Bulletin I27095 rev. A 08/97

International
IOR Rectifier

IRK.L132.. SERIES

FAST RECOVERY DIODES

INT-A-pak™ Power Modules

140 A

Features

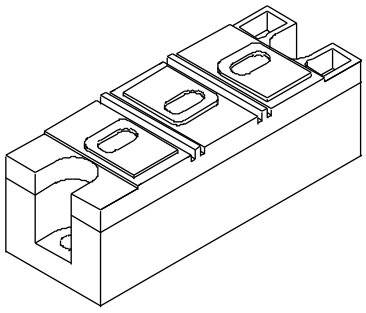
- Fast recovery time characteristics
- Electrically isolated base plate
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- 3000 V_{RMS} isolating voltage
- UL E78996 approved

Description

The IRK.L132 series of INT-A-pak uses fast recovery power diodes in four basic configurations. The semiconductors are electrically isolated from the metal base, allowing common heatsinks and compact assemblies to be built. Application includes power supplies, battery chargers, welders, motor controls and general industrial current rectification. These modules are intended for those applications where fast recovery characteristics are required.

Major Ratings and Characteristics

Parameters		IRK.L132..	Units
$I_{F(AV)}$		140(130)	A
	@ T_C	100(105)	°C
$I_{F(RMS)}$		220	A
I_{FSM}	@ 50Hz	3000	A
	@ 60Hz	3100	A
I^2t	@ 50Hz	44.2	KA^2s
	@ 60Hz	40.3	KA^2s
$I^2\sqrt{t}$		442	$KA^2\sqrt{s}$
V_{RRM}		up to 1400	V
T_J		-40 to 150	°C



ELECTRICAL SPECIFICATIONS

Voltage Ratings

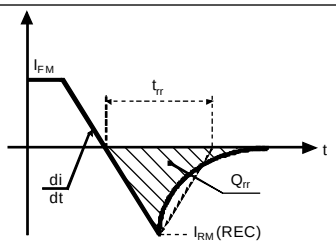
Type number	Voltage Code	t_{rr} Code	V_{RRM} , maximum repetitive peak reverse voltage V	V_{RSM} , maximum non-repetitive peak reverse voltage V	I_{RRM} max. @ 150°C mA
IRK.L132..	06	S10	600	700	40
	10	S10	1000	1100	
	12	S20	1200	1300	
	14	S20	1400	1500	

Forward Conduction

Parameter		IRK.L132..	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	140 (130)	A	180° conduction, half sine wave		
	@ Case temperature	100 (105)	°C			
$I_{F(RMS)}$	Max. RMS forward current	220	A	as AC switch		
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	3000	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		3100		t = 8.3ms		
		2500		t = 10ms	100% V_{RRM} reapplied	
		2600		t = 8.3ms		
I^2t	Maximum I^2t for fusing	44.2	KA^2s	t = 10ms	No voltage reapplied	
		40.3		t = 8.3ms		
		31.2		t = 10ms	100% V_{RRM} reapplied	
		28.5		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	442	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	1.12	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	1.51		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	1.52	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{f2}	High level value of forward slope resistance	0.71		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	1.68	V	$I_{FM} = \pi \times I_{F(AV)}$, $T_J = 25°C$ Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Recovery Characteristics

Code	Test conditions			Typ. values @ $T_J = 150°C$		
	I_{pk} (A)	di/dt (A/µs)	V_r (V)	Q_{rr} (µC)	I_{rr} (A)	
S10	500	100	50	38	70	
S20	500	100	50	68	95	



Blocking

	Parameter	IRK.L132..	Units	Conditions
I_{RRM}	Max. peak reverse leakage current	40	mA	T_J = 150°C
V_{INS}	RMS isolation voltage	3000	V	50 Hz, circuit to base, all terminals shorted, t = 1 sec

Thermal and Mechanical Specifications

	Parameter	IRK.L132..	Units	Conditions
T_J	Max. junction operating temperature range	-40 to 150	°C	
T_{stg}	Max. storage temperature range	-40 to 150	°C	
R_{thJC}	Max. thermal resistance, junction to case	0.20	K/W	Per junction, DC operation
R_{thCS}	Max. thermal resistance, case to heatsink	0.035	K/W	Mounting surface flat, smooth and greased Per module
T	Mounting torque ±10%		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
	IAP to heatsink	4 to 6		
	busbar to IAP	4 to 6		
wt	Approximate weight	500 (17.8)	g (oz)	

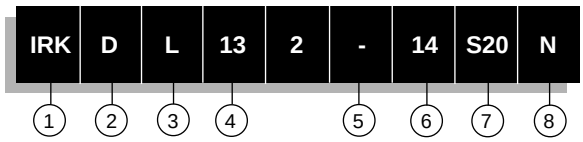
ΔR_{thJC} Conduction

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.011	0.012	K/W	T_J = T_J max.
120°	0.016	0.019		
90°	0.021	0.023		
60°	0.029	0.030		
30°	0.041	0.041		

Ordering Information Table

Device Code



1 - Module type

2 - Circuit configuration (see Outline Table)

3 - L = Fast recovery diode

4 - Current rating: $I_{F(AV)}$ x 10 rounded

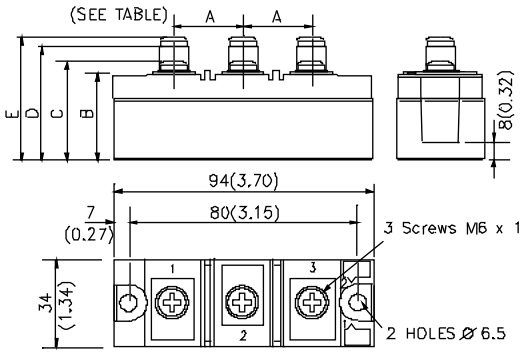
5 - 1 = option with spacers and longer terminal screws
2 = option with standard terminal screws

6 - Voltage code: Code x 100 = V_{RRM} (see Voltage Rating Table)

7 - t_{rr} code (see Recovery Characteristics Table) — S10 = 1000ns, S20 = 2000ns

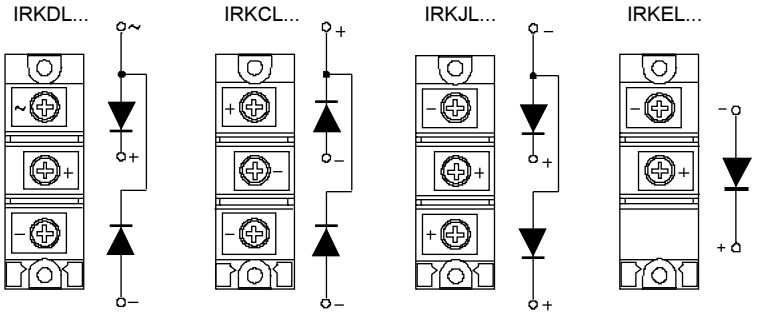
8 - None = Standard devices
N = Aluminum nitrade substrate

Outline Table



- All dimensions in millimeters (inches)
- Dimensions are nominal
- Full engineering drawings are available on request
- UL identification number for cathode wire: UL 1385
- UL identification number for package: UL 94V0

For all types	A	B	C	D	E
IRK...1	25 (0.98)	----	----	41 (1.61)	47 (1.85)
IRK...2	23 (0.91)	30 (1.18)	36 (1.42)	----	----



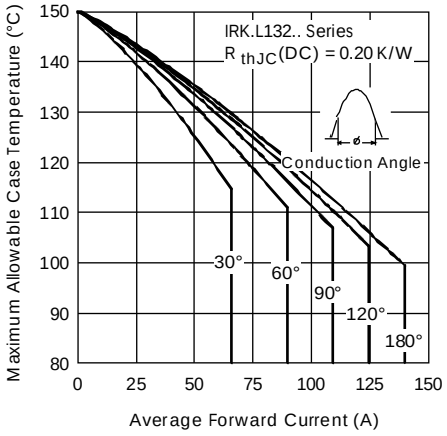


Fig. 1 - Current Ratings Characteristics

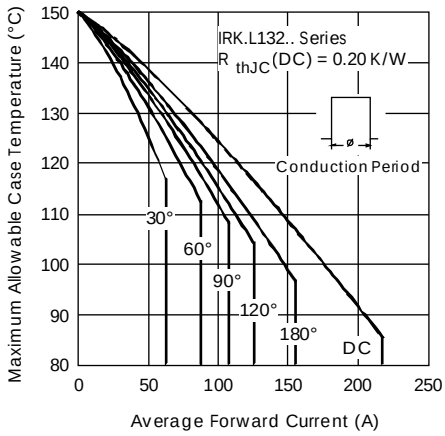


Fig. 2 - Current Ratings Characteristics

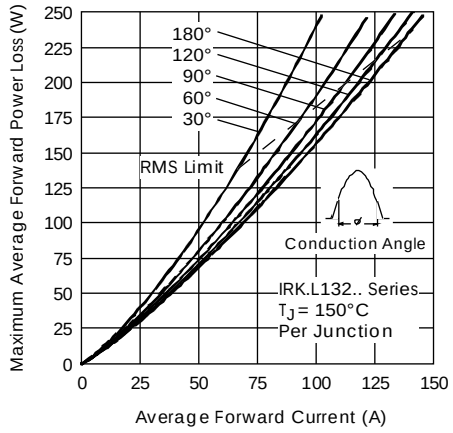


Fig. 3 - Forward Power Loss Characteristics

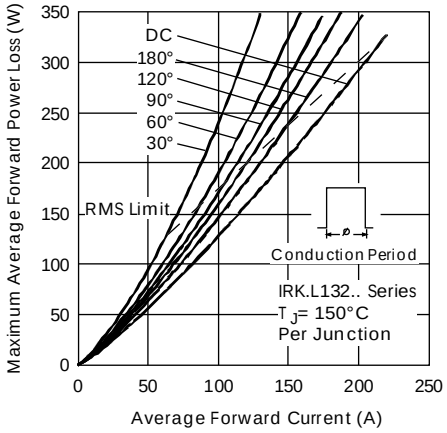


Fig. 4 - Forward Power Loss Characteristics

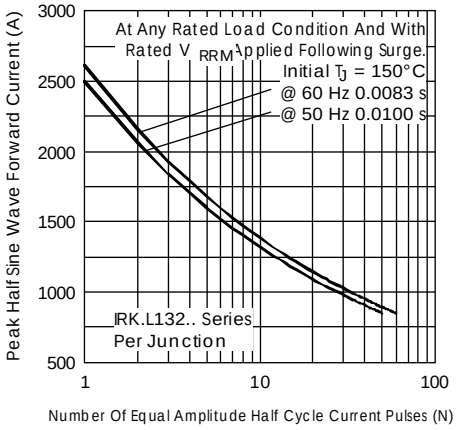


Fig. 5 - Maximum Non-Repetitive Surge Current

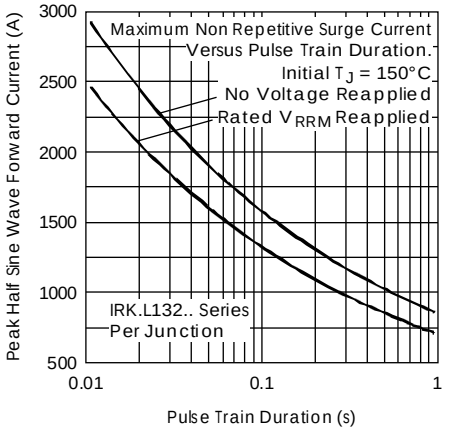


Fig. 6 - Maximum Non-Repetitive Surge Current

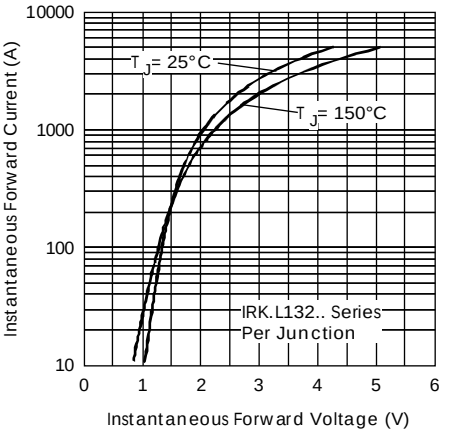


Fig. 7 - Forward Voltage Drop Characteristics

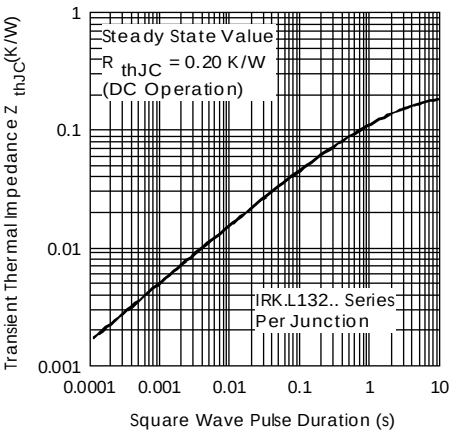


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

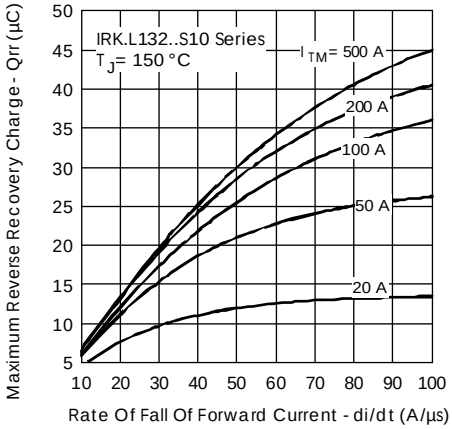


Fig. 9 - Reverse Recovery Charge Characteristics

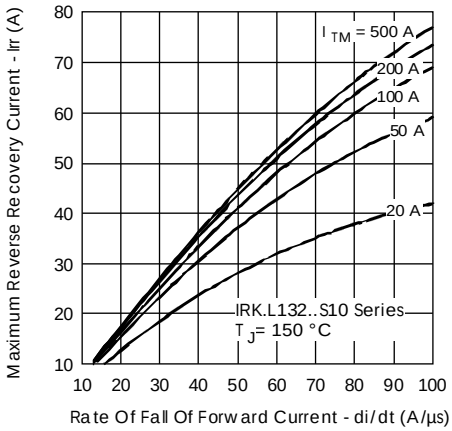


Fig. 10 - Reverse Recovery Current Characteristics

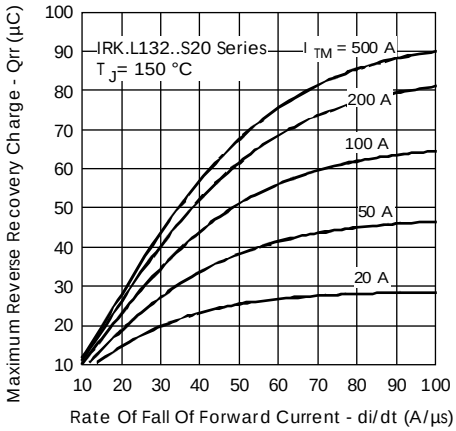


Fig. 11 - Reverse Recovery Charge Characteristics

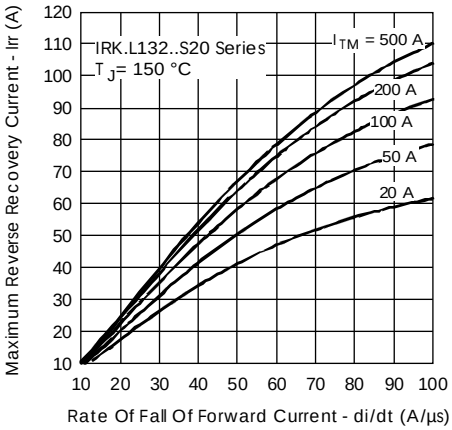


Fig. 12 - Reverse Recovery Current Characteristics

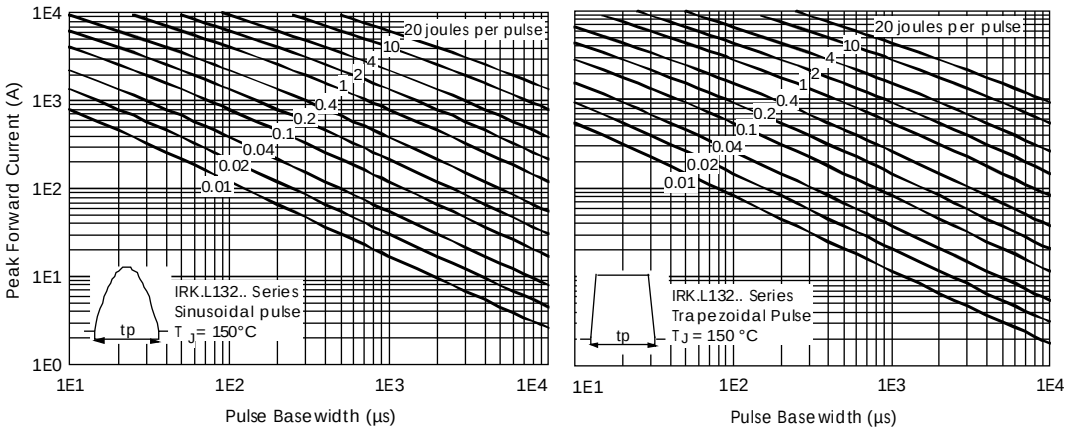


Fig. 13 - Maximum Forward Energy Power Loss Characteristics

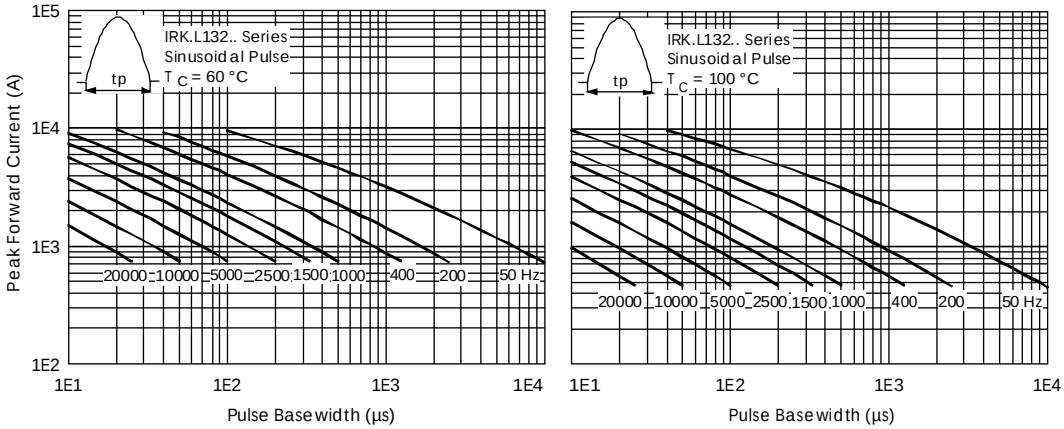


Fig. 14 - Frequency Characteristics

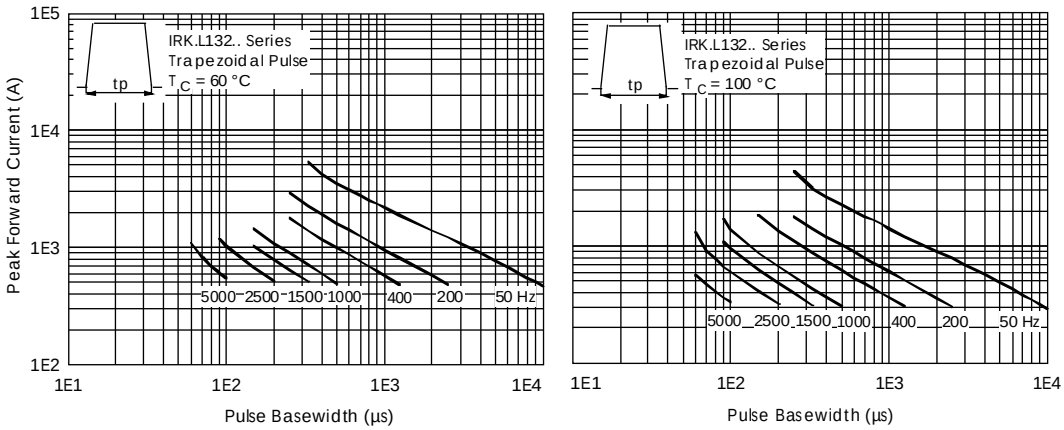


Fig. 15 - Frequency Characteristics