

	Specification	Symbol	Condition / Comment	151-30 SiC	151-60 SiC	Unit
ABSOLUTE MAXIMUM RATINGS	Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 50 \mu A$ , $T_{case} = 70^{\circ}C$	15		kVDC
	Maximum Isolation Voltage	$V_i$	Between HV switch and control / GND, continuously	$\pm 25$		kVDC
	Max. Housing Insulation Voltage	$V_{INS}$	Between switch and housing surface, 3 minutes	$\pm 50$		kVDC
	Maximum Turn-On Peak Current	$I_{P(max)}$	$T_{case} = 25^{\circ}C$ $t_p < 200 \mu s$ , duty cycle $< 1\%$ $t_p < 1 ms$ , duty cycle $< 1\%$ $t_p < 10 ms$ , duty cycle $< 1\%$ $t_p < 100 ms$ , duty cycle $< 1\%$	300 190 58 30	600 360 115 60	ADC
	Maximum Continuous Load Current	$I_{L(max)}$	$T_{case} = 25^{\circ}C$ Standard devices Devices with option DLC	2.52 60		ADC
	Max. Continuous Power Dissipation	$P_{d(max)}$	$T_{case} = 25^{\circ}C$ Standard devices & FC, forced air 4 m/s Devices with option DLC	10.5 1800	25 2600	Watt
	Linear Derating		Above $25^{\circ}C$ Standard devices & FC, forced air 4 m/s Devices with option DLC	0.033 21	0.06 40	W/K
	Operating Temperature Range	$T_o$	Standard devices & options CF, GCF, ILC. (Option DLC)	-40...70 (60)		$^{\circ}C$
	Storage Temperature Range	$T_s$	Switches with option ILC may require frost protection!	-40...90		$^{\circ}C$
	Max. Permissible Magnetic Field	B	Homogeneous steady-field, surrounding the whole switch	25		mT
	Max. Auxiliary Voltage	$V_{aux}$	Built-in overvoltage limiter (replaceable)	5.5		VDC
ELECTRICAL CHARACTERISTICS	Permissible Operating Voltage Range	$V_o$		$0... \pm 15$		kVDC
	Typical Breakdown Voltage	$V_{br}$	NOTE: $V_{br}$ is a test parameter for quality control purposes only. Not applicable in normal operation! $I_{off} > 0.5 mA$	16.5		kVDC
	Typical Off-State Current	$I_{off}$	$0.8 \times V_o$ , $T_{case} = 25...70^{\circ}C$ , reduced $I_{off}$ on request	$< 80$		$\mu ADC$
	Typical Turn-On Resistance	$R_{stat}$	Each switching path $t_p < 1 \mu s$ , duty cycle $< 1\%$ $0.1 \times I_{P(max)}$ , $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$ , $T_{case} = 25^{\circ}C$ $1.0 \times I_{P(max)}$ , $T_{case} = 70^{\circ}C$	0.28 0.6 1.3	0.14 0.3 0.65	Ohm
	Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$ , $0.8 \times V_o$ , 50-50%	200		ns
	Typical Output Pulse Jitter	$t_j$	Impedance matched input, $V_{aux} / V_{ctrl} = 5.00 VDC$	3		ns
	Typical Turn-On Rise Time	$t_{r(on)}$	Resistive load, 10-90% $0.1 \times V_o$ , $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_o$ , $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_o$ , $I_L = 1.0 \times I_{P(max)}$	22 38 45	23 43 52	ns
	Typical Turn-Off Rise Time	$t_{off}, t_q$	Resistive load, 10-90% $0.1 \times V_o$ , $I_L = 0.1 \times I_{P(max)}$ $0.8 \times V_o$ , $I_L = 1.0 \times I_{P(max)}$	50 100		ns
	Maximum Turn-On Time	$t_{on(max)}$	No limitation	$\infty$		ns
	Minimum Turn-On Time	$t_{on(min)}$	$t_{on(min)}$ can be customized. Please consult factory	120		ns
	Maximum Turn-Off Time	$t_{off(max)}$	No limitation	$\infty$		ns
	Minimum Turn-Off Time	$t_{off(min)}$	$t_{off(min)}$ can be customized. Please consult factory	120		ns
	Max. Continuous Switching Frequency	$f_{(max)}$	@ $V_{aux} = 5.00 V$ Sw. shutdown if $f_{(max)}$ is exceeded Standard devices without HFS option Standard devices with HFS supply Opt. HFS + sufficient cooling option	11 40 80	15 40 80	kHz
	Maximum Burst Frequency	$f_b$	Use option HFB for $> 10$ pulses within 20 $\mu s$ or less	500		kHz
	Maximum Number of Pulses / Burst	$N_{(max)}$	@ $f_b$ Note: Option HFB requires external buffer capacitors with a voltage rating of $> 630VDC$ and a capacitance of 100nF per additional pulse. Standard Option I-HFB Option HFB	$> 10$ $> 100$ $> 1000$		Pulses
	Coupling Capacitance	$C_C$	HV side against control side	$< 100$		pF
	Natural Capacitance	$C_N$	Between switch poles, @ $0.5 \times V_o$	$< 50$		pF
	Control Voltage Range	$V_{ctrl}$	The $V_{ctrl}$ has no impact on the output pulse shape.	3 ... 10		VDC
	Auxiliary Supply Voltage Range	$V_{aux}$	The +5 V supply is not required in the HFS mode.	4.5 ... 5.5		VDC
	Typical Auxiliary Supply Current	$I_{aux}$	$V_{aux} = 5.00 VDC$ , $T_{case} = 25^{\circ}C$ . Active current limitation above 1A. $0.01 \times f_{(max)}$ @ $f_{(max)}$	130 800	160 800	mADC
	Fault Signal Output		Switch will be turn off, if $f > f_{(max)}$ , $V_{aux} < 4.75V$ or $T_{case} > 75^{\circ}C$ Fault condition is indicated by a logical "L"	$> 4.0$ $< 0.8$		VDC
	Opt. HFS, Ext. Supply Voltage V1	$V_{HFS(V1)}$	Stability $\pm 3\%$ , current consumption $< 0.4 mA/kHz$ @ $25^{\circ}C$	15		VDC
	Opt. HFS, Ext. Supply Voltage V2	$V_{HFS(V2)}$	Stability $\pm 3\%$ , current consumption $< 0.5 mA/kHz$ @ $25^{\circ}C$	62	TBD	VDC
	Intrinsic Diode Forward Voltage	$V_F$	$T_{case} = 25^{\circ}C$ , $I_F = 0.3 \times I_{P(max)}$	25		VDC
	Diode Reverse Recovery Time	$t_{rr}$	$T_{case} = 25^{\circ}C$ , $I_F = 0.3 \times I_{P(max)}$ , $di/dt = 100 A/\mu s$	$< 50ns$		ns
HOUSING	Dimensions	LxWxH	Standard housing Devices with option DLC	TBD		mm <sup>3</sup>
	Weight		Standard housing Devices with option DLC	TBD		g
FUNCTIONS	Control Signal Input Logic GND / 5V Return 5V Auxiliary Supply Fault Signal Output Inhibit Signal Input LED Indicators Temperature Protection	<b>Pin 1 / Yellow (LS-C: Pin 1).</b> TTL compatible (LS-C: With 100 $\Omega$ termination). Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V for low jitter). <b>Pin 2 / Black (LS-C: Shielding).</b> The ground pin is internally connected with the safety earthings terminals (threaded inserts) on bottom side. <b>Pin 3 / Red (LS-C: Pin 4).</b> The 5 V input is used for rep rates up to the specified max. frequency $f_{(max)}$ . Higher rep rates require option HFS. <b>Pin 4 / Orange (LS-C: Pin 3).</b> TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault. <b>Pin 5 / Green (LS-C: Pin 2).</b> TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = Switch Inhibited. <b>GREEN:</b> "Auxiliary power good, switch OFF". <b>YELLOW:</b> "Control signal received, switch ON". <b>RED:</b> "Fault condition, switch OFF" Switches with option DLC: $65^{\circ}C$ , response time $< 3 s$ @ $3 \times P_d(max)$ , $\Delta T = 25K$ (40 to $65^{\circ}C$ ), coolant flow $> 3 l / min$ . Separate driver protection.				
ORDERING	HTS 151-30 SiC	Fast HV SiC Mosfet Switch, 15kV, 300 A	Option LP	Low Pass. Input filter for increased noise immunity.	Option I-PC	Integrated part components according to customer specification.
	HTS 151-60 SiC	Fast HV SiC Mosfet Switch, 12kV, 600 A	Option HFB	High Frequency Burst (improved capability by external capacitors)	Option UL-94	Flame retardant casting resin, UL94-V0
			Option HFS	High Frequency Switching (two auxiliary supply inputs V1 & V2)	Option I-FWD	Integrated Free-Wheeling Diode. In connection with inductive load only.
			Option I-HFS	Integrated High Frequency Burst	Option I-FWDN	Integrated Freewheeling Diode Network. In connection with inductive load.
			Option S-TT	Soft Transition Time decrease the rise and fall time by 20%	Option PT-C	Pigtail for control connection: Flexible leads (l=75mm) with lemo
			Option Min-On	Individually increased "Min. On-Time" to avoid unwanted triggering	Option SEP-C	Separated control unit. Control unit with LED indicators in a separate
			Option Min-Off	Individually increased "Min. Off-Time" to avoid unwanted triggering	Option TH	Tubular Housing
			Option PCC	Pulser Configuration. Switch combined with custom specific parts.	Option CF	Copper Cooling Fins. $P_{d(max)}$ can be increased by the factor 3 to 10.
			Option ISO-40	40kV Isolation. Isolation Voltage increased to 120kV.	Option DLC	Direct Liquid Cooling. $P_{d(max)}$ can be increased by the factor 10 to 100.
			Option ISO-60	60kV Isolation. Isolation Voltage increased to 200kV.	FOR FURTHER PRODUCT OPTIONS PLEASE REFER TO THE OPTIONS PAGE.	