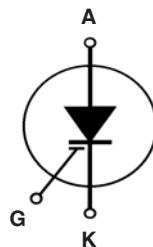
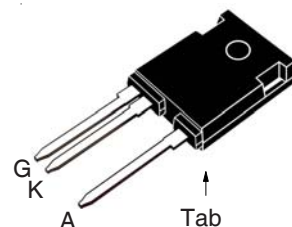


# 1500V MOS Gated Thyristor

## IXHH40N150HV

 $V_{DM} = 1500V$ 


TO-247HV



G = Gate                      K = Cathode  
A = Anode                    Tab = Anode

| Symbol     | Test Conditions                        | Maximum Ratings |             |
|------------|----------------------------------------|-----------------|-------------|
| $V_{DM}$   | $T_J = 25^{\circ}C$ to $150^{\circ}C$  | 1500            | V           |
| $V_{GK}$   | Continuous                             | $\pm 30$        | V           |
| $V_{GK}$   | Transient                              | $\pm 40$        | V           |
| $I_{TSM}$  | $T_C = 25^{\circ}C$ , $1\mu s$         | 7.6             | kA          |
|            | $T_C = 25^{\circ}C$ , $10\mu s$        | 3.5             | kA          |
| $P_D$      | $T_C = 25^{\circ}C$                    | 695             | W           |
| $T_J$      |                                        | -55 ... +150    | $^{\circ}C$ |
| $T_{JM}$   |                                        | 150             | $^{\circ}C$ |
| $T_{stg}$  |                                        | -55 ... +150    | $^{\circ}C$ |
| $T_L$      | Maximum Lead Temperature for Soldering | 300             | $^{\circ}C$ |
| $T_{SOLD}$ | 1.6 mm (0.062 in.) from Case for 10s   | 260             | $^{\circ}C$ |
| $M_d$      | Mounting Torque                        | 1.13/10         | Nm/lb.in    |
| Weight     |                                        | 6               | g           |

| Symbol       | Test Conditions<br>( $T_J = 25^{\circ}C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|------------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                        | Min.                  | Typ. | Max.               |
| $V_{BR}$     | $I_A = 250\mu A$ , $V_{GK} = 0V$                                       | 1500                  |      | V                  |
| $V_{GK(th)}$ | $I_A = 250\mu A$ , $V_{AK} = V_{GK}$                                   | 2.5                   |      | 5.0 V              |
| $V_T$        | $I_T = 1000A$ , $V_{GK} = 15V$                                         |                       | 5.95 | 7.5 V              |
| $r_T$        | $I_T > I_L$ , $V_{GK} = 15V$                                           |                       | 1.20 | m $\Omega$         |
| $V_{BO}$     | $V_{GK} = 15V$                                                         |                       | 6.45 | V                  |
| $I_D$        | $V_{AK} = 1500V$ , $V_{GK} = 0V$<br>$T_J = 125^{\circ}C$               |                       |      | 15 $\mu A$<br>1 mA |
| $I_L$        |                                                                        |                       | 250  | A                  |
| $I_H$        |                                                                        |                       | 200  | A                  |
| $I_{GKS}$    | $V_{AK} = 0V$ , $V_{GK} = \pm 30V$                                     |                       |      | $\pm 200$ nA       |

### Features

- Very High Voltage Package
- Very High Current Capability

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

- Capacitive Discharge Circuits
- Ignition Circuits
- Solid State Surge Protection

## Symbol Test Conditions

( $T_J = 25^\circ\text{C}$  Unless Otherwise Specified)

