



# PD54008-E

RF power transistor, LdmoST plastic family  
N-channel enhancement-mode, lateral MOSFETs

## Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 8\text{ W}$  with 11.5dB gain @ 500 MHz/7.5 V
- New RF plastic package

## Description

The device 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. The device boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, PowerSO-10RF. Device's superior linearity performance makes it an ideal solution for portable radio.

The PowerSO-10 plastic package, designed to offer high reliability, is the first ST JEDEC approved, high power SMD package. It has been specially optimized for RF needs and offers excellent RF performances and ease of assembly.

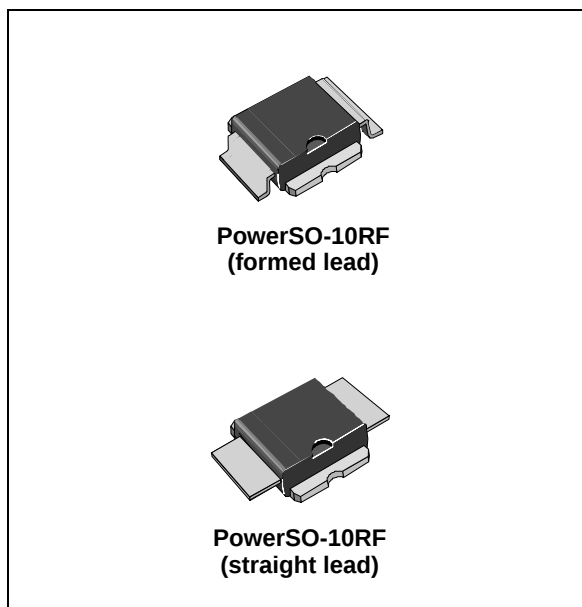


Figure 1. Pin connection

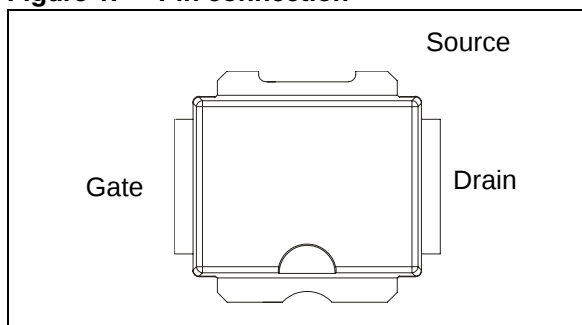


Table 1. Device summary

| Order code   | Package                      | Packing       |
|--------------|------------------------------|---------------|
| PD54008-E    | PowerSO-10RF (formed lead)   | Tube          |
| PD54008S-E   | PowerSO-10RF (straight lead) | Tube          |
| PD54008TR-E  | PowerSO-10RF (formed lead)   | Tape and reel |
| PD54008STR-E | PowerSO-10RF (straight lead) | Tape and reel |

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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                       | 25          | V           |
| $V_{GS}$      | Gate-source voltage                        | $\pm 20$    | V           |
| $I_D$         | Drain current                              | 5           | A           |
| $P_{DISS}$    | Power dissipation (@ $T_C = 70^{\circ}C$ ) | 73          | W           |
| $T_J$         | Max. operating junction temperature        | 165         | $^{\circ}C$ |
| $T_{STG}$     | 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 | 1.2   | $^{\circ}C/W$ |

## 2 Electrical characteristics

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

### 2.1 Static

**Table 4. Static**

| Symbol              | Test conditions               |                                | Min. | Typ. | Max. | Unit          |
|---------------------|-------------------------------|--------------------------------|------|------|------|---------------|
| $I_{\text{DSS}}$    | $V_{\text{GS}} = 0$           | $V_{\text{DS}} = 25\text{ V}$  |      |      | 1    | $\mu\text{A}$ |
| $I_{\text{GSS}}$    | $V_{\text{GS}} = 20\text{ V}$ | $V_{\text{DS}} = 0$            |      |      | 1    | $\mu\text{A}$ |
| $V_{\text{GS(Q)}}$  | $V_{\text{DS}} = 10\text{ V}$ | $I_{\text{D}} = 150\text{ mA}$ | 2.0  |      | 5.0  | V             |
| $V_{\text{DS(ON)}}$ | $V_{\text{GS}} = 10\text{ V}$ | $I_{\text{D}} = 2\text{ A}$    |      |      | 0.6  | V             |
| $g_{\text{FS}}$     | $V_{\text{DS}} = 10\text{ V}$ | $I_{\text{D}} = 2\text{ A}$    | 2.0  | 2.5  |      | mho           |
| $C_{\text{ISS}}$    | $V_{\text{GS}} = 0$           | $V_{\text{DS}} = 7.5\text{ V}$ |      | 91   |      | pF            |
| $C_{\text{OSS}}$    | $V_{\text{GS}} = 0$           | $V_{\text{DS}} = 7.5\text{ V}$ |      | 68   |      | pF            |
| $C_{\text{RSS}}$    | $V_{\text{GS}} = 0$           | $V_{\text{DS}} = 7.5\text{ V}$ |      | 8.5  |      | pF            |

### 2.2 Dynamic

**Table 5. Dynamic**

| Symbol           | Test conditions                                                                                                                             | Min. | Typ. | Max. | Unit |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $P_{1\text{dB}}$ | $V_{\text{DD}} = 7.5\text{ V}$ , $I_{\text{DQ}} = 150\text{ mA}$ $f = 500\text{ MHz}$                                                       | 8    |      |      | W    |
| $G_{\text{P}}$   | $V_{\text{DD}} = 7.5\text{ V}$ , $I_{\text{DQ}} = 150\text{ mA}$ , $P_{\text{OUT}} = 8\text{ W}$ , $f = 500\text{ MHz}$                     | 10   | 11.5 |      | dB   |
| $h_{\text{D}}$   | $V_{\text{DD}} = 7.5\text{ V}$ , $I_{\text{DQ}} = 150\text{ mA}$ , $P_{\text{OUT}} = 8\text{ W}$ , $f = 500\text{ MHz}$                     | 50   | 55   |      | %    |
| Load mismatch    | $V_{\text{DD}} = 9.5\text{ V}$ , $I_{\text{DQ}} = 150\text{ mA}$ , $P_{\text{OUT}} = 8\text{ W}$ , $f = 500\text{ MHz}$<br>All phase angles | 20:1 |      |      | VSWR |

### 2.3 Moisture sensitivity level

**Table 6. Moisture sensitivity level**

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

3 Impedance

Figure 2. Current conventions

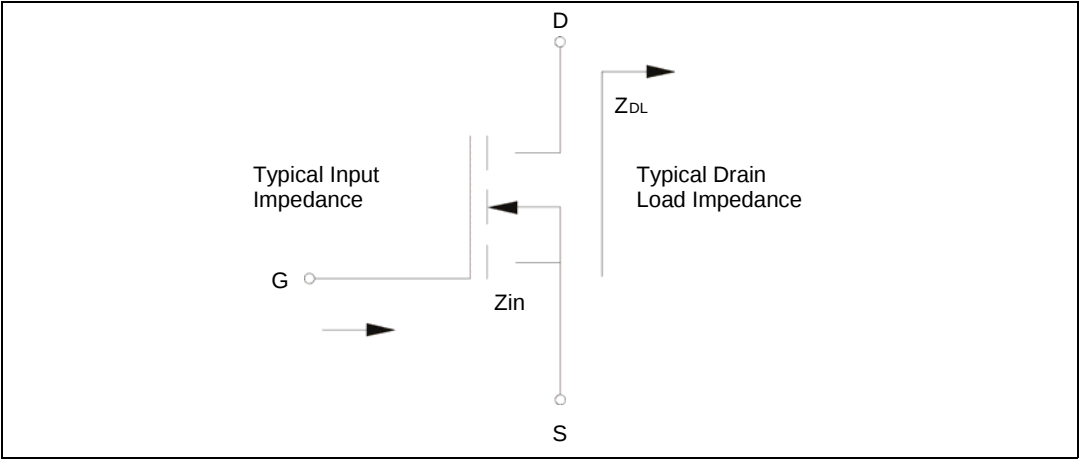


Table 7. Impedance data

| PD54008-E   |                   |                   | PD54008-E   |                   |                   |
|-------------|-------------------|-------------------|-------------|-------------------|-------------------|
| Freq. (MHz) | $Z_{IN} (\Omega)$ | $Z_{DL} (\Omega)$ | Freq. (MHz) | $Z_{IN} (\Omega)$ | $Z_{DL} (\Omega)$ |
| 175         | $2.3 - j 4.8$     | $1.9 + j 1.9$     | 480         | $1.22 - j 0.91$   | $1.04 - j 0.65$   |
| 200         | $2.1 - j 4.0$     | $2.8 + j 1.1$     | 500         | $1.20 - j 0.48$   | $1.28 - j 0.55$   |
| 250         | $1.3 - j 3.8$     | $2.3 + j 0.0$     | 520         | $1.28 - j 0.74$   | $1.44 - j 0.99$   |
| 480         | $1.65 + j 0.53$   | $1.35 - j 1.57$   |             |                   |                   |
| 500         | $1.73 + j 0.96$   | $1.48 - j 1.62$   |             |                   |                   |
| 520         | $1.73 + j 1.15$   | $1.47 - j 1.97$   |             |                   |                   |

