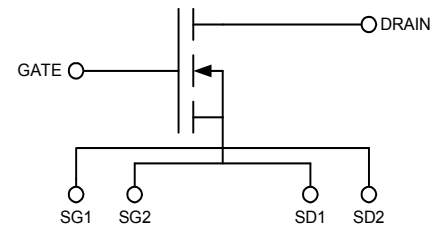


N-Channel Enhancement Mode
Low Q_g and R_g
High dv/dt
Nanosecond Switching
Ideal for Class C, D, & E Applications

$$\begin{aligned} V_{DSS} &= 500 \text{ V} \\ I_{D25} &= 16 \text{ A} \\ R_{DS(on)} &= 0.4 \Omega \\ P_{DC} &= 590 \text{ W} \end{aligned}$$



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_{DC}		590	W
P_{DHS}	$T_c = 25^\circ\text{C}$ Derate $1.9 \text{ W}/^\circ\text{C}$ above 25°C	284	W
P_{DAMB}	$T_c = 25^\circ\text{C}$	3.0	W
R_{thJC}		0.25	C/W
R_{thJHS}		0.53	C/W

Symbol	Test Conditions	Characteristic Values		
		min.	typ.	max.
T _J = 25°C unless otherwise specified				
V _{DSS}	V _{GS} = 0 V, I _D = 3 ma	500		V
V _{GS(th)}	V _{DS} = V _{GS} , I _D = 4 ma	3.5	4.0	5.5 V
I _{GSS}	V _{GS} = ±20 V _{DC} , V _{DS} = 0			±100 nA
I _{DSS}	V _{DS} = 0.8 V _{DSS} T _J = 25°C			50 μA
	V _{GS} = 0 T _J = 125°C			1 mA
R _{DS(on)}	V _{GS} = 15 V, I _D = 0.5I _{D25} Pulse test, t ≤ 300μS, duty cycle d ≤ 2%		.38	Ω
g _{fs}	V _{DS} = 20V, I _D = 0.5 I _{D25} pulse test	3	5	S
T _J		-55		+175 °C
T _{JM}			175	°C
T _{stg}		-55		+175 °C
T _L	1.6mm(0.063 in) from case for 10 s		300	°C
Weight			2	g

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

- Optimized for RF and high speed switching at frequencies to 100MHz
- Easy to mount—no insulators needed
- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified)		
		min.	typ.	max.
R_G			0.3	Ω
C_{iss}			1650	pF
C_{oss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 0.8 V_{DSS(max)}$, $f = 1\text{ MHz}$		122	pF
C_{rss}			33	pF
C_{stray}	Back Metal to any Pin		21	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			50	nC
Q_{gs}	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 V_{DSS}$ $I_D = 0.5 I_{D25}$		12	nC
Q_{gd}			24	nC

Source-Drain Diode		Characteristic Values ($T_J = 25^\circ\text{C}$ unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
I_S	$V_{GS} = 0\text{ V}$			6 A
I_{SM}	Repetitive; pulse width limited by T_{JM}			98 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}	$I_F = I_S$, $-di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$		0.6	μC
I_{RM}			4	A

For detailed device mounting and installation instructions, see the “*Device Installation & Mounting Instructions*” technical note on the IXYSRF web site at;

http://www.ixysrf.com/pdf/switch_mode/appnotes/7de_series_mosfet_installation_instructions.pdf

IXYS RF reserves the right to change limits, test conditions and dimensions.

IXYS RF MOSFETS are covered by one or more of the following U.S. patents:

4,835,592	4,860,072	4,881,106	4,891,686	4,931,844	5,017,508
5,034,796	5,049,961	5,063,307	5,187,117	5,237,481	5,486,715
5,381,025	5,640,045				

Fig. 1

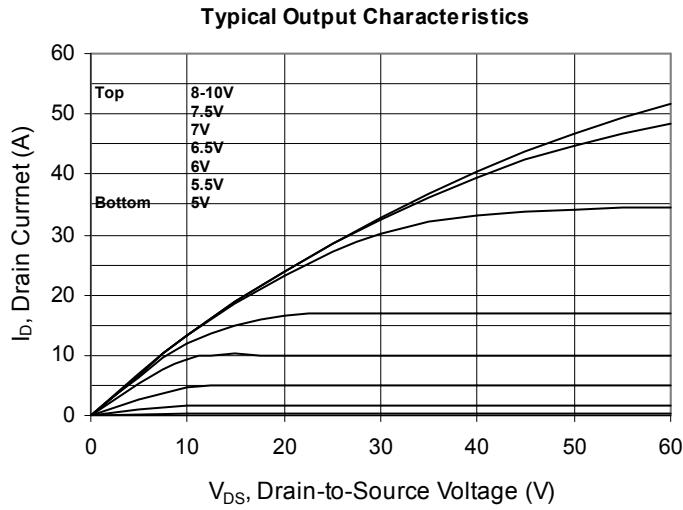


Fig. 2

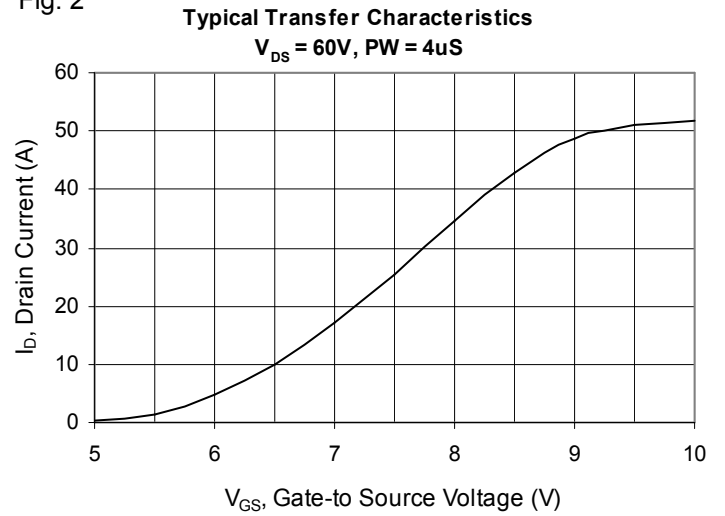


Fig. 3

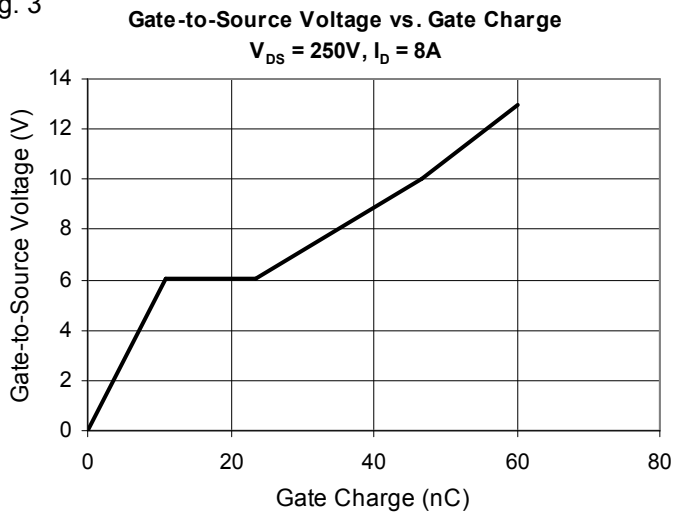
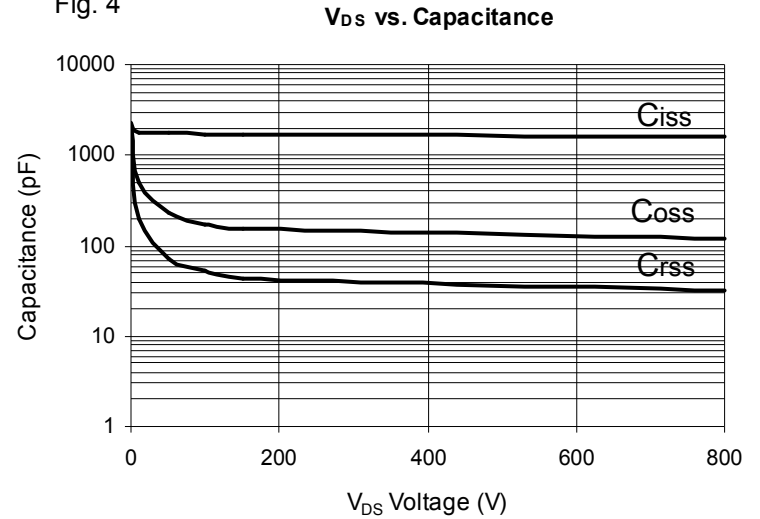


Fig. 4



The drawing shows the mechanical specifications for a 2N7000 N-channel MOSFET. The top view includes dimensions for the package width (0.650 [16.51]), length (1.450 [36.83]), and lead spacing (0.130 [3.30]). The gate, source, and drain regions are labeled. The side view shows the package height (0.130 [3.30]) and lead dimensions (0.105 [2.67] and 0.130 [3.30]). The drawing also indicates a chamfer is optional on the package body.

501N16A DE-SERIES SPICE Model

The DE-SERIES SPICE Model is illustrated in Figure 6. 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} .

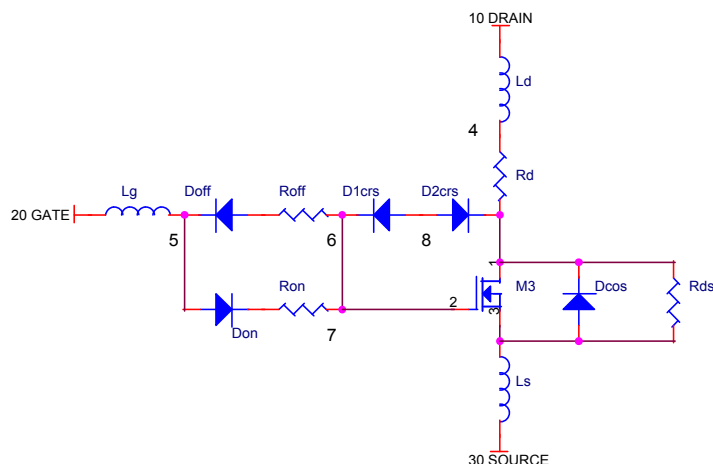


Figure 6 DE-SERIES SPICE Model

This SPICE model may be downloaded as a text file from the IXYS RF web site at
http://www.ixysrf.com/products/switch_mode.html

<http://www.ixysrf.com/spice/de275-501n16a.html>

Net List:

SYM=POWMOSN

.SUBCKT 501N16A 10 20 30

* TERMINALS: D G S

* 500 Volt 16 Amp .38 ohm N-Channel Power MOSFET

* REVA 6-15-00

M1 1 2 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 .38

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

Doc #9200-0222 Rev 5
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