Medium Power Thyristors

(Stud Version), 50A

Available RoHS* COMPLIANT

FEATURES

- Improved glass passivation for high reliability
- High current rating
- Excellent dynamic characteristics
- dV/dt = 1000 V/μs option
- Superior surge capabilities
- Standard package
- Metric threads version available
- Types up to 1600V V_{DRM}/V_{RRM}
- RoHs compliant

TO-208AC(TO-65)

TYPICAL APPLICATIONS

- Phase control applications in converters
- Lighting circuits
- Battery charges
- Regulated power supplies temperature and speed control circuit
- Can be supplied to meet stringent military, aerospace and other high reliability requirements

PRODUCT SUMMARY	
$I_{T(AV)}$	50A

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$		50	A
	T_C	94	°C
$I_{T(RMS)}$		78.5	A
I_{TSM}	50 HZ	1430	A
	60 HZ	1490	
I^2t	50 HZ	10.22	Ka^2s
	60 HZ	9.32	
V_{DRM}/V_{RRM}		600 to 1600	V
t_q	Typical	110	μs
T_J		-40 to 125	°C

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V_{DRM}/V_{RRM}, MAXIMUM REPETITIVE PEAK 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
50PTS	06	600	700	15
	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			50	A
					94	°C
Maximum RMS on-state current	$I_{T(RMS)}$				78.5	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	1430	A
		t = 8.3ms			1490	
		t = 10ms	100%V_{RRM} reapplied		1200	
		t = 8.3ms			1255	
Maximum I^2t for fusing	I^2t	t = 10ms	No voltage reapplied		10.22	A^2s
		t = 8.3ms			9.32	
		t = 10ms	100%V_{RRM} reapplied		7.23	
		t = 8.3ms			6.59	
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			102.2	$A^2\sqrt{s}$
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			0.94	V
High level value of threshold voltage	$V_{T(TO)2}$	(π x $I_{T(AV)}$ < I < 20 × π × $I_{T(AV)}$), $T_J = T_J$ maximum, $T_J = T_J$ maximum			1.08	
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			4.08	mΩ
High level value of on-state slope resistance	r_{t2}	(π x $I_{T(AV)}$ < I < 20 × π × $I_{T(AV)}$), $T_J = T_J$ maximum			3.34	
Maximum on-state voltage	V_{TM}	I_{pk} = 157 A, T_J = 25°C			1.60	V
Maximum holding current	I_H	T_J = 25 °C, anode supply 22 V, resistive load initial I_T = 2A			150	mA
Latching current	I_L	Anode supply 6V , resistive load			300	

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum rate of rise of turned-on current	dI/dt	T_C = 125 °C, V_{DM} = 2/3 V_{DRM}, t_P = 200 µs I_G = 0.3A, dI_G/dt = 0.3 A/µs	150	A/µs
Typical delay time	t_d	T_c = 25 °C, V_{DM} = Rated V_{DRM}, I_{TM} = 10 A dc resistive circuit Gate pulse = 10V, 15Ω source, t_p = 20µs	0.9	µs
Typical turn-off time	t_q	T_c = 125 °C ,ITM = 50A, reapplied dV/dt = 20 V/µs dIr/dt = - 10 A/µs, V_R = 50V	110	

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	T_J = 125°C, V_D =2/3 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, t_p ≤ 5 ms		10	W
Maximum average gate power	$P_{G(AV)}$			2.5	
Maximum peak positive gate current	I_{GM}			2.5	A
Maximum peak positive gate voltage	$+V_{GM}$			20	V
Maximum peak negative gate voltage	$-V_{GM}$			10	
DC gate current required to trigger	I_{GT}	T_J = -40°C	Maximum required gate trigger current/voltage are the lowest value which will trigger all units 6 V anode to cathode applied	250	mA
		T_J = 25°C		100	
		T_J = 125°C		50	
DC gate voltage required to trigger	V_{GT}	T_J = -40°C		3.5	V
		T_J = 25°C		2.0	
DC gate current not to trigger	I_{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	5.0	mA
DC gate voltage not to trigger	V_{GD}	T_J = T_J maximum,		0.2	V

