

	Specification	Symbol	Condition / Comment		HTS 401-300 SiC	HTS 401-600 SiC	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 400 \mu ADC$, $T_{case} = 70^{\circ}C$		40		kVDC
	Maximum Isolation Voltage	V_I	Between HV switch and control / GND, continuously		± 25		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 $< 1\%$	3000 1800 500 300	6000 3800 1160 600	ADC
	Maximum Continuous Load Current	$I_{L(max)}$	$T_{case} = 25^{\circ}C$	Standard devices Devices with option DLC	38 250		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	420 4000		Watt
	Linear Derating		Above $25^{\circ}C$	Standard devices & FC, forced air 4 m/s Devices with option DLC	1.4 260		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		< 400		μADC
	Typical Turn-On Resistance	R_{stat}	Each switching path $t_p < 1 \mu s$, duty cycle $< 1\%$	$0.1 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 70^{\circ}C$	0.072 0.16 0.3	0.036 0.07 0.15	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%	$0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	35 90 130		ns
	Maximum Turn-On Time	$t_{on(max)}$	No limitation		∞		
	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		∞		
	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	TBD 30 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		> 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.	$0.01 \times f_{(max)}$ @ $f_{(max)}$	TBD 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 $< 0.9 mA/kHz$ @ $25^{\circ}C$		TBD		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 manufactured!	
Weight			Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC		Please contact the manufactured!		g
FUNCTION	Control Signal Input Logic GND / 5V Return 5V Auxiliary Supply Fault Signal Output Inhibit Signal Input LED Indicators Temperature Protection	Pin 1 / Yellow. TTL compatible with Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V recommended for low jitter). Pin 2 / Black. The ground pin is internally connected with the safety earthing terminal (threaded insert) on bottom side. 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. Pin 4 / Orange. TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault. Pin 5 / Green. TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = Switch Inhibited. GREEN: "Auxiliary power good, switch OFF". YELLOW: "Control signal received, switch ON". RED: "Fault condition, switch OFF" 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 $> 3l/min$. Separate driver protection.					
ORDERING	HTS 401-300 SiC	Transistor Switch, 40 kVDC, 3000 ADC	Option LP	Low Pass. Input filter for increased noise immunity.	Option UL-94	Flame retardant casting resin, UL94-V0	
	HTS 401-600 SiC	Transistor Switch, 40 kVDC, 6000 ADC	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 for up-dates.

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