

MirrorFETs™ and LIMOFETs™

T-39-15

IXYS is developing new integrated solutions that simplify the logic-to-power interface while adding safeguard protection features to the power device. Because of its process compatibility with CMOS, HDMOS technology has enabled us to create a new family of "SMART" power MOS products. On the power device we have added monolithic current sensing to simplify the design of current mode switching power supplies. These devices will soon integrate on the power chip a function to monitor device junction temperature.

To complement these sensing power FETs, we will supply innovative CMOS IC driver circuits which accept the current and temperature sense signals, and provide status outputs which can be used to close the protection feedback loop.

IXYS' expanding "SMART" power product family is addressing the need for practical and cost-effective solutions to efficiently handle the critical two-way communications among the load, power device, and control logic.

MirrorFETs

MirrorFETs add a new capability to power control designs—load current sensing which eliminates high-power sense resistors or expensive current measuring circuitry. They are available in five-leaded versions of the popular TO-220 and TO-247 packages as well as in the new Z-Pac.

IXYS has improved the tracking accuracy of the current sense to within $\pm 2.5\%$ over the temperature range. The accuracy of these devices is less dependent on the sense voltage due to the high transconductance of HDMOS FET designs. This allows for sense voltages of 0.5 volts which matches IC input thresholds and results in better noise immunity.

MirrorFETs also come with a separate Kelvin source pad on the chip which is brought out separately from the load source terminal. In high frequency switching applications, the Kelvin source is used with the gate to reduce inductive noise generated when load and drive currents share common bond wires.

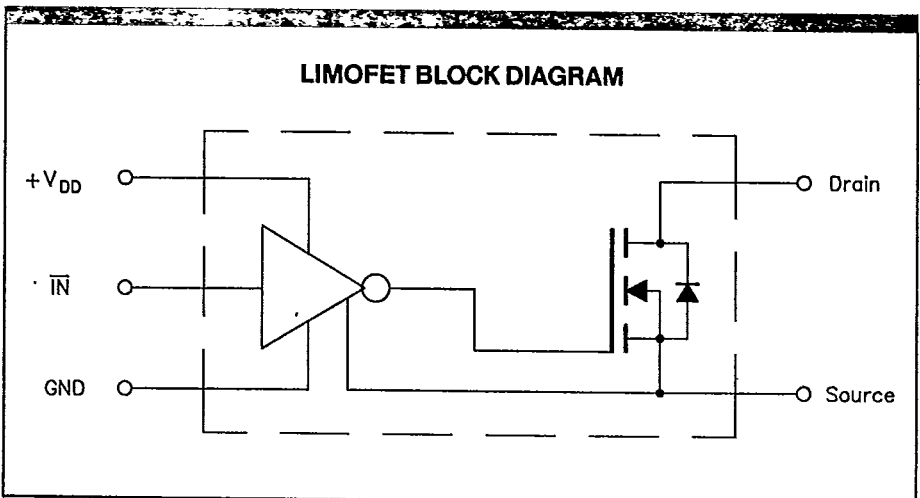
These devices have current handling capabilities ranging from 20 amps at 100 volts to 10 amps at 1000 volts. They offer the same level of ruggedness and low on-resistance as our standard N-channel power MOSFETs.

LIMOFETs—Logic In/MOS Output

In applications in which space and part count is critical, IXYS supplies a device which combines MegaMOS FETs and IC drive technology in one package.

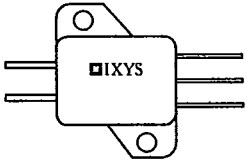
The initial family of LIMOFETs will be packaged in the new 5-pin hermetic Z-Pac. The input side is TTL and CMOS compatible allowing for direct interface to the control logic. The internal CMOS driver has a rugged totem-pole output section capable of switching the MegaMOS FETs to 500 kHz. The third input terminal to the Z-Pac is used for the V_{cc} of the driver sections; a V_{cc} of 7-15 volts is required.

LIMOFETs in a Z-Pac are internally isolated and range in current from 75 amps at 100 volts to 10 amps at 1000 volts. For Hi-Rel military applications, they offer a major space savings over discrete FETs and IC drivers. Future versions of these logic input FETs will have on-board over-current and temperature protection as well as diagnostic static outputs.

