

# X2-Class HiPerFET™ Power MOSFET

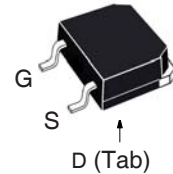
## IXFT80N65X2HV

$V_{DSS} = 650V$   
 $I_{D25} = 80A$   
 $R_{DS(on)} \leq 38m\Omega$

N-Channel Enhancement Mode  
 Avalanche Rated  
 Fast Intrinsic Diode



TO-268HV (IXFT)



G = Gate      D = Drain  
 S = Source    Tab = Drain

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $150^\circ C$	650	V
$V_{DGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$	650	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ C$	80	A
$I_{DM}$	$T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$	160	A
$I_A$	$T_C = 25^\circ C$	20	A
$E_{AS}$	$T_C = 25^\circ C$	3	J
$dv/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$	50	V/ns
$P_D$	$T_C = 25^\circ C$	890	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
<b>Weight</b>		4	g

### Features

- High Voltage Package
- Low  $R_{DS(ON)}$  and  $Q_G$
- Avalanche Rated
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 1mA$	650		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4mA$	3.5		5.0 V
$I_{GSS}$	$V_{GS} = \pm 30V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 125^\circ C$			50 $\mu A$ 3 mA
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			38 m $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$g_{fs}$	$V_{DS} = 10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	33	55	S
$R_{Gi}$	Gate Input Resistance		0.6	$\Omega$
$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		8300	pF
$C_{oss}$			5010	pF
$C_{rss}$			1.6	pF
<b>Effective Output Capacitance</b>				
$C_{o(er)}$	Energy related	$V_{GS} = 0\text{V}$ $V_{DS} = 0.8 \cdot V_{DSS}$	280	pF
$C_{o(tr)}$	Time related		1160	pF
<b>Resistive Switching Times</b>				
$t_{d(on)}$	$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 3\Omega$ (External)		32	ns
$t_r$			24	ns
$t_{d(off)}$			70	ns
$t_f$			11	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		140	nC
$Q_{gs}$			50	nC
$Q_{gd}$			40	nC
$R_{thJC}$				0.14 $^\circ\text{C/W}$

**Source-Drain Diode**

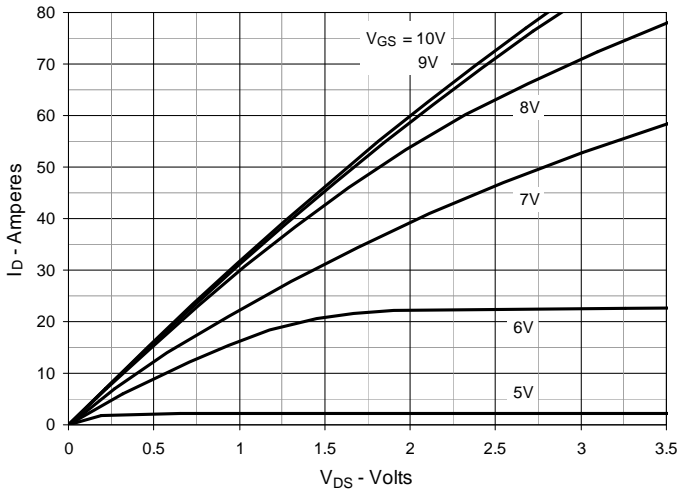
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
$I_S$	$V_{GS} = 0\text{V}$			80 A
$I_{SM}$	Repetitive, pulse Width Limited by $T_{JM}$			320 A
$V_{SD}$	$I_F = I_S$ , $V_{GS} = 0\text{V}$ , Note 1			1.4 V
$t_{rr}$	$I_F = 40\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$		200	ns
$Q_{RM}$			1.7	$\mu\text{C}$
$I_{RM}$			16.7	A

