DAM-E3070D

User's Manual

Beijing ART Technology Development Co., Ltd.

DAM-E3070D Module

Features

2-ch Counter/Frequency Module

- Channels: 2-ch 32-bit counter
- Input Type: isolated or non-isolated

Isolation Channel

- Input Level:

  Logic 0: +1V (Max)

  Logic 1: +3.5V~30V

- Isolation Voltage: 3750V

Non-isolated channel: Programmable threshold

- Input Level:

  Logic 0: 0~+5V (0.8V default)

  Logic 1: 0~+5V (2.4V default)

- Maximum Count: 4,294,967,295 (32 bit)
- Programmable Digital Filter: 2 ~ 65ms
- Alarm Threshold: 2-ch counter
- Counting Pre-adjusted Value: programmable

Frequency Measurement

- Range: 1Hz~100KHz
- Built-in Programmable Threshold Time: 1.0/0.1 seconds

Digital Output

- Channels: 2-ch
- Open-collector 30V (maximum load 30mA)
- Power Consumption: 300mW
- LED Display: 5-bit, channel 0 or channel 1 programmable
- Support 10/100Mbps Ethernet
- Provide the default Web page or pages can be customized
- Support Double-watchdog
- Power Supply: unregulated +10 ~ +30 V_{DC}
- Power Consumption: 2W @ 24V_{DC}

DAM-E3070D

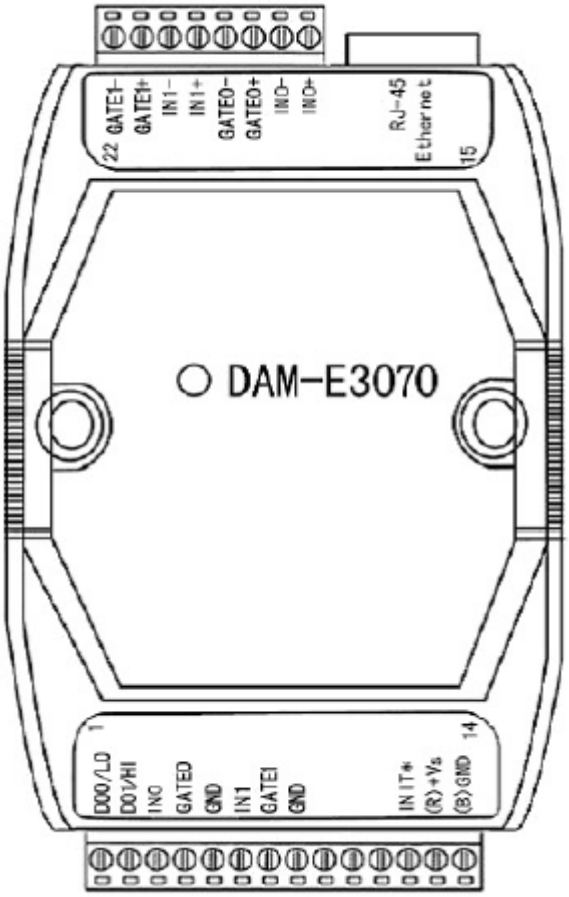

Fig.1 DAM-E3070D Drawing

Communication Protocol

At present, Ethernet Distributed Acquisition Modules of our company use MODBUS TCP mode. Supported function code includes the following categories:

01 READ COIL STATUS
02 READ INPUT STATUS
03 READ HOLDING REGISTERS
04 READ INPUT REGISTERS
05 FORCE SINGLE COIL
06 PRESET SINGLE REGISTER
15 FORCE MULTIPLE COILS
16 FORCE MULTIPLE REGISTERS
20 READ FILE RECORD
21 WRITE FILE RECORD

Address Mapping Table

Read Holding Register

Function Code: 03
Note: Read the holding register value

Data Description:

