

<ul style="list-style-type: none"> ■ Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits ■ Blocking Voltage to 1000 Volts ■ On-State Current Rating of 12A RMS at 80°C ■ High Surge Current Capability 110A ■ Glass Passivated Junctions for Reliability and Uniformity ■ Minimum and Maximum Values of I_{GT}, V_{GT} and I_H Specified for Ease of Design ■ Immunity to dv/dt: 5V/μS Minimum at 110°C 	<p>■ 产品特点 大电流、高灵敏度、微触发、特制高压单向可控硅；PNPN四层结构硅器件双面台面玻璃钝化工艺；背面多层金属电极；具有较高的阻断电压和抗电流冲击能力；可以适应于DB3触发电路、直流和交流光藕触发电路</p> <p>■ 主要用途 自动化电气设备；开关电源；无功补偿；复合开关；交流电开关；交流/直流电源变换；工业和家庭电加热器的温度控制；逆变电源；大功率捕鱼器电机马达调速控制电路；以及三相交流输入的高压电路、变频电路</p> <p>■ 代替型号 高灵敏度SCR: 12A、600V~1000V 同等规格所有器件</p>
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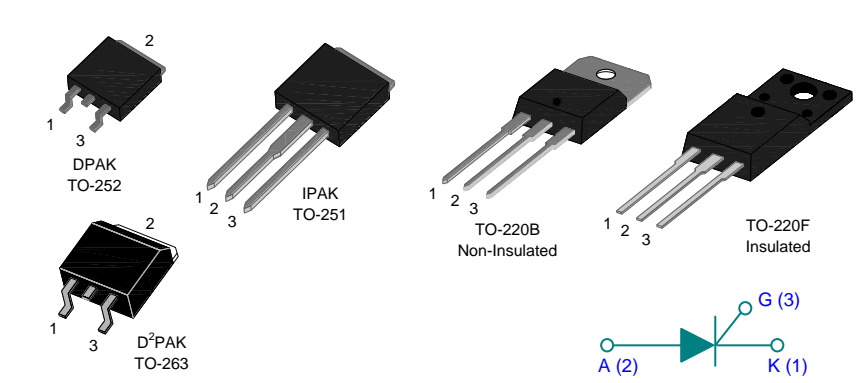
■ Product Model Reference & Naming【产品型号参考及型号命名】

12A	产品型号列表、种类区分、型号对照电压值						I_{GT}
	封装标识	400V	600V	800V	1000V	1200V	
TO-251	U	MCRU12SD	MCRU12SM	MCRU12SN	MCRU12SH	MCRU12SG	"S" $\leq 200\mu A$
TO-252	D	MCRD12SD	MCRD12SM	MCRD12SN	MCRD12SH	MCRD12SG	
TO-220F	F	MCRF12SD	MCRF12SM	MCRF12SN	MCR12FSH	MCRF12SG	
TO-220AB	无标记	MCR12SD	MCR12SM	MCR12SN	MCR12SH	MCR12SG	
Remarks (说明)		已停产	标准品种	高压品种	特制高压	未量产	

■ PINNING: Insulated Package

TO-251(IPAK), TO-252 (DPAK), TO-220B, TO-220F, TO-263(D²PAK)

Pin in Symbol and Description				Pin Polarity Circuit Diagram 脚位与极性 电路符号表示
1	K	Cathode	阴极	
2	A	Anode	阳极	
3	G	Gate	控制极	
4		Tab	散热片	



H	MCR	—	12	S	N
↓	↓	↓	↓	↓	↓
厂商	品种表示	封装表示	电流表示	触发电流	电压表示
HAOHAI ELECTRONICS CO.,LTD.	SCR 单向可控硅 Microelectronics SCR	U: TO-251 (IPAK) D: TO-252 (DPAK) F: TO-220F P: TO-220AB 或无标记 No letters in TO-220B	4=4A 6=6A 8=8A 10=10A 12=12A 16=16A 20=20A 25=25A	$I_{GT} \leq 200\mu A$ Standard trigger	D=400V M=600V N=800V H=1000V G=1200V

