

	Specification	Symbol	Condition / Comment	HTS 400-200 SCR	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 200 \mu ADC$, $T_{case} = 70^{\circ}C$	40	kVDC
	Maximum Isolation Voltage	V_i	Between HV switch and control / GND, continuously	± 50	kVDC
	Max. Housing Insulation Voltage	V_{INS}	Between switch and housing surface, 3 minutes	± 50	kVDC
	Maximum Turn-On Peak Current	$I_{P(max)}$	$T_{case} = 25^{\circ}C$ $t_p < 200 \mu s$, duty cycle $< 1\%$ $t_p < 1 ms$, duty cycle $< 1\%$ $t_p < 10 ms$, duty cycle $< 1\%$ $t_p < 100 ms$, duty cycle $< 1\%$	2000 1600 1300 230	ADC
	Max. Non-Repetitive Peak Current	$I_{P(nr)}$	$T_{case} = 25^{\circ}C$ $T_{fin} = 70^{\circ}C$ Half sine single pulse, $t_p < 200 \mu s$ Half sine single pulse, $t_p < 20 \mu s$	4000 8000	ADC
	Max. Continuous Load Current	I_L	Standard plastic case With option CCS (air velocity on surface $> 4m/s$) With option CF (air velocity on surface $> 4m/s$. true laminar flow)	0.9 1.5 6.3	ADC
	Max. Rate-of-Rise of OFF-State Voltage	dv/dt	@ $V_{O(max)}$, exponential waveform	96	kV/ μs
	Max. Continuous Power Dissipation	$P_{d(max)}$	$T_{case} = 25^{\circ}C$ Standard devices & FC, forced air 4 m/s	25	Watt
	Linear Derating		Above $25^{\circ}C$ Standard devices & FC, forced air 4 m/s	0.555	W/K
	Operating Temperature Range	T_O	Standard devices & options CF, GCF, ILC. (Option DLC)	$-40...75$	$^{\circ}C$
	Storage Temperature Range	T_S	Switches with option ILC may require frost protection!	$-50...90$	$^{\circ}C$
	Max. Permissible Magnetic Field	B	Homogeneous steady-field, surrounding the whole switch	25	mT
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	V_O		$0... \pm 40$	kVDC
	Typical Breakdown Voltage	V_{br}	NOTE: V_{br} is a test parameter for quality control purposes only. Not applicable in $I_{off} > 0.5 mA$	44	kVDC
	Typical Off-State Current	I_{off}	$0.8 \times V_O$, $T_{case} = 25...70^{\circ}C$, reduced I_{off} on request	< 200	μADC
	Typical Holding Current	I_H	$T_{case} = 25^{\circ}C$ $T_{case} = 70^{\circ}C$	200 110	mADC
	Typical On-State Voltage	V_{sat}	Each switching path $t_p < 1 \mu s$, duty cycle $< 1\%$ $0.001 \times I_{P(max)}$ $0.01 \times I_{P(max)}$ $0.1 \times I_{P(max)}$ $1.0 \times I_{P(max)}$	18 21 54 300	VDC
	Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$, $0.8 \times V_{O(max)}$, 50-50%	~ 200	ns
	Typical Output Pulse Jitter	t_j	Impedance matched input, $V_{aux} / V_{ctrl} = 5.00 VDC$	600	ps
	Typical Turn-On Rise Time	$t_{r(on)}$	Resistive load, 10-90% $0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	97 32 80	ns
	Typical Turn-Off Time	t_{off}, t_q	Resistive load, 10-90% $0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	40	μs
	On Time	t_{on}		$35... \infty$	ns
	Internal Driver Recovery Time	t_{rc}	Standart device With option HFB	1000 100	μs
	Max. Continuous Switching Frequency	$f_{(max)}$	@ $V_{aux} = 5.00 V$ Sw. shutdown if $f_{(max)}$ is exceeded Standard devices without HFS option Standard devices with HFS supply Opt. HFS + sufficient cooling option	2.5 10 50	kHz
	Maximum Burst Frequency	$f_{b(max)}$	Use option HFB for > 10 pulses within $20 \mu s$ or less	10	kHz
	Maximum Number of Pulses / Burst	$N_{(max)}$	@ $f_{b(max)}$ Standard Option I-HFB Option HFB Note: Option HFB requires external buffer capacitors with a voltage rating of $> 630VDC$ and a capacitance of $100nF$ per additional pulse.	15 Use option HFB for > 15 > 100 > 1000	Pulses
	Coupling Capacitance	C_C	HV side against control side	> 30	pF
	Control Voltage Range	V_{ctrl}	The V_{ctrl} has no impact on the output pulse shape.	$4... 5$	VDC
	Auxiliary Supply Voltage Range	V_{aux}	The $+5 V$ supply is not required in the HFS mode.	5	VDC
	Typical Auxiliary Supply Current	I_{aux}	$V_{aux} = 5.00 VDC$, $T_{case} = 25^{\circ}C$. Active current limitation above 1A. $0.01 \times f_{(max)}$ @ $f_{(max)}$	250 500	mADC
	Fault Signal Output		Switch will be turn off, if $f > f_{(max)}$, $V_{aux} < 4.75V$ or $T_{case} > 75^{\circ}C$ Fault condition is indicated by a logical "L"	$H = 4V$, $L = 0.5V$	VDC
	Trigger Voltage Range	V_{TR}	Switching behaviour is not influenced by trigger quality	3-10	VDC
	HOUSING	Dimensions	$L \times W \times H$	Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC	Please contact the manufactured!
Weight			Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC	Please contact the manufactured!	g
FUNCTIONS	Control Signal Input	Pin 1 / Yellow. TTL compatible with Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V recommended for low jitter).			
	Logic GND / 5V Return	Pin 2 / Black. The ground pin is internally connected with the safety earthing terminal (threaded insert) on bottom side.			
	5V Auxiliary Supply	Pin 3 / Red. The 5 V input is used for rep rates up to the specified max. frequency $f_{(max)}$. Higher rep rates require option HFS.			
	Fault Signal Output	Pin 4 / Orange. TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault.			
	Inhibit Signal Input	Pin 5 / Green. TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = Switch Inhibited.			
	LED Indicators	GREEN: "Auxiliary power good, switch OFF". YELLOW: "Control signal received, switch ON". RED: "Fault condition, switch OFF"			
	Temperature Protection	A) Standard switches and switches with option CF, GCF: Thermo trigger $75^{\circ}C$, response time $< 60 s$ @ $3 \times P_{d(max)}$, $\Delta T = 25K$ (50 to $75^{\circ}C$). Separate driver protection. B) Switches with option DLC: $65^{\circ}C$, response time $< 3 s$ @ $3 \times P_{d(max)}$, $\Delta T = 25K$ (40 to $65^{\circ}C$), coolant flow $> 3 l/min$. Separate driver protection.			
ORDERING TI	HTS 400-200 SCR	Thyristor Switch, 40 kVDC, 2000 ADC	Option LP Low Pass. Input filter for increased noise immunity.	Option CCS Ceramic Cooling Surface. $P_{d(max)}$ can be increased by the factor 2 to 3.	
			Option S-TT Soft Transition Time. Slower switching speed for simplified EMC.	Option CCF Ceramic Flange Housing. $P_{d(max)}$ can be increased by the factor 3 to 15.	
			Option HFB High Frequency Burst, Improved burst capability by driver.	Option CF Copper Cooling Fins. $P_{d(max)}$ can be increased by the factor 3 to 10.	
			Option HFS High Frequency Switching (two auxiliary supply inputs V1 & V2)	Option GCF Grounded Cooling Flange (copper). $P_{d(max)}$ can be increased by the factor 3 to 15.	
			Option UFTR Ultra Fast Thermotrigger. Response time for shut down $< 5s$.	Option ILC Indirect Liquid Cooling (for water). $P_{d(max)}$ can be increased by the factor 3 to 15.	
			Option UFTS Ultra Fast Thermosensor. Response time $< 5s$. NTC $10k / \pm 1\%$	Option DLC Direct Liquid Cooling (for FPE/PFC). $P_{d(max)}$ can be increased by the factor 10 to 100. 15.	
	FOR FURTHER PRODUCT OPTIONS PLEASE REFER TO THE OPTIONS PAGE.				
Customized switching units are available on request. All data and specifications subject to change without notice. Please visit www.behlke.com for up-dates. Revision 27.09.2019 ©2017 All rights reserved					