IXYS

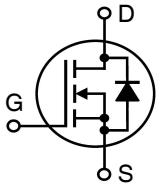
Q3-Class HiperFET™ Power MOSFET

(Electrically Isolated Tab)

N-Channel Enhancement Mode
Fast Intrinsic Rectifier

IXFR48N60Q3

V_{DSS} = 600V
I_{D25} = 32A
$R_{DS(on)}$ ≤ 154mΩ
t_{rr} ≤ 300ns



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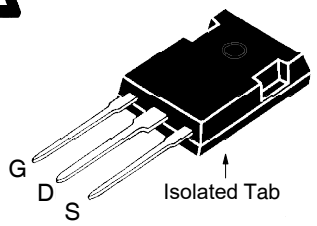

G = Gate D = Drain
S = Source

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	600	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	600	V
V_{GSS}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	32	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	120	A
I_A	T_C = 25°C	48	A
E_{AS}	T_C = 25°C	2	J
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	50	V/ns
P_D	T_C = 25°C	500	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
F_C	Mounting Force	20..120/4.5..27	N/lb.
Weight		5	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	600			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 4mA	3.5		6.5	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±200	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			25	μA
	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 24A, Note 1			154	mΩ

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- Low Intrinsic Gate Resistance
- 2500V~ Electrical Isolation
- Fast Intrinsic Rectifier
- Avalanche Rated
- Low Package Inductance

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- DC Choppers
- Temperature and Lighting Controls

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Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 20V, I_D = 24A, Note 1	20	36		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		7020		pF
C_{oss}			790		pF
C_{rss}			70		pF
R_{Gi}	Gate Input Resistance		0.13		Ω
$t_{d(on)}$	**Resistive Switching Times**		37		ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 24A		11		ns
$t_{d(off)}$	R_G = 1Ω (External)		40		ns
t_f			9		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 24A		140		nC
Q_{gs}			54		nC
Q_{gd}			60		nC
R_{thJC}				0.25	°C/W
R_{thCS}			0.15		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			48	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			192	A
V_{SD}	$I_F = I_S$, V_{GS} = 0V, Note 1			1.4	V
t_{rr}	I_F = 24A, -di/dt = 100A/μs			300	ns
Q_{RM}	V_R = 100V, V_{GS} = 0V		2.2		μC
I_{RM}			15.4		A

