



DB-55008-500

RF POWER amplifier using 1 x PD55008
N-Channel enhancement-mode lateral MOSFETs

General feature

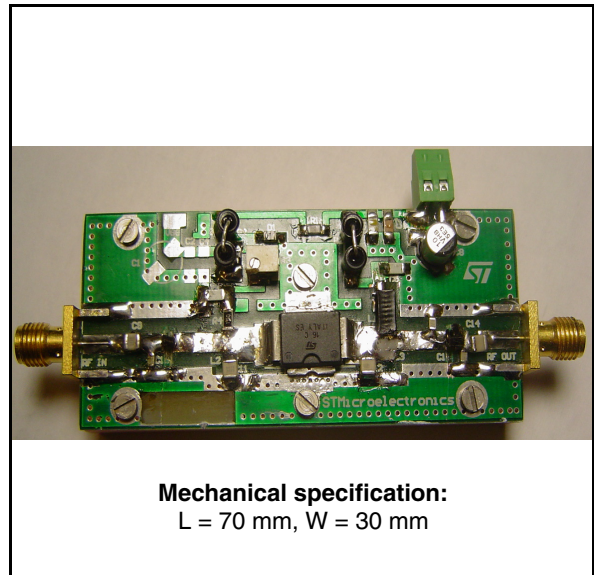
- Excellent thermal stability
- Frequency: 400 - 500MHz
- Supply voltage: 12.5V
- Output power: 8W
- Efficiency: 48% - 54%
- Load mismatch: 20:1
- Beo free amplifier

Description

The DB-55008-500 is a common source N-Channel Enhancement-Mode Lateral Field Effect RF power amplifier designed as driver for UHF Mobile radio applications

Order Code

- DB-55008-500



Contents

| | | |
|----------|---|-----------|
| 1 | Electrical data | 3 |
| | 1.1 Maximum ratings | 3 |
| 2 | Electrical characteristics | 4 |
| 3 | Typical performance | 5 |
| 4 | Test circuit | 8 |
| 5 | Circuit layout | 9 |
| 6 | Mounting indications | 11 |
| 7 | Package mechanical data | 13 |
| 8 | Revision history | 17 |

1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|------------|----------------------------|------------|------|
| V_{DD} | Supply voltage | 16 | V |
| I_D | Drain current | 3 | A |
| T_{CASE} | Operating case temperature | -20 to +85 | °C |
| T_A | Max. ambient temperature | +55 | °C |

2 Electrical characteristics

$$T_A = +25\text{ }^\circ\text{C}, V_{DD} = 12.5\text{V}, I_{DQ} = 100\text{ mA}$$

Table 2. Electrical Specification

| Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------|--|--------------|------|------|------|
| Freq | Frequency range | 400 | | 500 | MHz |
| P _{OUT} | | 8 | 10 | | W |
| Gain | @ P _{OUT} = 8W | 13.9 ± 0.7dB | | | dB |
| ND | @ P _{OUT} = 8W | 48 | | 54 | % |
| H2 | 2 ND Harmonic @ P _{OUT} = 8W | | -53 | -50 | dBc |
| H3 | 3 RD Harmonic @ P _{OUT} = 8W | | -60 | -55 | dBc |
| VSWR | Load mismatch all phases @ P _{OUT} = 8W | | | 20:1 | |

