

Phase Control Thyristors

FEATURES

- Amplified gate structure
- Qualified for industrial level
- International standard case TO-200AD
- Metal case with ceramic insulator

TYPICAL APPLICATIONS

- Controlled DC power supplies
- AC controllers
- DC motor controls
- AC switches

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		1400	A
	T_{Case}	74	°C
$I_{T(RMS)}$		1600	A
	T_{Case}	74	°C
I_{TSM}	50 Hz	15970	A
	60 Hz	17120	A
I^2t	50 Hz	4678	kA ² s
	60 Hz	4861	kA ² s
V_{DRM}/V_{RRM}		1200 to 2000	V
t_q	Typical	100	µs
T_J		-40 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
SERIES	VOLTAGE CODE	V _{DRM} /V _{RRM} , MAX. RE- PETITIVE PEAK AND OFF-STATE VOLTAGE	V _{RSM} , MAX. NON- REPETITIVE PEAK VOLTAGE (V)	I _{DRM} /I _{RRM} , MAX. at T _J = T _{J(Max.)} (mA)
N1400/...	12	1200	1300	100
N1400/...	14	1400	1500	
N1400/...	16	1600	1700	
N1400/...	18	1800	1900	
N1400/...	20	2000	2100	

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MAXIMUM ALLOWABLE RATINGS					
SYMBOL	DESCRIPTION	TEST CONDITIONS		VALUE	UNITS
$I_{T(AV)}$	Maximum average on-state current at heatsink temperature	180° conduction, half sine wave, double side cooled		1400	A
				74	°C
$I_{T(RMS)}$	Maximum RMS on-state current	DC at 25°C heatsink temperature, double side cooled		1600	A
I_{TSM}	Maximum peak, one-cycle non-repetitive surge current	t = 10 ms	100% V_{RRM} reapplied	Sinusoidal half wave, initial $T_J = T_J \text{ max.}$	kA
		t = 8.3 ms	reapplied		
		t = 10 ms	No voltage reapplied		
		t = 8.3 ms	reapplied		
I^2t	Maximum I^2t	t = 10 ms	100% V_{RRM} reapplied		kA ² s
		t = 8.3 ms	reapplied		
		t = 10 ms	No voltage reapplied		
		t = 8.3 ms	reapplied		
$I^2t^{1/2}$	Maximum $I^2t^{1/2}$	t = 0.1 to 10 ms, no voltage reapplied		46700	kA ² s ^{1/2}
$V_{T(TO)}$	Low level threshold voltage	(16.7% $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), $T_J = T_J \text{ max.}$		0.924	V
r_T	Low level on-state slope resistance			0.190	mΩ
V_{TM}	Maximum on-state voltage	$I_{pk} = 4398A$, 50Hz half sine pulse, $T_J = T_J \text{ max.}$		1.93	V
I_H	Maximum holding current	$T_J = 25^\circ C$, anode supply 12V resistive load		500	mA
I_L	Typical latching current			800	

SWITCHING					
SYMBOL	DESCRIPTION	TEST CONDITIONS		VALUE	UNITS
dI/dt	Maximum non-repetitive rate of rise of turned-on current	Gate drive 20 V, 20 Ω, $t_r \leq 1 \mu s$, $T_J = T_J \text{ max.}$, anode voltage $\leq 80\% V_{DRM}$		800	A/ μs
t_d	Typical delay time	Gate current 1 A, $dI_g/dt = 1 A/\mu s$, $V_d = 0.67$		0.7	μs
t_q	Typical turn-off time			100	

BLOCKING					
SYMBOL	DESCRIPTION	TEST CONDITIONS		VALUE	UNITS
dV/dt	Maximum critical rate of rise of off-	$T_J = T_J \text{ max.}$ Linear to 80% rated V_{DRM}		1000	V/ μs
I_{RRM}, I_{DRM}	Maximum peak reverse and off-	$T_J = T_J \text{ max.}$, rated V_{DRM}/V_{RRM} applied		60	mA

