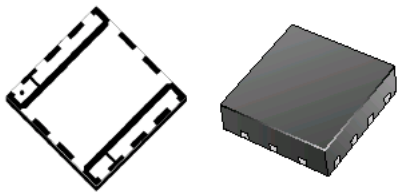
# PD54003L-E

## RF Power Transistors
## The LdmoST Plastic FAMILY

## Features

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT}$ = 3W WITH 20 dB GAIN @ 500MHz
- NEW RF PLASTIC PACKAGE
- EDS PROTECTION
- SUPPLIED IN TAPE & REEL OF 3K UNITS
- IN COMPLIANCE WITH THE 2002/93/EC EUROPEAN DIRECTIVE



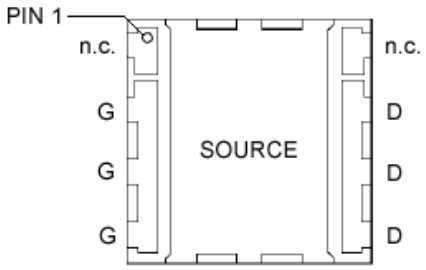
**PowerFLAT™ (5x5)**

## Description

The PD54003L-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. PD54003L-E boasts the excellent gain, linearity and reliability of STH1LV latest LDMOS technology mounted in the innovative leadless SMD plastic package, PowerFLAT™.

PD54003L-E's superior linearity performance makes it an ideal solution for portable radio.

## Pin Connection




**TOP VIEW**

## Order Codes

| Part Number | Marking | Package | Packaging |
|---|---|---|---|
| PD54003L-E | 54003 | 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 | 4 | A |
| $P_{DISS}$ | Power Dissipation ($t_{case}$=70°C) | 19.5 | W |
| $T_J$ | Max. 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 | 4.1 | °C/W |

## 1.3 Electrical Characteristics

($T_{CASE}$ = 25°C)

**Table 3. Static**

| Symbol | Test Conditions | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_{DSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 25 V | | | | 1 | µA |
| $I_{GSS}$ | $V_{GS}$ = 20 V | $V_{DS}$ = 0 V | | | | 1 | µA |
| $V_{GS(Q)}$ | $V_{DS}$ = 10 V | $I_D$ = 50 mA | | 2.0 | | 3.3 | V |
| $V_{DS(ON)}$ | $V_{GS}$ = 10 V | $I_D$ = 0.5 A | | | 0.13 | 0.16 | V |
| $g_{FS}$ | $V_{DS}$ = 10 V | $I_D$ = 3.2 A | | | TBD | | mho |
| $C_{ISS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 7.5 V | f = 1 MHz | | 54 | | pF |
| $C_{OSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 7.5 V | f = 1 MHz | | 43 | | pF |
| $C_{RSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 7.5 V | f = 1 MHz | | 4.0 | | pF |

**Table 4. Dynamic**

| Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $P_{OUT}$ | $V_{DD}$ = 7.5 V $I_{DQ}$ = 50 mA f = 500MHz | 3 | | | W |
| $G_{PS}$ | $V_{DD}$ = 7.5 V $I_{DQ}$ = 50 mA $P_{OUT}$ = 3 W f = 500MHz | 16 | 20 | | dB |
| $\eta_D$ | $V_{DD}$ = 7.5 V $I_{DQ}$ = 50 mA $P_{OUT}$ = 3 W f = 500MHz | 50 | 55 | | % |
| Load Mismatch | $V_{DD}$ = 9.5 V $I_{DQ}$ = 50 mA $P_{OUT}$ = 3W f = 500MHz All Phase Angles | 20:1 | | | VSWR |

**Table 5. ESD Protection Characteristics**

| Test Conditions | Class |
|---|---|
| Human Body Model | 2 |
| Machine Model | M3 |

