

Medium Power Thyristors (Stud Version), 25A



FEATURES

- Improved glass passivation for high reliability and exceptional stability at high temperature
- High di/dt and dV/dt capabilities
- Standard package
- Low thermal resistance
- Metric threads version available
- Types up to 1600 V V_{DRM}/V_{RRM}
- RoHS compliant
- Designed and qualified for industrial and consumer level

TYPICAL APPLICATIONS

- Medium power switching
- Phase control applications
- Can be supplied to meet stringent military, aerospace and other high reliability requirements



TO-208AA(TO-48)

PRODUCT SUMMARY

$I_{T(AV)}$	25A
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MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		25	A
	T_C	85	°C
$I_{T(RMS)}$		40	A
I_{TSM}	50 HZ	420	A
	60 HZ	440	
I^2t	50 HZ	882	A ² s
	60 HZ	804	
V_{DRM}/V_{RRM}		600 to 1600	V
t_q	Typical	110	μs
T_J		-65 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	V_{DRM}/V_{RRM} , MAXIMUM AND OFF-STATE VOLTAGE ⁽¹⁾ V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK VOLTAGE ⁽²⁾ V	I_{DRM}/I_{RRM} , MAXIMUM AT $T_J = T_J$ MAXIMUM mA
25PT	06	600	700	10
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	16	1600	1700	

Note

(1) Units may be broken over non-repetitively in the off-state direction without damage, if di/dt does not exceed 20 A/μs

(2) For voltage pulses with $t_p \leq 5$ ms

FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS	
Maximum average forward current at case temperature	I _{T(AV)}	180° conduction, half sine wave			25	A	
					85	°C	
Maximum RMS forward current	I _{T(RMS)}				40	A	
Maximum peak, one-cycle non-reptitive surge current	I _{TSM}	t = 10ms	No voltage reapplied	Sinusoidal half wave, initial T _J = T _J maximum	420	A	
		t = 8.3ms			440		
		t = 10ms	100% V _{RRM} reapplied		350		A ² s
		t = 8.3ms			370		
Maximum I ² t for fusing	I ² t	t = 10ms	No voltage reapplied		882		
		t = 8.3ms			804		
		t = 10ms	100% V _{RRM} reapplied		625		
		t = 8.3ms			569		
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reapplied, T _J = T _J maximum			8820	A ² √s	
Low level value of threshold voltage	V _{T(TO)1}	(16.7 % x π x I _{T(AV)}) < I < π x I _{T(AV)}), T _J = T _J maximum			0.99	V	
High level value of threshold voltage	V _{T(TO)2}	(I > π x I _{T(AV)}), T _J = T _J maximum			1.40		
Low level value of on-state slope resistance	r _{t1}	(16.7 % x π x I _{T(AV)}) < I < π x I _{T(AV)}), T _J = T _J maximum			10.1	mΩ	
High level value of on-state slope resistance	r _{t2}	(I > π x I _{T(AV)}), T _J = T _J maximum			5.7		
Maximum on-state voltage	V _{TM}	I _{pk} = 79 A, T _J = 25°C			1.70	V	
Maximum holding current	I _H	T _J = 25 °C, anode supply 6 V, resistive load			130	mA	
Latching current	I _L				200		

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum rate of rise of turned-on current	di/dt	$T_J = T_J$ maximum, $V_{DM} = 2/3 V_{DRM}$, $t_p = 200 \mu s$, $I_G = 0.3A$, $dI_G/dt = 0.3 A/\mu s$, $T_J = 125^\circ C$	150	A/ μs
Typical turn-on time	t_{gt}	$T_J = 25^\circ C$, at rated V_{DRM}/V_{RRM} , $T_J = 125^\circ C$	0.9	μs
Typical reverse recovery time	t_{rr}	$T_J = T_J$ maximum, $I_{TM} = I_{T(AV)}$, $t_p > 200 \mu s$, $dI/dt = -10 A/\mu s$	4	
Typical turn-off time	t_q	$T_J = T_J$ maximum, $I_{TM} = I_{T(AV)}$, $t_p > 200 \mu s$, $V_R = 100 V$, $dI/dt = -10 A/\mu s$, $dV/dt = 20 V/\mu s$ linear to 67 % V_{DRM} , gate bias 0 V to 100 V	110	

Note

$t_q = 10 \mu s$ up to 600 V, $t_q = 30 \mu s$ up to 1600 V available on special request

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum linear to 67 % rated V_{DRM} , gate open	1000	V/ μs

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P _{GM}	T _J = T _J maximum		8.0	W
Maximum average gate power	P _{G(AV)}			2.0	
Maximum peak positive gate current	I _{GM}	T _J = T _J maximum		1.5	A
Maximum peak negative gate voltage	-V _{GM}	T _J = T _J maximum		10	V
DC gate current required to trigger	I _{GT}	T _J = -65°C	Maximum required gate trigger current/voltage are the lowest value which will trigger all units 6 V anode to cathode applied	90	mA
		T _J = 25°C		60	
		T _J = 125°C		35	
DC gate voltage required to trigger	V _{GT}	T _J = -65°C		3.0	V
		T _J = 25°C		1.5	
		T _J = 125°C		1.0	
DC gate current not to trigger	I _{GD}	T _J = T _J maximum, V _{DRM} = Rated value		2.0	mA
DC gate voltage not to trigger	V _{GD}	T _J = T _J maximum, V _{DRM} = Rated value	Maximum gate current/voltage not to trigger is the maximum value which will not trigger any unit with rated V _{DRM} anode to cathode applied	0.2	V

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction operating and storage temperature range	T_J, T_{stg}			- 65 to 125	$^{\circ}\text{C}$
Maximum thermal resistance, junction to case	R_{thJC}	DC operation		0.75	K/W
Maximum thermal resistance case to heatsink	R_{thCS}	Mounting surface, smooth, flat and greased		0.35	
Allowable mounting torque		Not-lubricated threads		$3.4^{+0}_{-10\%}$ (30)	N · m (lbf · in)
		Lubricated threads		$23^{+0}_{-10\%}$ (20)	N · m (lbf · in)
Approximate weight				11.5	g
				0.41	oz.
Case style		See dimensions - link at the end of datasheet		TO-208AA (TO-48)	

ΔR_{thJC} CONDUCTION					
CONDUCTION ANGEL	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDUCTIONS	UNITS	
180°	0.17	0.13	$T_J = T_J$ maximum	K/W	
120°	0.21	0.22			
90°	0.27	0.30			
60°	0.40	0.42			
30°	0.69	0.70			

Note

- The table above shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC

Fig.1 Current ratings characteristics

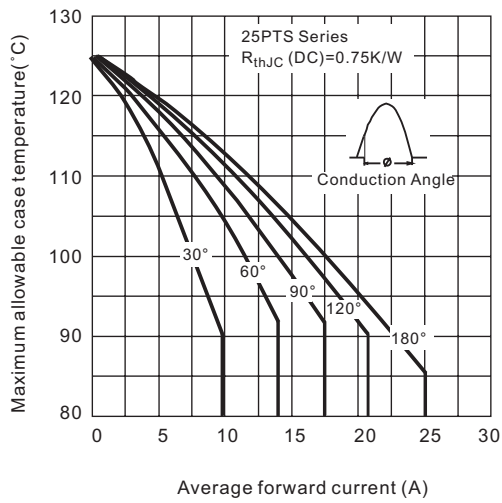


Fig.2 Current ratings characteristics

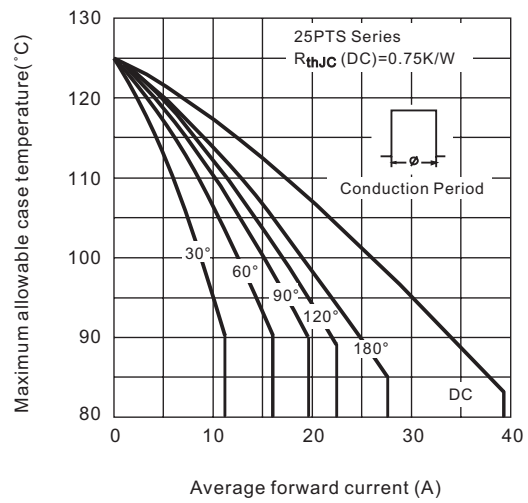


Fig.3 On-state power loss characteristics

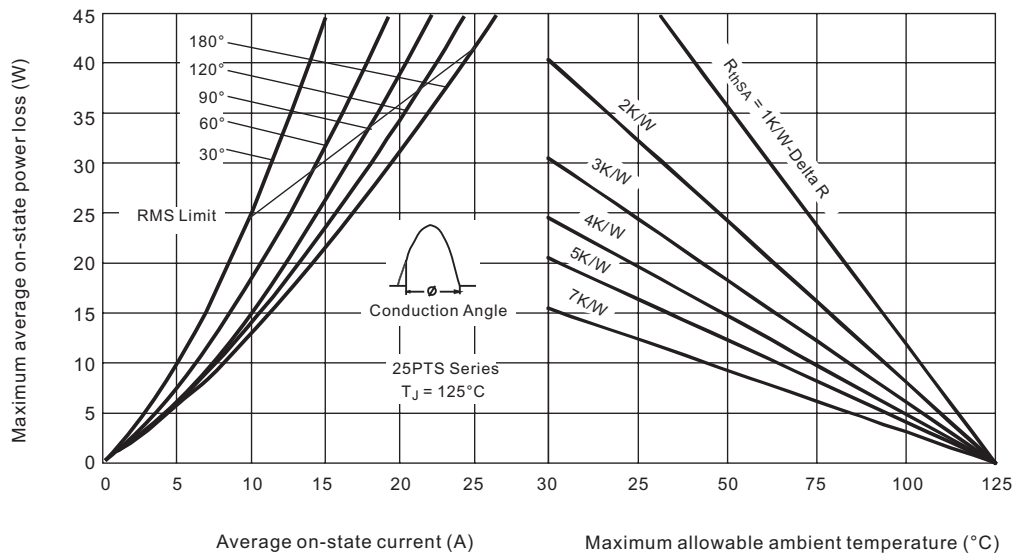


Fig.4 On-state power loss characteristics

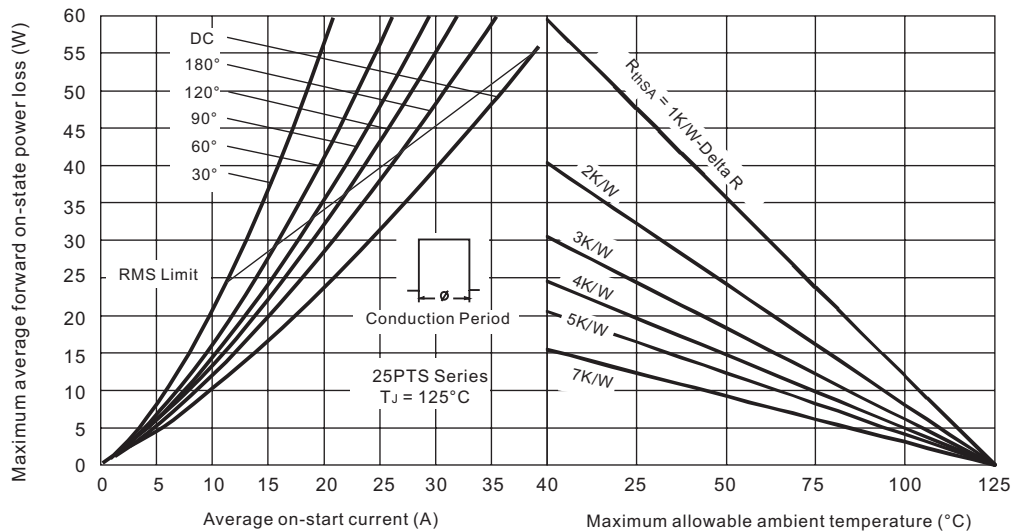