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25°C

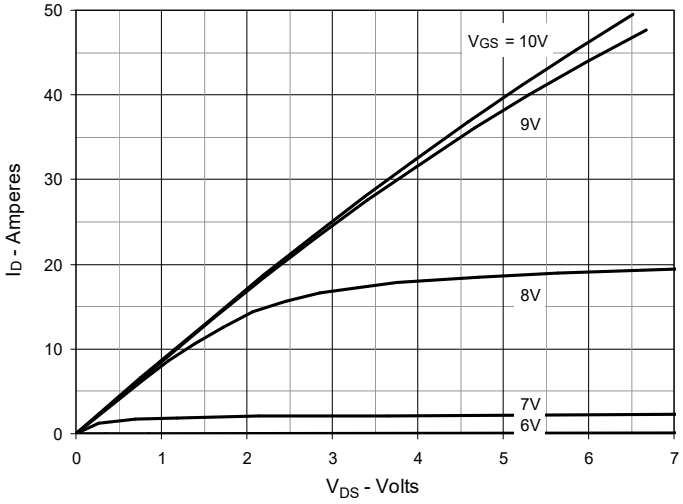

Fig. 2. Extended Output Characteristics @ T_J = 25°C

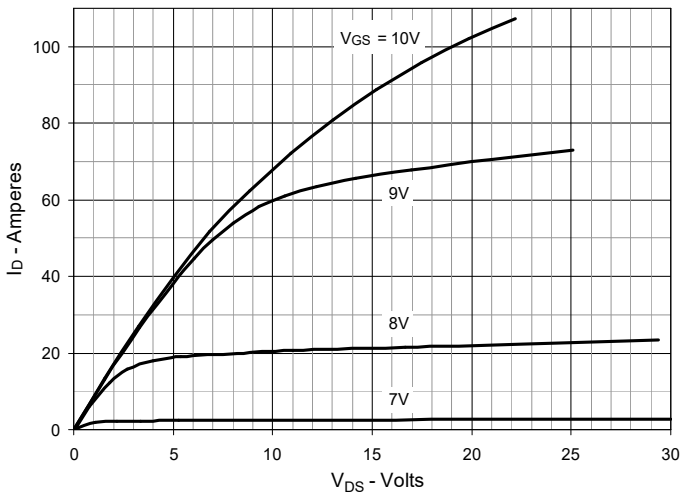

Fig. 3. Output Characteristics @ T_J = 125°C

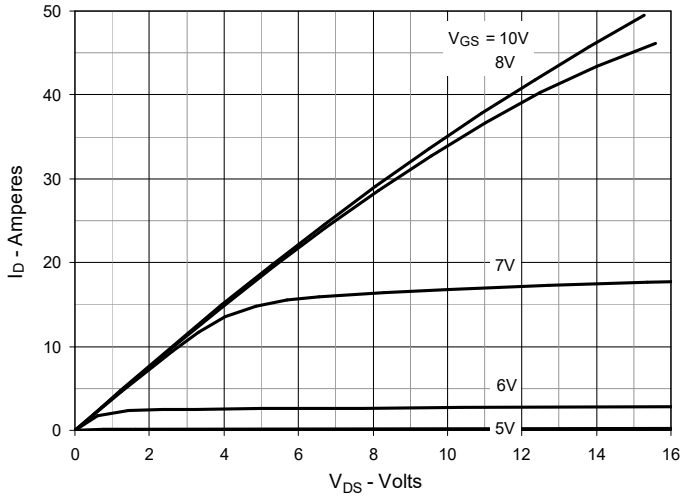

Fig. 4. $R_{DS(on)}$ Normalized to I_D = 24A Value vs. Junction Temperature

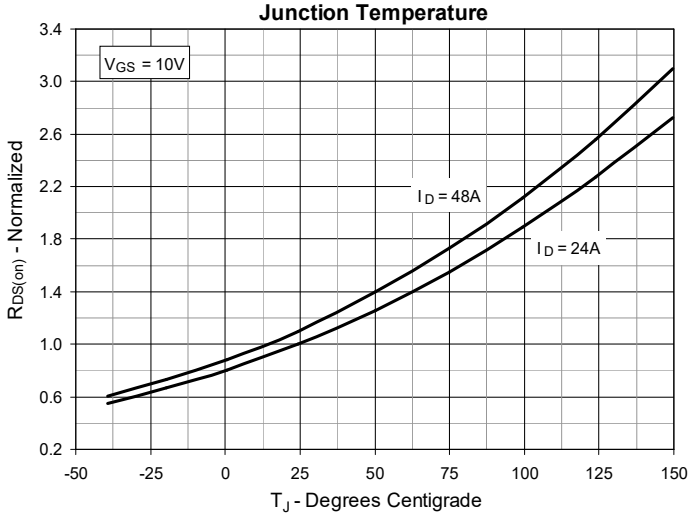

Fig. 5. $R_{DS(on)}$ Normalized to I_D = 24A Value vs. Drain Current

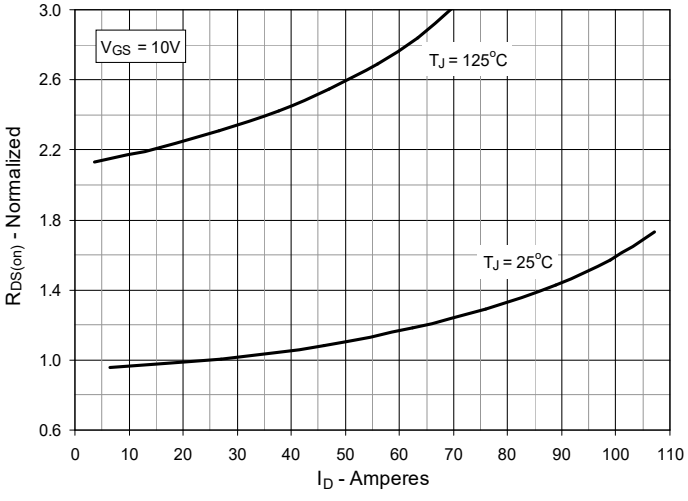

Fig. 6. Maximum Drain Current vs. Case Temperature

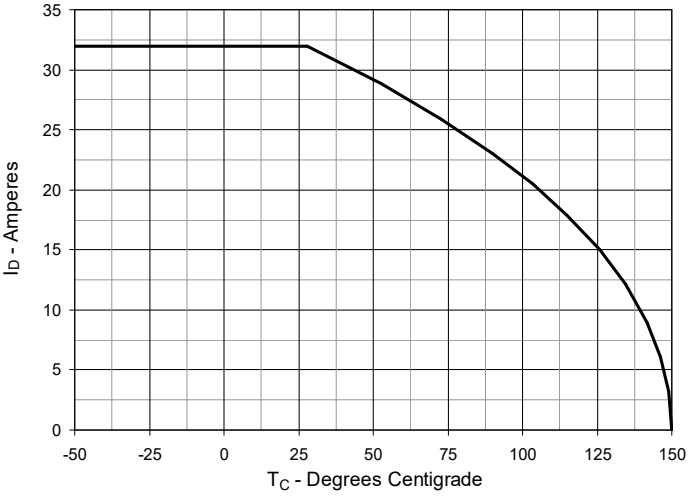

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Fig. 7. Input Admittance

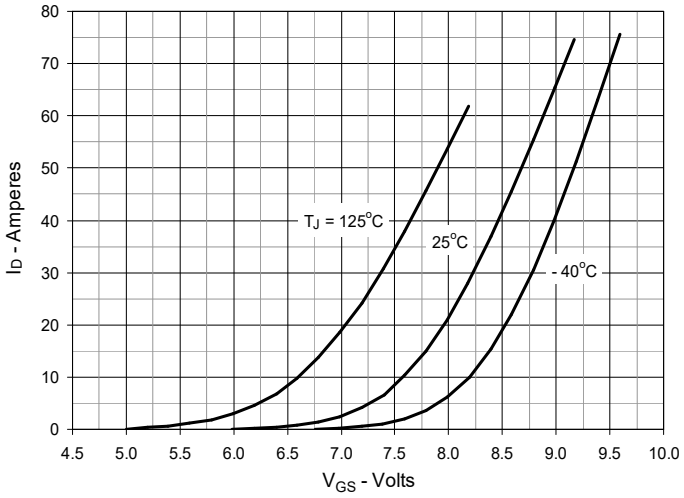

Fig. 8. Transconductance

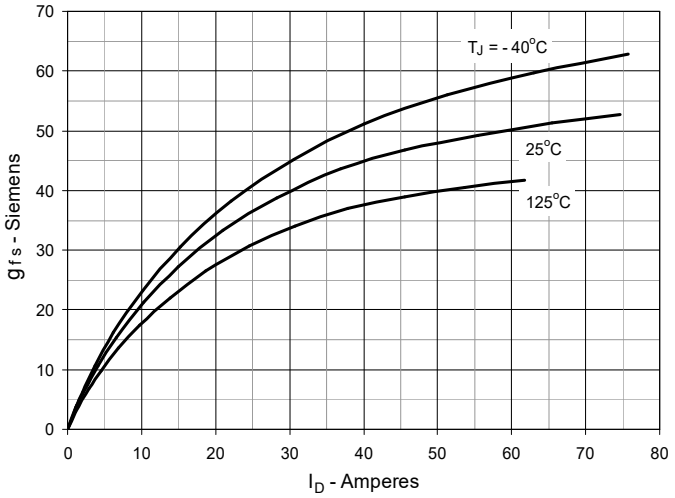

Fig. 9. Forward Voltage Drop of Intrinsic Diode

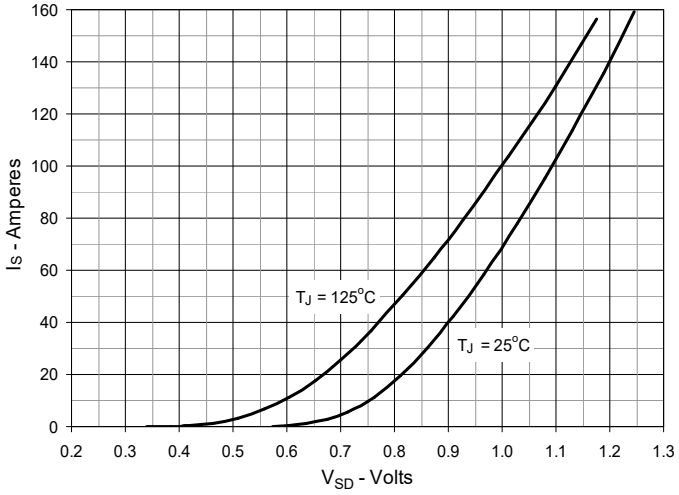

