

MRF35003N6T1 replaced by MRF35003N6AT1.

Gallium Arsenide PHEMT

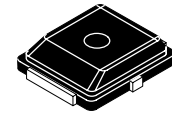
RF Power Field Effect Transistor

Designed for 3.5 GHz WLL/MMDS/BWA or UMTS applications. Characterized from 0.5 to 5.0 GHz. Device is unmatched and is characterized for use in Class AB Customer Premise Equipment (CPE) applications.

- Typical W-CDMA Performance: -42 dBc ACPR, 3.55 GHz, 6 Volts, $I_{DQ} = 180$ mA
 - Output Power — 450 mWatts
 - Power Gain — 9 dB
 - Efficiency — 24%
- 3 Watts P1dB @ 3.55 GHz
- Excellent Phase Linearity and Group Delay Characteristics
- High Gain, High Efficiency and High Linearity
- N Suffix Indicates Lead-Free Terminations. RoHS Compliant.
- In Tape and Reel. T1 Suffix = 1000 Units per 12 mm, 7 inch Reel.

MRF35003N6T1

**3.5 GHz, 3 W, 6 V
 POWER FET
 GaAs PHEMT**



**CASE 466-03, STYLE 1
 PLD-1.5
 PLASTIC**

LIFETIME BUY

LAST ORDER 8 DEC 07 LAST SHIP 8 JUN 08

Table 1. Maximum Ratings

| Rating | Symbol | Value | Unit |
|--|-----------|----------------------|--------------------------|
| Drain-Source Voltage | V_{DSS} | 8 | Vdc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 22.7 (2) 0.15 (2) | W W/ $^\circ\text{C}$ |
| Gate-Source Voltage | V_{GS} | -5 | Vdc |
| RF Input Power | P_{in} | 24 | dBm |
| Storage Temperature Range | T_{stg} | -65 to +150 | $^\circ\text{C}$ |
| Channel Temperature (1) | T_{ch} | 175 | $^\circ\text{C}$ |
| Operating Case Temperature Range | T_C | -20 to +85 | $^\circ\text{C}$ |

Table 2. Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--------------------------------------|-----------------|---------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 6.6 (2) | $^\circ\text{C}/\text{W}$ |

Table 3. Moisture Sensitivity Level

| Test Methodology | Rating | Package Peak Temperature | Unit |
|---------------------------------------|--------|--------------------------|------------------|
| Per JESD 22-A113, IPC/JEDEC J-STD-020 | 1 | 260 | $^\circ\text{C}$ |

1. For reliable operation, the operating channel temperature should not exceed 150°C .
2. Simulated.

Table 4. Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|--------------|------|-------|------|-----------------|
| Saturated Drain Current ($V_{DS} = 3.5 \text{ Vdc}$, $V_{GS} = 0 \text{ Vdc}$) | I_{DSS} | — | 2.9 | — | Adc |
| Off State Leakage Current ($V_{GS} = -0.4 \text{ Vdc}$, $V_{DS} = 0 \text{ Vdc}$) | I_{GSS} | — | < 1.0 | 100 | μAdc |
| Off State Drain Current ($V_{DS} = 6 \text{ Vdc}$, $V_{GS} = -1.9 \text{ Vdc}$) | I_{DSO} | — | 0.02 | 1.0 | mAdc |
| Off State Current ($V_{DS} = 20 \text{ Vdc}$, $V_{GS} = -2.5 \text{ Vdc}$) | I_{DSX} | — | 1.0 | 15 | mAdc |
| Gate-Source Cut-off Voltage ($V_{DS} = 3.5 \text{ Vdc}$, $I_{DS} = 15 \text{ mA}$) | $V_{GS(th)}$ | -1.2 | -1.0 | -0.7 | Vdc |
| Quiescent Gate Voltage ($V_{DS} = 6 \text{ Vdc}$, $I_{DQ} = 180 \text{ mA}$) | $V_{GS(Q)}$ | -1.1 | -0.9 | -0.7 | Vdc |
| Power Gain ($V_{DD} = 6 \text{ Vdc}$, $I_{DQ} = 180 \text{ mA}$, $f = 3.55 \text{ GHz}$) | G_{ps} | 8 | 9 | — | dB |
| Output Power, 1 dB Compression Point ($V_{DD} = 6 \text{ Vdc}$, $I_{DQ} = 180 \text{ mA}$, $f = 3.55 \text{ GHz}$) | P1dB | — | 3 | — | W |
| Drain Efficiency ($V_{DD} = 6 \text{ Vdc}$, $I_{DQ} = 180 \text{ mA}$, $P_{out} = 450 \text{ mW}$, $f = 3.55 \text{ GHz}$. Tune for Maximum P_{out}) | η_D | 22 | 24 | — | % |
| Adjacent Channel Power Ratio ($V_{DD} = 6 \text{ Vdc}$, $P_{out} = 450 \text{ mW Avg.}$, $I_{DQ} = 180 \text{ mA}$, $f = 3.55 \text{ GHz}$, W-CDMA, 8.5 P/A @ 0.01% Probability, 64 CH, 3.84 MCPS) | ACPR | — | -42 | -38 | dBc |