Fig.5 Maximum non-repetitive surge current

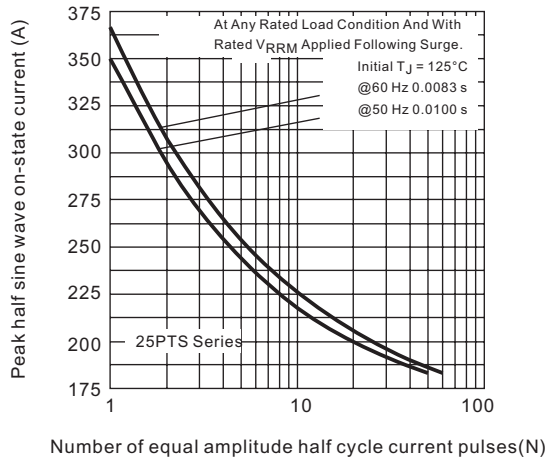


Fig.6 Maximum non-repetitive surge cCurrent

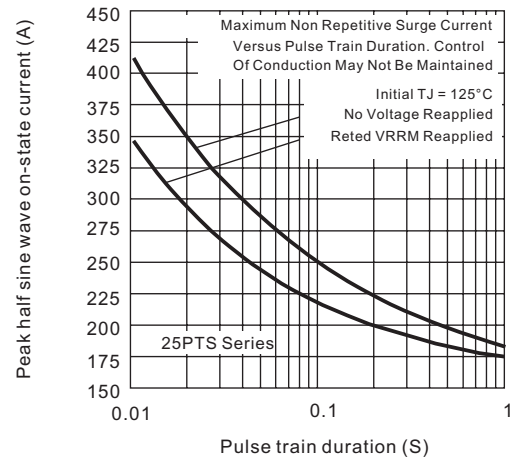


Fig.7 Forward voltage drop characteristics

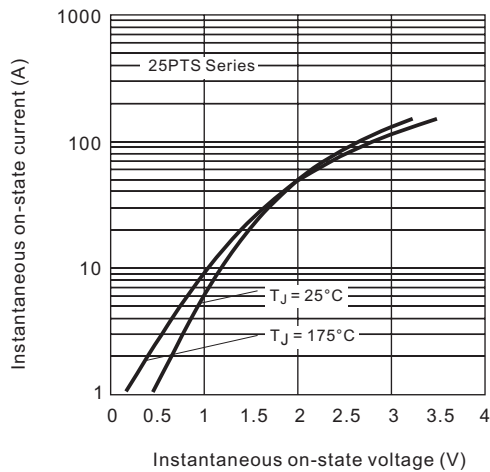


Fig.8 Thermal Impedance Z_{thJC} characteristics

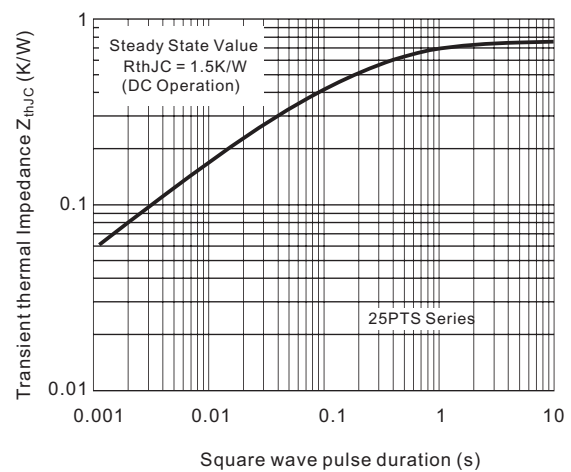
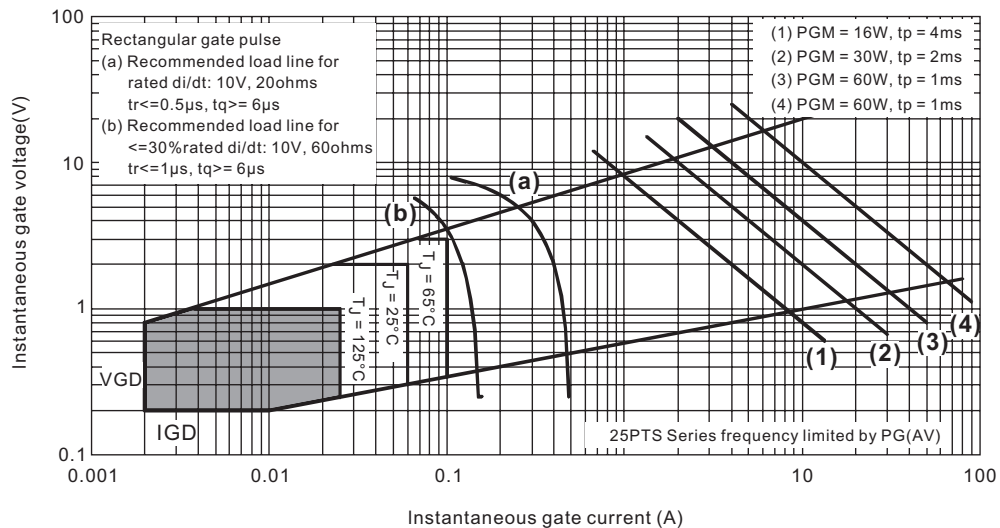


Fig.9 Gate characteristics

