

Development Guide for DCT_100B Basic I/O Board V1.0

May,2013

Amp Display Inc.

Index

1 GENERAL INFORMATION	2
2 VARIABLE MEMORY	3
3 SCHEMATICS	4
4 BASIC HARDWARE SPEC.....	5
5 DATA COMMUNICATION	6
6 INSTALLATION:.....	8
7 DIMENSIONS	9
8 REVISION HISTORY	10

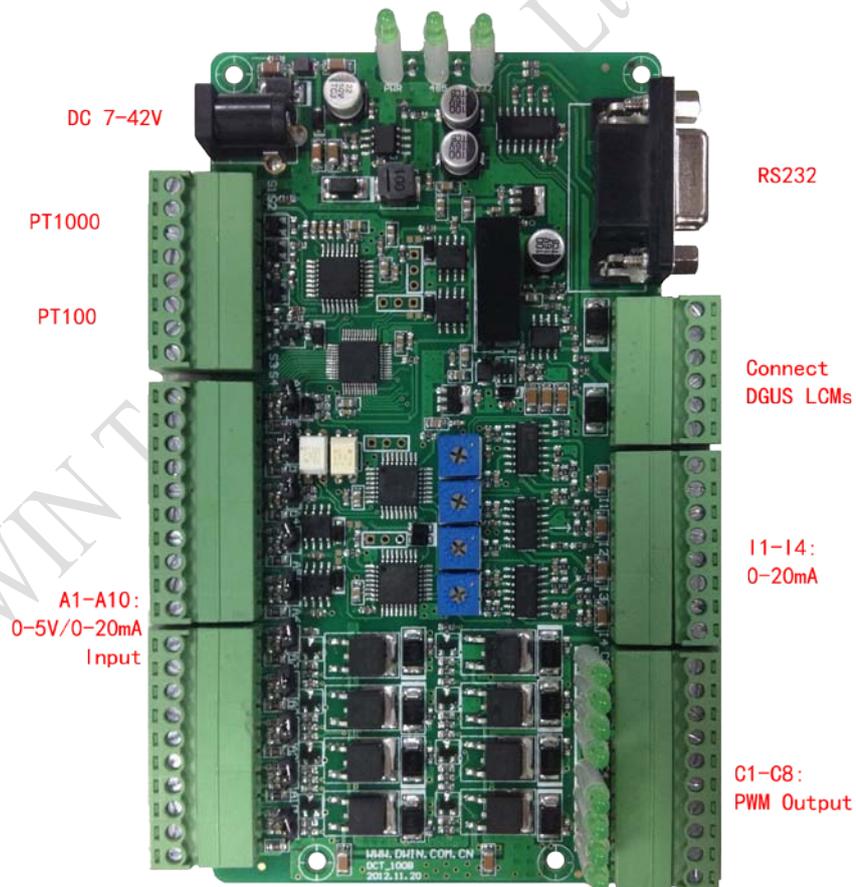


1 General Information

DCT_100B I/O extension Device is designed for expand the functionalities of DGUS LCM. Seamless working with host device -DGUS LCM, a mid-small industrial automation system which is highly reliable and high cost effective can be easily built-up.

The features of DCT_100B:

- Build-In DC/DC, support DC7-42V wide input voltage.
- 2 ways for PT1000 input, 2 ways for PT100 input.
- 10 ways of 0-5V or 0-20mA non-isolated analog input measurement, the tolerance is +/-1mV.
- 8 ways of non-isolated, 16bit PWM output, max output current can be 1A for single way.
- 4 ways of 0-20mA output.
- 1 RS232 port with fixed baud rate 115200bps.
- 1 RS485 port with baud rate can be set from 2400-115200bps.
- 100% compatible with DGUS LCMs.
- 8 16bits software timer, 4 32bit software timer, 4 32bit clock in BCD code.
- LEDs indicates the working status for Power, communication and PWM output.
- Use 3.81mm contact to connect with peripherals.
- Working temperature:-40/+85°C.
- Use Rails to install.



