

CAN and optical fiber Hub

FEATURES



RoHS



- With 2-channel CAN interface, and two channels are isolated from the power supply, and the isolation voltage is 3000VDC
- With 2-channel optical fiber interface, the type is single-mode optical fiber, SC interface
- The CAN baud rate can be configured in the range of 5k-1Mbps
- The optical fiber baud rate can be configured in the range of 5k-800kbps
- CAN message filtering function, effectively avoiding unwanted messages from being forwarded
- The destination port for message forwarding can be set arbitrarily
- Port data throughput up to 6000fps(1Mbps and extended frame)
- Comply with CAN2.0B specification and ISO/DIS 11898 specification
- Working voltage: 9V - 36V DC (automatically change direction)
- Operating ambient temperature range: -40°C to +85°C
- Supporting 110 nodes in the same network
- Set isolation and ESD bus protection in one
- CAN ports are equipped with shielded wire ground interface
- Preset 120Ω terminal matching resistance
- With indicator lights for power supply, device status, bus activity, error indicator

TB24CFA-2 can realize transparent connection of multiple CAN networks, and multi-point connection of complex structure at bus level, so that the trunk network has no branch length limit, and any two nodes in the network can reach the protocol distance. The equipment has four communication ports, and two twisted-pair ports have independent CAN transceivers, which can double the number of nodes. Therefore, while providing a free wiring mode, it also lifts the driving limit of the maximum number of nodes of CAN transceivers on the system bus. Two optical fiber ports can make TB24CFA-2 be used in high interference field environment, especially in high voltage and power situations.

Each port of TB24CFA-2 has indicator lights for detecting bus activity and bus failure, which is convenient for observing the working status of CAN bus network. TB24CFA-2 can be used in CAN networks with a baud rate of up to 1Mbps, and all channels can work at different baud rates. TB24CFA-2 complies with CAN specification 2.0A (11-bit CAN identifier) and 2.0B (29-bit CAN identifier). It supports transparent and protocol-independent CAN message transmission, making it suitable for a variety of applications. In addition, it can be used for various high-level CAN protocols (CANOpen, SDS, J1939, DeviceNet or other customized protocols).

TB24CFA-2 can be configured with the corresponding CAN message filter, which can ensure that only the required data is transmitted to other CAN networks through the repeater. At the same time, it also has a data routing function, which can selectively forward CAN messages received from one channel to another channel. Therefore, the device can effectively reduce the load on the network. TB24CFA-2 can be configured by connecting to a PC through an asynchronous serial communication interface; it provides configuration software based on Windows system, which is simple to use and supports immediate configuration effect. After the device is configured, it can be put into work without any operation.

Selection Guide

Certification	Part No.	Power input (VDC)	CAN Baud rate (kbps)	Optical fiber Baud rate (kbps)	Static power consumption(W)	Dynamic power consumption(W)	Number of single-channel Nodes
--	TB24CFA-2	9-36	5-1000	5-800	1.3	1.5	110

Power Supply Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Power Supply Input Voltage		9	24	36	VDC
Consumption	Static power consumption	--	1.0	1.3	W

	Dynamic power consumption	--	1.3	1.5	W
Protection characteristics	Over-voltage protection, 40V; Power supply reversing automatically				
Note: *Both JP2 and JP3 are power connectors, only connect one of them.					

Transmission Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Transmission delay		--	30	300	us
POWER indicator (red)	Light on, the power status is OK; Light off, the power is not connected or the power is abnormal				
SYSTEM indicator (green)	Flashing frequency 0.5HZ, the system is working normally; Light off, the system is not working; flashing irregularly, insufficient power or abnormal interference				
ACTIVE indicator (green)	Flashing, the corresponding channel bus with data forwarding; Light off, the corresponding channel bus without data forwarding				
FAULT indicator (red)	Light on, the corresponding channel bus with an error; Light off, the corresponding channel bus without error				

