| | Specification | Symbol | Condition / Comment | | 151-15-SiC | Unit |
|---|---|---|---|---|---|---|
| ABSOLUTE MAXIMUM RATINGS | Maximum Operating Voltage | $V_{O(max)}$ | $I_{off}$ < 50 µADC, $T_{case}$ = 70°C | | ± 15 | kVDC |
| | Maximum Isolation Voltage | $V_I$ | Between HV switch and control / GND, continuously | | ± 25 | kVDC |
| | Max. Housing Insulation Voltage | $V_{INS}$ | Between switch and housing surface, 3 minutes | | ± 50 | kVDC |
| | Maximum Turn-On Peak Current | $I_{P(max)}$ | $T_{case}$ = 25°C | $t_p$< 200 µs, duty cycle <1%<br>$t_p$< 1 ms, duty cycle <1%<br>$t_p$< 10 ms, duty cycle <1%<br>$t_p$< 100 ms, duty cycle <1% | 155<br>100<br>65<br>45 | ADC |
| | Maximum Continuous Load Current | $I_{L(max)}$ | $T_{case}$ = 25°C | Standard devices<br>Devices with option DLC | 1.26<br>16.5 | ADC |
| | Max. Continuous Power Dissipation | $P_{d(max)}$ | $T_{case}$ = 25°C | Standard devices & FC, forced air 4 m/s<br>Devices with option ILC | 16<br>1400 | Watt |
| | Linear Derating | | Above 25°C | Standard devices & FC, forced air 4 m/s<br>Devices with option DLC | 0.11<br>13.07 | W/K |
| | Operating Temperature Range | $T_O$ | Standard devices & options CF, GCF, ILC. (Option DLC) | | -40...70 (60) | °C |
| | Storage Temperature Range | $T_S$ | Switches with option ILC may require frost protection! | | -40...90 | °C |
| | Max. Permissible Magnetic Field | B | Homogeneous steady-field, surrounding the whole switch | | 25 | mT |
| | Max. Auxilliary Voltage | $V_{aux}$ | Built-in overvoltage limiter (replaceable) | | 5.5 | VDC |
| ELECTRICAL CHARACTERISTICS | Permissible Operating Voltage Range | $V_O$ | | | 0... ± 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 | kVDC |
| | Typical Off-State Current | $I_{off}$ | 0.8x$V_O$, $T_{case}$ =25...70°C, reduced $I_{off}$ on request | | < 80 | µADC |
| | Typical Turn-On Resistance | $R_{stat}$ | Each switching path<br>$t_p$ < 1µs, duty cycle < 1% | 0.1 x $I_{P(max)}$, $T_{case}$ =25°C<br>1.0 x $I_{P(max)}$, $T_{case}$ =25°C<br>1.0 x $I_{P(max)}$, $T_{case}$ =70°C | 0.55<br>1.16<br>2,75 | Ohm |
| | Typical Propagation Delay Time | $t_{d(on)}$ | Resistive load, 0.1 x $I_{P(max)}$, 0.8 x $V_{O(max)}$, 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 x $V_{O(max)}$, $I_L$ = 0.1 x $I_{p(max)}$<br>0.8 x $V_{O(max)}$, $I_L$ = 0.1 x $I_{p(max)}$<br>0.8 x $V_{O(max)}$, $I_L$ = 1.0 x $I_{p(max)}$ | 13<br>27<br>31 | ns |
| | Typical Turn-Off Rise Time | $t_{off}$, $t_q$ | Resistive load, 10-90% | 0.1 x $V_{O(max)}$, $I_L$ = 0.1 x $I_{p(max)}$<br>0.8 x $V_{O(max)}$, $I_L$ = 1.0 x $I_{p(max)}$ | 50<br>100 | ns |
| | Maximum Turn-On Time | $t_{on(max)}$ | No limitation | | ∞ | ns |
| | Minimum Turn-On Time | $t_{on(min)}$ | $t_{on(min)}$ can be customized. Please consult factory | | 150 | ns |
| | Maximum Turn-Off Time | $t_{off(max)}$ | No limitation | | ∞ | ns |
| | Minimum Turn-Off Time | $t_{off(min)}$ | $t_{off(min)}$ can be customized. Please consult factory | | 150 | ns |
| | Max. Continuous Switching Frequency | $f_{(max)}$ | @ $V_{aux}$= 5.00 V<br>Sw. shutdown if $f_{(max)}$ is exceeded | Standard devices without HFS option<br>Standard devices with HFS supply<br>Opt. HFS + ILC | 12<br>40<br>80 | kHz |
| | Maximum Burst Frequency | $f_{b(max)}$ | Use option HFB for >10 pulses within 20µs or less | | 500 | kHz |
| | Maximum Number of Pulses / Burst | $N_{(max)}$ | @ $f_{b(max)}$<br>Note: Option HFB requires external buffer capacitors with a voltage rating of > 630VDC and a cpacitance of 100nF per additional pulse. | Standard<br>Option I-HFB<br>Option HFB | >10<br>>100<br>>1000 | Pulses |
| | Coupling Capacitance | $C_C$ | HV side against control side | | <100 | pF |
| | Natural Capacitance | $C_N$ | Between switch poles, @ 0.5 x $V_{O(max)}$ | | 200 | 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°C.<br>Active current limitation above 1A. | 0.01 x $f_{(max)}$<br>@ $f_{(max)}$ | 180<br>800 | mADC |
| | Fault Signal Output | | Switch will be turn off, if f>$f_{(max)}$, $V_{aux}$<4.75V or $T_{case}$>75°C<br>Fault condition is indicated by a logical "L" | | >4.0<br><0.8 | VDC |
| | Opt. HFS, Ext. Supply Voltage V1 | $V_{HFS(V1)}$ | Stability ±3%, current consumption <0.4 mA/kHz @ 25°C | | 15 | VDC |
| | Opt. HFS, Ext. Supply Voltage V2 | $V_{HFS(V2)}$ | Stability ±3%, current consumption <0.5 mA/kHz @ 25°C | | 65 | VDC |
| | Intrinsic Diode Forward Voltage | $V_F$ | $T_{case}$ = 25°C, $I_F$ = 0.3 x $I_{P(max)}$ | | 24 | VDC |
| | Diode Reverse Recovery Time | $t_{rrc}$ | $T_{case}$ = 25°C, $I_F$ = 0.3 x $I_{P(max)}$, di/dt = 100 A/µs | | <250ns | ns |
| HOUSING | Dimensions | LxWxH | Standard housing<br>Devices with option ILC | | 175x75x58<br>200x125x56 | $mm^3$ |
| | Weight | | Standard housing | | 1600 | g |

