

Specification		Symbol	Condition / Comment		HTS 320-200 SCR		Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 50 \mu ADC$, $T_{case} = 70^{\circ}C$		32		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		± 40		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 1300 480 230		ADC
	Max. Non-Repetitive Peak Current	$I_{P(nr)}$	$T_{case} = 25^{\circ}C$	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	$T_{case} = 25^{\circ}C$		2.76		ADC
	Max. Rate-of-Rise of OFF-State Voltage	dv/dt	@ $V_{O(max)}$, exponential waveform		90		kV/ μs
	Max. Continuous Power Dissipation	$P_{d(max)}$	$T_{case} = 25^{\circ}C$	Standard devices & FC, forced air 4 m/s	20		Watt
	Linear Derating		Above $25^{\circ}C$	Standard devices & FC, forced air 4 m/s	0.5		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
	Max. Auxiliary Voltage	V_{aux}	Built-in overvoltage limiter (replaceable)		5		VDC
	ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	V_O			$0... \pm 32$	
Typical Breakdown Voltage		V_{br}	NOTE: V_{br} is a test parameter for quality control purposes only. Not applicable in	$I_{off} > 0.5 mA$	> 35		kVDC
Typical Off-State Current		I_{off}	$0.8 \times V_O$, $T_{case} = 25...70^{\circ}C$, reduced I_{off} on request		< 150		μADC
Typical Holding Current			$T_{case} = 70^{\circ}C$		70		mADC
Typical On-State Voltage		V_{sat}	Each switching path $t_p < 1 \mu s$, duty cycle $< 1\%$	$0.01 \times I_{P(max)}$ $0.1 \times I_{P(max)}$ $1.0 \times I_{P(max)}$	32 82 450		VDC
Typical Propagation Delay Time		$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$, $0.8 \times V_{O(max)}$, 50-50%		0.4		μs
Typical Output Pulse Jitter		t_j	Impedance matched input, $V_{aux} / V_{ctrl} = 5.00 VDC$		1		ns
Typical Turn-On Rise Time		$t_{r(on)}$	Resistive load, 10-90%	$0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	220 240 200		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...300		μs
Typical Turn-On Time		t_{on}			35.... ∞		ns
Internal Driver Recovery Time		t_{rc}			1000		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 50 80		kHz
Maximum Burst Frequency		$f_{b(max)}$	Use option HFB for > 10 pulses within 20 μs or less		20		kHz
Maximum Number of Pulses / Burst		$N_{(max)}$	@ $f_{b(max)}$ Note: Option HFB requires external buffer capacitors with a voltage rating of $> 630 VDC$ and a capacitance of 100nF per additional pulse	Standard Option I-HFB Option HFB	15 Use option HFB for > 15 > 100 > 1000		Pulses
Coupling Capacitance		C_C	Standard device & option CF,DLC Device with option GCF, ILC		> 40 80...240		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.	$0.01 \times f_{(max)}$ @ $f_{(max)}$	300 800		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
Typical Insulation Strength of Housing		V_{INS}	Caution: Keep appropriate distance between module housing and all conductive elements of the setup!		10		VDC
HOUSING		Dimensions	LxWxH	Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC		Please contact the manufacturer!	
	Weight		Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC		Please contact the manufacturer!		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"					
ORDERING TI	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.					
	HTS 320-200 SCR	Thyristor Switch, 32 kVDC, 200 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 Thermotrieger. 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.		