



## SD57060-01

### RF POWER TRANSISTORS

#### The *LdmoST* FAMILY

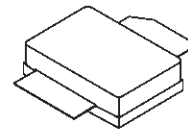
ADVANCE DATA

#### N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT} = 60$  W WITH 13 dB gain @ 945 MHz
- BeO FREE PACKAGE

#### DESCRIPTION

The SD57060-01 is a common source N-Channel enhancement-mode lateral Field-Effect RF power transistor designed for broadband commercial and industrial applications at frequencies up to 1.0 GHz. The SD57060-01 is designed for high gain and broadband performance operating in common source mode at 28 V. It is ideal for base station applications requiring high linearity.

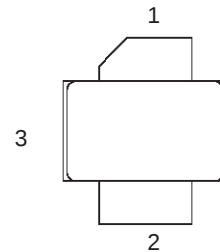


**M250**  
epoxy sealed

**ORDER CODE**  
SD57060-01

**BRANDING**  
TSD57060-01

#### PIN CONNECTION



1. Drain  
2. Gate

3. Source

#### ABSOLUTE MAXIMUM RATINGS ( $T_{CASE} = 25^{\circ}\text{C}$ )

| Symbol        | Parameter                                         | Value       | Unit               |
|---------------|---------------------------------------------------|-------------|--------------------|
| $V_{(BR)DSS}$ | Drain-Source Voltage                              | 65          | V                  |
| $V_{GS}$      | Gate-Source Voltage                               | $\pm 20$    | V                  |
| $I_D$         | Drain Current                                     | 7           | A                  |
| $P_{DISS}$    | Power Dissipation (@ $T_c = 70^{\circ}\text{C}$ ) | 118         | W                  |
| $T_J$         | Max. Operating Junction Temperature               | 200         | $^{\circ}\text{C}$ |
| $T_{STG}$     | Storage Temperature                               | -65 to +150 | $^{\circ}\text{C}$ |

#### THERMAL DATA

|                |                                   |     |                      |
|----------------|-----------------------------------|-----|----------------------|
| $R_{th(j-c)}$  | Junction -Case Thermal Resistance | 1.1 | $^{\circ}\text{C/W}$ |
| $R_{th(c-s)*}$ | Case-Heatsink Thermal Resistance  | 0.5 | $^{\circ}\text{C/W}$ |

\* Determined using a flat aluminum or copper heatsink with thermal compound applied (Dow Corning 340 or equivalent).

ELECTRICAL SPECIFICATION (T<sub>CASE</sub> = 25°C)

STATIC

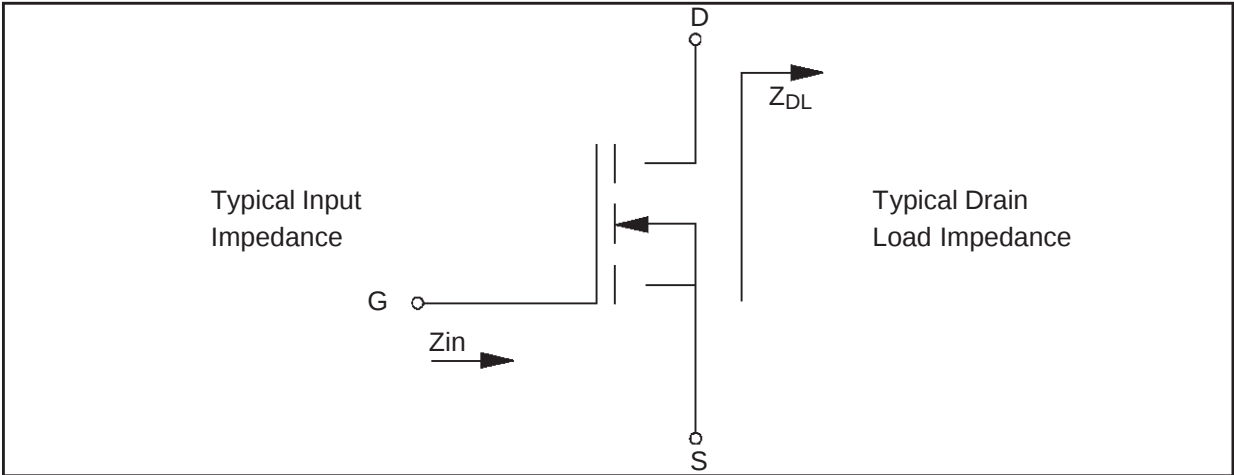
| Symbol               | Test Conditions        |                         | Min.      | Typ. | Max. | Unit |
|----------------------|------------------------|-------------------------|-----------|------|------|------|
| V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V  | I <sub>DS</sub> = 1 mA  | 65        |      |      | V    |
| I <sub>DSS</sub>     | V <sub>GS</sub> = 0 V  | V <sub>DS</sub> = 28 V  |           |      | 1    | μA   |
| I <sub>GSS</sub>     | V <sub>GS</sub> = 20 V | V <sub>DS</sub> = 0 V   |           |      | 1    | μA   |
| V <sub>GS(Q)</sub>   | V <sub>DS</sub> = 28 V | I <sub>D</sub> = 100 mA | 2.0       |      | 5.0  | V    |
| V <sub>DS(ON)</sub>  | V <sub>GS</sub> = 10 V | I <sub>D</sub> = 3 A    |           | 0.7  | 0.8  | V    |
| G <sub>FS</sub>      | V <sub>DS</sub> = 10 V | I <sub>D</sub> = 3 A    | 2.5       |      |      | mho  |
| C <sub>ISS</sub> *   | V <sub>GS</sub> = 0 V  | V <sub>DS</sub> = 28 V  | f = 1 MHz |      | 88   | pF   |
| C <sub>OSS</sub>     | V <sub>GS</sub> = 0 V  | V <sub>DS</sub> = 28 V  | f = 1 MHz |      | 44   | pF   |
| C <sub>RSS</sub>     | V <sub>GS</sub> = 0 V  | V <sub>DS</sub> = 28 V  | f = 1 MHz |      | 2.8  | pF   |

