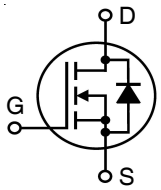
IXYS

Polar3™ HiPerFET™ Power MOSFET

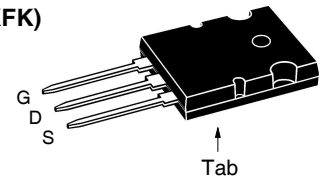
IXFK120N30P3
IXFX120N30P3

V_{DSS} = 300V
I_{D25} = 120A
$R_{DS(on)}$ ≤ 27mΩ
t_{rr} ≤ 250ns

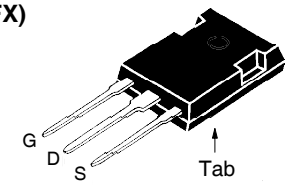
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



TO-264
(IXFK)



PLUS247
(IXFX)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	300	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	300	V
V_{GSS}	Continuous	± 20	V
V_{GSM}	Transient	± 30	V
I_{D25}	T_C = 25°C	120	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	300	A
I_A	T_C = 25°C	60	A
E_{AS}	T_C = 25°C	3	J
P_D	T_C = 25°C	1130	W
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le$ 150°C	35	V/ns
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}	Plastic Body for 10s	260	°C
M_d	Mounting Torque (TO-264)	1.13/10	Nm/lb.in
F_C	Mounting Force (PLUS247)	20..120 /4.5..27	N/lb
Weight	TO-264	10	g
	PLUS247	6	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	300			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 4mA	3.0		5.0	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V			± 200	nA
I_{DSS}	V_{DS} = V_{DSS}, V_{GS} = 0V			25	μA
	T_J = 125°C			750	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Note 1			27	mΩ

Features

- Dynamic dv/dt Rating
- Avalanche Rated
- Fast Intrinsic Diode
- Low Q_G
- Low $R_{DS(on)}$
- Low Drain-to-Tab Capacitance
- Low Package Inductance

Advantages

- Easy to Mount
- Space Savings

Applications

- DC-DC Converters
- Battery Chargers
- Switch-Mode and Resonant-Mode Power Supplies
- Uninterrupted Power Supplies
- AC Motor Drives
- High Speed Power Switching Applications

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Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10V, I_D = 0.5 • I_{D25}, Note 1	54	90		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		8630		pF
C_{oss}			1406		pF
C_{rss}			20		pF
R_{Gi}	Gate Input Resistance		1.5		Ω
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25} R_G = 1Ω (External)		26		ns
t_r			13		ns
$t_{d(off)}$			60		ns
t_f			11		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		150		nC
Q_{gs}			40		nC
Q_{gd}			53		nC
R_{thJC}				0.11	°C/W
R_{thCS}			0.15		°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			120	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			480	A
V_{SD}	I_F = I_S , V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 60A, -di/dt = 100A/μs V_R = 100V, V_{GS} = 0V			250	ns
Q_{RM}			2.2		μC
I_{RM}			19.6		A

