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Chungbuk National University - 충북대학교

UHF RFID

AEL Laboratory

2023.03.11

슬라이드 1

e18 hello everyone im going to present about the UHF RFID reader and writer

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Contents

1. The basics of UHF RFID

RFID writer

Writers write to change using the data that old stored on the tags, often, simply an ide ntifier such as the Electronic Product Code (EPC) but possibly historical or other cac hed information.

Name	Description
UHF (Ultra High Frequency)	Frequencies: 0.3-3 GHz
	Read range: up to 12 m(40 feet)
	Comply with the global, universally adopted UHF Gen2 ISO 18000-63
	Work frequencies range: 860-960 MHz
	Cheapest tag to manufacture

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2. Block diagram

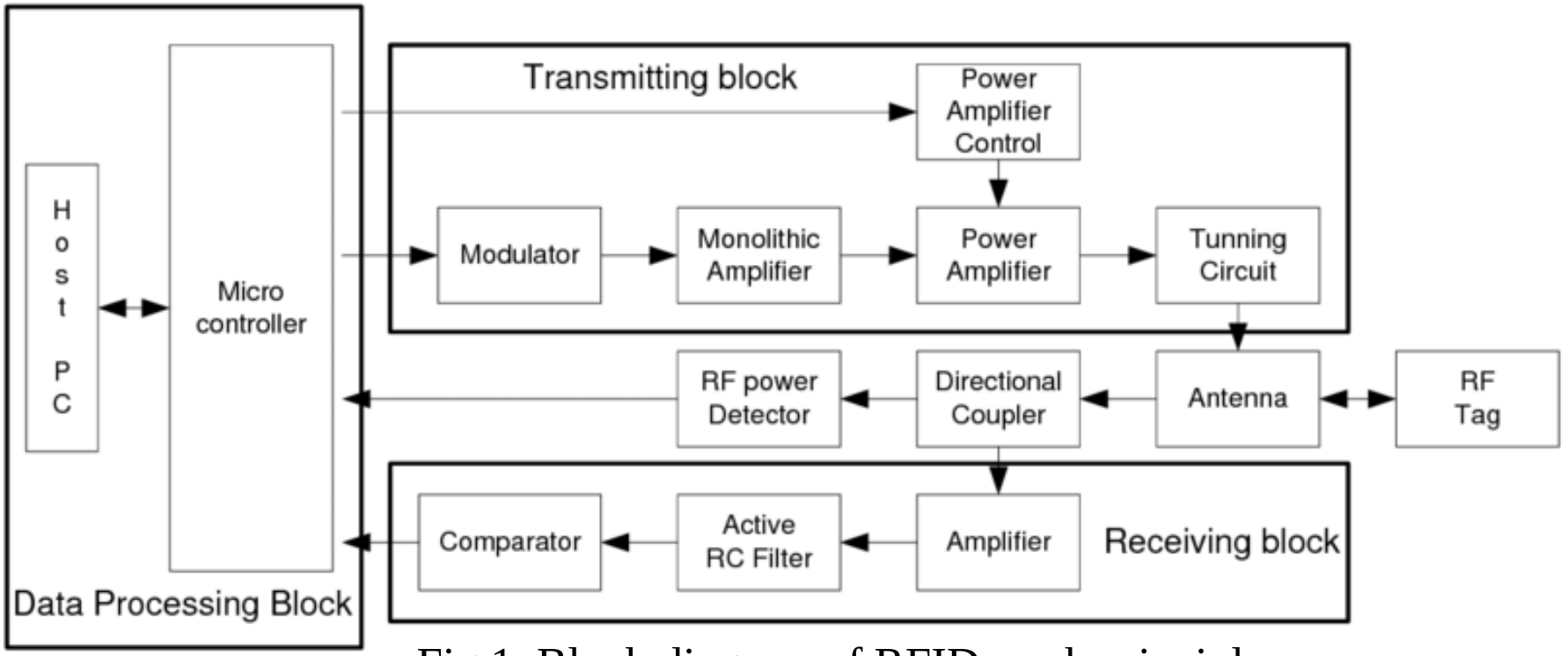
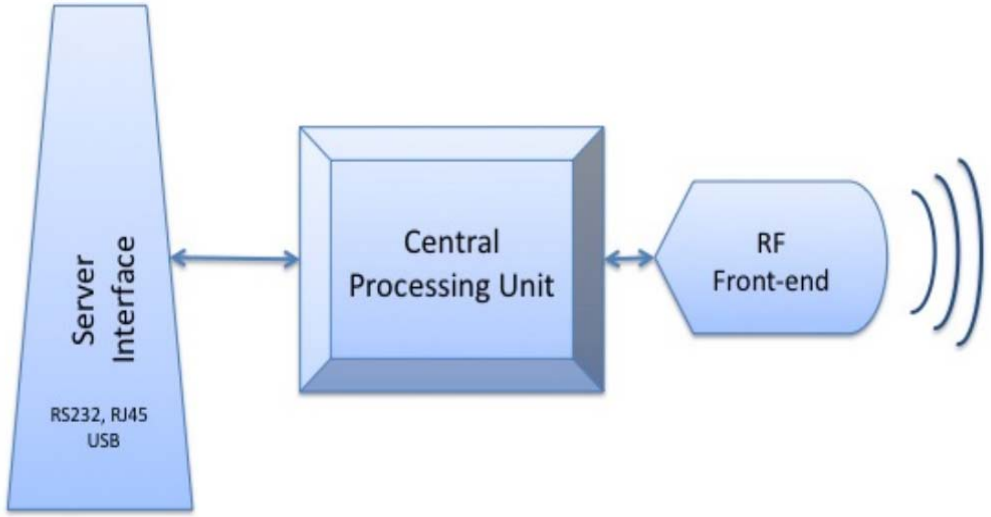


