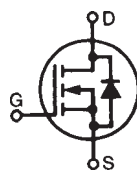


## Polar3™ HiperFET™ Power MOSFET

**IXFT50N60P3**  
**IXFQ50N60P3**  
**IXFH50N60P3**

**$V_{DSS} = 600V$**   
 **$I_{D25} = 50A$**   
 **$R_{DS(on)} \leq 160m\Omega$**

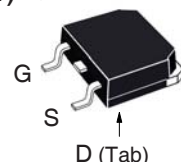
N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Rectifier



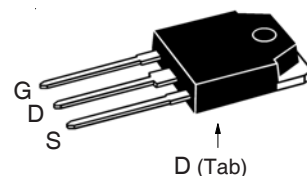
Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ C$ to $150^\circ C$	600	V
$V_{DGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$	600	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ C$	50	A
$I_{DM}$	$T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$	125	A
$I_A$	$T_C = 25^\circ C$	25	A
$E_{AS}$	$T_C = 25^\circ C$	1	J
$dv/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$	35	V/ns
$P_D$	$T_C = 25^\circ C$	1040	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	$^\circ C$
$T_{SOLD}$	Plastic Body for 10s	260	$^\circ C$
$M_d$	Mounting Torque (TO-247 & TO-3P)	1.13 / 10	Nm/lb.in
Weight	TO-268	4.0	g
	TO-3P	5.5	g
	TO-247	6.0	g

Symbol	Test Conditions ( $T_J = 25^\circ C$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = 1mA$	600		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 4mA$	3.0		5.0 V
$I_{GSS}$	$V_{GS} = \pm 30V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$ , $V_{GS} = 0V$ $T_J = 125^\circ C$			25 $\mu A$ 2 mA
$R_{DS(on)}$	$V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			160 m $\Omega$

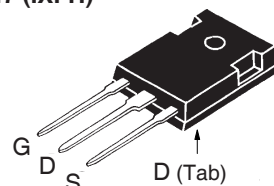
TO-268 (IXFT)



TO-3P (IXFQ)



TO-247 (IXFH)



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

### Features

- Fast Intrinsic Rectifier
- Avalanche Rated
- Low  $R_{DS(ON)}$  and  $Q_G$
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = 20\text{V}, I_D = 0.5 \cdot I_{D25}, \text{Note 1}$	32	55	S
$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$		6300	pF
$C_{oss}$			630	pF
$C_{rss}$			2.5	pF
$R_{Gi}$	Gate Input Resistance		1.0	$\Omega$
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$ $R_G = 1\Omega$ (External)		31	ns
$t_r$			20	ns
$t_{d(off)}$			62	ns
$t_f$			17	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$		94	nC
$Q_{gs}$			27	nC
$Q_{gd}$			23	nC
$R_{thJC}$	(TO-247 & TO-3P)		0.12	$^\circ\text{C/W}$
$R_{thCS}$				$^\circ\text{C/W}$

## Source-Drain Diode

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{V}$			50 A
$I_{SM}$	Repetitive, Pulse Width Limited by $T_{JM}$			200 A
$V_{SD}$	$I_F = I_S, V_{GS} = 0\text{V}, \text{Note 1}$			1.4 V
$t_{rr}$	$I_F = 25\text{A}, -di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GS} = 0\text{V}$		11	250 ns
$I_{RM}$				A
$Q_{RM}$				$\mu\text{C}$

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

## TO-3P Outline

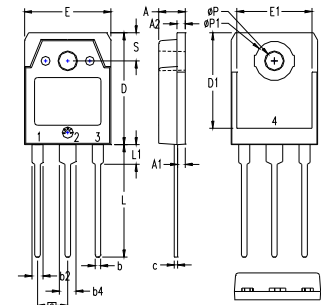


Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$

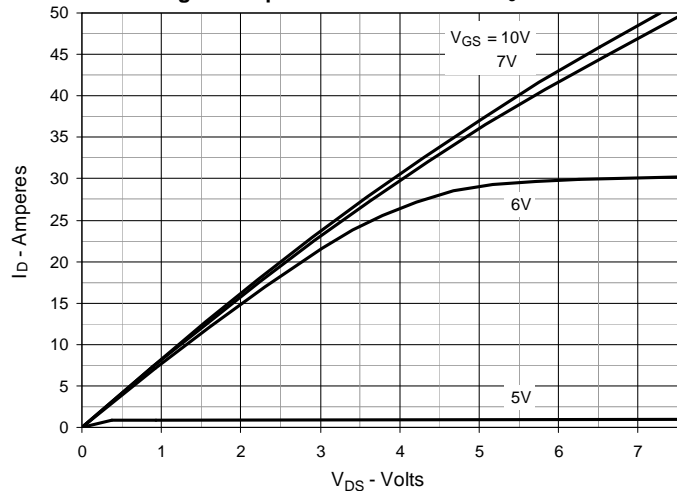


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

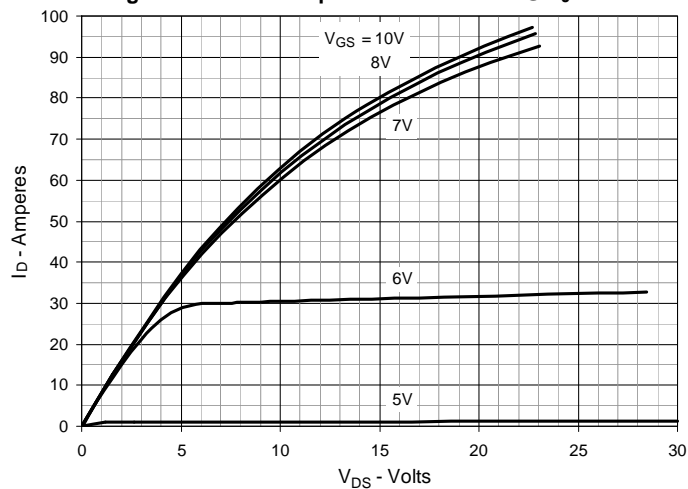


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

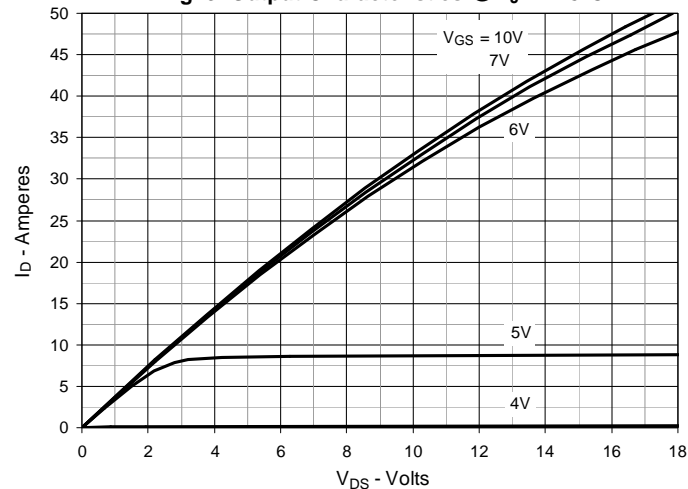


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 25\text{A}$  Value vs. Junction Temperature

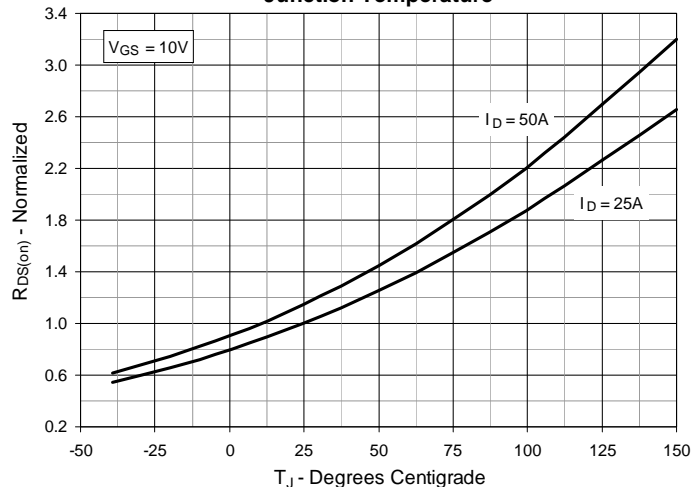


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 25\text{A}$  Value vs. Drain Current

