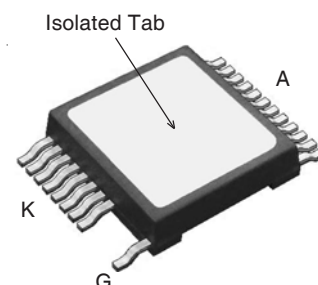
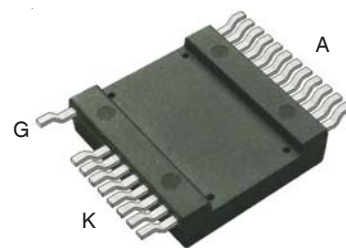


1500V MOS Gated Thyristor w/ Anti-Parallel Diode

MMIX1H60N150V1

 $V_{DM} = 1500V$

(Electrically Isolated Tab)



G = Gate
A = Anode

K = Cathode

Symbol	Test Conditions	Maximum Ratings	
V_{DM}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1500	V
V_{GK}	Continuous	± 30	V
V_{GK}	Transient	± 40	V
I_{TSM}	$T_C = 25^\circ\text{C}, 1\mu\text{s}$	32.0	kA
	$T_C = 25^\circ\text{C}, 10\mu\text{s}$	11.8	kA
P_D	$T_C = 25^\circ\text{C}$	446	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062 in.) from Case for 10s	260	$^\circ\text{C}$
V_{ISOL}	50/60Hz, 1 minute	2500	V~
F_C	Mounting Force	50..200/11..45	N/lb
Weight		8	g

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
V_{BR}	$I_A = 250\mu\text{A}, V_{GK} = 0V$	1500		V
$V_{GK(th)}$	$I_A = 250\mu\text{A}, V_{AK} = V_{GK}$	2.5		5.0 V
V_T	$I_T = 1000A, V_{GK} = 15V$		4.6	6.0 V
r_T	$I_T > I_L, V_{GK} = 15V$		1.2	m Ω
V_{BO}	$V_{GK} = 15V$		4.8	V
I_D	$V_{AK} = 1500V, V_{GK} = 0V$ $T_J = 125^\circ\text{C}$			15 μA 1.5 mA
I_L			400	A
I_H			350	A
I_{GKS}	$V_{AK} = 0V, V_{GK} = \pm 30V$			± 200 nA

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- Anti-Parallel Diode
- 2500V~ Electrical Isolation
- 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} C_{oks} C_{rks}	$\left. \begin{array}{l} \\ \\ \end{array} \right\} V_{AK} = 25V, V_{GK} = 0V, f = 1\text{MHz}$	5120 340 84	pF pF pF
$Q_{g(on)}$ Q_{gk} Q_{ga}	$\left. \begin{array}{l} \\ \\ \end{array} \right\} I_C = 60A, V_{GK} = 15V, V_{AK} = 600V$	180 33 62	nC nC nC
t_{ri} t_d	Capacitive Discharge, $T_J = 25^\circ\text{C}$ $I_A = 2000A, V_{GK} = 15V, R_G = 1\Omega$ $V_{AK} = 1000V, L < 20nH, \text{Notes 2 \& 3}$	100 50	ns ns
t_{ri} t_d	Capacitive Discharge, $T_J = 125^\circ\text{C}$ $I_A = 2000A, V_{GK} = 15V, R_G = 1\Omega$ $V_{AK} = 1000V, L < 20nH, \text{Notes 2 \& 3}$	100 50	ns ns
R_{thJC} R_{thCS} R_{thJA}		0.05 19	0.28°C/W $^\circ\text{C/W}$ $^\circ\text{C/W}$

Reverse Diode (FRED)
Symbol Test Conditions
 $(T_J = 25^\circ\text{C Unless Otherwise Specified})$
Characteristic Values
Min. Typ. Max.

