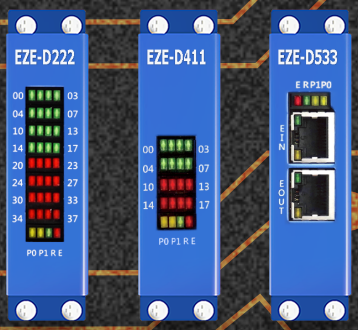
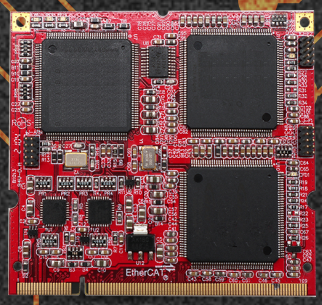
EziModule®

EtherCAT® Slave Module

EtherCAT Slaves



EZE Module



ESM Module

White Paper

Taking distributed I/O modules to next level

Product customization with plug-in modules

Combining the benefits of standard module and customized carrier.

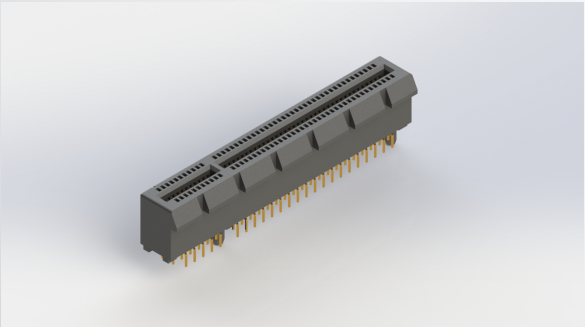
Time to market and quick response in customized design services are always the priorities to a product development team. Time to market is also a product development strategy to achieve market position. Taiwan Pulse Motion provides reference designs for its off-the-shelf carrier boards, and customers may also create their own carrier board by demands.

EtherCAT® based EziModule family (EZE/ESM) continues to address many customer needs by offering semi-customized and full customized solutions in carrier board design with multi-channel distributed I/O module selections. Plug and play capabilities make EziModule product family a smart choice for your machine control system.

Either EZE or ESM design concept, a customized distributed I/O module, is comprised of carrier board with flexible integration of multi-connector types and an I/O extensional plug-in card to be an alternative solution to a rat's nest of wires.

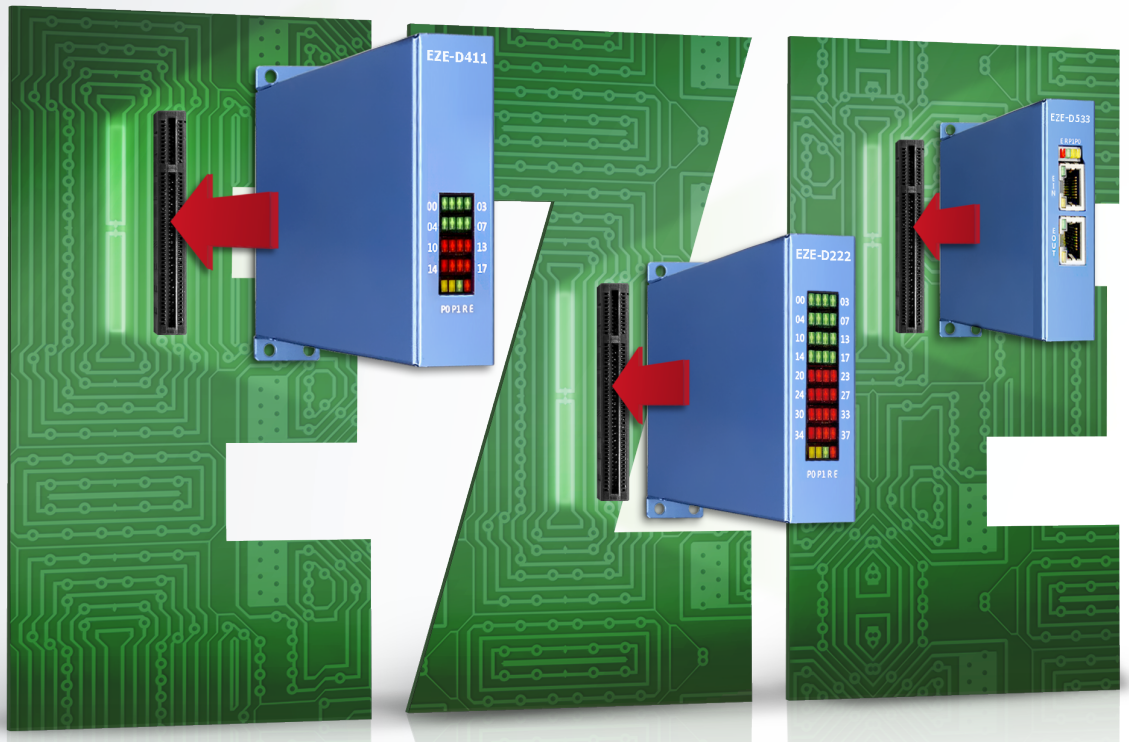
Each carrier board consists of multi-type connectors that could be designed by user. EziModule® family products perfectly turn a typical distributed I/O module into reliable implementation of customer-specific applications.

