

International **IOR** Rectifier

SERIES IRK.166, .196, .236

STANDARD RECOVERY DIODES

NEW INT-A-pak Power Modules

165 A
195 A
230 A

Features

- High Voltage
- Electrically Isolated by DBC Ceramic (Al_2O_3)
- 3500 V_{RMS} Isolating Voltage
- Industrial Standard Package
- High Surge Capability
- Glass Passivated Chips
- Modules uses High Voltage Power diodes in four Basic Configurations
- Simple Mounting
- UL E78996 approved 

Applications

- DC Motor Control and Drives
- Battery Charges
- Welders
- Power Converters

Major Ratings and Characteristics

Parameters	IRK.166..	IRK.196..	IRK.236..	Units
$I_{F(AV)}$	165	195	230	A
@ T_C	100	100	100	°C
$I_{F(RMS)}$	260	305	360	A
I_{FSM} @ 50Hz	4000	4750	5500	A
@ 60Hz	4200	4980	5765	A
I^2t @ 50Hz	80	113	151	KA ² s
@ 60Hz	73	103	138	KA ² s
$I^2\sqrt{t}$	798	1130	1516	KA ² √s
V_{RRM}	400 to 1600			V
T_J range	-40 to 150			°C

CASE STYLE NEW INT-A-PAK



Electrical Specifications

Voltage Ratings

Type number	Voltage Code	V_{RRM} , Maximum repetitive peak reverse voltage V	V_{RSM} , Maximum non-repetitive peak reverse voltage V	I_{RRM} 150°C mA
IRK.166	04	400	500	20
IRK.196	08	800	900	
IRK.236	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

Parameter	IRK.166	IRK.196	IRK.236	Units	Conditions
$I_{F(AV)}$ Max. average on-state current @ Case temperature	165	195	230	A	180° conduction, half sine wave
	100	100	100	°C	
$I_{F(RMS)}$ Max. RMS on-state current	260	305	360	A	
I_{FSM} Maximum peak, one-cycle on-state, non-repetitive surge current	4000	4750	5500	A	t = 10ms No voltage
	4200	4980	5765		t = 8.3ms reapplied
	3350	4000	4630		t = 10ms 100% V_{RRM}
	3500	4200	4850		t = 8.3ms reapplied
I^2t Maximum I^2t for fusing	80	113	151	KA ² s	t = 10ms No voltage
	73	103	138		t = 8.3ms reapplied
	56	80	107		t = 10ms 100% V_{RRM}
	52	73	98		t = 8.3ms reapplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	798	1130	1516	KA ² √s	t = 0.1 to 10ms, no voltage reapplied
$V_{F(TO)1}$ Low level value of threshold voltage	0.73	0.69	0.7	V	(16.7% $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), @ T_J max.
$V_{F(TO)2}$ High level value of threshold voltage	0.88	0.78	0.83		($I > \pi \times I_{F(AV)}$), @ T_J max.
r_{t1} Low level value on-state slope resistance	1.5	1.3	1.2	mΩ	(16.7% $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), @ T_J max.
r_{t2} High level value on-state slope resistance	1.26	1.2	1.07		($I > \pi \times I_{F(AV)}$), @ T_J max.
V_{FM} Maximum forward voltage drop	1.43	1.38	1.46	V	$I_{FM} = \pi \times I_{F(AV)}$, $T_J = 25^\circ\text{C}$, 180° conduction Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$

Blocking

I_{RRM}	Maximum peak reverse and off-state leakage current	20	mA	$T_J = 150^{\circ}\text{C}$
V_{INS}	RMS isolation voltage	3500	V	50Hz, circuit to base, all terminals shorted, $t = 1\text{s}$

Thermal and Mechanical Specifications

Parameter	IRK.166	IRK.196	IRK.236	Units	Conditions
T_J Max. junction operating temperature range	-40 to 150			$^{\circ}\text{C}$	
T_{stg} Max. storage temperature range	-40 to 150			$^{\circ}\text{C}$	
R_{thJC} Max. thermal resistance, junction to case	0.2	0.16	0.14	K/W	DC operation, per junction
R_{thCS} Max. thermal resistance, case to heatsink	0.05			K/W	Mounting surface smooth, flat and greased Per module
T Mounting IAP to heatsink torque $\pm 10\%$ busbar to IAP	4 to 6			Nm	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.
wt Approximate weight	200 (7.1)			g (oz)	
Case Style	New Int-A-Pak				

ΔR Conduction (per Junction)

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

Devices	Sinusoidal conduction @ T_J max.					Rectangular conduction @ T_J max.					Units
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
IRK.166	0.025	0.03	0.038	0.055	0.089	0.018	0.031	0.041	0.057	0.089	K/W
IRK.196	0.016	0.019	0.024	0.034	0.053	0.012	0.02	0.026	0.035	0.054	
IRK.236	0.009	0.010	0.014	0.018	0.025	0.008	0.012	0.015	0.019	0.025	

