



DISCRETE POWER DIODES and THYRISTORS
DATA BOOK



ST183S SERIES

INVERTER GRADE THYRISTORS

Stud Version

Features

- All diffused design
- Center amplifying gate
- Guaranteed high dv/dt
- Guaranteed high di/dt
- High surge current capability
- Low thermal impedance
- High speed performance

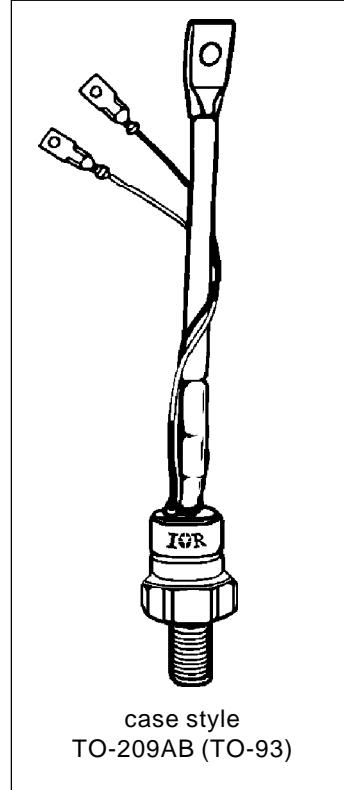
195A

Typical Applications

- Inverters
- Choppers
- Induction heating
- All types of force-commutated converters

Major Ratings and Characteristics

Parameters	ST183S	Units
$I_{T(AV)}$	195	A
@ T_C	85	°C
$I_{T(RMS)}$	306	A
I_{TSM}	4900	A
@ 50Hz	4900	A
@ 60Hz	5130	A
I^2t	120	KA ² s
@ 50Hz	120	KA ² s
@ 60Hz	110	KA ² s
V_{DRM}/V_{RRM}	400 to 800	V
t_q range	10 to 20	μs
T_J	- 40 to 125	°C



ST183S Series

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM} , maximum repetitive peak voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_{J\max}$ mA
ST183S	04	400	500	40
	08	800	900	

Current Carrying Capability

Frequency				Units
50Hz	570	370	900	A
400Hz	560	360	940	
1000Hz	500	300	925	
2500Hz	340	190	760	
Recovery voltage V_r	50	50	50	50
Voltage before turn-on V_d	V_{DRM}	V_{DRM}	V_{DRM}	V
Rise of on-state current di/dt	50	50	-	- A/ μ s
Case temperature	60	85	60	85 °C
Equivalent values for RC circuit	$47\Omega / 0.22\mu F$	$47\Omega / 0.22\mu F$	$47\Omega / 0.22\mu F$	

On-state Conduction

Parameter	ST183S	Units	Conditions			
$I_{T(AV)}$ Max. average on-state current @ Case temperature	195	A	180° conduction, half sine wave			
	85	°C				
$I_{T(RMS)}$ Max. RMS on-state current	306		DC @ 74°C case temperature			
I_{TSM} Max. peak, one half cycle, non-repetitive surge current	4900	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_{J\max}$	
	5130		t = 8.3ms			
	4120		t = 10ms	100% V_{RRM} reapplied		
	4310		t = 8.3ms			
I^2t Maximum I^2t for fusing	120	KA ² s	t = 10ms	No voltage reapplied	Initial $T_J = T_{J\max}$	
	110		t = 8.3ms			
	85		t = 10ms	100% V_{RRM} reapplied		
	78		t = 8.3ms			
$I^{2\sqrt{t}}$ Maximum $I^{2\sqrt{t}}$ for fusing	1200	KA ² \sqrt{s}	t = 0.1 to 10ms, no voltage reapplied			

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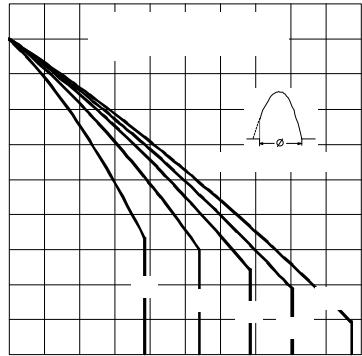


