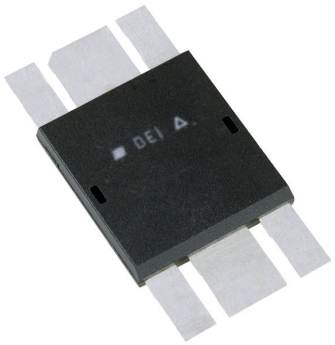
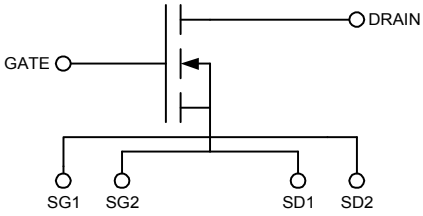
DE375-102N15A
RF Power MOSFET

N-Channel Enhancement Mode
Low Q_g and R_g
High dv/dt
Nanosecond Switching
50MHz Maximum Frequency

V_{DSS} = 1000 V
I_{D25} = 15 A
$R_{DS(on)}$ ≤ 1.0 Ω
P_{DC} = 940 W





Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	1000	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	1000	V
V_{GS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_c = 25°C	15	A
I_{DM}	T_c = 25°C, pulse width limited by T_{JM}	90	A
I_{AR}	T_c = 25°C	15	A
E_{AR}	T_c = 25°C	1	J
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}		940	W
P_{DHS}	T_c = 25°C Derate 3.7W/°C above 25°C	425	W
P_{DAMB}	T_c = 25°C	4.5	W

Symbol	Test Conditions T_J = 25°C unless otherwise specified	Characteristic Values min.	typ.	max.	
V_{DSS}	V_{GS} = 0 V, I_D = 3 ma	1000			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1 ma	4.0	5.4	6.0	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, $I_D = 0.5I_{D25}$ Pulse test, t ≤ 300μS, duty cycle d ≤ 2%			1.00	Ω
R_{thJC} R_{thJHS}			0.3	0.13	°C/W °C/W
g_{fs}	V_{DS} = 15 V, $I_D = 0.5I_{D25}$, pulse test		11.3	13.0	S
T_J		-55		+150	°C
T_{JM}			150		°C
T_{stg}		-55		+150	°C
T_L	1.6mm (0.063 in) from case for 10 s		300		°C
Weight			3		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 50MHz
- 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			0.2		Ω
C_{iss}			3000		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 0.8 $V_{DSS(max)}$, f = 1 MHz		93		pF
C_{rss}			9		pF
C_{stray}	Back Metal to any Pin		33		pF
$T_{d(on)}$			5		ns
T_{on}	V_{GS} = 15 V, V_{DS} = 0.8 V_{DSS}		3		ns
$T_{d(off)}$	I_D = 0.5 I_{DM} R_G = 0.2 Ω (External)		5		ns
T_{off}			8		ns
$Q_{g(on)}$			57		nC
Q_{gs}	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS} I_D = 0.5 I_{D25}		24		nC
Q_{gd}			22		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			15	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			72	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2%			1.4	V
T_{rr}				250	ns
Q_{RM}	I_F = I_S, -di/dt = 100A/μs, V_R = 100V		0.66		μC
I_{RM}			7.6		A

