

## C3

## HV switch, variable on-time, low capacitance, MOSFET

- Versatile HV switch with true relay character
- On-time controllable by TTL signal
- Simplified EMC and reduced capacitive losses due to low coupling capacitance
- Now available: LC2 technology for highest transient immunity

Note: The model number contains coded information about voltage, current and turn-on behavior. The first digits stand for the voltage in kV, the last digit before the dash indicates the turn-on behavior (0 = fixed on-time, 1 = variable on-time). The digits after the dash indicate the current in Amperes x10. Special features are coded by the letters after a second dash. **Example HTS 31-12-LC:** HTS = HV Transistor Switch, 3 = 3 kV, 1 = variable on-time, 12 = 120 Ampere, LC = Low Capacitance.

Model [sorted by dimensions]	Description / Comment ● Preferred stock type ○ Limited stock X Not for new development	Dimensions [mm <sup>3</sup> ]	Voltage [kV]	Pk. Current [A]	On-Resist. [Ω]	On-Time [ns]
HTS 31-12-LC	●	89 x 64 x 27	3	120	1.25	60...∞
HTS 61-06-LC	●	89 x 64 x 27	6	60	5	60...∞
HTS 111-03-LC	●	89 x 64 x 27	11	30	24	60...∞
HTS 121-03-LC	○	89 x 64 x 27	12	30	24	60...∞
HTS 41-12-LC	●	112 x 64 x 27	4.5	120	2.5	60...∞
HTS 91-06-LC	●	112 x 64 x 27	9	60	10	60...∞
HTS 161-03-LC	●	112 x 64 x 27	16	30	36	60...∞
HTS 181-03-LC	○	112 x 64 x 27	18	30	36	60...∞
HTS 81-12-LC	○	200 x 70 x 27	8	120	3.75	100...∞
HTS 91-12-LC	●	200 x 70 x 27	9	120	3.75	100...∞
HTS 161-06-LC	○	200 x 70 x 27	16	60	15	100...∞
HTS 181-06-LC	●	200 x 70 x 27	18	60	15	100...∞
<a href="#">HTS 331-03-LC</a>	●	200 x 70 x 35	33	30	72	100...∞
HTS 361-03-LC	○	200 x 70 x 35	36	30	72	100...∞
HTS 161-12-LC	○	263 x 70 x 35	16	120	7.5	150...∞
HTS 181-12-LC	●	263 x 70 x 35	18	120	7.5	150...∞
HTS 331-06-LC	○	263 x 70 x 35	33	60	30	150...∞
HTS 361-06-LC	●	263 x 70 x 35	36	60	30	150...∞
HTS 121-20-LC2	●	103 x 70 x 35	12	200	1.95	120...∞
HTS 201-10-LC2	●	103 x 70 x 35	20	100	7.8	120...∞
<a href="#">HTS 501-10-LC2</a>	●	252 x 150 x 68	50	100	18	250...∞
HTS 501-20-LC2	●	252 x 200 x 68	50	200	9	250...∞
HTS 501-40-LC2	●	372 x 150 x 68	50	400	4.5	250...∞
HTS 501-80-LC2	●	372 x 300 x 68	50	800	2.25	250...∞
<a href="#">HTS 701-10-LC2</a>	●	312 x 150 x 68	70	100	25	250...∞
HTS 701-20-LC2	●	312 x 200 x 68	70	200	12.5	250...∞
<a href="#">HTS 901-10-LC2</a>	●	372 x 150 x 68	90	100	32	250...∞
HTS 901-20-LC2	●	372 x 200 x 68	90	200	16	250...∞
HTS 1001-10-LC2	●	432 x 150 x 68	100	100	36	250...∞
HTS 1001-20-LC2	●	432 x 200 x 68	100	200	18	250...∞
HTS 1001-40-LC2	●	372 x 150 x 130	100	400	9	250...∞
HTS 1001-80-LC2	●	372 x 300 x 130	100	800	4.5	250...∞
HTS 1201-10-LC2	●	492 x 150 x 68	120	100	42	250...∞
HTS 1201-20-LC2	●	492 x 200 x 68	120	200	21	250...∞
HTS 1401-10-LC2	●	672 x 150 x 68	140	100	52	250...∞
HTS 1401-20-LC2	●	672 x 200 x 68	140	200	26	250...∞
Old models	Switches are available, but not recommended for new development:					
<a href="#">HTS 501-03-LC</a>	X Use HTS 501-10-LC2 for new development	260 x 70 x 35	50	30	86	150...∞
<a href="#">HTS 651-03-LC</a>	X Use HTS 701-10-LC2 for new development	300 x 70 x 35	65	30	144	150...∞
HTS 721-03-LC	X Use HTS 701-10-LC2 for new development	300 x 70 x 35	72	30	144	150...∞