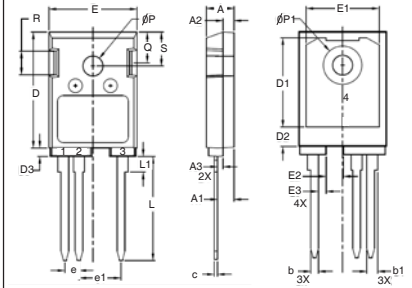
## Characteristic Values

|                                     | Min.                                                                                                                                                                                    | Typ. | Max.                                         |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------|
| $C_{iks}$<br>$C_{oks}$<br>$C_{rks}$ | $V_{AK} = 25\text{V}, V_{GK} = 0\text{V}, f = 1\text{MHz}$                                                                                                                              |      | 2825 pF<br>164 pF<br>50 pF                   |
| $Q_{g(on)}$<br>$Q_{gk}$<br>$Q_{ga}$ | $I_C = 40\text{A}, V_{GK} = 15\text{V}, V_{AK} = 600\text{V}$                                                                                                                           |      | 99 nC<br>22 nC<br>36 nC                      |
| $t_{ri}$<br>$t_d$                   | <b>Capacitive Discharge, <math>T_J = 25^\circ\text{C}</math></b><br>$I_A = 2000\text{A}, V_{GK} = 15\text{V}, R_G = 1\Omega$<br>$V_{AK} = 1000\text{V}, L < 20\text{nH}$ , Notes 2 & 3  |      | 100 ns<br>50 ns                              |
| $t_{ri}$<br>$t_d$                   | <b>Capacitive Discharge, <math>T_J = 125^\circ\text{C}</math></b><br>$I_A = 2000\text{A}, V_{GK} = 15\text{V}, R_G = 1\Omega$<br>$V_{AK} = 1000\text{V}, L < 20\text{nH}$ , Notes 2 & 3 |      | 100 ns<br>50 ns                              |
| $R_{thJC}$<br>$R_{thCS}$            | 0.21                                                                                                                                                                                    |      | $0.18^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |

## Notes:

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. It is recommended to use a gate driver capable of supplying more than 4Amps and  $\geq 15\text{V}$  gate voltage.
3. Refer to fig. 8 & 9.

## TO-247HV Outline



PINS:  
1 - Gate 2 - Cathode  
3, 4 - Anode

| SYM | INCHES |      | MILLIMETERS |       |
|-----|--------|------|-------------|-------|
|     | MIN    | MAX  | MIN         | MAX   |
| A   | .193   | .201 | 4.90        | 5.10  |
| A1  | .114   | .122 | 2.90        | 3.10  |
| A2  | .075   | .083 | 1.90        | 2.10  |
| A3  | .035   | .043 | 0.90        | 1.10  |
| b   | .053   | .059 | 1.35        | 1.50  |
| b1  | .075   | .083 | 1.90        | 2.10  |
| c   | .022   | .030 | 0.55        | 0.75  |
| D   | .819   | .843 | 20.80       | 21.40 |
| D1  | .638   | .646 | 16.20       | 16.40 |
| D2  | .134   | .146 | 3.40        | 3.70  |
| D3  | .055   | .063 | 1.40        | 1.60  |
| E   | .622   | .638 | 15.80       | 16.20 |
| E1  | .520   | .528 | 13.20       | 13.40 |
| E2  | .118   | .126 | 3.00        | 3.20  |
| E3  | .051   | .059 | 1.30        | 1.50  |
| e   | .100   | BSC  | 2.54        | BSC   |
| e1  | .300   | BSC  | 7.62        | BSC   |
| L   | .732   | .748 | 18.60       | 19.00 |
| L1  | .106   | .118 | 2.70        | 3.00  |
| øP  | .138   | .142 | 3.50        | 3.60  |
| øP1 | .272   | .280 | 6.90        | 7.10  |
| Q   | .216   | .224 | 5.50        | 5.70  |
| R   | .165   | .169 | 4.20        | 4.30  |
| S   | .240   | .248 | 6.10        | 6.30  |

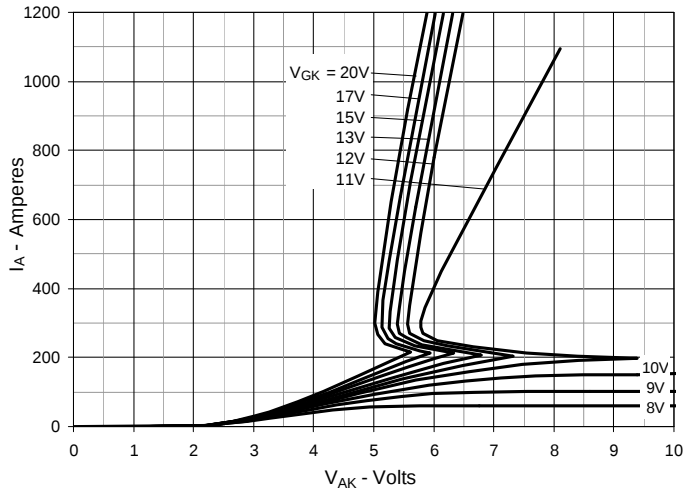
## PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

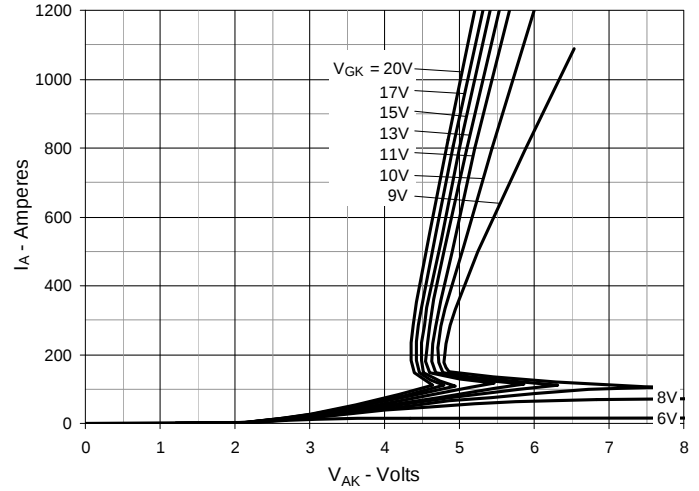
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered 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  
by one or more of the following U.S. patents: 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

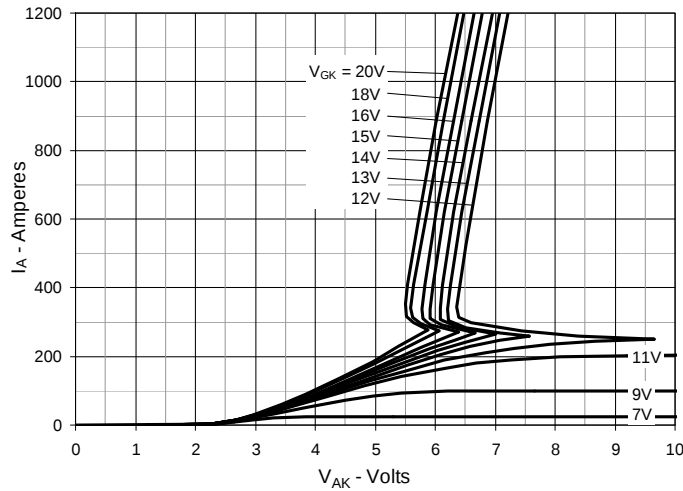
**Fig. 1. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



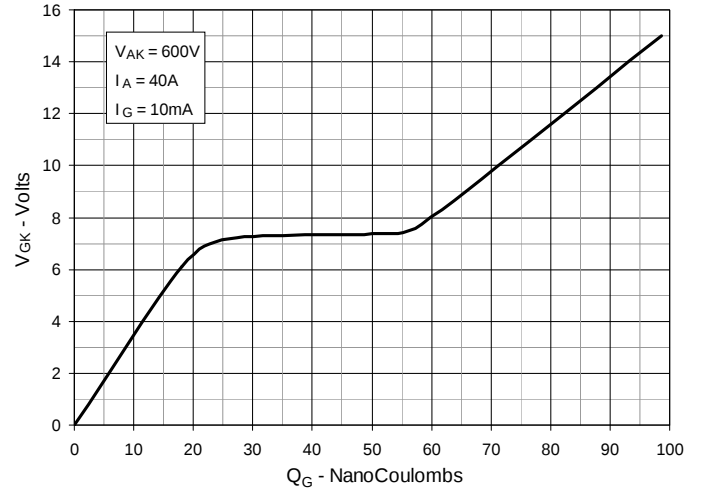
**Fig. 2. Extended Output Characteristics @  $T_J = 125^\circ\text{C}$**



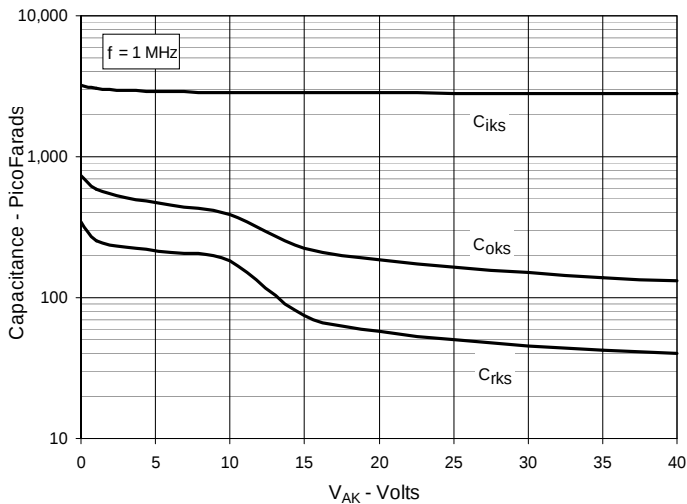
**Fig. 3. Extended Output Characteristics @  $T_J = -40^\circ\text{C}$**



**Fig. 4. Gate Charge**



**Fig. 5. Capacitance**



**Fig. 6. Maximum Transient Thermal Impedance**

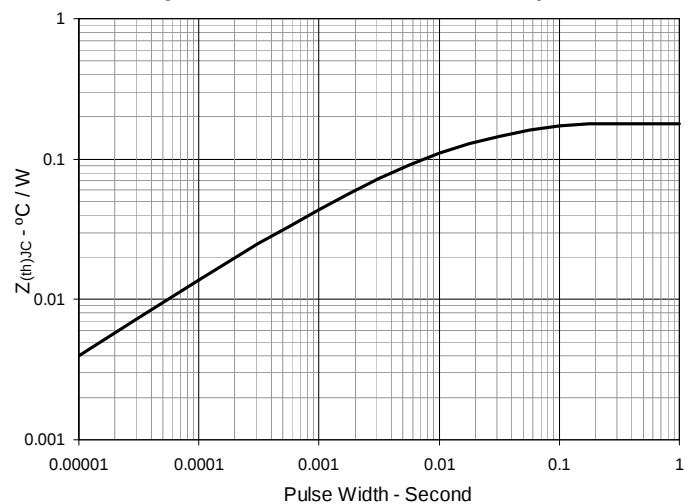
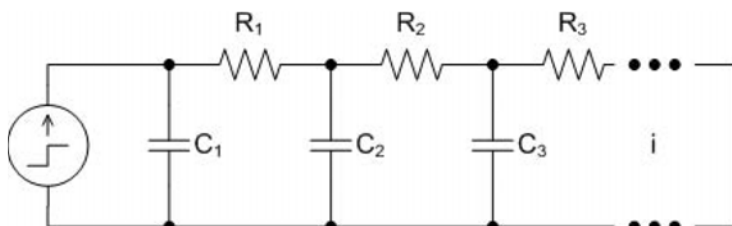


Fig. 7. Cauer Thermal Network



| i | $R_i (\Omega)$ | $C_i (F)$ |
|---|----------------|-----------|
| 1 | 0.015004       | 0.005397  |
| 2 | 0.071079       | 0.028026  |
| 3 | 0.051007       | 0.121930  |
| 4 | 0.002310       | 2.500000  |

Fig. 8. Capacitive Discharge

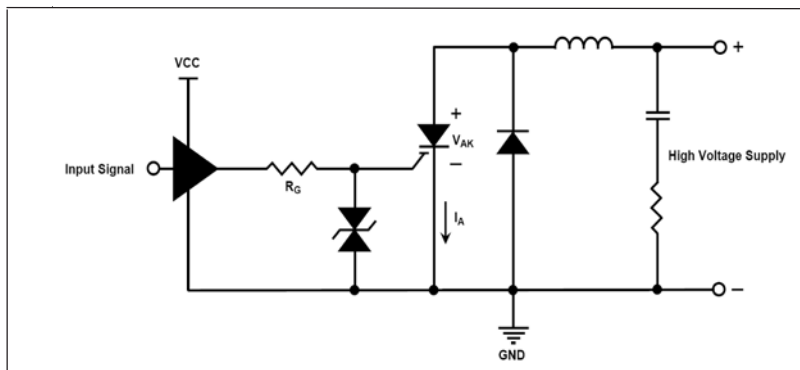
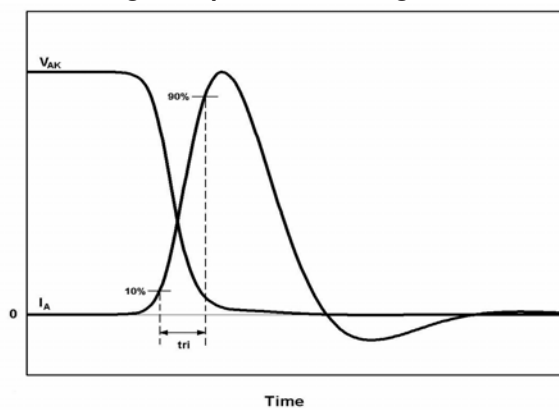


Fig. 9. Capacitive Discharge Waveform





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