# 4 Typical performance

Figure 3. Capacitance vs. drain voltage

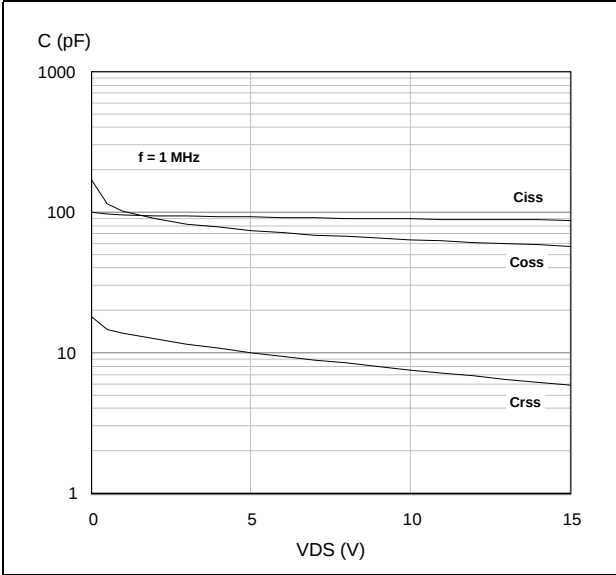


Figure 4. Drain current vs. gate-source voltage

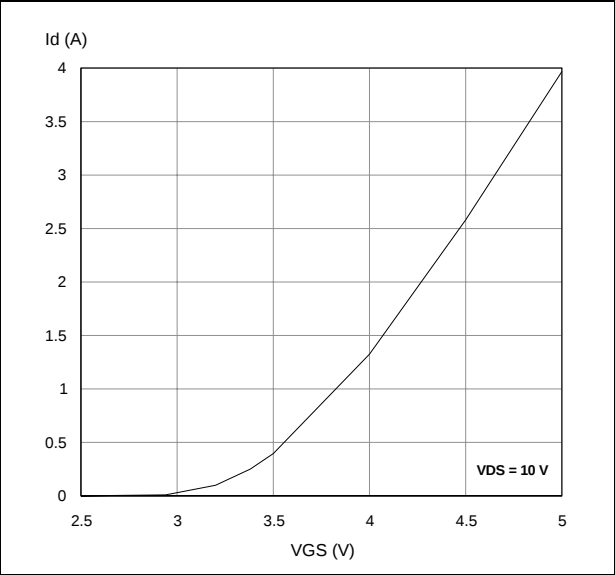
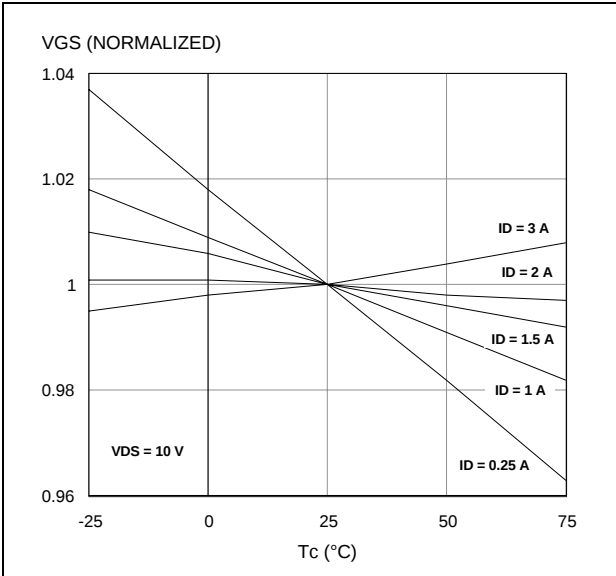


Figure 5. Gate-source voltage vs. case temperature



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Figure 6. Output power vs. input power

