EtherCAT Board Type Specification

- ET-DI32U - DI:32pt(Sink/Source)
- ET-DO32P - DO:32pt(Source)
- ET-DO32N - DO:32pt(Sink)
- ET-DH16P - DI:16pt(Sink/Source), DO:16pt(Source)
- ET-DH16N - DI:16pt(Sink/Source), DO:16pt(Sink)
- TW-DH16N - DI:16pt(Sink/Source), DO:16pt(Sink)
- TW-DO32N - DO:32pt(Sink)
- TW-DI32U - DI:32pt(Sink/Source)
- ET-AIAO - AI:8pt, AO:8pt, DI:8pt, DO:8pt
- ET-AI32 - AI:32pt(0~10V)

CREVIS

DOCUMENT CHANGE SUMMARY				
REV.	**PAGES**	**REMARKS**	**DATE**	**Editor**
1.00		Delete 'Preliminary'	2015 10 27	YMKIM
1.01	(22,23,24)	Changed LED Status	2016 04 01	WHCHO
1.02	(11,22,25)	Changed Connector Name and Etc.	2016 04 25	WHCHO

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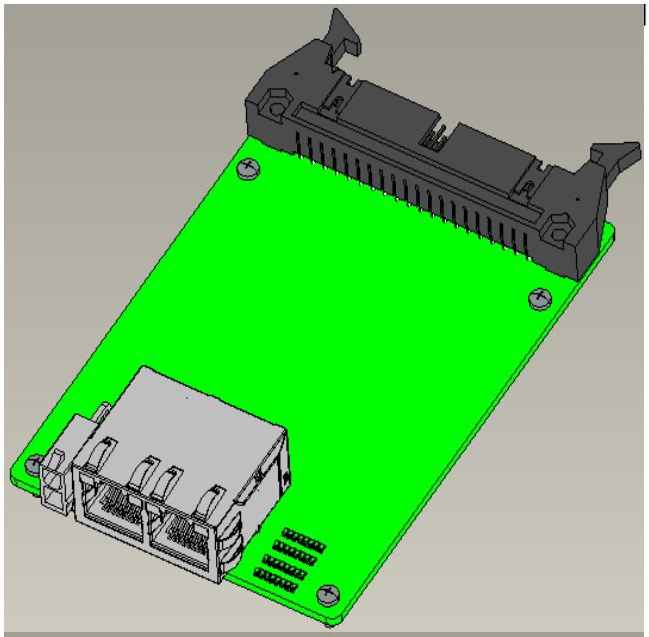
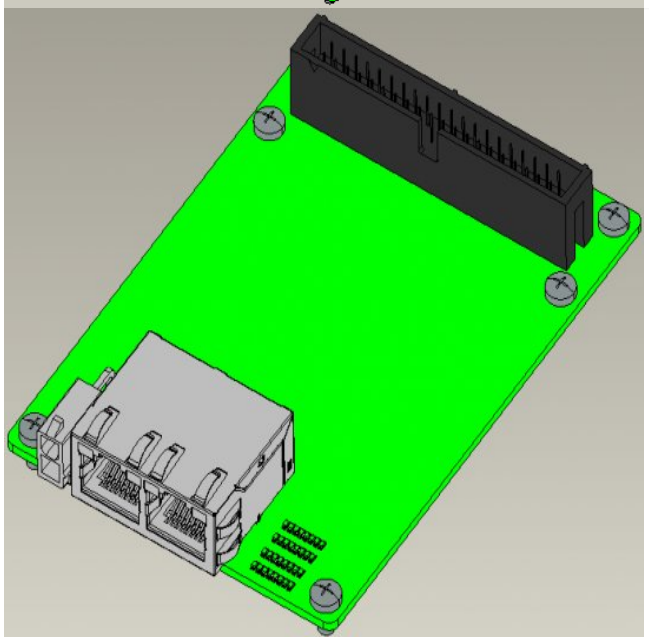
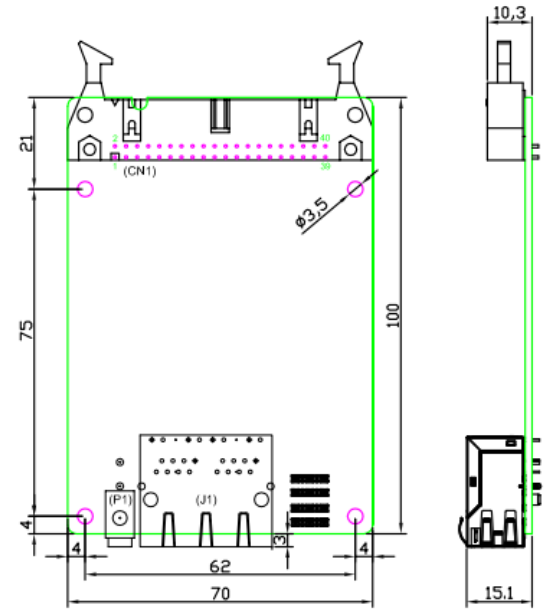
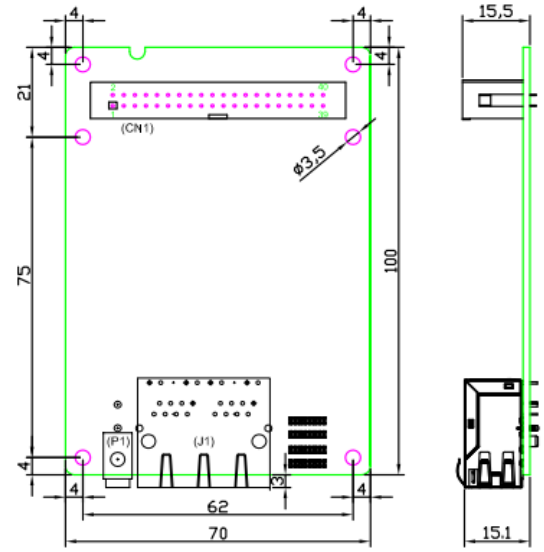
1. MODULE LIST

ET-Series



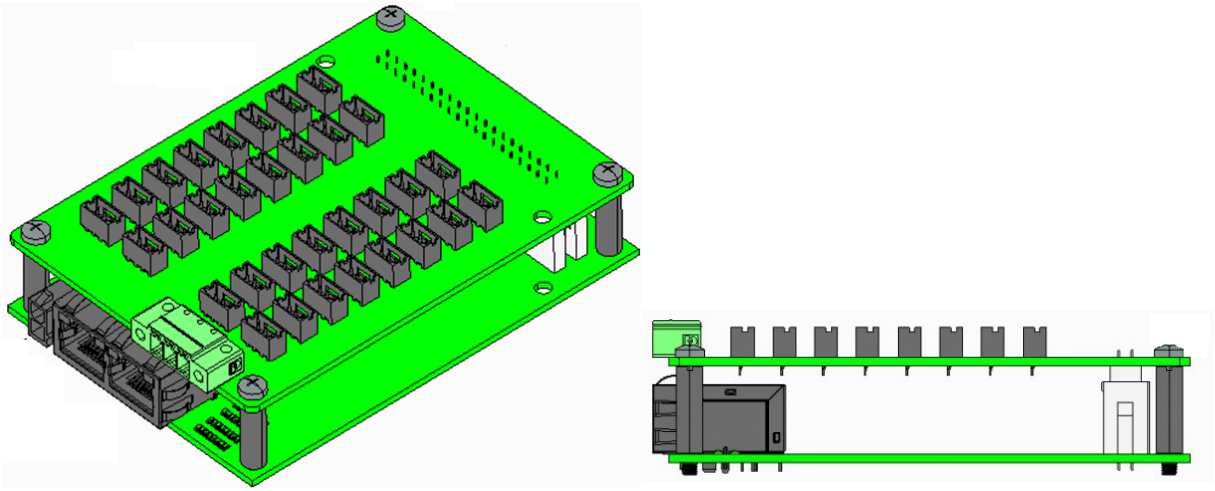






- Size : 70x100mm

TW-Series



- Size : 70x100mm

■ **Module List**

Catalog Number	Description	Input, Output Size (Byte)	Production Status
ET-DI32U	DI:32pt(Sink/Source, Bi-Direction)	In:4	Active
ET-DO32P	DO:32pt(Source)	Out:4	Active
ET-DO32N	DO:32pt(Sink)	Out:4	Active
ET-DH16P	DI:16pt(Sink/Source), DO:16pt(Source)	In:2, Out:2	Active
ET-DH16N	DI:16pt(Sink/Source), DO:16pt(Sink)	In:2, Out:2	Active
TW-DH16N	IO Ternimal Board / DI:16pt, DO:16pt	-	Active
TW-DO32N	IO Ternimal Board / DO:32pt(Sink)	-	Active
TW-DI32U	IO Ternimal Board / DI:32pt(Sink/Source, Bi-Direction)	-	Active
ET-AIAO	AI:8pt, AO:8pt, DI:8pt, DO:8pt (AI,AO 0~10V, 14bits)	In:17, Out:17	Active
ET-AI32	AI:32pt(AI 0~10V, 14bits)	In:64	Active

1.1. ET-DI32U's Connector Signal (DI)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24(or N24) **	2	V2	P24(or N24) **
3	G3	N24(or P24) DI#24~31 Common	4	G2	N24(or P24) DI#16~23 Common
5	DI#31	DI Ch#31	6	DI#23	DI Ch#23
7	DI#30	DI Ch#30	8	DI#22	DI Ch#22
9	DI#20	DI Ch#29	10	DI#21	DI Ch#21
11	DI#28	DI Ch#28	12	DI#20	DI Ch#20
13	DI#27	DI Ch#27	14	DI#19	DI Ch#19
15	DI#26	DI Ch#26	16	DI#18	DI Ch#18
17	DI#25	DI Ch#25	18	DI#17	DI Ch#17
19	DI#24	DI Ch#24	20	DI#16	DI Ch#16
21	V1	P24(or N24) **	22	V0	P24(or N24) **
23	G1	N24(or P24) DI#8~15 Common	24	G0	N24(or P24) DI#0~7 Common
25	DI#15	DI Ch#15	26	DI#7	DI Ch#7
27	DI#14	DI Ch#14	28	DI#6	DI Ch#6
29	DI#13	DI Ch#13	30	DI#5	DI Ch#5
31	DI#12	DI Ch#12	32	DI#4	DI Ch#4
33	DI#11	DI Ch#11	34	DI#3	DI Ch#3
35	DI#10	DI Ch#10	36	DI#2	DI Ch#2
37	DI#9	DI Ch#9	38	DI#1	DI Ch#1
39	DI#8	DI Ch#8	40	DI#0	DI Ch#0

** These pins are not connected internally.
- DI(Digital Input) channels are Bi-Direction (Sink/Source) input.

1.2. ET-DO32P's Connector Signal (DO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24 DO#24~31 Common	2	V2	P24 DO#16~23 Common
3	G3	N24	4	G2	N24
5	DO#31	DO Ch#31	6	DO#23	DO Ch#23
7	DO#30	DO Ch#30	8	DO#22	DO Ch#22
9	DO#20	DO Ch#29	10	DO#21	DO Ch#21
11	DO#28	DO Ch#28	12	DO#20	DO Ch#20
13	DO#27	DO Ch#27	14	DO#19	DO Ch#19
15	DO#26	DO Ch#26	16	DO#18	DO Ch#18
17	DO#25	DO Ch#25	18	DO#17	DO Ch#17
19	DO#24	DO Ch#24	20	DO#16	DO Ch#16
21	V1	P24 DO#8~15 Common	22	V0	P24 DO#0~7 Common
23	G1	N24	24	G0	N24
25	DO#15	DO Ch#15	26	DO#7	DO Ch#7
27	DO#14	DO Ch#14	28	DO#6	DO Ch#6
29	DO#13	DO Ch#13	30	DO#5	DO Ch#5
31	DO#12	DO Ch#12	32	DO#4	DO Ch#4
33	DO#11	DO Ch#11	34	DO#3	DO Ch#3
35	DO#10	DO Ch#10	36	DO#2	DO Ch#2
37	DO#9	DO Ch#9	38	DO#1	DO Ch#1
39	DO#8	DO Ch#8	40	DO#0	DO Ch#0

- DO(Digital Output) channels are Source(similar to PNT TR) output.

