IXYS

HiPerFET™ Power MOSFETs

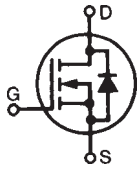
IXFA 3N120
IXFP 3N120

V_{DSS} = 1200 V
I_{D25} = 3 A
$R_{DS(on)}$ = 4.5 Ω

$t_{rr} \leq 300$ ns

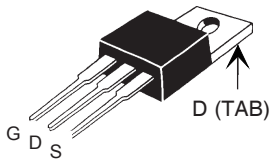
N-Channel Enhancement Mode
Avalanche Rated, Low Q_g, High dv/dt

Preliminary Data Sheet

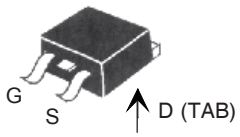


Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	1200	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ	1200	V
V_{GS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	3	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	12	A
I_{AR}	T_C = 25°C	3	A
E_{AR}	T_C = 25°C	20	mJ
E_{AS}		700	mJ
dv/dt	$I_S \leq I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \leq V_{DSS}$, $T_J \leq 150$°C, R_G = 4.7 Ω	10	V/ns
P_D	T_C = 25°C	200	W
T_J		-55 to +150	°C
T_{JM}		150	°C
T_{stg}		-55 to +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s	300	°C
M_d	Mounting torque (TO-220)	1.13/10	Nm/lb.in.
Weight	TO-220	4	g
	TO-263	2	g

TO-220 (IXFP)



TO-263 (IXFA)



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

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_{DSS}	V_{GS} = 0 V, I_D = 1 mA		1200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1.5 mA		2.5		5.0	V
I_{GSS}	V_{GS} = ±20 V_{DC}, V_{DS} = 0				±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$	T_J = 25°C			50	µA
	V_{GS} = 0 V	T_J = 125°C			2	mA
$R_{DS(on)}$	V_{GS} = 10 V, $I_D = 0.5\ I_{D25}$ Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %				4.5	Ω

Features

- Low gate charge and capacitances
  - easier to drive
  - faster switching
- International standard packages
- Low $R_{DS\ (on)}$
- Rated for unclamped Inductive load Switching (UIS)
- Molding epoxies meet UL 94 V-0 flammability classification

Advantages

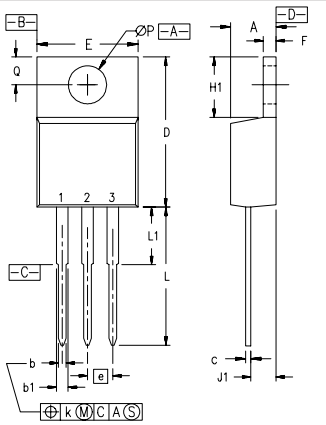
- Easy to mount
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	V_{DS} = 20 V; I_D = 0.5 • I_{D25}, pulse test	1.5	2.5		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1050		pF
C_{oss}			100		pF
C_{rss}			25		pF
$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25} R_G = 4.7 Ω (External),		17		ns
t_r			15		ns
$t_{d(off)}$			32		ns
t_f			18		ns
$Q_{g(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		39		nC
Q_{gs}			9		nC
Q_{gd}			22		nC
R_{thJC}				0.62	K/W
R_{thCK}	(TO-220)		0.25		K/W

Source-Drain Diode

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
I_S	V_{GS} = 0 V			3	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			12	A
V_{SD}	$I_F = I_S$, V_{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			1.5	V
t_{rr}	$I_F = I_S$, -di/dt = 100 A/μs, V_R = 100 V			300	ns
Q_{RM}			0.4		μC
I_{RM}			1.2		A

TO-220 (IXFP) Outline

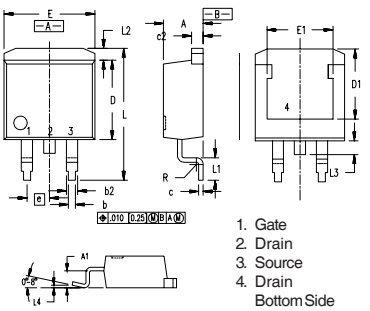


Pins: 1 - Gate 2 - Drain
3 - Source 4 - Drain
Bottom Side

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-220 AB.

TO-263 (IXFA) Outline



1. Gate
2. Drain
3. Source
4. Drain
Bottom Side

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015
R	0.46	0.74	.018	.029

Fig. 1. Output Characteristics @ 25 Deg. C

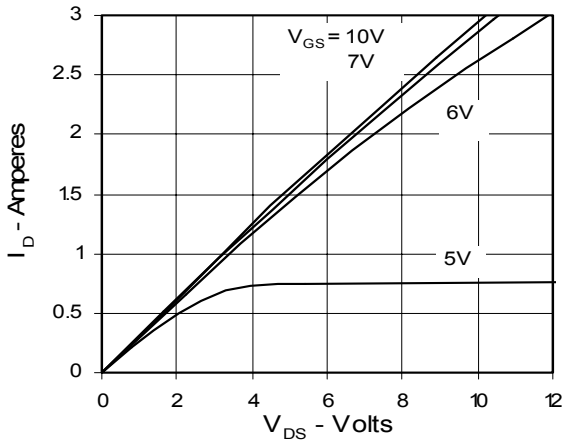


Fig. 2. Extended Output Characteristics @ 25 deg. C

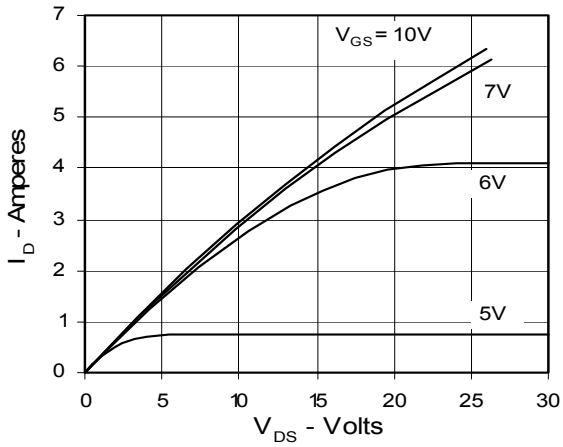


Fig. 3. Output Characteristics @ 125 Deg. C

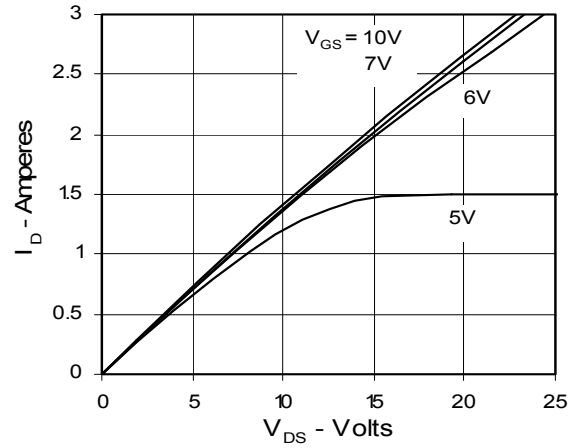


Fig. 4. $R_{DS(on)}$ Normalized to I_{D25} Value vs. Junction Temperature

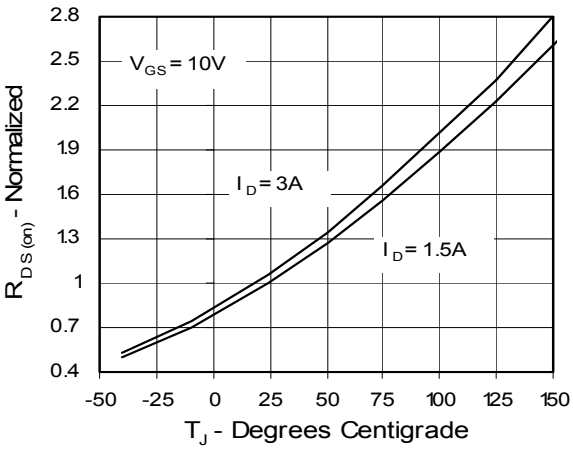


Fig. 5. $R_{DS(on)}$ Normalized to I_{D25} Value vs. I_D

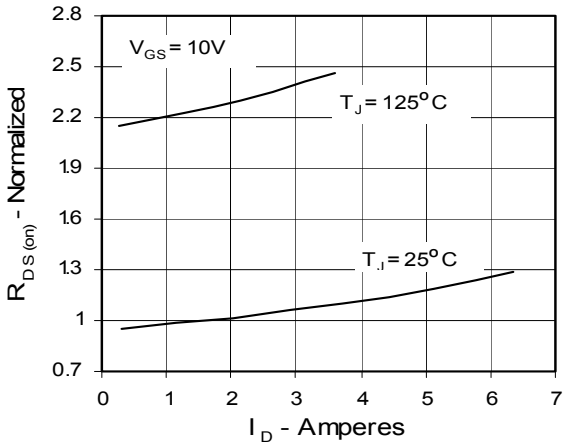


Fig. 6. Drain Current vs. Case Temperature

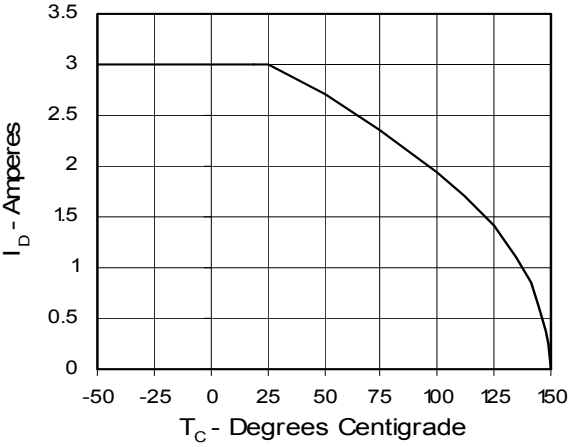


Fig. 7. Input Admittance

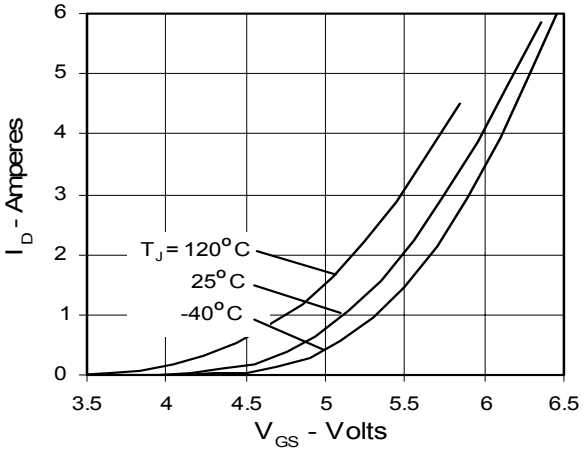


Fig. 8. Transconductance

