5-/8-Port 10/100/1000Mbps

Industrial Gigabit Ethernet Switch

IGS-501T / IGS-801T

User's Manual

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To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Revision

PLANET 5-/8-Port 10/100/1000Mbps Industrial Gigabit Ethernet Switch User's Manual

FOR MODELS: IGS-501T / IGS-801T

REVISION: 2.0 (FEB, 2014)

PART No: EM-IGS-501_801_v2.0 (2350-AH0100-002)

Table of Contents

1. INTRODUCTION

1.1 Package Contents

Check the contents of your package for the following parts:

- Industrial Gigabit Ethernet Switch x 1

- User's Manual x 1

- DIN Rail Kit x 1

- Wall Mount Kit x 1

If any of these are missing or damaged, please contact your dealer immediately; if possible, retain the carton including the original packing material, and use them again to repack the product in case there is a need to return it to us for repair.

1.2 How to Use This Manual

This Industrial Gigabit Ethernet Switch User Manual is structured as follows:

Chapter 2 Installation

The chapter explains the feature, functionality and the physical installation of the Industrial Gigabit Ethernet Switch.

Chapter 3 Application

The chapter explains the Industrial Gigabit Ethernet Switch application.

Chapter 4 Switch Operation

The chapter explains the Industrial Gigabit Ethernet Switch transmit operation.

Chapter 5 Troubleshooting

The chapter explains the troubleshooting of the Industrial Gigabit Ethernet Switch.

Appendix A

This chapter contains cable information of the Industrial Gigabit Ethernet Switch.

1.3 Product Features

Physical Port

- 5-Port 10/100/1000Base-T RJ-45 with auto MDI/MDI-X function (IGS-501T)
- 8-Port 10/100/1000Base-T RJ-45 with auto MDI/MDI-X function (IGS-801T)

Layer 2 Features

- Complies with IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3ab 1000Base-T Ethernet standard
- Supports auto-negotiation and 10/100Mbps half / full duplex and 1000Mbps full duplex mode
- High performance Store and Forward architecture, broadcast storm control, runt/CRC filtering eliminates erroneous packets to optimize the network bandwidth
- Prevents packet loss with back pressure (Half-Duplex) and IEEE 802.3x pause frame flow control (Full-Duplex)
- Backplane (Switching Fabric): IGS-501T: 10Gbps, IGS-801T: 16Gbps
- Integrated address look-up engine, supporting 8K absolute MAC addresses on IGS-801T
- Integrated address look-up engine, supporting 2K absolute MAC addresses on IGS-501T
- 1M bits on-chip buffer memory on IGS-501T
- 4M bits on-chip frame buffer on IGS-801T
- 9K Jumbo packet size support
- Automatic address learning and address aging
- CSMA/CD Protocol

Industrial Case / Installation

- IP30 Metal Case / Protection
- DIN Rail and Wall Mount Design
- 12 to 48V DC, redundant power with polarity reverse protect function and connective removable terminal block for master and slave power, 24V AC power support
- -40 to 75 degrees C operating temperature on IGT-501T / IGT-801T

1.4 Product Specifications

Model	IGS-501T	IGS-801T
Hardware Specifications		
10/100/1000Base-T Ports	5	8
Dimensions (W x D x H)	135mm x 87mm x 32mm	
Weight	498g	498g
Power Requirements	12~48V DC, redundant power with polarity reverse protection function, 24V AC power support	
Power Consumption / Dissipation	5.28 watts / 18BTU	11.2 watts / 38.2BTU
Installation	DIN rail kit and wall mount ear	
Switch Specifications		
Switch Processing Scheme	Store-and-Forward	
Address Table	2K	8K
Buffer	1M bits	4M bits
Flow Control	Back pressure for half duplex, IEEE 802.3x pause frame for full duplex	
Switch fabric	10Gbps	16Gbps
Throughput (packet per second)	7.4Mpps	11.9Mpps
Jumbo Frame	9K	
Network cables	10/100/1000Base-T: Cat. 3, 4, 5, 5e, 6 UTP cable (100 meters, max.) EIA/TIA-568 100-ohm STP (100 meters, max.)	
Standards Conformance		