Address	Description	Note
40513	watchdog control register	bit0: 0 disabled, 1start bit1: 0 normal, 1 overflow bit2: 0 normal, 1 reset
40514	watchdog overflow register	watchdog time-out time constant
40515	watchdog reset register	0x55AA
Reservation		
40529	display format	Reservation
40530	display channel	host computer controls when the highest bit is 1
40531	the first LCD block code	D8=0 no decimal point, =1 with decimal point
40532	the second LCD block code	D8=0 no decimal point, =1 with decimal point
40533	the third LCD block code	D8=0 no decimal point, =1 with decimal point
40534	the forth LCD block code	D8=0 no decimal point, =1 with decimal point
40535	the fifth LCD block code	D8=0 no decimal point, =1 with decimal point
Reservation		
40769	counter 0 work mode	D0 = 0 count = 1 frequency D1 = 0 frequency time 0.1s, = 1 frequency time 1s
40770	counter 1 work mode	D0 = 0 count = 1 frequency D1 = 0 frequency time 0.1s, = 1 frequency time 1s
40771	counter 0 input mode	D0 = 0 non-isolated, = 1 isolated
40772	counter 1 input mode	D0 = 0 non-isolated, = 1 isolated
40773	counter 0 count/frequency enabled	D0 = 0 disabled count = 1 enabled count D1 = 0 disabled frequency, = 1 enabled frequency
40774	counter 0 count/frequency enabled	D0 = 0 disabled count = 1 enabled count D1 = 0 disabled frequency, = 1 enabled frequency
40775	counter 0 filtering enabled	D0 = 0 disabled, = 1 enabled Valid only in counting mode
40776	counter 1 filtering enabled	D0 = 0 disabled, = 1 enabled Valid only in counting mode
40777	counter 0 filter H level width	unit: 1us
40778	counter 1 filter H level width	unit: 1us
40779	counter 0 filter L level width	unit: 1us
40780	counter 1 filter L level width	unit: 1us
40781	counter Input low threshold level	unit: 0.1V, max5.0V
40782	counter Input high threshold level	unit: 0.1V, max5.0V
40783	counter 0 trigger threshold selection	D0 = 0 low level, =1 high level D1 = 0 threshold effective, = 1 threshold invalid
40784	counter 1 trigger threshold selection	D0 = 0 low level, =1 high level D1 = 0 threshold effective, = 1 threshold invalid
40785	counter 0 max low word	
40786	counter 0 max high word	
40787	counter 1 max low word	
40788	counter 1 max high word	
40789	counter 0 initial value low word	

40790	counter 0 initial value high word	
40791	counter 1 initial value low word	
40792	counter 1 initial value high word	
40793	counter 0 count low word	it is frequency value in frequency mode: only read
40794	counter 0 count high word	it is frequency value in frequency mode: only read
40795	counter 1 count low word	it is frequency value in frequency mode: only read
40796	counter 1 count high word	it is frequency value in frequency mode: only read
40797	counter 0 reset	write any non-zero number
40798	counter 1 reset	write any non-zero number
40799	counter 0 overflow status	D0 = 0 does not overflow, = 1 overflow, only read
40800	counter 1 overflow status	D0 = 0 does not overflow, = 1 overflow, only read
40801	counter alarm mode	D0 = 0 mode 0, = 1 mode 1
40802	counter 0 alarm enabled mode 0	D0 = 0 disabled, = 1 enabled
40803	counter 1 alarm enabled mode 0	D0 = 0 disabled, = 1 enabled
40804	counter 0 alarm enabled mode 1	D1D0 = 00 disabled, = 01 instant, = 10 atresia
40805	clear alarm output	only alarm mode 1 effective , write any non-zero number
40806	counter 0 upper limit alarm value low word	
40807	counter 0 upper limit alarm value high word	
40808	counter 1 upper limit alarm value low word	counter 0 upper limit alarm value low word
40809	counter1 upper limit alarm value high word	counter 0 upper limit alarm value high word
40810	alarm status	D1: D0 (D/O status) 00 = DO0 off, DO1 off 01 = DO0 on, DO1 off 10 = DO0 off, DO1 on 11 = DO0 on, DO1 on write-invalidate after counter and alarm are
40811		D1: D0 (alarm mode 0) 00 = counter 0 and 1 disabled 01 = counter 0 enabled, counter 1 disabled 10 = counter 0 disabled, counter 1 enabled 11 = counter 0 and 1 enabled D1: D0 (alarm mode 1) 00 = counter 0 disableds alarm 01 = counter 0 instant alarm 10 = counter 0 alarm latch only read
40812	overall reset counter	D0 = 0 do not reset, = 1 reset
Reservation		