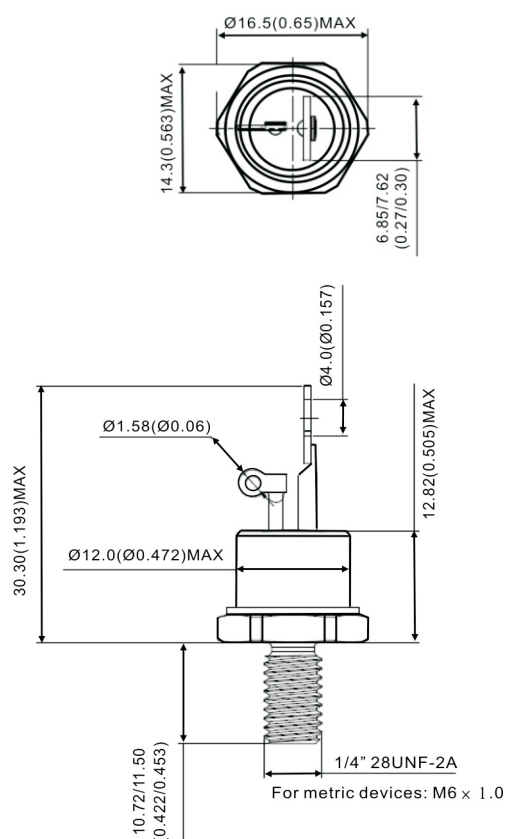


ORDERING INFORMATION TABLE

Device code	25	PT	12	S	M
	1	2	3	4	5

- 1** - Current Code
- 2** - PT for SCR series
- 3** - Voltage code $\times 100 = V_{RRM}$ (see Voltage Ratings table)
- 4** - S for stud type
- 5** - None = Stud base TO-208AA (TO-48) 1/4"-28 UNF-2A
M = Stud base TO-208AA (TO-48) M6 $\times$ 1

GLASS - METAL SEAL



All dimensions in millimeters (inches)