



LET9060S

RF POWER TRANSISTORS

Ldmos Enhanced Technology in Plastic Package

PRELIMINARY DATA

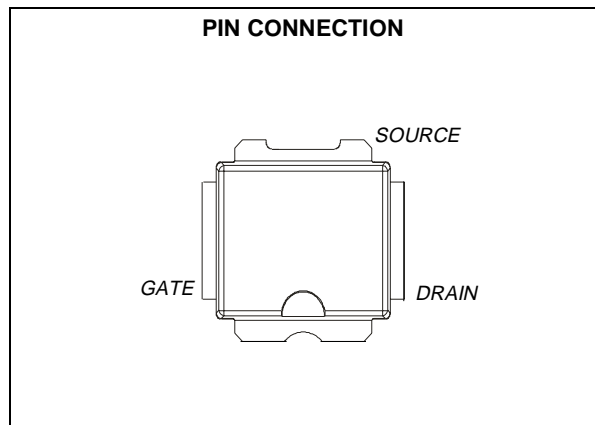
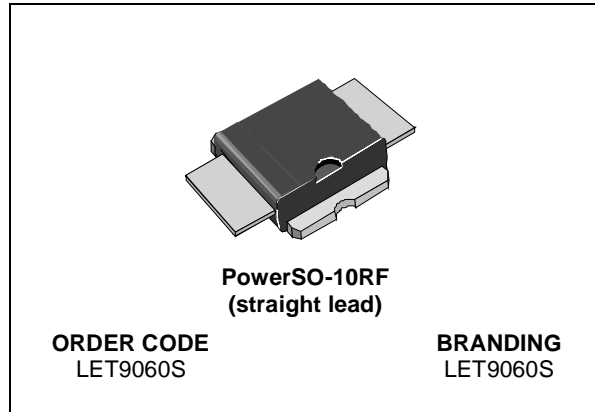
N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT} = 60\text{ W}$ with 17 dB gain @ 945 MHz / 26V
- NEW RF PLASTIC PACKAGE
- HIGH GAIN
- ESD PROTECTION
- AVAILABLE IN TAPE & REEL with TR SUFFIX

DESCRIPTION

The LET9060S 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 26 V in common source mode at frequencies up to 1 GHz. LET9060S 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. LET9060S's superior linearity performance makes it an ideal solution for base station applications.

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.



Mounting recommendations are available in www.st.com/rf/ (look for application note AN1294)

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

| Symbol | Parameter | Value | Unit |
|---------------|-------------------------------------|-------------|--------------------|
| $V_{(BR)DSS}$ | Drain-Source Voltage | 65 | V |
| V_{GS} | Gate-Source Voltage | -0.5 to +15 | V |
| I_D | Drain Current | 7 | A |
| P_{DISS} | Power Dissipation | 170 | W |
| T_j | Max. Operating Junction Temperature | 165 | $^{\circ}\text{C}$ |
| T_{STG} | Storage Temperature | -65 to +150 | $^{\circ}\text{C}$ |

THERMAL DATA

| | | | |
|---------------|-----------------------------------|-----|----------------------|
| $R_{th(j-c)}$ | Junction -Case Thermal Resistance | 0.7 | $^{\circ}\text{C/W}$ |
|---------------|-----------------------------------|-----|----------------------|

LET9060S

ELECTRICAL SPECIFICATION ($T_{CASE} = 25\text{ }^{\circ}\text{C}$)