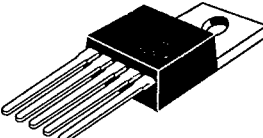


T-39-15

LIMOFETs

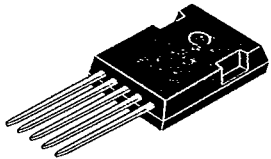
Part Number	Drain-Source Voltage $V_{(BR)DSS}$ (Volts)	Drain Current $I_{D(Cont)}$ (Amps)	On Resistance $R_{DS(on)}$ (Ohms)	Driver Characteristics			Notes	Case Style
				V_{IH} min (Volts)	V_{IL} max (Volts)	V_{DD} max (Volts)		
IXLZ11N100	1000	11	1.15	2.4	0.8	20	1	Z-Pac 
IXLZ10N100	1000	10	1.2	2.4	0.8	20	1	
IXLZ12N90	900	12	0.9	2.4	0.8	20	1	
IXLZ11N90	900	11	0.95	2.4	0.8	20	1	
IXLZ18N65	650	18	0.4	2.4	0.8	20	1	
IXLZ15N65	650	15	0.5	2.4	0.8	20	1	
IXLZ21N60	600	21	0.3	2.4	0.8	20	1	
IXLZ17N60	600	17	0.4	2.4	0.8	20	1	
IXLZ24N50	500	24	0.23	2.4	0.8	20	1	
IXLZ21N50	500	21	0.25	2.4	0.8	20	1	
IXLZ35N30	300	35	0.1	2.4	0.8	20	1	
IXLZ42N20	200	42	0.065	2.4	0.8	20	1	
IXLZ67N10	100	67	0.03	2.4	0.8	20	1	

MirrorFET Power MOSFETs

Part Number	Drain-Source Voltage $V_{(BR)DSS}$ (Volts)	Drain Current I_D @ 25 °C Case		On Resistance $R_{DS(on)}$ (Ohms)	Mirror Ratio		Power Diss. P_D Max (Watts)	Notes	Case Style
		$I_{D(Cont)}$ (Amps)	$I_{D(Pulsed)}$ (Amps)		I_D/I_M n	Tol (%)			
IXTP8N50MA	500	8	32	0.8	1310	2.5	125	1	TO-220-5 
IXTP8N50MB	500	8	32	0.8	1310	5.0	125	1	
IXTP8N45MA	450	8	32	0.8	1310	2.5	125		
IXTP8N45MB	450	8	32	0.8	1310	5.0	125		
IXTP15N30MA	300	15	60	0.28	1295	2.5	125		
IXTP15N30MB	300	15	60	0.28	1295	5.0	125		
IXTP15N25MA	250	15	60	0.28	1295	2.5	125		
IXTP15N25MB	250	15	60	0.28	1295	5.0	125		
IXTP22N20MA	200	22	88	0.15	1305	2.5	125		
IXTP22N20MB	200	22	88	0.15	1305	5.0	125		
IXTP22N15MA	150	22	88	0.15	1305	2.5	125		
IXTP22N15MB	150	22	88	0.15	1305	5.0	125		
IXTP30N10MA	100	30	120	0.077	1350	2.5	125		
IXTP30N10MB	100	30	120	0.077	1350	5.0	125		
IXTP30N08MA	80	30	120	0.077	1350	2.5	125		
IXTP30N08MB	80	30	120	0.077	1350	5.0	125		

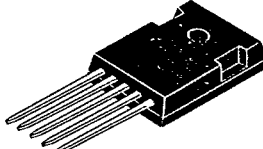
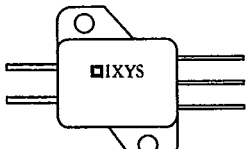
Notes: 1. New product available 4Q88

MirrorFET Power MOSFETs

Part Number	Drain-Source Voltage $V_{(BR)DSS}$ (Volts)	Drain Current I_D @ 25 °C Case		On Resistance $R_{DS(on)}$ (Ohms)	Mirror Ratio		Power Diss. P_D Max (Watts)	Notes	Case Style
		$I_{D(Cont)}$ (Amps)	$I_{D(Pulsed)}$ (Amps)		I_D/I_M n	Tol (%)			
IXTH20N60MA	600	20	80	0.35	NA	2.5	300	1	TO-247-5 
IXTH20N60MB	600	20	80	0.35	NA	5.0	300	1	
IXTH20N55MA	550	20	80	0.35	NA	2.5	300	1	
IXTH20N55MB	550	20	80	0.35	NA	5.0	300	1	
IXTH24N50MA	500	24	96	0.23	NA	2.5	300	1	
IXTH24N50MB	500	24	96	0.23	NA	5.0	300	1	
IXTH12N50MA	500	12	48	0.4	1100	2.5	150	1	
IXTH12N50MB	500	12	48	0.4	1100	5.0	150	1	
IXTH24N45MA	450	24	96	0.23	NA	2.5	300	1	
IXTH24N45MB	450	24	96	0.23	NA	5.0	300	1	
IXTH12N45MA	450	12	48	0.4	1100	2.5	150	1	
IXTH12N45MB	450	12	48	0.4	1100	5.0	150	1	
IXTH27N40MA	400	27	108	0.18	NA	2.5	300	1	
IXTH27N40MB	400	27	108	0.18	NA	5.0	300	1	
IXTH15N40MA	400	15	60	0.3	1100	2.5	150	1	
IXTH15N40MB	400	15	60	0.3	1100	5.0	150	1	
IXTH27N35MA	350	27	108	0.18	NA	2.5	300	1	
IXTH27N35MB	350	27	108	0.18	NA	5.0	300	1	
IXTH15N35MA	350	15	60	0.3	1100	2.5	150	1	
IXTH15N35MB	350	15	60	0.3	1100	5.0	150	1	
IXTH35N25MA	250	35	140	0.1	NA	2.5	300	1	
IXTH35N25MB	250	35	140	0.1	NA	5.0	300	1	
IXTH23N25MA	250	23	92	0.14	1100	2.5	150	1	
IXTH23N25MB	250	23	92	0.14	1100	5.0	150	1	
IXTH42N20MA	200	42	168	0.065	NA	2.5	300	1	
IXTH42N20MB	200	42	168	0.065	NA	5.0	300	1	
IXTH31N20MA	200	31	124	0.085	1100	2.5	150	1	
IXTH31N20MB	200	31	124	0.085	1100	5.0	150	1	

Notes: 1. New product available 4Q88

MirrorFET Power MOSFETs

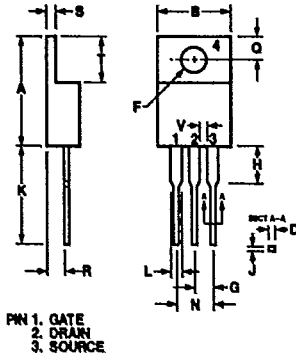
Part Number	Drain-Source Voltage $V_{(BR)DSS}$ (Volts)	Drain Current I_D @ 25 °C Case		On Resistance $R_{DS(on)}$ (Ohms)	Mirror Ratio		Power Diss. P_D Max (Watts)	Notes	Case Style	
		$I_{D(Cont)}$ (Amps)	$I_{D(Pulsed)}$ (Amps)		I_D/I_{Mn}	Tol (%)				
IXTH42N15MA	150	42	168	0.065	NA	2.5	300	1	TO-247-5 	
IXTH42N15MB	150	42	168	0.065	NA	5.0	300	1		
IXTH31N15MA	150	31	124	0.085	1100	2.5	150	1		
IXTH31N15MB	150	31	124	0.085	1100	5.0	150	1		
IXTH67N10MA	100	67	268	0.025	NA	2.5	300	1		
IXTH67N10MB	100	67	268	0.025	NA	5.0	300	1		
IXTH39N10MA	100	39	156	0.055	1100	2.5	150	1		
IXTH39N10MB	100	39	156	0.055	1100	5.0	150	1		
IXTH67N08MA	80	67	268	0.025	NA	2.5	300	1		
IXTH67N08MB	80	67	268	0.025	NA	5.0	300	1		
IXTH39N08MA	80	39	156	0.055	1100	2.5	150	1		
IXTH39N08MB	80	39	156	0.055	1100	5.0	150	1		
IXTZ20N60MA	600	20	80	0.35	NA	2.5	300	1		Z-Pac 
IXTZ20N60MB	600	20	80	0.35	NA	5.0	300	1		
IXTZ24N50MA	500	24	96	0.23	NA	2.5	300	1		
IXTZ24N50MB	500	24	96	0.23	NA	5.0	300	1		
IXTZ27N40MA	400	27	108	0.18	NA	2.5	300			
IXTZ27N40MB	400	27	108	0.18	NA	5.0	300			
IXTZ35N25MA	250	35	140	0.1	NA	2.5	300			
IXTZ35N25MB	250	35	140	0.1	NA	5.0	300			
IXTZ42N20MA	200	42	168	0.065	NA	2.5	300			
IXTZ42N20MB	200	42	168	0.065	NA	5.0	300			
IXTZ67N10MA	100	67	268	0.03	NA	2.5	300			
IXTZ67N10MB	100	67	268	0.03	NA	5.0	300			

Notes: 1. New product available 4Q88

DETAILED PACKAGE OUTLINES

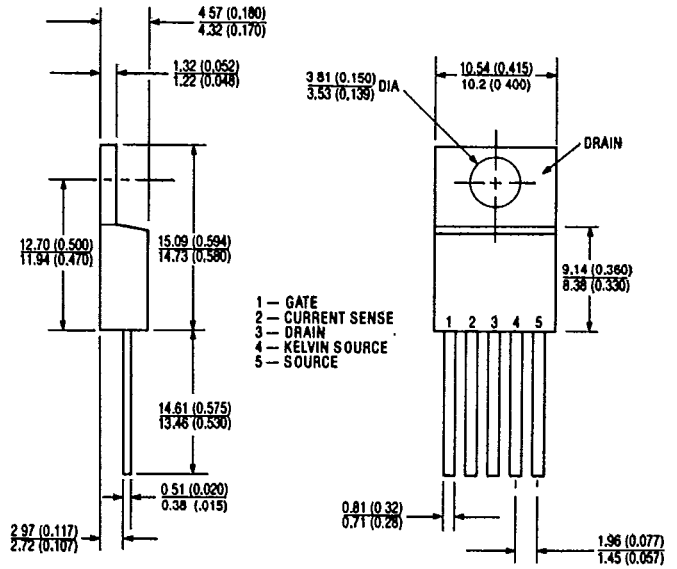
T-91-20

TO-220 AB

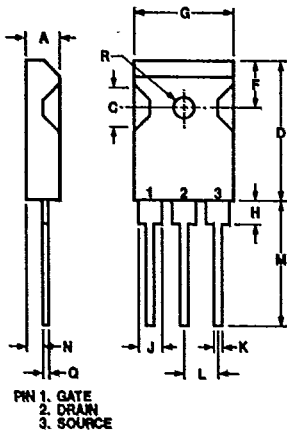


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	14.23	16.51	.560	.650
B	9.66	10.66	.380	.420
C	3.56	4.82	.140	.190
D	0.64	0.89	.025	.035
F	3.54	4.08	.139	.161
G	2.29	2.79	.090	.110
H	-	6.35	-	.250
J	0.51	.76	.020	.030
K	12.70	14.73	.500	.580
L	1.15	1.77	.045	.070
N	4.83	5.33	.190	.210
Q	2.54	3.42	.100	.135
R	2.04	2.49	.080	.115
S	0.64	1.39	.025	.055
T	5.85	6.85	2.30	2.70
V	1.15	-	.045	-

CONFORMS TO OUTLINE TO-220 (IR H-7)
Dimensions in Millimeters (Inches)

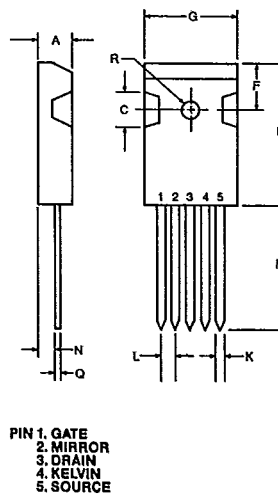


TO-247 (3 LEADED)



