



POWER MODULES

IRK.715 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. 715	Units
$I_{T(AV)}$ @ 85°C	715	A
$I_{T(RMS)}$	1120	A
I_{TSM} @ 50 Hz	28	KA
I^2t @ 50 Hz	3920	kA ² s
$V_{DRM} - V_{RRM}$	Up to 1800	V
T_J	-40 to 130	°C

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ELECTRICAL SPECIFICATION VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} / V_{DRM} max. repetitive peak reverse and off-state voltage blocking voltage V	V_{RSM} max. non-rep ²⁰⁰ re peak reverse voltage V	I_{DRM} / I_{RRM} max. @ 130°C mA
IRK. 715	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. 715	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Case temperature	715 85	A °C	180° conduction, half sine wave
$I_{T(RMS)}$ Max. RMS on-state current	1120	A	
I_{TSM} Max. peak, one cycle on-state, non-repetitive surge current	28	KA	t = 10ms Sinusoidal half wave, Initial $T_J = T_{J \text{ max.}}$
I^2t Maximum I^2t for fusing	3920	kA ² s	t = 10ms Sinusoidal half wave, Initial $T_J = T_{J \text{ max.}}$
$V_{T(TO)}$ Threshold voltage	0.85	V	$T_J = T_{J \text{ max.}}$
r_t On-state slope resistance	0.2	mΩ	$T_J = T_{J \text{ max.}}$
V_{TM} Max. on-state voltage drop	1.45	V	$I_t = 2512A, 25°C$
I_H Maximum holding current	500 max.	mA	
I_L Max. latching current	1500 max.	mA	$T_J = 25°C, R_G = 33Ω$

SWITCHING

t_d Delay Time	2.0	μs	$T_J = 25°C$ Gate Pulse $I_G = I_{FGM}, V_G = 20V, di/dt = 1A/μs$ $V_D = 0.4 V_{DEM}, T_{TM} = I_{T(AV)}, t_{GP} = 500μs$
t_q Turn-Off Time	250	μs	$T_J = T_{J \text{ max.}}$ $dv/dt = 50V/μs, I_{TM} = I_{T(AV)}, di/dt = 10A/μs$ $V_R = 100V, V_D = 0.67 V_{DRM}$

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BLOCKING

	Parameter	715		Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500		V/ μ s	$T_J = 130^\circ\text{C}$, exponential to 67% rated V_{DRM}
I_{RRM} I_{DRM}	Max. peak reverse and off-state leakage current	150		mA	$T_J = 130^\circ\text{C}$, rated $V_{\text{DRM}}/V_{\text{RRM}}$ applied
V_{INS}	RMS isolation voltage	3500		V	50Hz, Circuit to base, all terminal shorted, 25°C , 1sec

TRIGGERING

	Parameter	715	Units	Conditions
I_{FGM}	Peak Forward gate current	8	A	$T_J = T_J \text{ max.}$
V_{RGM}	Peak reverse gate voltage	5	V	$T_J = T_J \text{ max.}$
P_G	Gate power dissipation	4	W	$T_J = T_J \text{ max.}$ for DC Gate Current
I_{GT}	DC gate current required to trigger	250	mA	$T_J = 25^\circ\text{C}$
V_{GT}	DC gate voltage required to trigger	2.5	V	$T_J = 25^\circ\text{C}$
V_{GD}	DC gate voltage not to trigger	0.25 max	V	$T_J = 130^\circ\text{C}$
I_{GD}	DC gate current not to trigger	10.0 max	mA	$T_J = 130^\circ\text{C}$
di/dt	Maximum critical rate of rise of turned-on current	400 max	A/ μ s	$T_J = 130^\circ\text{C}$,

Max. required gate trigger/current / voltage are the lowest value which will trigger all units 12V anode-to-cathode applied.