Fig 1. Block diagram of RFID work principle.



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r1 this block diagram shows the functional block diagram of a 900 MHz RFID reader. The RFID reader consists of three functional blockswhich are a data processing block, a transmitting block, and a receiving block. transmitting block sends request commands to an RF-tag in the recognition field. The receiving block
receives data from RF-tags through an antenna. The data processing block deals with the tag information. The transmitting block contains a signal generator, a modulator, a power amplifier, and a tuning
circuit. The signal generator generates the carrier signals for the RFID system. For each analog front-end passive RFID tag we have a power generating circuit that can generate the
power to each RFID tag sub-blocks. The efficiency of power generating circuit and communication range
of the RFID system depend on the voltage rectifier used in the voltage generator circuit. it have rectifier.
The voltage rectifier is a circuit converts the RF incident signal to a DC signal with very small ripples. It comes after the RF voltage limiter.
To improve power efficiency, the proposed full wave RF rectifier.

rk, 2022-04-13

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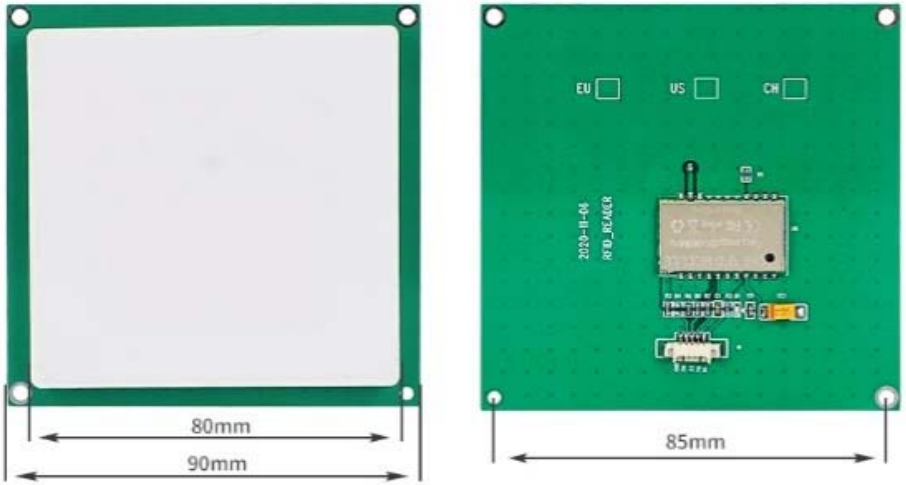
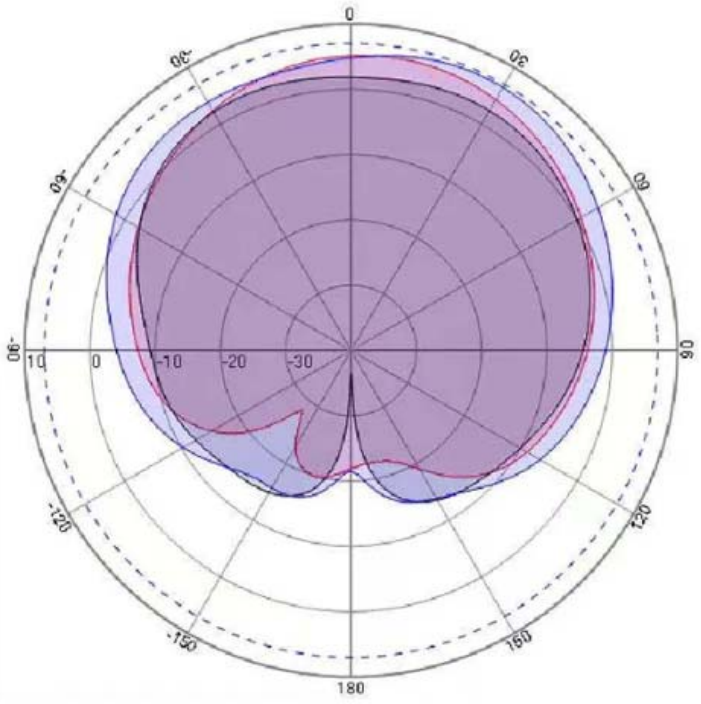
3. Specifications

5dbi Integrated Module: FM-509





모델	FM-505
프로토콜	ISO18000-6C / EPC C1 GEN2
주파수	865-868MHZ(EU),902-928MHZ (미국)
RF 출력	-2 ~ 25dBm
인터페이스	TTL(UART)
이득 안테나	3dbi 안테나
모듈 크기	50*50mm
거리	2.5M (태그에 따라 다름)
읽기 속도	> 50pcs 태그/sec
태그 저장	200pcs 태그 @ 96 비트 EPC
전원	3.3V-5V
대기 현재	<80mA(EN 핀 고수준)
잠자는 전류	<100uA(EN 핀 저수준)
가동 현재	180mA @ 3.5V(25dBm 산출, 25 ℃) 110mA @ 3.5V (-2 dBm 출력, 25 ℃)
수신 감도	<70dbm
방열 방법	공기 냉각 (밖으로 설치를 위한 필요 없음 냉각 탄미익)

