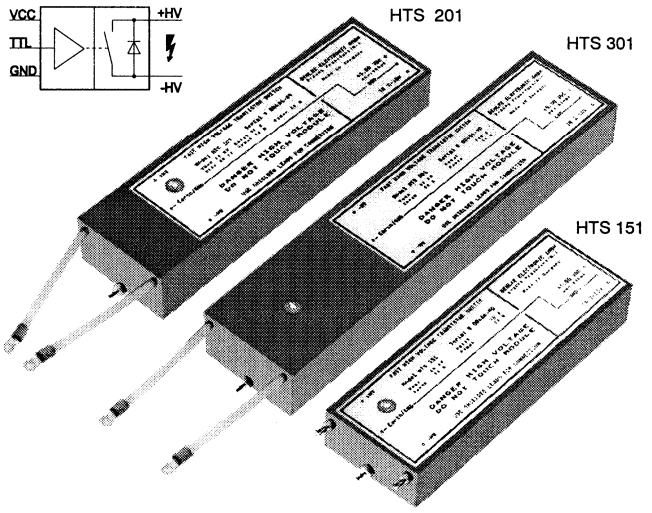
FAST HIGH VOLTAGE TRANSISTOR SWITCHES

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. The switches are turned-on by a positive going signal of 3 to 10 volts amplitude. The on-time may be varied between 150 ns and infinity. A short recovery time of 500 ns allows burst frequencies up to 2 MHz. Due to the high galvanic isolation (Up to 80 kV optionally) the switches may simply be operated also in high-side and floating 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 Pd(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 10 to 15. A metal case for a continuous power dissipation of more than1000 Watt is also available (Option 05, cf. data sheet "High Power Metal Case"). For detailed design recom-mendations please refer to the general instructions.

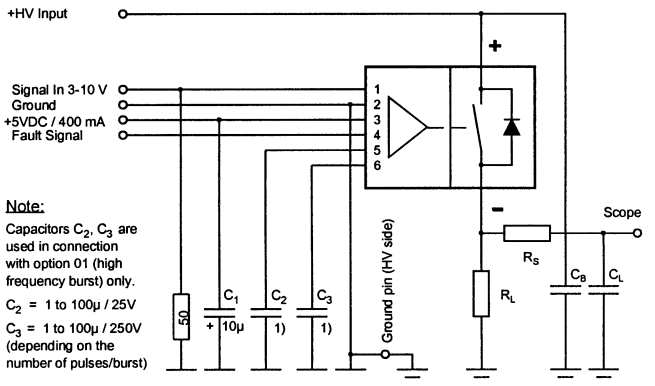
HTS 151 15000 VDC / 30 Amps
HTS 201 20000 VDC / 30 Amps
HTS 301 30000 VDC / 30 Amps



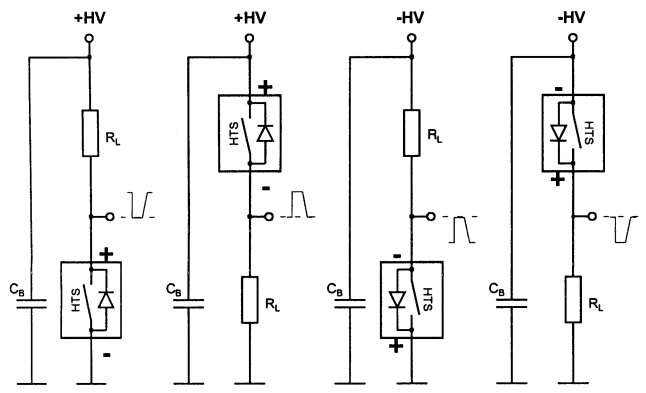
Variable On-Time

- Patented -
Made in Germany

Test Circuit (High-Side Switch)

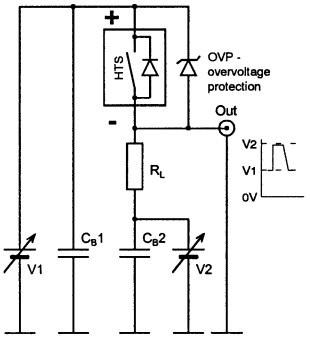


Basic Circuits



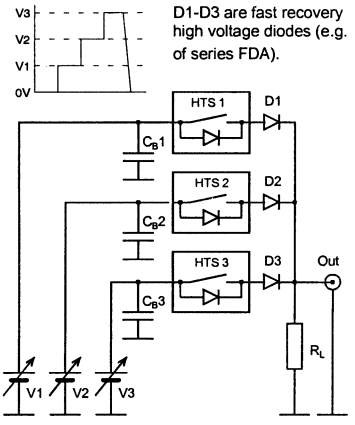
Floating Pulser

V1 must not exceed the Maximum Isolation voltage of the switching module. An OVP is recommended for V1 > Vo(max).



Step Voltage Pulser

D1-D3 are fast recovery high voltage diodes (e.g. of series FDA).



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TECHNICAL DATA

Specification	Symbol	Condition / Comment		HTS 151	HTS 201	HTS 301	Unit
Maximum Operating Voltage	$V_{O(max)}$	I_{off} < 10 µADC		15000	20000	30000	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		17000	22000	34000	VDC
Galvanic Isolation	V_I	Continuously		20000	40000	40000	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
Max. Continuous Load Current	I_L	T_{case} = 25°C	Standard plastic case	0.48	0.46	0.4	
		T_{fin} = 25°C	Opt. 04, cooling fins (air >4m/s)	1.58	1.54	1.52	ADC
Static On-Resistance	R_{stat}	T_{case} = 25°C	0.1 x $I_{P(max)}$	35	47	74	
			1.0 x $I_{P(max)}$	88	118	185	Ω
Maximum Off-State Current	I_{off}	0.8 x V_O, T_{case} = 25...70°C			5		µADC
Turn-On Delay Time	$t_{d(on)}$	@ $I_{P(max)}$		80	90	100	ns
Typical Turn-On Rise Time	$t_{r(on)}$	0.8 x V_O,	0.1 x $I_{P(max)}$	10	14	20	ns
Typ. Turn-Off Rise Time (Current)	$t_{r(off)}$	0.8xV_O, 0.1x $I_{P(max)}$, resistive load, 10-90%			10		ns
Minimum On-Time	$t_{on(min)}$	Limited by driver circuit			150		ns
Maximum On-Time	$t_{on(max)}$	Please note possible $P_{d(max)}$ limitations			∞		
Switch Recovery Time	t_{rc}	t_{rc} = minimum pulse spacing			500		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		10	8	5	kHz
Maximum Burst Frequency	$f_{b(max)}$	Use option 01 for >10 pulses per 20µs burst			2		MHz
Maximum Continuous Power	$P_{d(max)}$	T_{case} = 25°C	Standard plastic case	20	24	30	
Dissipation		T_{fin} = 25°C	Opt. 04, cooling fins (air >4m/s)	220	280	430	Watts
Linear Derating		Above 25 °C	Standard plastic case	0.44	0.53	0.66	
			Opt. 04, cooling fins (air >4m/s)	4.88	6.22	9.55	W/K
Temperature Range	T_O				-40...70		°C
Natural Capacitance	C_N	Capacitance between switch poles at $V_{O(max)}$		36	27	18	pF
Coupling Capacitance	C_C	HV side against control side		35	42	50	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	25	33	51	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		178x64x31	205x64x31	267x64x31	
		Flat plastic case (opt. 06-B), pls. consult factory		178x64x19	205x64x19	267x64x19	
		Plastic case + cooling fins (opt. 04)		178x64x66	205x64x66	267x64x66	mm^3
Weight		Standard plastic case		500	580	750	
		Flat plastic case (opt. 06-B)		330	390	450	
		Plastic case + cooling fins (opt. 04)		670	800	1090	g

Ordering Informations

HTS 151	Transistor switch, 15000 VDC, 30 Amps.	**Option 04**	Cooling fins, non-isolated
HTS 201	Transistor switch, 20000 VDC, 30 Amps.	**Option 05**	Metal case, potential-free (Cf. separate data sheet)
HTS 301	Transistor switch, 30000 VDC, 30 Amps.	**Option 06**	Soldering pins for PCB assembly, module height 31 mm
Option 01	High frequency burst	**Option 06-B**	Module height 19 mm (please consult factory)
Option 02	Flame retardend casting resin UL94-VO	**Option 08**	40 kV instead of 20 kV isolation, HTS 151 only
Option 03	Increased thermal conductivity	**Option 08-B**	80 kV instead of 40 kV isolation

Further data and mechanical drawings are available on request. All data and specifications subject to change without notice.