TPM offers high level flexibility during installation. It is designed to be installed in the field near to your devices. Control cabinet space saving is always a challenge for plant engineer working in fieldbus-based automation.



EZE Series - PCIe x8 98P Slot

ESM Series - DDR2 SODIMM Socket



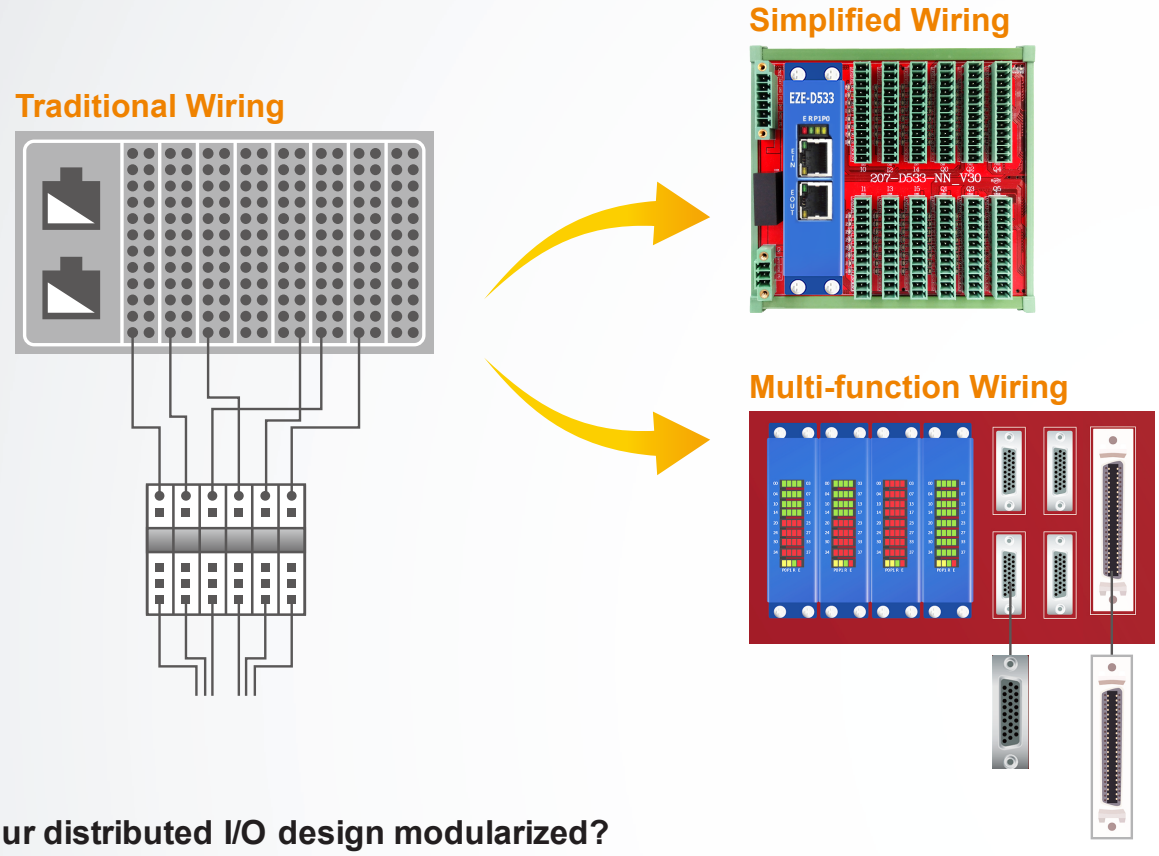
EZE:

EZE module, as an EtherCAT® plug-in I/O module , is a standard type of pluggable upper I/O module makes users to exchange I/O module itself without removing an entire EtherCAT® I/O module from a control cabinet, which saves engineers valuable time and money from complex wiring over and over again.

On each of standard digital and analog I/O module, an individual wiring is switched to a distribution board which ensures dependable quality for each machine and avoids error-wiring mistakes associated with individual wiring of terminals by eliminating long, complex and expensive multi-core cable runs from field devices to your distributed control system cabinets.

The unique design of EZE with PCIex8 98P connector reduces the per-point cost of digital I/O systems by providing up to multiple times the number of I/O channels in the same amount of I/O board.

EZE also enhances plug-and-play functionality for easy maintenance and also lowers risk of damage of entire EtherCAT I/O module. Its flexible mix of carrier design with multi connectors with needed interfaces implemented offering users either a ready-to-go or a cost-saving custom specific design solutions.



Is your distributed I/O design modularized?

Modular design makes EZE series a fantastic solution for distributed I/O structure. Engineers can save lots of time from setting up the machine on-site, not to mention the time wasted on debugging and justifying the additional wiring.

Why keep struggling with rigid I/O architecture design?

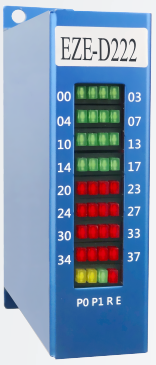
Imagine electrical engineers pull wires out to devices all day long just for building up an Ethernet network between the controller and I/O modules inside the machine-mounted enclosure. New EZE series with a customized carrier can ease the selection process by spanning control architectures used in both centralized and distributed systems.

Advantages

TPM is able to leverage existing solutions and proven design concepts to meet unique application needs. We provide compliant solutions with significantly reduced lead time, cost and risk to our clients global wide.

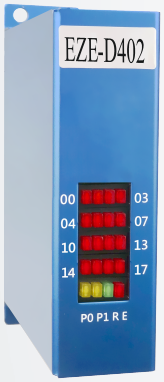
- ✓ Reduced capital equipment costs
- ✓ Reduced installation time and expense
- ✓ Increased control cabinet space
- ✓ Increased process ability

DIGITAL SIGNAL



EZE-D200 Series

Product	Type	Digital Inpout	Digital Output
EZE-D240-NX	NPN	32	0
EZE-D204-XN	NPN	0	32
EZE-D222-NN	NPN	16	16
EZE-D240-PX	PNP	32	0
EZE-D204-XP	PNP	0	32
EZE-D222-XP	PNP	16	16



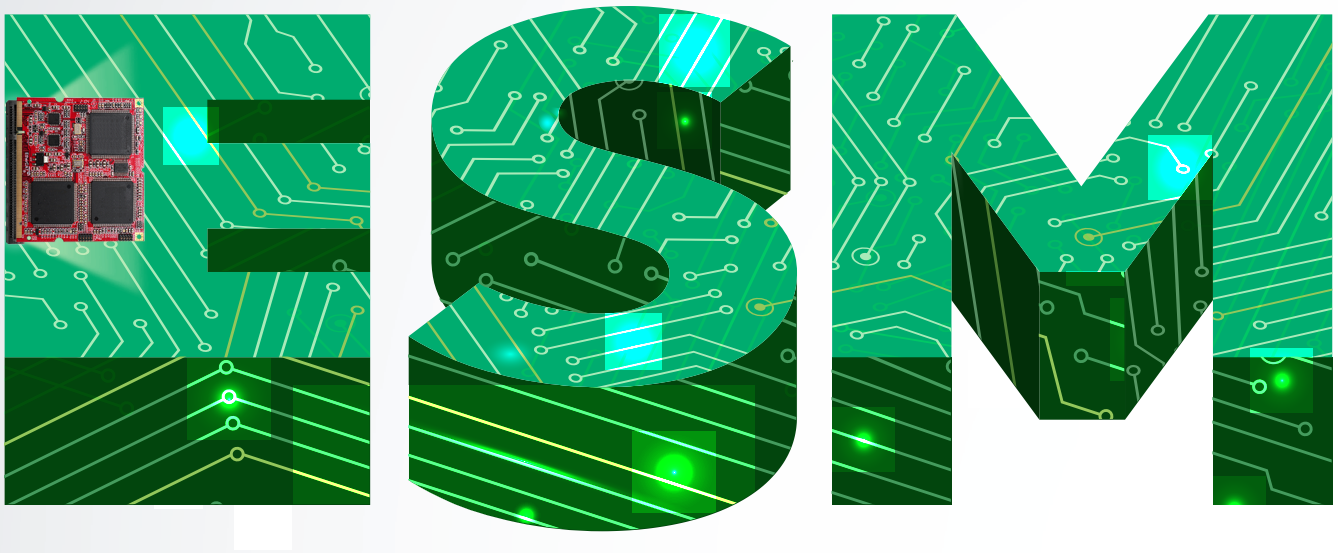
EZE-D400 Series

Product	Type	Digital Inpout	Digital Output
EZE-D402-XN	NPN	0	16
EZE-D411-NN	NPN	8	8
EZE-D402-XP	PNP	0	16
EZE-D411-PP	PNP	0	8

EZE-D500 Series

Product	Type	Digital Inpout	Digital Output
EZE-D540	TTL	64	0
EZE-D522	TTL	32	32
EZE-D550	TTL	80	0
EZE-D532	TTL	48	32
EZE-D560	TTL	96	0
EZE-D542	TTL	64	32
EZE-D533	TTL	48	48

Features Models		EZE-D200 Series	EZE-D400 Series	EZE-D500 Series
EtherCAT	Serial interface	Fast Ethernet,Full-Duplex		
	Distributed clock	1 ms		
	Cable type	CAT5 UTP/STP Ethernet cable		
	Surge protection	10 KV		
	Transmission speed	100Mbps		
	I/O isolation voltage	3750Vrms	N/A	N/A
General	Power input	24VDC±10%	24VDC±10%	5VDC±10%
	Power consumption	3W typical		
	working temperature	0 to 60 ℃		



ESM:

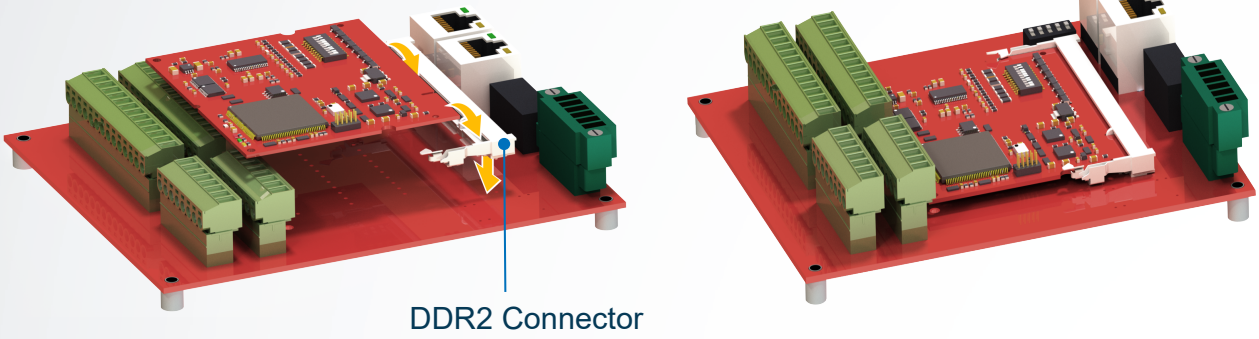
Changing to smaller component heights across all factory automation control devices allows optimizing space of I/O module and turning to an industry-leading compact designs.

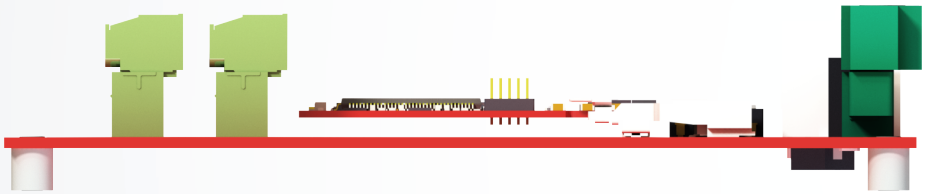
ESM I/O module contains a piggyback carrier board with varied connectors in combination including a DDR2-SODIMM connector and multi I/O up 96 channels in a compact size which significantly enhances total functionality, housing design and multi-circuit functions. TPM offers six models of standard ESM I/O module supporting up to 96 channels and one TTL compatible 4-CH encoder motion controller with high speed trigger function. To again all the advantages of ESM I/O module and motion controller with high speed trigger function, we also offer a customized solution for total 64-CH and 4-CH encoder motion controller supported in a compact size.

The major design concept is to highlight the slim and flexible design of ESM I/O module from saving space of control cabinet to the machine. Imaging less space could possibly increases more spaces on the factory floor meaning more production capabilities can be achieved afterwards.

We try to make implementation and time consuming easier than traditional approach for our customers. Beyond this, minimizing the risk of incorrect wiring through the use of standard connectors by changing to the piggyback design.

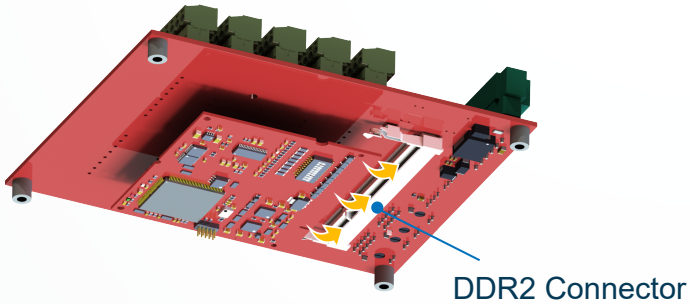
Type A - The Same Side

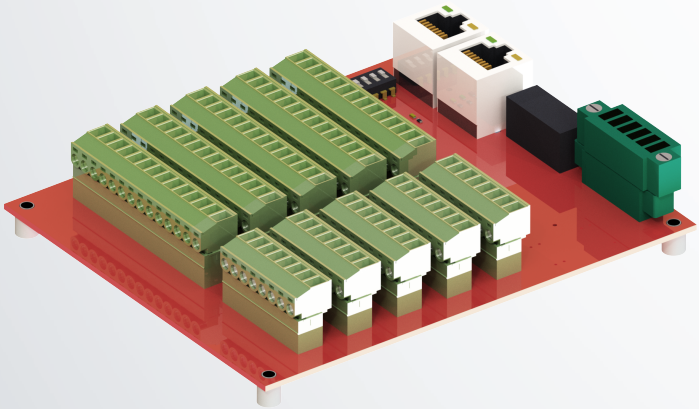




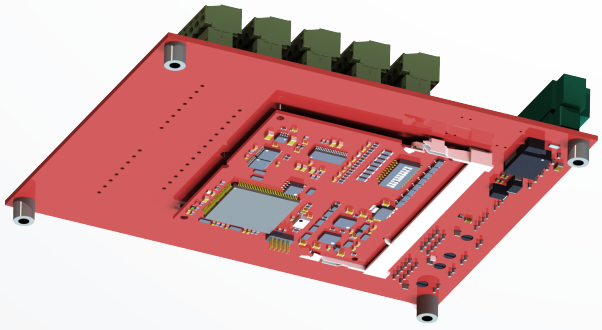
SIDE VIEW

Type B - Opposite Sides

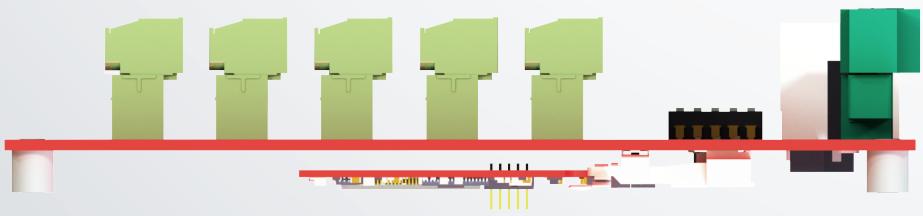




FRONT



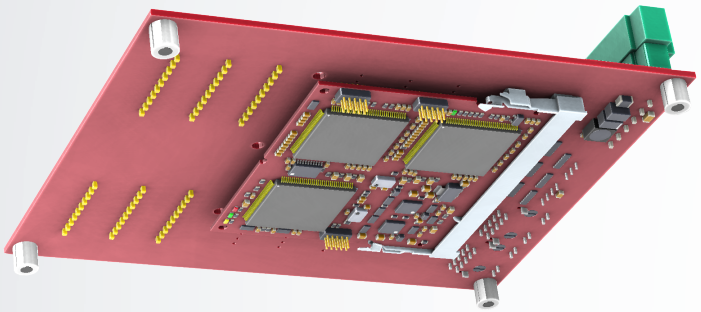
BACK



SIDE VIEW

ANALOG SIGNAL

ESM-A600 Series



Specification		Content
Protocol		EtherCAT
Distributed Clocks		Free Run or DC 1ms
Analog Input Channels (max)		8 for voltage / 4 for current
Analog Input Type		Voltage or Current, selectable
Analog Input Interface	Voltage	8(single-ended) or 4(differential)
	Current	4(single-ended) or (differential)
Analog Input Range	Voltage	±10V, 0~10V, 0~5V
	Current	0~20 mA, 4~20mA
Analog Input Resolution		16-bit
Input bandwidth		Conversion Time: 1ms for all channels
Measurement error		Accuracy: 1mV
Dimension		L60 x W67.6 mm
Power		DC12V input (200mA) DC3.3V input (400mA)
Others		PCB UL94V-0 Standard PCBA ROHS Standard

Pin definition

Pin	Front Side	Pin	Back Side
1	12V IN	2	12V GND
3	D3.3V IN	4	DGND
5	D3.3V IN	6	DGND
7	P0_LINKA	8	P1_LINKA
9	P0_LINKA_ACT	10	P1_LINK_ACT
11	DGND	12	DGND
13	TD0+	14	TD1+
15	TD0-	16	TD1-
17	DGND	18	DGND
19	RD0+	20	RD1+
21	RD0-	22	RD1-
23	DGND	24	DGND
25	LED_ECAT_PWR	26	LED_ECAT_RUN
27	LED_ECAT_ERR	28	Address_b0
29	Address_b1	30	Address_b2
31	Address_b3	32	Address_b4
33	DGND	34	DGND
35	D3.3V IN	36	DGND
37	Reserve	38	DGND
39	Reserve	40	Reserve
Key notch			
DGND			
141	AGND	142	AGND
143	AI0+	144	AI4+
145	AI0-	146	AI4-
147	AGND	148	AGND
149	AI1+	150	AI5+
151	AI1-	152	AI5-
153	AGND	154	AGND
155	AI2+	156	AI6+
157	AI2-	158	AI6-
159	AGND	160	AGND
161	AI3+	162	AI7+
163	AI3-	164	AI7-
165	AGND	166	AGND
DGND			

Voltage mode

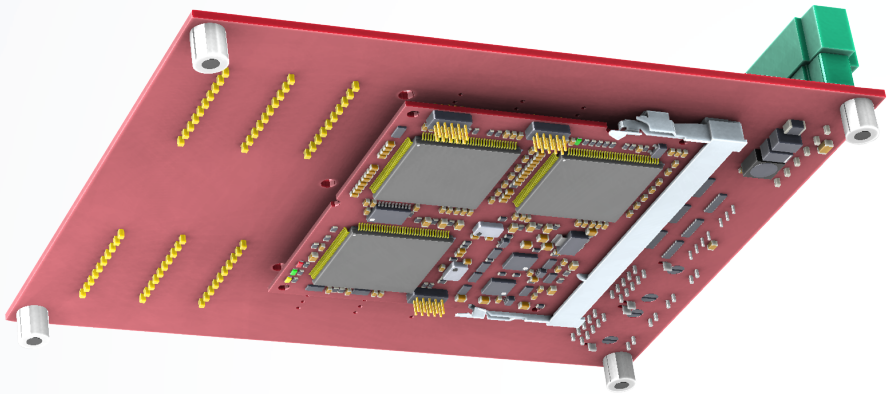
Pin	Label	Single-ended	Differential	Pin	Label	Single-ended
141	AGND			142	AGND	
143	AI0+	CH0	CH0+	144	AI4+	CH4
145	AI0-	CH0	CH0-	146	AI4-	CH4
147	AGND			148	AGND	
149	AI1+	CH1	CH1+	150	AI5+	CH5
151	AI1-	CH1	CH1-	152	AI5-	CH5
153	AGND			154	AGND	
155	AI2+	CH2	CH2+	156	AI6+	CH6
157	AI2-	CH2	CH2-	158	AI6-	CH6
159	AGND			160	AGND	
161	AI3+	CH3	CH3+	162	AI7+	CH7
163	AI3-	CH3	CH3-	164	AI7-	CH7
165	AGND			166	AGND	