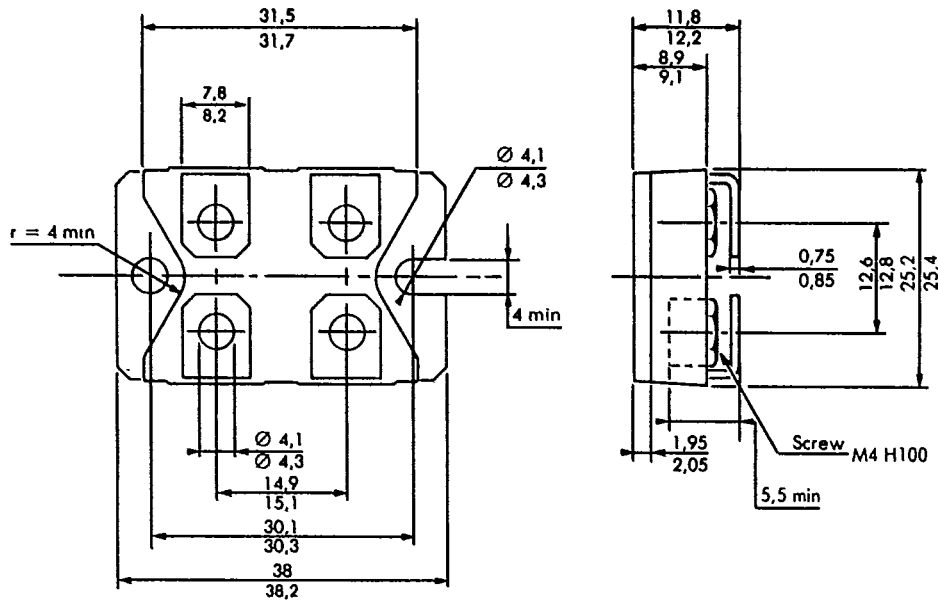
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
C	4.5	6.0	.178	.236
D	19.7	21.4	.776	.843
F	5.3	6.1	.209	.240
G	15.3	15.9	.602	.625
H	3.7	4.3	.146	.169
J	1.95	2.4	.077	.094
J ₁	2.97	3.4	.117	.134
K	1.0	1.4	.040	.055
L	5.4	5.5	.213	.217
M	19.9	20.2	.783	.795
N	2.2	2.6	.087	.102
Q	0.4	0.8	.016	.031
R	2.9	3.3	.114	.129

TO-247 (5 LEADED)

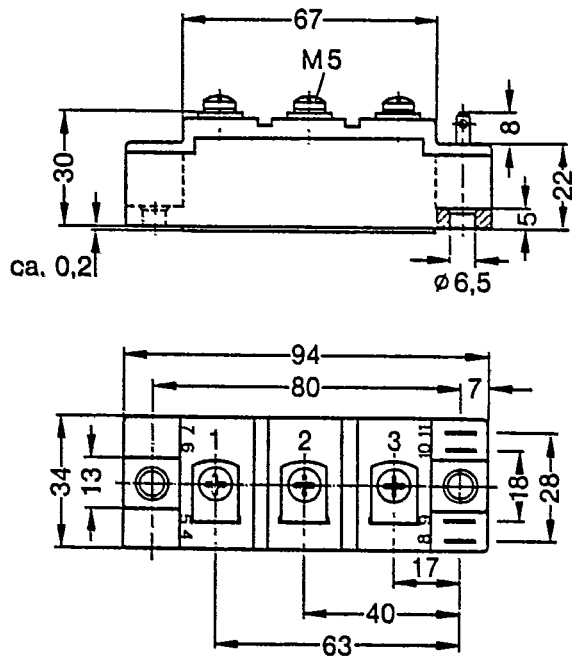


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
C	4.5	6.0	.178	.236
D	19.7	21.4	.776	.843
F	5.3	6.1	.209	.240
G	15.3	15.9	.602	.625
K	1.1	1.3	.043	.051
L	2.51	2.56	.099	.101
M	19.9	20.2	.783	.795
N	2.2	2.6	.087	.102
Q	0.4	0.8	.016	.031
R	2.9	3.3	.114	.129

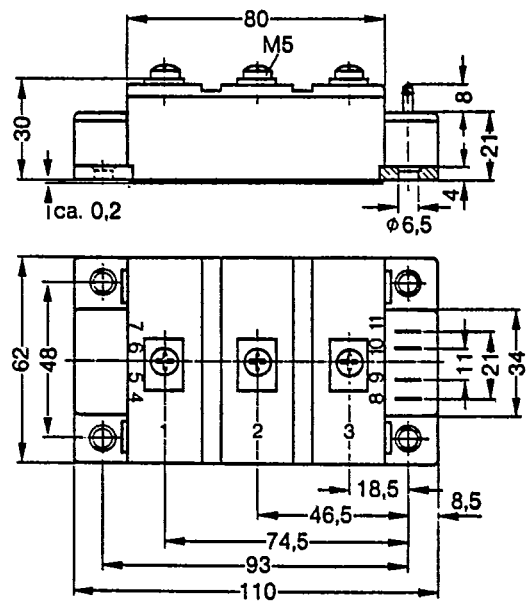
TO-238
Dimensions in Millimeters



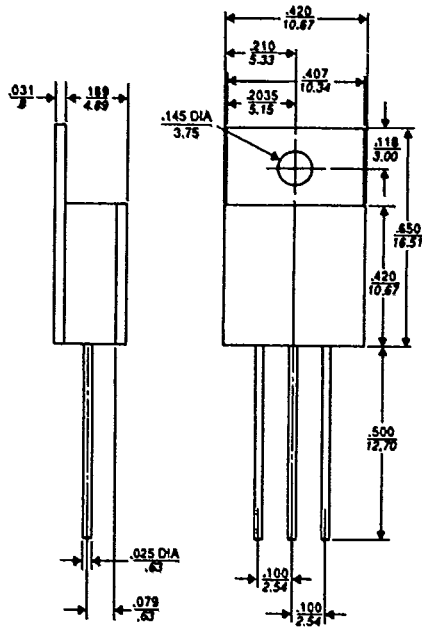
Y-4
Dimensions in Millimeters



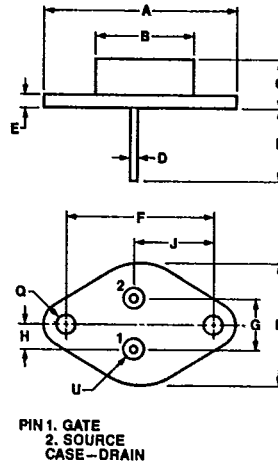
Y-3
Dimensions in Millimeters



TO-220 HERMETIC

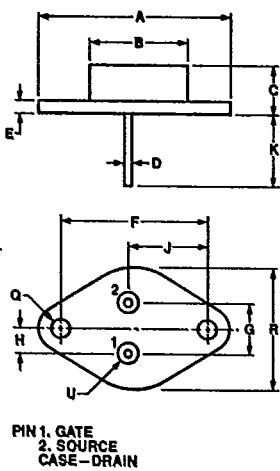


TO-204 AE



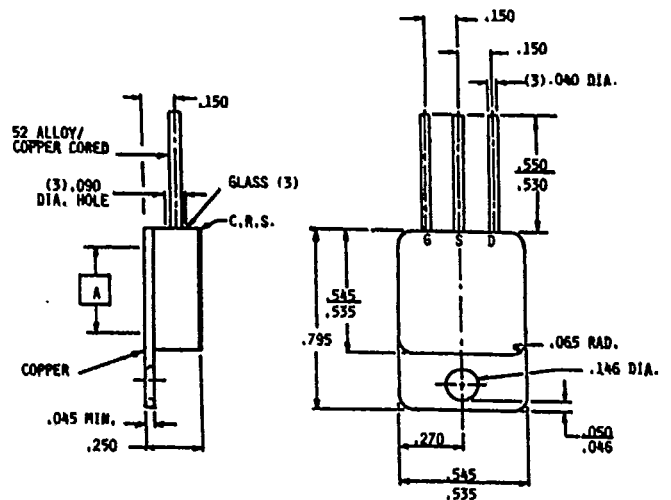
Dim.	Millimeter	Max.	Inches	Max.
A	—	39.37	—	1.55
B	—	19.71	—	.776
C	7.62	10.16	.300	.400
D	1.47	1.57	.058	.062
E	1.52	3.43	.060	.135
F	30.15	BSC	1.187	BSC
G	10.67	11.18	.420	.440
H	5.33	6.10	.210	.240
J	16.68	17.12	.657	.674
K	11.20	11.98	.441	.472
Q	3.86	4.11	.152	.162
R	24.84	25.27	.978	.995

