



DS5977 – 2 May 2011 (LN28438)

### FEATURES

- Double Side Cooling
- High Surge Capability
- Avalanche Capability

### KEY PARAMETERS

$V_{RRM}$	<b>4400V</b>
$I_{F(AV)}$	<b>170A</b>
$I_{FSM}$	<b>1500A</b>

### VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages $V_{RRM}$ V	Conditions
DRA170E44	4400	$V_{RSM} = V_{RRM} + 100V$

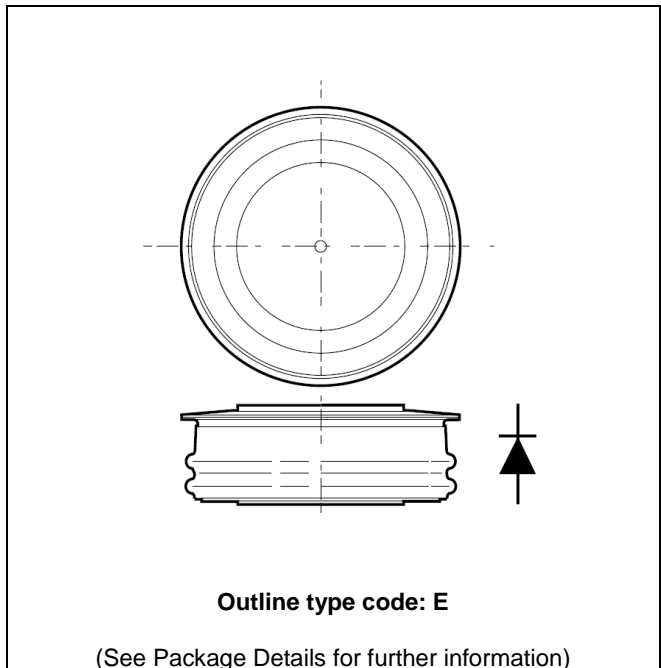


Fig. 1 Package outline

### ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table.

For example:

**DRA170E44** for a 4400V device

## CURRENT RATINGS

T<sub>case</sub> = 75°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
I <sub>F(AV)</sub>	Mean forward current	Half wave resistive load	219	A
I <sub>F(RMS)</sub>	RMS value	-	344	A
I <sub>F</sub>	Continuous (direct) on-state current	-	333	A
<b>Single Side Cooled (Anode side)</b>				
I <sub>F(AV)</sub>	Mean forward current	Half wave resistive load	132	A
I <sub>F(RMS)</sub>	RMS value	-	207	A
I <sub>F</sub>	Continuous (direct) on-state current	-	181	A

T<sub>case</sub> = 100°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
I <sub>F(AV)</sub>	Mean forward current	Half wave resistive load	170	A
I <sub>F(RMS)</sub>	RMS value	-	267	A
I <sub>F</sub>	Continuous (direct) on-state current	-	254	A
<b>Single Side Cooled (Anode side)</b>				
I <sub>F(AV)</sub>	Mean forward current	Half wave resistive load	100	A
I <sub>F(RMS)</sub>	RMS value	-	157	A
I <sub>F</sub>	Continuous (direct) on-state current	-	134	A

**SURGE RATINGS**

Symbol	Parameter	Test Conditions	Max.	Units
$I_{FSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 150^{\circ}C$	1.5	kA
$I^2t$	$I^2t$ for fusing	$V_R = 50\% V_{RRM} - 1/4$ sine	11.25	$kA^2s$
$I_{FSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 150^{\circ}C$	1.8	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	16.2	$kA^2s$

**THERMAL AND MECHANICAL RATINGS**

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.115	$^{\circ}C/W$
		Single side cooled	Anode DC	-	0.27	$^{\circ}C/W$
			Cathode DC	-	0.27	$^{\circ}C/W$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 3kN	Double side	-	0.02	$^{\circ}C/W$
		(with mounting compound)	Single side	-	0.04	$^{\circ}C/W$
$T_{vj}$	Virtual junction temperature	On-state (conducting)	-	165	$^{\circ}C$	
		Reverse (blocking)	-	150	$^{\circ}C$	
$T_{stg}$	Storage temperature range		-55	150	$^{\circ}C$	
$F_m$	Clamping force		2.5	3.8	kN	

CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$V_{FM}$	Forward voltage	At 300A peak, $T_{case} = 25^{\circ}C$	-	2.1	V
$P_{RSM}$	Non-repetitive peak avalanche power	10 $\mu$ s avalanche, $T_{vj} = 150^{\circ}C$	-	10	kW
$I_{RM}$	Peak reverse current	At $V_{RRM}$ , $T_{case} = 150^{\circ}C$	-	20	mA
		At 50% $V_{RRM}$ , $T_{case} = 150^{\circ}C$	1*	10*	A
$V_{TO}$	Threshold voltage	At $T_{vj} = 150^{\circ}C$	-	1.12	V
$r_T$	Slope resistance	At $T_{vj} = 150^{\circ}C$	-	3.75	m $\Omega$

\*This selection for series sharing only upon request

CURVES

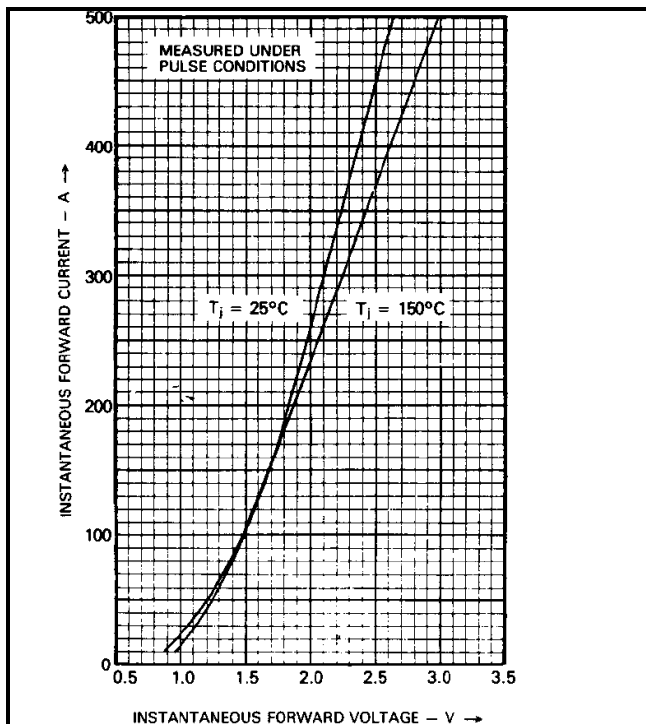


Fig.2 Maximum (limit) on-state characteristics

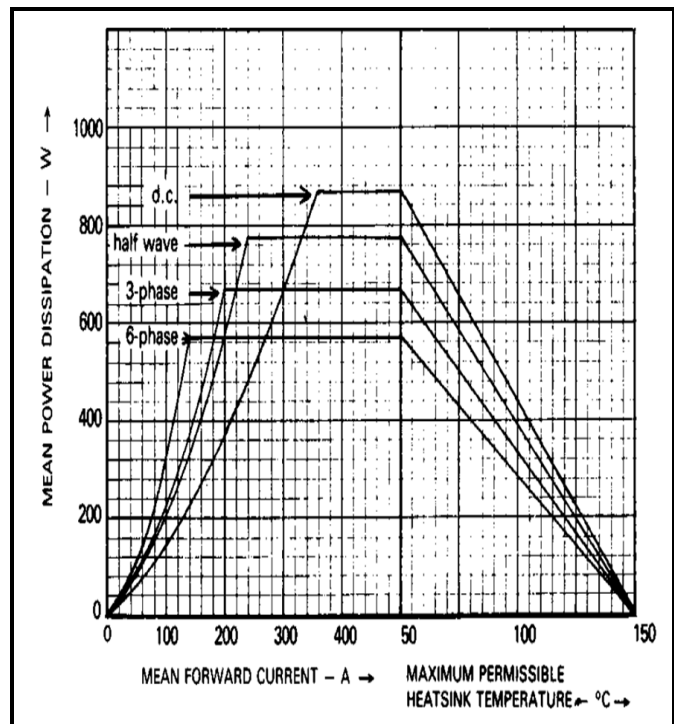


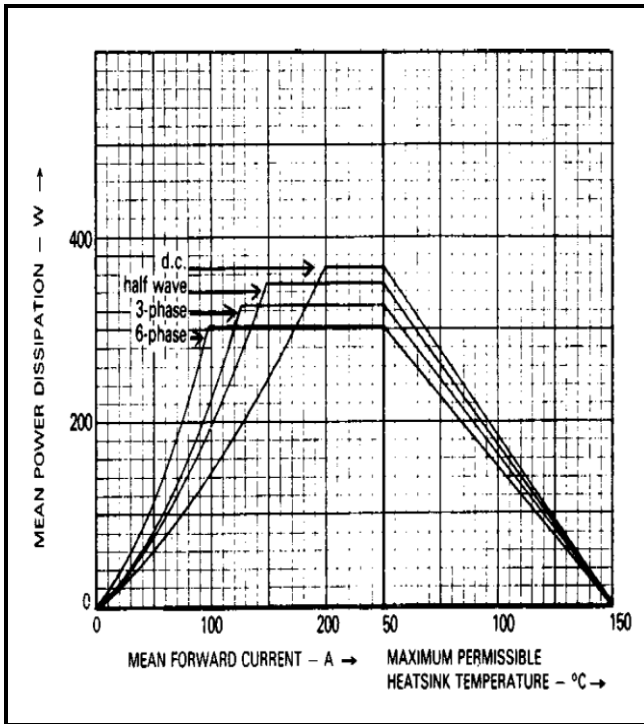
Fig.3 Dissipation curves (double side cooled)

$V_{TM}$  EQUATION

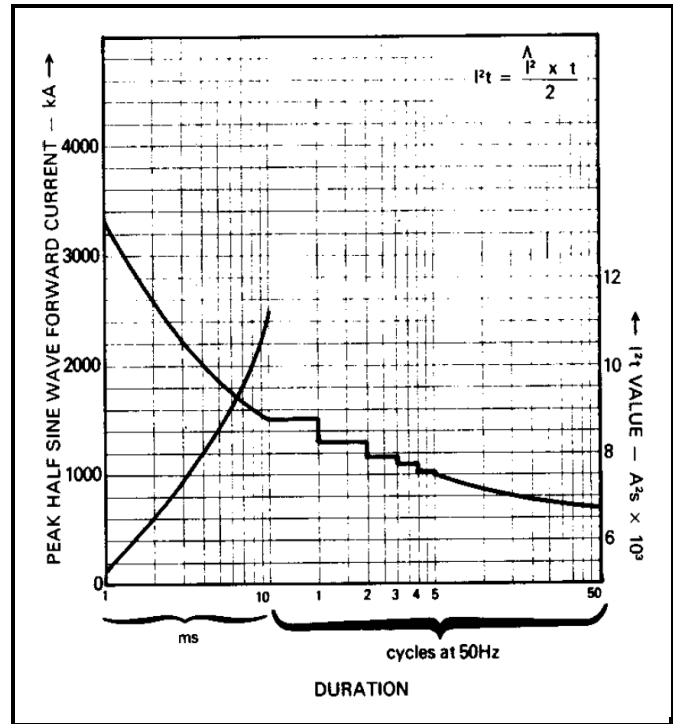
$$V_{TM} = A + B \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

Where  $A = 0.576648$   
 $B = 0.116697$   
 $C = 0.003044$   
 $D = 0.007655$

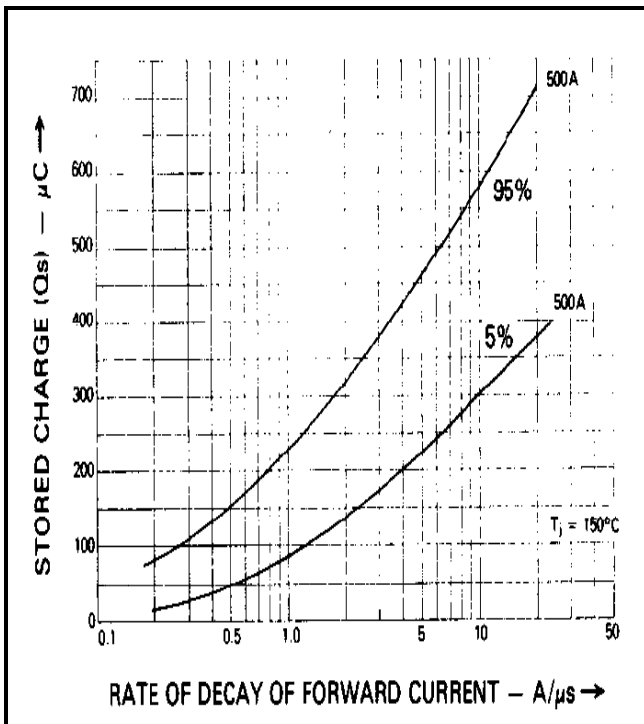
these values are valid for  $T_j = 150^{\circ}C$  for  $I_F 10A$  to  $500A$



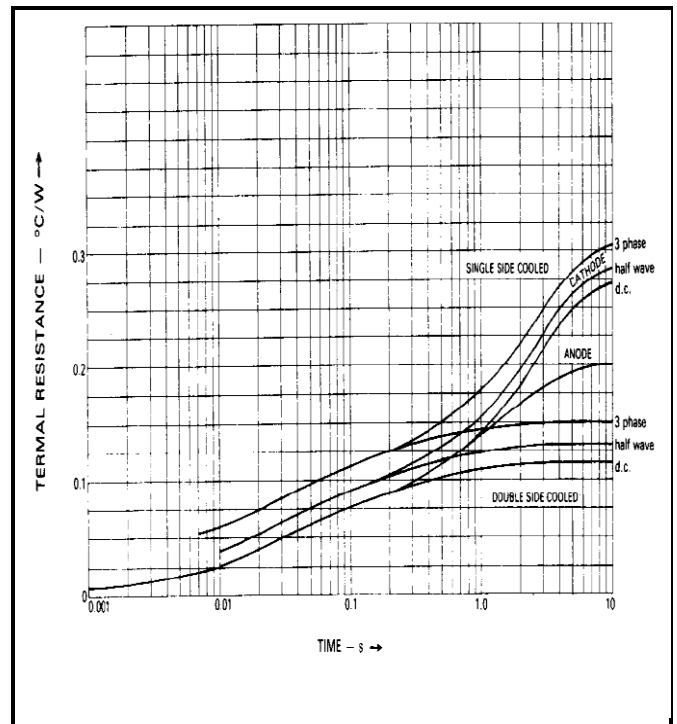
**Fig.4 Dissipation curve – single side cooled**



**Fig.5 Surge (non-repetitive) forward current vs time (with 50% VRRM at T<sub>case</sub> 150°C)**



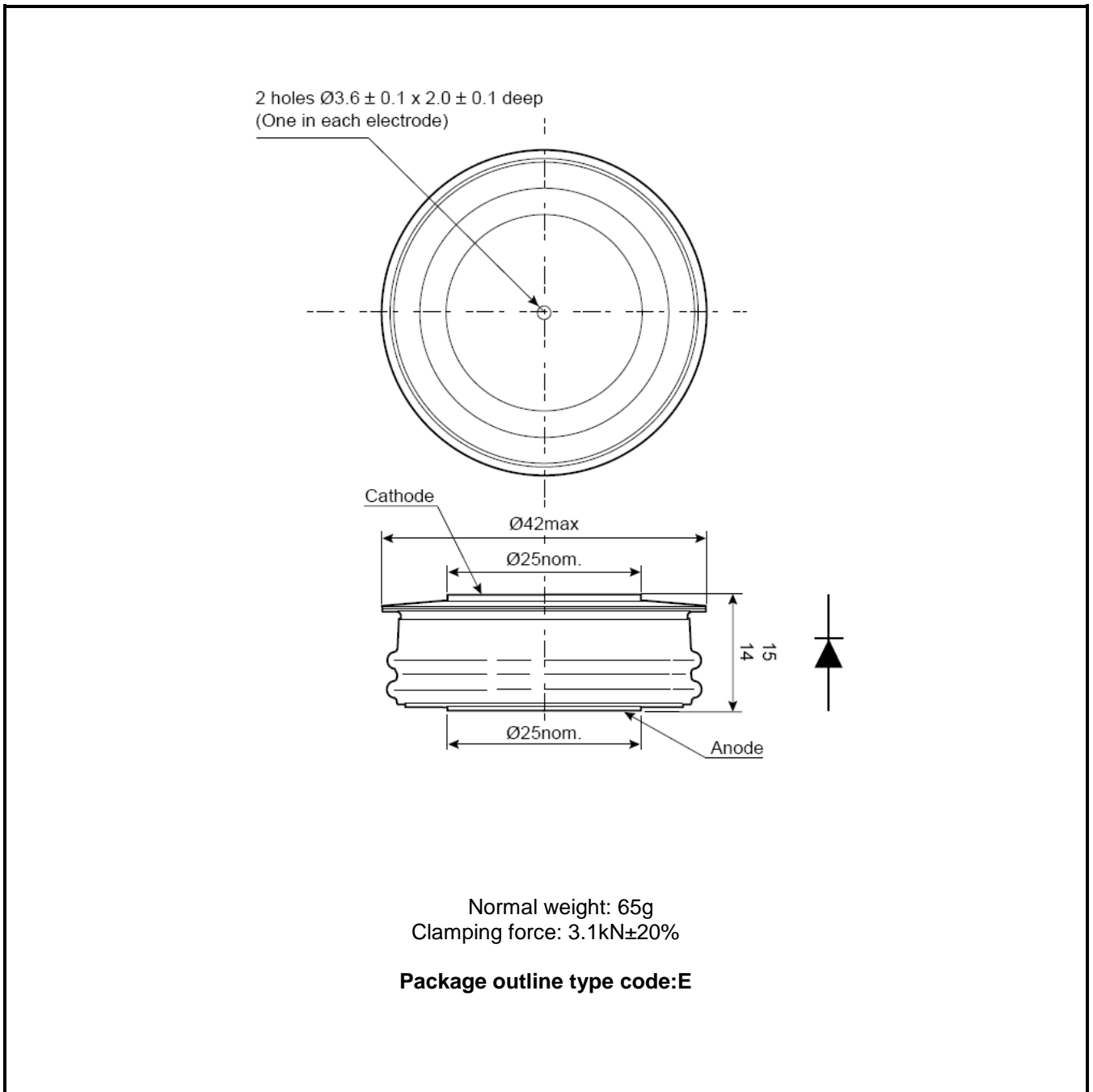
**Fig.6 Stored charge**



**Fig.7 Maximum (limit) transient thermal impedance-junction to case**

**PACKAGE DETAILS**

For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



**Note:**  
Some packages may be supplied with gate and or tags.

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