Standards Compliance	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3ab Gigabit Ethernet IEEE 802.3x Full-Duplex Flow control
Temperature	Operating: -40~75 degrees C Storage: -40~75 degrees C
Humidity	Operating: 5% to 95%, Storage: 5% to 95% (non-condensing)
Regulation Compliance	FCC Part 15 Class A, CE

2. INSTALLATION

This section describes the functionalities of the Industrial Gigabit Ethernet Switch's components and guides how to install it on the desktop. Basic knowledge of networking is assumed. Please read this chapter completely before continuing.

In the following section, the term **"Industrial Gigabit Ethernet Switch"** means the IGT-501T / IGT-801T.

2.1 Product Description

PLANET IGT-501T / IGT-801T is 5-/8-port 10/100/1000Mbps Industrial Gigabit Ethernet Switch with non-blocking wire-speed performance and new slim type with IP30 metal shape for easy deployment in heavy industrial demanding environments.

With a 10/16Gbps internal switching fabric, the Industrial Gigabit Ethernet Switch can handle extremely large amounts of data in a secure topology linking to a backbone or high capacity servers.

The Industrial Gigabit Ethernet Switch has 2K / 8K MAC address table and offers wire-speed packets transfer performance without risk of packet loss. The Gigabit ports with 9K jumbo packet support large amounts of data transmission in a secure topology linking to a backbone or high-power servers. The high data throughput of the device makes it ideal for most Gigabit network environments.

All RJ-45 copper interfaces support 10/100/1000Mbps auto-negotiation for optimal speed detection through RJ-45 category 6, 5 or 5e cables. Support standard for Auto-MDI/MDI-X can detect the type of connection to any Ethernet device without requiring special straight or crossover cables.

The Flow Control function allows Industrial Gigabit Ethernet Switch supported routers and servers to directly connect to this device for fast, reliable data transfer.

2.1.1 Product Overview

PLANET Industrial Gigabit Ethernet Switch comes with 5/8 RJ-45 10/100/1000Mbps ports for high-speed network connectivity. The Industrial Gigabit Ethernet Switch can also automatically identify and determine the correct transmission speed and half / full duplex mode of the attached devices with its 5/8 ports. The Gigabit port with 9K jumbo frame feature supported can handle extremely large amounts of data transmission in a secure topology linking to a backbone or high-power servers.

The Industrial Gigabit Ethernet Switch also supports Store-and-Forward forwarding scheme to ensure low latency and high data integrity, eliminates unnecessary traffic and relieves congestion on critical network paths. With an intelligent address recognition algorithm, the Industrial Gigabit Ethernet Switch could recognize up to 2K / 8K different MAC address and enables filtering and forwarding at full wire speed.

2.1.2 Switch Front Panel

Figures 2-1 and 2-2 show the front panel of Industrial Gigabit Ethernet Switches.
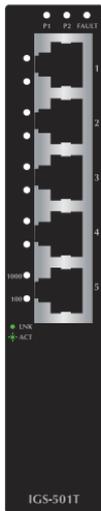
Figure 2-1: IGS-501T Front Panel   **Figure 2-2:** IGS-801T Front Panel

2.1.3 LED Indicators

LED	Color	Function
P1	Green	**Lit:** indicates power 1 has power.
P2	Green	**Lit:** indicates power 2 has power.
FAULT	Green	**Lit:** indicates either power 1 or power 2 has no power.
1000	Green	**Lit:** indicates the Switch is successfully connecting to the network at 1000Mbps. **Off:** indicates that the Switch is successfully connecting to the network at 10Mbps or 100Mbps. **Blink:** indicatse that the Switch is actively sending or receiving data over that port.
100	Green	**Lit:** indicates the Switch is successfully connecting to the network at 100Mbps or 10Mbps. **Off:** indicates that the Switch is successfully connecting to the network at 1000Mbps. **Blink:** indicates that the Switch is actively sending or receiving data over that port.

