FAST HIGH VOLTAGE TRANSISTOR SWITCHES

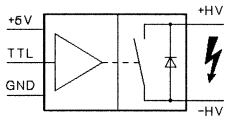
Description

The solid-state switch HTS 150 generates precise high-voltage pulses with amplitudes of up to 15 kV as needed for example in pulsed electrostatic deflection and accelaration systems. The HTS 150 is a cost-effective solution in all pulse applications, which require a fast leading edge and a low pulse droop at a relatively uncritical trailing edge. In contrast to conventional high-voltage switches like gas discharge tubes or electron tubes the HTS 150 does not need heating power or a complex drive circuitry. Further advantages are very short recovery times, low jitter and a lifetime typical of semiconductor devices. The power part of switch is made up of a large number of MOSFET connected in parallel and in series which are controlled absolutely synchronously. Due to the galvanic isolation the HTS 150 can be used as high-side switch for positive as well as for negative voltages. The device is protected from thermal overload by means of an internal temperature sensor. Further protection is afforded against too high a signal frequency, unsuitable control signals and an unsuitable auxiliary supply.

The on-time of the standard model is fixed at 150 ns. On-time extensions of 1, 10 and 100 microseconds as well as customized on-time extensions are available as built-in options. In connection with these options the switch can also be re-triggered according to its burst capability which allows an on-time variation in certain limits. The turn-off rise time of switches with on-time option roughly corresponds to the preceding on-time. As a result of that considerable switching losses may arise, esspecially at low load resistances. Therefore the working resistor should not be smaller than 10 kΩ if on-time options are used. For detailed design recommendations please refer to the instructions.

HTS 150

15000 Volts / 30 Amps



Fixed On-Time
Simple Connection
Compact Design

Patented

NEW

SPECIFICATION	SYMBOL	CONDITION / COMMENT		HTS 150	UNIT
Maximum Operating Voltage	$V_{O(max)}$			±15000	VDC
Switch Breakdown Voltage	V_{br}	I_{off} = 1 mADC, T_{case} = 70°C		>18000	VDC
Isolation Voltage	V_I	HV side against control side		>18000	VDC
Maximum Peak Current	$I_{P(max)}$	t_p < 10 µs, duty cycle < 1%		30	ADC
Static On-Resistance	R_{stat}	I_L = 0.1 x $I_{P(max)}$		36	
		I_L = $I_{P(max)}$		90	Ω
Maximum Off-State Current	I_{off}	0.8 x V_O		<15	µADC
Turn-On Delay Time	$t_{d(on)}$	0.8 x V_O, C_L = 20 pF, R_S = 51Ω		75	ns
Turn-On Rise Time	$t_{r(on)}$	R_L = 10K	0.8 x V_O, C_L = 20 pF	12	
		R_S = 51Ω	0.8 x V_O, C_L = 100 pF	35	
			0.8 x V_O, C_L = 250 pF	70	ns
Typical Turn-On Jitter	$t_{j(on)}$	V_{aux} = 5.0 VDC, V_{tr} = 5VDC, f = 1kHz		100	ps
On-Time	t_{on}	Tolerance ±10%	Standard	150	ns
		Tolerance -10, +30%	Option 01	1	
		$t_{r(off)}$ roughly	Option 02	10	
		corresponds to t_{on}	Option 03	100	µs
Maximum Burst Frequency	$f_{b(max)}$	Use burst option for > 20 pulses / 20µs burst		2	MHz
Maximum Continuous Frequency	$f_{c(max)}$	@ V_{aux} = 5.00 VDC, note $P_{d(max)}$ limitations		30	kHZ
Continuous Power Dissipation	$P_{d(max)}$	T_{case} = 25 °C, derating 0.22 W/°C above 25°C		10	Watts
Temperature Range	T_O	Extented temperature range on request		-30 to +70	°C
Switch Natural Capacitance	C_N	Capacitance between switch poles at $V_{O(max)}$		16	pF
Coupling Capacitance	C_C	Power side against control side		20	pF
Diode Reverse Recovery Time	t_{rrc}	@ I_F = 6A, Caution: Diode must not be used!		1	µs
Auxiliary Supply Voltage	V_{aux}	Stabilized to ± 5%		5	VDC
Auxiliary Supply Current	I_{aux}	@ $fc_{(max)}$		400	mADC
Trigger Voltage	V_{tr}			2-10	VDC
Dimensions		Case only, see drawing		89x64x27	mm³
Weight				250	g

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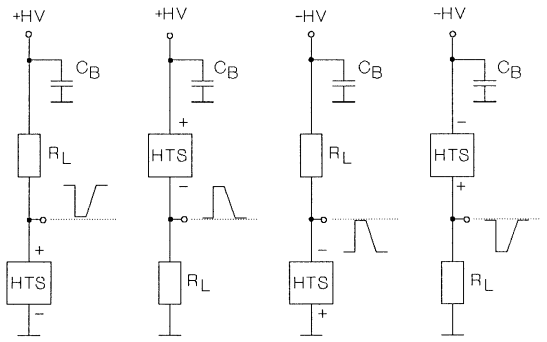
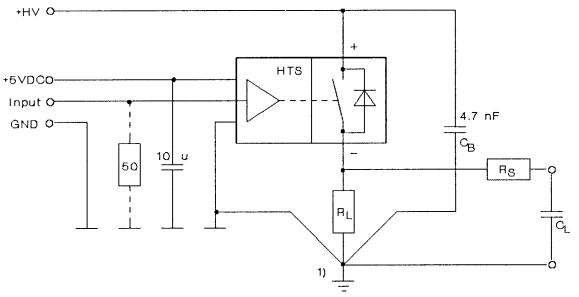
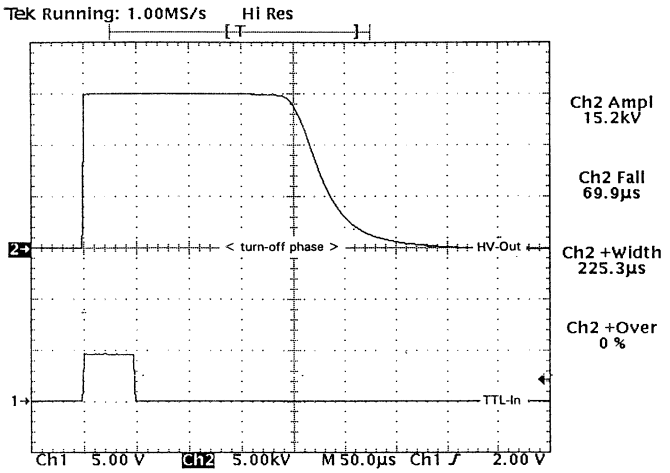
Basic Circuits



Test Circuit (High-Side Switch)



1) Star-type grounding at earth terminal
All leads as short as possible !



HTS 150 with 100μs on-time extension. R_L = 1MΩ, C_L = 20pF, vert. 5kV/div.

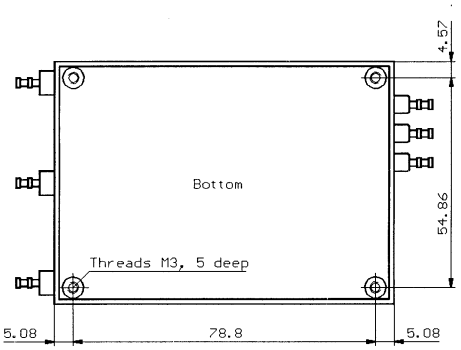
Ordering Information

HTS 150	Fast solid-state switch, 15 kVDC
Option 01	On-time extension, 1 µs
Option 02	On-time extension, 10 µs
Option 03	On-time extension, 100 µs
Option 04	Customized on-time extension
Option 05	High frequency burst (ext. buffer caps.)
Option 06	Flame-retartend casting resin, UL94-VO
Option 07	Increased thermal conductivity
Option 08	Hermetically sealed metal case for high power applications (from II/94)
Option 09	Soldering pins for printed circuit boards

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

All dimensions in mm

1 - TTL trigger input
2 - Return & shielding
3 - +5VDC / 400 mA



Case HTS 150

Standard case with soldering terminals. Soldering pins for mounting on printed circuit boards are optionally available.