3 Typical performance

Figure 1. Output power vs input power Figure 2. Gain vs output power

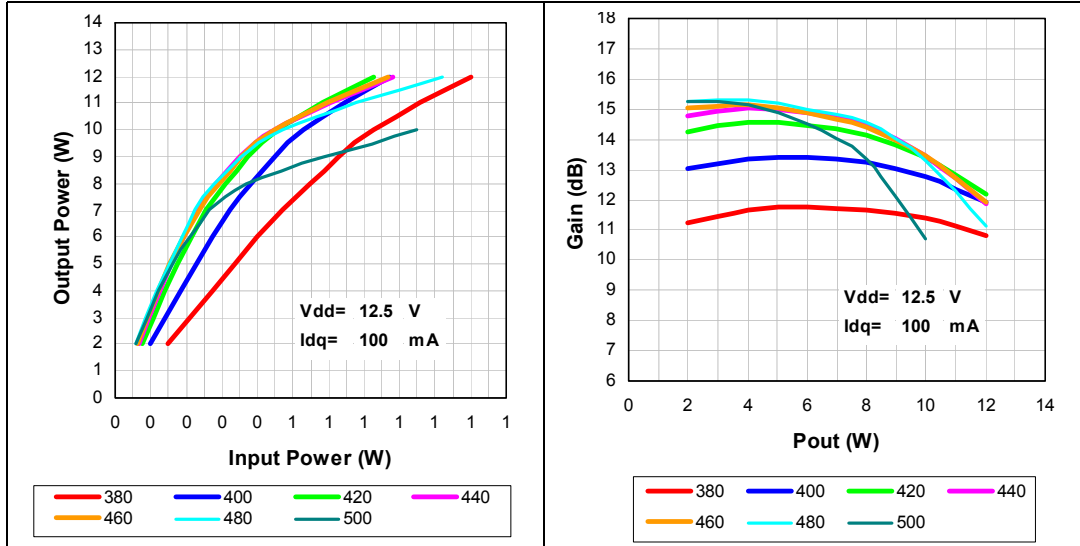


Figure 3. Drain efficiency vs output power

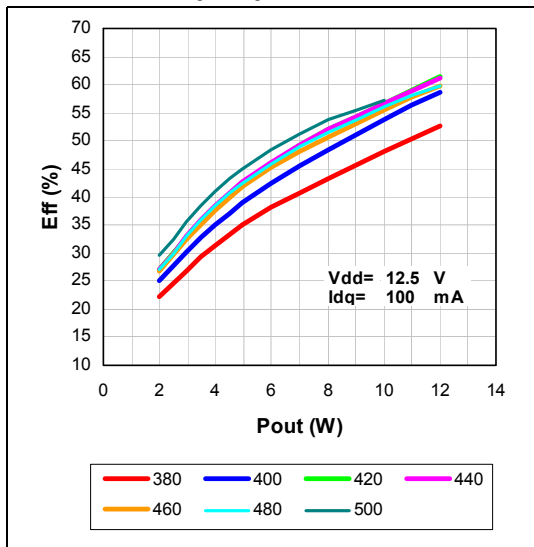


Figure 4. Gain vs frequency

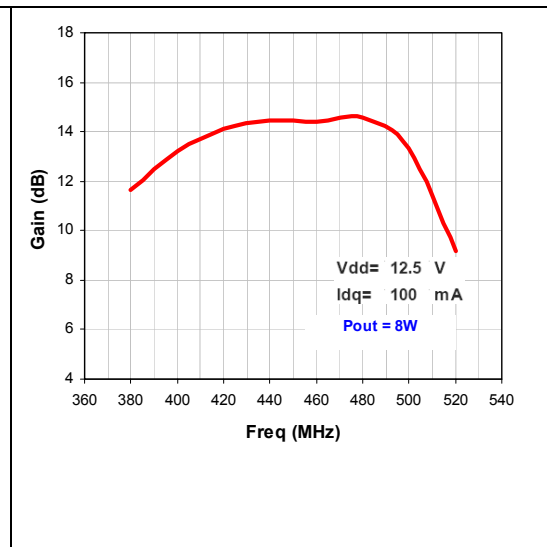