V_F	$I_F = 100A, V_{GK} = 0V, \text{Note 1}$		1.8 V
I_{RM} t_{rr}	$\left. \begin{array}{l} \\ \end{array} \right\} I_F = 50A, V_{GK} = 0V,$ $-di_F/dt = 200A/\mu s, V_R = 300V$	20 700	A ns
R_{thJC}			0.50°C/W

Notes:

1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.
2. It is recommended to use a gate driver capable of supplying more than 4Amps and $\geq 15V$ gate voltage.
3. Refer to fig. 9 & 10.

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

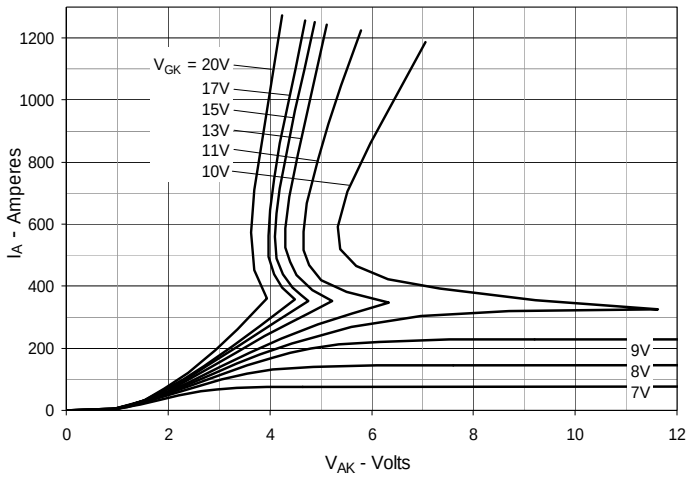


Fig. 2. Extended Output Characteristics @ $T_J = 125^\circ\text{C}$

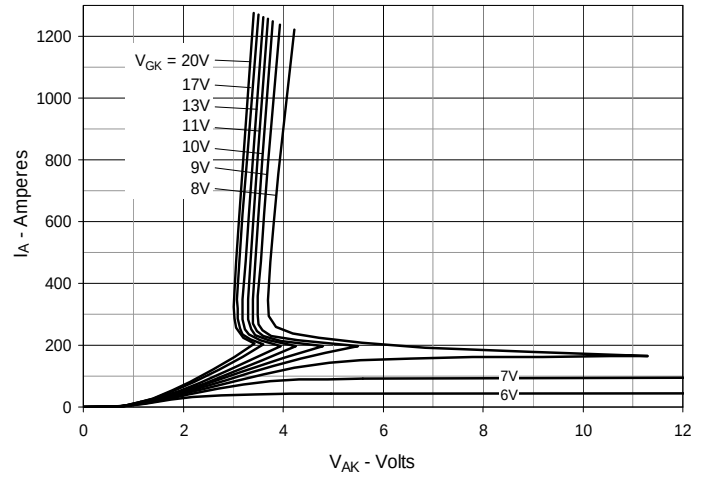


Fig. 3. Extended Output Characteristics @ $T_J = -40^\circ\text{C}$

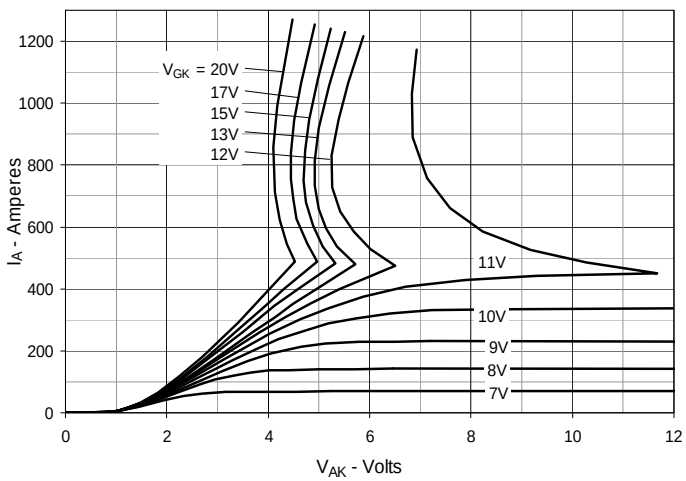


Fig. 4. Gate Charge

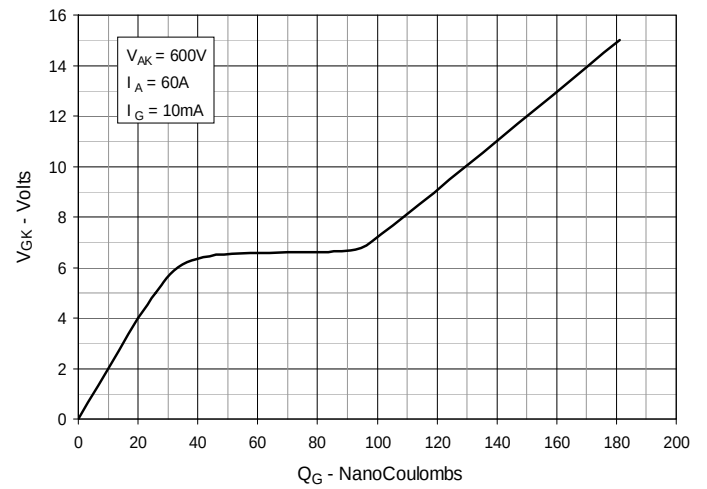


Fig. 5. Capacitance

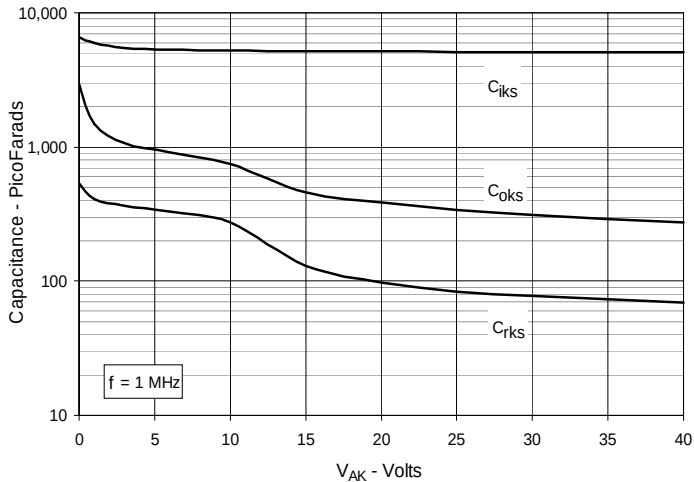
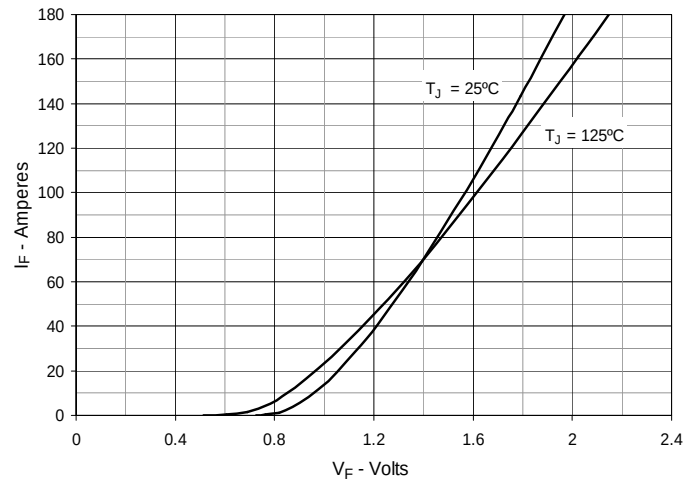