2.1.4 Switch Upper Panel

The upper panel of the Industrial Gigabit Ethernet Switch consists of one terminal block connector within two DC power inputs. Figure 2-3 shows the upper panel of the switch.

Figure 2-3 shows upper panel of Industrial Gigabit Ethernet Switch.
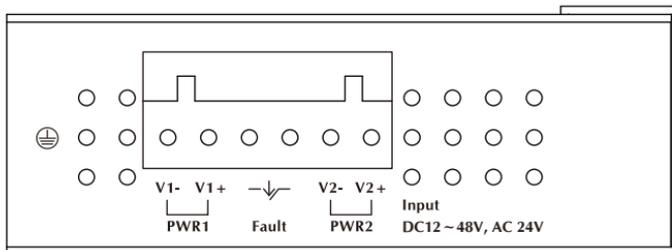

Figure 2-3: Industrial Gigabit Ethernet Switch Upper Panel

2.1.5 Wiring the Power Inputs

The 6-contact terminal block connector on the top panel of Industrial Gigabit Ethernet Switch is used for two DC redundant powers input. Please follow the steps below to insert the power wire.

1. Insert positive / negative DC power wires into contacts 1 and 2 for POWER 1, or 5 and 6 for POWER 2.
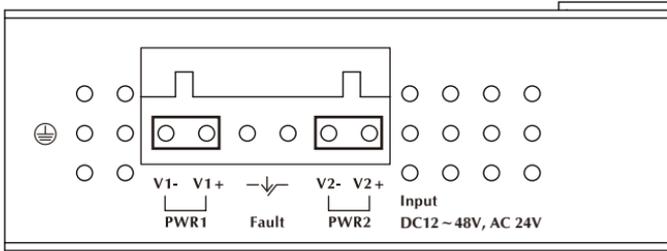
V1- V1 +   V2 - V2 +

2. Tighten the wire-clamp screws for preventing the wires from loosening.
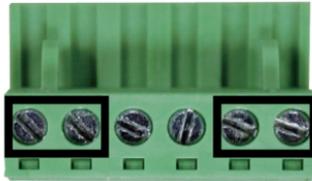
1   2   3   4   5   6
Power 1   Fault   Power 2
-    +   -   +

	The wire gauge for the terminal block should be in the range between 12 and 24 AWG.
Note	

2.1.6 Wiring the Fault Alarm Contact

The fault alarm contacts are in the middle of the terminal block connector as the picture shows below. Inserting the wires, the Industrial Gigabit Ethernet Switch will detect the fault status of the power failure, or port link failure and then forms an open circuit. The following illustration shows an application example for wiring the fault alarm contacts.
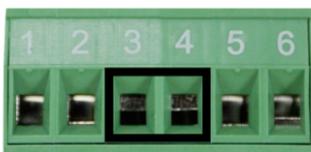
Insert the wires into the fault alarm contacts

Note	1. The wire gauge for the terminal block should be in the range between 12 and 24 AWG. 2. Alarm relay circuit accepts up to 30V, max. 3A currents.

Fault Alarm Contacts

Fault

The Fault Alarm Contacts are energized (CLOSE) for normal operation and will OPEN when failure occurs
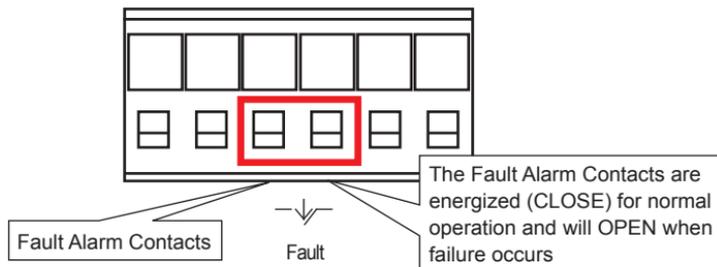
2.2 Mounting Installation

This section describes how to install the Industrial Gigabit Ethernet Switch and make connections to it. Please read the following topics and perform the procedures in the order being presented.

