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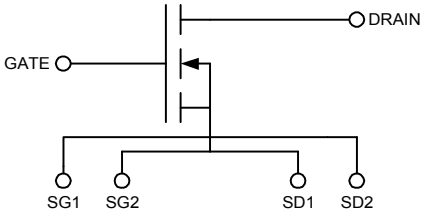
DE150-201N09A
RF Power MOSFET

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

V_{DSS} = 200 V
I_{D25} = 15 A
$R_{DS(on)}$ ≤ 0.2 Ω
P_{DC} = 200 W



Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	200	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	200	V
V_{GS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_c = 25°C	15.0	A
I_{DM}	T_c = 25°C, pulse width limited by T_{JM}	90	A
I_{AR}	T_c = 25°C	9.0	A
E_{AR}	T_c = 25°C	7.5	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}		200	W
P_{DHS}	T_c = 25°C Derate 4.4W/°C above 25°C	80	W
P_{DAMB}	T_c = 25°C	3.5	W
R_{thJC}		0.74	C/W
R_{thJHS}		1.15	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	200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 μa	2	3	4	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			25 250	μA μA
$R_{DS(on)}$	V_{GS} = 15 V, $I_D = 0.5I_{D25}$ Pulse test, t ≤ 300μS, duty cycle d ≤ 2%			0.2	Ω
g_{fs}	V_{DS} = 40 V, $I_D = 0.5I_{D25}$, pulse test	3.0	4.5		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 (T_J = 25°C unless otherwise specified)	Characteristic Values min.	typ.	max.	
R_G				5	Ω
C_{iss}			650		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 0.8 $V_{DSS(max)}$, f = 1 MHz		130		pF
C_{rss}			15		pF
C_{stray}	Back Metal to any Pin		16		pF
$T_{d(on)}$			4		ns
T_{on}	V_{GS} = 15 V, V_{DS} = 0.8 V_{DSS}		4		ns
$T_{d(off)}$	I_D = 0.5 I_{DM} R_G = 0.2 Ω (External)		4		ns
T_{off}			4		ns
$Q_{g(on)}$			28		nC
Q_{gs}	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS} I_D = 0.5 I_{D25} , Ig = 3 ma		3.5		nC
Q_{gd}			14.5		nC

Source-Drain Diode

Characteristic Values
(T_J = 25°C unless otherwise specified)

Symbol	Test Conditions	min.	typ.	max.	
I_S	V_{GS} = 0 V			9.0	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			90	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2%			1.4	V
T_{rr}			450		ns

CAUTION: Operation at or above the Maximum Ratings values may impact device reliability or cause permanent damage to the device.

Information in this document is believed to be accurate and reliable. IXYSRF reserves the right to make changes to information published in this document at any time and without notice.

