

IO-Link Data Map

This document refers to the following IODD files: Banner_Engineering-EA5R###XKQ-20110601-IODD1.0.1.xml (where ### is the length of the EZ-Array sticks in mm). The IODD file and support files can be found on www.bannerengineering.com under the download section of the product family page.

Communication Parameters

The following communication parameters are used.

Parameter	Value	Device IDs and Minimum Cycle Times		
		Model	Device ID	Min. Cycle Time (ms)
IO-Link revision	V1.0	EA5R150XKQ	65536	11.6
Process Data In length	16-bit	EA5R300XKQ	65537	19.2
Process Data Out length	n/a	EA5R450XKQ	65538	26.4
Bit Rate	38,400 bps	EA5R600XKQ	65539	35.2
Minimum cycle time	See table	EA5R750XKQ	65540	43.2
Port class	A	EA5R900XKQ	65541	49.6
SIO mode	Yes	EA5R1050XKQ	65542	57.6
Smart sensor profile	n/a	EA5R1200XKQ	65543	64.0
Block parameterization	No	EA5R1500XKQ	65545	80.0
Data Storage	No	EA5R1800XKQ	65546	94.4
		EA5R2100XKQ	65547	108.8
		EA5R2400XKQ	65548	123.2

IO-Link Process Data In (Device to Master)

Process Data In is transmitted cyclically to the IO-Link master from the IO-Link device.

Process Data Input			
Subindex	Name	Number of Bits	Data Values
1	Measurement 1	12	Measurement 1 value, given in quarter-beam increments

Octet 0								
Subindex	1111	1111	1111	1111	1			
Bit offset	15	14	13	12	11	10	9	8
Value					0	0	0	0

Octet 1								
Subindex	1							
Bit offset	7	6	5	4	3	2	1	0
Value	0	0	1	1	0	0	0	0
Example	Measurement 1 value (uses bit offset 0 to 11) = 48 quarter beams blocked (EZ-ARRAY display would show "12")							



IO-Link Process Data Out (Master to Device)

Not applicable.

Parameters Set Using IO-Link

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
0	1-16	Direct Parameter Page 1 (incl. Vendor ID & Device ID)				ro	
1	1-16	Direct Parameters Page 2				rw	
2-15		<i>reserved</i>					
16		Vendor Name string			Banner Engineering Corporation	ro	
18		Product Name string	64-octet string UTF-8		A-Gage EZ-Array IO-Link	ro	
24		App Specific Name (user defined)	32-octet string UTF-8		more sensors, more solutions	rw	
25-31		<i>reserved</i>					
32		Error Count	16-bit Uinteger			ro	y
33		Last Event					
33	1	Event Qualifier	8-bit Uinteger			ro	y
33	2	Event Code	16-bit Uinteger			ro	y
34-39		<i>reserved</i>					
40		Process Data Input				ro	
41-63		<i>unused/reserved</i>					
64		Active Measurements					
64	1	Measurement 1	16-bit Uinteger			ro	y
64	2	Measurement 2	16-bit Uinteger			ro	y
65		Channel States					
65	1	Channel 1-16	16-bit Uinteger			ro	y
65	2	Channel 17-32 [30 = Max for 150mm]	16-bit Uinteger			ro	y
65	3	Channel 33-48	16-bit Uinteger			ro	y
65	4	Channel 49-64 [60 = Max for 300mm]	16-bit Uinteger			ro	y
65	5	Channel 65-80	16-bit Uinteger			ro	y
65	6	Channel 81-96 [90 = Max for 450mm]	16-bit Uinteger			ro	y
65	7	Channel 97-112	16-bit Uinteger			ro	y
65	8	Channel 113-128 [120 = Max for 600mm]	16-bit Uinteger			ro	y
65	9	Channel 129-144	16-bit Uinteger			ro	y
65	10	Channel 145-160 [150 = Max for 750mm]	16-bit Uinteger			ro	y
65	11	Channel 161-176	16-bit Uinteger			ro	y
65	12	Channel 177-192 [180 = Max for 900mm]	16-bit Uinteger			ro	y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
65	13	Channel 193-208	16-bit Uinteger			ro	y
65	14	Channel 209-224 [210 = Max for 1050mm]	16-bit Uinteger			ro	y
65	15	Channel 225-240 [240 = Max for 1200mm]	16-bit Uinteger			ro	y
65	16	Channel 241-256	16-bit Uinteger			ro	y
65	17	Channel 257-272 [270 = Max for 1350mm]	16-bit Uinteger			ro	y
65	18	Channel 273-288	16-bit Uinteger			ro	y
65	19	Channel 289-304 [300 = Max for 1500mm]	16-bit Uinteger			ro	y
65	20	Channel 305-320	16-bit Uinteger			ro	y
65	21	Channel 321-336	16-bit Uinteger			ro	y
65	22	Channel 337-352	16-bit Uinteger			ro	y
65	23	Channel 353-368 [360 = Max for 1800mm]	16-bit Uinteger			ro	y
65	24	Channel 369-384	16-bit Uinteger			ro	y
65	25	Channel 385-400	16-bit Uinteger			ro	y
65	26	Channel 401-416	16-bit Uinteger			ro	y
65	27	Channel 417-432 [420 = Max for 2100mm]	16-bit Uinteger			ro	y
65	28	Channel 433-448	16-bit Uinteger			ro	y
65	29	Channel 449-464	16-bit Uinteger			ro	y
65	30	Channel 465-480 [480 = Max for 2400mm]	16-bit Uinteger			ro	y
66		System Info Status					
66	1	Number of Emitter Channels	16-bit Uinteger			ro	y
66	2	Emitter- First Bad Channel	16-bit Uinteger	0..480		ro	y
66	3	Number of Receiver Channels	16-bit Uinteger				y
66	5	Dip Switch 6	1-bit integer	0 = off, 1 = on		ro	y
66	6	Dip Switch 5	1-bit integer	0 = off, 1 = on		ro	y
66	7	Dip Switch 4	1-bit integer	0 = off, 1 = on		ro	y
66	8	Dip Switch 3	1-bit integer	0 = off, 1 = on		ro	y
66	9	Dip Switch 2	1-bit integer	0 = off, 1 = on		ro	y
66	10	Dip Switch 1	1-bit integer	0 = off, 1 = on		ro	y
66	12	Error Code	8-bit Uinteger	0 = System OK 1 = Receiver EEPROM hard failure 2 = Receiver Alignment/Blanking Configuration Error 4 = Emitter or Wiring problem 5 = Emitter Channel error 10 = Incompatible Scan and Measurement Mode		ro	y
66	13	Alignment Status	8-bit Uinteger	0 = failed, 1 = success	1	ro	y
66	14	Discrete Output 1	1-bit integer	0 = off, 1 = on		ro	y
66	15	Discrete Output 2	1-bit integer	0 = off, 1 = on		ro	y
66	17	Analog Output 1 DAC value	16-bit Uinteger	0..4095		ro	y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
66	18	Analog Output 2 DAC value	16-bit Uinteger	0..4095		ro	y
67		ALL Measurements					
67	1	First Beam Blocked (FBB)	16-bit Uinteger			ro	y
67	2	Last Beam Blocked (LBB)	16-bit Uinteger			ro	y
67	3	Total Beams Blocked (TBB)	16-bit Uinteger			ro	y
67	4	Transitions (TRN)	16-bit Uinteger			ro	y
67	5	Contiguous Beams Blocked (CBB)	16-bit Uinteger			ro	y
67	6	First Beam Made (FBM)	16-bit Uinteger			ro	y
67	7	Last Beam Made (LBM)	16-bit Uinteger			ro	y
67	8	Total Beams Made (TBM)	16-bit Uinteger			ro	y
67	9	Contiguous Beams Made (CBM)	16-bit Uinteger			ro	y
67	10	Middle Beam Blocked (MBM)	16-bit Uinteger			ro	y
67	11	Outer Diameter (OD)	16-bit Uinteger			ro	y
67	12	Inner Diameter (ID)	16-bit Uinteger			ro	y
67	13	Contiguous First Beam Blocked	16-bit Uinteger			ro	y
67	14	Contiguous Last Beam Blocked	16-bit Uinteger			ro	y
67	15	Object 1 First Beam Blocked*	16-bit Uinteger			ro	y
67	16	Object 1 Last Beam Blocked*	16-bit Uinteger			ro	y
67	17	Object 2 First Beam Blocked*	16-bit Uinteger			ro	y
67	18	Object 2 Last Beam Blocked*	16-bit Uinteger			ro	y
67	19	Object 3 First Beam Blocked*	16-bit Uinteger			ro	y
67	20	Object 3 Last Beam Blocked*	16-bit Uinteger			ro	y
67	21	Carpet Nap	16-bit Uinteger			ro	y
67	22	Analog 1 Latched	16-bit Uinteger			ro	y
67	23	Analog 2 Latched	16-bit Uinteger			ro	y
67	24	Carpet Edge	16-bit Uinteger			ro	y
68		Info					
68	1	Receiver Firmware Part Number	32-bit Uinteger		125799	ro	y
68	2	Receiver Firmware Version	8-bit Uinteger		16h	ro	y
68	3	Emitter Firmware Part Number	32-bit Uinteger		125798	ro	y
68	4	Emitter Firmware Version	8-bit Uinteger		11h	ro	y
69		Info					
69	1	Communications Firmware Part Number	32-bit Uinteger		150420	ro	y
69	2	Communications Firmware Version	8-bit Uinteger		12h	ro	y
70-79		<i>reserved</i>					
80		Scan Configuration					

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
80	1	Scan Type	8-bit Uinteger	1 = Straight 2 = Single Edge 3 = Double Edge - Step 1 4 = Double Edge - Step 2 5 = Double Edge - Step 4, 6 = Double Edge - Step 8, 7 = Double Edge - Step 16 8 = Double Edge - Step 32 10 = Carpet Nap	1	rw	y
80	2	Remote Teach/Gate	8-bit Uinteger	0 = Disabled 1 = Remote Teach 2 = Alignment/Sensitivity 3 = Gate - Active High 4 = Gate - Active Low 5 = Gate - Rising Edge 6 = Gate - Falling Edge	1	rw	y
81		Blanking Configuration					
81	1	Blanking 1-16	16-bit Uinteger			rw	y
81	2	Blanking 17-32 [30 = Max for 150mm]	16-bit Uinteger			rw	y
81	3	Blanking 33-48	16-bit Uinteger			rw	y
81	4	Blanking 49-64 [60 = Max for 300mm]	16-bit Uinteger			rw	y
81	5	Blanking 65-80	16-bit Uinteger			rw	y
81	6	Blanking 81-96 [90 = Max for 450mm]	16-bit Uinteger			rw	y
81	7	Blanking 97-112	16-bit Uinteger			rw	y
81	8	Blanking 113-128 [120 = Max for 600mm]	16-bit Uinteger			rw	y
81	9	Blanking 129-144	16-bit Uinteger			rw	y
81	10	Blanking 145-160 [150 = Max for 750mm]	16-bit Uinteger			rw	y
81	11	Blanking 161-176	16-bit Uinteger			rw	y
81	12	Blanking 177-192 [180 = Max for 900mm]	16-bit Uinteger			rw	y
81	13	Blanking 193-208	16-bit Uinteger			rw	y
81	14	Blanking 209-224 [210 = Max for 1050mm]	16-bit Uinteger			rw	y
81	15	Blanking 225-240 [240 = Max for 1200mm]	16-bit Uinteger			rw	y
81	16	Blanking 241-256	16-bit Uinteger			rw	y
81	17	Blanking 257-272 [270 = Max for 1350mm]	16-bit Uinteger			rw	y
81	18	Blanking 273-288	16-bit Uinteger			rw	y
81	19	Blanking 289-304 [300 = Max for 1500mm]	16-bit Uinteger			rw	y
81	20	Blanking 305-320	16-bit Uinteger			rw	y
81	21	Blanking 321-336	16-bit Uinteger			rw	y
81	22	Blanking 337-352	16-bit Uinteger			rw	y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
81	23	Blanking 353-368 [360 = Max for 1800mm]	16-bit Uinteger			rw	y
81	24	Blanking 369-384	16-bit Uinteger			rw	y
81	25	Blanking 385-400	16-bit Uinteger			rw	y
81	26	Blanking 401-416	16-bit Uinteger			rw	y
81	27	Blanking 417-432 [420 = Max for 2100mm]	16-bit Uinteger			rw	y
81	28	Blanking 433-448	16-bit Uinteger			rw	y
81	29	Blanking 449-464	16-bit Uinteger			rw	y
81	30	Blanking 465-480 [480 = Max for 2400mm]	16-bit Uinteger			rw	y
82		Analog Output 1					
82	1	Slope	1-bit integer	0 = negative, 1 = positive	1	rw	
82	2	Measurement	1-bit integer	0 = Measurement 2, 1 = Measurement 1	1	rw	
82	3	ZERO Value	2-bit Uinteger	0 = Hold 1 = Minimum 2 = Maximum	1	rw	
82	4	Peak Detect	1-bit integer	0 = disabled, 1 = enabled	0	rw	
82	5	Peak Detection Direction	1-bit integer	0 = maximum, 1 = minimum	0	rw	
82	6	Status	1-bit integer	0 = disabled, 1 = enabled	1	rw	
82	7	Peak Detect Reset	1-bit integer	0 = auto, 1 = External Communication	0	rw	
82	9	Filter Speed	8-bit Uinteger	0 = Fast 1 = Medium 3 = Slow	0	rw	
82	11	NULL Output	16-bit Uinteger	0..4095	0	rw	
82	12	SPAN Output	16-bit Uinteger	0..4095	4095	rw	
83		Analog Output 2					
83	1	Slope	1-bit integer	0 = negative, 1 = positive	1	rw	
83	2	Measurement	1-bit integer	0 = Measurement 2, 1 = Measurement 1	0	rw	
83	3	ZERO Value	2-bit Uinteger	0 = Hold 1 = Minimum 2 = Maximum	1	rw	
83	4	Peak Detect	1-bit integer	0 = disabled, 1 = enabled	0	rw	
83	5	Peak Detection Direction	1-bit integer	0 = maximum, 1 = minimum	0	rw	
83	6	Status	1-bit integer	0 = disabled, 1 = enabled	1	rw	
83	7	Peak Detect Reset	1-bit integer	0 = auto, 1 = External Communication	0	rw	

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
83	9	Filter Speed	8-bit Uinteger	0 = Fast 1 = Medium 3 = Slow	0	rw	
83	11	NULL Output	16-bit Uinteger	0..4095	0	rw	
83	12	SPAN Output	16-bit Uinteger	0..4095	4095	rw	
84		Discrete Output 1					
84	1	Status	1-bit integer	0 = disabled, 1 = enabled	1	rw	y
84	2	Type	1-bit integer	0 = measurement, 1 = Alarm or Health	0	rw	y
84	4	Mode	1-bit integer	0 = Normally Closed (Alarm), 1 = Normally Open (Health)	1	rw	y
84	5	Measurement	1-bit integer	0 = Measurement 2, 1 = Measurement 1	1	rw	y
84	7	Scan Response	16-bit Uinteger	1..250	1	rw	y
84	8	Hysteresis LOW	16-bit Uinteger	0..299	0	rw	y
84	9	Hysteresis HIGH	16-bit Uinteger	2..301	301	rw	y
84	10	Threshold LOW	16-bit Uinteger	1..300	1	rw	y
84	11	Threshold HIGH	16-bit Uinteger	1..300	300	rw	y
85		Discrete Output 2					
85	1	Status	1-bit integer	0 = disabled, 1 = enabled	1	rw	y
85	2	Type	1-bit integer	0 = measurement, 1 = Alarm or Health	0	rw	y
85	3	Polarity	1-bit integer	0 = PNP, 1 = NPN	0	rw	y
85	4	Mode	1-bit integer	0 = Normally Closed (Alarm), 1 = Normally Open (Health)	0	rw	y
85	5	Measurement	1-bit integer	0 = Measurement 2, 1 = Measurement 1	1	rw	y
85	7	Scan Response	16-bit Uinteger	1..250	1	rw	y
85	8	Hysteresis LOW	16-bit Uinteger	0..299	0	rw	y
85	9	Hysteresis HIGH	16-bit Uinteger	2..301	301	rw	y
85	10	Threshold LOW	16-bit Uinteger	1..300	1	rw	y
85	11	Threshold HIGH	16-bit Uinteger	1..300	300	rw	y
86		General Configuration					
86	1	Emitter Power	8-bit Uinteger	1..11	11	rw	y
86	2	Gain Method	8-bit Uinteger	1 = High Excess Gain 2 = Low Contrast	1	rw	y
86	3	Low Contrast Sensitivity	8-bit Uinteger	0 = 10% below aligned signal 1 = 15% below aligned signal 2 = 20% below aligned signal 3 = 25% below aligned signal 4 = 30% below aligned signal 5 = 35% below aligned signal 6 = 40% below aligned signal 7 = 45% below aligned signal 8 = 50% below aligned signal	4	rw	y

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
86	4	Display Orientation	1-bit integer	0 = normal, 1 = inverted	0	rw	y
86	5	Configuration Type	1-bit integer	0 = DIP switch control, 1 = advanced	0	rw	y
86	6	Sensitivity Button	1-bit integer	0 = enabled, 1 = disabled	0	rw	y
86	7	Align/Blank Button	1-bit integer	0 = enabled, 1 = disabled	0	rw	y
86	9	Measurement 1	8-bit Uinteger	0 = Measurement Disabled 1 = FBB 2 = LBB 3 = TBB 4 = TRN 5 = CBB 6 = FBM 7 = LBM 8 = TBM 9 = CBM 10 = MBB 11 = OD 12 = ID 13 = CFBB 14 = CLBB 15 = O1 FBB* 16 = O1 LBB* 17 = O2 FBB* 18 = O2 LBB* 19 = O3 FBB* 20 = O3 LBB* 21 = Carpet Nap 22 = Carpet Edge	3	rw	y
86	10	Measurement 2	8-bit Uinteger	0 = Measurement Disabled 1 = FBB 2 = LBB 3 = TBB 4 = TRN 5 = CBB 6 = FBM 7 = LBM 8 = TBM 9 = CBM 10 = MBB 11 = OD 12 = ID 13 = CFBB 14 = CLBB 15 = O1 FBB* 16 = O1 LBB* 17 = O2 FBB* 18 = O2 LBB* 19 = O3 FBB* 20 = O3 LBB* 21 = Carpet Nap 22 = Carpet Edge		rw	y
86	12	Number of Dirty Channels	16-bit Uinteger	1..480	1	rw	y
86	13	Time of Service (hrs)	32-bit Uinteger		0	rw	y
92		Alignment/Blanking Routine					

Index	Subindex	Name	Length	Value Range	Default	Access Rights	AOI?
92	1	Alignment/Blanking Mode	8-bit Uinteger	0 = IDLE state 1 = Access Alignment Mode 2 = Alignment State 3 = Exit Alignment Mode 4 = Access Blanking State 5 = Blanking State 6 = Exit Blanking Mode	0		y

*These measurements (Object 1 FBB, Object 1 LBB, Object 2 FBB, Object 2 LBB, Object 3 FBB, Object 3 LBB; Index 67, Subindex 15 to 20) are only valid when the Scan Type (Index 80, Subindex 1) is set to one of the Double Edge selections and the Gain Method (Index 86, Subindex 2) is set to High Excess Gain. See section 2.6.3 in the A-GAGE EZ-ARRAY IO-Link Instruction Manual (p/n 157954) for more information.

IO-Link Events

Events are acyclic transmissions from the IO-Link device to the IO-Link master. Events can be error messages and/or warning or maintenance data. The EZ-Array has two events defined.

Code	Type	Description
30480 (0x7710)	Error	Over-current condition
36112 (0x8d10)	Error	EEPROM failure (replace receiver)