International
IOR Rectifier

SERIES B40DL/CL/JL

FAST RECOVERY DIODE / DIODE **Power Modules in B-package**

40A

Features

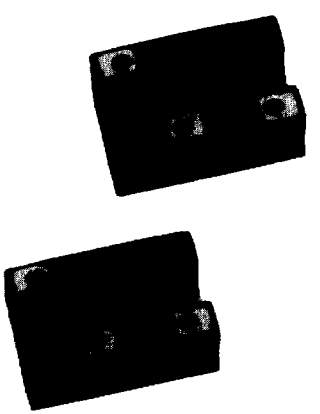
- Fast recovery time characteristics
- Electrically isolated base plate
- Standard JEDEC package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL E78996 approved
- 3500 V_{RMS} isolating voltage

Description

The B40DL../CL../JL.. Series use fast recovery power diodes in three 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		B40HFL/B40H2L	Units
$I_{F(AV)}$		40	A
	@T_C	50	°C
I_{FSM}	50Hz	480	A
	60Hz	500	A
I^2t	50Hz	1130	A^2s
	60Hz	1030	A^2s
V_{RRM}	range	100 to 1000	V
t_{rr}	range	200 to 1000	ns
T_J		-40 to 125	°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} @ 25°C. µA
B40DL B40CL B40JL	10	S02, S05, S10	100	150	100
	20	S02, S05, S10	200	300	100
	40	S02, S05, S10	400	500	100
	60	S02, S05, S10	600	700	100
	80	S05, S10	800	900	100
	100	S05, S10	1000	1100	100

Forward Conduction

	Parameter	B40HFL/B40H2L	Units			
$I_{F(AV)}$	Max. average forward current @ Case temperature	40 50	A °C	180° conduction, half sine wave		
$I_{F(RMS)}$	Max. RMS forward current	63	A			
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	400	A	t = 10ms	100% V_{RRM} reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		420	A	t = 8.3ms		
		480	A	t = 10ms	No voltage reapplied	
		500	A	t = 8.3ms		
I^2t	Maximum I^2t for fusing	800	A^2s	t = 10ms	100% V_{RRM} reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		730	A^2s	t = 8.3ms		
		1130	A^2s	t = 10ms	No voltage reapplied	
		1030	A^2s	t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	11300	$A^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	0.97	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$		
$V_{F(TO)2}$	High level value of threshold voltage	1.35	V	$(\pi \times I_{F(AV)} < I < 20 \times \pi \times I_{F(AV)})$		
r_{f1}	Low level value of forward slope resistance	4.85	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$		
r_{f2}	High level value of forward slope resistance	2.34	mΩ	$(\pi \times I_{F(AV)} < I < 20 \times \pi \times I_{F(AV)})$		
V_{FM}	Max. forward voltage drop	1.55	V	$I_{FM} = \pi \times I_{F(AV)}$, $T_J = 25$°C, 180° conduction Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Blocking

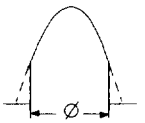
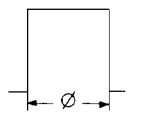
I_{RRM}	Max. peak reverse leakage current	5	mA	$T_J = 125$°C
V_{INS}	RMS isolation voltage	3500	V	50Hz, circuit to base, all terminals shorted; t = 1s

Thermal and Mechanical Specifications

T_J	Max. junction operating temper.	-40 to 125	°C	
T_{stg}	Max. storage temperature range	-40 to 125	°C	
R_{thJC}	Max. internal thermal resistance junction to case	1.2	K/W	Per module, DC operation
R_{thC-S}	Thermal resistance, case to heatsink	0.10	K/W	Mounting surface flat, smooth and greased Per module/ Per junction
T	Mounting torque ±10% — Device to heatsink	2	Nm	M4 mounting screws Non-lubricated threads
	Terminals	0.8	Nm	M3 screws terminals; Non-lubricated threads
wt	Approximate weight	40	g (oz)	
	Case style	"B" Type		See outline table

ΔR Conduction (per Junction)

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

Conduction angle		B40DL	B40CL	B40JL	Units
	180°	0.058	0.058	0.058	K/W
	120°	0.072	0.072	0.072	K/W
	90°	0.095	0.095	0.095	K/W
	60°	0.141	0.141	0.141	K/W
	30°	0.238	0.238	0.238	K/W
	180°	0.046	0.046	0.046	K/W
	120°	0.080	0.080	0.080	K/W
	90°	0.106	0.106	0.106	K/W
	60°	0.148	0.148	0.148	K/W
	30°	0.240	0.240	0.240	K/W

Reverse Recovery Characteristics

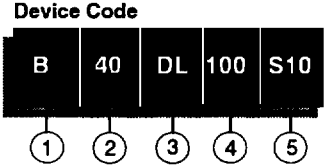
Parameter	B40DL/B40CL/JL			Units	Conditions
	S02	S05	S10		
t_{rr} Maximum reverse recovery time	70	110	270	ns	T_J = 25 °C, $-di_F/dt$ = 100A/μs I_F = 1A
	200	500	1000	ns	T_J = 25 °C, $-di_F/dt$ = 25A/μs I_{FM} = 125 A (*)
Q_{rr} Maximum reverse recovered charge	0.2	0.4	1.35	μC	T_J = 25 °C, $-di_F/dt$ = 100A/μs I_F = 1 A
	0.9	3.3	12.7	μC	T_J = 25 °C, $-di_F/dt$ = 25A/μs I_{FM} = 125 A (*)

(*) Tested on LEM 300A Diodemeter Tester

DATA SHEETS

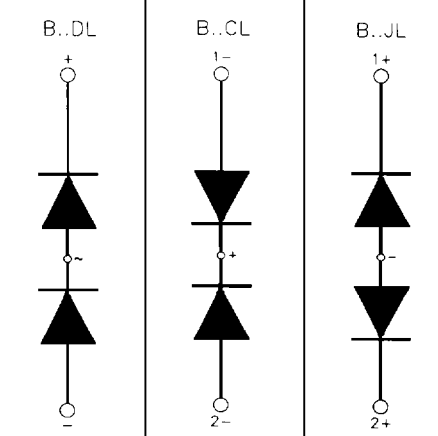
Ordering Information Table

Device Code

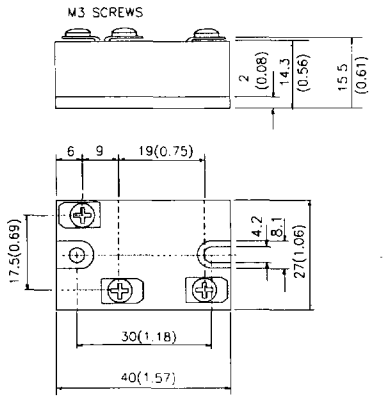


1 - Module type
2 - Current code
3 - Circuit configuration (See table on the right)
4 - Voltage code (See Voltage Ratings Table)
5 - trr code
(See Reverse Recovery Characteristics Table)

Circuit Configuration Table



Outlines Table



All dimensions in millimeters (inches)

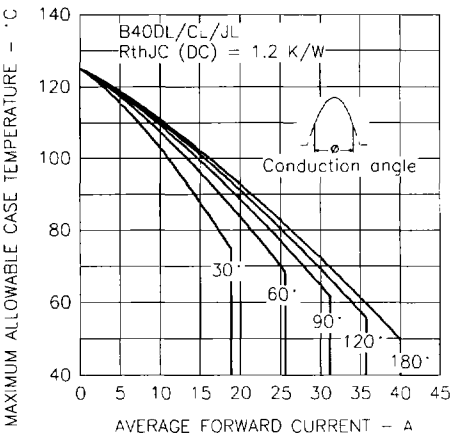


Fig. 1 - Current Ratings Characteristics

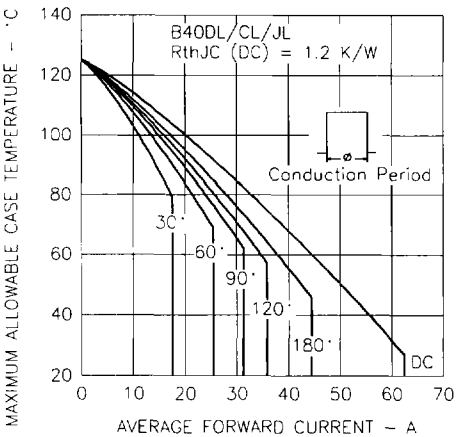


Fig. 2 - Current Ratings Characteristics

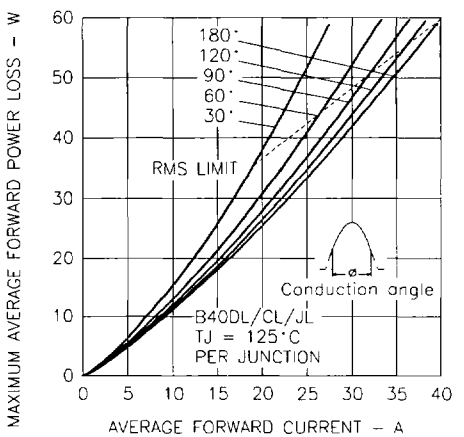


Fig. 3 - Forward Power Loss Characteristics

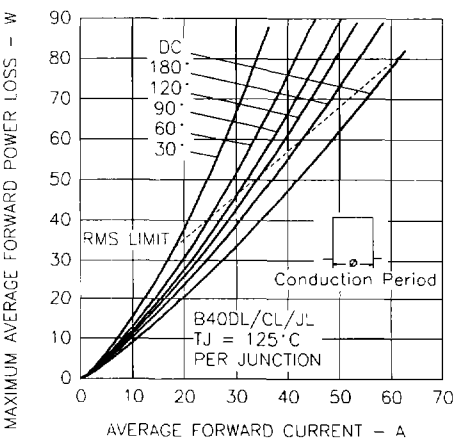


Fig. 4 - Forward Power Loss Characteristics

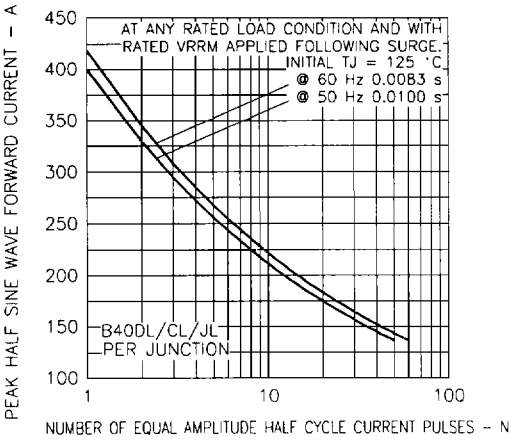


Fig. 5 - Maximum Non-Repetitive Surge Current

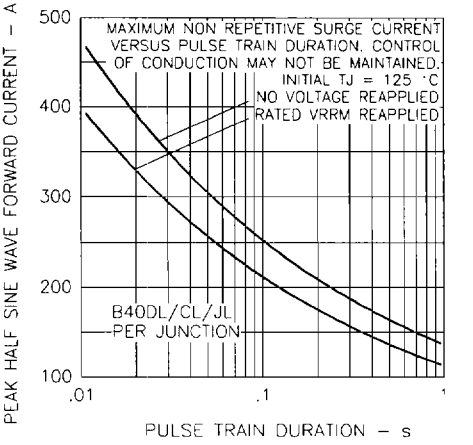


Fig. 6 - Maximum Non-Repetitive Surge Current

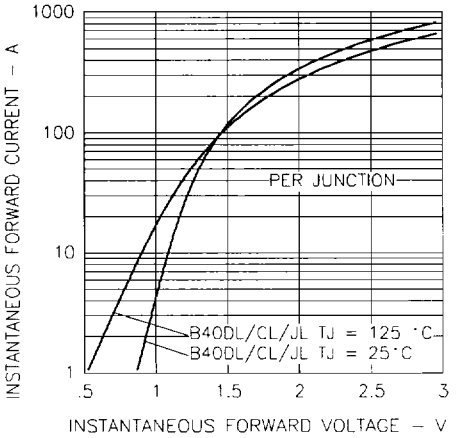


Fig. 7 - Forward Voltage Drop Characteristics

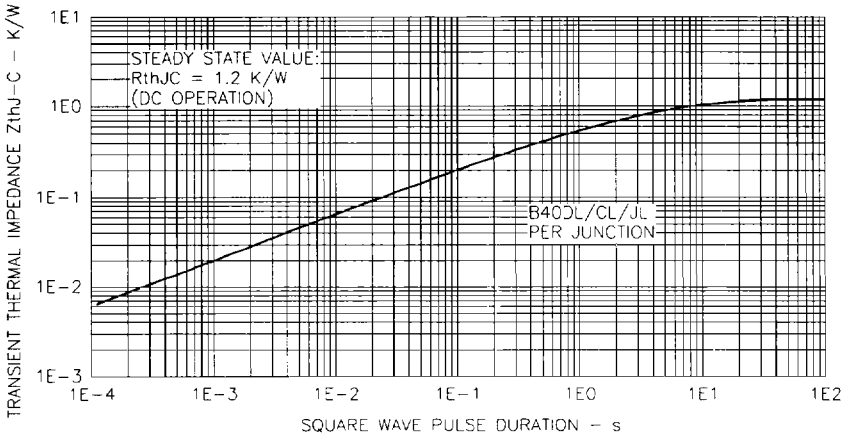


Fig. 8 - Thermal Impedance ZthJC Characteristics

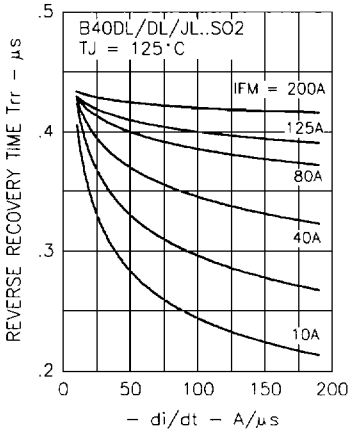


Fig. 9 - Recovery Time Characteristics

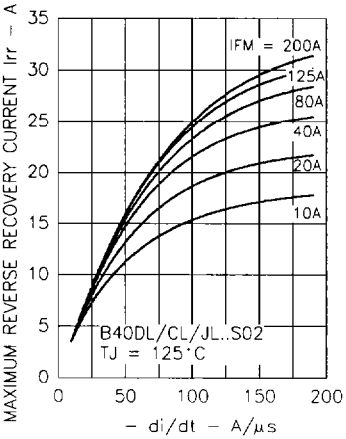


Fig. 10 - Recovery Current Characteristics

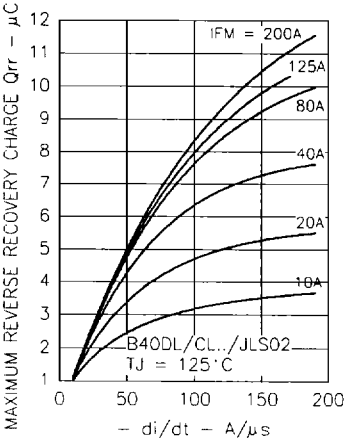


Fig. 11 - Recovery Charge Characteristics

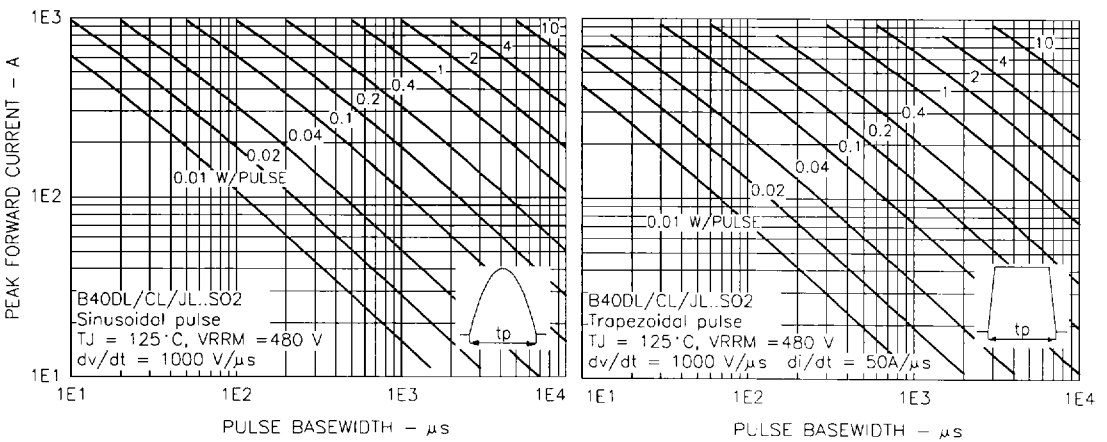


Fig. 12 - Maximum Total Energy Loss Per Pulse Characteristics

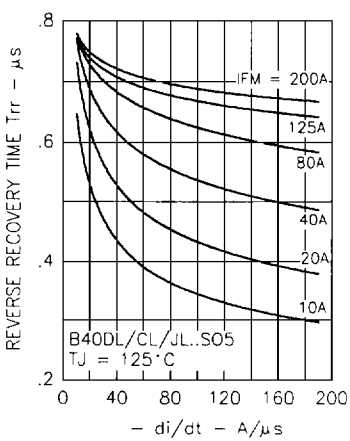


Fig. 13 - Recovery Time Characteristics

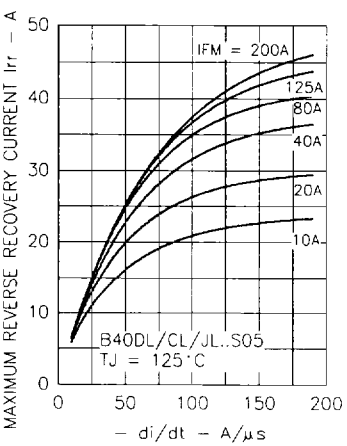


Fig. 14 - Recovery Current Characteristics

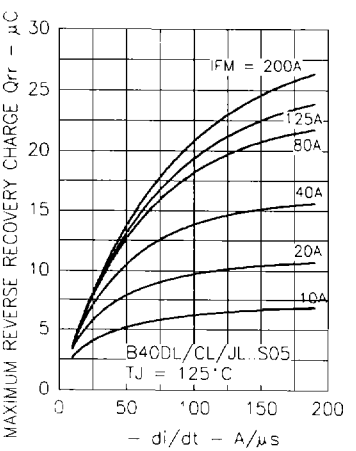


Fig. 15 - Recovery Charge Characteristics

