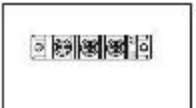
Ruttonsha International Rectifier Ltd.

POWER MODULES

IRK.105 SERIES
High Voltage Thyristor/Diode and Thyristor/Thyristor



FEATURES

- *Standard voltage.*
- *Electrically isolated base plate.*
- *3000 V_{rms} isolating voltage.*
- *Industrial standard package.*
- *Simplified mechanical designs, rapid assembly.*
- *High surge capability.*
- *Large creepage distances.*

DESCRIPTION

These RK series of Power Modules use power thyristors/diodes in a variety of circuit 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.105	Units
$I_{T(AV)}$	@T(HS)	105	A
$I_{T(AV)}$ (2)		205	A
$I_{T(RMS)}$	@T(HS)	1965	A
I^2t	@T(HS)	15.84	kA²s
$I^2\sqrt{t}$		158.4	kA²√s
V_{RRM} / V_{DRM}		Up to 1600	V
T_J		-40 to 125	°C

(2) As AC switch

ELECTRICAL SPECIFICATION

VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} / V_{DRM}, max. repetitive peak reverse and off-state voltage blocking voltage V	V_{RSM}, max. non-repetitive peak reverse voltage V	I_{RRM} / I_{DRM} max. @ 125°C mA
	04	400	500	20
	06	600	700	20
IRK.105	08	800	900	20
	10	1000	1100	20
	12	1200	1300	20
	14	1400	1500	20
	16	1600	1700	20

ON-STATE CONDUCTION

	Parameters	IRK.105	Units	Conditions
$I_{T(AV)}$	Max. average on-state current	105	A	180° conduction, half sine wave
	@ Case temperature	85	°C	
$I_{T(RMS)}$	Max. RMS on-state current	235	A	as AC switch
I_{TSM}	Max. peak, one cycle on-state, non-repetitive surge current	1785	A	t = 10ms; Sinusoidall half wave, Initial $T_J = T_J$ max.
I^2t	Maximum I^2t for fusing	15.91	kA^2s	t = 10ms; Sinusoidall half wave, Initial $T_J = T_J$ max.
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	159.1	$kA^2\sqrt{s}$	t = 0.1 to 10ms. No voltage reapplied.
$V_{T(TO)}$	Threshold voltage	0.80	V	$T_J = T_J$ max.
r_t	On-state slope resistance	2.37	mΩ	$T_J = T_J$ max.
V_{TM}	Max. on-state voltage drop	1.64	V	$I_{TM} = \pi \times I_{T(AV)}$, T_J = 25°C, 180° conduction
I_H	Maximum holding current	200	mA	Anode supply = 6V, resistive load, T_J = 25°C gate open circuit
I_L	Max. latching current	400	mA	Anode supply = 6V, resistive load, T_J = 25°C

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BLOCKING

I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	20	mA	$T_J = T_J$ max.
V_{INS}	RMS isolation voltage	3000	V	50 Hz circuit to base, all terminal shorted, t = 1m
dv/dt	Critical rate of rise of off-state voltage	500	V/µs	$T_J = T_J$ max. linear to 67% rated V_{DRM}

TRIGGERING

	Parameters	IRK.105	Units	Conditions	
P_{GM}	Max. peak gate power	12.0	W		
$P_{G(AV)}$	Max. average gate power	3.0	W		
$+I_{GM}$	Max. peak gate current	3.0	A		
$-V_{GT}$	Max. peak negative gate voltage	10	V		
V_{GT}	Max. required DC gate voltage to trigger	2.5	V	$T_J = 25^0C$	Anode supply = 6V, resistive load
I_{GT}	Max. required DC gate current to trigger	150	mA	$T_J = 25^0C$	Anode supply = 6V, resistive load
V_{GD}	Max. gate voltage that will not trigger	0.25	V	@ $T_J = T_J$ max., rated V_{DRM} applied	
I_{GD}	Max. gate current that will not trigger	6.0	mA	@ $T_J = T_J$ max., rated V_{DRM} applied	
di/dt	Max. rate of rise of turned-on current	100	A/µs	@ $T_J = 25^0C$, $I_{TM} = \pi \times I_{T(AV)}$, 0.67% V_{DRM} applied $I_g = 500mA$, $t_r < 0.5\mu s$, $t_p > 6\mu s$	

THERMAL AND MECHANICAL SPECIFICATIONS

	Parameters		IRK.105	Units	Conditions
T_J	Junction operating temperature		-40 to 125	°C	
T_{stg}	Storage temperature range		-40 to 140	°C	
R_{thJC}	Max. thermal resistance, junction to case		0.135	K/W	Per junction, DC operation
R_{thC-S}	Thermal resistance, case to heatsink		0.1	K/W	Mounting surface flat,smooth and greased (per modul
T	Mounting torque ±10%	Module to heatsink	5	Nm	A mounting compound is recommended and the torque should be rechecked after a period of about 3 hours to allow for the spread of the compound.
		Busbar to module	3	Nm	
Wt	Approximate weight		75	gm	