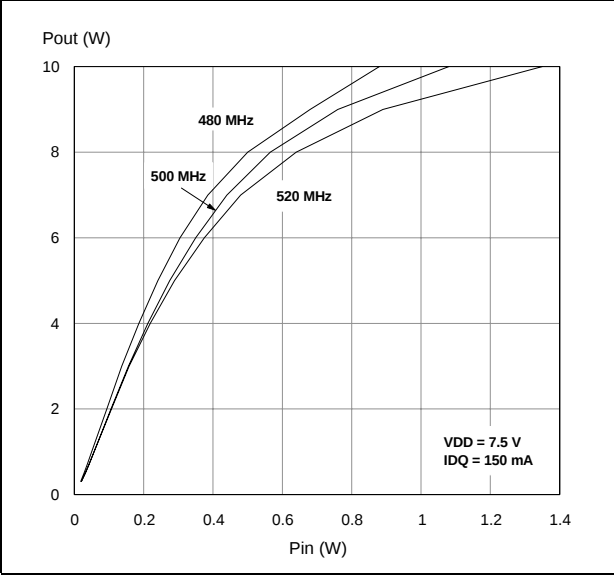


Figure 7. Power gain vs. output power

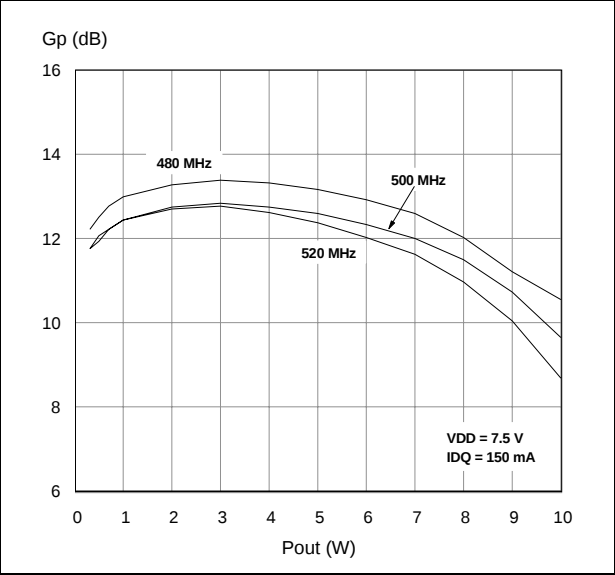


Figure 8. Drain efficiency vs. output power

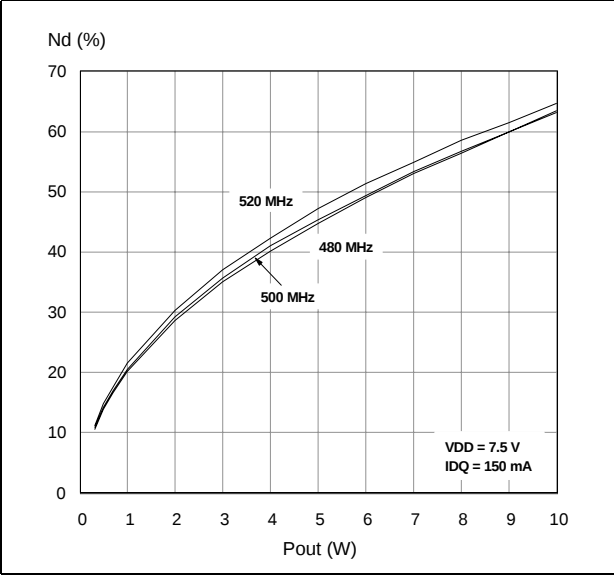


Figure 9. Return loss vs. output power

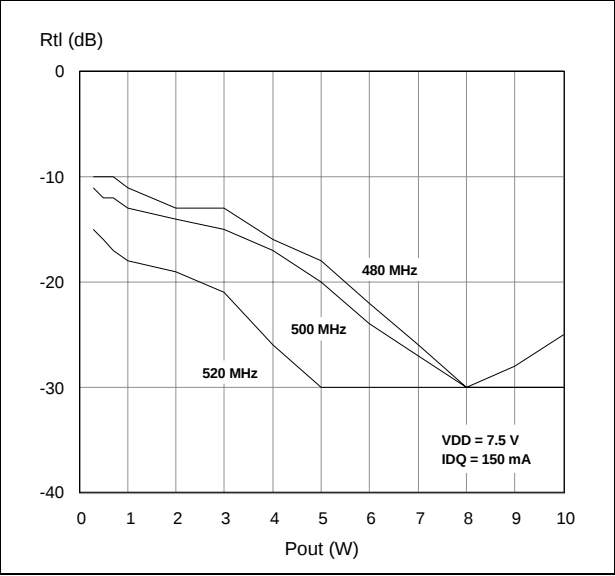


Figure 10. Output power vs. bias current

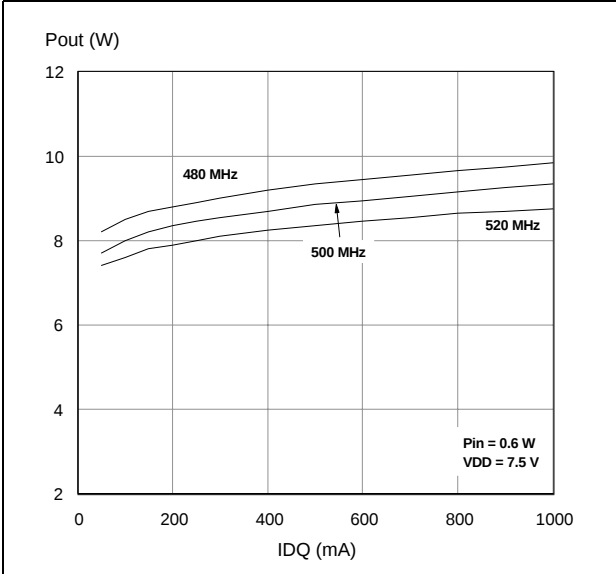


Figure 11. Drain efficiency vs. bias current

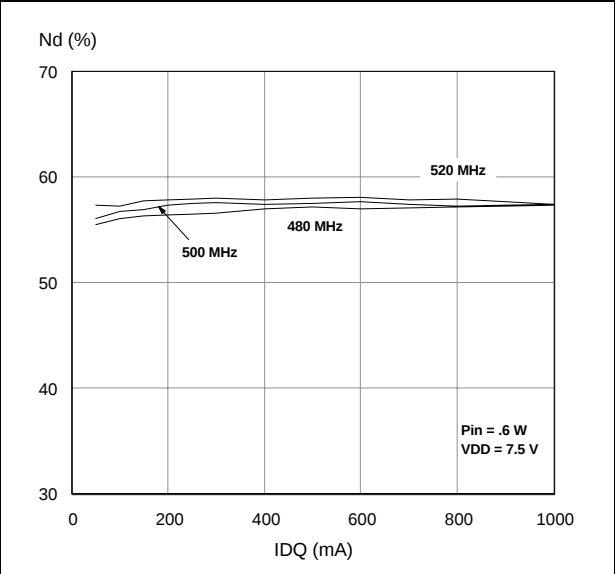


Figure 12. Output power vs. drain voltage

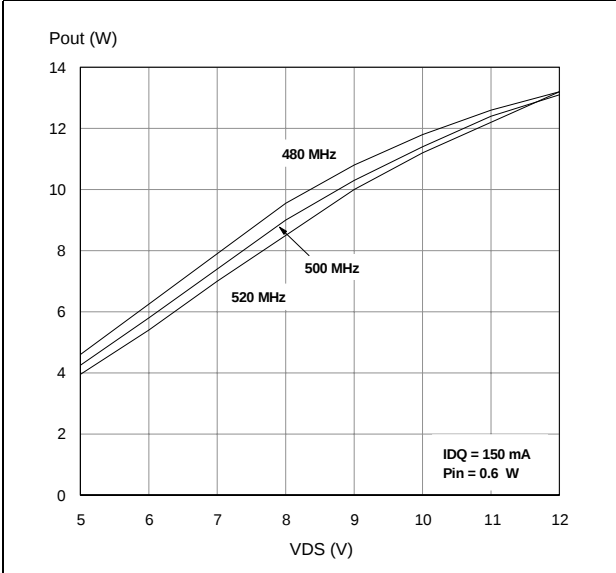


Figure 13. Drain efficiency vs. drain voltage

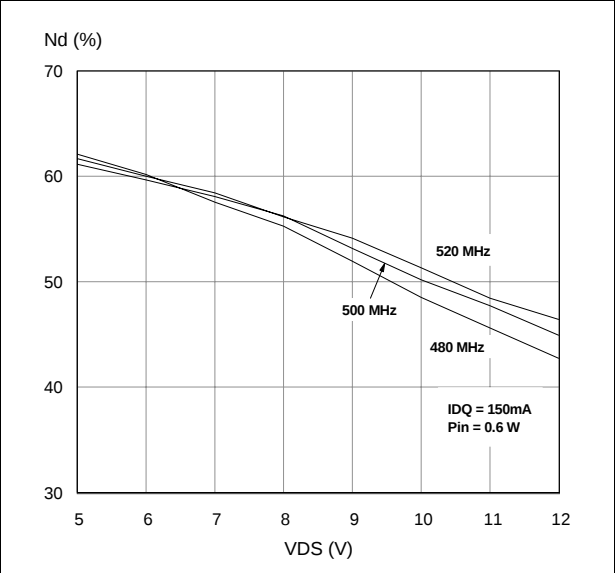


Figure 14. Output power vs. gate bias voltage Table 8. IMD3 vs. output power (470MHz)

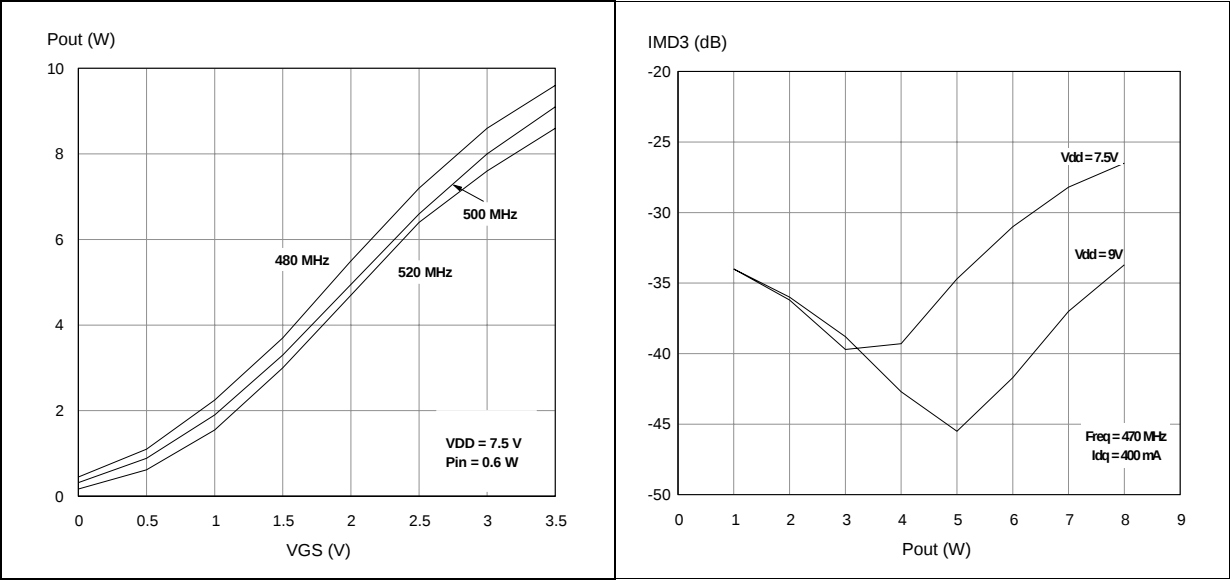
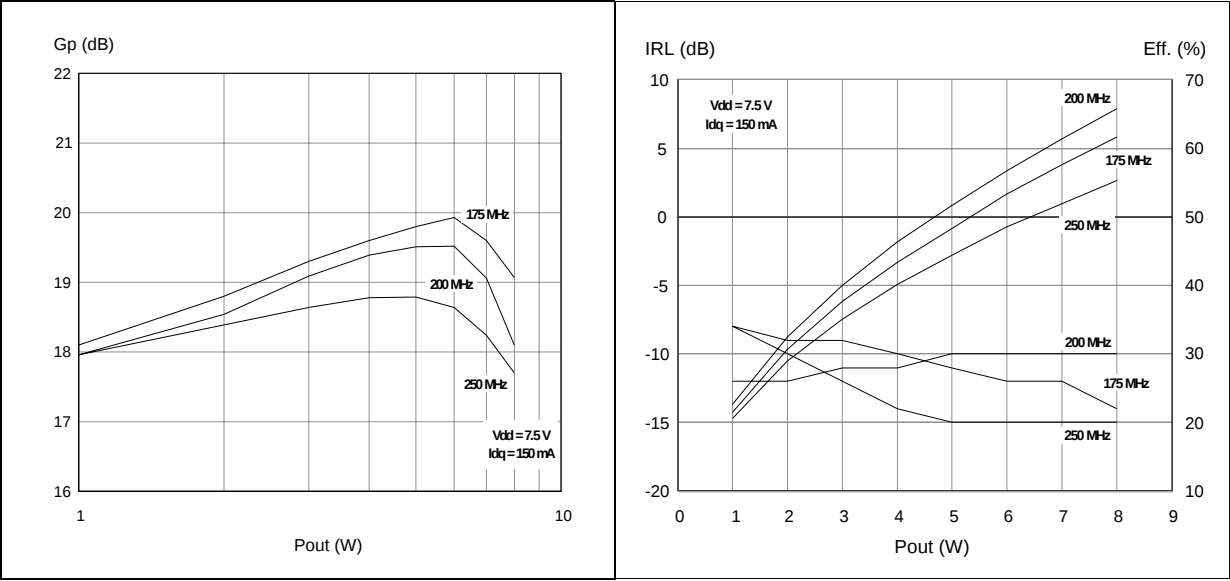


Figure 15. Power gain vs. output power Table 9. Return loss and efficiency vs. output power



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Figure 16. Output power vs. input power