Fig. 10. Gate Charge

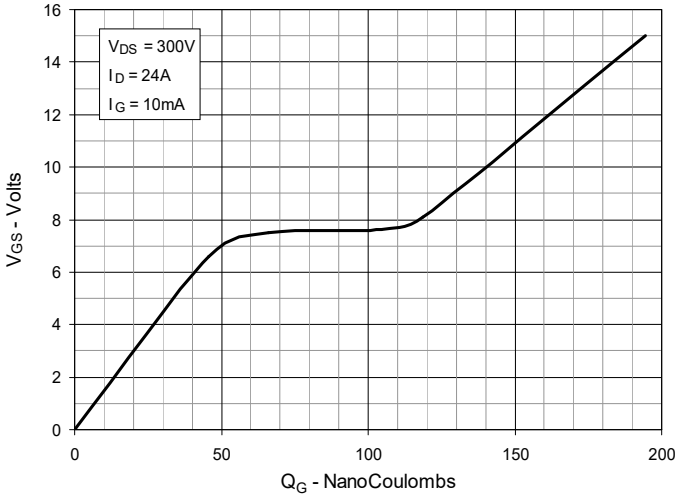

Fig. 11. Capacitance

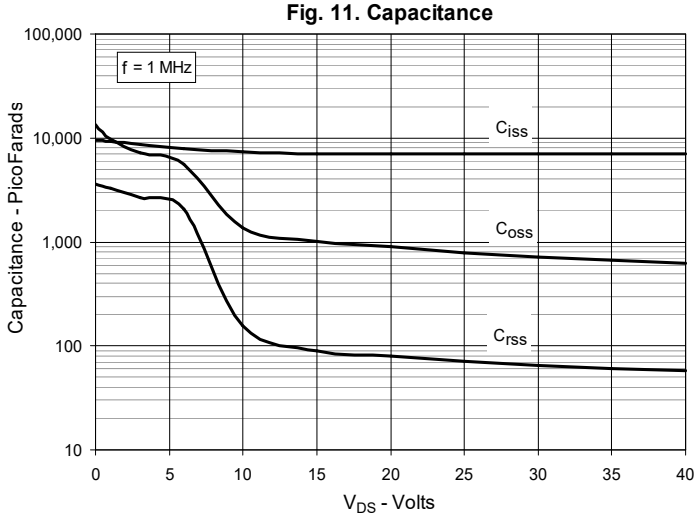

Fig. 12. Forward-Bias Safe Operating Area

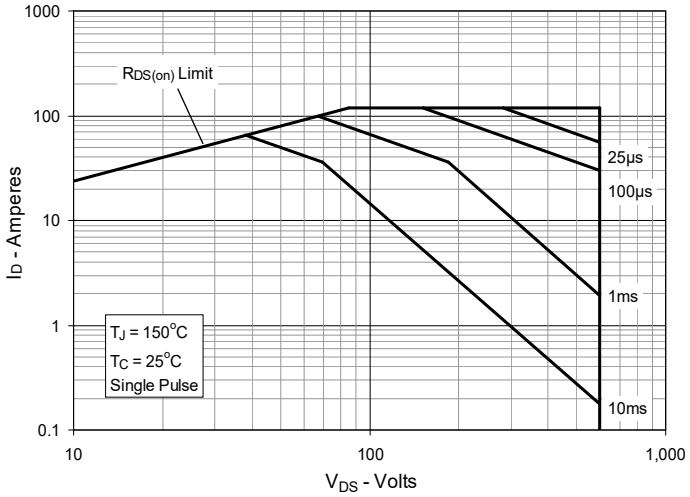

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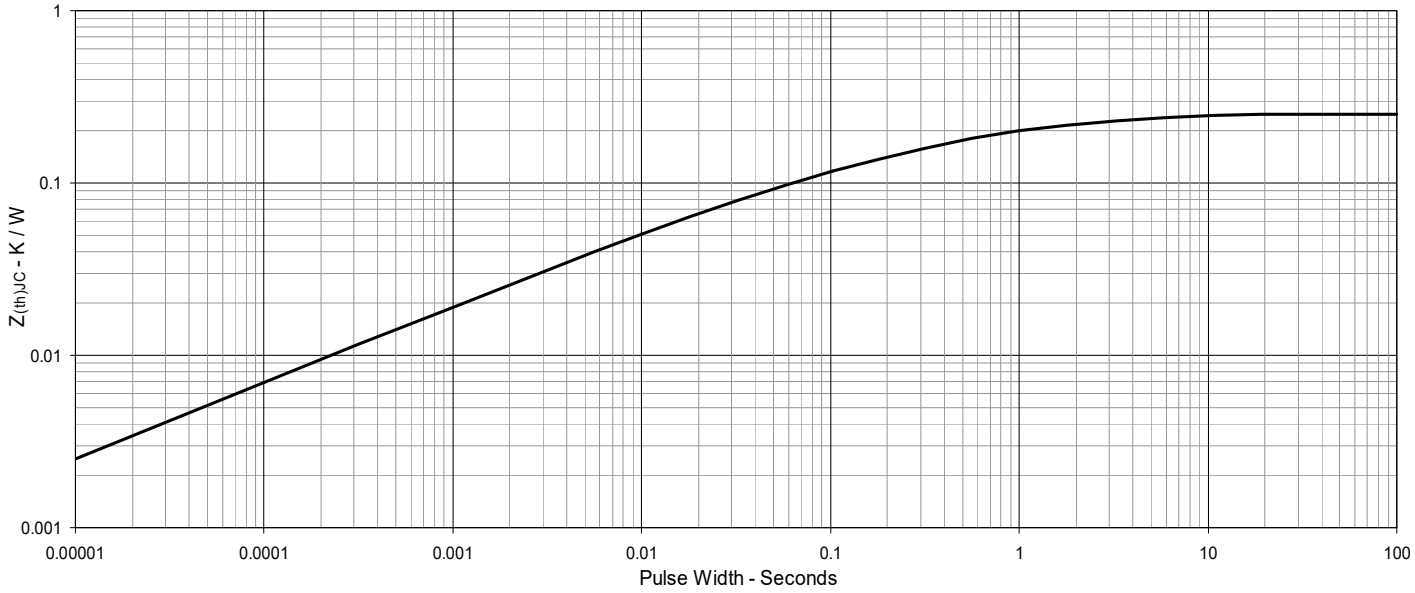
Fig. 13. Maximum Transient Thermal Impedance



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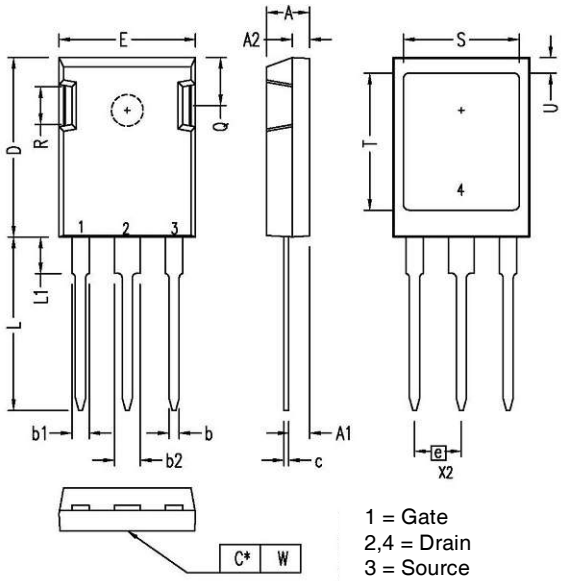
ISOPLUS247 (IXFR) Outline



1 = Gate
2,4 = Drain
3 = Source

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.085	1.91	2.15
b2	.115	.126	2.92	3.20
C	.024	.033	0.61	0.83
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.811	19.81	20.60
L1	.150	.172	3.81	4.38
Q	.220	.244	5.59	6.20
R	.170	.191	4.32	4.85
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03
W	0	.004	0	0.10

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