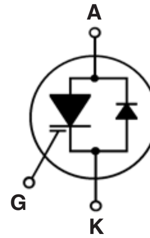
IXYS Preliminary Technical Information

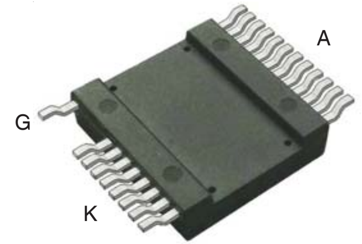
1500V MOS Gated Thyristor w/ Anti-Parallel Diode

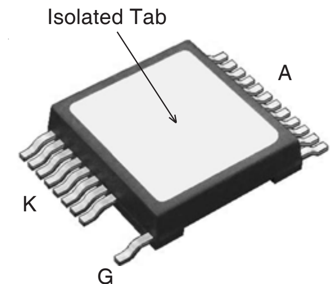
MMIX1H60N150V1

V_{DM} = 1500V

(Electrically Isolated Tab)







G = Gate K = Cathode
A = Anode

Symbol	Test Conditions	Maximum Ratings	
V_{DM}	T_J = 25°C to 150°C	1500	V
V_{GK}	Continuous	±30	V
V_{GK}	Transient	±40	V
I_{TSM}	T_C = 25°C, 1μs	32.0	kA
	T_C = 25°C, 10μs	11.8	kA
P_D	T_C = 25°C	446	W
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}	1.6 mm (0.062 in.) from Case for 10s	260	°C
V_{ISOL}	50/60Hz, 1 minute	2500	V~
F_C	Mounting Force	50..200/11..45	N/lb
Weight		8	g

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- Anti-Parallel Diode
- 2500V~ Electrical Isolation
- Very High Current Capability

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_{BR}	I_A = 250μA, V_{GK} = 0V	1500			V
$V_{GK(th)}$	I_A = 250μA, 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		mΩ
V_{BO}	V_{GK} = 15V		4.8		V
I_D	V_{AK} = 1500V, V_{GK} = 0V			15	μA
	T_J = 125°C			1.5	mA
I_L			400		A
I_H			350		A
I_{GKS}	V_{AK} = 0V, V_{GK} = ±30V			±200	nA

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

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Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	
C_{iks}	V_{AK} = 25V, V_{GK} = 0V, f = 1MHz		5120		pF
C_{oks}			340		pF
C_{rks}			84		pF
$Q_{g(on)}$	I_C = 60A, V_{GK} = 15V, V_{AK} = 600V		180		nC
Q_{gk}			33		nC
Q_{ga}			62		nC
t_{ri}	**Capacitive Discharge, T_J = 25°C** I_A = 2000A, V_{GK} = 15V, R_G = 1Ω V_{AK} = 1000V, L < 20nH, Notes 2 & 3		100		ns
t_d			50		ns
t_{ri}	**Capacitive Discharge, T_J = 125°C** I_A = 2000A, V_{GK} = 15V, R_G = 1Ω V_{AK} = 1000V, L < 20nH, Notes 2 & 3		100		ns
t_d			50		ns
R_{thJC}				0.28	°C/W
R_{thCS}			0.05		°C/W
R_{thJA}			19		°C/W

Reverse Diode (FRED)

Symbol	Test Conditions (TJ = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	
V_F	I_F = 100A, V_{GK} = 0V, Note 1			1.8	V
I_{RM}	I_F = 50A, V_{GK} = 0V, $-di_F/dt$ = 200A/μs, V_R = 300V		20		A
t_{rr}			700		ns
R_{thJC}				0.50	°C/W

Notes:

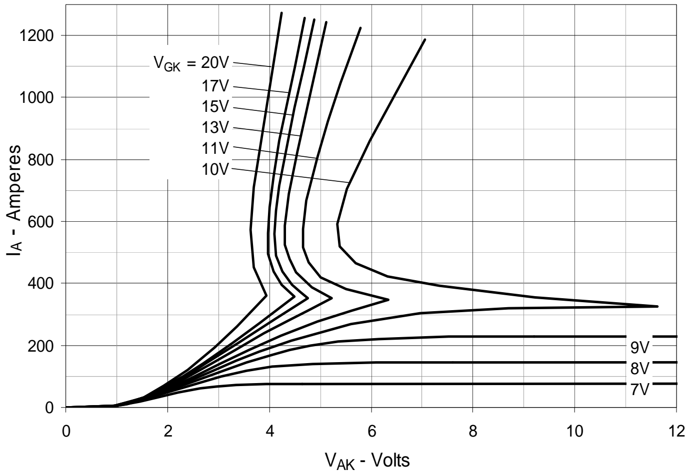
1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. It is recommended to use a gate driver capable of supplying more than 4Amps and ≥15V gate voltage.
3. Refer to fig. 9 & 10.