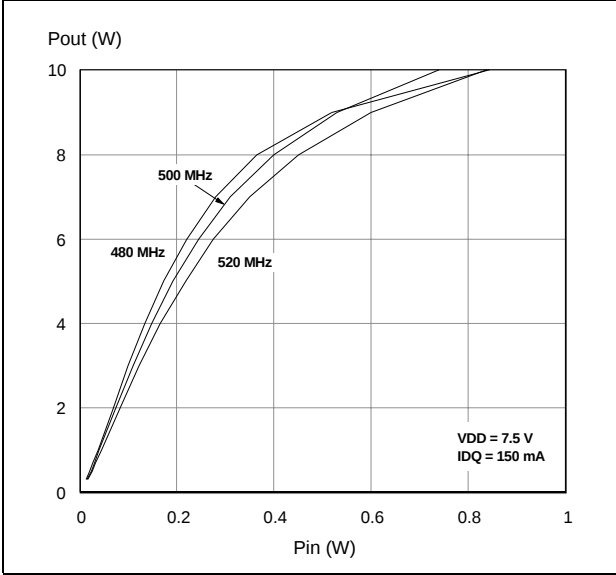


Figure 17. Power gain vs. output power

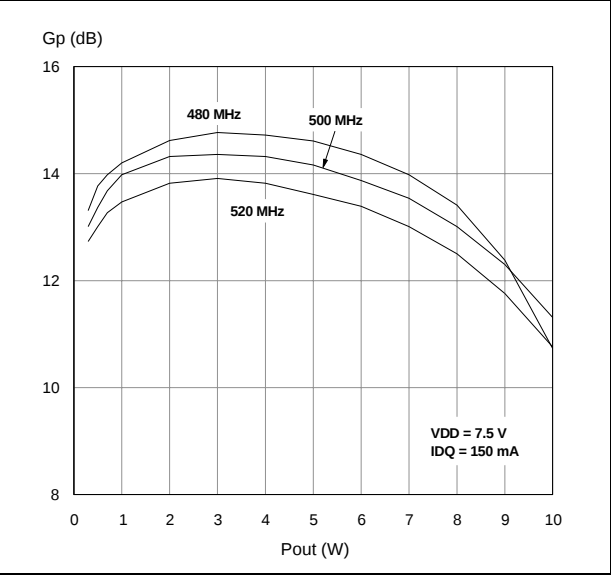


Figure 18. Drain efficiency vs. output power

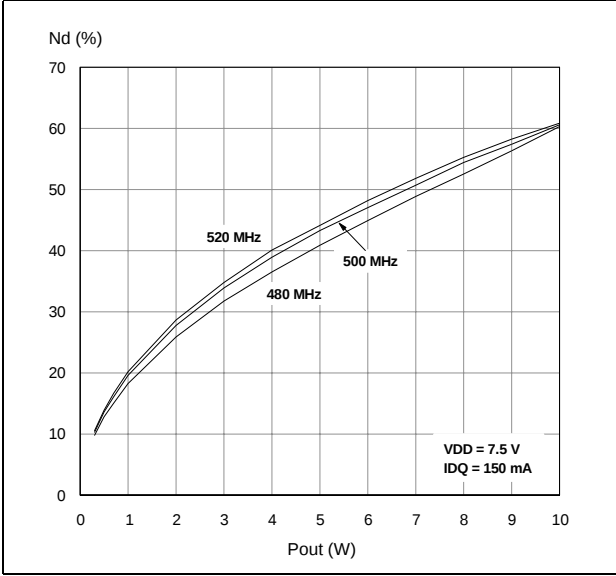


Figure 19. Return loss vs. output power

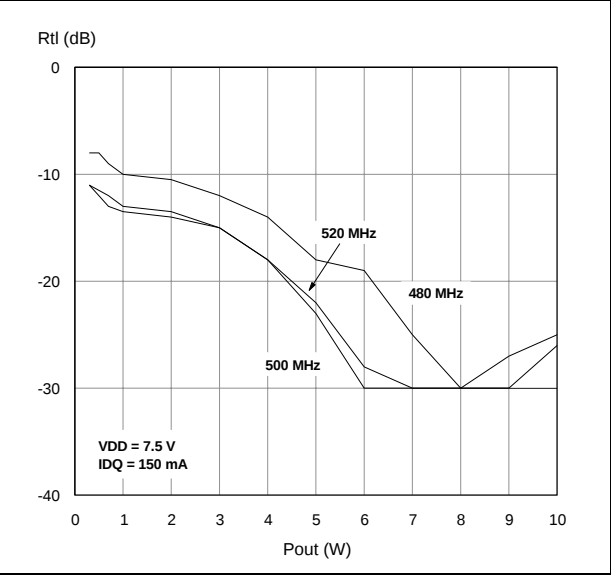


Figure 20. Output power vs. bias current

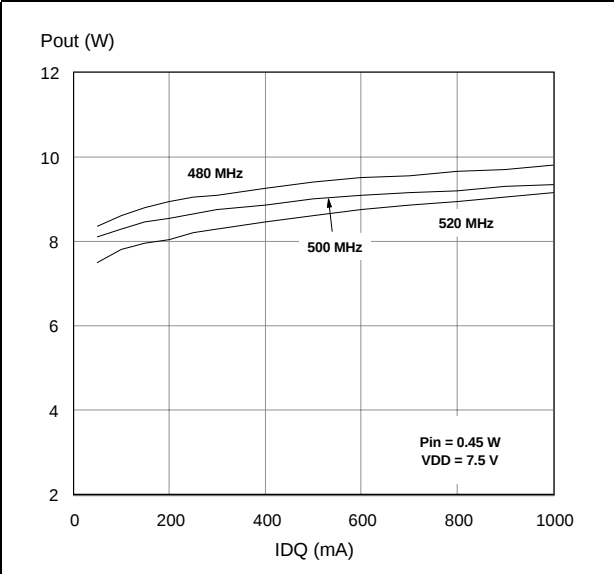


Figure 21. Drain efficiency vs. bias current

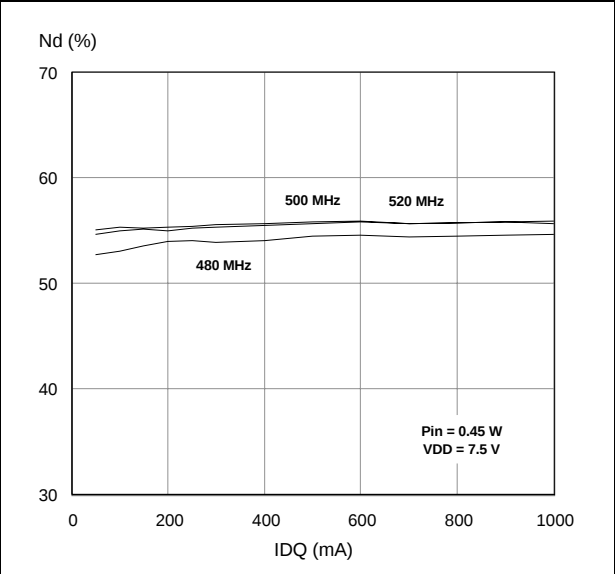


Figure 22. Output power vs. drain voltage

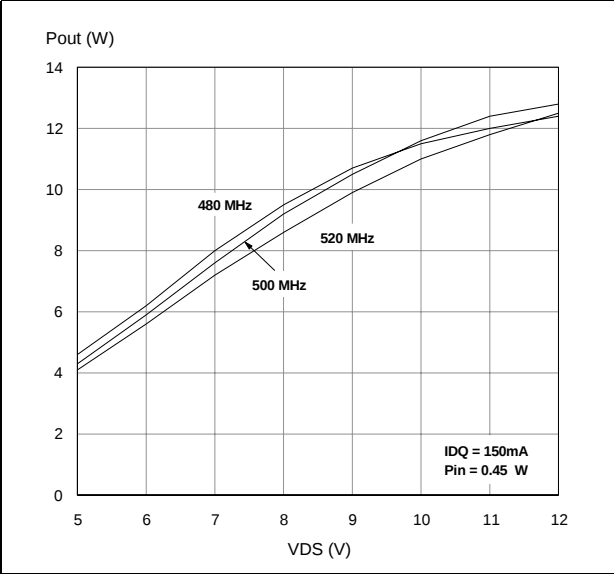


Figure 23. Drain efficiency vs. drain voltage

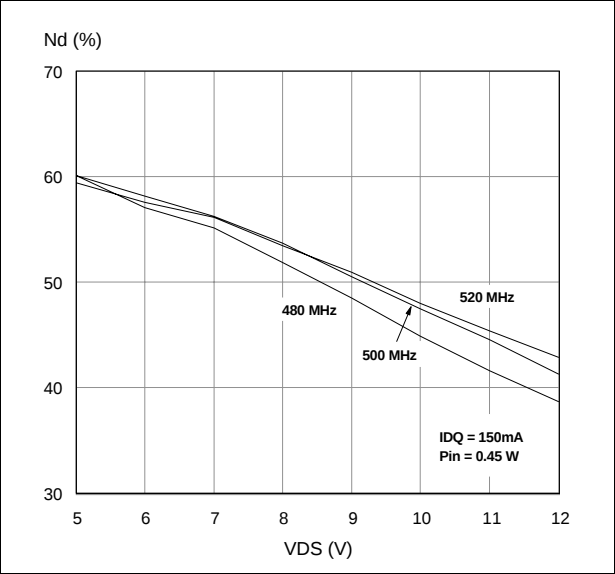
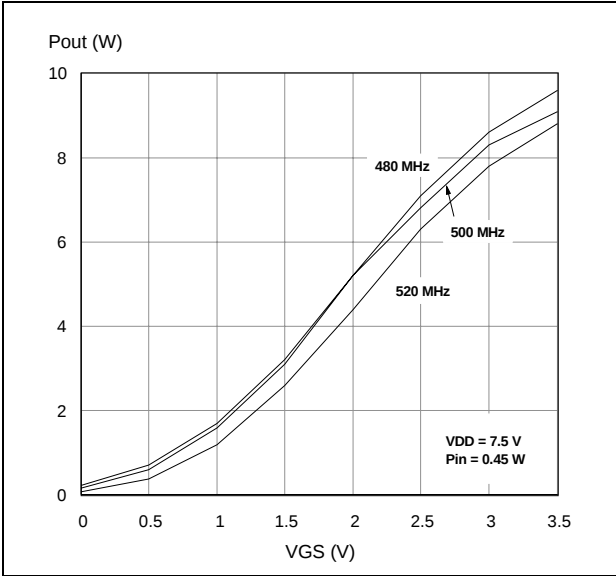


Figure 24. Output power vs. gate bias voltage



## 5 Test circuit

Figure 25. Test circuit schematic

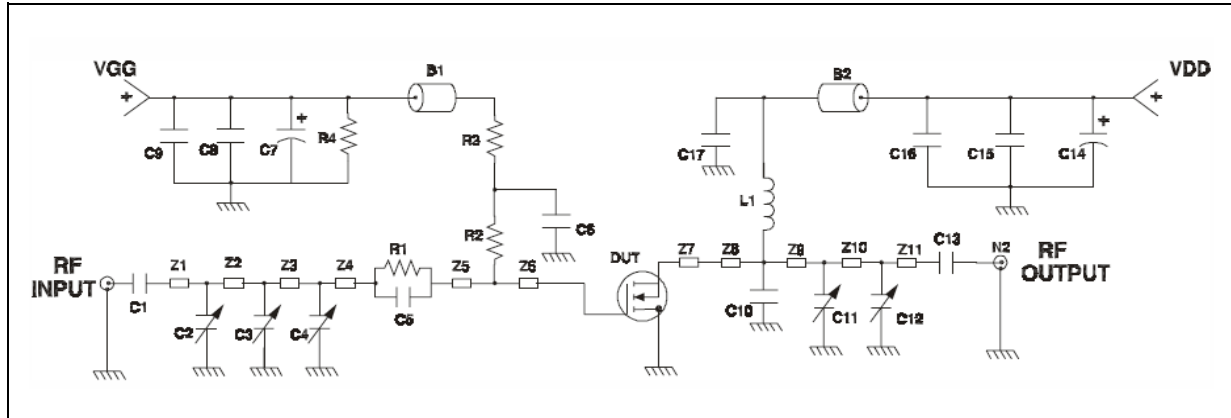


Table 10. Test circuit component part list

| Component            | Description                                         |
|----------------------|-----------------------------------------------------|
| B1,B2                | Short ferrite bead, fair rite products (2743021446) |
| C1,C13               | 240 pF, 100 mil chip capacitor                      |
| C2,C3,C4,C10,C11,C12 | 0 to 20 pF trimmer capacitor                        |
| C5                   | 130 pF, 100 mil chip capacitor                      |
| C6,C17               | 120 pF, 100 mil chip capacitor                      |
| C7,C14               | 10 $\mu$ F, 50 V electrolytic capacitor             |
| C8,C15               | 1.200 pF, 100 mil chip capacitor                    |
| C9,C16               | 0.1 F, 100 mil chip capacitor                       |
| L1                   | 55,5 Nh, 5 turn, Coilcraft                          |
| N1,N2                | Type N flange mount                                 |
| R1                   | 15 $\Omega$ 0805 chip resistor                      |
| R2                   | 1.0 k $\Omega$ 1/8 W resistor                       |
| R3                   | 15 $\Omega$ 0805 chip resistor                      |
| R4                   | 33 k $\Omega$ 1/8 W resistor                        |
| Z1                   | 0.175" X 0.080" microstrip                          |
| Z2                   | 1.049" X 0.080" microstrip                          |
| Z3                   | 0.289" X 0.080" microstrip                          |
| Z4                   | 0.026" X 0.080" microstrip                          |
| Z5                   | 0.192" X 0.223" microstrip                          |
| Z6,Z7                | 0.260" X 0.223" microstrip                          |
| Z8                   | 0.064" X 0.080" microstrip                          |

**Table 10. Test circuit component part list (continued)**

| Component | Description                                                               |
|-----------|---------------------------------------------------------------------------|
| Z9        | 0.334" X 0.080" microstrip                                                |
| Z10       | 0.985" X 0.080" microstrip                                                |
| Z11       | 0.472" X 0.080" microstrip                                                |
| Board     | ROGER, ultra lam 2000 THK 0.030", $\epsilon_r = 2.55$ 2oz. ED cu 2 SIDES. |

## 6 Circuit layout

Figure 26. Test fixture component layout

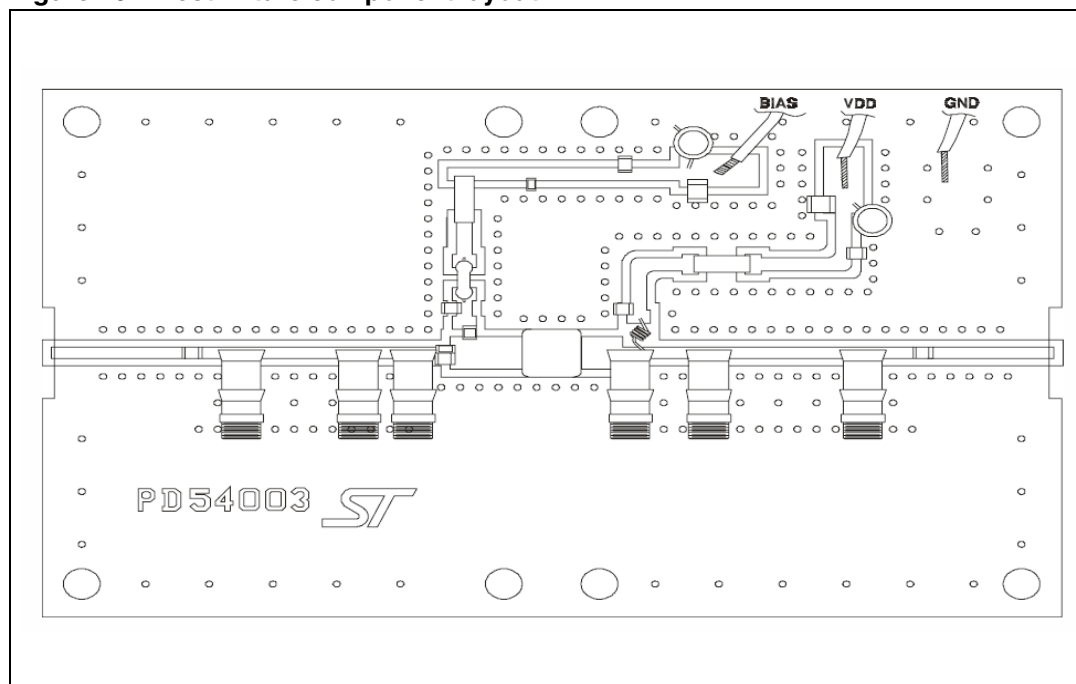
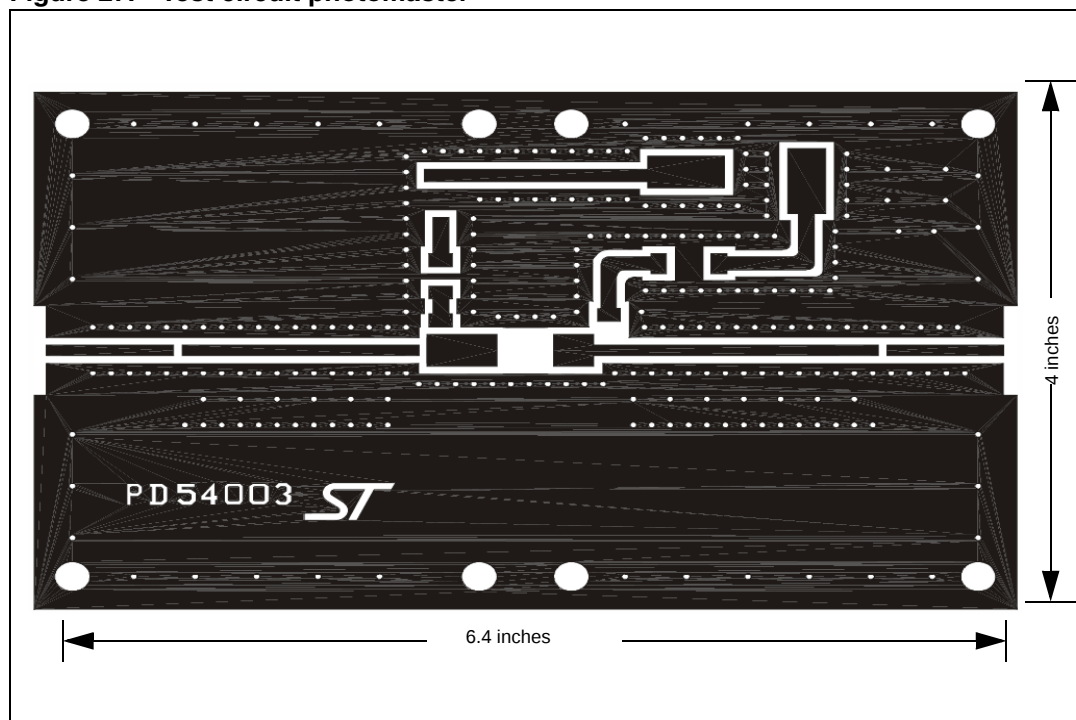


Figure 27. Test circuit photomaster



## 7 Common source s-parameter

Table 11. S-parameter for PD54008-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 150\text{ mA}$ )

| Freq<br>(MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50            | 0.771 | -164  | 7.80  | 86    | 0.036 | -4    | 0.773 | -164  |
| 100           | 0.819 | -170  | 3.81  | 75    | 0.034 | -14   | 0.786 | -170  |
| 150           | 0.850 | -172  | 2.47  | 65    | 0.033 | -21   | 0.800 | -171  |
| 200           | 0.865 | -174  | 1.76  | 57    | 0.030 | -28   | 0.826 | -172  |
| 250           | 0.881 | -175  | 1.32  | 50    | 0.028 | -35   | 0.847 | -172  |
| 300           | 0.896 | -176  | 1.03  | 43    | 0.025 | -39   | 0.867 | -173  |
| 350           | 0.909 | -176  | 0.82  | 38    | 0.023 | -43   | 0.886 | -174  |
| 400           | 0.921 | -177  | 0.67  | 33    | 0.021 | -46   | 0.897 | -175  |
| 450           | 0.930 | -178  | 0.56  | 29    | 0.018 | -51   | 0.912 | -176  |
| 500           | 0.939 | -179  | 0.47  | 24    | 0.016 | -52   | 0.924 | -177  |
| 550           | 0.944 | 179   | 0.40  | 21    | 0.014 | -53   | 0.930 | -178  |
| 600           | 0.952 | 179   | 0.35  | 18    | 0.013 | -56   | 0.938 | -179  |
| 650           | 0.956 | 178   | 0.30  | 15    | 0.011 | -55   | 0.943 | 180   |
| 700           | 0.960 | 177   | 0.27  | 13    | 0.009 | -54   | 0.949 | 179   |
| 750           | 0.961 | 176   | 0.24  | 10    | 0.008 | -54   | 0.952 | 179   |
| 800           | 0.963 | 175   | 0.21  | 8     | 0.007 | -51   | 0.955 | 178   |
| 850           | 0.966 | 174   | 0.19  | 6     | 0.006 | -49   | 0.960 | 177   |
| 900           | 0.967 | 174   | 0.17  | 4     | 0.004 | -34   | 0.964 | 176   |
| 950           | 0.968 | 173   | 0.16  | 3     | 0.004 | -34   | 0.964 | 175   |
| 1000          | 0.969 | 172   | 0.14  | 1     | 0.003 | -28   | 0.962 | 175   |
| 1050          | 0.972 | 171   | 0.13  | 0     | 0.003 | -6    | 0.969 | 174   |
| 1100          | 0.970 | 171   | 0.12  | -1    | 0.002 | 7     | 0.967 | 173   |
| 1150          | 0.969 | 170   | 0.11  | -2    | 0.003 | 25    | 0.963 | 173   |
| 1200          | 0.971 | 169   | 0.10  | -3    | 0.003 | 49    | 0.966 | 172   |
| 1250          | 0.970 | 169   | 0.10  | -4    | 0.005 | 58    | 0.969 | 172   |
| 1300          | 0.970 | 168   | 0.09  | -5    | 0.005 | 61    | 0.969 | 171   |
| 1350          | 0.970 | 167   | 0.09  | -6    | 0.006 | 68    | 0.966 | 170   |
| 1400          | 0.969 | 167   | 0.08  | -6    | 0.006 | 70    | 0.965 | 169   |
| 1450          | 0.967 | 166   | 0.07  | -7    | 0.007 | 79    | 0.965 | 169   |
| 1500          | 0.963 | 166   | 0.07  | -8    | 0.008 | 92    | 0.964 | 168   |

Table 12. S-parameter PD54008-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 800\text{ mA}$ )

| Freq<br>(MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50            | 0.837 | -173  | 8.92  | 84    | 0.017 | -2    | 0.867 | -174  |
| 100           | 0.882 | -176  | 4.35  | 79    | 0.017 | -7    | 0.870 | -177  |
| 150           | 0.902 | -178  | 3.00  | 75    | 0.017 | -8    | 0.868 | -178  |
| 200           | 0.909 | -179  | 2.17  | 71    | 0.016 | -12   | 0.876 | -178  |
| 250           | 0.912 | -180  | 1.71  | 66    | 0.016 | -14   | 0.878 | -179  |
| 300           | 0.918 | 180   | 1.40  | 61    | 0.015 | -16   | 0.884 | -179  |
| 350           | 0.920 | 179   | 1.17  | 57    | 0.014 | -18   | 0.890 | -180  |
| 400           | 0.925 | 179   | 1.00  | 52    | 0.013 | -19   | 0.893 | -180  |
| 450           | 0.928 | 178   | 0.86  | 48    | 0.013 | -21   | 0.902 | 180   |
| 500           | 0.932 | 177   | 0.75  | 44    | 0.012 | -22   | 0.911 | 179   |
| 550           | 0.935 | 177   | 0.66  | 41    | 0.011 | -20   | 0.914 | 179   |
| 600           | 0.939 | 176   | 0.59  | 38    | 0.01  | -22   | 0.920 | 178   |
| 650           | 0.944 | 175   | 0.53  | 34    | 0.009 | -17   | 0.924 | 178   |
| 700           | 0.947 | 175   | 0.47  | 32    | 0.008 | -13   | 0.927 | 177   |
| 750           | 0.946 | 174   | 0.43  | 29    | 0.008 | -12   | 0.932 | 177   |
| 800           | 0.951 | 174   | 0.39  | 26    | 0.007 | -9    | 0.933 | 176   |
| 850           | 0.953 | 173   | 0.36  | 24    | 0.007 | -4    | 0.939 | 175   |
| 900           | 0.954 | 172   | 0.33  | 22    | 0.006 | 6     | 0.942 | 175   |
| 950           | 0.955 | 172   | 0.30  | 19    | 0.006 | 9     | 0.944 | 174   |
| 1000          | 0.958 | 171   | 0.28  | 17    | 0.006 | 15    | 0.943 | 174   |
| 1050          | 0.958 | 170   | 0.26  | 15    | 0.005 | 23    | 0.950 | 173   |
| 1100          | 0.957 | 170   | 0.24  | 13    | 0.006 | 31    | 0.947 | 173   |
| 1150          | 0.959 | 169   | 0.23  | 11    | 0.006 | 40    | 0.946 | 172   |
| 1200          | 0.969 | 169   | 0.21  | 10    | 0.006 | 46    | 0.950 | 172   |
| 1250          | 0.961 | 168   | 0.20  | 8     | 0.007 | 50    | 0.953 | 171   |
| 1300          | 0.960 | 167   | 0.19  | 5     | 0.008 | 51    | 0.954 | 171   |
| 1350          | 0.958 | 167   | 0.18  | 3     | 0.008 | 54    | 0.951 | 170   |
| 1400          | 0.959 | 166   | 0.16  | 1     | 0.008 | 61    | 0.950 | 169   |
| 1450          | 0.958 | 166   | 0.15  | 1     | 0.009 | 67    | 0.951 | 169   |
| 1500          | 0.953 | 165   | 0.14  | 0     | 0.009 | 80    | 0.950 | 168   |

Table 13. S-parameter for PD54008-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 1.5\text{ A}$ )

| Freq<br>(MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50            | 0.852 | -174  | 8.94  | 84    | 0.014 | -1    | 0.885 | -175  |
| 100           | 0.896 | -176  | 4.37  | 80    | 0.014 | -5    | 0.887 | -178  |
| 150           | 0.917 | -178  | 2.96  | 77    | 0.014 | -6    | 0.886 | -179  |
| 200           | 0.923 | -180  | 2.20  | 73    | 0.014 | -8    | 0.891 | -179  |
| 250           | 0.924 | 180   | 1.75  | 69    | 0.013 | -8    | 0.891 | -180  |
| 300           | 0.927 | 179   | 1.44  | 65    | 0.013 | -10   | 0.897 | 180   |
| 350           | 0.930 | 178   | 1.21  | 60    | 0.012 | -11   | 0.900 | 179   |
| 400           | 0.931 | 178   | 1.04  | 57    | 0.012 | -13   | 0.901 | 179   |
| 450           | 0.933 | 177   | 0.91  | 53    | 0.011 | -12   | 0.905 | 179   |
| 500           | 0.936 | 177   | 0.79  | 49    | 0.010 | -11   | 0.913 | 178   |
| 550           | 0.938 | 176   | 0.70  | 45    | 0.010 | -10   | 0.916 | 178   |
| 600           | 0.942 | 175   | 0.63  | 42    | 0.009 | -10   | 0.920 | 177   |
| 650           | 0.945 | 175   | 0.57  | 39    | 0.008 | -8    | 0.924 | 177   |
| 700           | 0.947 | 174   | 0.51  | 37    | 0.008 | -4    | 0.927 | 177   |
| 750           | 0.947 | 174   | 0.47  | 34    | 0.008 | -1    | 0.931 | 176   |
| 800           | 0.951 | 173   | 0.43  | 31    | 0.007 | 4     | 0.932 | 175   |
| 850           | 0.951 | 173   | 0.39  | 29    | 0.007 | 7     | 0.938 | 175   |
| 900           | 0.952 | 172   | 0.36  | 26    | 0.007 | 14    | 0.938 | 175   |
| 950           | 0.955 | 171   | 0.33  | 24    | 0.007 | 19    | 0.940 | 174   |
| 1000          | 0.957 | 171   | 0.31  | 22    | 0.006 | 24    | 0.941 | 174   |
| 1050          | 0.957 | 170   | 0.29  | 20    | 0.007 | 29    | 0.946 | 173   |
| 1100          | 0.957 | 169   | 0.27  | 18    | 0.007 | 30    | 0.947 | 172   |
| 1150          | 0.956 | 169   | 0.25  | 16    | 0.007 | 38    | 0.945 | 172   |
| 1200          | 0.958 | 168   | 0.24  | 14    | 0.007 | 45    | 0.947 | 172   |
| 1250          | 0.957 | 168   | 0.23  | 11    | 0.008 | 50    | 0.950 | 171   |
| 1300          | 0.958 | 167   | 0.21  | 9     | 0.008 | 50    | 0.952 | 170   |
| 1350          | 0.957 | 167   | 0.20  | 7     | 0.008 | 53    | 0.946 | 170   |
| 1400          | 0.957 | 166   | 0.18  | 5     | 0.008 | 60    | 0.949 | 169   |
| 1450          | 0.957 | 166   | 0.17  | 4     | 0.010 | 66    | 0.948 | 169   |
| 1500          | 0.952 | 165   | 0.16  | 3     | 0.009 | 76    | 0.948 | 168   |

