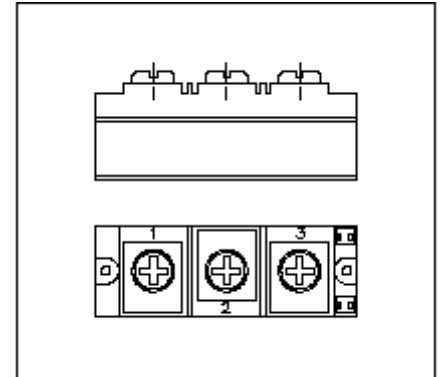




IRK.166, .196, .236 SERIES High Voltage Diode/Diode

FEATURES

- ❖ High voltage.
- ❖ Electrically isolated base plate.
- ❖ 3000 V_{RMS} isolating voltage.
- ❖ Industrial standard package.
- ❖ Simplified mechanical designs, rapid assembly.
- ❖ High surge capability.
- ❖ Large creepage distances.
- ❖ Beryllium oxide substrate.



DESCRIPTION

This IRK series of Power Modules uses power diodes in three 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. These modules are intended for general purpose applications such as battery chargers, welders and plating equipment.

MAJOR RATINGS & CHARACTERISTICS

Parameters	IRK.166	IRK.196	IRK.236	Units
$I_{F(AV)}$ @ $T_c = 100^\circ\text{C}$	165	195	230	A
$I_{F(RMS)}$	260	305	360	A
I_{FSM} @ 50 Hz	4000	4750	6540	A
I^2t @ 50 Hz	80	113	214	kA ² s
$I^2\sqrt{t}$	798	1130	2140	kA ² \sqrt{s}
V_{RRM} range	Up to 1600	Up to 1600	Up to 1600	V
T_J	-40 to 150			$^\circ\text{C}$

POWER MODULES

IRK.166, .196, .236 SERIES

ELECTRICAL SPECIFICATION

VOLTAGE RATINGS

Type Number	Voltage Code	V_{RRM} , max. repetitive peak reverse and off-state voltage blocking voltage V	V_{RSM} , max. non-repetitive peak reverse voltage V	I_{RRM} max. @ 150°C mA
	04	400	500	50
IRK.166	06	600	700	50
IRK.196	08	800	900	50
IRK.236	10	1000	1100	50
	12	1200	1300	50
	14	1400	1500	50
	16	1600	1700	50

FORWARD CONDUCTION

	Parameters	IRK.166	IRK.196	IRK.236	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	165	195	230	A	180°C conduction, half sine wave		
	@ case temperature	100	100	100	°C			
$I_{F(RMS)}$	Max. RMS forward current	260	305	360	A	as AC switch		
I_{FSM}	Max. peak, one cycle forward non-repetitive surge current	4000	4750	6540	A	t = 10ms	No voltage reappplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		3350	4000	5500	A	t = 10ms	100% V_{RRM} reappplied	
I^2t	Maximum I^2t for fusing	80	113	214	kA ² s	t = 10ms	No voltage reappplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		56	80	151	kA ² s	t = 10ms	100% V_{RRM} reappplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	798	1130	2140	kA ² √s	t = 0.1 to 10ms. No voltage reappplied.		
$V_{F(TO)1}$	Low level value of threshold voltage	0.70	0.75	0.79	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
$V_{F(TO)2}$	High level value of threshold voltage	0.87	0.86	0.92	V	$(\pi \times I_{F(AV)} < I < 20 \times \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{t1}	Low level forward slope resistance	1.69	0.92	0.64	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{t2}	High level forward slope resistance	1.42	0.77	0.49	mΩ	$(\pi \times I_{F(AV)} < I < 20 \times \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	1.57	1.32	1.26	V	$I_{FM} = \pi \times I_{F(AV)}$, $T_J = T_J$ max., 180° conduction AV. power = $V_{F(TO)} \times I_{F(AV)} + r_1 \times (I_{F(RMS)})^2$		