Ref. 7145649B

DYNAMIC

| Symbol           | Test Conditions        |                          |                         | Min. | Typ. | Max. | Unit |
|------------------|------------------------|--------------------------|-------------------------|------|------|------|------|
| P <sub>OUT</sub> | V <sub>DD</sub> = 28 V | I <sub>DQ</sub> = 100 mA | f = 945 MHz             | 60   |      |      | W    |
| G <sub>PS</sub>  | V <sub>DD</sub> = 28 V | I <sub>DQ</sub> = 100 mA | P <sub>OUT</sub> = 60 W | 13   | 15   |      | dB   |
| η <sub>D</sub>   | V <sub>DD</sub> = 28 V | I <sub>DQ</sub> = 100 mA | P <sub>OUT</sub> = 60 W | 53   | 60   |      | %    |
| Load mismatch    | V <sub>DD</sub> = 28 V | I <sub>DQ</sub> = 100 mA | P <sub>OUT</sub> = 60 W | 5:1  |      |      | VSWR |
|                  | ALL PHASE ANGLES       |                          |                         |      |      |      |      |

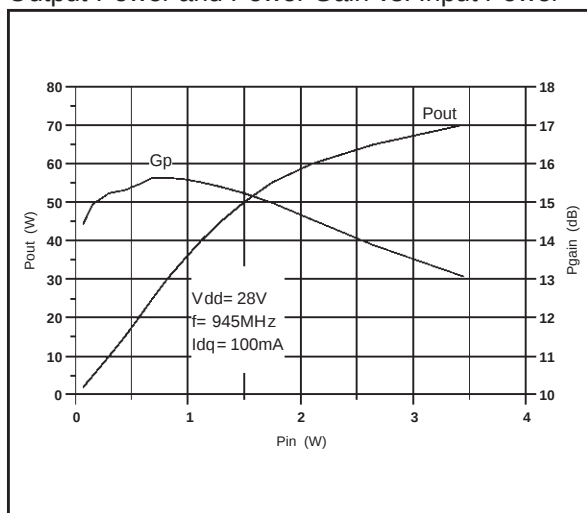
IMPEDANCE DATA



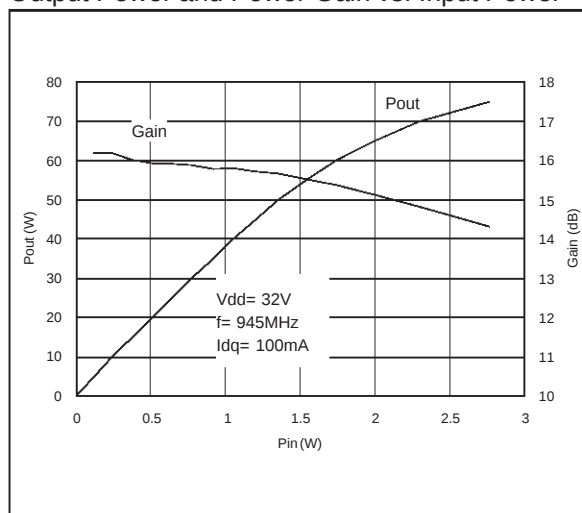
| FREQ.   | Z <sub>IN</sub> (Ω) | Z <sub>DL</sub> (Ω) |
|---------|---------------------|---------------------|
| 925 MHz | 0.8 - j 0.095       | 1.5 + j 0.48        |
| 945 MHz | 0.7 - j 0.05        | 1.6 + j 0.25        |
| 960 MHz | 0.7 - j 0.1         | 1.7 + j 0.130       |

## TYPICAL PERFORMANCE

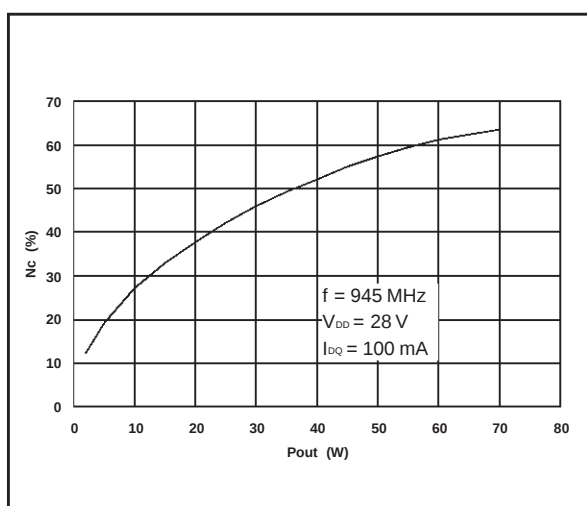
Output Power and Power Gain vs. Input Power



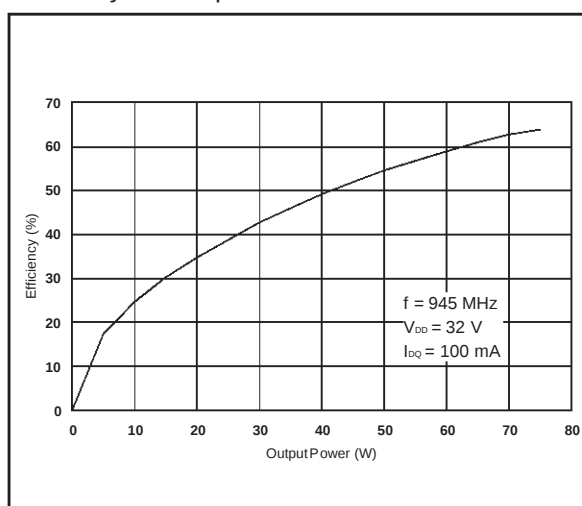
Output Power and Power Gain vs. Input Power



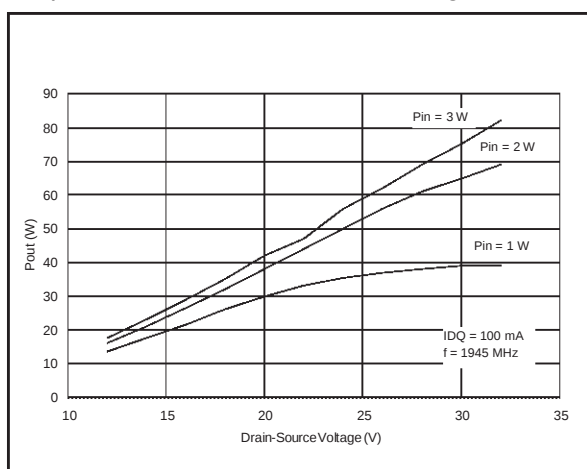
Efficiency vs. Output Power



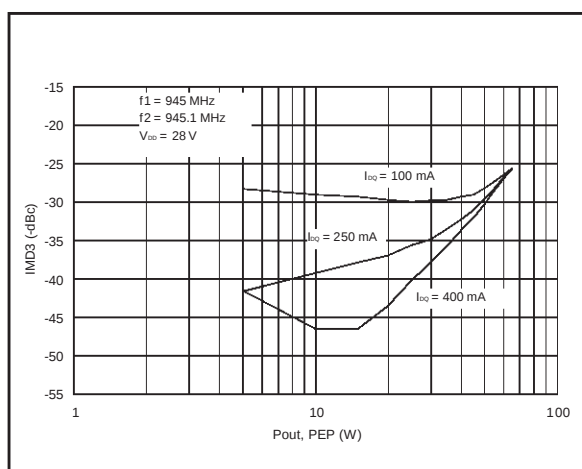
Efficiency vs. Output Power



Output Power vs. Drain-Source Voltage



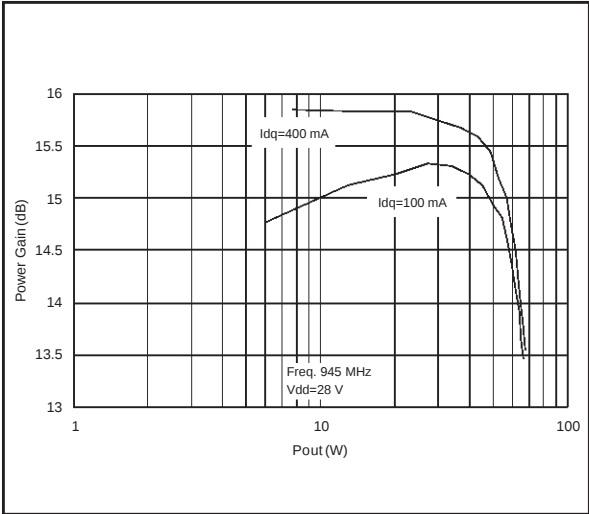
Intermodulation Distortion vs. Output Power



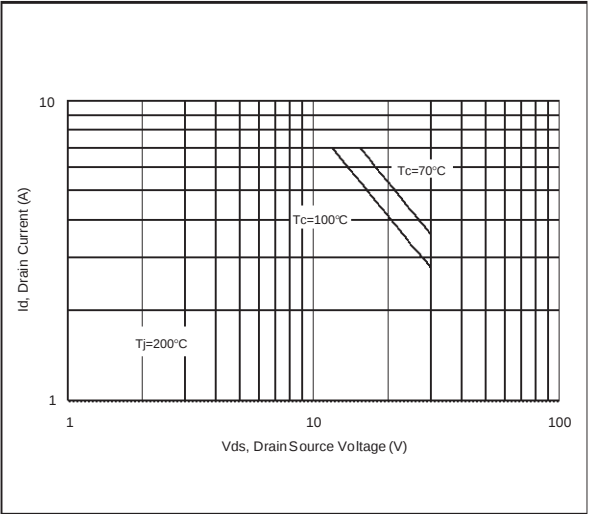
**SD57060-01**

**TYPICAL PERFORMANCE**

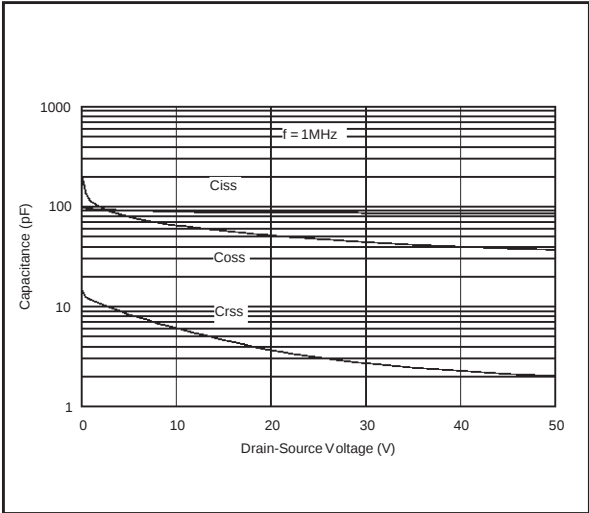
Power Gain vs. Output Power



Safe Operating Area



Capacitance vs. Drain-Source Voltage



## COMMON SOURCE S-PARAMETERS

(V<sub>DS</sub> = 13.5 V, I<sub>DS</sub> = 2 A)

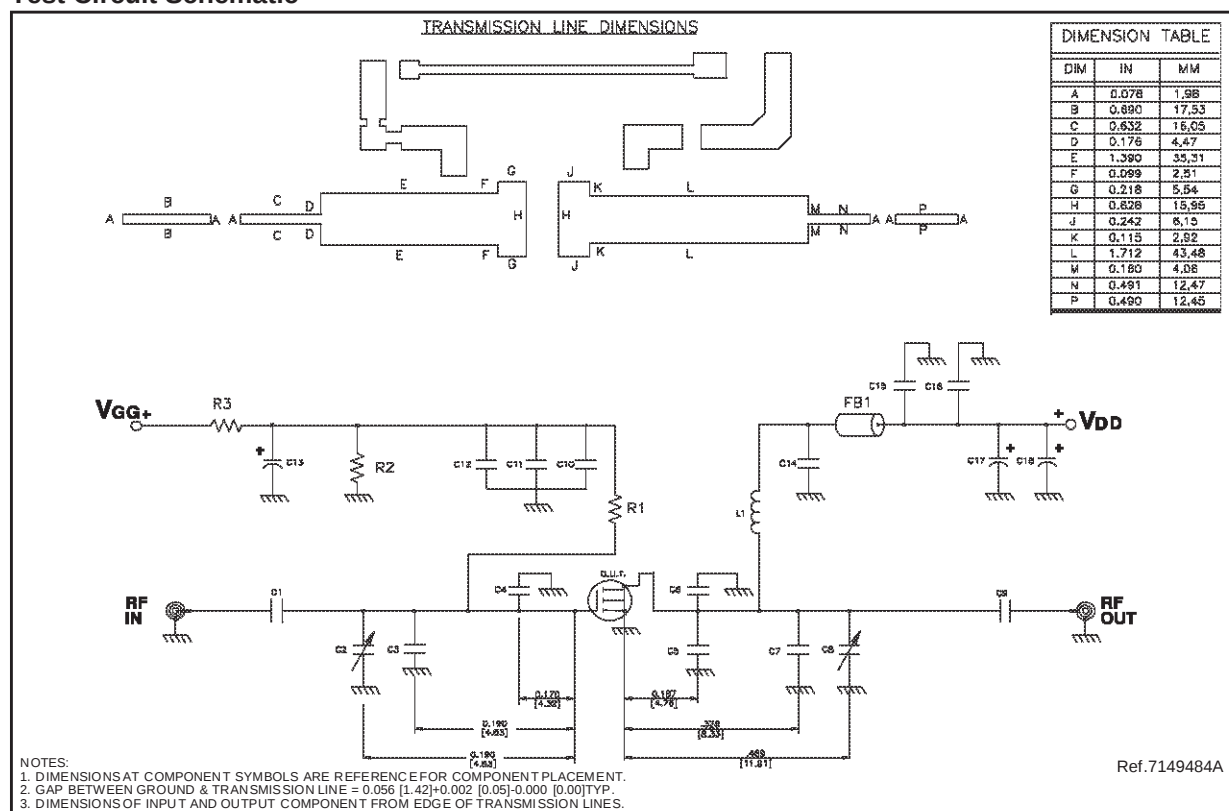
| FREQ(MHz) | s11 MAG | s11 ang | s21 MAG | s21 ang | s12 MAG | s12 ang | s22 MAG | s22 ang |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| 50        | 0.896   | -168.86 | 15.679  | 85.012  | 0.0116  | -5.1128 | 0.796   | -170.27 |
| 60        | 0.896   | -169.3  | 14.859  | 84.592  | 0.0116  | -5.4369 | 0.796   | -170.49 |
| 70        | 0.869   | -169.76 | 14.004  | 84.14   | 0.0116  | -5.7912 | 0.797   | -170.7  |
| 80        | 0.869   | -170.23 | 13.122  | 83.644  | 0.0115  | -6.0658 | 0.797   | -170.9  |
| 90        | 0.897   | -170.71 | 12.213  | 83.074  | 0.0115  | -6.3789 | 0.798   | -171.1  |
| 100       | 0.897   | -171.19 | 11.285  | 82.404  | 0.0114  | -6.8198 | 0.799   | -171.29 |
| 150       | 0.9     | -173.39 | 6.9575  | 76.841  | 0.0111  | -9.6817 | 0.808   | -171.96 |
| 200       | 0.905   | -174.29 | 4.751   | 71.951  | 0.0103  | -11.87  | 0.821   | -171.79 |
| 250       | 0.912   | -174.64 | 3.637   | 68.471  | 0.0097  | -12.957 | 0.836   | -171.36 |
| 300       | 0.92    | -174.9  | 2.889   | 64.839  | 0.0089  | -13.493 | 0.851   | -171.03 |
| 350       | 0.927   | -175.08 | 2.428   | 62.538  | 0.0083  | -11.937 | 0.866   | -170.76 |
| 400       | 0.934   | -175.3  | 2.077   | 58.748  | 0.0077  | -11.228 | 0.881   | -170.6  |
| 450       | 0.941   | -175.5  | 1.802   | 56.081  | 0.0071  | -8.7753 | 0.894   | -170.49 |
| 500       | 0.947   | -175.73 | 1.592   | 51.84   | 0.0066  | -7.5009 | 0.907   | -170.47 |
| 550       | 0.952   | -176.02 | 1.379   | 48.632  | 0.0059  | -4.8834 | 0.917   | -170.55 |
| 600       | 0.956   | -176.29 | 1.221   | 45.777  | 0.0053  | 0.12909 | 0.927   | -170.67 |
| 650       | 0.96    | -176.6  | 1.049   | 42.778  | 0.0048  | 5.0249  | 0.936   | -170.82 |
| 700       | 0.962   | -176.9  | 0.924   | 42.212  | 0.0043  | 13.591  | 0.943   | -170.94 |
| 750       | 0.965   | -177.22 | 0.814   | 40.376  | 0.0039  | 22.729  | 0.95    | -171.05 |
| 800       | 0.968   | 177.51  | 0.723   | 41.348  | 0.0036  | 37.954  | 0.956   | -171.14 |
| 850       | 0.97    | -177.83 | 0.662   | 40.788  | 0.0037  | 51.305  | 0.961   | -171.16 |
| 900       | 0.972   | -178.19 | 0.6     | 41.719  | 0.0041  | 63.188  | 0.966   | -171.24 |
| 950       | 0.974   | -178.56 | 0.566   | 41.469  | 0.0047  | 73.463  | 0.971   | -171.24 |
| 1000      | 0.975   | -178.96 | 0.523   | 41.747  | 0.0055  | 80.707  | 0.974   | -171.25 |
| 1050      | 0.976   | -179.28 | 0.504   | 41.439  | 0.0064  | 88.27   | 0.977   | -171.26 |
| 1100      | 0.978   | -179.62 | 0.477   | 40.692  | 0.0074  | 92.504  | 0.979   | -171.36 |
| 1150      | 0.979   | -179.85 | 0.466   | 39.239  | 0.0084  | 96.743  | 0.981   | -171.43 |
| 1200      | 0.981   | 179.9   | 0.444   | 36.775  | 0.0097  | 98.282  | 0.982   | 171.5   |
| 1250      | 0.982   | 179.68  | 0.431   | 34.788  | 0.011   | 99.121  | 0.983   | -171.58 |
| 1300      | 0.983   | 179.52  | 0.408   | 31.862  | 0.0125  | 98.773  | 0.983   | -171.71 |
| 1350      | 0.984   | 179.35  | 0.395   | 30.219  | 0.0136  | 97.973  | 0.983   | -171.86 |
| 1400      | 0.985   | 179.24  | 0.382   | 26.465  | 0.0148  | 97.464  | 0.984   | -171.94 |
| 1450      | 0.987   | 179.13  | 0.365   | 23.869  | 0.0157  | 95.39   | 0.984   | -171.98 |
| 1500      | 0.988   | 179.09  | 0.351   | 21.267  | 0.0165  | 93.871  | 0.985   | -171.98 |

## COMMON SOURCE S-PARAMETERS

(V<sub>DS</sub> = 28 V, I<sub>DS</sub> = 2A)

| FREQ(MHz) | s11 MAG | s11 ang | s21 MAG | s21 ang | s12 MAG | s12 ang | s22 MAG | s22 ang |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| 50        | 0.857   | -159.69 | 22.757  | 85.934  | 0.0114  | -3.8342 | 0.67    | -161.72 |
| 60        | 0.86    | -160.69 | 21.547  | 85.328  | 0.0113  | -4.4852 | 0.672   | -162.07 |
| 70        | 0.862   | -161.73 | 20.287  | 84.672  | 0.0112  | -5.1512 | 0.674   | -162.41 |
| 80        | 0.865   | -162.8  | 18.987  | 83.933  | 0.0111  | -5.8379 | 0.677   | -162.74 |
| 90        | 0.869   | -163.89 | 17.65   | 83.083  | 0.011   | -6.5533 | 0.679   | -163.07 |
| 100       | 0.872   | -164.98 | 16.286  | 82.083  | 0.011   | -7.4226 | 0.683   | -163.39 |
| 150       | 0.891   | -169.66 | 9.9447  | 74.03   | 0.0103  | -12.13  | 0.708   | -164.66 |
| 200       | 0.905   | -171.43 | 6.719   | 67.256  | 0.0094  | -15.548 | 0.74    | -164.87 |
| 250       | 0.915   | -172.29 | 5.074   | 62.268  | 0.0086  | -17.236 | 0.774   | -164.99 |
| 300       | 0.926   | -172.84 | 3.978   | 57.533  | 0.0077  | -18.625 | 0.806   | -163.35 |
| 350       | 0.935   | -173.34 | 3.297   | 54.035  | 0.0069  | -17.313 | 0.834   | -165.82 |
| 400       | 0.943   | -173.79 | 2.775   | 49.488  | 0.0061  | -16.81  | 0.86    | -166.35 |
| 450       | 0.951   | -174.24 | 2.376   | 46.121  | 0.0054  | -13.006 | 0.881   | -166.85 |
| 500       | 0.957   | -174.67 | 2.061   | 41.541  | 0.0048  | -9.175  | 0.898   | -167.35 |
| 550       | 0.962   | -175.11 | 1.766   | 38.23   | 0.0041  | -2.5323 | 0.913   | -167.83 |
| 600       | 0.966   | -175.53 | 1.546   | 35.173  | 0.0035  | -7.641  | 0.925   | -168.25 |
| 650       | 0.969   | -175.95 | 1.32    | 32.548  | 0.0031  | 19.501  | 0.937   | -168.57 |
| 700       | 0.972   | -176.34 | 1.162   | 31.674  | 0.0031  | 34.423  | 0.946   | -168.81 |
| 750       | 0.974   | -176.75 | 1.021   | 29.983  | 0.0032  | 48.345  | 0.954   | -168.93 |
| 800       | 0.976   | -177.15 | 0.91    | 30.341  | 0.0035  | 62.927  | 0.96    | -168.98 |
| 850       | 0.977   | -177.57 | 0.826   | 29.318  | 0.004   | 74.982  | 0.967   | -168.95 |
| 900       | 0.978   | -177.98 | 0.749   | 29.508  | 0.0047  | 81.962  | 0.973   | -168.88 |
| 950       | 0.979   | -178.41 | 0.696   | 28.477  | 0.0054  | 87.332  | 0.978   | -168.77 |
| 1000      | 0.979   | -178.85 | 0.639   | 27.949  | 0.0063  | 90.913  | 0.982   | -168.72 |
| 1050      | 0.98    | -179.24 | 0.601   | 26.768  | 0.0072  | 95.707  | 0.984   | -168.75 |
| 1100      | 0.981   | -179.61 | 0.561   | 25.598  | 0.0082  | 98.95   | 0.985   | -168.87 |
| 1150      | 0.981   | -179.95 | 0.533   | 23.746  | 0.0094  | 101.25  | 0.986   | -169.13 |
| 1200      | 0.982   | 179.72  | 0.498   | 21.331  | 0.011   | 102.03  | 0.985   | -169.64 |
| 1250      | 0.983   | 179.44  | 0.472   | 19.005  | 0.012   | 102.21  | 0.981   | -170.42 |
| 1300      | 0.984   | 179.23  | 0.44    | 16.272  | 0.0131  | 101.78  | 0.976   | -171.5  |
| 1350      | 0.985   | 179.02  | 0.417   | 14.424  | 0.0143  | 100.61  | 0.969   | -172.89 |
| 1400      | 0.986   | 178.85  | 0.394   | 11.161  | 0.0156  | 99.505  | 0.96    | -174.72 |
| 1450      | 0.986   | 178.7   | 0.372   | 8.789   | 0.0163  | 97.699  | 0.949   | -176.87 |
| 1500      | 0.986   | 178.6   | 0.354   | 6.5533  | 0.0168  | 96.68   | 0.94    | -178.58 |

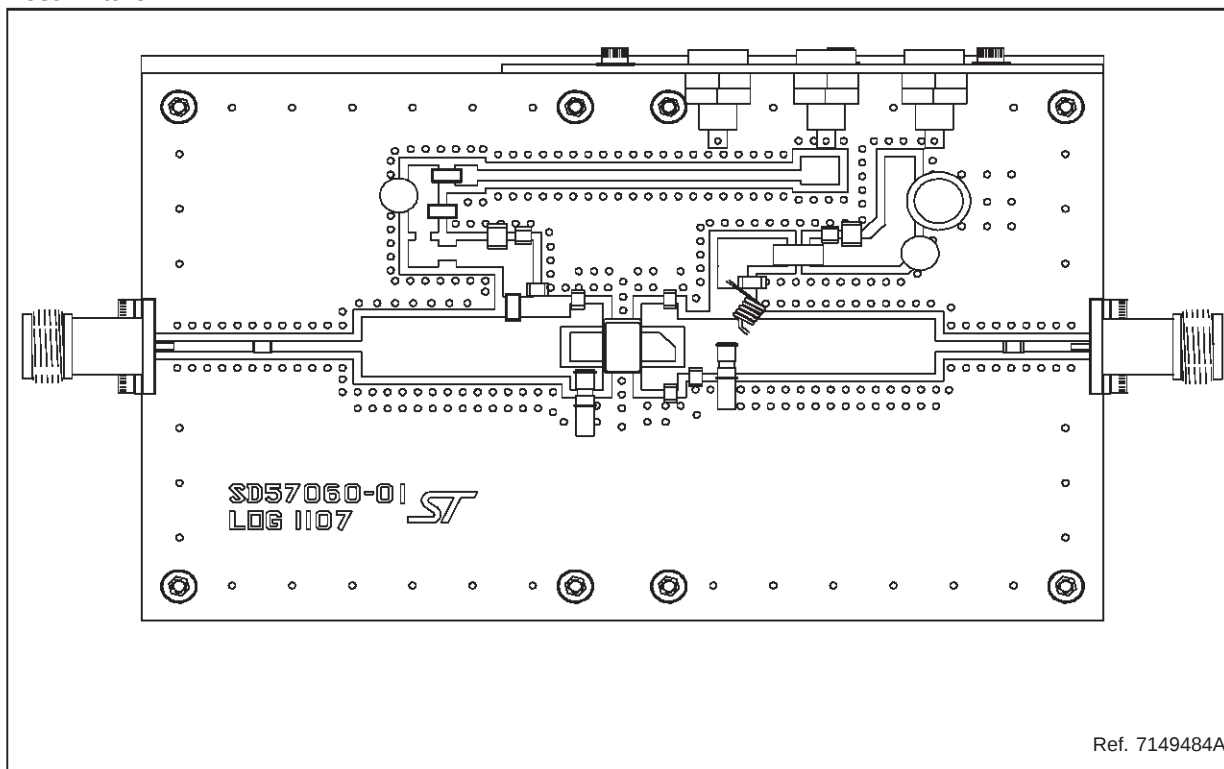
## Test Circuit Schematic



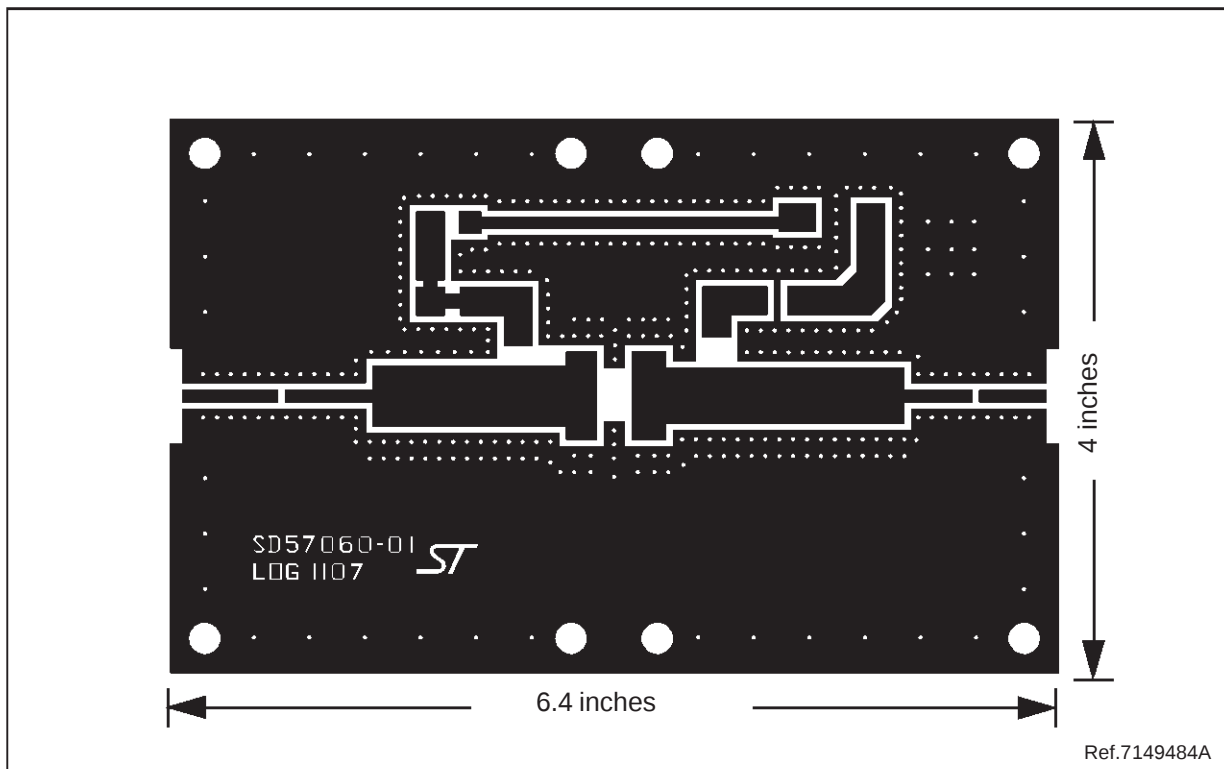
## Test Circuit Component Part List

|       |                                                                                 |         |                                                                                              |
|-------|---------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------------------|
| L1    | INDUCTOR, 5 TURNS AIR WOUND #18 AWG, ID = 0.125 [3.18] NYLON COATED MAGNET WIRE | C6      | 7.5 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                         |
| FB1   | SHIELD BEAD SURFACE MOUNT EMI                                                   | C7      | 8.2 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                         |
| R1    | 1 K Ohm, SURFACE MOUNT CHIP RESISTOR                                            | C9      | 100 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                         |
| R2    | 18 k Ohm, SURFACE MOUNT CHIP RESISTOR                                           | C10,C14 | 47 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                          |
| R3    | 10 K Ohm, SURFACE MOUNT CHIP RESISTOR                                           | C11,C15 | 10000 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                       |
| C1    | 36 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                             | C12,C16 | 0.1 μF / 500 V SURFACE MOUNT CERAMIC CHIP CAPACITOR                                          |
| C2,C8 | 0.8-8.0 pF GIGA TRIM VARIABLE CAPACITOR                                         | C13,C17 | 10 μF / 50 V ALUMINIUM ELECTROLITIC RADIAL LEAD CAPACITOR                                    |
| C3    | 4.7 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                            | C18     | 220 μF / 63 V V ALUMINIUM ELECTROLITIC RADIAL LEAD CAPACITOR                                 |
| C4    | 11 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                             | C6      | 7.5 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                                         |
| C5    | 1.3 pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR                            | PCB     | ULTRALAM 2000, WOVEN FIBERGLASS REINFORCED PTFE. 0.030" THK, εr= 2.55, 2 OZ ED CU BOTH SIDES |

Test Fixture

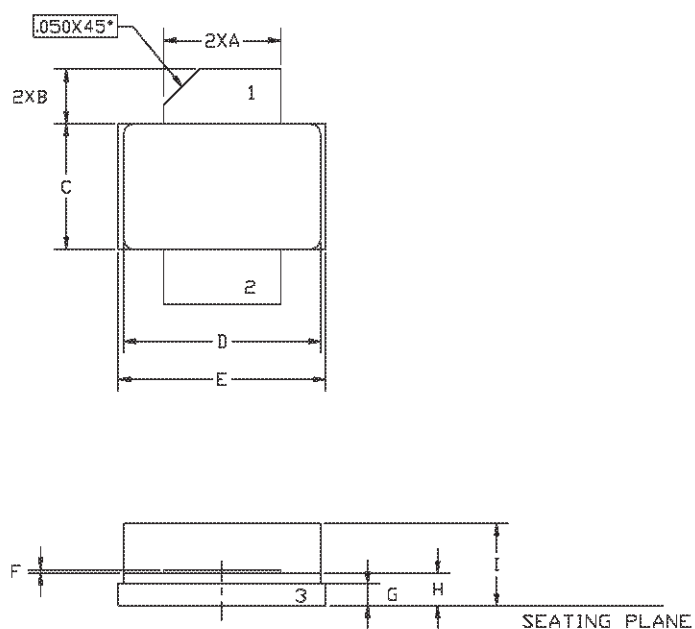


Test Circuit Photomaster



## M250 (.230 x .360 2L N/HERM W/FLG) MECHANICAL DATA

| DIM. | mm   |      |      | Inch  |      |       |
|------|------|------|------|-------|------|-------|
|      | MIN. | TYP. | MAX  | MIN.  | TYP. | MAX   |
| A    | 5.21 |      | 5.71 | 0.205 |      | 0.225 |
| B    | 2.16 |      | 2.92 | 0.085 |      | 0.115 |
| C    | 5.59 |      | 6.09 | 0.220 |      | 0.240 |
| D    | 8.89 |      | 9.40 | 0.350 |      | 0.370 |
| E    | 9.40 |      | 9.91 | 0.370 |      | 0.390 |
| F    | 0.11 |      | 0.15 | 0.004 |      | 0.006 |
| G    | 0.89 |      | 1.14 | 0.035 |      | 0.045 |
| H    | 1.45 |      | 1.70 | 0.057 |      | 0.067 |
| I    | 2.67 |      | 3.94 | 0.105 |      | 0.155 |



Controlling dimension: Inches

1022729B

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