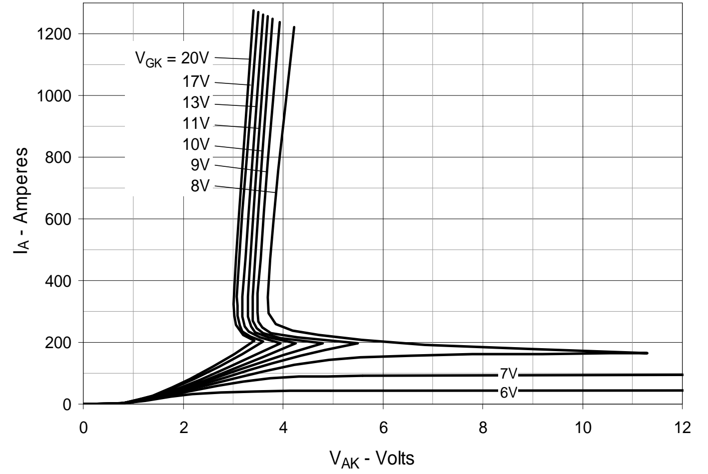
PRELIMANARY TECHNICAL INFORMATION

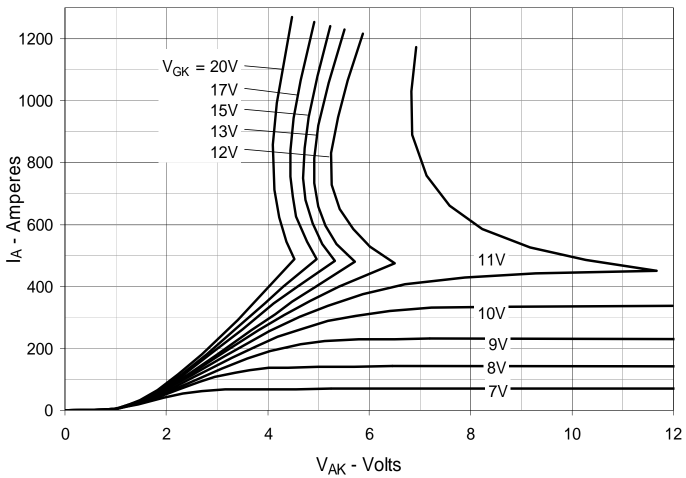
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test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

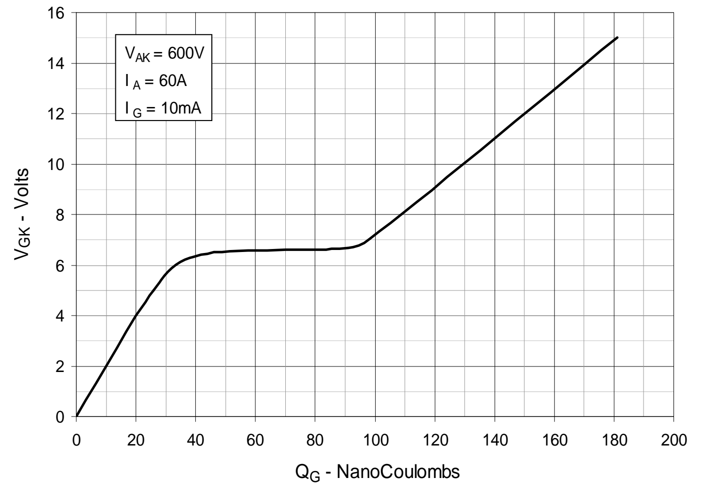
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