POWER MODULES

IRK.166, .196, .236 SERIES

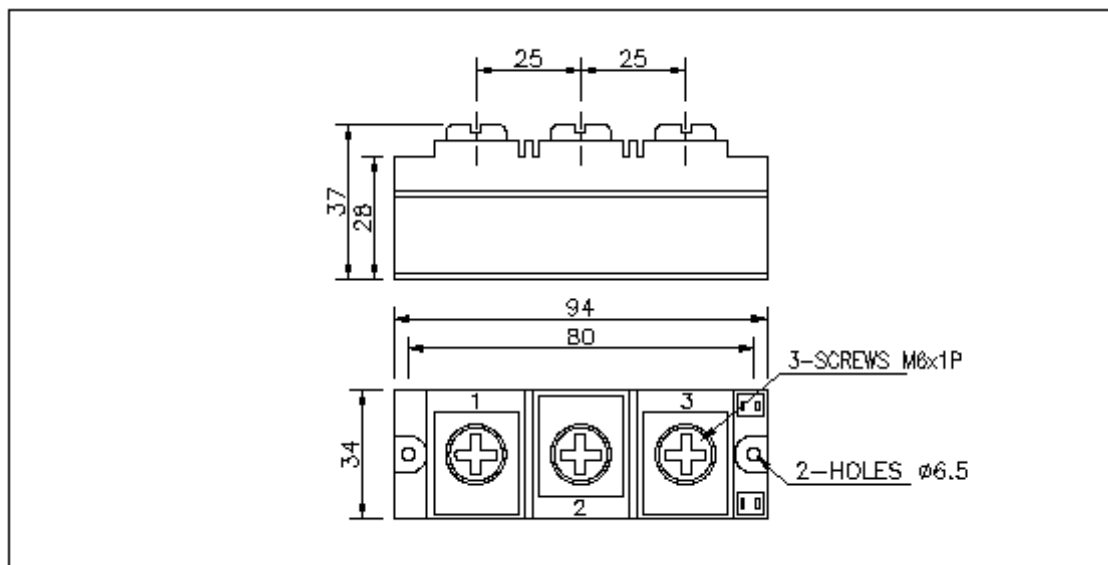
THERMAL AND MECHANICAL SPECIFICATIONS

Parameters	IRK.166	IRK.196	IRK.236	Units	Conditions	
T_J	Junction operating temperature			-40 to 150	°C	
T_{stg}	Storage temperature range			-40 to 150	°C	
R_{thj-c}	Max. internal thermal resistance, junction to case			0.20 0.20 0.17	K/W IRKD../IRKJ../IRKC.. Per junction, DC operation	
R_{thc-s}	Thermal resistance, case to heatsink			0.035 0.035 0.035	K/W Mounting surface flat, smooth and greased	
T	Mounting torque $\pm 10\%$	Module to heatsink	4 to 6		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	4 to 6		Nm	
Wt	Approximate weight			500	g	

BLOCKING

Parameter	IRK.166	IRK.196	IRK.236	Units	Conditions
I_{RFM}	Max. peak reverse leakage current			50 50 50	mA $T_J = 150^\circ\text{C}$
V_{INS}	RMS isolation voltage			3000 3000 3000	V 50 Hz, circuit to base, all terminals shorted, $t=1\text{sec}$

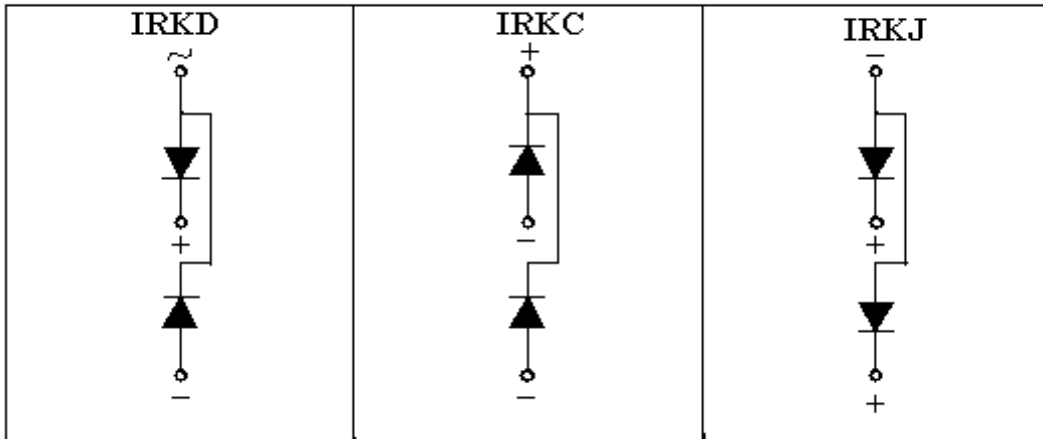
OUTLINE DIAGRAM



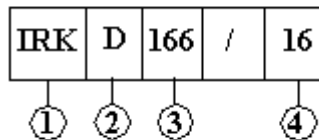
POWER MODULES

IRK.166, .196, .236 Series

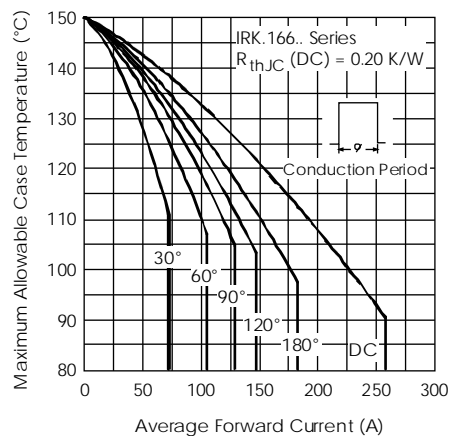
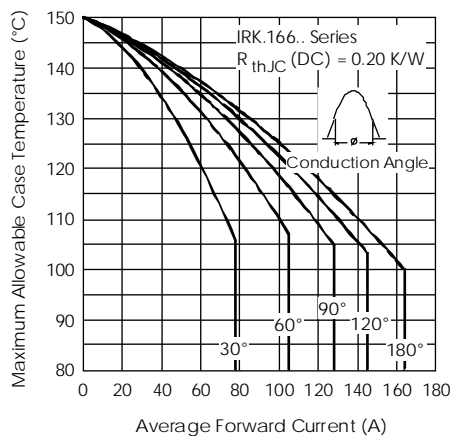
Circuit Configuration Table



