

THYRISTOR / DIODE and
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SUPER MAGN-A-PAK™ Power Modules

Features

- High current capability
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- High surge capability
- Industrial standard package
- UL recognition pending

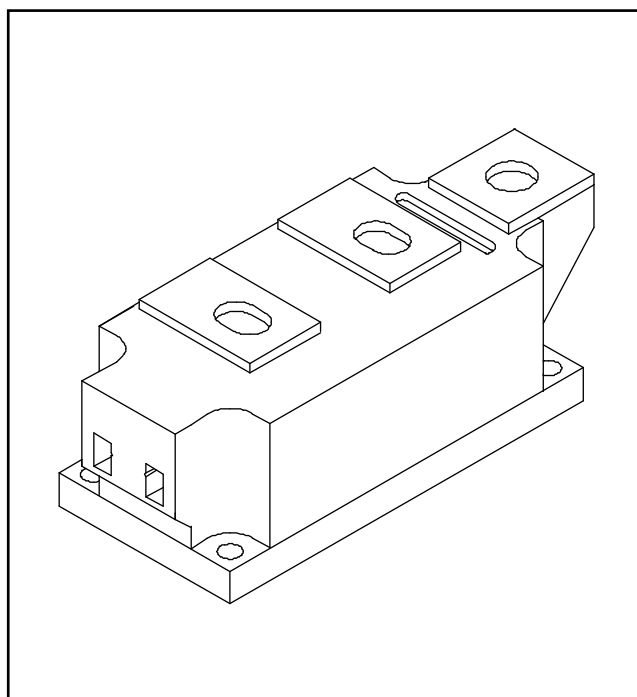
500 A

Typical Applications

- Motor starters
- DC motor controls - AC motor controls
- Uninterruptable power supplies

Major Ratings and Characteristics

Parameters	IRK.500..	Units
$I_{T(AV)}$ or $I_{F(AV)}$	500	A
@ T_C	82	°C
$I_{T(RMS)}$	900	A
@ T_C	82	°C
I_{TSM} or I_{FSM} @ 50Hz	17.8	KA
@ 60Hz	18.7	KA
I^2t @ 50Hz	1591	KA ² s
@ 60Hz	1452	KA ² s
$I^2\sqrt{t}$	15910	KA ² √s
V_{DRM}/V_{RRM} range	800 to 1600	V
T_{STG} range	-40 to 150	°C
T_J range	-40 to 130	°C



ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{RRM} , maximum repetitive peak reverse voltage V	V_{RSM} , maximum non-repetitive peak rev. voltage V	I_{RRM} max. @ $T_J = T_J$ max. mA
IRK.500..	08	800	900	100
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

On-state Conduction

Parameter	IRK.500..	Units	Conditions	
$I_{T(AV)}$ Maximum average on-state current	500	A	180° conduction, half sine wave	
$I_{F(AV)}$ @ Case temperature	82	°C		
$I_{T(RMS)}$ Maximum RMS on-state current	900	A	180° conduction, half sine wave @ $T_C = 82^\circ\text{C}$	
I_{TSM} Maximum peak, one-cycle, non-repetitive surge current	17.8	KA	Sinusoidal half wave, Initial $T_J = T_J$ max.	
I_{FSM}	18.7			t = 10ms No voltage reappplied
	15.0			t = 8.3ms 100% V_{RRM} reappplied
	15.7			t = 10ms 100% V_{RRM} reappplied
I^2t Maximum I^2t for fusing	1591	KA ² s	Initial $T_J = T_J$ max.	
	1452			t = 10ms No voltage reappplied
	1125			t = 8.3ms 100% V_{RRM} reappplied
	1027			t = 10ms 100% V_{RRM} reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	15910	KA ² √s	t = 0.1 to 10ms, no voltage reappplied	
$V_{T(TO)1}$ Low level value of threshold voltage	0.85	V	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.	
$V_{T(TO)2}$ High level value of threshold voltage	0.93		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.	
r_{t1} Low level value of on-state slope resistance	0.36	mΩ	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.	
r_{t2} High level value of on-state slope resistance	0.32		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.	
V_{TM} Maximum on-state or forward voltage drop	1.50	V	$I_{pk} = 1500\text{A}$, $T_J = 25^\circ\text{C}$, $t_p = 10\text{ms}$ sine pulse	
I_H Maximum holding current	500	mA	$T_J = 25^\circ\text{C}$, anode supply 12V resistive load	
I_L Typical latching current	1000			