Fig. 1 - Current Ratings Characteristics

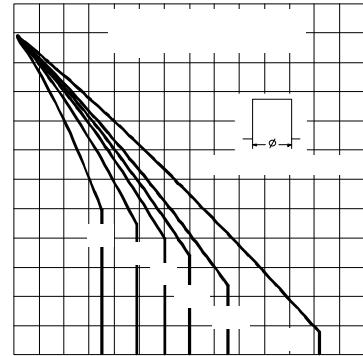


Fig. 2 - Current Ratings Characteristics

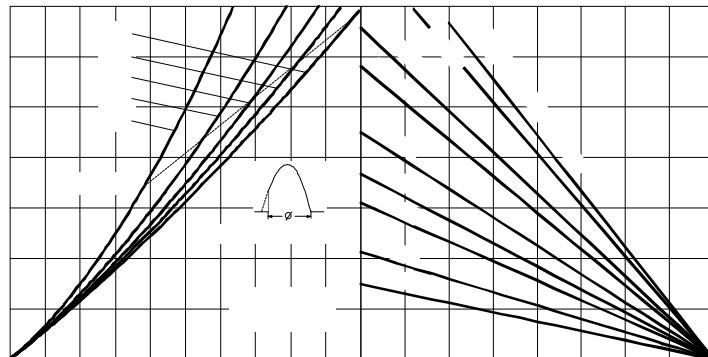


Fig. 3 - On-state Power Loss Characteristics

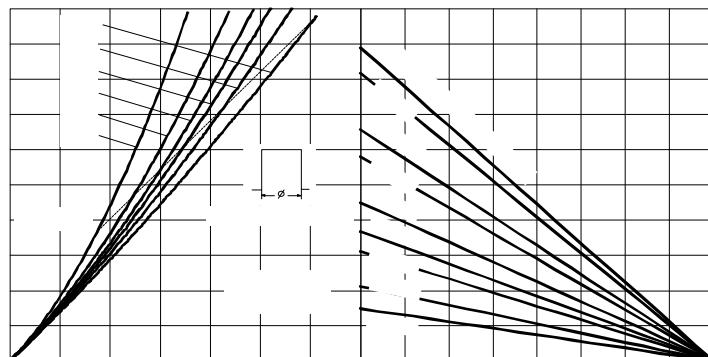


Fig. 4 - On-state Power Loss Characteristics

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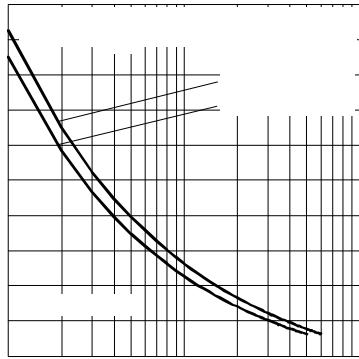


