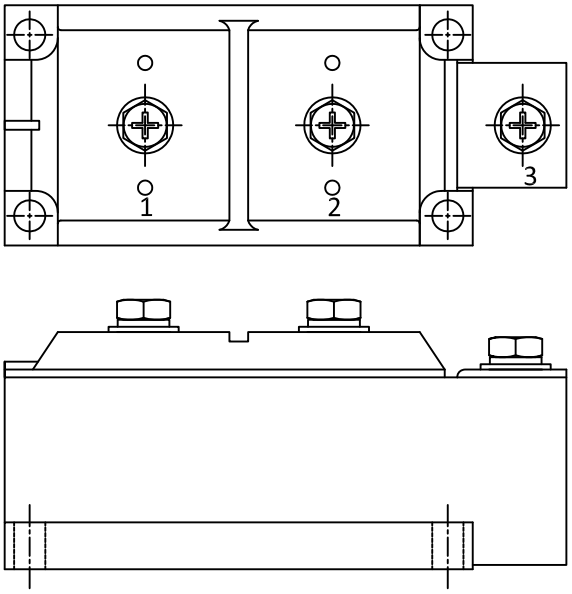
Ruttonsha International Rectifier Ltd.

POWER MODULES

IRK. 500 Series
High Voltage Thyristor/ Diode and Thyristor/ Thyristor



FEATURES

 # Electrically isolated base plate.
 # 3500Vrms isolating voltage.
 # Industrial standard package.
 # Simplified mechanical designs, rapid assembly.
 # High surge capability.
 # Large creepage distance.

DESCRIPTION

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

MAJOR RATING & CHARACTERISTICS

Parameters		IRK. 500	Units
$I_{T(AV)}$	@Tc-85°C	500	A
$I_{T(RMS)}$	@Tc-85°C	785	A
I_{TSM}	@ 50Hz	18.0	kA
I^2t	@ 50Hz	1620	kA^2s
V_{RRM}		3000 to 3600	V
T_J		-40 to 125	°C

IRK. 500 Series

ELECTRICAL SPECIFICATION

VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} max. repetitive peak reverse and off-state blocking voltage V	V_{RSM} max.non-repetitive peak reverse voltage V	I_{DRM} / I_{RRM} max. @ 125°C Max. mA
IRK.500	30	3000	3100	250
	32	3200	3300	
	34	3400	3500	
	36	3600	3700	

ON-STATE CONDUCTION

	Parameter	IRK.500	Unit	Conditions	
$I_{T(AV)}$	Max, average On-state current @ case temperature	500 85	A °C	180°C conduction, half sine wave	
$I_{T(RMS)}$	Max, RMS on-state current	785	A	as AC switch	
I_{TSM}	Max, peak, one cycle on-state, non-repetitive surge current	18.0	kA	t = 10ms	Sinusoidal half wave initial Tj = Tj max.
I^2t	Maximum I^2t for fusing	1620	kA^2s	t = 10ms	
$V_{T(TO)}$	Max, value of Threshold voltage	1.10	V	Tj = Tj max.	
r_t	Max, value of on-state slope resistance	0.4	mΩ	Tj = Tj max,	
V_{TM}	Max, on-state voltage drop	1.85	V	I_T = 1570A, 25°C	
I_H	Maximum holding current	300	mA	V_D =12V, Gate Open TJ = 25°C	
I_L	Max, latching current	1500	mA	Tj = 25°C, V_D = 12V, Gate pulse I_G = 2A t_{GP}=50µs	

SWITCHING

t_d	Typical delay time	3.0	µs	Tj = 25°C Gate current = 1A dig/dt = 1A/µS Vd = 0.4% V_{DRM} I_{TM} = $I_{T(AV)}$ VG = 20V tGP = 500µS, dig/dt=1A/µs.
t_q	Typical turn-off time	400	µs	I_{TM} = $I_{T(AV)}$ di/dt = 10A/µs, Tj = Tj max, V_r = 100V, dv/dt = 50 V/µs. V_D=0.67V_{DRM}

IRK. 551 Series

BLOCKING

	Parameter	IRK. 500	Unit	Conditions	
dv/dt	Max, critical rate of rise of off-state voltage	1000	V/µs	Tj = Tj Max, V_D = 0.67V_{DRM}, Gate Open	
I_{RRM} I_{DRM}	Max. peak reverse and off state leakage current at V_{RRM} V_{DRM}	250	mA	Tj = 125°C, rated V_{DRM}/V_{RRM} Applied	
V_{INS}	RMS Isolation voltage	3.0	kV	Sine wave, 50Hz, RMS	t = 1 min
		3.6			t = 1 sec

ELECTRICAL SPECIFICATION TRIGGERING

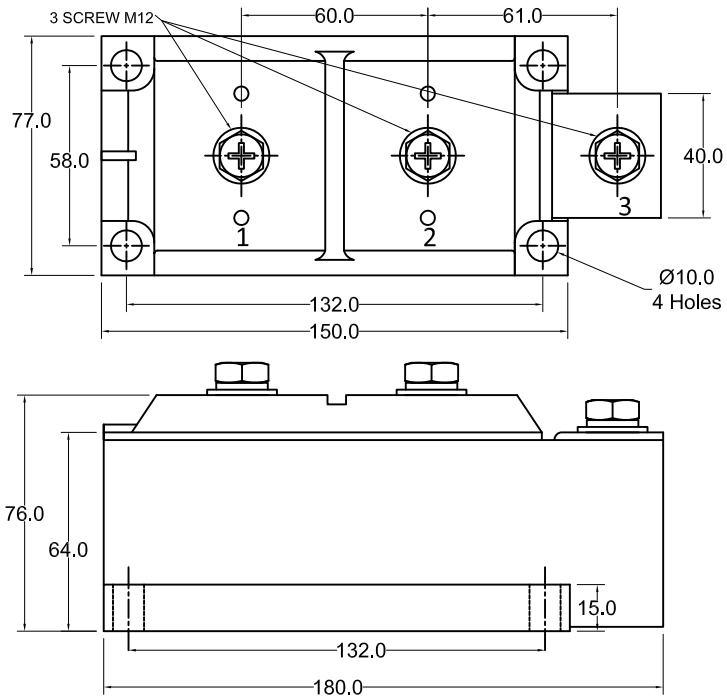
	Parameter	IRK. 500	Unit	Conditions
P_{FGM}	Peak forward gate current	8	A	Tj = Tj max,
V_{RGM}	Peak reverse gate voltage	5	V	Tj = Tj max,
P_G	Gate Power dissipation	4	W	Tj = Tj Max, for DC gate current
I_{GT}	DC gate current required to trigger	250	mA	Tj = 25°C V_D = 12V, I_D = 3A
V_{GT}	DC gate voltage required to trigger	2.5	V	
V_{GD}	DC gate voltage not to trigger	0.35	V	Tj = Tj max. VD = 0.67V_{DRM}
I_{GD}	DC gate current not to trigger	15	mA	
di/dt	Max, critical rate of rise of turneed-on current	400	A/µs	V_D = 0.67V_{DRM} I_{TM}=2$I_{T(AV)}$

THERMAL AND MECHANICAL SPECIFICATION

	Parameter	IRK. 500	Unit	Conditions
T_J	Junction operating temperature	-40 to 125	°C	
T_{stg}	Max, storage temperature range	-40 to 125		
R_{thJ-C}	Max. thermal resistance, junction to case Per Module Per arm	 0.0250 0.0500	°C/W	180° half wave 50Hz
R_{thC-h}	Max. thermal resistance junction to heatsink Per Module Per arm	 0.0080 0.0160	°C/W	
T	Mounting torque ±10%	9 (18)	Nm	For module to heat sink and bus bar to module
Wt	Approximate Weight	3500	g	

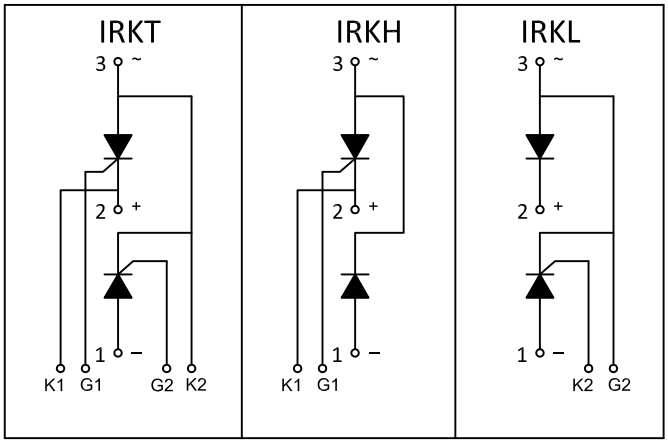
IRK. 500 Series

OUTLINE DIAGRAM



UNIT : MM

CIRCUIT CONFIGURATION TABLE



CIRCUIT CONFIGURATION TABLE

IRK	T	500	/	36
1	2	3		4

1). - Module Type
2). - Circuit configuration (See Circuit Configuration table)
3). - Current Code
4). - Voltage Code (See Voltage Rating Table)