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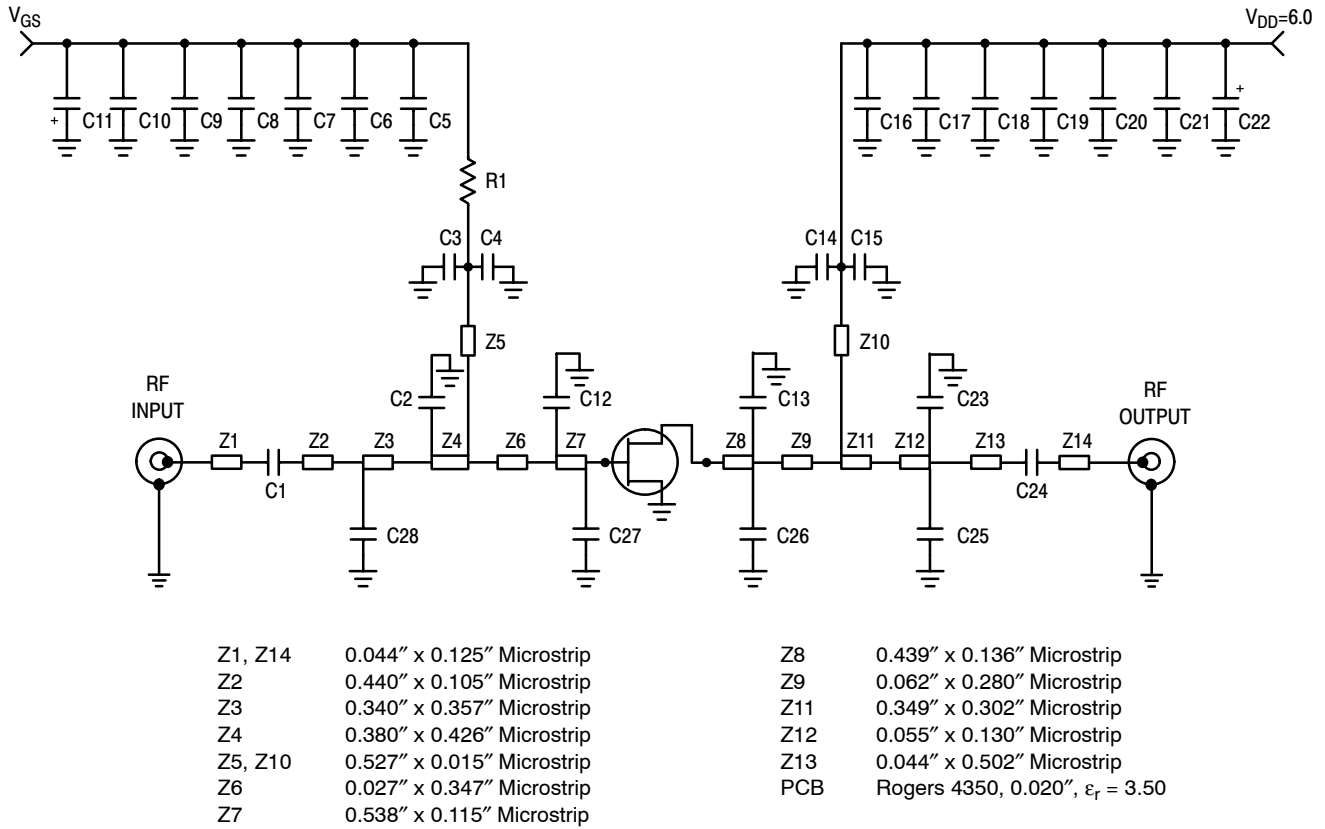
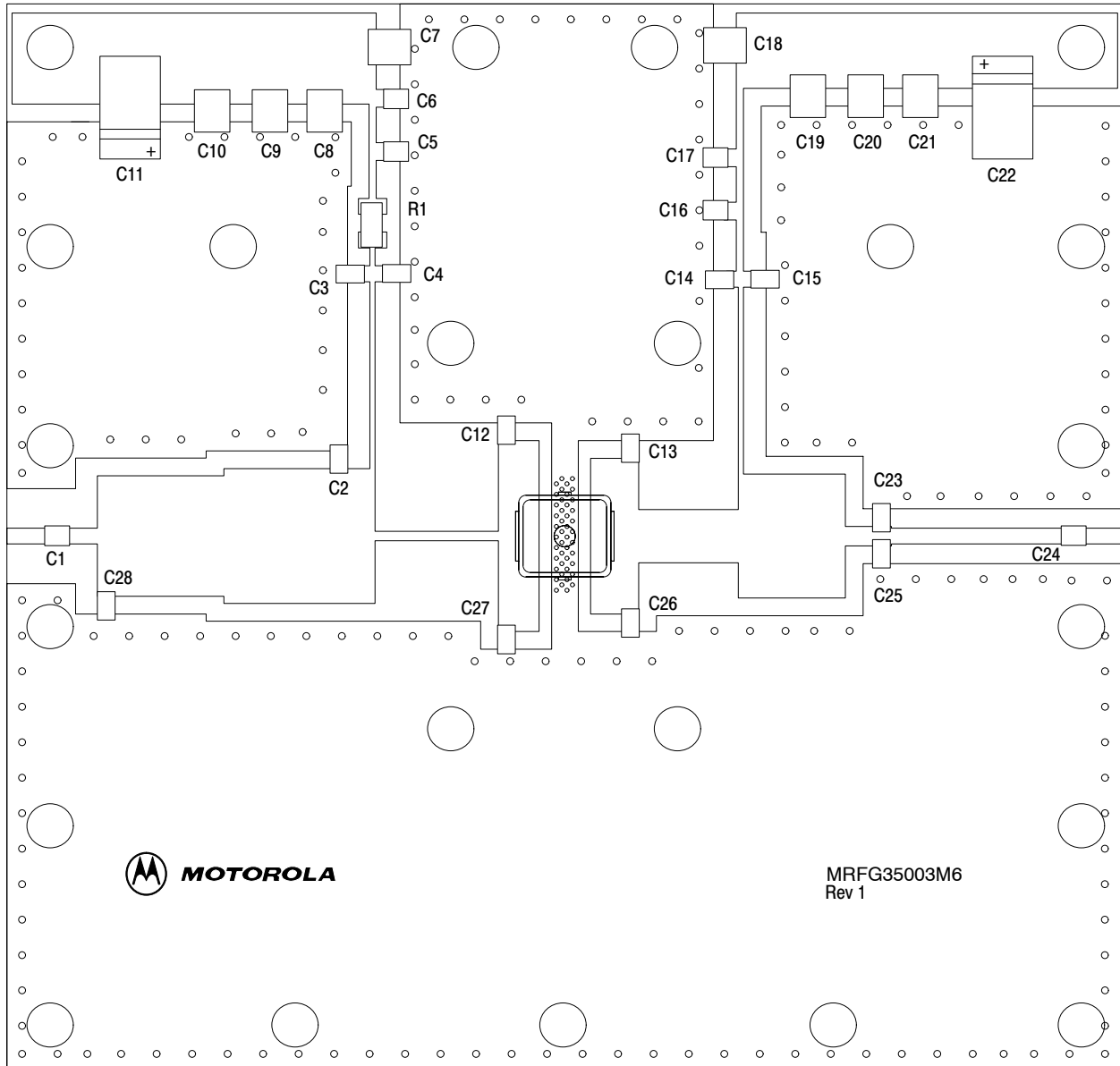


Figure 1. 3.5 GHz Test Circuit Schematic

Table 5. 3.5 GHz Test Circuit Component Designations and Values

| Designation | Description |
|--------------------|---|
| C1 | 12 pF Chip Capacitor, ATC |
| C2 | 0.1 pF Chip Capacitor (0805), AVX |
| C3, C4, C14, C15 | 3.9 pF Chip Capacitors (0805), AVX |
| C5, C16 | 10 pF Chip Capacitors, ATC |
| C6, C17 | 100 pF Chip Capacitors, ATC |
| C7, C18 | 100 pF Chip Capacitors, ATC |
| C8, C19 | 1000 pF Chip Capacitors, ATC |
| C9, C20 | 3.9 μ F Chip Capacitors, ATC |
| C10, C21 | 0.1 μ F Chip Capacitors, ATC |
| C11, C22 | 22 μ F, 35 V Tantalum Surface Mount Capacitor, Newark |
| C12, C13, C26, C27 | 0.3 pF Chip Capacitors (0805), AVX |
| C23, C25, C28 | 1.0 pF Chip Capacitors (0805), AVX |
| C24 | 7.5 pF Chip Capacitor, ATC |
| R1 | 50 Ω Chip Resistor, Newark |



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Figure 2. 3.5 GHz Test Circuit Component Layout

TYPICAL CHARACTERISTICS

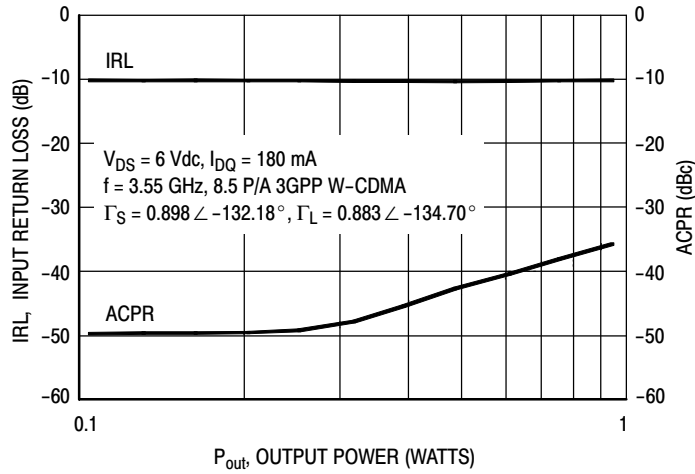


Figure 3. W-CDMA ACPR and Input Return Loss versus Output Power

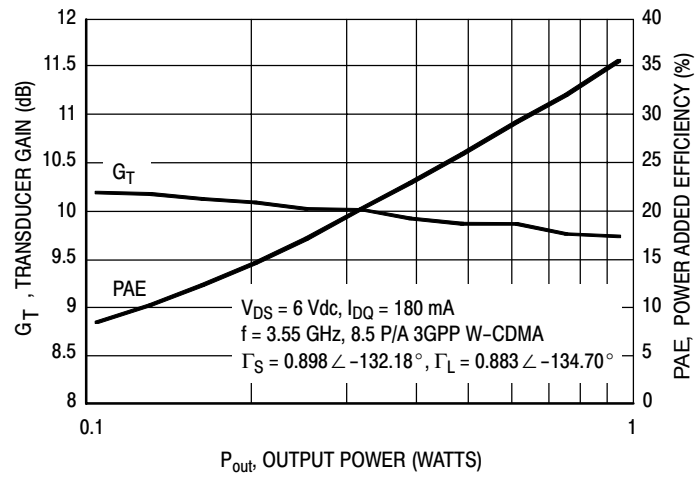


Figure 4. Transducer Gain and Power Added Efficiency versus Output Power

NOTE: All data is referenced to package lead interface. Γ_S and Γ_L are the impedances presented to the DUT. All data is generated from load pull, not from the test circuit shown.

Table 6. Class AB Common Source S-Parameters at $V_{DS} = 6$ Vdc, $I_{DQ} = 180$ mA

| f GHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|----------|-----------------|---------|-----------------|-------|-----------------|------|-----------------|--------|
| | S ₁₁ | ∠φ | S ₂₁ | ∠φ | S ₁₂ | ∠φ | S ₂₂ | ∠φ |
| 0.5 | 0.954 | -176.79 | 3.859 | 84.89 | 0.016 | 9.07 | 0.847 | 178.96 |
| 0.55 | 0.953 | -177.98 | 3.527 | 83.61 | 0.016 | 8.90 | 0.846 | 178.38 |
| 0.6 | 0.952 | -179.13 | 3.250 | 82.29 | 0.016 | 8.49 | 0.846 | 177.74 |
| 0.65 | 0.952 | 179.80 | 3.019 | 80.95 | 0.016 | 8.44 | 0.845 | 177.07 |
| 0.7 | 0.952 | 178.89 | 2.818 | 79.74 | 0.016 | 8.51 | 0.844 | 176.28 |
| 0.75 | 0.951 | 177.96 | 2.643 | 78.49 | 0.016 | 8.53 | 0.844 | 175.55 |
| 0.8 | 0.952 | 177.03 | 2.491 | 77.11 | 0.017 | 8.75 | 0.843 | 174.77 |
| 0.85 | 0.952 | 176.22 | 2.354 | 75.85 | 0.017 | 8.61 | 0.842 | 173.93 |
| 0.9 | 0.951 | 175.46 | 2.234 | 74.67 | 0.017 | 8.62 | 0.842 | 173.12 |
| 0.95 | 0.951 | 174.66 | 2.124 | 73.38 | 0.017 | 8.56 | 0.841 | 172.27 |
| 1 | 0.952 | 173.92 | 2.025 | 72.17 | 0.017 | 8.48 | 0.841 | 171.37 |
| 1.05 | 0.951 | 173.18 | 1.934 | 70.97 | 0.017 | 8.47 | 0.841 | 170.50 |
| 1.1 | 0.951 | 172.40 | 1.851 | 69.68 | 0.017 | 8.93 | 0.841 | 169.75 |
| 1.15 | 0.951 | 171.63 | 1.774 | 68.46 | 0.017 | 8.90 | 0.840 | 168.89 |
| 1.2 | 0.951 | 170.90 | 1.704 | 67.25 | 0.018 | 8.79 | 0.841 | 168.10 |
| 1.25 | 0.950 | 170.06 | 1.638 | 65.98 | 0.018 | 8.80 | 0.841 | 167.34 |
| 1.3 | 0.951 | 169.23 | 1.576 | 64.74 | 0.018 | 8.44 | 0.840 | 166.61 |
| 1.35 | 0.946 | 168.58 | 1.518 | 63.62 | 0.018 | 8.76 | 0.838 | 166.13 |
| 1.4 | 0.952 | 167.47 | 1.463 | 62.45 | 0.018 | 9.00 | 0.845 | 165.24 |
| 1.45 | 0.949 | 166.77 | 1.411 | 61.29 | 0.018 | 8.57 | 0.841 | 164.98 |
| 1.5 | 0.949 | 163.72 | 1.360 | 60.14 | 0.018 | 8.15 | 0.842 | 166.78 |
| 1.55 | 0.948 | 162.94 | 1.317 | 59.12 | 0.018 | 8.28 | 0.843 | 166.27 |
| 1.6 | 0.947 | 162.21 | 1.276 | 58.03 | 0.018 | 8.51 | 0.843 | 165.71 |
| 1.65 | 0.950 | 161.60 | 1.237 | 56.92 | 0.018 | 8.31 | 0.843 | 165.16 |
| 1.7 | 0.951 | 160.97 | 1.201 | 55.93 | 0.018 | 8.40 | 0.844 | 164.60 |
| 1.75 | 0.950 | 160.44 | 1.167 | 54.89 | 0.018 | 8.35 | 0.844 | 164.10 |
| 1.8 | 0.950 | 159.95 | 1.135 | 53.83 | 0.019 | 8.44 | 0.844 | 163.47 |
| 1.85 | 0.952 | 159.46 | 1.105 | 52.85 | 0.019 | 8.61 | 0.843 | 162.87 |
| 1.9 | 0.951 | 159.01 | 1.076 | 51.92 | 0.019 | 8.34 | 0.844 | 162.37 |
| 1.95 | 0.950 | 158.58 | 1.049 | 50.84 | 0.019 | 7.93 | 0.843 | 161.77 |
| 2 | 0.952 | 158.25 | 1.024 | 49.95 | 0.019 | 8.02 | 0.843 | 161.24 |
| 2.05 | 0.951 | 157.84 | 1.000 | 49.06 | 0.019 | 7.86 | 0.844 | 160.75 |
| 2.1 | 0.951 | 157.48 | 0.979 | 48.17 | 0.019 | 7.67 | 0.845 | 160.26 |
| 2.15 | 0.952 | 157.17 | 0.959 | 47.22 | 0.019 | 7.24 | 0.843 | 159.69 |
| 2.2 | 0.952 | 156.89 | 0.939 | 46.34 | 0.020 | 6.89 | 0.843 | 159.08 |
| 2.25 | 0.952 | 156.63 | 0.921 | 45.44 | 0.020 | 6.73 | 0.844 | 158.58 |
| 2.3 | 0.952 | 156.35 | 0.904 | 44.48 | 0.020 | 6.86 | 0.843 | 158.07 |
| 2.35 | 0.953 | 155.98 | 0.888 | 43.57 | 0.020 | 6.83 | 0.842 | 157.42 |
| 2.4 | 0.951 | 155.66 | 0.873 | 42.68 | 0.020 | 6.80 | 0.842 | 156.97 |
| 2.45 | 0.952 | 155.28 | 0.860 | 41.72 | 0.020 | 6.74 | 0.842 | 156.47 |
| 2.5 | 0.952 | 154.86 | 0.848 | 40.82 | 0.020 | 6.73 | 0.840 | 155.83 |
| 2.55 | 0.950 | 154.44 | 0.836 | 39.90 | 0.021 | 6.72 | 0.841 | 155.29 |
| 2.6 | 0.949 | 153.93 | 0.826 | 38.89 | 0.021 | 6.86 | 0.840 | 154.74 |
| 2.65 | 0.950 | 153.36 | 0.815 | 37.85 | 0.021 | 6.74 | 0.838 | 154.18 |
| 2.7 | 0.949 | 152.82 | 0.806 | 36.81 | 0.022 | 6.24 | 0.838 | 153.62 |
| 2.75 | 0.946 | 152.08 | 0.797 | 35.75 | 0.022 | 5.69 | 0.839 | 153.16 |

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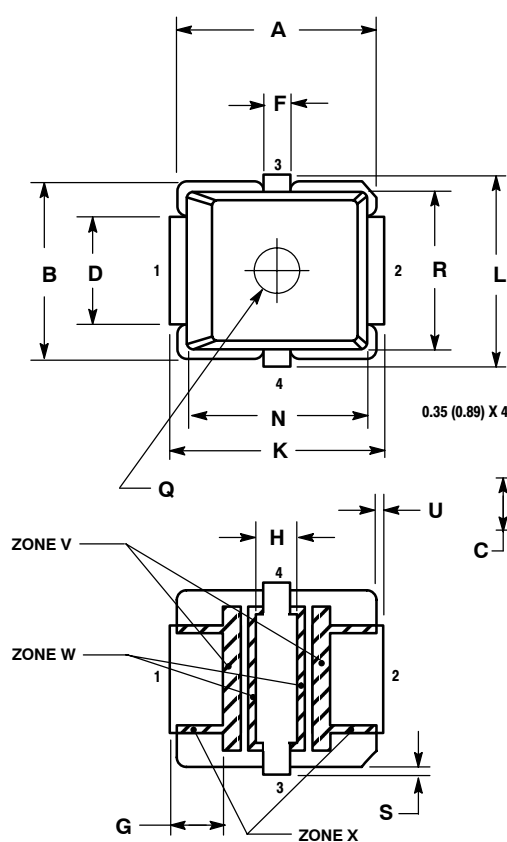
Table 6. Class AB Common Source S-Parameters at $V_{DS} = 6$ Vdc, $I_{DQ} = 180$ mA (continued)

| f GHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|----------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|
| | S ₁₁ | ∠φ | S ₂₁ | ∠φ | S ₁₂ | ∠φ | S ₂₂ | ∠φ |
| 2.8 | 0.946 | 151.55 | 0.787 | 34.63 | 0.022 | 4.64 | 0.836 | 152.55 |
| 2.85 | 0.946 | 150.81 | 0.778 | 33.54 | 0.023 | 3.61 | 0.836 | 152.02 |
| 2.9 | 0.945 | 150.11 | 0.770 | 32.46 | 0.023 | 2.16 | 0.837 | 151.54 |
| 2.95 | 0.945 | 149.30 | 0.762 | 31.37 | 0.023 | 1.54 | 0.835 | 150.98 |
| 3 | 0.945 | 148.44 | 0.754 | 30.25 | 0.023 | 1.03 | 0.835 | 150.40 |
| 3.05 | 0.944 | 147.58 | 0.747 | 29.09 | 0.023 | 0.48 | 0.837 | 149.89 |
| 3.1 | 0.943 | 146.55 | 0.739 | 27.89 | 0.023 | 0.15 | 0.835 | 149.35 |
| 3.15 | 0.943 | 145.54 | 0.732 | 26.69 | 0.023 | -0.33 | 0.834 | 148.72 |
| 3.2 | 0.944 | 144.52 | 0.725 | 25.53 | 0.023 | -0.41 | 0.836 | 148.13 |
| 3.25 | 0.941 | 143.47 | 0.718 | 24.33 | 0.023 | -0.52 | 0.835 | 147.62 |
| 3.3 | 0.941 | 142.43 | 0.711 | 23.09 | 0.023 | -1.22 | 0.834 | 147.01 |
| 3.35 | 0.941 | 141.33 | 0.704 | 21.89 | 0.023 | -1.40 | 0.834 | 146.44 |
| 3.4 | 0.940 | 140.22 | 0.697 | 20.67 | 0.024 | -1.31 | 0.834 | 145.89 |
| 3.45 | 0.939 | 139.25 | 0.689 | 19.44 | 0.024 | -1.58 | 0.832 | 145.40 |
| 3.5 | 0.940 | 138.09 | 0.682 | 18.26 | 0.024 | -1.85 | 0.833 | 144.66 |
| 3.55 | 0.940 | 137.05 | 0.675 | 17.08 | 0.024 | -2.29 | 0.834 | 144.11 |
| 3.6 | 0.939 | 136.07 | 0.668 | 15.88 | 0.025 | -2.75 | 0.832 | 143.59 |
| 3.65 | 0.941 | 135.06 | 0.661 | 14.68 | 0.025 | -3.55 | 0.831 | 142.91 |
| 3.7 | 0.939 | 134.20 | 0.653 | 13.50 | 0.025 | -4.69 | 0.832 | 142.34 |
| 3.75 | 0.939 | 133.35 | 0.646 | 12.39 | 0.025 | -5.45 | 0.831 | 141.92 |
| 3.8 | 0.939 | 132.47 | 0.639 | 11.29 | 0.025 | -6.34 | 0.830 | 141.27 |
| 3.85 | 0.940 | 131.67 | 0.632 | 10.20 | 0.025 | -6.85 | 0.831 | 140.64 |
| 3.9 | 0.939 | 130.89 | 0.625 | 9.15 | 0.025 | -6.90 | 0.831 | 140.02 |
| 3.95 | 0.940 | 130.26 | 0.619 | 8.10 | 0.025 | -6.60 | 0.830 | 139.40 |
| 4 | 0.941 | 129.57 | 0.613 | 7.10 | 0.025 | -6.63 | 0.830 | 138.76 |
| 4.05 | 0.941 | 128.98 | 0.608 | 6.11 | 0.026 | -6.67 | 0.831 | 138.17 |
| 4.1 | 0.942 | 128.44 | 0.602 | 5.10 | 0.026 | -7.00 | 0.830 | 137.56 |
| 4.15 | 0.942 | 128.03 | 0.598 | 4.14 | 0.026 | -7.30 | 0.828 | 136.87 |
| 4.2 | 0.941 | 127.57 | 0.593 | 3.17 | 0.027 | -7.73 | 0.828 | 136.20 |
| 4.25 | 0.940 | 127.14 | 0.589 | 2.15 | 0.027 | -8.12 | 0.827 | 135.56 |
| 4.3 | 0.941 | 126.75 | 0.585 | 1.21 | 0.027 | -8.11 | 0.826 | 134.85 |
| 4.35 | 0.941 | 126.39 | 0.581 | 0.25 | 0.027 | -8.33 | 0.826 | 134.13 |
| 4.4 | 0.939 | 125.97 | 0.578 | -0.74 | 0.028 | -8.73 | 0.825 | 133.44 |
| 4.45 | 0.939 | 125.64 | 0.575 | -1.67 | 0.028 | -8.92 | 0.823 | 132.68 |
| 4.5 | 0.939 | 125.36 | 0.573 | -2.59 | 0.029 | -9.42 | 0.823 | 131.92 |
| 4.55 | 0.938 | 124.98 | 0.571 | -3.50 | 0.029 | -9.66 | 0.823 | 131.23 |
| 4.6 | 0.938 | 124.55 | 0.570 | -4.53 | 0.030 | -10.28 | 0.822 | 130.45 |
| 4.65 | 0.938 | 124.20 | 0.571 | -5.52 | 0.030 | -10.87 | 0.821 | 129.60 |
| 4.7 | 0.937 | 123.76 | 0.570 | -6.60 | 0.031 | -11.91 | 0.821 | 128.79 |
| 4.75 | 0.935 | 123.17 | 0.569 | -7.76 | 0.031 | -13.22 | 0.819 | 127.98 |
| 4.8 | 0.935 | 122.58 | 0.569 | -8.89 | 0.031 | -14.16 | 0.817 | 127.09 |
| 4.85 | 0.934 | 121.93 | 0.570 | -9.98 | 0.031 | -14.45 | 0.817 | 126.23 |
| 4.9 | 0.932 | 121.14 | 0.570 | -11.17 | 0.032 | -14.82 | 0.816 | 125.41 |
| 4.95 | 0.932 | 120.43 | 0.571 | -12.37 | 0.032 | -14.82 | 0.815 | 124.46 |
| 5 | 0.929 | 119.55 | 0.573 | -13.61 | 0.032 | -14.83 | 0.815 | 123.55 |