Figure 5. Efficiency vs frequency

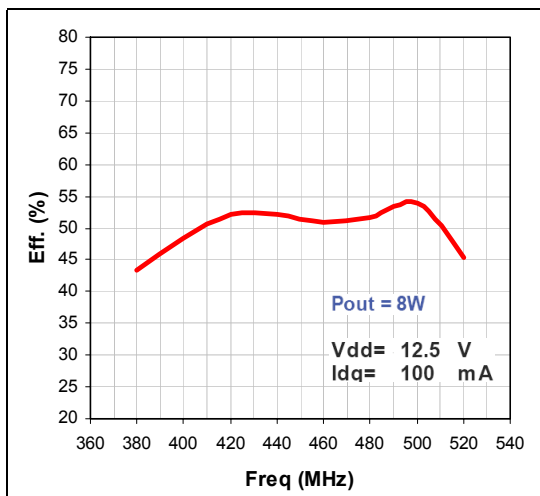


Figure 6. Input return loss vs frequency

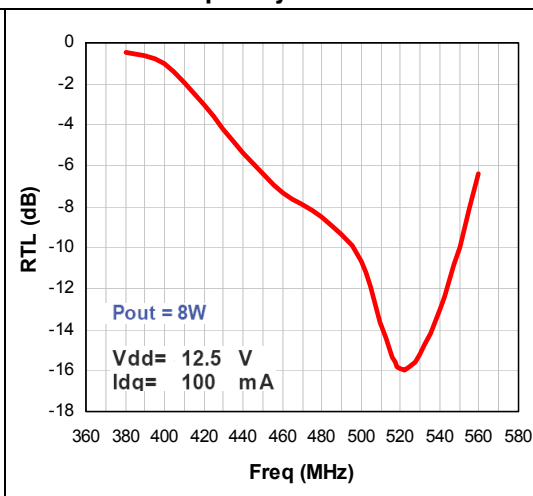


Figure 7. Harmonics vs frequency

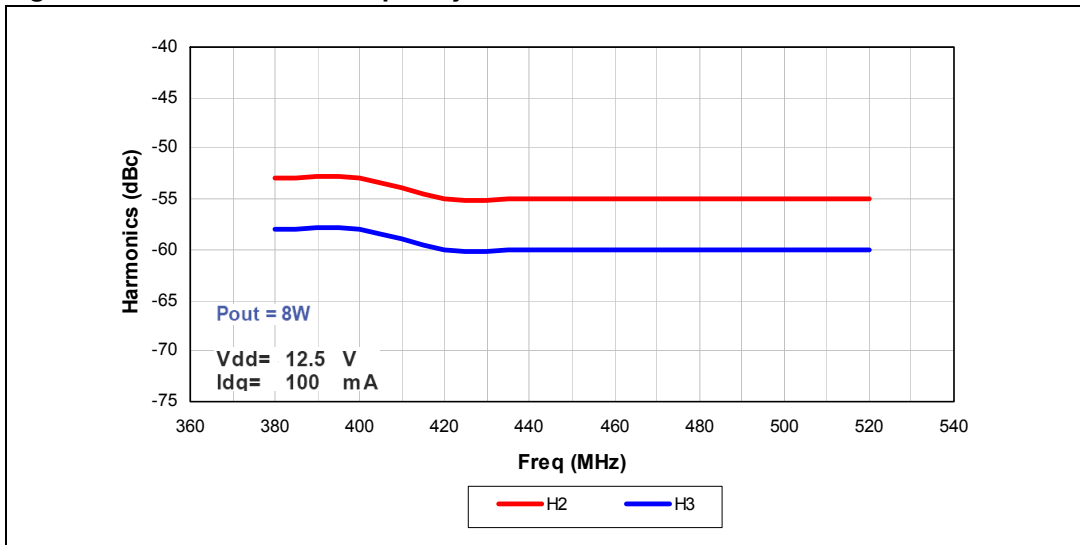
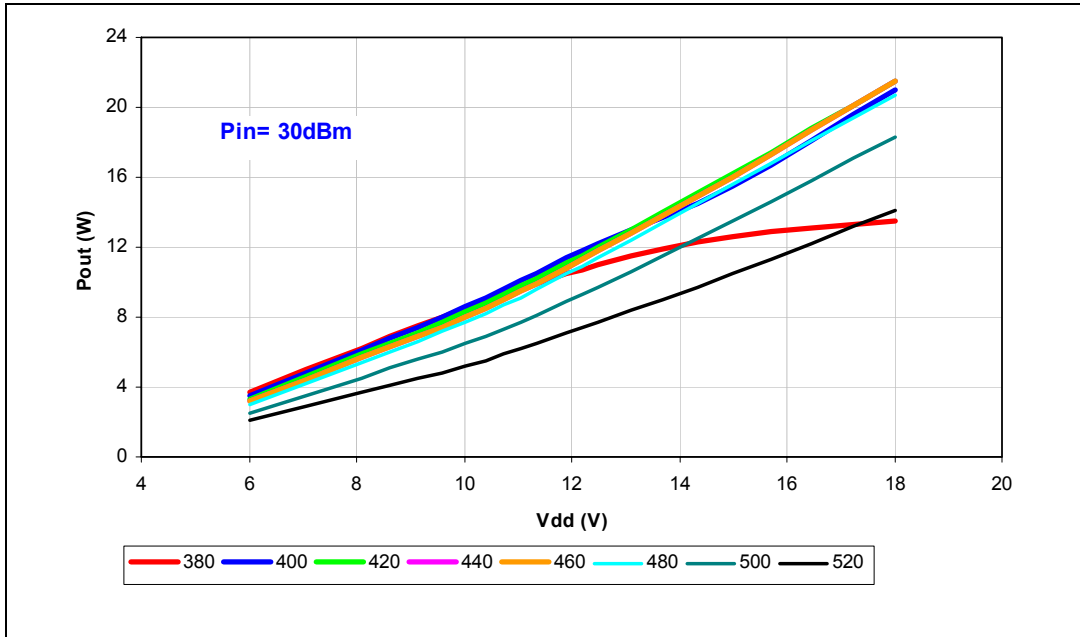
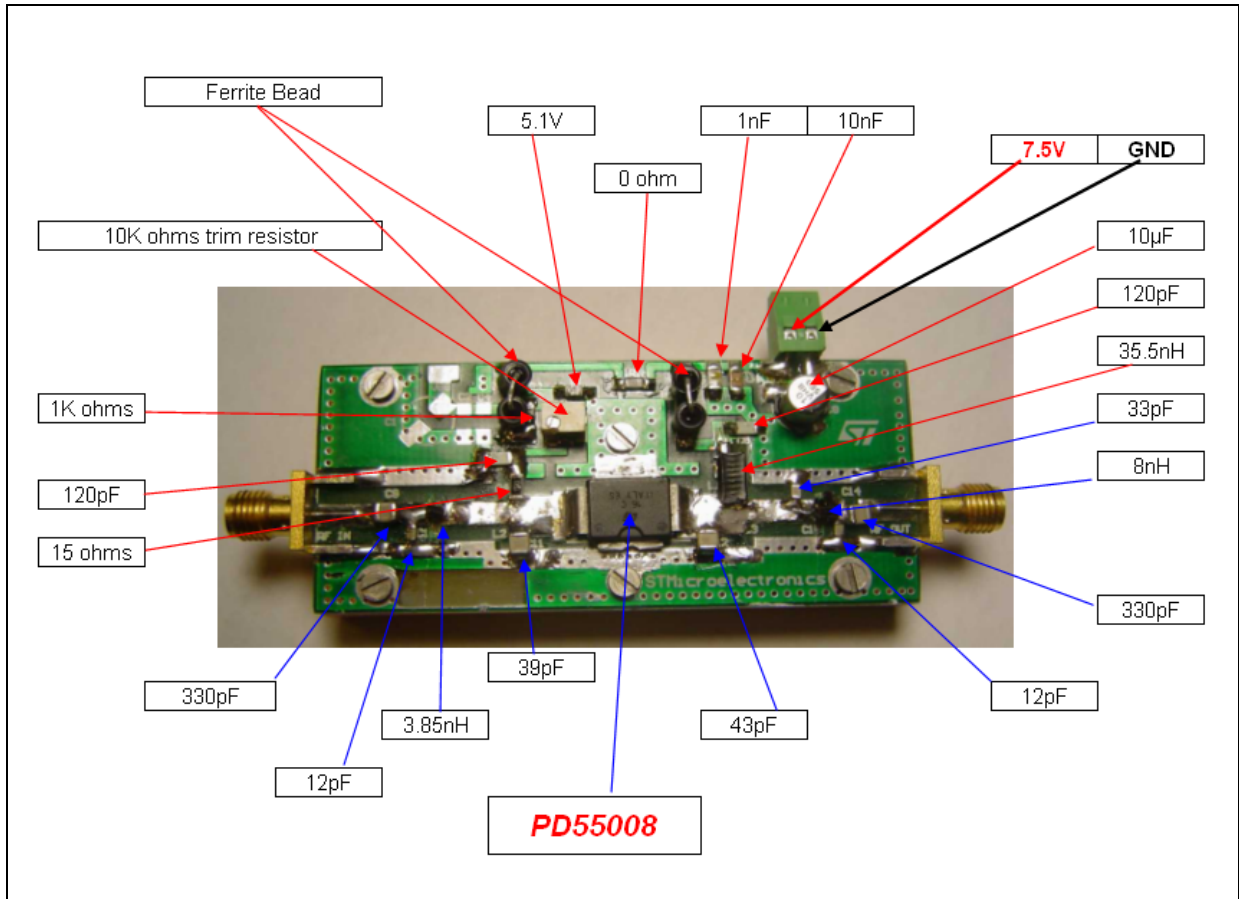


Figure 8. Output power vs drain supply voltage



4 Test circuit

Figure 9. Test circuit schematic



5 Circuit layout

Figure 10. Circuit layout

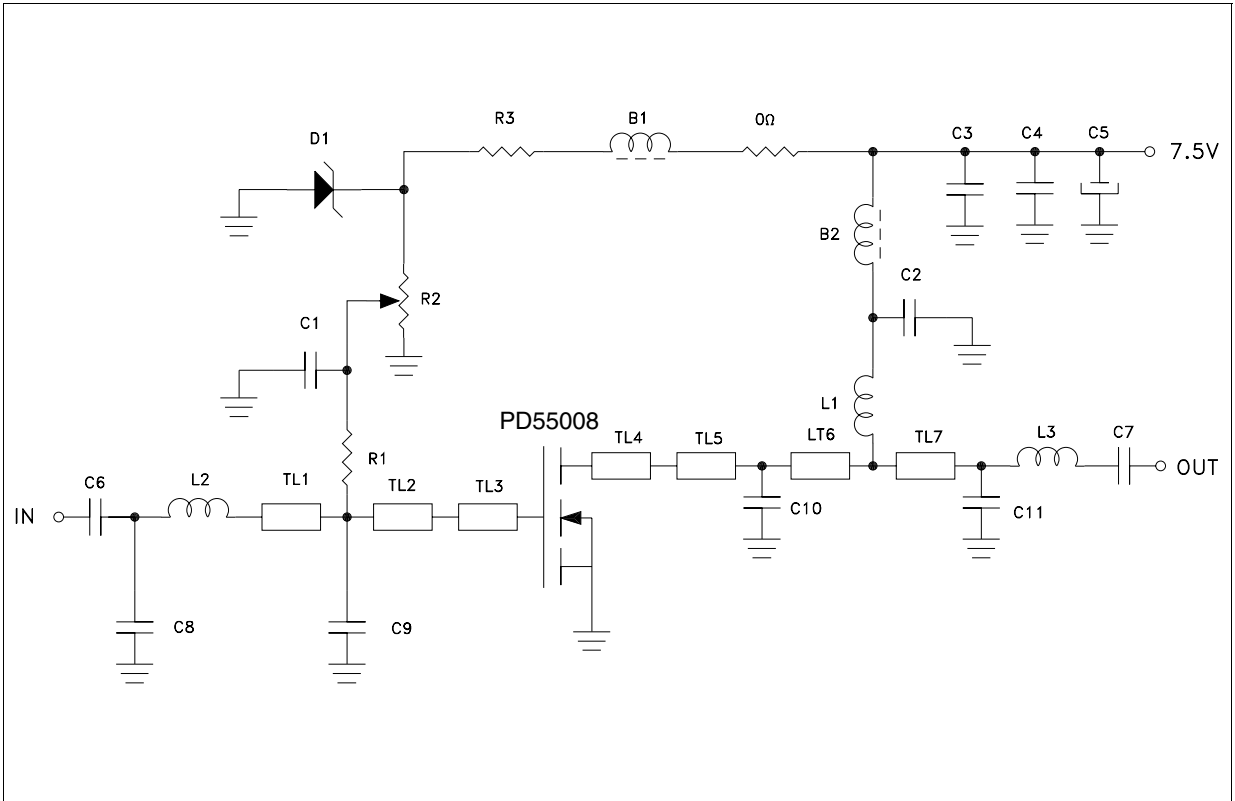


Table 3. Components part list for DB-55008-500

| Part Type | Component ID | Description | Value | Case size | Manufacturer | Part Code |
|------------------|-----------------------------------|-------------------|-----------------------|-----------|------------------------|------------------|
| CAP | C1 | Capacitor | 120 pF | 1206 | Murata | GRM42-6C0G121J50 |
| CAP | C2 | Capacitor | 120 pF | 1206 | Murata | GRM42-6C0G121J50 |
| CAP | C3 | Capacitor | 1 nF | 1206 | Murata | GRM42-6C0G102J50 |
| CAP | C4 | Capacitor | 10 nF | 1206 | Murata | GRM42-6X7R104K50 |
| Electrolytic CAP | C5 | Capacitor | 10 uF | SMT | Panasonic | EEVHB1V100P |
| CAP | C6 | Capacitor | 330 pF | 100B | ATC | 331 |
| CAP | C7 | Capacitor | 330pF | 100B | ATC | 331 |
| CAP | C8 | Capacitor | 12 pF | 100B | ATC | 120 |
| CAP | C9 | Capacitor | 39 pF | 100B | ATC | 390 |
| CAP | C10 | Capacitor | 43 pF | 100B | ATC | 430 |
| CAP | C11 | Capacitor | 12 pF | 100B | ATC | 120 |
| TL | TL1, TL7 | Transmission Line | W = 2.87 mm L = 7 mm | | | |
| TL | TL2 | Transmission Line | W = 4.9 mm L = 5 mm | | | |
| TL | TL3, TL4 | Transmission Line | W = 6 mm L = 3 mm | | | |
| TL | TL5 | Transmission Line | W = 4.9 mm L = 2.5 mm | | | |
| TL | TL6 | Transmission Line | W = 4.9 mm L = 2.5 mm | | | |
| Ferrite Bead | B1 | Ferrite Bead | | | PANASONIC | EXCELDRC35C |
| Ferrite Bead | B2 | Ferrite Bead | | | PANASONIC | EXCELDRC35C |
| INDUCTOR | L1 | Inductor | 35.5nH | | Coilcraft Mini Spring | B09TJ |
| INDUCTOR | L2 | Inductor | 3.85 nH | | Coilcraft Micro Spring | 0906-4J |
| INDUCTOR | L3 | Inductor | 8 nH | | Coilcraft Mini Spring | A03TJ |
| TRANSISTOR | PD55008 | LDMOS | | | STMicroelectronics | PD55008 |
| Resistor | R1 | Resistor | 15 ohms | 1206 | TYCO ELECTRONICS | 01623440-1 |
| POT | R2 | Potentiometer | 10 K | | BOURNS ELECTRONICS | 3214W-1-103E |
| Resistor | R3 | Resistor | 1K | 1206 | TYCO ELECTRONICS | 01623440-1 |
| SMA-CONN | RF in | SMA-CONN | | | Johnson | 142-0701-801 |
| SMA-CONN | RF out | SMA-CONN | | | Johnson | 142-0701-801 |
| ZENER | D1 | Zener Diode | 5.1 V | SOD110 | PHILIPS | BZX284C5V1 |
| BOARD | FR-4 THk=0.060" 2OZ Cu Both Sides | | | | | |

6 Mounting indications

Figure 11. Standard SMD mounting

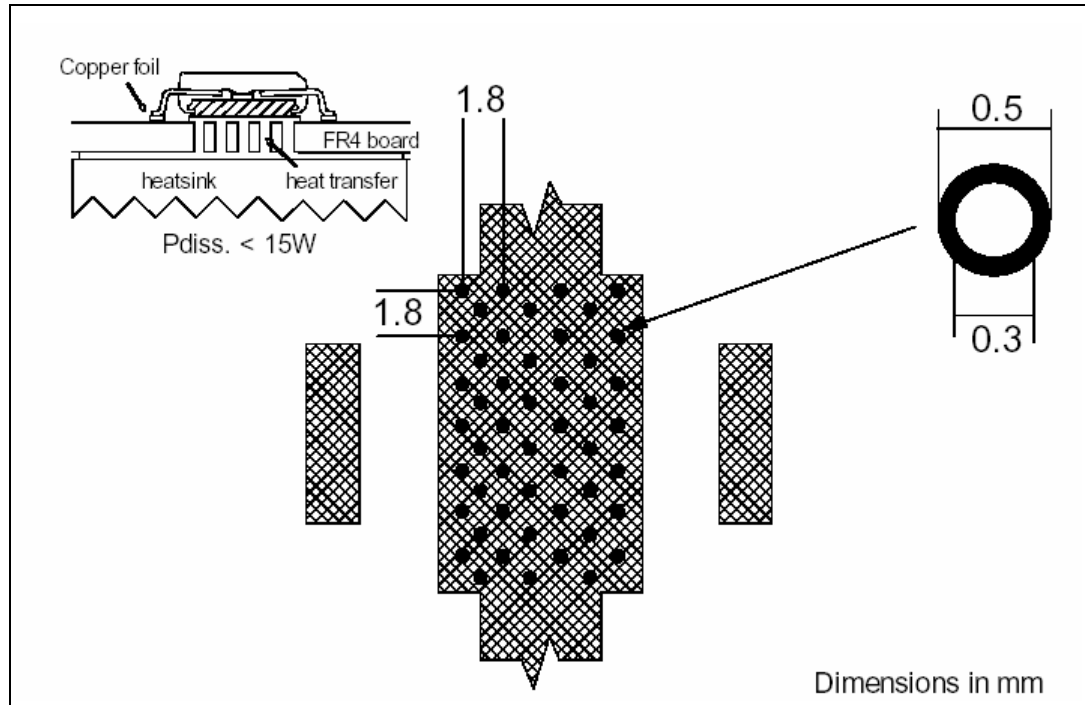


Figure 12 shows the recommended solder for devices that have Pb-free terminal plating and where a Pb-free solder is used.

Figure 12. Recommended solder profile

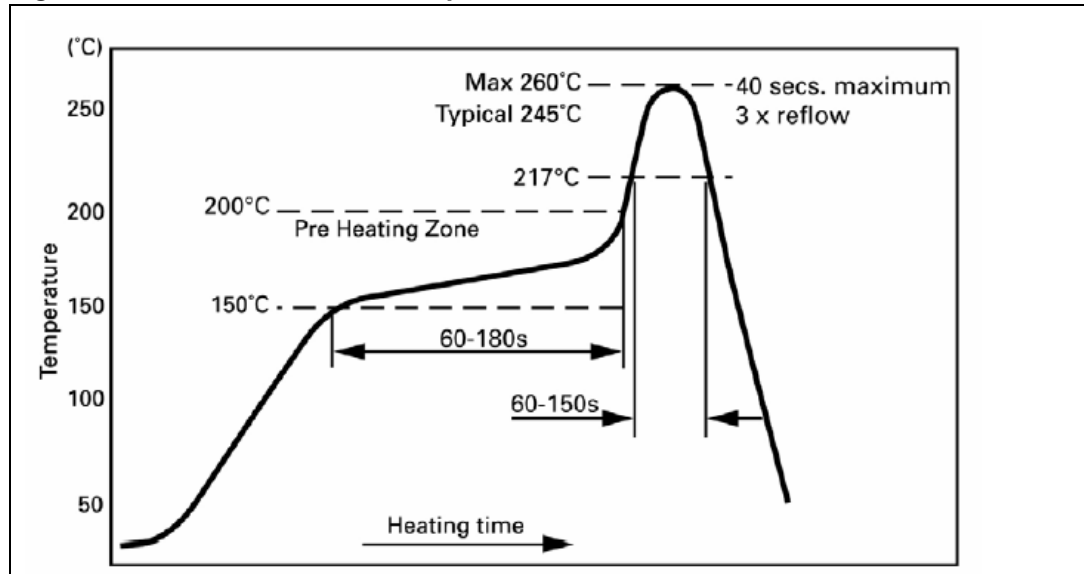


Figure 13 shows the recommended solder for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

Figure 13. Recommended solder profile for leaded devices

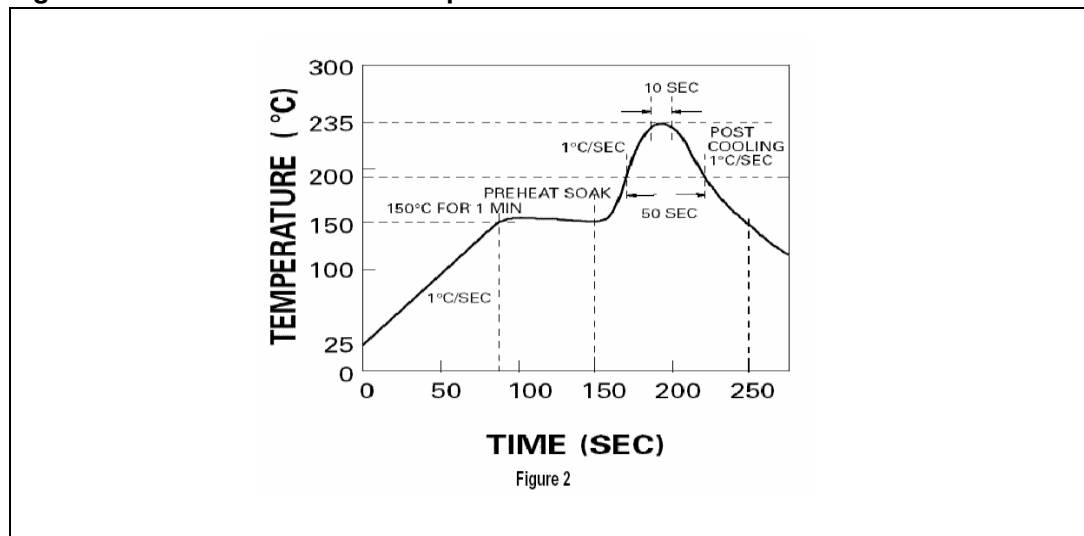


Figure 2

7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

Table 4. PowerSO-10RF Formed lead (Gull Wing) Mechanical data

| Dim. | mm. | | | Inch | | |
|------|-------|--------|-------|-------|--------|--------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A1 | 0 | 0.05 | 0.1 | 0. | 0.0019 | 0.0038 |
| A2 | 3.4 | 3.5 | 3.6 | 0.134 | 0.137 | 0.142 |
| A3 | 1.2 | 1.3 | 1.4 | 0.046 | 0.05 | 0.054 |
| A4 | 0.15 | 0.2 | 0.25 | 0.005 | 0.007 | 0.009 |
| a | | 0.2 | | | 0.007 | |
| b | 5.4 | 5.53 | 5.65 | 0.212 | 0.217 | 0.221 |
| c | 0.23 | 0.27 | 0.32 | 0.008 | 0.01 | 0.012 |
| D | 9.4 | 9.5 | 9.6 | 0.370 | 0.374 | 0.377 |
| D1 | 7.4 | 7.5 | 7.6 | 0.290 | 0.295 | 0.298 |
| E | 13.85 | 14.1 | 14.35 | 0.544 | 0.555 | 0.565 |
| E1 | 9.3 | 9.4 | 9.5 | 0.365 | 0.37 | 0.375 |
| E2 | 7.3 | 7.4 | 7.5 | 0.286 | 0.292 | 0.294 |
| E3 | 5.9 | 6.1 | 6.3 | 0.231 | 0.24 | 0.247 |
| F | | 0.5 | | | 0.019 | |
| G | | 1.2 | | | 0.047 | |
| L | 0.8 | 1 | 1.1 | 0.030 | 0.039 | 0.042 |
| R1 | | | 0.25 | | | 0.01 |
| R2 | | 0.8 | | | 0.031 | |
| T | 2 deg | 5 deg | 8 deg | 2 deg | 5 deg | 8 deg |
| T1 | | 6 deg | | | 6 deg | |
| T2 | | 10 deg | | | 10 deg | |

Note: Resin protrusions not included (max value: 0.15 mm per side)