Fig. 6. Forward Voltage Drop of Intrinsic Diode

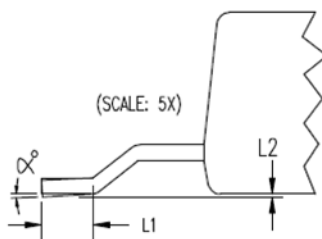
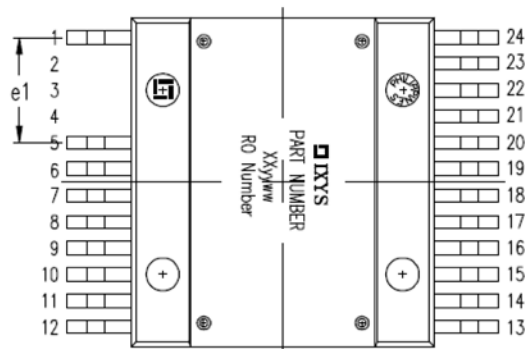
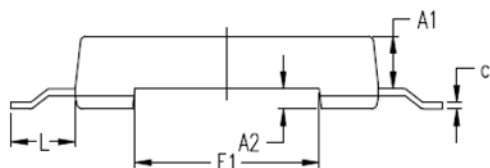
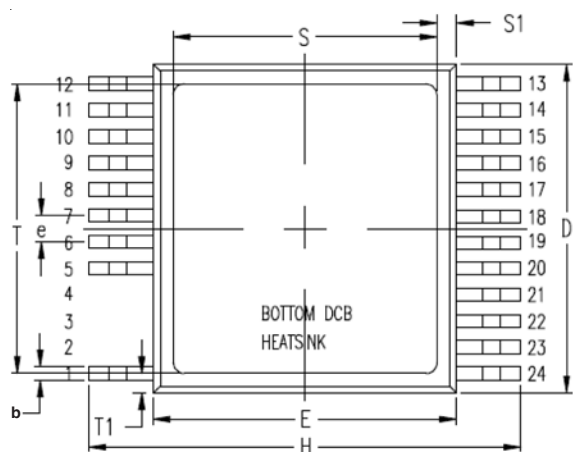


The graph shows the relationship between the pulse width and the junction temperature rise. The y-axis, labeled $Z(t_{inj})_{JC} - ^\circ C / W$, is on a logarithmic scale from 0.001 to 1. The x-axis, labeled Pulse Width - Seconds, is also on a logarithmic scale from 0.00001 to 10. The curve starts at a value of 0.001 for a pulse width of 0.00001 seconds and increases, reaching a plateau of approximately 0.3 for pulse widths greater than 1 second.

Pulse Width - Seconds	$Z(t_{inj})_{JC} - ^\circ C / W$
0.00001	0.001
0.0001	0.005
0.001	0.02
0.01	0.08
0.1	0.2
1	0.3
10	0.3

i	Ri (Ω)	Ci (F)
1	0.018327	0.024851
2	0.052439	0.058268
3	0.099100	0.208110
4	0.048364	4.000000

The graph shows the turn-off characteristics of a thyristor. The vertical axis represents both anode-cathode voltage (V_{AK}) and anode current (I_A). The horizontal axis represents Time. The V_{AK} curve starts at a constant high level, then drops sharply to zero. The I_A curve starts at a constant high level, then drops sharply to zero. The turn-off delay time t_{r1} is the time interval between the 10% point of the I_A falling edge and the 90% point of the V_{AK} rising edge. Dashed vertical lines indicate these 10% and 90% levels on their respective curves.



PIN: 1 = Gate
5-12 = Cathode
13-24 = Anode

Dim.	Millimeter		Inches	
	min	max	min	max
A	5.30	5.70	0.209	0.224
A1	3.90	4.10	0.154	0.161
A2	1.40	1.60	0.055	0.063
b	0.90	1.15	0.035	0.045
c	0.45	0.65	0.018	0.026
D	24.80	25.25	0.976	0.994
E	22.80	23.25	0.898	0.915
E1	13.80	14.20	0.543	0.559
e	2.00	BSC	0.079	BSC
e1	8.00	BSC	0.315	BSC
H	32.30	33.30	1.272	1.311
L	4.60	5.30	0.181	0.209
L1	1.30	1.70	0.051	0.067
L2	0.00	0.15	0.000	0.006
S	18.85	20.12	0.742	0.792
S1	1.45	2.08	0.057	0.082
T	20.90	22.17	0.823	0.873
T1	1.42	2.03	0.056	0.080
a	4°	-	4°	-



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