International
IOR Rectifier

SERIES IRK.L240

FAST RECOVERY DIODES

NEW MAGN-A-pak™ Power Modules

INTERNATIONAL RECTIFIER 65E D

240A
250A

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

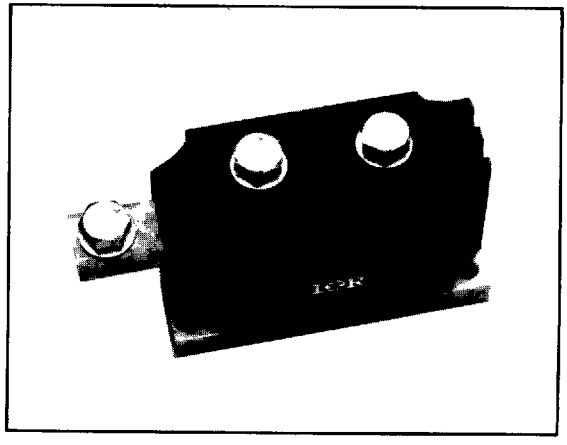
Description

The IRK.L240 Series of MAGN-A-paks 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.L240 S10/S20	IRK.L240 S30	Units
$I_{F(AV)}$		250	240	A
	@ T_C	100	100	°C
$I_{F(RMS)}$		392	377	A
I_{FSM}	@ 50Hz	8000	7500	A
	@ 60Hz	8400	7850	A
I^2t	@ 50Hz	322	280	kA^2s
	@ 60Hz	294	256	kA^2s
V_{RRM} (*) range		400 to 2500		V
T_J		-40 to 150		°C

(*) See Voltage Ratings Table



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.L240	04	S10/S20	400	500	50
	06	S10/S20	600	700	50
	08	S10/S20	800	900	50
	10	S10/S20	1000	1100	50
	12	S20	1200	1300	50
	14	S20	1400	1500	50
	16	S30	1600	1700	50
	18	S30	1800	1900	50
	20	S30	2000	2100	50
	22	S30	2200	2300	50
	24	S30	2400	2500	50
	25	S30	2500	2600	50

Forward Conduction

	Parameter	IRK.L240		Units	Conditions		
$I_{F(AV)}$	Max. average forward current @ Case temperature	250	240	A	180° conduction, half sine wave		
		100	100	°C			
$I_{F(RMS)}$	Max. RMS forward current	392	377	A	as AC switch		
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	8000	7500	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		8400	7850	A	t = 8.3ms		
		6750	6300	A	t = 10ms	100% V_{RRM} reapplied	
		7100	6600	A	t = 8.3ms		
I^2t	Maximum I^2t for fusing	322	280	kA^2s	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		294	256	kA^2s	t = 8.3ms		
		228	198	kA^2s	t = 10ms	100% V_{RRM} reapplied	
		208	181	kA^2s	t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	3220	2800	$kA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	0.98	0.98	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	1.31	1.31	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	0.75	0.97	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	0.41	0.60	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	1.75	V	I_{FM} = 800, T_J = 150 °C tp = 10 ms Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Blocking

I_{RRM}	Max. peak reverse leakage current	50	mA	T_J = 150 °C, leakage current
V_{INS}	RMS isolation voltage	3000	V	50Hz, circuit to base, all terminals shorted, 25°C, 1s

Thermal and Mechanical Specifications

T_J	Max. junction operating temperature	-40 to 150	°C		
T_{stg}	Max. storage temperature range	-40 to 150	°C		
R_{thJ-C}	Max. internal thermal resistance junction to case	0.125	K/W	IRKDL/CL/JL	Per junction, DC operation
		0.125	K/W	IRKEL	Per junction, DC operation
R_{thC-S}	Thermal resistance, case to heatsink	0.02	K/W	Mounting surface flat, smooth and greased Per module	
T	Mounting torque ±10% MAGN-A-pak to heatsink	4 to 6	Nm	A mounting compound is recommended and the torqshould be rechecked after a period of about 3 hours to allow for the spread of the compound	
	Busbar to MAGN-A-pak	8 to 10	Nm		
wt	Approximate weight	850 (30)	g (oz)		
	Case style	MAGN-A-pak			

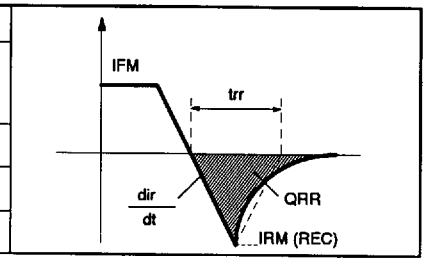
ΔR Conduction (per Junction)

