



S34BF & S34BFH SERIES
400-200 VOLTS RANGE
STANDARD TURN-OFF TIME 8 μ s
935 AMP RMS, RING AMPLIFYING GATE
INVERTER TYPE HOCKEY PUK SCRs

VOLTAGE RATINGS

VOLTAGE CODE (1)	$V_{RRM}, V_{DRM} - (V)$ Max. rep. peak reverse and off-state voltage	$V_{RSM} - (V)$ Max. non-rep. peak reverse voltage $t_p \leq 5ms$	NOTES
	$T_J = -40^\circ$ to max. rated	$T_J = 25^\circ$ to max. rated	
4	400	500	Gate open
2	200	300	

MAXIMUM ALLOWABLE RATINGS

PARAMETER	SERIES	VALUE	UNITS	NOTES
T_J Junction temperature	S34BF	-40 to 125	$^{\circ}C$	
	S34BFH	-40 to 140		
T_{stg} Storage temperature	ALL	-40 to 150	$^{\circ}C$	
$I_T(AV)$ Max. av. current	ALL	595	A	180° half sine wave
@ Max. T_C	S34BF	70	$^{\circ}C$	
	S34BFH	85		
$I_T(RMS)$ Nom. RMS current	ALL	935	A	
I_{TSM} Max. peak non-repetitive surge current	ALL	11000	A	50Hz half cycle sine wave Initial $T_J = 125^{\circ}C$, rated V_{RRM} applied after surge.
		11400		60Hz half cycle sine wave
		13000		50Hz half cycle sine wave Initial $T_J = 125^{\circ}C$, no voltage applied after surge.
		13500		60Hz half cycle sine wave
I^2t Max. I^2t capability	ALL	595	kA^2s	$t = 10ms$ Initial $T_J = 125^{\circ}C$, rated V_{RRM} applied after surge.
		540		$t = 8.3ms$
		840		$t = 10ms$ Initial $T_J = 125^{\circ}C$, no voltage applied after surge.
		765		$t = 8.3ms$
I^2/t Max. I^2/t capability	ALL	8400	$kA^2/\sqrt{s}$	Initial $T_J = 125^{\circ}C$, no voltage applied after surge. I^2t for time $t_x = I^2/t = \sqrt{t_x}$, $0.1 \leq t_x \leq 10ms$.
di/dt Max. non-repetitive rate-of-rise of current	ALL	800	A/ μs	$T_J = 125^{\circ}C$, $V_D = V_{DRM}$, $I_{TH} = 1600A$. Gate pulse: 20V, 20 μs , 10 μs , 0.5 μs rise time. Max. repetitive di/dt is approximately 40% of non-repetitive value.
P_{GM} Max. peak gate power	ALL	16	W	$t_p \leq 5ms$
$P_G(AV)$ Max. av. gate power	ALL	3	W	
$+I_{GM}$ Max. peak gate current	ALL	4	A	$t_p \leq 5ms$
$-V_{GM}$ Max. peak negative gate voltage	ALL	15	V	
F Mounting force	ALL	12250(2750) $\pm$ 10%	N(lbf)	

(1) To complete the part number, refer to the Ordering Information table.