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

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

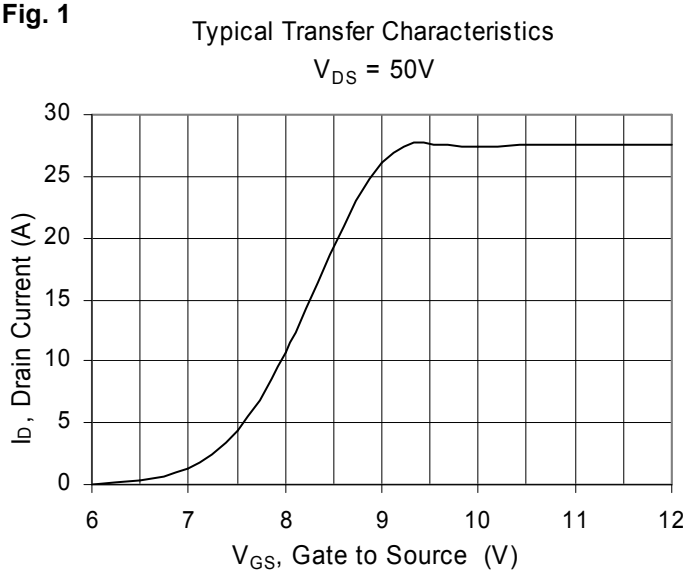


Fig. 2

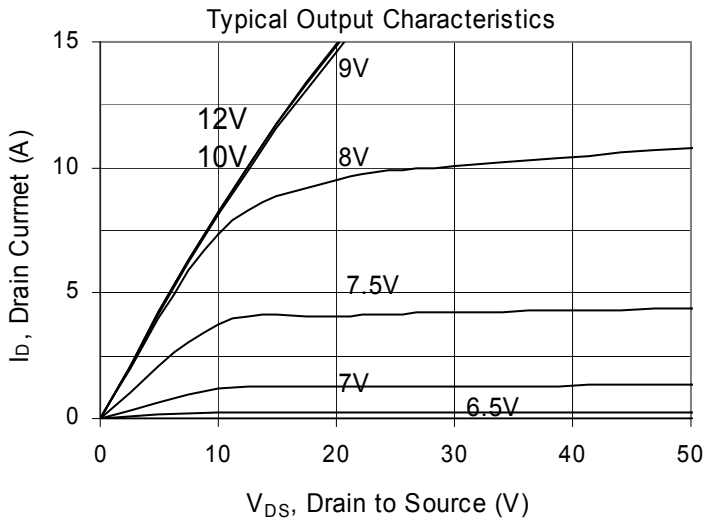


Fig. 3