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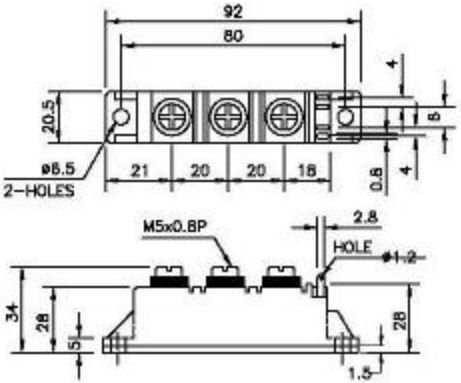
OUTLINE DIAGRAM



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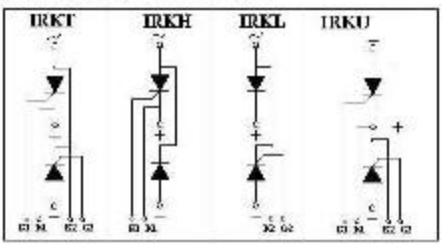
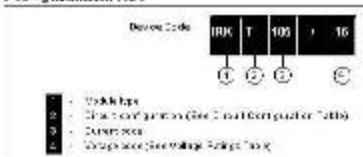
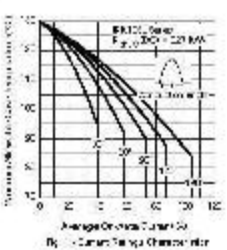
Circuit Configuration Table



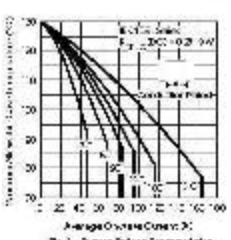
Ordering Information Table





Average On-state Current (A)

Fig. - Current Ratings Characteristics



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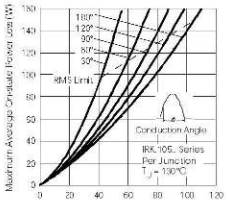

Fig. 3 - On-state Power Loss Characteristics

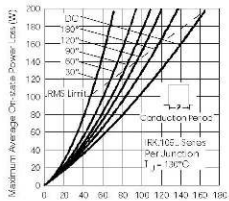

Fig. 4 - On-state Power Loss Characteristics

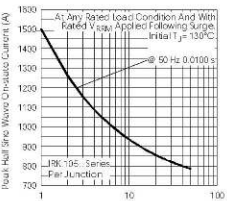

Fig. 5 - Maximum Non-Repetitive Surge Current

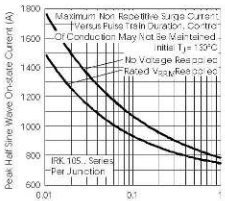

Fig. 6 - Maximum Non-Repetitive Surge Current

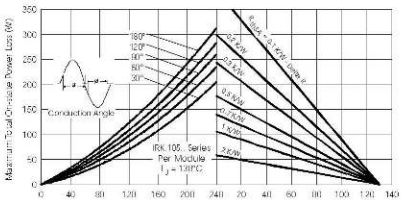

Fig. 7 - On-state Power Loss Characteristics

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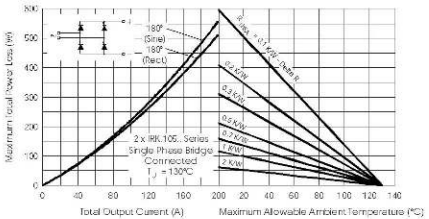

Fig. 8 - On-state Power Loss Characteristics

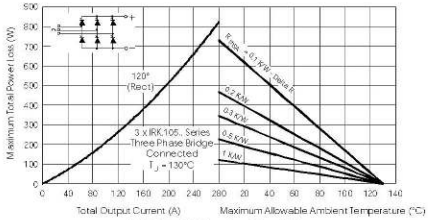

Fig. 9 - On-state Power Loss Characteristics

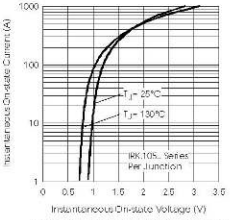

Fig. 10 - On-state Voltage Drop Characteristics

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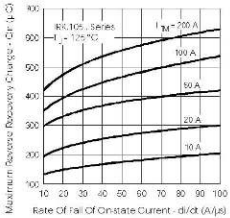

Fig. 11 - Recovery Charge Characteristics

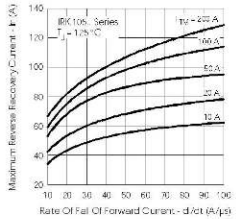

Fig. 12 - Recovery Current Characteristics

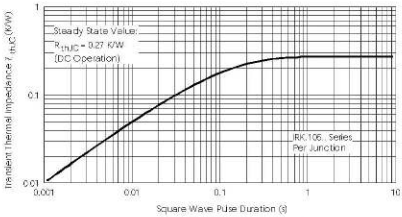

Fig. 13 - Thermal Impedance Z_{thJC} Characteristics

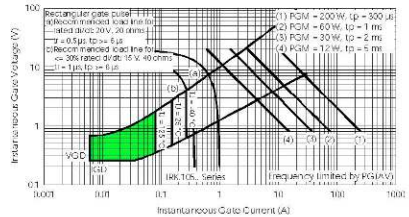

Fig. 14- Gate Characteristics