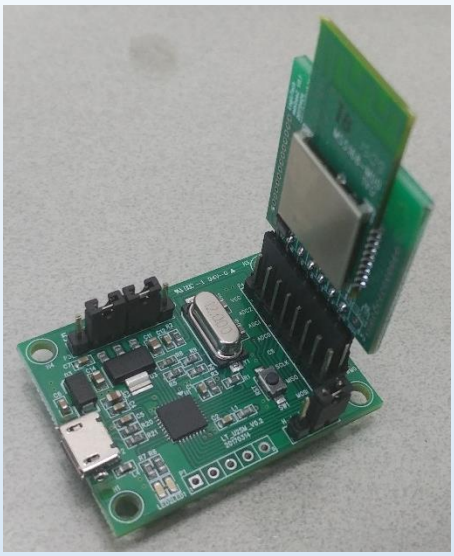
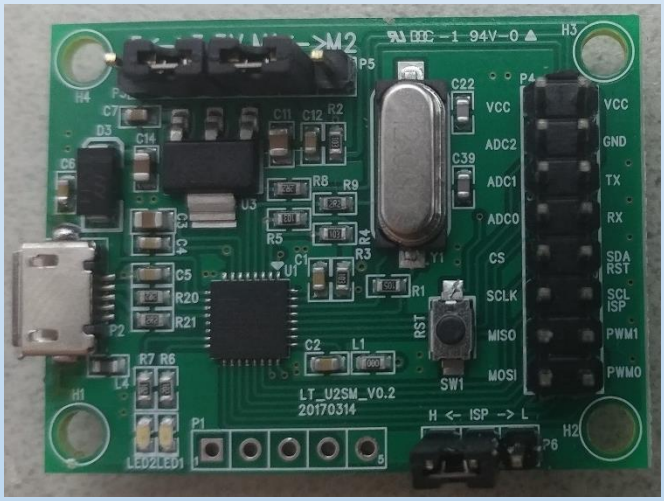


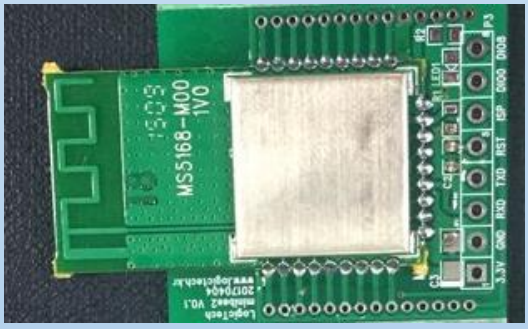
기능

- USB를 이용하여 ZigBee 모듈에 다운로드 및 통신 테스트
- ZigBee 3.0 Pro 스택을 이용한 mesh망 구현
- 간단한 AT커맨드로 제어
- 최대 18dBm 고출력 모듈 지원
- 패턴안테나, 외장안테나 두 가지 타입
- 32bit core 내장으로 별도의 MCU 없이 메인 어플리케이션 구현

다운로더



ZigBee 모듈

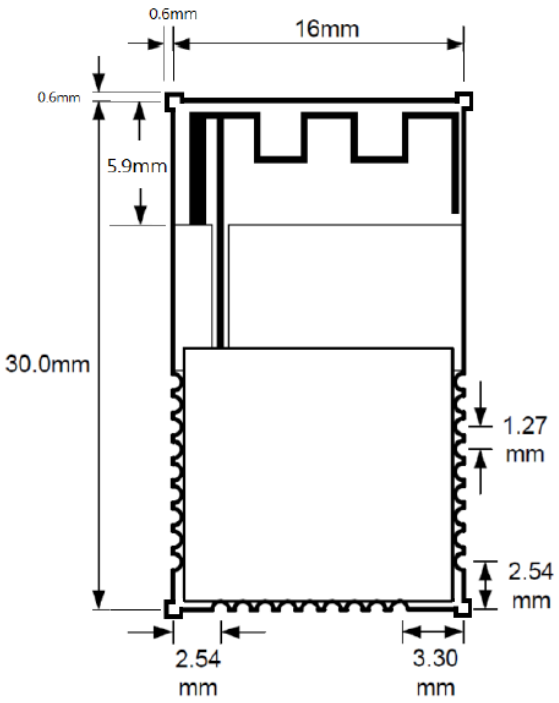


구매시 유의점

- 라우터 제품과 코디네이터 제품 두개를 구매하셔야 통신 테스트가 가능합니다.
- 통신 방식은 코디네이터1대와 라우터 여러대간 통신이 가능합니다. (코디네이터간 통신 불가) 추가 구매시 이점 유의 하시기 바랍니다.
- 기본 구매시 Zigbee 모듈은 패턴 안테나 타입이 나가게 되며, 외부 안테나 타입은 추가 구매를 하셔야 합니다. (안테나, 안테나 케이블 별매)