Table 14. S-parameter for PD54008S-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 150\text{ mA}$ )

| Freq<br>(MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50            | 0.760 | -161  | 9.32  | 84    | 0.034 | -3    | 0.743 | -160  |
| 100           | 0.810 | -167  | 4.44  | 72    | 0.003 | -16   | 0.761 | -166  |
| 150           | 0.838 | -169  | 2.86  | 63    | 0.031 | -24   | 0.783 | -167  |
| 200           | 0.862 | -171  | 2.01  | 56    | 0.028 | -31   | 0.817 | -168  |
| 250           | 0.881 | -172  | 1.50  | 48    | 0.026 | -38   | 0.845 | -169  |
| 300           | 0.900 | -173  | 1.16  | 42    | 0.023 | -43   | 0.866 | -170  |
| 350           | 0.916 | -174  | 0.92  | 37    | 0.021 | -47   | 0.888 | -171  |
| 400           | 0.927 | 0     | 0.75  | 32    | 0.019 | -51   | 0.906 | -172  |
| 450           | 0.938 | -175  | 0.61  | 28    | 0.017 | -54   | 0.918 | -173  |
| 500           | 0.945 | -176  | 0.52  | 25    | 0.015 | -56   | 0.932 | -174  |
| 550           | 0.952 | -177  | 0.44  | 22    | 0.013 | -59   | 0.940 | -175  |
| 600           | 0.957 | -178  | 0.38  | 19    | 0.012 | -60   | 0.950 | -176  |
| 650           | 0.963 | -178  | 0.33  | 16    | 0.011 | -61   | 0.951 | -176  |
| 700           | 0.965 | -179  | 0.29  | 14    | 0.009 | -60   | 0.958 | -177  |
| 750           | 0.968 | -180  | 0.25  | 12    | 0.008 | -63   | 0.960 | -178  |
| 800           | 0.973 | 180   | 0.23  | 10    | 0.007 | -65   | 0.962 | -178  |
| 850           | 0.973 | 179   | 0.20  | 9     | 0.006 | -65   | 0.961 | -179  |
| 900           | 0.974 | 179   | 0.18  | 7     | 0.005 | -55   | 0.971 | -180  |
| 950           | 0.976 | 178   | 0.17  | 5     | 0.005 | -58   | 0.970 | 180   |
| 1000          | 0.979 | 178   | 0.15  | 4     | 0.003 | -58   | 0.967 | 179   |
| 1050          | 0.981 | 177   | 0.14  | 3     | 0.002 | -50   | 0.970 | 179   |
| 1100          | 0.978 | 177   | 0.13  | 2     | 0.002 | -36   | 0.974 | 178   |
| 1150          | 0.979 | 177   | 0.12  | 1     | 0.001 | -16   | 0.975 | 179   |
| 1200          | 0.980 | 176   | 0.11  | 0     | 0.001 | 36    | 0.973 | 179   |
| 1250          | 0.981 | 176   | 0.10  | -1    | 0.001 | 49    | 0.990 | 178   |
| 1300          | 0.981 | 175   | 0.10  | -3    | 0.002 | 60    | 0.994 | 176   |
| 1350          | 0.981 | 175   | 0.09  | -3    | 0.002 | 92    | 0.976 | 176   |
| 1400          | 0.980 | 175   | 0.08  | -4    | 0.002 | 98    | 0.977 | 176   |
| 1450          | 0.977 | 174   | 0.08  | -4    | 0.004 | 110   | 0.975 | 175   |
| 1500          | 0.977 | 174   | 0.07  | -4    | 0.005 | 118   | 0.978 | 175   |

Table 15. S-parameter for PD54008S-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 800\text{ mA}$ )

| Freq (MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50         | 0.825 | -171  | 10.81 | 84    | 0.017 | -2    | 0.844 | -172  |
| 100        | 0.871 | -174  | 5.27  | 79    | 0.017 | -8    | 0.846 | -175  |
| 150        | 0.890 | -176  | 3.54  | 74    | 0.017 | -11   | 0.849 | -176  |
| 200        | 0.901 | -177  | 2.61  | 70    | 0.016 | -15   | 0.857 | -176  |
| 250        | 0.905 | -177  | 2.04  | 64    | 0.016 | -18   | 0.862 | -176  |
| 300        | 0.910 | -178  | 1.66  | 60    | 0.015 | -22   | 0.871 | -177  |
| 350        | 0.916 | -178  | 1.38  | 55    | 0.014 | -24   | 0.879 | -177  |
| 400        | 0.922 | -178  | 1.17  | 51    | 0.013 | -27   | 0.891 | -177  |
| 450        | 0.927 | -179  | 1.00  | 47    | 0.012 | -30   | 0.899 | -177  |
| 500        | 0.935 | -179  | 0.86  | 43    | 0.011 | -32   | 0.908 | -177  |
| 550        | 0.938 | -180  | 0.75  | 40    | 0.010 | -32   | 0.914 | -178  |
| 600        | 0.944 | -180  | 0.66  | 37    | 0.009 | -35   | 0.925 | -178  |
| 650        | 0.949 | 180   | 0.59  | 34    | 0.008 | -33   | 0.926 | -179  |
| 700        | 0.951 | 179   | 0.53  | 31    | 0.007 | -33   | 0.932 | -179  |
| 750        | 0.953 | 179   | 0.47  | 29    | 0.007 | -32   | 0.937 | -180  |
| 800        | 0.958 | 178   | 0.43  | 26    | 0.006 | -28   | 0.944 | -180  |
| 850        | 0.960 | 178   | 0.39  | 24    | 0.006 | -25   | 0.940 | 180   |
| 900        | 0.961 | 178   | 0.36  | 22    | 0.005 | -26   | 0.951 | 179   |
| 950        | 0.964 | 177   | 0.33  | 20    | 0.004 | -19   | 0.950 | 179   |
| 1000       | 0.966 | 177   | 0.30  | 18    | 0.004 | -17   | 0.947 | 178   |
| 1050       | 0.968 | 176   | 0.28  | 16    | 0.004 | -7    | 0.954 | 178   |
| 1100       | 0.967 | 176   | 0.26  | 15    | 0.003 | 7     | 0.958 | 178   |
| 1150       | 0.968 | 176   | 0.24  | 13    | 0.003 | 14    | 0.958 | 178   |
| 1200       | 0.970 | 176   | 0.23  | 12    | 0.003 | 37    | 0.957 | 178   |
| 1250       | 0.971 | 175   | 0.22  | 10    | 0.003 | 45    | 0.974 | 177   |
| 1300       | 0.970 | 175   | 0.20  | 8     | 0.003 | 48    | 0.979 | 176   |
| 1350       | 0.973 | 174   | 0.19  | 7     | 0.003 | 59    | 0.963 | 176   |
| 1400       | 0.972 | 174   | 0.17  | 5     | 0.004 | 75    | 0.966 | 175   |
| 1450       | 0.970 | 174   | 0.16  | 4     | 0.004 | 88    | 0.961 | 175   |
| 1500       | 0.970 | 174   | 0.15  | 3     | 0.005 | 102   | 0.967 | 174   |

Table 16. S-parameter for PD54008S-E ( $V_{DS} = 7.5\text{ V}$   $I_{DS} = 1.5\text{ A}$ )

| Freq<br>(MHz) | IS11I | S11.F | IS21I | S21.F | IS12I | S12.F | IS22I | S22.F |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 50            | 0.843 | -173  | 10.89 | 84    | 0.001 | -2    | 0.864 | -174  |
| 100           | 0.888 | -175  | 5.32  | 80    | 0.014 | -6    | 0.863 | -176  |
| 150           | 0.905 | -177  | 3.60  | 76    | 0.014 | -8    | 0.866 | -177  |
| 200           | 0.915 | -178  | 2.66  | 72    | 0.013 | -11   | 0.870 | -177  |
| 250           | 0.916 | -178  | 2.11  | 68    | 0.013 | -13   | 0.875 | -178  |
| 300           | 0.920 | -179  | 1.73  | 63    | 0.013 | -16   | 0.881 | -178  |
| 350           | 0.924 | -179  | 1.44  | 59    | 0.012 | -18   | 0.889 | -178  |
| 400           | 0.927 | -179  | 1.23  | 55    | 0.011 | -18   | 0.893 | -178  |
| 450           | 0.934 | -180  | 1.00  | 51    | 0.010 | -23   | 0.901 | -178  |
| 500           | 0.937 | -180  | 0.93  | 48    | 0.010 | -22   | 0.907 | -178  |
| 550           | 0.939 | 180   | 0.82  | 44    | 0.009 | -23   | 0.916 | -179  |
| 600           | 0.944 | 180   | 0.72  | 42    | 0.008 | -26   | 0.923 | -179  |
| 650           | 0.948 | 179   | 0.65  | 38    | 0.008 | -24   | 0.921 | -179  |
| 700           | 0.949 | 179   | 0.58  | 36    | 0.007 | -23   | 0.932 | -180  |
| 750           | 0.952 | 178   | 0.53  | 33    | 0.007 | -22   | 0.934 | 180   |
| 800           | 0.957 | 178   | 0.48  | 31    | 0.006 | -20   | 0.937 | 180   |
| 850           | 0.958 | 178   | 0.44  | 29    | 0.005 | -13   | 0.936 | 179   |
| 900           | 0.959 | 177   | 0.40  | 27    | 0.005 | -12   | 0.946 | 178   |
| 950           | 0.961 | 177   | 0.37  | 25    | 0.004 | -5    | 0.945 | 179   |
| 1000          | 0.963 | 177   | 0.35  | 23    | 0.005 | -2    | 0.946 | 178   |
| 1050          | 0.965 | 176   | 0.32  | 21    | 0.004 | 7     | 0.947 | 178   |
| 1100          | 0.964 | 176   | 0.30  | 19    | 0.003 | 15    | 0.954 | 177   |
| 1150          | 0.967 | 176   | 0.28  | 17    | 0.004 | 28    | 0.952 | 178   |
| 1200          | 0.967 | 175   | 0.27  | 15    | 0.004 | 39    | 0.953 | 178   |
| 1250          | 0.969 | 175   | 0.25  | 13    | 0.004 | 46    | 0.970 | 177   |
| 1300          | 0.970 | 175   | 0.23  | 11    | 0.004 | 50    | 0.973 | 176   |
| 1350          | 0.971 | 174   | 0.22  | 10    | 0.004 | 56    | 0.957 | 176   |
| 1400          | 0.970 | 174   | 0.20  | 8     | 0.004 | 69    | 0.961 | 175   |
| 1450          | 0.968 | 174   | 0.19  | 7     | 0.005 | 81    | 0.958 | 175   |
| 1500          | 0.970 | 173   | 0.17  | 6     | 0.006 | 95    | 0.962 | 174   |

