Medium Power Thyristors

(Stud Version), 25A

Available RoHS* COMPLIANT

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

TO-208AA(TO-48)

TYPICAL APPLICATIONS

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

PRODUCT SUMMARY	
$I_{T(AV)}$	25A

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^2s
	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
25PTS	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 tp ≤ 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	
		t = 8.3ms			370	
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied		882	A^2s
		t = 8.3ms			804	
		t = 10ms	100%V_{RRM} reapplied		625	
		t = 8.3ms			569	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied, $T_J = T_J$ maximum			8820	$A^2\sqrt{s}$
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 µs I_G = 0.3A, dI_G/dt = 0.3 A/us, T_J = 125 °C	150	A/µs
Typical turn-on time	t_{gt}	T_J = 25 °C, at rated V_{DRM}/V_{RRM}, T_J = 125 °C	0.9	µs
Typical reverse recovery time	t_{rr}	$T_J = T_J$ maximum, $I_{TM} = I_{T(AV)}$, t_p > 200 µs, dI/dt = - 10 A/µs	4	
Typical turn-off time	t_q	$T_J = T_J$ maximum, $I_{TM} = I_{T(AV)}$, t_p > 200 µs, V_R = 100 V, dI/dt = - 10 A/µs, dV/dt = 20 V/µs linear to 67 % V_{DRM}, gate bias 0 V to 100 V	110	

Note

- t_q = 10 µs up to 600 V, t_q = 30 µs 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 SPECIFCATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum junction operating and storage temperature range	T_J,T_{stg}		- 65 to125	°C
Maximum thermal resistace, 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

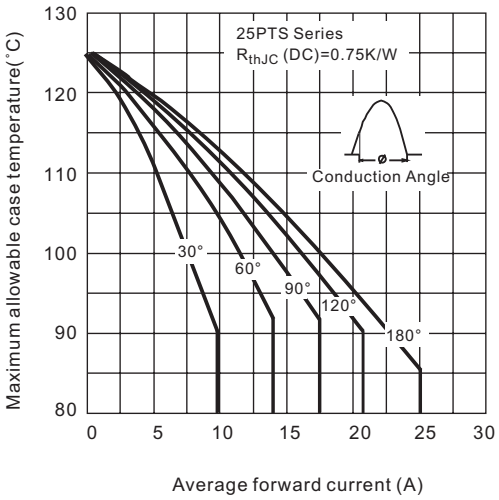


Fig.2 Current ratings characteristics

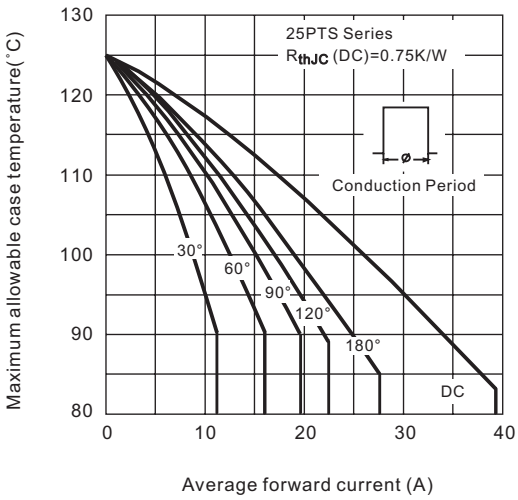


Fig.3 On-state power loss characteristics

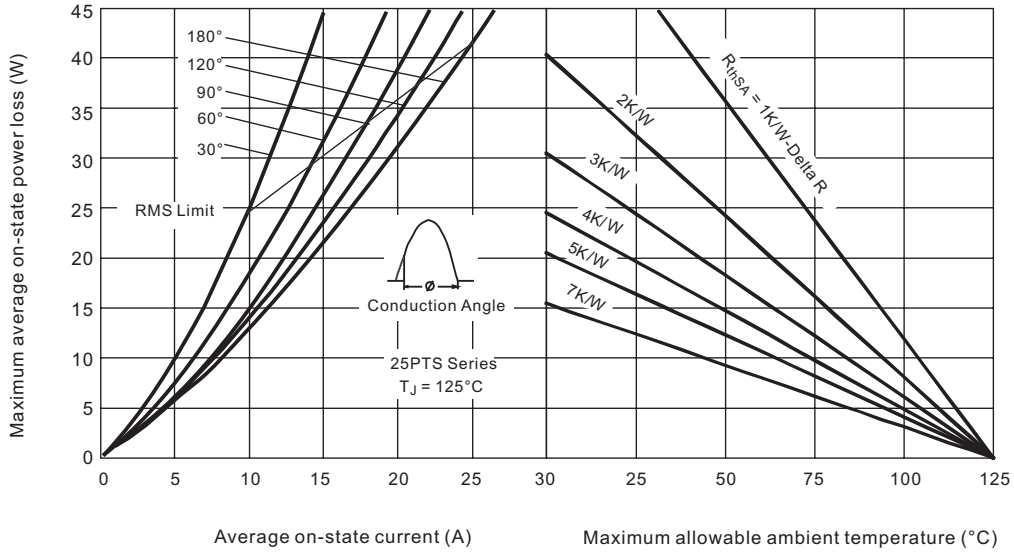


Fig.4 On-state power loss characteristics

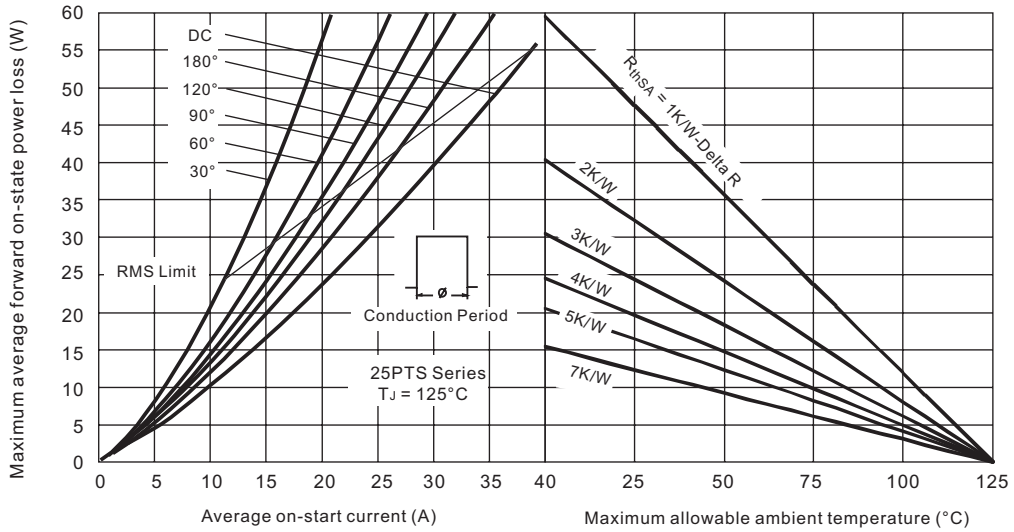


Fig.5 Maximum non-repetitive surge current

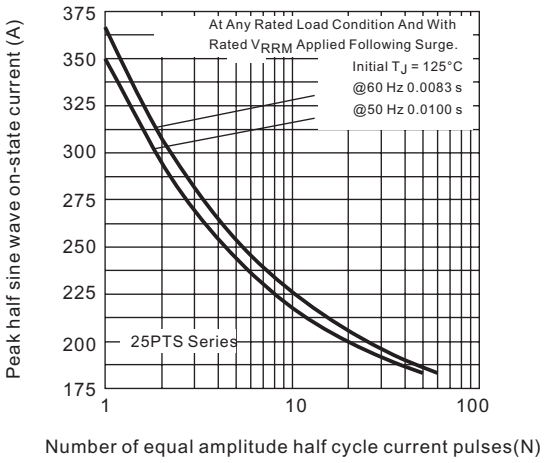


Fig.6 Maximum non-repetitive surge cCurrent

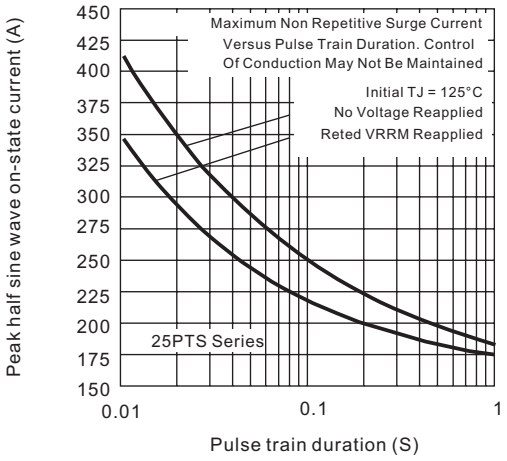


Fig.7 Forward voltage drop characterisics