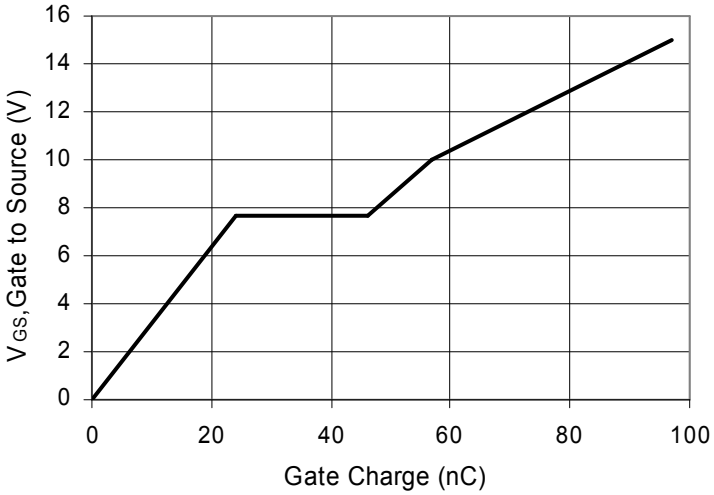


Fig. 4

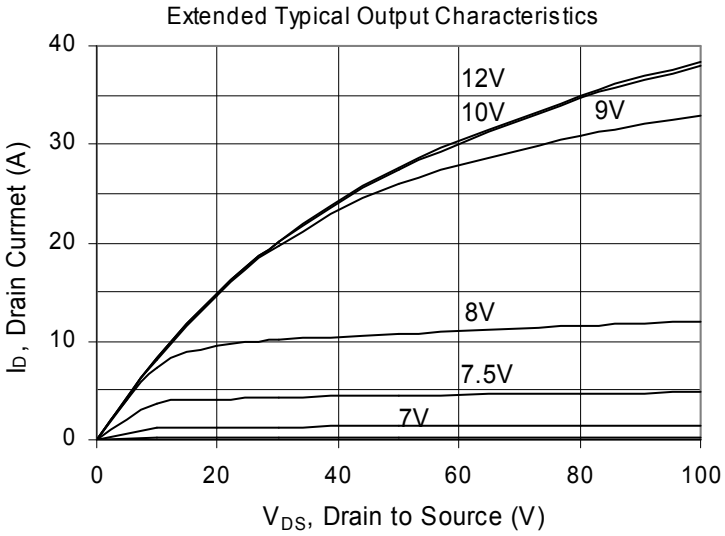


Fig. 5

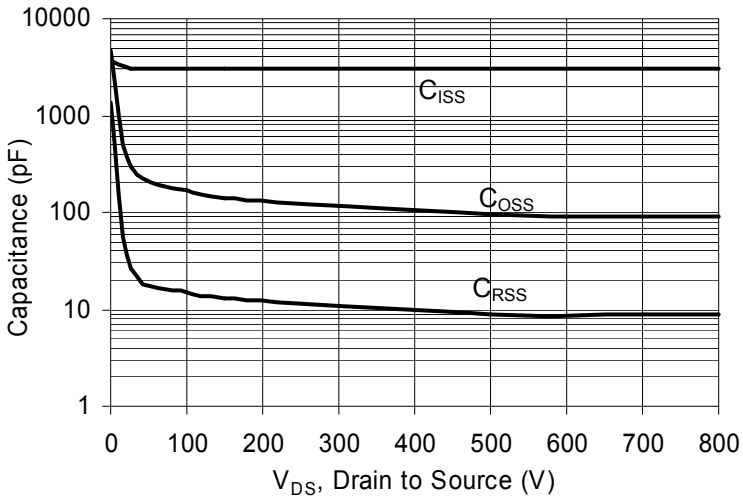


Fig. 6

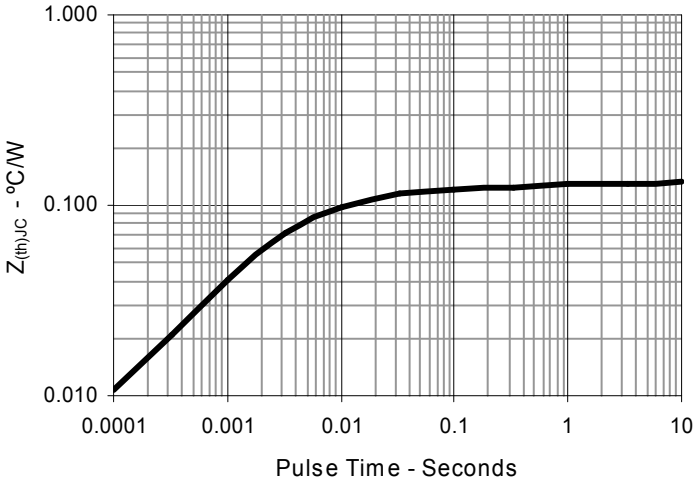


Fig. 7