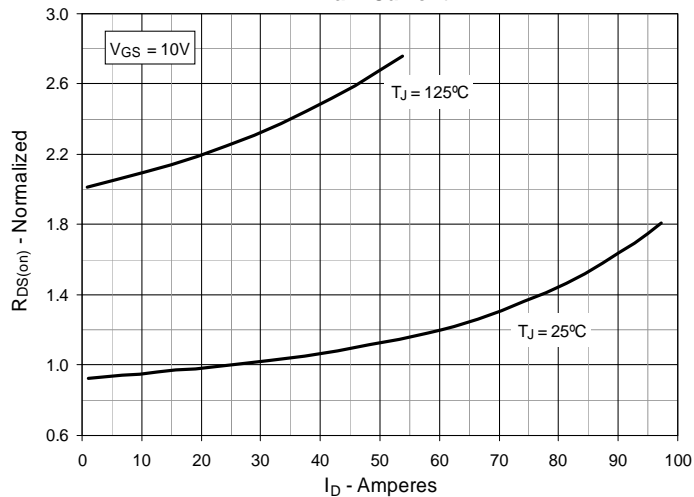


Fig. 6. Maximum Drain Current vs. Case Temperature

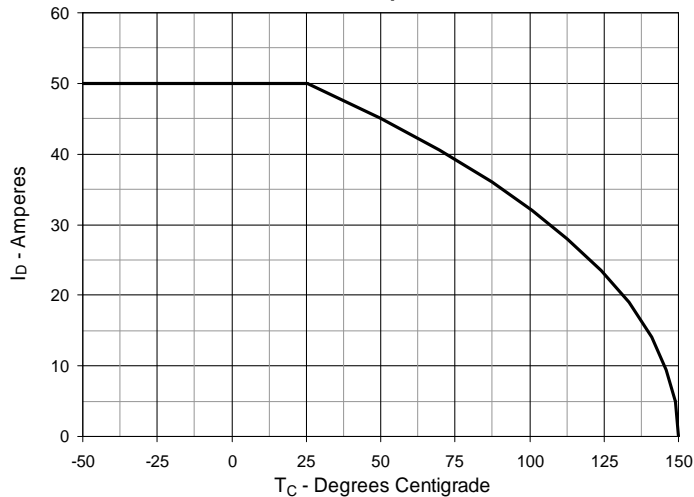


Fig. 7. Input Admittance

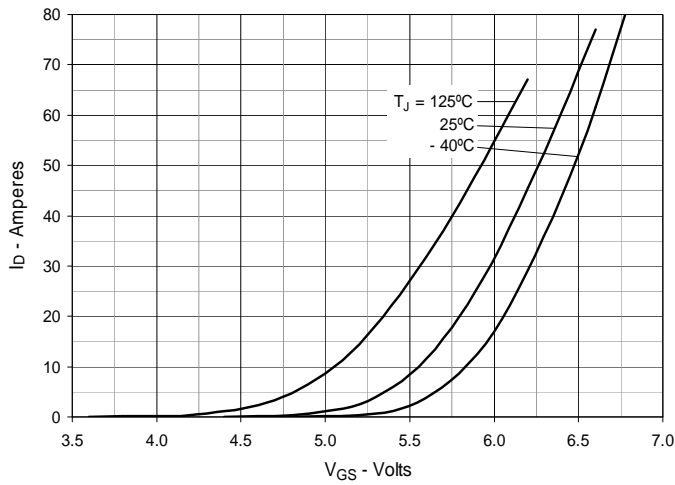


Fig. 8. Transconductance