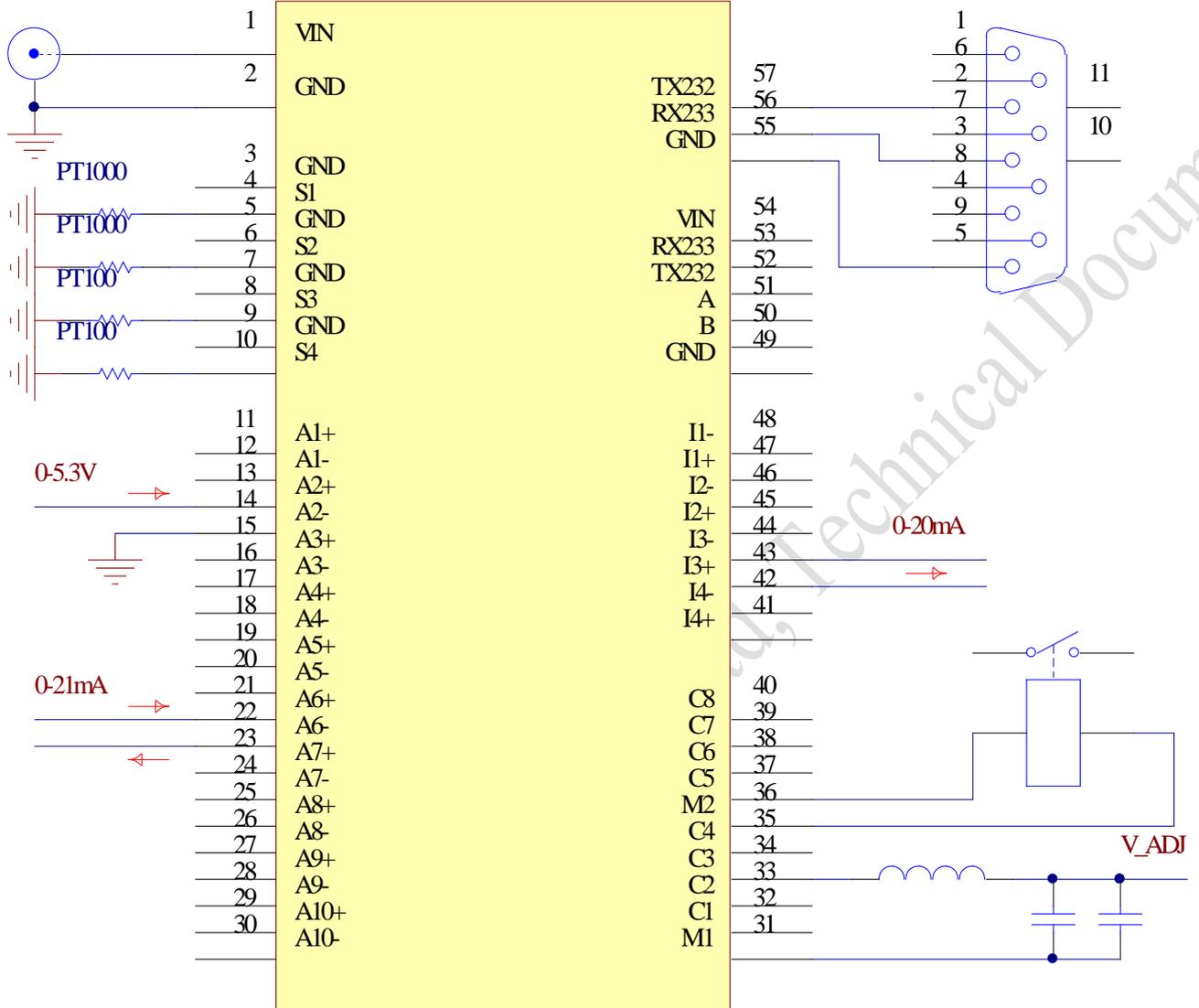
2 Variable Memory

Every DCT_100B will take 64 words to store the device properties. When DGUS LCM is connected with it, DGUS LCM will allocate 64 words in the memory for mapping the variables in DCT_100B correspondingly.

Type	Variable Add.		Length (Bytes)	Definition	Description
	DCT_100B	DGUS			
I/O	0x00	0x00	16	Model, version and I/O	DCT_100B V1.0 1412 Note: 1412=14AI, 12AO
AI	0x10	0x08	2	Data collected in S1 channel from PT1000	Use BCD Code, 1 decimal, highest bit is signed/unsigned. If returned value is 0x8233, indicated the temperature is -23.3°C. This value can be calibrated by 0x8E via RS232.
	0x12	0x09	2	Data collected in S2 channel from PT1000	
	0x14	0x0A	2	Data collected in S3 channel from PT100	
	0x16	0x0B	2	Data collected in S4 channel from PT100	
	0x18	0x0C	2	Input voltage for channel A1	Input Voltage: 0-5.3V Input Current: 0-21mA Enable build-in resistant of 249±1% Ohm if jumper is shortened. Precision: ±1mV, can be calibrated by 0x8E via RS232.
	0x1A	0x0D	2	Input voltage for channel A2	
	0x1C	0x0E	2	Input voltage for channel A3	
	0x1E	0x0F	2	Input voltage for channel A4	
	0x20	0x10	2	Input voltage for channel A5	
	0x22	0x11	2	Input voltage for channel A6	
	0x24	0x12	2	Input voltage for channel A7	
	0x26	0x13	2	Input voltage for channel A8	
	0x28	0x14	2	Input voltage for channel A9	
0x2A	0x15	2	Input voltage for channel A10		
AO	0x34	0x1A	2	Output current for I1,0-20mA	Last 2 bits indicates the decimal numbers. For example: 0x320 indicates 8.00mA output.
	0x36	0x1B	2	Output current for I2,0-20mA	
	0x38	0x1C	2	Output current for I3,0-20mA	
	0x3A	0x1D	2	Output current for I4,0-20mA	16bit PWM output, 0x8000 is GND, 0x0000 is 1/2 power, 0x7FFF is full power. Frequency for PWM is 732Hz, max current for single connection is 1A. Brightness of output LED indicates the voltage.
	0x3C	0x1E	2	PWM output for C1 channel	
	0x3E	0x1F	2	PWM output for C2 channel	
	0x40	0x20	2	PWM output for C3 channel	
	0x42	0x21	2	PWM output for C4 channel	
	0x44	0x22	2	PWM output for C5 channel	
	0x46	0x23	2	PWM output for C6 channel	
	0x48	0x24	2	PWM output for C7 channel	
0x4A	0x25	2	PWM output for C8 channel		
Timer	0x4C	0x26	2	Timer0	16bit software timer: Time unit is 1ms, max time is 65.335 seconds. Count down will be stopped if 0.
	0x4E	0x27	2	Timer1	
	0x50	0x28	2	Timer2	
	0x52	0x29	2	Timer3	
	0x54	0x2A	2	Timer4	
	0x56	0x2B	2	Timer5	
	0x58	0x2C	2	Timer6	
	0x5A	0x2D	2	Timer7	32bit software timer: Time unit is 1ms, max time is 4294967.298 seconds. Count down will be stopped if 0.
	0x5C	0x2E	4	Timer8	
	0x60	0x30	4	Timer9	
	0x64	0x32	4	Timer10	
	0x68	0x34	4	Timer11	Clock timer: Hours: Minute: Second, Millisecond in BCD code Count down will stop at 00:00:00:00
	0x6C	0x36	4	Timer12	
	0x70	0x38	4	Timer13	
	0x74	0x3A	4	Timer14	
0x78	0x3C	4	Timer15	Clock timer: Hours: Minute: Second, Millisecond in BCD code Counting will stop at 99:59:59:99	
Reserved	0x7C	0x3E	4	Not defined	

Note: During the storage and transmission, all the data are sent by MSB.

3 Schematics



4 Basic Hardware Spec.

Type	Parameters	Test Condition	Min	Type	Max	Unit
Power Supply	Voltage		7	24	42	V
	Current	24V, input and output is floating		10		mA
AI(S1-S2)	Measuring range		-50		130	°C
	Measuring tolerance		-0.8	0	0.8	Ω
AI(S3-S4)	Measuring range		-50		130	°C
	Measuring tolerance		-0.08	0	0.08	Ω
AI (A1-A10)	Input Voltage	Jumper is open circuit, measure the voltage.	0		5.3	V
	Input Impedance			85		KΩ
	Input Current	Jumper is open circuit, measure the voltage.	0		21	mA
	Input Impedance		248	249	250	Ω
	Resolution			1		mV
	Measurement	2.500V input	-1	0	+1	mV
	Cut-off frequency of DGUS			2.5		Hz
AO (C1-C8)	Frequency of PWM	Output is set to 0x0000, the duty ratio is 50%		732		Hz
	Resolution of PWM			16		bit
	Output range of PWM	Power voltage is 24V, no load	0		24	V
	Load current of PWM	Power voltage is 24V, pure resistor load	0	1	2	A
AO(I1-I4)	Output range		0		20	mA
	Output tolerance		-0.1	0	0.1	mA
RS485	Baud Rate	N81 mode, can be set via RS232	2.4	115.2	115.2	Kbps
	Load capacity of BUS				64	
RS232	Baud Rate			115.2		Kbps
Environment Parameter	Operating Temperature		-40	25	85	°C
	Storage Temperature		-55	25	85	°C
	Operating Humidity	25	10%		90%	RH

5 Data Communication

5.1 RS232 Interface

Serial connection properties:

115200bps, N81 (1 starting bit, 8 Data bits, 1 stop bit, No parity bit)

Data frame

Address	0x00	0x02	0x03	0x04	0x05
Def.	0x5AA5	Length	Command	0x00	DATA_Pack
Spec.	Frame head	Data length	Cmd		Data_pack
E.g.	0x5AA5	0x04	0x82	0x00	0x08 0x01

Instructions:

- 0x80: Configure properties of RS485 interface

TX: 5A A5 07 80 00 **ADR485** **BODE_485** **ACK_ADR_START** **ACK_ADR_END**

RX: None

E.g: 5A A5 07 80 00 **0001** **07** **08** **21**

ADR485: RS485 address, 0x0001-0xFFFF. 0x0001 is factory default value;

BODE_485: Baud Rate for RS485, 0x00-0x0F. Default value is 0x07. Please refer to the chart below.

Bode_485	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
Baud Rate	2400	2400	4800	9600	19200	38400	57600	115200
Bode_485	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
Baud Rate	28800	76800	62500	125000	250000	230400	345600	691200

ACK_ADR_START: Start address of the register for auto reply by RS485. Value is 0x00-0x3F

ACK_ADR_END: Final address of the register for auto reply by RS485. Value is 0x00-0x3F

- 0x81: Read the properties of RS485 interface

TX: 5A A5 03 81 00 05

RX: 5A A5 07 81 00 ADR485 BODE_485 ACK_ADR_START ACK_ADR_END

- 0x82: Read from memory

TX: 5A A5 04 82 00 ADR(0x00-0x3F) RD_LEN

RX: 5A A5 LEN 82 00 ADR DATA

ADR: Start address (Word) of variable memory to be read in DCT_100B.

RD_LEN: The length of the info to be read.

Note: 0x82 command will clear the contents from memory after reading it.

- 0x83: Write in memory

TX: 5A A5 LEN 83 00 ADR(0x1D-0x3F) WR_LEN DATA

RX: None

ADR: Start address (Word) of variable memory to be changed in DCT_100B.

WR_LEN: The length of the info to be written.

DATA: The contents to be written.

5.2 RS485 Interface

Serial Connection properties

Baud Rate can be set from 2400bps – 691.2Kbps via RS232. Transmit in N81 mode: 1 starting bit, 8 data bits, 1 stop bit, no parity bit)

Data frame

Addr.	0x00	0x02	0x03	0x04	0x05
Def.	0x5AA5	Length	Command	DATA_Pack	CRC16
Spec	Frame head	Data length	Cmd	Data	ECC
E.g.	0x5AA5	0x03	0x8F		0xFEE4

CRC16 is the CRC sum in ANSI, X16+X15+X2+1 for instructions and data.

Instructions

- 0x83: Write contents in memory via RS485

TX: 5AA5 LEN 83 **ADR_DGUS** **LEN_DATA** **DATA** **CRC**,

RX: None

E.g.5AA5 10 83 **005D** **05** **FF FF FF FF FF FF FF FF** **00 00** **25AE**

ADR_DGUS: Starting address of DGUS data variable memory which is mapped from DCT_100B memory, every DCT_100B will be assigned 64 words (128KB) according to the RS485 address.

ADR_DGUS=ADR485*64+DCT_100B starting address

LEN_DATA: Length of the contents to be written in Word

DATA: data to be written.

- 0x8F: Signal for reading request in RS485

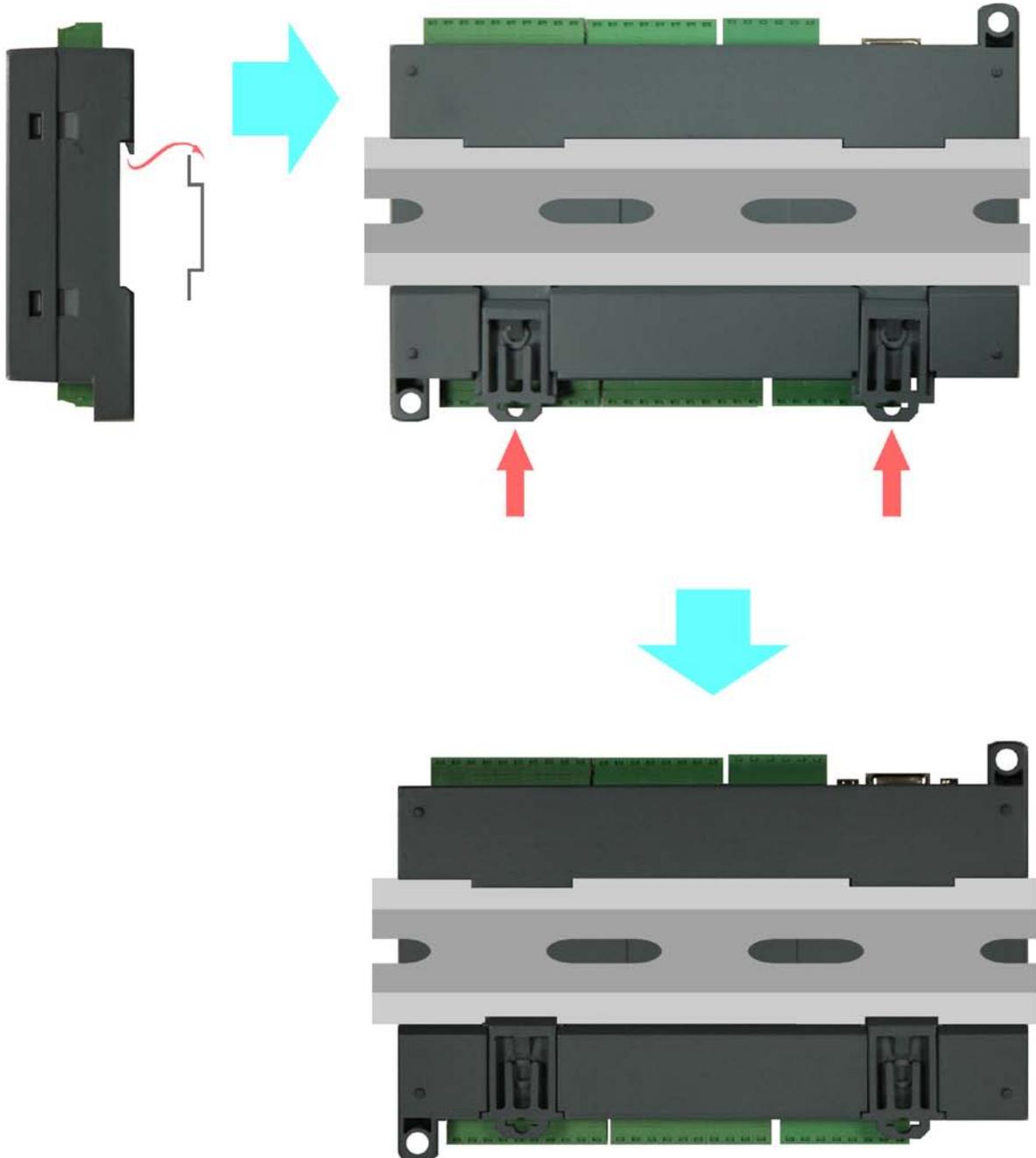
TX: 5AA5 03 8F FE E4

RX: 5AA5 LEN 82 ADR_DGUS DATA CRC

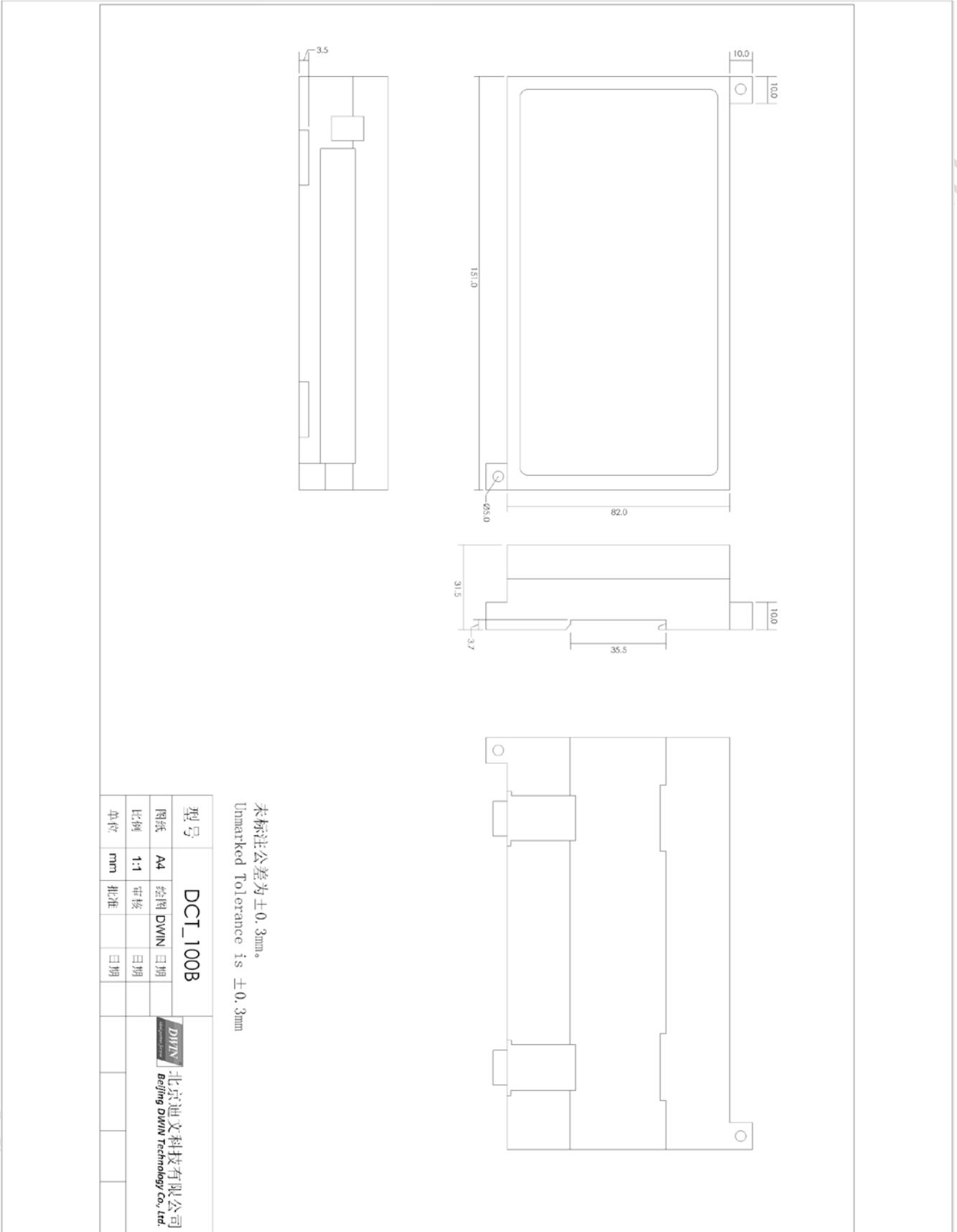
To avoid data collision, all devices on RS485 will answer 0x8F command by Timing, the range of acknowledged data will be decided by ACK_ADR_START and ACK_ADR_END set by 0x80 command via RS232.

6 Installation:

DCT_100B use rails to install as the diagram below:



7 Dimensions



8 Revision History

Data	Contents	Version
2012.12.11	Initial released	V1.0

If you have any doubts, suggestions, or want the latest update for our industrial automation products, please contact us :

info@ampdisplay.com

Thank you and your support will motivate us for further improvements!