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Ultra-High Frequency
Ultra-high frequency RFID technology, also known as RAIN, has an extremely high read range compared to both LF and HF RFID tags. RAIN RFID is a good solution when trying to track multiple products at one time, such as large boxes full of product that is passing through a space, or a cabinet full of inventory. The use of UHF technology spans many markets; including retail, healthcare, life science, pharmaceutical, anti-counterfeiting, transportation, and manufacturing. There are some things to consider when looking at RAIN RFID for your solution. Because RAIN RFID is very powerfu and has shorter wavelengths, it is sensitive to interference. This means that items like metal or water can disrupt its signal, however, there are mechanisms in place to ensure that all products of any material can be tracked with UHF technology.

Frequencies from 300 MHz to 3 GHz
Read range up to 12 meters (40 feet)
Comply with the global, universally adopted UHF Gen2 standard (EPCglobal Gen2 ISO 18000-63)
Use the 860 to 960 MHz band
Fastest growing segment of RFID technology
Cheapest tag to manufacture
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3. Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
RF Output Frequency for reader	Fc	860	-	960	Mhz
RF Output Power	Pout	-	-	26.5	dbm
RF Transmission setup time	TRF_OUT	-	-	0.5	ms
RF Frequency error	Ferror	-	-	1000	ppm
Interrogator Transmit Spurious Emissions, In-Band	In accordance with local regulations				-
Interrogator Transmit Spurious Emissions, Out of-Band	In accordance with local regulations				-
RF Bandwidth	In accordance with local regulations				-
Transmit data rate	TRate	-	26K	-	bps
Modulation	ASK				
Modulation depth	90% normally				
Data Coding	PIE				
Demodulation	ASK				
Download data rate	DRate	-	40K	-	bps
Data encoding	FM0				