Note 1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

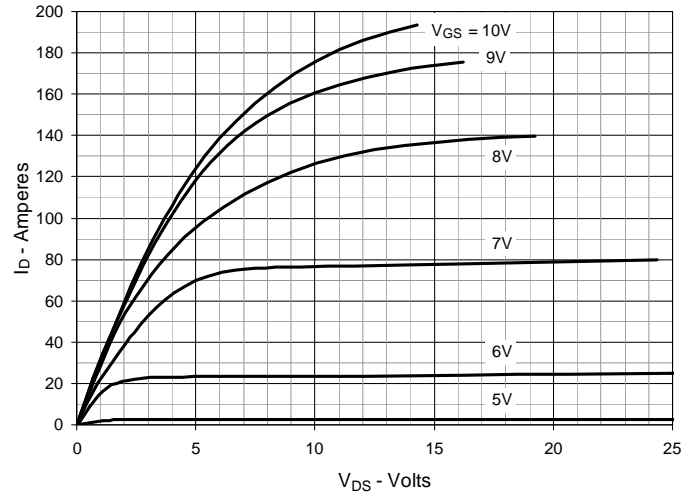
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

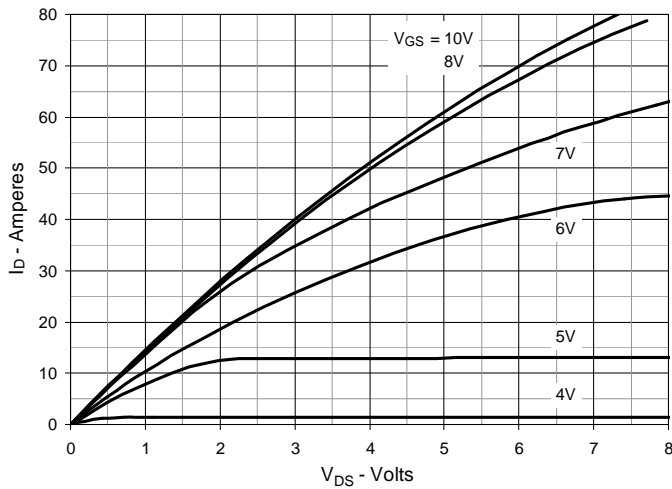
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



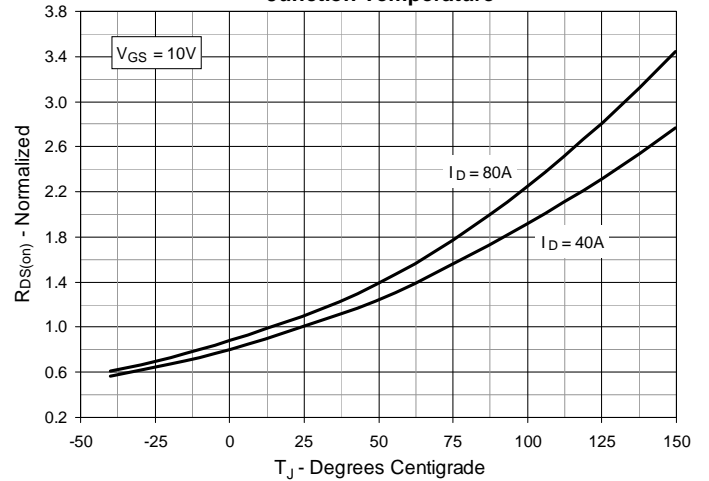
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



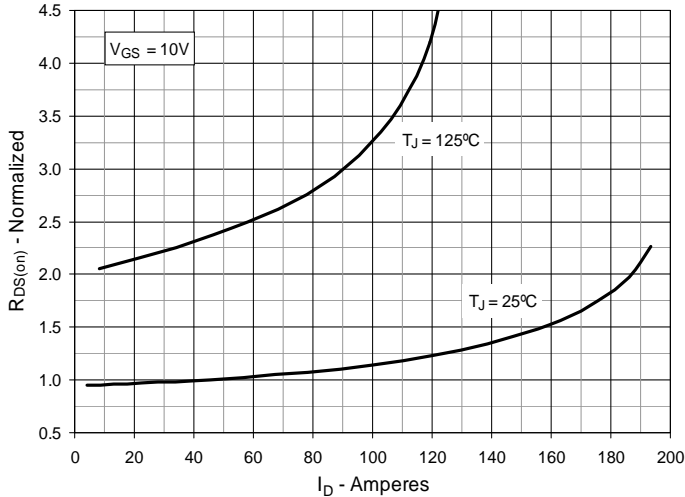
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