THERMAL AND MECHANICAL SPECIFCATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum operating junction and storage temperature range	T_J,T_{stg}		- 40 to125	°C
Maximum thermal resistace, junction to case	R_{thJC}	DC operation	0.35	K/W
Maximum thermal resistance case to heatsink	R_{thCS}	Mounting surface, smooth, flat and greased	0.25	
Allowable mounting torque		Not-lubricated threads	$3.4^{+0}_{-10\%}$ (30)	N · m (lbf · in)
		Lubricated threads	$2.3^{+0}_{-10\%}$ (20)	N · m (lbf · in)
Approximate weight			16	g
			0.56	oz.
Case style		See dimensions - link at the end of datasheet	TO-208AC (TO-65)	

ΔRthJC CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDUCTIONS	UNITS
180°	0.078	0.057	$T_J = T_J$ maximum	K/W
120°	0.094	0.098		
90°	0.120	0.130		
60°	0.176	0.183		
30°	0.294	0.296		

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

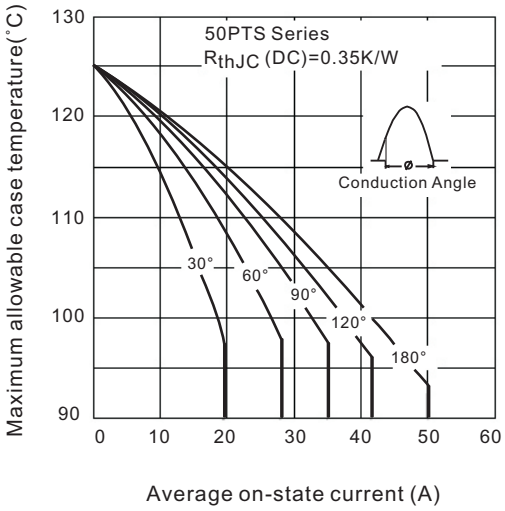


Fig.2 Current ratings characteristics

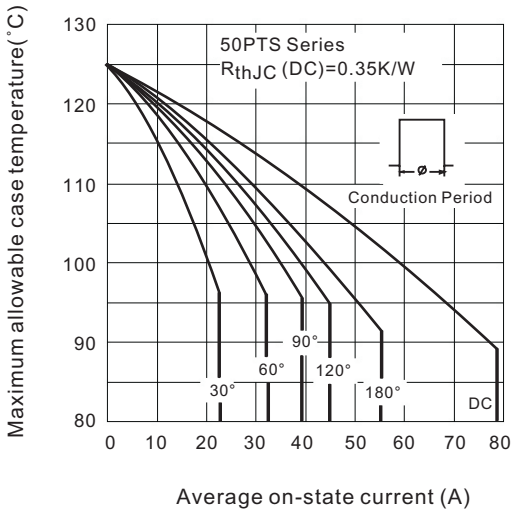


Fig.3 On-state power loss characteristics

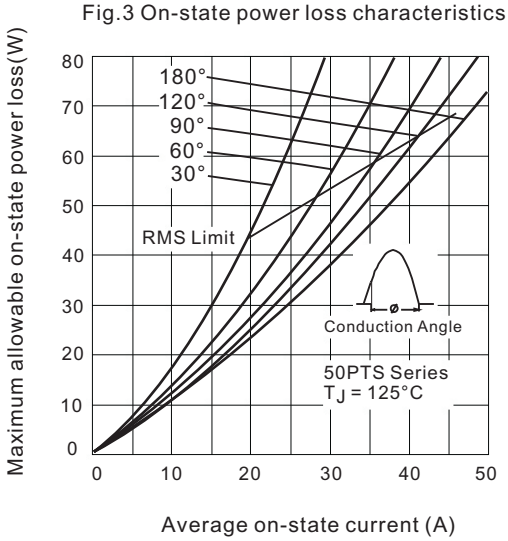


Fig.4 Maximum non-repetitive surge current

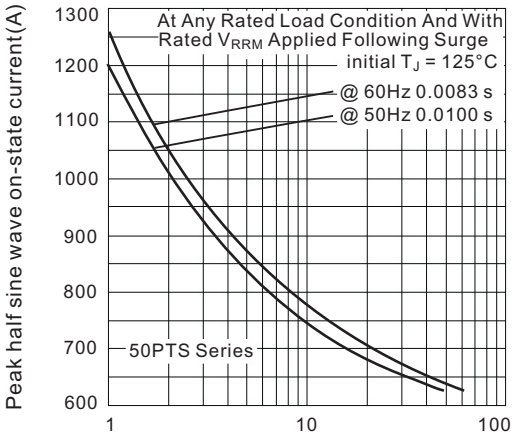


Fig.5 On-state power loss characteristics

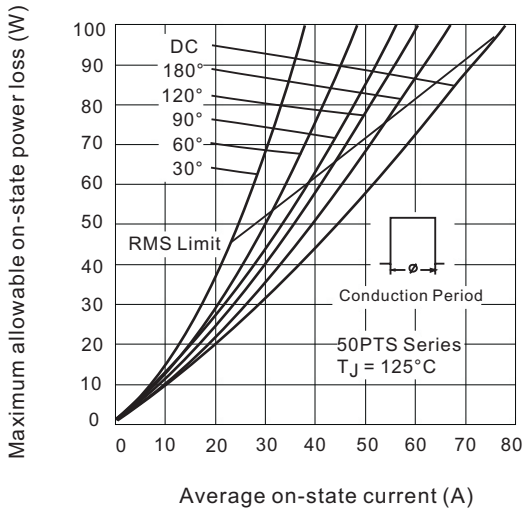


Fig.6 Maximum non-repetitive surge current

