

**IXGP10N50, 60****IXGM10N50, 60**

10 AMPS, 500–600 VOLTS

**MAXIMUM RATINGS**

| Parameter                                                         | Sym.              | IXGP10N50<br>IXGM10N50 | IXGP10N60<br>IXGM10N60 | Unit          |
|-------------------------------------------------------------------|-------------------|------------------------|------------------------|---------------|
| Drain-Source Voltage (1)                                          | $V_{DSS}$         | 500                    | 600                    | $V_{dc}$      |
| Drain-Gate Voltage ( $R_{GS} = 1.0M\Omega$ ) (1)                  | $V_{DGR}$         | 500                    | 600                    | $V_{dc}$      |
| Gate-Source Voltage                                               | $V_{GS}$          | $\pm 30$               | $\pm 30$               | $V_{dc}$      |
| Drain Current Continuous $T_C = 25^\circ C$<br>$T_C = 90^\circ C$ | $I_D$             | 20<br>10               | 20<br>10               | $A_{dc}$      |
| Drain Current Peak (3)                                            | $I_{DM}$          | 40                     | 40                     | $A_{dc}$      |
| Total Power Dissipation @ $25^\circ C$                            | $P_D$             | 100                    |                        | W             |
| Power Dissipation Derating > $25^\circ C$                         |                   | 0.83                   |                        | W/ $^\circ C$ |
| Operating and Storage Junction Temperature                        | $T_J$ & $T_{stg}$ | -65 to +150            |                        | $^\circ C$    |
| Thermal Resistance                                                | $R_{thJC}$        | 1.2                    |                        | $^\circ C/W$  |

**ELECTRICAL CHARACTERISTICS**  $T_C = 25^\circ C$  unless otherwise specified

| Parameter                                 | Type        | Min. | Typ. | Max. | Units   | Test Conditions                                                                |
|-------------------------------------------|-------------|------|------|------|---------|--------------------------------------------------------------------------------|
| $BV_{DSS}$ Drain-Source Breakdown Voltage | 10N50, 50A  | 500  | —    | —    | V       | $V_{GS} = 0V$                                                                  |
|                                           | 10N60, 60A  | 600  | —    | —    | V       | $I_D = 250\mu A$                                                               |
| $V_{GS(th)}$ Gate Threshold Voltage       | ALL         | 2.5  | —    | 5.0  | V       | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$                                           |
| $I_{GSS}$ Gate-Source Leakage             | ALL         | —    | —    | 100  | nA      | $V_{GS} = \pm 30V$                                                             |
| $I_{DSS}$ Zero Gate Voltage Drain Current | ALL         | —    | —    | 200  | $\mu A$ | $V_{DS} = \text{Max. Rating} \times 0.8$ , $V_{GS} = 0V$                       |
|                                           |             | —    | —    | 1000 | $\mu A$ | $V_{DS} = \text{Max. Rating} \times 0.8$ , $V_{GS} = 0V$ , $T_C = 125^\circ C$ |
| $V_{DS(on)}$ Drain-Source On Voltage      | 10N50, 60   | —    | —    | 2.5  | V       | $V_{GS} = 15V$ , $I_D = 10A$                                                   |
|                                           | 10N50A, 60A | —    | —    | 3.0  | V       |                                                                                |
| $G_{fs}$ Forward Transconductance (2)     | ALL         | 4.0  | —    | —    | S       | $V_{DS} = 10V$ , $I_D = 5A$                                                    |
| $C_{iss}$ Input Capacitance               | ALL         | —    | —    | 1200 | pF      | $V_{GS} = 0V$ , $V_{DS} = 25V$ , $f = 1.0 \text{ MHz}$                         |
| $C_{oss}$ Output Capacitance              | ALL         | —    | —    | 100  | pF      |                                                                                |
| $C_{rss}$ Reverse Transfer Capacitance    | ALL         | —    | —    | 30   | pF      |                                                                                |

**SWITCHING CHARACTERISTICS****RESISTIVE LOAD**

|                                  |             |   |   |     |         |                                                                                                                                            |
|----------------------------------|-------------|---|---|-----|---------|--------------------------------------------------------------------------------------------------------------------------------------------|
| $t_{d(on)}$ Turn-On Delay Time   | ALL         | — | — | 100 | ns      | Resistive Load, $T_J = 125^\circ C$<br>$I_D = 10A$ , $V_{DS} = \text{Rated } V_{DSS} \times 0.8$<br>$V_{GS} = 15V$<br>$R_{GS} = 100\Omega$ |
| $t_r$ Current Rise Time          | ALL         | — | — | 200 | ns      |                                                                                                                                            |
| $t_{d(off)}$ Turn-Off Delay Time | ALL         | — | — | 500 | ns      |                                                                                                                                            |
| $t_f$ Current Fall Time          | 10N50, 60   | — | — | 1.5 | $\mu s$ |                                                                                                                                            |
|                                  | 10N50A, 60A | — | — | 0.5 | $\mu s$ |                                                                                                                                            |

**INDUCTIVE LOAD**

|                                  |             |   |   |     |         |                                                                                                                                                                            |
|----------------------------------|-------------|---|---|-----|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $t_{d(off)}$ Turn-Off Delay Time | ALL         | — | — | 500 | ns      | Inductive Load, $T_J = 125^\circ C$<br>$L = 100 \mu H$ , $I_D = 10A$<br>$V_{DS}(\text{Clamp}) = \text{Rated } V_{DSS} \times 0.8$<br>$V_{GS} = 15V$ , $R_{GS} = 100\Omega$ |
| $t_f$ Current Fall Time          | 10N50, 60   | — | — | 2.0 | $\mu s$ |                                                                                                                                                                            |
|                                  | 10N50A, 60A | — | — | 0.6 | $\mu s$ |                                                                                                                                                                            |

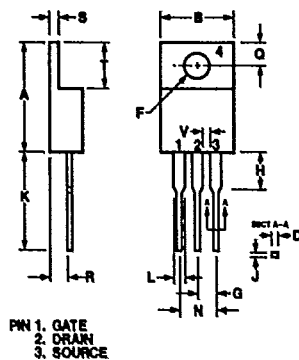
(1)  $T_J = 25^\circ C$  to  $150^\circ C$ (2) Pulse Test: Pulse width  $\leq 300ms$ , duty cycle  $\leq 2\%$ 

(3) Repetitive Rating: Pulse width limited by max junction temperature

# DETAILED PACKAGE OUTLINES

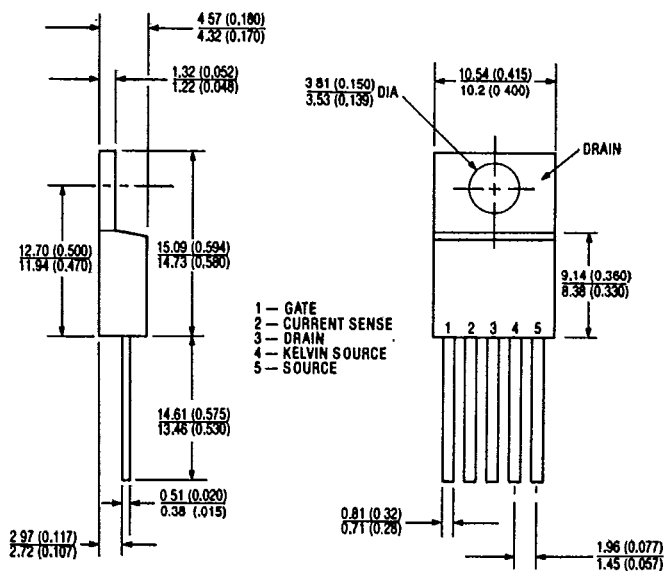
T-91-20

TO-220 AB

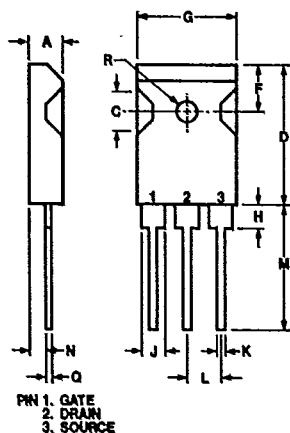


| Dim. | Millimeter |       | Inches |      |
|------|------------|-------|--------|------|
|      | Min.       | Max.  | Min.   | Max. |
| A    | 14.23      | 16.51 | .560   | .650 |
| B    | 9.66       | 10.66 | .380   | .420 |
| C    | 3.56       | 4.82  | .140   | .190 |
| D    | 0.64       | 0.89  | .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  | .230   | .270 |
| V    | 1.15       | —     | .045   | —    |

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

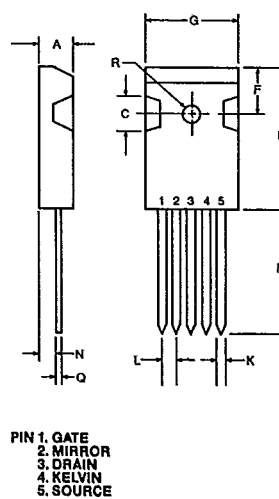


TO-247 (3 LEADED)



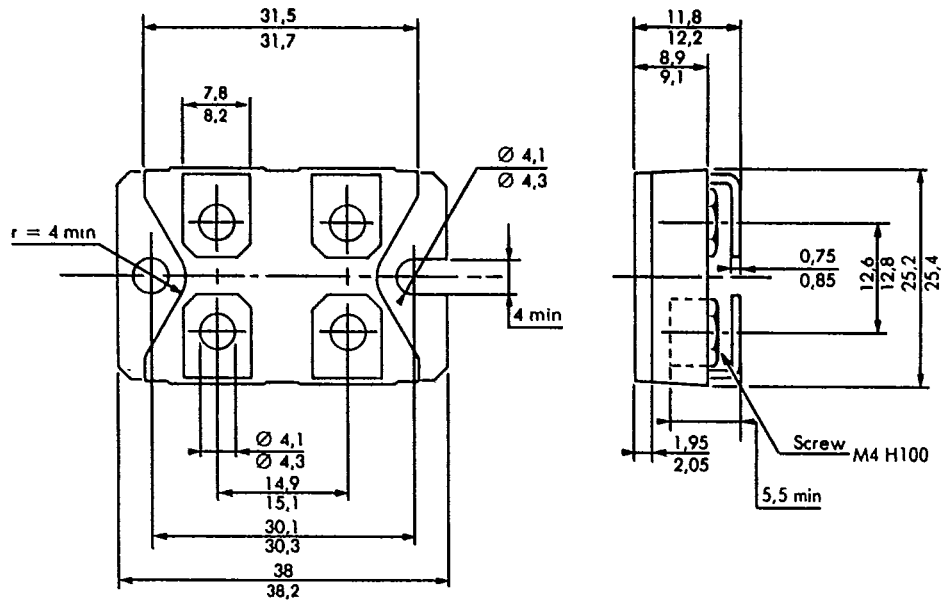
| Dim.           | Millimeter |      | Inches |      |
|----------------|------------|------|--------|------|
|                | Min.       | Max. | Min.   | Max. |
| A              | 4.7        | 5.3  | .185   | .209 |
| C              | 4.5        | 6.0  | .178   | .236 |
| D              | 19.7       | 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 <sub>1</sub> | 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)

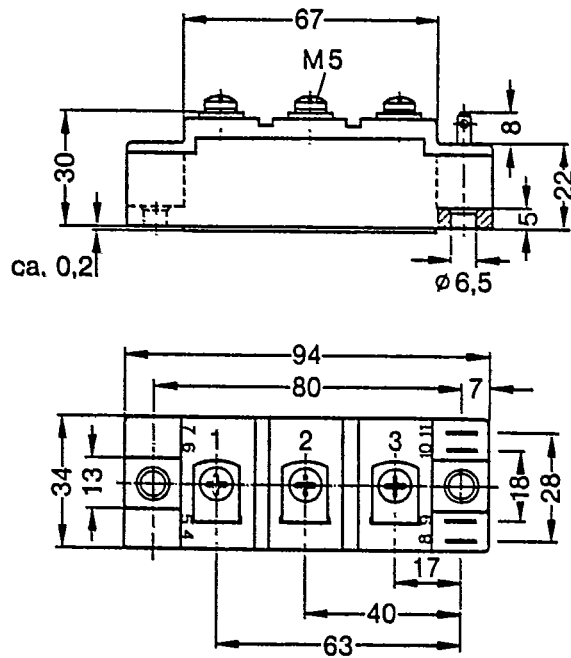


| Dim. | Millimeter |      | Inches |      |
|------|------------|------|--------|------|
|      | Min.       | Max. | Min.   | Max. |
| A    | 4.7        | 5.3  | .185   | .209 |
| C    | 4.5        | 6.0  | .178   | .236 |
| D    | 19.7       | 21.4 | .776   | .843 |
| F    | 5.3        | 6.1  | .209   | .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 |

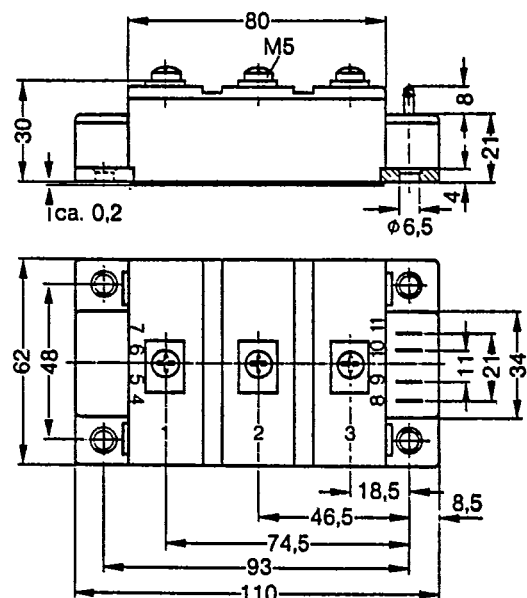
**TO-238**  
Dimensions in Millimeters



**Y-4**  
Dimensions in Millimeters

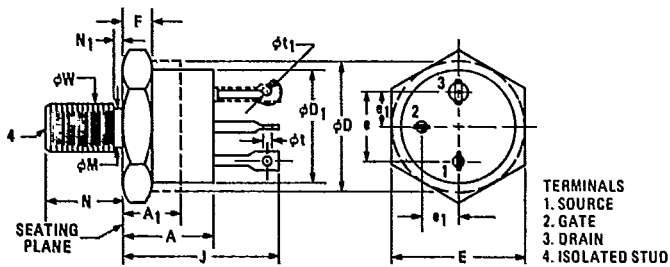


**Y-3**  
Dimensions in Millimeters





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

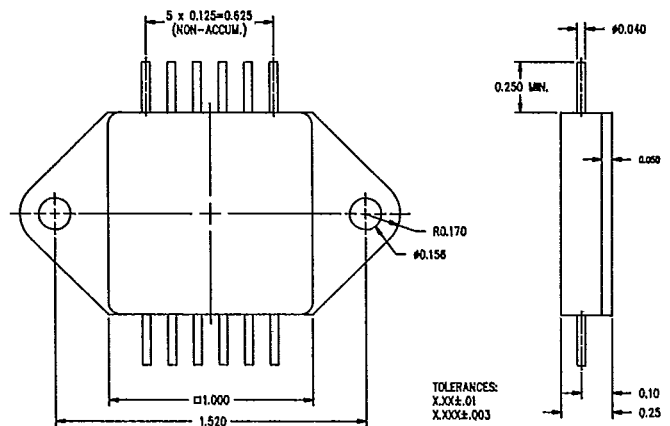


| Inches          |       |       | Millimeters |       | Notes | Inches          |        |        | Millimeters |       | Notes |
|-----------------|-------|-------|-------------|-------|-------|-----------------|--------|--------|-------------|-------|-------|
| Symbol          | Min.  | Max.  | Min.        | Max.  |       | Symbol          | Min.   | Max.   | Min.        | Max.  |       |
| A               | 0.325 | 0.450 | 8.26        | 11.68 |       | J               | 0.640  | 0.875  | 16.26       | 22.23 |       |
| A <sub>1</sub>  |       | 0.270 |             | 6.86  | 2     | ⌀M              | 0.220  | 0.249  | 5.59        | 6.32  |       |
| ⌀D              | 0.610 | 0.687 | 15.49       | 17.45 | 2     | N               | 0.422  | 0.455  | 10.72       | 11.56 |       |
| ⌀D <sub>1</sub> | 0.570 | 0.610 | 14.48       | 15.49 |       | N <sub>1</sub>  |        | 0.090  |             | 2.29  |       |
| E               | 0.667 | 0.687 | 16.94       | 17.45 |       | ⌀T              | 0.055  | 0.072  | 1.19        | 1.83  |       |
| e               | 0.340 | 0.415 | 8.64        | 10.54 | 5     | ⌀T <sub>1</sub> | 0.046  | 0.077  | 1.17        | 1.96  | 4     |
| e <sub>1</sub>  | 0.170 | 0.213 | 4.32        | 5.41  | 5     | ⌀W              | 0.2225 | 0.2268 | 5.561       | 5.761 | 3     |
| F               | 0.090 | 0.150 | 2.29        | 3.81  | 1     |                 |        |        |             |       |       |

## 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 28).  
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



TOLERANCES:  
X.XX±.01  
X.XXX±.005

