



SD56150

RF power transistor
the LdmoST family

Features

- Excellent thermal stability
- Common source configuration Push-pull
- $P_{OUT} = 150W$ with 13dB gain @ 860MHz / 32V
- BeO free package
- Internal input matching
- In compliance with the 2002/95/EC european directive

Description

The SD56150 is a common source N-channel enhancement-mode lateral Field-Effect RF power transistor designed for broadband commercial and industrial applications at frequencies up to 1.0 GHz. The SD56150 is designed for high gain and broadband performance operating in common source mode at 32 V. Its internal matching makes it ideal for TV broadcast applications requiring high linearity.

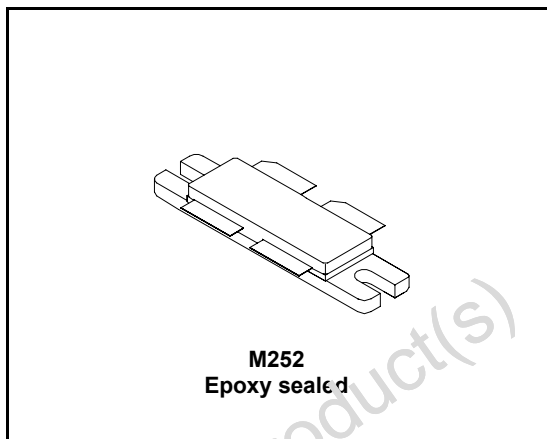


Figure 1. Pin connection

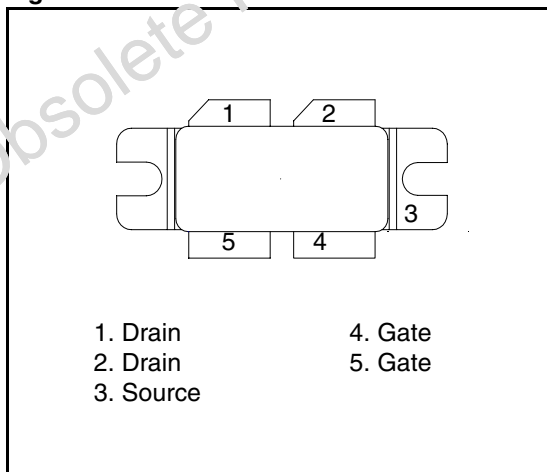


Table 1. Device summary

| Order code | Package | Branding |
|------------|---------|----------|
| SD56150 | M252 | SD56150 |

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1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings ($T_{CASE} = 25^{\circ}C$)

| Symbol | Parameter | Value | Unit |
|---------------|--|-------------|-------------|
| $V_{(BR)DSS}$ | Drain-Source Voltage | 65 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current | 17 | A |
| P_{DISS} | Power Dissipation (@ $T_c = 70^{\circ}C$) | 236 | W |
| T_j | Max. Operating Junction Temperature | 200 | $^{\circ}C$ |
| T_{STG} | Storage Temperature | -65 to +150 | $^{\circ}C$ |

1.2 Thermal data

Table 3. Thermal data

| Symbol | Parameter | Value | Unit |
|------------|------------------------------------|-------|---------------|
| R_{thJC} | Junction - case thermal resistance | 0.55 | $^{\circ}C/W$ |

2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

2.1 Static

Table 4. Static (per section)

| Symbol | Test conditions | | Min | Typ | Max | Unit |
|-----------------------------|-------------------------------|--------------------------------|-----|-----|-----|---------------|
| $V_{(\text{BR})\text{DSS}}$ | $V_{\text{GS}} = 0\text{ V}$ | $I_{\text{DS}} = 10\text{ mA}$ | 65 | | | V |
| I_{DSS} | $V_{\text{GS}} = 0\text{ V}$ | $V_{\text{DS}} = 28\text{ V}$ | | | 1 | μA |
| I_{GSS} | $V_{\text{GS}} = 20\text{ V}$ | $V_{\text{DS}} = 0\text{ V}$ | | | 1 | μA |
| $V_{\text{GS(Q)}}$ | $V_{\text{DS}} = 28\text{ V}$ | $I_{\text{D}} = 100\text{ mA}$ | 2.0 | | 5.0 | V |
| $V_{\text{DS(ON)}}$ | $V_{\text{GS}} = 10\text{ V}$ | $I_{\text{D}} = 3\text{ A}$ | | 0.5 | 0.8 | V |
| G_{FS} | $V_{\text{DS}} = 10\text{ V}$ | $I_{\text{D}} = 3\text{ A}$ | 2.5 | | 4 | mho |
| $C_{\text{ISS}}^{(1)}$ | $V_{\text{GS}} = 0\text{ V}$ | $V_{\text{DS}} = 28\text{ V}$ | | 255 | | pF |
| C_{OSS} | $V_{\text{GS}} = 0\text{ V}$ | $V_{\text{DS}} = 28\text{ V}$ | | 50 | | pF |
| C_{RSS} | $V_{\text{GS}} = 0\text{ V}$ | $V_{\text{DS}} = 28\text{ V}$ | | 2.9 | | pF |

1. Includes Internal Input Moscap.

2.2 Dynamic

Table 5. Dynamic

| Symbol | Test conditions | | Min | Typ | Max | Unit |
|------------------|-------------------------------|---------------------------------|------|------|-----|------|
| P_{OUT} | $V_{\text{DD}} = 32\text{ V}$ | $I_{\text{DQ}} = 500\text{ mA}$ | 150 | | | W |
| G_{PS} | $V_{\text{DD}} = 32\text{ V}$ | $I_{\text{DQ}} = 500\text{ mA}$ | 13 | 16.5 | | dB |
| h_{D} | $V_{\text{DD}} = 32\text{ V}$ | $I_{\text{DQ}} = 500\text{ mA}$ | 50 | 60 | | % |
| Load mismatch | $V_{\text{DD}} = 32\text{ V}$ | $I_{\text{DQ}} = 500\text{ mA}$ | 10:1 | | | VSWR |

3 Impedance

Figure 2. Current conventions

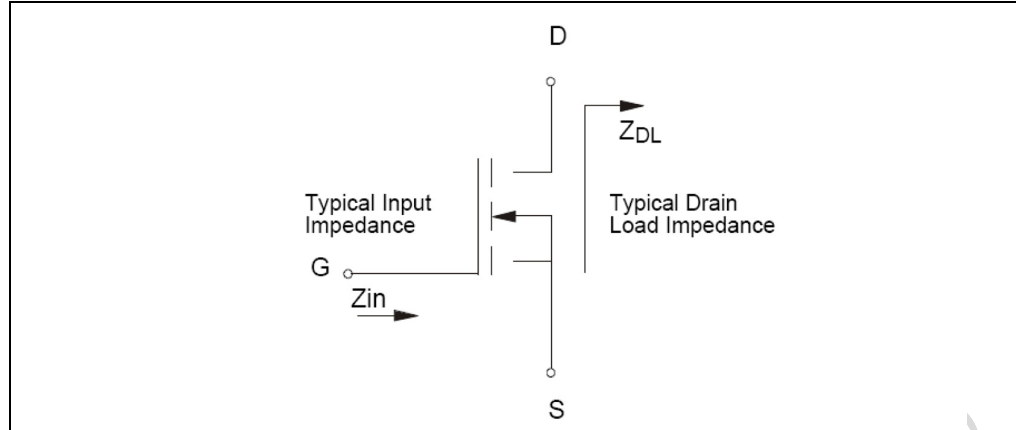


Table 6. Impedance data

| Freq. (MHz) | $Z_{IN} (\Omega)$ | $Z_{DL} (\Omega)$ |
|-------------|-------------------|-------------------|
| 860 MHz | $4.7 - j 5.5$ | $3.6 + j 6.5$ |
| 880 MHz | $4.3 - j 6.9$ | $3.9 + j 7.4$ |
| 900 MHz | $4.5 - j 8.8$ | $4.4 + j 7.8$ |

Note: Measured drain to drain and gate to gate respectively.