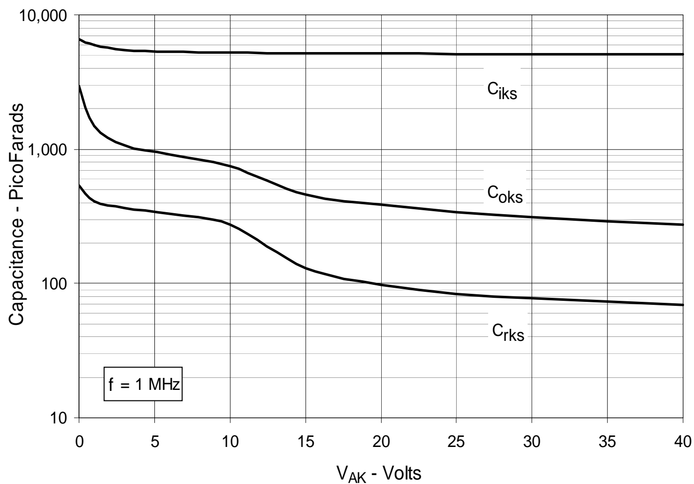
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2 4,860,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537











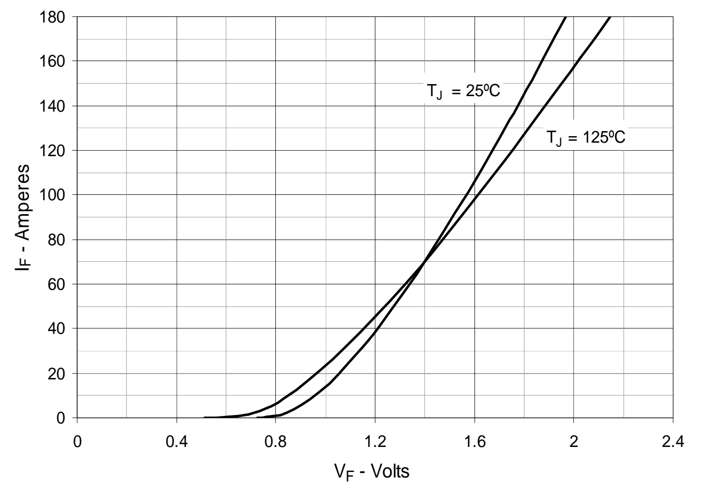


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Fig. 7. Maximum Transient Thermal Impedance

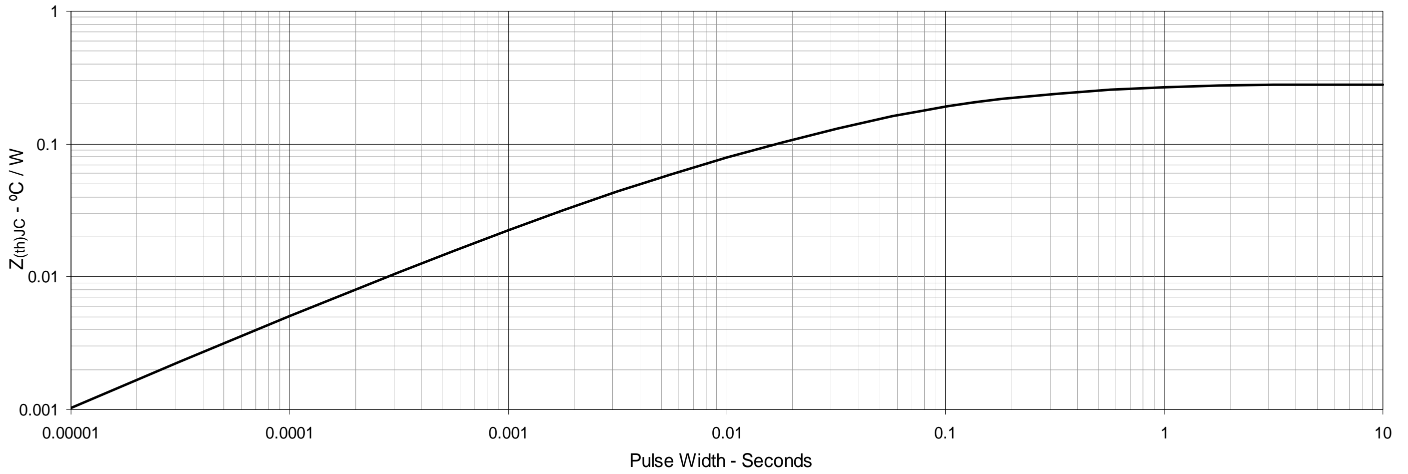
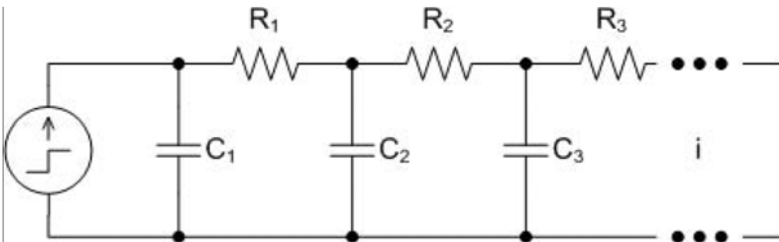


Fig. 8. Cauer Thermal Network



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

Fig. 9. Capacitive Discharge Circuit

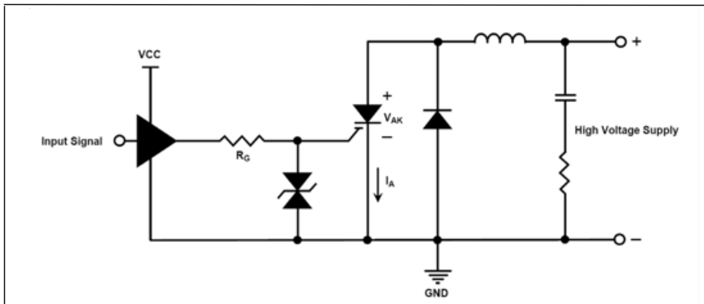
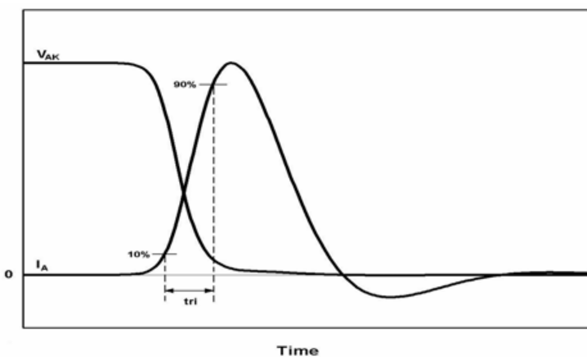


Fig. 10. Capacitive Discharge Waveform



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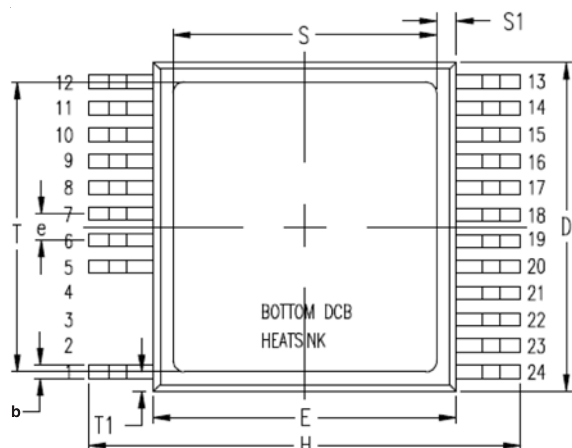

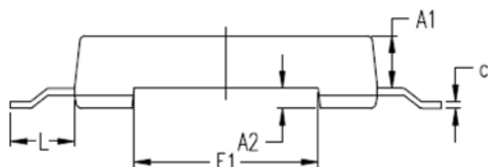

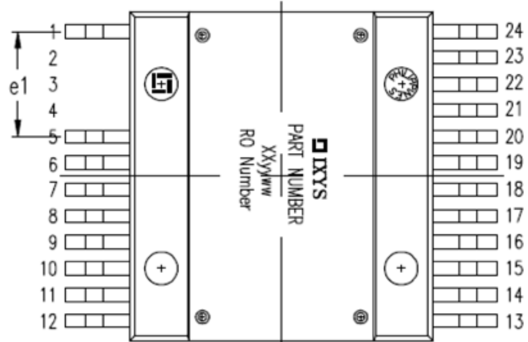

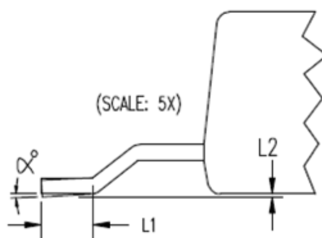

PIN: **1 = Gate**
5-12 = Cathode
13-24 = Anode

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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