Ordering Information Table



- ① - **Module type**
- ② - **Circuit configuration (See Circuit Configuration table)**
- ③ - **Current Code**
- ④ - **Voltage Code (See Voltage Ratings table)**



POWER MODULES

IRK.166, .196, .236 Series

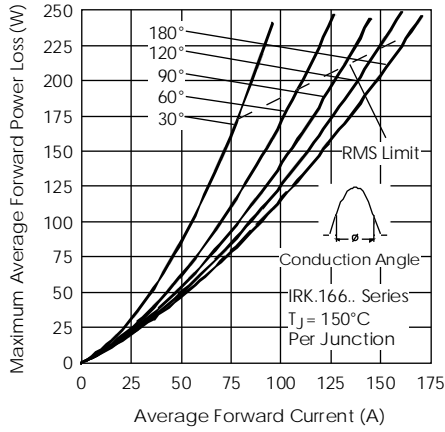


Fig. 3 - Forward Power Loss Characteristics

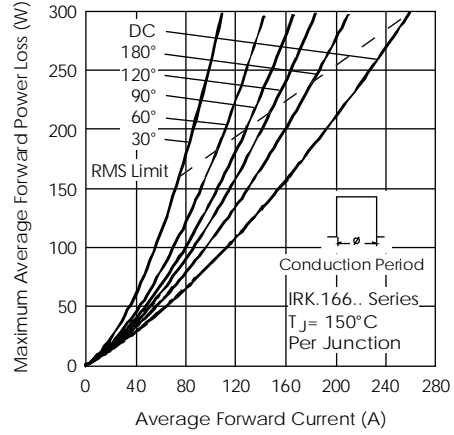


Fig. 4 - Forward Power Loss Characteristics

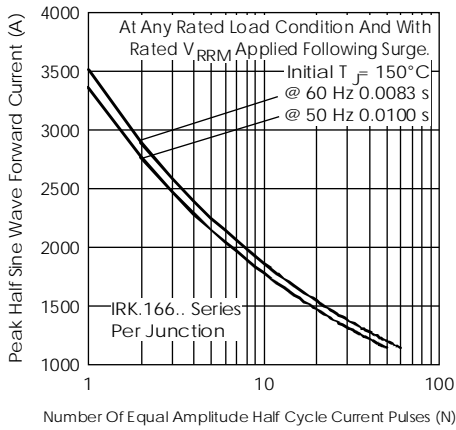


Fig. 5 - Maximum Non-Repetitive Surge Current

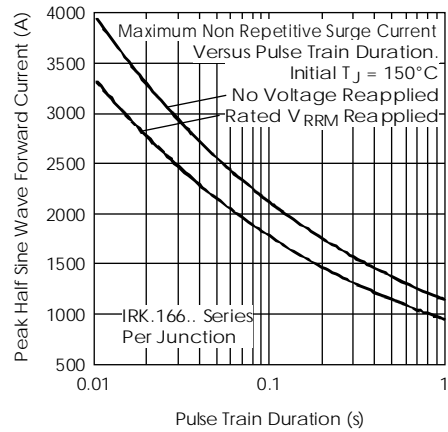