1.3. ET-DO32N's Connector Signal (DO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24	2	V2	P24
3	G3	N24 DO#24~31 Common	4	G2	N24 DO#16~23 Common
5	DO#31	DO Ch#31	6	DO#23	DO Ch#23
7	DO#30	DO Ch#30	8	DO#22	DO Ch#22
9	DO#20	DO Ch#29	10	DO#21	DO Ch#21
11	DO#28	DO Ch#28	12	DO#20	DO Ch#20
13	DO#27	DO Ch#27	14	DO#19	DO Ch#19
15	DO#26	DO Ch#26	16	DO#18	DO Ch#18
17	DO#25	DO Ch#25	18	DO#17	DO Ch#17
19	DO#24	DO Ch#24	20	DO#16	DO Ch#16
21	V1	P24	22	V0	P24
23	G1	N24 DO#8~15 Common	24	G0	N24 DO#0~7 Common
25	DO#15	DO Ch#15	26	DO#7	DO Ch#7
27	DO#14	DO Ch#14	28	DO#6	DO Ch#6
29	DO#13	DO Ch#13	30	DO#5	DO Ch#5
31	DO#12	DO Ch#12	32	DO#4	DO Ch#4
33	DO#11	DO Ch#11	34	DO#3	DO Ch#3
35	DO#10	DO Ch#10	36	DO#2	DO Ch#2
37	DO#9	DO Ch#9	38	DO#1	DO Ch#1
39	DO#8	DO Ch#8	40	DO#0	DO Ch#0

- DO(Digital Output) channels are Sink(similar to NPN TR) output.

1.4. ET-DH16P's Connector Signal (DI/DO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24 DO#8~15 Common	2	V2	P24 DO#0~7 Common
3	G3	N24	4	G2	N24
5	DO#15	DO Ch#15	6	DO#7	DO Ch#7
7	DO#14	DO Ch#14	8	DO#6	DO Ch#6
9	DO#13	DO Ch#13	10	DO#5	DO Ch#5
11	DO#12	DO Ch#12	12	DO#4	DO Ch#4
13	DO#11	DO Ch#11	14	DO#3	DO Ch#3
15	DO#10	DO Ch#10	16	DO#2	DO Ch#2
17	DO#9	DO Ch#9	18	DO#1	DO Ch#1
19	DO#8	DO Ch#8	20	DO#0	DO Ch#0
21	V1	P24(or N24) **	22	V0	P24(or N24) **
23	G1	N24(or P24) DI#8~15 Common	24	G0	N24(or P24) DI#0~7 Common
25	DI#15	DI Ch#15	26	DI#7	DI Ch#7
27	DI#14	DI Ch#14	28	DI#6	DI Ch#6
29	DI#13	DI Ch#13	30	DI#5	DI Ch#5
31	DI#12	DI Ch#12	32	DI#4	DI Ch#4
33	DI#11	DI Ch#11	34	DI#3	DI Ch#3
35	DI#10	DI Ch#10	36	DI#2	DI Ch#2
37	DI#9	DI Ch#9	38	DI#1	DI Ch#1
39	DI#8	DI Ch#8	40	DI#0	DI Ch#0

** These pins are not connected internally.
- DI(Digital Input) channels are Bi-Direction (Sink/Source) input.
- DO(Digital Output) channels are Source(similar to PNP TR) output.

1.5. ET-DH16N's Connector Signal (DI/DO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24	2	V2	P24
3	G3	N24 DO#8~15 Common	4	G2	N24 DO#0~7 Common
5	DO#15	DO Ch#15	6	DO#7	DO Ch#7
7	DO#14	DO Ch#14	8	DO#6	DO Ch#6
9	DO#13	DO Ch#13	10	DO#5	DO Ch#5
11	DO#12	DO Ch#12	12	DO#4	DO Ch#4
13	DO#11	DO Ch#11	14	DO#3	DO Ch#3
15	DO#10	DO Ch#10	16	DO#2	DO Ch#2
17	DO#9	DO Ch#9	18	DO#1	DO Ch#1
19	DO#8	DO Ch#8	20	DO#0	DO Ch#0
21	V1	P24(or N24) DI#8~15 Common	22	V0	P24(or N24) DI#0~7 Common
23	G1	N24(or P24) **	24	G0	N24(or P24) **
25	DI#15	DI Ch#15	26	DI#7	DI Ch#7
27	DI#14	DI Ch#14	28	DI#6	DI Ch#6
29	DI#13	DI Ch#13	30	DI#5	DI Ch#5
31	DI#12	DI Ch#12	32	DI#4	DI Ch#4
33	DI#11	DI Ch#11	34	DI#3	DI Ch#3
35	DI#10	DI Ch#10	36	DI#2	DI Ch#2
37	DI#9	DI Ch#9	38	DI#1	DI Ch#1
39	DI#8	DI Ch#8	40	DI#0	DI Ch#0

** These pins are not connected internally.
- DI(Digital Input) channels are Bi-Direction (Sink/Source) input.
- DO(Digital Output) channels are Sink(similar to NPN TR) output.

1.6. TW-DH16N's Connector Signal (DI/DO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	V3	P24	2	V2	P24
3	G3	N24 DO#8~15 Common	4	G2	N24 DO#0~7 Common
5	DO#15	DO Ch#15	6	DO#7	DO Ch#7
7	DO#14	DO Ch#14	8	DO#6	DO Ch#6
9	DO#13	DO Ch#13	10	DO#5	DO Ch#5
11	DO#12	DO Ch#12	12	DO#4	DO Ch#4
13	DO#11	DO Ch#11	14	DO#3	DO Ch#3
15	DO#10	DO Ch#10	16	DO#2	DO Ch#2
17	DO#9	DO Ch#9	18	DO#1	DO Ch#1
19	DO#8	DO Ch#8	20	DO#0	DO Ch#0
21	V1	P24(or N24) DI#8~15 Common	22	V0	P24(or N24) DI#0~7 Common
23	G1	N24(or P24) **	24	G0	N24(or P24) **
25	DI#15	DI Ch#15	26	DI#7	DI Ch#7
27	DI#14	DI Ch#14	28	DI#6	DI Ch#6
29	DI#13	DI Ch#13	30	DI#5	DI Ch#5
31	DI#12	DI Ch#12	32	DI#4	DI Ch#4
33	DI#11	DI Ch#11	34	DI#3	DI Ch#3
35	DI#10	DI Ch#10	36	DI#2	DI Ch#2
37	DI#9	DI Ch#9	38	DI#1	DI Ch#1
39	DI#8	DI Ch#8	40	DI#0	DI Ch#0

■ **JY1~JY16, JX1~JX16 (Molex, 53014-0310)**

Name	Pin#1	Pin#2	Pin#3	Name	Pin#1	Pin#2	Pin#3
JY1	V2(P24)	DO Ch#0	G2(N24)	JY9	V3(P24)	DO Ch#8	G3(N24)
JY2	V2(P24)	DO Ch#1	G2(N24)	JY10	V3(P24)	DO Ch#9	G3(N24)
JY3	V2(P24)	DO Ch#2	G2(N24)	JY11	V3(P24)	DO Ch#10	G3(N24)
JY4	V2(P24)	DO Ch#3	G2(N24)	JY12	V3(P24)	DO Ch#11	G3(N24)
JY5	V2(P24)	DO Ch#4	G2(N24)	JY13	V3(P24)	DO Ch#12	G3(N24)
JY6	V2(P24)	DO Ch#5	G2(N24)	JY14	V3(P24)	DO Ch#13	G3(N24)
JY7	V2(P24)	DO Ch#6	G2(N24)	JY15	V3(P24)	DO Ch#14	G3(N24)
JY8	V2(P24)	DO Ch#7	G2(N24)	JY16	V3(P24)	DO Ch#15	G3(N24)
JX1	V0(P24 or N24)	DI Ch#0	G0(N24 or N24)	JX9	V1(P24 or N24)	DI Ch#8	G1(N24 or N24)
JX2	V0(P24 or N24)	DI Ch#1	G0(N24 or N24)	JX10	V1(P24 or N24)	DI Ch#9	G1(N24 or N24)
JX3	V0(P24 or N24)	DI Ch#2	G0(N24 or N24)	JX11	V1(P24 or N24)	DI Ch#10	G1(N24 or N24)
JX4	V0(P24 or N24)	DI Ch#3	G0(N24 or N24)	JX12	V1(P24 or N24)	DI Ch#11	G1(N24 or N24)
JX5	V0(P24 or N24)	DI Ch#4	G0(N24 or N24)	JX13	V1(P24 or N24)	DI Ch#12	G1(N24 or N24)
JX6	V0(P24 or N24)	DI Ch#5	G0(N24 or N24)	JX14	V1(P24 or N24)	DI Ch#13	G1(N24 or N24)
JX7	V0(P24 or N24)	DI Ch#6	G0(N24 or N24)	JX15	V1(P24 or N24)	DI Ch#14	G1(N24 or N24)
JX8	V0(P24 or N24)	DI Ch#7	G0(N24 or N24)	JX16	V1(P24 or N24)	DI Ch#15	G1(N24 or N24)

** These pins are not connected internally.
- DI(Digital Input) channels are Bi-Direction (Sink/Source) input.
- DO(Digital Output) channels are Sink(similar to NPN TR) output.

1.7. ET-AIAO's Connector Signal (DI/DO/AI/AO)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	A24V	A24V	2	A24V	A24V
3	AG	AGND	4	AG	AGND
5	AO#7	AO Ch#7	6	AI#7	AI Ch#7
7	AO#6	AO Ch#6	8	AI#6	AI Ch#6
9	AO#5	AO Ch#5	10	AI#5	AI Ch#5
11	AO#4	AO Ch#4	12	AI#4	AI Ch#4
13	AO#3	AO Ch#3	14	AI#3	AI Ch#3
15	AO#2	AO Ch#2	16	AI#2	AI Ch#2
17	AO#1	AO Ch#1	18	AI#1	AI Ch#1
19	AO#0	AO Ch#0	20	AI#0	AI Ch#0
21	V1	P24(or N24) DO#0~7 Common	22	V0	P24(or N24) DI#0~7 Common
23	G1	N24(or P24) **	24	G0	N24(or P24) **
25	DO#7	DO Ch#7	26	DI#7	DI Ch#7
27	DO#6	DO Ch#6	28	DI#6	DI Ch#6
29	DO#5	DO Ch#5	30	DI#5	DI Ch#5
31	DO#4	DO Ch#4	32	DI#4	DI Ch#4
33	DO#3	DO Ch#3	34	DI#3	DI Ch#3
35	DO#2	DO Ch#2	36	DI#2	DI Ch#2
37	DO#1	DO Ch#1	38	DI#1	DI Ch#1
39	DO#0	DO Ch#0	40	DI#0	DI Ch#0

** These pins are not connected internally.
- DI(Digital Input) channels are Bi-Direction (Sink/Source) input.
- DO(Digital Output) channels are Sink(similar to NPN TR) output.

1.8. ET-AI32's Connector Signal (AI)

■ **CN1 (Hirose, HIF3BA-40PA-2.54DS)**

No	Signal Name	Description	No	Signal Name	Description
1	A24V	A24V	2	A24V	A24V
3	AG	AGND	4	AG	AGND
5	AI#31	AI Ch#31	6	AI#23	AI Ch#23
7	AI#30	AI Ch#30	8	AI#22	AI Ch#22
9	AI#29	AI Ch#29	10	AI#21	AI Ch#21
11	AI#28	AI Ch#28	12	AI#20	AI Ch#20
13	AI#27	AI Ch#27	14	AI#19	AI Ch#19
15	AI#26	AI Ch#26	16	AI#18	AI Ch#18
17	AI#25	AI Ch#25	18	AI#17	AI Ch#17
19	AI#24	AI Ch#24	20	AI#16	AI Ch#16
21	N.C.	N.C.	22	N.C.	N.C.
23	AG	AGND	24	AG	AGND
25	AI#15	AI Ch#15	26	AI#7	AI Ch#7
27	AI#14	AI Ch#14	28	AI#6	AI Ch#6
29	AI#13	AI Ch#13	30	AI#5	AI Ch#5
31	AI#12	AI Ch#12	32	AI#4	AI Ch#4
33	AI#11	AI Ch#11	34	AI#3	AI Ch#3
35	AI#10	AI Ch#10	36	AI#2	AI Ch#2
37	AI#9	AI Ch#9	38	AI#1	AI Ch#1
39	AI#8	AI Ch#8	40	AI#0	AI Ch#0

2. HARDWARE SPECIFICATION

2.1. ENVIRONMENT SPECIFICATION

Environmental Specifications	
Operating Temperature	-20℃~60℃, TBD
Storage Temperature	-40℃~85℃
Relative Humidity	5% ~ 90% non-condensing
Operating Altitude	2000m

General Specifications	
Shock Operating	10g
Shock Non-Operating	30g
Vibration/shock resistance	Displacement : 0.012Inch p-p from 10~57Hz Acceleration : 2G's from 57~500Hz Sweep Rate : 1 octave Per Minute Axes to test : x, y, z Frequency Sweeps Per Axis : 10
EMC resistance burst/ESD	EMC Directive
Installation Pos. / Protect. Class	Variable/IP20
Product Certifications	-

2.2. DI (DIGITAL INPUT)

Items	Specification
Input type	ET-DI32U : Bi-Direction (Sink/Source) Input (32pt) ET-DH16P : Bi-Direction (Sink/Source) Input (16pt) ET-DH16N : Bi-Direction (Sink/Source) Input (16pt)
Indicator	1Led/point
On-state Voltage	24Vdc Nominal Min. 17Vdc to Max 28.8Vdc
Off-state Voltage	Max. 10Vdc
On-state Current	2.5mA max./point @24Vdc
Input Delay	OFF to ON : 0.5msec max. ON to OFF : 1.0msec max.
Nominal Input Impedance	10Kohm typical
General Specification	
Power Supply	From external, 24Vdc Nominal, 17~28.8Vdc
Power Dissipation	< 100mA/24Vdc, TBD
Isolation	DI/DO to System : Photo coupler isolation
Environment Conditions	Refer to Environment Specification

2.3. DO (DIGITAL OUTPUT)

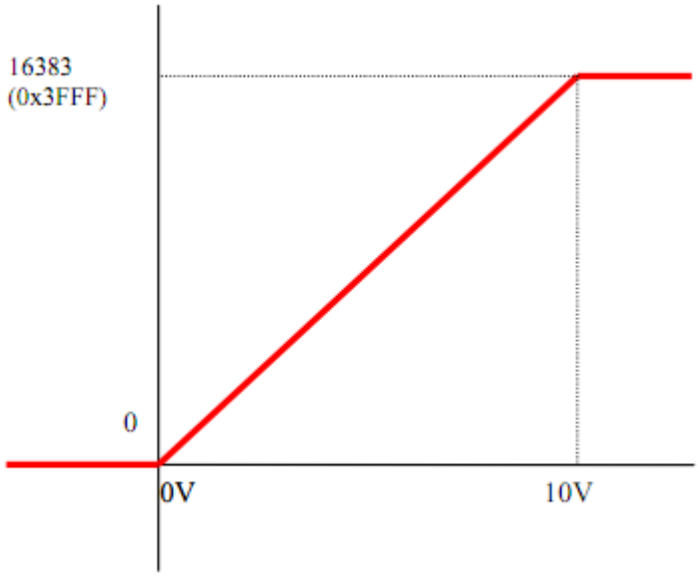
Items	Specification
Output type	ET-DO32P : Source Output (32pt) ET-DO32N : Sink Output (32pt) ET-DH16P : Source Output (16pt) ET-DH16N : Sink Output (16pt)
Indicator	1Led/point
On-state Voltage Range	Nominal 24Vdc, min. 17Vdc, max. 28.8Vdc
On-state Voltage Drop	Max. 0.2Vdc@25℃
On-state Current	Min. 1mA/channel
Output Delay	OFF to ON : 0.3msec max. ON to OFF : 0.3msec max.
Off-state Leakage Current	Max. 0.3mA
Output Current Rating	Max. 0.5A/channel, 4A/all channel
Surge Current Rating	1A for 10msec, repeatable every 3sec
Output Protection	Short Circuit Protection Over Current limit :3.5A max
General Specification	
Power Supply	From external, 24Vdc Nominal, 17~28.8Vdc
Power Dissipation	< 100mA/24Vdc, TBD expect Output Driver Current
Isolation	DI/DO to System : Photo coupler isolation
Environment Conditions	Refer to Environment Specification

2.4. ET-AIAO (DI/DO/AI/AO)

Items	Specification
Input type	ET-AIAO / AI:8pt AO:8pt DI:8pt DO:8pt
Indicator	16Led/point for DI/DO
Resolution in Range	14bits (0~10V : 0x0000~0x3FFF)
Module Error	±0.1% Full Scale @ 25℃ ±0.3% Full Scale @ -20℃, 60℃
Input Voltage Range	0~10V nominal
On-state Voltage	24Vdc Nominal Min. 17Vdc to Max 28.8Vdc
Off-state Voltage	Max. 10Vdc
On-state Current	2.5mA max./point @24Vdc
Digital Input Delay	OFF to ON : 0.3msec max. ON to OFF : 0.3msec max. , TBD
Digital Outnput Delay	OFF to ON : 0.3msec max. ON to OFF : 0.3msec max. , TBD
Analog Input Delay	OFF to ON : 15msec max. ON to OFF : 40msec max.
Analog Output Delay	OFF to ON : 20msec max. ON to OFF : 20msec max.
Nominal Input Impedance	470Kohm typical
Load Resistance	Min. 2Kohm
General Specification	
Power Supply	From external, 24Vdc Nominal, 17~28.8Vdc
Power Dissipation	< 100mA/24Vdc
Isolation	DI/DO/AI/AO to System : Photo coupler isolation
Environment Conditions	Refer to Environment Specification

■ Analog Conversion Charateristic

Input Voltage	0V	2.5V	5V	10V
Data	0(0000_{HEX})	4095($0FFF_{HEX}$)	8191($1FFF_{HEX}$)	16383($3FFF_{HEX}$)

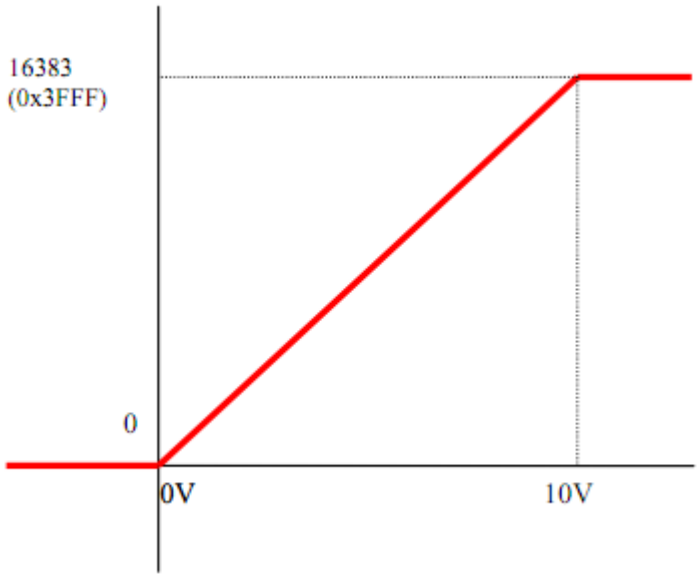


2.5. ET-AI32 (ANALOG INPUT)

Items	Specification
Input type	ET-AI32 / AI:32pt
Indicator	1Led for Hardware Error, 1Led for External Power
Resolution in Range	14bits (0~10V : 0x0000~0x3FFF)
Module Error	±0.1% Full Scale @ 25℃ ±0.3% Full Scale @ -20℃, 60℃
Input Voltage Range	0~10V nominal
Nominal Input Impedance	470Kohm typical
General Specification	
Power Supply	From external, 24Vdc Nominal, 17~28.8Vdc
Power Dissipation	< 100mA/24Vdc
Isolation	AI to System : Photo coupler isolation
Environment Conditions	Refer to Environment Specification

■ Analog Conversion Charateristic

Input Voltage	0V	2.5V	5V	10V
Data	0(0000_{HEX})	4095($0FFF_{HEX}$)	8191($1FFF_{HEX}$)	16383($3FFF_{HEX}$)



2.6. IO Terminal Board (TW-DH16N)

Items	Specification
Matching Board type	ET-DH16N : Bi-Direction (Sink/Source) Input (16pt) Sink Output (16pt)
Indicator	16 Green Led/point for Input 16 Red Led/point for Input 4 Red Led/8Point for Field power(Fuse/LD1,LD2,LD3,LD4)
Overcurrent Protection (Fuse)	I_{hold} : 1.50A ** I_{trip} : 3.00A V_{max} : 24Vdc I_{max} : 20A Maximum Time to Trip Current : 8.00A Time : 1.50Sec.
General Specification	
Power Supply	From external, 24Vdc Nominal, 17~26Vdc
Power Dissipation	< 150mA/24Vdc, TBD

** I_{hold} = Hold current: maximum current device will pass without tripping in 20°C still air.
I_{trip} = Trip current : minimum current at which the device will trip in 20°C still air.
V_{max} = Maximum voltage device can withstand without damage at rated current (I_{max})
I_{max} = Maximum fault current device can withstand without damage at rated voltage (V_{max})

3. ETHERCAT SPECIFICATION

3.1. EtherCAT Specification

■ **Specification**

Interface Specification	
IO Size	- ET-DI32U (In:4byte) - ET-DO32P, ET-DO32N (Out:4byte) - ET_DH16P, ET-DH16N (In:2byte, Out:2byte)
Max. Nodes	65535
Communication Speed	100Mbps
Interface Connector	Two Port RJ45 Socket (J1) / ECAT IN / ECAT OUT
Indicator	- Power : Green, Module Power Status - RUN : Green, EtherCAT Communication Status - Active : Yellow, Network Status - IO(DI/DO) Green/1pt
General Specification	
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 17~28.8Vdc Protection : Reverse polarity protection
Isolation	EtherCAT to Internal System : Non-isolation Internal System to I/O driver : Isolation
Field Power	Supply voltage : 24Vdc nominal Supply voltage range : 17~28.8Vdc
Weight	ET-Series About 61g TW-Series About 40g
Board PCB Size	70mm x 100mm
Environment Condition	Refer to Environment Specification

4. ETHERCAT LED, IO DATA/SIZE

4.1. Power Status LED

State	LED is:	To indicate:
No Power	Off	No power is supplied to the unit.
Power On	Green	Power is supplied to the unit.

4.2. Current Running Status LED (RUN)

State	LED is :	To indicate :
Init	Off	State of the EtherCAT State Machine: INIT = Initialization
Pre-Operational	Blinking	State of the EtherCAT State Machine: PREOP = Pre-Operational
Safe-Operational	Single Flash	State of the EtherCAT State Machine: SAFEOP = Safe-Operational
Initialization or Bootstrap	Flashes	State of the EtherCAT State Machine: BOOT = Bootstrap (Update of the coupler firmware)
Operational	On	State of the EtherCAT State Machine: OP = Operational

4.3. IO (DI/DO) Status LED

ET-DI32U : DI0~31(DI:32pt)
ET-DO32P, ET-DO32N : DO0~31(DO:32pt)
ET-DH16P, ET-DH16N : DI0~15(DI:16pt), DO0~15(DO:16pt)

■ **DI 0~31, Digital Input Status (DI 0 ~ 31)**

LED	Signal Name	Description
DI 0	DI Ch#0 Status	
DI 1	DI Ch#1 Status	
DI 2	DI Ch#2 Status	
DI 3	DI Ch#3 Status	
….	….	
….	….	
DI 30	DI Ch#30 Status	
DI 31	DI Ch#31 Status	

■ **DO 0~31, Digital Output Status (DO 0 ~ 31)**

LED	Signal Name	Description
DO 0	DO Ch#0 Status	
DO 1	DO Ch#1 Status	
DO 2	DO Ch#2 Status	
DO 3	DO Ch#3 Status	
….	….	
….	….	
DO 30	DO Ch#30 Status	
DO 31	DO Ch#31 Status	

4.4. IO Terminal Board(DI/DO) Status LED (Only for TW-DH16N)

TW-DH16N : DI0~15(DI:16pt), DO0~15(DO:16pt)

■ **DI 0~15, Digital Input Status (LX 1 ~16)**

LED	Signal Name	Description
LX 1	DI Ch#0 Status	
LX 2	DI Ch#1 Status	
LX 3	DI Ch#2 Status	
LX 4	DI Ch#3 Status	
….	….	
….	….	
LX 15	DI Ch#14 Status	
LX 16	DI Ch#15 Status	

■ **DO 0~15, Digital Output Status (LY 1 ~ 16)**

LED	Signal Name	Description
LY 1	DO Ch#0 Status	
LY 2	DO Ch#1 Status	
LY 3	DO Ch#2 Status	
LY 4	DO Ch#3 Status	
….	….	
….	….	
LY 15	DO Ch#14 Status	
LY 16	DO Ch#15 Status	

■ **Field Power Status (LD 1 ~ 4)**

LED	Signal Name	Description
LD 1	DI Ch#0 ~ 7 Field Power Status	ON : Field Power ON OFF : Field Power OFF
LD 2	DI Ch#8 ~ 15 Field Power Status	ON : Field Power ON OFF : Field Power OFF
LD 3	DO Ch#0 ~ 7 Field Power Status	ON : Field Power ON OFF : Field Power OFF
LD 4	DO Ch#8 ~ 15 Field Power Status	ON : Field Power ON OFF : Field Power OFF

4.5. ET-AIAO Status LED

ET-AIAO : DI 0~7(DI:8pt), DO 0~7(DO:8pt)

■ **DI 0~7, Digital Input Status**

LED	Signal Name	Description
DI 0	DI Ch#0 Status or Hardware Error	Off : No Error Blinking: Hardware Error
DI 1	DI Ch#1 Status or External Power	Off : Field Power On Blinking: Field Power Off
DI 2	DI Ch#2 Status	
DI 3	DI Ch#3 Status	
DI 4	DI Ch#4 Status	
DI 5	DI Ch#5 Status	
DI 6	DI Ch#6 Status	
DI 7	DI Ch#7 Status	

■ **DO 0~7, Digital Output Status**

LED	Signal Name	Description
DO 0	DO Ch#0 Status	
DO 1	DO Ch#1 Status	
DO 2	DO Ch#2 Status	
DO 3	DO Ch#3 Status	
DO 4	DO Ch#4 Status	
DO 5	DO Ch#5 Status	
DO 6	DO Ch#6 Status	
DO 7	DO Ch#7 Status	

4.6. ET-AI32 Status LED

ET-AI32 : Hardware Error LED, External Power LED

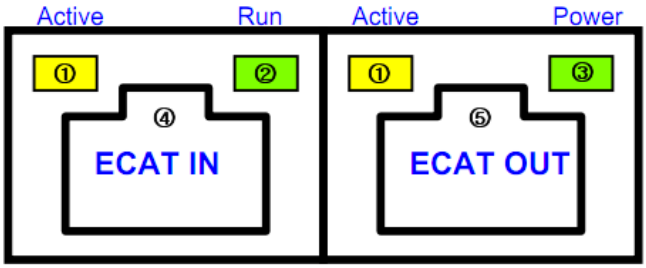
■ **Status LED 0,1**

LED	Signal Name	Description
# 0	Hardware Error Status	On : No Error Blinking: Hardware Error
# 1	External Power Status	On : Field Power On Blinking: Field Power Off

4.7. Two Port RJ45 Socket (J1)

■ **J1**

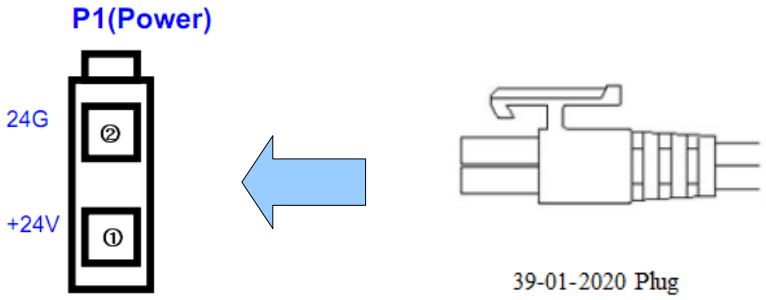
No	Description
1	Active LED
2	RUN LED
3	Power LED
4	EtherCAT IN
5	EtherCAT OUT



4.8. Power Socket

■ **P1**

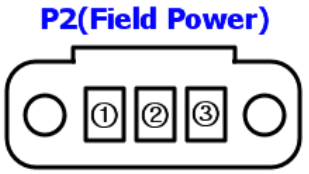
No	Description (39-30-0020 Board Connector / molex)
1	System Power +24Vdc
2	System Power 24G



4.9. Field Power Socket (Only for TW-DH16N)

■ **P2**

No	**Description** (1827871Phoenix Contact)
1	Field Power +24Vdc
2	Field Power 24G
3	Field Power +24Vdc



1827716 (Phoenix Contact)

4.10. IO Connector (Only for TW-DH16N)

22-03-5035 Board Connector (Molex)

50-37-5033 Plug (Molex)

08-70-1040 Crimp (Molex)
* 케이블을 Plug에 연결 시 Crimp를 사용 해야 함.

4.11. IO Data/Size for ET-DI32U

■ **IO Input (4Byte, Assembly Instance=100)**

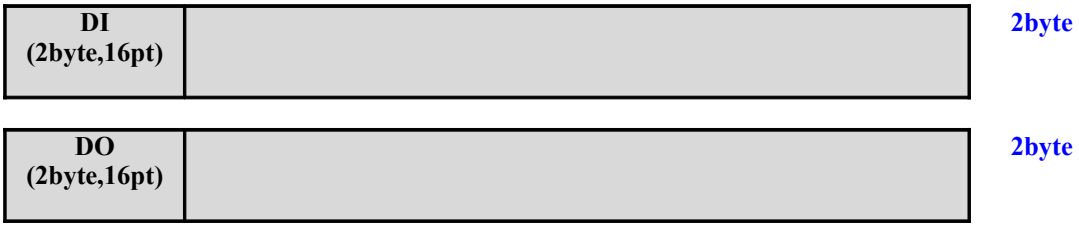
Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Digital Input 8 point (bit#7~0)							
1	Digital Input 8 point (bit#15~8)							
2	Digital Input 8 point (bit#23~16)							
3	Digital Input 8 point (bit#31~24)							

4.12. IO Data/Size for ET-DO32P, ET-DO32N

■ **IO Input (4Byte, Assembly Instance=150)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Digital Output 8 point (bit#7~0)							
1	Digital Output 8 point (bit#15~8)							
2	Digital Output 8 point (bit#23~16)							
3	Digital Output 8 point (bit#31~24)							

