolytic capacitor |

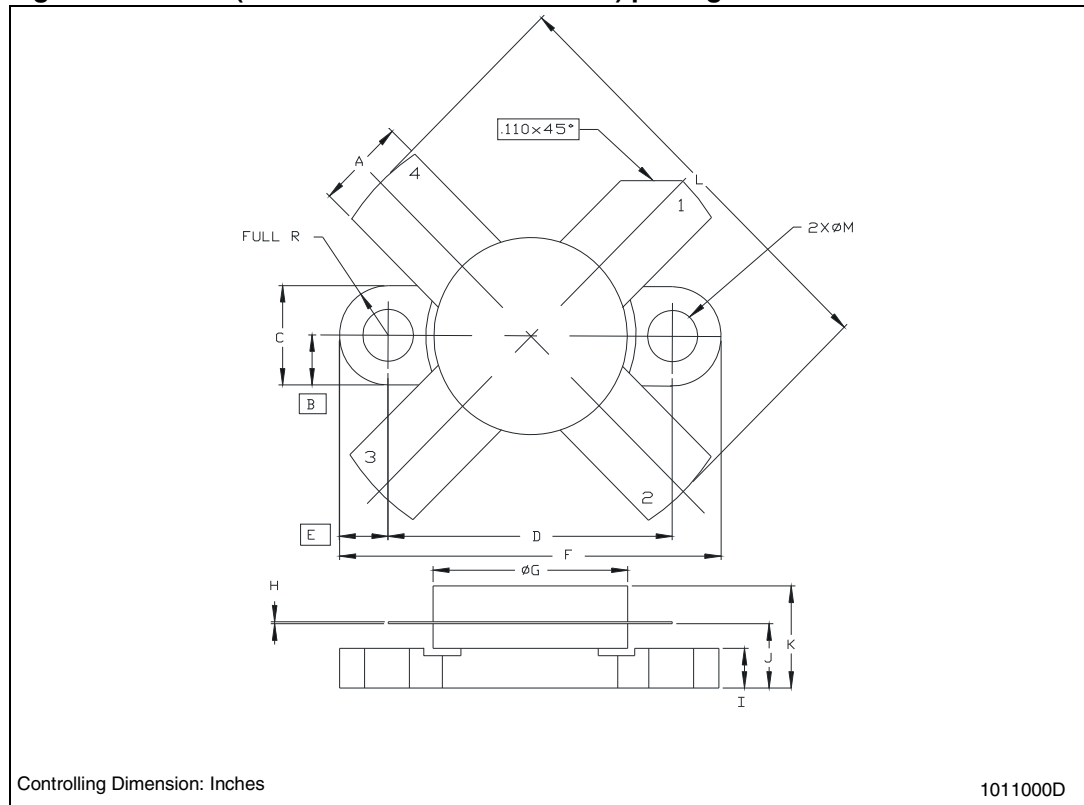
10 Package mechanical data

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Table 9. M174 (0.500 DIA 4/L N/HERM W/FLG) mechanical data

| Dim. | mm. | | | Inch | | |
|------|-------|------|-------|-------|-------|-------|
| | Min | Typ | Max | Min | Typ | Max |
| A | 5.56 | | 5.584 | 0.219 | | 0.230 |
| B | | 3.18 | | | 0.125 | |
| C | 6.22 | | 6.48 | 0.245 | | 0.255 |
| D | 18.28 | | 18.54 | 0.720 | | 0.730 |
| E | | 3.18 | | | 0.125 | |
| F | 24.64 | | 24.89 | 0.970 | | 0.980 |
| G | 12.57 | | 12.83 | 0.495 | | 0.505 |
| H | 0.08 | | 0.18 | 0.003 | | 0.007 |
| I | 2.11 | | 3.00 | 0.083 | | 0.118 |
| J | 3.81 | | 4.45 | 0.150 | | 0.175 |
| K | | | 7.11 | | | 0.280 |
| L | 25.53 | | 26.67 | 1.005 | | 1.050 |
| M | 3.05 | | 3.30 | 0.120 | | 0.130 |