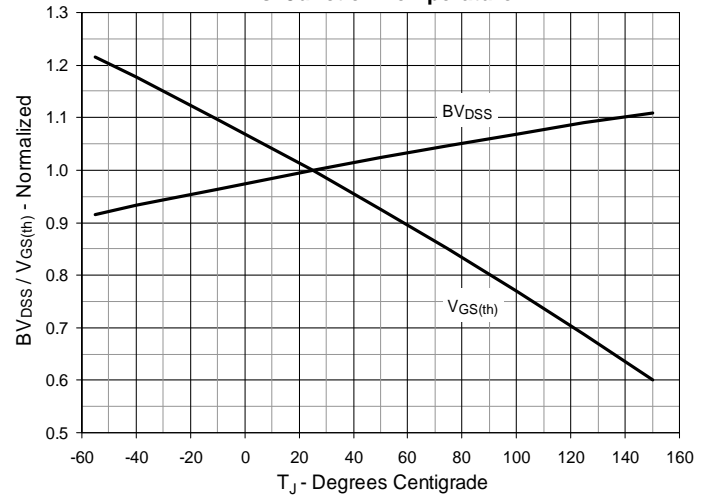
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 40\text{A}$  Value vs. Junction Temperature**

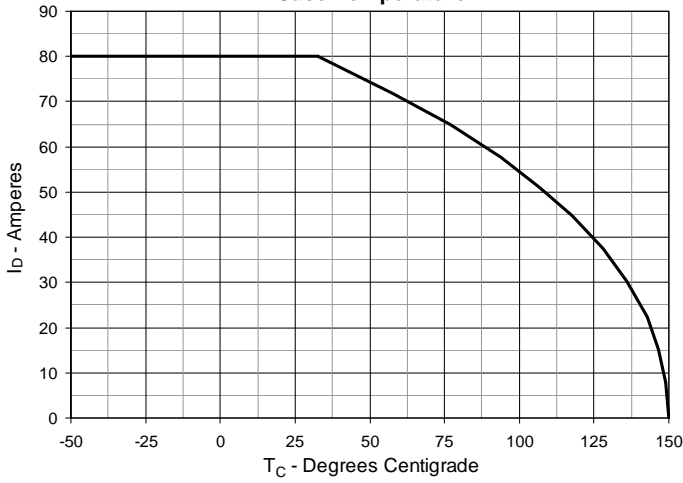