(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°	0.008	0.007	K/W	$T_J = T_J$ max.
120°	0.010	0.011	K/W	
90°	0.013	0.015	K/W	
60°	0.019	0.020	K/W	
30°	0.032	0.033	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	135	100
S20	"	"	"	250	145
S30	"	"	"	360	200



Ordering Information Table

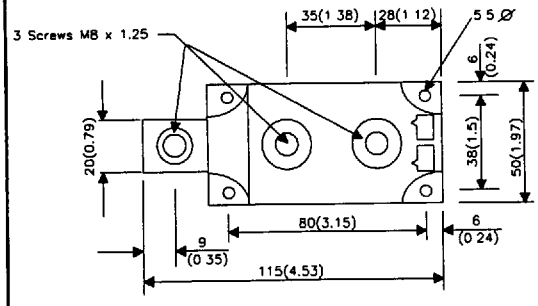
Device Code

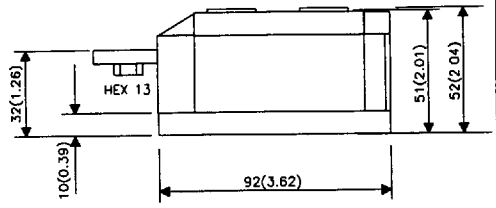
IRK	D	L	240	-	25	S30	N
①	②	③	④		⑤	⑥	⑦

1 - Module type
2 - Circuit configuration (See Outline Table)
3 - L = Fast recovery diode
4 - Current rating
5 - Voltage code: Code x 100 = VRRM (See Voltage Ratings Table)
6 - trr code (See Recovery Characteristics Table)
7 - None = Standard devices (beryllium oxide)
N = Aluminum Nitrade substrate (Contact factory)

Recovery Characteristics Table
S10 = 1000 ns
S20 = 2000 ns
S30 = 3000 ns

Outline Table



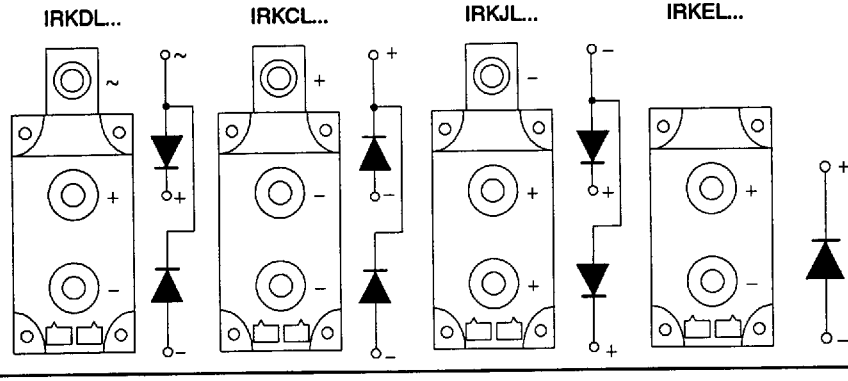


- All dimensions in millimeters (inches)
- Dimensions are nominal
- Full engineering drawings are available on request
- UL identification number for cathode wire: UL 1385
- UL identification number for package: UL 94V0

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.