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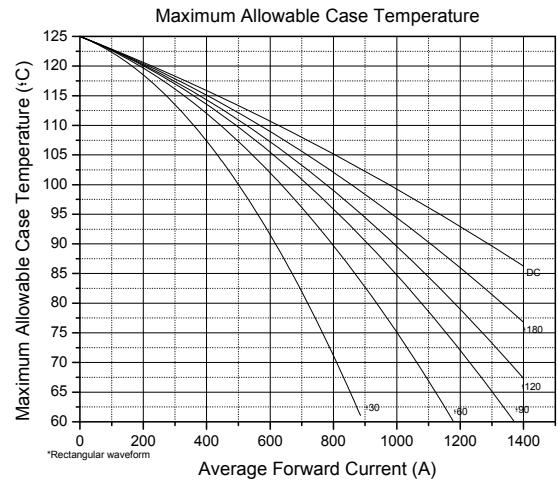
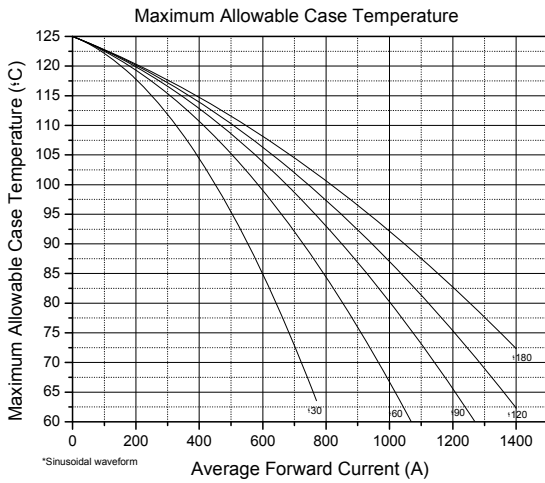
TRIGGERING						
SYMBOL	DESCRIPTION	TEST CONDITIONS	VALUE		UNITS	
			TYP.	MAX.		
P_{GM}	Maximum peak gate power	$T_J = T_J \text{ max.}, t_p \leq 5\text{ms}$	16		W	
$P_{G(AV)}$	Maximum average gate power	$T_J = T_J \text{ max.}, f = 50\text{Hz}, d\% = 50$	3			
I_{GM}	Maximum peak gate current	$T_J = T_J \text{ max.}, t_p \leq 5\text{ms}$	2		A	
$-V_{GM}$	Maximum negative gate voltage	$T_J = T_J \text{ max.}, t_p \leq 5\text{ms}$	3		V	
I_{GT}	DC gate current to trigger	$T_J = -40^\circ\text{C}$	Maximum required gate trigger/current/voltage are the lowest values which will trigger all units, 12V anode to cathode applied	40	300	mA
		$T_J = 25^\circ\text{C}$		20	200	
V_{GT}	DC gate voltage to trigger	$T_J = -40^\circ\text{C}$		-	5	V
		$T_J = 25^\circ\text{C}$		-	3	
V_{GD}	DC gate voltage not to trigger	$T_J = T_J \text{ max.}$	0.3		V	

THERMAL AND MECHANICAL SPECIFICATIONS					
SYMBOL	DESCRIPTION	TEST CONDITIONS	VALUE	UNITS	
T_J	Maximum operating junction temperature	-	-40 to 125	°C	
T_{Stg}	Maximum storage temperature	-	-40 to 150		
R_{thJ-hs}	Maximum thermal resistance, junction to heatsink	DC, double side cooled	0.023	°C/W	
		180° sine wave, double side cooled	0.026		
		120° rectangular wave, double side cooled	0.027		
R_{thC-hs}	Maximum thermal resistance, case to heat-sink	Mtg. Surface smooth, flat, greased, double side cooled	0.01		
-	Mounting force, $\pm 10\%$	-	2500	kgf	
-	Approximate weight	-	460	g	
-	Case style	-	TO-200AD	JEDEC	