Ordering Information Table

Device Code

IRK

D

236

/

16

1

2

3

4

1

2

3

4

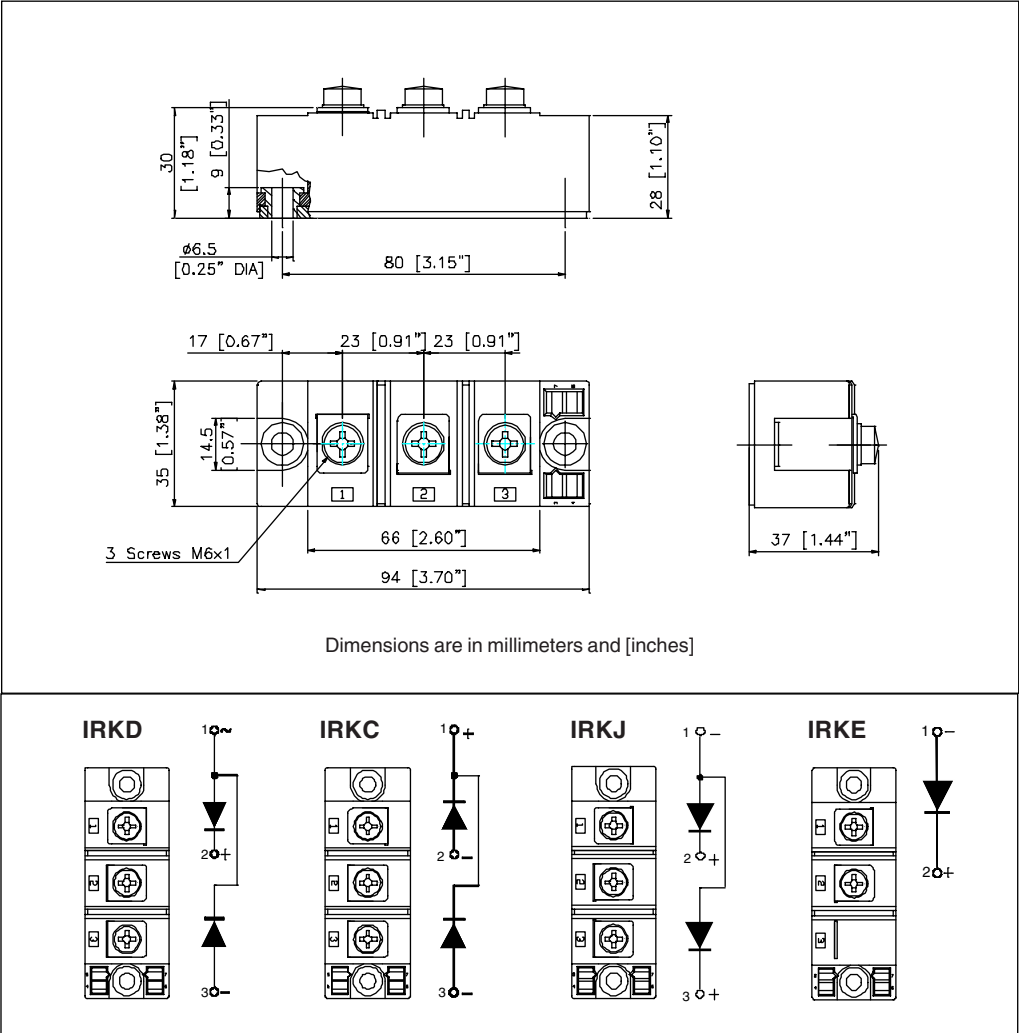
- Module Type

- Circuit Configuration

- Current Rating: $I_{F(AV)}$

- Voltage Code: Code x 100 = V_{RRM}

Outline Table



NOTE: To order the Optional Hardware see Bulletin I27900

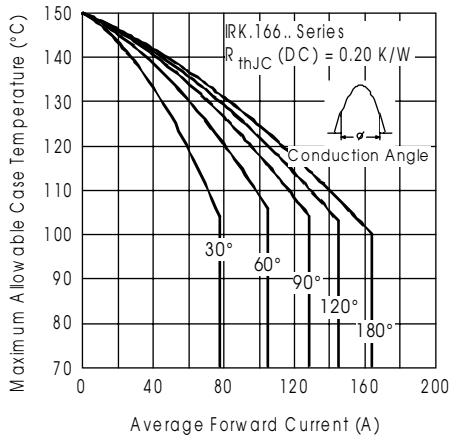


Fig. 1 - Current Ratings Characteristics

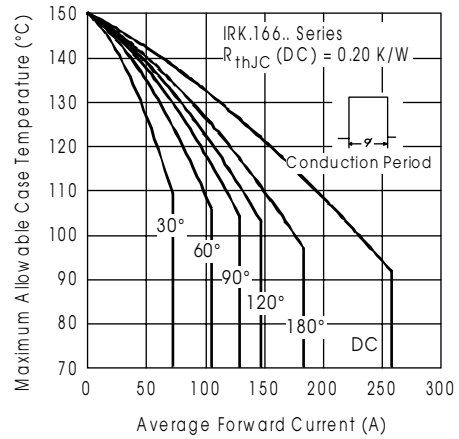


Fig. 2 - Current Ratings Characteristics

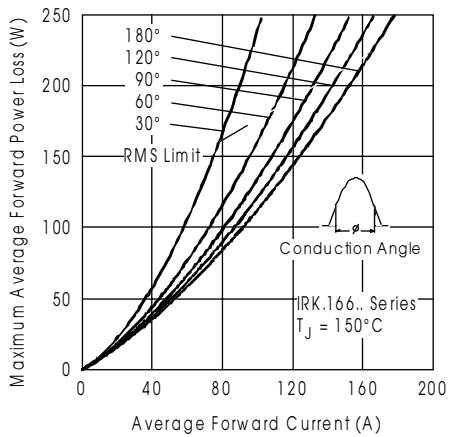


Fig. 3 - On-State Power Loss Characteristics