HARMFUL



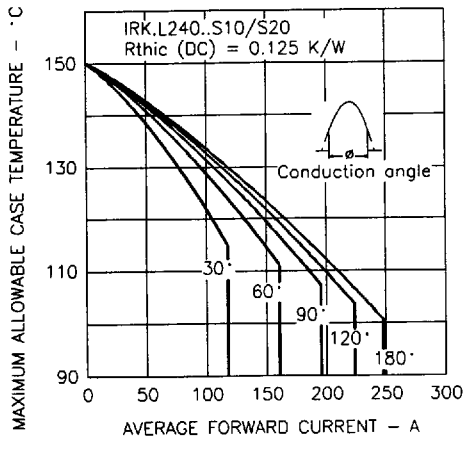


Fig. 1 - Current Ratings Characteristics

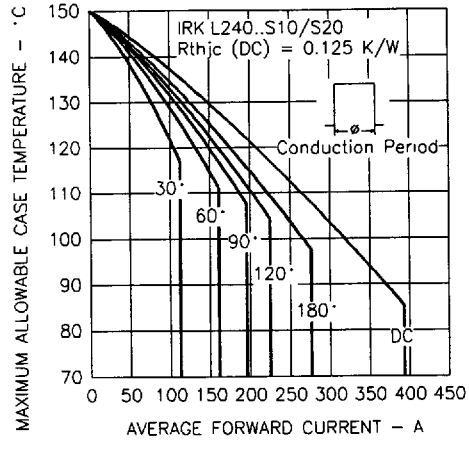


Fig. 2 - Current Ratings Characteristics

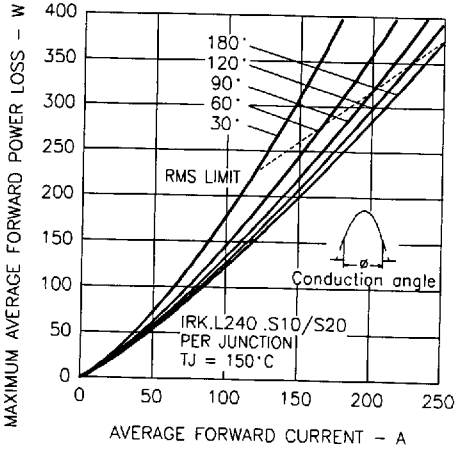


Fig. 3 - Forward Power Loss Characteristics

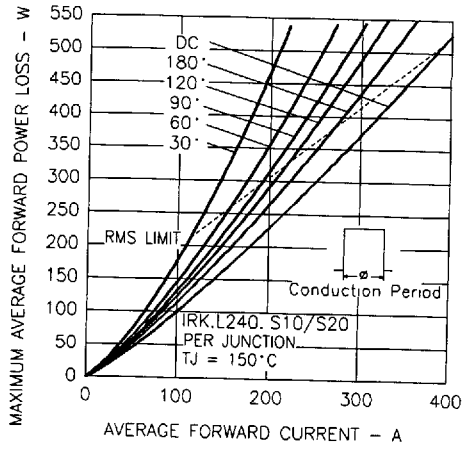


Fig. 4 - Forward Power Loss Characteristics

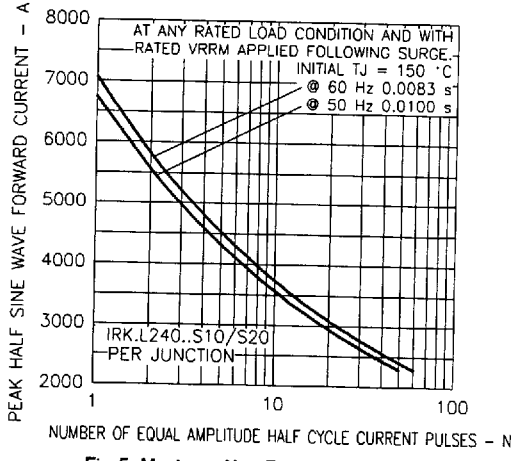