4 Typical performance

Figure 3. Capacitance vs drain voltage

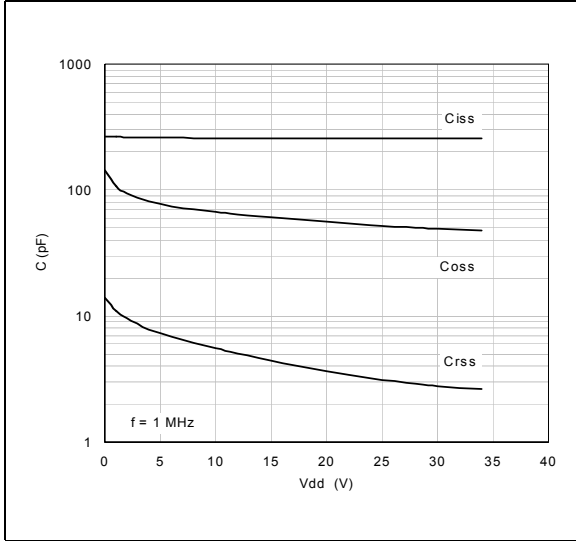


Figure 4. Gate-source voltage vs case temperature

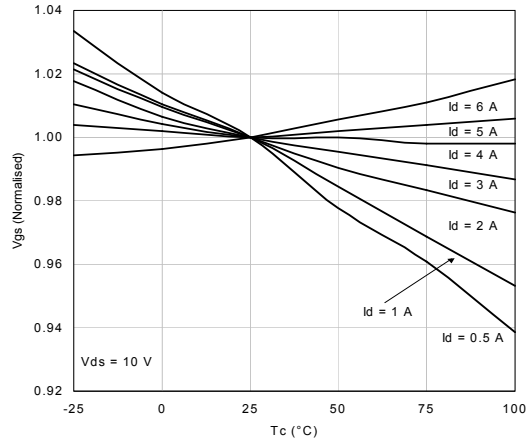


Figure 5. Drain current vs gate voltage

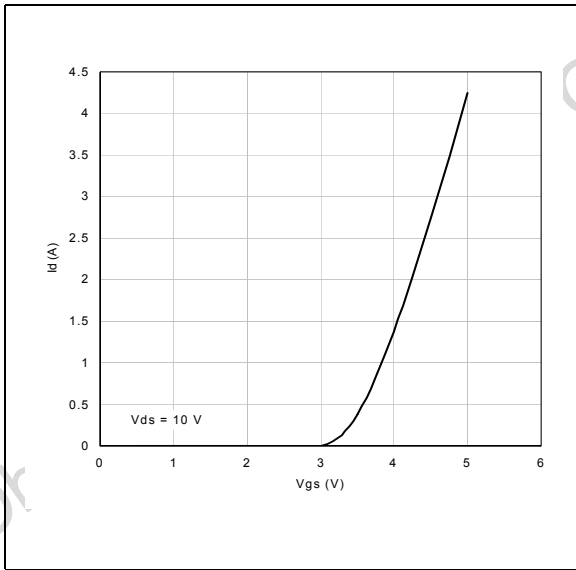


Figure 6. Output power vs input power

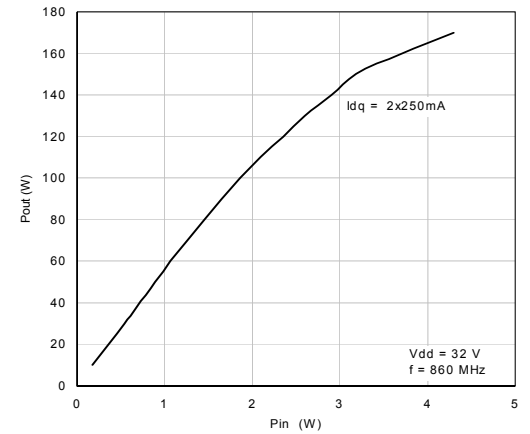


Figure 7. Power gain vs output power

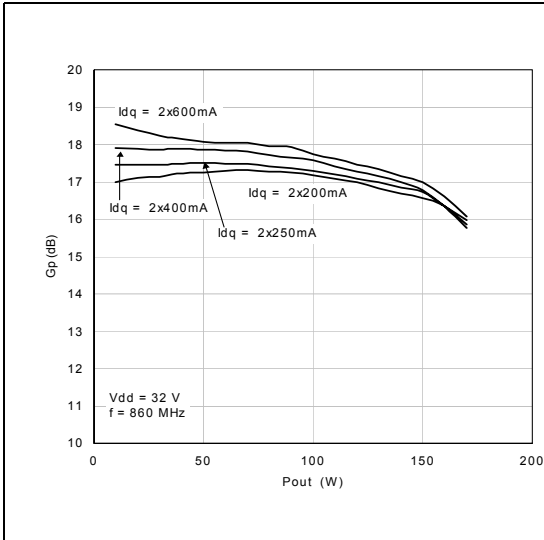


Figure 8. Efficiency vs output power

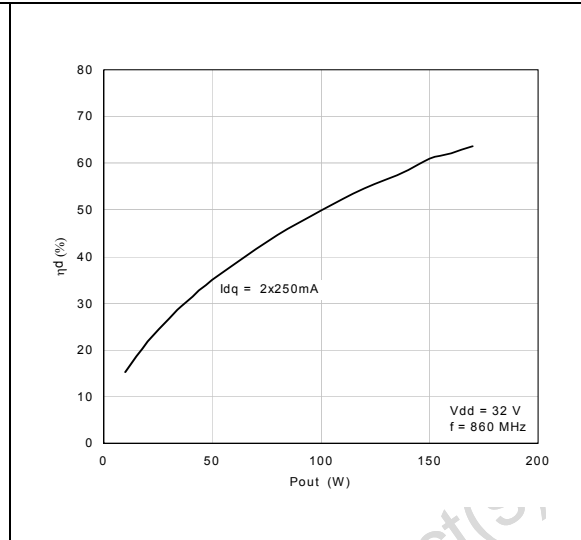


Figure 9. Output power vs supply voltage

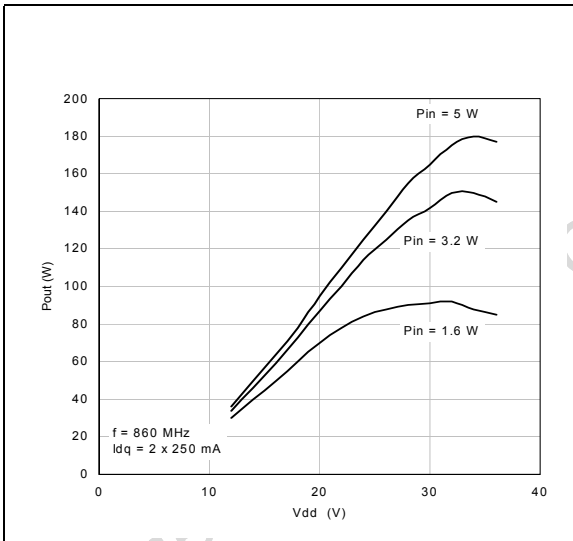


Figure 10. Efficiency vs supply voltage

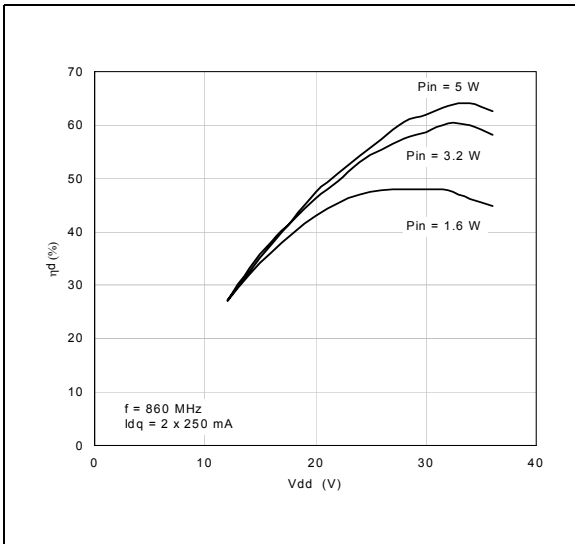
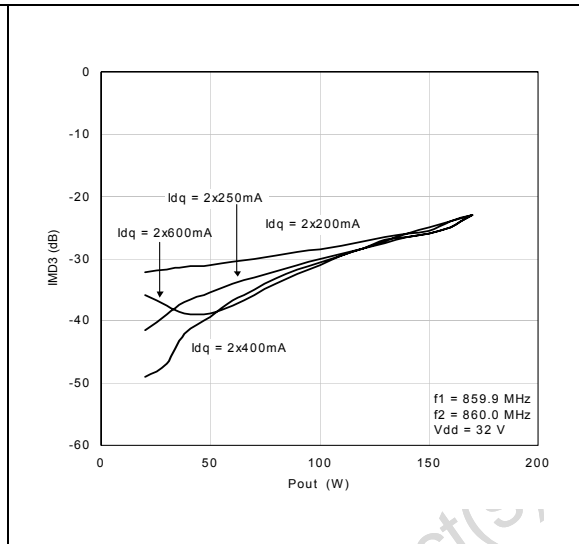
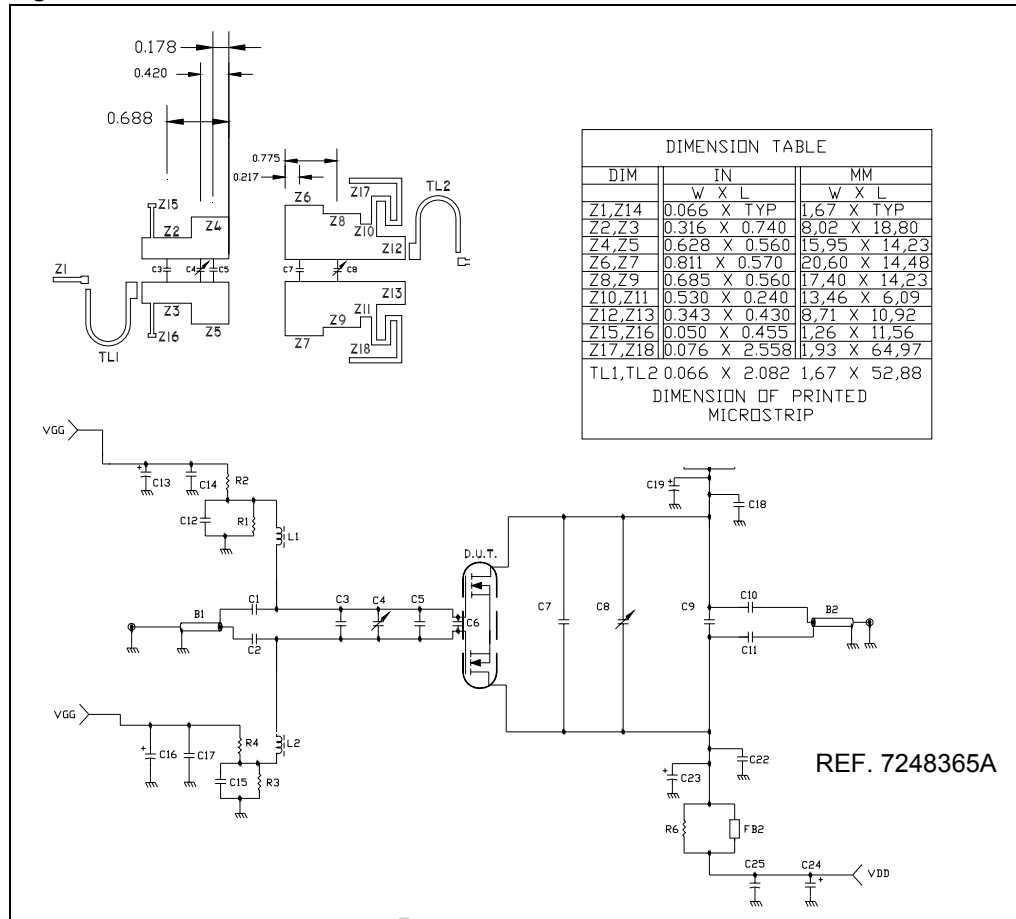