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

Typical Transfer Characteristics

V_{DS} = 40V PW = 20µS

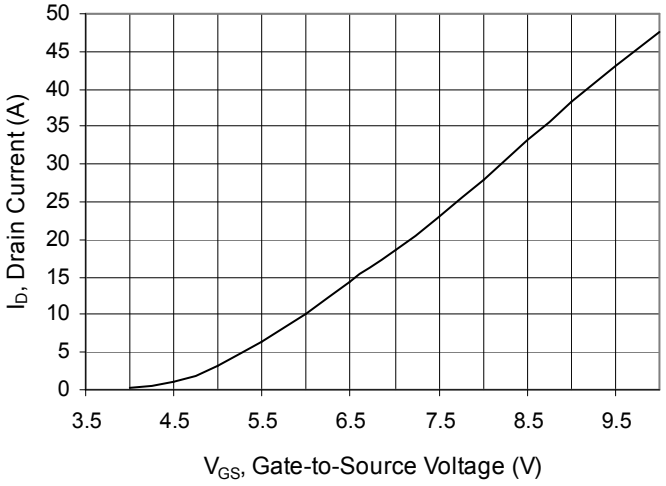


Fig. 2

Typical Output Characteristics

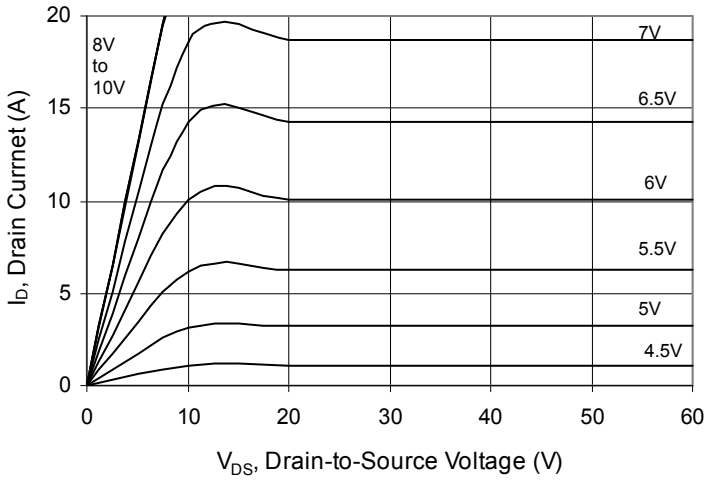


Fig. 3

Gate Charge vs. Gate-to-Source Voltage

V_{DS} = 100V I_D = 7.5A

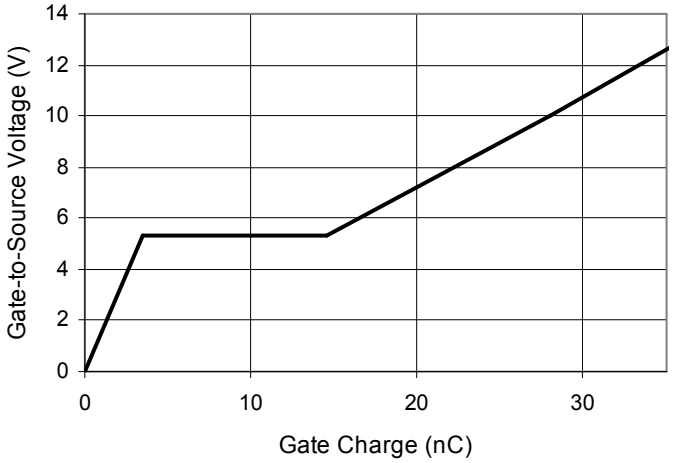


Fig. 4

Extended Typical Output Characteristics

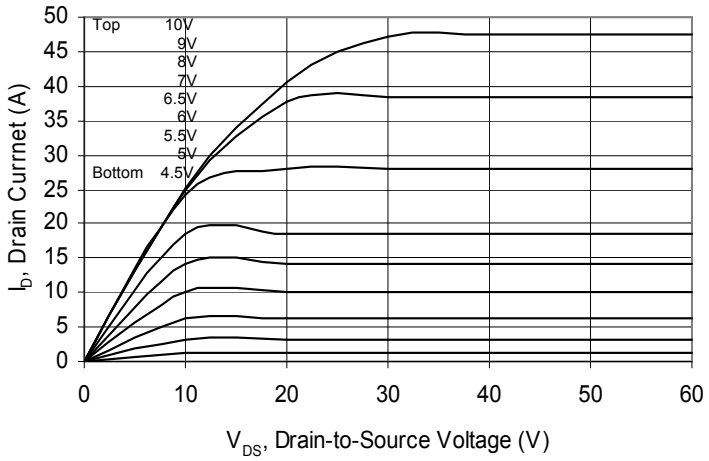


Fig. 5

V_{DS} vs. Capacitance

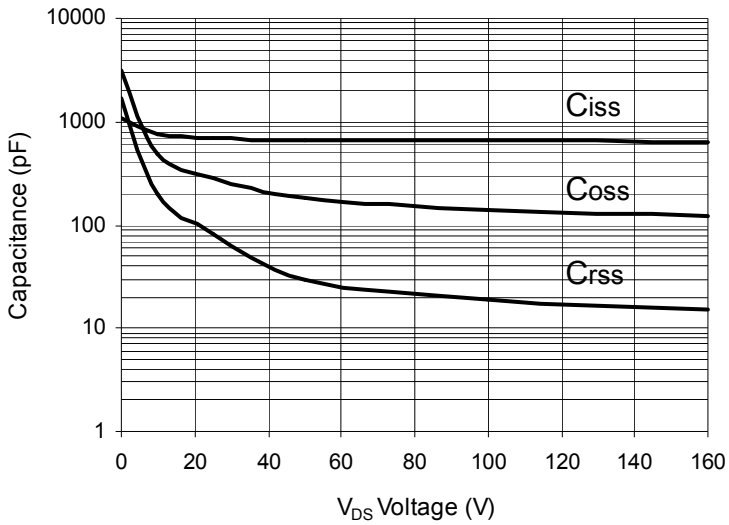
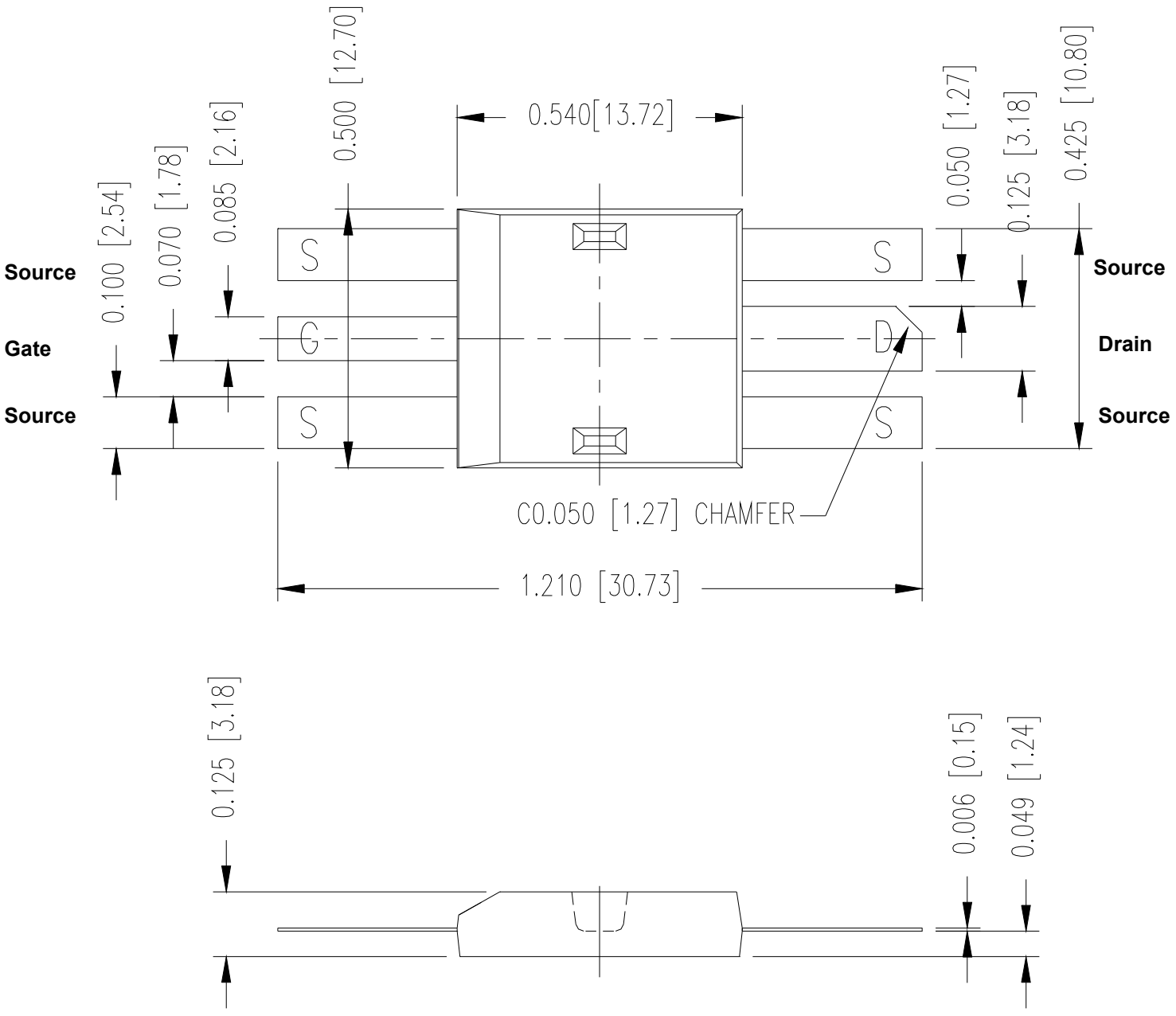


Fig. 6 Package drawing



201N09A DE-SERIES SPICE Model

The DE-SERIES SPICE Model is illustrated in Figure 7. 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.

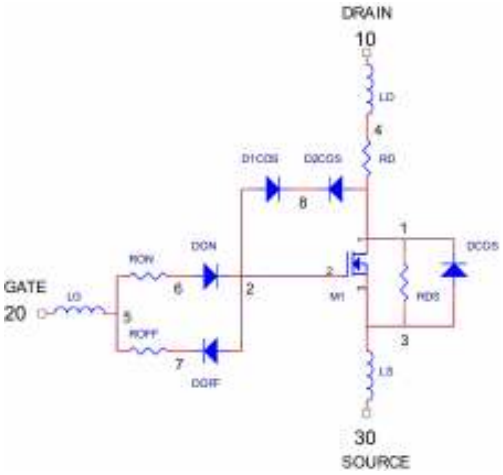


Figure 7 DE-SERIES SPICE Model

