

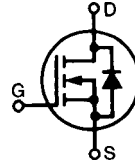
# HiPerFET™ Power MOSFETs

## ISOPLUS247™

(Electrically Isolated Back Surface)

IXFR 30N50Q  
IXFR 32N50Q

N-Channel Enhancement Mode  
High dV/dt, Low  $t_{rr}$ , HDMOS™ Family



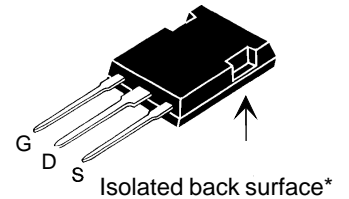
Preliminary data

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
$I_{D25}$	$T_C = 25^\circ\text{C}$	30N50 32N50	30 A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , Pulse width limited by $T_{JM}$	30N50 32N50	120 A
$I_{AR}$	$T_C = 25^\circ\text{C}$	30N50 32N50	30 A
$E_{AS}$	$T_C = 25^\circ\text{C}$	1.5	J
$E_{AR}$	$T_C = 25^\circ\text{C}$	45	mJ
$dv/dt$	$I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ $T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$	5	V/ns
$P_D$	$T_C = 25^\circ\text{C}$	310	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	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz, RMS $t = 1$ minute leads-to-tab	2500	V~
<b>Weight</b>		6	g

$V_{DSS}$	$I_{D25}$	$R_{DS(on)}$
500 V	29 A	0.16 $\Omega$
500 V	30 A	0.15 $\Omega$

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

ISOPLUS 247™  
E 153432



G = Gate      D = Drain  
S = Source

\* Patent pending

### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance (<50pF)
- 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
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0\text{ V}$ , $I_D = 1\text{ mA}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4\text{ mA}$	2		V
$I_{GSS}$	$V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$			$\pm 100\text{ nA}$
$I_{DSS}$	$V_{DS} = V_{DSS}$ $V_{GS} = 0\text{ V}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		100 $\mu\text{A}$ 1 mA
$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = I_T$ Notes 1, 2	30N50 32N50		0.16 $\Omega$ 0.15 $\Omega$

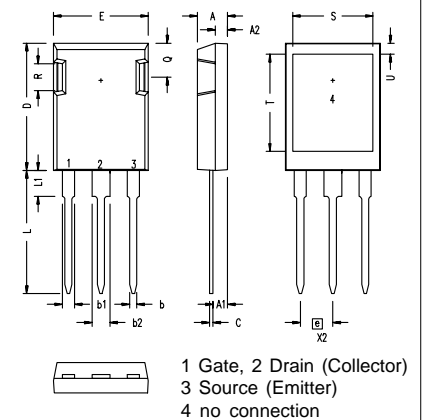
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$V_{DS} = 10\text{ V}; I_D = I_T$ Note 2	18	28	S
$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		3950	pF
$C_{oss}$			640	pF
$C_{rss}$			210	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$ $R_G = 1\ \Omega$ (External),		35	ns
$t_r$			42	ns
$t_{d(off)}$			75	ns
$t_f$			20	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = I_T$		150	nC
$Q_{gs}$			26	nC
$Q_{gd}$			85	nC
$R_{thJC}$			0.40	K/W
$R_{thCK}$		0.15		K/W

**Source-Drain Diode**

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_S$	$V_{GS} = 0\text{ V}$			32 A
$I_{SM}$	Repetitive; pulse width limited by $T_{JM}$			128 A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{ V}$ , Note 1			1.5 V
$t_{rr}$	$I_F = I_S,$ $-di/dt = 100\text{ A/ms},$ $V_R = 100\text{ V}$			250 ns
$Q_{RM}$			0.75	$\mu\text{C}$
$I_{RM}$			7.5	A

- Note: 1.  $I_T$  test condition:  
IXFR30N50:  $I_T = 15\text{ A}$   
IXFR32N50:  $I_T = 16\text{ A}$
- Note: 2. Pulse test,  $t \leq 300\ \mu\text{s}$ ,  
duty cycle  $d \leq 2\ \%$

**ISOPLUS 247 (IXFR) OUTLINE**



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190
S	13.21	13.72	.520	.540
T	15.75	16.26	.620	.640
U	1.65	3.03	.065	.080

