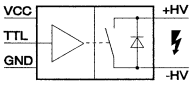
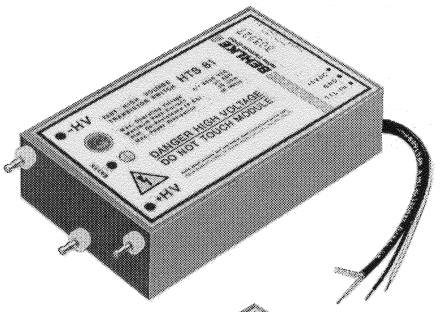
FAST HIGH VOLTAGE TRANSISTOR SWITCHES

These MOSFET switches are designed for general high voltage switching applications such as pockels cell drivers, deflection and acceleration grid drivers, piezo drivers, MCP/SEV pulsers and DC/DC converters. The switching modules incorporate all features of the well known HTS switch family: Easy handling, high reliability, low jitter and precise switching. In contrast to conventional high voltage switches like spark gaps, electron tubes, gas discharge tubes and mechanical switches, HTS transistor switches show very stable switching characteristics independent of temperature and age. The mean time between failures (MTBF) is by several orders of magnitude higher than that of the classical HV switches. The switching modules are controlled by an interference-proof driver circuit which provides signal conditioning, auxiliary voltage monitoring, frequency limitation and temperature protection. In case of false operating conditions the switches are immediately turned-off and a fault signal is generated (not available for "pigtail" devices). The switches are turned-on by a positive going signal of 2 to 10 volts amplitude. The on-time may be varied between 100 ns and infinity. A short recovery time of 300 ns allows burst frequencies up to 3.3 MHz. Due to the galvanic isolation of more than 10 kV the switches may simply be operated also in high-side circuits. Three housing options are available to meet individual electrical and constructive requirements. The plastic case is the cost-effective standard package in low frequency, pulsed power applications with a low continuous power dissipation. The standard housing has soldering terminals and "pigtails" for connection. It is also available as a printed circuit board version with soldering pins at bottom (option 06). To increase the Maximum Power Dissipation $P_{d(max)}$ the plastic modules can additionally be fitted with non-isolated cooling fins (option 04), which improve the Pd(max) value by approximately the factor 5. A metal case for a continuous power dissipation of up to 400 Watt is also available (option 05, cf. data sheet "High Power Metal Case"). For detailed design recommendations please refer to the general instructions.

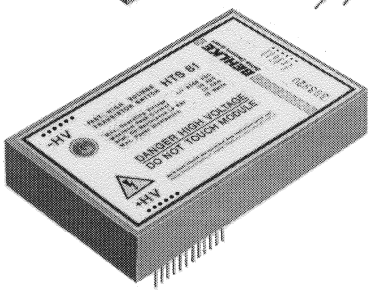
HTS 31 3000 VDC / 30 Amps
HTS 51 5000 VDC / 30 Amps
HTS 81 8000 VDC / 30 Amps