■ ABSOLUTE RATINGS (Limiting Values) 【额定值参数】

SYMBOL	Parameter & Test Conditions		Value	Unit
$I_{T(RMS)}$	On-State RMS Current	TO-251, TO-252, TO-220B (Non-Ins), $T_C=90^\circ\text{C}$	12	A
		TO-220F (Ins-外绝缘式), $T_C=85^\circ\text{C}$		
		TO-263 (D ² PAK), $T_C=95^\circ\text{C}$		
I_{TSM}	Peak Non-Repetitive Surge Current (tp=10ms)		110	
I_{GM}	Peak gate current (tp=20μs, $T_J=110^\circ\text{C}$)		1.2	
I^2t	I^2t value for fusing (tp=10ms)		45	A ² s
P_{GM}	Peak gate power (tp=20μs, $T_J=110^\circ\text{C}$)		3	W
$P_{G(AV)}$	Average gate power dissipation ($T_J=110^\circ\text{C}$)		0.2	
V_{DRM}	Peak Repetitive Off-State Voltage	见参考特性对应说明 See Reference Feature Description	600~1000	V
V_{RRM}	Repetitive peak reverse voltage			
T_j	Operating Junction Temperature Range		-40~+110	°C
T_{stg}	Storage Temperature Range		-40~+150	
T_L	Maximum Lead Temperature for Soldering Purposes 1/8, from Case for 10 Seconds		260	

■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$ Unless Otherwise Noted)

SYMBOL	Parameter & Test Conditions	Min	Typ	Max	Unit
I_{GT}	$V_D=12\text{V}$, $R_L=33\Omega$	--	60	200	μA
I_H	$I_T = 0.05A$	--	--	6	mA
I_L	Latching Current ($I_G = 1.2 I_{GT}$)	--	--	5	
V_{GT}	Gate Trigger Voltage ($V_D=12\text{V}$, $R_L=33\Omega$)	--	--	0.8	V
V_{GD}	Gate Non-Trigger Voltage ($V_D=V_{DRM}$, $T_J=110^\circ\text{C}$)	0.1	--	--	
V_{TM}	$I_{TM}=24A$, tp=380μs, $T_J=25^\circ\text{C}$	--	--	1.6	
I_{DRM}	Peak Reverse Blocking Current $V_D=V_{DRM}$, $V_R=V_{RRM}$	$T_J=25^\circ\text{C}$	--	10	μA
I_{RRM}		$T_J=110^\circ\text{C}$	--	2	mA

■ DYNAMIC CHARACTERISTICS

SYMBOL	Parameter & Test Conditions	Min	Typ	Max	Unit
dv/dt	$V_D=2/3V_{DRM}$, $T_J=110^\circ\text{C}$, $R_{GK}=1K\Omega$	5	--	--	V/μs
di/dt	Critical Rate of Rise of On-State Current	--	50	--	A/μs

■ THERMAL CHARACTERISTICS

SYMBOL	Parameter & Test Conditions	Min	Typ	Max	Unit	
$R_{th(j-c)}$	junction to case	TO-251, TO-252, TO-220F (Ins)	--	--	2.2	°C/W
		TO-220B (Non-Ins 非绝缘式封装)	--	--	2.0	
		TO-263 (D ² PAK)	--	--	1.9	

Electrical characteristics & Typical characteristics (电气特性与典型特征)

FIG.1 Maximum power dissipation versus RMS on-state current

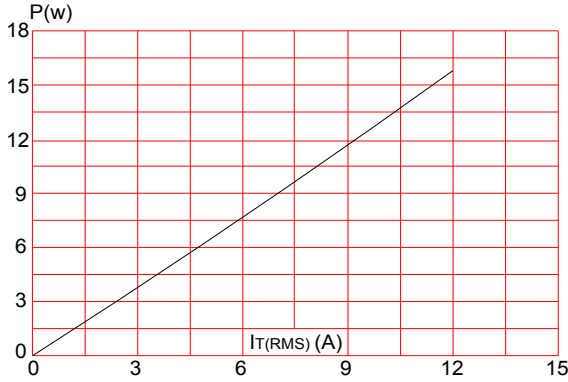


FIG.2: RMS on-state current versus case temperature

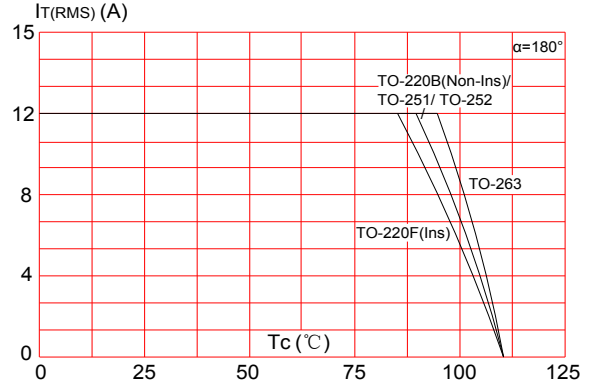


FIG.3: Surge peak on-state current versus number of cycles

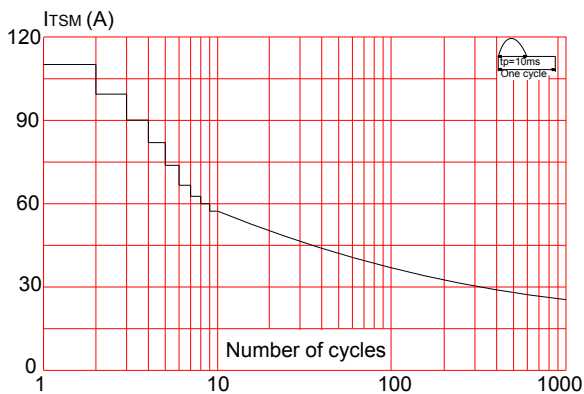


FIG.4: On-state characteristics (maximum values)

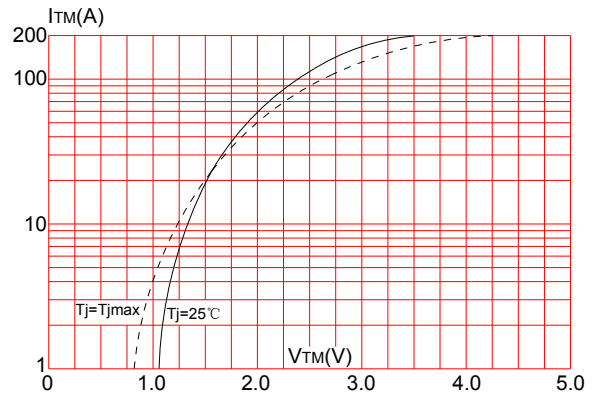


FIG.5: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10\text{ms}$, and corresponding value of I_t ($dI/dt < 50\text{A}/\mu\text{s}$)

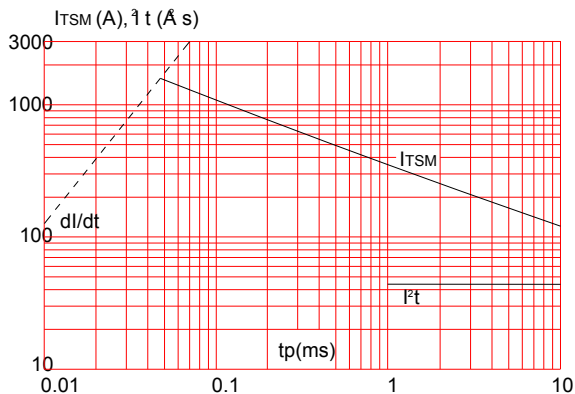
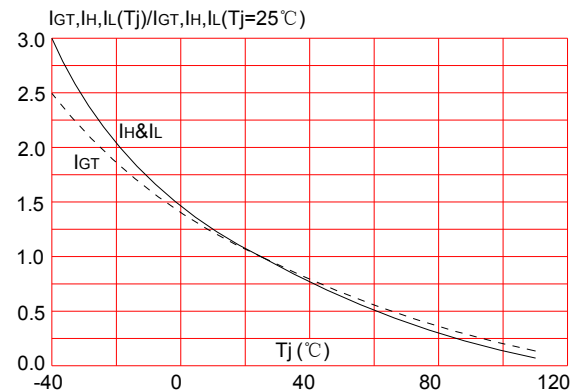


FIG.6: Relative variations of gate trigger current, holding current and latching current versus junction temperature



PACKAGE MECHANICAL DATA (mm & inch) 封装尺寸数据 (毫米与英寸对照)

打印标识

TO-251 (IPAK)
Package Code: U

REF	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.095
A1	0.90	1.10	0.035	0.043
B	0.55	0.65	0.021	0.026
B2	5.10	5.40	0.200	0.212
B3	0.76	0.85	0.030	0.033
C	0.45	0.62	0.017	0.024
C2	0.48	0.62	0.019	0.024
D	6.00	6.20	0.236	0.244
E	6.40	6.70	0.252	0.264
G	2.30 TYP		0.091 TYP	
H	16.0	16.7	0.630	0.658
L	8.90	9.40	0.350	0.370
L1	1.80	1.90	0.071	0.075
L2	1.37	1.50	0.054	0.059
V1	4° TYP		4° TYP	

Marking

LOGO in
The upper left corner mark
XXXXXXXX: Part Number
KKG: Registered trademark
aa: Year
bb: Week (01~53)

XXXXXXXX: 产品型号
KKG: 注册商标
aa: 出厂年份
bb: 出厂自然周 (01~53)
左上角: 公司LOGO

TO-252 (DPAK)
Package Code: D

REF	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.095
A2	0.03	0.23	0.001	0.009
B	0.55	0.65	0.022	0.026
B2	5.10	5.40	0.200	0.213
C	0.45	0.62	0.018	0.024
C2	0.48	0.62	0.019	0.024
D	6.00	6.20	0.236	0.244
E	6.40	6.70	0.252	0.264
G	4.40	4.70	0.173	0.185
H	9.35	10.6	0.368	0.417
L1	1.30	1.70	0.051	0.067
L2	1.37	1.5	0.054	0.059
V1	4° TYP		4° TYP	
V2	0°	8°	0°	8°