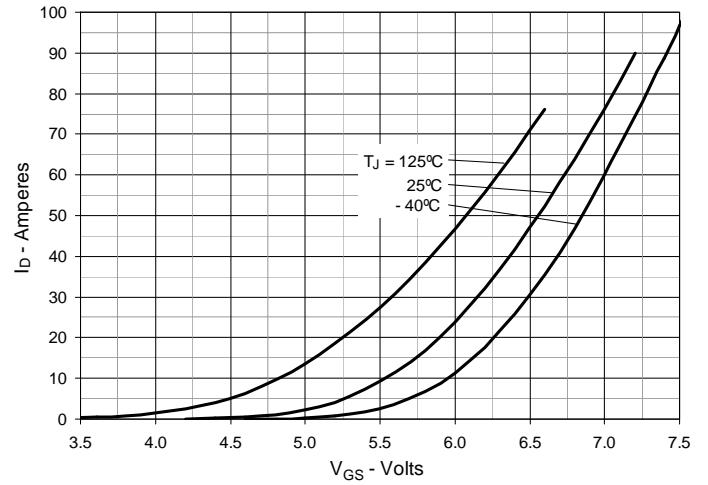
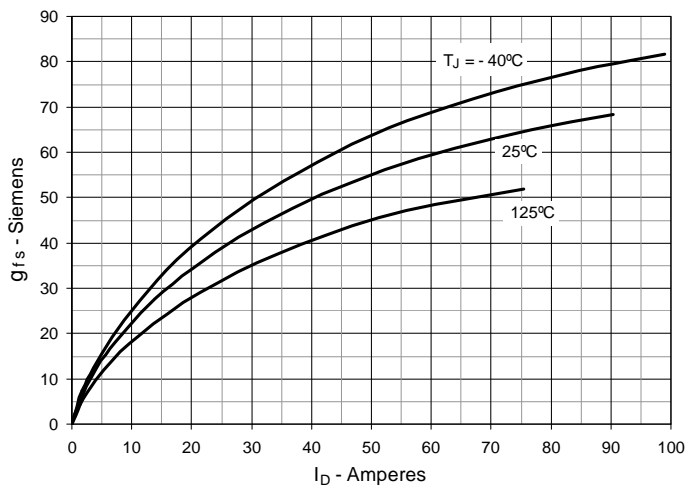
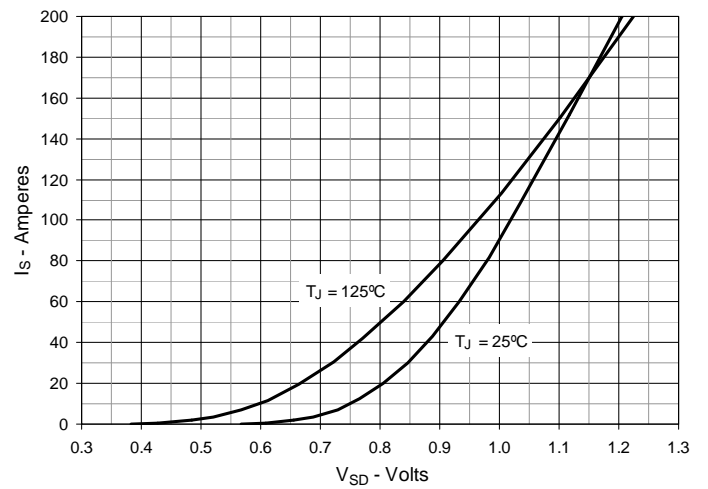
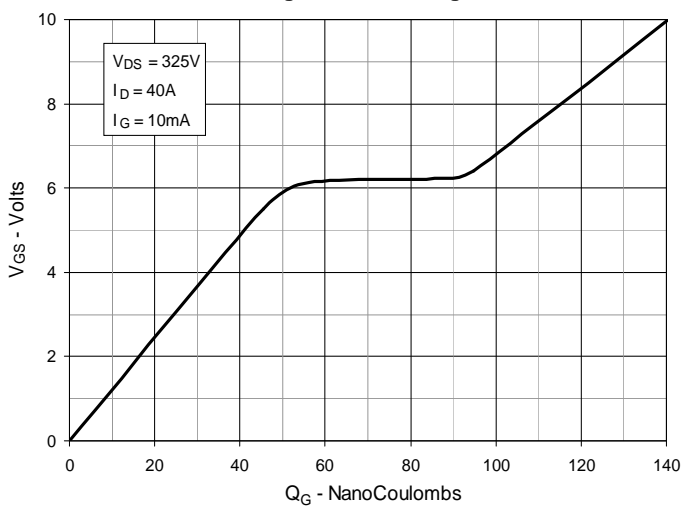
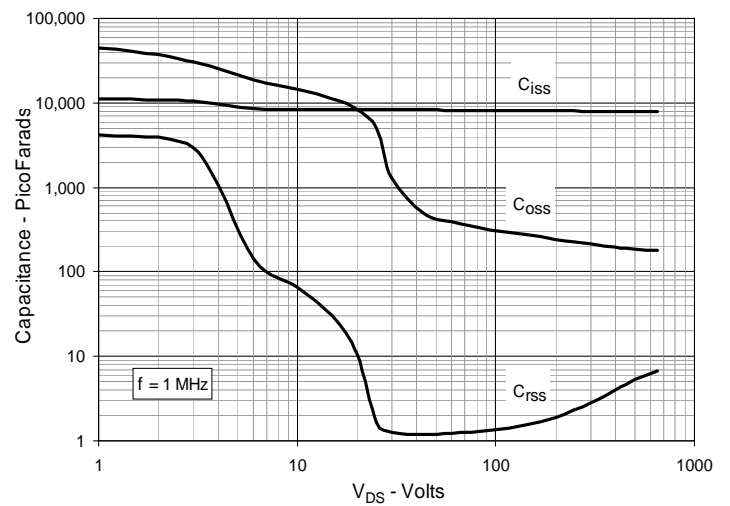


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 40\text{A}$  Value vs. Drain Current**

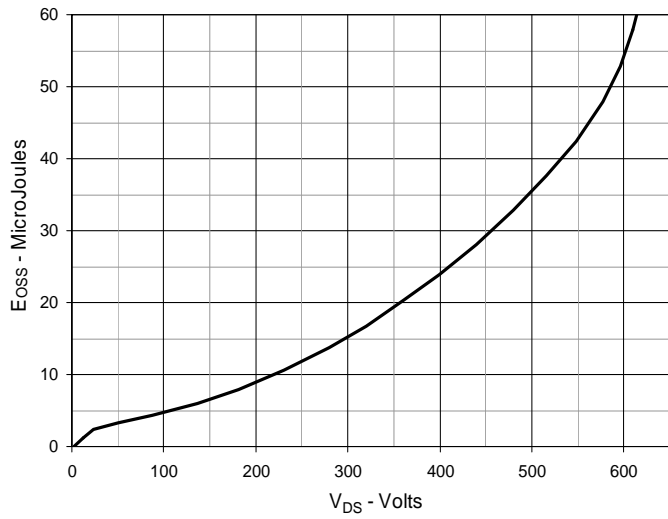


**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**

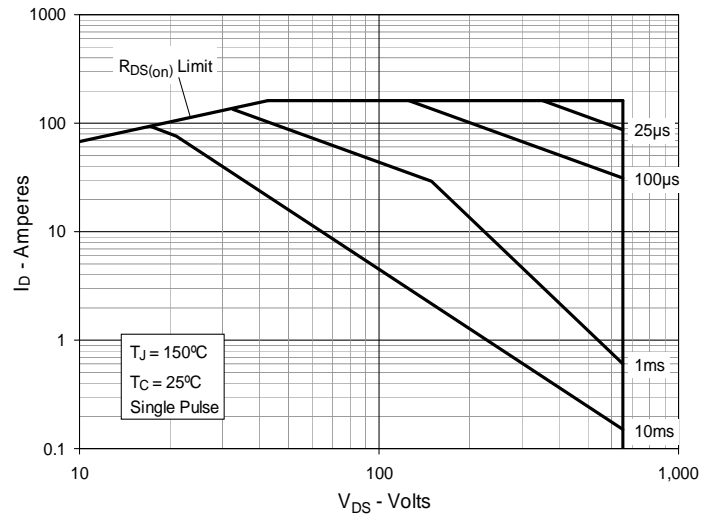


**Fig. 7. Maximum Drain Current vs. Case Temperature**

**Fig. 8. Input Admittance**

**Fig. 9. Transconductance**

**Fig. 10. Forward Voltage Drop of Intrinsic Diode**

**Fig. 11. Gate Charge**

**Fig. 12. Capacitance**


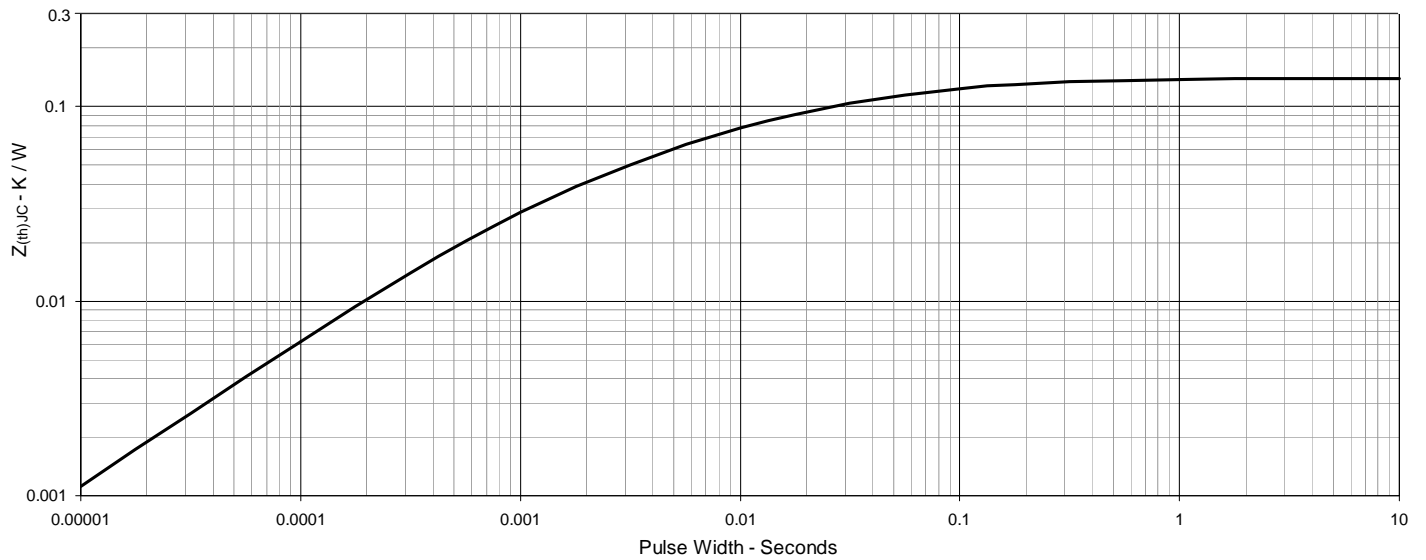
**Fig. 13. Output Capacitance Stored Energy**

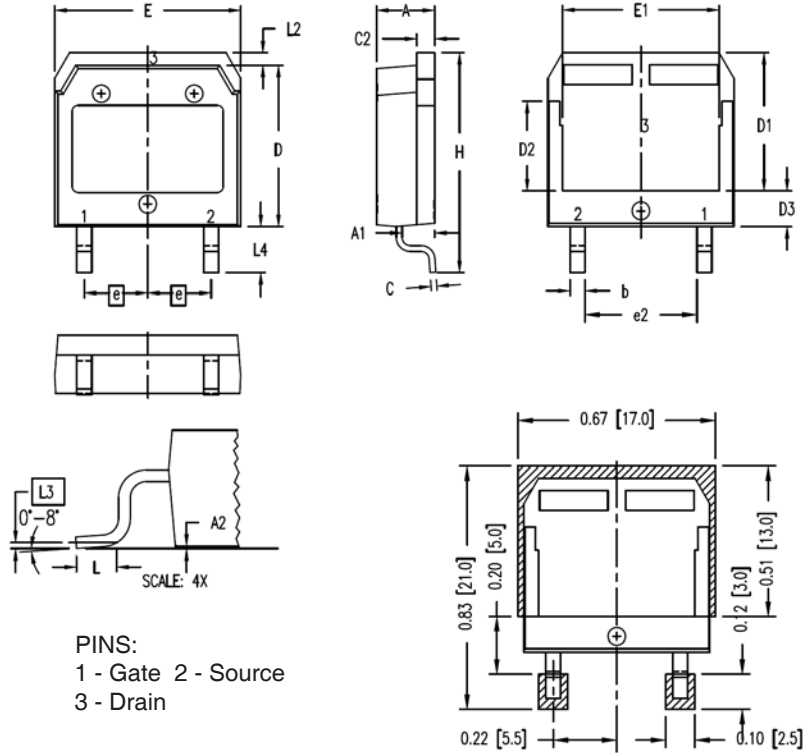


**Fig. 14. Forward-Bias Safe Operating Area**



**Fig. 15. Maximum Transient Thermal Impedance**



**TO-268HV Outline**


SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.465	.476	11.80	12.10
D2	.295	.307	7.50	7.80
D3	.114	.126	2.90	3.20
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
$\boxed{e}$	.215	BSC	5.45	BSC
(e2)	.374	.386	9.50	9.80
H	.736	.752	18.70	19.10
L	.067	.079	1.70	2.00
L2	.039	.045	1.00	1.15
$\boxed{L3}$	.010	BSC	0.25	BSC
L4	.150	.161	3.80	4.10



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