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CHARACTERISTICS

PARAMETER		SERIES	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
V_{TH}	Peak on-state voltage	ALL	—	1.60	1.72	V	Initial $T_J = 25^{\circ}\text{C}$, 50-60Hz half sine, $I_{peak} = 1870\text{A}$.
$V_{T(TO)1}$	Low-level threshold	ALL	—	—	1.14	V	$T_J = \text{max. rated}$ $\text{Av. power} = V_{T(TO)} \cdot I_{T(AV)} + r_T \cdot [I_{T(RMS)}]^2$ Use low level values for $I_{TH} \leq \pi \text{ rated } I_{T(AV)}$
$V_{T(TO)2}$	High-level threshold		—	—	1.39		
r_{T1}	Low-level resistance	ALL	—	—	0.31	m Ω	
r_{T2}	High-level resistance		—	—	0.20		
I_L	Latching current	ALL	—	300	—	mA	$T_C = 25^{\circ}\text{C}$, 12V anode. Gate pulse: 10V, 20 Ω , 100 μs .
I_H	Holding current	ALL	—	100	500	mA	$T_C = 25^{\circ}\text{C}$, 12V anode. Initial $I_T = 10\text{A}$.
t_d	Delay time	ALL	—	0.5	1.5	μs	$T_C = 25^{\circ}\text{C}$, $V_D = \text{rated } V_{DRM}$, 50A resistive load. Gate pulse: 10V, 20 Ω , 10 μs , 1 μs rise time.
t_q	Turn-off time						$T_J = \text{max. rated}$. $I_{TH} = 500\text{A}$, $di_R/dt = 25\text{A}/\mu\text{s}$, $V_R = 50\text{V}$, $dv/dt = 200\text{V}/\mu\text{s}$ lin. to 80% rated V_{DRM} . Gate: 0V, 100%.
	"A" suffix	S34BF	—	—	8	μs	
	"B" suffix	S34BF/H	—	—	10		
$t_{q(\text{diode})}$	Turn-off time with feedback diode						$T_J = \text{max. rated}$. $I_{TH} = 500\text{A}$, $di_R/dt = 25\text{A}/\mu\text{s}$, $V_R = 1\text{V}$, $dv/dt = 600\text{V}/\mu\text{s}$ lin. to 40% V_{DRM} . Gate: 0V, 100%.
	"A" suffix	S34BF	—	—	10	μs	
	"B" suffix	S34BF/H	—	—	13		
$I_{RM(REC)}$	Recovery current	ALL	—	44	—	A	$T_J = 125^{\circ}\text{C}$, $I_{TH} = 750\text{A}$, $di_R/dt = 50\text{A}/\mu\text{s}$.
Q_{RR}	Recovered charge	ALL	—	38	—	μC	
dv/dt	Critical rate-of-rise of off-state voltage	ALL	500	700	—	V/ μs	$T_J = 125^{\circ}\text{C}$. Exp. to 100% or lin. Higher dv/dt values to 80% V_{DRM} , gate open. available.
			1000	—	—		$T_J = 125^{\circ}\text{C}$. Exp. to 67% V_{DRM} , gate open.
I_{RM} , I_{DM}	Peak reverse and off-state current	S34BF	—	15	50	mA	$T_J = \text{max. rated}$. Rated V_{RRM} and V_{DRM} , gate open.
		S34BFH	—	25	75		
I_{GT}	DC gate current to trigger	ALL	—	—	300	mA	$T_C = -40^{\circ}\text{C}$ +12V anode-to-cathode. For recommended gate drive see "Gate Characteristics" figure. $T_C = 25^{\circ}\text{C}$
			50	60	150		
V_{GT}	DC gate voltage to trigger	ALL	—	—	3.3	V	$T_C = -40^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}$
			—	1.2	2.5		
V_{GD}	DC gate voltage not to trigger	ALL	—	—	0.3	V	$T_C = 125^{\circ}\text{C}$. Max. value which will not trigger with rated V_{DRM} anode-to-cathode.
R_{thJC}	Thermal resistance, junction-to-case	ALL	—	—	0.050	$^{\circ}\text{C}/\text{W}$	DC operation, double side cooled.
			—	—	0.057	$^{\circ}\text{C}/\text{W}$	180 $^{\circ}$ sine wave, double side cooled.
			—	—	0.059	$^{\circ}\text{C}/\text{W}$	120 $^{\circ}$ rectangular wave, double side cooled.
R_{thCS}	Thermal resistance, case-to-sink	ALL	—	—	0.030	$^{\circ}\text{C}/\text{W}$	Mtg. surface smooth, flat and greased. Single side cooled. For double side, divide value by 2.
wt	Weight	ALL	—	255(9.0)	—	g(oz.)	
Case Style		ALL	TO-200AC			JEDEC	