Current mode

Pin	Label	Single-ended	Differential
141	AGND		
143	AI0+	CH0	CH0+
145	AI0-	CH0	CH0-
147	AGND		
149	AI1+	CH1	CH1+
151	AI1-	CH1	CH1-
153	AGND		
155	AI2+	CH2	
157	AI2-	CH2	
159	AGND		
161	AI3+	CH3	
163	AI3-	CH3	
165	AGND		

DIGITAL SIGNAL

ESM-D600 Series



ESM-D660		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***96***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***0***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D642		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***64***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D622C2		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Encoder Input & Output	Channels	***2***
	Signal Type	TTL
	Modes	Incremental, A/B phase or CW/CCW
	Range	32-bit signed integer
	Frequency	A/B x1 500KHz, AB x4 2MHz
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D633		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***48***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***48***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D640		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***64***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***0***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D622C4		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Encoder Input & Output	Channels	***4***
	Signal Type	TTL
	Modes	Incremental, A/B phase or CW/CCW
	Range	32-bit signed integer
	Frequency	A/B x1 500KHz, AB x4 2MHz
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D622		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***32***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

ESM-D604		
Protocol		EtherCAT
Distributed Clocks		Free Run / DC 1ms
Station Alias		5-bit address
Digital Input	Channels	***0***
	Signal Type	TTL
	Pins position	Depends on Model
Digital Output	Channels	***64***
	Signal Type	TTL
	Pins position	Depends on Model
Connector		DDR2-SODIMM
Dimension		L60 x W67.6 mm
Power		DC3.3V (1000mA)

Reduced capital equipment costs

A remote I/O solution reduces cost and space needed inside the main cabinet since it reduces the quantity of both terminals and protection mechanisms. Each I/O carrier forms a robust bus for up to 96 I/O interfaces. Full modular design is available in 32, 48, 64 up to 96 channels. Users has flexibilities for choosing exact amount of I/O module in one carrier board which may reduce total capital equipment cost.

Reduced installation time and expanse

Eliminate complex cable wiring by simply wiring to the controller and the I/O modules with a single EtherCAT® cableline. Each EZE I/O module can be seamlessly integrated with an EtherCAT terminal as a single distribution board but more flexible.

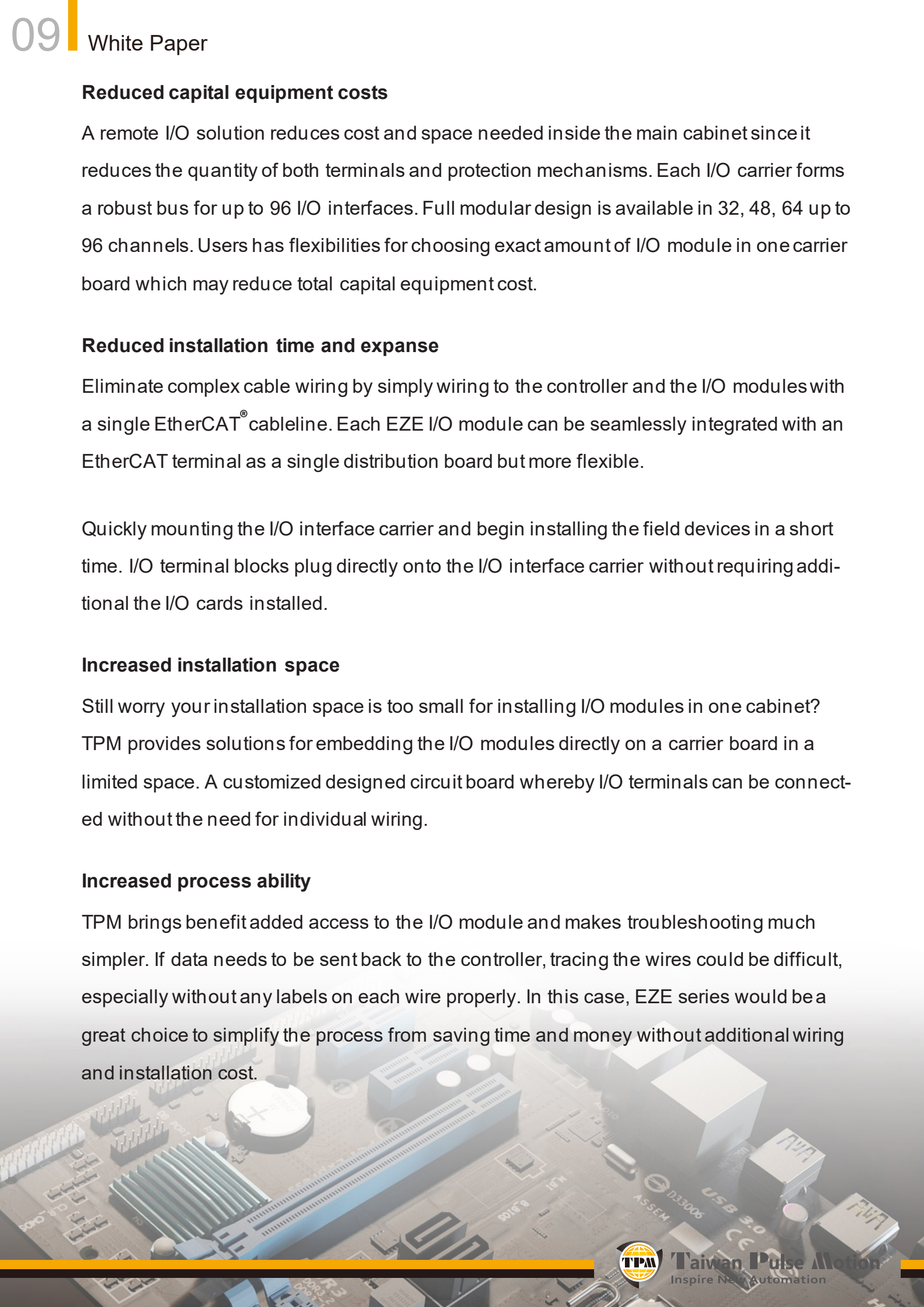
Quickly mounting the I/O interface carrier and begin installing the field devices in a short time. I/O terminal blocks plug directly onto the I/O interface carrier without requiring additional the I/O cards installed.

Increased installation space

Still worry your installation space is too small for installing I/O modules in one cabinet? TPM provides solutions for embedding the I/O modules directly on a carrier board in a limited space. A customized designed circuit board whereby I/O terminals can be connected without the need for individual wiring.

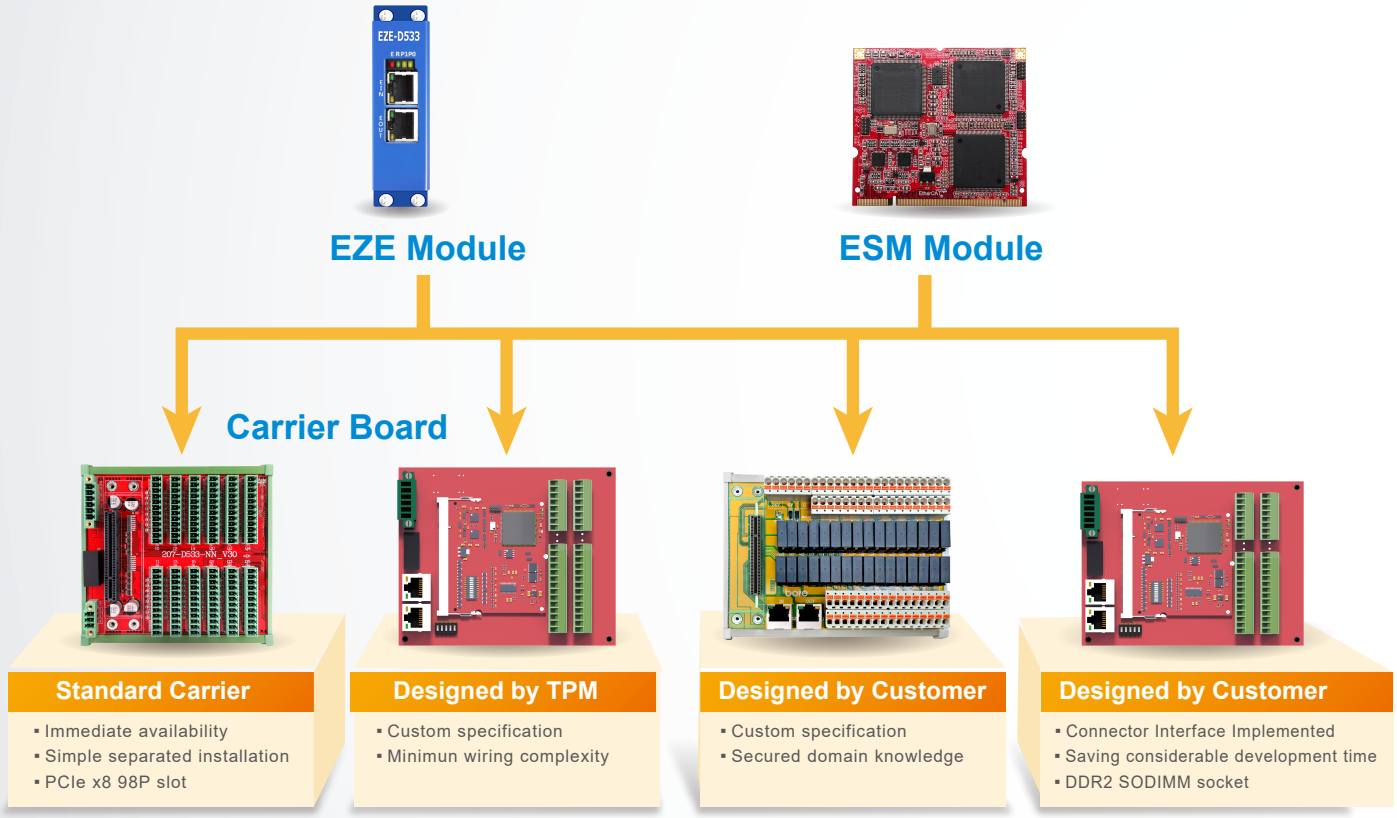
Increased process ability

TPM brings benefit added access to the I/O module and makes troubleshooting much simpler. If data needs to be sent back to the controller, tracing the wires could be difficult, especially without any labels on each wire properly. In this case, EZE series would be a great choice to simplify the process from saving time and money without additional wiring and installation cost.



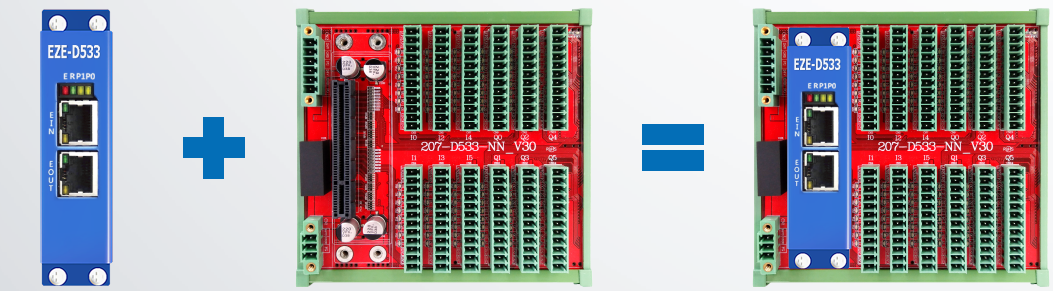
Flexible Customization

Both EZE & ESM modules are designed to be mounted on a wide range of carrier boards that could be either developed by TPM or by customers with a flexible, cost effective transition from DDR2 DIMM, Sub-D, Ribbon Cable and other connectors to terminal blocks.



A combination of customized carrier board with either standard EZE (EZE-D series) or ESM (ESM-D series) plug-in I/O module offers a complete development platform with enhanced design scalability and flexibility. Designers can simply develop their custom carrier board based on the specific interface requirements and budget limits.

Standard Products



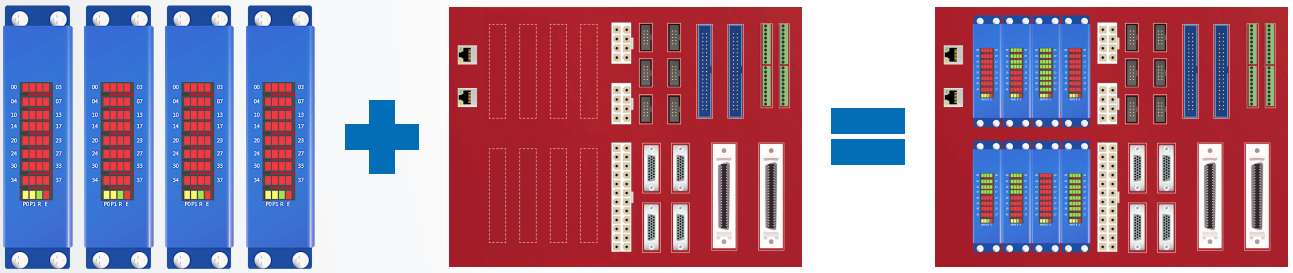
EZE-D Series | Standard Carrier Board | 207-D5 Seires

Custom Design Services

A centralized solution helps user on reducing the length of peripheral cables with tailored carriers. Users may simply plug in a EZE or ESM I/O module either in a standard carrier board or a customized carrier board with ribbon, DDR2 DIMM, E-Con or pluggable connectors. Special designed EZE & ESM modules provide error proof function by preventing the wrong I/O module being installed or plugged into a carrier board.

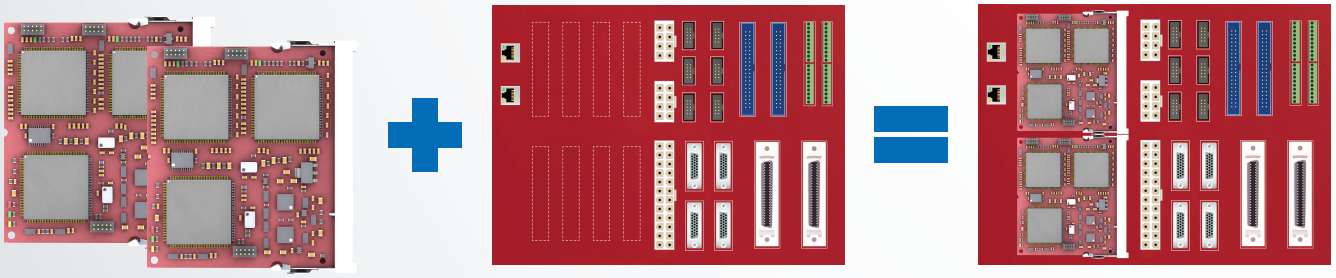
Both EZE & ESM series are design to integrate add-on I/O and connectors into a single baseboard. With constant I/O connections, simplified system packaging, and eliminated cabling, the system-level cost is greatly reduced.

Designed by TPM



EZE Series | Customized Carrier Board | Implemented Solution

Designed by TPM



ESM Series | Customized Carrier Board | Implemented Solution

Designed by Customer

EZE-D Series + Full Customized Carrier