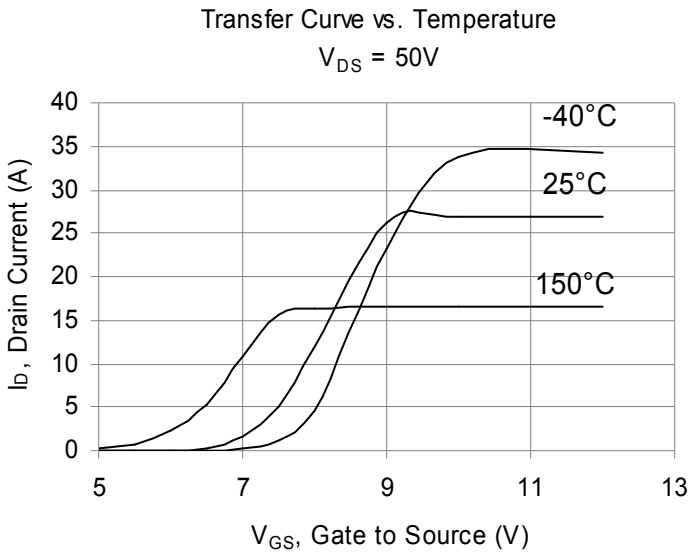


Fig. 8

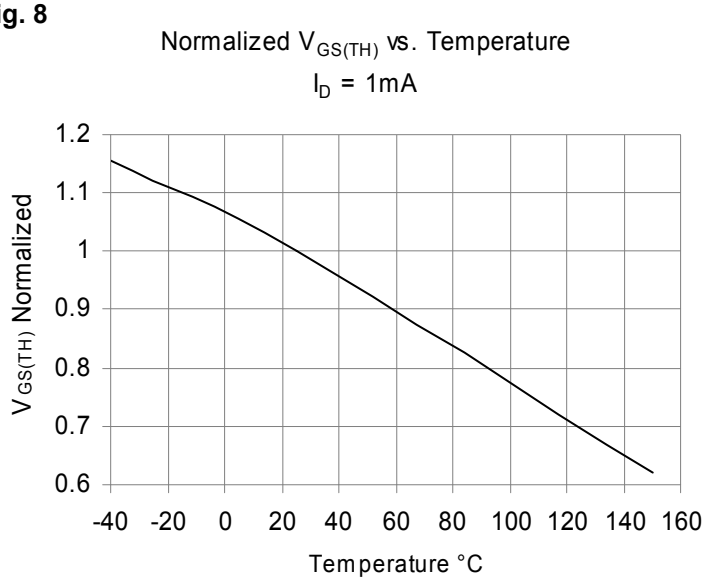


Fig. 9

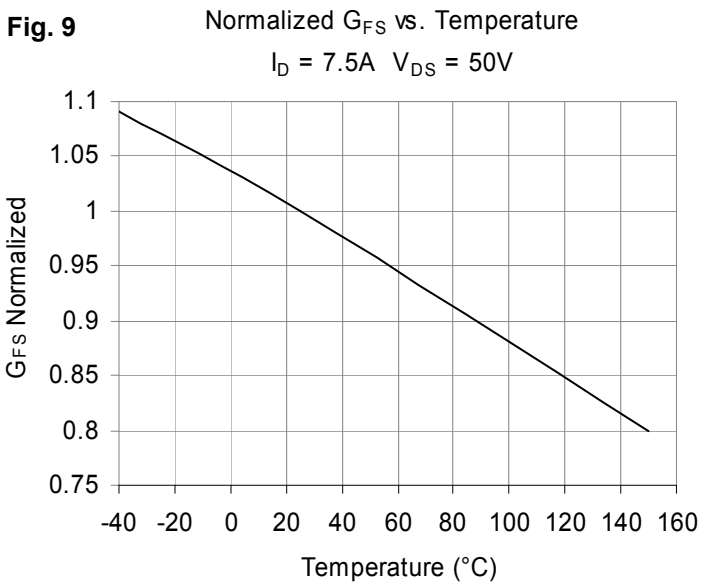


Fig. 10

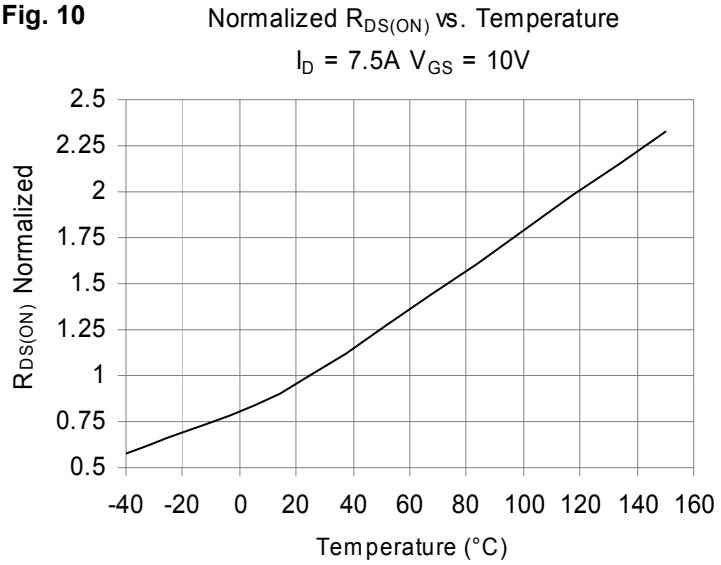
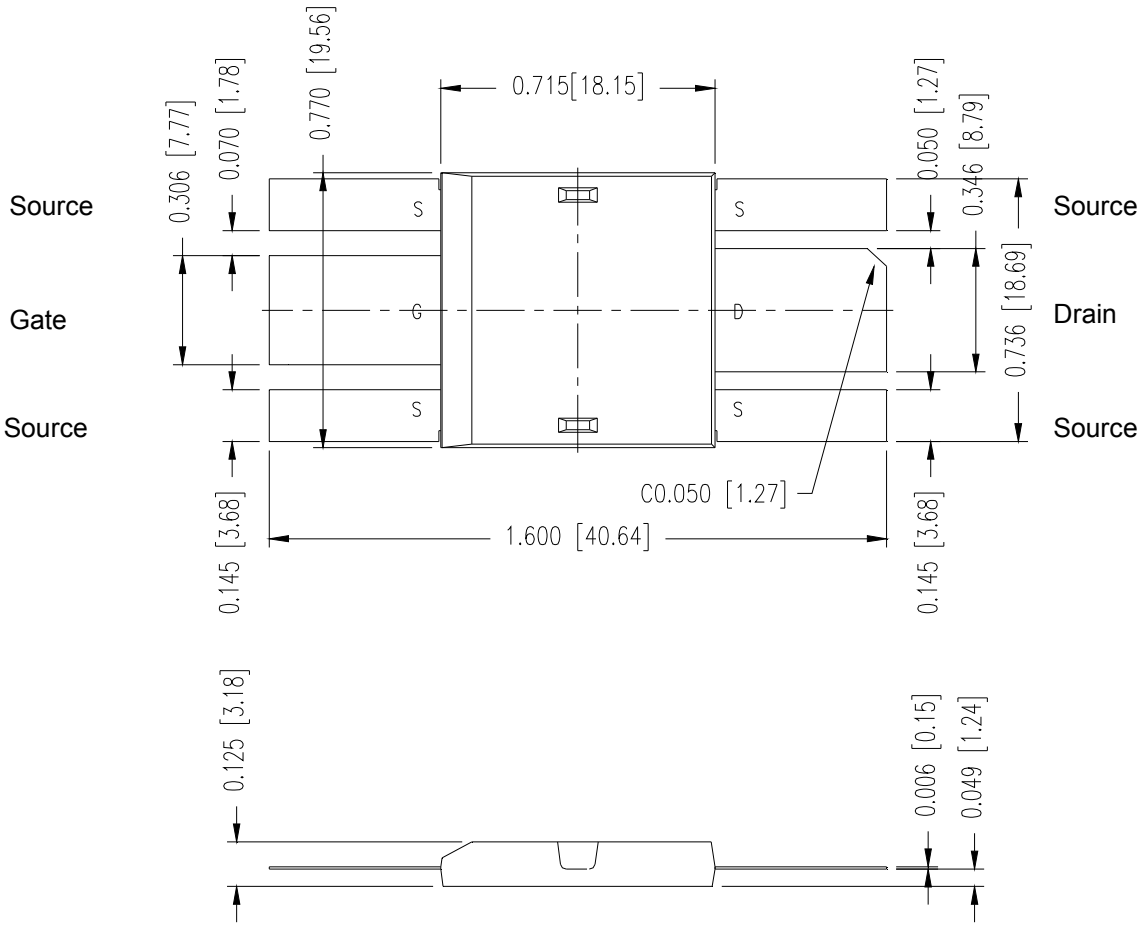


Fig. 11 Package Drawing



102N15A DE-SERIES SPICE Model

The DE-SERIES SPICE Model is illustrated in Figure 12. 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.

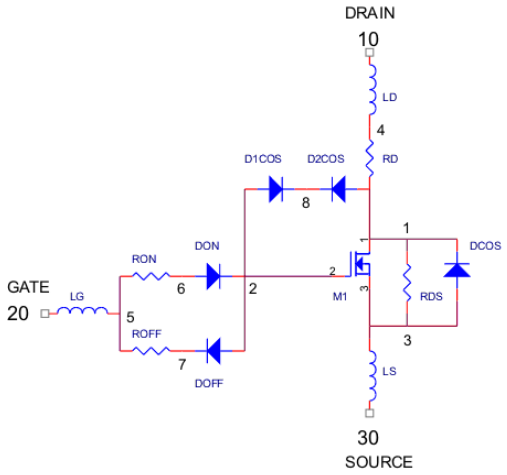


Figure 12 DE-SERIES SPICE Model

Net List:

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.SUBCKT 102N15A   10 20 30
*  TERMINALS:  D  G  S
*  1000 Volt  15 Amp  1 ohm  N-Channel Power MOSFET
*  REV.A  02-10-12
M1   1  2  3  3  DMOS L=1U W=1U
RON   5  6  0.2
DON   6  2  D1
ROFF   5  7 .1
DOF   2  7  D1
D1CRS 2  8  D2
D2CRS 1  8  D2
CGS   2  3  3.0N
RD    4  1  1.0
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=3.8)
.MODEL D1 D (IS=.5F CJO=1P BV=100 M=.5 VJ=.6 TT=1N)
.MODEL D2 D (IS=.5F CJO=400P BV=1000 M=.4 VJ=.6 TT=400N RS=10M)
.MODEL D3 D (IS=.5F CJO=900P BV=1000 M=.3 VJ=.4 TT=400N RS=10M)
.ENDS
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150C Rev. 1

An IXYS Company

Fort Collins, CO USA 80526
970-493-1901 Fax: 970-232-3025
Email: sales@ixyscolorado.com
Web: http://www.ixyscolorado.com