International
IOR Rectifier

SERIES IRK.L131/132

FAST RECOVERY DIODES

NEW INT-A-pak™ Power Modules

140A

Features

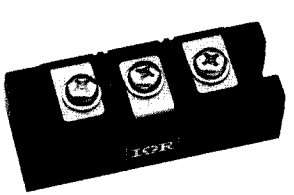
- Fast recovery time characteristics
- Electrically isolated base plate
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL recognised
- 3000 V_{RMS} isolating voltage
- Beryllium oxide substrate
- Also available with aluminum nitrade substrate

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

Parameter		IRK.L131/132	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
V_{RRM} range		400 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. mA
IRK.L131/132	04	S10/S20	400	500	40
	06	S10/S20	600	700	40
	08	S10/S20	800	900	40
	10	S10/S20	1000	1100	40
	12	S20	1200	1300	40
	14	S20	1400	1500	40

Forward Conduction

Parameter		IRK.L131/132	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	A	t = 8.3ms		
		2500	A	t = 10ms	100% V_{RRM}	
		2600	A	t = 8.3ms	reapplied	
I^2t	Maximum I^2t for fusing	44.2	kA^2s	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		40.3	kA^2s	t = 8.3ms		
		31.2	kA^2s	t = 10ms	100% V_{RRM}	
		28.5	kA^2s	t = 8.3ms	reapplied	
$I^2\sqrt{t}$	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	V	$(\pi \times I_{F(AV)} < I < 20 \times \pi \times I_{F(AV)})$ $T_J = T_J$ 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	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	1.68	V	$I_{FM} = \pi \times I_{F(AV)}$, $T_J = 25$ °C Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Thermal and Mechanical Specifications

T_J	Max. junction operating temp.	-40 to 150	°C		
T_{stg}	Max. storage temperature range	-40 to 150	°C		
R_{thJC}	Max. internal thermal resistance junction to case	0.20	K/W	IRKDL/CL/JL	Per junction, DC operation
		0.20	K/W	IRKEL	Per junction, DC operation
R_{thC-S}	Thermal resistance, case to heatsink	0.035	K/W	Mounting surface flat, smooth and greased Per module	
T	Mounting torque ±10% INT-A-pak 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 INT-A-pak	4 to 6	Nm		
wt	Approximate weight	500 (17.8)	g (oz)		
	Case style	INT-A-pak			

Blocking

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

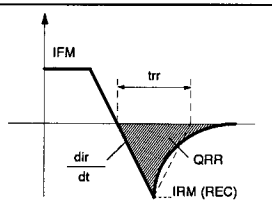
ΔR Conduction (per Junction)

(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°	0.015	0.011	K/W	T_J = T_J max.
120°	0.018	0.019	K/W	Per junction
90°	0.024	0.026	K/W	
60°	0.035	0.037	K/W	
30°	0.059	0.060	K/W	

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	"	"	"	68	95



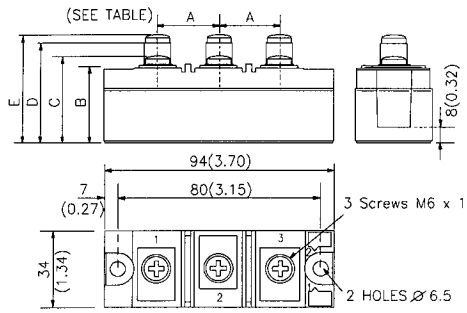
Ordering Information Table

Device Code

IRK	D	L	13	2	-	14	S20	N
①	②	③	④	⑤		⑥	⑦	⑧

1. Module type
2. Circuit configuration (See Outiline Table)
3. L = Fast recovery diode
4. Current rating
5. 1 = option with spacers and longer terminal screws
   2 = option with standard terminal screws
6. Voltage code: Code x 100 = VRRM (See Voltage Ratings Table)
7. trr code (See Recovery Characteristics Table)
8. None = Standard devices (beryllium oxide)
   N = Aluminum Nitrade substrate (contact factory)

Recovery Characteristics Table
S10= 1000 n s
S20= 2000 n s

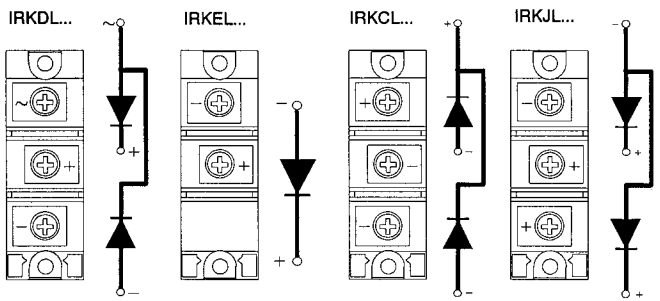


- All dimensions in millimeters (inches)
- Dimensions are nominal
- Full engineering drawings are available on request
- UL identification number for cathode wire: UL 1385
- UL identification number for package: UL 94V0

For all types	A	B	C	D	E
IRK...5	25(0.98)	----	----	41(1.61)	47(1.85)
IRK...6	23(0.91)	30(1.18)	36(1.42)	----	----

CONTAINS BERYLLIUM OXIDE CERAMIC

- May contain Beryllium Oxide Ceramic, and under normal circumstances is non hazardous.
- Do not open, cut or grind.
- Unserviceable parts must be disposed of as harmful waste.



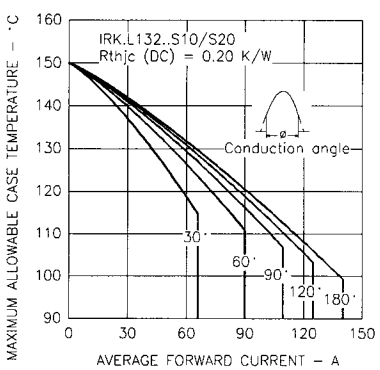


Fig. 1 - Current Ratings Characteristics

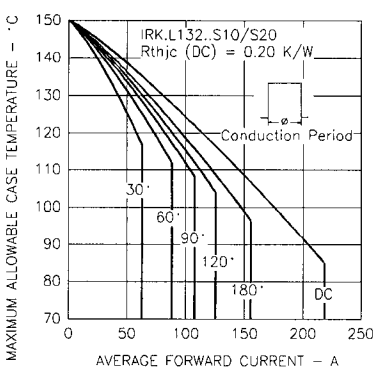


Fig. 2 - Current Ratings Characteristics

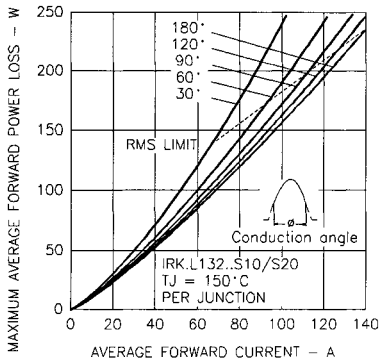


Fig. 3 - Forward Power Loss Characteristics

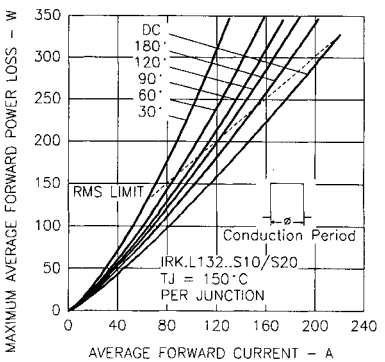


Fig. 4 - Forward Power Loss Characteristics

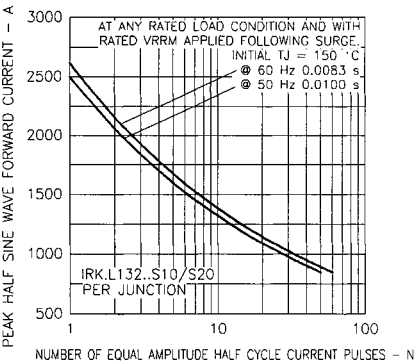


Fig. 5 - Maximum Non-Repetitive Surge Current

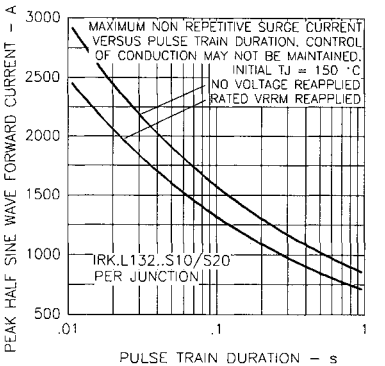


Fig. 6 - Maximum Non-Repetitive Surge Current

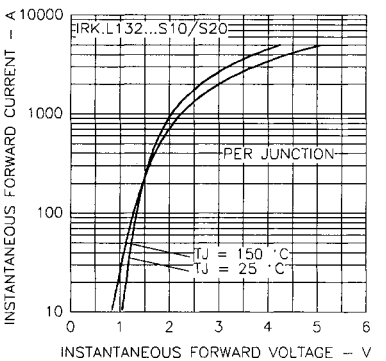


Fig. 7 - Forward VoltageDrop Characteristics

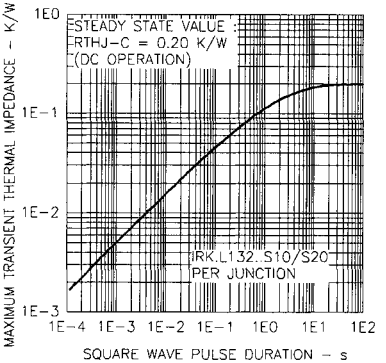


Fig. 8 - Thermal Impedance ZthJC Characteristics

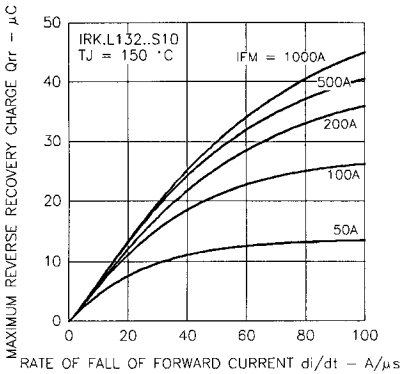


Fig. 9 - Reverse Recovery Charge Characteristics

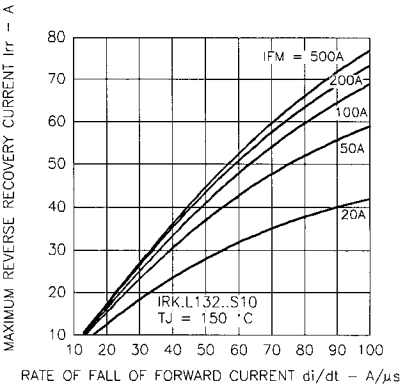


Fig. 10 - Reverse Recovery Current Characteristics

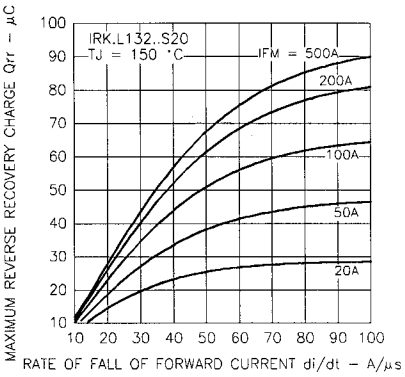


Fig. 11 - Reverse Recovery Charge Characteristics

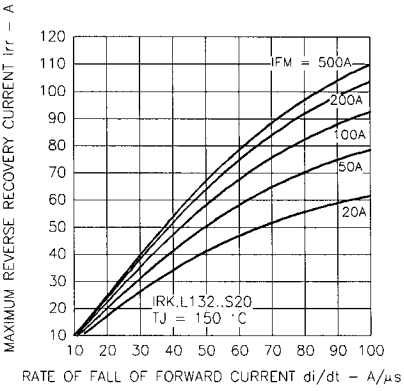


Fig. 12 - Reverse Recovery Current Characteristics

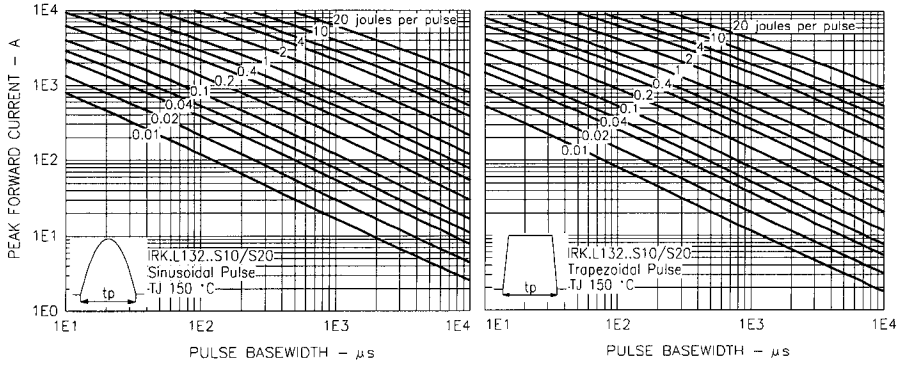


Fig. 13 - Maximum Forward Energy Power Loss Characteristics

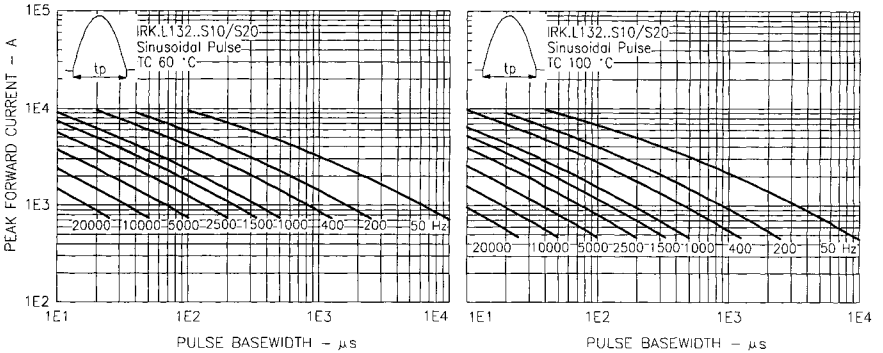


Fig. 14 - Frequency Characteristics

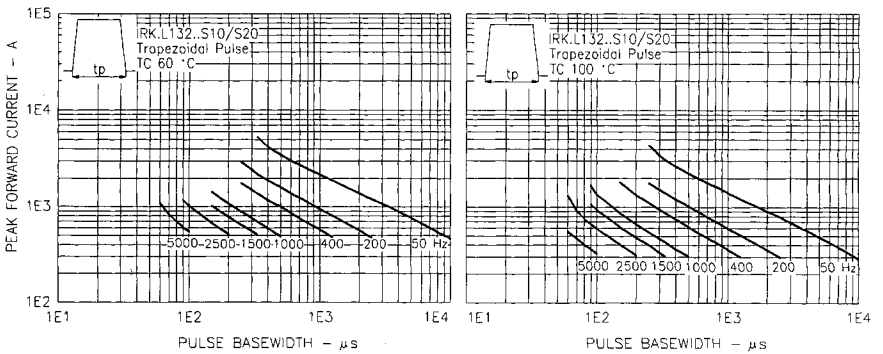


Fig. 15 - Frequency Characteristics

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