Figure 11. Intermodulation distortion vs output power



Obsolete Product(s) - Obsolete Product(s)

Figure 12. Test circuit schematic



- 1 Gap between ground & transmission line = 0.056 [1.42] +0.002 [0.05] -0.000 [0.00] Typ.
- 2 C3 and C4 adjacent to each other

Table 7. Test circuit component part list

| Component | Description |
|--------------------|--|
| C1,C2, C10, C11 | 51 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C3 | 9.1 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C4, C8 | 0.6 - 4.5 pF GIGATRIM VARIABLE CAPACITOR |
| C5 | 10 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C6 | 4.7 pF ATC 100A SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C7 | 13 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C9 | 6.2 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C12, C15, C18, C22 | 91 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C13, C16, C20, C24 | 10 μ F 50V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR |
| C14, C17, C21, C25 | 0.1 μ F 500V SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C19, C23 | 100 μ F 63V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR |
| R1, R2, R3, R4 | 200 OHM 1/4 W SURFACE MOUNT CHIP RESISTOR |
| R5, R6 | 1.8 OHM 1/4 W SURFACE MOUNT CHIP RESISTOR |
| L1, L2 | CHIP INDUCTOR 10 nH SURFACE MOUNT COIL |
| FB1, FB2 | SURFACE MOUNT EMI SHIELD BEAD |
| B2, B1 | BALUN, 25 OHM, SEMI-RIDGE OD 0.141 2.365 LG COAXIAL CABLE OR EQUIVALENT |
| PCB | WOVEN GLASS REINFORCED / CERAMIC FILLED 0.030" THK $\epsilon_r = 3.48$, 2 Oz ED CU BOTH SIDES |