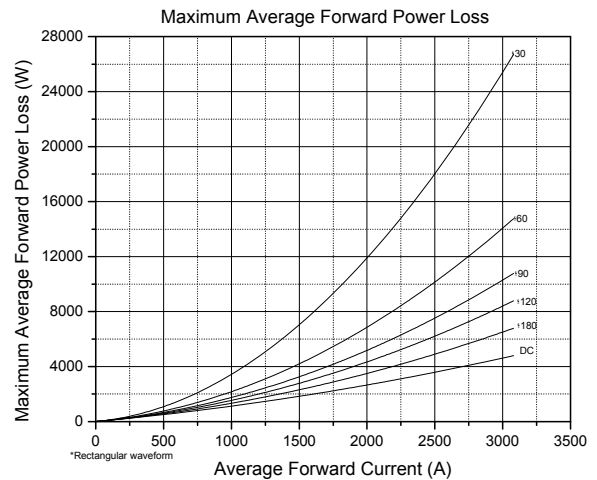
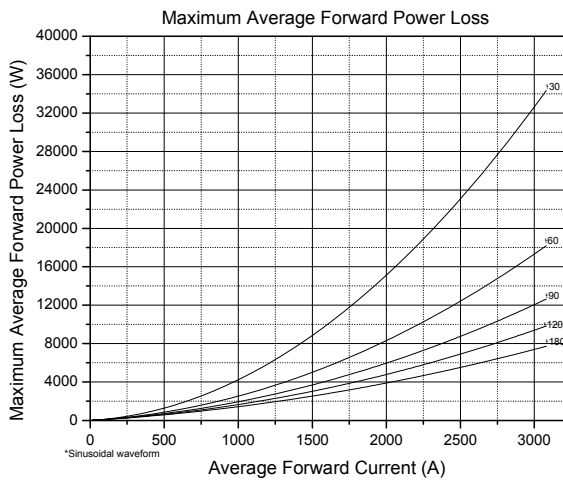
CURRENT FORM FACTOR								
FORM FACTOR	CONDUCTION ANGLE	15°	30°	45°	60°	90°	120°	180°
		Sine wave		31.956	15.832	10.452	7.721	4.933
Rectangular wave		24.000	12.000	8.000	6.000	4.000	3.000	2.000

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CURRENT RATINGS CHARACTERISTICS

