	Specification	Symbol	Condition / Comment		HTS 401-20 LC2	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	I_{off} < 20 µADC, T_{case} = 70°C		40	kVDC
	Maximum Isolation Voltage	V_I	Between HV switch and control / GND, continuously		± 70	kVDC
	Max. Housing Insulation Voltage	V_{INS}	Between switch and housing surface, 3 minutes		± 90	kVDC
	Maximum Turn-On Peak Current	$I_{P(max)}$	T_{case} = 25°C	t_p< 200 µs, 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 70 50	ADC
	Maximum Continuous Load Current	$I_{L(max)}$	T_{case} = 25°C	Standard devices Devices with option DLC	1.6 9	ADC
	Max. Continuous Power Dissipation	$P_{d(max)}$	T_{case} = 25°C	Standard devices & FC, forced air 4 m/s Devices with option DLC	30 3000	Watt
	Linear Derating		Above 25°C	Standard devices & FC, forced air 4 m/s Devices with option DLC	0.66 24	W/K
	Operating Temperature Range	T_O	Standard devices & options CF, GCF, ILC. (Option DLC)		-40...70	C°
	Storage Temperature Range	T_S	Switches with option ILC may require frost protection!		-40...90	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	VDC
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	V_O			0... ± 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}	0.8xV_O, T_{case} =25...70°C, reduced I_{off} on request		20	µADC
	Typical Turn-On Resistance	R_{stat}	Each switching path t_p < 1µs, duty cycle < 1%	0.1 x $I_{P(max)}$, T_{case} =25°C 1.0 x $I_{P(max)}$, T_{case} =25°C 1.0 x $I_{P(max)}$, T_{case} =70°C	7.1 9 19	Ohm
	Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, 0.1 x $I_{P(max)}$, 0.8 x $V_{O(max)}$, 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 x $V_{O(max)}$, I_L = 0.1 x $I_{p(max)}$ 0.8 x $V_{O(max)}$, I_L = 0.1 x $I_{p(max)}$ 0.8 x $V_{O(max)}$, I_L = 1.0 x $I_{p(max)}$	18 56 60	ns
	Typical Turn-Off Rise Time	t_{off}, t_q	Resistive load, 10-90%	0.1 x $V_{O(max)}$, I_L = 0.1 x $I_{p(max)}$ 0.8 x $V_{O(max)}$, I_L = 1.0 x $I_{p(max)}$	30 80	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	1.4 40 70	kHz
	Maximum Burst Frequency	$f_{b(max)}$	Use option HFB for >10 pulses within 20µs 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 cpacitance of 100nF per additional pulse.	Standard Option I-HFB Option HFB	10 >100 >1000	Pulses
	Coupling Capacitance	C_C	HV side against control side		<40	pF
	Natural Capacitance	C_N	Between switch poles, @ 0.5 x $V_{O(max)}$		23	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°C. Active current limitation above 1A.	0.01 x $f_{(max)}$ @ $f_{(max)}$	250 800	mADC
	Fault Signal Output		Switch will be turn off, if f>$f_{(max)}$, V_{aux}<4.75V or T_{case}>75°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 ±3%, current consumption <0.4 mA/kHz @ 25°C		15	VDC
	Opt. HFS, Ext. Supply Voltage V2	$V_{HFS(V2)}$	Stability ±3%, current consumption <0.9 mA/kHz @ 25°C		199	VDC
	Intrinsic Diode Forward Voltage	V_F	T_{case} = 25°C, I_F = 0.3 x $I_{P(max)}$		<40	VDC
	Diode Reverse Recovery Time	t_{rrc}	T_{case} = 25°C, I_F = 0.3 x $I_{P(max)}$, di/dt = 100 A/µs		<250	ns
HOUSING	Dimensions	LxWxH	Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC		Please contact the manufactured!	mm^3
	Weight		Standard housing Devices with option CF, non-isolated cooling fins Devices with option DLC		Please contact the manufactured!	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"
Temperature Protection	**A)** Standard switches and switches with option CF, GCF: Thermo trigger 75°C, response time < 60 s @ 3xPd(max), ΔT=25K (50 to 75°C). Separate driver protection. **B)** Switches with option DLC: 65°C, response time < 3 s @ 3xPd(max), ΔT=25K (40 to 65°C), coolant flow > 3l / min. Separate driver protection.

ORDERINGTI

HTS 401-20 LC2 | Transistor Switch, 40 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 Thermotrigger. 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 / ± 1%	**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.