STATIC

| Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|---|------|------|------|---------------|
| $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}$ $I_{DS} = 1\text{ mA}$ | 65 | | | V |
| I_{DSS} | $V_{GS} = 0\text{ V}$ $V_{DS} = 26\text{ V}$ | | | 1 | μA |
| I_{GSS} | $V_{GS} = 5\text{ V}$ $V_{DS} = 0\text{ V}$ | | | 1 | μA |
| $V_{GS(Q)}$ | $V_{DS} = 26\text{ V}$ $I_D = 100\text{ mA}$ | 2.0 | | 5.0 | V |
| $V_{DS(ON)}$ | $V_{GS} = 10\text{ V}$ $I_D = 3\text{ A}$ | | 0.7 | 0.8 | V |
| G_{FS} | $V_{DS} = 10\text{ V}$ $I_D = 3\text{ A}$ | 2.5 | | | mho |
| C_{ISS} | $V_{GS} = 0\text{ V}$ $V_{DS} = 26\text{ V}$ $f = 1\text{ MHz}$ | | 74 | | pF |
| C_{OSS} | $V_{GS} = 0\text{ V}$ $V_{DS} = 26\text{ V}$ $f = 1\text{ MHz}$ | | 40 | | pF |
| C_{RSS} | $V_{GS} = 0\text{ V}$ $V_{DS} = 26\text{ V}$ $f = 1\text{ MHz}$ | | 2.8 | | pF |

Ref. 7143417B

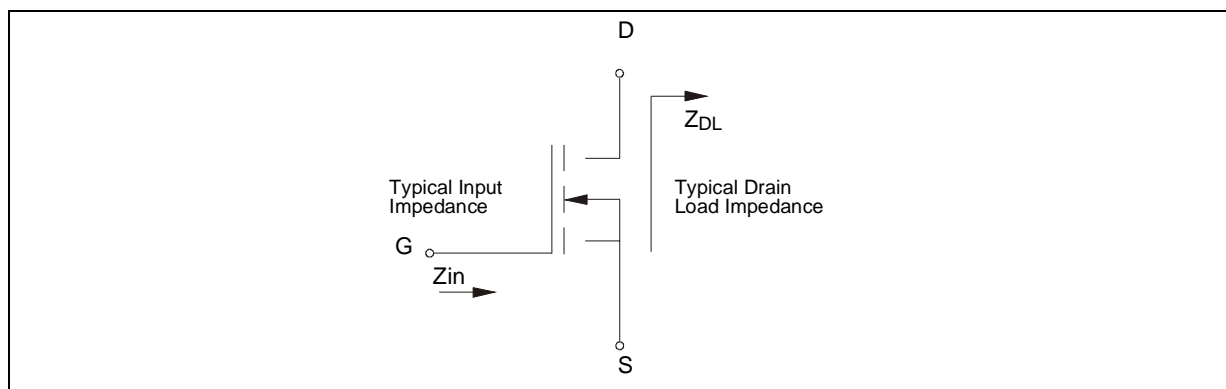
DYNAMIC ($f = 945\text{ MHz}$)

| Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|---|------|------|------|------|
| G_P | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W PEP}$ | 17 | | | dB |
| η_D | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W PEP}$ | | 47 | | % |
| IMD3 | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W PEP}$ | | | -28 | dBc |
| P_{1dB} | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ | | 70 | | W |
| G_P | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W}$ | | 16.7 | | dB |
| η_D | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W}$ | | 61 | | % |
| Load mismatch | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W}$ ALL PHASE ANGLES | 10:1 | | | VSWR |

DYNAMIC ($f = 925 - 960\text{ MHz}$)

| Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------|---|------|------|------|------|
| P_{1dB} | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ | | 65 | | W |
| G_P | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W}$ | | 16 | | dB |
| η_D | $V_{DD} = 26\text{ V}$ $I_{DQ} = 250\text{ mA}$ $P_{OUT} = 60\text{ W}$ | | 56 | | % |

IMPEDANCE DATA



| FREQ. MHz | $Z_{IN} (\Omega)$ | $Z_{DL}(\Omega)$ |
|-----------|-------------------|------------------|
| 860 | 0.65 - j 0.05 | 2.0 + j 0.1 |
| 880 | 0.75 - j 0.6 | 2.0 + j 0.1 |
| 900 | 0.9 - j 1.4 | 1.4 + j 0.2 |
| 920 | 0.4 - j 1.3 | 1.4 + j 0.5 |
| 940 | 0.4 - j 0.8 | 1.2 + j 0.3 |
| 960 | 0.5 - j 1.6 | 1.8 + j 1.0 |

ESD PROTECTION CHARACTERISTICS

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

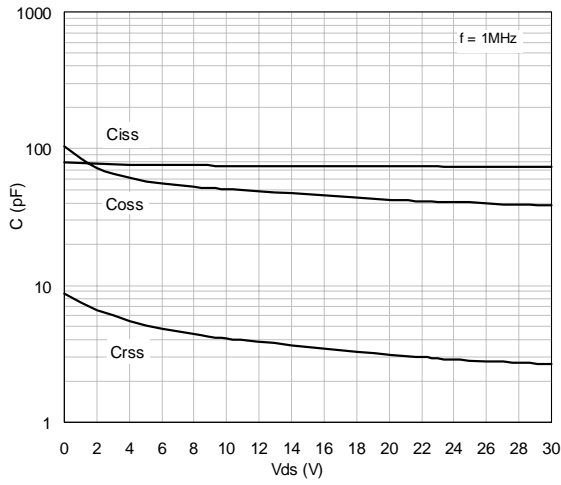
MOISTURE SENSITIVITY LEVEL

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

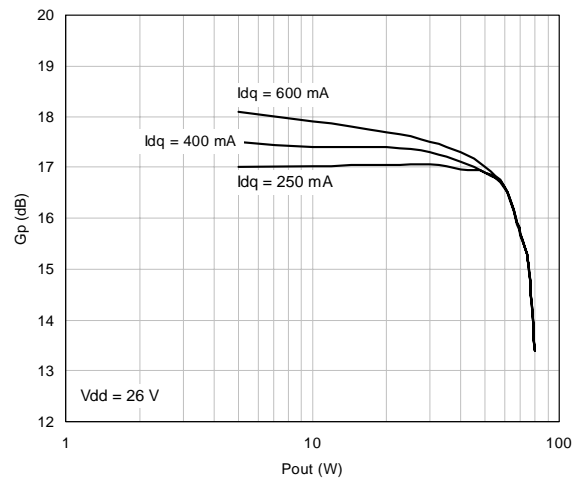
LET9060S

TYPICAL PERFORMANCE

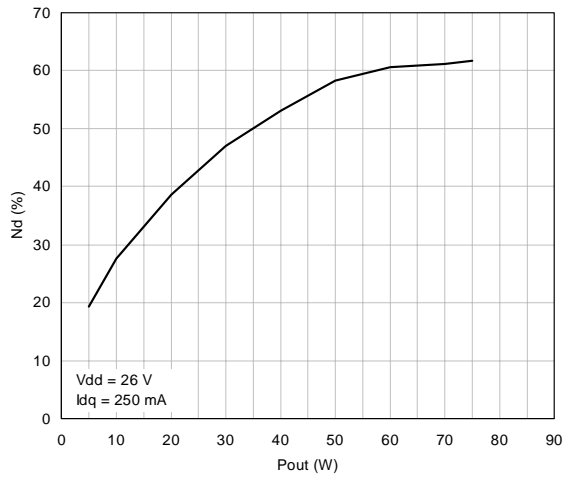
Power Gain Vs Output Power



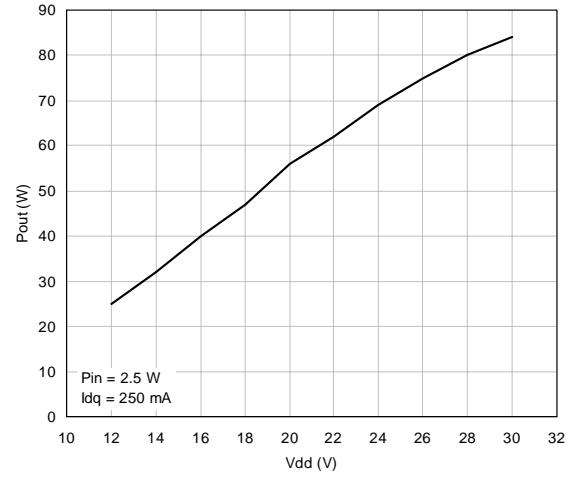
Power Gain Vs Output Power



Efficiency Vs Output Power

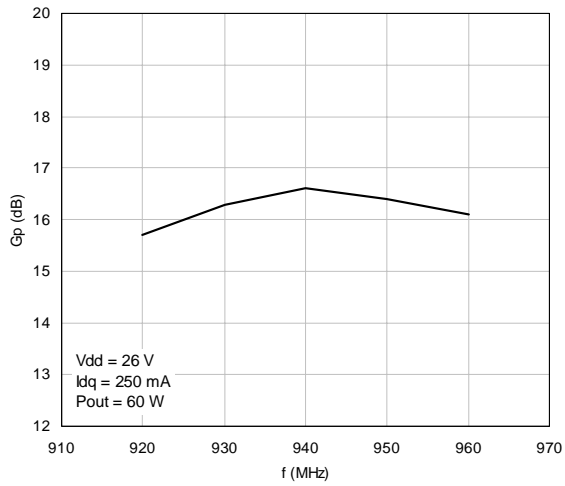


Output Power Vs Drain Voltage

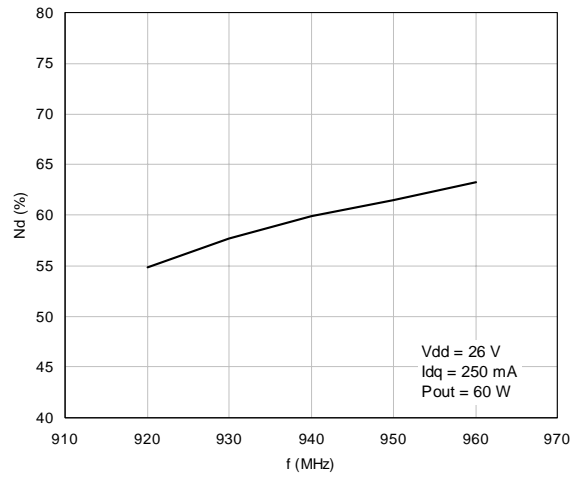


TYPICAL PERFORMANCE (BROADBAND)

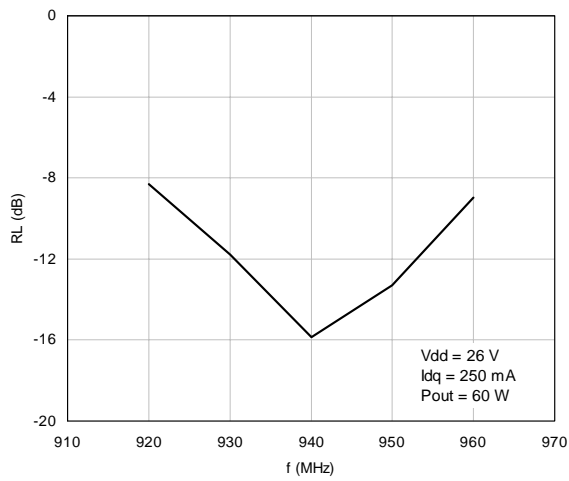
Power Gain Vs Frequency



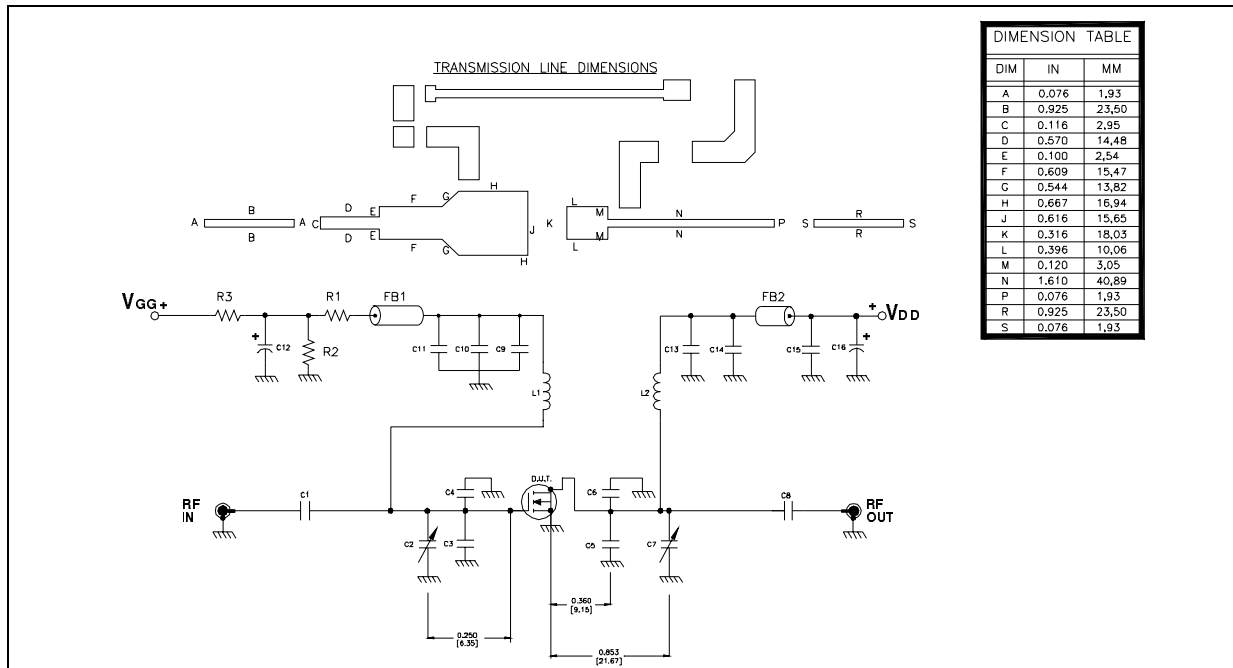
Efficiency Vs Frequency



Input Return Loss Vs Frequency



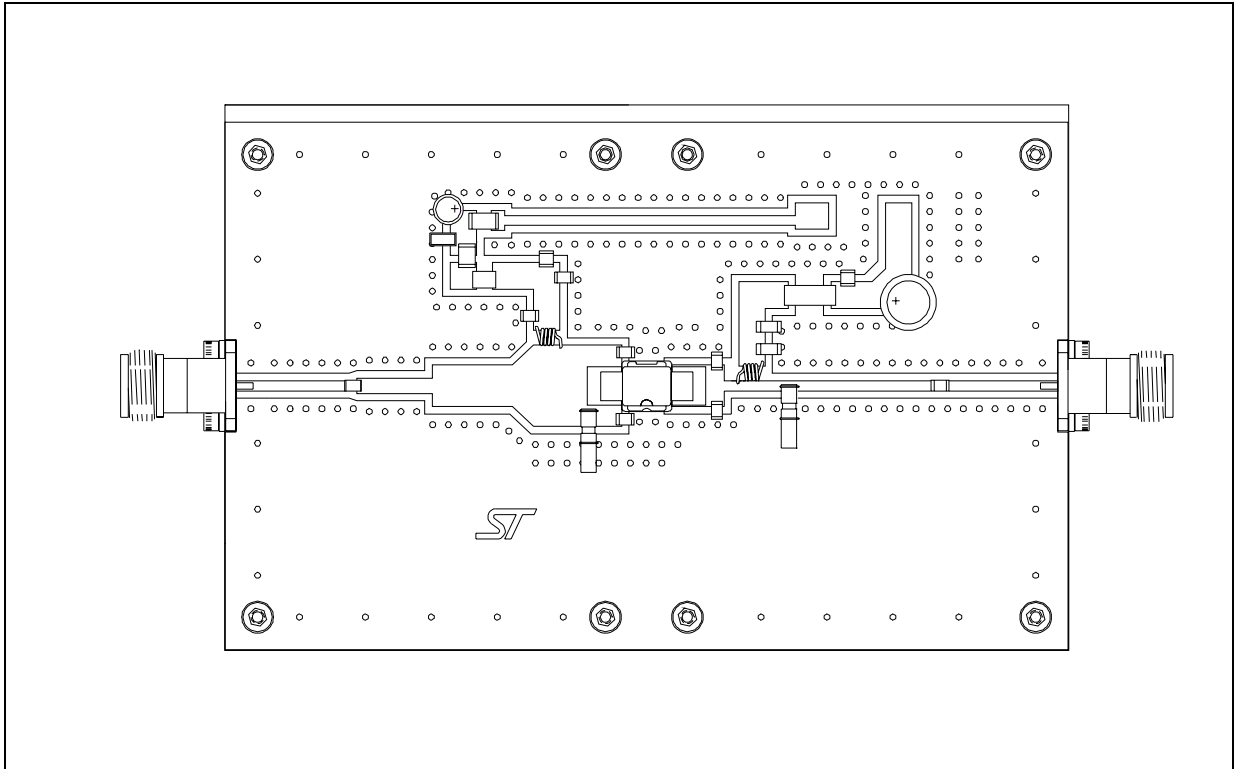
TEST CIRCUIT SCHEMATIC



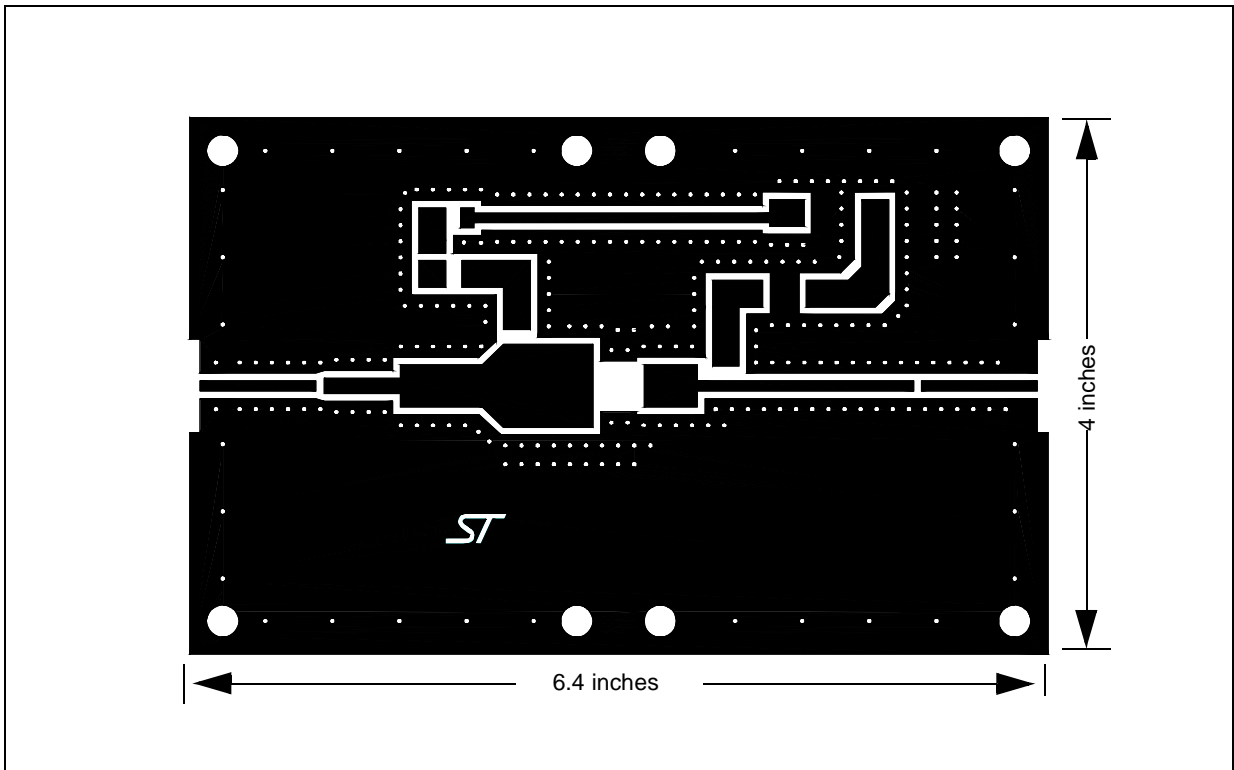
TEST CIRCUIT COMPONENT PART LIST

| COMPONENT | DESCRIPTION |
|-----------------|---|
| C1, C8, C9, C13 | 47pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C2, C7 | 0.8-8.0pF GIGA TRIM VARIABLE CAPACITOR |
| C3, C4, C5, C6 | 7.5pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C10 | 1000pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C11, C15 | 0.1µF / 500V SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C12 | 10µF / 50V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR |
| C14 | 100pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR |
| C16 | 220µF / 63V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR |
| R1 | 18KΩ, 1W SURFACE MOUNT CHIP RESISTOR |
| R2 | 4.7MΩ, 1W SURFACE MOUNT CHIP RESISTOR |
| R3 | 120Ω, 2W SURFACE MOUNT CHIP RESISTOR |
| FB1, FB2 | SHIELD BEAD SURFACE MOUNT EMI |
| L1, L2 | INDUCTOR, 5TURNS AIR WOUND #22AWG, ID=0.059[1.49], NYLON COATED MAGNET WIRE |

TEST CIRCUIT

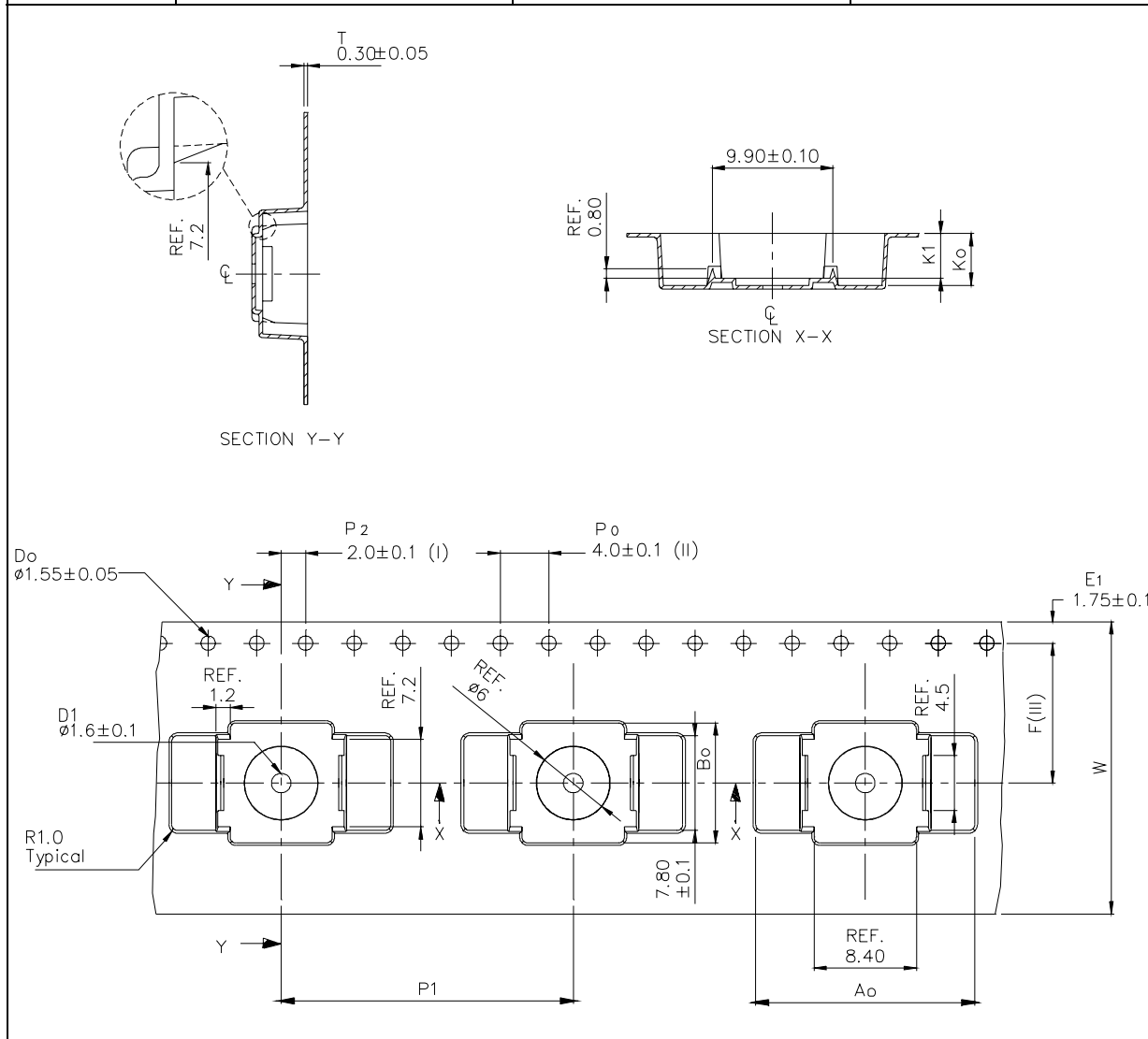


TEST CIRCUIT PHOTOMASTER



TAPE & REEL DIMENSIONS

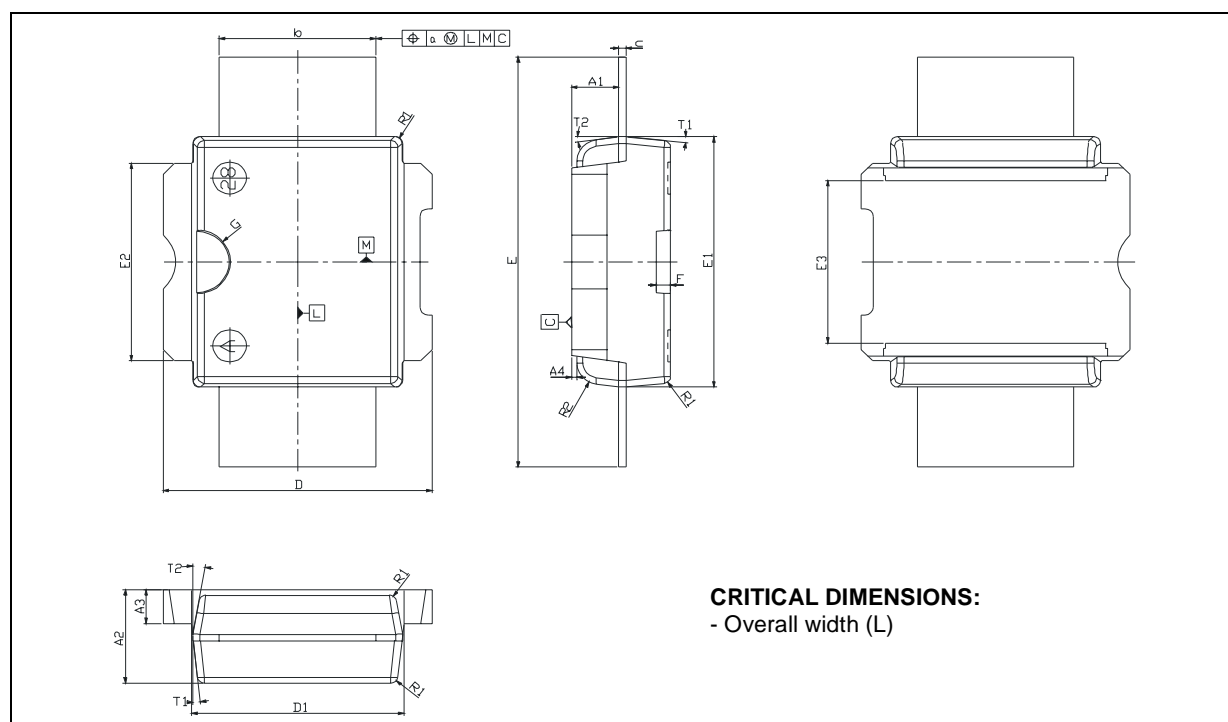
| | mm | | |
|----|------|------|------|
| | MIN. | TYP. | MAX |
| Ao | 17.9 | 18.0 | 18.1 |
| Bo | 9.7 | 9.8 | 9.9 |
| Ko | 4.15 | 4.25 | 4.35 |
| K1 | 3.6 | 3.7 | 3.8 |
| F | 11.4 | 11.5 | 11.6 |
| P1 | 23.9 | 24.0 | 24.1 |
| W | 23.7 | 24.0 | 24.3 |



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



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