

	Specification	Symbol	Condition / Comment	HTS 151-20-AC	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 20 \mu ADC$, $T_{case} = 70^{\circ}C$	± 15	kVDC
	Maximum Isolation Voltage	V_i	Between HV switch and control / GND, continuously	± 40	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 $< 1\%$	200 110 72 54	ADC
	Maximum Continuous Load Current	$I_{L(max)}$	$T_{case} = 25^{\circ}C$ Standard devices Devices with option DLC	1.2 6	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	15.5 1500	Watt
	Linear Derating		Above $25^{\circ}C$ Standard devices & FC, forced air 4 m/s Devices with option DLC	0.28 2	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!	-50...90	$^{\circ}C$
	Permissible Operating Voltage Range	V_o		$0... \pm 15$	kVDC
ELECTRICAL CHARACTERISTICS	Typical Breakdown Voltage	V_{br}	NOTE: V_{br} is a test parameter for quality control purposes only. $I_{off} > 0.5 mA$	16.5	kVDC
	Typical Off-State Current	I_{off}	$0.8 \times V_o$, $T_{case} = 25...70^{\circ}C$, reduced I_{off} on request	20	μADC
	Typical Turn-On Resistance	R_{stat}	Each switching path $t_p < 1 \mu s$, duty cycle $< 1\%$ $0.1 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$, $T_{case} = 70^{\circ}C$	3.42 5.3 13.4	Ohm
	Residual Voltage (Total Voltage drop on-state)	V_{res}	$T_{case} = 25^{\circ}C$ $I_L = 0.001 A$ $I_L = 0.01 A$ $I_L = 0.1 A$ $I_L = 1.0 A$ $I_L = 10.0 A$	0.012 0.12 1.2 16 72	VDC
	Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$, $0.8 \times V_{O(max)}$, 50-50%	250	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% $0.1 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$, $I_L = 1.0 \times I_{P(max)}$	21 63 72	ns
	Typical Turn-Off Rise 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 90	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	120	ns
	Minimum Turn-Off Time	$t_{off(min)}$	$t_{off(min)}$ can be customized. Please consult factory	120	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	<2 50 100	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	<25	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.	2... 6	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 $t > f_{(max)}$, $V_{aux} < 4.75V$ 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	$T_{case} = 25^{\circ}C$, $I_F = 0.3 \times I_{P(max)}$	<10	VDC
	Diode Reverse Recovery Time	t_{rrc}	$T_{case} = 25^{\circ}C$, $I_F = 0.3 \times I_{P(max)}$, $di/dt = 100 A/\mu s$	<255	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!	mm ³
	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). 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.			
	Logic GND / 5V Return				
ORDERING	5V Auxiliary Supply				
	Fault Signal Output				
	Inhibit Signal Input				
	LED Indicators				
	Temperature Protection				
	HTS 151-20 AC	Transistor Switch, 15 kVDC, 200 ADC	Option LP Low Pass. Input filter for increased noise immunity. Option S-TT Soft Transition Time. Slower switching speed for simplified EMC. Option HFB High Frequency Burst, Improved burst capability by driver. Option HFS High Frequency Switching (two auxiliary supply inputs V1 & V2) Option CCS Ceramic Cooling Surface. $P_{d(max)}$ can be increased by the factor 2	Option CCF Ceramic Flange Housing. $P_{d(max)}$ can be increased by the factor 3 to 15. Option CF Copper Cooling Fins. $P_{d(max)}$ can be increased by the factor 3 to 10. Option GCF Grounded Cooling Flange (copper). $P_{d(max)}$ can be increased by the factor 3 to 15. Option ILC Indirect Liquid Cooling (for water). $P_{d(max)}$ can be increased by the factor 3 to 15. 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 19-02-2023 ©2017 All rights reserved	