Power consumption:

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply voltage	VIN	3.6	5	5.5	V

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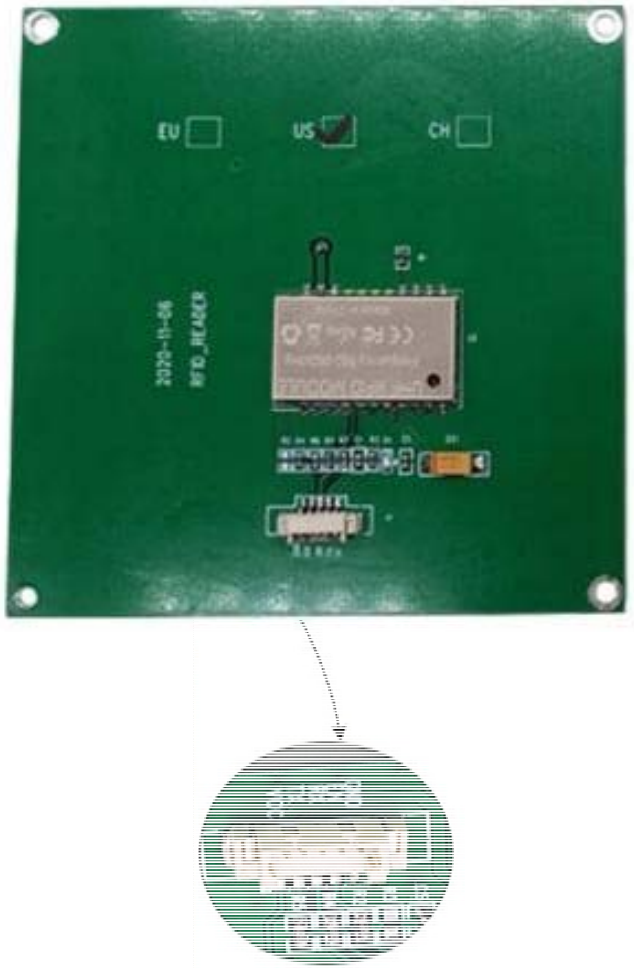
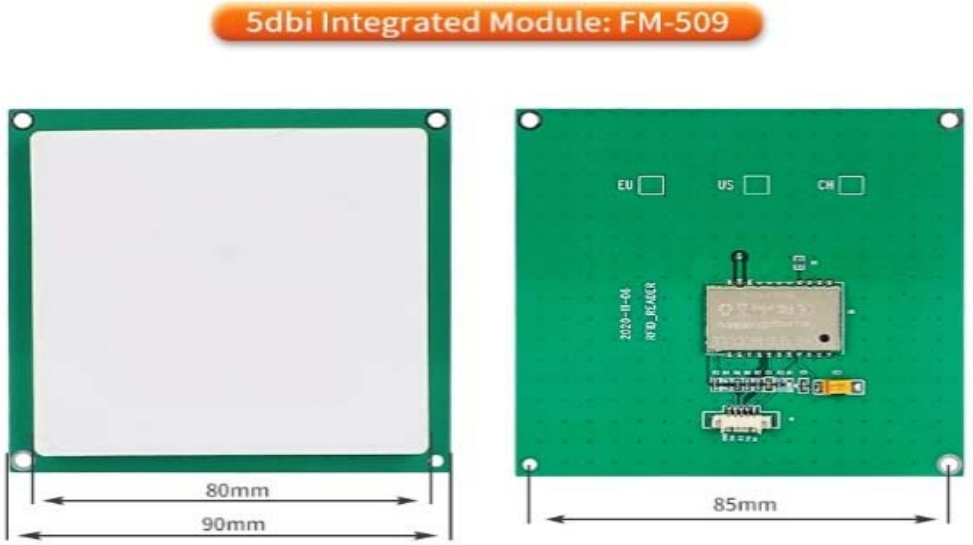
3. Pinout





Front of FM-505

Rear of FM-505

Fig 4. RFID tag

e5 we tesed M6E RFID reader and writter module.

