

DCR1020SF

Phase Control Thyristor

Replaces January 2000 version, DS4245-4.0

DS4245-5.0 July 2001

FEATURES

- Double Side Cooling
- High Surge Capability

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- DC Motor Control
- Welding
- Battery Chargers

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V _{DRM} V V	Conditions
DCR1020SF65	6500	$T_{v_j} = 0^{\circ} \text{ to } 125^{\circ}\text{C},$
DCR1020SF64	6400	$I_{DRM} = I_{RRM} = 150 \text{mA},$
DCR1020SF63	6300	V_{DRM} , V_{RRM} $t_p = 10ms$,
DCR1020SF62	6200	V _{DSM} & V _{RSM} =
DCR1020SF61	6100	V _{DRM} & V _{RRM} + 100V
DCR1020SF60	6000	respectively

Lower voltage grades available.

ORDERING INFORMATION

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

For example:

DCR1020SF63

Note: Please use the complete part number when ordering and quote this number in any future correspondance relating to your order.

KEY PARAMETERS

 V_{DRM} 6500V $I_{T(AV)}$ 640A I_{TSM} 10700A dVdt 1000V/ μ s dI/dt 100A/ μ s

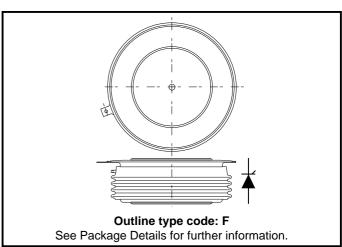


Fig. 1 Package outline



CURRENT RATINGS

 $T_{case} = 60$ °C unless stated otherwise.

Symbol	Parameter	Conditions	Max.	Units			
Double Sid	Double Side Cooled						
I _{T(AV)}	Mean on-state current	Half wave resistive load	640	Α			
I _{T(RMS)}	RMS value	-	1005	А			
I _T	Continuous (direct) on-state current	-	967	А			
Single Side Cooled (Anode side)							
I _{T(AV)}	Mean on-state current	Half wave resistive load	473	А			
I _{T(RMS)}	RMS value	-	742	А			
I _T	Continuous (direct) on-state current	-	682	А			

CURRENT RATINGS

 $T_{case} = 80$ °C unless stated otherwise.

Symbol	Parameter	Conditions	Max.	Units			
Double Sic	Double Side Cooled						
I _{T(AV)}	Mean on-state current	Half wave resistive load	515	А			
I _{T(RMS)}	RMS value	-	809	Α			
I _T	Continuous (direct) on-state current	-	765	А			
Single Side Cooled (Anode side)							
I _{T(AV)}	Mean on-state current	Half wave resistive load	377	А			
I _{T(RMS)}	RMS value	-	592	А			
I _T	Continuous (direct) on-state current	-	530	А			



SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I _{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T _{case} = 125°C	8.5	kA
l²t	I ² t for fusing	V _R = 50% V _{RRM} - 1/4 sine	0.36 x 10 ⁶	A²s
I _{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T _{case} = 125°C	10.7	kA
l²t	I ² t for fusing	V _R = 0	0.562 x 10 ⁶	A ² s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
	Thermal resistance - junction to case	Double side cooled	dc	-	0.022	°C/W
$R_{th(j-c)}$		Single side cooled	Anode dc	-	0.038	°C/W
			Cathode dc	-	0.052	°C/W
6	Thermal resistance - case to heatsink	Clamping force 19.5kN with mounting compound	Double side	-	0.004	°C/W
$R_{th(c-h)}$			Single side	-	0.008	°C/W
T	Virtual junction temperature	On-state (conducting)		-	135	°C
$T_{v_{j}}$		Reverse (blocking)		-	125	°C
T _{stg}	Storage temperature range			-55	125	°C
-	Clamping force			18.0	22.0	kN



DYNAMIC CHARACTERISTICS

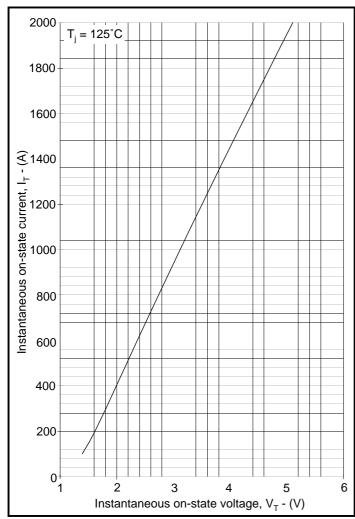
Symbol	Parameter	Conditions		Тур.	Max.	Units
V _{TM}	Maximum on-state voltage	At 1800A peak, T _{case} = 25°C		-	3.6	V
I _{RRM} /I _{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$		150	mA
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% V _{DRM} T _j = 125°C.		-	1000	V/µs
all/alt	Data of vice of an etate accuracy	Gate source 30V, 15Ω	Repetitive 50Hz	-	30	A/μs
dl/dt	Rate of rise of on-state current		Non-repetitive	-	100	A/μs
V _{T(TO)}	Threshold voltage	At T _{vj} = 125°C		•	1.2	V
r _T	On-state slope resistance	At T _{vj} = 125°C		-	1.92	mΩ
t _{gd}	Delay time	$V_D = 67\% V_{DRM}$, Gate source 30V, 15Ω Rise time 0.5μs, $T_j = 25^{\circ}C$		0.5	1.5	μs
t _q	Turn-off time	$I_{T} = 1000A, t_{p} = 1 \text{ms}, T_{j} = 125 ^{\circ}\text{C},$ $V_{RM} = 100 \text{V}, dI_{RR} / dt = 10 A / \mu s,$ $V_{DR} = 67 \% V_{DRM}, dV_{DR} / dt = 25 V / \mu s$		600	-	μs
IL	Latching current	$T_{j} = 25^{\circ}C, V_{D} = 10V$		-	600	mA
I _H	Holding current	T _j = 25°C		-	200	mA

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions		Max.	Units
$V_{\rm GT}$	Gate trigger voltage	$V_{DRM} = 5V$, $T_{case} = 25$ °C	-	3.0	V
I _{GT}	Gate trigger current	$V_{DRM} = 5V, T_{case} = 25^{\circ}C$	-	300	mA
V _{GD}	Gate non-trigger voltage	At V _{DRM} T _{case} = 125°C	-	0.25	V
V_{FGM}	Peak forward gate voltage	Anode positive with respect to cathode	-	30	V
V_{FGN}	Peak forward gate voltage	Anode negative with respect to cathode	-	0.25	V
V_{RGM}	Peak reverse gate voltage		-	5	V
I _{FGM}	Peak forward gate current	Anode positive with respect to cathode	-	10	А
$P_{G(M)}$	Peak gate power	See Gate Characteristics curve/table	-	150	W
P _{G(AV)}	Mean gate power		-	5	W



CURVES



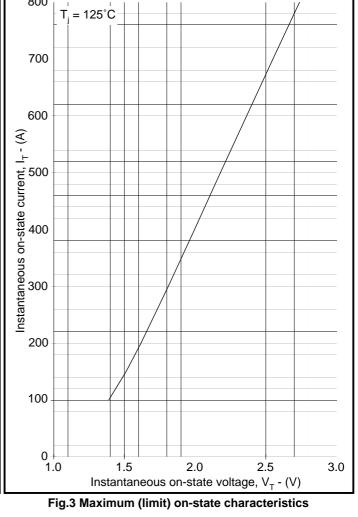


Fig.2 Maximum (limit) on-state characteristics

$$V_{TM}$$
 Equation:-

$$V_{TM} = A + Bln (I_T) + C.I_T + D.\sqrt{I_T}$$

Where
$$A = 0.25863$$

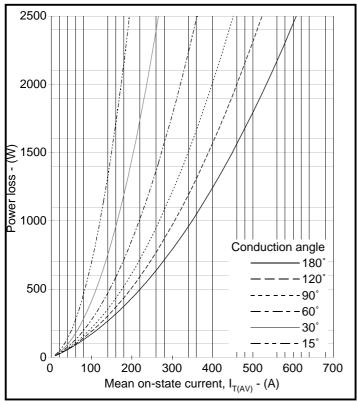
 $B = 0.322589$

800

C = 0.002564D = -0.061059

these values are valid for $T_i = 125$ °C for $I_T 100$ A to 2000A





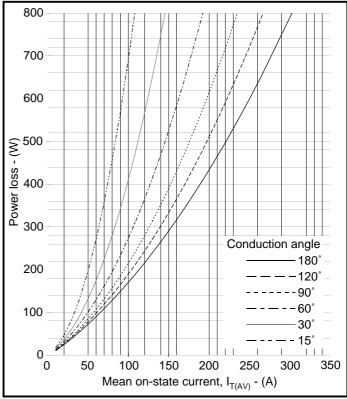
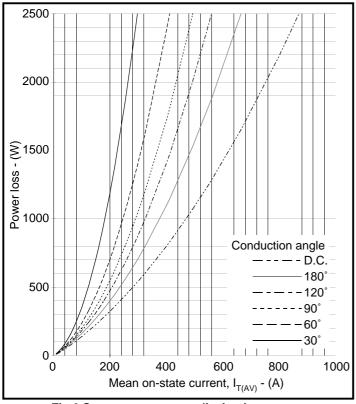


Fig.4 Sine wave power dissipation curves

Fig.5 Sine wave power dissipation curves





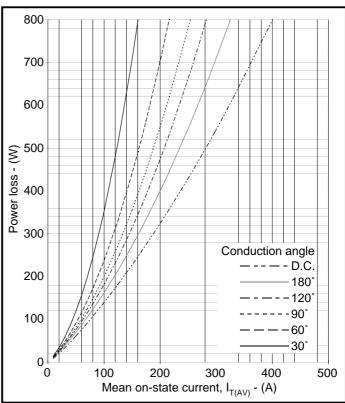


Fig.7 Square wave power dissipation curves



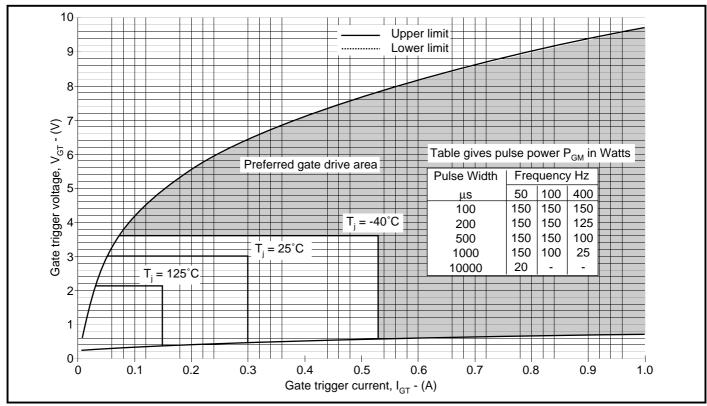


Fig.8 Gate characteristics

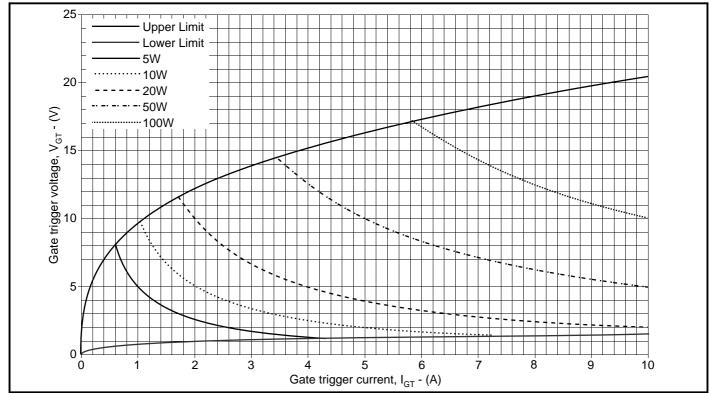
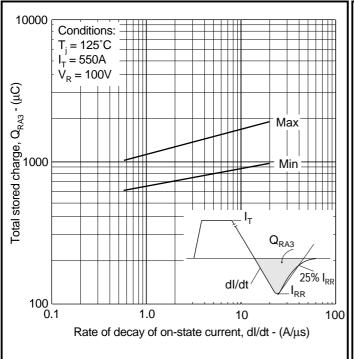


Fig.9 Gate characteristics





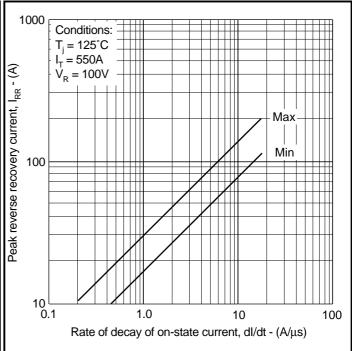


Fig.10 Stored charge

Fig.11 Reverse recovery current

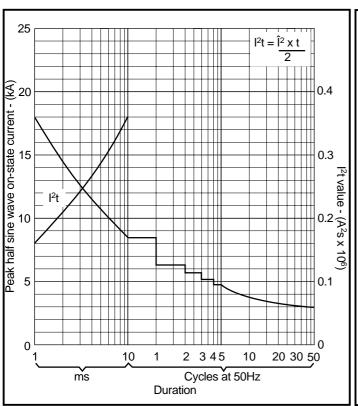


Fig.12 Surge (non-repetitive) on-state current vs time (with 50% V_{RRM} @ T_{case} = 125°C)

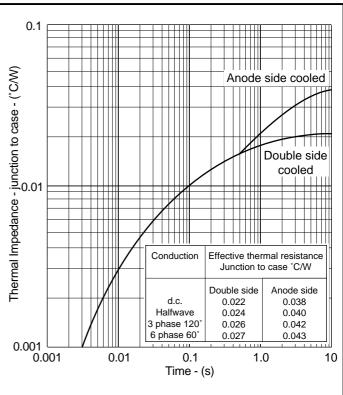
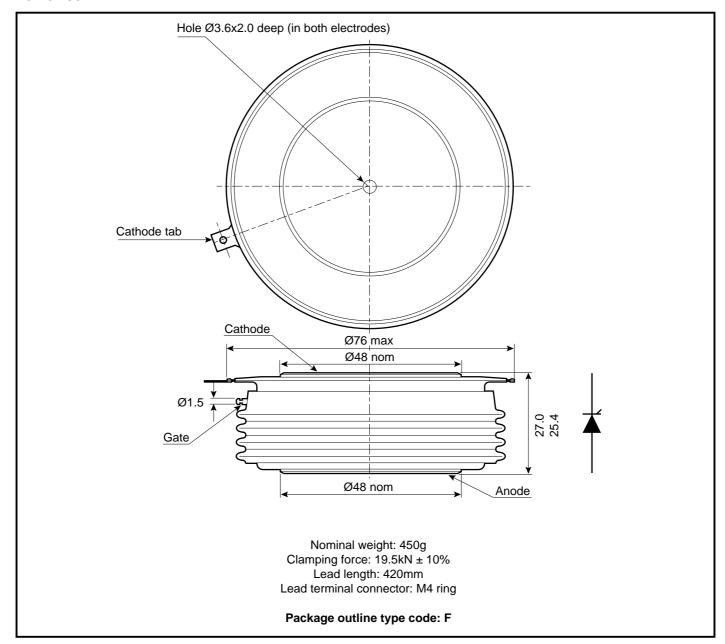


Fig.13 Transient thermal impedance - junction to case



PACKAGE DETAILS

For further package information, please contact your nearest Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.





POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink and clamping systems in line with advances in device voltages and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group continues to offer high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

DEVICE CLAMPS

Disc devices require the correct clamping force to ensure their safe operation. The PACS range includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 23mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

Clamps are available for single or double side cooling, with high insulation versions for high voltage assemblies.

Please refer to our application note on device clamping, AN4839

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or customer service office.



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Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

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