Fig. 5 - Maximum Non-repetitive Surge Current

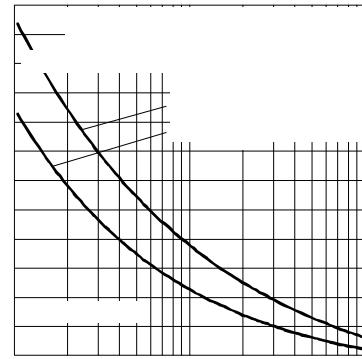


Fig. 6 - Maximum Non-repetitive Surge Current

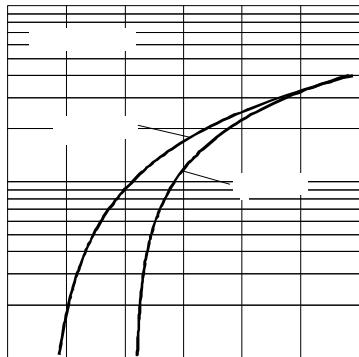


Fig. 7 - On-state Voltage Drop Characteristics

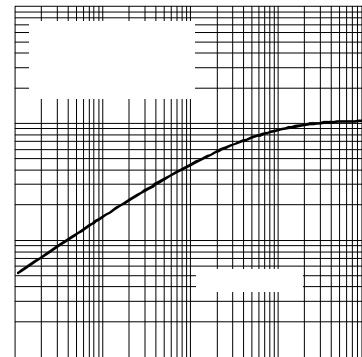


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

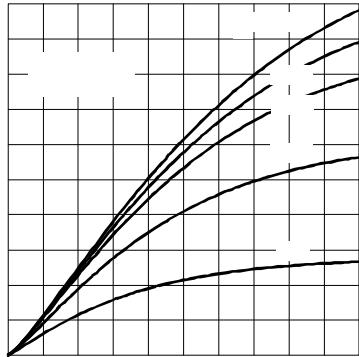


Fig. 9 - Reverse Recovered Charge Characteristics

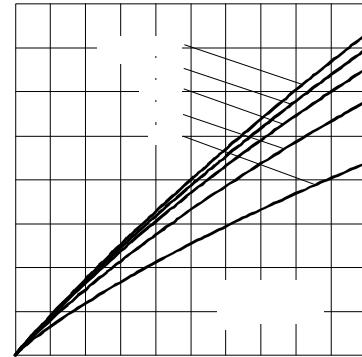


Fig. 10 - Reverse Recovery Current Characteristics

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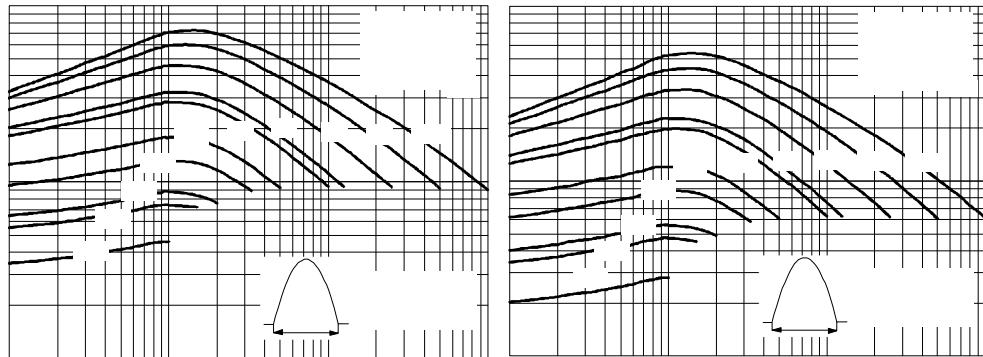