Max. gate current / voltage not to trigger the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied

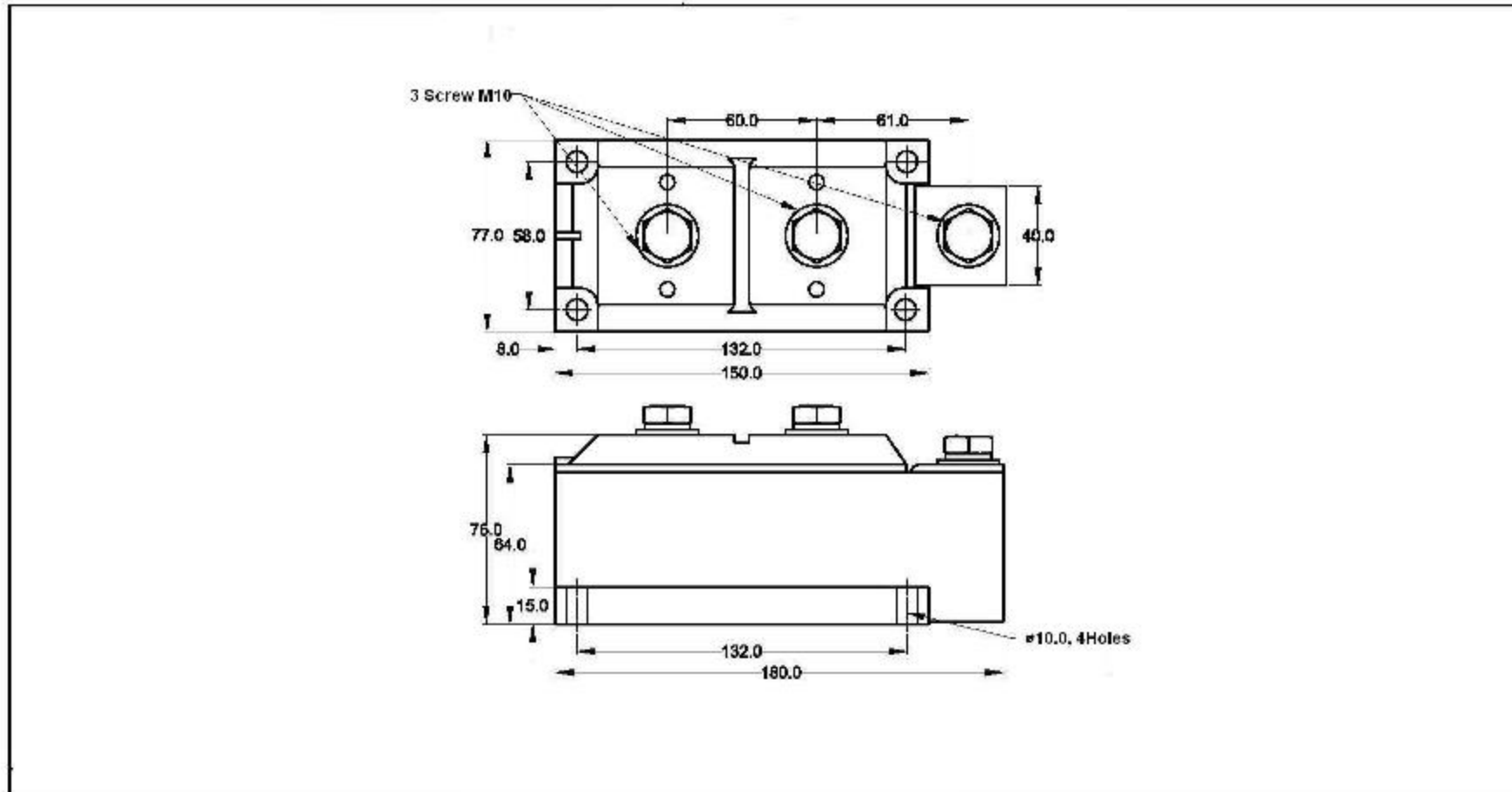
THERMAL AND MECHANICAL SPECIFICATION

	Parameter	715	Units	Conditions
T_J	Max. operating temperature range	-40 to 130	°C	
T_{sg}	Max. storage temperature range	-40 to 125		
R_{thJC}	Max. thermal resistance, junction to case	0.0500	°C/W	Per module / per arm
R_{thJC}	Max. thermal resistance, case to heatsink	0.0160	°C/W	Per module / per arm
T	Mounting torque, $\pm 15\%$	9(18)	Nm	to heatsink & to (terminal)
W	Weight	3500	gm	