S34BF & S34BFH SERIES 400-200 VOLTS RANGE

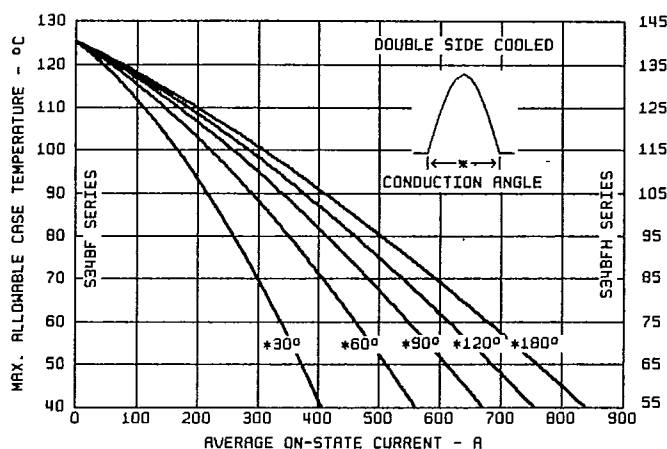


Fig. 1 — Case Temperature Ratings
— Sinusoidal Waveforms, 50 to 400 Hz

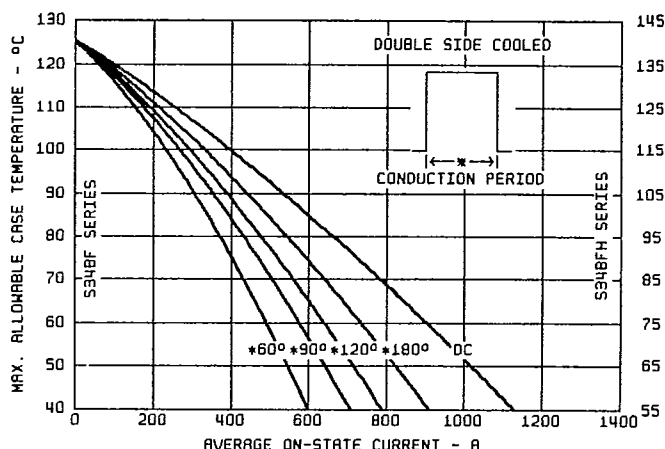


Fig. 2 — Case Temperature Ratings
— Rectangular Waveforms, 50 to 400 Hz

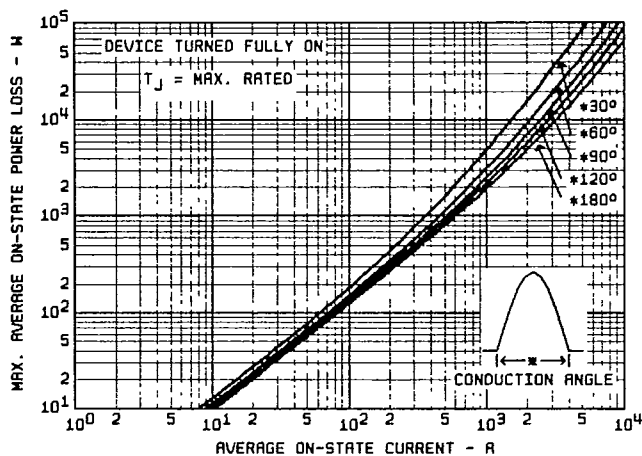


Fig. 3 — Power Loss Characteristics
— Sinusoidal Waveforms

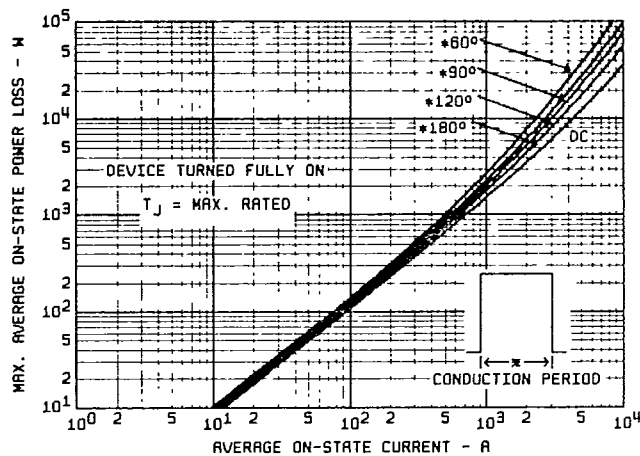


Fig. 4 — Power Loss Characteristics
— Rectangular Waveforms