Switching

Parameter	IRK.500..	Units	Conditions
di/dt Maximum rate of rise of turned-on current	1000	A/μs	$T_J = T_J$ max., $I_{TM} = 400\text{A}$, V_{DRM} applied
t_d Typical delay time	2.0	μs	Gate current 1A, $di_g/dt = 1\text{A}/\mu\text{s}$ $V_d = 0.67\% V_{DRM}$, $T_J = 25^\circ\text{C}$
t_q Typical turn-off time	200	μs	$I_{TM} = 750\text{A}$, $T_J = T_J$ max, $di/dt = -60\text{A}/\mu\text{s}$, $V_R = 50\text{V}$, $dv/dt = 20\text{V}/\mu\text{s}$, Gate 0 V 100Ω

IRK.500.. Series

ΔR_{thJC} Conduction

(The following table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.009	0.006	K/W	$T_J = T_{J \text{ max.}}$
120°	0.011	0.011		
90°	0.014	0.015		
60°	0.021	0.022		
30°	0.037	0.038		

Ordering Information Table

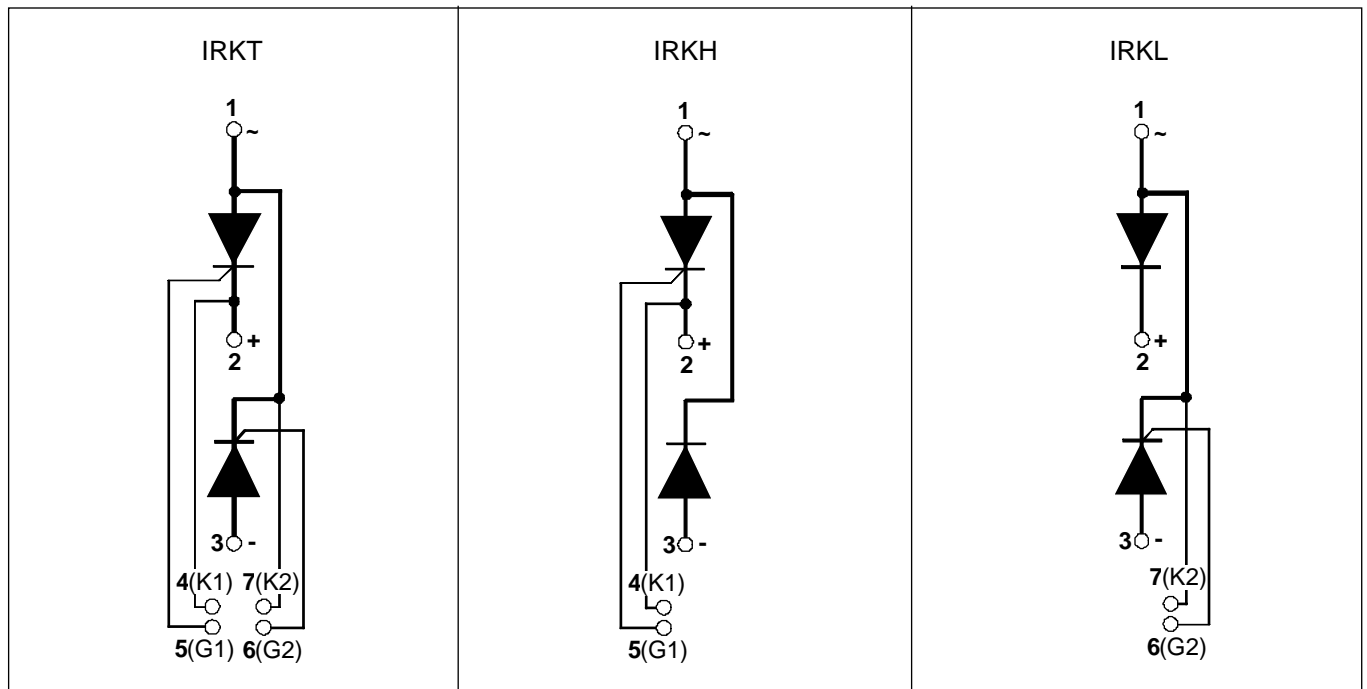
Device Code

IRK	T	500	-	16
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③
④

- 1** - Module type
- 2** - Circuit configuration (See Circuit Configurations Table)
- 3** - Current rating
- 4** - Voltage code: Code x 100 = V_{RRM} (See Voltage Ratings Table)

Circuit Configurations Table



Outline Table

