

# PolarHV™ Power HiPerFET MOSFET

N-Channel Enhancement  
ModeAvalanche Rated  
Fast Intrinsic Diode

**IXFH 30N50P**  
**IXFT 30N50P**  
**IXFQ 30N50P**  
**IXFV 30N50P**  
**IXFV 30N50PS**

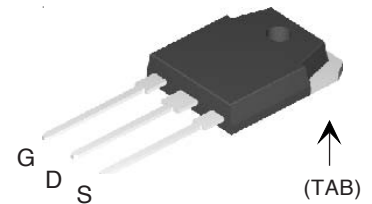
$V_{DSS} = 500 \text{ V}$   
 $I_{D25} = 30 \text{ A}$   
 $R_{DS(on)} = 200 \text{ m}\Omega$   
 $t_{rr} < 200 \text{ ns}$



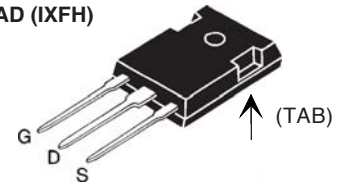
Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$	500	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $175^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	500	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	30	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	75	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	30	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	40	mJ
$E_{AS}$	$T_C = 25^\circ\text{C}$	1.2	J
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 5 \Omega$	10	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	460	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.062 in.) from case for 10 s Maximum tab temperature for soldering for 10s	300 260	$^\circ\text{C}$ $^\circ\text{C}$
$M_d$	Mounting torque (TO-247, TO-3P)	1.13/10	Nm/lb.in.
Weight	TO-247	6	g
	TO-268	5	g
	PLUS220, PLUS220SMD	4	g
	TO-3P	5.5	g

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$(T_J = 25^\circ\text{C}$ , unless otherwise specified)				
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$		500	V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$		3.0	5.0 V
$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$			25 $\mu\text{A}$
		$T_J = 125^\circ\text{C}$		250 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2\%$	165	200	$\text{m}\Omega$

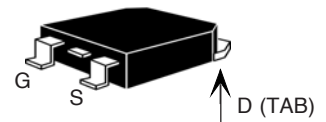
TO-3P (IXFQ)



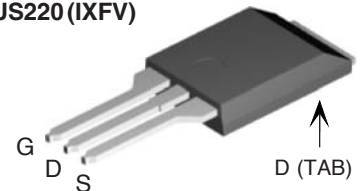
TO-247 AD (IXFH)



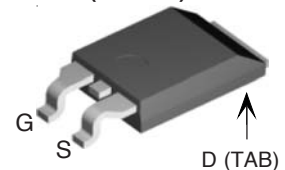
TO-268 (IXFT)



PLUS220 (IXFV)



PLUS220 SMD (IXFV..S)



G = Gate      D = Drain  
S = Source      TAB = Drain

### Features

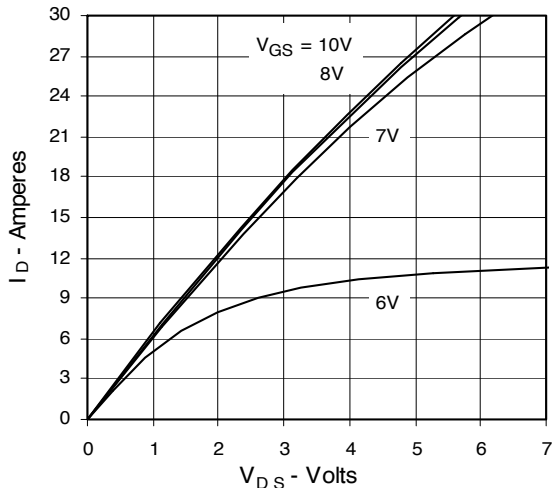
- International standard packages
- Unclamped Inductive Switching (UIS) rated
- Low package inductance  
- easy to drive and to protect

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 20\text{ V}; I_D = 0.5 I_{D25}$ , pulse test	17	27	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4150	pF
$C_{oss}$			445	pF
$C_{rss}$			28	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = I_{D25}$ $R_G = 5\ \Omega$ (External)		25	ns
$t_r$			27	ns
$t_{d(off)}$			75	ns
$t_f$			21	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}$		70	nC
$Q_{gs}$			27	nC
$Q_{gd}$			22	nC
$R_{thJC}$				0.23 K/W
$R_{thCK}$	(TO-247, PLUS220, TO-3P)		0.21	K/W

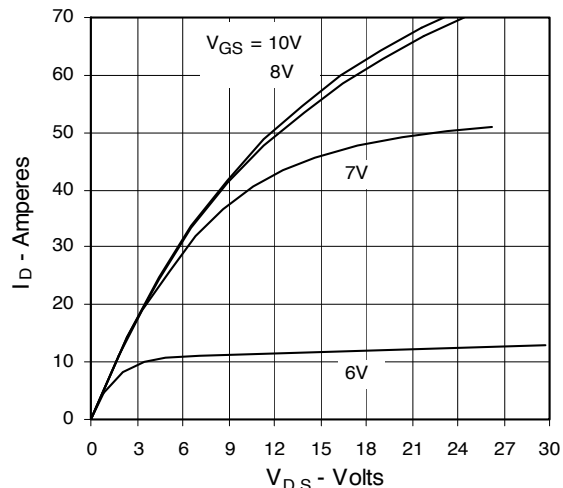
Source-Drain Diode		Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
Symbol	Test Conditions	Min.	typ.	Max.
$I_S$	$V_{GS} = 0\text{ V}$			30 A
$I_{SM}$	Repetitive			90 A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			1.5 V
$t_{rr}$	$I_F = 25\text{ A}; -di/dt = 100\text{ A}/\mu\text{s}$	150		250 ns
$I_{RM}$	$V_R = 100\text{ V}; V_{GS} = 0\text{ V}$		6	A
$Q_{RM}$			0.6	$\mu\text{C}$

### Characteristic Curves

**Fig. 1. Output Characteristics  
@ 25°C**



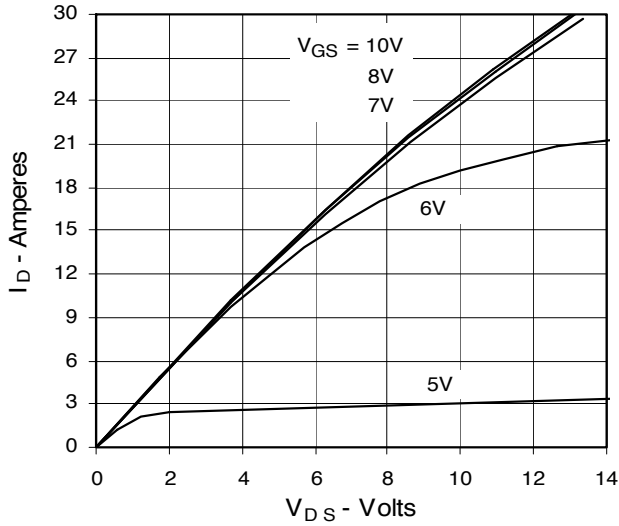
**Fig. 2. Extended Output Characteristics  
@ 25°C**



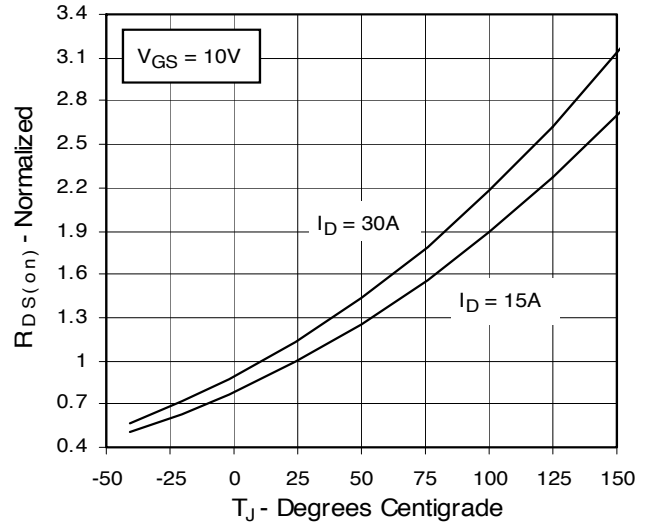
IXYS reserves the right to change limits, test conditions, and dimensions.

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	6,404,065 B1	6,683,344	6,727,585
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	

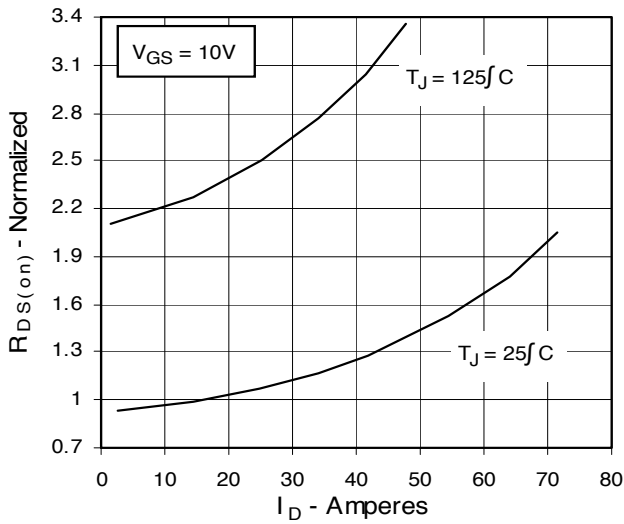
**Fig. 3. Output Characteristics**  
@ 125°C



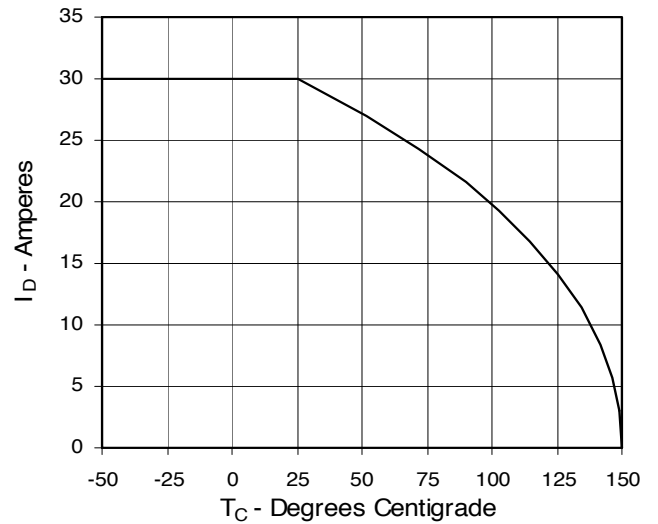
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



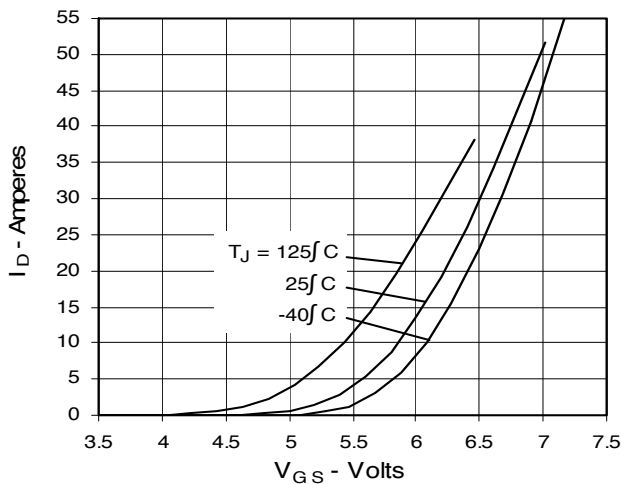
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



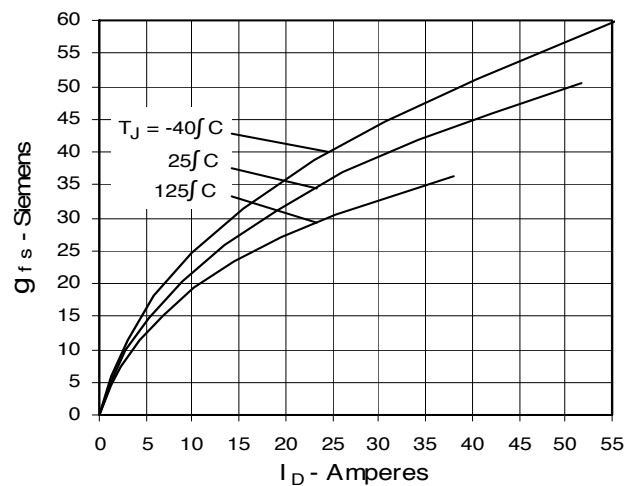
**Fig. 6. Drain Current vs. Case Temperature**



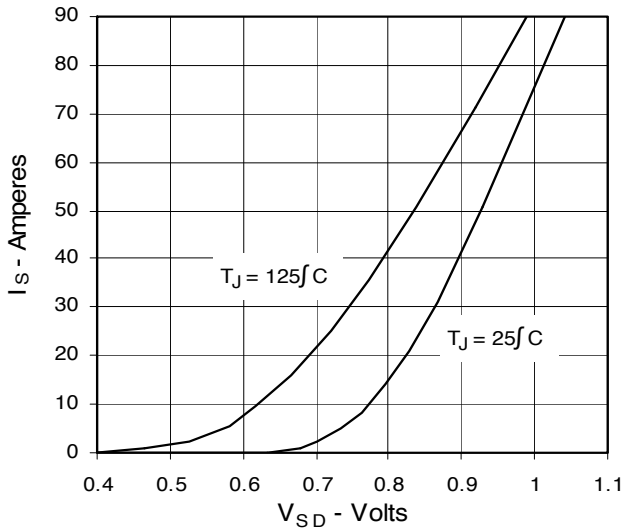
**Fig. 7. Input Admittance**



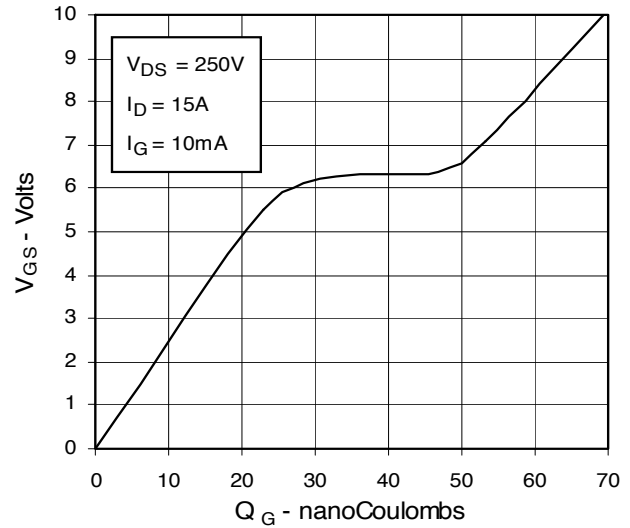
**Fig. 8. Transconductance**



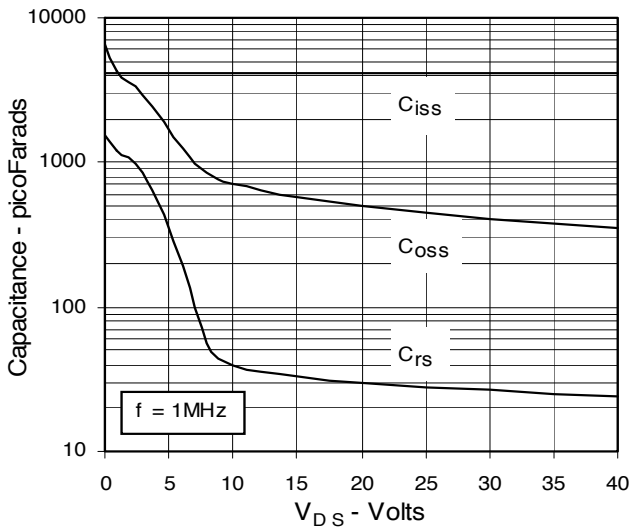
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



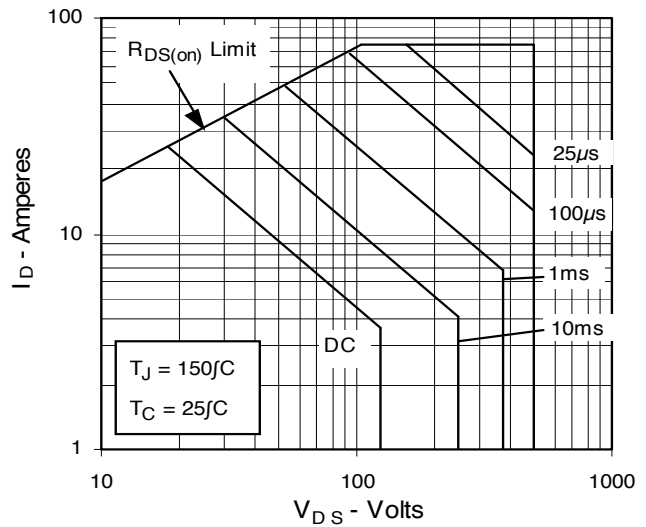
**Fig. 10. Gate Charge**



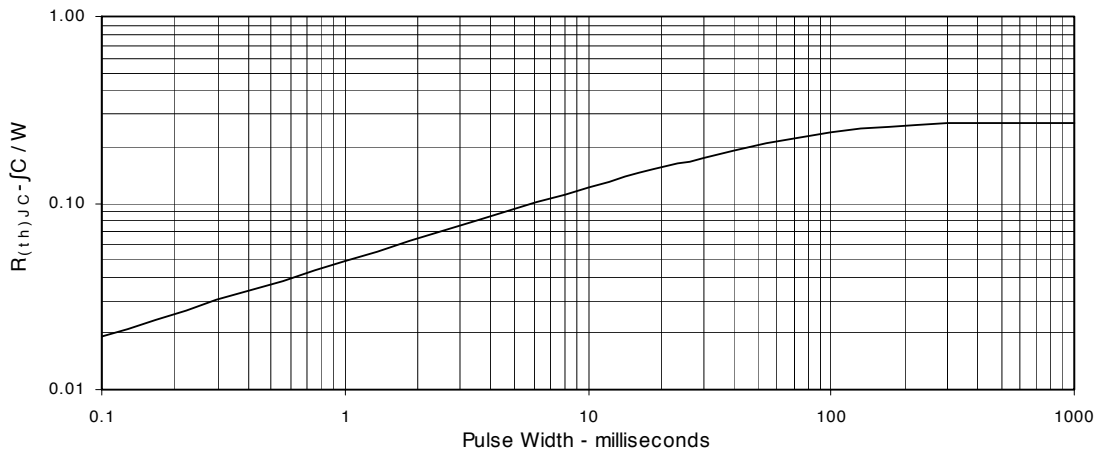
**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**



**Fig. 13. Maximum Transient Thermal Resistance**

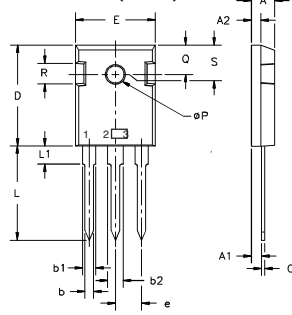


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	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	

### Package Outline Drawings

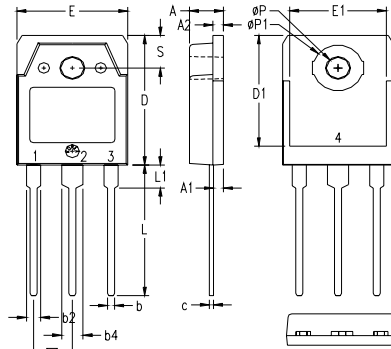
**TO-247 AD (IXFH) Outline**



Terminals:  
1 - Gate  
2 - Drain  
3 - Source  
Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L <sub>1</sub>		4.50		.177
phi P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S		6.15 BSC		242 BSC

**TO-3P (IXTQ) Outline**

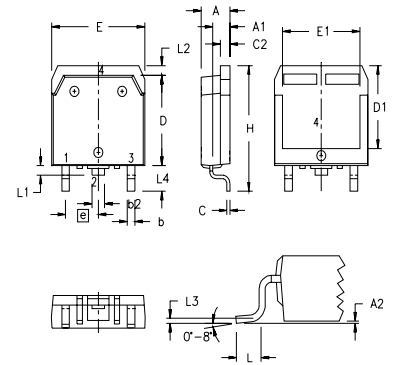


2 - DRAIN (COLLECTOR)  
3 - SOURCE (EMITTER)  
4 - DRAIN (COLLECTOR)

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A <sub>1</sub>	.051	.059	1.30	1.50
A <sub>2</sub>	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b <sub>2</sub>	.075	.087	1.90	2.20
b <sub>4</sub>	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D <sub>1</sub>	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E <sub>1</sub>	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L <sub>1</sub>	.134	.142	3.40	3.60
phi P	.126	.134	3.20	3.40
phi P <sub>1</sub>	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

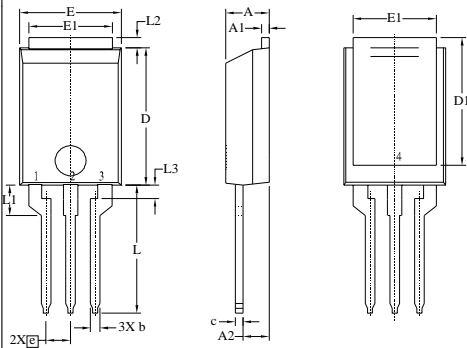
All metal area are tin plated.

**TO-268 (IXTT) Outline**



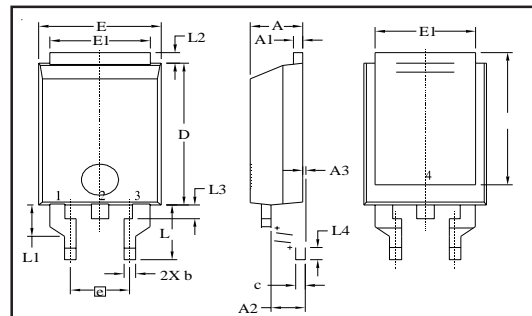
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A <sub>1</sub>	.106	.114	2.70	2.90
A <sub>2</sub>	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b <sub>2</sub>	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C <sub>2</sub>	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D <sub>1</sub>	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E <sub>1</sub>	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L <sub>1</sub>	.047	.055	1.20	1.40
L <sub>2</sub>	.039	.045	1.00	1.15
L <sub>3</sub>	.010 BSC		0.25 BSC	
L <sub>4</sub>	.150	.161	3.80	4.10

**PLUS220 (IXFV) Outline**



Terminals: 1-Gate 2-Drain

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A <sub>1</sub>	.028	.035	0.70	0.90
A <sub>2</sub>	.098	.118	2.50	3.00
b	.035	.047	0.90	1.20
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D <sub>1</sub>	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E <sub>1</sub>	.331	.346	8.40	8.80
e	.100 BSC		2.54 BSC	
L	.512	.551	13.00	14.00
L <sub>1</sub>	.118	.138	3.00	3.50
L <sub>2</sub>	.035	.051	0.90	1.30
L <sub>3</sub>	.047	.059	1.20	1.50



Terminals: 1-Gate 2-Drain

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A <sub>1</sub>	.028	.035	0.70	0.90
A <sub>2</sub>	.098	.118	2.50	3.00
A <sub>3</sub>	.000	.010	0.00	0.25
b	.035	.047	0.90	1.20
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D <sub>1</sub>	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E <sub>1</sub>	.331	.346	8.40	8.80
e	.200 BSC		5.08 BSC	
L	.209	.228	5.30	5.80
L <sub>1</sub>	.118	.138	3.00	3.50
L <sub>2</sub>	.035	.051	0.90	1.30
L <sub>3</sub>	.047	.059	1.20	1.50
L <sub>4</sub>	.039	.059	1.00	1.50