



# Near Field Communication (NFC) Trainer

**KL-900E**



NFC (Near Field Communication) is a kind of short-range wireless technologies, typically distance of 10 cm or less. NFC is compatible with existing passive RFID (13.56 MHz ISO/IEC 18000-3) infrastructures.

KL-900E NFC Trainer covers three parts: (1)NFC Principle of Transmission, (2)NFC and Contactless Smart Card and (3)NFC Appliance Integration. We hope to provide a complete learning experiment instrument that cover NFC physical to application layer for the novice.

*\* Notebook is excluded*

## ● Part I: NFC Principle of Transmission

NFC physical layer technology is the radio frequency carrier. Through KL-900E Trainer, FG and DSO, we can generate radio frequency signals and observe waveform signals. In this part, we will be able to study the technique of LC circuit and Load Modulation,...., etc.

## ● Part II : NFC and Contactless Smart Card

NFC devices can be used in contactless payment systems, similar to those currently used in credit cards and electronic ticket smartcards, and allow mobile payment to replace or supplement these systems. NFC standards cover communications protocols and data exchange formats, and are based on existing RFID standards including ISO/IEC 14443 and JISX6319-4. In this part, we will be able to study the technique of Mifare Card and Felica Card,...., etc.

## ● Part III: NFC Appliance Integration

In this part, we will be able to study the technique of NFC Tag, NFC Data Exchange Format(NDEF), NDEF vCard, P2P Message Transmission and P2P File Transmission.

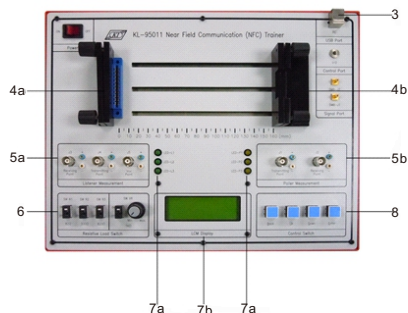


## ► Features

- 8 antenna modules
- Adjustable antenna module holder
- LED/LCD/BUTTON user interface
- Standard NFC SOC Module
- Mifare S50 card and Ultralight card
- NDEF, NDEF vCard and P2P data transmission,...etc
- Complete learning experiment instrument that cover NFC physical to application layer



## ► Specifications



### Main Unit(KL-95011 NFC Trainer):

1. Input Power : 100~240V,50~60Hz.
2. CPU : Microcontroller.
3. USB interface(Type B) : Connect main unit with PC.
4. Adjustable antenna module holder :
  - a. Left holder(Listener End) : The gold fingers socket to connect main unit with listener module.
  - b. Right holder(Poller End) : The Signal Port and Control Port to connect main unit with Poller module.
5. Signal Measurement Connector :
 

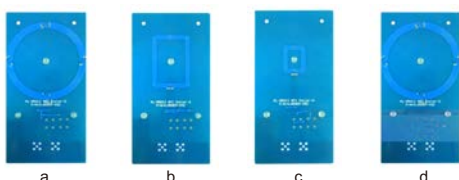
Each measurement point contains one BNC connector and two 2mm connectors.

  - a. Left measurement connector(Listener End) : The listener measurement end contains three measurement points.
  - b. Right measurement connector(Poller End) : The poller measurement end contains two measurement points.
6. Resistive load switch : The resistive load switch contains three fixed resistors and one variable resistor.
7. Status Display :
  - a. LED Display.
  - b. LCD Display.
8. Control Switch : 4 Push Buttons.

## ► List of Modules

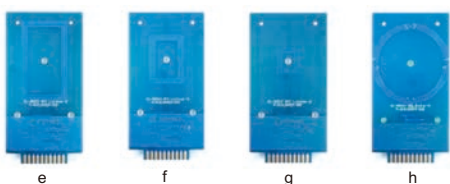
### 1. NFC Poller Modules:

- a. NFC Poller 0 (KL-95012 NFC Poller-0)
- b. NFC Poller 3 (KL-95013 NFC Poller-3)
- c. NFC Poller 6 (KL-95014 NFC Poller-6)
- d. NFC Poller PN532 (KL-95018 NFC Poller-PN532)



### 2. NFC Listener Modules:

- e. NFC Listener 1 (KL-95015 NFC Listener-1)
- f. NFC Listener 3 (KL-95016 NFC Listener-3)
- g. NFC Listener 6 (KL-95017 NFC Listener-6)
- h. NFC Listener PN532 (KL-95019 NFC Listener-PN532)



## ► List of Experiments

### Part I : NFC Principle of Transmission

#### ◆ Coupled Transmission

- Experiment 1 : Coupled Transmission
- Experiment 2 : RF DC Converter

#### ◆ LC Characteristics

- Experiment 3 : LC Circuit Point
- Experiment 4 : LC Characteristics

#### ◆ Load modulation

- Experiment 5 : Resistance modulation
- Experiment 6 : Carrier Modulation

### Part II : NFC and Contactless Smart Card

#### ◆ NFC ASK modulation

- Experiment 7 : NFC-A Signal Waveform Measurement
- Experiment 8 : NFC-B/F Signal Waveform Measurement

#### ◆ NFC Data Rate Experiment

- Experiment 9 : NFC-A Data Rate Experiment
- Experiment 10 : NFC-B/F Data Rate Experiment

#### ◆ NFC Read Card ID

- Experiment 11 : NFC-A Read ID
- Experiment 12 : NFC-F Read ID

#### ◆ NFC Read / Write Data Block

- Experiment 13 : Mifare S50 Card Read/Write Data Block
- Experiment 14 : Ultralight Card Read/Write Data Block

### Part III : NFC Appliance Integration

#### ◆ NDEF

- Experiment 15 : NFC Data Exchange Format
- Experiment 16 : NDEF vCard

#### ◆ P2P

- Experiment 17 : P2P Message Transmission
- Experiment 18 : P2P File Transmission

## ► Accessories

1. Experiment Manual : 1 pc.
2. CD : 1pc.
3. Mifare S50 Card : 2 pcs.
4. Ultralight Card : 2 pcs.
5. SMB Cable : 2 pcs.
6. NFC Poller-PN532 Control Cable : 1 pc.
7. Connect Leads : 1 set
8. USB Cable(Type A to Type B) : 1 pc.

## ► Options

1. Computer
  - PC With Pentium 4 or above
  - Windows XP or upper version
  - Experiment : 8,9,10,11,12,13,14,15,16,17,18
2. Digital Storage Oscilloscope
  - 25MHz Bandwidth
  - 2 Input Channels
  - Experiment : 1,2,3,4,5,6,7,8,9,10
3. Function Generator 1
  - Wide Frequency Ranges From 1MHz to 25MHz (Sine Wave)
  - Experiment : 1,2,3,4,5,6
4. Function Generator 2
  - Wide Frequency 106KHz(Square Wave)
  - Experiment : 6

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