Request

Domain Name	Byte	Value
Function Code	1 byte	0×03

Start Address	2 bytes	0×0000 to 0×FFFF
Read Amount	2 bytes	1 to 125 (0x7D)

Response

Domain Name	Byte	Value
Function Code	1 byte	0×03
Byte Count	1 byte	2n
Input State	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×03+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	03	Function Code	03
Start Address H（byte）	00	Byte Count	02
Start Address L（byte）	08	Holding Registers High	00
Read Amount H (byte)	00	Holding Register Low	0A
Read Amount L (byte)	01		

Note 1: The unit of the pulse output level width: millisecond
The unit of the watchdog timer length: millisecond
Note 2: When power on, the highest bit of the watchdog control register is 1, can be done to do determine whether the module is rested or not.

Single Relay Setting

Function Code: 05

Request

Domain Name	Byte	Value
Function Code	1 byte	0×05
Address Setting	2 bytes	0×0000 to 0×FFFF
Content Setting	2 bytes	0x0000 or 0xFF00 0x0000 release relay 0xFF00 engage relay

Response

Domain Name	Byte	Value
Function Code	1 byte	0x05
Address Setting	2 bytes	0x0000 to 0xFFFF
Content Setting	2 bytes	0x0000 or 0xFF00

Exception

Domain Name	Byte	Value
Function Code	1 byte	0x05+0x80
Error Code	1 byte	0x1 or 0x2

Example

Request		Response	
Domain Name	Data (hex)	Domain Name	Data (hex)
Function Code	05	Function Code	05
Set Address H（byte）	00	Set Address H（byte）	00
Set Address L（byte）	05	Set Address L（byte）	05
Set Content H (byte)	FF	Set Content H (byte)	FF
Set Content L (byte)	00	Set Content L (byte)	00

Single Holding Register Setting

Function Code: 06

MODBUS Request

Domain Name	Byte	Value
Function Code	1 byte	0×06
Address Setting	2 bytes	0×0000 to 0×FFFF
Content Setting	2 bytes	0×0000 to 0×FFFF

MODBUS Response

Domain Name	Byte	Value
Function Code	1 byte	0×06
Address Setting	2 bytes	0×0000 to 0×FFFF
Content Setting	2 bytes	0×0000 to 0×FFFF

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×06+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	06	Function Code	06
Set Address H (byte)	00	Set Address H (byte)	00
Set Address L (byte)	08	Set Address L (byte)	08
Set Content H (byte)	00	Set Content H (byte)	00
Set Content L (byte)	19	Set Content L (byte)	19

Set Multiple Relays

Function Code: 0F

Request

Domain Name	Byte	Value
Function Code	1 byte	0×0F
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0
Byte count	1 byte	n
Content Setting	n bytes	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×0F
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×0F+0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	OF	Function Code	OF
Set Address H (byte)	00	Set Address H (byte)	00
Set Address L (byte)	13	Set Address L (byte)	13
Set Amount H (byte)	00	Set Amount H (byte)	00
Set Amount L (byte)	0A	Set Amount L (byte)	0A
Byte count	02		
Set Content H (byte)	CD		
Set Content L (byte)	01		

Set Multiple Holding Registers

Function Code: 10

Request

Domain Name	Byte	Value
Function Code	1 byte	0×10
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0
Byte count	1 byte	2n
Content Setting	2n bytes	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×10
Start Address Setting	2 bytes	0×0000 to 0×FFFF
Length Setting	2 bytes	0×0000 to 0×07B0

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×10+ 0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)

Function Code	10	Function Code	10
Set Address H (byte)	00	Set Address H (byte)	00
Set Address L (byte)	01	Set Address L (byte)	01
Set Amount H (byte)	00	Set Amount H (byte)	00
Set Amount L (byte)	02	Set Amount L (byte)	02
Byte count	04		
Set Content H (byte)	00		
Set Content L (byte)	0A		
Set Content H (byte)	01		
Set Content L (byte)	02		

Read File Record

Function Code: 14/06

Read file record: in MODBUS, file is considered to be 16-bit array, addressing according to address. Read file: set the start address and read length and change the Start Address and Read Length can traverse the entire file. The file does not have a name, it has number only. You can only read and write one file at one time.

