

### FEATURES

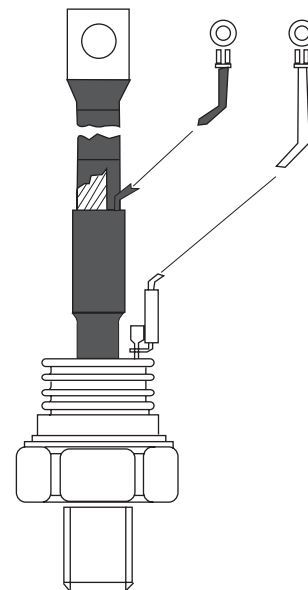
- 1). Center amplifying gate
- 2). Hermetic metal case with ceramic insulator  
(Also available with glass-metal seal up to 1200V)
- 3). International standard case TO-209AB (TO-93)
- 4). Threaded studs UNF 3/4 - 16UNF2A or ISO M16x1.5
- 5). Compression Bonded Encapsulation for heavy duty operations such as severe thermal cycling

### TYPICAL APPLICATIONS

- 1). DC motor controls
- 2). Controlled DC power supplies
- 3). AC controllers

### MAJOR RATINGS AND CHARACTERISTICS

Parameters		KST230S	Unit
$I_{F(AV)}$		250	A
	@ $T_c$	85	°C
$I_{F(RMS)}$		360	A
$I_{FSM}$	@ 50Hz	5700	A
	@ 60Hz	5970	A
$I^2t$	@ 50Hz	163	KA <sup>2</sup> s
	@ 60Hz	149	KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$		400 to 1600	V
$T_q$	typical	100	μs
$T_J$		40 to 125	°C



### ELECTRICAL SPECIFICATIONS

#### 1). Voltage Ratings

Type number	Voltage Code	$V_{DRM}/V_{RRM}$ , maximum repetitive peak reverse voltage	$V_{RSM}$ , maximum non-repetitive peak reverse voltage	$I_{DRM}/I_{RRM}$ max. @ $T_J = T_{J\max}$
		V	V	mA
KST230S	04	400	500	30
	08	800	900	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

2). Forward Conduction

Parameters		KST230S	Unit	Conditions		
$I_{T(AV)}$	Max. average forward current	250	A	180° conduction, half sine wave		
	@ Case temperature	85	°C			
$I_{T(RMS)}$	Max. RMS forward current	360	A	DC @ 78°C case temperature		
$I_{TSM}$	Max. peak, one-cycle forward, non-repetitive surge current	5700	A	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J \text{ max.}$
		5970		t = 8.3ms	reapplied	
		4800		t = 10ms	100% $V_{RRM}$	
		5000		t = 8.3ms	reapplied	
$I^2t$	Maximum $I^2t$ for fusing	163	KA <sup>2</sup> s	t = 10ms	No voltage	Initial $T_J = T_J \text{ max.}$
		148		t = 8.3ms	reapplied	
		115		t = 10ms	100% $V_{RRM}$	
		105		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	1630	KA <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$	Low level value of threshold voltage	0.92	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$		
$V_{T(TO)2}$	High level value of threshold voltage	0.98		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$		
$r_{t1}$	Low level value of forward slope resistance	0.88	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$		
$r_{t2}$	High level value of forward slope resistance	0.81		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$		
$V_{TM}$	Max. forward voltage drop	1.55	V	$I_{pk} = 720A$ , $T_J = T_J \text{ max.}$ , $t_p = 10ms$ sine pulse		
$I_H$	Maximum holding current	600	mA	$T_J = 25^\circ\text{C}$ , anode supply 12V resistive load		
$I_L$	Typical latching current	1000 (300)				
$di/dt$	Max. non-repetitive rate of rise of turned-on current	1000	A/μs	Gate drive 20V, 20Ω, $tr \leq 1 \mu s$ $T_J = T_J \text{ max.}$ , anode voltage $\leq 80\% V_{DRM}$		
$t_d$	Typical delay time	1.0	μs	Gate current 1A, $di_g/d_t = 1A/\mu s$ $V_d = 0.67\% V$ , $T = 25^\circ\text{C}$ $V_{DRM}$ , $T_J = 25^\circ\text{C}$		
$t_q$	Typical turn-off time	100		$I_{TM} = 300A$ , $T_J = T_J \text{ max.}$ , $di/dt = 20A/\mu s$ , $V_R = 50V$ $dv/dt = 20V/\mu s$ , Gate 0V 100Ω, $t_p = 500 \mu s$		
$dv/dt$	Maximum critical rate of rise of off-state voltage	500	V/μs	$T_J = T_J \text{ max.}$ linear to 80% rated $V_{DRM}$		
$I_{DRM}$	Max. peak reverse and off-state	30	mA	$T_J = T_J \text{ max.}$ rated $V_{DRM}/V_{RRM}$ applied		
$I_{RRM}$	leakage current					