2.2.1 DIN-Rail Mounting

The DIN-Rail is screwed on the Industrial Gigabit Ethernet Switch when out of factory. When you need to replace the wall mount application with DIN-Rail application on Industrial Gigabit Ethernet, please refer to the following figures to screw the DIN-Rail on the Industrial Gigabit Ethernet Switch. To hang the Industrial Gigabit Ethernet Switch, follow the steps below:
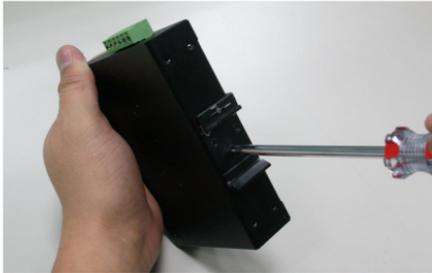
Step 1: Screw the DIN-Rail on the Industrial Gigabit Ethernet Switch.

Step 2: Place the bottom of DIN-Rail lightly into the track.

Step 3: Check whether the DIN-Rail is tightly on the track.

Step 4: Please refer to following procedures to remove the Industrial Gigabit Ethernet Switch from the track.

Step 5: Lightly pull out the bottom of DIN-Rail to remove it from the track.

2.2.2 Wall Mount Plate Mounting

To install the Industrial Gigabit Ethernet Switch on the wall, please follow the instructions described below.

Step 1: Remove the DIN-Rail from the Industrial Gigabit Ethernet Switch; loose the screws to remove the DIN-Rail.

**Step 2:** Place the wall mount plate on the rear panel of the Industrial Gigabit Ethernet Switch.

Step 3: Use the screws to screw the wall mount plate on the Industrial Gigabit Ethernet Switch.

Step 4: Use the hook holes at the corners of the wall mount plate to hang the Industrial Gigabit Ethernet Switch on the wall.

Step 5: To remove the wall mount plate, reverse the steps above.

3. APPLICATIONS

In this paragraph, we will describe how to install Industrial Gigabit Ethernet Switch and the installation points for the attention.
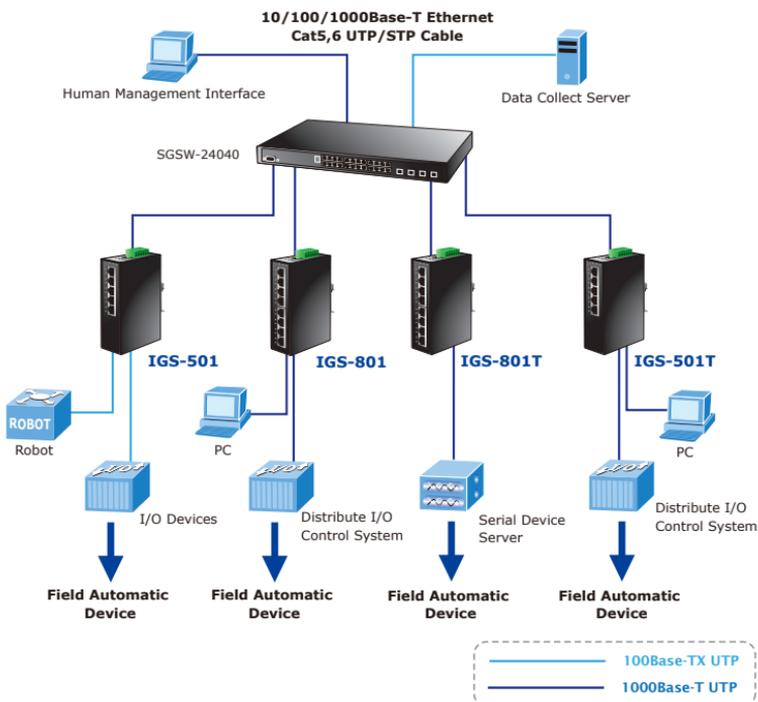
Installation Steps

Step 1: Unpack the Industrial Gigabit Ethernet Switch.