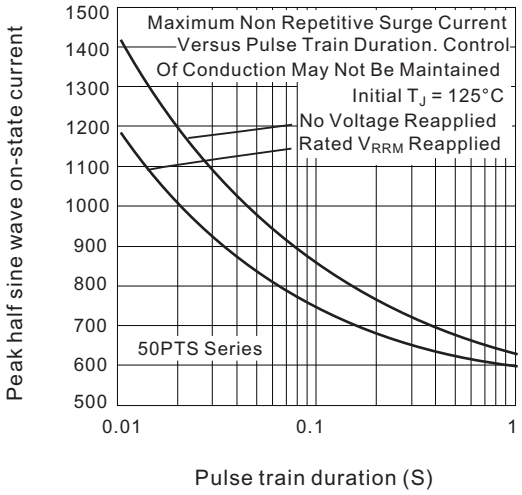


Fig.7 Forward voltage drop characteristics

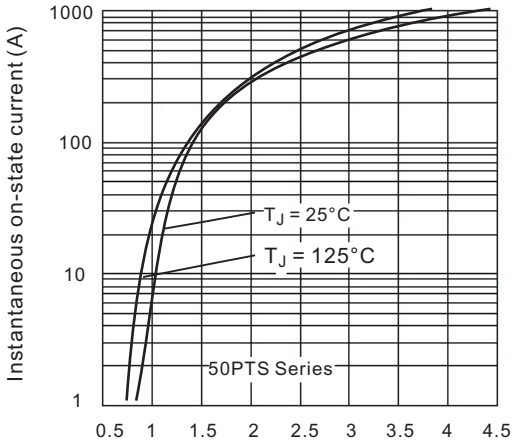


Fig.8 Thermal impedance Z_{thJC} Characteristics

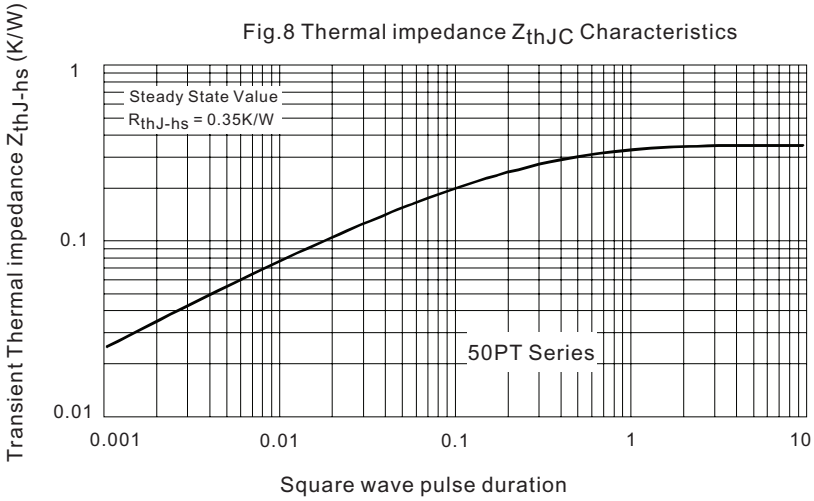
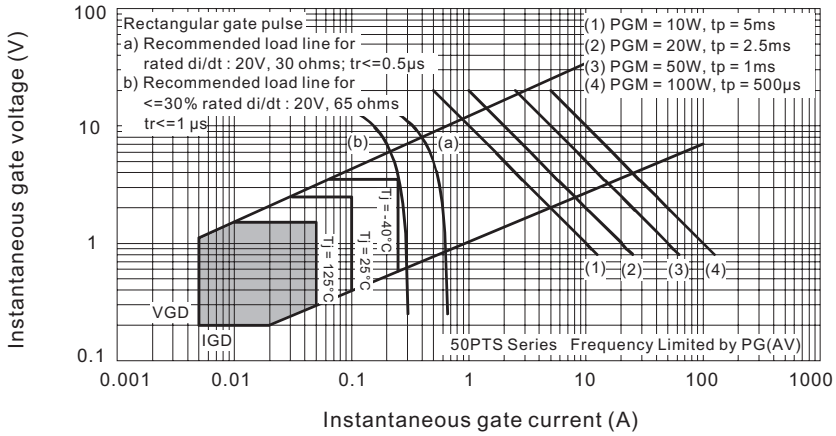


Fig.9 Gate characteristics



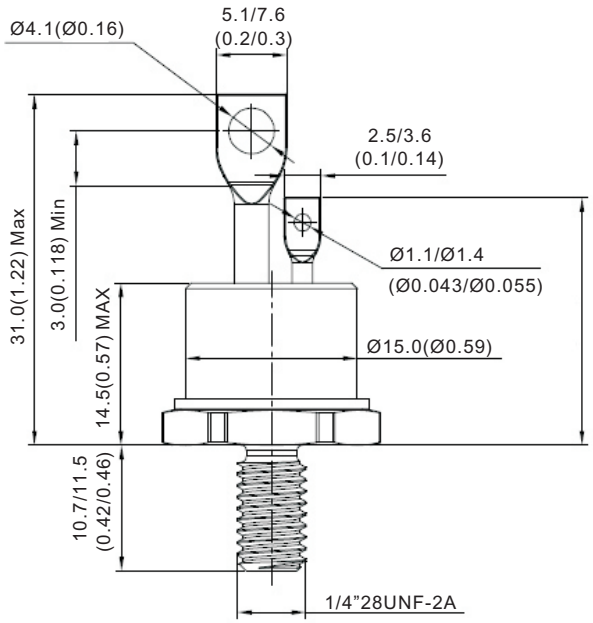
ORDERING INFORMATION TABLE

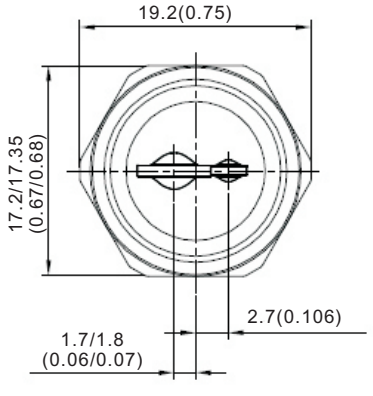
Device code

50	PT	12	S	M
①	②	③	④	⑤

1 - Current Code
2 - 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-65) 1/4”-28 UNF-2A
M = Stud base TO-208AA (TO-65) M6×1

GLASS - METAL SEAL





All dimensions in millimeters(inches)