

	Specification	Symbol	Condition / Comment		HTS 401-120 SiC	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 20 \mu ADC$ , $T_{case} = 70^{\circ}C$		40	kVDC
	Maximum Isolation Voltage	$V_i$	Between HV switch and control / GND, continuously		$\pm 50$	kVDC
	Max. Housing Insulation Voltage	$V_{INS}$	Between switch and housing surface, 3 minutes		$\pm 70$	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 $< 1\%$	1200 760 230 120	ADC
	Maximum Continuous Load Current	$I_{L(max)}$	$T_{case} = 25^{\circ}C$	Standard devices Devices with option DLC	10 240	ADC
	Max. Continuous Power Dissipation	$P_{d(max)}$	$T_{case} = 25^{\circ}C$	Standard devices & FC, forced air 4 m/s Devices with option DLC	120 4800	Watt
	Linear Derating		Above $25^{\circ}C$	Standard devices & FC, forced air 4 m/s Devices with option DLC	2.85 475	W/K
	Operating Temperature Range	$T_o$	Standard devices & options CF, GCF, ILC. (Option DLC)		-40...70	$^{\circ}C$
	Storage Temperature Range	$T_s$	Switches with option ILC may require frost protection!		-40...90	$^{\circ}C$
	Max. Permissible Magnetic Field	B	Homogeneous steady-field, surrounding the whole switch		25	mT
Max. Auxilliary Voltage	$V_{aux}$	Built-in overvoltage limiter (replaceable)		5.5	VDC	
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	$V_o$	Unipolar operation (one switch pole grounded or floated)		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		20	$\mu ADC$
	Typical Turn-On Resistance	$R_{stat}$	Each switching path $t_p < 1 \mu s$ , duty cycle $< 1\%$	$0.1 \times I_{P(max)}$ , $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$ , $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$ , $T_{case} = 70^{\circ}C$	0.18 0.37 0.39	Ohm
	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, $V_{aux} / V_{ctrl} = 5.00 VDC$		3	ns
	Typical Turn-On Rise Time	$t_{r(on)}$	Resistive load, 10-90%	$0.1 \times V_{O(max)}$ , $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$ , $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$ , $I_L = 1.0 \times I_{P(max)}$	30 40 60	ns
	Maximum Turn-On Time	$t_{on(max)}$	No limitation		$\infty$	
	Minimum Turn-On Time	$t_{on(min)}$	$t_{on(min)}$ can be customized. Please consult factory		200	ns
	Maximum Turn-Off Time	$t_{off(max)}$	No limitation		$\infty$	
	Minimum Turn-Off Time	$t_{off(min)}$	$t_{off(min)}$ can be customized. Please consult factory		200	ns
	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	3.2 50 80	kHz
	Maximum Burst Frequency	$f_b(max)$	Use option HFB for $> 10$ pulses within $20 \mu s$ or less		500	kHz
	Maximum Number of Pulses / Burst	$N_{(max)}$	@ $f_b(max)$ Note: Option HFB requires external buffer capacitors with a voltage rating of $> 630VDC$ and a capacitance of $100nF$ per additional	Standard Option I-HFB Option HFB	$> 10$ Use option HFB for $> 10$ $> 100$ $> 1000$	Pulses
	Coupling Capacitance	$C_C$	HV side against control side		$< 100$	pF
	Natural Capacitance	$C_N$	Between switch poles, @ $0.5 \times V_{O(max)}$		$< 50$	pF
	Control Voltage Range	$V_{ctrl}$	The $V_{ctrl}$ has no impact on the output pulse shape.		3... 10	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.	$0.01 \times f_{(max)}$ @ $f_{(max)}$	260 800	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
	Opt. HFS, Ext. Supply Voltage V1	$V_{HFS(V1)}$	Stability $\pm 3\%$ , current consumption $< 0.4 mA/kHz$ @ $25^{\circ}C$		15	VDC
	Opt. HFS, Ext. Supply Voltage V2	$V_{HFS(V2)}$	Stability $\pm 3\%$ , current consumption $< 0.9 mA/kHz$ @ $25^{\circ}C$		270	VDC
	Intrinsic Diode Forward Voltage	$V_f$	$T_{case} = 25^{\circ}C$ , $I_f = 0.3 \times I_{P(max)}$		$< 30$	VDC
	Diode Reverse Recovery Time	$t_{rr}$	$T_{case} = 25^{\circ}C$ , $I_f = 0.3 \times I_{P(max)}$ , $di/dt = 100 A/\mu s$		$< 50$	ns
	HOUSING	Dimensions	$L \times W \times H$	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
FUNCTION	Control Signal Input Logic GND / 5V Return 5V Auxiliary Supply Fault Signal Output Inhibit Signal Input LED Indicators Temperature Protection	<b>Pin 1</b> / Yellow. TTL compatible with Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V recommended for low jitter). <b>Pin 2</b> / Black. The ground pin is internally connected with the safety earthing terminal (threaded insert) on bottom side. <b>Pin 3</b> / Red. The 5 V input is used for rep rates up to the specified max. frequency $f_{(max)}$ . Higher rep rates require option HFS. <b>Pin 4</b> / Orange. TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault. <b>Pin 5</b> / Green. TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = Switch Inhibited. <b>GREEN:</b> "Auxiliary power good, switch OFF". <b>YELLOW:</b> "Control signal received, switch ON". <b>RED:</b> "Fault condition, switch OFF" <b>A)</b> 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>B)</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	HTS 401-120 SiC	Transistor Switch, 40 kVDC, 1200 ADC	Option LP	Low Pass. Input filter for increased noise immunity.	Option UL-94	Flame retardant casting resin, UL94-V0
			Option HFB	High Frequency Burst (improved capability by external	Option I-FWD	Integrated Free-Wheeling Diode. In connection with inductive load only.
			Option HFS	High Frequency Switching (two auxiliary supply inputs V1 & V2)	Option I-FWDN	Integrated Freewheeling Diode Network. In connection with inductive load.
			Option I-HFS	Integrated High Frequency Burst	Option PT-C	Pigtail for control connection: Flexible leads (l=75mm) with lermo connector.
			Option S-TT	Soft Transition Time decrease the rise and fall time by 20%	Option SEP-C	Separated control unit. Control unit with LED indicators in a separate housing.
			Option Min-On	Individually increased "Min. On-Time" to avoid unwanted	Option TH	Tubular Housing
			Option Min-Off	Individually increased "Min. Off-Time" to avoid unwanted	Option CF	Copper Cooling Fins. $P_{d(max)}$ can be increased by the factor 3 to 10.
			Option PCC	Pulser Configuration. Switch combined with custom specific	Option GCF	Grounded Cooling Flange. $P_{d(max)}$ can be increased by the factor 3 to 15.
			Option ISO-80	80kV Isolation. Isolation Voltage increased to 80kV.	Option ILC	Indirect Liquid Cooling (for water). $P_{d(max)}$ can be increased by the factor 3 to 15.
			Option I-PC	Integrated part components according to customer specification.	Option DLC	Direct Liquid Cooling. $P_{d(max)}$ can be increased by the factor 10 to 100.

Customized switching units are available on request. All data and specifications subject to change without notice. Please visit [www.behlke.com](http://www.behlke.com) for up-dates.

Revision 28-08-2020 ©2017 All rights reserved