

FEATURES

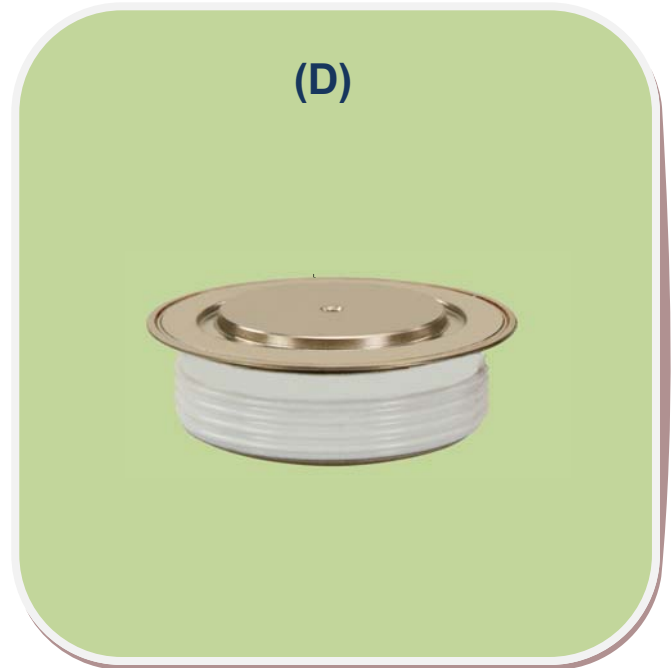
- Double Side Cooling
- High Surge Capability
- High Mean Current
- Fatigue Free

TYPICAL APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- DC Motor Control

TECHNICAL DATA

DEVICE TYPE	V_{DRM}/V_{RRM} (V)	V_{RSM} (V)
DCR1006SD2121	2100	2200
DCR1006SD2424	2400	2500
DCR1006SD2828	2800	2900



CURRENT RATINGS

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

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
I _{T(AV)}	Mean on-state current	Half wave resistive load	1255	A
I _{T(RMS)}	RMS value	-	1971	A
I _T	Continuous (direct) on-state current	-	1801	A
Single Side Cooled (Anode side)				
I _{T(AV)}	Mean on-state current	Half wave resistive load	899	A
I _{T(RMS)}	RMS value	-	1412	A
I _T	Continuous (direct) on-state current	-	1216	A

CURRENT RATINGS

$T_{case} = 80^{\circ}\text{C}$ unless stated otherwise.

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	990	A
$I_{T(RMS)}$	RMS value	-	1555	A
I_T	Continuous (direct) on-state current	-	1290	A
Single Side Cooled (Anode side)				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	700	A
$I_{T(RMS)}$	RMS value	-	1100	A
I_T	Continuous (direct) on-state current	-	875	A

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}\text{C}$	16.4	kA
I^2t	I^2t for fusing	$V_R = 50\% V_{RRM}$ - 1/4 sine	1.35×10^6	A^2s
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}\text{C}$	20.5	kA
I^2t	I^2t for fusing	$V_R = 0$	2.1×10^6	A^2s

THERMAL AND MECHANICAL DATA

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

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions	Typ.	Max.	Units	
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$	-	100	mA	
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% V_{DRM} , $T_j = 125^{\circ}C$.	-	1000	V/ μs	
di/dt	Rate of rise of on-state current	From 67% V_{DRM} to 1000A Gate source 1.5A $t_r = 0.5\mu s$, $T_j = 125^{\circ}C$.	Repetitive 50Hz	-	250	A/ μs
			Non-repetitive	-	500	A/ μs
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$	-	0.92	V	
r_T	On-state slope resistance	At $T_{vj} = 125^{\circ}C$	-	0.4	m Ω	
t_{gd}	Delay time	$V_D = 67\% V_{DRM}$, Gate source 30V, 15 Ω Rise time 0.5 μs , $T_j = 25^{\circ}C$	-	1.8	μs	
t_q	Turn-off time	$I_T = 800A$, $t_p = 1ms$, $T_j = 125^{\circ}C$, $V_{RM} = 50V$, $dI_{RR}/dt = 20A/\mu s$, $V_{DR} = 50\% V_{DRM}$, $dV_{DR}/dt = 20V/\mu s$ linear	450	-	μs	
I_L	Latching current	$T_j = 25^{\circ}C$, $V_D = 5V$	-	1000	mA	
I_H	Holding current	$T_j = 25^{\circ}C$, $R_{g-k} = \infty$	-	500	mA	
V_T	Max on state voltage	At $I_T = 2900 A$ Peak	-	1.70	V	

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Max.	Units
V_{GT}	Gate trigger voltage	$V_{DRM} = 5V$, $T_{case} = 25^{\circ}C$	3.5	V
I_{GT}	Gate trigger current	$V_{DRM} = 5V$, $T_{case} = 25^{\circ}C$	200	mA
V_{GD}	Gate non-trigger voltage	At 67% V_{DRM} , $T_{case} = 125^{\circ}C$	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	30	A
P_{GM}	Peak gate power	See table, gate characteristics curve	150	W
$P_{G(AV)}$	Mean gate power		10	W

CURVES

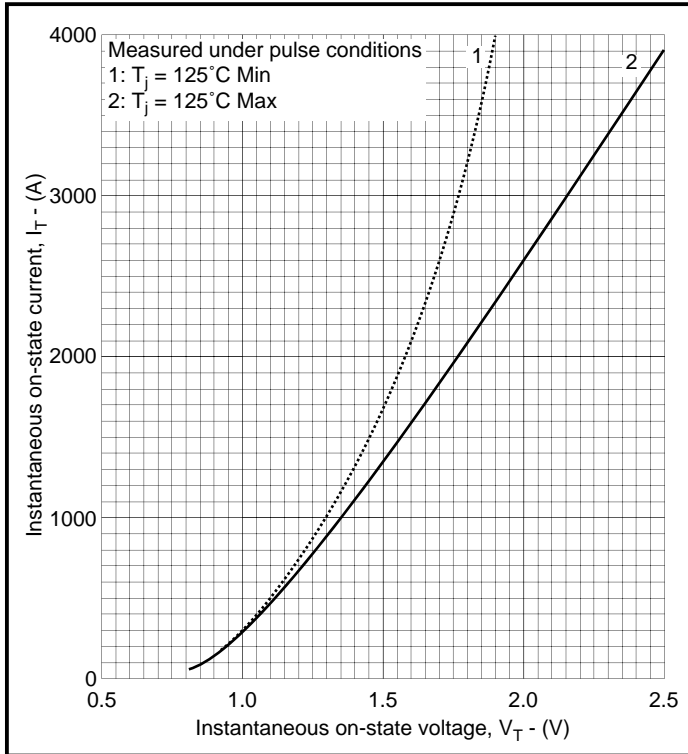


Fig.2 Maximum (limit) on-state characteristics

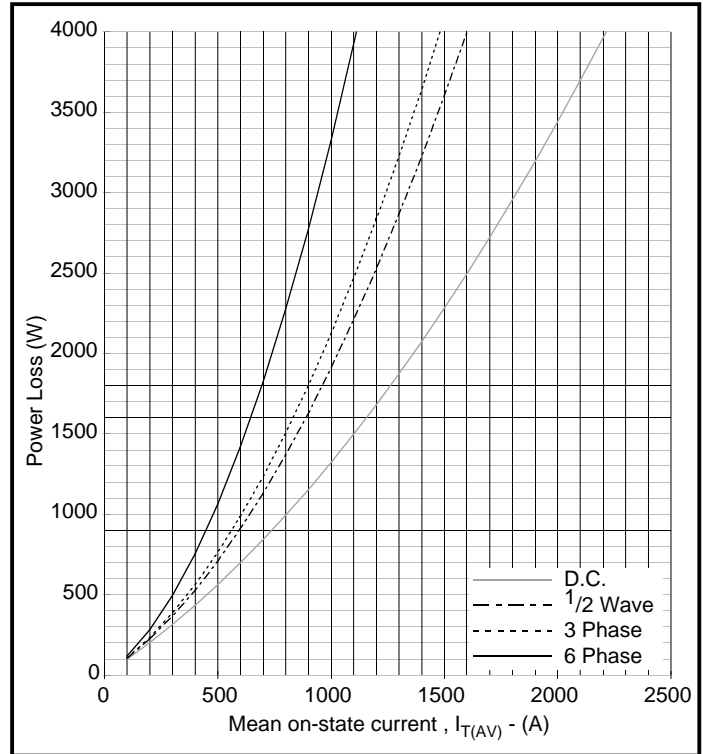


Fig.3 Dissipation curves

V_{TM} Equation:-

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

Where

- A = -1.456962
- B = 0.5361379
- C = 3.623888×10^{-4}
- D = -0.02991257

these values are valid for $T_j = 125^\circ\text{C}$ for I_T 500A to 4000A

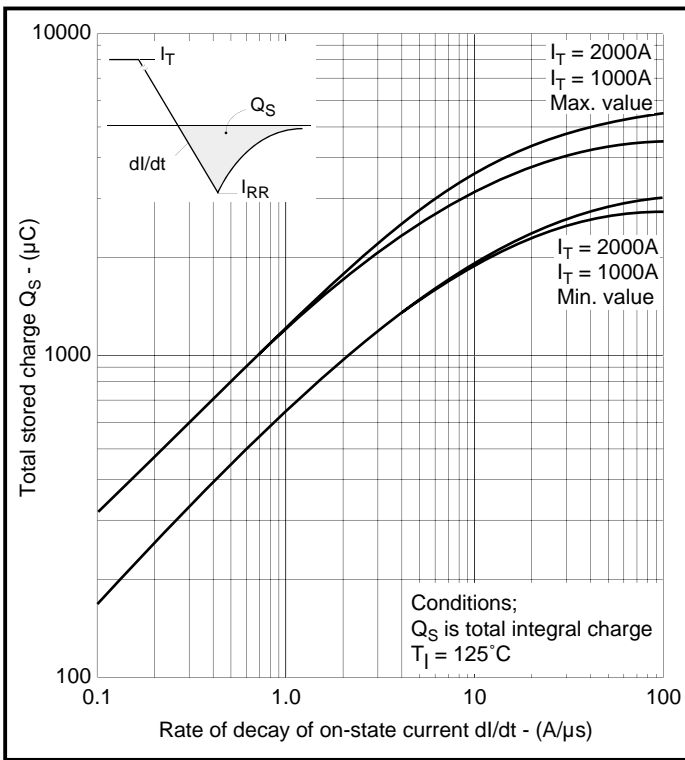


Fig.4 Stored charge

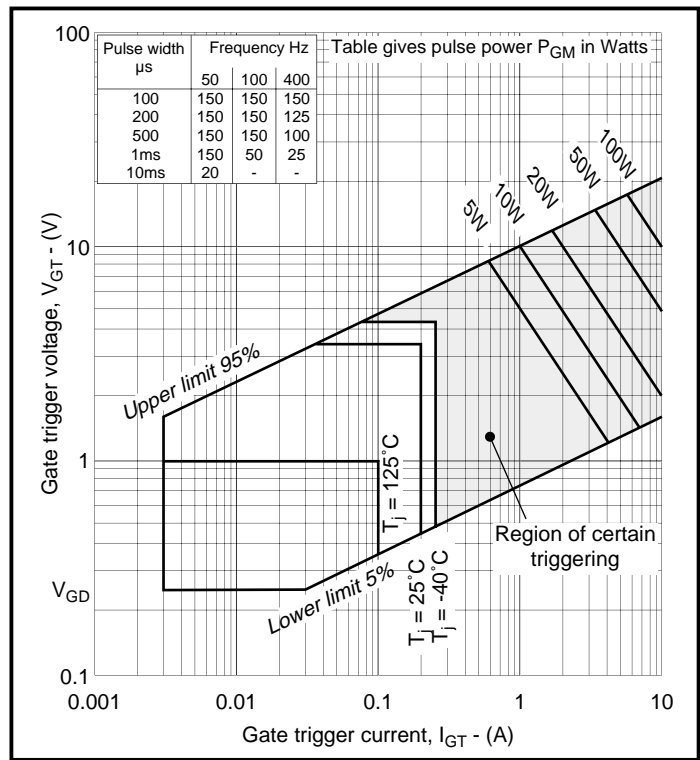


Fig.5 Gate characteristics

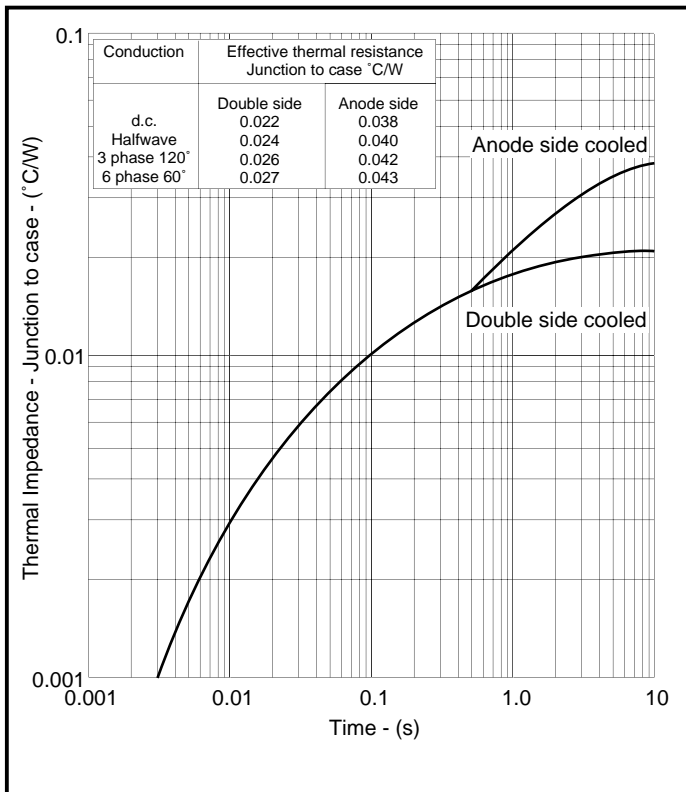


Fig.6 Transient thermal impedance - junction to case

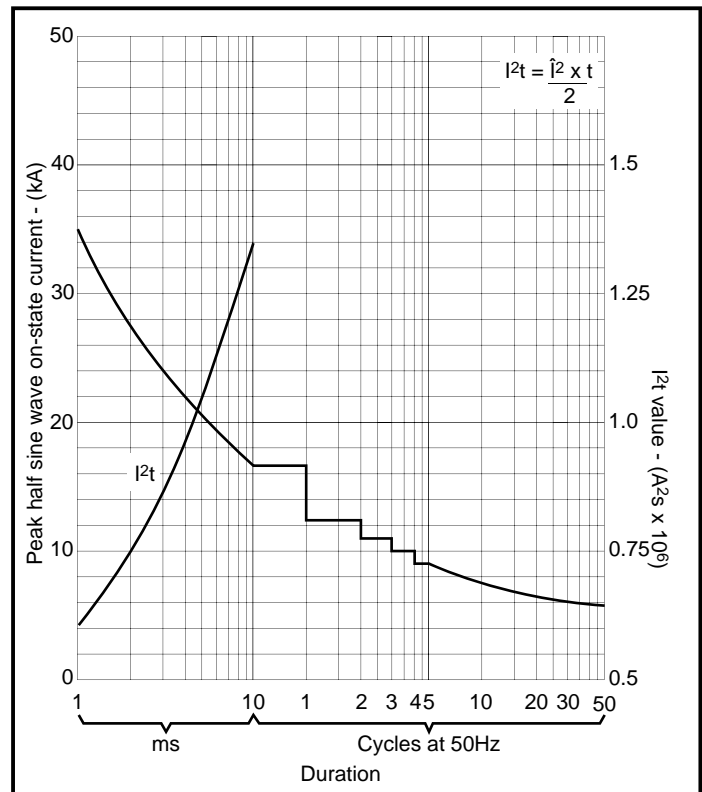
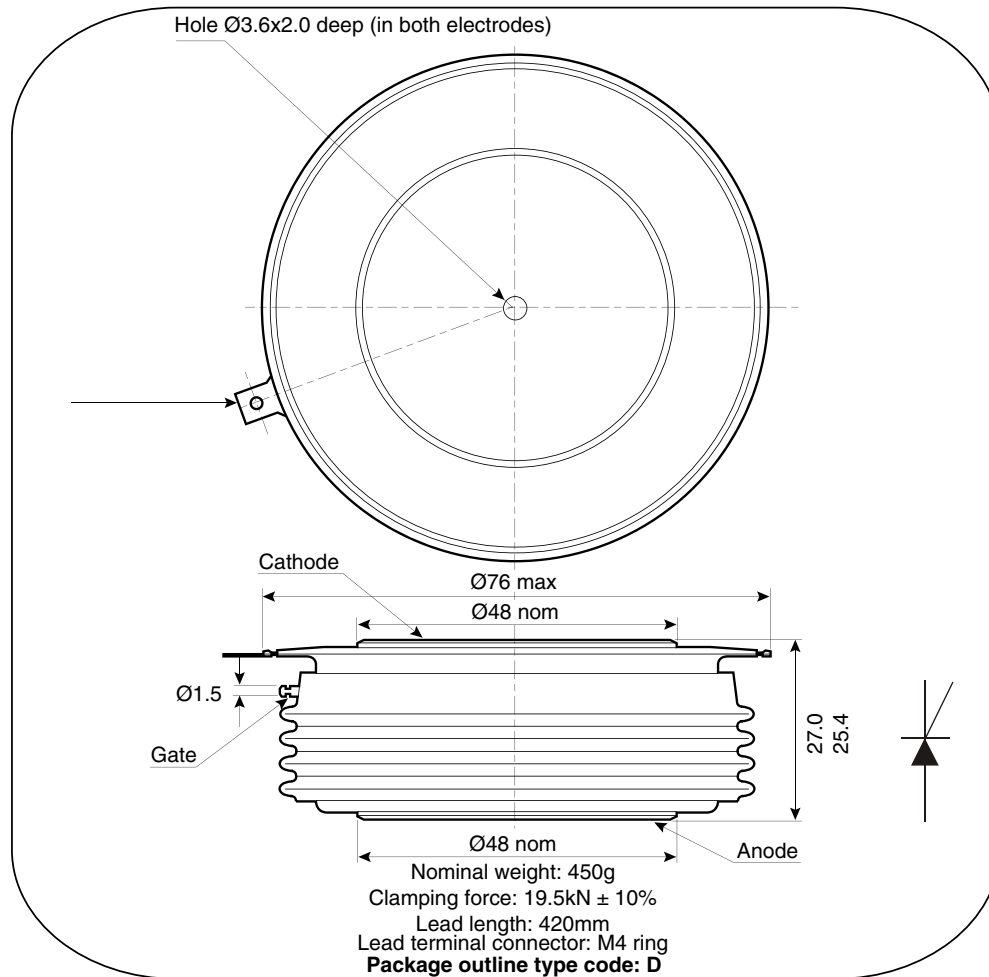


Fig.7 Surge (non-repetitive) on-state current vs time (with 50% V_RRM at T_case = 125°C)

PACKAGE OUTLINE



All dimensions are in mm.

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