3). Triggering

Parameters		KST230S		Unit	Conditions
$P_{GM}$	Maximum peak gate power	10.0		W	$T_J = T_J \text{ max, } t_p \leq 5\text{ms}$
$P_{G(AV)}$	Maximum average gate power	2.0			
$I_{GM}$	Max. peak positive gate current	3.0		A	$T_J = T_J \text{ max, } f = 50\text{Hz, } d\% = 50$
$+V_{GM}$	Max. peak positive gate current	20		V	$T_J = T_J \text{ max, } t_p \leq 5\text{ms}$
$-V_{GM}$	Maximum peak positive gate voltage	5.0			
$I_{GT}$	DC gate current required to trigger	TYP.	MAX.	mA	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
		180	-		
		90	150		
$V_{GT}$	DC gate voltage required to trigger	2.9	-	V	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
		1.8	3.0		
		1.2	-		
$I_{GD}$	DC gate current not to trigger	10		mA	$T_J = T_J \text{ max.}$ Max. gate current/ voltage not to trigger is the max. value which. will not trigger any unit with rated $V_{DRM}$ anode-to-cathode applied
$V_{GD}$	DC gate voltage not to trigger	0.25			
$T_J$	Max. operating temperature range	-40 to 125		$^\circ\text{C}$	
$T_{stg}$	Max. storage temperature range	-40 to 150		$^\circ\text{C}$	
$R_{thJC}$	Max. thermal resistance, junction to case	0.105		K/W	DC operation
$R_{thCS}$	Max. thermal resistance, case to heatsink	0.04		K/W	Mounting surface, smooth, flat and greased
T	Mounting torque	31 (275)		Nm	Non lubricated threads
		24.5 (210)		(lbf-in)	Lubricated threads
wt	Approximate weight	280		g	
	Case style	TO-118			See Outline Table

$\Delta R_{thJC}$  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	$T_J = T_J \text{ max.}$
120°	0.019	0.020		
90°	0.025	0.027		
60°	0.036	0.037		
30°	0.060	0.060		

**PERFORMANCE CURVES FIGURE**

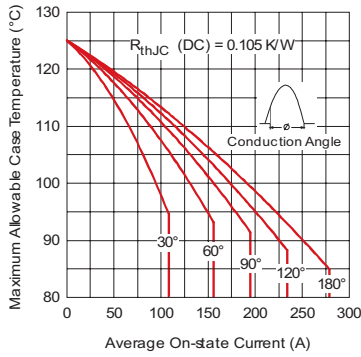


Fig. 1 - Current Ratings Characteristics

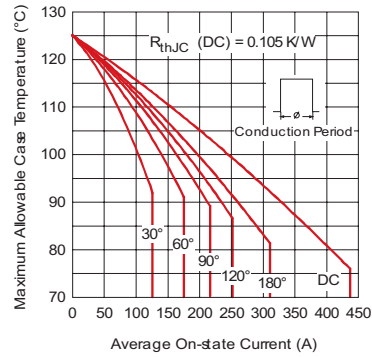


Fig. 2 - Current Ratings Characteristics

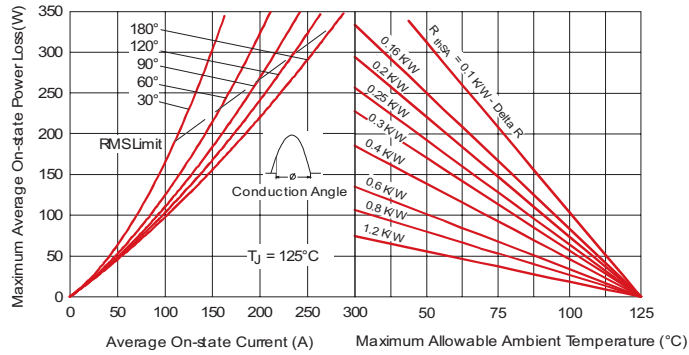


Fig. 3 - On-state Power Loss Characteristics

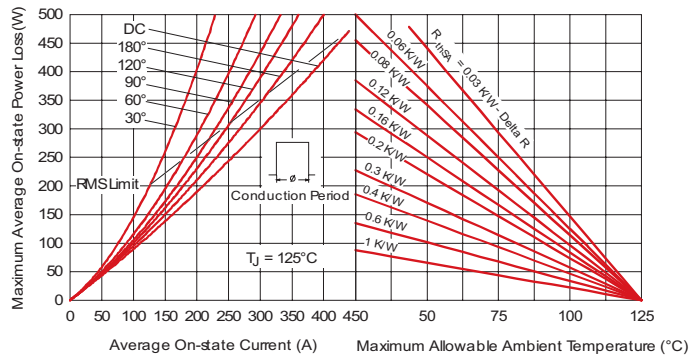


Fig. 4 - On-state Power Loss Characteristics

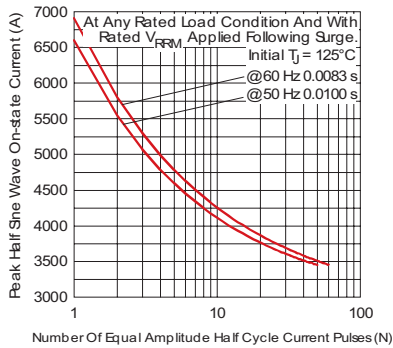


Fig. 5 - Maximum Non-Repetitive Surge Current

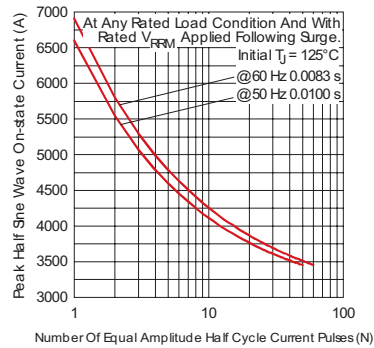


Fig. 6 - Maximum Non-Repetitive Surge Current

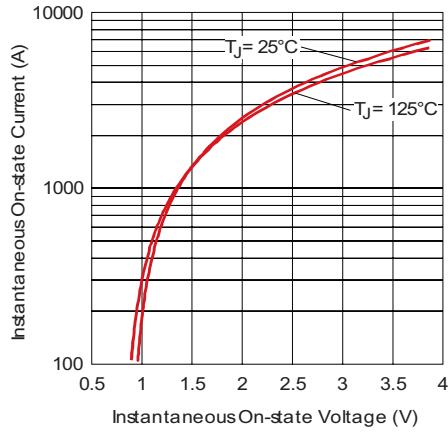


Fig. 7 - On-state Voltage Drop Characteristics

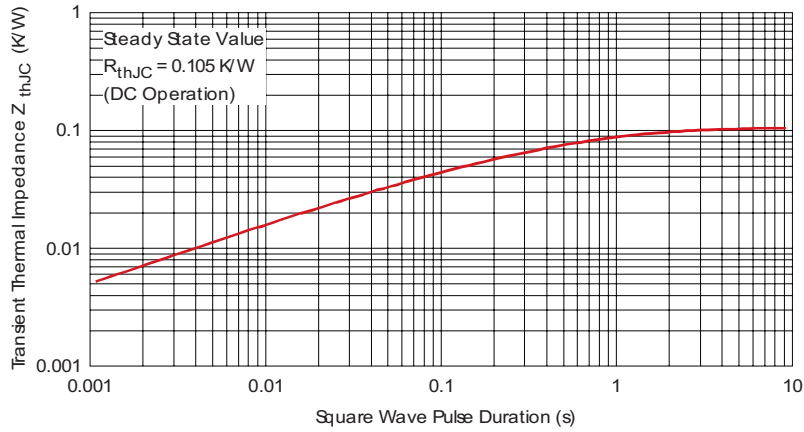


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic

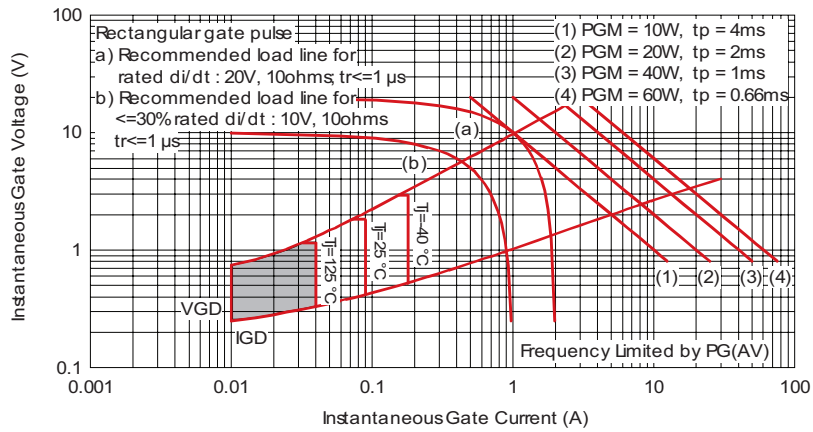
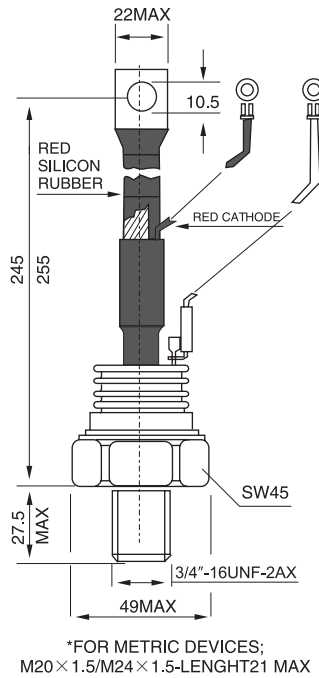


Fig. 9 - Gate Characteristics

**OUTLINE**



**Case Style TO-118**

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