### Options (1)

HFB	<b>High Frequency Burst:</b> Improved burst capability of driver by means of external buffer capacitors. Recommended if more than 10 pulses with less than 10 μs spacing are generated.
HFS	<b>High Frequency Switching:</b> External supply of auxiliary driver voltage (50-350 VDC according to type). Necessary if the specified "Maximum Operating Frequency" shall be exceeded. (2)
LP	<b>Low Pass:</b> Low pass filter at the control input. Propagation delay time will be increased by ~50 ns. Jitter + 500 ps. Improved noise immunity and less critical wiring in high speed applications. (3)
MIN-ON	<b>Minimum On-Time:</b> Individually increased Minimum On-Time to ensure a minimum on duration independtly of control signal. For safety relevant circuits.
MIN-OFF	<b>Minimum Off-Time:</b> Individually increased Minimum Off-Time to ensure a minimum off duration independtly of control signal. For safety relevant circuits.
LL	<b>Low Leakage Current:</b> Off-state current reduced to less than 10% of the specified value. Not available in connection with the cooling fin options and for switches of the UF series.
LN	<b>Low Noise:</b> Internal power driver modified for zero noise emission for a specific period of time. Relevant in conjunction with sensitive detector amplifiers (e.g. SEV/MCP applications) only. (2)
ISO-25	<b>25 kV Isolation:</b> Isolation Voltage increased to 25 kVDC. Housing dimensions may change for some models.
ISO-40	<b>40 kV Isolation:</b> Isolation Voltage increased to 40 kVDC. Housing dimensions may change for some models. Only in connection with option PT-HV.
ISO-80	<b>80 kV Isolation:</b> Isolation Voltage increased to 80 kVDC. Housing dimensions may change for some models. Only in connection with option PT-HV.
ISO-120	<b>120 kV Isolation:</b> Isolation Voltage increased to 120 kVDC. Housing dimensions may change for some models. Only in connection with option PT-HV.
ISO-200	<b>200 kV Isolation:</b> Isolation Voltage increased to 200 kVDC. Housing dimensions may change for some models. Only in connection with option PT-HV.
I-PC	<b>Integrated Part Components:</b> Integration of small part components according to customer's specifications (e.g. buffer capacitors, snubbers, damping resistors, diodes, opto couplers). (2)
I-FWD	<b>Integrated Free-Wheeling Diode:</b> Built-in parallel diode with short recovery time. In connection with inductive load only.

I-FWDN	<b>Integrated Free-Wheeling Diode Network:</b> Built-in parallel diode plus serial blocking diode with short recovery time. In connection with inductive load only.
LS-C	<b>LEMO socket for Control Connection.</b> Input impedance 100Ω. An assembled linkage cable (1m/3ft) with two plugs plus one additional socket is included in supply. Improved noise immunity. (3)
PT-C	<b>Pigtails for Control Connection:</b> Flexible leads (l=75 mm) with PCB connector. This option is only relevant for switching modules with pins. Recommended for modules with options CF & GCF.
PT-HV	<b>Pigtails for HV Connection:</b> Flexible leads with cable lugs. For increased creepage. PT-HV is standard for all types with >25 kV switching voltage. Not recommended in extremely fast circuits.
ST-HV	<b>Screw Terminals for HV Connection:</b> Threaded inserts at the bottom of module (if not standard). For PCB design. Operation above 25 kV requires liquid insulation (Galden®/Oil) or potting.
SEP-C	<b>Separated Control Unit.</b> Control unit with LED indicators in a separate housing (dim. 79x38x17 mm). Linkage cable (<1m) with plug. Control unit with soldering pins or pigtails.
UL94	<b>Flame Retardant Casting Resin:</b> Casting resin according to UL-94-VO. Minimum order quantity required. (2)
TH	<b>Tubular Housing:</b> Tubular instead of rectangular housing. Adaption to specific ambient conditions or in case of difficult assembly situations. (2)
FC	<b>Flat Case:</b> Height of standard plastic housings reduced to 19 mm or less. Not in combination with cooling options CF, GCF and DLC.
ITC	<b>Increased Thermal Conductivity:</b> Special moulding process to increase the thermal conductivity of the module. $P_{d(max)}$ will be increased by approx. 20-30%. (2)
CF	<b>Non-Isolated Cooling Fins:</b> Standard sizes in categories I to VII according to model. Nickel plated copper 0.5 mm, fin height 35 mm. For air and liquid cooling (e.g. Galden® or oil).
CF-1	<b>Non-Isolated Cooling Fins d=1mm:</b> Nickel plated copper 1.0 mm instead of 0.5 mm. The Max. Power Dissipation will be increased by ~80 %. For air and liquid cooling (e.g. Galden® or oil).
CF-X2	<b>Non-Isolated Cooling Fins enlarged by x2:</b> Fin area enlarged by factor 2. Not relevant in connection with liquid cooling.
CF-CS	<b>Non-Isolated Cooling Fins with customized shape:</b> Individual shape to meet specific OEM requirements. (2)
CF-GRA	<b>Non-isolated Cooling Fins made of graphite.</b> Very light weight compared to copper at similar heat transfer, but reduced heat capacity. 0.5 or 1 mm thickness, height 35 mm.
CF-CER	<b>Isolated Cooling Fins made of ceramics.</b> Heat transfer properties similar to alumina. Forced convection recommended, height 35 mm.
CCS	<b>Ceramic Cooling Surface.</b> Top side of switching module made of special ceramics. Heat transfer properties similar to alumina. Forced convection recommended.
C-DR	<b>Cooling for Driver:</b> Extra cooling for the driver and control electronics. Recommended in combination with option HFS at higher switching frequencies. (2)
GCF	<b>Grounded Cooling Flange:</b> Nickel-plated copper flange for medium power. Max. isolation voltage 40kV. Increased coupling capacitance $C_C$ .
ILC	<b>Indirect Liquid Cooling:</b> Liquid cooling for all kind of conductive coolants incl. water. Internal heat exchanger made of ceramics. For medium power dissipation.
DLC	<b>Direct Liquid Cooling:</b> Internal cooling channels around the power semiconductors. The most efficient cooling for high frequency applications. Non-conductive coolants only.
HI-REL	<b>High Reliability / MIL Versions:</b> Available on request. (2)

(1) New option code: Data sheets may differ from this coding system (especially older ones) and do not indicate all possible options as per above table. (2) Please consult factory for detailed information.  
(3) These options are EMC-relevant and are recommended for industrial power applications, difficult noise ambients, prototype experiments with flying leads and for users without special EMC design experience.

Further information, data sheets and drawings are available on request. All data and specifications subject to change without notice. BEHLKE POWER ELECTRONICS 07-11-2011

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