Figure 13. Test fixture

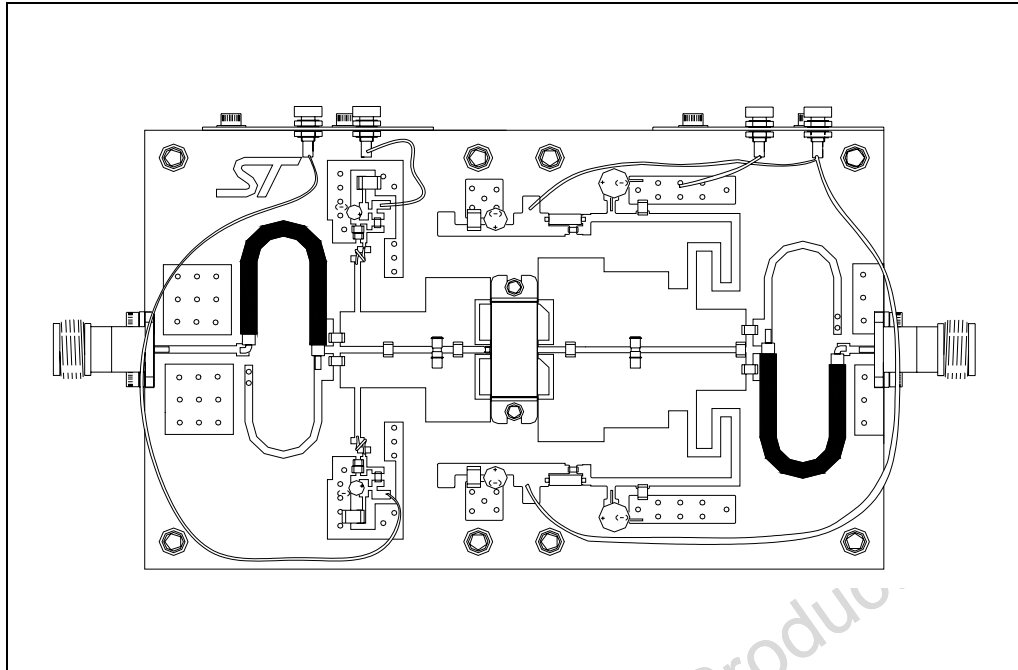
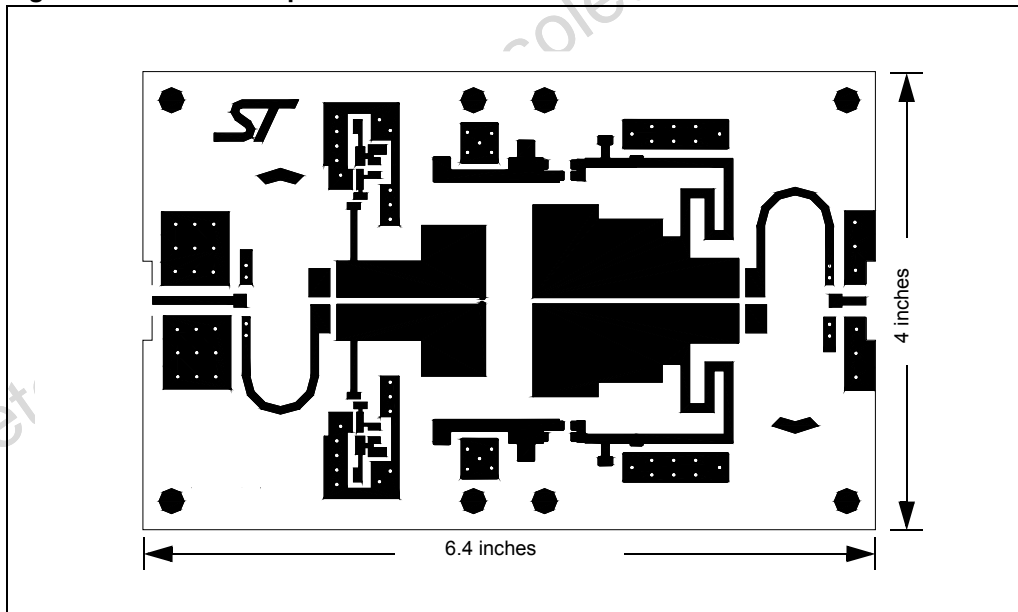


Figure 14. Test circuit photomaster

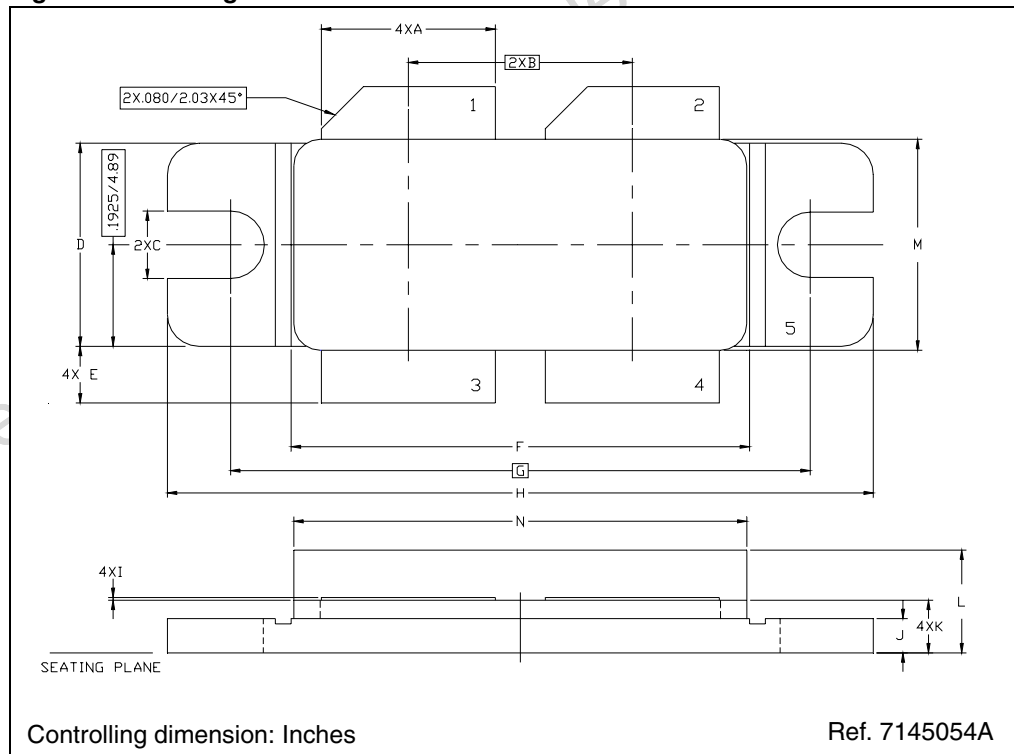


5 Package mechanical data

Table 8. M252 (.400 x .860 4L BAL N/HERM W/FLG) mechanical data

| Dim. | mm. | | | Inch | | |
|------|-------|-------|-------|-------|-------|-------|
| | Min | Typ | Max | Min | Typ | Max |
| A | 8.13 | | 8.64 | .320 | | .340 |
| B | | 10.80 | | | .425 | |
| C | 3.00 | | 3.30 | .118 | | .130 |
| D | 9.65 | | 9.91 | .380 | | .390 |
| E | 2.16 | | 2.92 | .085 | | .115 |
| F | 21.97 | | 22.23 | .865 | | .875 |
| G | | 27.94 | | | 1.100 | |
| H | 33.91 | | 34.16 | 1.335 | | 1.345 |
| I | 0.10 | | 0.15 | .004 | | .006 |
| J | 1.52 | | 1.78 | .060 | | .070 |
| K | 2.36 | | 2.74 | .093 | | .108 |
| L | 4.57 | | 5.33 | .180 | | .210 |
| M | 9.96 | | 10.34 | .392 | | .407 |
| N | 21.64 | | 22.05 | .852 | | .868 |

Figure 15. Package dimensions



6 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 12-Sep-2003 | 5 | First Issue |
| 23-Jul-2007 | 6 | Document reformatted, added lead free info |
| 24-Aug-2007 | 7 | Cover page title updated |

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