Figure 1. Output Characteristics at 25°C

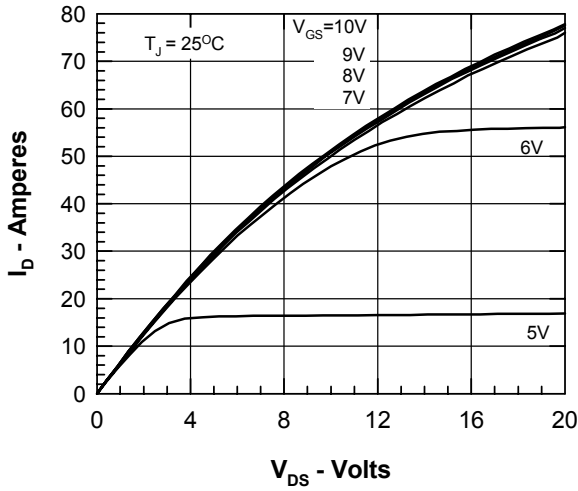


Figure 2. Output Characteristics at 125°C

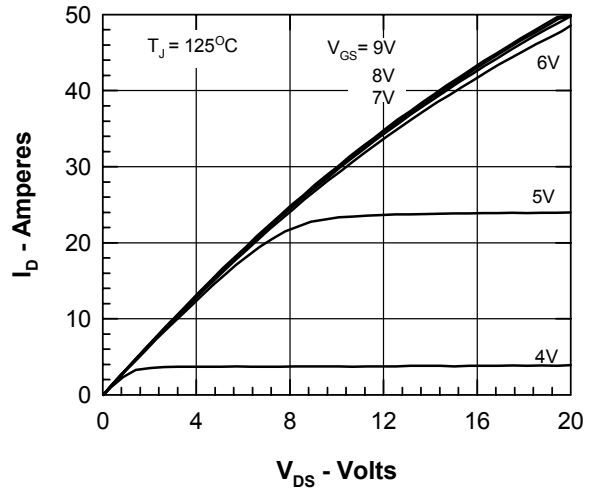


Figure 3.  $R_{DS(on)}$  normalized to 15A/25°C vs.  $I_D$

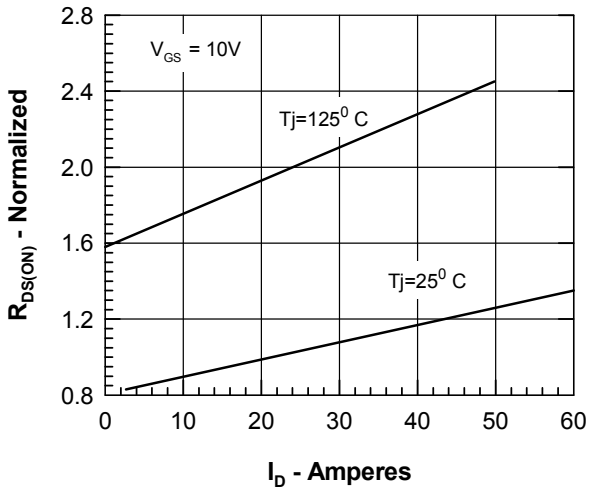


Figure 4.  $R_{DS(on)}$  normalized to 15A/25°C vs.  $T_J$

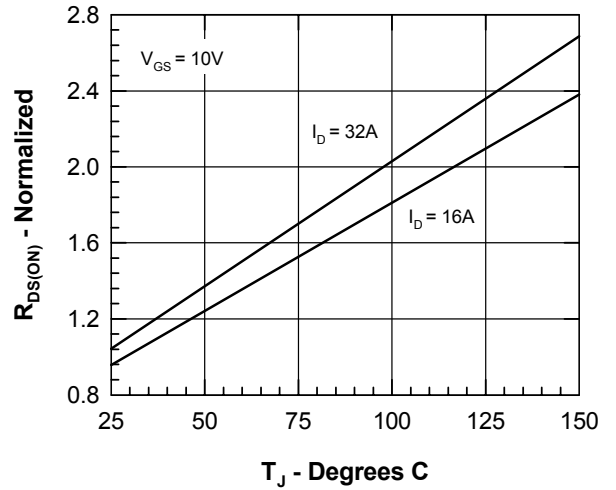


Figure 5. Drain Current vs. Case Temperature