Fig. 5 - Maximum Non-Repetitive Surge Current

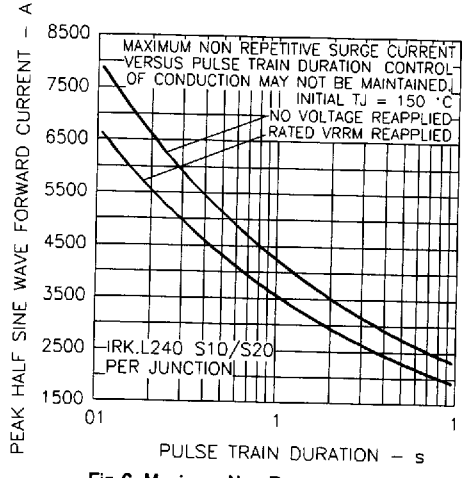


Fig. 6 - Maximum Non-Repetitive Surge Current

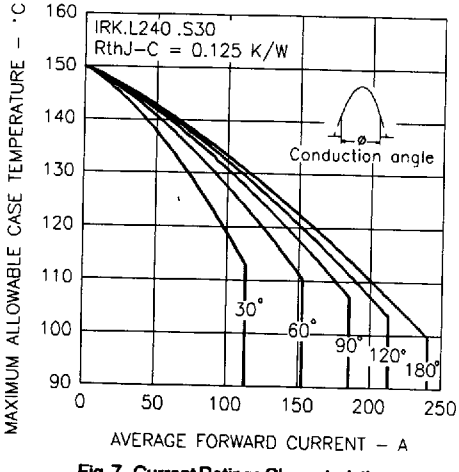


Fig. 7 - Current Ratings Characteristics

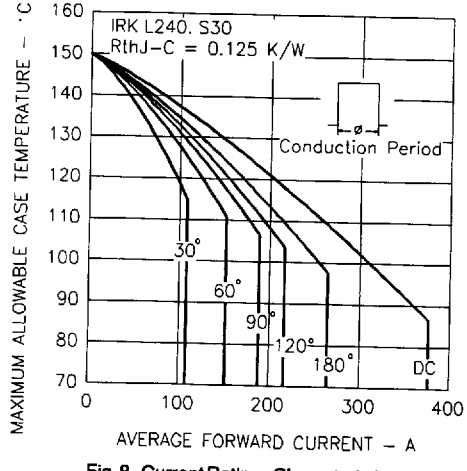


Fig. 8 - Current Ratings Characteristics

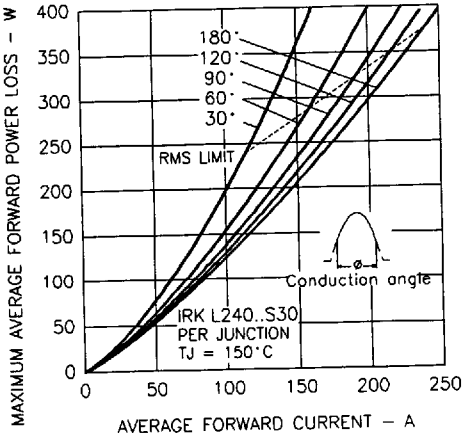


Fig. 9 - Forward Power Loss Characteristics

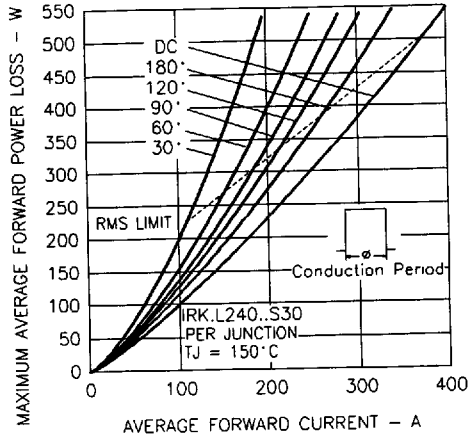


Fig. 10 - Forward Power Loss Characteristics

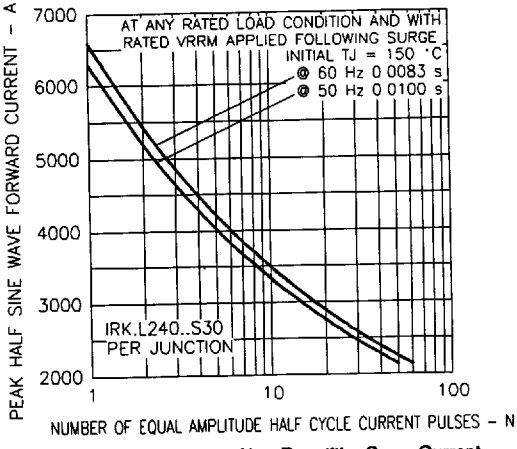


Fig. 11 - Maximum Non-Repetitive Surge Current

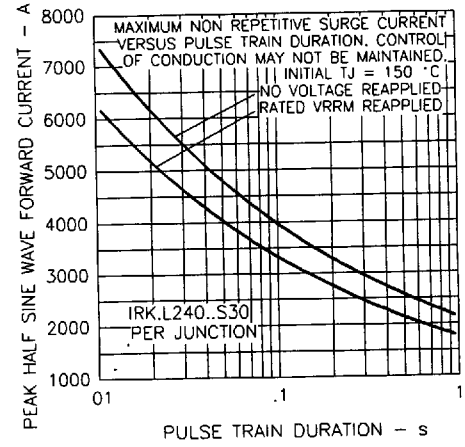


Fig. 12 - Maximum Non-Repetitive Surge Current

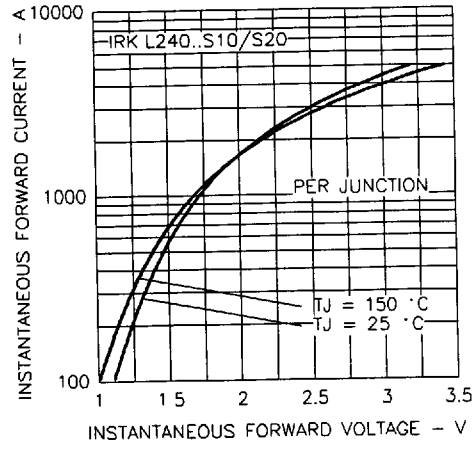


Fig. 13 - Forward Voltage Drop Characteristics

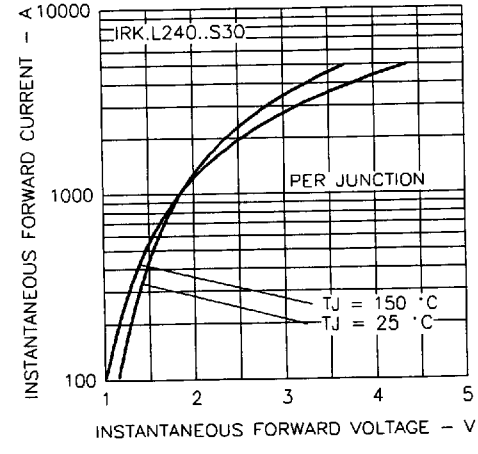