Figure 26. M174 (0.500 DIA 4/L N/HERM W/FLG) package dimensions



11 Marking, packing and shipping specifications

Table 10. Packing and shipping specifications

| Order code | Packaging | Pcs per tray | Dry pack humidity | V _{GS} | Lot code |
|------------|--------------|--------------|-------------------|-----------------|----------|
| SD2931-10W | Plastic tray | 25 | < 10 % | Not mixed | Mixed |

Figure 27. Marking drawing

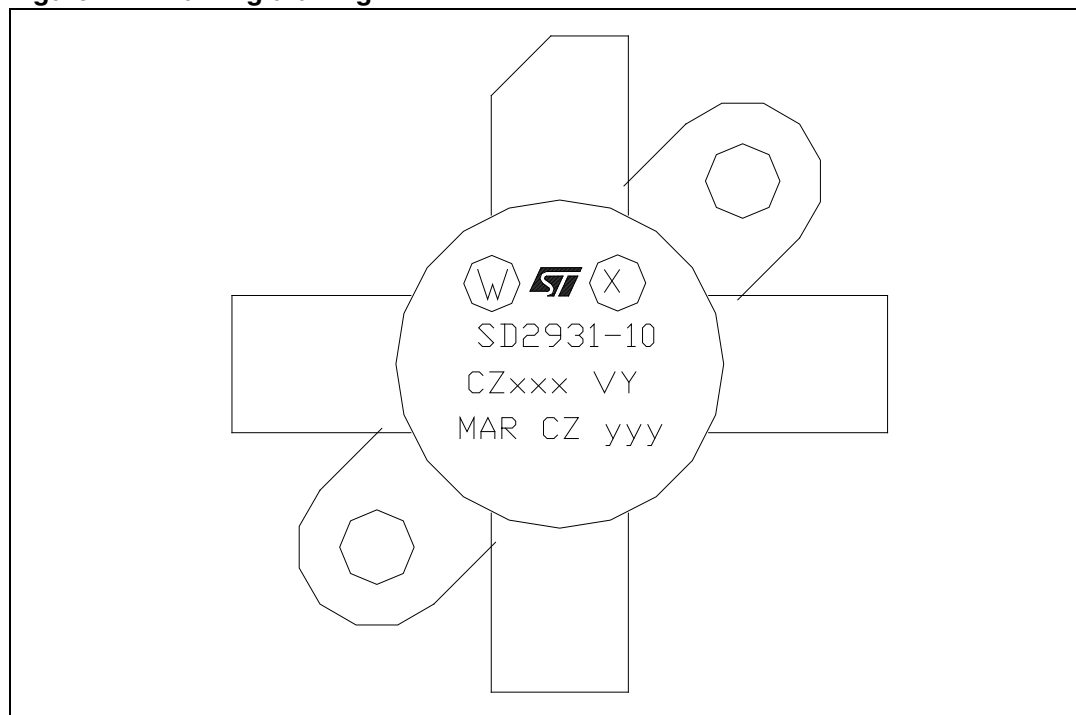


Table 11. Marking specifications

| Symbol | Description |
|--------|-------------------------------|
| W | Wafer process code |
| X | V _{GS} sort |
| CZ | Assembly plant |
| xxx | Last 3 digit of diffusion lot |
| VY | Diffusion plant |
| MAR | County of origin |
| CZ | Test and finishing plant |
| y | Assembly year |
| yy | Assembly week |

12 Revision history

Table 12. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 09-Sep-2004 | 4 | |
| 17-Jun-2004 | 5 | Updated Table 5: Dynamic on page 4 |
| 04-Mar-2008 | 6 | Updated Table 4: Static (per side) , Table 5: Dynamic and Table 6: VGS sorts on page 5 |
| 08-Feb-2011 | 7 | Inserted Chapter 11: Marking, packing and shipping specifications . |
| 12-Jan-2012 | 8 | Inserted Chapter 3: Transient thermal impedance . |

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