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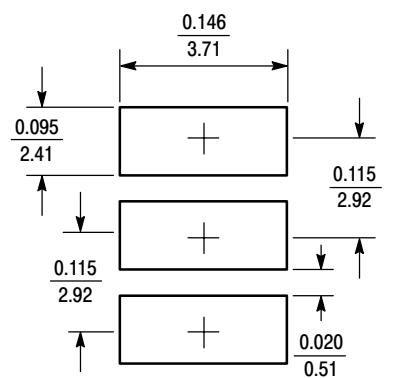
PACKAGE DIMENSIONS



VIEW Y-Y

**CASE 466-03
ISSUE D
PLD-1.5
PLASTIC**

- NOTES:
 1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1984.
 2. CONTROLLING DIMENSION: INCH
 3. RESIN BLEED/FLASH ALLOWABLE IN ZONE V, W, AND X.
- STYLE 1:
 PIN 1. DRAIN
 2. GATE
 3. SOURCE
 4. SOURCE



(inches
mm)

SOLDER FOOTPRINT

| DIM | INCHES | | MILLIMETERS | |
|--------|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.255 | 0.265 | 6.48 | 6.73 |
| B | 0.225 | 0.235 | 5.72 | 5.97 |
| C | 0.065 | 0.072 | 1.65 | 1.83 |
| D | 0.130 | 0.150 | 3.30 | 3.81 |
| E | 0.021 | 0.026 | 0.53 | 0.66 |
| F | 0.026 | 0.044 | 0.66 | 1.12 |
| G | 0.050 | 0.070 | 1.27 | 1.78 |
| H | 0.045 | 0.063 | 1.14 | 1.60 |
| J | 0.160 | 0.180 | 4.06 | 4.57 |
| K | 0.273 | 0.285 | 6.93 | 7.24 |
| L | 0.245 | 0.255 | 6.22 | 6.48 |
| N | 0.230 | 0.240 | 5.84 | 6.10 |
| P | 0.000 | 0.008 | 0.00 | 0.20 |
| Q | 0.055 | 0.063 | 1.40 | 1.60 |
| R | 0.200 | 0.210 | 5.08 | 5.33 |
| S | 0.006 | 0.012 | 0.15 | 0.31 |
| U | 0.006 | 0.012 | 0.15 | 0.31 |
| ZONE V | 0.000 | 0.021 | 0.00 | 0.53 |
| ZONE W | 0.000 | 0.010 | 0.00 | 0.25 |
| ZONE X | 0.000 | 0.010 | 0.00 | 0.25 |

REVISION HISTORY

The following table summarizes revisions to this document.

| Revision | Date | Description |
|----------|-----------|--|
| 6 | Jan. 2008 | <ul style="list-style-type: none">Listed replacement part, p. 1Added Revision History, p. 9 |

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