

Specification	Symbol	Condition / Comment	FQD 30-04-C	FQD 40-03-C	FQD 60-03-C	Unit	
Maximum Operating Voltage	$V_{O(max)}$	$I_{off} < 100 \mu ADC$, $T_{case} = 25^{\circ}C$	3000	4000	6000	VDC	
Maximum Isolation Voltage	V_I	Between HV switch and control / GND, continuously		>10000		VDC	
Typical Breakdown Voltage	V_{Br}	$I_{off} > 1 \text{ mADC}$, $T_{case} = 70^{\circ}C$	3200	4350	6500	VDC	
Maximum Turn-On Peak Current	$I_{P(max)}$	$T_{case} = 25^{\circ}C$ Peak current is internally limited	40	30	30	ADC	
Maximum Off-State Current	I_{off}	$T_{case} = 25^{\circ}C$, $0.8 \times V_{O(max)}$, Lower I_{off} on request		10		μADC	
Output Impedance	Z_{out}	Standard devices see option M-RS		75		Ohm	
Maximum Continuous Power Dissipation	$P_{d(max)}$	Standard devices & FC, $T=25^{\circ}C$ Devices with option DLC/ILC, $T_{liquid}=25^{\circ}C$, 1liter/min With Option GCF, $T_{flange}=25^{\circ}C$		5 60-200 (consult Behlke) 200		Watt	
Max. Continuous Switching Frequency	$f_{(max)}$	Cooling may be required at higher operating frequency Standard devices with Option HFS supply Customized units	8	12 50 up to 500	13	kHz	
Maximum Burst Frequency	$f_{b(max)}$	Use option HFB for >10 pulses within 20 μs or less		2		MHz	
Operating Temperature Range	T_O	Extended range on request		-40...75		$^{\circ}C$	
Storage Temperature Range	T_{ST}			-50...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		VDC	
Typical Power Dissipation	P_d	@ $0.8 \times V_O$ C_L Pockels cell capacitance Data valid for cooling option GCF. Standard device without cooling option have 10% less losses.	f=2kHz f=20kHz f=100kHz	$C_L=10 \text{ pF}$ $C_L=5 \text{ pF}$ $C_L=10 \text{ pF}$ $C_L=20 \text{ pF}$ $C_L=10 \text{ pF}$	0.75 6.2 7.7 8.1 38	Watt	
Typical Turn-On Jitter	$t_{j(on)}$	$V_{aux} / V_{tr} = 5 \text{ DC}$		100		ps	
Typical Propagation Delay Time	$t_{d(on)}$	Resistive load, $0.1 \times I_{P(max)}$, $0.8 \times V_{O(max)}$, 50-50%		50		ns	
Typical Output Pulse Jitter	t_j	Impedance matched input, $V_{aux} / V_{ctrl} = 5.00 \text{ VDC}$		1		ns	
Typical Turn-On Rise Time	$t_{r(on)}$	- @ $0.8 \times V_O$ Standard - Standard Output impedance 75 Ohm - Pockels cell connecting leads <100mm (4")	$C_L=5 \text{ pF}$ $C_L=10 \text{ pF}$ $C_L=20 \text{ pF}$	2.3 2.9 3.6	2.2 2.7 3.4	2.9 3.7 4.7	ns
Typical Turn-On Time	t_{on}	Switch on-time only. See also option OT-xxxx		100		ns	
Effective HV Pulse Width	$t_{p(HV)}$	$C_L=10 \text{ pF}$, top flatness <3%. See also option M-RL		200		ns	
Typical HV Pulse Fall Time	t_f	10-90%, $C_L=10 \text{ pF}$. See also Option M-RL.	1.3	1.2	0.6	μs	
Switch recovery time	t_{rc}	Driver recovery only. Trigger pulse $t_p=100 \text{ ns}$		500		ns	
Maximum Number of Pulses / Burst	$N_{(max)}$	@ $f_{b(max)}$ Standard Option I-HFB Option HFB		150 Use option HFB for >150 >1000 >10000		Pulses	
Coupling Capacitance	C_C	HV side against control side		10		pF	
Auxiliary Supply Voltage Range	V_{aux}	The +5 V supply is not required in the HFS mode.		5		VDC	
