



# IEI Smart Transportation Solution **Marine**

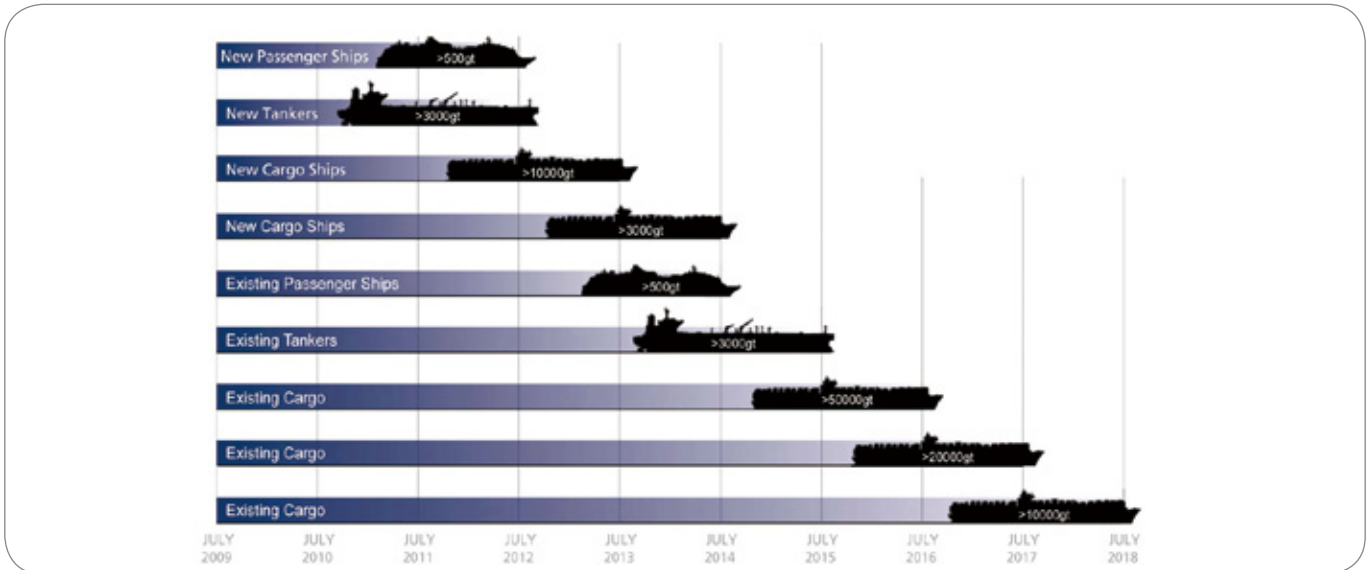


IEI Marine System



For more information, please visit: [www.ieiworld.com](http://www.ieiworld.com)

## • Marine Automation Market Overview – The Implementation Schedule of ECDIS



INTERNATIONAL MARITIME ORGANIZATION

The International Maritime Organization (IMO) has announced that Electronic Chart Display and Information System (ECDIS) should be implemented into all the vessels by July 2018. Both new ships and existing ships should follow this regulation according to the timetable. The bridge systems are complicated and usually composed of multiple sub-systems. ECDIS clearly defines and regulates all the devices and connections, which include data collection, data communication and color calibration. Therefore, this is a huge opportunity for system integrators (SI) and hardware manufacturers.

## • Famous Marine Certifications in the World

### DNV 2.4



DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment at sea and on shore. DNV certification is related to quality of ships, offshore units and installations of the system and components. The DNV regulation is one of the most stringent standards in the maritime industry. It sets the minimum requirements of devices based on where the device is located. IEI marine series complies with DNV regulations and has passed tests for temperature, humidity, vibration, EMC and water- and dust-proof levels.

### ■ Operating Temperature

The marine series can run in wide temperature environment from -15°C to 55°C.

Temperature	Class A	Class B	Class C	Class D
Location	Machinery spaces, control rooms, accommodation, bridge	Inside cubicles, desks, etc. with temperature rise of 5° C or more	Pump rooms, holds, rooms with no heating	Open deck, masts
Minimum equipment specification	Ambient temperatures: +5°C to +55°C	Ambient temperatures: +5° C to +70°C	Ambient temperatures: -25°C to +55°C	Ambient temperatures: -25°C to +70°C

### ■ Humidity

The marine series conforms to DNV class A of humidity.

Humidity	Class A	Class B
Location	Locations where special pre-cautions are taken to avoid condensation	All other locations
Minimum equipment specification	Relative humidity up to 96 % at all relevant temperatures.	Relative humidity up to 100 % at all relevant temperatures

### ■ Vibration

The marine series is subjected to DNV Class A vibration test and can be widely used on bulkheads, beams, deck and bridge.

Vibration	Class A	Class B	Class C
Location	On bulkheads, beams, deck, bridge	On machinery such as internal combustion engines, com-compressors, pumps, including piping on such machinery	Masts
Minimum equipment specification	Frequency range: 3-13.2 Hz, Amplitude: 1.0 mm (peak value) Frequency range: 13.2-100 Hz, Acceleration amplitude: 0.7 g	Frequency range: 3-25 Hz, Amplitude: 1.6 mm (peak value) Frequency range: 25-100 Hz, acceleration amplitude: 4.0 g	Frequency range: 3-13.2 Hz, Amplitude: 3.0 mm (peak value) Frequency range: 13.2-50 Hz, Acceleration amplitude: 2.1 g

### ■ EMC

Being different to CE and FCC standards, DNV regulations especially emphasize the importance of electromagnetic compatibility. IEI marine series is compliant with strict class B level and can provide a safe operating environment of sailing period.

Vibration	Class B			
Location	All locations including bridge and open deck			
Minimum equipment specification	Immunity			
	Conducted Low Frequency (Test 3.14.4)		Electrical Fast Transient/Burst (Test 3.14.5)	Electrical Slow Transient Surge (Test 3.14.6)
	AC 50/60 Hz Supply Voltage up to 15 <sup>th</sup> harmonics: 10% of UN 15 <sup>th</sup> to 100 <sup>th</sup> harmonics: decreasing from 10% to 1% of UN 100 <sup>th</sup> to 200 <sup>th</sup> : harmonics 1% of UN	DC Supply Voltage Frequency Sweep Range: 50 Hz to 10 kHz Signal Level: 3 V r.m.s. max 2W	Amplitude : 2 kV line on power supply port/earth; 1 kV on I/O data control and communication ports(coupling clamp)	Amplitude: 0.5 kV, differential mode 1 kV, common mode
	Conducted Radio Frequency (Test 3.14.7 – Table 3.20/3.21)		Radiated Electromagnetic Field (Test 3.14.8)	Electrostatic Discharge (Test 3.14.9)
	Frequency range:150 kHz - 80 MHz Voltage level (e.m.f.): 3 V r.m.s. Spot frequencies: 2/3/4/6.2/8.2/12.6/16.5/18.8/22/25 MHz. Voltage level (e.m.f.):10 V r.m.s.		Frequency range: 80 MHz to 2 GHz Electric field strength: 10 V/m	Output voltage Air: 8 kV Contact: 6 kV
	Emission			
	Radiated (Test 3.14.10 - 11)			
	Enclosure Port	Frequency range	Measuring bandwidth	Limits (quasi-peak)
	EMC B All locations including bridge and open deck	0.15-0.3 MHz	9 kHz	80 - 52 dBµV/m
		0.30-30 MHz	9 kHz	52 - 34 dBµV/m
30-2000 MHz		120 kHz	54 dBµV/m	
Except: 156-165 MHz		9 kHz	24 dBµV/m	
Conducted (Test 3.14.10 - 12)				
Power Port	Frequency range	Measuring bandwidth	Limits (quasi-peak)	
EMC B All locations including bridge and open deck	10-150 kHz	200 Hz	96 – 50 dBµV	
	150-350 kHz	9 kHz	60 – 50 dBµV	
	0.35 - 30 MHz	9 kHz	50 dBµV	

