



DS5978 – 1 January 2011 (LN27997)

### FEATURES

- Double Side Cooling
- High Surge Capability

### KEY PARAMETERS

$V_{RRM}$	<b>4000V</b>
$I_{F(AV)}$	<b>1225A</b>
$I_{FSM}$	<b>25000A</b>

### VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages $V_{RRM}$ V	Conditions
DRD1230F40 DRD1230F36 DRD1230F30	4000 3600 3000	$V_{RSM} = V_{RRM} + 100V$

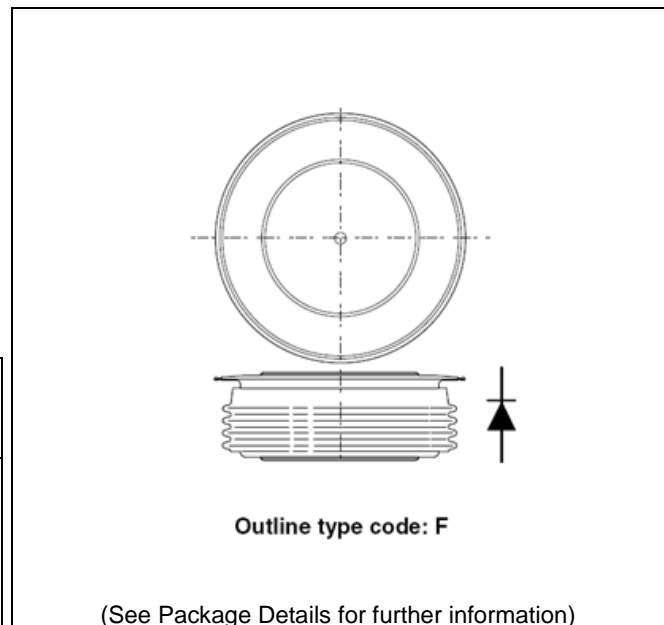


Fig. 1 Package outline

### ORDERING INFORMATION

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

For example:

**DRD1230F36** for a 3600V device

## CURRENT RATINGS

$T_{case} = 75^{\circ}C$  unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load	1594	A
$I_{F(RMS)}$	RMS value	-	2504	A
$I_F$	Continuous (direct) on-state current	-	2295	A
<b>Single Side Cooled (Anode side)</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load	1144	A
$I_{F(RMS)}$	RMS value	-	1797	A
$I_F$	Continuous (direct) on-state current	-	1553	A

$T_{case} = 100^{\circ}C$  unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load	1225	A
$I_{F(RMS)}$	RMS value	-	1923	A
$I_F$	Continuous (direct) on-state current	-	1720	A
<b>Single Side Cooled (Anode side)</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load	820	A
$I_{F(RMS)}$	RMS value	-	1287	A
$I_F$	Continuous (direct) on-state current	-	1050	A

**SURGE RATINGS**

Symbol	Parameter	Test Conditions	Max.	Units
$I_{FSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 150^{\circ}C$	20.0	kA
$I^2t$	$I^2t$ for fusing	$V_R = 50\% V_{RRM} - 1/4$ sine	2.0	MA <sup>2</sup> s
$I_{FSM}$	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 150^{\circ}C$	25.0	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	3.125	MA <sup>2</sup> s

**THERMAL AND MECHANICAL RATINGS**

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.022	$^{\circ}C/W$
		Single side cooled	Anode DC	-	0.038	$^{\circ}C/W$
			Cathode DC	-	0.052	$^{\circ}C/W$
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 19.5kN	Double side	-	0.004	$^{\circ}C/W$
		(with mounting compound)	Single side	-	0.008	$^{\circ}C/W$
$T_{vj}$	Virtual junction temperature	On-state (conducting)	-	160	$^{\circ}C$	
		Reverse (blocking)	-	150	$^{\circ}C$	
$T_{stg}$	Storage temperature range		-55	175	$^{\circ}C$	
$F_m$	Clamping force		18	22	kN	

## CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$V_{FM}$	Forward voltage	At 3400A peak, $T_{case} = 25^{\circ}C$	-	1.6	V
$I_{RM}$	Peak reverse current	At $V_{RRM}$ , $T_{case} = 150^{\circ}C$	-	75	mA
$Q_S$	Total stored charge	$I_F = 2000A$ , $dI_{RR}/dt = 3A/\mu s$	-	3500	$\mu C$
$I_{rr}$	Peak reverse recovery current	$T_{case} = 150^{\circ}C$ , $V_R = 100V$	-	110	A
$V_{TO}$	Threshold voltage	At $T_{vj} = 150^{\circ}C$	-	0.82	V
$r_T$	Slope resistance	At $T_{vj} = 150^{\circ}C$	-	0.29	$m\Omega$

## CURVES

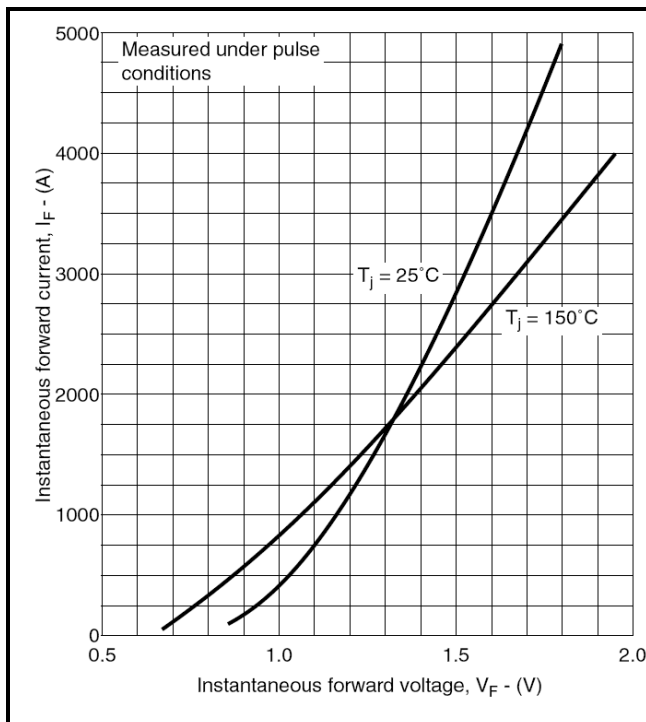


Fig.2 Maximum (limit) on-state characteristics

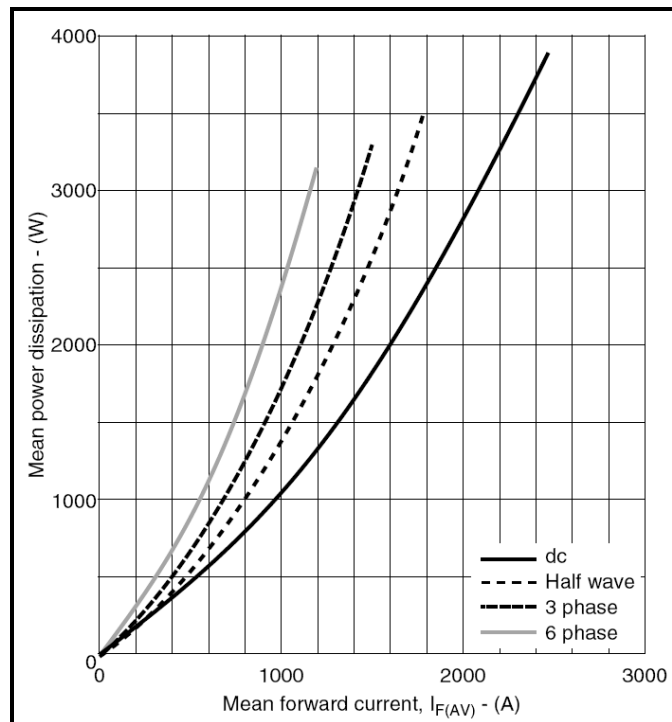


Fig.3 Dissipation curves

### $V_{TM}$ EQUATION

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

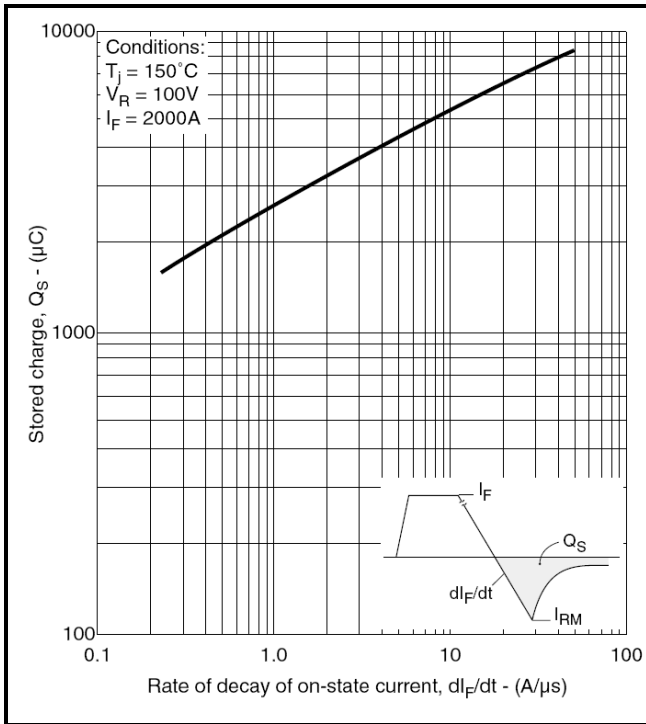
Where  $A = 0.658789$

$B = -0.01706$

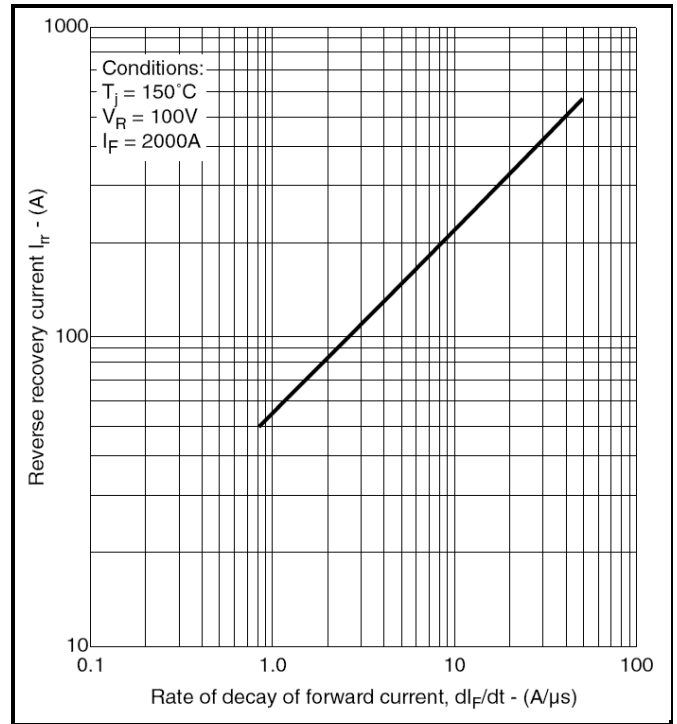
$C = 0.000194$

$D = 0.010358$

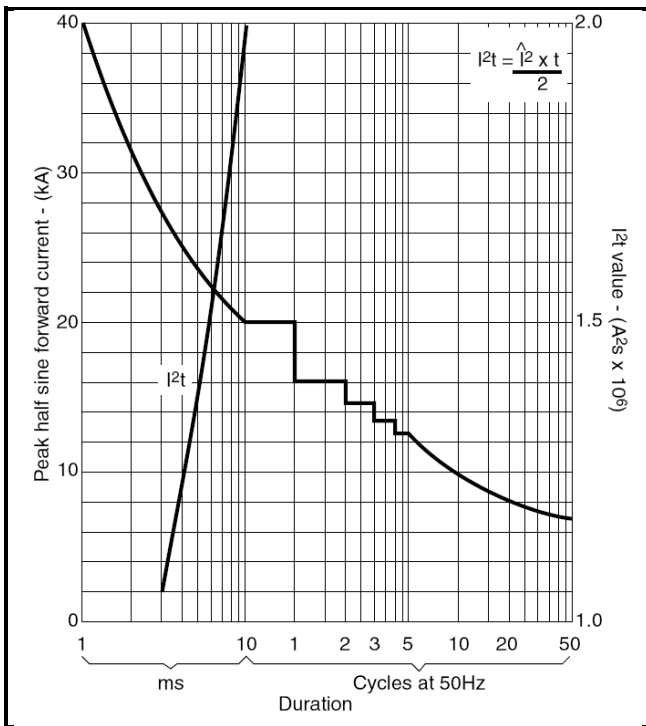
these values are valid for  $T_j = 150^{\circ}C$  for  $I_F$  500A to 5000A



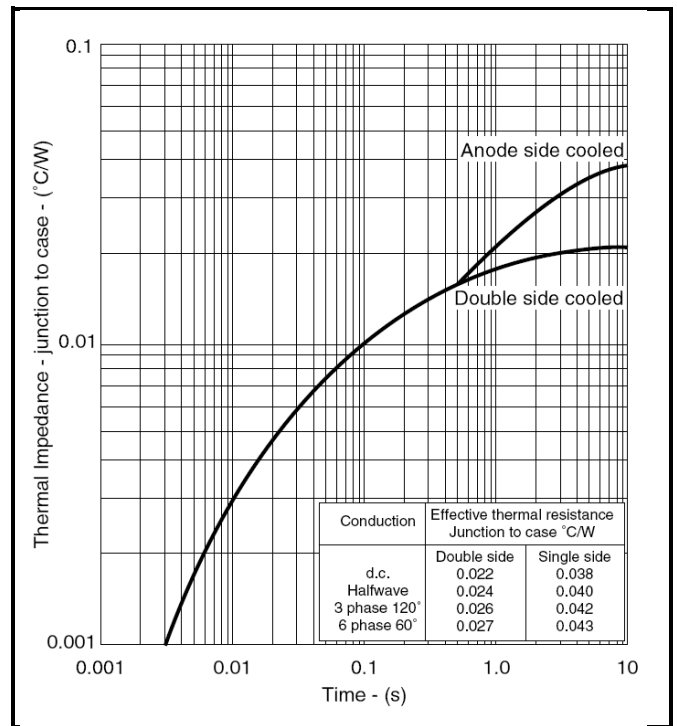
**Fig.4 Total stored charge**



**Fig.5 Maximum reverse recovery current**



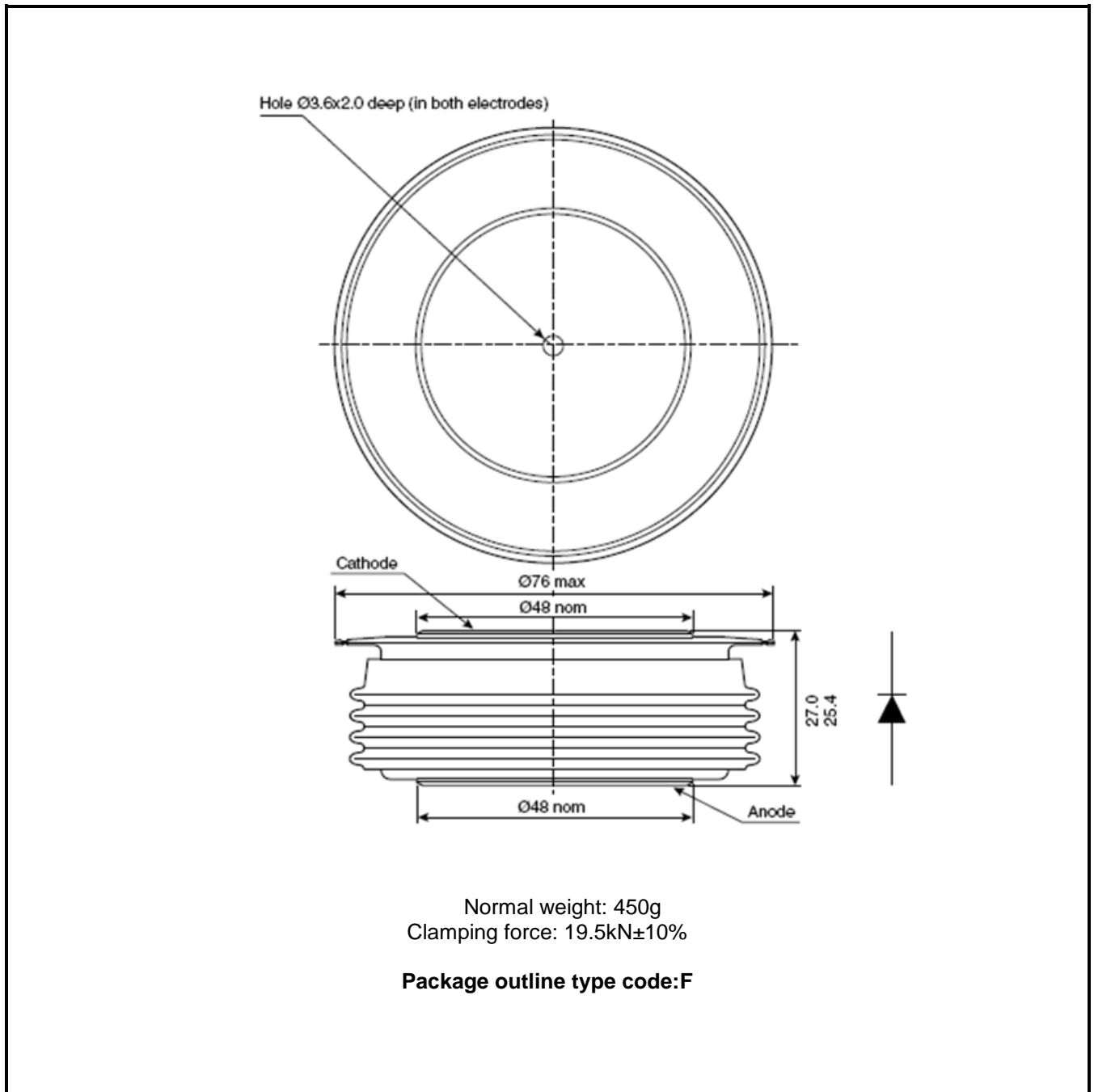
**Fig.6 Surge (non-repetitive) forward current vs time (with 50%  $V_{RRM}$  at  $T_{case} 150^\circ\text{C}$ )**



**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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