ABSOLUTE MAXIMUM RATINGS

Specification	Symbol	Condition / Comment			FQD 30-04-C	FQD 40-03-C	FQD 60-03-C	Unit
Maximum Operating Voltage	$V_{O\,(max)}$	$I_{off} < 100\ \mu ADC$, $T_{case} = 25°C$			3000	4000	6000	VDC
Maximum Isolation Voltage	V_I	Between HV switch and control / GND, continuously			>10000			VDC
Typical Breakdown Voltage	V_{Br}	$I_{off} > 1\ mADC$, $T_{case} = 70°C$			3200	4350	6500	VDC
Maximum Turn-On Peak Current	$I_{P\,(max)}$	$T_{case} = 25°C$	Peak current is internally limited		40	30	30	ADC
Maximum Off-State Current	I_{off}	$T_{case} = 25°C$, $0.8 \times V_{O(max)}$, 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°C			5			Watt
		Devices with option DLC/ILC, T liquid=25°C, 1liter/min			60-200 (consult Behlke)			
		With Option GCF, T flange=25°C			200			
Max. Continuous Switching Frequency	$f_{(max)}$	Cooling may be required at higher operating frequency	Standard devices		8	12	13	kHz
			with Option HFS supply		50			
			Customized units		up to 500			
Maximum Burst Frequency	$f_{b(max)}$	Use option HFB for >10 pulses within 20µs or less			2			MHz
Operating Temperature Range	T_O	Extended range on request			-40...75			C°
Storage Temperature Range	T_{ST}				-50...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			VDC
Typical Power Dissipation	P_d	@0.8xV_O	f=2kHz	$C_{L=10\ pF}$	0.75			Watt
		C_L Pockels cell capacitance	f=20kHz	$C_{L=5\ pF}$	6.2			
		Data valid for cooling option GCF.		$C_{L=10\ pF}$	7.7			
		Standard device without cooling option		$C_{L=20\ pF}$	8.1			
		have 10% less losses.	f=100kHz	$C_{L=10\ pF}$	38			
Typical Turn-On Jutter	$t_{j(on)}$	$V_{aux}/V_{tr} = 5$ 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, $V_{aux} / V_{ctrl} = 5.00$ VDC			1			ns
Typical Turn-On Rise Time	$t_{r(on)}$	- @ 0.8xV_O Standard	$C_{L=5\ pF}$		2.3	2.2	2.9	
		- Standard Output impedance 75 Ohm	$C_{L=10\ pF}$		2.9	2.7	3.7	
		- Pockels cell connecting leads <100mm (4")	$C_{L=20\ pF}$		3.6	3.4	4.7	ns
Typical Turn-On Time	t_{on}	Switch on-time only. See also option OT-xxxx			100			ns
Effective HV Pulse Width	$t_{p(HV)}$	$C_{L=10pF}$, top flatness<3%. See also option M-RL			200			ns
Typical HV Pulse Fall Time	t_f	10-90%, $C_{L=10pF}$. See also Option M-RL.			1.3	1.2	0.6	µs
Switch recovery time	t_{rc}	Driver recovery only. Trigger pulse tp=100ns			500			ns
Maximum Number of Pulses / Burst	$N_{(max)}$	@ $f_{b(max)}$	Standard		150 Use option HFB for >150			Pulses
			Option I-HFB		>1000			
			Option HFB		>10000			
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}	$V_{aux} = 5.00$ VDC, $T_{case} = 25°C$.	$0.01 \times f_{(max)}$		107	100	80	mADC
			@ $f_{(max)}$		400	400	400	
Fault Signal Output		Indicates over temperature, over frequency (>100kHz) and low aux. voltage (>4.75 V)	"Ready" = H		4.5			VDC
			"Fault" =L		0.8			
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

HOUSING

Specification	Symbol	Condition / Comment	FQD 30-04-C	FQD 40-03-C	FQD 60-03-C	Unit
Dimensions	LxWxH	Standard housing	64x30x18			mm³
		Devices with option GCF, non-isolated cooling fins	Please contact the manufactured!			
		Devices with option DLC				
Weight		Standard housing	Please contact the manufactured!			g
		Devices with option CCF, non-isolated cooling fins				
		Devices with option DLC				

FUNCTIONS

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°C, response time < 60 s @ 3xPd(max), ΔT=25K (50 to 75°C). Separate driver protection.
	B) 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

FQD 30-04-C	Q-Switch driver, on mode, 3.0 kVDC, 40	Option OFF	OFF mode configuration.	Option OT-10µ	Switch on-time 10µs
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 100µs
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 retardent casting resin according to UL94-VO	Option GCF	Grounded cooling flange (attachment on heatsinks)
		Option M-RL	Modified working resistor (customized HV-pulse, tp(HV)&tf)	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 1µs		

FOR FURTHER PRODUCT OPTIONS PLEASE REFER TO THE OPTIONS PAGE.

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