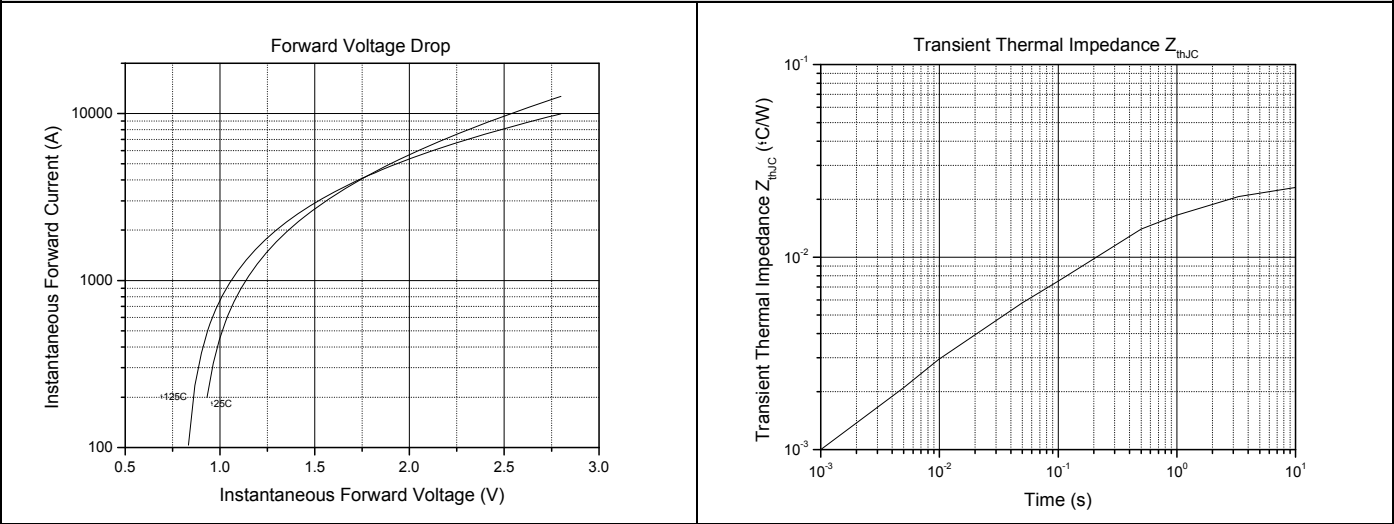


ON-STATE POWER LOSS CHARACTERISTICS

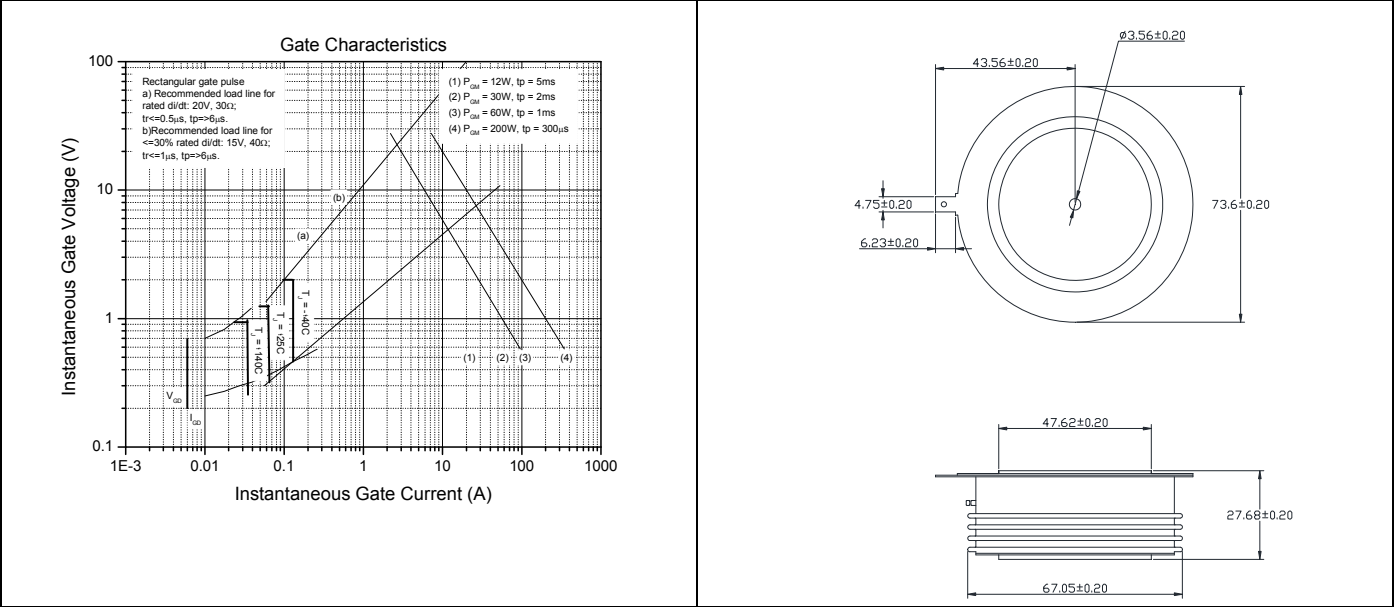


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FORWARD VOLTAGE DROP / THERMAL IMPEDANCE CHARACTERISTICS



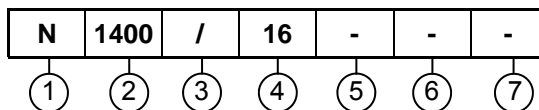
GATE TRIGGER / OUTLINE CHARACTERISTICS



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ORDERING INFORMATION

Device code



- | | |
|---|--|
| 1 | <ul style="list-style-type: none"> - N = Phase Control Thyristors - F = Fast Thyristors (inverter grade) - D = Normal Recovery Diodes - DF = Fast Recovery Diodes - DD = Module (diode-diode) - DT = Module (diode-thyristor) - TD = Module (thyristor-diode) - TT = Module (thyristor-thyristor) - P = Press-fit diode |
| 2 | - Average Current Code |
| 3 | - Essential Part Number |
| 4 | - Voltage Code x 100 = V_{RRM} |
| 5 | <ul style="list-style-type: none"> - Turn-off time (fast thyristors only) - Reverse Recovery Time (fast diodes only) |
| 6 | <ul style="list-style-type: none"> - M = Metric Thread - I = Inch Thread |
| 7 | <ul style="list-style-type: none"> - None = Anode to stud (stud diodes only) - R = Cathode to stud (stud diodes only) |

Disclaimer

All product specifications and data are subject to change without notice.

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