Fig. 14 - Forward Voltage Drop Characteristics

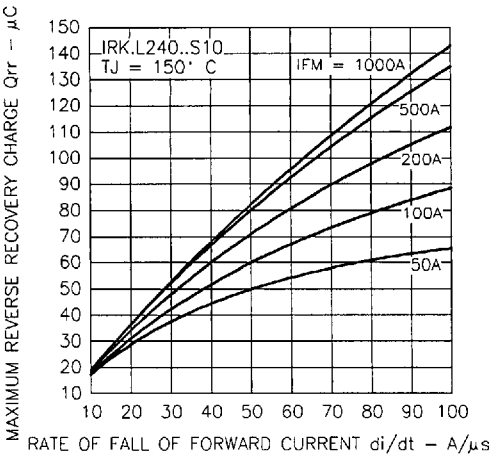


Fig. 15 - Reverse Recovery Charge Characteristics

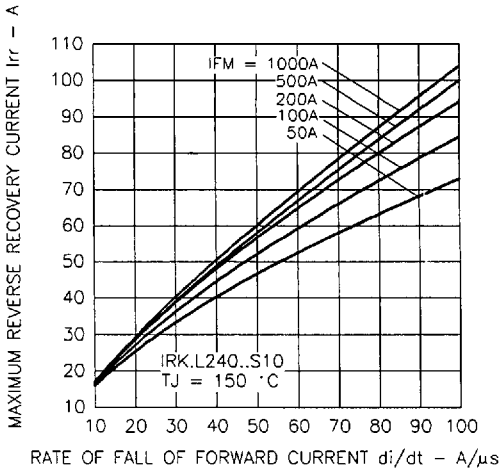


Fig. 16 - Reverse Recovery Current Characteristics

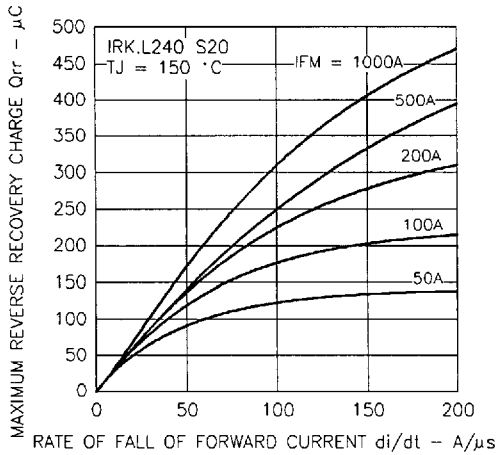


Fig. 17 - Reverse Recovery Charge Characteristics

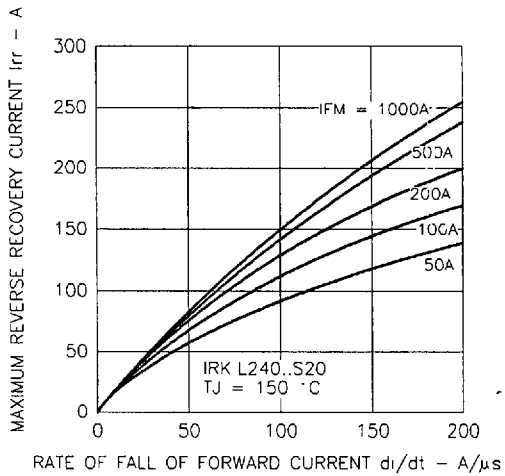


Fig. 18 - Reverse Recovery Current Characteristics

