



# Technical Data

	Specification	Symb.	Condition / Comment	HTS 501-20-LC2	HTS 701-20-LC2	HTS 901-20-LC2	Unit	
<b>ABSOLUTE MAXIMUM RATINGS</b>	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 50 \mu ADC$ , $T_{case} = 70^\circ C$	50	70	90	kVDC	
	Maximum Isolation Voltage	$V_I$	Between HV switch and control input / GND	80	100	120	kVDC	
	Max. Housing Insulation Voltage	$V_{INS}$	Between switch and housing surface, 3 minutes		150		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 $< 1\%$		200 118 72 54		ADC	
	Maximum Continuous Load Current	$I_L$	$T_{case} = 25^\circ C$ $T_{fluid} = 25^\circ C$	Standard model Option DLC - 2.0 / 2.8 / 3.6 1) Option DLC - 6.0 / 8.4 / 10 1)	1.26 9.5 16.5	1.26 9.5 16.5	1.26 9.5 16.5	ADC
	Max. Continuous Power Dissipation	$P_{d(max)}$	$T_{case} = 25^\circ C$ $T_{fluid} = 25^\circ C$	Standard model Option DLC - 2.0 / 2.8 / 3.6 1) Option DLC - 6.0 / 8.4 / 10 1)	35 2000 6000	49 2800 8400	63 3600 10800	Watts
	Linear Derating		Above $25^\circ C$	Standard model Option DLC - 2.0 / 2.8 / 3.6 1) Option DLC - 6.0 / 8.4 / 10 1)	0.777 44.44 133.3	1.088 62.22 186.6	1.4 80 240	W/K
	Operating Temperature Range	$T_O$				-40...70		$^\circ C$
	Storage Temperature Range	$T_S$				-40...90		$^\circ C$
	Maximum Auxiliary Supply Voltage	$V_{aux(max)}$				9		VDC
<b>ELECTRICAL CHARACTERISTICS</b>	Permissible Operating Voltage Range	$V_O$		0...50	0...70	0...90	kVDC	
	Typical Breakdown Voltage	$V_{br}$	<small>CAUTION: <math>V_{br}</math> is a test parameter only for quality control purposes and is not applicable in normal operation!</small>	$I_{off} > 500 \mu ADC$	53	74	95	kVDC
	Typical Off-State Current	$I_{off}$	$0.8 \times V_O$ , $T_{case} = 25^\circ C$ , lower leakage current on request			40		$\mu ADC$
	Typical Static On-Resistance	$R_{stat}$	$t_p < 1 \mu s$ , duty cycle $< 1\%$	$0.1 \times I_{P(max)}$ , $T_{case} = 25^\circ C$ $1.0 \times I_{P(max)}$ , $T_{case} = 25^\circ C$ $1.0 \times I_{P(max)}$ , $T_{case} = 70^\circ C$	9 10.5 22	12.5 15 31	16 19 40	Ohm
	Typical Turn-On Delay Time	$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$ , $0.8 \times V_{O(max)}$ , 50-50%			250		ns
	Typical Turn-On Rise Time	$t_{r(on)}$	Resistive load, 10-90%	$0.1 \times V_{O(max)}$ , $0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$ , $0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$ , $1.0 \times I_{P(max)}$	12 32 35	14 45 50	15 56 62	ns
	Typical Turn-Off Rise Time	$t_{off}$ , $t_q$	Resistive load, 10-90%	$0.8 \times V_{O(max)}$ , $0.1 \times I_{P(max)}$ $0.8 \times V_{O(max)}$ , $1.0 \times I_{P(max)}$		30 80		ns
	Maximum On-Time	$t_{on(max)}$				Infinitely		
	Minimum On-Time	$t_{on(min)}$	$t_{on(min)}$ can be customized. Please consult factory.			300		ns
	Maximum Off-Time	$t_{off(max)}$				Infinitely		
	Minimum Off-Time	$t_{off(min)}$	$t_{off(min)}$ can be customized. Please consult factory.			300		ns
	Typical Turn-On Jitter	$t_{j(on)}$	$V_{aux} / V_{tr} = 5.00 VDC$			3		ns
	Max. Continuous Switching Frequency	$f_{(max)}$	$V_{aux} = 5.00 VDC$ , $T_{case} = 25^\circ C$ , switch will be turned off, if $f_{(max)}$ is exceeded	Standard Option HFS	0.8	0.6 100	0.5	kHz
	Maximum Burst Frequency	$f_b(max)$	<small>CAUTION: Applications with long lasting high frequency bursts may require special cooling measures to prevent MOSFET overheating. Please consult factory.</small>			2		MHz
	Maximum Number of Pulses / Burst	N	@ $f_b(max)$ <small>NOTE: Option HFB requires external buffer capacitors with a voltage rating of <math>&gt; 630 VDC</math> and a capacitance of <math>= 100nF</math> per additional pulse. The buffer capacitors are internally monitored.</small>	Standard Option I-HFB Option HFB		$> 100$ $> 1000$ $> 10000$		Pulses
	Coupling Capacitance	$C_C$	HV side against control side		33	46	60	pF
	Natural Capacitance	$C_N$	Between switch poles		54	40	30	pF
	Auxiliary Supply Voltage Range	$V_{aux}$	5.00 VDC recommended for best driver efficiency			4.75 – 5.25		VDC
	Intrinsic Diode Forward Voltage	$V_F$	$T_{case} = 25^\circ C$ , $I_F = 10 A$		40	57	74	VDC
	Diode Reverse Recovery Time	$t_{rrc}$	<small>CAUTION: Intrinsic diodes must not be used in normal operation. Inductive load requires fast free-wheeling diodes (series FDA) in parallel to the switch!</small>		$I_F = 10A$	$< 250$		ns
Auxiliary Supply Current	$I_{aux}$	$V_{aux} = 5.00 VDC$ , $T_{case} = 25^\circ C$	$0.1 \times f_{(max)}$ @ $f_{(max)}$	250 800	350 800	450 800	mADC	
Control Voltage Range	$V_{tr}$	4 - 6 VDC recommended for best EMC			3 - 10		VDC	
<b>MECHANICAL / OPTIONS</b>	Dimensions	Standard housing, without pigtails		252 x 200 x 68	312 x 200 x 68	372 x 200 x 68	mm <sup>3</sup>	
	Weight	Standard housing		3700	5200	6700	g	
<b>Recommended Options:</b>								
Option HFB	<b>High Frequency Burst:</b> Improved burst capability of driver by means of external buffer capacitors. Recommended for burst operation with $> 100$ pulses within a burst of $< 100 \mu s$ duration.							
Option I-HFB	<b>Integrated High Frequency Burst:</b> Improved burst capability by integrated buffer capacitors. For moderate burst requirements ( $10-100$ pulses within a burst of $< 100 \mu s$ duration).							
Option HFS	<b>High Frequency Switching:</b> Connector for additional auxiliary voltages ( $+12 VDC$ and $+350 VDC$ to $+450 VDC$ , model depending). Necessary for operation above standard $f_{(max)}$ .							
Option LP	<b>Low Pass:</b> Low pass filter at the control input. Propagation delay time will be increased by $\sim 200 ns$ . Improved noise immunity and less critical wiring in high speed applications.							
Option MIN-ON	<b>Minimum On-Time:</b> Individually increased "Minimum On-Time" to avoid unwanted triggering by input noise during this time. Please indicate the demanded $t_{on(min)}$ with order.							
Option MIN-OFF	<b>Minimum Off-Time:</b> Individually increased "Minimum Off-Time" to avoid unwanted triggering by input noise during this time. Please indicate the demanded $t_{off(min)}$ with order.							
Option DLC – X.X	<b>Direct Liquid Cooling:</b> Internal liquid channel in direct contact with the power semiconductors. Excellent cooling method for very high voltages. GALDEN® & non-conductive liquids only.							
Option TH	<b>Tubular Housing:</b> Self-supporting axial housing. Attachment & HV connection by M12 bolts at the tube ends. Dimension $\varnothing 90 \times 350$ , $\varnothing 90 \times 450$ or $\varnothing 90 \times 550 mm$ (depending on switch model).							
Option SEP-C	<b>Separate Control Unit:</b> Control unit (dimension $79 \times 38 \times 25 mm^3$ ) separated from high-voltage switching unit. 1m connecting cable between switch and control (standard if option TH is ordered).							

Note 1) Customized switching units with max. power dissipation of up to 15 kW are available on request.

All data and specifications subject to change without notice! 901-20-LC2\_09.09