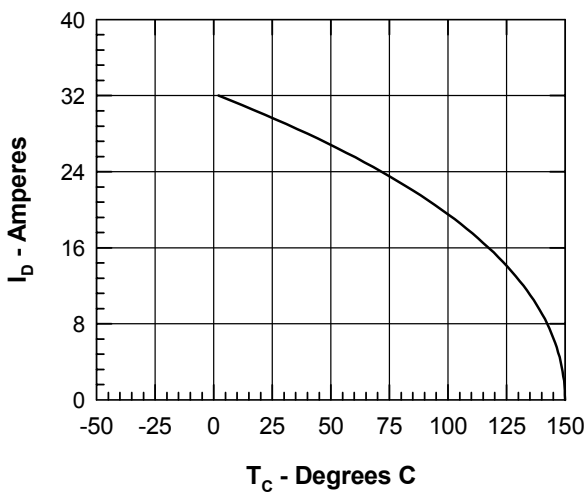


Figure 6. Admittance Curves

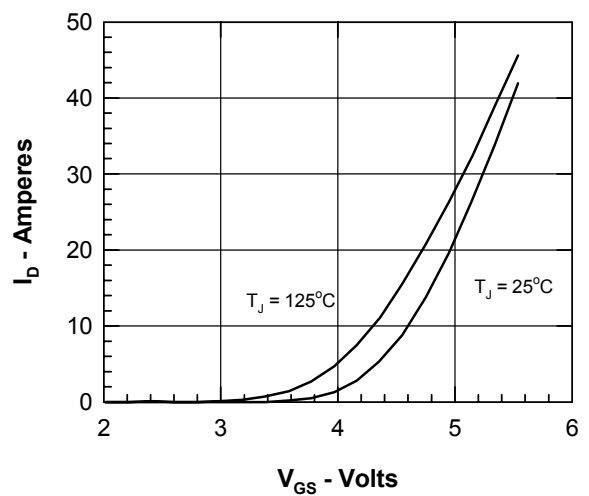


Figure 7. Gate Charge

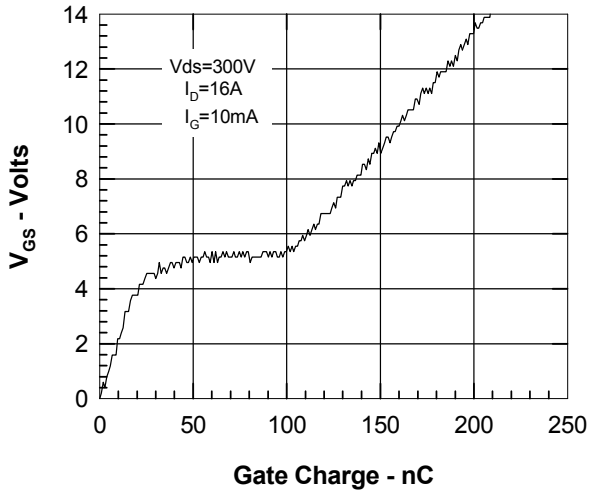


Figure 8. Capacitance Curves

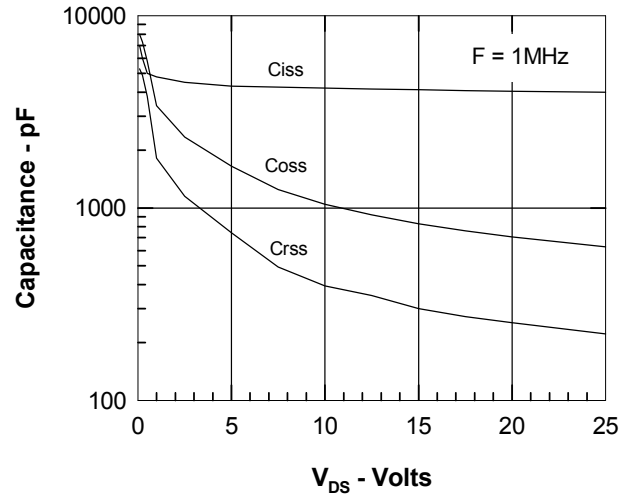


Figure 9. Forward Voltage Drop of the Intrinsic Diode

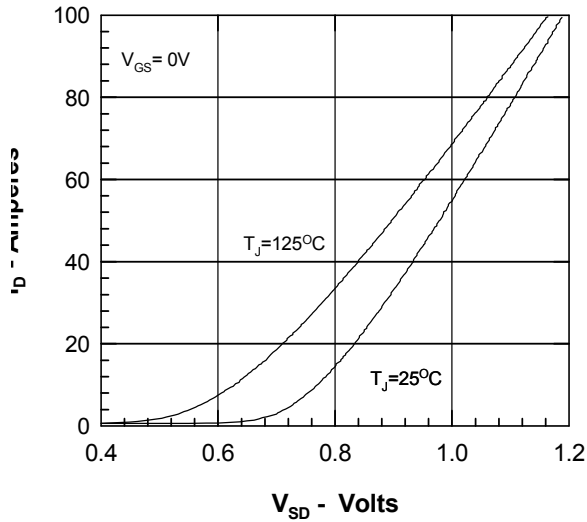


Figure 10. Transient Thermal Resistance