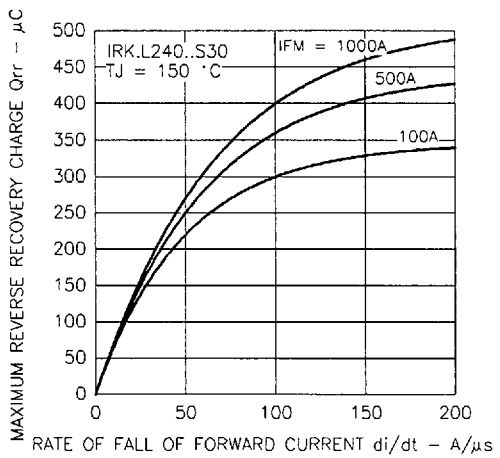


Fig. 19 - Reverse Recovery Charge Characteristics

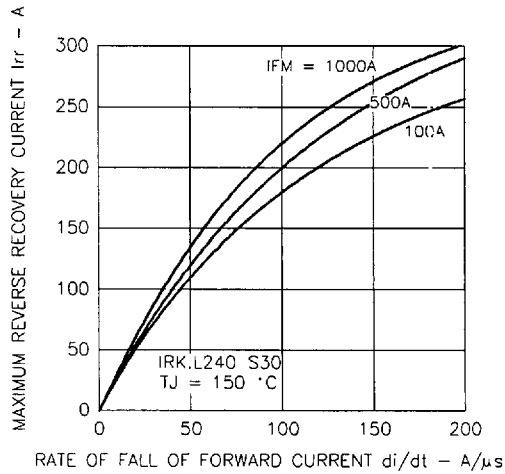


Fig. 20 - Reverse Recovery Current Characteristics

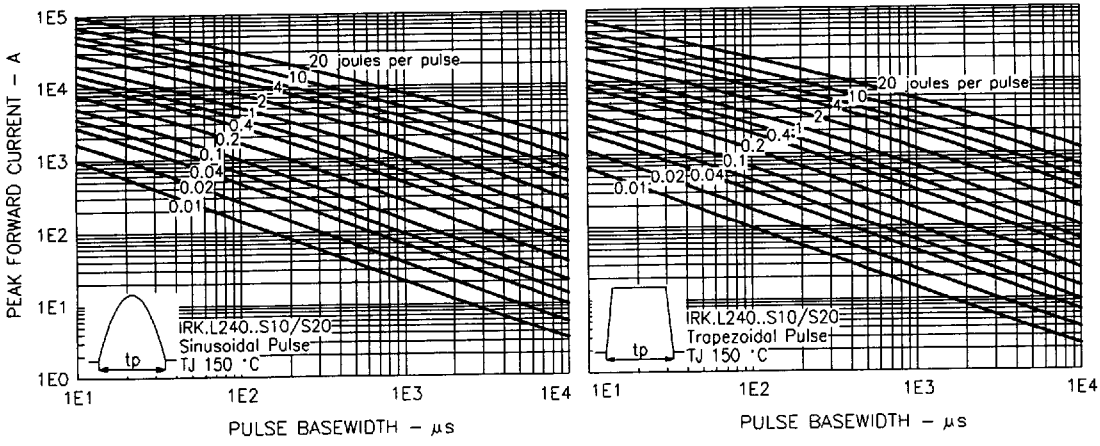


Fig. 21 - Maximum Forward Energy Power Loss Characteristics

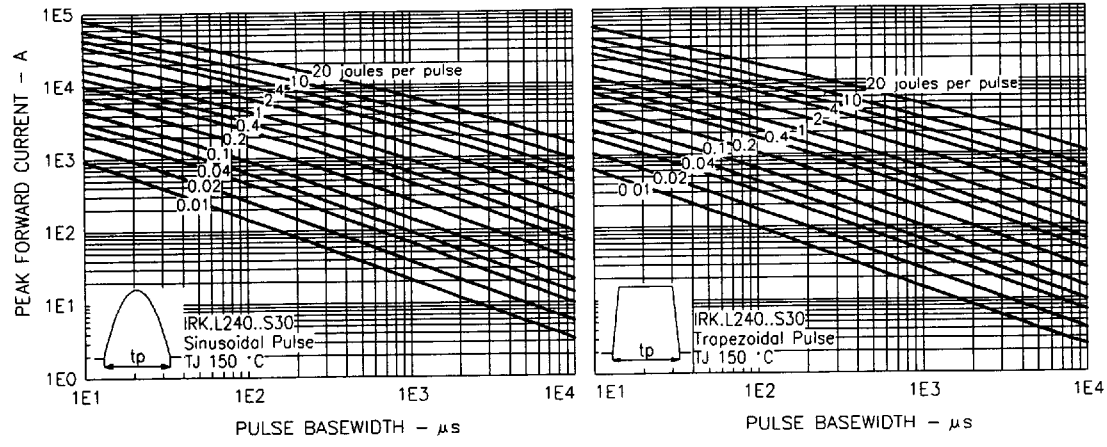


Fig. 22 - Maximum Forward Energy Power Loss Characteristics

