

CM-028 Data Communications



- 7 wired communication & 7 wireless communication training equipment to learn wired/wireless communication technology in a server-client structure
- Connected to peripheral device control such as light sensor, temperature /humidity sensor to induce interest in communication experiments
- Oscilloscope for intuitive analysis of communication data
- Experiments for RS232, RS422, and RS485, the basic serial communication interface
- Experiments for USB, CAN, and Ethernet, the high speed serial communication interface
- Experiments NFC communication of 13.56MHz band, a short-range wireless communication interface
- Experiments for RF communication in 433MHz frequency band
- Experiments for ZigBee, LoRa, Bluetooth that are short-range low-power wireless communication interfaces
- Experiments for Wi-fi based P2P communication, the short range wireless communication interface
- Experiments for IrDA communication, the home appliance control communication interface
- Experiments for optical communication, which is the optical fiber-based communication interface

Software Specification

LIST	Specification
Controller Dashboard with Server-Client Mode Monitoring	Basic Peripheral RS232 Data Block, RS422 Data Block, RS485 Data Block, IrDA Data Block, RF433 Data Block, Wi-Fi Data Block, Ethernet Data Block, ZigBee Data Block, LoRA Data Block, Bluetooth Data Block, USB Data Block, CAN Data Block, NFC Data Block, Optical Data Block
Oscilloscope software	Frequency, Voltage, Cursor Settings Measurements

Hardware Specification

	LIST	Specification
Main Board	Size	Base : 314 X 246, Module : 121 X 70
	Text LCD	Display : 2 Lines 16 Interface : I ² C
	DOT MATRIX 2EA	Size : 1.8inch, 8x8 Interface : 3 wire Serial Interface
	SEVEN SEGMENT (2Digits x 2EA)	Size : 1.2inch Type : Common Anode Interface : I ² C
	RGB LED	Size : 10pi Wavelength : RED(630 nm), GREEN(525 nm), BLUE(430 nm) Interface : GPIO
	SERVO MOTOR	working speed : 0.12sec/60 (4.8V no load) Interface : I ² C
	TEMPERATURE	Accuracy : ± 4°C Resolution : 14bit(0.01C), 12bit(0.04C) Interface : I ² C
	HUMIDITY	Resolution : 12bit(0.04%RH), 8bit(0.7%RH) Accuracy : ± 3%RH Interface : I ² C
	BUZZER	Sound Output at 10cm(dB) : Min85dB Interface : GPIO
	Light Sensor	Illuminance Value : 0.1 ~ 40,000(Lux) Interface : Analog to I ² C
	Distance Measuring Sensor	Detecting distance : 2~40cm Interface : Analog to I ² C
	Status Display	Display : 2 Lines 16 Text Interface : I ² C
	Module Select Switch	Tact Switch 3EA Interface : GPIO
	Oscilloscope	Using PC Software (USB Cable connected), View : AC / DC Control Sampling Speed : 20kHz ~ 60MHz 1ch 14 step/ 2ch 11 step, 1ch up to 60Msps(2ch up to 30Msps) Voltage Range : +25V ~ -25V Voltage Division : 0.02V ~ 5V / 8 step, Impedance : 1MΩ, Capacitance : 20pF Measure : Frequency, Vmax, Vmin, Vp-p, Vmean, Cursor Measurements

LIST		Specification
Power		Input : AC 220V Output : 5V/3A
RS232/ RS422/485 Module 2EA	RS232	500Kbps Data Rate Under Load Operation mode : Single Ended Speed : 115200bps(max) Voltage level : -25V ~ +25V(max voltage)
	RS422	4-wire standard EIA RS422 communication Operation mode : Full-duplex differential Transceiver/Receiver Speed : 115200bps(max) Voltage level : -6V ~ +6V(max voltage)
	RS485	2-wire standard EIA RS485 communication Operation mode : Half-duplex differential Transceiver/Receiver Speed : 115200bps(max) Voltage level : -6V ~ +6V(max voltage)
IrDA/RF433 Module 2EA	IrDA Transmitter	Output radiant intensity : $\pm 24^\circ$ Emission Wavelength : 880 ~ 900(nm) Spectral bandwidth : 45nm
	IrDA Receiver	Minimum irradiance in angular range : $0^\circ \sim 15^\circ$ (20mW/m ²) RXD pulse width : Input pulse length > 1.2uS
	RF433	RF data rate : 600 ~ 4800(bps) Used channel per frequency range 424MHz band: 21ch(max) 447MHz band: 25ch(max) Output Power : 10dBm(max) Rx sensitivity : -118dBm Antenna Impedance : 50Ohm
Wi-Fi/ Ethernet Module 2EA	Wi-Fi	Protocol stack : TCP/IP Protocol stack Mode : station/softAP/softAP+station Security : WPA/WPA2 Encryption : WEP/TKIP/AES Deep sleep power < 10uA wake up and transmit packet in < 2ms Output Power : +20dBm (802.11b mode)
	Ethernet	Interface : USB Connector : USB Type A, RJ-45 Speed : 1000Mbps
ZigBee/LoRA/ Optical Module 2EA	ZigBee	Indoor : up to 30m Outdoor line-of-sight : up to 100m Transmit Power : 1mW(0dBm) Receiver sensitivity : -92dBm RF Data Rate : 250,000bps Operating Frequency : ISM 2.4 GHz Supported Network Topologies : Point-to-point, Point-to-multipoint & Peer-to-peer
	LoRA	Support IEEE802.15.4(e)MAC Support 6LoWPAN, IPv6, RPL, UDP, CoAP Frequency Band : 902 ~ 958MHz Data Rate : 0.3Kbps ~ 150kbps Output Power : 0dBm to 14dBm single-ended PA : MAX 20dBm
	Optical	820nm wavelength technology Signal rates up to 160 MBd Optical jumper Code : 1EA
Bluetooth/ Bluetooth Audio Module 2EA	Bluetooth	Bluetooth version : V2.0+EDR Frequency : 2.4GHz Output power : +4dBm Sensitivity : -80dBm Speed: Asynchronous 2.1Mbps(max)/160 Kbps, Synchronous : 1Mbps/1Mbps Profiles : SPP
	Bluetooth Audio	Bluetooth version : V4.1 Audio Codec : 20bit DAC and 16bit ADC codec. 98dB SNR DAC playback Output power : class2 / +4dBm max Frequency range : 2.4GHz to 2.48GHz Receive Sensitivity : 91dBm(2Mbps EDR) Data rate : 2Mb/s range : >10m(free space and no interference) Antenna : Printed Antenna
USB/CAN Module 2EA	USB	USB2.0 compliant full speed HID Interface Driver support : Windows10 32, 64bit. Windows7 32, 64bit. Windows XP Data transfer rate : 1.2k to 12Mbaud(RS232)
	CAN	CAN V2.0B at 1Mb/s Compatible ISO 11898 standard Data rate : up to 1Mbaud
NFC Module		ISO/IEC 14443A/MIFARE Reader/Writer Frequency : 13.56MHz Interface : UART 14443A Card 1EA

Training Contents



Wired Communication

- RS232
- RS422
- RS485
- USB
- CAN
- Ethernet
- Optical

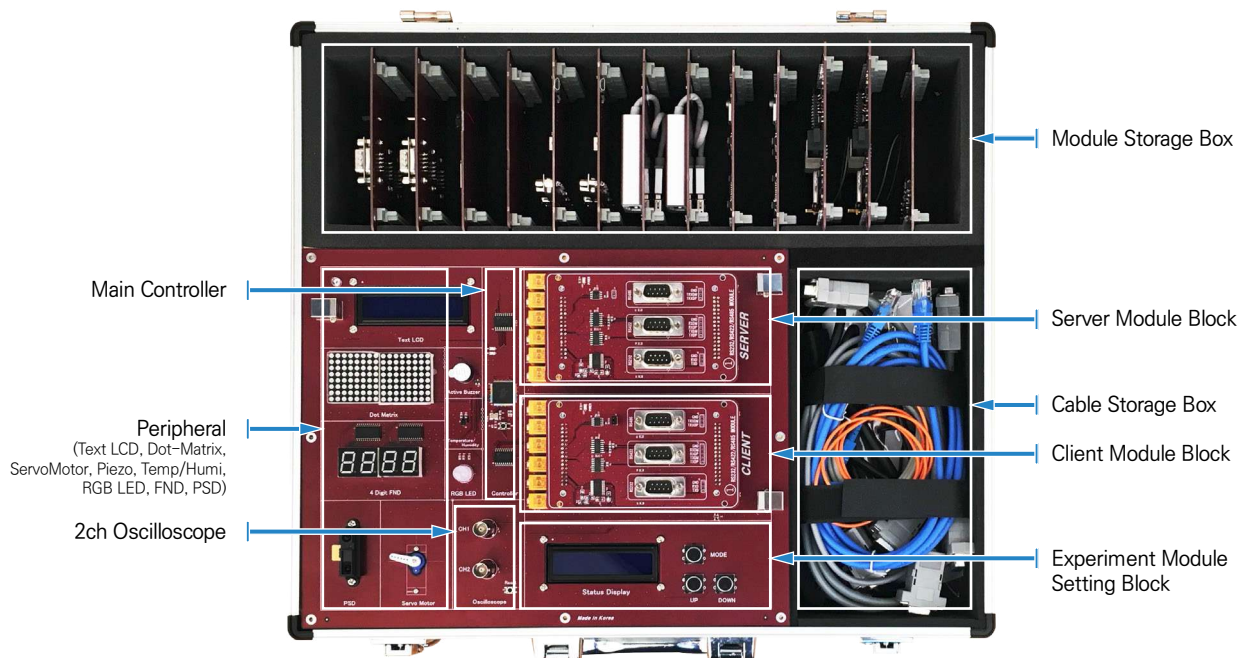


Wireless Communication

- IrDA
- RF433
- Wi-Fi
- Bluetooth
- ZigBee
- LoRA
- NFC



Layout



Product Composition



CM-028 Data Communications



AC Power Cable 1EA



NFC Card 1EA



Ethernet Cable 1EA



Serial Cable 3EA



USB A-B Cable 2EA



Oscilloscope Probe 2EA



USB Memory 1EA



User Guide book 1EA