IXYS

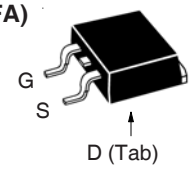
Polar3™ HiperFET™ Power MOSFET

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Rectifier

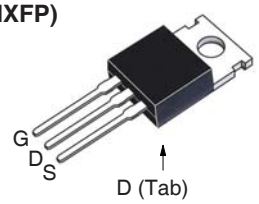
IXFA22N60P3
IXFP22N60P3
IXFQ22N60P3
IXFH22N60P3

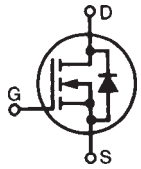
V_{DSS} = 600V
I_{D25} = 22A
$R_{DS(on)}$ ≤ 390mΩ

TO-263 (IXFA)

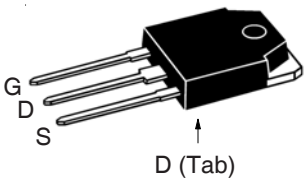


TO-220 (IXFP)

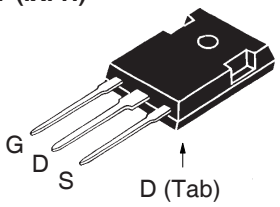




TO-3P (IXFQ)



TO-247 (IXFH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	600	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	600	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	T_C = 25°C	22	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	55	A
I_A	T_C = 25°C	11	A
E_{AS}	T_C = 25°C	400	mJ
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	35	V/ns
P_D	T_C = 25°C	500	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb
M_d	Mounting Torque (TO-247, TO-220 & TO-3P)	1.13 / 10	Nm/lb.in
Weight	TO-263	2.5	g
	TO-220	3.0	g
	TO-3P	5.5	g
	TO-247	6.0	g

Symbol	Test Conditions (T_J = 25°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 = 1.5mA	3.0		5.0	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			25	μA
	T_J = 125°C			1.25	mA
$R_{DS(on)}$	V_{GS} = 10V, $I_D = 0.5 \bullet I_{D25}$, Note 1			390	mΩ

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

© 2018 IXYS CORPORATION, All Rights Reserved

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 20V, I_D = 0.5 • I_{D25}, Note 1	14	24		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		2600		pF
C_{oss}			265		pF
C_{rss}			3.4		pF
R_{Gi}	Gate Input Resistance		2.1		Ω
$t_{d(on)}$	**Resistive Switching Times**		28		ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		17		ns
$t_{d(off)}$	R_G = 1Ω (External)		54		ns
t_f			19		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		38		nC
Q_{gs}			10		nC
Q_{gd}			11		nC
R_{thJC}				0.25	°C/W
R_{thCS}	(TO-220)		0.50		°C/W
	(TO-247 & TO-3P)		0.25		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			22	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			88	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.4	V
t_{rr}	I_F = 11A, -di/dt = 100A/μs			250	ns
I_{RM}	V_R = 100V, V_{GS} = 0V		8.0		A
Q_{RM}			0.8		μC

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25°C

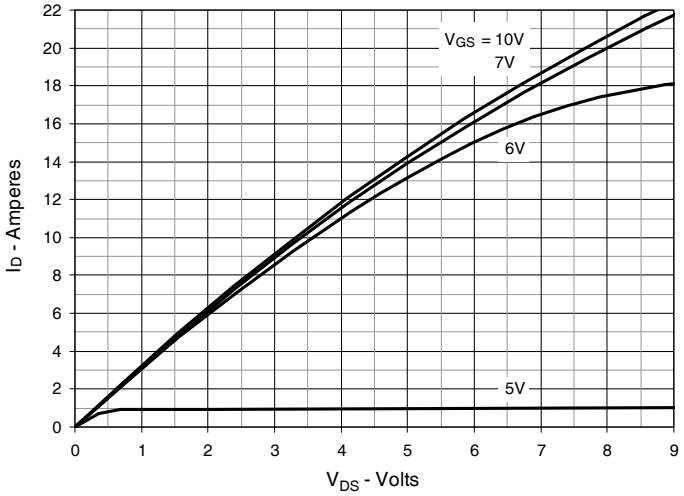


Fig. 2. Extended Output Characteristics @ T_J = 25°C

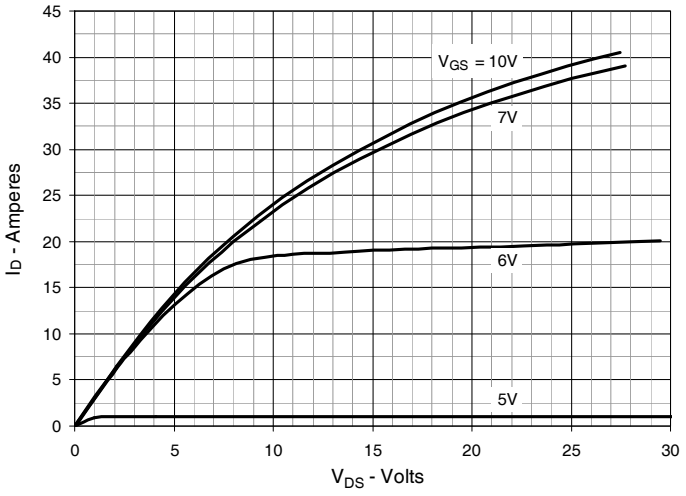


Fig. 3. Output Characteristics @ T_J = 125°C

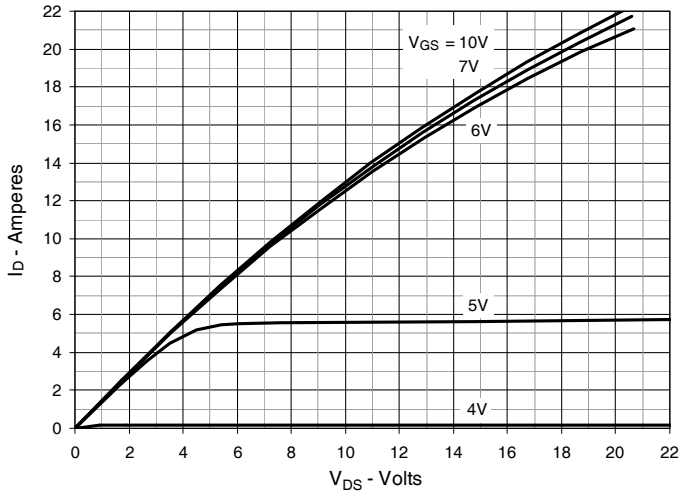


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 11A Value vs. Junction Temperature

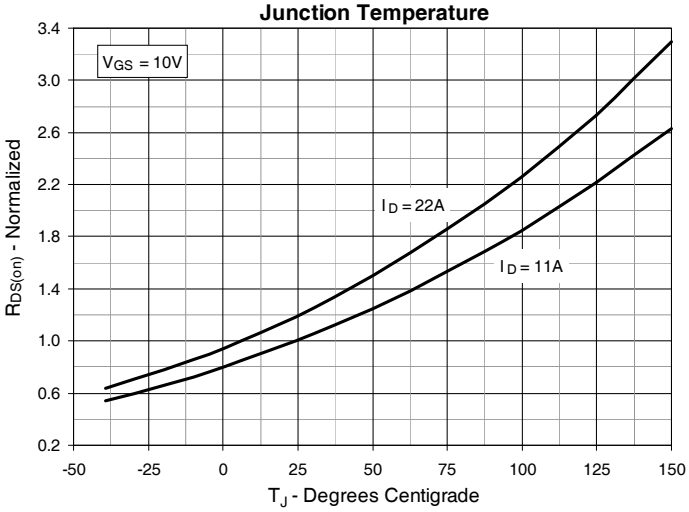


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 11A Value vs. Drain Current

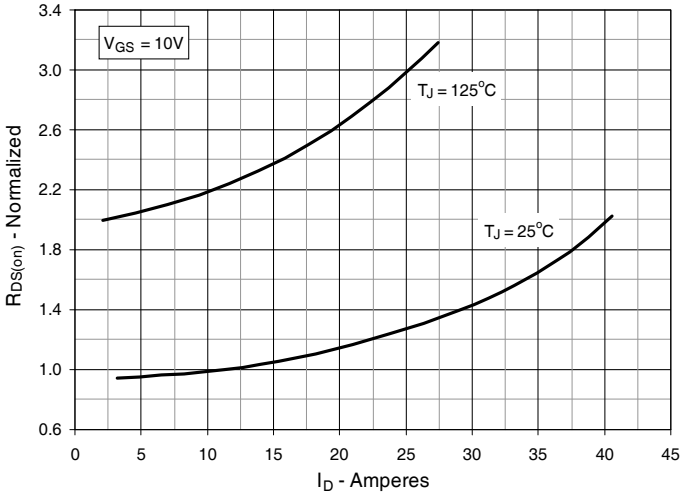
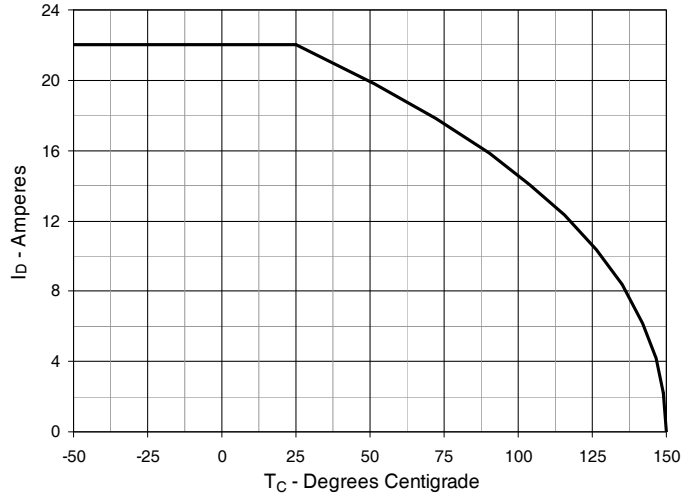


Fig. 6. Maximum Drain Current vs. Case Temperature



© 2018 IXYS CORPORATION, All Rights Reserved

Fig. 7. Input Admittance

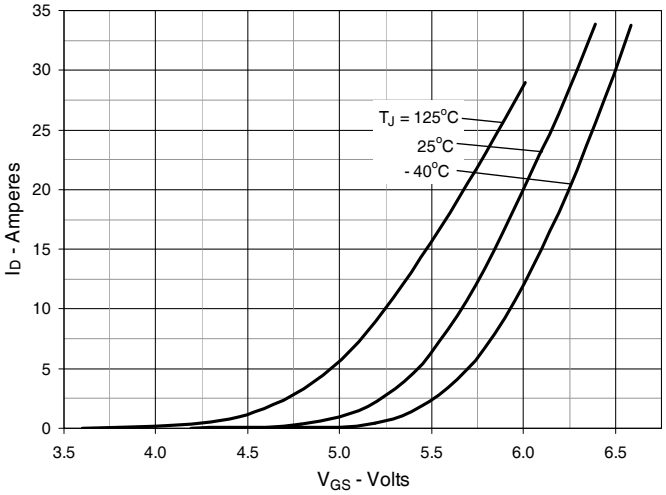


Fig. 8. Transconductance

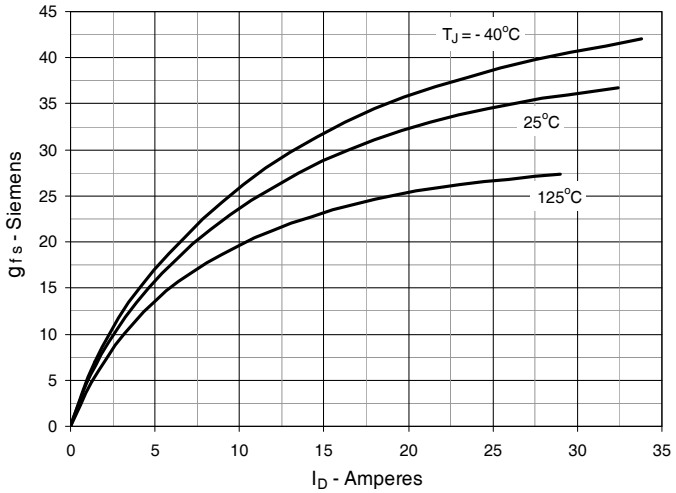


Fig. 9. Forward Voltage Drop of Intrinsic Diode

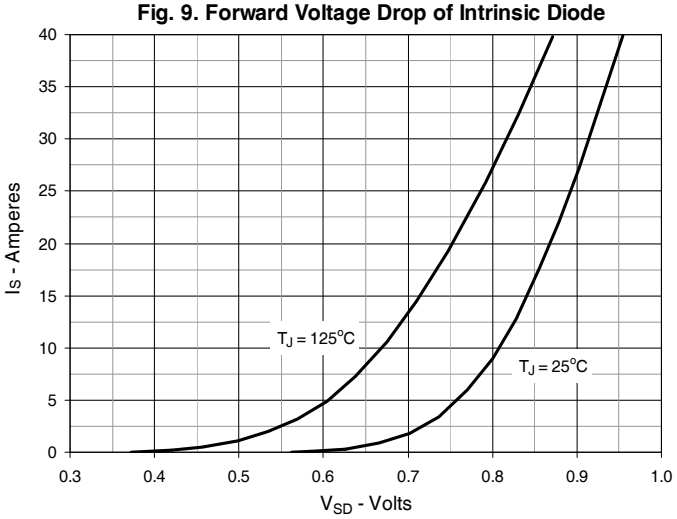


Fig. 10. Gate Charge

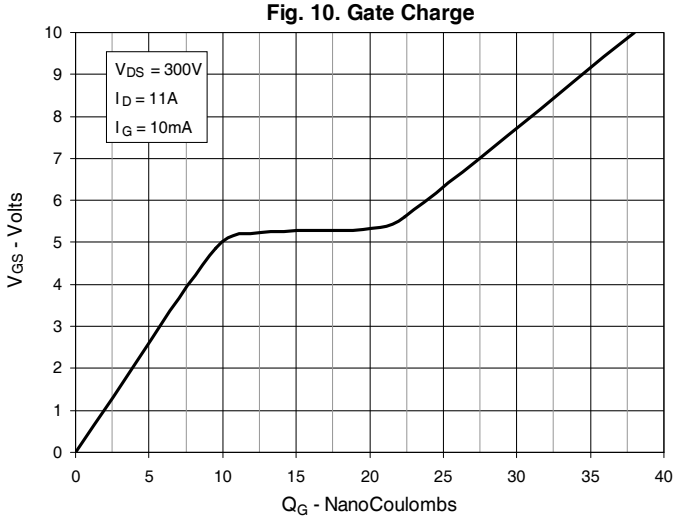


Fig. 11. Capacitance

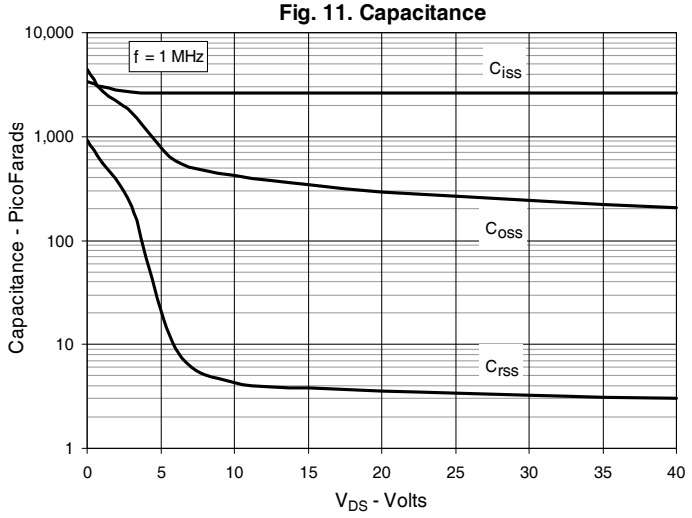


Fig. 12. Forward-Bias Safe Operating Area

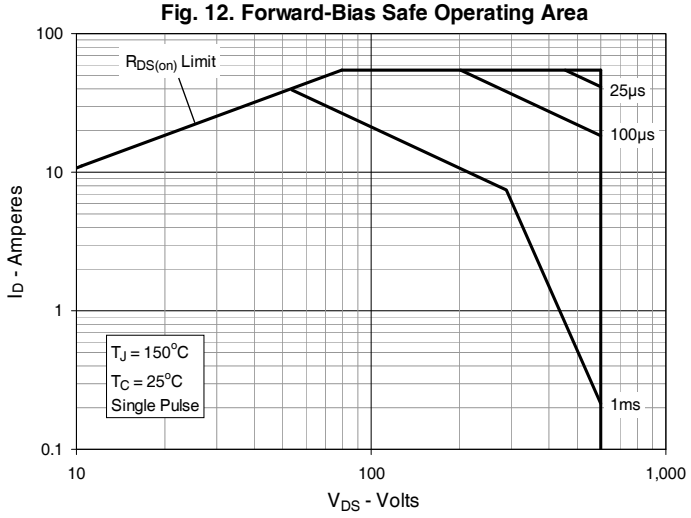
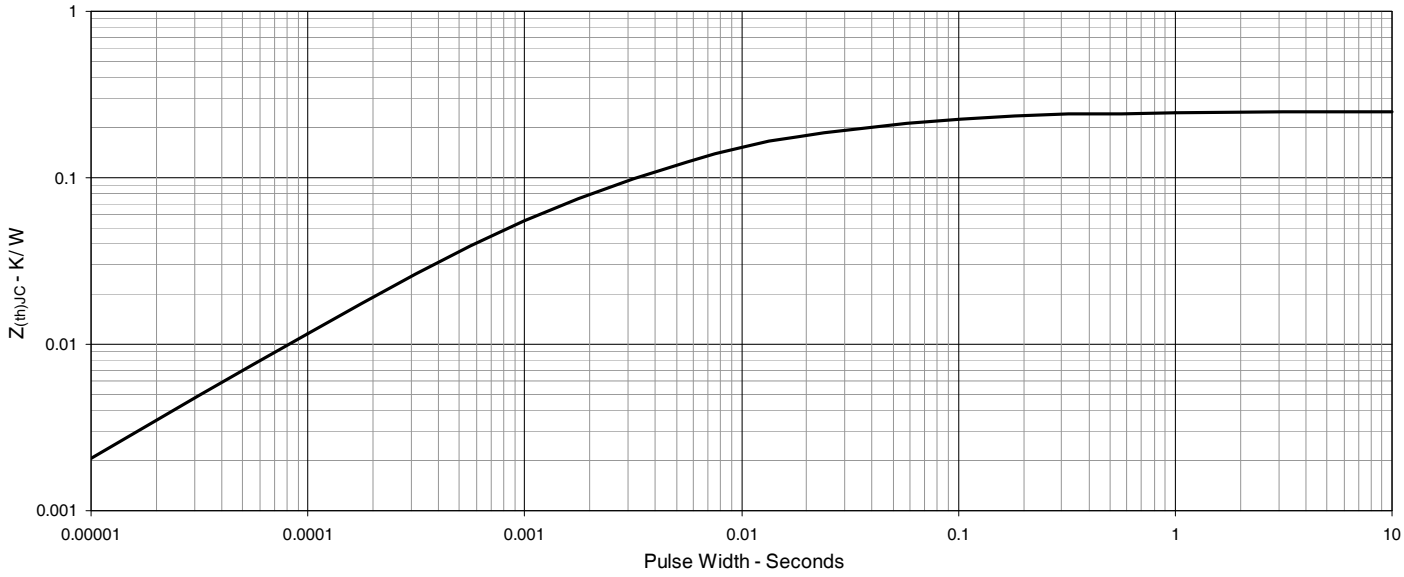
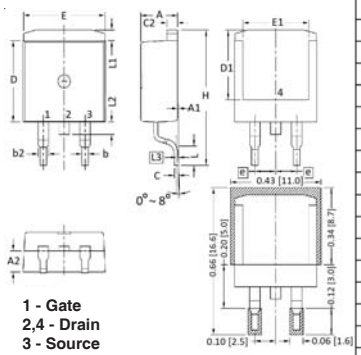


Fig. 13. Maximum Transient Thermal Impedance



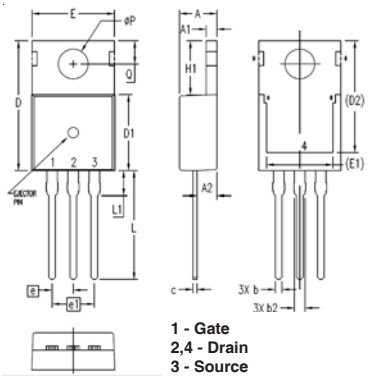
© 2018 IXYS CORPORATION, All Rights Reserved

TO-263 Outline



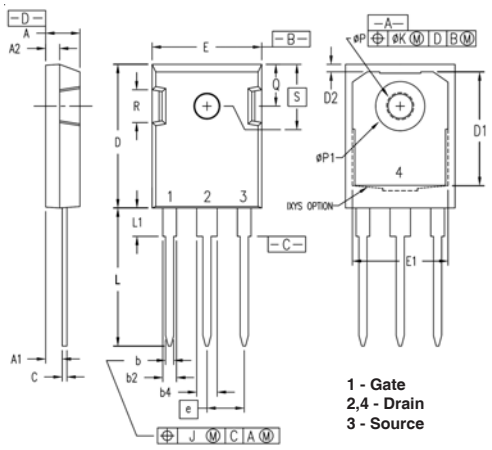
SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.170	.185	4.30	4.70
A1	.000	.008	0.00	0.20
A2	.091	.098	2.30	2.50
b	.028	.035	0.70	0.90
b2	.046	.060	1.18	1.52
C	.018	.024	0.45	0.60
C2	.049	.060	1.25	1.52
D	.340	.370	8.63	9.40
D1	.300	.327	7.62	8.30
E	.380	.410	9.65	10.41
E1	.270	.330	6.86	8.38
e	.100 BSC		2.54 BSC	
H	.580	.620	14.73	15.75
L	.075	.105	1.91	2.67
L1	.039	.060	1.00	1.52
L2	—	.070	—	1.77
L3	.010 BSC		0.254 BSC	

TO-220 Outline



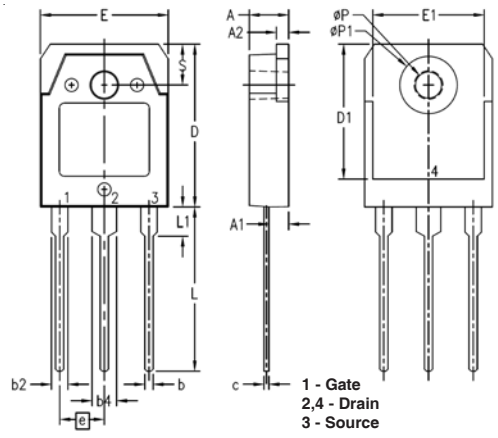
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
b	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
c	.014	.026	0.35	0.65
D	.587	.626	14.90	15.90
D1	.335	.370	8.50	9.40
(D2)	.500	.531	12.70	13.50
E	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
H1	.244	.268	6.20	6.80
L	.492	.547	12.50	13.90
L1	.110	.154	2.80	3.90
ØP	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20

TO-247 Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b2	.075	.087	1.91	2.20
b4	.115	.126	2.92	3.20
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
D1	.650	.690	16.51	17.53
D2	.035	.050	0.89	1.27
E	.620	.635	15.75	16.13
E1	.545	.565	13.84	14.35
e	.215 BSC		5.45 BSC	
J	--	.010	--	0.25
K	--	.025	--	0.64
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
ØP	.140	.144	3.55	3.65
ØP1	.275	.290	6.99	7.37
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.242 BSC		6.15 BSC	

TO-3P Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.181	.197	4.60	5.00
A1	.087	1.02	2.20	2.60
A2	.057	.065	1.45	1.65
b	.031	.047	0.80	1.20
b2	.071	.087	1.80	2.20
b4	.110	.126	2.80	3.20
c	.022	.031	0.55	0.80
D	.776	.791	19.70	20.10
D1	.640	.680	16.26	17.27
E	.606	.622	15.40	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.130	.146	3.30	3.70
ØP	.122	.134	3.10	3.40
ØP1	.272	.280	6.90	7.10
S	.189	.205	4.80	5.20

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.