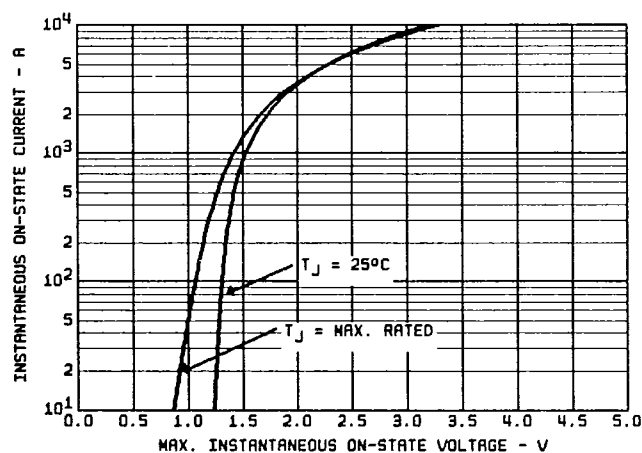


Fig. 5 — On-State Characteristics

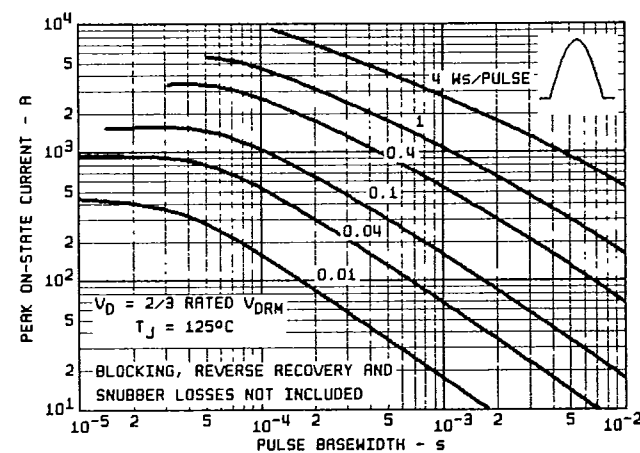


Fig. 6 — Max. Energy Loss per Pulse
— Sinusoidal Waveforms



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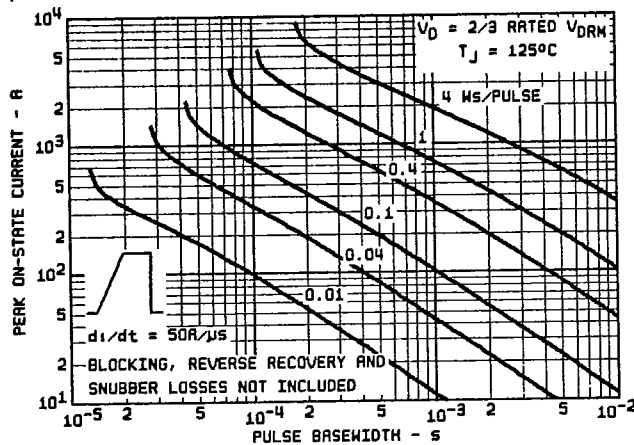


Fig. 7 — Max. Energy Loss per Pulse
— Trapezoidal Waveforms, $di/dt = 50 \text{ A}/\mu\text{s}$

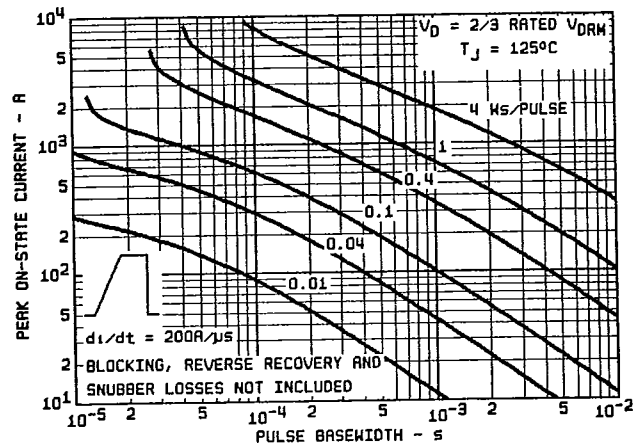


Fig. 8 — Max. Energy Loss per Pulse
— Trapezoidal Waveforms, $di/dt = 200 \text{ A}/\mu\text{s}$