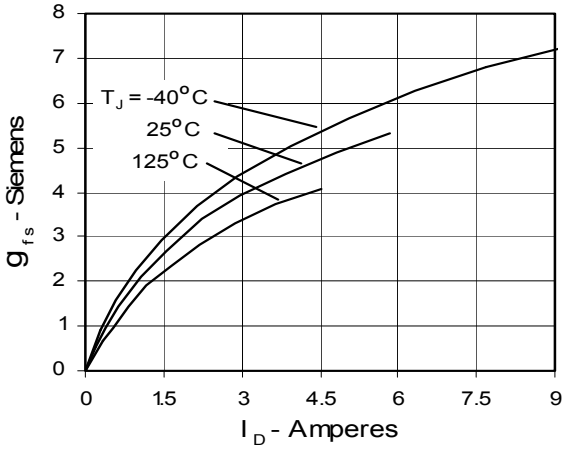


Fig. 9. Source Current vs. Source-To-Drain Voltage

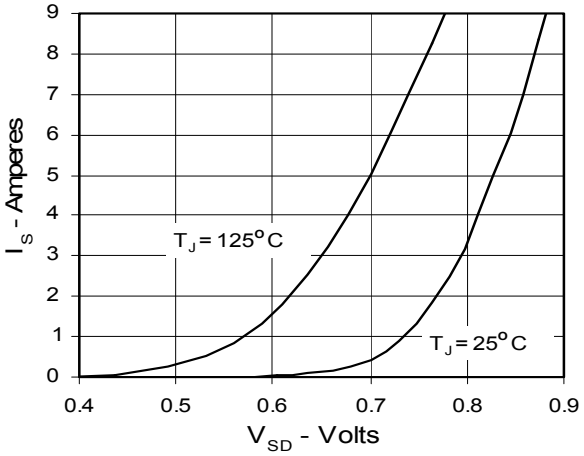


Fig. 10. Gate Charge

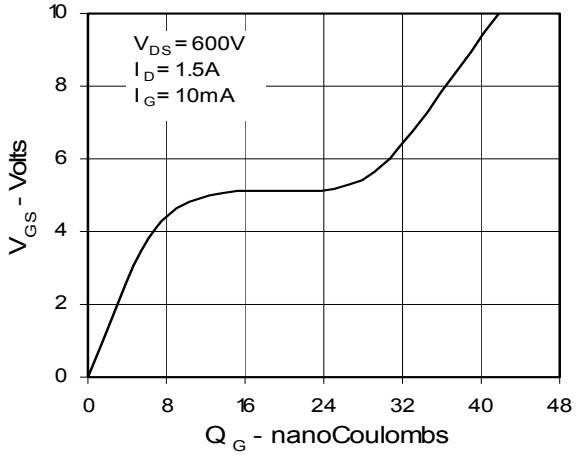


Fig. 11. Capacitance

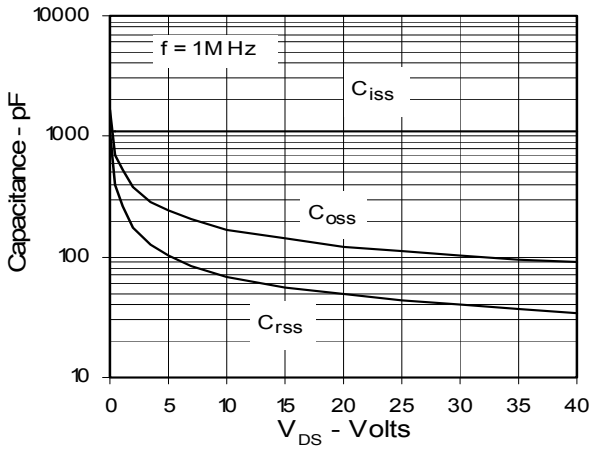
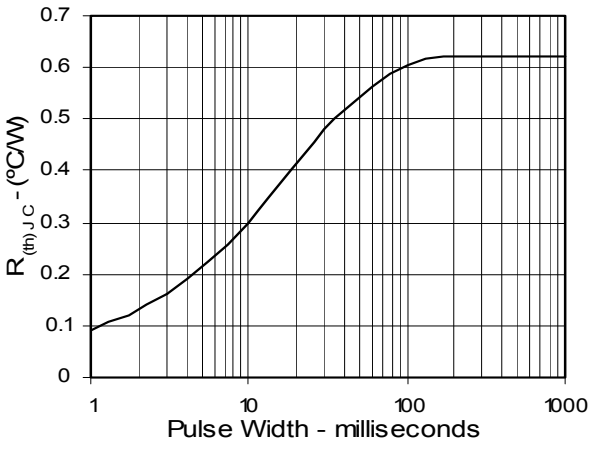


Fig. 12. Maximum Transient Thermal Resistance



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