TO-204 AA

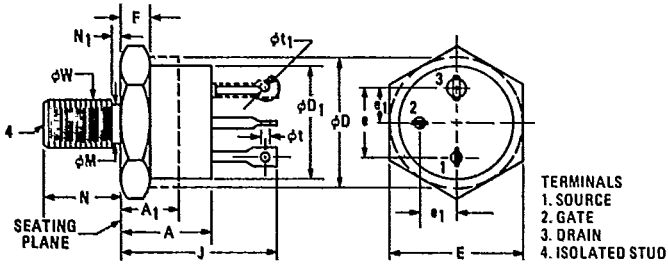


Dim.	Millimeter	Max.	Inches	Max.
A	—	39.37	—	.155
B	—	19.71	—	.776
C	6.35	8.89	.250	.350
D	.097	1.09	.038	.043
E	—	3.43	—	.135
F	30.15	BSC	1.187	BSC
G	10.67	11.18	.420	.440
H	5.33	6.10	.210	.240
J	16.68	17.12	.657	.674
K	11.20	11.98	.441	.472
Q	3.86	4.11	.152	.162
R	24.84	25.47	.978	1.00

TO-254 HERMETIC



CONFORMS TO JEDEC OUTLINE TO-210AC (TO-61)
Dimensions in Millimeters (Inches)



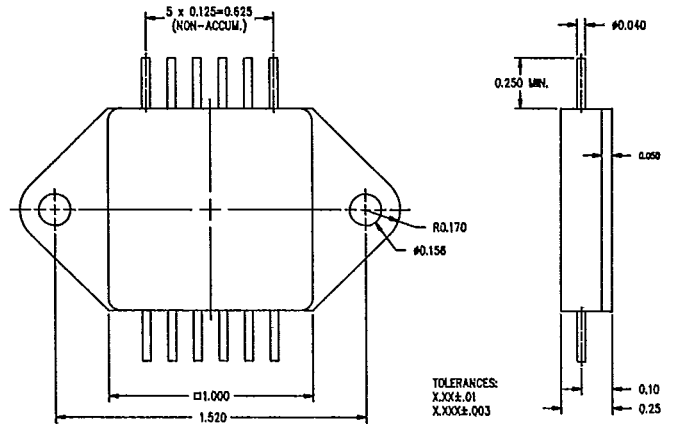
TERMINALS
1. SOURCE
2. GATE
3. DRAIN
4. ISOLATED STUD

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	0.325	0.450	8.26	11.68	
A ₁	0.270		6.86		2
φD	0.610	0.687	15.49	17.45	2
φD ₁	0.570	0.610	14.48	15.49	
E	0.667	0.687	16.94	17.45	
e	0.340	0.415	8.64	10.54	5
e ₁	0.170	0.213	4.32	5.41	5
F	0.090	0.150	2.29	3.81	1

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
J	0.640	0.875	16.26	22.23	
φM	0.220	0.249	5.59	6.32	
N	0.422	0.455	10.72	11.56	
N ₁		0.090		2.29	
φt	0.055	0.072	1.19	1.83	
φt ₁	0.046	0.077	1.17	1.96	4
φW	0.2225	0.2768	5.561	5.761	3

- NOTES
1. DIMENSION DOES NOT INCLUDE SEALING FLANGES.
 2. PACKAGE CONTOUR OPTIONAL WITHIN DIMENSIONS SPECIFIED.
 3. PITCH DIAMETER - THREAD 1/4 28 UNF 2A (COATED).
REFERENCE ISCREW THREAD STANDARDS FOR FEDERAL SERVICES - HANDBOOK H 281.
 4. THIS TERMINAL CAN BE FLATTENED AND PIERCED OR HOOK TYPE.
 5. POSITION OF LEADS IN RELATION TO THE HEXAGON IS NOT CONTROLLED.

QUADPAC



Z-Pac

