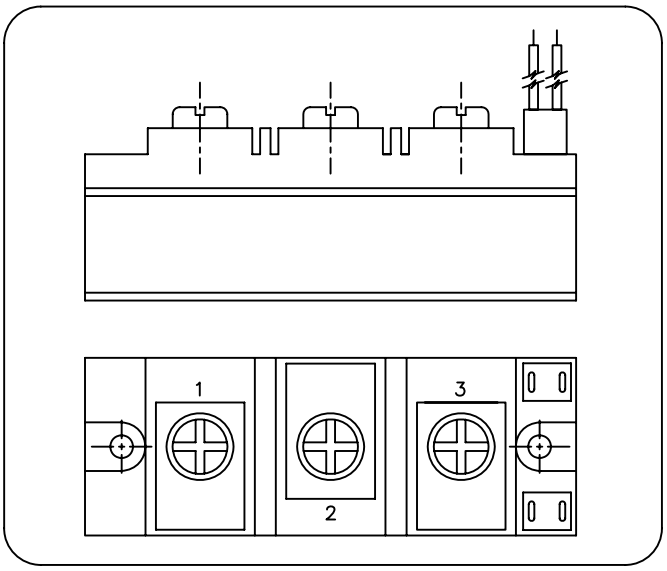
Ruttonsha International Rectifier Ltd.

POWER MODULES

IRK. 142 Series
High Voltage Thyristor/ Diode and Thyristor/ Thyristor



FEATURES

 # Electrically isolated base plate.
 # 3000Vrms isolating voltage.
 # Industrial standard package.
 # Simplified mechanical designs, rapid assembly.
 # High surge capability.
 # Large creepage distance.
 # Aluminum Nitride.

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 controller. These 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. 142	Units
$I_{T(AV)}$	@Tc-85°C	140	A
$I_{T(RMS)}$		310	A
I_{TSM}	@ 50Hz	4750	A
I^2t	@ 50Hz	113.0	kA^2s
V_{RRM}		400 to 1600	V
T_J		-40 to 130	°C

IRK. 142 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. @ 130°C Max. mA
IRK.142	04	400	500	50
	06	600	700	
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

ON-STATE CONDUCTION

	Parameter	IRK. 142	Unit	Conditions	
$I_{T(AV)}$	Max, average On-state current @ case temperature	140 85	A °C	180°C conduction, half sine wave	
$I_{T(RMS)}$	Max, RMS on-state current	310	A	as AC switch	
I_{TSM}	Max, peak, one cycle on-state, non-repetitive surge current	4750	A	t = 10ms	Sinusoidal half wave initial Tj = Tj max.
I^2t	Maximum I^2t for fusing	113.0	kA^2s	t = 10ms	
$V_{T(TO)}$	Max, value of Threshold voltage	1.14	V	Tj = Tj max.	
r_t	Max, value of on-state slope resistance	1.29	mΩ	Tj = Tj max,	
V_{TM}	Max, on-state voltage drop	1.70	V	I_{TM} = π x $I_{T(AV)}$, T_j = T_j Max, 180° conduction AV Power = $V_{T(TO)}$ x $I_{T(AV)}$ + r1 x $(I_{T(RMS)})^2$	
I_H	Maximum holding current	500	mA	Anode supply = 12V initial I_T = 30A, TJ = 25°C	
I_L	Max, latching current	300	mA	Anode supply = 12V resistive Load = 1Ω, gate pulse. 10V, 100µs, Tj = 25°C	

SWITCHING

t_d	Typical delay time	1.0	µs	Tj = 25°C	Gate current = 1A dig/dt = 1A/µS
T_R	Typical rise time	2.0	µs	Tj = 25°C	Vd = 0.67% V_{DRM}
r_q	Typical turn-off time	50-150	µs	I_{TM} = 300A, di/dt = 15A/µs, Tj = Tj max, V_r = 50V, dv/dt = 20/µs. Gate 0V, 100Ω	

IRK. 142 Series

BLOCKING

	Parameter	IRK. 142	Unit	Conditions
dv/dt	Max, critical rate of rise of off-state voltage	1000	V/µs	Tj = 125°C exponential to 0.67% rated V_{DRM}.
I_{RRM} I_{DRM}	Max. peak reverse and off state leakage current at V_{RRM} V_{DRM}	50	mA	Tj = 125°C, rated V_{DRM}/V_{RRM} Applied
V_{INS}	RMS Isolation voltage	3000	V	50Hz, Circuit to base, all terminal shorted, 25°C t=1 sec.