CAN Interface Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Differential Level	Dominant Level (Logic 0)	$V_{diff(c)}$	1.5	2	3	VDC
	Recessive Level (Logic 1)	$V_{diff(r)}$	-0.05	0	0.05	
Bus Pin Maximum Withstand Voltage	V_x	-30	--	+30		
Load Resistance Differential	R_L	50	60	65	Ω	
Input Impedance Differential	R_{diff}	30	--	80	$k\Omega$	
Baud Rate		5	--	1000	kbps	
CAN Bus Interface	Meets ISO/DIS 11898-2 standard Twisted-pair output					

General Specifications

Item	Operating Conditions	Value
Isolation Test	Electric Strength Test for 1 minute, leakage current <1mA	3000VDC(Between CAN interface and Power interface)
Insulation Resistance	At 500VDC	1000M Ω (Between CAN interface and Power interface)
Operating Temperature		-40 $^{\circ}$ C to +85 $^{\circ}$ C
Transportation and Storage Temperature		-40 $^{\circ}$ C to +85 $^{\circ}$ C
Operating Humidity	Non-condensing	10% - 90%

Mechanical Specifications

Case Material	Metal (SPCC, surface paint process)
Dimensions	118 x 72.0 x 23mm
Weight	300g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Immunity	ESD	IEC/EN 61000-4-2 Contact $\pm 2kV$ (Bus port, FG pin is not connected to the ground)	Perf. Criteria A
		IEC/EN 61000-4-2 Contact $\pm 4kV$ (Bus port, FG pin is connected to the ground)	Perf. Criteria A
	EFT	IEC/EN 61000-4-4 $\pm 2kV$ (Bus port, without external components)	Perf. Criteria B
	Surge	IEC/EN 61000-4-5 $\pm 2kV$ (Bus port, common mode, without external components)	Perf. Criteria B

Application Precautions

1. Carefully read and follow the instructions before use; contact our technical support if you have any question;
2. Do not use the product in hazardous areas;
3. It is strictly forbidden to disassemble the product privately in order to avoid product failure or malfunction.

After-sales service

1. Factory inspection and quality control are strictly enforced before shipping any product; please contact your local representative or our technical support if you experience any abnormal operation or possible failure of the module;
2. The products have a 3-year warranty period, from the date of shipment. The product will be repaired or exchanged free of charge within the warranty period for any quality problem that occurs under normal use.

Design Reference

1. Typical application circuit

The typical application of TB24CFA-2 is shown in Figure 1. There are 2 CAN channels in total, and each CAN channel can be connected to a CAN network or a device with CAN interface.

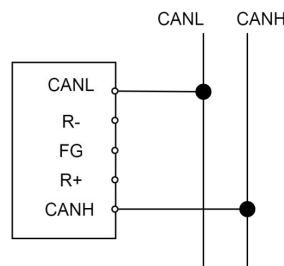


Figure 1. Typical application circuit

The pin functions of the terminal block are as follows:

Table 1. CAN bus terminal function description

Port name	Function Description
CANL	CANL signal line
R-	Terminal resistance (short-circuit with R+ to obtain 120Ω terminal matching resistance)
FG	Shield ground wire (not necessarily connected)
R+	Terminal resistance (short-circuit with R- to obtain 120Ω terminal matching resistance)
CANH	CANH signal line

According to the ISO 11898 specification, in order to reduce the signal reflection on the CAN bus and enhance the reliability of communication, terminal matching resistors are usually added to the two end points of the bus. The size of the terminal matching resistance is determined by the characteristic impedance of the transmission cable. For example, if the characteristic impedance of a twisted pair is 120Ω, the two terminals on the bus should also be connected to a 120Ω terminal resistance.

The TB24CFA-2 converter itself comes with a 120 ohm terminal resistor, and each port provides terminals R+ and R- connecting the terminal resistor. When TB24CFA-2 is at the end of the bus, you can use a wire to short-circuit the "R-" and "R+" pins, then a 120 ohm terminal resistor is connected, as shown in Figure 2:

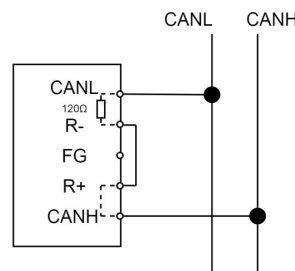


Figure 2. Built in 120Ω terminal resistor

If users use cables with impedance characteristics other than 120 Ω, they can choose appropriate terminal resistance to connect to ports A and B, as shown in Figure 3:

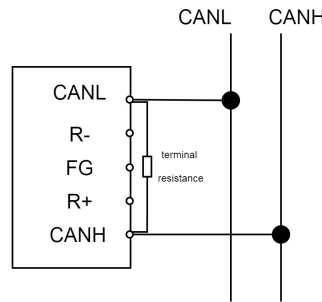


Figure 3. External terminal resistor

The two-channel optical fiber interface structure of T24CFA-2 is very simple. Each optical fiber interface has only two ports for optical fiber connection: one is the optical fiber output port (TX) and the other is the optical fiber input port (RX). As the optical fibers are point-to-point connected (several wires can't be tied together like twisted pair), each optical fiber interface of TB24CFA-2 has two connectors for connecting optical fibers, TX of optical fiber interface can only be connected to RX of another optical fiber interface through optical fiber. The specific connection method is shown in Figure 4.

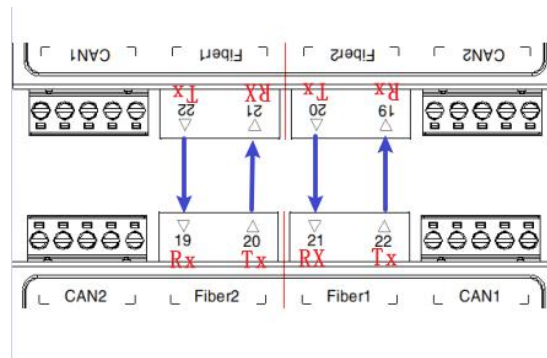


Figure 4. Connection of optical fiber

TB24CFA-2 is connected to the PC through the RS232 interface to achieve the purpose of configuring or reading the bus status. Connect the TB24CFA-2 to the PC through the RS232 cable. The setting is completed by the special configuration program running on the PC, without any hardware jumpers or switch configuration, and the configuration will take effect immediately after the completion. This port uses a DB-9 female connector. Before connecting with the PC, use an RS232 extension cable to connect the TB24CFA-2 with the PC's serial port. If you use a crossover cable, you cannot communicate. The RS232 interface on TB24CFA-2 is shown in Figure 4:

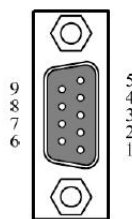


Figure 5. RS232 interface

Table 2. 232 Terminal function description

Port number	Function Description	Function description
2	TXD	Send data
3	RXD	Receive data
5	GND	Ground
1,4,6,7,8,9	NC	Invalid

2. Function configuration

2.1 Basic Information

The first tab is basic information. The general settings include some basic information of the TB24CFA-2 communication port and equipment. The operations of downloading all user-modified configurations to the device, or obtaining the current configuration and device information of the device are performed on this interface.

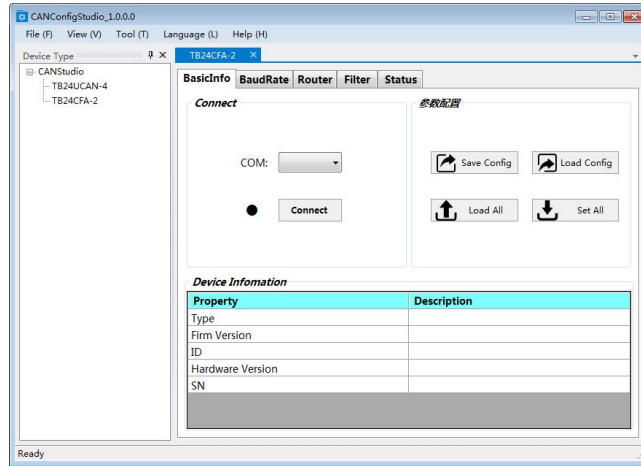


Figure 6. Basic Information

Connection port: select the communication port between the host computer and TB24CFA-2. The serial communication ports available in the system will be listed in the drop-down list of the combo box;

Read configuration: read configuration from TB24CFA-2 (including configuration of other option cards);

Write configuration: write all configurations (including the configuration of other option cards) to the TB24CFA-2 device.

2.2 Baud rate

The second tab is the baud rate setting. The user selects the baud rate of the corresponding port in this tab. If you select "Custom" in the list below, you can enter the baud rate calculated by the user in the edit box below. To calculate the baud rate of non-standard value, click "Baud rate calculation".

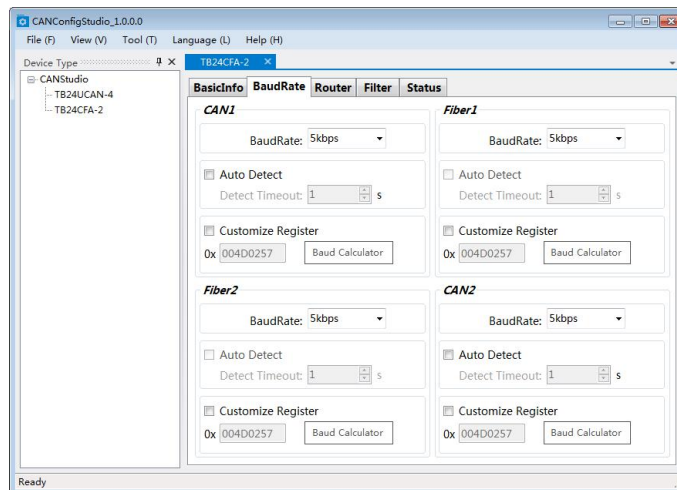


Figure 7. Baud rate

2.3 Routing function

TB24CFA-2 has a simple message routing function, which can selectively forward CAN messages received by one channel to another channel. These operations are done in the "Routing" tab. Select the radio button of the corresponding channel to forward the message to that channel.

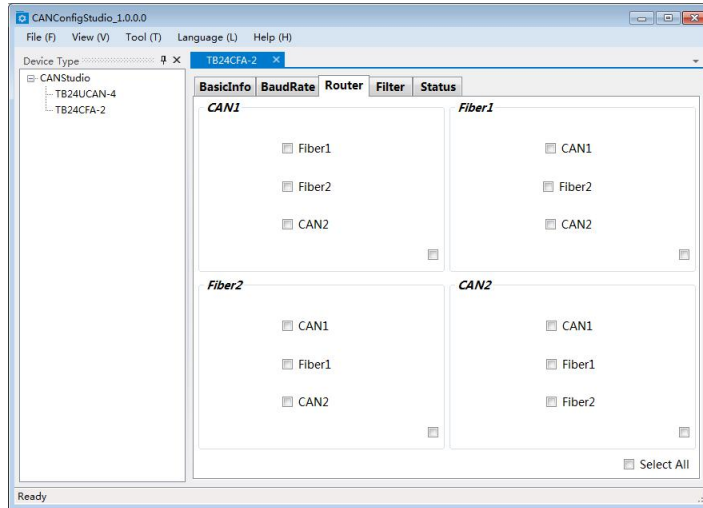


Figure 8. Routing function

2.4 Filter function

TB24CFA-2 has a powerful message filter. The filter has 56 units, which can accommodate 56 standard identifiers or 56 extended identifiers or a mixture of two types of identifiers. The 56 filters are evenly distributed to 4 CAN bus ports within the product, with each port at most it can support 14 filters. In the "Filter" tab, there are two types of filters: standard single frame format and extended single frame format. Click the corresponding button on the configuration program interface, the detailed information of the corresponding filter can be displayed in the list box below, and the content of the filter can be changed at the same time.

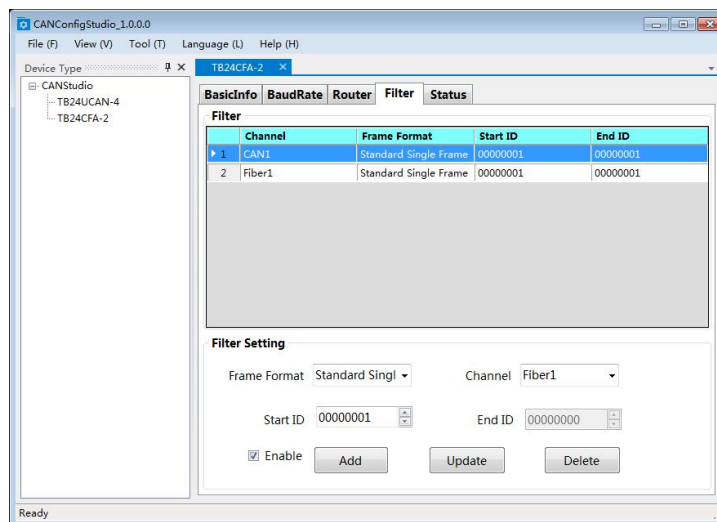


Figure 9. Filter functionn

- 1) Click "Frame Format" and select "Standard Single Frame Format" or "Extended Frame Single Frame Format";
- 2) Click the "Channel" column of the newly added filter, and select the port corresponding to the filter in the pop-up drop-down list;
- 3) Enter the identifier of the filter in the "Start ID" edit box. Such as: 00000001 (hexadecimal). Note: The standard frame identifier range is 0~2047, and the extended frame identifier range is 0~536870911;
- 4) Click "Add Filter" with the mouse to complete the steps of adding a new filter;
- 5) Repeat the above operation to add other filters;
- 6) Delete one or several filters: click the filter or filters you want to delete in the "Filter Table", and then click "Delete Filter" to complete;
- 7) After finishing adding the filter table, note that the filter operation in the filter table will take effect after configuration after the radio button before "Enable" is selected, otherwise the filter operation will not be performed.

2.5 State refresh

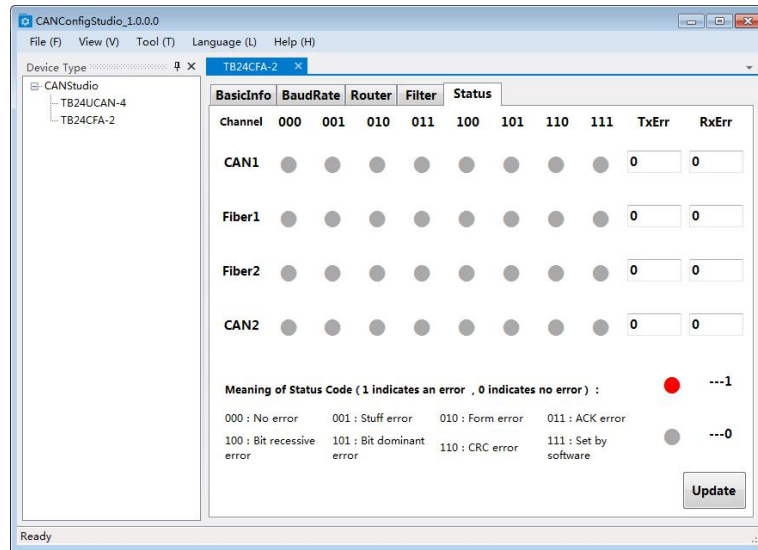


Figure 10. State refresh

The status of each channel of the TB24CFA-2 can be monitored in real time through the configuration program. Click the "Refresh" button under the "Status" tab, and the software interface can display the working conditions of each channel of the device. The meaning of the status code is listed below the status indicator for comparison and reference.

3. Indicator light

There are 10 LED indicators on the top panel of TB24CFA-2. The detailed functions are described in Table 3 below:

Table 3. LED instructions

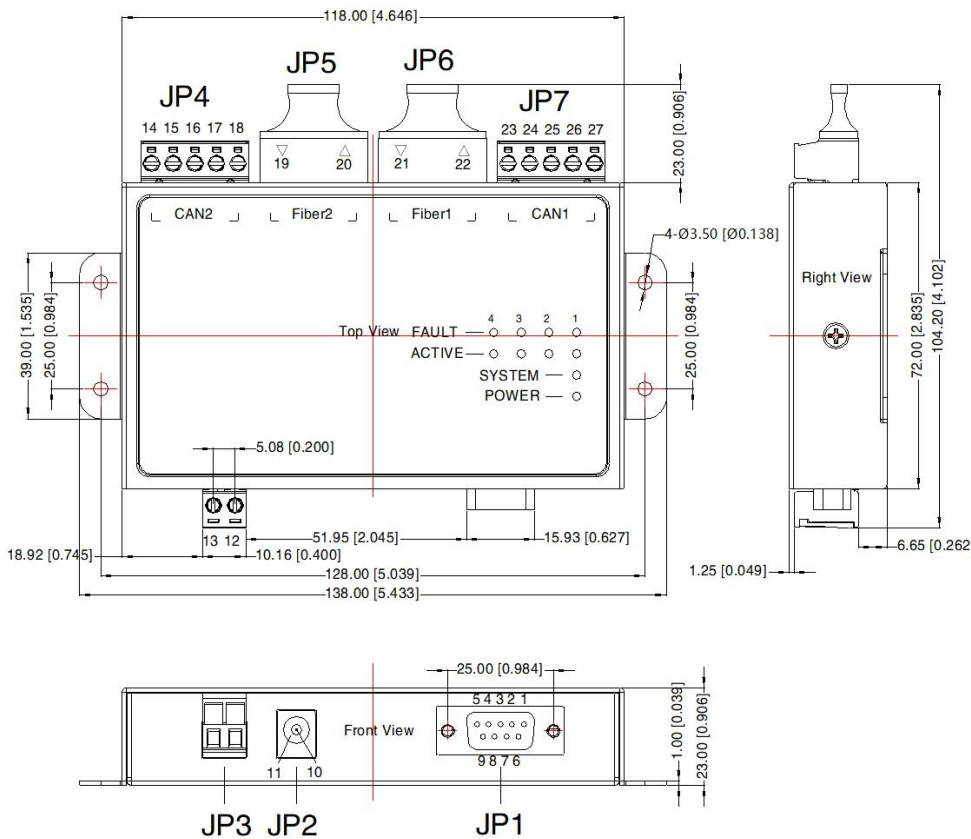
Name	Color	Status	Meaning
POWER	Red	Light up	Power status OK
		Light off	The power is not connected or the power supply is abnormal
SYSTEM	Green	0.5HZ frequency flashing	The system is working
		Light off	The system is not working
		Flicker irregularly	Insufficient power or interference causes anomalies
ACTIVE(1-4)	Green	Light up/Flashing	The corresponding channel bus is in data forwarding
		Light off	The corresponding channel bus is not in data forwarding
FAULT(1-4)	Red	Light up	No optical fiber is inserted or removed(Optical fiber only)
		Flashing	Error occurred on the corresponding channel bus
		Light off	No error occurred on the corresponding channel bus, or optical fiber is inserted

Precautions

1)TB24CFA-2 has 4 CAN ports in total, and the ports can work at different baud rates at the same time. When the receiving port rate is high and the forwarding port rate is low, it is necessary to pay attention to whether the port cache is sufficient. Each port of TB24CFA-2 has a buffer of 512 frames, which supports high-rate reception and low-rate forwarding. But when this buffer size is overflowed, the data will be overwritten.

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Connector: JP1	
Pin	Mark
1	NC
2	TXD
3	RXD
4	NC
5	GND
6	
7	
8	NC
9	

Connector: JP4	
Pin	Mark
14	CANH
15	R+
16	FG
17	R-
18	CANL

Connector: JP5	
Pin	Mark
19	Rx
20	Tx

Connector: JP2	
Pin	Mark
10	VCC+
11	VCC-

Connector: JP6	
Pin	Mark
21	Rx
22	Tx

Connector: JP3	
Pin	Mark
12	VCC-
13	VCC+

Connector: JP7	
Pin	Mark
23	CANH
24	R+
25	FG
26	R-
27	CANL

Note:

Unit: mm[inch]

General tolerances: $\pm 1.00[\pm 0.039]$

Connector:

JP1:

Type: RS232

Connector tightening torque: M3, Max 0.4N · m

JP2:

Type: DC JACK

JP3: Power interface

JP2/JP3: Built-in rectifier bridge, still work properly after the power pins are reversed.

JP3/JP4/JP7:

Wire range: 28-12AWG

Connector tightening torque: Max 0.4N · m

JP5/JP6: Fiber SC interface

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58240042;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

MORNSUN Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com