Fig. 6 - Maximum Non-Repetitive Surge Current

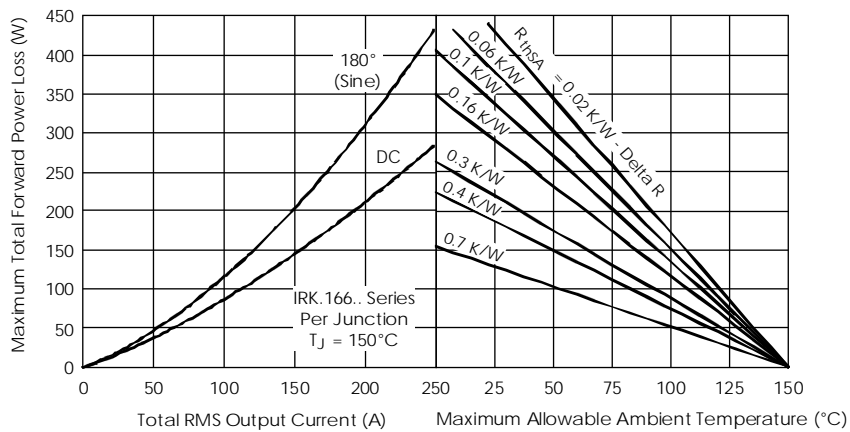


Fig. 7 - Forward Power Loss Characteristics

POWER MODULES

IRK.166, .196, .236 Series

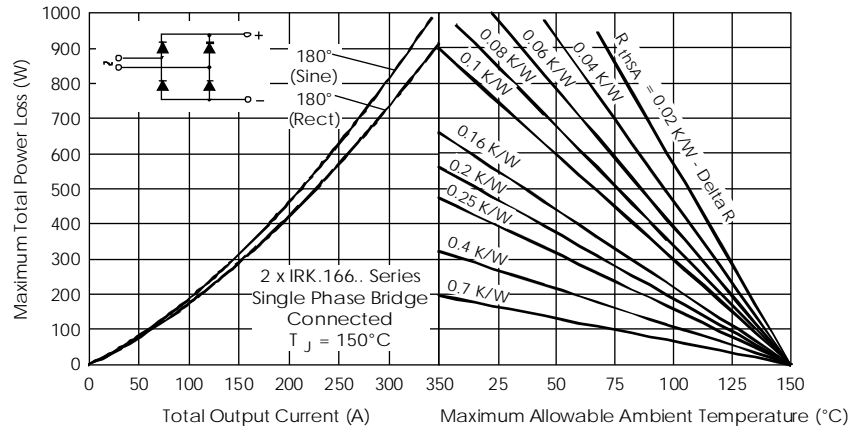


Fig. 8 - Forward Power Loss Characteristics

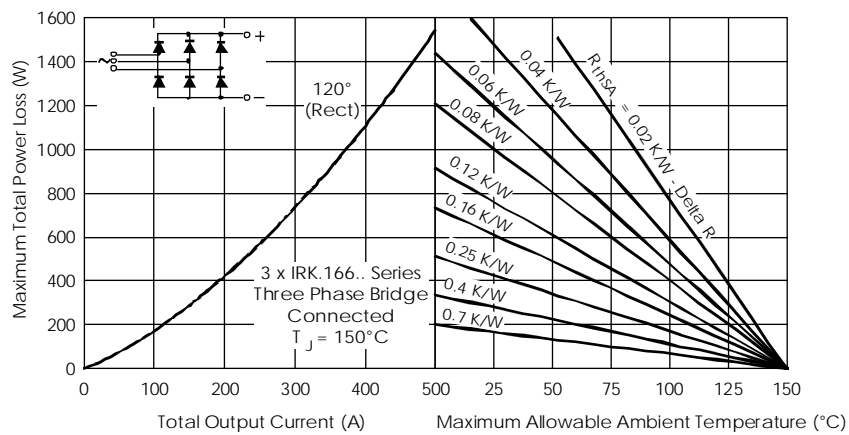


Fig. 9 - Forward Power Loss Characteristics

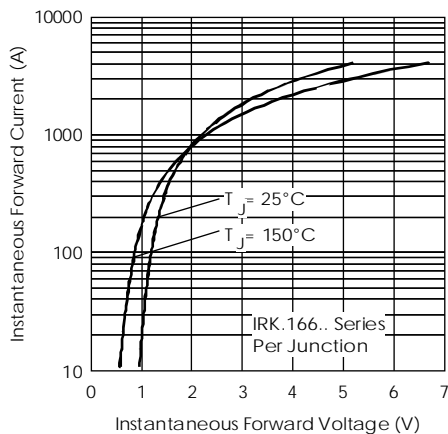


Fig. 10 - Forward Voltage Drop Characteristics

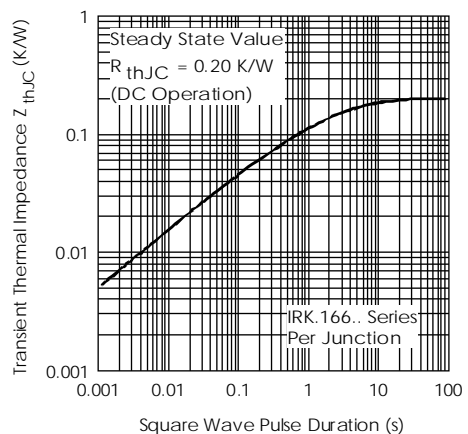


Fig. 11 - Thermal Impedance Z_{thJC} Characteristic

POWER MODULES