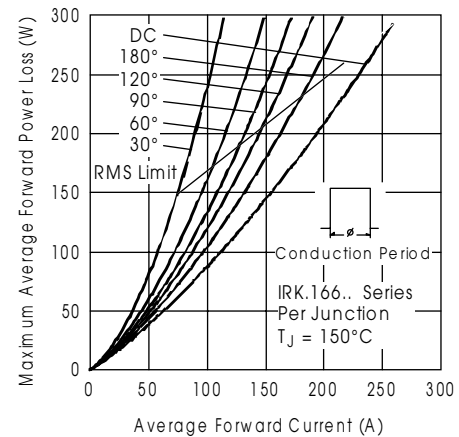


Fig. 4 - On-State Power Loss Characteristics

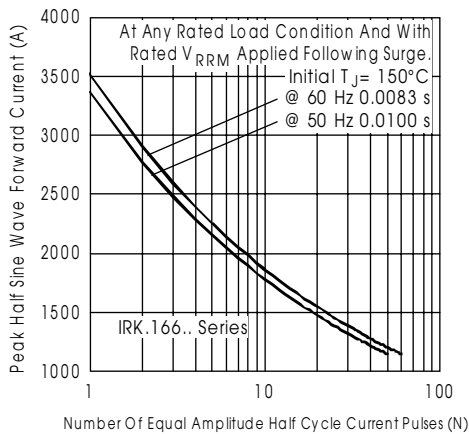


Fig. 5 - Maximum Non-Repetitive Surge Current

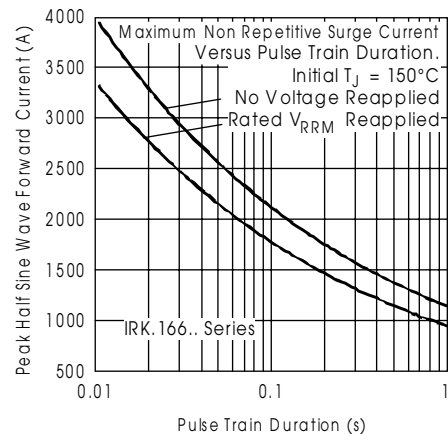


Fig. 6 - Maximum Non-Repetitive Surge Current

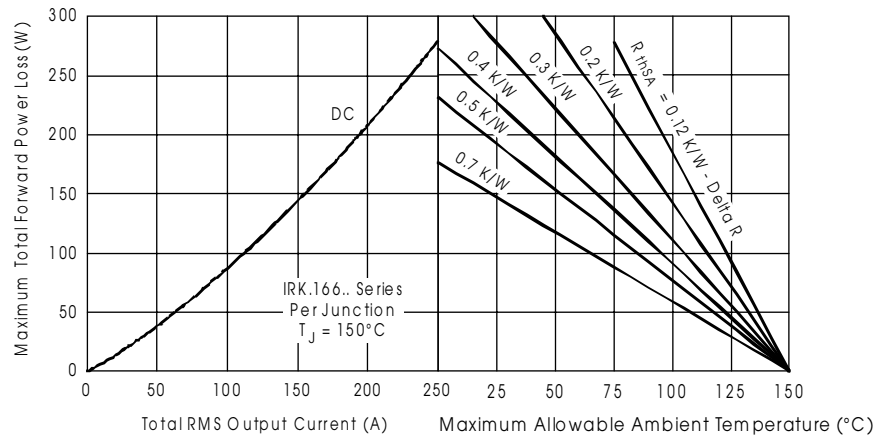


Fig.7 - On State Power Loss Characteristics

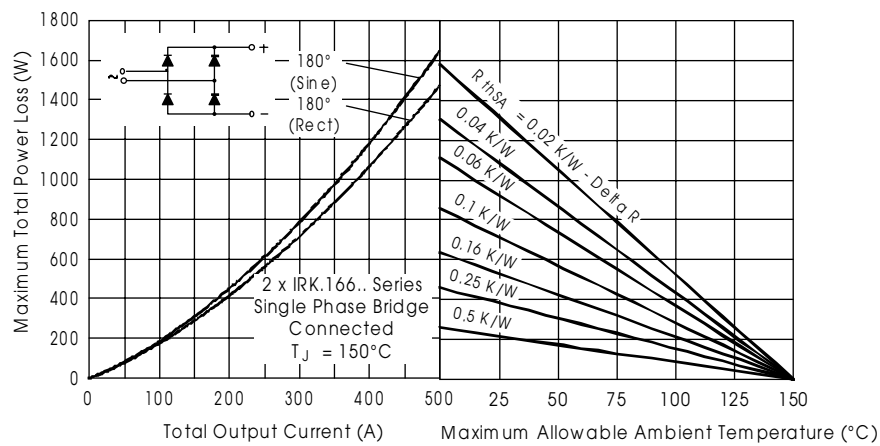


Fig.8 - On State Power Loss Characteristics

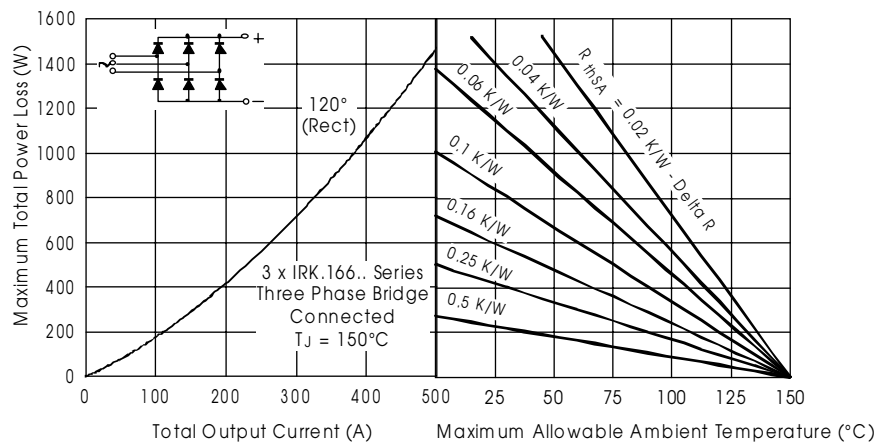


Fig.9- On State Power Loss Characteristics

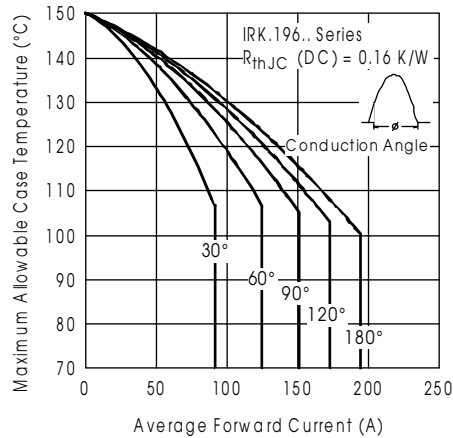