Fig. 11 - Frequency Characteristics

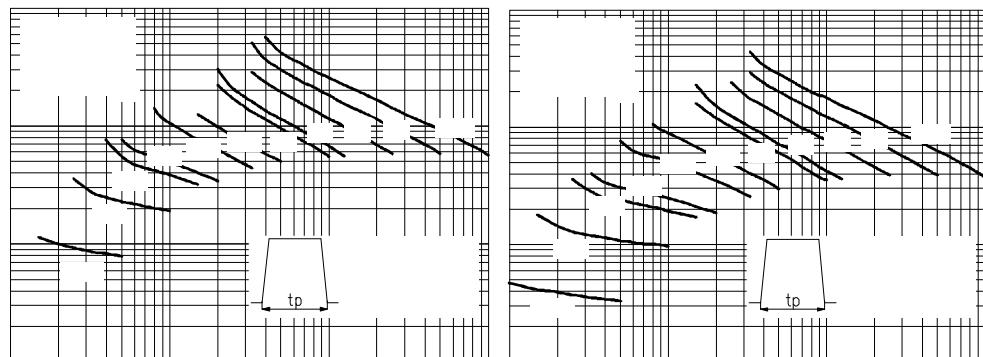


Fig. 12 - Frequency Characteristics

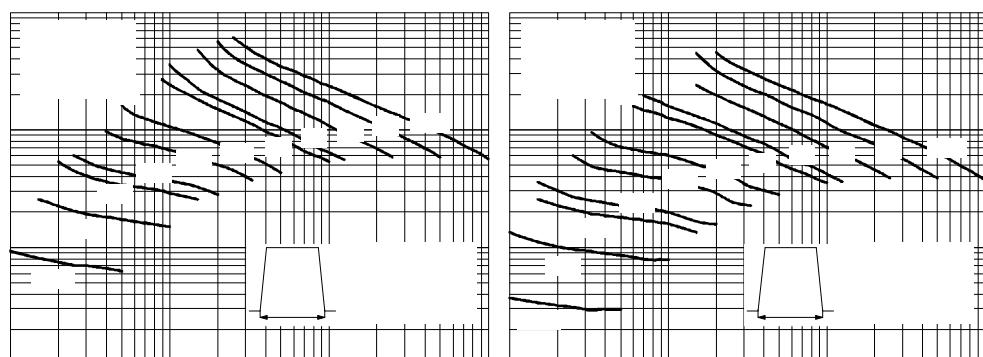


Fig. 13 - Frequency Characteristics

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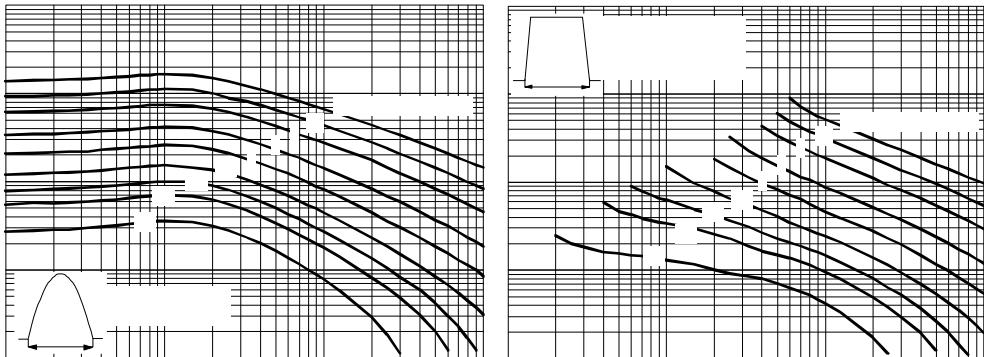


Fig. 14 - Maximum On-state Energy Power Loss Characteristics

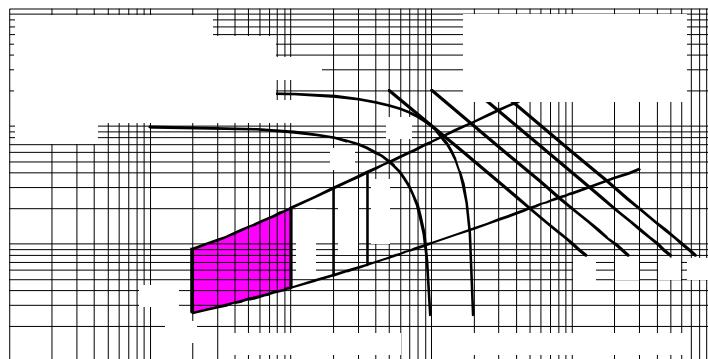


Fig. 15 - Gate Characteristics

ST183S Series

On-state Conduction

Parameter	ST183S	Units	Conditions	
V_{TM}	Max. peak on-state voltage	1.80	V	$I_{TM} = 600A, T_J = T_J \text{ max}, t_p = 10\text{ms sine wave pulse}$
$V_{T(TO)1}$	Low level value of threshold voltage	1.40		$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}, T_J = T_J \text{ max.}$
$V_{T(TO)2}$	High level value of threshold voltage	1.45		$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ max.}$
r_{t1}	Low level value of forward slope resistance	0.67	$\text{m}\Omega$	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}, T_J = T_J \text{ max.}$
r_{t2}	High level value of forward slope resistance	0.58		$(I > \pi \times I_{T(AV)}), T_J = T_J \text{ max.}$
I_H	Maximum holding current	600	mA	$T_J = 25^\circ\text{C}, I_T > 30\text{A}$
I_L	Typical latching current	1000		$T_J = 25^\circ\text{C}, V_A = 12\text{V}, R_a = 6\Omega, I_G = 1\text{A}$