IRK.166, .196, .236 Series

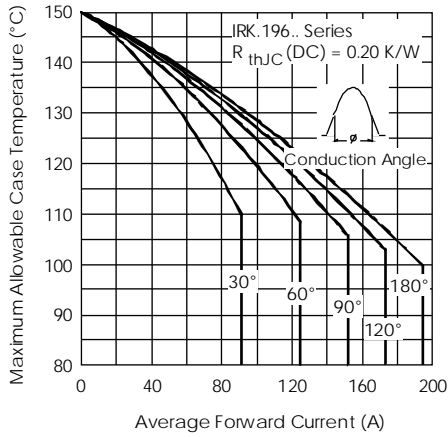


Fig. 12 - Current Ratings Characteristics

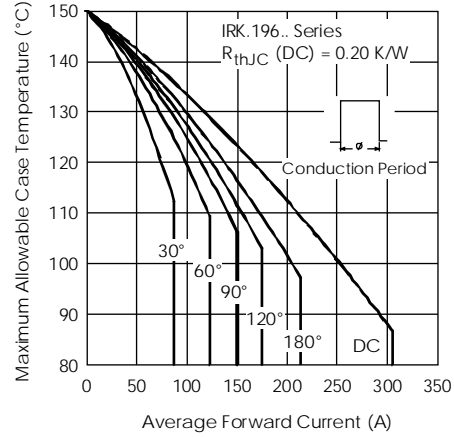


Fig. 13 - Current Ratings Characteristics

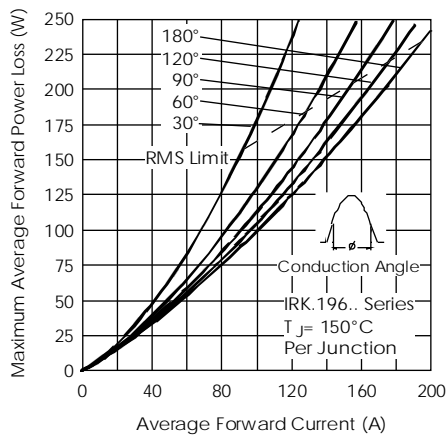


Fig. 14 - Forward Power Loss Characteristics

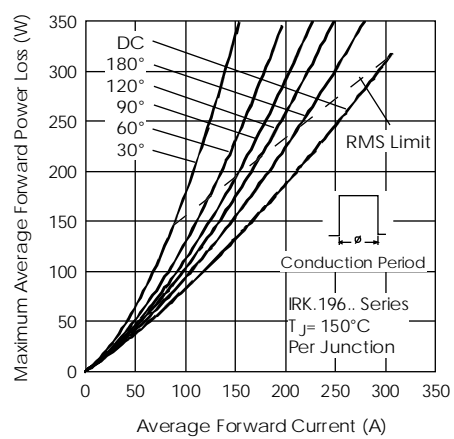


Fig. 15 - Forward Power Loss Characteristics

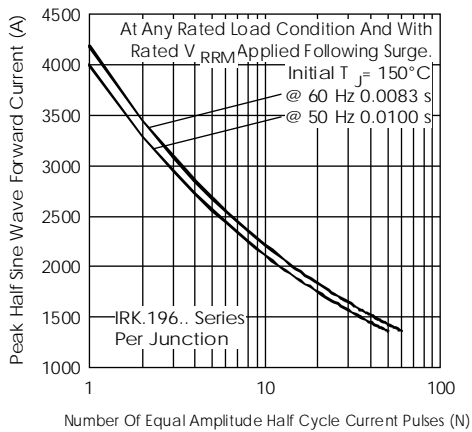


Fig. 16 - Maximum Non-Repetitive Surge Current

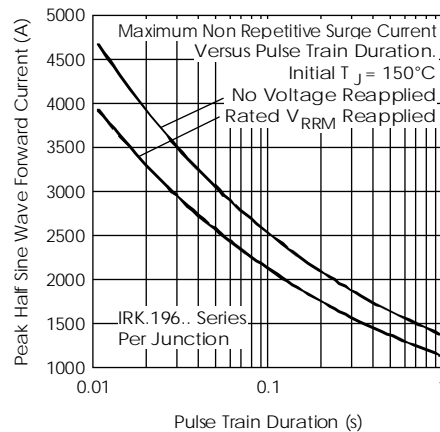


Fig. 17 - Maximum Non-Repetitive Surge Current

POWER MODULES

IRK.166, .196, .236 Series

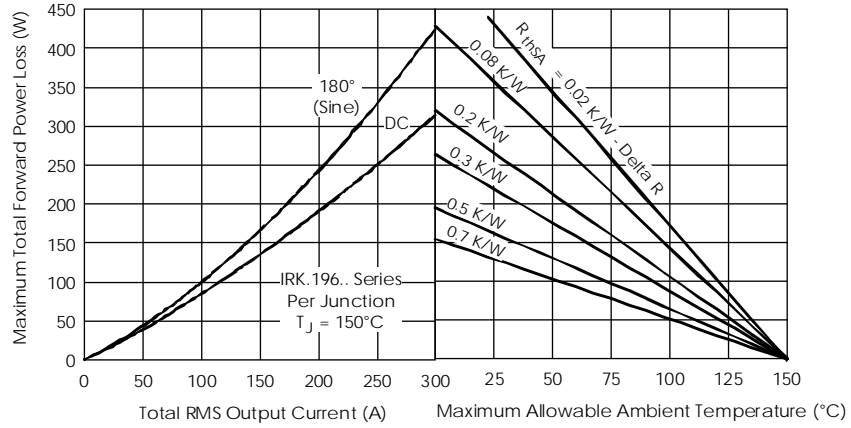


Fig. 18 - Forward Power Loss Characteristics

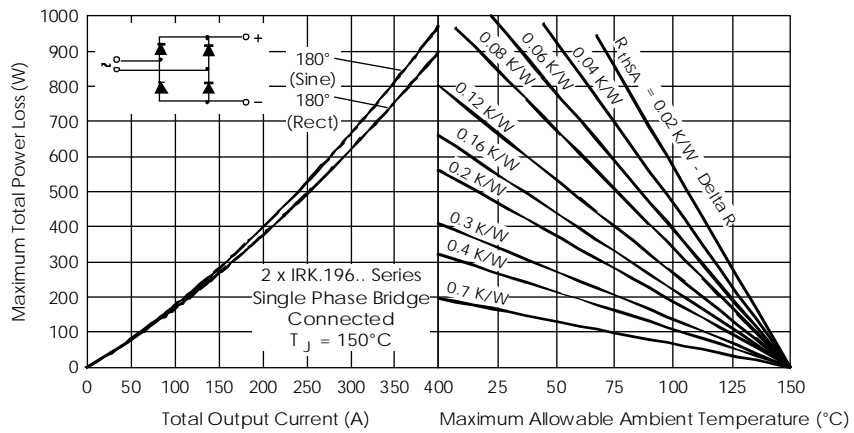


Fig. 19 - Forward Power Loss Characteristics

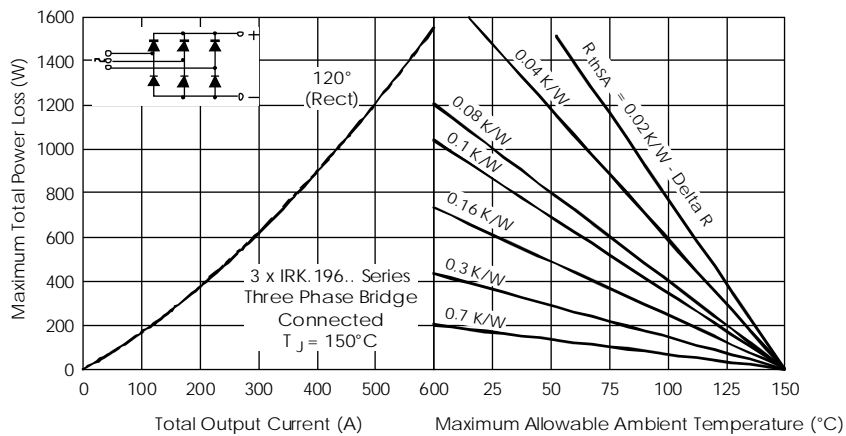


Fig. 20 - Forward Power Loss Characteristics

POWER MODULES

IRK.166, .196, .236 Series

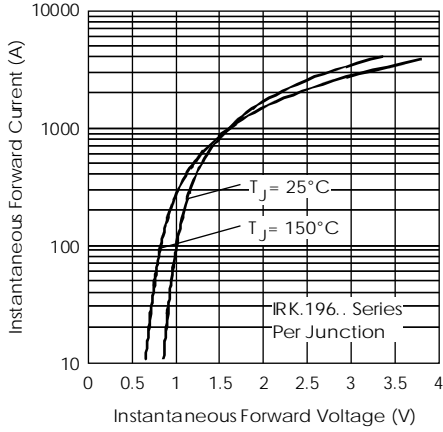


Fig. 21 - Forward Voltage Drop Characteristics

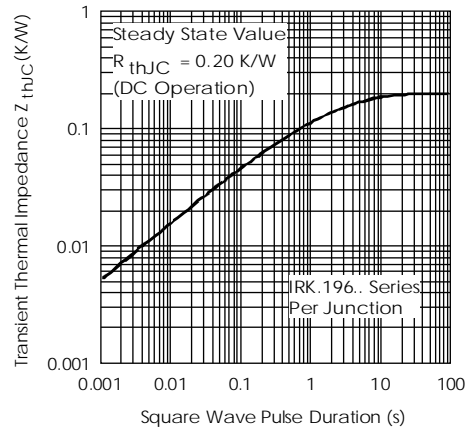


Fig. 22 - Thermal Impedance Z_{thJC} Characteristic