ELECTRICAL SPECIFICATION TRIGGERING

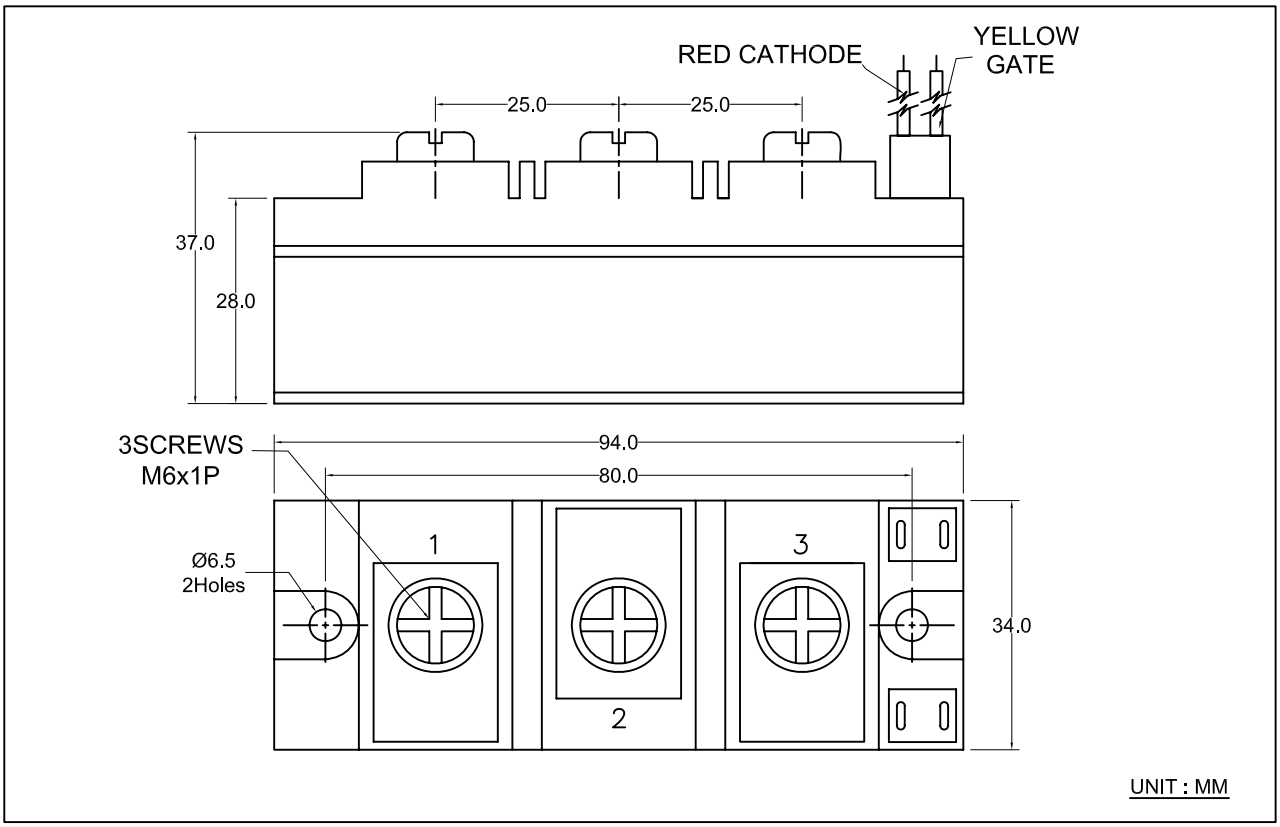
	Parameter	IRK. 142	Unit	Conditions	
P_{GM}	Max, peak gate power	10	W	Tj = 125°C, $t_p \leq$ 5ms	
$P_{G(AV)}$	Maximum average gate power	2.0		Tj = 125°C, f = 50Hz, d% = 50	
I_{GM}	Max, peak positive gate current	3.0	A	Tj = 125°C, $t_p \leq$ 5ms	
$+V_{GM}$	Max. peak positive gate voltage	20	V	Tj = 125°C, $t_p \leq$ 5ms	
$-V_{GM}$	Max. peak negative gate voltage	5.0	V		
I_{GT}	DC gate current required to trigger	200	mA	Tj = 25°C	Max required gate trigger/current/voltage are the lowest value which will trigger all units 12V anode-to-cathode applied.
V_{GT}	DC gate voltage required to trigger	3.0	V	Tj = 25°C	
V_{GD}	DC gate voltage not to trigger	0.30	V	Tj = 125°C	Max required gate trigger/current/voltage are the lowest value which will trigger all units 12V anode-to-cathode applied.
I_{GD}	DC gate current not to trigger	10	mA		
dv/dt	Max, critical rate of rise of turneed-on current	500	A/µs	Tj = 125°C I_{TM} = 400A, rated V_{DRM} applied.	

THERMAL AND MECHANICAL SPECIFICATION

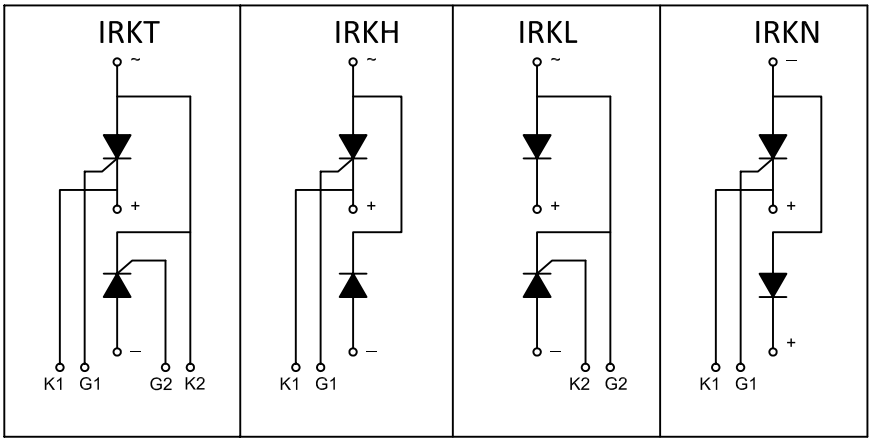
	Parameter	IRK. 142	Unit	Conditions
T_J	Junction operating temperature	-40 to 130	°C	
T_{stg}	Max, storage temperature range	-40 to 150		
R_{thJ-C}	Max. thermal resistance, junction to case	0.17	K/W	Per Junction, DC operation
R_{thC-h}	Max. thermal resistance junction to heatsink	0.035	K/W	Mounting surface flat smooth and greased (per Module)
T	Mounting torque ±10%	4 to 6	Nm	For module to heat sink and bus bar to module
Wt	Approximate Weight	500	g	
	Case style	INT-A-PAK		

IRK. 142 Series

OUTLINE DIAGRAM



CIRCUIT CONFIGURATION TABLE



CIRCUIT CONFIGURATION TABLE

IRK	T	142	/	16
1	2	3		4

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