Typical Auxiliary Supply Current	I_{aux}	$V_{aux} = 5.00 \text{ VDC}$, $T_{case} = 25^{\circ}C$.	$0.01 \times f_{(max)}$ @ $f_{(max)}$	107 400	100 400	80 400	mADC
Fault Signal Output		Indicates over temperature, over frequency (>100kHz) and low aux. voltage (>4.75 V) "Ready" = H "Fault" =L		4.5 0.8		VDC	
Trigger Signal Voltage Range	V_{TR}	3-6 VDC recommended for low jitter		2-10		VDC	
Minimum trigger pulse width	$t_{ptr(min)}$	Switching behaviour cannot be influenced by trigger pulse		50		ns	
Fault Signal Output Current		Source/sink current, short circuit proof		10		mADC	
Dimensions	LxWxH	Standard housing Devices with option GCF, non-isolated cooling fins Devices with option DLC		64x30x18 Please contact the manufacturer!		mm ³	
Weight		Standard housing Devices with option CCF, non-isolated cooling fins Devices with option DLC		Please contact the manufacturer!		g	
Control Signal Input		Pin 1 / Yellow. TTL compatible with Schmitt-Trigger characteristics. Control voltage 2-10 V (3-5 V recommended for low jitter).					
Logic GND / 5V Return		Pin 2 / Black. The ground pin is internally connected with the safety earthing terminal (threaded insert) on bottom side.					
5V Auxiliary Supply		Pin 3 / Red. 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. TTL output, short circuit proof. Indicating switch & driver over-heat, over-frequency, low auxiliary voltage. L = Fault.					
LED Indicators		GREEN: "Ready, auxiliary power good". YELLOW: "Switch triggered". RED: "Fault condition, switch OFF"					
Temperature Protection		A) Standard switches and switches with option GCF: Thermo trigger $75^{\circ}C$, response time < 60 s @ $3 \times P_{d(max)}$, $\Delta T=25K$ (50 to $75^{\circ}C$). Separate driver protection. B) 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.					
FQD 30-04-C	Q-Switch driver, on mode, 3.0 kVDC, 40	Option OFF	OFF mode configuration.	Option OT-10μ	Switch on-time 10 μs		
FQD 40-03-C	Q-Switch driver, on mode, 4.0 kVDC, 30	Option NEG	Negative high voltage supply/negative output pulse polarity.	Option OT-100μ	Switch on-time 100 μs		
FQD 60-03-C	Q-Switch driver, on mode, 6.0 kVDC, 30	Option HFB	High Frequency Burst. Improved burst capability by driver.	Option PL-HV	Plug connector for high voltage connection		
		Option HFS	High Frequency Switching (two auxiliary supply inputs V1 & V2)	Option SPT-C	Shielded pigtail for control connection, incl. LEMO plug		
		Option UL94	Flame retardant casting resin according to UL94-VO	Option GCF	Grounded cooling flange (attachment on heatsinks)		
		Option M-RL	Modified working resistor (customized HV-pulse, $t_p(HV) \& t_f$)	Option ILC	Indirect Liquid Cooling (for water). $P_{d(max)}$ can be increased by the factor 3 to 15.		
		Option M-RS	Modified damping resistor (customized HV-pulse, tr	Option DLC	Direct Liquid Cooling (for FPE/PFC). $P_{d(max)}$ can be increased by the factor 10 to		
		Option OT-1μ	Switch on-time 1 μs				

FOR FURTHER PRODUCT OPTIONS PLEASE REFER TO THE OPTIONS PAGE.