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

Fig. 1. Output Characteristics @ T_J = 25ºC

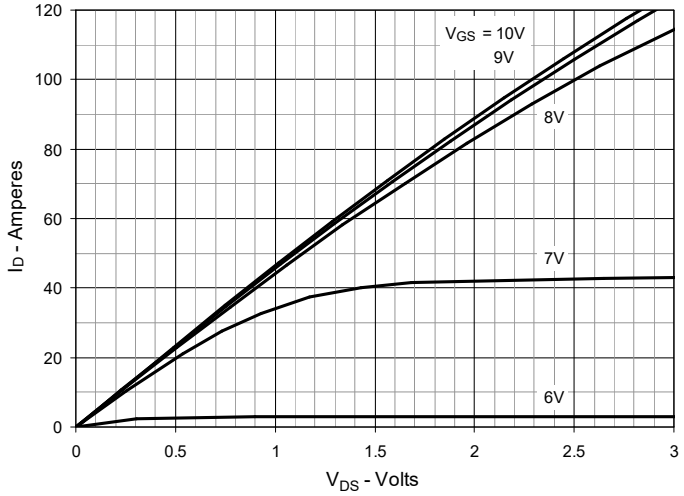

Fig. 2. Extended Output Characteristics @ T_J = 25ºC

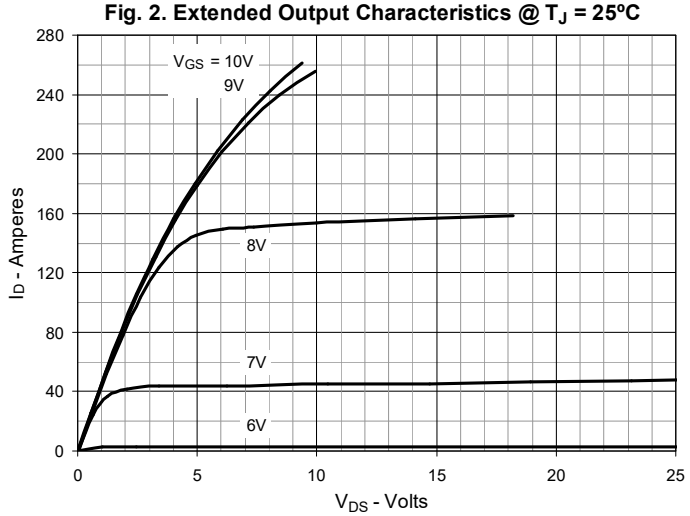

Fig. 3. Output Characteristics @ T_J = 125ºC

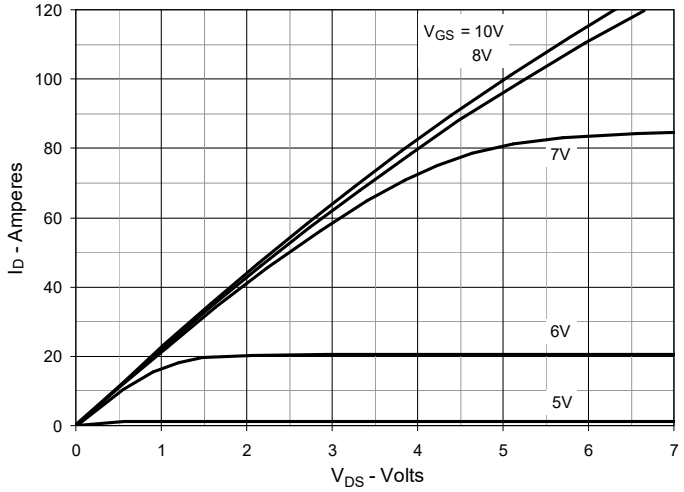

Fig. 4. $R_{DS(on)}$ Normalized to I_D = 60A Value vs. Junction Temperature

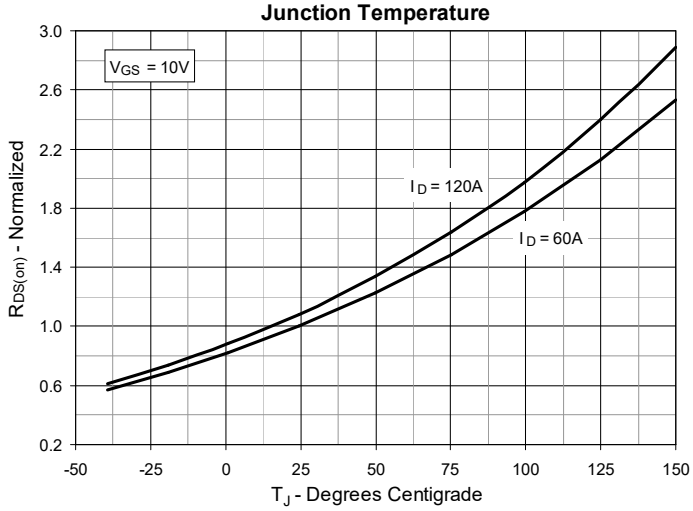

Fig. 5. $R_{DS(on)}$ Normalized to I_D = 60A Value vs. Drain Current

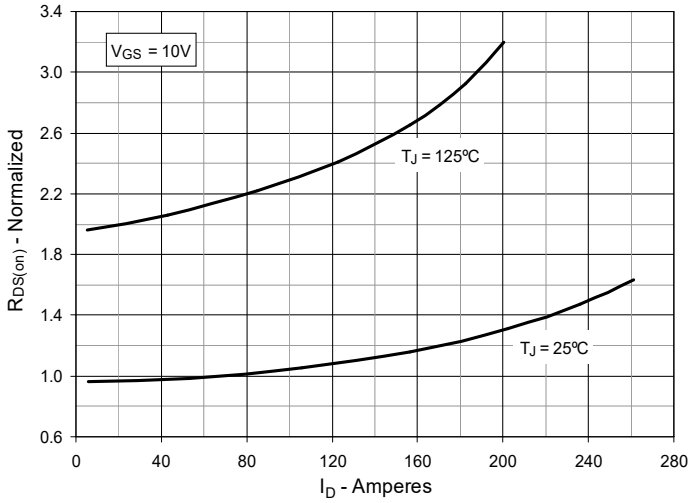

Fig. 6. Maximum Drain Current vs. Case Temperature

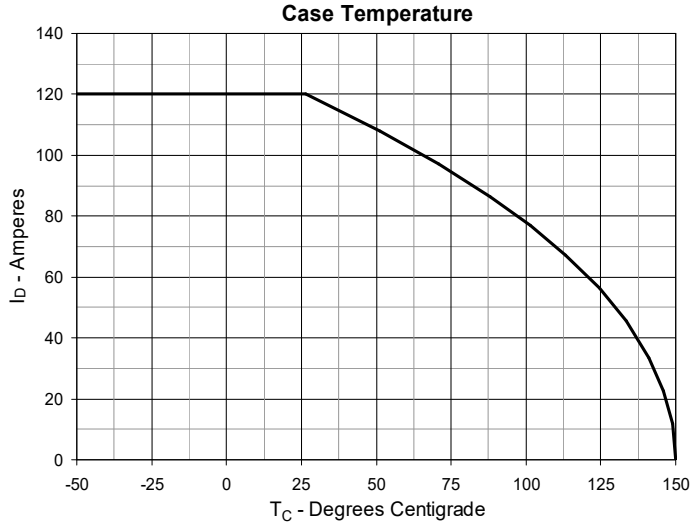

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Fig. 7. Input Admittance

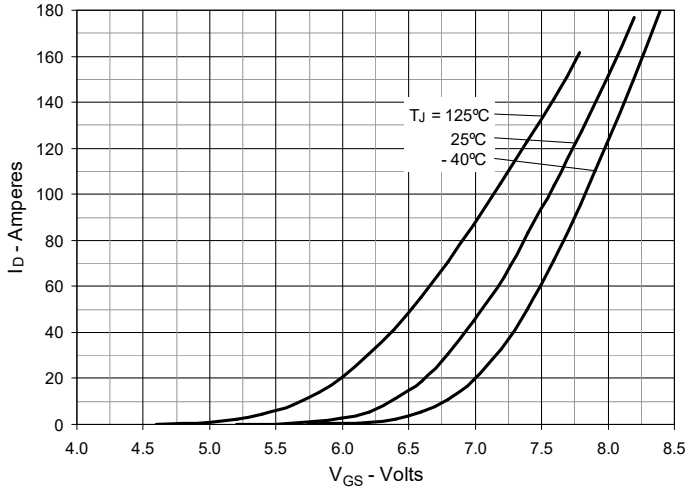

Fig. 8. Transconductance

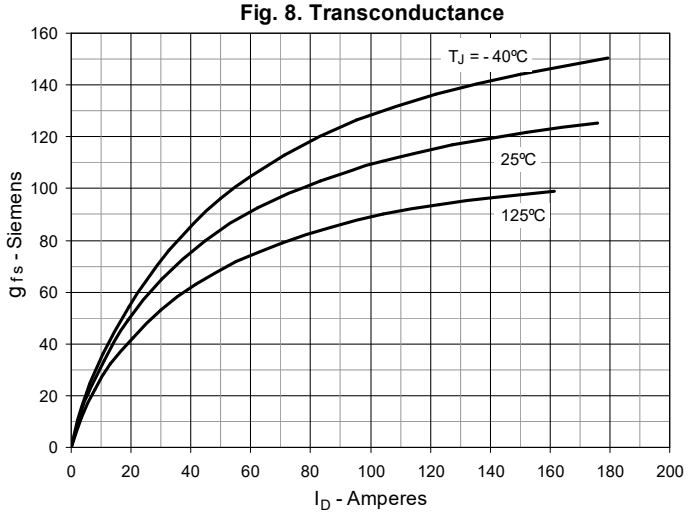

Fig. 9. Forward Voltage Drop of Intrinsic Diode

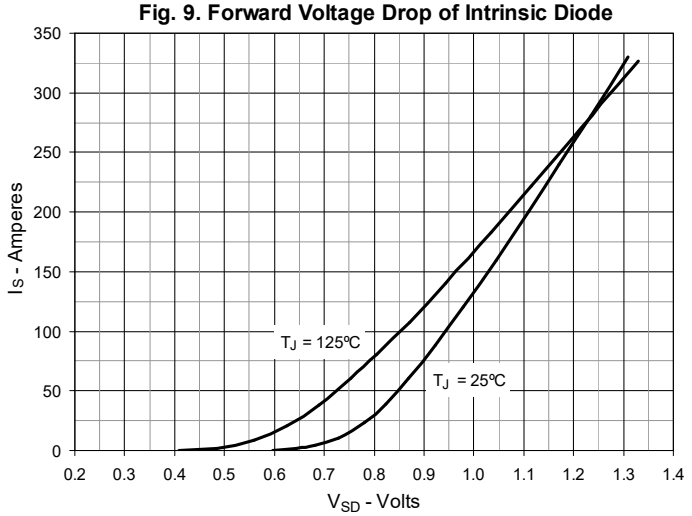

Fig. 10. Gate Charge

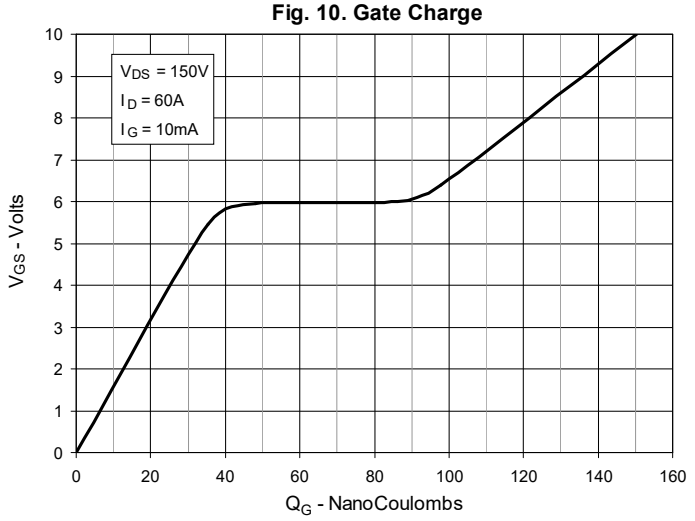

Fig. 11. Capacitance

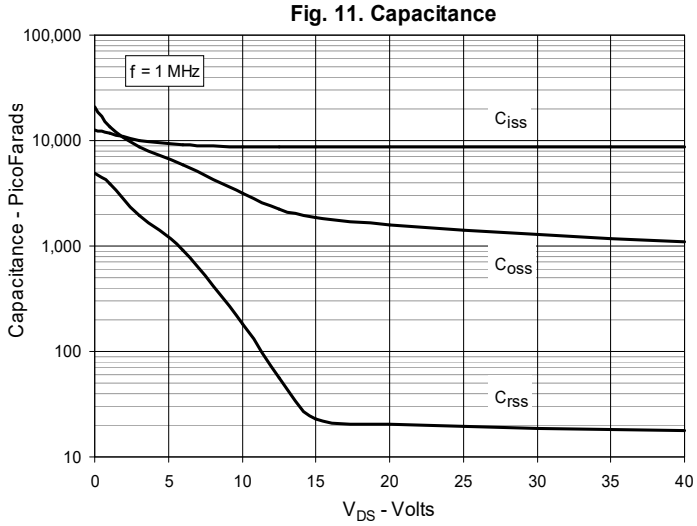

Fig. 12. Forward-Bias Safe Operating Area

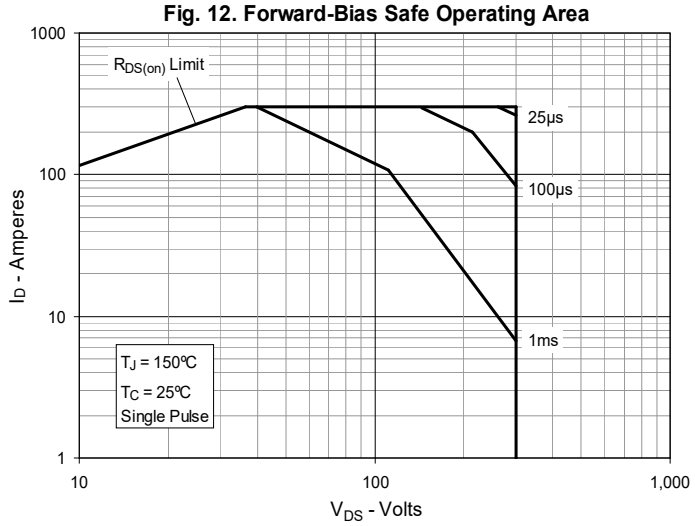

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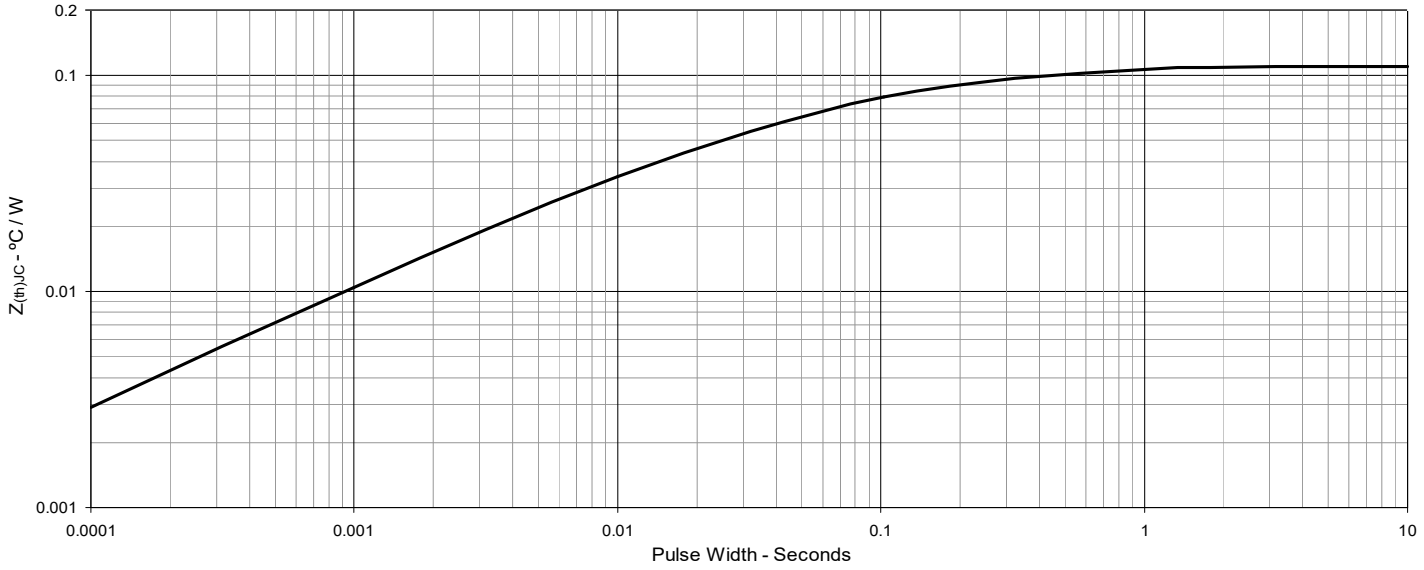
Fig. 13. Maximum Transient Thermal Impedance



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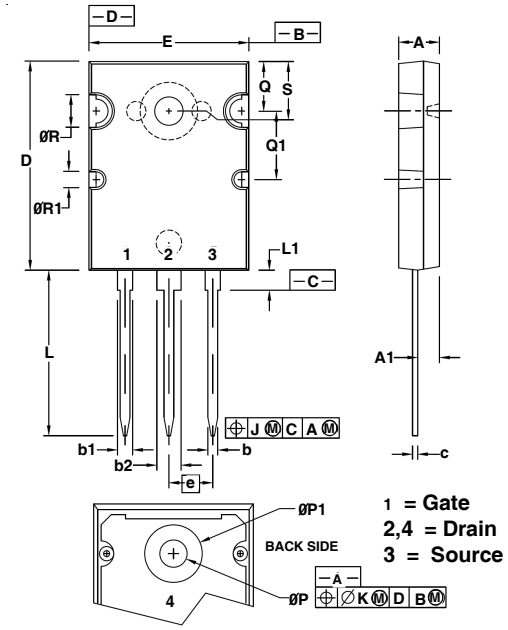
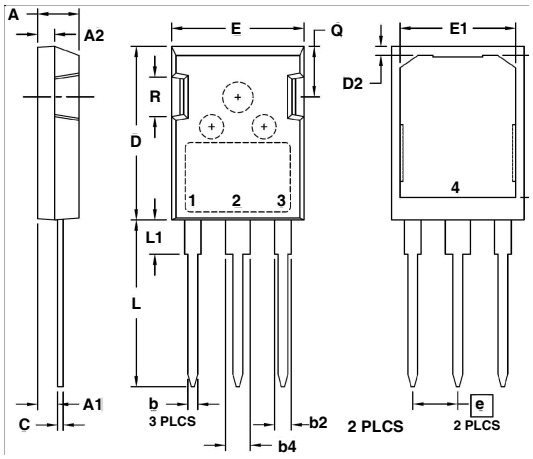
TO-264 Outline



SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
ØP1	.270	.290	6.86	7.37
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

PLUS247™ Outline



1 = Gate
2,4 = Drain
3 = Source

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	.520	.560	13.08	14.22
e	.215 BSC		5.45 BSC	
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

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