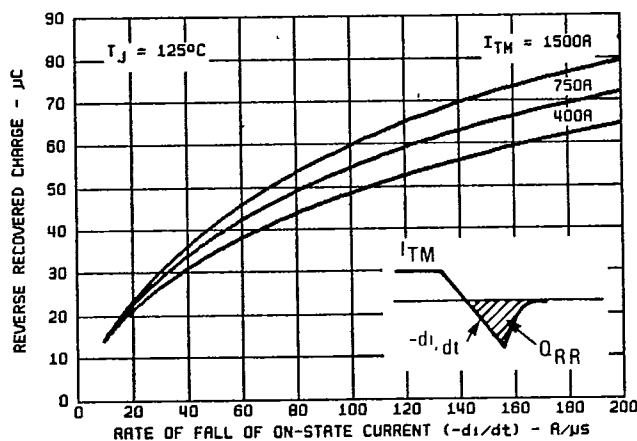


Fig. 9 — Typical Recovered Charge

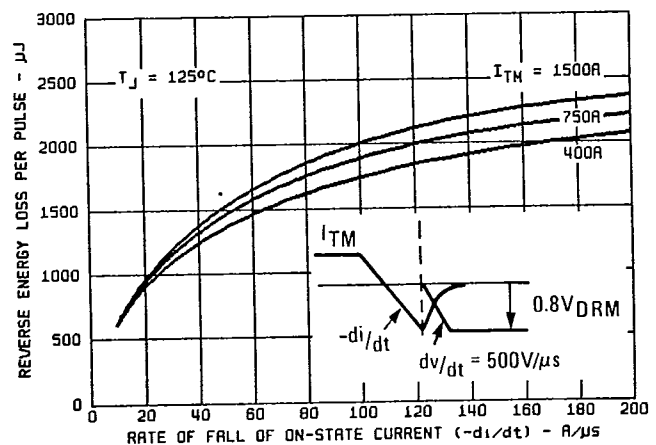


Fig. 10 — Typical Reverse Energy Losses

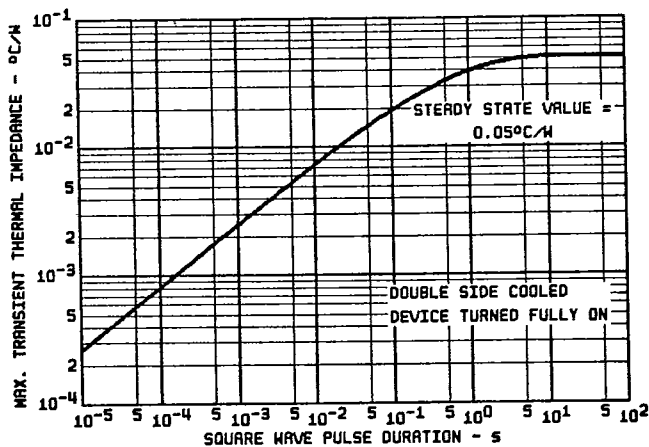


Fig. 11 — Transient Thermal Impedance,
Junction-to-Case

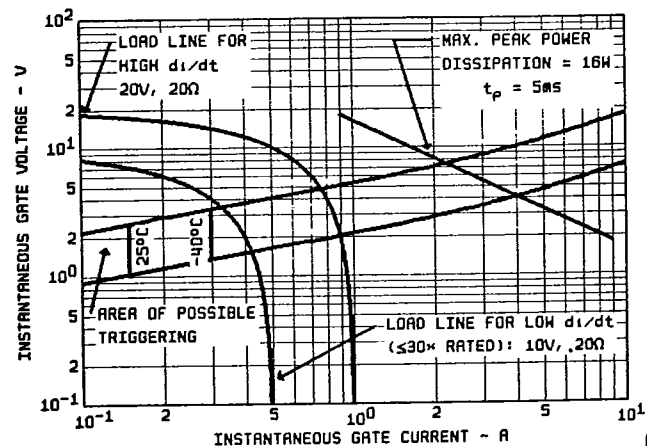


Fig. 12 — Gate Characteristics

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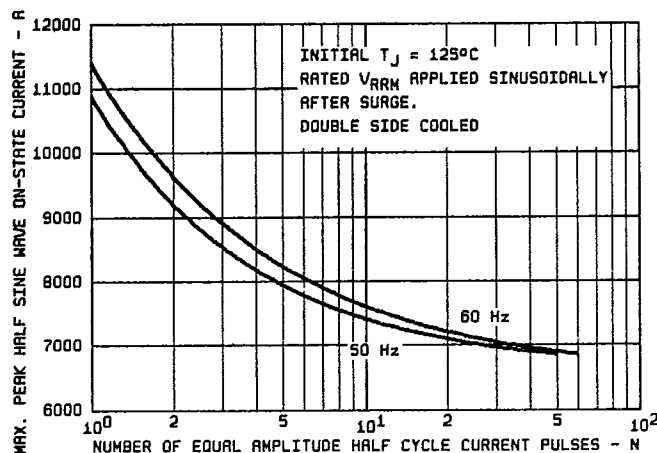


Fig. 13 — Non-Repetitive Surge Current Ratings

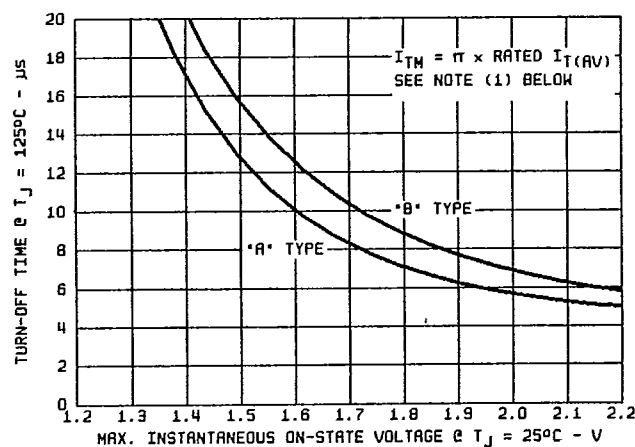


Fig. 14 — Trend for Turn-Off Time vs. On-State Voltage

(1) These curves are intended as a guideline. To specify non-standard t_q/V_{TM} contact factory.

ORDERING INFORMATION

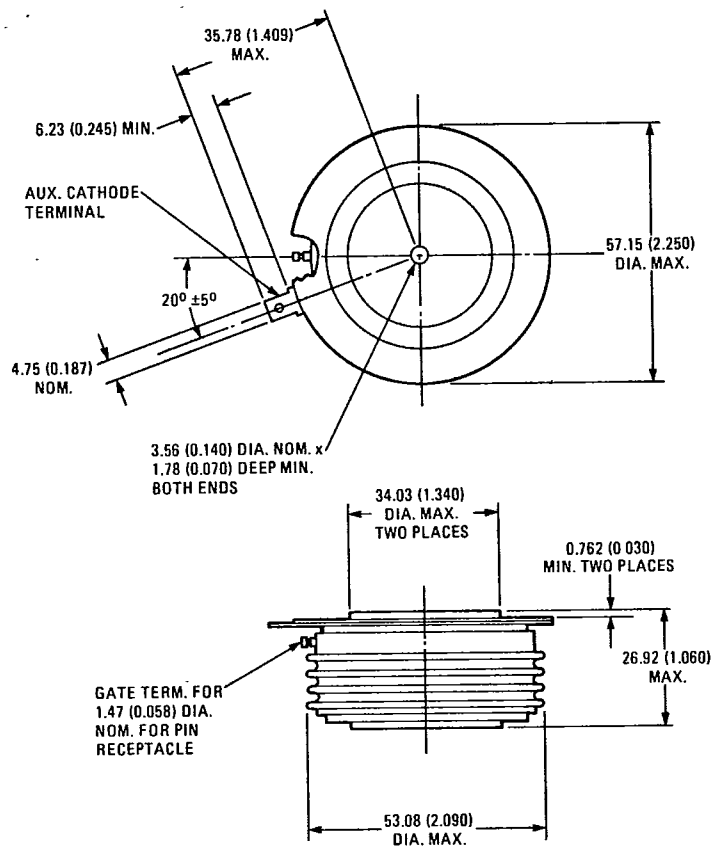
TYPE	TEMPERATURE		VOLTAGE		TURN-OFF	
	CODE	MAX. T_J	CODE	V_{DRM}	CODE	MAX. t_q
S34BF	—	125°C	4	400V	A	8μs
	H	140°C	2	200V	B	10μs

For example, for a device with max. $T_J = 125^\circ\text{C}$, $V_{DRM} = 400\text{V}$, max. $t_q = 8\mu\text{s}$, order as: S34BF4A.



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CONFORMS TO JEDEC OUTLINE TO-200AC
 ANODE TO GATE
 CREEPAGE DISTANCE: 36.33 (1.430) MIN.
 STRIKE DISTANCE: 17.43 (0.686) MIN.

SUPPLIED WITH LEADS. FOR DETAILS CONTACT
 YOUR INTERNATIONAL RECTIFIER SALES OFFICE
 OR DISTRIBUTOR.

Conforms to JEDEC Outline TO-200AC

Dimensions in Millimeters and (Inches)