

- ◆ Common Source Push-Pull Pair
- ◆ N-Channel Enhancement Mode
- ◆ Low Q_g and R_g
- ◆ High dv/dt
- ◆ Nanosecond Switching

The DE275X2-501N16A is a matched pair of RF power MOSFET devices in a common source configuration. The device is optimized for push-pull or parallel operation in RF generators and amplifiers at frequencies to >65 MHz.

Unless noted, specifications are for each output device

| Symbol | Test Conditions | Maximum Ratings | |
|-------------------|--|-----------------|------------------|
| V_{DSS} | $T_J = 25^\circ\text{C}$ to 150°C | 500 | V |
| V_{DGR} | $T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1\text{ M}\Omega$ | 500 | V |
| V_{GS} | Continuous | ± 20 | V |
| V_{GSM} | Transient | ± 30 | V |
| I_{D25} | $T_c = 25^\circ\text{C}$ | 16 | A |
| I_{DM} | $T_c = 25^\circ\text{C}$, pulse width limited by T_{JM} | 96 | A |
| I_{AR} | $T_c = 25^\circ\text{C}$ | 16 | A |
| E_{AR} | $T_c = 25^\circ\text{C}$ | 20 | mJ |
| dv/dt | $I_S \leq I_{DM}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 0.2\Omega$ | 5 | V/ns |
| | $I_S = 0$ | >200 | V/ns |
| $P_{DHS}^{(1)}$ | $T_c = 25^\circ\text{C}$, Derate $6.0\text{W}/^\circ\text{C}$ above 25°C | 750 | W |
| $P_{DAMB}^{(1)}$ | $T_c = 25^\circ\text{C}$ | 5.0 | W |
| $R_{thJHS}^{(1)}$ | | 0.17 | K/W |
| T_J | | -55...+150 | $^\circ\text{C}$ |
| T_{JM} | | 150 | $^\circ\text{C}$ |
| T_{stg} | | -55...+150 | $^\circ\text{C}$ |
| T_L | 1.6mm (0.063 in) from case for 10 s | 300 | $^\circ\text{C}$ |
| Weight | | 4 | g |

| Symbol | Test Conditions | Characteristic Values | | |
|--------------|--|---|------|--------------------------|
| | | $T_J = 25^\circ\text{C}$ unless otherwise specified | | |
| | | min. | typ. | max. |
| V_{DSS} | $V_{GS} = 0\text{ V}$, $I_D = 3\text{ ma}$ | 500 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D = 4\text{ ma}$ | 2.5 | | 5.5 V |
| I_{GSS} | $V_{GS} = \pm 20\text{ V}_{DC}$, $V_{DS} = 0$ | | | $\pm 100\text{ nA}$ |
| I_{DSS} | $V_{DS} = 0.8 V_{DSS}$, $T_J = 25^\circ\text{C}$ $V_{GS} = 0$, $T_J = 125^\circ\text{C}$ | | | 50 μA 1 mA |
| $R_{DS(on)}$ | $V_{GS} = 15\text{ V}$, $I_D = 0.5I_{D25}$ Pulse test, $t \leq 300\mu\text{S}$, duty cycle $d \leq 2\%$ | | | 0.5 Ω |
| g_{fs} | $V_{DS} = 15\text{ V}$, $I_D = 0.5I_{D25}$, pulse test | 2 | 6 | S |

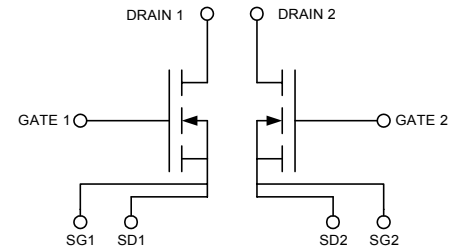
Preliminary Data Sheet

$$V_{DSS} = 500\text{ V}$$

$$I_{D25} = 16\text{ A}$$

$$R_{DS(on)} = 0.5\ \Omega$$

$$P_{DHS} = 750\text{ W}$$



Features

- Isolated Substrate
 - high isolation voltage (>2500V)
 - excellent thermal transfer
 - Increased temperature and power cycling capability
- IXYS advanced low Q_g process
- Low gate charge and capacitances
 - easier to drive
 - faster switching
- Low $R_{DS(on)}$
- Very low insertion inductance (<2nH)
- No beryllium oxide (BeO) or other hazardous materials

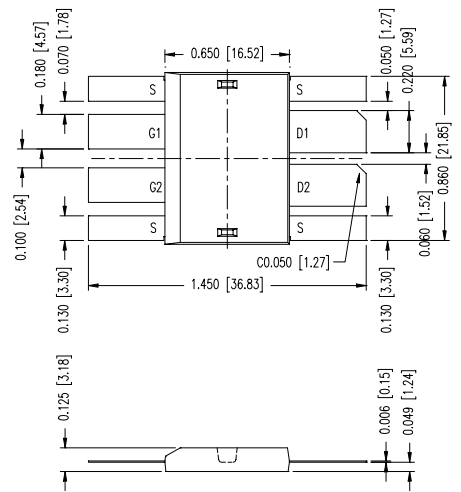
Advantages

- High Performance Push-Pull RF Package
- Optimized for RF and high speed switching at frequencies to >65MHz
- Easy to mount—no insulators needed
- High power density

Note: All specifications are per each transistor, unless otherwise noted.

(1) Thermal specifications are for the package, not per transistor

| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified) | | |
|--------------|--|---|------|----------|
| | | min. | typ. | max. |
| R_G | | | 0.3 | Ω |
| C_{iss} | | | 1800 | pF |
| C_{oss} | $V_{GS} = 0\text{ V}, V_{DS} = 0.8 V_{DSS(max)}, f = 1\text{ MHz}$ | | 150 | pF |
| C_{rss} | | | 45 | pF |
| $T_{d(on)}$ | | | 3 | ns |
| T_{on} | $V_{GS} = 15\text{ V}, V_{DS} = 0.8 V_{DSS}, I_D = 0.5 I_{DM}$ | | 2 | ns |
| $T_{d(off)}$ | $R_G = 0.2\ \Omega$ (External) | | 4 | ns |
| T_{off} | | | 5 | ns |
| $Q_{g(on)}$ | | | 50 | nC |
| Q_{gs} | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$ | | 20 | nC |
| Q_{gd} | | | 30 | nC |



Source-Drain Diode **Characteristic Values**
($T_J = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Test Conditions | min. | typ. | max. |
|----------|--|------|------|---------------|
| I_S | $V_{GS} = 0\text{ V}$ | | | 16 A |
| I_{SM} | Repetitive; pulse width limited by T_{JM} | | | 96 A |
| V_{SD} | $I_F = I_S, V_{GS} = 0\text{ V},$ Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$ | | | 1.5 V |
| T_{rr} | | | 200 | ns |
| Q_{RM} | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ | | 0.8 | μC |
| I_{RM} | | | 6.5 | A |

(1) These parameters apply to the package, not individual MOSFET devices.

For detailed device mounting and installation instructions, see the “DE-Series MOSFET Mounting Instructions” technical note on DEI’s web site at www.directedenergy.com/apptech.htm

501N16A DE-SERIES SPICE Model

The DE-SERIES SPICE Model is illustrated in Figure 1. The model is an expansion of the SPICE level 3 MOSFET model. It includes the stray inductive terms L_G , L_S and L_D . R_d is the $R_{DS(ON)}$ of the device, R_{ds} is the resistive leakage term. The output capacitance, C_{OSS} , and reverse transfer capacitance, C_{RSS} are modeled with reversed biased diodes. This provides a varactor type response necessary for a high power device model. The turn on delay and the turn off delay are adjusted via R_{on} and R_{off} .

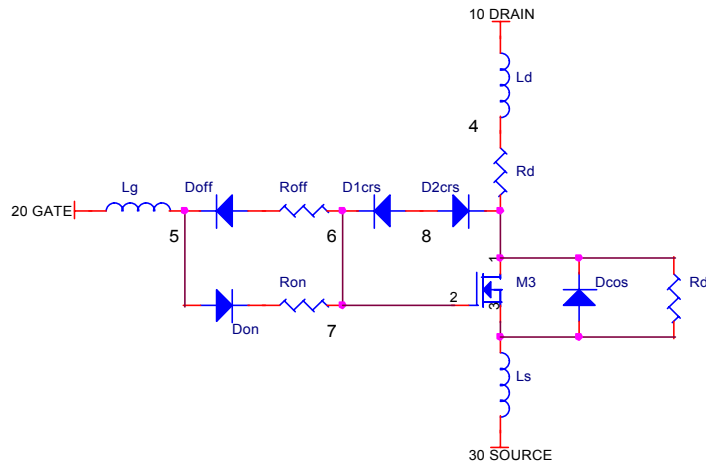


Figure 1 DE-SERIES SPICE Model

This SPICE model may be downloaded as a text file from the DEI web site at www.directedenergy.com/spice.htm

Net List:

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SYM=POWMOSN
.SUBCKT 501N16A 10 20 30
* TERMINALS: D G S
* 500 Volt 16 Amp .5 ohm N-Channel Power MOSFET
* REVA 6-15-00
M1 12 3 3 DMOS L=1U W=1U
RON 5 6 .2
DON 6 2 D1
ROF 5 7 .2
DOF 2 7 D1
D1CRS 2 8 D2
D2CRS 1 8 D2
CGS 2 3 2.0N
RD 4 1 .5
DCOS 3 1 D3
RDS 1 3 5.0MEG
LS 3 30 .5N
LD 10 4 1N
LG 20 5 1N
.MODEL DMOS NMOS (LEVEL=3 VTO=3.0 KP=5.8)
.MODEL D1 D (IS=.5F CJO=10P BV=100 M=.5 VJ=.7 TT=1N RS=10M)
.MODEL D2 D (IS=.5F CJO=450P BV=500 M=.4 VJ=.6 TT=10N RS=10M)
.MODEL D3 D (IS=.5F CJO=900P BV=500 M=.3 VJ=.3 TT=400N RS=10M)
.ENDS

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