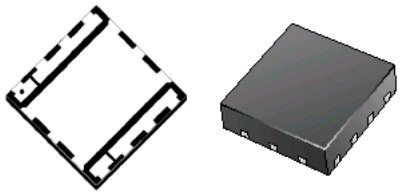
# PD54008L-E

RF power transistors
The LdmoST Plastic family

## Features

- Excellent thermal stability
- Common source configuration
- Broadband performances $P_{OUT}$ = 8W with 15 dB gain @ 500MHz
- New leadless plastic package
- EDS protection
- Supplied in tape & reel of 3K units
- In compliance with the 2002/93/EC european directive



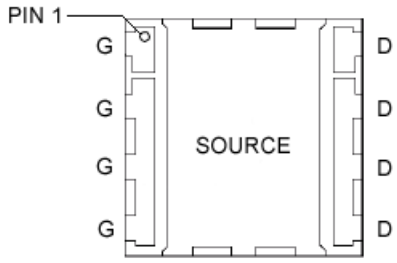
**PowerFLAT™ (5x5)**

## Description

The PD54008L-E is a common source N-Channel, enhancement-mode lateral Field-Effect RF power transistor. It is designed for high gain, broad band commercial and industrial applications. It operates at 7 V in common source mode at frequencies of up to 1 GHz. PD54008L-E boasts the excellent gain, linearity and reliability of STH1LV latest LDMOS technology mounted in the innovative leadless SMD plastic package, PowerFLAT™.

PD54008L-E's superior linearity performance makes it an ideal solution for portable radio.

## Pin connection




**Top view**

## Order codes

| Part Number | Marking | Package | Packaging |
|---|---|---|---|
| PD54008L-E | 54008 | PowerFLAT (5x5) | Tape & Reel |

# Contents

# 1 Electrical data

## 1.1 Maximum ratings

**Table 1. Absolute maximum ratings** ($T_{CASE}$ = 25°C)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{(BR)DSS}$ | Drain source voltage | 25 | V |
| $V_{GS}$ | Gate-source voltage | -0.5 to +15 | V |
| $I_D$ | Drain current | 5 | A |
| $P_{DISS}$ | Power dissipation ($t_{CASE}$ = 70°C) | 26.7 | W |
| $T_J$ | Maximum operating junction temperature | 150 | °C |
| $T_{STG}$ | Storage temperature | -65 to +150 | °C |

## 1.2 Thermal data

**Table 2. Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thJC}$ | Junction to case thermal resistance | 3 | °C/W |

## 1.3 Electrical characteristics

**Table 3. Static** ($T_{CASE}$ = 25°C)

| Symbol | Test conditions | | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{DSS}$ | $V_{GS}$ = 0V | $V_{DS}$ = 25V | | | | 1 | µA |
| $I_{GSS}$ | $V_{GS}$ = 5V | $V_{DS}$ = 0V | | | | 1 | µA |
| $V_{GS(Q)}$ | $V_{DS}$ = 10V | $I_D$ = 50mA | | 2.0 | | 5.0 | V |
| $V_{DS(ON)}$ | $V_{GS}$ = 10V | $I_D$ = 0.5A | | | 0.09 | | V |
| $C_{ISS}$ | $V_{GS}$ = 0V | $V_{DS}$ = 7.5V | f = 1MHz | | 80 | | pF |
| $C_{OSS}$ | $V_{GS}$ = 0V | $V_{DS}$ = 7.5V | f = 1MHz | | 60 | | pF |
| $C_{RSS}$ | $V_{GS}$ = 0V | $V_{DS}$ = 7.5V | f = 1MHz | | 6.6 | | pF |

**Table 4. Dynamic**

| Symbol | Test conditions | | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|
| $P_{1dB}$ | $V_{DD}$ = 7.5 V | $I_{DQ}$ = 200 mA | | f = 500MHz | 8 | | | W |
| $G_{PS}$ | $V_{DD}$ = 7.5 V | $I_{DQ}$ = 200 mA | $P_{OUT}$ = 8 W | f = 500MHz | 15 | | | dB |
| $\eta_D$ | $V_{DD}$ = 7.5 V | $I_{DQ}$ = 200 mA | $P_{OUT}$ = 8 W | f = 500MHz | 50 | | | % |
| Load Mismatch | $V_{DD}$ = 7.5 V<br>All Phase Angles | $I_{DQ}$ = 200 mA | $P_{OUT}$ = 8W | f = 500MHz | 20:1 | | | VSWR |

**Table 5. ESD protection characteristics**

| Test conditions | Class |
|---|---|
| Human body model | 2 |
| Machine model | M3 |

**Table 6. Moisture sensitivity level**

| Test methodology | Rating |
|---|---|
| J-STD-020B | MSL 3 |

# 2 Impedances

**Figure 1. Impedance data schematic**

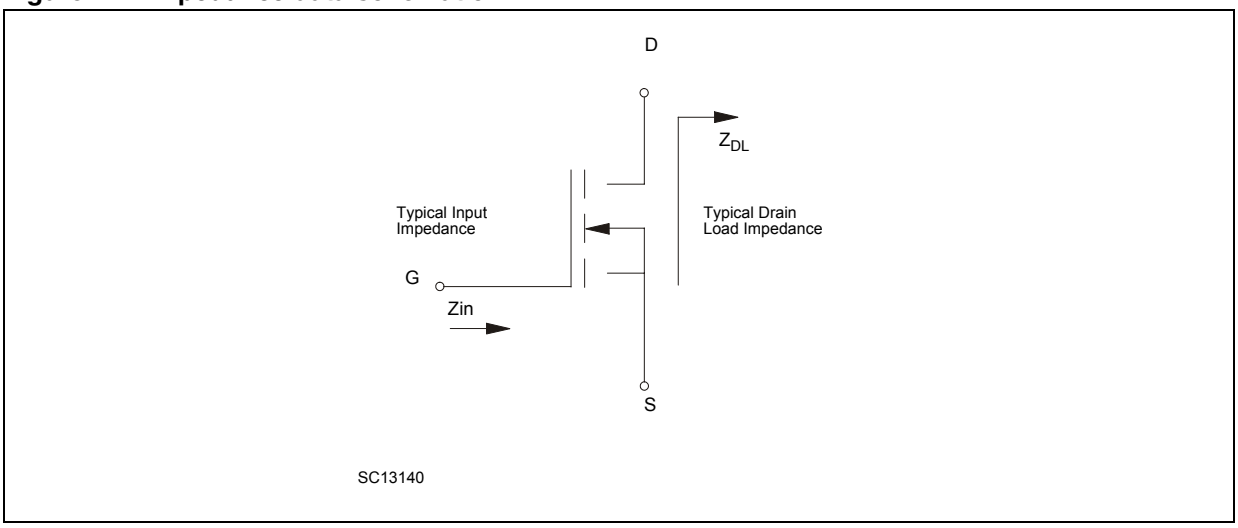



**Table 7. Impedance data (1)**

| f | $Z_{IN}$ (Ω) | $Z_{DL}$ (Ω) |
|---|---|---|
| 480MHz | 1.12 - j 2.02 | 2.01 + j 0.13 |
| 500MHz | 1.3 - j 2.01 | 1.84 + j 0.7 |
| 520MHz | 1.66 - j 2.55 | 1.66 + j 1.51 |

1. In Broadband amplifier

# 3 Typical performance

**Figure 2. Power gain vs output power**

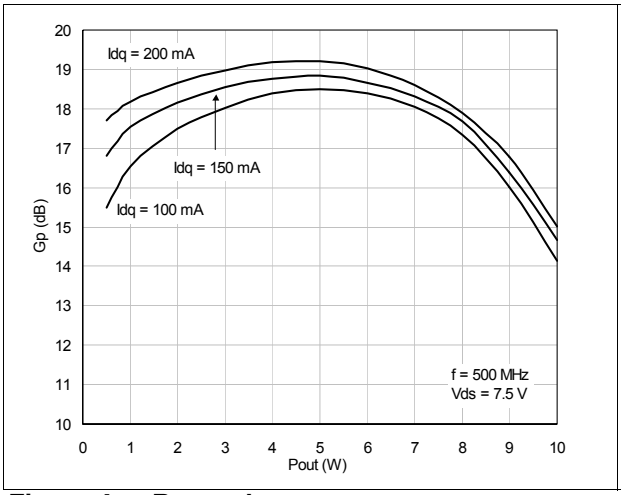



**Figure 3. Efficiency vs output power**

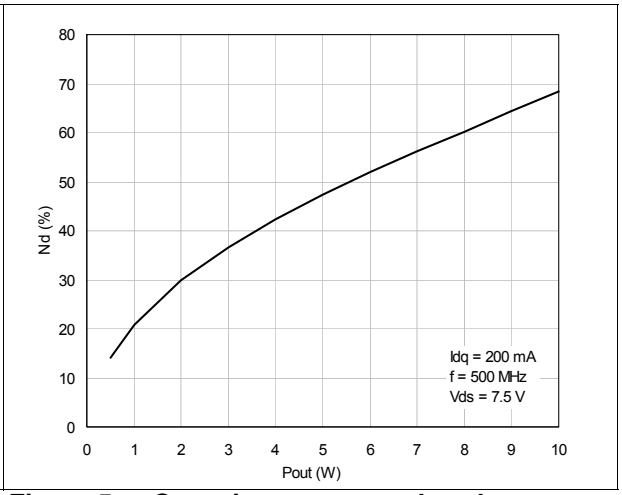



**Figure 4. Return loss vs output power**

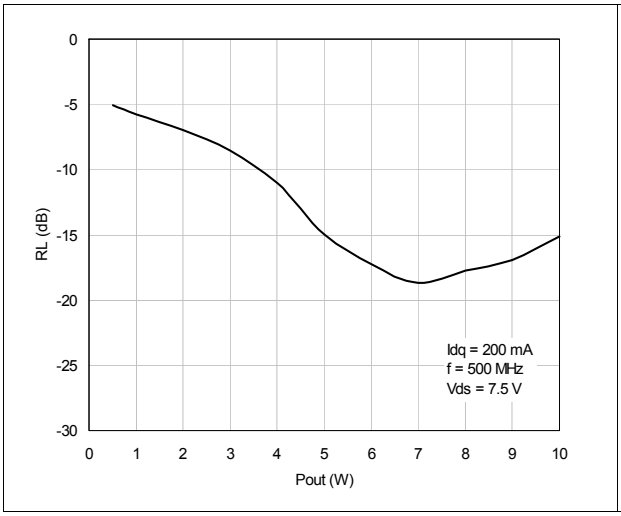
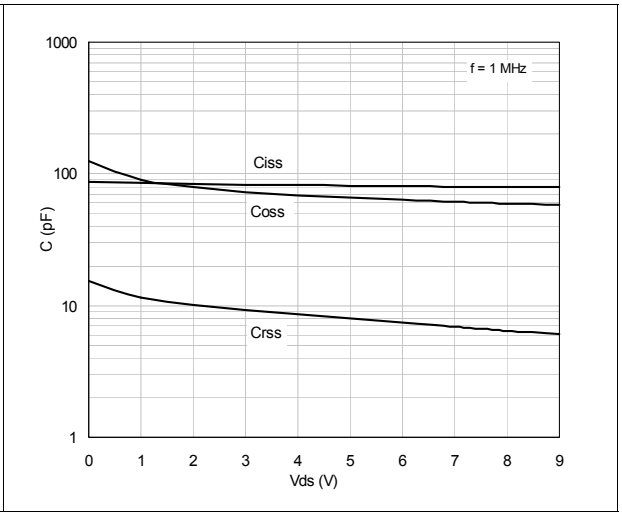



**Figure 5. Capacitance vs supply voltage**



## 3.1 Typical performance (Broadband)

**Figure 6. Power gain vs frequency**

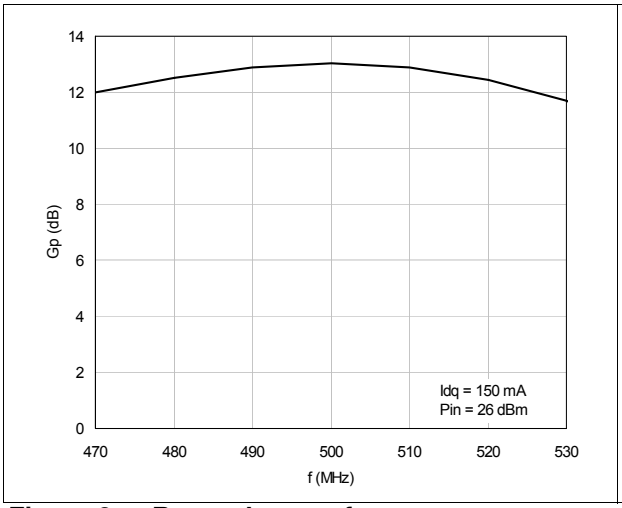



**Figure 7. Efficiency vs frequency**

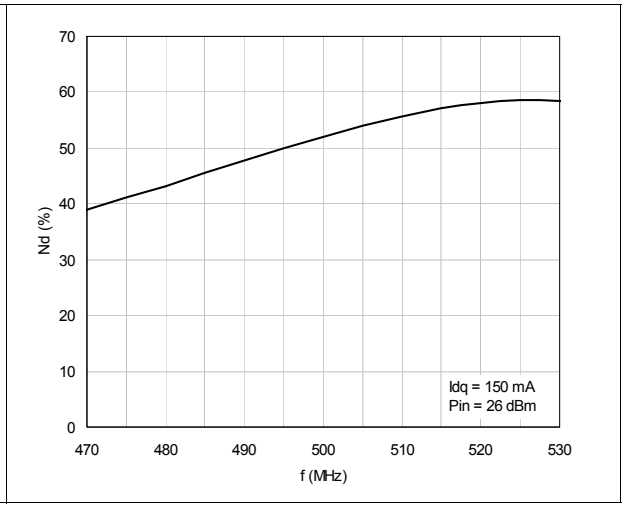
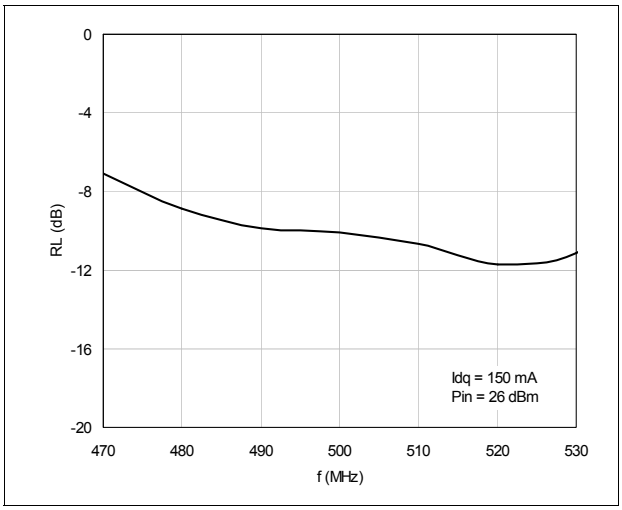



**Figure 8. Return loss vs frequency**



# 4 Test circuit schematic

**Figure 9. Internal schematic**

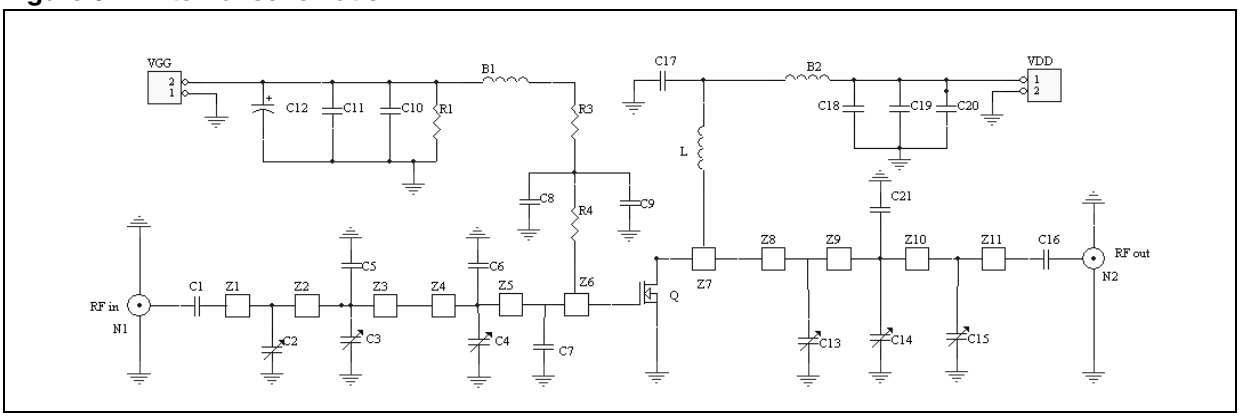



**Table 8. Test circuit component part list**

| Component | Description |
|---|---|
| B1, B2 | Ferrite bead |
| C1, C16 | 300 pF, 100 mil ATC |
| C2, C3, C4, C13,C14 | 1 -:- 20 pF Trimmer cap - JOHANSON |
| C15 | 0.8 -:- 10 pF Trimmer cap - JOHANSON |
| C5 | 36 pF, 100 mil ATC |
| C6 | 51 pF, 100 mil ATC |
| C7 | 62 pF, 100 mil ATC |
| C8, C17 | 150 pF, 100 mil CHIP CAP |
| C9 | 1 nF, 100 mil CHIP CAP |
| C10, C18 | 1000 pF, 100 mil CHIP CAP |
| C11, C19 | 0.1 nF, 100 mil CHIP CAP |
| C12, C20 | 10 µF 50 V Electrolytic Capacitor |
| C21 | 15 pF, 100 mil ATC |
| L | 43nH, Coilcraft |
| R1 | 33 KΩ, 1W CHIP Resistor |
| R3 | 1 KΩ, 1W CHIP Resistor |
| R4 | 15 Ω, 1W CHIP Resistor |
| Z1 | 0.49" X 0.080" MICROSTRIP |
| Z2 | 1.024" X 0.080" MICROSTRIP |
| Z3 | 0.079" X 0.080" MICROSTRIP |
| Z4 | 0.24" X 0.223" MICROSTRIP |
| Z5 | 0.079" X 0.223" MICROSTRIP |

**Table 8. Test circuit component part list**

| | |
|---|---|
| Z6 | 0.138" X 0.223" MICROSTRIP |
| Z7 | 0.259" X 0.223" MICROSTRIP |
| Z8 | 0.079" X 0.080" MICROSTRIP |
| Z9 | 0.413" X 0.080" MICROSTRIP |
| Z10 | 0.756" X 0.080" MICROSTRIP |
| Z11 | 0.61" X 0.080" MICROSTRIP |
| N1, N2 | Type N Flange Mount |
| Board | ROGER, ULTRA LAM 2000 THK 0.030", $\varepsilon r$ = 2.55 2oz. ED cu SIDES |

# 5 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 9. PowerFLAT™ mechanical data**

| Dim. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | 0.90 | 1.00 | | 0.035 | 0.039 |
| A1 | | 0.02 | 0.05 | | 0.001 | 0.002 |
| A3 | | 0.24 | | | 0.009 | |
| AA | 0.15 | 0.25 | 0.35 | 0.006 | 0.01 | 0.014 |
| b | 0.43 | 0.51 | 0.58 | 0.017 | 0.020 | 0.023 |
| c | 0.64 | 0.71 | 0.79 | 0.025 | 0.028 | 0.031 |
| D | | 5.00 | | | 0.197 | |
| d | | 0.30 | | | 0.011 | |
| E | | 5.00 | | | 0.197 | |
| E2 | 2.49 | 2.57 | 2.64 | 0.098 | 0.101 | 0.104 |
| e | | 1.27 | | | 0.050 | |
| f | | 3.37 | | | 0.132 | |
| g | | 0.74 | | | 0.03 | |
| h | | 0.21 | | | 0.008 | |

**Figure 10. PowerFLAT™ package dimensions**

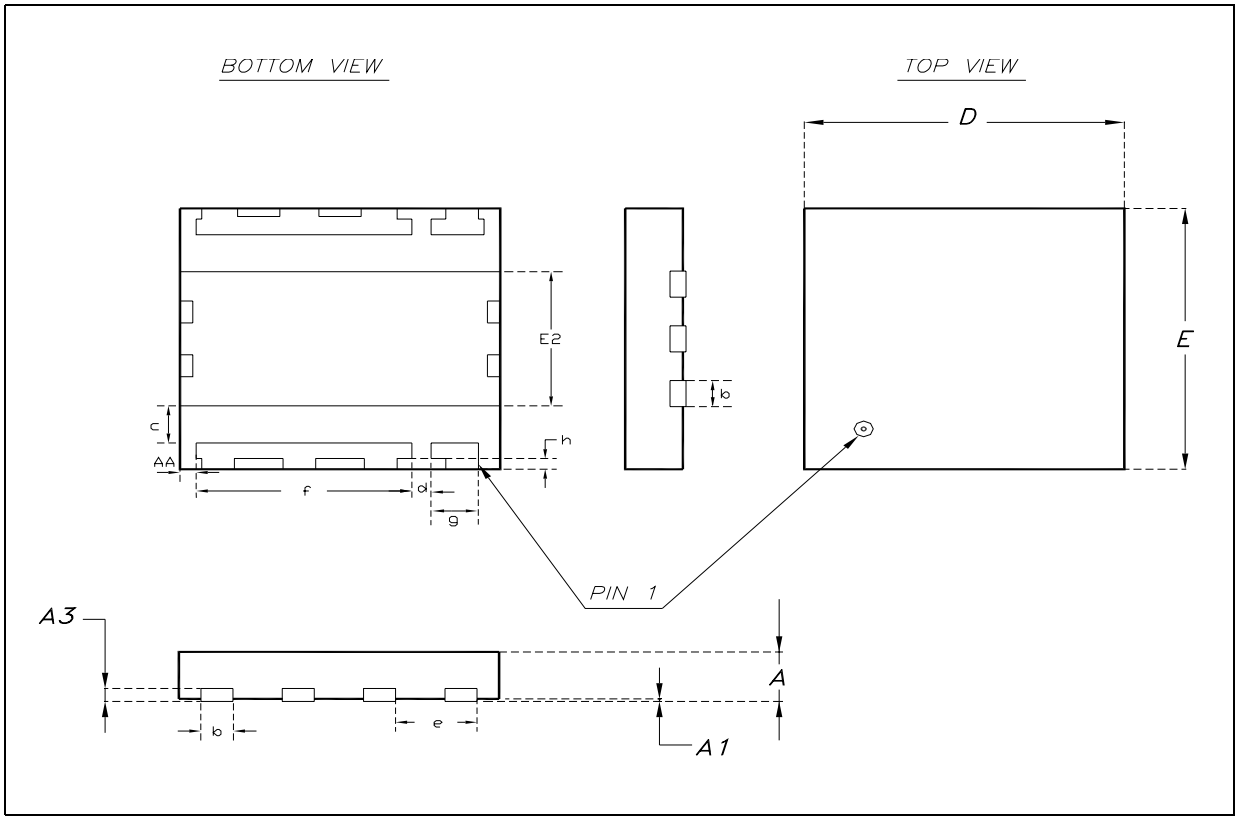


**Table 10. PowerFLAT™ tape & reel dimensions**

| DIM. | mm. | | |
|---|---|---|---|
| | Min. | Typ | Max. |
| Ao | 5.15 | 5.25 | 5.35 |
| Bo | 5.15 | 5.25 | 5.35 |
| Ko | 1.0 | 1.1 | 1.2 |

**Figure 11. PowerFLAT™ tape & reel**

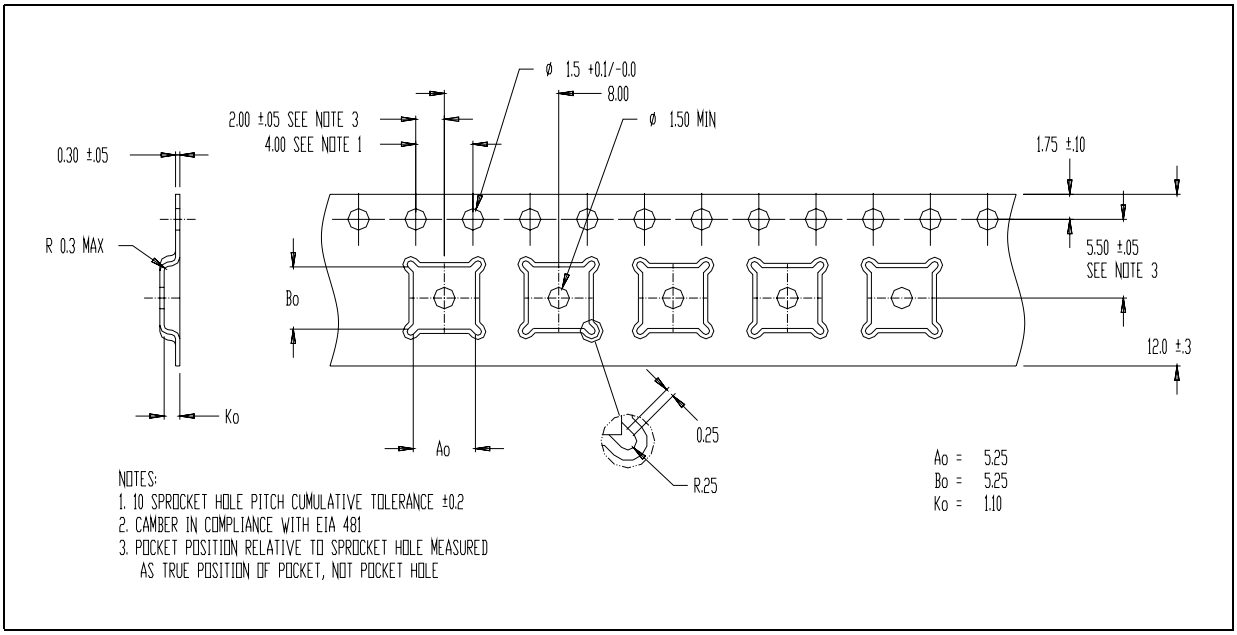
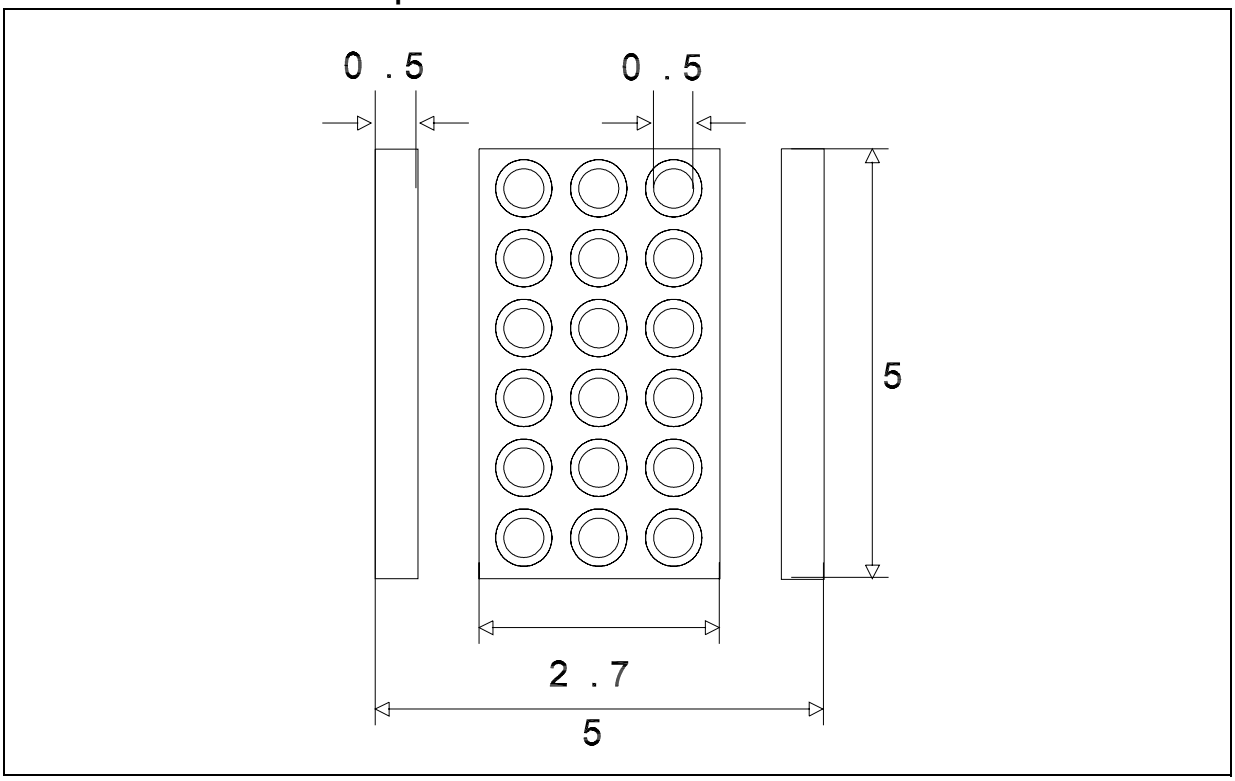


**Table 11. Recommended footprint**



# 6 Revision history

**Table 12. Revision history**

| Date | Revision | Changes |
|---|---|---|
| 19-Jan-2006 | 1 | First Issue |
| 23-Jan-2007 | 2 | Document has been reformatted |

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