High Frequency Variable On-Time

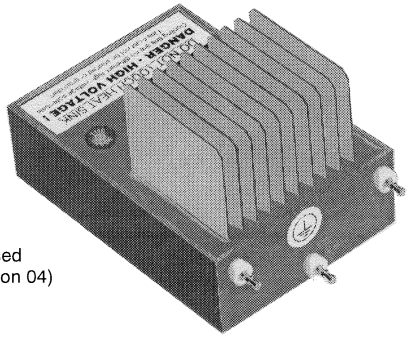




Standard plastic case with pigtail connection

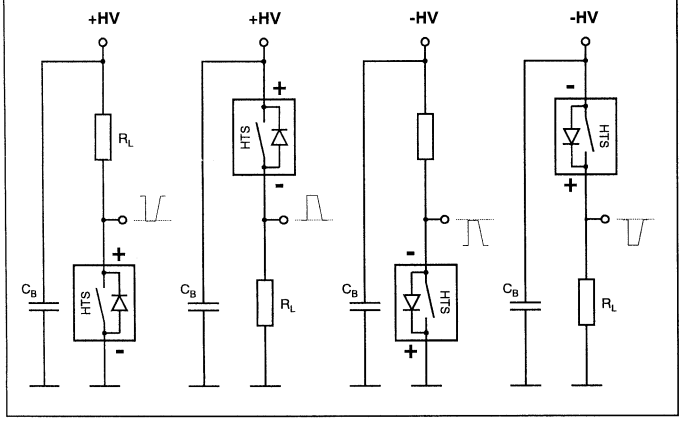


Plastic case for PCB insertion (flat version, option 06-B).

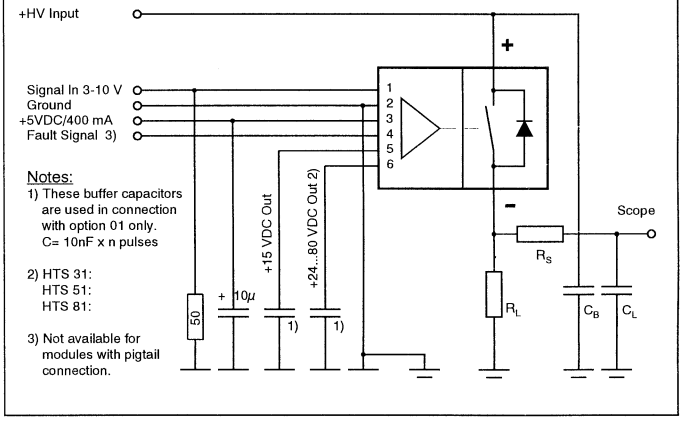


Standard plastic case with copper cooling fins for increased power dissipation (option 04)

Basic Circuits



Test Circuit



✉ **BEHLKE ELECTRONIC GMBH** · Am Auernberg 4 · 61476 Kronberg/Germany
☎ +49 (0) 6173-929020, **Fax** +49 (0) 6173-929030, **e-mail** info@behlke.de, **www**.behlke.de

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TECHNICAL DATA

Specification	Symbol	Condition / Comment		HTS 31	HTS 51	HTS 81	Unit
Maximum Operating Voltage	$V_{O(max)}$	I_{off} < 10 μADC		3000	5000	8000	VDC
Minimum Operating Voltage	$V_{O(min)}$	Increased $t_{r(on)}$ and $t_{r(off)}$ below 0.1x $V_{O(max)}$			0		VDC
Typical Breakdown Voltage	V_{br}	I_{off} > 1mADC, T_{case} = 70 °C		3600	6000	9600	VDC
Galvanic Isolation	V_I	HV part against control, standard			>10000		VDC
Maximum Peak Current	$I_{P(max)}$	T_{case} = 25°C	t_p<10 μs, duty cycle <1%		30		
			t_p<100μs, duty cycle <1%		24		
			t_p<1 ms, duty cycle <1%		17		ADC
Maximum Continuous Load Current	I_L	T_{case} = 25°C respectively T_{fin} = 25°C	Standard plastic case	0.71	0.58	0.45	
			Ditto + option 03	0.87	0.71	0.55	
			Ditto +cooling fins (opt. 04)	-	-	1.09	
			Metal case B1 (opt. 05)	-	-	2.83	ADC
Static On-Resistance	R_{stat}	T_{case} = 25°C	0.1 x $I_{P(max)}$	8	12	20	
			@ $I_{P(max)}$	20	30	50	Ω
Maximum Off-State Current	I_{off}	0.8 x V_O, T_{case} = 25...70°C			5		μADC
Turn-On Delay Time	$t_{d(on)}$	@ $I_{P(max)}$			100		ns
Typical Turn-On Rise Time	$t_{r(on)}$	0.8 x V_O,	0.1 x $I_{P(max)}$		6		
		10-90 %	1.0 x $I_{P(max)}$		9		ns
Typical Turn-Off Rise Time	$t_{r(off)}$	0.8xV_O, 0.1x $I_{P(max)}$, resistive load, 10-90%			7		ns
Minimum On-Time	$t_{on(min)}$	Limited by driver circuit			100		ns
Maximum On-Time	$t_{on(max)}$	Please note possible $P_{d(max)}$ limitations			∞		
Switch Recovery Time	t_{rc}	t_{rc} = minimum pulse spacing			300		ns
Typical Turn-On Jitter	$t_{j(on)}$	V_{aux} / V_{tr} = 5.0 VDC			100		ps
Max. Switching Frequency	$f_{(max)}$	Please note possible $P_{d(max)}$ limitations		100	70	40	kHz
Maximum Burst Frequency	$f_{b(max)}$	Use option 01 for >10 pulses within<20μs			3.3		MHz
Maximum Continuous Power Dissipation	$P_{d(max)}$	T_{case} = 25°C respectively T_{fin} = 25°C	Standard plastic case	10	10	10	
			Ditto + option 03	15	15	15	
			Ditto +cooling fins (opt. 04)	-	-	60	
			Metal case B1 (opt. 05)	-	-	400	Watts
Linear Derating		Above 25 °C	Standard plastic case	0.22	0.22	0.22	
			Ditto + option 03	0.33	0.33	0.33	
			Ditto + cooling fins (opt. 04)	-	-	1.33	
			Metal case B1 (opt. 05)	-	-	6.66	W/K
Temperature Range	T_O	Plastic case, plastic case +cooling fins			-40...70		
		Metal case B1 (option 05)			-30...85		°C
Natural Capacitance	C_N	Capacitance between switch poles at $V_{O(max)}$		110	75	45	pF
Coupling Capacitance	C_C	HV side against control side			16		pF
Diode Reverse Recovery Time	t_{rrc}	I_F=0.1x$I_{P(max)}$	MOSFET parasitic diode		500		ns
Diode Forward Voltage Drop	V_F	I_F=0.1x$I_{P(max)}$	MOSFET parasitic diode	6	9	15	VDC
Auxiliary Supply Voltage	V_{aux}	Stabilized to ± 5%			5.0		VDC
Auxiliary Supply Current	I_{aux}	@ f_{max}			400		mADC
Control Signal	V_{tr}	> 3VDC recommended			2-10		VDC
Fault Signal Output		TTL compatible, short circuit proof, L=Fault			H= 4 V, L= 0.5 V		VDC
Dimensions	LxBxH	Standard plastic case			89 x 64 x 27		
		Flat plastic case (opt. 06-B)			89 x 64 x 19		
		Plastic case + cooling fins (opt. 04)			89 x 64 x 60		
		Metal case B1 (opt. 05)			180 x 100 x 53.5		mm^3
Weight		Standard plastic case			250		
		Flat plastic case (opt. 06-B)			190		
		Plastic case + cooling fins (opt. 04)			350		
		Metal case B1 (opt. 05)			2500		g

Ordering Informations

HTS 31 Transistor switch, 3000 VDC, 30 Amps.
HTS 51 Transistor switch, 5000 VDC, 30 Amps.
HTS 81 Transistor switch, 8000 VDC, 30 Amps.
Option 01 High frequency burst
Option 02 Flame retardend casting resin UL94-VO
Option 03 Increased thermal conductivity
Option 04 Cooling fins, non-isolated
Option 05 Metal case B1, potential-free (cf. separate data sheet)
Option 06 Soldering pins for printed boards, module height 27 mm
Option 06-B Ditto, module height 19 mm (options 02,03, 04 excluded)
Option 08 30 kV instead of 10 kV isolation, module size on request
Option 08-B 80 kV instead of 10 kV isolation, module size on request

All data and specifications subject to change without notice. Custom designed devices on request.