### ■ Enclosure

The marine series is compliant with high waterproof and dustproof level. The front bezel complies with IP66 rating and the rear side complies with

Enclosure	Class A	Class B	Class C	Class D
Location	Control rooms, accommodation, bridge	Engine room	Open deck, masts, below floor plates in engine room	Submerged application, bilges
Minimum equipment specification	IP22	IP44	IP56	IP68

IACS E-10



International Association of Classification Societies (IACS) is an organization that provides technical support and guidance for promoting the safety of life, property and the environment through the verification of compliance with technical and engineering standards for the design, construction and life-cycle maintenance of ships, offshore units and other marine-related facilities

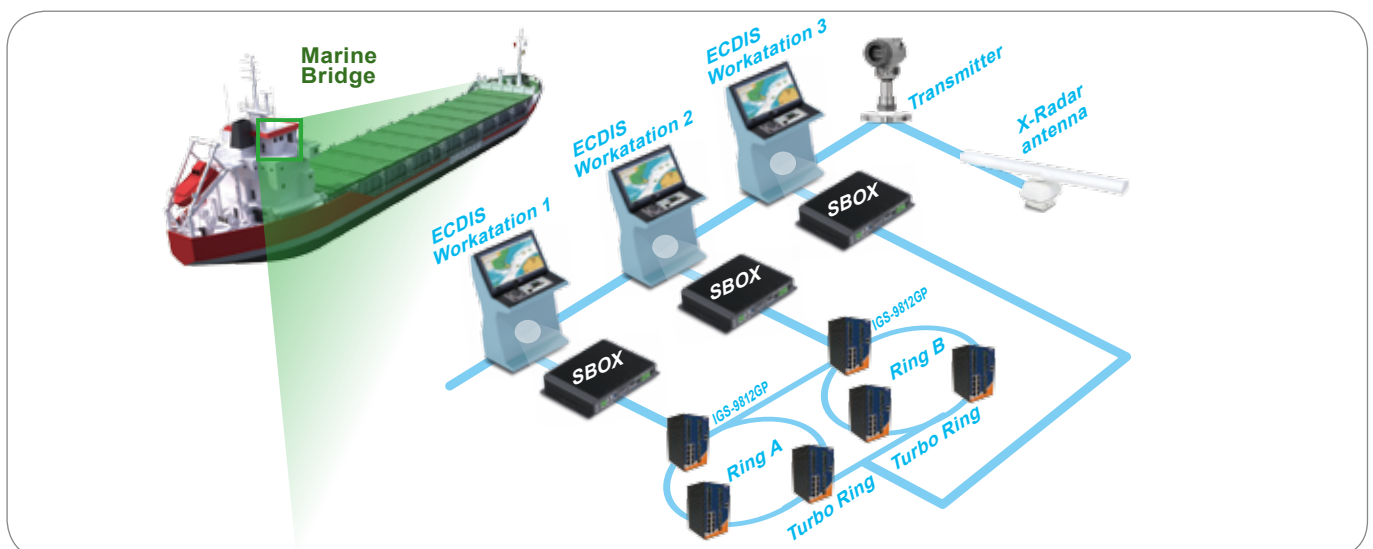
IEC 60945



Equipment wished to be use in navigation and radio communication systems has to comply with IEC Publication No. 60945, “Maritime navigation and radio communication equipment and systems – General Requirements- Method of testing and required test results.”