Request

Domain Name	Byte	Value
Function Code	1 byte	0×14
Byte Count	1byte	0×07 to 0×F5
Sub Function Code	1byte	0×06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Read Length	2 bytes	n
Sub Function Code	1 byte	0x06
……	……	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×14
Byte Count	1 byte	0x07 to 0xF5
Sub Function Byte Count	1 byte	0x07 to 0xF5
Sub Function Code	1 byte	0x06
Data	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×14+ 0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	14	Function Code	14

Byte Count	07	Byte Count	06
Sub Function Code	06	Respond Count	05
File Number H (byte)	00	Sub Function Code	06
File Number L (byte)	04	Record Data H(byte)	0D
Record Number H (byte)	00	Record Date L (byte)	FE
Record Number L (byte)	01	Record Data H (byte)	00
Read Length H (byte)	00	Record Date L (byte)	20
Read Length L (byte)	02		

Write File Record

Function Code: 15/06

Request

Domain Name	Byte	Value
Function Code	1 byte	0×15
Byte Count	1 byte	0×07 to 0×F5
Sub Function Code	1 byte	0×06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Read Length	2 byte s	n
Data	2n bytes	
……	……	

Response

Domain Name	Byte	Value
Function Code	1 byte	0×15
Byte Count	1 byte	0x07 to 0xF5
Sub Function Code	1 byte	0x06
File Number	2 bytes	0x0000 to 0xFFFF
Record Number	2 bytes	0x0000 to 0x270F
Write Length	2 bytes	n
Data	2n bytes	

Exception

Domain Name	Byte	Value
Function Code	1 byte	0×15+ 0×80
Error Code	1 byte	0×1 or 0×2

Example

Request		Response	
Domain Name	Data(hex)	Domain Name	Data(hex)
Function Code	15	Function Code	15
Byte Count	0B	Byte Count	0B
Sub Function Code	06	Sub Function Code	06
File Number H (byte)	00	File Number H (byte)	00
File Number L (byte)	04	File Number L (byte)	04
Record Number H (byte)	00	Record Number H (byte)	00

Record Number L (byte)	01	Record Number L (byte)	01
Read Length H (byte)	00	Write Length H (byte)	00
Read Length L (byte)	02	Write Length L (byte)	02
Write Data	4 bytes	Write Data	4 bytes

EEPROM Assignment

```
//file 0
#define MODULE_NET_ADDR                 0x0000
#define MODULE_VER_ADDR                 0x0020
//file 1
#define NET_CONFIG_ADDR                 0x0000
//file 2
#define CNT_CFG_ADDR                    0x0080
//file3 to file 7
……
```

Note:

EEPROM is 8kbyte capacity，divide to 8 file blocks, every block 1kbyte。

1. MODULE_NET_ADDR

Restore to factory defaults network configuration parameter.

Byte	4	4	4	6
Content	IP Address	Default Gateway	Subnet Mask	MAC Address

2. MODULE_VER_ADDR

Module Version Information:

Byte	42byte
Content	DAM-E3070D V6.20 2006.09.01 ID:DAME123456

3. NET_CONFIG_ADDR

Network configuration parameter, call table 1 for structures.

4. CNT_CFG_ADDR

Counter power default configuration, a total of 62 bytes.

In turn saved registers:
40769, 40770, 40771, 40772, 40775, 40776, 40777, 40778, 40779, 40780, 40781, 40782, 40783, 40784, 40785, 40786, 40787, 40788, 40789, 40790, 40791, 40792, 40801, 40802, 40803, 40804, 40806, 40807, 40808, 40809, 40810