**Table 6. Moisture Sensitivy Level**

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

# 2 Typical Performance

**Figure 1. Capacitance vs. Supply Voltage**

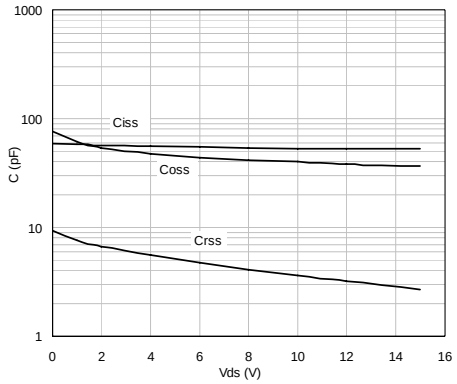



**Figure 2. Output Power vs. Input Power**

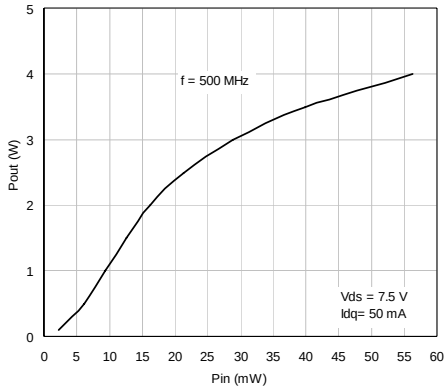



**Figure 3. Power Gain vs. Output Power**

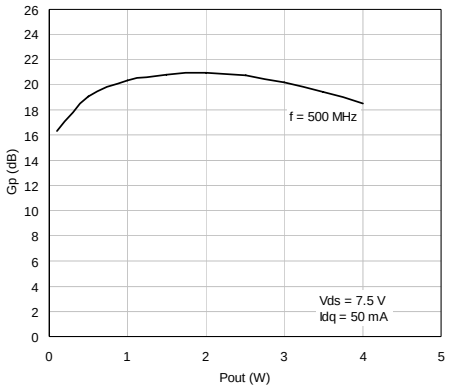



**Figure 4. Efficiency vs Output Power**

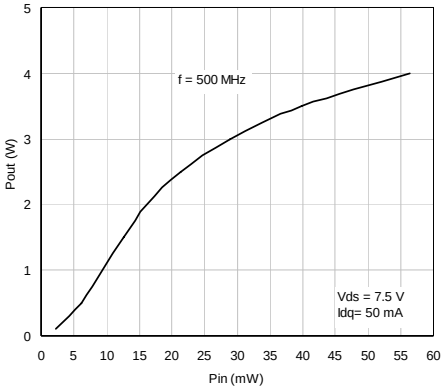



**Figure 5. Output Power vs Bias Current**

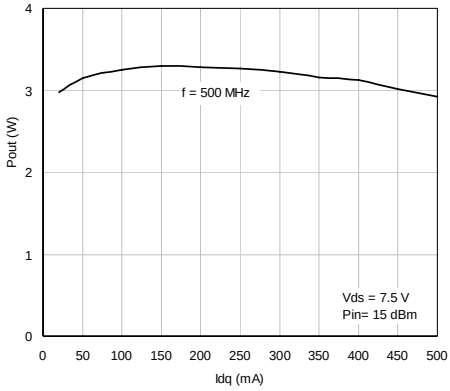


**Figure 6. Efficiency vs Bias Current**

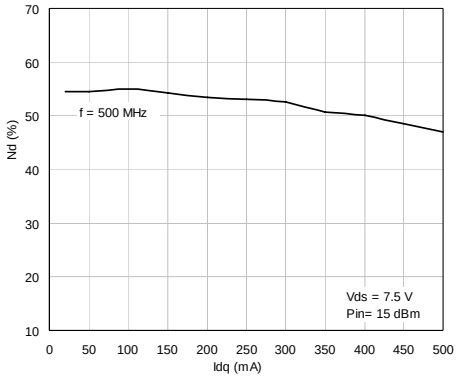



**Figure 7. Output Power vs Supply Voltage**

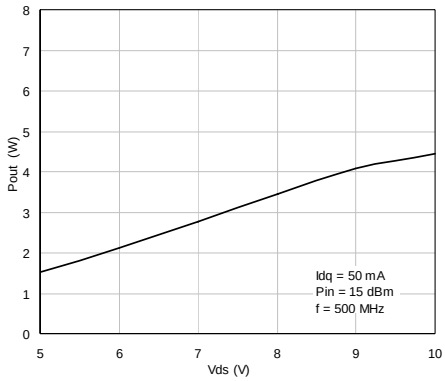
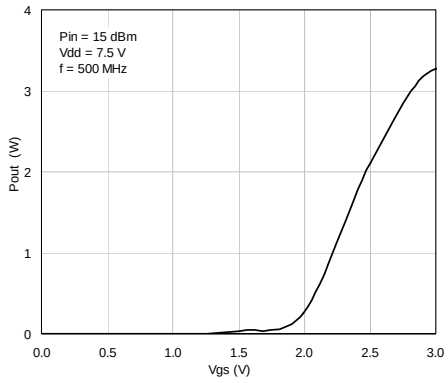



**Figure 8. Output Power vs Gate-Source Volt**



## 2.1 Typical Performance (Broadband)

**Figure 9. Power Gain vs Frequency**

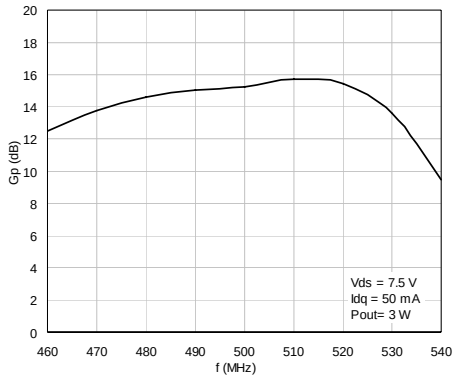



**Figure 10. Efficiency vs Frequency**

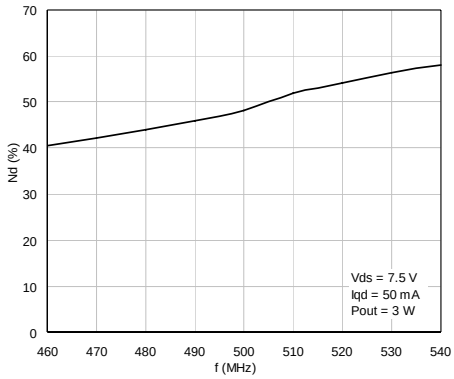
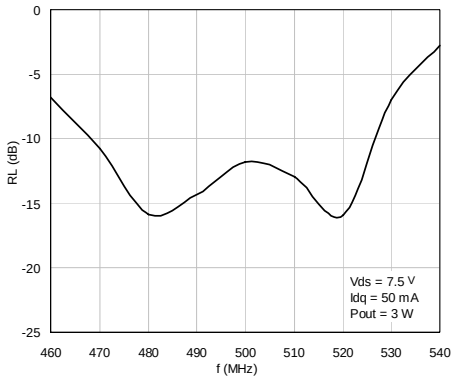



**Figure 11. Return Loss vs Frequency**



# 3 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 7. 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 12. PowerFLAT™ Package Dimensions**

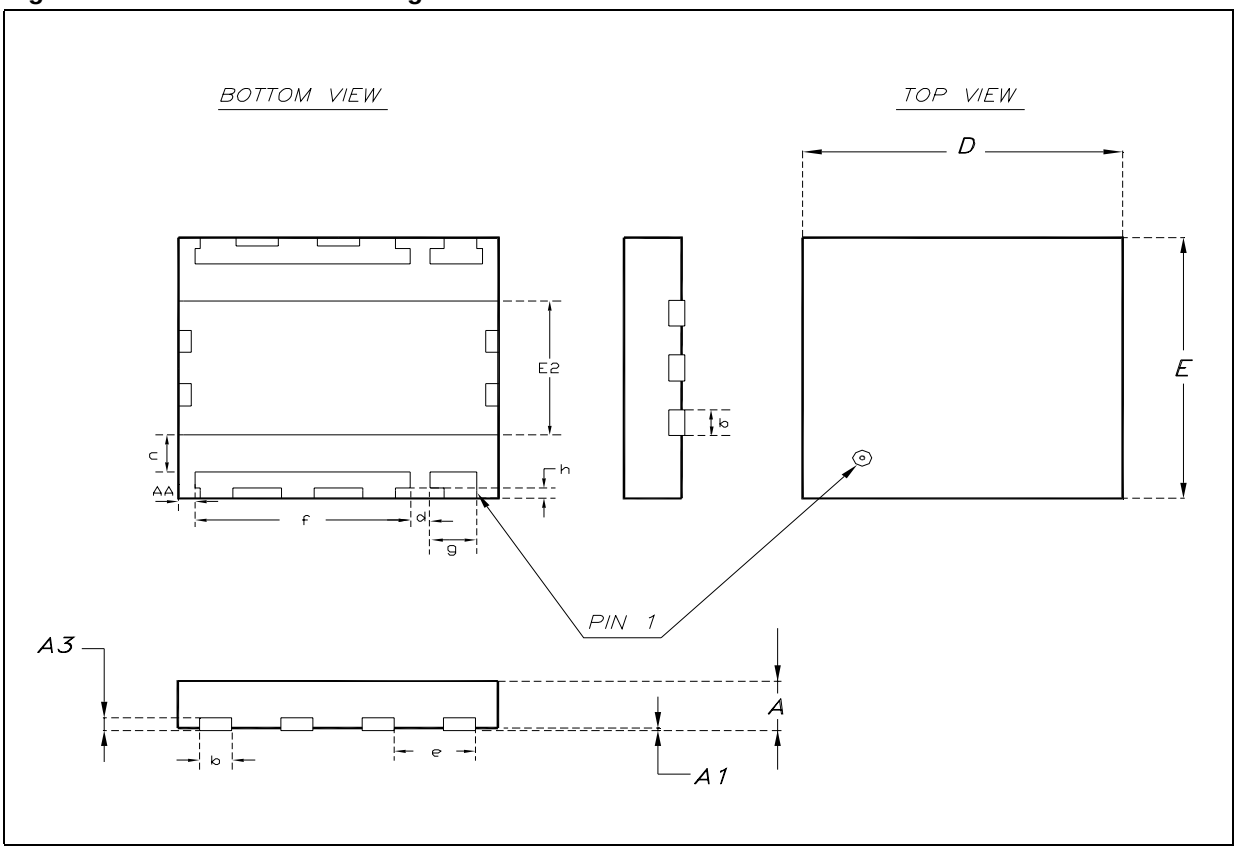


**Table 8. PowerFLAT™ Tape & Reel Dimensions**

| 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 13. PowerFLAT™ Tape & Reel**

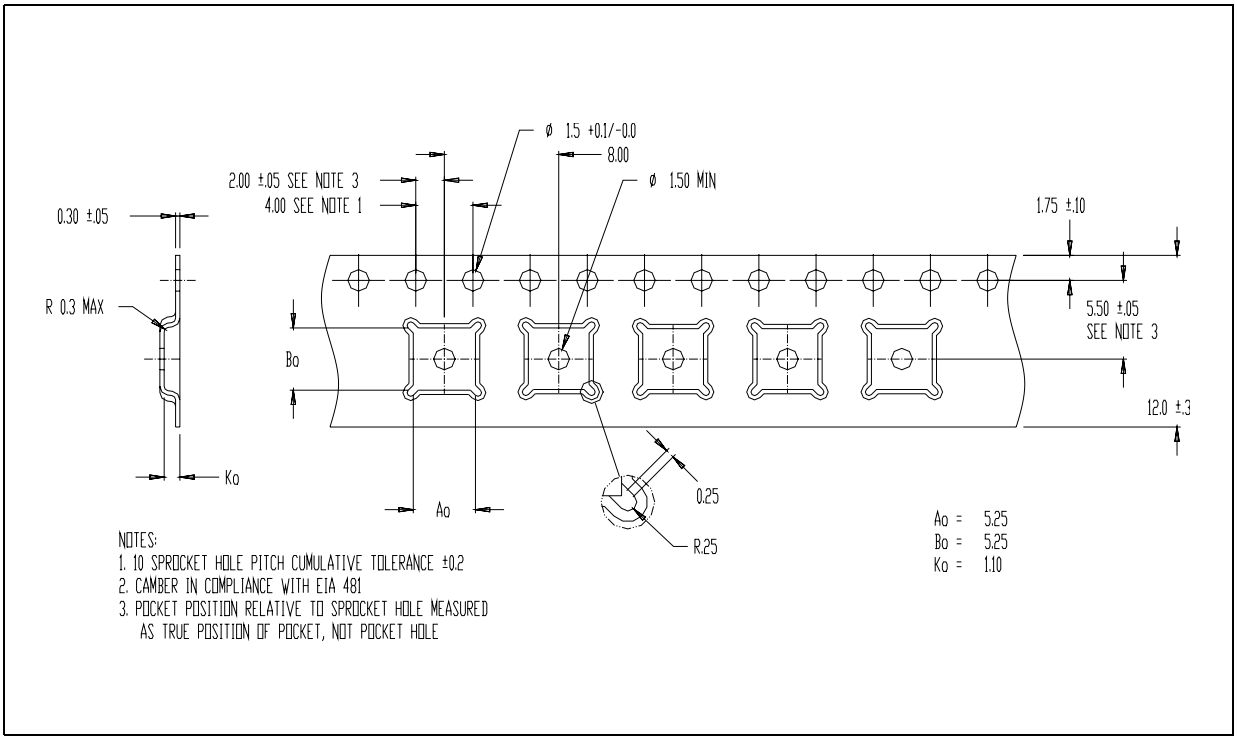
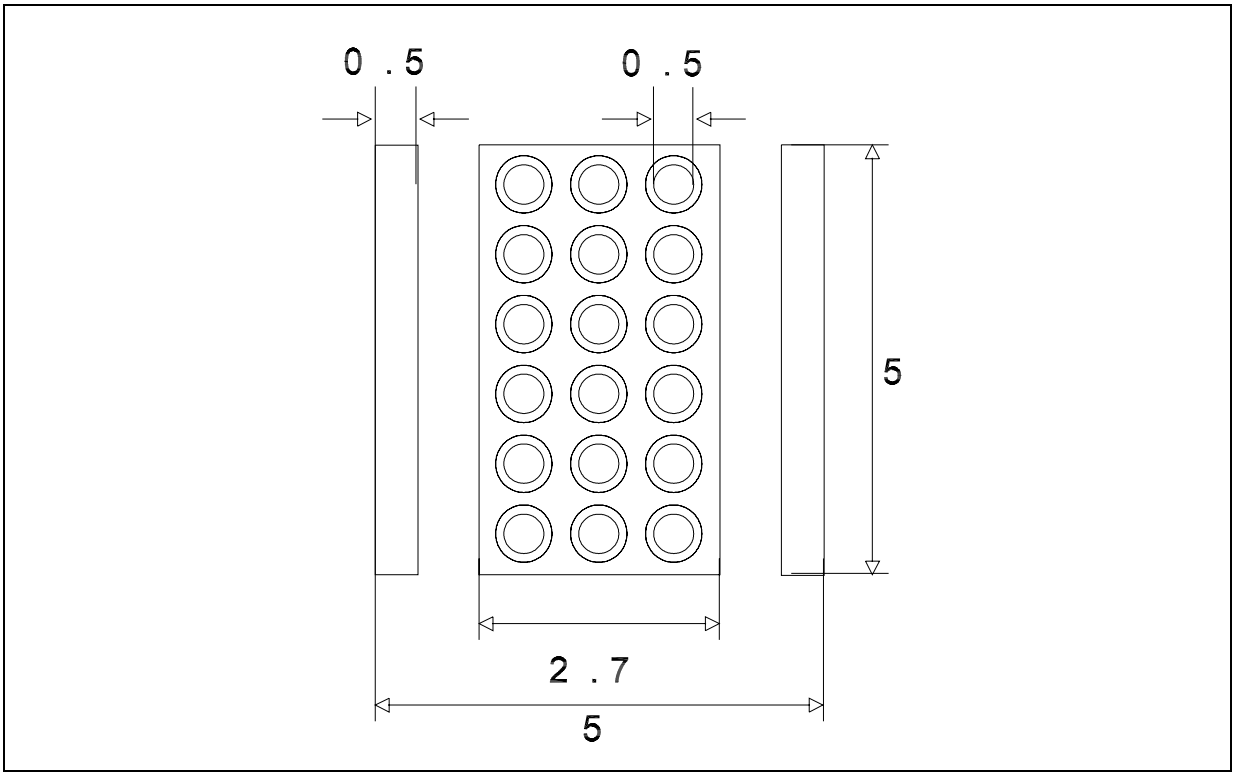


**Table 9. Recommended FOOTPRINT**



# 4 Revision History

| Date | Revision | Description of Changes |
|---|---|---|
| 04-Jan-2006 | 1 | First Issue. |