Step 2: Check whether the DIN-Rail is screwed on the Industrial Gigabit Ethernet Switch. (Please refer to DIN-Rail Mounting section for DIN-Rail installation if the DIN-Rail is not screwed on the Industrial switch). If you want to wall-mount the Industrial Gigabit Ethernet Switch, please refer to Wall Mount Plate Mounting section for wall mount plate installation.

Step 3: To hang the Industrial Gigabit Ethernet Switch on the DIN-Rail track or wall, please refer to the Mounting Installation section.

Step 4: Power on the Industrial Gigabit Ethernet Switch. (Please refer to the Wiring the Power Inputs section for power input.) The power LED on the Industrial Gigabit Ethernet Switch will light up. Please refer to the LED Indicators section for the definition of LED lights.

Step 5: Prepare the twisted-pair, straight through Category 5 cable for Ethernet connection.

Step 6: Insert one side of Category 5 cables into the Industrial Gigabit Ethernet Switch Ethernet port (RJ-45 port) and another side of category 5 cables to the network devices' Ethernet port (RJ-45 port), eg. Switch, PC or Server. The UTP port (RJ-45) LED on the Industrial Gigabit Ethernet Switch will light up when the cable is connected with the network device. Please refer to the LED Indicators section for the definition of LED light.

Note	Be sure the connected network devices support MDI/MDI-X. If it does not support then use the crossover category 5 Cable.

Step 7: When all connections are all set and all the LED lights show normally, the installation is completed.

4. SWITCH OPERATION

4.1 Address Table

The Industrial Gigabit Ethernet Switch is implemented with an address table. This address table is composed of many entries. Each entry is used to store the address information of some nodes in the network, including MAC address, port no, etc. This information comes from the learning process of Industrial Gigabit Ethernet Switch.

4.2 Learning

When one packet comes in from any port, the Industrial Gigabit Ethernet Switch will record the source address and port number, and the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

4.3 Forwarding & Filtering

When one packet comes from some ports of the Industrial Gigabit Ethernet Switch, it will also check the destination address besides the source address learning. The Industrial Gigabit Ethernet Switch will look up the address table for the destination address. If not found, this packet will be forwarded to all the other ports except the port which this packet comes in. And these ports will transmit this packet to the network it connected. If found, and the destination address is located at different ports from this packet comes in, the Industrial Gigabit Ethernet Switch will forward this packet to the port where this destination address is located according to the information from address table. But, if the destination address is located at the same port with this packet comes in, then this packet will be filtered, thereby increasing the network throughput and availability.

4.4 Store-and-Forward

Store-and-Forward is one type of packet-forwarding techniques. A Store-and Forward Industrial Gigabit Ethernet Switch stores the incoming frame in an internal buffer, do the complete error checking before transmission. Therefore, no error packets occur as it is the best choice when a network needs efficiency and stability.

The Industrial Gigabit Ethernet Switch scans the destination address from the packet-header, searches the routing table provided for the incoming port and forwards the packet, only if required. The fast forwarding makes the switch attractive for connecting servers directly to the network, thereby increasing throughput and availability. However, the switch is most commonly used to segment existing hubs, which nearly always improve the overall performance. An Ethernet Switching can be easily configured in any Ethernet network environment to significantly boost bandwidth using conventional cabling and adapters.

Due to the learning function of the Industrial Gigabit Ethernet Switch, the source address and corresponding port number of each incoming and outgoing packet are stored in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines network traffic to its respective domain, reducing the overall load on the network.

The Industrial Gigabit Ethernet Switch performs **"Store and Forward"**; therefore, no error packets occur. More reliably, it reduces the re-transmission rate. No packet loss will occur.

4.5 Auto-Negotiation

The STP ports on the Industrial Gigabit Ethernet Switch have built-in **"Auto-negotiation"**. This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detecting the modes and speeds within the second of both the devices connected and capable of. Both 10Base-T and 100Base-TX devices can connect with the port in either half- or full-duplex mode. 1000Base-T can be only connected in full-duplex mode.

5. TROUBLESHOOTING

This chapter contains information to help you solve issues. If the Industrial Gigabit Ethernet Switch is not functioning properly, make sure the Industrial Gigabit Ethernet Switch was set up according to instructions in this manual.

The per port LED is not lit

Solution:

Check the cable connection of the Industrial Gigabit Ethernet Switch.

Performance is bad

Solution:

Check the speed duplex mode of the partner device. The Industrial Gigabit Ethernet Switch is run in auto-negotiation mode and if the partner is set to half duplex, then the performance will be poor.

Per port LED is lit, but the traffic is irregular

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

Why the Industrial Gigabit Ethernet Switch doesn't connect to the network

Solution:

Check per port LED on the Industrial Gigabit Ethernet Switch. Try another port on the Industrial Gigabit Ethernet Switch. Make sure the cable is installed properly. Make sure the cable is the right type. Turn off the power. After a while, turn on the power again.

Why the Industrial Gigabit Ethernet Switch doesn't connect to the network

Solution:

Check per port LED on the Industrial Gigabit Ethernet Switch. Try another port on the Industrial Gigabit Ethernet Switch. Make sure the cable is installed properly. Make sure the cable is the right type. Turn off the power. After a while, turn on the power again.

APPENDIX A: NETWORKING CONNECTION

A.1 Switch's RJ-45 Pin Assignments

1000Mbps, 1000Base-T

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

10/100Mbps, 10/100Base-TX

RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface -Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

A.2 RJ-45 Cable Pin Assignments
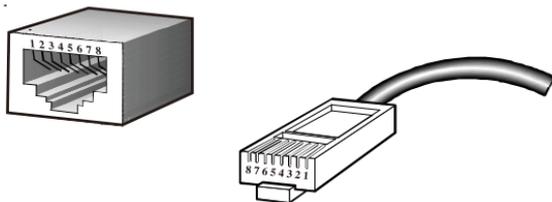
The standard RJ-45 receptacle/connector

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

Straight Cable
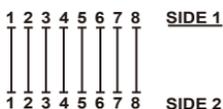
	SIDE 1	SIDE 2
1 2 3 4 5 6 7 8 **SIDE 1**	1 = White/Orange	1 = White/Orange
	2 = Orange	2 = Orange
	3 = White/Green	3 = White/Green
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
1 2 3 4 5 6 7 8 **SIDE 2**	6 = Green	6 = Green
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

Cross Over Cable

	SIDE 1	SIDE 2
1 2 3 4 5 6 7 8 **SIDE 1**	1 = White/Orange	1 = White/Green
	2 = Orange	2 = Green
	3 = White/Green	3 = White/Orange
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
1 2 3 4 5 6 7 8 **SIDE 2**	6 = Green	6 = Orange
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

Figure A-1: Straight-through and Crossover Cable

Please make sure your connected cables are with same pin assignment and color as the above picture before deploying the cables into your network.

EC Declaration of Conformity

For the following equipment:

*Type of Product	:	5/8-Port 10/100/1000Mbps Industrial Ethernet Switch
*Model Number	:	IGS-501T, IGS-801T

* Produced by:

Manufacturer's Name   : **Planet Technology Corp.**

Manufacturer's Address : 10F., No.96, Minquan Rd., Xindian Dist.,
                                     New Taipei City 231, Taiwan (R.O.C.)

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive on (2004/108/EC).
For the evaluation regarding the EMC, the following standards were applied:

EN 55022	(2010+AC: 2011)
EN 61000-3-2	(2006+A1:2009+A2:2009)
EN 61000-3-3	(2008)
EN 55024	(2010)
IEC 61000-4-2	(2009)
IEC 61000-4-3	(2006 + A1:2008 + A2 :2010)
IEC 61000-4-4	(2010)
IEC 61000-4-5	(2006)
IEC 61000-4-6	(2009)
IEC 61000-4-8	(2010)
IEC 61000-4-11	(2004)

Responsible for marking this declaration if the:

☒ **Manufacturer**   ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname   **Kent Kang**

Position / Title :   **Product Manager**

Taiwan	**21, April, 2014**	
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION