ERICSSON

# PTF 10049
# 85 Watts, 470–860 MHz
# LDMOS Field Effect Transistor

## Description

The 10049 is an internally matched, common source, n-channel enhancement-mode lateral MOSFET intended for large signal amplifier applications in the 470 to 860 MHz band. It is rated at 85 watts minimum output power. Nitride surface passivation and gold metallization ensure excellent device lifetime and reliability. 100% lot traceability is standard.

- ***INTERNALLY MATCHED*** for ease of circuit design
- Performance at 800 MHz, 32 Volts
  - Output Power = 85 Watts
  - Power Gain = 13.5 dB Typ
  - Efficiency = 58% Typ
- Gold Metallization
- Silicon Nitride Passivated
- Excellent Thermal Stability

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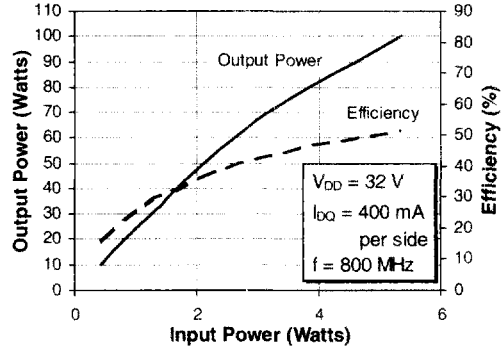
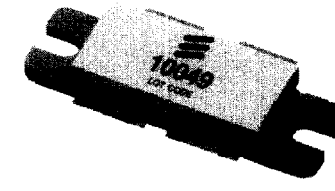
**Typical Output Power and Efficiency vs. Input Power**




Package 20240

## Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 65 | Vdc |
| Gate-Source Voltage | $V_{GS}$ | ±20 | Vdc |
| Operating Junction Temperature | $T_J$ | 200 | °C |
| Total Device Dissipation at $T_{flange}$ = 25°C<br>Above 25°C derate by | $P_D$ | 225<br>2.0 | Watts<br>W/°C |
| Storage Temperature Range | $T_{STG}$ | –40 to +150 | °C |
| Thermal Resistance ($T_{flange}$ = 70°C) | $R_{\theta JC}$ | 0.5 | °C/W |

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## Electrical Characteristics (100% Tested)

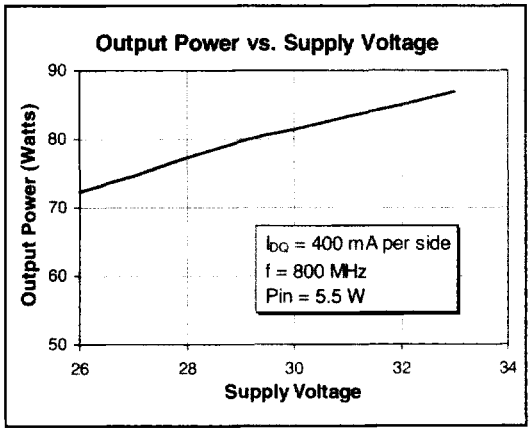
| Characteristic | Conditions | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 25 mA | $V_{(BR)DSS}$ | 65 | — | — | Volts |
| Drain-Source Leakage Current | $V_{DS}$ = 32 V, $V_{GS}$ = 0 V | $I_{DSS}$ | — | — | 1.0 | mA |
| Gate Threshold Voltage | $V_{DS}$ = 10 V, $I_D$ = 75 mA | $V_{GS(th)}$ | — | 2.0 | — | Volts |
| Forward Transconductance | $V_{DS}$ = 10 V, $I_D$ = 3 A | $g_{fs}$ | — | 2.8 | — | Siemens |

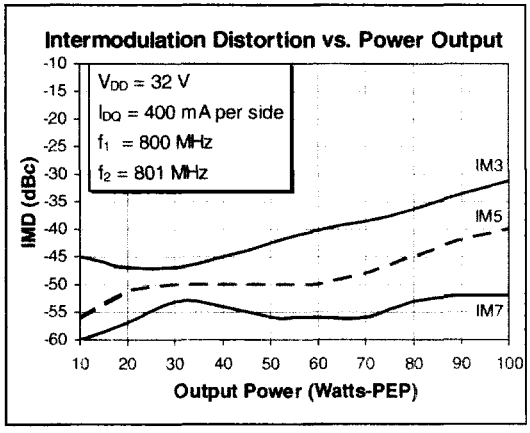


## RF Specifications (100% Tested)

| Characteristic | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| **Common Source Power Gain** ($V_{DD}$ = 32 V, $P_{out}$ = 30 W, $I_{DQ}$ = 400 mA per side, f = 800 MHz) | $G_{ps}$ | 12.0 | 13.5 | — | dB |
| **Drain Efficiency** ($V_{DD}$ = 32 V, $P_{out}$ = 85 W, $I_{DQ}$ = 400 mA per side, f = 800 MHz) | $\eta_D$ | 52 | 58 | — | % |
| **Distortion** ($V_{DD}$ = 32 V, $P_{out}$ = 85 W(PEP), $I_{DQ}$ = 400 mA per side, $f_1$ = 800 MHz, $f_2$ = 801 MHz) | $IMD_3$ | –30 | –35 | — | dBc |
| **Load Mismatch Tolerance** ($V_{DD}$ = 32 V, $P_{out}$ = 42.5 W, $I_{DQ}$ = 400 mA per side, f = 800 MHz —all phase angles at frequency of test) | $\Psi$ | — | — | 5:1 | — |

## Typical Performance

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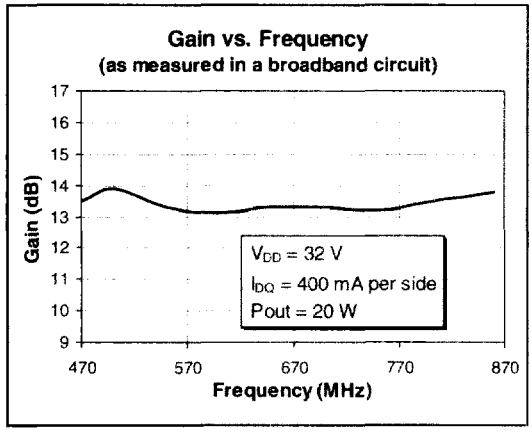


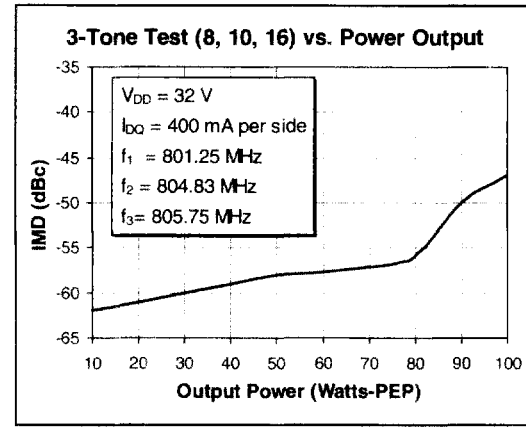


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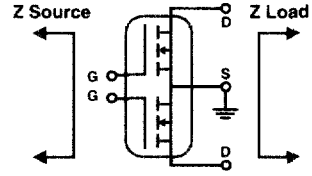
## Impedance Data (shown for fixed-tuned broadband circuit)

$V_{DD}$ = 32 V, $P_{out}$ = 85 W, $I_{DQ}$ = 400 mA per side, f = 800 MHz




| Frequency | Z Source | | Z Load | |
|---|---|---|---|---|
| MHz | R | jX | R | jX |
| 470 | 2.41 | −4.23 | 8.02 | −0.15 |
| 500 | 3.08 | −5.08 | 6.70 | −0.84 |
| 550 | 3.88 | −5.08 | 8.42 | +1.68 |
| 600 | 5.16 | −6.82 | 7.77 | +1.29 |
| 650 | 6.38 | −9.00 | 7.83 | +0.48 |
| 700 | 9.85 | −12.17 | 4.82 | +0.53 |
| 750 | 13.00 | −7.00 | 4.48 | −0.60 |
| 800 | 12.87 | +0.00 | 3.97 | −1.79 |
| 860 | 9.33 | +5.13 | 2.75 | −3.00 |

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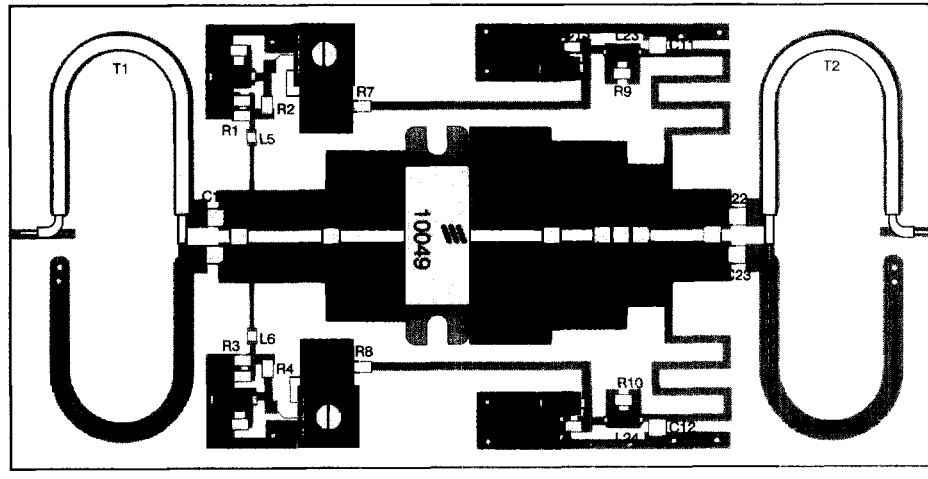
## Typical Scattering Parameters (one side)

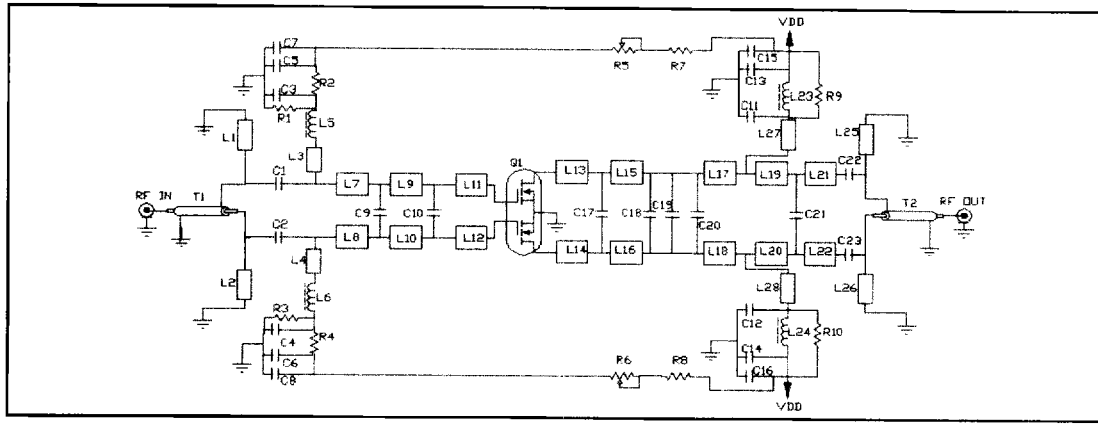
($V_{DS}$ = 32 V, $I_{DQ}$ = 2 A)

| f | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| (MHz) | Mag | Ang | Mag | Ang | Mag | Ang | Mag | Ang |
| 400 | 0.94 | 176 | 2.04 | 9 | 0.004 | –57 | 0.90 | –163 |
| 425 | 0.94 | 175 | 1.94 | 6 | 0.004 | –55 | 0.90 | –164 |
| 450 | 0.94 | 174 | 1.86 | 3 | 0.004 | –57 | 0.91 | –165 |
| 475 | 0.94 | 173 | 1.81 | 0 | 0.003 | –59 | 0.92 | –167 |
| 500 | 0.93 | 172 | 1.78 | –2 | 0.003 | –59 | 0.92 | –168 |
| 525 | 0.92 | 171 | 1.78 | –6 | 0.003 | –54 | 0.93 | –169 |
| 550 | 0.91 | 169 | 1.80 | –10 | 0.003 | –51 | 0.93 | –170 |
| 575 | 0.90 | 168 | 1.84 | –14 | 0.003 | –49 | 0.94 | –171 |
| 600 | 0.86 | 166 | 1.92 | –19 | 0.002 | –54 | 0.94 | –172 |
| 625 | 0.85 | 164 | 2.04 | –25 | 0.003 | –42 | 0.94 | –173 |
| 650 | 0.80 | 162 | 2.20 | –32 | 0.003 | –43 | 0.94 | –174 |
| 675 | 0.73 | 160 | 2.42 | –44 | 0.003 | –45 | 0.95 | –176 |
| 700 | 0.63 | 161 | 2.64 | –57 | 0.003 | –63 | 0.96 | –177 |
| 725 | 0.54 | 170 | 2.76 | –75 | 0.003 | –65 | 0.96 | –178 |
| 750 | 0.55 | –174 | 2.60 | –98 | 0.003 | –69 | 0.96 | –179 |
| 775 | 0.67 | –167 | 2.20 | –117 | 0.002 | –101 | 0.96 | 180 |
| 800 | 0.78 | –168 | 1.77 | –132 | 0.001 | –110 | 0.96 | 179 |
| 825 | 0.86 | –171 | 1.35 | –144 | 0.001 | –142 | 0.96 | 178 |
| 850 | 0.90 | –174 | 1.06 | –152 | 0.001 | –137 | 0.96 | 177 |
| 875 | 0.93 | –177 | 0.86 | –157 | 0.001 | 145 | 0.96 | 176 |
| 900 | 0.95 | –179 | 0.69 | –163 | 0.001 | 108 | 0.96 | 175 |
| 925 | 0.96 | 179 | 0.58 | –166 | 0.001 | 128 | 0.96 | 175 |
| 950 | 0.97 | 178 | 0.49 | –169 | 0.001 | 99 | 0.96 | 174 |
| 975 | 0.97 | 177 | 0.41 | –172 | 0.001 | 90 | 0.96 | 173 |
| 1000 | 0.97 | 176 | 0.36 | –175 | 0.002 | 84 | 0.97 | 172 |

## Test Circuit

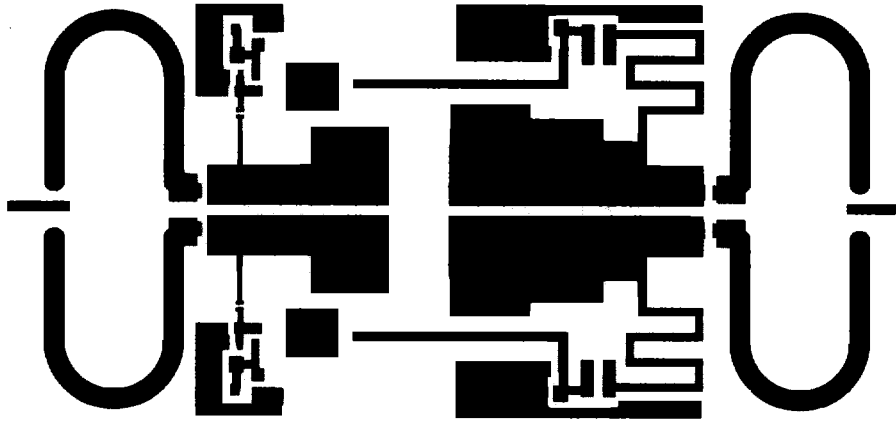



*Placement Diagram*




*Block diagram for f = 470–806 MHz broadband circuit*

| | | |
|---|---|---|
| Q1 | 10049 | |
| L1, L2, L25, L26 | 0.25 λ 680 MHz | Microstrip 25 Ω |
| L3, L4 | 0.065 λ 800 MHz | Microstrip 70 Ω |
| L5, L6 | 10 nH | SMT Coil |
| L7, L8 | 0.010 λ 800 MHz | Microstrip 18.5 Ω |
| L9, L10 | 0.07 λ 800 MHz | Microstrip 18.5 Ω |
| L11, L12 | 0.060 λ 800 MHz | Microstrip 10.2 Ω |
| L13, L14 | 0.0525 λ 800 MHz | Microstrip 8.1 Ω |
| L15, L16 | 0.061 λ 800 MHz | Microstrip 9.3 Ω |
| L17, L18 | 0.032 λ 800 MHz | Microstrip 12.13 Ω |
| L19, L20 | 0.021 λ 800 MHz | Microstrip 22.6 Ω |
| L21, L22 | 0.01 λ 800 MHz | Microstrip 22.6 Ω |
| L23, L24 | 4x8 mm | Ferrite Bead |
| L27, L28 | 0.25 λ 680 MHz | Microstrip 60 Ω |
| C1, C2, C22, C23 | 51 pF | Chip Cap ATC 100 B |
| C3, C4, C11, C12 | 91 pF | Chip Cap ATC 100 B |
| C5, C6, C13, C14 | 0.1 µF | SMT K1206 |
| C7, C8, C15, C16 | 10 µF | Electrolytic Capacitor |
| C9, C17 | 5.6 pF | Chip Cap ATC 100 B |
| C18 | 1.3 pF | Chip Cap ATC 100 B |
| C19, C20 | 1.7 pF | Chip Cap ATC 100 B |
| C10, C21 | 7.5 pF | Chip Cap ATC 100 B |
| R1, R3 | 200 Ω | K 1206 SMT Resistor |
| R2, R4 | 200 Ω | K 1206 SMT Resistor |
| R5, R6 | 1K Ω Pot | |
| R7, R8 | 500 Ω | 1/4 W Resistor |
| R9, R10 | 1.8 Ω | 1/4 W Resistor |
| T1, T2 | UT-85-25 Balun | Coaxial |
| Circuit Board | .031" Thick G200, $\varepsilon_r$ = 4.0, 2 oz. Copper, AlliedSignal | |



*Artwork (1 inch ——— )*