

	Specification	Symbol	Condition / Comment	HTS 121-60 SiC	Unit	
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 270 \mu ADC$, $T_{case} = 70^{\circ}C$	12	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 $< 1\%$	600 360 115 60	ADC	
	Maximum Continuous Load Current	$I_{L(max)}$	$T_{case} = 25^{\circ}C$ Standard devices Devices with option DLC	2.52 60	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	40 4000	Watt	
	Linear Derating		Above $25^{\circ}C$ Standard devices & FC, forced air 4 m/s Devices with option DLC	0.12 160	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...80	$^{\circ}C$	
	Max. Permissible Magnetic Field	B	Homogeneous steady-field, surrounding the whole switch	25	mT	
Max. Auxiliary Voltage	V_{aux}	Built-in overvoltage limiter (replaceable)	5.5	VDC		
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	V_o	Unipolar operation (one switch pole grounded or floated)	0... ± 12	kVDC	
	Typical Breakdown Voltage	V_{br}	NOTE: V_{br} is a test parameter for quality control purposes only. Not applicable in $I_{off} > 0.5 mA$	13	kVDC	
	Typical Off-State Current	I_{off}	$0.8 \times V_o$, $T_{case} = 25...70^{\circ}C$, reduced I_{off} on request	< 270	μADC	
	Typical Turn-On Resistance	R_{stat}	Each switching path $t_p < 1 \mu s$, duty cycle $< 1\%$ $0.1 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 70^{\circ}C$	0.26 0.56 0.60	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% $0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	15 33 50	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	20 80 120	kHz	
	Maximum Burst Frequency	$f_b(max)$	Use option HFB for > 10 pulses within 20 μs 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 pulse 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. $0.01 \times f_{(max)}$ @ $f_{(max)}$	150 800	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 $< 0.9 mA/kHz$ @ $25^{\circ}C$	101	VDC	
	Intrinsic Diode Forward Voltage	V_f	$T_{case} = 25^{\circ}C$, $I_f = 0.3 \times I_{P(max)}$	< 60	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	LxWxH	Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC	Please contact the manufacturer!	mm ³
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	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 $> 3 l/min$. Separate driver protection.				
ORDERING	HTS 121-60 SiC	Transistor Switch, 12 kVDC, 60 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 for up-dates.

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