FAST HIGH VOLTAGE TRANSISTOR SWITCHES

These MOSFET switches are designed for general high voltage switching applications such as deflection and acceleration grid drivers and electrical test equipment. The switching modules incorporate all features of the well known HTS switch family: Easy handling, high reliability, low jitter and reproducible switching behaviour. The HTS-LC2 series represents the second generation of Behlke low capacitance switches. The HV transient immunity of the HTS-LC2 series has been improved significantly and is now comparable with that of the standard HTS series.

The switch is turned-on by a positive going control signal of 3 to 6 Volts at the control input (pin1). The shielded control cable is terminated by an internal 100 Ohm resistor. The on-time may simply be controlled by the input control pulse width and can range from 200 ns to infinity. The control electronics of the switching module requires an auxiliary supply of +4.75 to +9.0 VDC (pin 3). To ensure a safe off-state of the switch, the auxiliary supply should be permanently present, especially in the case of possible voltage fluctuations or fast transients at the high voltage input.

An interference-proof driver and control circuit provides signal conditioning, auxiliary voltage monitoring, frequency limitation and temperature protection. Any false operating condition (under voltage, over frequency or over temperature) will result in immediate switch deactivation and a TTL compatible fault signal ("L") will be generated at pin 4 of the control plug. All operating conditions (pulse, on, off, fault) are indicated by LED's.

The high frequency burst operation (>10 pulses/100µs) requires the option "HFB" (High Frequency Burst) respectively "I-HFB" (Integrated High Frequency Burst), depending on the number of pulses to be generated. In case of option HFB, external buffer capacitors must be connected to the internal driver circuitry. A continuous high frequency operation above the specified maximum switching frequency requires the option "HFS" (High Frequency Switching). With the help of this option, two external supply voltages can be connected to increase the power capability of the internal switch driver for higher switching frequencies. Those external voltages are +15 V and +380-480 V, depending on switch model. The +5 V auxiliary supply is not required then.

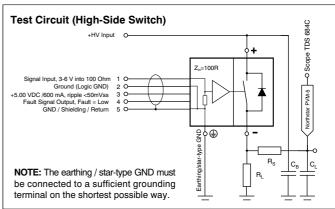
Due to high galvanic isolation, the switches may also simply be operated in floating circuits or in high-side switching applications without any additional isolation transformer or optical coupler. Several housing and cooling options are available to meet individual design requirements. Please refer to product survey "C3 Variable On-Time, Low Coupling Capacitance, MOSFET" or consult BEHLKE for more details.

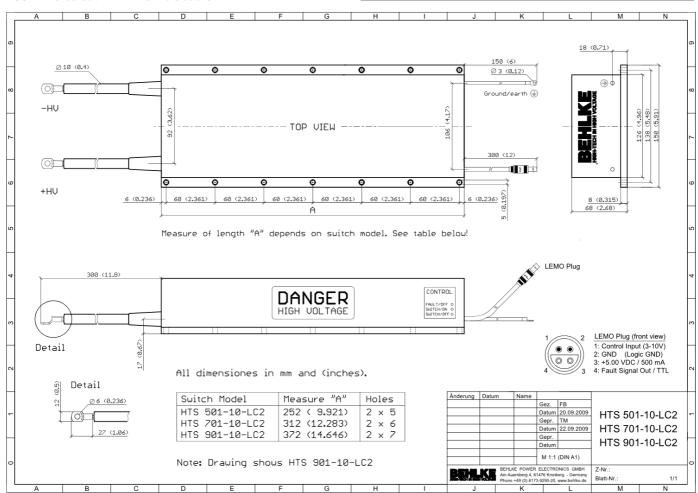
HTS 501-10-LC2 50 kV / 100 A
HTS 701-10-LC2 70 kV / 100 A
HTS 901-10-LC2 (standard model)

MOSFET
TECHNOLOGY

WWW.BEHLKE.DE

Made in Germany









	Specification		Symbol	Condition / Comment				HTS 501-10-LC2	HTS 701-10-LC2	HTS 901-10-LC2	Unit
	Maximum Operating	Voltage	V _{O(max)}	I _{off} < 50 μADC, T _{case} = 70°C			50	70	90	kVDC	
	Maximum Isolation \	oltage	Vı	Between HV switch and	control ir	nput / G	GND	80	100	120	kVDC
	Max. Housing Insula		V _{INS}	Between switch and hou	using surf	ace, 3	minutes		150		kVDC
ຸນ	Maximum Turn-On F		I _{P(max)}			t _p < 200 μs, duty cycle <1%			100		
RATINGS			ir (IIIax)		t _p < 1 ms, duty cycle <1%		•		59		
Ē						•	cycle <1%		36		
5						•	cycle <1%		27		ADC
Ē	Maximum Continuous Load Current		IL		Standard	• •	,	0.85	0.85	0.85	7150
Ž	Waximum Continuous Load Current		·L		Option DLC - 1.0 / 1.4 / 1.8 ¹⁾		4.75	4.75	4.75		
MAXIMUN					Option DLC - 3.0 / 4.2 / 5.4 1)			8.25	8.25	8.25	ADC
Ž	Max. Continuous Power Dissipation		P _{d(max)}	+	Standard model		32	45	58	71.50	
_	Iviax. Continuous Fower Dissipation		i d(max)		Option DLC - 1.0 / 1.4 / 1.8 ¹⁾		1000	1400	1800		
ABSOLUTE				Option DLC - 3.0 / 4.2 / 5.4 1)		3000	4200	5400	Watts		
	Linear Derating				Standard			0.711	1	1.288	vvalio
	Linear Deraung						0 / 1.4 / 1.8 1)	22.22	31.11	40	
	Operating Temperature Range				•		0/4.2/5.4 1)	66.66	93.33	120	W/K
			To		Ориопъ	LU - J.	0/4.2/3.4 7	00.00	-4070	120	°C
											°C
	Storage Temperatur		Ts				-4090		-		
	Maximum Auxiliary S	,	V _{aux(max)}						9		VDC
	Permissible Operating		Vo	CAUTION V is a tool page for a big for well to a visit of a second of the second of th		050	070	090	kVDC		
	Typical Breakdown \	/oltage	V_{br}	$ \begin{array}{c c} \textbf{CAUTION: } \textit{V}_{\text{tr}} \text{ is a test parameter only for quality control} \\ \textbf{purposes and is not applicable in normal operation!} \end{array} \hspace{-0.5cm} \textbf{I}_{\text{off}} > 500 \hspace{0.5cm} \mu ADC $		53	74	95	kVDC		
ACT	Typical Off-State Cu	rrent	loff	$0.8xV_{O,}T_{case}$ =25°C, lower leakage current on requ		ent on request		20		μADC	
	Typical Static On-Resistance		R _{stat}	t _p < 1 μs, duty cycle <1%	6 0.1	x I _{P(max}), T _{case} = 25°C	18	25	32	
					1.0	x I _{P(max}), T _{case} = 25°C	21	30	38	
					1.0	x I _{P(max}), T _{case} = 70°C	44	62	80	Ohm
	Typical Turn-On Del	ay Time	t _{d(on)}	Resistive load, 0.1 x I _{P(max)} , 0.8 x V _{O(max)} ,		, 50-50%		250		ns	
	Typical Turn-On Rise Time		t _{r(on)}	Resistive load, 10-90%	0.1	x V _{O(ma}	x), 0.1 x I _{P(max)}	12	14	15	
							x), 0.1 x I _{P(max)}	32	45	56	
						0.8 x V _{O(max)} , 1.0 x I _{P(max)}		35	50	62	ns
	Typical Turn-Off Rise Time		t _{off} , t _q	Resistive load, 10-90% 0.8 x V _{O(max)} , 0.1 x I _{P(max)} 0.8 x V _{O(max)} , 1.0 x I _{P(max)}		0.8 x V _{O(max)} , 0.1 x I _{P(max)}			30		
							80		ns		
	Maximum On-Time		ton(max)	The state of the s					Infinitely		
	Minimum On-Time ton(min			t _{on(min)} can be customized. Please consult factory.					250		ns
	Maximum Off-Time		toff(max)						Infinitely		
	Minimum Off-Time		toff(min)	t _{off(min)} can be customized. Please consult factory.				250		ns	
SHAR	Typical Turn-On Jitte	er	t _{j(on)}	V _{aux} / V _{tr} = 5.00 VDC				3		ns	
S	Max. Continuous Switching		f _(max)	V _{aux} = 5.00 VDC, T _{case} =	= 25°C sv	vitch	Standard	1.7	1.2	1	
¥	Frequency		-()	will be turned off, if f _(max)			Option HFS		100	·	kHz
ELECTRICAL	Maximum Burst Fred	ulency	f _{b(max)}	CAUTION: Applications with long lasti cooling measures to prevent overheating	ing high freque	ncy bursts			2		MHz
	Maximum Number of Pulses / Burst		N	@ fb(max). Note: Option			Standard		10		
Ä			`	external buffer capacitors			Option I-HFB		>100		
ij				C _{ext} ≈ 100nF per gene	,		'		>10000		Pulses
CAL &	Coupling Capacitano	ne .	Cc	HV side against control		,		33	46	60	pF
	Natural Capacitance		Cn	Between switch poles				27	20	15	pF
	Auxiliary Supply Volt		V _{aux}	5.00 VDC recommended for best driver efficiency					4.75 – 9.00	10	VDC
	, , , , ,	Intrinsic Diode Forward Voltage V _F			T _{case} = 25°C, I _F = 10 A				57	74	VDC
	Diode Reverse Reco		trrc	CAUTION: Intrinsic diodes must not be used in normal operation. Inductive load requires fast free-wheeling diodes (FDA) in parallel to the switch!				40	<250		ns
	Auxiliary Supply Cur		I _{aux}	Vaux = 5.00 VDC, T _{case} =			0.1 x f _(max)	250	350	450	113
	Auxiliary Supply Cul	iGiit	iaux	Vaux - 3.00 VDC, Tcase -	- 23 0		D f _(max)	800	800	800	mADO
	Control Voltage Ban	20	V _{tr}	>E VDC recommended	for boot E		υ (max)	000	3 - 10	000	VDC
	Control Voltage Ran Dimensions	9 [©]	V (f	>5 VDC recommended for best EMC Standard housing, without pigtails			252 - 450 00		270 450 00		
	Weight			<u>. </u>	out pigtall	٥		252 x 150 x 68	312 x 150 x 68	372 x 150 x 68	mm ³
	Weight Standard housing Recommended Options:						3200	4000	4700	g	
	· · · · · · · · · · · · · · · · · · ·										durati
	Option HFB High Frequency Burst: Improved burst capability of driver by means of external buffer capacitors. Option I-HFB Integrated High Frequency Burst: Improved burst capability by integrated buffer capacitors.									•	
≶	Option HFS High Frequency Switching: Connector for additional auxiliary voltages (+12 VDC and +350 VI										
≤.	Option LP Low Pass: Low pass filter at the control input. Propagation delay time will be increased by ~20										
Ĭ	Option MIN-ON Minimum On-Time: Individually increased "Minimum On-Time" to avoid unwanted triggering by i										
ECHA			Option MIN-OFF Option DLC - X.X Direct Liquid Cooling: Internal liquid channel in direct contact with the power semiconductors. Exc								rdor
MECHANICAL	Option MIN-OFF									, ,	
MECHA	Option MIN-OFF Option DLC – X.X	irect Liquid Cool	ing: Interna		act with the	power s	emiconductors. Ex	xcellent cooling method for	very high voltages. GALE	DEN® & non-conductive liq	uids only.

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!