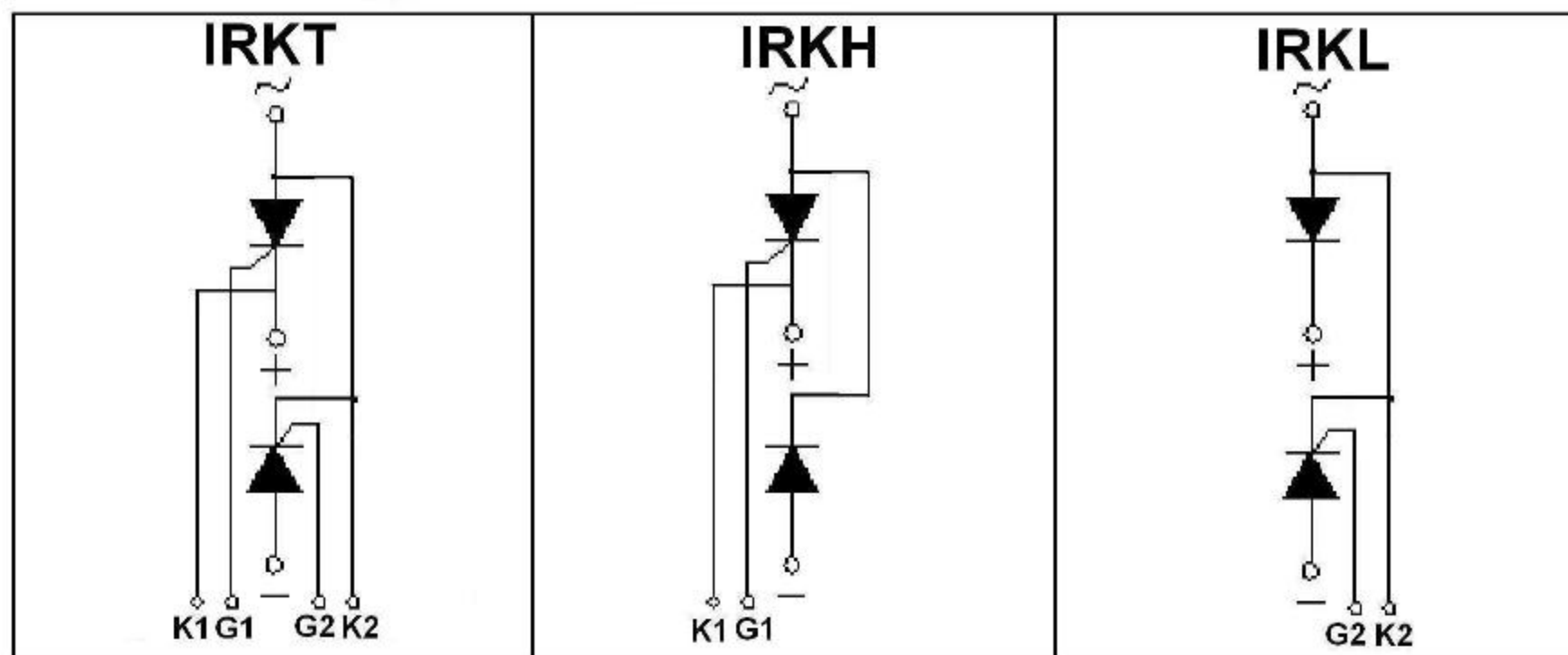
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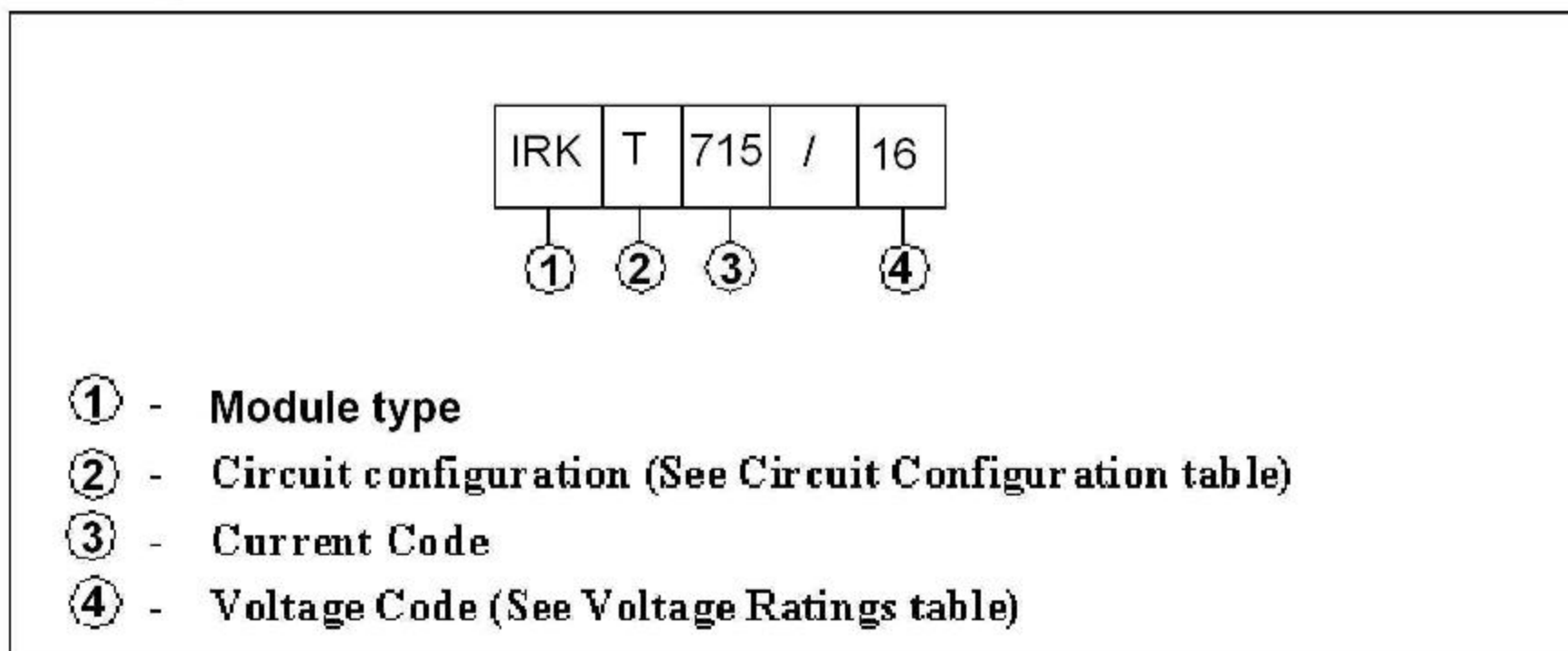
OUTLINE DIAGRAM



Circuit Configuration Table

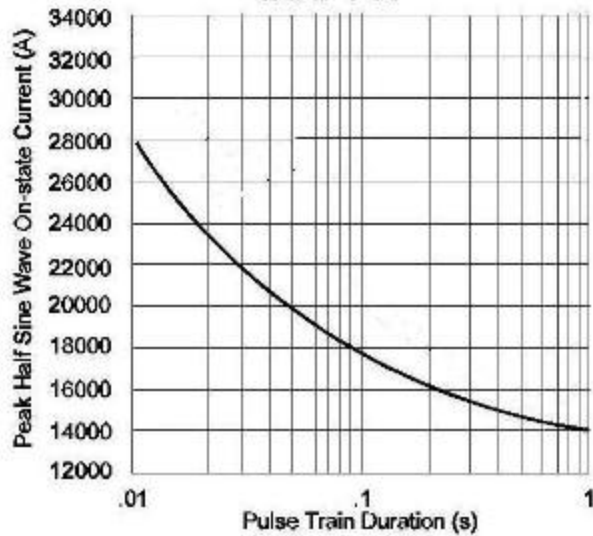


Ordering Information Table

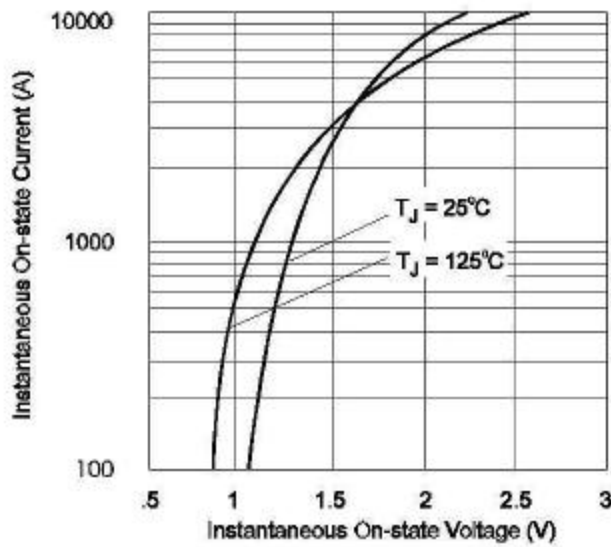


POWER MODULES

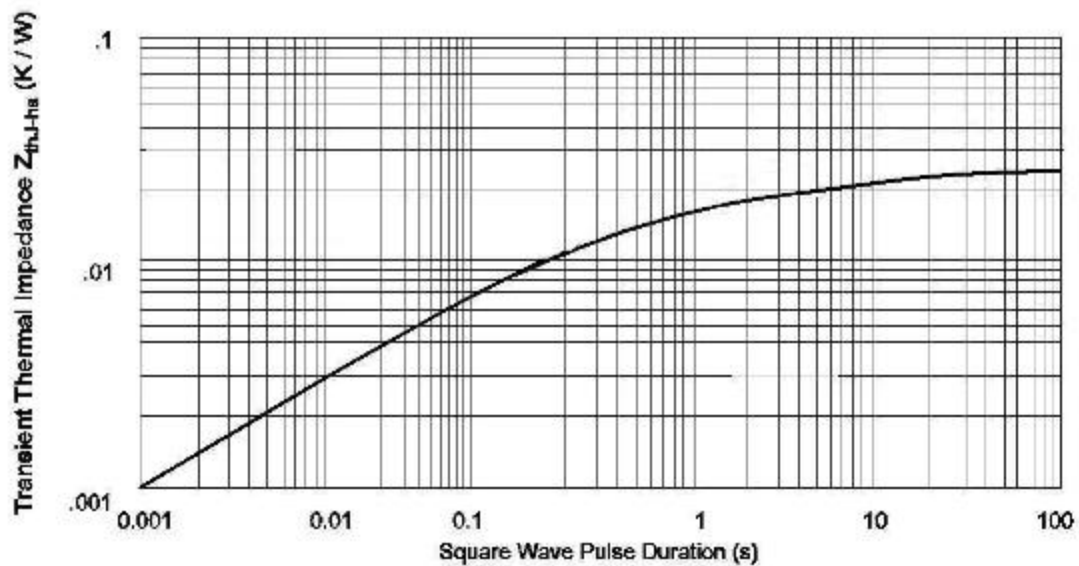
IRK. 715



Maximum Non-Repetitive Surge Current



On-state Voltage Drop Characteristics



Thermal Impedance Z_{thJ-hs} Characteristics