Switching

Parameter	ST183S	Units	Conditions	
di/dt	Max. non-repetitive rate of rise of turned-on current	1000	$\text{A}/\mu\text{s}$	$T_J = T_J \text{ max}, V_{DRM} = \text{rated } V_{DRM}$ $I_{TM} = 2 \times di/dt$
t_d	Typical delay time	1.1		$T_J = 25^\circ\text{C}, V_{DM} = \text{rated } V_{DRM}, I_{TM} = 50\text{A DC}, t_p = 1\mu\text{s}$ Resistive load, Gate pulse: 10V, 5Ω source
t_q	Max. turn-off time	Min 10 Max 20		$T_J = T_J \text{ max}, I_{TM} = 300\text{A}, \text{commutating } di/dt = 20\text{A}/\mu\text{s}$ $V_R = 50\text{V}, t_p = 500\mu\text{s}, dv/dt: \text{see table in device code}$

Blocking

Parameter	ST183S	Units	Conditions
dv/dt	Maximum critical rate of rise of off-state voltage	500	$V/\mu\text{s}$
$I_{RRM/DRM}$	Max. peak reverse and off-state leakage current	40	mA

Triggering

Parameter	ST183S	Units	Conditions	
P_{GM}	Maximum peak gate power	60	W	$T_J = T_J \text{ max}, f = 50\text{Hz}, d\% = 50$
$P_{G(AV)}$	Maximum average gate power	10		
I_{GM}	Max. peak positive gate current	10	A	$T_J = T_J \text{ max}, t_p \leq 5\text{ms}$
$+V_{GM}$	Maximum peak positive gate voltage	20		
$-V_{GM}$	Maximum peak negative gate voltage	5	V	$T_J = T_J \text{ max}, t_p \leq 5\text{ms}$
I_{GT}	Max. DC gate current required to trigger	200		
V_{GT}	Max. DC gate voltage required to trigger	3	V	$T_J = T_J \text{ max}, V_A = 12\text{V}, R_a = 6\Omega$
I_{GD}	Max. DC gate current not to trigger	20	mA	
V_{GD}	Max. DC gate voltage not to trigger	0.25	$T_J = T_J \text{ max, rated } V_{DRM} \text{ applied}$	

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Thermal and Mechanical Specifications

Parameter	ST183S	Units	Conditions
T _J	Max. junction operating temperature range	-40 to 125	°C
T _{stg}	Max. storage temperature range	-40 to 150	
R _{thJC}	Max. thermal resistance, junction to case	0.105	K/W
R _{thCS}	Max. thermal resistance, case to heatsink	0.04	
T	Mounting torque, ± 10%	31 (275)	Nm (lbf-in)
		24.5 (210)	Nm (lbf-in)
wt	Approximate weight	280	g
Case style		TO-209AB (TO-93)	See Outline Table

ΔR_{thJC} Conduction

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.016	0.012	K/W	T _J = T _J max.
120°	0.019	0.020		
90°	0.025	0.027		
60°	0.036	0.037		
30°	0.060	0.060		

Ordering Information Table

Device Code	ST	18	3	S	08	P	F	N	0		
	1	2	3	4	5	6	7	8	9	10	
1 - Thyristor											
2 - Essential part number											
3 - 3 = Fast turn off											
4 - S = Compression bonding Stud											
5 - Voltage code: Code x 100 = V _{RRM} (See Voltage Ratings table)											
6 - P = Stud base 3/4" 16UNF-2A M = Stud base metric threads M16 x 1.5											
7 - Reapplied dv/dt code (for t _q test condition)											
8 - t _q code											
9 - 0 = Eyelet terminals (Gate and Aux. Cathode Leads) 1 = Fast-on terminals (Gate and Aux. Cathode Leads) 2 = Flag terminals (For Cathode and Gate Terminals)											
10 - Critical dv/dt: None = 500V/μsec (Standard value) L = 1000V/μsec (Special selection)											
*Standard part number. All other types available only on request.											
dv/dt - t _q combinations available											
dv/dt (V/μs)		20	50	100	200	400					
t _q (μs)		10	CN	DN	EN	FN *					
		12	CM	DM	EM	FM					
		15	CL	DL	EL	FL *					
		18	CP	DP	EP	FP					
		20	CK	DK	EK	FK					

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Outline Table

