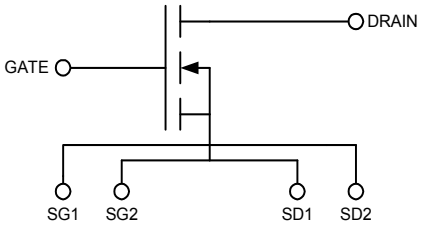
DE275-501N16A
RF Power MOSFET

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

V_{DSS}	=	500 V
I_{D25}	=	16 A
$R_{DS(on)}$	=	0.4 Ω
P_{DC}	=	590 W

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	500	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	500	V
V_{GS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_c = 25°C	16	A
I_{DM}	T_c = 25°C, pulse width limited by T_{JM}	96	A
I_{AR}	T_c = 25°C	16	A
E_{AR}	T_c = 25°C	20	mJ
dv/dt	$I_S \le I_{DM}$, di/dt ≤~ 100A/μs, $V_{DD} \le V_{DSS}$, $T_j \le 150°C$, R_G = 0.2Ω	5	V/ns
	I_S = 0	>200	V/ns
P_{DC}		590	W
P_{DHS}	T_c = 25°C Derate 1.9W/°C above 25°C	284	W
P_{DAMB}	T_c = 25°C	3.0	W
R_{thJC}		0.25	C/W
R_{thJHS}		0.53	C/W

Symbol	Test Conditions	Characteristic Values			
T_J = 25°C unless otherwise specified		min.	typ.	max.	
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 V_{GS} = 0 T_J = 125°C			50 1	μA mA
$R_{DS(on)}$	V_{GS} = 15 V, $I_D = 0.5 I_{D25}$ 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	8	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°C unless otherwise specified) min.	typ.	max.	
R_G			0.3		Ω
C_{iss}			1650		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 0.8 $V_{DSS(max)}$, f = 1 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 V, V_{DS} = 0.8 V_{DSS}		2		ns
$T_{d(off)}$	I_D = 0.5 I_{DM} R_G = 0.2 Ω (External)		4		ns
T_{off}			5		ns
Q_g			50		nC
Q_{gs}	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS} I_D = 0.5 I_{D25}		12		nC
Q_{gd}			24		nC

Source-Drain Diode

Symbol	Test Conditions	Characteristic Values (T_J = 25°C unless otherwise specified) min.	typ.	max.	
I_S	V_{GS} = 0 V			6	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			98	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2%			1.5	V
T_{rr}			200		ns
Q_{RM}	I_F = I_S, -di/dt = 100A/μs, V_R = 100V		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

Fig. 1

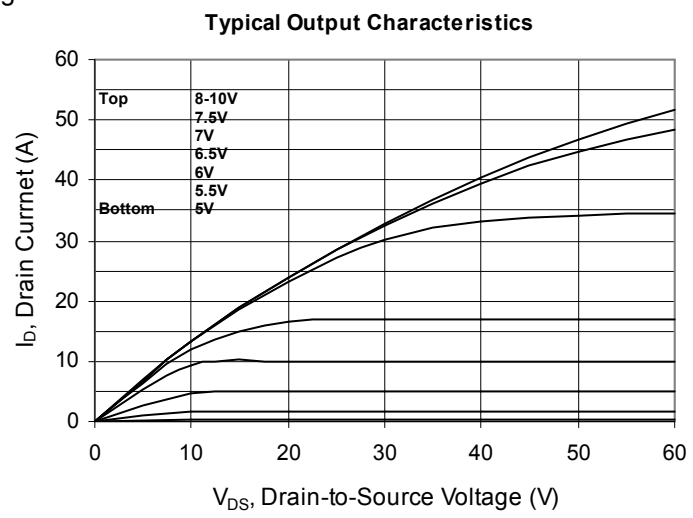


Fig. 2

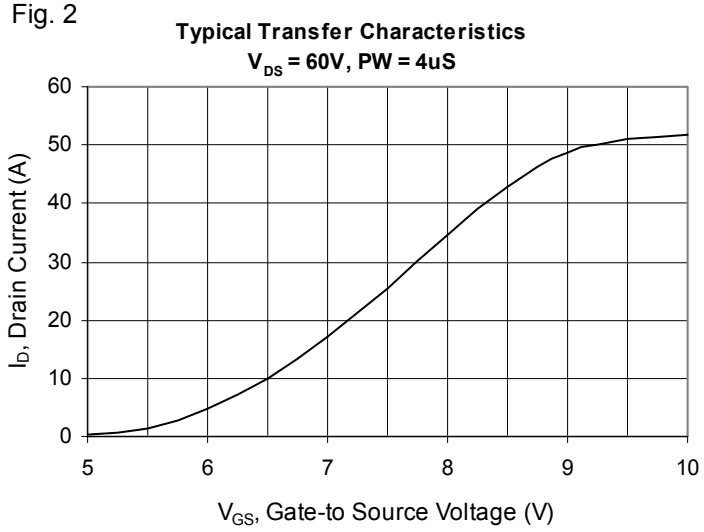


Fig. 3

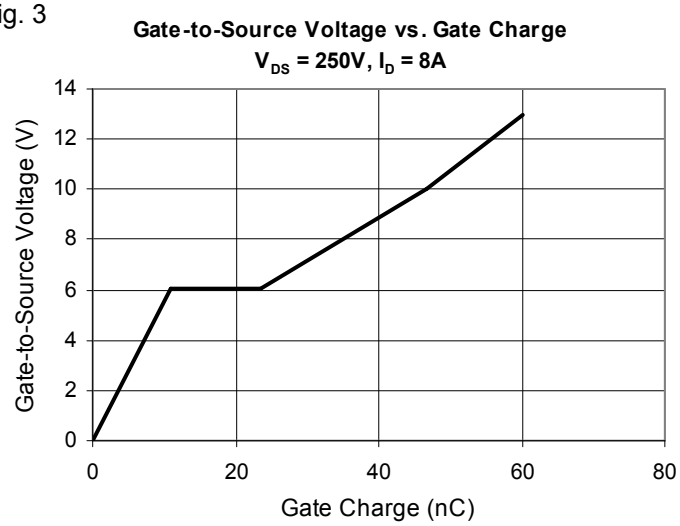


Fig. 4

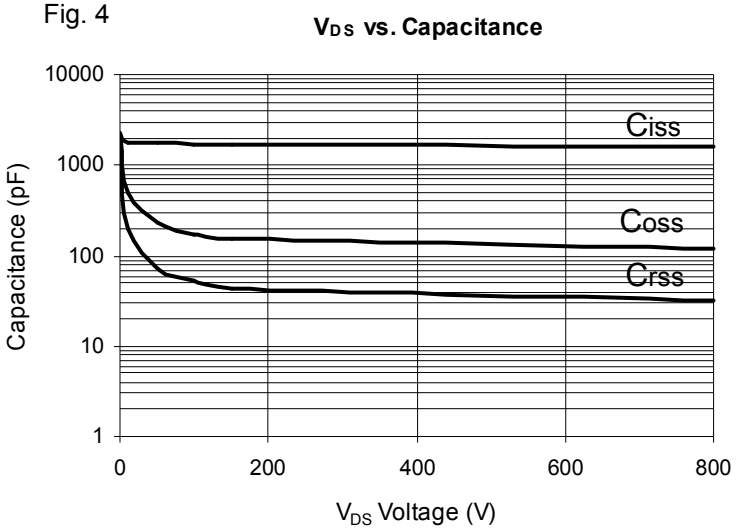
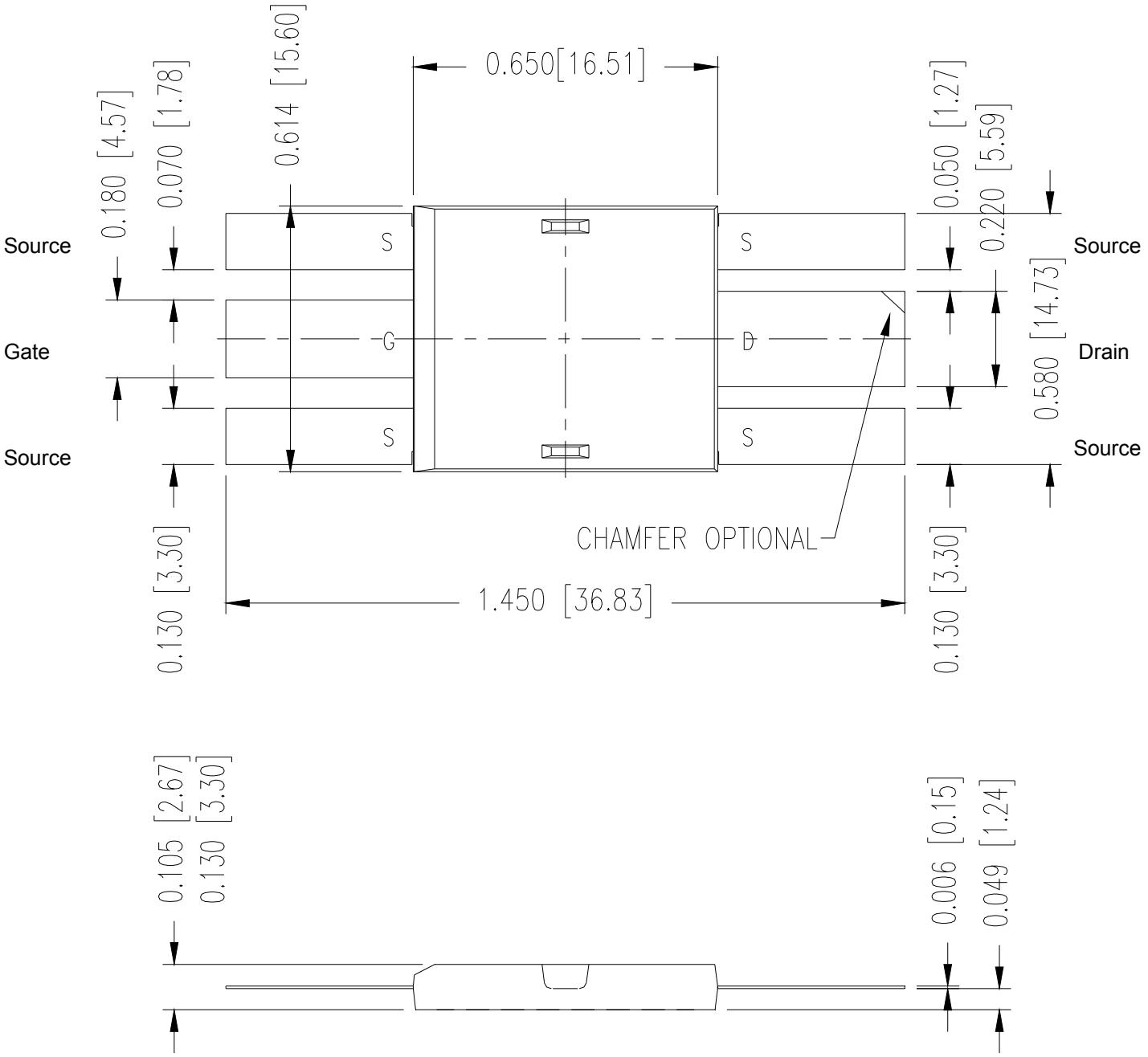


Fig. 5 Package Drawing



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. Rd is the $R_{DS(ON)}$ of the device, Rds 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 Ron and Roff.

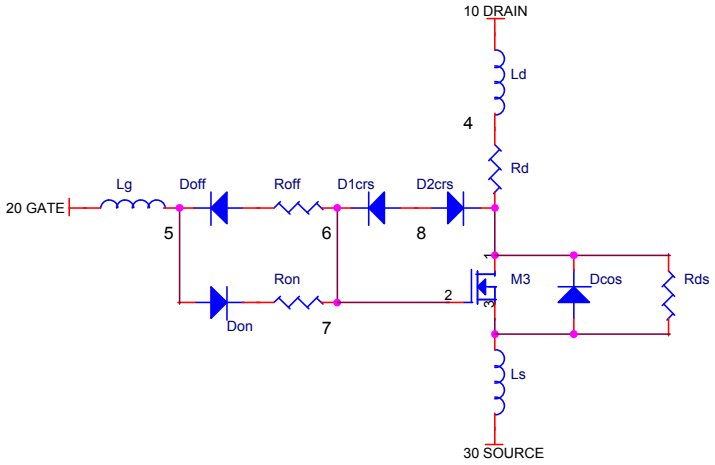


Figure 6 DE-SERIES SPICE Model

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

An IXYS Company
2401 Research Blvd., Suite 108
Fort Collins, CO USA 80526
970-493-1901 Fax: 970-493-1903
Email: sales@ixyscolorado.com
Web: http://www.ixyscolorado.com