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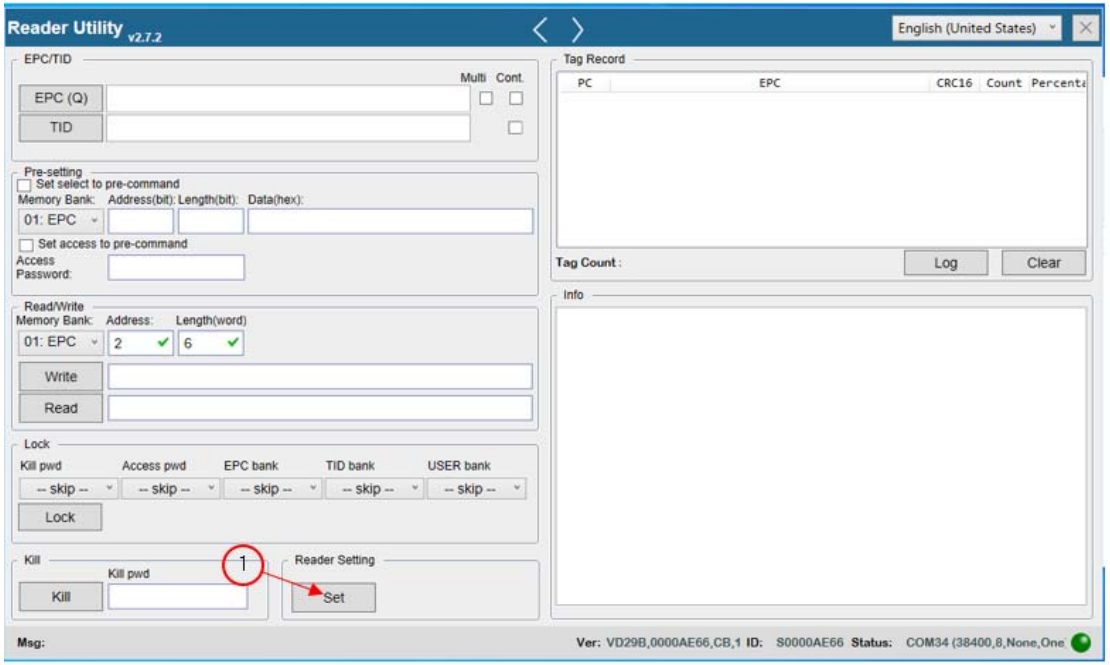
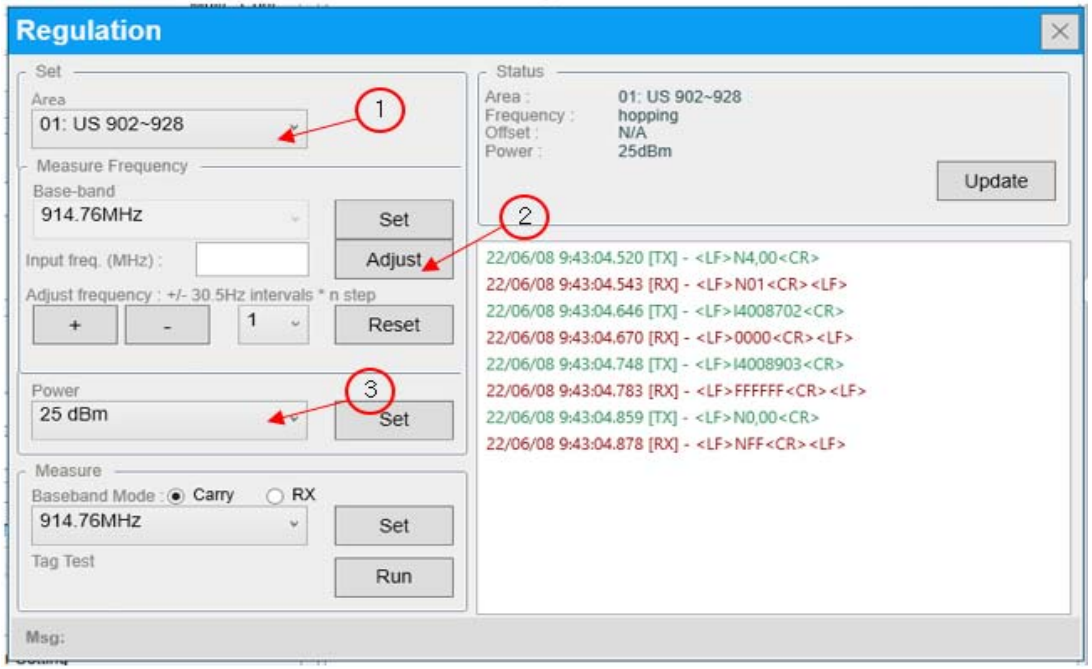
4.Principle of operation





r2 if you want to test and develope the M6E module, you need to folloe this steps.

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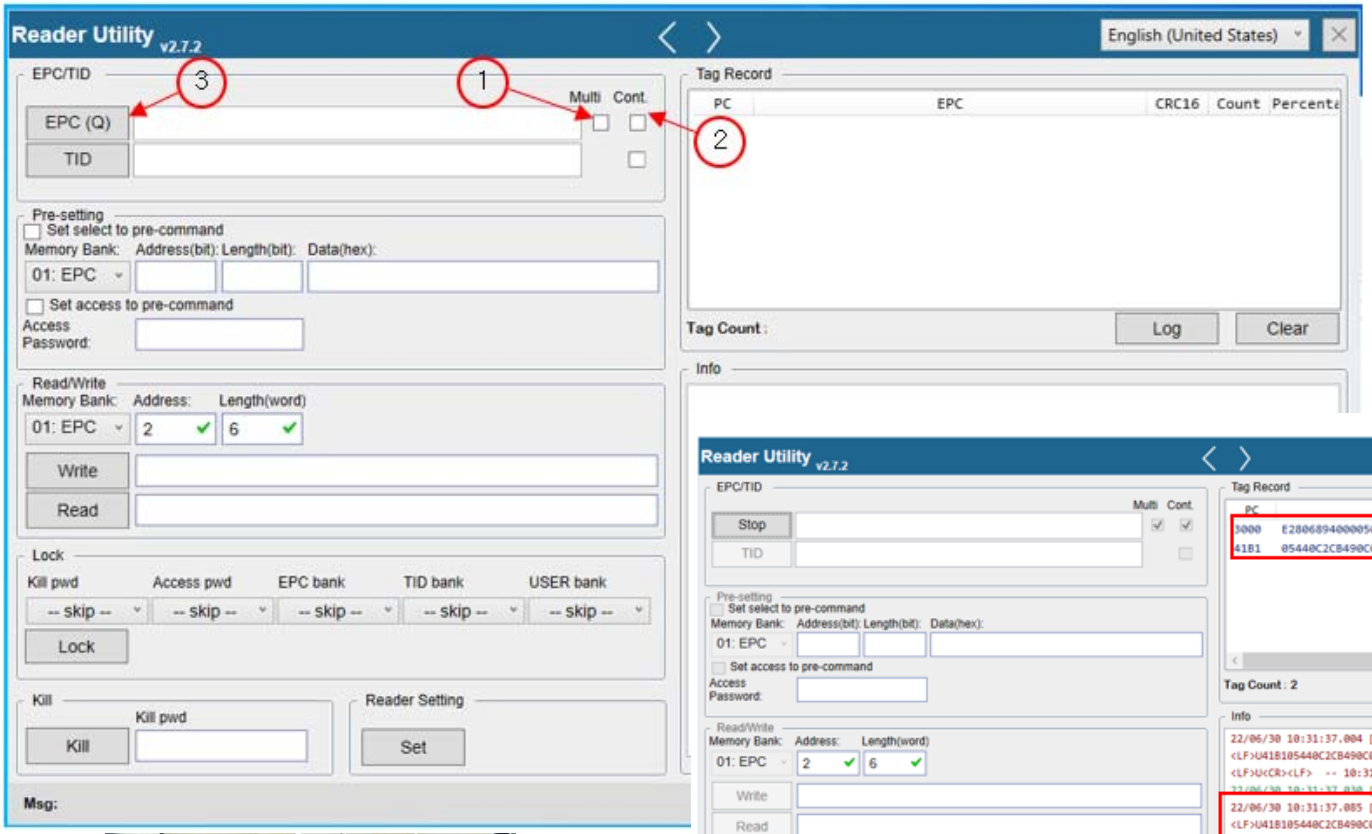
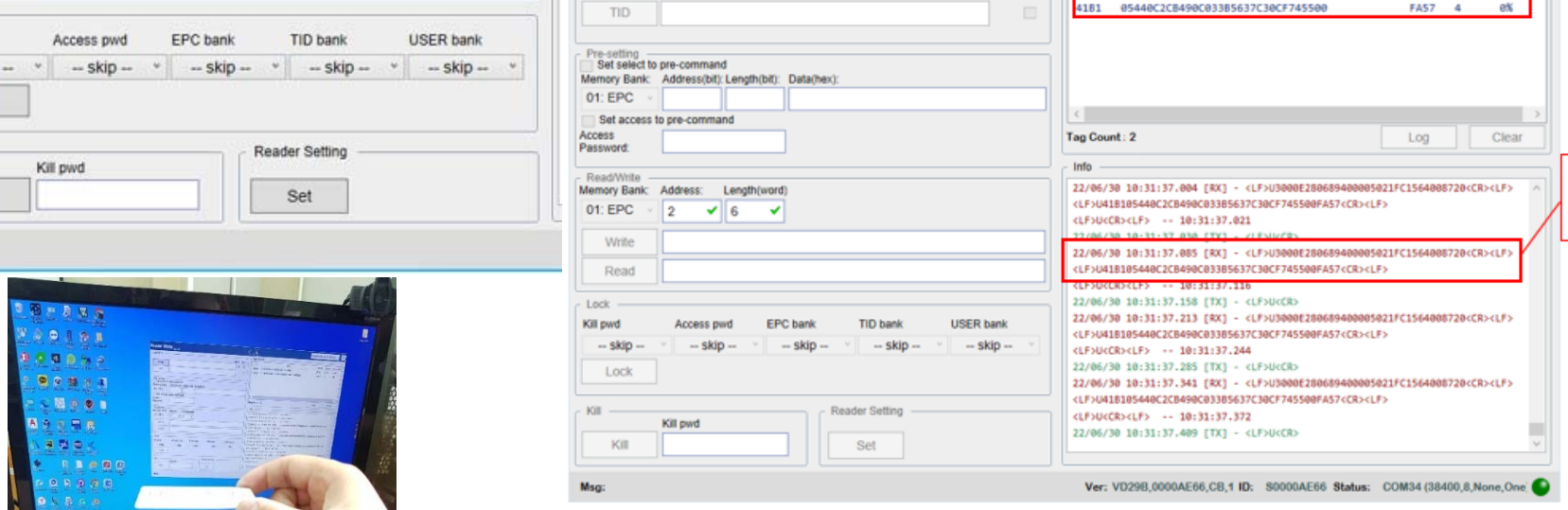
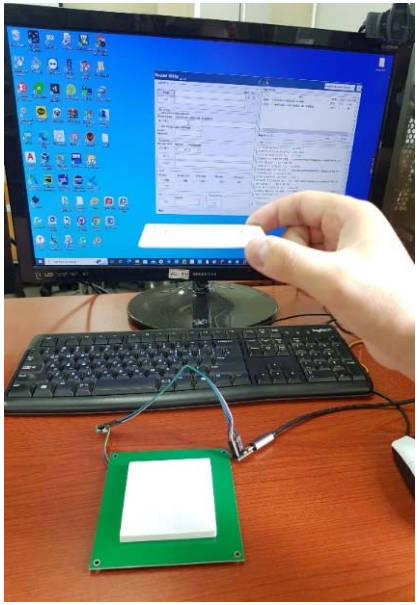
4.Principle of operation





Reading data and counting

Command data



4.Principle of operation

Relay control using by RFID