Fig. 10 - Current Ratings Characteristics

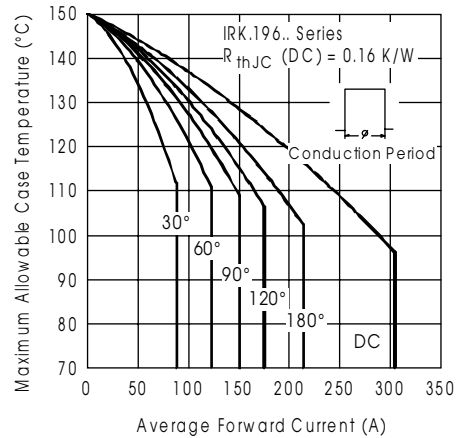


Fig. 11 - Current Ratings Characteristics

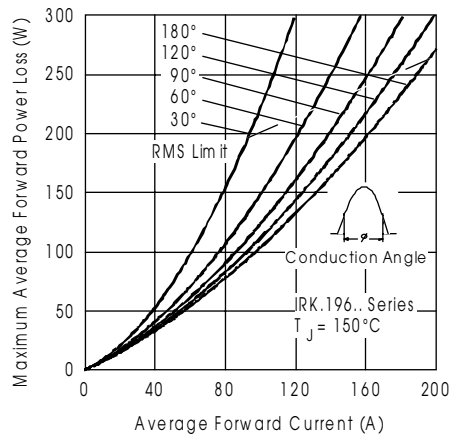


Fig. 12 - On-State Power Loss Characteristics

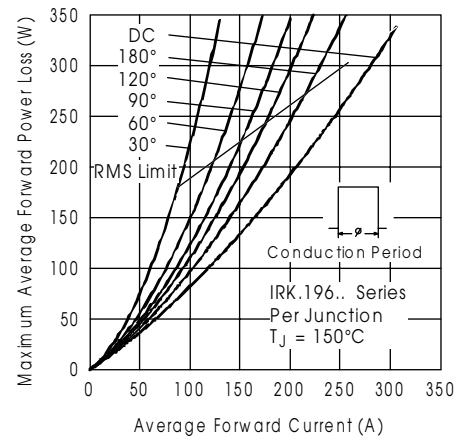


Fig. 13 - On-State Power Loss Characteristics

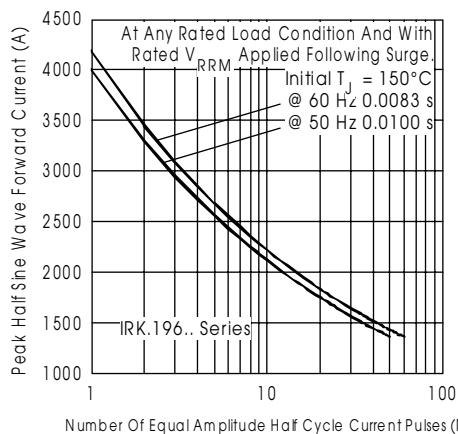


Fig. 14 - Maximum Non-Repetitive Surge Current

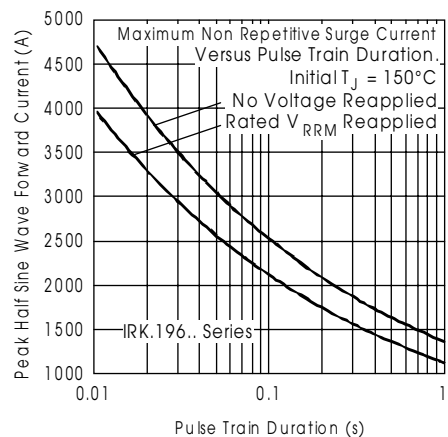


Fig. 15 - Maximum Non-Repetitive Surge Current

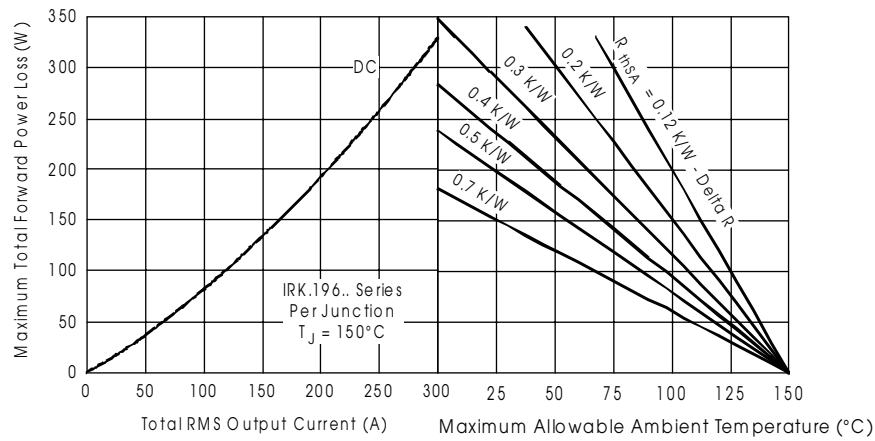


Fig.16 - On State Power Loss Characteristics

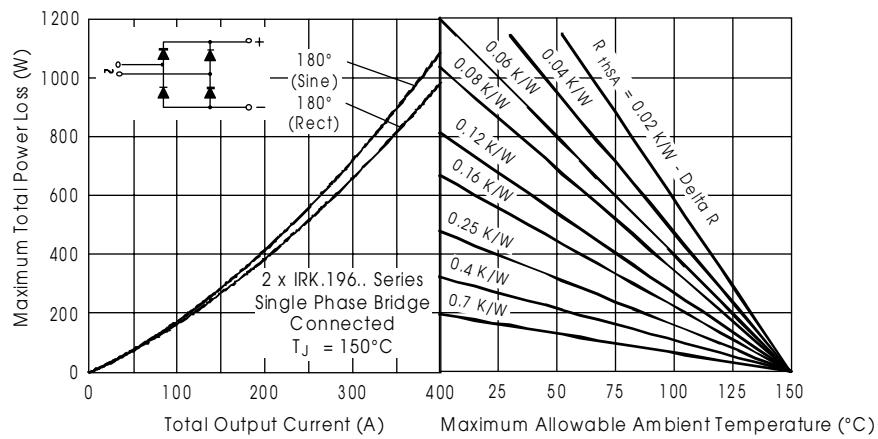


Fig.17 - On State Power Loss Characteristics

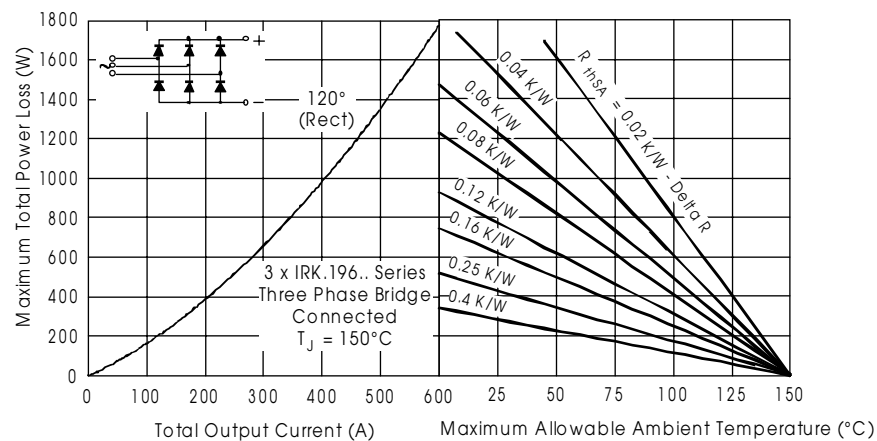


Fig.18- On State Power Loss Characteristics

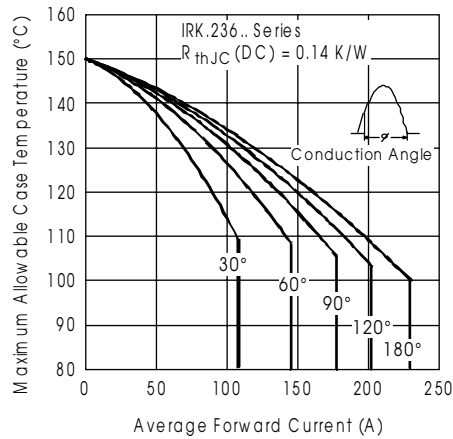


Fig. 19 - Current Ratings Characteristics

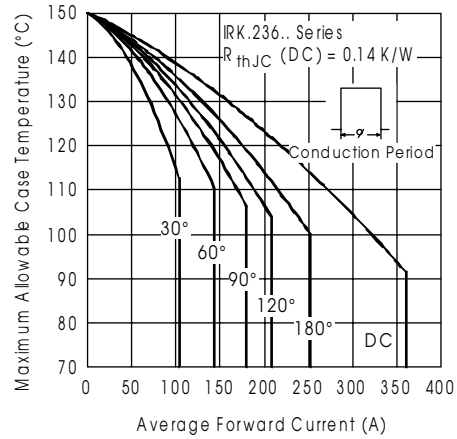


Fig. 20 - Current Ratings Characteristics

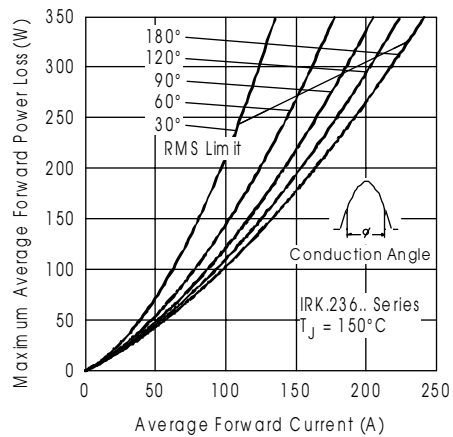


Fig. 21 - On-State Power Loss Characteristics

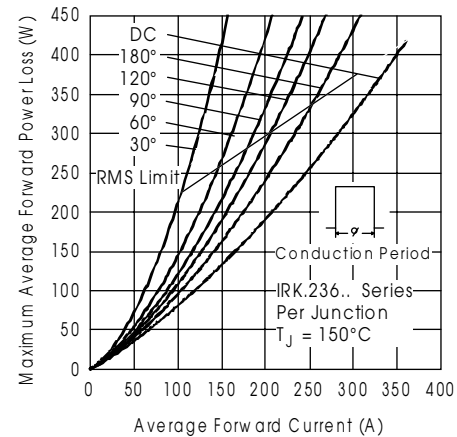


Fig. 22 - On-State Power Loss Characteristics

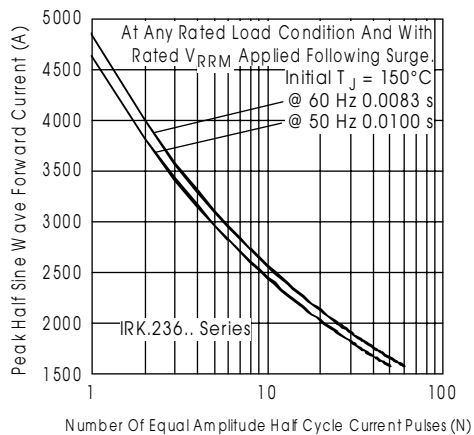


Fig.23 - Maximum Non-Repetitive Surge Current

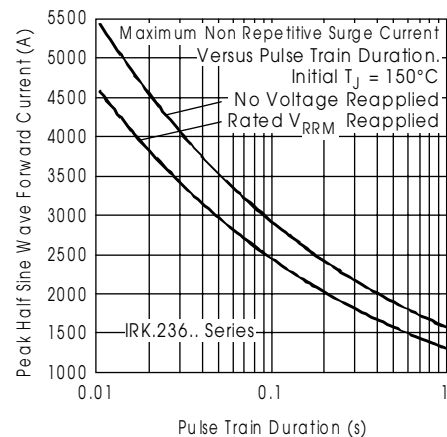


Fig. 24 - Maximum Non-Repetitive Surge Current

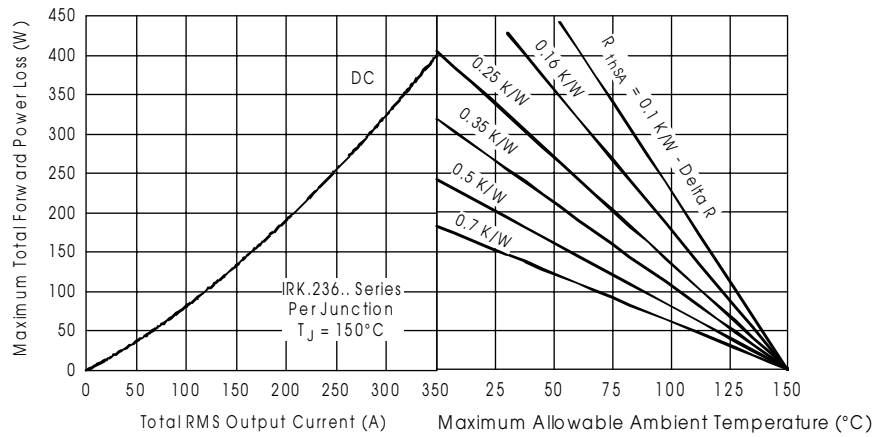


Fig.25 - On State Power Loss Characteristics

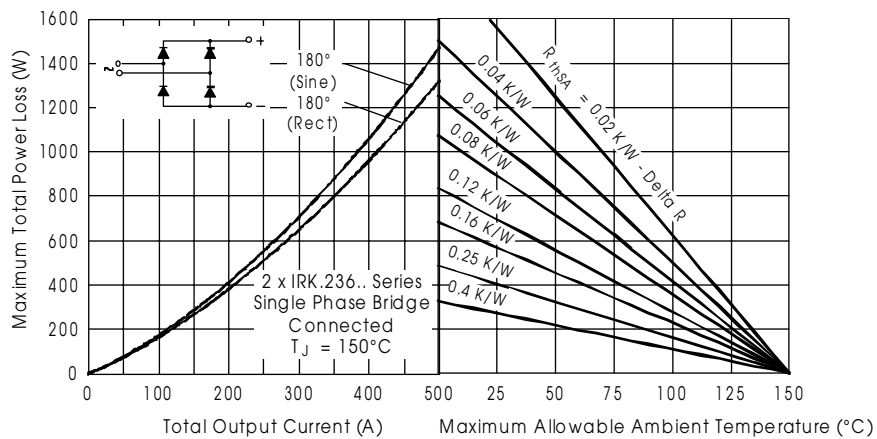


Fig.26 - On State Power Loss Characteristics

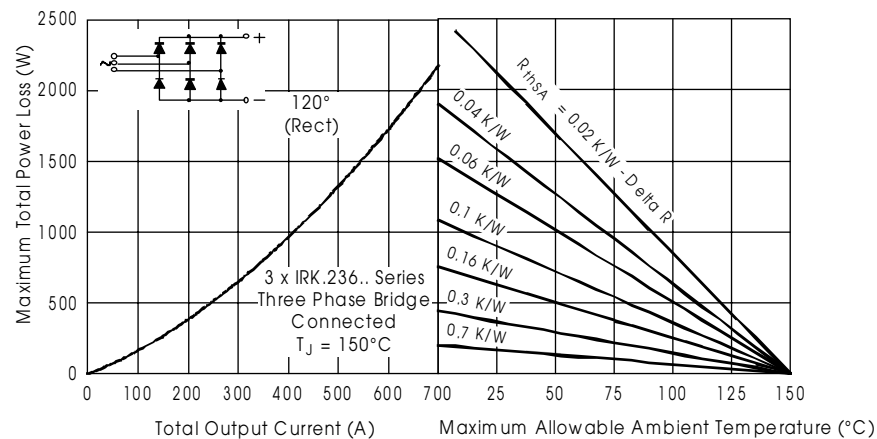


Fig.27 - On State Power Loss Characteristics

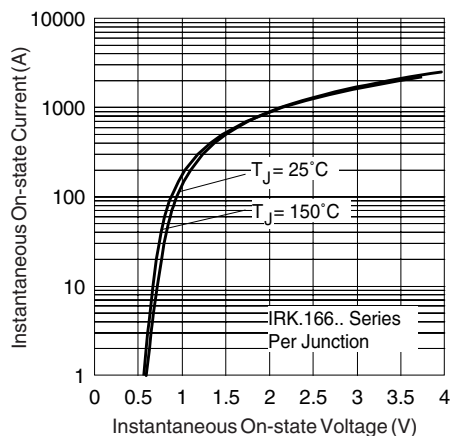


Fig.28 - On State Voltage Drop Characteristics

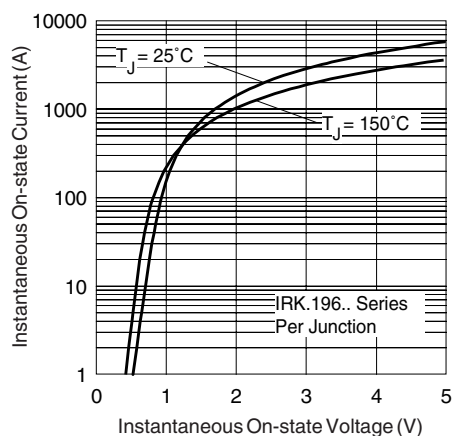


Fig.29 - On State Voltage Drop Characteristics

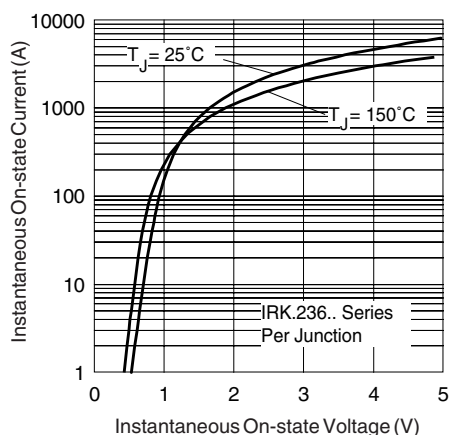


Fig.30 - On State Voltage Drop Characteristics

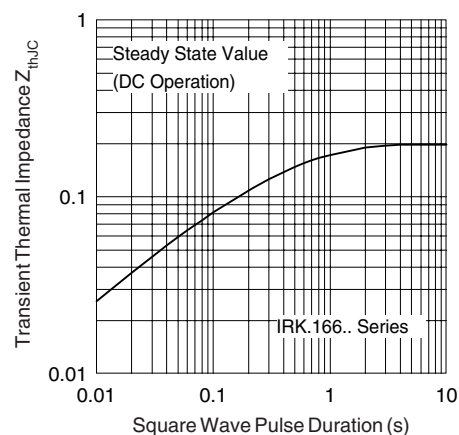


Fig.31 - Thermal Impedance Z_{thJC} Characteristics

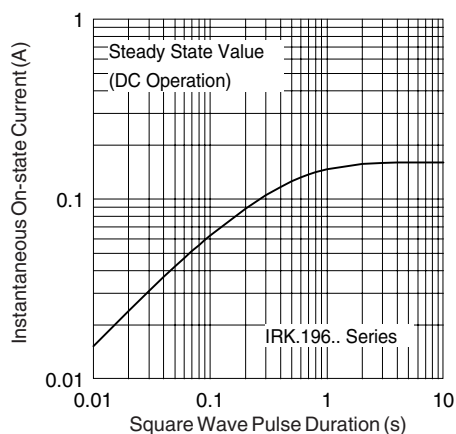


Fig.32 - Thermal Impedance Z_{thJC} Characteristics

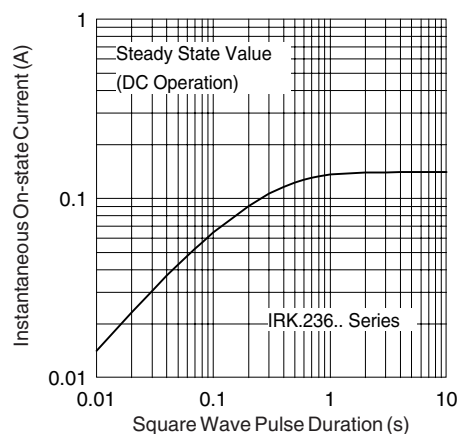


Fig.33 - Thermal Impedance Z_{thJC} Characteristics

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 U.S.A. Tel: (310) 322 3331. Fax: (310) 322 3332.
EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, U.K. Tel: ++ 44 1883 732020. Fax: ++ 44 1883 733408.
IR CANADA: 15 Lincoln Court, Brampton, Markham, Ontario L6T3Z2. Tel: (905) 453 2200. Fax: (905) 475 8801.
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg. Tel: ++ 49 6172 96590. Fax: ++ 49 6172 965933.
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino. Tel: ++ 39 11 4510111. Fax: ++ 39 11 4510220.
IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171. Tel: 81 3 3983 0086.
IR SOUTHEAST ASIA: 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994. Tel: ++ 65 838 4630.
IR TAIWAN: 16 Fl. Suite D.207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan. Tel: 886 2 2377 9936.