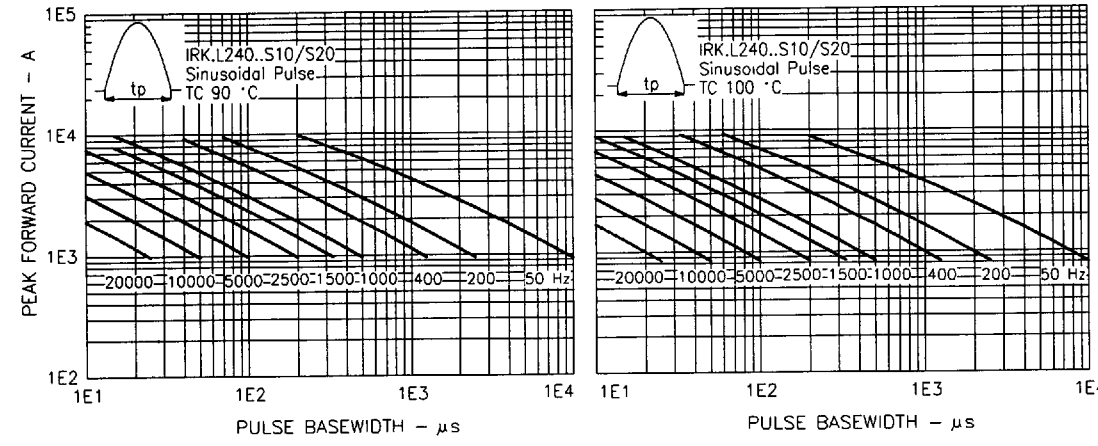


Fig. 23 - Frequency Characteristics

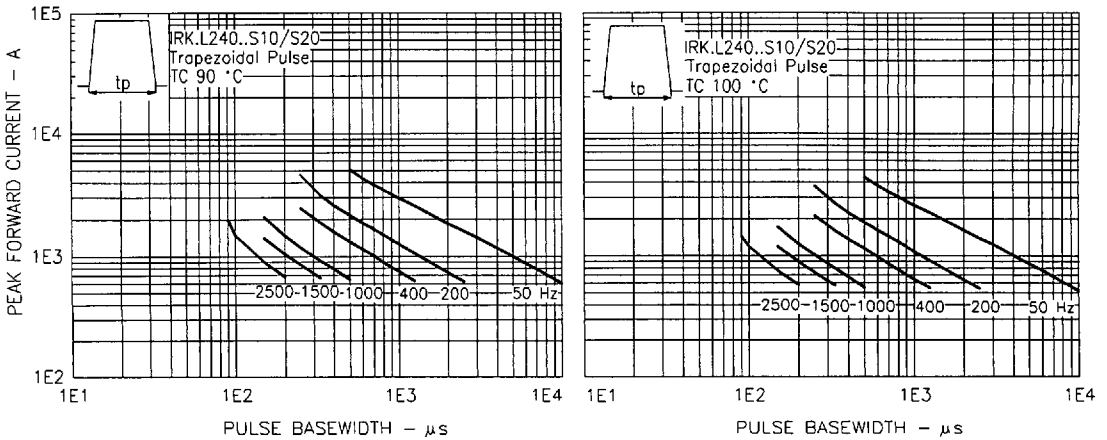


Fig. 24 - Frequency Characteristics

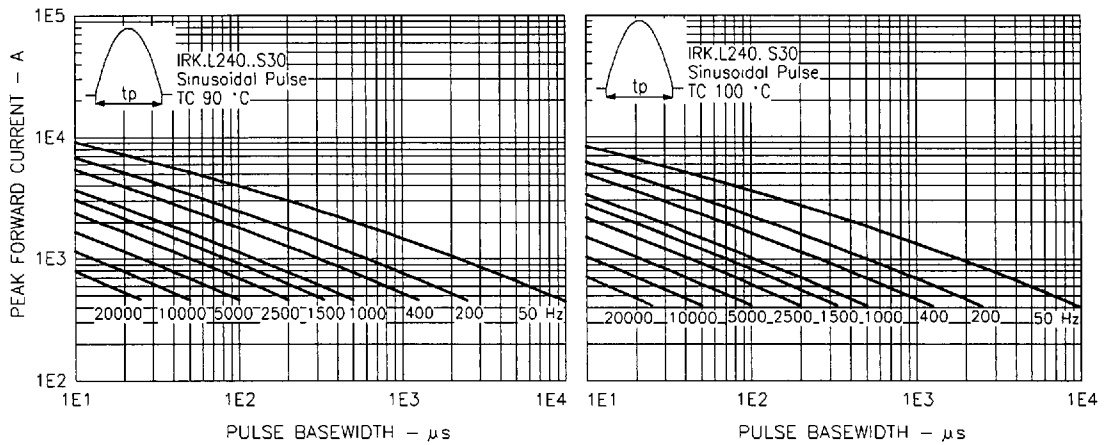


Fig. 25 - Frequency Characteristics

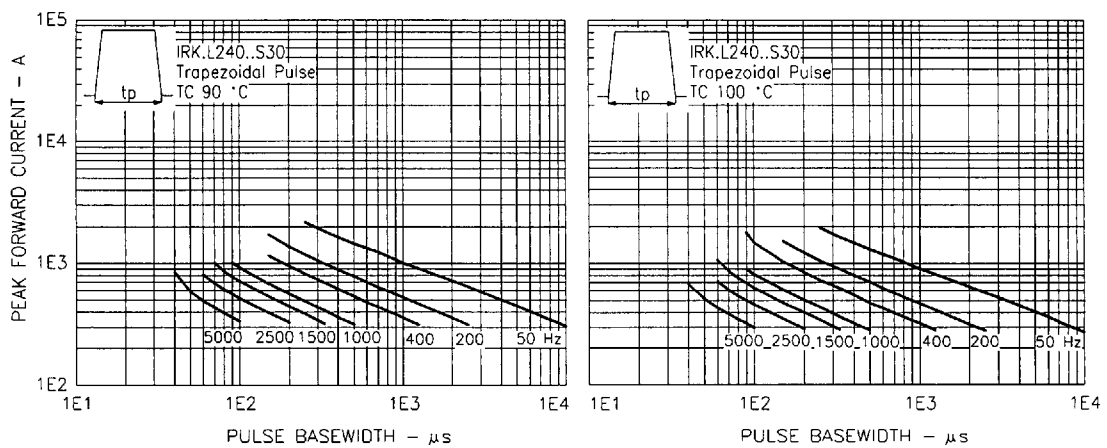


Fig. 26 - Frequency Characteristics

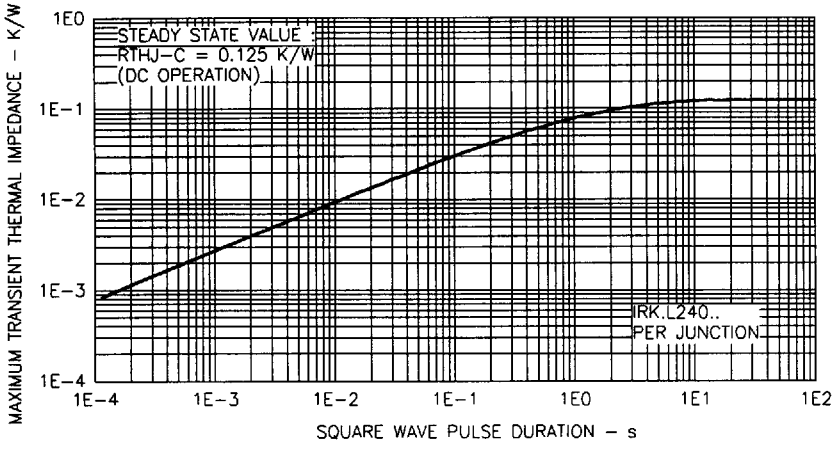


Fig. 27 - Thermal Impedance ZthJC Characteristics