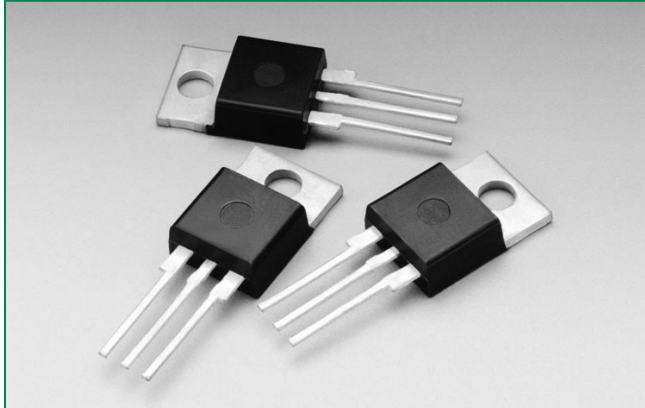


RoHS

## Dxx15L & Dxx20L & Dxx25L Series



### Description

Silicon rectifiers that are excellent for DC phase control applications with motor loads.

Isolated mounting tab allows for use in circuits with common anode or common cathode connections.

### Features & Benefits

- RoHS Compliant
- Glass – passivated junctions
- Voltage capability up to 1000 V
- Surge capability up to 350 A

### Applications

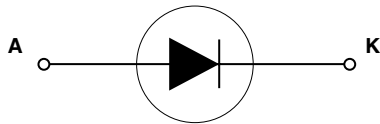
Typical applications are AC to DC solid-state switches for industrial power tools, exercise equipment, white goods, and commercial appliances.

Internally constructed isolated package is offered for ease of heat sinking with highest isolation voltage.

### Agency Approval

Agency	Agency File Number
	L Package : E71639

### Schematic Symbol



### Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	15 / 20 / 25	A
$V_{RRM}$	400 to 1000	V

### Absolute Maximum Ratings

Symbol	Parameter	Test Conditions	Value			Unit
			Dxx15L	Dxx20L	Dxx25L	
$I_{F(RMS)}$	RMS forward current	Dxx15L: $T_C = 85^\circ\text{C}$	15	20	25	A
$I_{F(AV)}$	Average forward current	Dxx20L/Dxx25L: $T_C = 80^\circ\text{C}$	9.5	12.7	15.9	A
$I_{FSM}$	Peak non-repetitive surge current	single half cycle; $f = 50\text{Hz}$ ; $T_J$ (initial) = $25^\circ\text{C}$	188	255	300	A
		single half cycle; $f = 60\text{Hz}$ ; $T_J$ (initial) = $25^\circ\text{C}$	225	300	350	
$I^2t$	$I^2t$ Value for fusing	$t_p = 8.3 \text{ ms}$	210	374	508	$\text{A}^2\text{s}$
$T_{stg}$	Storage temperature range		-40 to 150			$^\circ\text{C}$
$T_J$	Operating junction temperature range		-40 to 125			$^\circ\text{C}$

Note: xx = voltage

### Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Test Conditions		Value	Unit
t <sub>rr</sub>	Reverse-recovery Time	I <sub>F</sub> =0.9A, I <sub>R</sub> =1.5A	TYP.	4	μs

### Static Characteristics

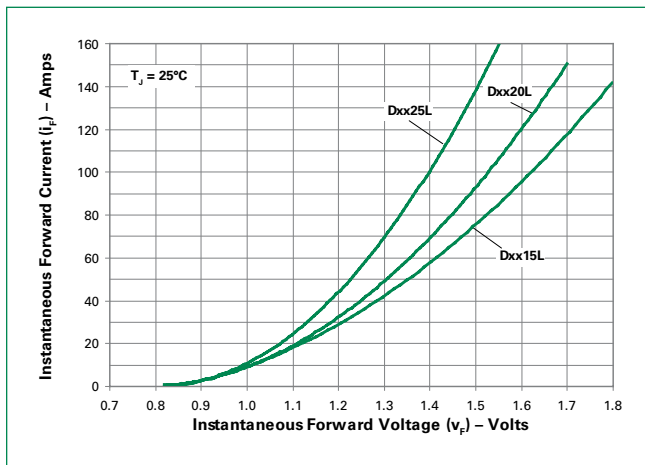
Symbol	Test Conditions		Value	Unit		
V <sub>FM</sub>	15A Device I <sub>T</sub> = 30A; t <sub>p</sub> = 380μs		MAX.	1.6	V	
	20A Device I <sub>T</sub> = 40A; t <sub>p</sub> = 380μs					
	25A Device I <sub>T</sub> = 50A; t <sub>p</sub> = 380μs					
I <sub>RM</sub>	V <sub>RRM</sub>	T <sub>J</sub> = 25°C	MAX.	400-600V	10	μA
				800-1000V	20	
		T <sub>J</sub> = 100°C		400-800V	500	
				1000V	3000	
		T <sub>J</sub> = 125°C		400-800V	1000	

### Thermal Resistances

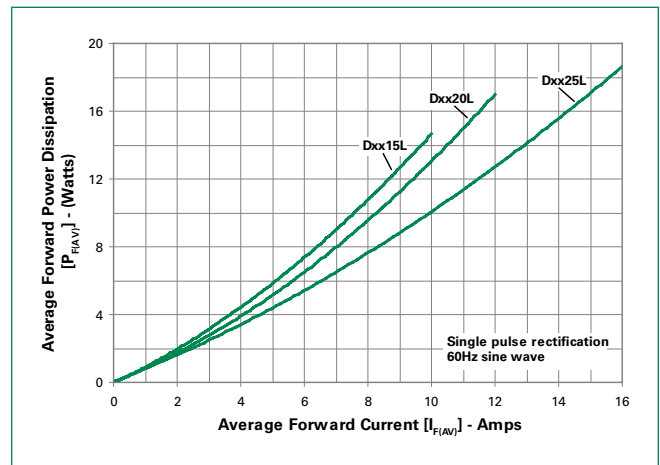
Symbol	Parameter	Value	Unit
R <sub>θ(J-C)</sub>	Junction to case (AC)	Dxx15L	2.85
		Dxx20L	2.55
		Dxx25L	2.50

Note: xx = voltage

**Figure 1: On-State Current vs. On-State Voltage (Typical)**



**Figure 2: Power Dissipation vs. RMS On-State Current (Typical)**



**Figure 3: Maximum Allowable Case Temperature vs. Average On-State Current**



Note: xx = voltage

**Figure 4: Surge Peak On-State Current vs. Number of Cycles**



**Soldering Parameters**

Reflow Condition	Pb – Free assembly	
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)	5°C/second max	
$T_{S(max)}$ to $T_L$ - Ramp-up Rate	5°C/second max	
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )	260°C $\pm 0.5$	
Time within 5°C of actual peak Temperature ( $t_p$ )	20 – 40 seconds	
Ramp-down Rate	5°C/second max	
Time 25°C to peak Temperature ( $T_p$ )	8 minutes Max.	
Do not exceed	280°C	



**Physical Specifications**

<b>Terminal Finish</b>	100% Matte Tin Plated
<b>Body Material</b>	UL recognized epoxy meeting flammability classification 94V-0
<b>Lead Material</b>	Copper Alloy

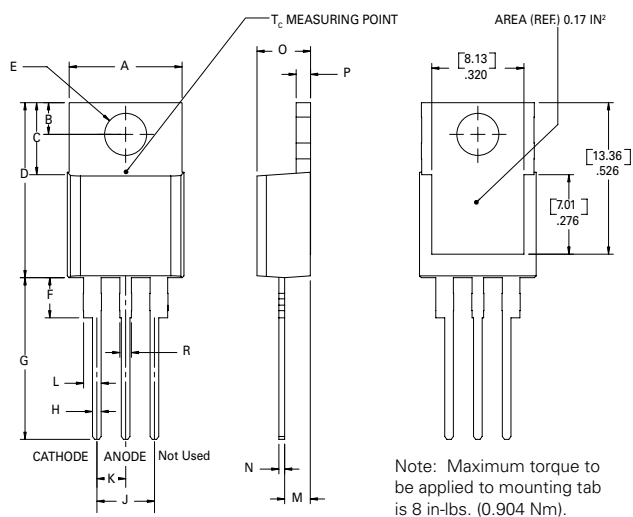
**Design Considerations**

Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the rectifier. Good design practice should limit the maximum continuous current through the main terminals to 75% of the device rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including dv/dt), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

**Environmental Specifications**

Test	Specifications and Conditions
<b>High Temperature Voltage Blocking</b>	MIL-STD-750: Method 1040, Condition A Rated $V_{RRM}$ , 125°C, 1008 hours
<b>Temperature Cycling</b>	MIL-STD-750: Method 1051 -40°C to 150°C, 15-minute dwell, 100 cycles
<b>Biased Temperature &amp; Humidity</b>	EIA/JEDEC: JESD22-A101 320VDC, 85°C, 85%RH, 1008 hours
<b>High Temp Storage</b>	MIL-STD-750: Method 1031 150°C, 1008 hours
<b>Low-Temp Storage</b>	1008 hours; -40°C
<b>Thermal Shock</b>	MIL-STD-750: Method 1056 0°C to 100°C, 5-minute dwell, 10-second transfer, 10 cycles
<b>Autoclave (Pressure Cooker Test)</b>	EIA/JEDEC: JESD22-A102 121°C, 100%RH, 2atm, 168 hours
<b>Resistance to Solder Heat</b>	MIL-STD-750: Method 2031 260°C, 10 seconds
<b>Solderability</b>	ANSI/J-STD-002, Category 3, Test A
<b>Lead Bend</b>	MIL-STD-750: Method 2036, Condition E

**Dimensions — TO-220AB (L-Package) — Isolated Mounting Tab**



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

### Product Selector

Part Number	Voltage				Type	Package
	400V	600V	800V	1000V		
Dxx15L	X	X	X	X	Rectifier	TO-220L
Dxx20L	X	X	X	X	Rectifier	TO-220L
Dxx25L	X	X	X	X	Rectifier	TO-220L

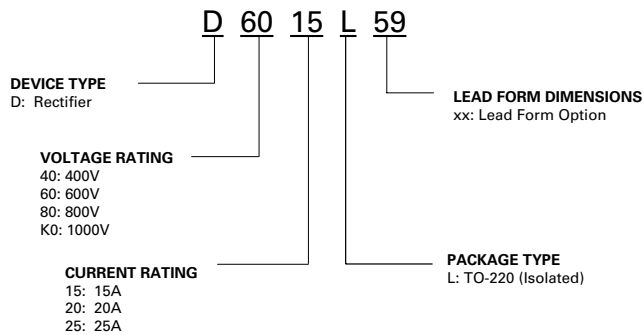
Note: xx = Voltage

### Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Dxx15L	Dxx15L	2.2 g	Bulk	500
Dxx15LTP	Dxx15L	2.2 g	Tube	500 (50 per tube)
Dxx20L	Dxx20L	2.2 g	Bulk	500
Dxx20LTP	Dxx20L	2.2 g	Tube	500 (50 per tube)
Dxx25L	Dxx25L	2.2 g	Bulk	500
Dxx25LTP	Dxx25L	2.2 g	Tube	500 (50 per tube)

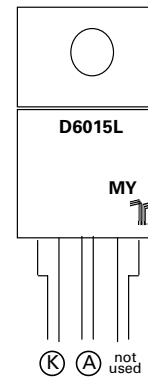
Note: xx = Voltage

### Part Numbering System



### Part Marking System

TO-220AB (L Package)



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