Ruttonsha International Rectifier Ltd.

POWER MODULES

IRK.800 SERIES
High Voltage Thyristor/Diode and Thyristor/Thyristor

FEATURES

- *Electrically isolated base plate.*
- *3500 V_{RMS} isolating voltage.*
- *Industrial standard package.*
- *Simplified mechanical designs, rapid assembly.*
- *High surge capability.*
- *Large creepage distances.*
- *Beryllium oxide substrate.*

DESCRIPTION

These IRK series of Power Modules use power thyristors/ diodes in four basic configurations. The semiconductors are electrically isolated from the metal base, allowing common heatsinks and compact assemblies to be built. They can be interconnected to form single phase or three phase bridges or as AC-switches when modules are connected in anti-parallel.
These modules are intended for general purpose applications such as battery chargers, welders and plating equipment.

MAJOR RATINGS & CHARACTERISTICS

Parameters		IRK. 800	Units
$I_{T(AV)}$	@ 78 °C	800	A
$I_{T(RMS)}$		1256	A
I_{TSM}	@ 50 Hz	28	kA
I^2t	@ 50 Hz	3920	kA^2s
V_{DRM} -V_{RRM}		Up to 1800	V
T_J		-40 to 130	°C

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ELECTRICAL SPECIFICATION

VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} max. repetitive peak reverse voltage blocking voltage V	V_{RSM}, max. non-repetitive peak reverse voltage V	I_{RD} max. @ 130°C mA
IRK. 800	10	1000	1100	150
	12	1200	1300	150
	14	1400	1500	150
	16	1600	1700	150
	18	1800	1900	150

ON-STATE CONDUCTION

	Parameters	IRK. 800	Units	Conditions	
$I_{T(AV)}$	Max. average on-state current	800	A	180° conduction, half sine wave Double side cooled	
	@ Case temperature	60	°C		
$I_{T(RMS)}$	Max. RMS on-state current	1256	A		
I_{TSM}	Max. peak, one cycle on-state, non-repetitive surge current	28	A	t = 10ms	180° half-sine wave ; 50Hz (t_p=10ms); single pulse; V_D=V_R = 0 V; Gate pulse: I_G=I_{FGM}; V_G=20V; t_{GP}= 500 µs; di_G/dt=1A/µs
I^2t	Maximum I^2t for fusing	3920	kA^2s	t = 10ms	180° half-sine wave ; 50Hz (t_p=10ms); single pulse; V_D=V_R = 0 V; Gate pulse: I_G=I_{FGM}; V_G=20V; t_{GP}= 500 µs; di_G/dt=1A/µs
$V_{T(TO)}$	threshold voltage max.	0.85	V	T_J = T_J max.	
r_t	on-state slope resistance max.	0.20	mΩ	T_J = T_J max.	
V_{TM}	Max. on-state voltage drop	1.45	V	I_T = 2512A , 25°C	
I_H	Maximum holding current	500 max.	mA	T_J =25°C V_D=12V, Gate Open	
I_L	Max. latching current	1500 max.	mA	V_D= 12V, tp= 500µs V_G = 20r I_G= I_{FGM} T_J =25°C dig/dt = 1A/µs	

SWITCHING

t_d	Delay Time	2.0	µs	T_J = 25°C Gate current = 1A $dIg/_{DT}$=1A/µs I_G=I_{FGM} Vd = 0.4 % V_{DRM} I_{TM}=$I_{T(AV)}$ V_G=20V, t_{GP}=500µs, dig/dt= 1A/µs.
t_q	Turn-Off Time max.	250	µs	dvD/dt = 50 V/µs I_{TM}=$I_{T(AV)}$ dir/dt = 10A/µs VR=100V, V_D=0.67 V_{DRM} T_J = T_J max.

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BLOCKING

	Parameter	800		Units Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	V/µs	$T_J = T_J$ max. V_D =0.67 V_{DRM} Gate Open
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	150	mA	$T_J = T_J$ max. rated V_{DRM}/V_{RRM} applied
V_{INS}	RMS isolation voltage	3500	V	50Hz,Circuit to base, all terminal shorted,25°C,1sec

TRIGGERING

	Parameter	800	Units	Conditions
I_{FGM}	Peak forwedrd gate current	8	A	$T_J = T_J$ max.
V_{RGM}	Peak reveres gate voltage	5	V	$T_J = T_J$ max.
P_G	Gate power dissipation	4	W	$T_J = T_J$ max. for DC gate current
I_{GT}	DC gate current required to trigger	250	mA	T_J = 25°C V_D =12V, I_D =3A
V_{GT}	DC gate voltage required to trigger	2.5	V	
V_{GD}	DC gate voltage not to trigger	min. 0.25	V	$T_J = T_J$ max. V_D = 0.67 V_{DRM}
I_{GD}	DC gate current not to trigger	min. 10.0	mA	
di/dt	Maximum critical rate of rise of turned-on current	100	A/µs	$T_J = T_J$ max. V_D = 0.67 V_{DRM} I_{TM} =2 $I_{T(AV)}$

THERMAL AND MECHANICAL SPECIFICATION

	Parameter	800	Units	Conditions
T_J	Max. operating temperature range	-40 to125	°C/W	
T_{stg}	Max. storage temperature range	-40 to 125		
R_{thJC}	Max. thermal resistance, junction to case	0.0250/0.0500	°C/W	Per module / per arm.
R_{thCh}	Max. thermal resistance, case to heatsink	0.0080/0.0160	°C/W	Per module / per arm.
T	Mounting tourque, ±15%	9 (18)	Nm	To heatsink & to (terminal)
W	Weight	3500	gm.	

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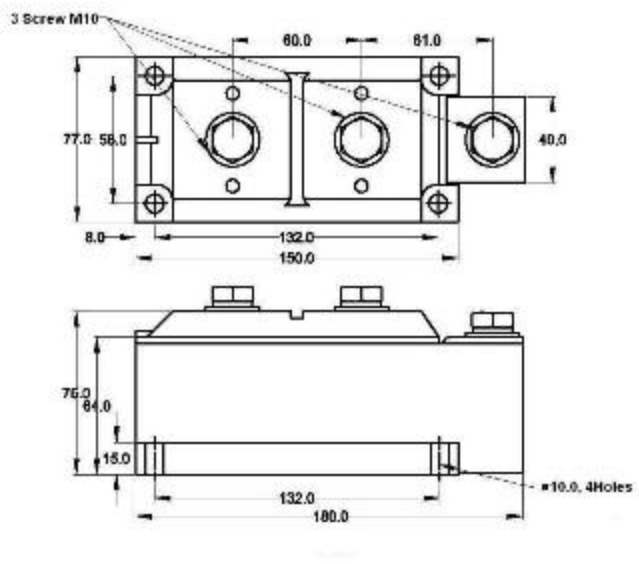
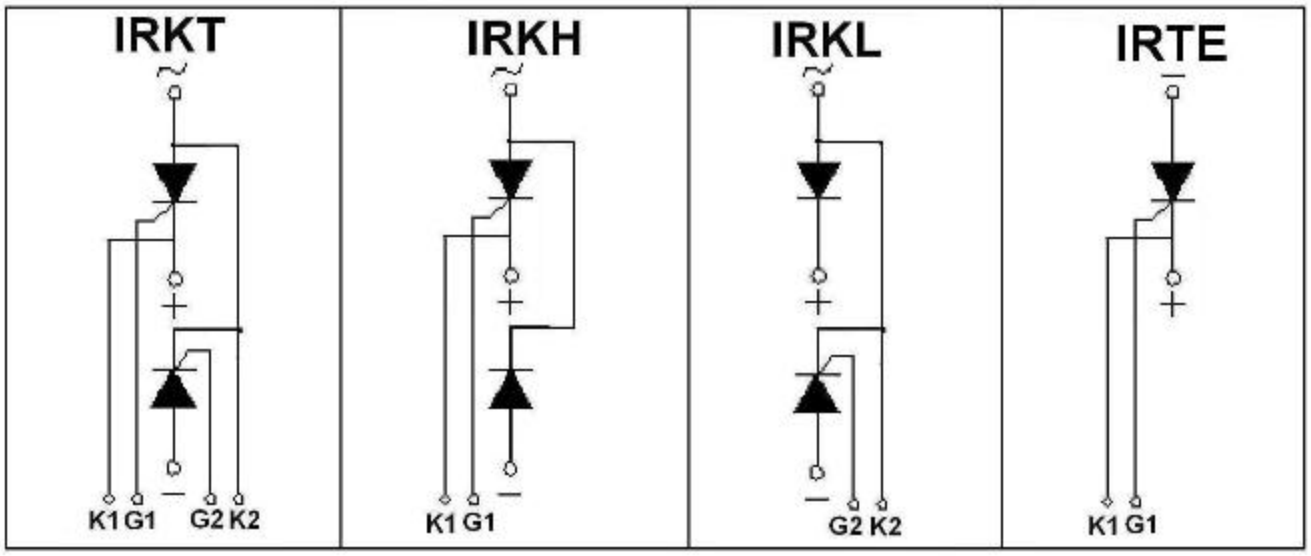
OUTLINE DIAGRAM



ALL DIM. ARE IN MM.

Circuit Configuration Table

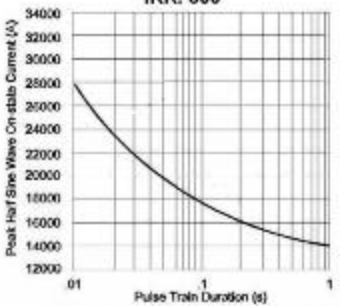


Ordering Information Table

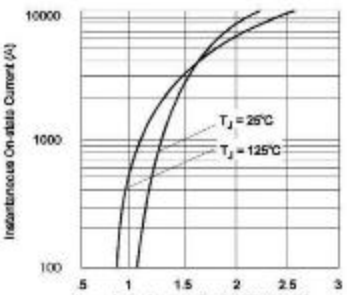
IRK	T	800	/	12
①	②	③		④

① - **Module type**
② - Circuit configuration (See Circuit Configuration table)
③ - Current Code
④ - Voltage Code (See Voltage Ratings table)

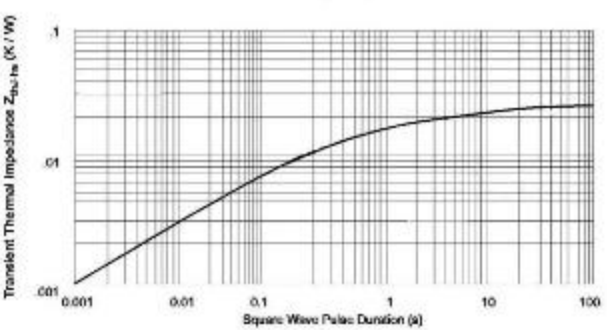
IRK. 800



Maximum Non-Repetitive Surge Current



On-state Voltage Drop Characteristics



Thermal Impedance Z_{thJ-hs} Characteristics