4.13. IO Data/Size for ET-DH16P, ET-DH16N



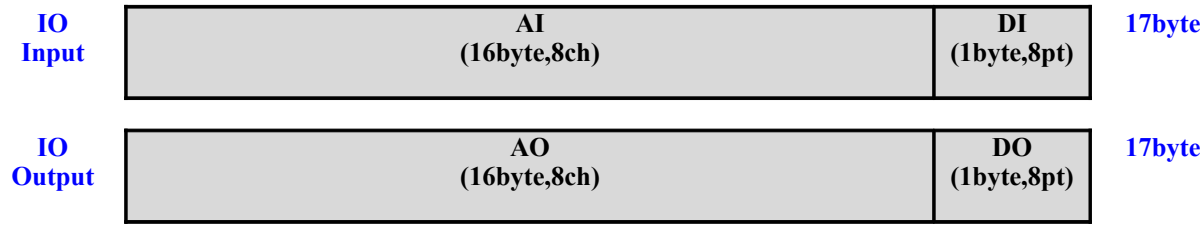
■ **IO Input (2Byte, Assembly Instance=100)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Digital Input 8 point (bit#7~0)							
1	Digital Input 8 point (bit#15~8)							

■ **IO Output (2Byte, Assembly Instance=150)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Digital Output 8 point (bit#7~0)							
1	Digital Output 8 point (bit#15~8)							

4.14. IO Data/Size for ET-AIAO



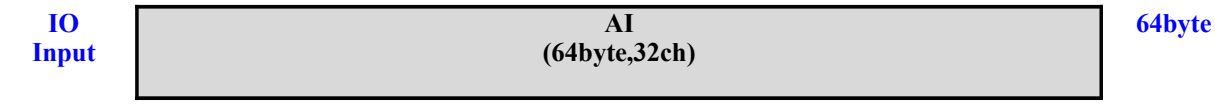
■ **IO Input (17Byte)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Analog Input Ch#0 Low Byte (bit#7~0)							
1	Analog Input Ch#0 High Byte (bit#15~8)							
2	Analog Input Ch#1 Low Byte (bit#7~0)							
3	Analog Input Ch#1 High Byte (bit#15~8)							
4	Analog Input Ch#2 Low Byte (bit#7~0)							
5	Analog Input Ch#2 High Byte (bit#15~8)							
6	Analog Input Ch#3 Low Byte (bit#7~0)							
7	Analog Input Ch#3 High Byte (bit#15~8)							
8	Analog Input Ch#4 Low Byte (bit#7~0)							
9	Analog Input Ch#4 High Byte (bit#15~8)							
10	Analog Input Ch#5 Low Byte (bit#7~0)							
11	Analog Input Ch#5 High Byte (bit#15~8)							
12	Analog Input Ch#6 Low Byte (bit#7~0)							
13	Analog Input Ch#6 High Byte (bit#15~8)							
14	Analog Input Ch#7 Low Byte (bit#7~0)							
15	Analog Input Ch#7 High Byte (bit#15~8)							
16	Digital Input 8 point (bit#7~0)							

■ **IO Output (17Byte)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Analog Output Ch#0 Low Byte (bit#7~0)							
1	Analog Output Ch#0 High Byte (bit#15~8)							
2	Analog Output Ch#1 Low Byte (bit#7~0)							
3	Analog Output Ch#1 High Byte (bit#15~8)							
4	Analog Output Ch#2 Low Byte (bit#7~0)							
5	Analog Output Ch#2 High Byte (bit#15~8)							
6	Analog Output Ch#3 Low Byte (bit#7~0)							
7	Analog Output Ch#3 High Byte (bit#15~8)							
8	Analog Output Ch#4 Low Byte (bit#7~0)							
9	Analog Output Ch#4 High Byte (bit#15~8)							
10	Analog Output Ch#5 Low Byte (bit#7~0)							
11	Analog Output Ch#5 High Byte (bit#15~8)							
12	Analog Output Ch#6 Low Byte (bit#7~0)							
13	Analog Output Ch#6 High Byte (bit#15~8)							
14	Analog Output Ch#7 Low Byte (bit#7~0)							
15	Analog Output Ch#7 High Byte (bit#15~8)							
16	Digital Output 8 point (bit#7~0)							

4.15. IO Data/Size for ET-AI32



■ **IO Input (64Byte)**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Analog Input Ch#0 Low Byte (bit#7~0)							
1	Analog Input Ch#0 High Byte (bit#15~8)							
2	Analog Input Ch#1 Low Byte (bit#7~0)							
3	Analog Input Ch#1 High Byte (bit#15~8)							
4	Analog Input Ch#2 Low Byte (bit#7~0)							
5	Analog Input Ch#2 High Byte (bit#15~8)							
6	Analog Input Ch#3 Low Byte (bit#7~0)							
7	Analog Input Ch#3 High Byte (bit#15~8)							
8	Analog Input Ch#4 Low Byte (bit#7~0)							
9	Analog Input Ch#4 High Byte (bit#15~8)							
10	Analog Input Ch#5 Low Byte (bit#7~0)							
11	Analog Input Ch#5 High Byte (bit#15~8)							
12	Analog Input Ch#6 Low Byte (bit#7~0)							
13	Analog Input Ch#6 High Byte (bit#15~8)							
14	Analog Input Ch#7 Low Byte (bit#7~0)							
15	Analog Input Ch#7 High Byte (bit#15~8)							
.. ..	.. ..							
.. ..	.. ..							
46	Analog Input Ch#23 Low Byte (bit#7~0)							
47	Analog Input Ch#23 High Byte (bit#15~8)							
48	Analog Input Ch#24 Low Byte (bit#7~0)							
49	Analog Input Ch#24 High Byte (bit#15~8)							
50	Analog Input Ch#25 Low Byte (bit#7~0)							
51	Analog Input Ch#25 High Byte (bit#15~8)							
52	Analog Input Ch#26 Low Byte (bit#7~0)							
53	Analog Input Ch#26 High Byte (bit#15~8)							
54	Analog Input Ch#27 Low Byte (bit#7~0)							
55	Analog Input Ch#27 High Byte (bit#15~8)							
56	Analog Input Ch#28 Low Byte (bit#7~0)							
57	Analog Input Ch#28 High Byte (bit#15~8)							
58	Analog Input Ch#29 Low Byte (bit#7~0)							
59	Analog Input Ch#29 High Byte (bit#15~8)							
60	Analog Input Ch#30 Low Byte (bit#7~0)							
61	Analog Input Ch#30 High Byte (bit#15~8)							
62	Analog Input Ch#31 Low Byte (bit#7~0)							
63	Analog Input Ch#31 High Byte (bit#15~8)							