

FAST HIGH VOLTAGE TRANSISTOR SWITCHES

These MOSFET switches of model series HTS have been designed for fast high voltage pulse generators with high peak current capability. Their universal design allows a direct replacement of electron tubes, gas discharge tubes and spark gaps in many pulsed power applications. The lifetime of solid-state switches is several orders of magnitude higher than those of conventional switches and the switching characteristics are widely unaffected by aging. The employment of 120 rugged MOSFETs together with an intelligent control system guarantees an exceptional good switching performance particularly for high frequency applications. Bursts in the megahertz-range and complex wave pattern as well as long lasting square-wave pulses can be generated without large-scale technical efforts.

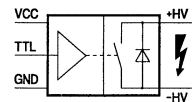
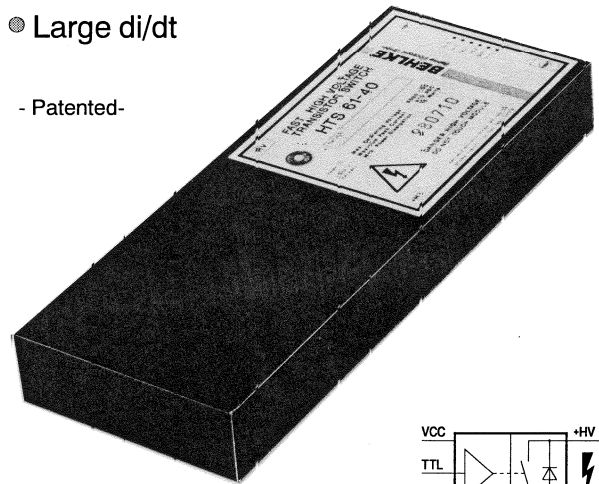
The turn-on rise times of these switches are constant over a wide range of operating voltage and load current. Under normal operating conditions there is no feedback from output to input. The on-time of the switches corresponds to the input control signal and can be varied between 300 ns and infinity. Due to the galvanic isolation the devices can be used as high-side switches for positive as well as for negative voltages. The modules are protected against thermal overload, too high a signal frequency, unsuitable control signals and an incompatible auxiliary supply.

To achieve lowest possible stray inductance the devices are designed to be mounted on printed circuit boards. Massive terminal blocks of 105 mm width serve as low inductance connectors for the circuit tracks. In the standard option the devices are delivered plastic encapsulated. At higher power dissipation up to 200 watts the modules can be equipped with cooling fins, that are on high voltage potential. For even higher power dissipation a hermetically sealed and potential-free metal case can be delivered which in connection with a heat sink or water cooling system can carry-off up to 2000 watts.

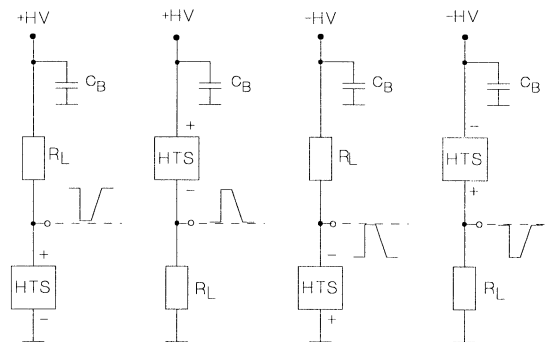
HTS 31-80 3000 VDC / 800 A
HTS 61-40 6000 VDC / 400 A

- Power MOS technology
- Fast turn-on & turn-off
- Variable on-time
- Large di/dt

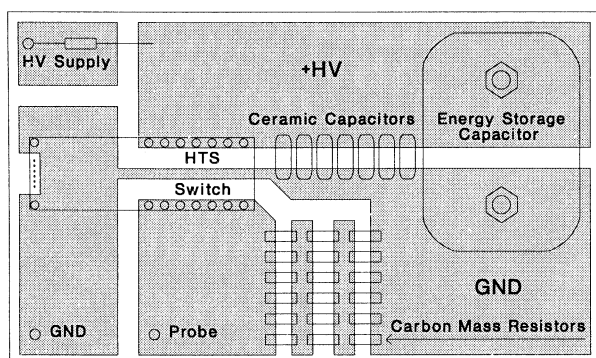
- Patented-



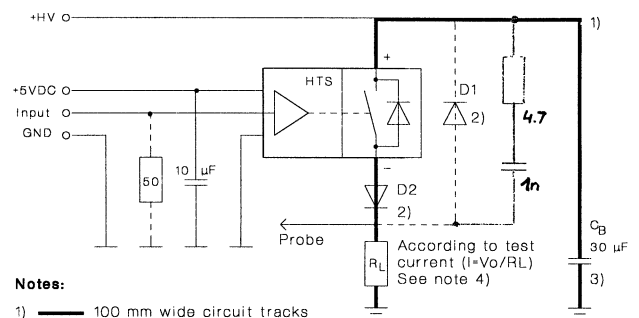
Basic Circuits



Test Board (Top View)



Test Circuit (High-Side Switch)



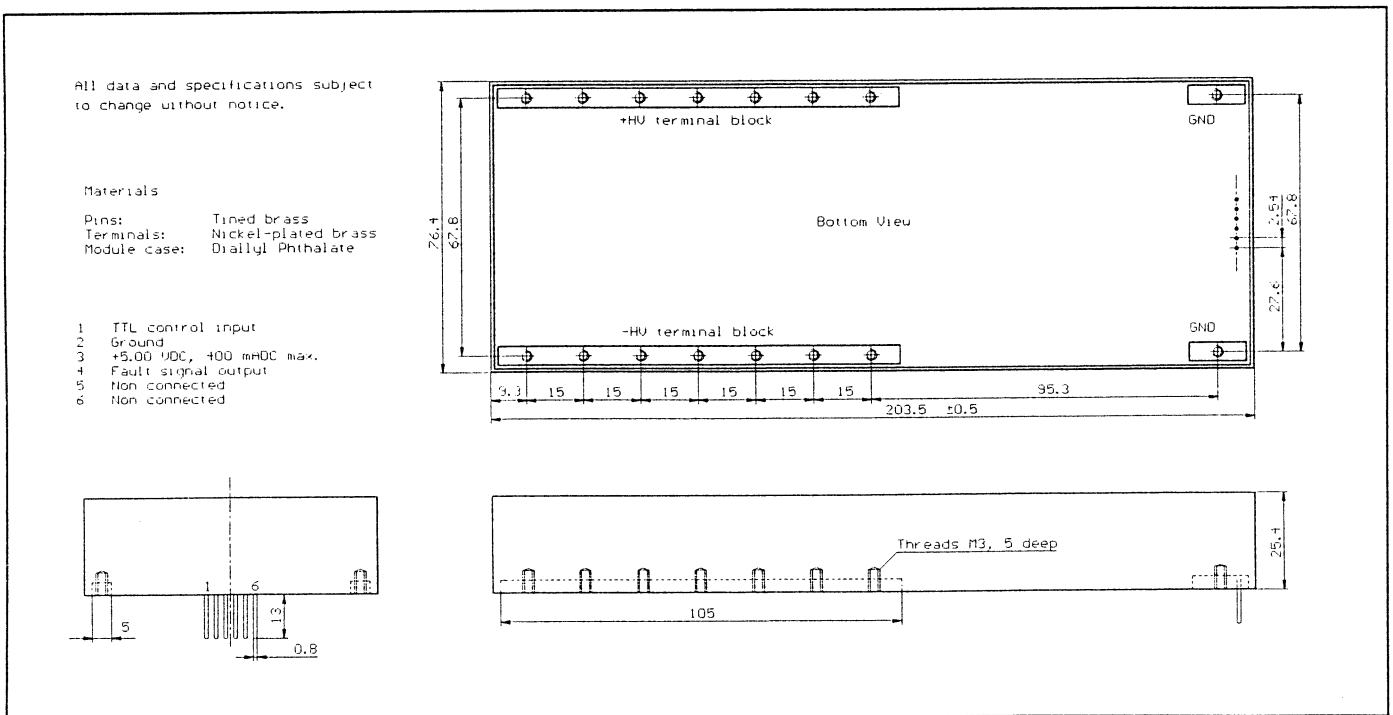
Notes:

- 1) — 100 mm wide circuit tracks
- 2) D1/D2 only in case of current reversal
- 3) MAXWELL energy storage capacitor in parallel with 500 nF ceramic cap.
- 4) ALLEN BRADLEY 2 watt mass resistors, >30 pieces in parallel & series.

Technical Data

SPECIFICATION	SYMBOL	CONDITION / COMMENT	31-80	61-40	UNIT
Maximum Operating Voltage	$V_{O(max)}$	$T_{case} = 25^{\circ}C$	± 3000	± 6000	VDC
Minimum Operating Voltage	$V_{O(min)}$	No saturated switching below $V_{O(min)}$	± 300	± 600	VDC
Breakdown Voltage	V_{br}	$I_{off} > 10 \text{ mA}$, $T_{case} = 25^{\circ}C$	± 3300	± 6600	VDC
Isolation Voltage	V_i	Continuously	10000		VDC
Static On-Resistance	$R_{(stat)}$	$0.1 \times I_{P(max)}$, $0.8 \times V_O$, single pulse $1 \mu s$	0.5	1.0	Ω
		$1.0 \times I_{P(max)}$, $0.8 \times V_O$, single pulse $1 \mu s$	1.05	2.1	
Maximum Peak Current ¹⁾	$I_{P(max)}$	$t_p < 10 \mu s$, duty cycle $< 1\%$, $T_{case} = 25^{\circ}C$	800	400	ADC
		$t_p < 100 \mu s$, duty cycle $< 1\%$, $T_{case} = 25^{\circ}C$	640	320	
		$t_p < 1 \text{ ms}$, duty cycle $< 1\%$, $T_{case} = 25^{\circ}C$	456	228	
Maximum Continuous Current	I_L	Standard plastic case, $T_{case} = 25^{\circ}C$	7	5	ADC
Maximum Off-State Current	I_{off}	$0.8 \times V_O$, $T_{case} = 25^{\circ}C$	200	100	μADC
On-Time Range	t_{on}		300- ∞		ns
Turn-On Delay Time	$t_{d(on)}$	$0.1 \times I_{P(max)}$	95		ns
Typical Turn-On Rise Time	$t_{r(on)}$	$0.1 \times I_{P(max)}$, $0.8 \times V_O$	8	8	ns
		$1.0 \times I_{P(max)}$, $0.8 \times V_O$	12	10	
Typical Turn-Off Rise Time	$t_{r(off)}$	Resistive load, @ $I_{P(max)}$	35	35	ns
Typical Turn-On Jitter	$t_{j(on)}$	$V_{tr} = 5 \text{ VDC}$, $V_{aux} = 5.00 \text{ VDC}$	500		ps
Maximum Burst Frequency ¹⁾	$f_{b(max)}$		1.5	1.5	MHz
Max. Number of Pulses/Burst ¹⁾	N_B	Use burst option for > 20 pulses / $100 \mu s$	20		
Max. Continuous Frequency ¹⁾	$f_{c(max)}$	10 kHz with optional metal case	2	2	kHZ
Max. Cont. Power Dissipation	$P_{d(max)}$	Optionally up to 200/2000 Watts	25		Watts
Linear Temp. Derating of $P_{d(max)}$		$T_{case} > 25^{\circ}C$	0.55		W/ $^{\circ}C$
Temperature Range	T_O	Extended temperature range on request	-30... + 70		$^{\circ}C$
Diode Reverse Recovery Time	t_{rrc}	Diode must not be used	1		μs
Switch Natural Capacitance	C_N	Capacitance between switch poles	1100	550	pF
Coupling Capacitance	C_C	Between switch and control part	30		pF
Auxiliary Supply Voltage	V_{aux}	Maximum tolerance $\pm 5\%$	5		VDC
Auxiliary Supply Current	I_{aux}	@ $f_{c(max)}$, $> 0.2 \times V_{O(max)}$	400		mADC
Control Voltage	V_{tr}	$> 3VDC$ recommended	2-10		VDC
Fault Detection Signal		Pin 4 is "Low" in case of fault	High: 4.8 (Typ.) Low: 0.2		VDC
Dimensions		Case only	199.5 x 76.4 x 25.4		mm ³
Weight			750		g

1) CAUTION: These data have to be considered in conjunction with the maximum continuous power dissipation! Please refer to the general instructions.



Ordering Informations:
 HTS 31-80 Transistor switch
 HTS 61-40 Transistor switch

Option 01 High frequency burst
 Option 02 UL-94VO casting resin
 Option 03 Increased thermal conductivity

Option 03 Cooling fins for up to 200 Watts
 Option 04 Metal case for up to 2000 Watts
 (Available from III/94)