

# HiPerFET™ MOSFET ISOPLUS220™

## IXFC13N50

### Electrically Isolated Back Surface

N-Channel Enhancement Mode

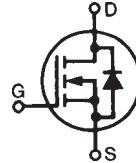
High dv/dt, Low  $t_{rr}$ , HDMOS™ Family

$$V_{DSS} = 500 \text{ V}$$

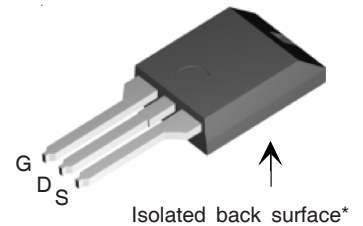
$$I_{D25} = 12 \text{ A}$$

$$R_{DS(on)} = 0.4 \text{ } \Omega$$

$$t_{rr} \leq 250 \text{ ns}$$



ISOPLUS 220™



G = Gate      D = Drain  
S = Source

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	500	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	500	V
$V_{GS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	12	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	48	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	13	A
$E_{AR}$	$T_C = 25^\circ\text{C}$	18	mJ
dv/dt	$I_S \leq I_{DM}$ , di/dt $\leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ , $R_G = 2 \text{ } \Omega$	5	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	140	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	300	$^\circ\text{C}$
Weight		3	g

#### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance (<35pF)
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic Rectifier

#### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

#### Advantages

- Easy assembly: no screws or isolation foils required
- Space savings
- High power density
- Low collector capacitance to ground (low EMI)

See IXFH13N50 data sheet for characteristic curves

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \text{ } \mu\text{A}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 2.5 \text{ mA}$	2		V
$I_{GSS}$	$V_{GS} = \pm 20 V_{DC}$ , $V_{DS} = 0$			$\pm 100 \text{ nA}$
$I_{DSS}$	$V_{DS} = 0.8 \cdot V_{DSS}$ , $T_J = 25^\circ\text{C}$ $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$			200 $\mu\text{A}$ 1 mA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = I_T$ Notes 1, 2			0.4 $\Omega$

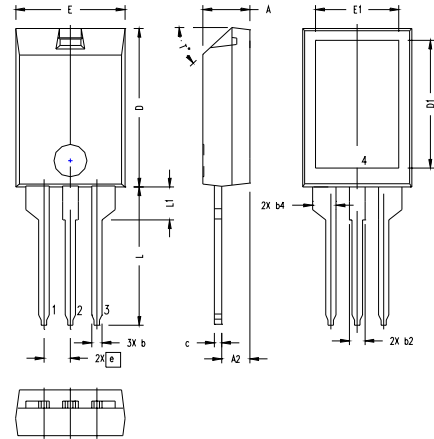
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$g_{fs}$	$V_{DS} = 10\text{ V}; I_D = 0; I_T$ Notes 1, 2	7.5	9.0	S	
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		2800	pF	
$C_{oss}$		300	pF		
$C_{rss}$		70	pF		
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}, R_G = 4.7\ \Omega$ (External)		18	30	ns
$t_r$			27	40	ns
$t_{d(off)}$			76	100	ns
$t_f$			32	60	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$		110	120	nC
$Q_{gs}$			15	25	nC
$Q_{gd}$			40	50	nC
$R_{thJC}$			0.90	K/W	
$R_{thCK}$		0.30		K/W	

### Source-Drain Diode

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$I_S$	$V_{GS} = 0\text{ V}$			13	A
$I_{SM}$	Repetitive; pulse width limited by $T_{JM}$			52	A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1			1.5	V
$t_{rr}$	$I_F = I_S$ $-di/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 100\text{ V}$	$T_J = 25^\circ\text{C}$		250	ns
		$T_J = 125^\circ\text{C}$		350	ns
$Q_{RM}$		$T_J = 25^\circ\text{C}$	0.6		$\mu\text{C}$
		$T_J = 125^\circ\text{C}$	1.25		$\mu\text{C}$
$I_{RM}$		$T_J = 25^\circ\text{C}$	9		A
		$T_J = 125^\circ\text{C}$	15		A

Note: 1. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$   
 2.  $I_T$  test current:  $I_T = 6.5\text{ A}$   
 3. See IXFH13N50 data sheet for characteristic curves.

### ISOPLUS220 Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.157	.197	4.00	5.00
A2	.098	.118	2.50	3.00
b	.035	.051	0.90	1.30
b2	.049	.065	1.25	1.65
b4	.093	.100	2.35	2.55
c	.028	.039	0.70	1.00
D	.591	.630	15.00	16.00
D1	.472	.512	12.00	13.00
E	.394	.433	10.00	11.00
E1	.295	.335	7.50	8.50
e	.100 BASIC		2.55 BASIC	
L	.512	.571	13.00	14.50
L1	.118	.138	3.00	3.50
T*			42.5°	47.5°

NOTE:

- Bottom heatsink (Pin 4) is electrically isolated from Pin 1, 2, or 3.
- This drawing will meet dimensional requirement of JEDEC SS Product Outline TO-273 except D and D1 dimension.