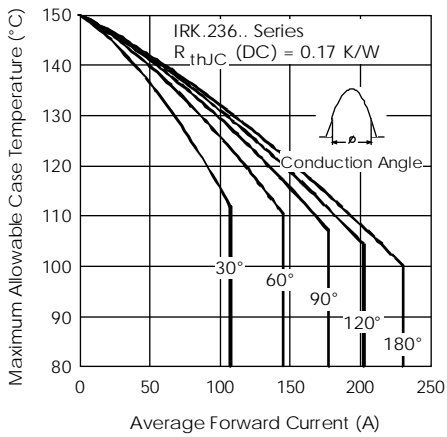


Fig. 23 - Current Ratings Characteristics

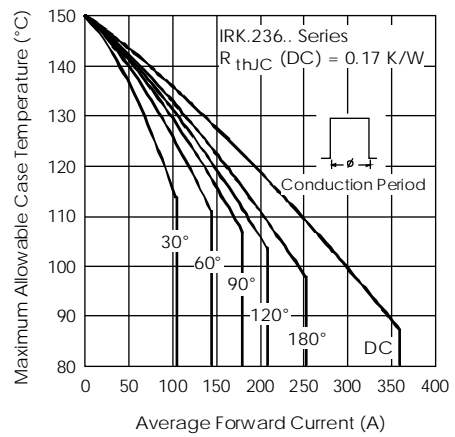


Fig. 24 - Current Ratings Characteristics

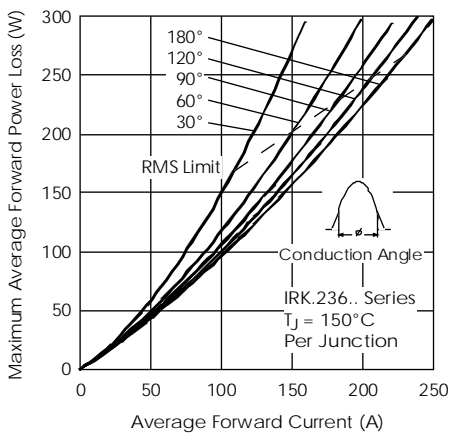


Fig. 25 - Forward Power Loss Characteristics

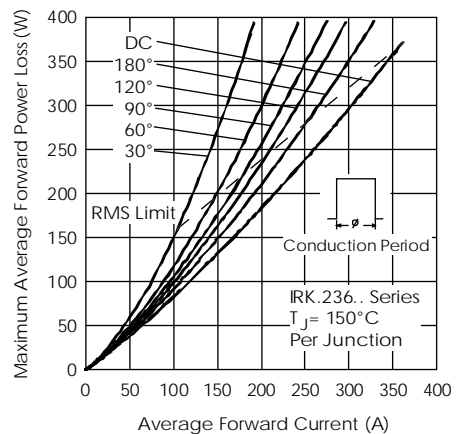


Fig. 26 - Forward Power Loss Characteristics

POWER MODULES

IRK.166, .196, .236 Series

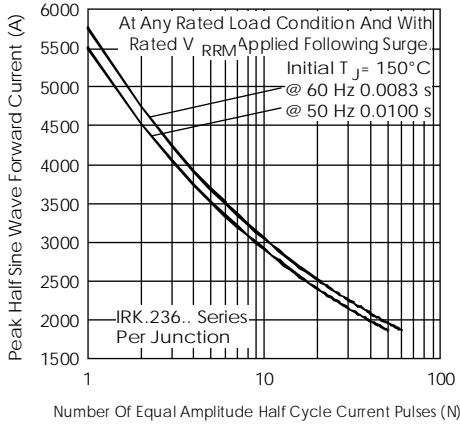


Fig. 27 - Maximum Non-Repetitive Surge Current

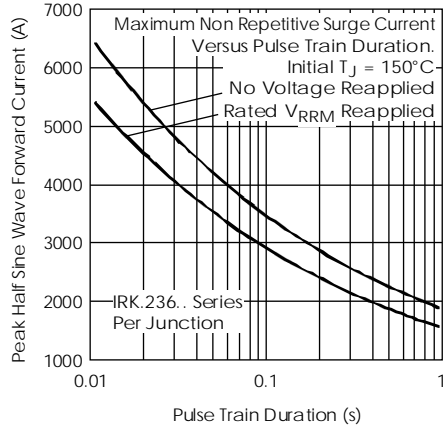