This SPICE model may be downloaded as a text file from the IXYSRF web site at

http://www.ixysrf.com/products/switch_mode.html

http://www.ixysrf.com/spice/de150-201n09a.html

Net List:

```
*SYM=POWMOSN
.SUBCKT 201N09  10 20 30
*     TERMINALS:  D  G  S
*  200 Volt  15 Amp  .2 ohm  N-Channel Power MOSFET  10-30-2001
M1   1 2  3  3  DMOS  L=1U W=1U
RON  5 6 1.5
DON  6 2  D1
ROF  5 7 .2
DOF  2 7  D1
D1CRS 2 8 D2
D2CRS 1 8 D2
CGS  2 3  .6N
RD   4 1  .2
DCOS 3 1 D3
RDS  1  3  5.0MEG
LS  3 30 .1N
LD  10 4  1N
LG  20 5  1N
.MODEL DMOS NMOS (LEVEL=3 VTO=3.0 KP=2.7)
.MODEL D1 D (IS=.5F CJO=1P BV=100 M=.5 VJ=.6 TT=1N)
.MODEL D2 D (IS=.5F CJO=1100P BV=200 M=.5 VJ=.6 TT=1N RS=10M)
.MODEL D3 D (IS=.5F CJO=300P BV=200 M=.3 VJ=.4 TT=400N RS=10M)
.ENDS
```

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