Figure 14. Package dimensions

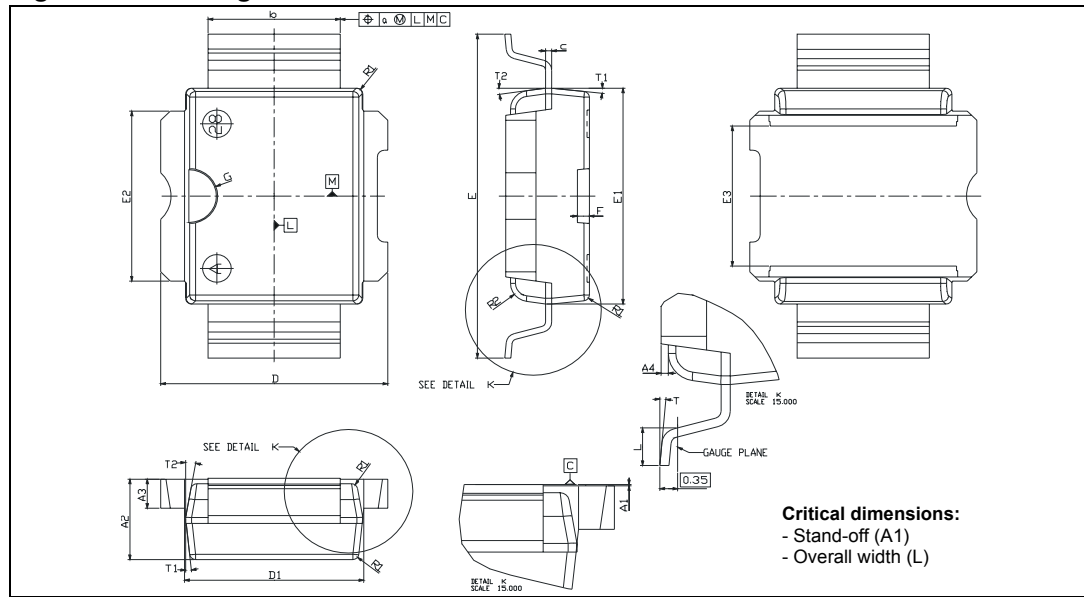


Figure 15. PowerSO-10RF Tape & reel

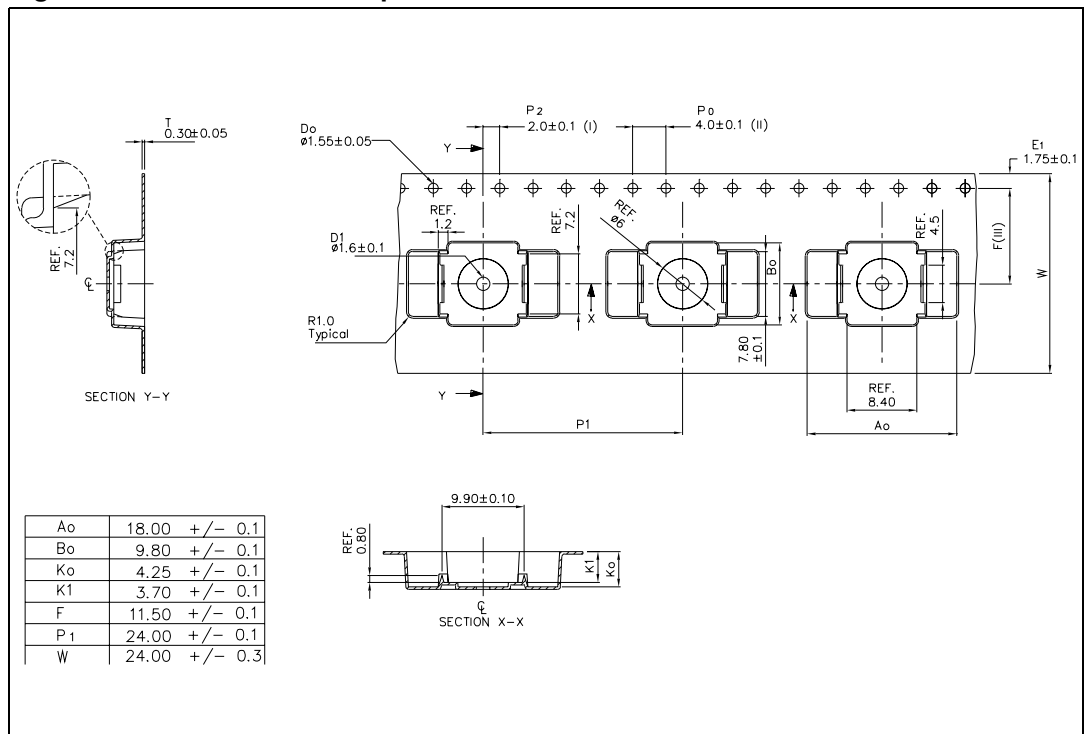
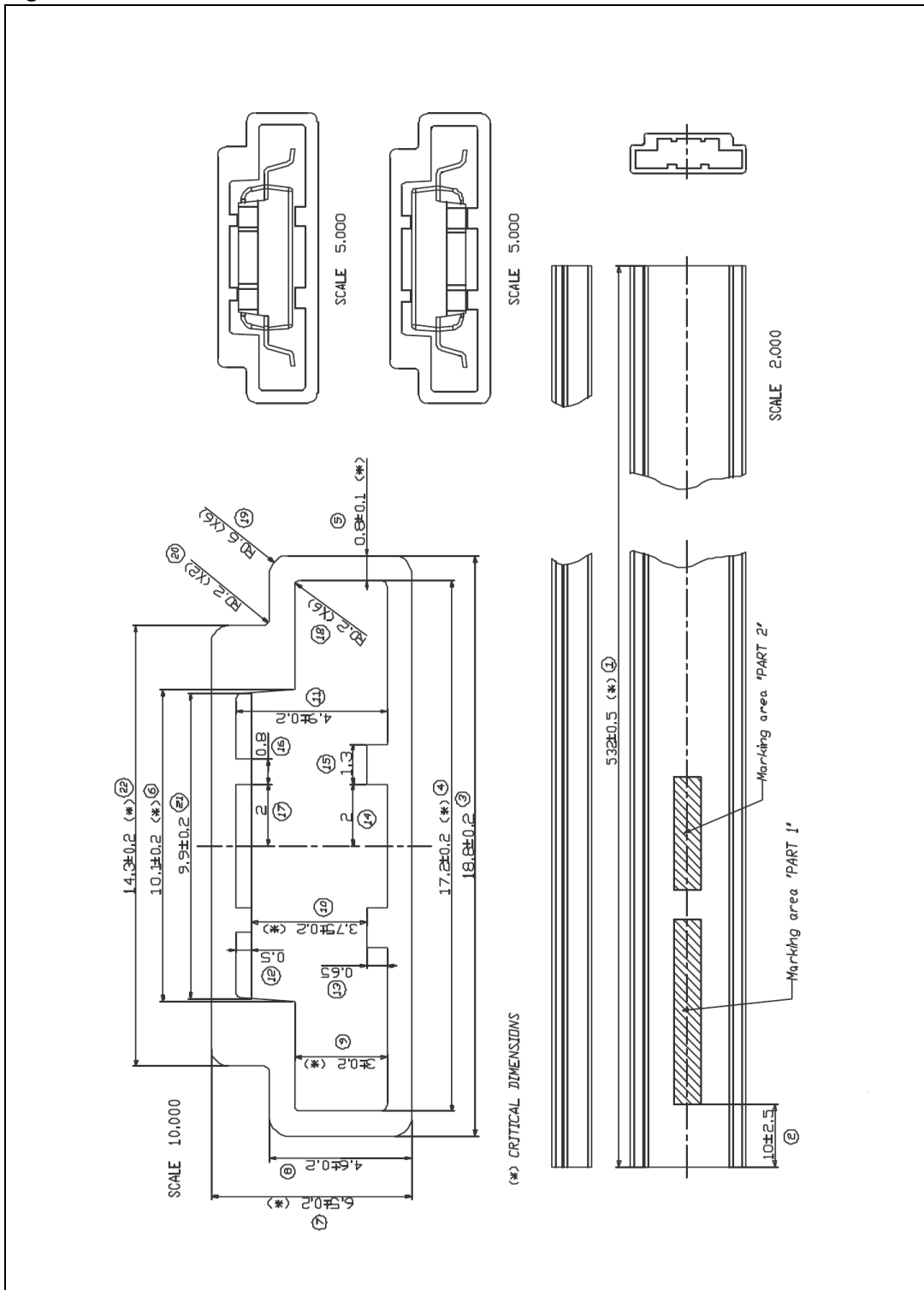


Figure 16. Tube information



8 Revision history

Table 5. Revision history

| Date | Revision | Changes |
|-------------|----------|------------------|
| 13-Jun-2006 | 1 | Initial release. |

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