

# Phase Control Disc Thyristor Type DT40-320-65

High power cycling capability / Low on-state and switching losses  
Designed for traction and industrial applications

Mean on-state current					$I_{TAV}$	320 A						
Repetitive peak off-state voltage					$V_{DRM}$	4600 ÷ 6500 V						
Repetitive peak reverse voltage					$V_{RRM}$							
Turn-off time					$t_q$	800 $\mu$ s						
$V_{DRM}, V_{RRM}, V$	4600	4800	5000	5200	5400	5600	5800	6000	6200	6400	6500	
Voltage code	46	48	50	52	54	56	58	60	62	64	65	
$T_{j, °C}$	-60 ÷ 125											

## MAXIMUM ALLOWABLE RATINGS

Symbols and parameters		Units	Values	Test conditions
<b>ON-STATE</b>				
$I_{TAV}$	Mean on-state current	A	320 359 293	$T_c=79\text{ °C}$ ; Double side cooled; $T_c=70\text{ °C}$ ; Double side cooled; $T_c=85\text{ °C}$ ; Double side cooled; 180° half-sine wave; 50 Hz
$I_{TRMS}$	RMS on-state current	A	502	$T_c=79\text{ °C}$ ; Double side cooled; 180° half-sine wave; 50 Hz
$I_{TSM}$	Surge on-state current	kA	4.0 4.5	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; $t_p=10\text{ ms}$ ; single pulse; $V_D=V_R=0\text{ V}$ ; Gate pulse: $I_G=2\text{ A}$ ; $t_{GP}=50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$
			4.0 4.5	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; $t_p=8.3\text{ ms}$ ; single pulse; $V_D=V_R=0\text{ V}$ ; Gate pulse: $I_G=2\text{ A}$ ; $t_{GP}=50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$
$I^2t$	Safety factor	$A^2s \cdot 10^3$	80 100	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; $t_p=10\text{ ms}$ ; single pulse; $V_D=V_R=0\text{ V}$ ; Gate pulse: $I_G=2\text{ A}$ ; $t_{GP}=50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$
			60 80	$T_j=T_{j\max}$ $T_j=25\text{ °C}$ 180° half-sine wave; $t_p=8.3\text{ ms}$ ; single pulse; $V_D=V_R=0\text{ V}$ ; Gate pulse: $I_G=2\text{ A}$ ; $t_{GP}=50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$
<b>BLOCKING</b>				
$V_{DRM}, V_{RRM}$	Repetitive peak off-state and Repetitive peak reverse voltages	V	4600 ÷ 6500	$T_{j\min} < T_j < T_{j\max}$ ; 180° half-sine wave; 50 Hz; Gate open
$V_{DSM}, V_{RSM}$	Non-repetitive peak off-state and Non-repetitive peak reverse voltages	V	4700 ÷ 6600	$T_{j\min} < T_j < T_{j\max}$ ; 180° half-sine wave; single pulse; Gate open
$V_{Df}, V_R$	Direct off-state and Direct reverse voltages	V	$0.6 \cdot V_{DRM}$ $0.6 \cdot V_{RRM}$	$T_j=T_{j\max}$ ; Gate open

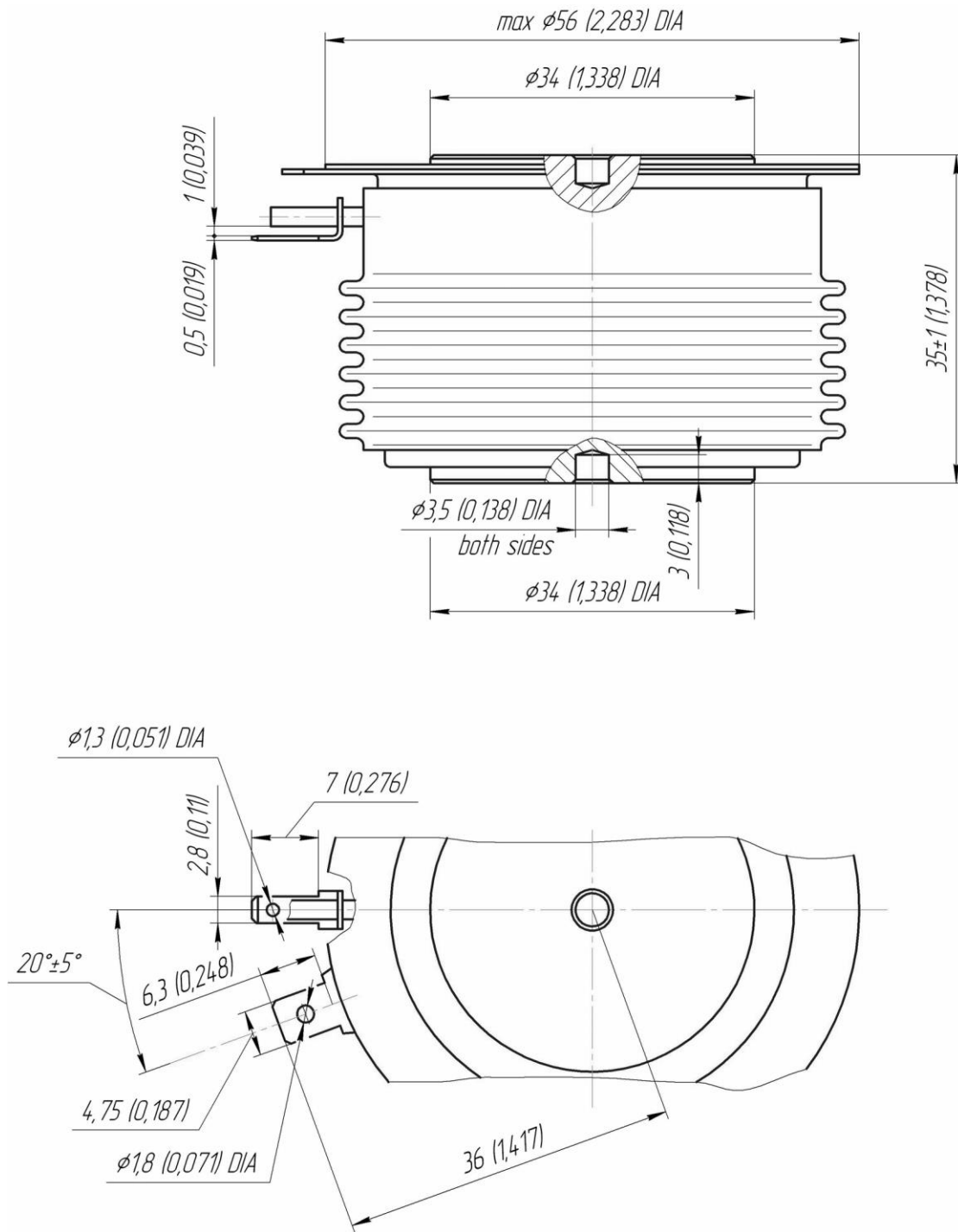
<b>TRIGGERING</b>				
$I_{FGM}$	Peak forward gate current	A	8	$T_j = T_{j\max}$
$V_{RGM}$	Peak reverse gate voltage	V	5	
$P_G$	Gate power dissipation	W	4	$T_j = T_{j\max}$ for DC gate current
<b>SWITCHING</b>				
$(di_T/dt)_{crit}$	Critical rate of rise of on-state current non-repetitive (f=1 Hz)	A/ $\mu$ s	500	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; $I_{TM} = 1400$ A; Gate pulse: $I_G = 2$ A; $t_{GP} = 50$ $\mu$ s; $di_G/dt \geq 2$ A/ $\mu$ s
<b>THERMAL</b>				
$T_{stg}$	Storage temperature	$^{\circ}$ C	-60 ÷ 50	
$T_j$	Operating junction temperature	$^{\circ}$ C	-60 ÷ 125	
<b>MECHANICAL</b>				
F	Mounting force	kN	14.0 ÷ 16.0	
a	Acceleration	m/s <sup>2</sup>	50	Device clamped

## CHARACTERISTICS

Symbols and parameters		Units	Values	Conditions	
<b>ON-STATE</b>					
$V_{TM}$	Peak on-state voltage, max	V	2.60	$T_j = 25$ $^{\circ}$ C; $I_{TM} = 785$ A	
$V_{T(TO)}$	On-state threshold voltage, max	V	1.338	$T_j = T_{j\max}$ ;	
$r_T$	On-state slope resistance, max	m $\Omega$	2.351	$0.5 \pi I_{TAV} < I_T < 1.5 \pi I_{TAV}$	
$I_L$	Latching current, max	mA	700	$T_j = 25$ $^{\circ}$ C; $V_D = 12$ V; Gate pulse: $I_G = 2$ A; $t_{GP} = 50$ $\mu$ s; $di_G/dt \geq 1$ A/ $\mu$ s	
$I_H$	Holding current, max	mA	300	$T_j = 25$ $^{\circ}$ C; $V_D = 12$ V; Gate open	
<b>BLOCKING</b>					
$I_{DRM}, I_{RRM}$	Repetitive peak off-state and Repetitive peak reverse currents, max	mA	150	$T_j = T_{j\max}$ ; $V_D = V_{DRM}$ ; $V_R = V_{RRM}$	
$(dv_D/dt)_{crit}$	Critical rate of rise of off-state voltage <sup>1)</sup> , min	V/ $\mu$ s	1000, 1600, 2000, 2500	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ; Gate open	
<b>TRIGGERING</b>					
$V_{GT}$	Gate trigger direct voltage, max	V	3.00	$T_j = T_{j\min}$	$V_D = 12$ V; $I_D = 3$ A; Direct gate current
			2.50	$T_j = 25$ $^{\circ}$ C	
			1.50	$T_j = T_{j\max}$	
$I_{GT}$	Gate trigger direct current, max	mA	400	$T_j = T_{j\min}$	
			250	$T_j = 25$ $^{\circ}$ C	
			150	$T_j = T_{j\max}$	
$V_{GD}$	Gate non-trigger direct voltage, min	V	0.25	$T_j = T_{j\max}$ ; $V_D = 0.67 \cdot V_{DRM}$ ;	
$I_{GD}$	Gate non-trigger direct current, min	mA	35.00	Direct gate current	
<b>SWITCHING</b>					
$t_{gd}$	Delay time, max	$\mu$ s	3.00	$T_j = 25$ $^{\circ}$ C; $V_D = 1500$ V; $I_{TM} = I_{TAV}$ ; $di/dt = 200$ A/ $\mu$ s;	
$t_{gt}$	Turn-on time, max	$\mu$ s	10.00	Gate pulse: $I_G = 2$ A; $V_G = 20$ V; $t_{GP} = 50$ $\mu$ s; $di_G/dt = 2$ A/ $\mu$ s	
$t_q$	Turn-off time <sup>2)</sup> , max	$\mu$ s	800	$dv_D/dt = 50$ V/ $\mu$ s; $T_j = T_{j\max}$ ; $I_{TM} = I_{TAV}$ ; $di_R/dt = -10$ A/ $\mu$ s; $V_R = 100$ V; $V_D = 2000$ V	
$Q_{rr}$	Total recovered charge, max	$\mu$ C	2600	$T_j = T_{j\max}$ ; $I_{TM} = 1000$ A;	
$t_{rr}$	Reverse recovery time, max	$\mu$ s	52	$di_R/dt = -5$ A/ $\mu$ s;	
$I_{rrM}$	Peak reverse recovery current, max	A	100	$V_R = 100$ V	

THERMAL					
$R_{thjc}$	Thermal resistance, junction to case, max	°C/W	0.0450	Direct current	Double side cooled
$R_{thjc-A}$			0.0990		Anode side cooled
$R_{thjc-K}$			0.0810		Cathode side cooled
$R_{thck}$	Thermal resistance, case to heatsink, max	°C/W	0.0075	Direct current	
MECHANICAL					
w	Weight, max	g	400		
$D_s$	Surface creepage distance	mm (inch)	38.00 (1.496)		
$D_a$	Air strike distance	mm (inch)	21.00 (0.827)		

PART NUMBERING GUIDE							NOTES					
DT	40	320	65	7	0		1) Critical rate of rise of off-state voltage					
1	2	3	4	5	6		Symbol of Group	7	8	8,5	9	
1. DT - Phase Control Disc Thyristor							$(dv_D/dt)_{crit}, V/\mu s$	1000	1600	2000	2500	
2. Element Diameter							2) Turn-off time ( $dv_D/dt=50 V/\mu s$ )					
3. Mean on-state current, A							Symbol of Group	0				
4. Voltage code							$t_q, \mu s$	800				
5. Critical rate of rise of on-state current non-repetitive, V/ $\mu s$												
6. Turn-off time ( $dv_D/dt=50 V/\mu s$ )												



All dimensions in millimeters (inches)