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■ Packaging Specifications (包装数量、包装规格、装箱规格、包装尺寸数据)

REF.	TO-251 (IPAK)			TO-252 (DPAK)		
	Tube.	BOX	Carton	Reel	BOX	Carton
QTY	80 Pcs	4,000 Pcs	24,000 Pcs	25000 Pcs	5,000 Pcs	25,000 Pcs

PACKAGE MECHANICAL DATA (mm & inch) 封装尺寸数据 (毫米与英寸对照)

打印标识

TO-220B PACKAGE DIMENSIONS

REF	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	1.181
B	0.61	0.88	0.024	0.035
C	0.46	0.70	0.018	0.028
C2	1.21	1.32	0.048	0.052
C3	2.40	2.72	0.094	0.107
D	8.60	9.70	0.339	0.382
E	9.60	10.4	0.378	0.409
F	6.20	6.60	0.244	0.260
G	2.54 TYP		0.100 TYP	
H	28.0	29.8	1.102	1.173
L1	3.75 TYP		0.148 TYP	
L2	1.14	1.70	0.045	0.067
L3	2.65	2.95	0.104	0.116
V1	45°		45°	

TO-220B Non-Ins

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TO-220F PACKAGE DIMENSIONS

REF	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.80	0.173	0.189
B	0.74	0.83	0.029	0.033
C	0.48	0.75	0.019	0.030
C2	2.40	2.70	0.094	0.106
C3	2.60	3.00	0.102	0.118
D	8.80	9.30	0.346	0.366
E	9.70	10.30	0.382	0.406
F	6.40	7.00	0.252	0.276
G	2.54 TYP		0.100 TYP	
H	28.0	29.80	1.102	1.173
L1	3.63 TYP		0.143	
L2	1.14	1.70	0.045	0.067
L3	3.30 TYP		0.130 TYP	
V1	45°		45°	

TO-220F Ins-外绝缘式

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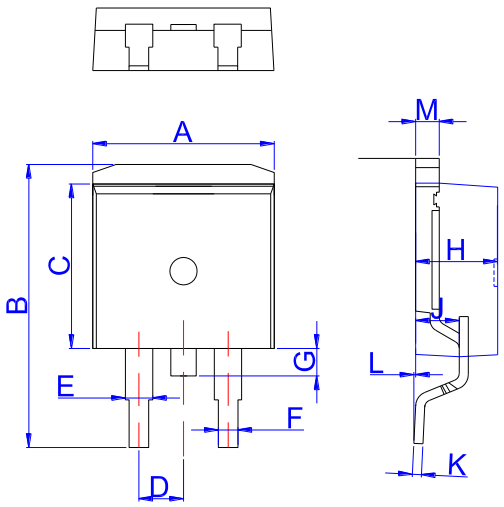
Packaging Specifications (包装规格、装箱规格、包装尺寸数据)

REF.	TO-220AB			TO-220F		
	Tube.	BOX	Carton	Tube.	BOX	Carton
QTY	50 Pcs	1,000 Pcs	5,000 Pcs	50 Pcs	1,000 Pcs	5,000 Pcs

PACKAGE MECHANICAL DATA (mm & inch) 封装尺寸数据 (毫米与英寸对照)

打印标识

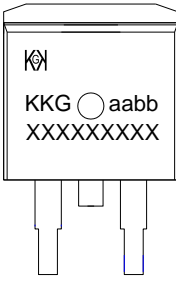
■ TO-263 (D²PAK) PACKAGE DIMENSIONS



REF	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	9.90	10.20	0.390	0.402
B	14.70	15.80	0.579	0.622
C	9.40	9.60	0.370	0.378
D	2.54 TYP		0.100 TYP	
E	1.20	1.40	0.047	0.055
F	0.75	0.85	0.029	0.033
G		1.75		0.069
H	4.40	4.70	0.173	0.185
J	2.30	2.70	0.091	0.106
K	0.38	0.55	0.015	0.022
L	0	0.25	0	0.010
M	1.25	1.35	0.049	0.053

TO-263
D²PAK

Marking



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■ Packaging Specifications (包装数量、包装规格、装箱规格、包装尺寸数据)

TO-263 (D ² PAK)						
	管装、盒装			载带卷盘包装		
REF.	Tube.	BOX	Carton	Reel	BOX	Carton
QTY	80 Pcs	4,000 Pcs	24,000 Pcs	800 Pcs	4,000 Pcs	40,000 Pcs

Manufacturers version information
2005-03-20, KKG™ Product Data-1.0
2010-04-01, KKG™ Product Data-1.1
2015-03-26, KKG™ Product Data-1.2



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