## 8 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Table 17. 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 28. Package dimensions

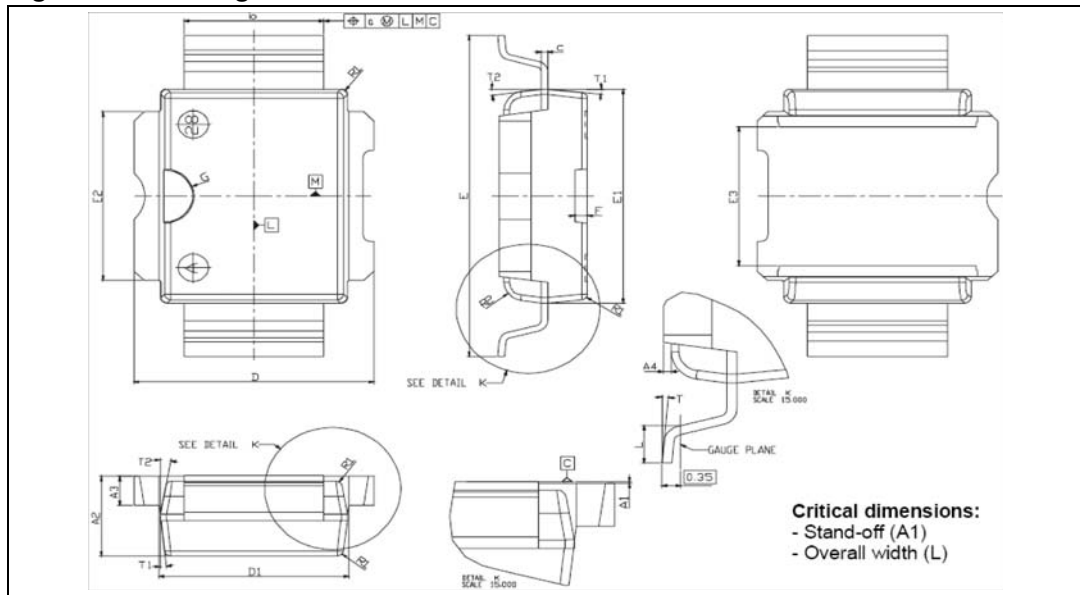
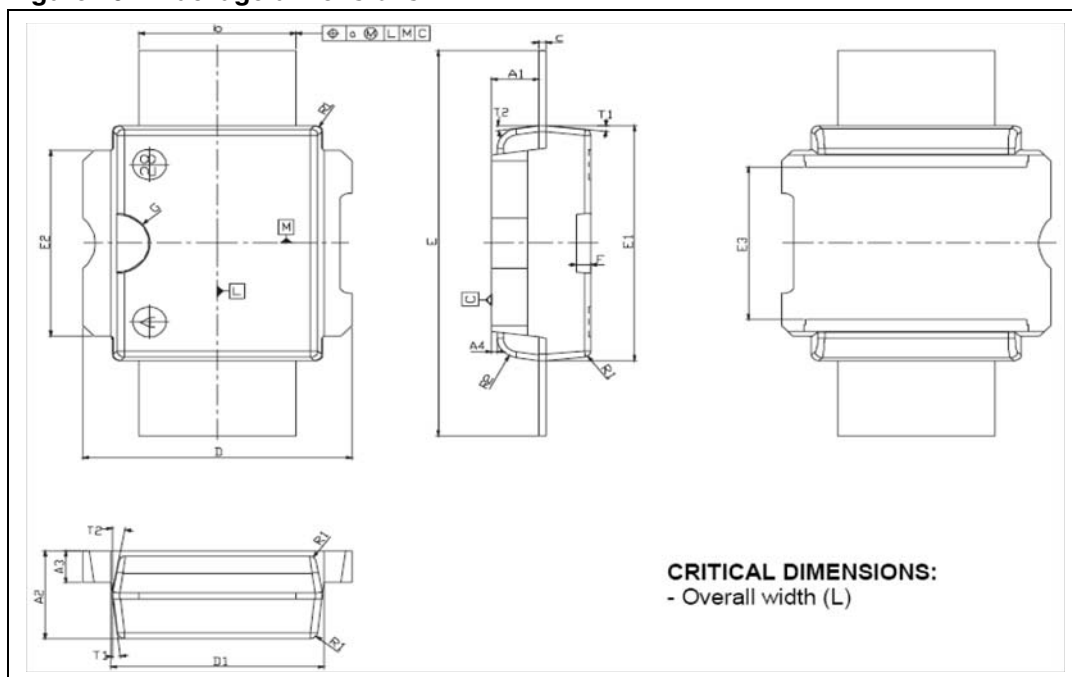


Table 18. PowerSO-10RF straight lead mechanical data

| Dim. | mm.   |        |       | Inch  |        |       |
|------|-------|--------|-------|-------|--------|-------|
|      | Min.  | Typ.   | Max.  | Min.  | Typ.   | Max.  |
| A1   | 1.62  | 1.67   | 1.72  | 0.064 | 0.065  | 0.068 |
| 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    | 15.15 | 15.4   | 15.65 | 0.595 | 0.606  | 0.615 |
| 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  |       |
| R1   |       |        | 0.25  |       |        | 0.01  |
| R2   |       | 0.8    |       |       | 0.031  |       |
| T1   |       | 6 deg  |       |       | 6 deg  |       |
| T2   |       | 10 deg |       |       | 10 deg |       |

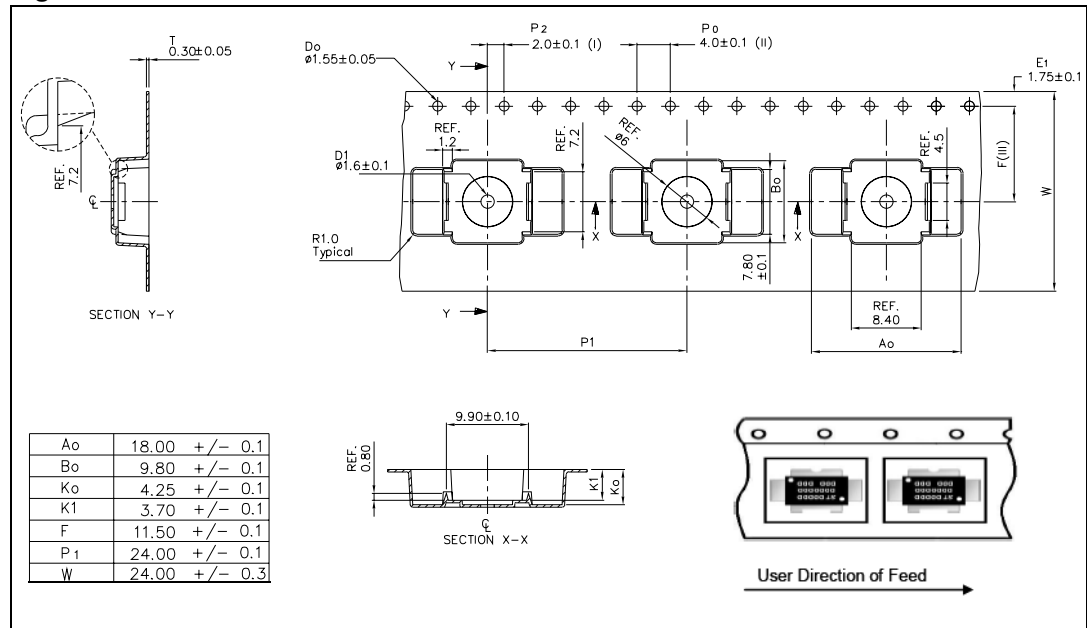
Note: Resin protrusions not included (max value: 0.15 mm per side)

Figure 29. Package dimensions



[illegible]

Figure 31. Reel information



## 9 Revision history

**Table 19. Document revision history**

| Date        | Revision | Changes                                                                                           |
|-------------|----------|---------------------------------------------------------------------------------------------------|
| 06-Apr-2006 | 1        | Initial release.                                                                                  |
| 21-May-2010 | 2        | Added: <a href="#">Table 6: Moisture sensitivity level</a> .                                      |
| 04-May-2011 | 3        | Updated <a href="#">Table 1: Device summary</a> and <a href="#">Figure 31: Reel information</a> . |

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