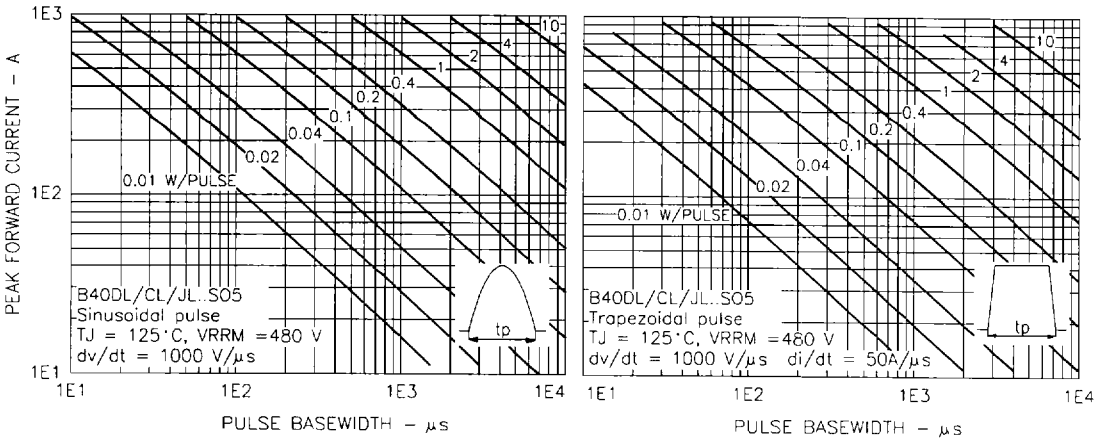


Fig. 16 - Maximum Total Energy Loss Per Pulse Characteristics

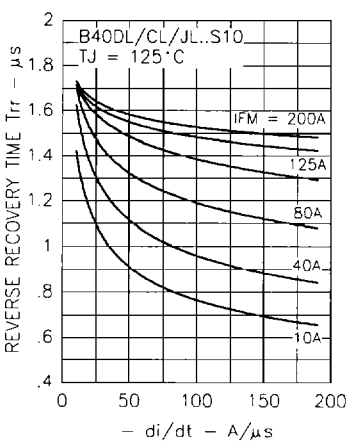


Fig. 17 - Recovery Time Characteristics

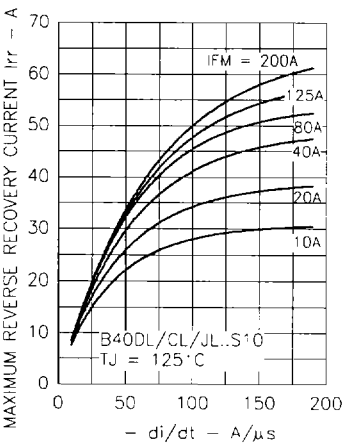


Fig. 18 - Recovery Current Characteristics

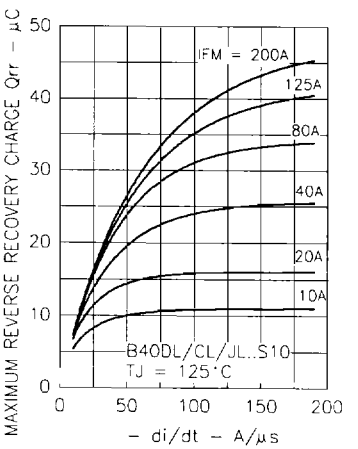


Fig. 19 - Recovery Charge Characteristics

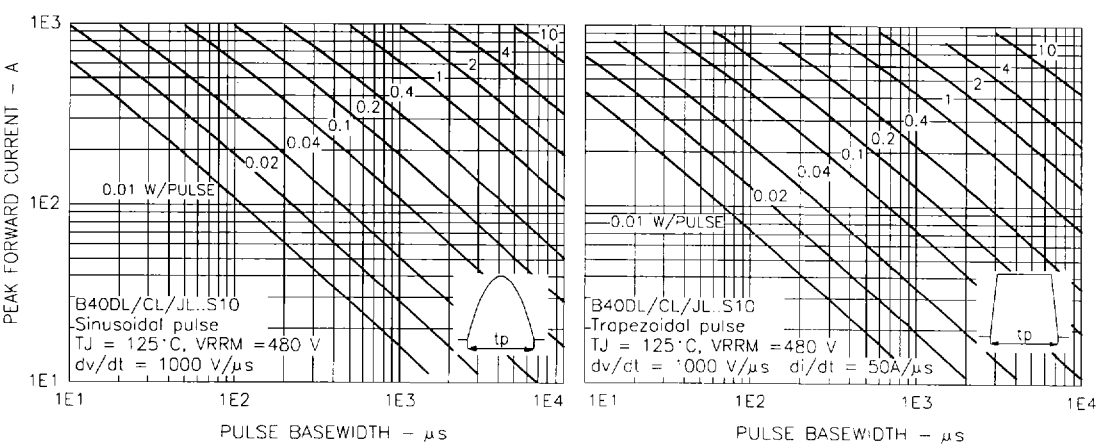


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics