QCM50-K3D40 IO-Link Data Reference Guide

IO-Link Data Map

This document refers to the following IODD file: Banner_Engineering-QCM50-K3D40-Q8-5-20190327-IODD1.1.xml. The IODD file and support files can be found on *www.bannerengineering.com* under the download section of the product family page.

Communication Parameters

Parameter	Value
IO-Link revision	V1.1
Process Data In length	48-bits
Process Data Out length	N/A

Parameter	Value
SIO mode	Yes
Bit Rate	38400 bps
Minimum cycle time	4 ms

IO-Link Process Data In (Device to Master)

Process Data Profile 0: Switch Outputs			
Subindex	**Process Data Input Name**	**Number of Bits**	**Data Values**	**bit offset**
1	Signal Quality	8	0=no signal, 1=overflow, 2..100	24
2	Switching Quality	1	0/1	16
3	Q7	1	0/1	6
4	Q6	1	0/1	5
5	Q5	1	0/1	4
6	Q4	1	0/1	3
7	Q3	1	0/1	2
8	Q2	1	0/1	1
9	Q1	1	0/1	0

Octet 0								
bit offset	47	46	45	44	43	42	41	40
subindex	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /

Octet 1								
bit offset	39	38	37	36	35	34	33	32
subindex	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /

Octet 2								
bit offset	31	30	29	28	27	26	25	24
subindex	1							

Octet 3								
bit offset	23	22	21	20	19	18	17	16
subindex	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	2

Octet 4								
bit offset	15	14	13	12	11	10	9	8

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Octet 4								
subindex	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /	/ / / / / /

Octet 5								
bit offset	7	6	5	4	3	2	1	0
subindex	/ / / / / /	3	4	5	6	7	8	9

Process Data Profile 1 : Color Values				
Subindex	Process Data Input Name	Number of Bits	Data Values	bit offset
1	Energy	12	0=no signal, 1=overflow, 10..4095	36
2	Ratio blue	12	0=no signal, 1=overflow, 10..4095	24
3	Ratio green	12	0=no signal, 1=overflow, 10..4095	12
4	Ratio red	12	0=no signal, 1=overflow, 10..4095	0

Octet 0								
bit offset	47	46	45	44	43	42	41	40
subindex	1							

Octet 1								
bit offset	39	38	37	36	35	34	33	32
subindex	1				2			

Octet 2								
bit offset	31	30	29	28	27	26	25	24
subindex	2							

Octet 3								
bit offset	23	22	21	20	19	18	17	16
subindex	3							

Octet 4								
bit offset	15	14	13	12	11	10	9	8
subindex	3				4			

Octet 5								
bit offset	7	6	5	4	3	2	1	0
subindex	4							

IO-Link Process Data Out (Master to Device)

Not applicable.

Parameters Set Using IO-Link

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
0	1-16	Direct Parameter Page 1 (incl. Vendor ID & Device ID)				ro		
1	1-16	Direct Parameters Page 2			rw			
2		Standard Command		64 = Teach apply 65 = Single Value Teach 71 = Color scan start 72 = Color scan stop 79 = Teach-in cancel 128 = Device Reset 130 = Restore Factory Settings 160 = Emitter OFF 161 = Emitter ON 162 = Reset switching output 169 = Trigger input pin 170 = Trigger ON 171 = Trigger OFF 175 = Detect sensor		wo		y
3		unused/reserved				ro		
4-11		reserved by IO-Link Specification						
12		Device Access Locks						
	1	Parameter Write Access Lock		0 = off 1 = on	0	rw	y	
	2	Data Storage Lock		0 = off, 1 = on	0	rw	y	
	3	Local Parameterization Lock		0 = off, 1 = on	0	rw	y	
	4	Local User Interface Lock		0 = off, 1 = on	0	rw	y	
13-15		unused/reserved				ro		
16		Vendor Name string		Banner Engineering Corp		ro		
17		Vendor Text string		More Sensors. More Solutions.		ro		
18		Product Name string		QCM50-K3D40-Q8-5		ro		
19		Product ID string		806617		ro		
20		Product Text string		Optical color sensor		ro		y
21		Serial Number				ro		
22		unused/reserved				ro		
23		Firmware Version				ro		y
24		App Specific Tag (user defined)				rw	y	y
25-35		reserved						
82		Temperature						
	1	Operating Temperature	8-bit integer			ro		
	2	Max. operating temperature since restart	8-bit integer			ro		
	3	Min. operating temperature since restart	8-bit integer			ro		
	4	Max. lifetime temperature	8-bit integer			ro		
	5	Min. lifetime temperature	8-bit integer			ro		
88		Operating Data						
	1	Operating hours	32-bit Uinteger			ro		
	2	Counter switch cycle	32-bit Uinteger			ro		
95		Electronic data sheet						
	1	Measurement range	10-octet string UTF-8			ro		
	2	Type of light and laser class	41-octet string UTF-8			ro		

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
	3	No-load current	8-octet string UTF-8			ro		
	4	Switching frequency	8-octet string UTF-8			ro		
	5	Warm-up time	5-octet string UTF-8			ro		
	6	Ambient temperature	11-octet string UTF-8			ro		
96		Color C1 at output Q1						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
	5	Counter	16-bit integer	0..65535 = 0...65535	0	rw		
	6	On-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	7	Off-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	8	Impulse (one shot)	16-bit integer	0..65535 = 0...65535	0	rw		
	9	Connect colors	8-bit integer	0 = Not connected 1 = Combine with color C4 2 = Exclude with color C4	0	rw		
97		Color C2 at output Q2						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output, 3 = Input (Trigger)	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
	5	Counter	16-bit integer	0..65535 = 0...65535	0	rw		
	6	On-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	7	Off-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	8	Impulse (one shot)	16-bit integer	0..65535 = 0...65535	0	rw		
	9	Connect colors	8-bit integer	0 = Not connected 1 = Combine with color C5 2 = Exclude with color C5	0	rw		
98		Color C3 at output Q3						

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
	5	Counter	16-bit integer	0..65535 = 0...65535	0	rw		
	6	On-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	7	Off-delay	16-bit integer	0..65535 = 0...65535	0	rw		
	8	Impulse (one shot)	16-bit integer	0..65535 = 0...65535	0	rw		
	9	Connect colors	8-bit integer	0 = Not connected 1 = Combine with color C6 2 = Exclude with color C6	0	rw		
99		Color C4 at virtual output Q4						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable 1 = Output 2 = Input (KeyLock)	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
100		Color C5 at virtual output Q5						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
101		Color C6 at virtual output Q6						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
102		Color C7 at virtual output Q7						
	1	Tolerance	8-bit integer	0 = Finest tolerance level 1 = 2nd tolerance level 2 = 3rd tolerance level 3 = 4th tolerance level 4 = 5th tolerance level 5 = 6th tolerance level 6 = 7th tolerance level 7 = 8th tolerance level 8 = Roughest tolerance level	3	rw		
	2	NO/NC	8-bit integer	0 = NO, 1 = NC	0	rw		
	3	Function switching output	8-bit integer	0 = Disable, 1 = Output	0	rw		
	4	Energy evaluation	8-bit integer	0 = Off, 1 = On	1	rw		
128		Color Tolerances C1						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
129		Color Tolerances C2						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
130		Color Tolerances C3						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
131		Color Tolerances C4						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
132		Color Tolerances C5						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
133		Color Tolerances C6						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
134		Color Tolerances C7						
	1	Ratio red	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	2	Ratio green	16-bit Uinteger	0..4095 = 0...100.00	1365	rw		
	3	Energy	16-bit Uinteger	0..4095 = 0...100.00	4095	rw		
	4	Red tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	5	Green tolerance	16-bit Uinteger	0..4095 = 0...100.00	65	rw		
	6	Energy tolerance	16-bit Uinteger	0..4095 = 0...100.00	200	rw		
176		Function Q all						
	1	PNP/NPN	8-bit Uinteger	0 = NPN 1 = PNP 2 = Auto	1	rw		
	2	Switching frequency/averaging	8-bit Uinteger	0 = 3 Hz 1 = 30 Hz 2 = 100 Hz 3 = 300 Hz 4 = 500 Hz 5 = 1500 Hz 6 = 3000 Hz	1	rw		
	3	Binary output	8-bit Uinteger	0 = Disable, 1 = Enable	0	rw		
177		Detection Mode	8-bit Uinteger	0 = Color Mode, 1 = Best Fit	0	rw		
196		Signal quality level	8-bit Uinteger	10..90 = 10…90	10	rw		
202		Process data profile	8-bit Uinteger	0 = Switching channel, 1 = Color values	0	rw		
203		Switching output Teach-In						
	1	Teach channel	8-bit Uinteger	1 = Q1 2 = Q2 3 = Q3 4 = Q4 5 = Q5 6 = Q6 7 = Q7	1	rw		
204		Teachin status						
	1	Teach status	4-bit Uinteger	0 = Idle 1 = Teach successful 2 = Teach successful 3 = Teach successful 4 = Wait for command 5 = Busy 7 = Error		ro		
	2	Teach flag SP1->TP1	Boolean	false = -, true = Teach successful		ro		
	3	Teach flag SP1->TP2	Boolean	false = -, true = Teach successful		ro		
	4	Teach flag SP2->TP1	Boolean	false = -, true = Teach successful		ro		
	5	Teach flag SP2->TP2	Boolean	false = -, true = Teach successful		ro		
207		Current signal quality	8-bit Uinteger	0..100 = 0…100		ro		
224		Display						
	1	Screensaver	8-bit Uinteger	0 = Screensaver OFF, 1 = Screensaver ON	1	rw		
	2	Rotate display	8-bit Uinteger	0 = Display read from back, 1 = Display read from front	1	rw		

Index	Subindex	Name	Length	Value Range	Default	Access Rights	Data Storage?	Smart Sensor Profile
252		Test_252 - event generation	8-bit Uinteger	0 = A_Appear 1 = A_Disappear 2 = B_Appear 3 = B_Disappear		rw		
253		Test_253 - test parameter	8-bit Uinteger			rw		
254		Test_254 - test parameter	16-octet Octet String			rw		
16382		Test_16832 - Test	2-octet Octet Sting			rw		

IO-Link Events

Code	Type	Description
6384 (0x4000)	Error	Temperature fault (overload)
16912 (0x4210)	Warning	Device temperature over-run (clear source of heat)
16928 (0x4220)	Warning	Device temperature under-run (insulate device)
20480 (0x5000)	Error	Device hardware fault (Device Exchange)
20497 (0x5011)	Error	Non volatile memory loss (Check batteries)

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