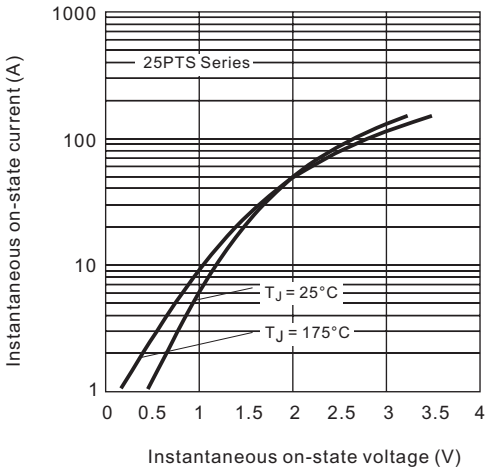


Fig.8 Thermal Impedance Z_{thJC} characteristics

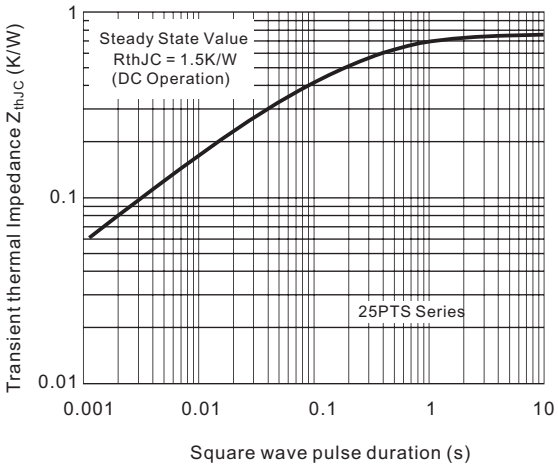
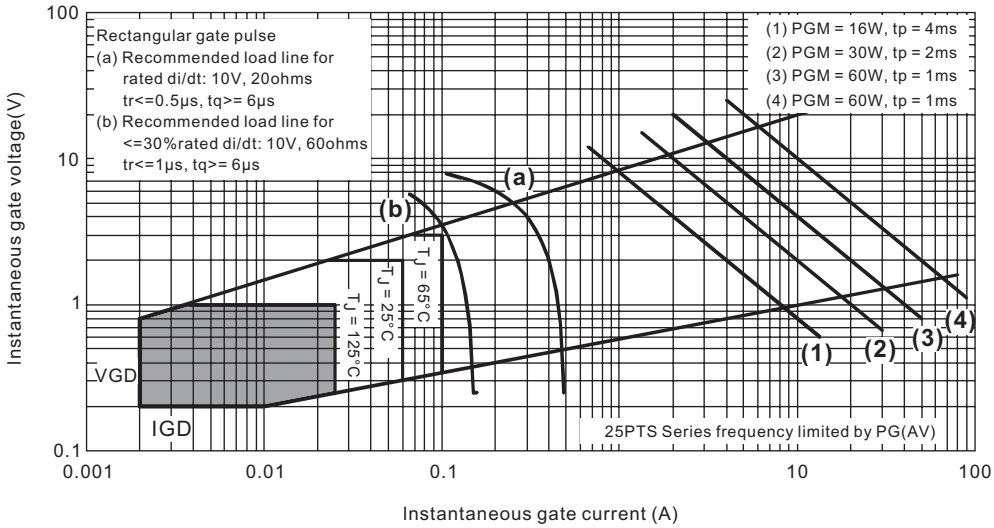


Fig.9 Gate characteristics



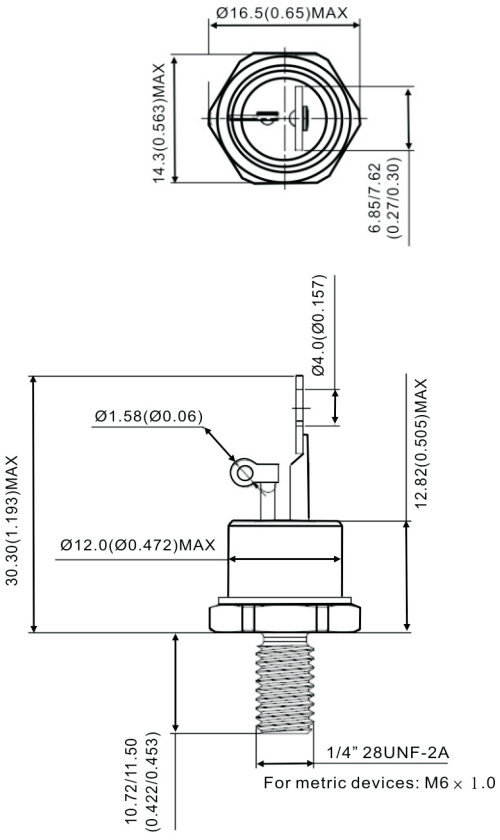
ORDERING INFORMATION TABLE

Device code

25	PT	12	S	M
①	②	③	④	⑤

1 - Current Code
2 - PT for SCR series
3 - Voltage code × 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) M6×1

GLASS - METAL SEAL



All dimensions in millimeters (inches)