IXYS

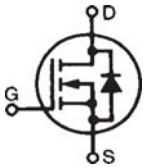
Advance Technical Information

High Voltage Power MOSFET

IXTF1R4N450

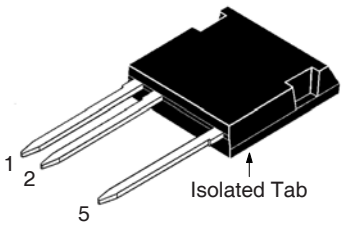
V_{DSS} = 4500V
I_{D25} = 1.4A
$R_{DS(on)}$ ≤ 40Ω

(Electrically Isolated Tab)



N-Channel Enhancement Mode

ISOPLUS i4-Pak™



1 = Gate 5 = Drain
2 = Source

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	4500	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	4500	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	1.4	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	4.2	A
P_D	T_C = 25°C	190	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
F_C	Mounting Force	20..120 / 4.5..27	N/lb
V_{ISOL}	50/60Hz, 1 Minute	4500	V~
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	4.0		6.0	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = 3.6kV, V_{GS} = 0V			5	μA
	V_{DS} = 4.5kV			25	μA
	V_{DS} = 3.6kV Note 2, T_J = 100°C		25		μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 50mA, Note 1			40	Ω

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4500V~ Electrical Isolation
- Molding Epoxies meet UL 94 V-0 Flammability Classification

Advantages

- High Voltage Package
- Easy to Mount
- Space Savings
- High Power Density

Applications

- High Voltage Power Supplies
- Capacitor Discharge Applications
- Pulse Circuits
- Laser and X-Ray Generation Systems

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Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 50V, I_D = 700mA, Note 1	1.2	2.0		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		3300		pF
C_{oss}			134		pF
C_{rss}			52		pF
R_{Gi}	Gate Input Resistance		7.8		Ω
$t_{d(on)}$	**Resistive Switching Times**		44		ns
t_r	V_{GS} = 10V, V_{DS} = 500V, I_D = 0.5 • I_{D25}		60		ns
$t_{d(off)}$	R_G = 10Ω (External)		126		ns
t_f			170		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		88		nC
Q_{gs}			16		nC
Q_{gd}			42		nC
R_{thJC}				0.65	°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, Note1			1.4	A
I_{SM}	Repetitive, pulse Width Limited by T_{JM}			5.6	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 1A, -di/dt = 100A/μs		660		ns
Q_{RM}	V_R = 100V		4.6		μC
I_{RM}			14.0		A

Notes: 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Part must be heatsunk for high-temp I_{DSS} measurement.

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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

IXYS MOSFETs and IGBTs are covered by one or moreof 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 = 25ºC

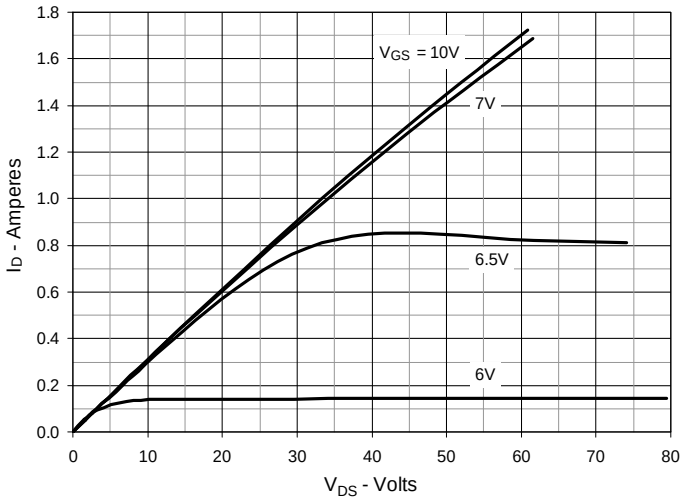


Fig. 2. Output Characteristics @ T_J = 125ºC

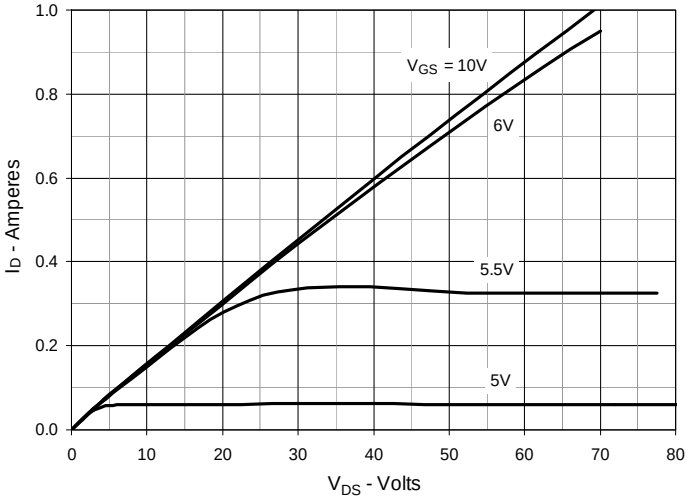


Fig. 3. $R_{DS(on)}$ Normalized to I_D = 0.7A Value vs. Junction Temperature

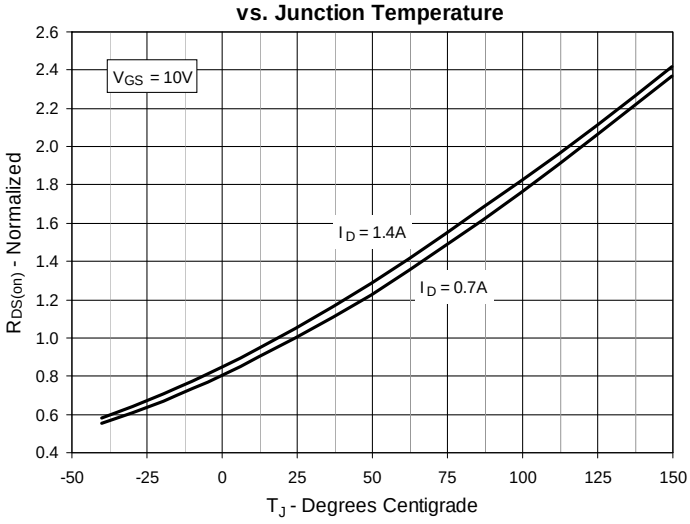


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 0.7A Value vs. Drain Current

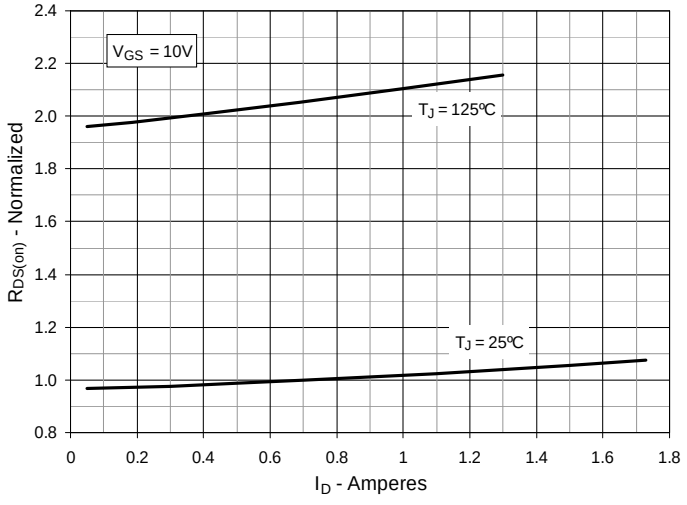


Fig. 5. Maximum Drain Current vs. Case Temperature

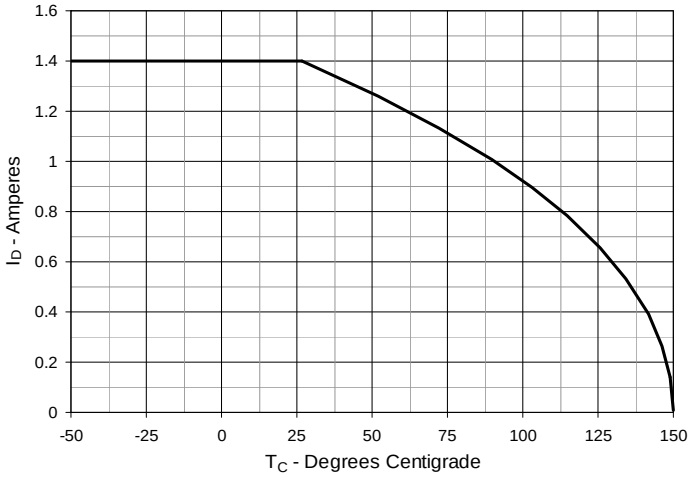
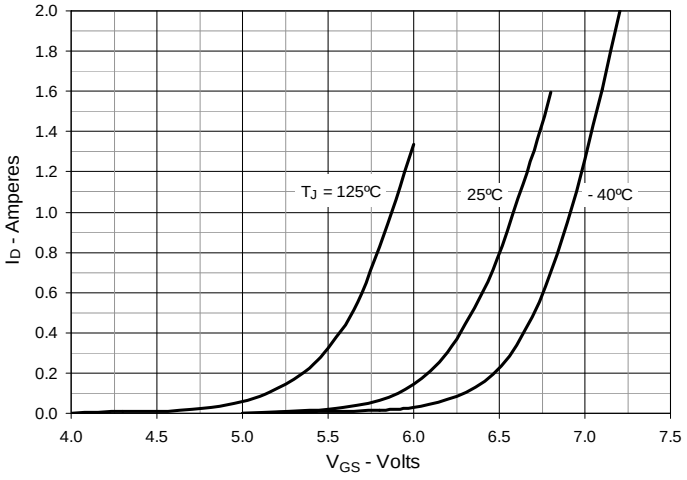


Fig. 6. Input Admittance



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Fig. 7. Transconductance

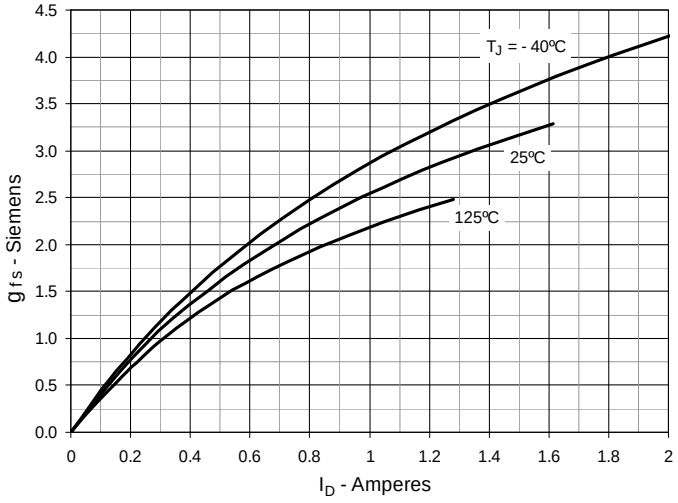


Fig. 8. Forward Voltage Drop of Intrinsic Diode

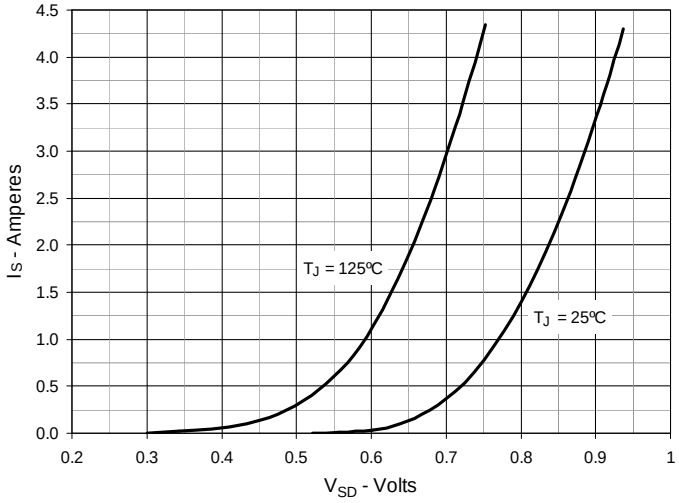


Fig. 9. Gate Charge

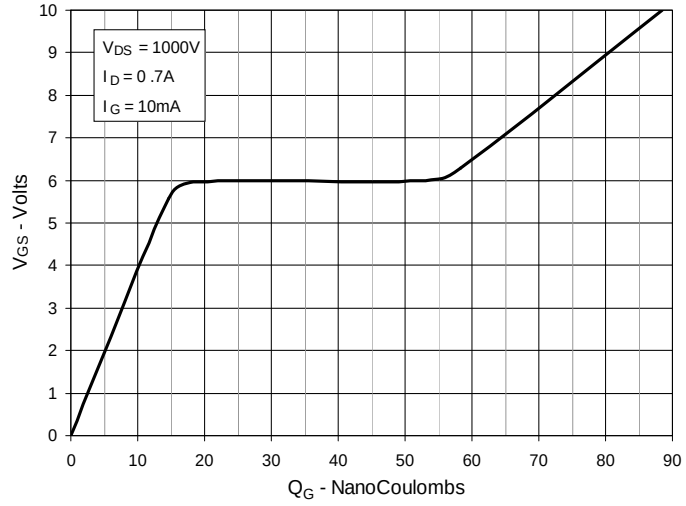


Fig. 10. Capacitance

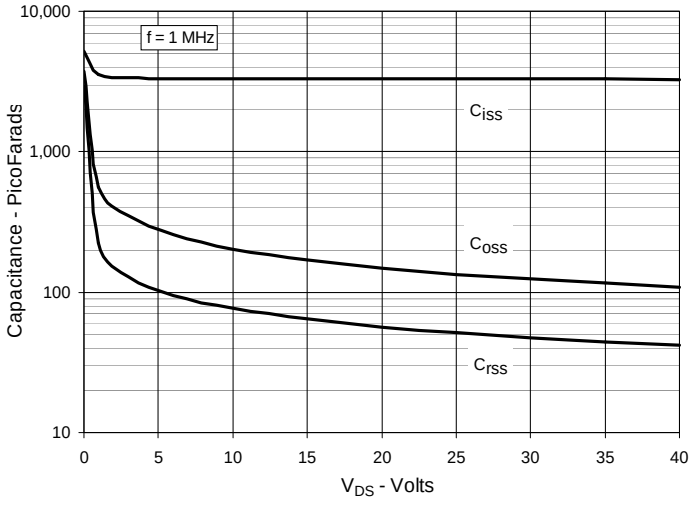


Fig. 11. Forward-Bias Safe Operating Area

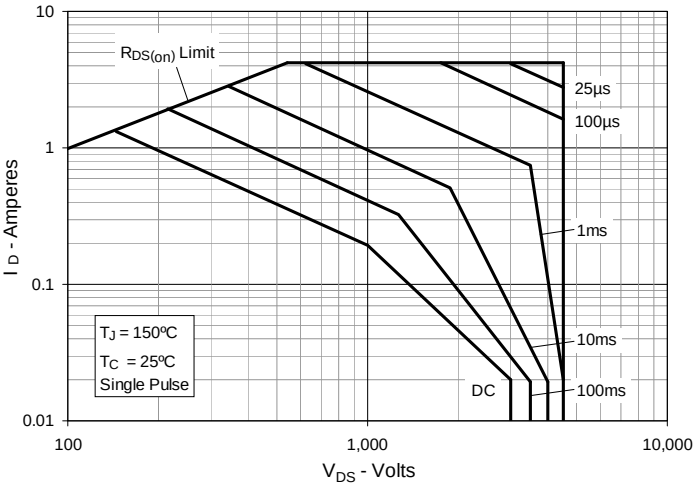
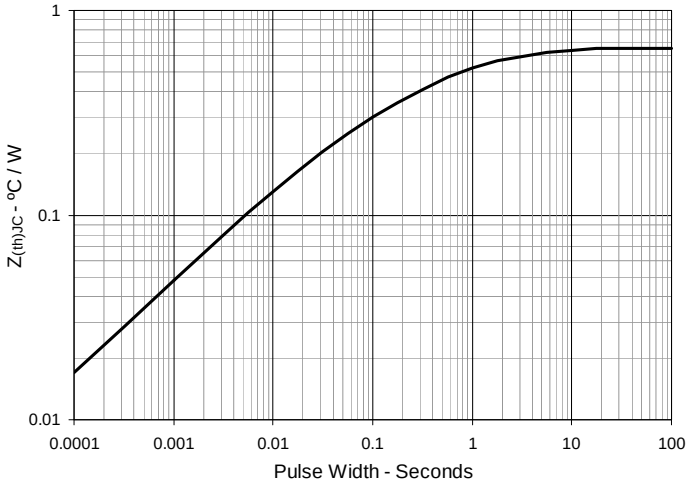
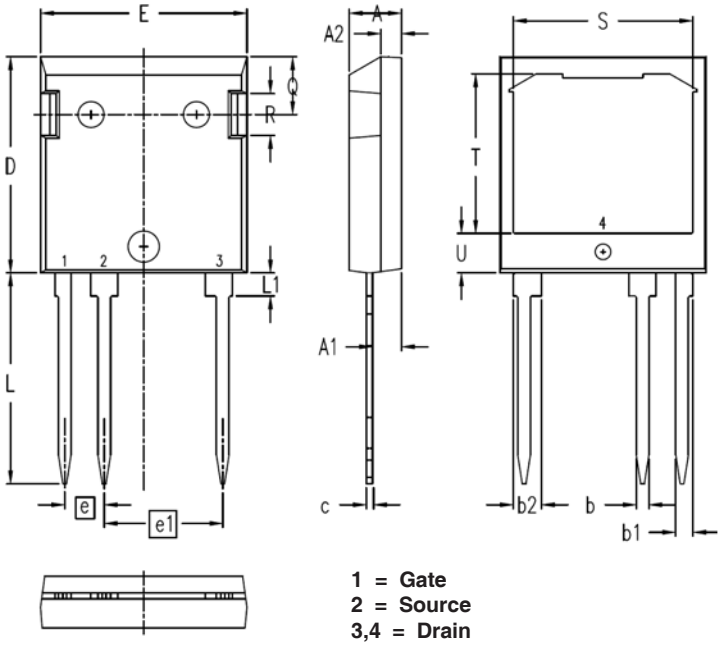


Fig. 12. Maximum Transient Thermal Impedance



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

ISOPLUS i4-Pak Outline



1 = Gate
2 = Source
3,4 = Drain

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.075	.083	1.90	2.10
b	.047	.055	1.20	1.40
b1	.061	.069	1.55	1.75
b2	.087	.094	2.20	2.40
c	.020	.029	0.51	0.74
D	.819	.846	20.80	21.50
E	.768	.799	19.50	20.30
e	.150 BSC		3.81 BSC	
e1	.450 BSC		11.43 BSC	
L	.780	.838	19.80	21.30
L1	.083	.094	2.10	2.40
Q	.213	.236	5.40	6.00
R	.157	.169	4.00	4.30
S	.673	.685	17.10	17.40
T	.602	.614	15.30	15.60
U	.142	.154	3.60	3.90

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