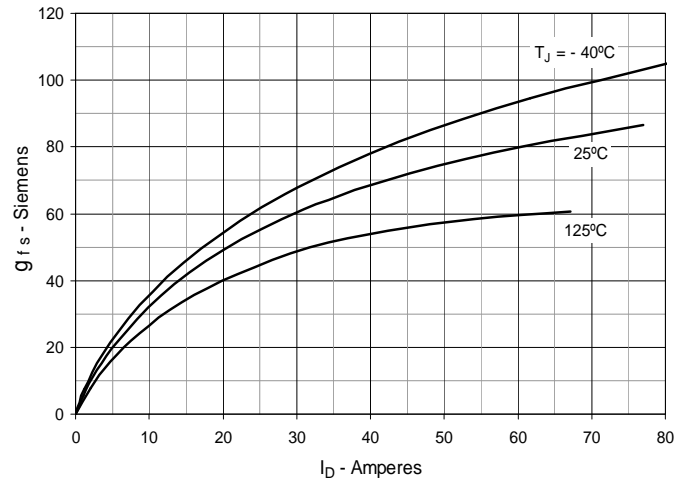


Fig. 9. Forward Voltage Drop of Intrinsic Diode

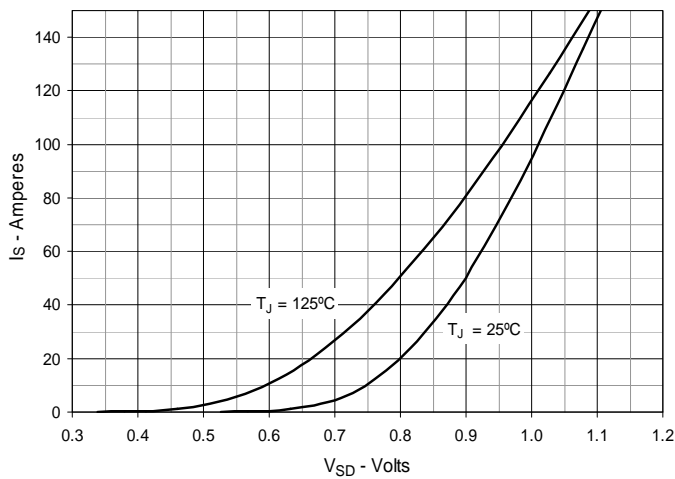


Fig. 10. Gate Charge

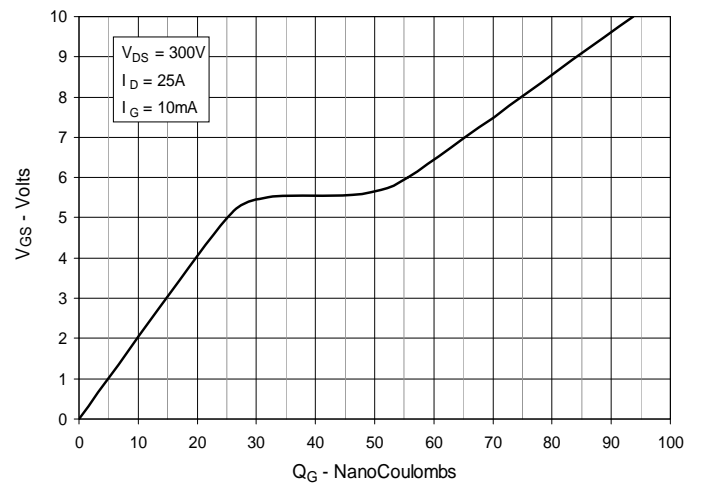


Fig. 11. Capacitance

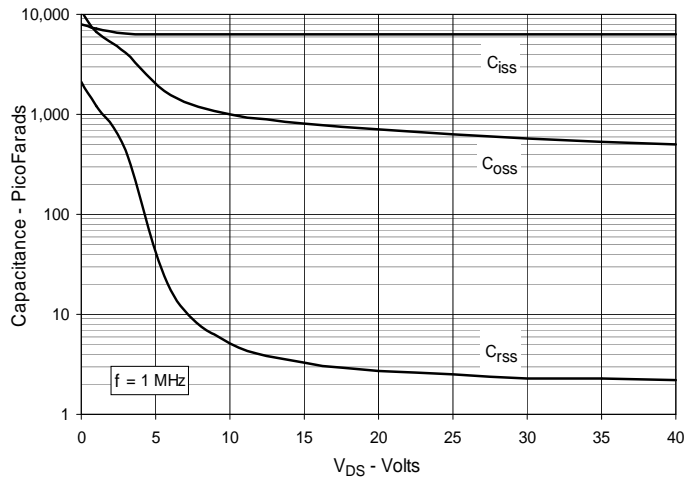