| FUNCTIONS | |
|---|---|
| Control Signal Input | **Pin 1** / Yellow (LS-C: Pin 1). TTL compatible (LS-C: With 100Ω termination). Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V for low jitter). |
| Logic GND / 5V Return | **Pin 2** / Black (LS-C: Shielding). The ground pin is internally connected with the safety earthings terminals (threaded inserts) on bottom side. |
| 5V Auxiliary Supply | **Pin 3** / Red (LS-C: Pin 4). The 5 V input is used for rep rates up to the specified max. frequency $f_{(max)}$. Higher rep rates require option HFS. |
| Fault Signal Output | **Pin 4** / Orange (LS-C: Pin 3). TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault. |
| Inhibit Signal Input | **Pin 5** / Green (LS-C: Pin 2). TTL compatible, Schmitt-Trigger characteristics for the connection of external safety circuits. L = Switch Inhibited. |
| LED Indicators | **GREEN**: "Auxiliary power good, switch OFF". **YELLOW**: "Control signal received, switch ON". **RED**: "Fault condition, switch OFF" |
| Temperature Protection | Switches with option DLC: 65°C, response time < 3 s @ 3xPd(max), ΔT=25K (40 to 65°C), coolant flow > 3l / min. Separate driver protection. |

ORDERING

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|---|---|---|---|---|---|
| **HTS 151-15-SiC** | Fast HV SiC Mosfet Switch, 15kV, 155 A | **Option LP** | Low Pass. Input filter for increased noise immunity. | **Option I-PC** | Integrated part components according to customer specification. |
| | | **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.** | |