## • Electronic Chart Display and Information System (ECDIS)

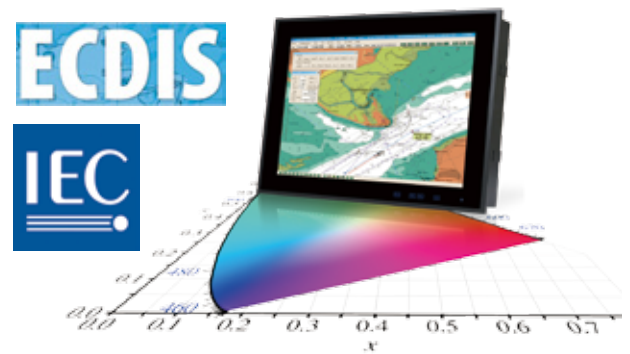
The bridge system usually needs to collect and analyze massive observation data from anemometer stations, speed logs, weather stations and GPS signal. In order to precisely observe the changing walruses, the sensors are usually located at the top of ship or in the open deck. These signals and communication paths for long distance communication should all follow specific regulation such as NEMA 0813, and the large amounts of data received at bridge should be carefully processed and precisely analyzed. A powerful and reliable embedded box or panel PC is necessary for this task. IEI marine embedded box, the SBOX series, is equipped with up to six COM ports which can be used to synchronously handle a large amount of data. A ship bridge system generally consists of many sub-systems, which include navigation system, path control system, radar system, etc. Most of them usually have dual system in order to prevent the failure of the primary system. Additionally, dual system can also display the identical information such as sea chart to the captain and pilot simultaneously. In practical application, dual or multiple LAN ports are necessary for connecting and controlling multiple monitors. The SBOX series and the S24A/S19A series contain six COM ports and two LAN ports to fulfill the requirements mentioned above.



## • ECDIS Color Calibration

For industrial and commercial applications, color rendering accuracy and consistency are absolutely essential. The human eye is generally likely to be impacted by environment and misled presentation of colors in the brain. The maritime environment is much more ruggedized compared with general industrial environment. The requirements for the degree of light and dark and color of accuracy are more stringent. Color calibration technology ensures that monitor would effectively show the largest

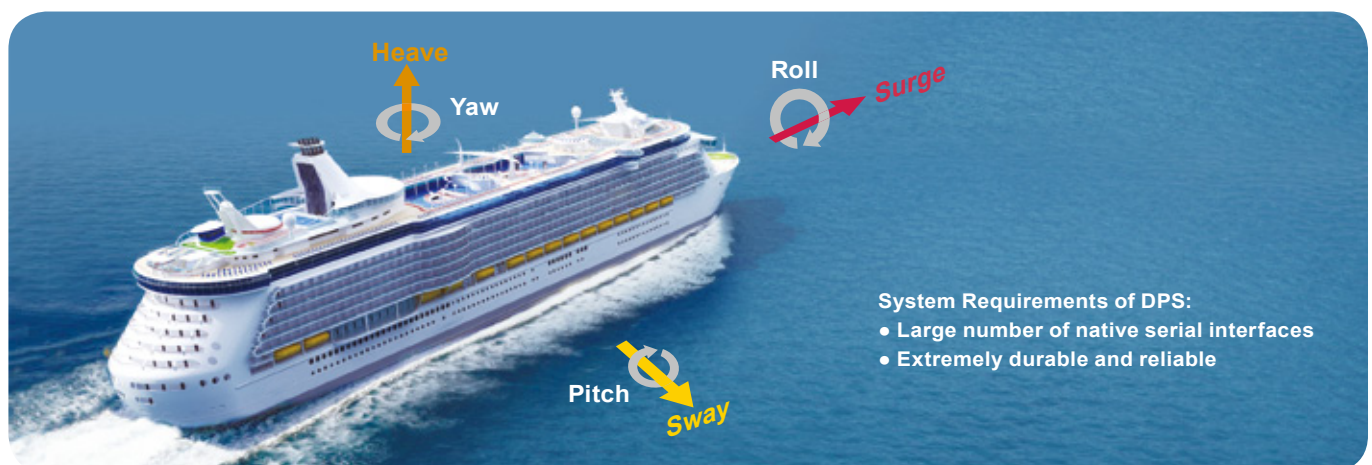
accuracy and minimum deviation of artificial color. IEI marine monitors and panel PCs follow the IEC 61174 ECDIS regulation. It is performed by monitoring up to N checkpoints and measuring the color and brightness of the display. After precisely calculating and highly reliable calibrating, the profile matrix will be stored in the firmware of monitor. The monitors (PPCs) compliant with ECDIS specifications will provide a safer and more secure maritime environment.



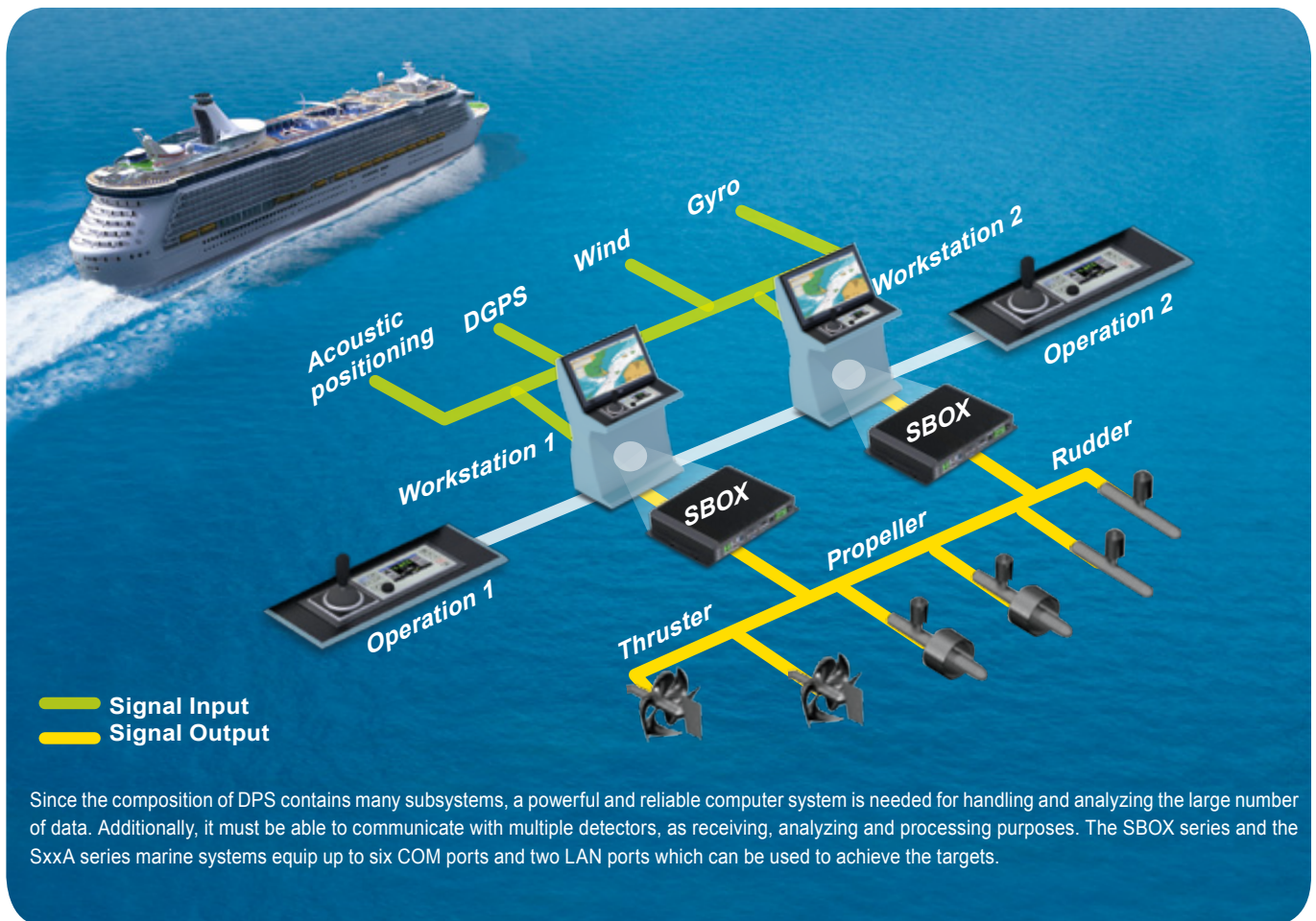
## • Dynamic Position System (DPS)

Dynamic Positioning System (DPS) is a closed-loop control system. It is driven by the control system of the ship to counteract the environmental forces, such as wind, waves and ocean currents. DPS precisely calculates the propellant force by continuously monitoring the ship position deviation and analyzing the natural forces which may affect ship’s navigation direction. This mechanism can make the ship remain and maintain in the correct position on the sea.

DPS is commonly used at various marine applications, such as subsea engineering work, underwater salvage, marine resources survey, marine engineering lifting, marine engineering umbilical laying, deep diving support, underwater engineering operations and marine engineering comprehensive test. DPS consists of measurement systems, control systems, power systems and propulsion systems, and other components. DPS has many functions which include maintaining the specified location, targeting, automatic searching for the best bow position, turning point tracking, ROV automatic tracking, changing the center of rotation, automatic navigation, parallel movement and other functions.



- System Requirements of DPS:
- Large number of native serial interfaces
  - Extremely durable and reliable



## • IEI Marine Solution

The maritime field faces critical environmental challenges, therefore the reliable and rugged systems is essential. IEI provides professional marine-grade embedded box, panel PCs and monitors with leading technologies and industrial grade materials which are perfect for applications on the dock, on the open deck, or in the control room or bridge. Considering various and complicated marine environment and real applications, IEI introduces a total solution from harbor to ship which provides customers a reliable environment.

- Fanless and front IP 66 design for marine environment
- DNV compliant isolation protection on COM and power
- Wide temperature design and flat-bezel PCAP touch
- Multiple video input and output for marine monitor
- Dual isolated AC/DC input with redundant power protection
- Remote OSD setting through LAN, RS-232, RS-422 and RS-485



RFID Sensor Tag

- Support temperature, vibration, humidity and GPS data logging
- Design for long-term data recording
- 13.56 MHz RFID, ISO15693 RF air protocol



S24A/S19A

- Fanless PPC with Intel® Core™ i5 dual-core processor
- Isolation protection for COM and power
- Compliant with DNV, IEC 60945 4th



SBOX-100

- Triple independent display: HDMI, DVI & VGA
- Wide operating temperature design
- 2 x 2.5" SSD bay with RAID 0/1 function

**Cargo      Bridge      Accommodation**



**Management Center      Bridge      Open Deck**



QNAP NAS

- Thunderbolt support
- Missing mode protection
- Smart power management



S24M/S19M

- Wide viewing angle, full range dimming
- Remote OSD control through LAN & COM
- Compliant with DNV, IEC 60945 4th



S12A

- IP67 aluminum enclosure protection
- Built-in internal wireless function
- Ambient light sensor detection

## • IEI Marine Series Features

### ■ Three Independent Displays: HDMI, DVI and VGA

The triple simultaneously independent display is supported via the on-board video output combinations of VGA, DVI and HDMI. This versatile combination of display output options makes the marine system ideal for multi-monitor required applications in the bridge.



### ■ Multiple Isolated Ports for Comprehensive Protection against Electrical Surges

Ground loop and electric surges are common in the marine applications of electronic products due to the dense placement of devices. IEI marine series provides isolation protection on COM ports and power connectors to prevent equipment damage or malfunction caused by stray electrical signals.

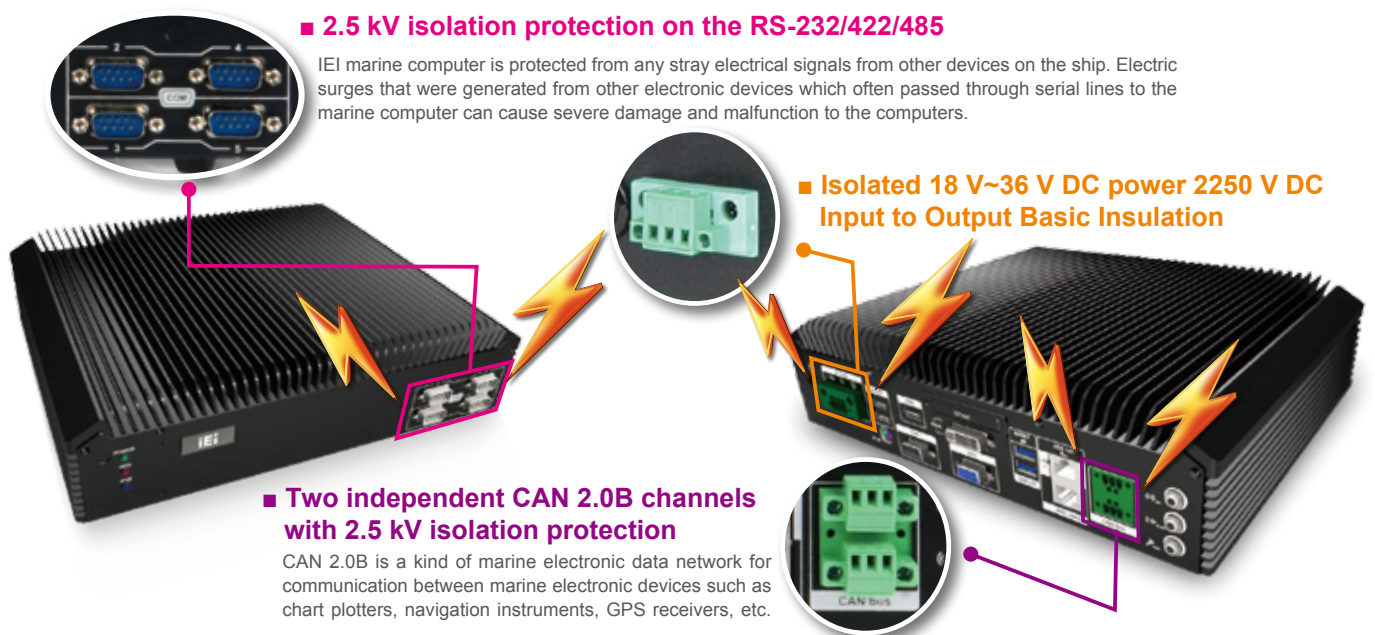
#### ■ 2.5 kV isolation protection on the RS-232/422/485

IEI marine computer is protected from any stray electrical signals from other devices on the ship. Electric surges that were generated from other electronic devices which often passed through serial lines to the marine computer can cause severe damage and malfunction to the computers.

#### ■ Isolated 18 V~36 V DC power 2250 V DC Input to Output Basic Insulation

#### ■ Two independent CAN 2.0B channels with 2.5 kV isolation protection

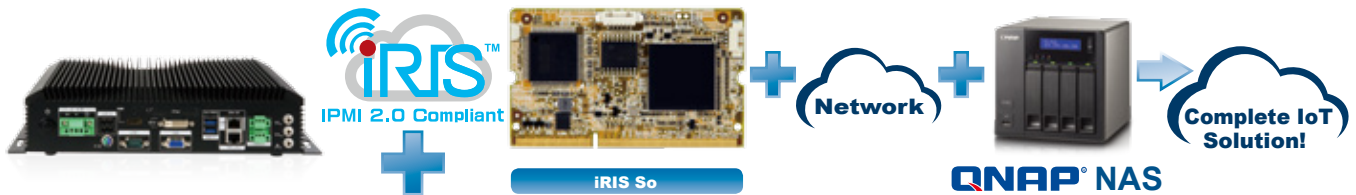
CAN 2.0B is a kind of marine electronic data network for communication between marine electronic devices such as chart plotters, navigation instruments, GPS receivers, etc.





## ■ IEI Remote Intelligent Management System

The marine computer supports IEI iRIS remote management solution which helps users to manage multiple devices through a single management interface and elevates work efficiency. The iRIS solution only requires a module and Internet connection!



## ■ Optical Bonding Enhance Visibility (Optional)

The lightness is a crucial factor to sailing safety. IEI provides an option for optical bonding between touchscreen and LCD panel. The light transmitting between various media may produce reflection. Traditionally, there is an air gap between touchscreen and LCD panel, which may reflect light seriously. It is possible to affect the sailing security tremendously. Adding optical bonding material between touchscreen and LCD panel can improve reflection effectively and increase brightness by 10%. Furthermore, it not only increases hardness of touchscreen but also reduces power consumption.

### Improving the viewing experience

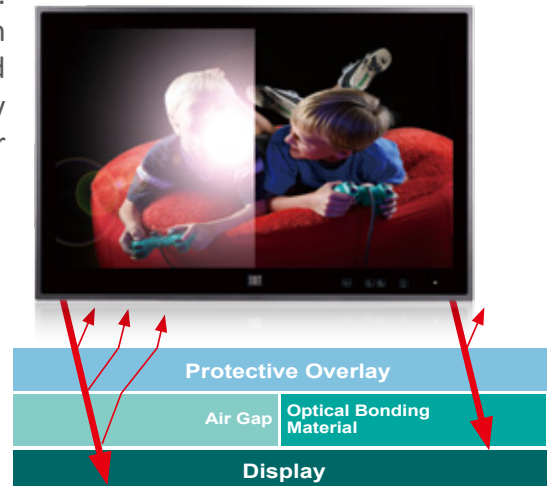
- Increase contrast ratio by 400% in sunlight
- Increase brightness by 10%

### Increasing the display ruggedness

- Increase the falling ball impact resistance by up to 3 times

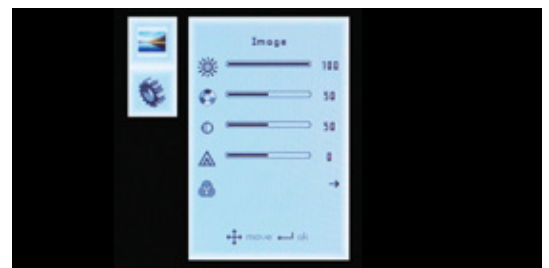
### Reduced power consumption

- By reducing the light loss due to reflection



## ■ Auto-Dimming and Adjustable LCD Brightness

The auto-dimming function can slightly modify LCD brightness according to ambient light. To consider the safety of navigation and operators' eye comfort, both LCD brightness and OSD brightness are designed to be programmable.



## ■ OSD Control on Front Panel

On Screen Display (OSD) offers customers a quick way to modify the LCD brightness. In contrary to traditional tuner, the full flat OSD design not only features beautiful outward appearance but also improves the shortcoming of dust accumulation in physical buttons.



### Picture-in-Picture (PIP) Function & Surveillance Application

Picture-in-Picture function offers high efficiency to surveillance. Users can monitor the radar information and observe surveillance video simultaneously. To do this, simply connect a BNC camera to the BNC input port and link a DVR to the BNC output port. The recorded video can also be saved for further use.



		Main Channel					
Sub Channel	VGA1	X			X	X	X
	VGA2		X		X	X	X
	DVI1	X	X		X		X
	DVI2	X	X			X	X
	CVBS1	X	X		X	X	X

### Daisy Chain OSD Remote Control

It is essential to show the same displays to captains and pilots through the monitors which are usually cascaded at the ship bridge. IEI marine monitors are equipped with both VGA input and VGA output. By connecting the VGA-out of the first monitor to the VGA-in of the second monitor, IEI marine monitors is capable to support group display with maximum up to 16 screens in the group. To comply with the ECDIS regulation, adjusting the brightness and contrast on all monitors at the same time is necessary, and this can be achieved through the Ethernet or serial COM ports. LAN is used to communicate in long distance in the group; as for short distance, COM port is the best choice. The LAN port can also be used for updating firmware and maintaining service.