Fig. 28 - Maximum Non-Repetitive Surge Current

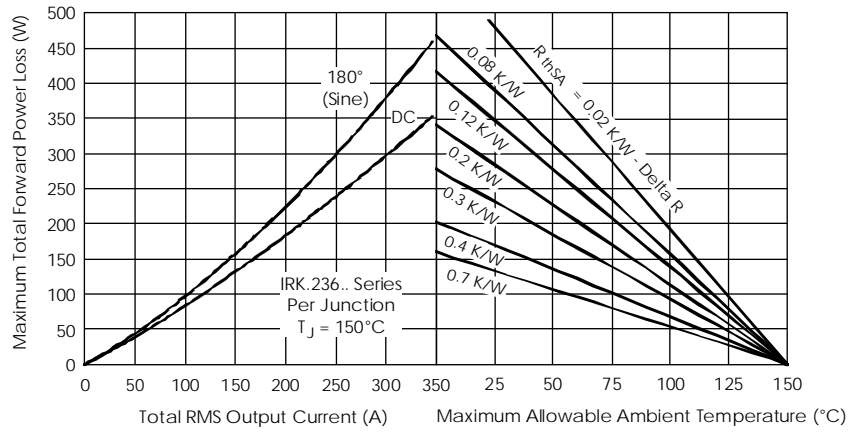


Fig. 29 - Forward Power Loss Characteristics

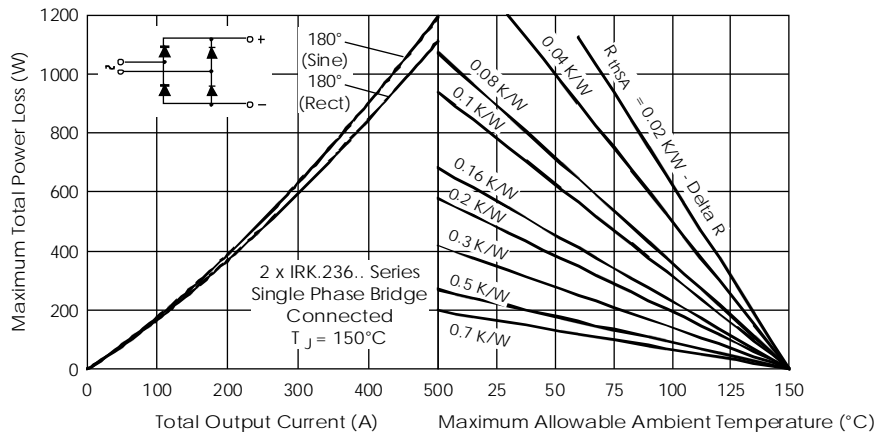


Fig. 30 - Forward Power Loss Characteristics

POWER MODULES

IRK.166, .196, .236 Series

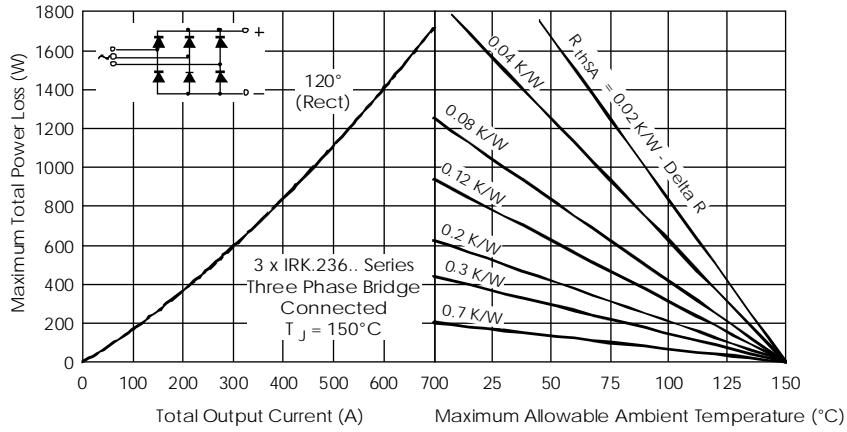


Fig. 31 - Forward Power Loss Characteristics

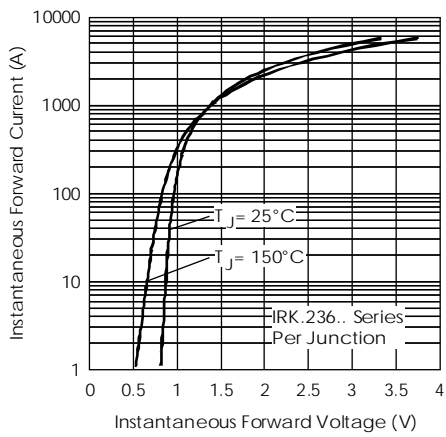


Fig. 32 - Forward Voltage Drop Characteristics

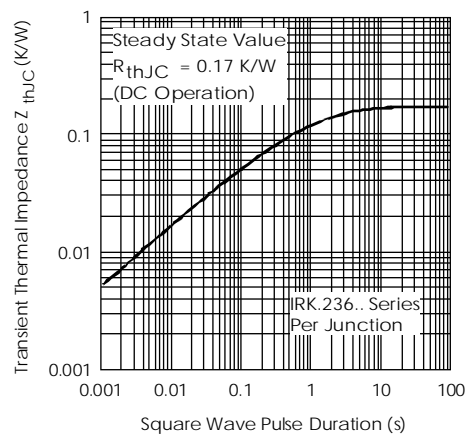


Fig. 33 - Thermal Impedance Z_{thJC} Characteristic

Last Update : Sep 2002