Fig. 12. Forward-Bias Safe Operating Area

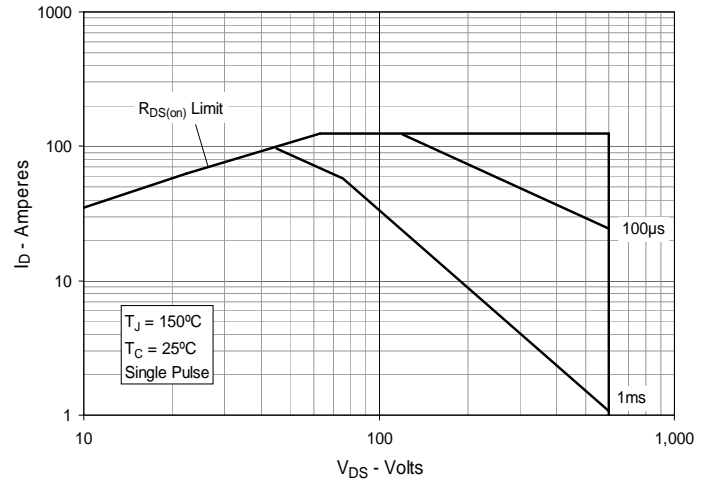
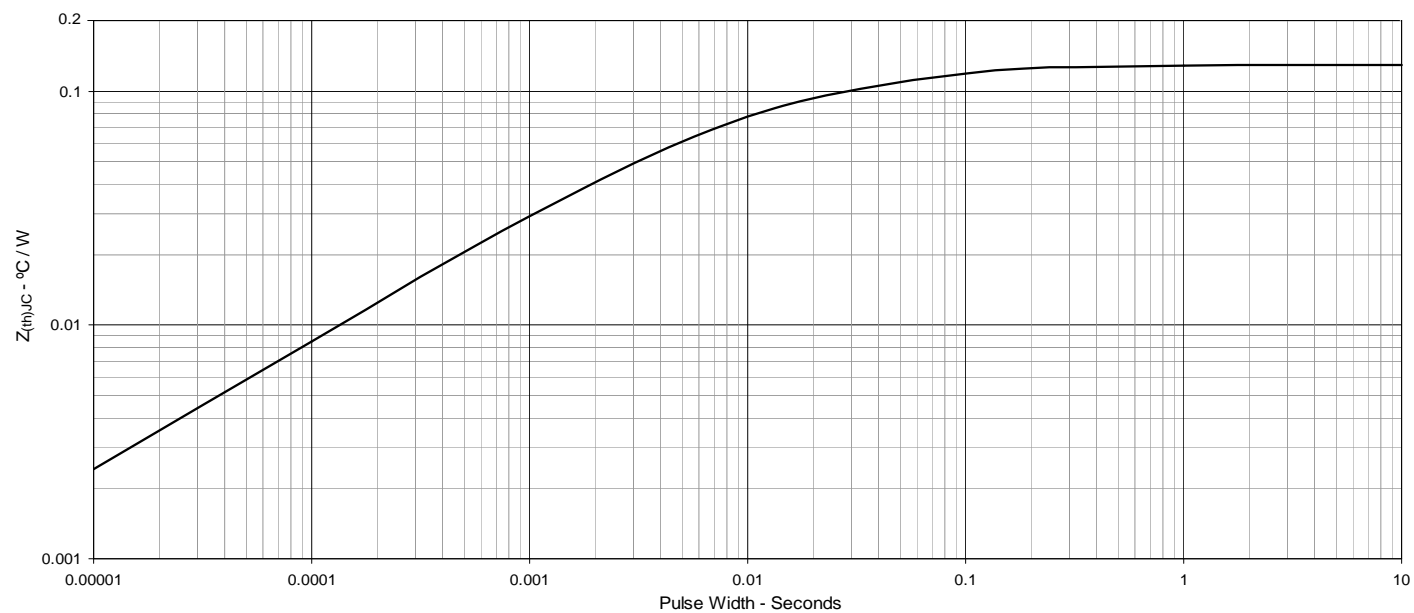


Fig. 13. Maximum Transient Thermal Impedance





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