VDD=3.3V @ +25°C

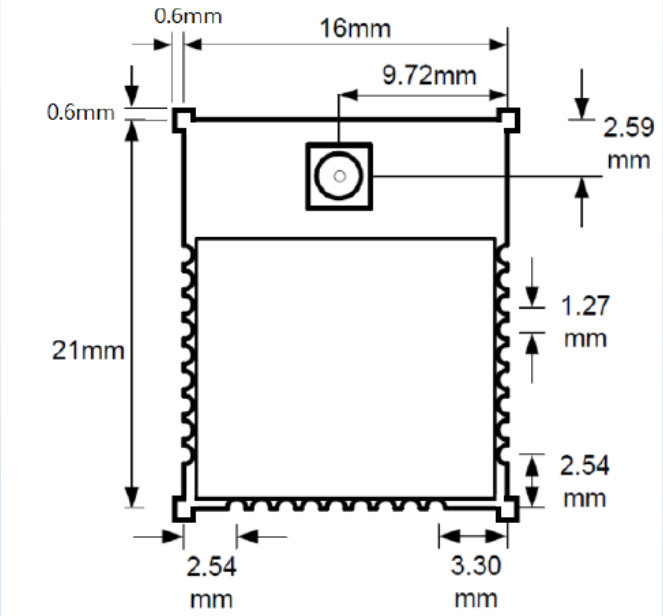
Typical DC Characteristics				Notes
	M00/03	M04/05	MS5169-M03	
Deep sleep current	100nA	100nA	100nA	
Sleep Current	0.70uA	0.70µA	0.73µA	With active sleep timer
Radio Transmit current	15.3mA	150mA	23.3mA	CPU + Protocol + radio transmitting
Radio receive current	17mA	22mA	15mA	CPU in doze + radio receiving
Centre frequency accuracy	+/-10ppm	+/-10ppm	+/-10ppm	Additional +/-15ppm allowance for temperature and ageing
Typical RF Characteristics				**Notes**
Receive sensitivity	-95dBm	-100dBm	-95dBm	Nominal for 1% PER, as per 802.15.4 section 6.5.3.3 (Note 1)
Maximum Transmit power	+2.5dBm	+18dBm	+9dBm	
Maximum input signal	10dBm	+5dBm	+10dBm	For 1% PER, measured as sensitivity
RSSI range (dBm)	-95 ~ -10dBm	-105 ~ -20	-95~-10dBm	
RF Port impedance – SMA/uFl connector	50 ohm	50 ohm	50 ohm	2.4 - 2.5GHz
Rx Spurious Emissions	-61dBm	-69dBm	-70dBm	Measured conducted into 50 ohms
Tx Spurious Emissions	-40dBm	-49dBm	--65dBm	Measured conducted into 50 ohms
VSWR (max)	2:1	2:1	2:1	2.4 - 2.5GHz
Peripherals				**Notes**
Master SPI port	3 selects	3 selects		250kHz - 16MHz
Slave SPI port	√	√		250kHz - 8MHz
Two UARTs	√	√		16550 compatible
Two-wire serial I/F (compatible with SMbus & I²C)	√	√		Up to 400kHz
5 x PWM (4 x timer, 1x timer/counter)	√	√		16MHz clock
Two programmable Sleep Timers	√	√		32kHz clock
Digital IO lines (multiplexed with UARTs, timers and SPI selects)	20	18		
Four channel Analogue-to-Digital converter	√	√		10-bit, up to 100ks/s
Programmable analogue comparators	√	√		Ultra low power mode for sleep
Internal temperature sensor and battery monitor	√	√		



Thickness: 2.8mm

Four corner of PCB are PCB V-Cut tolerance

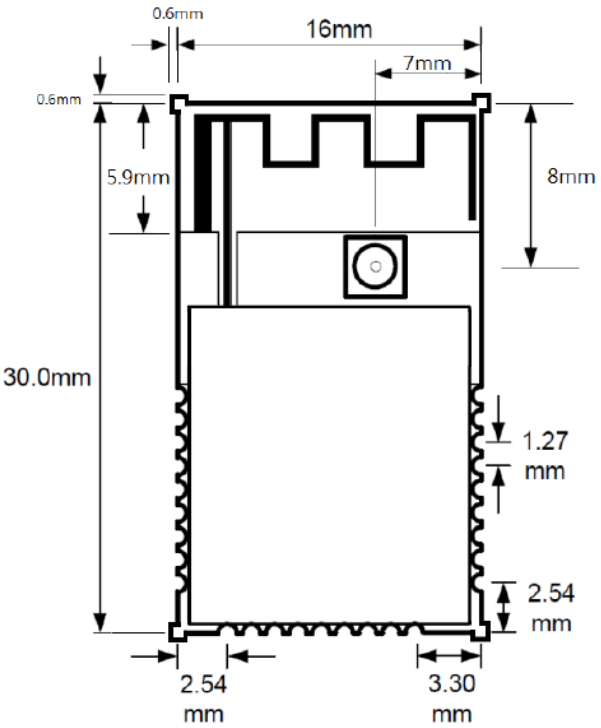
Figure 3 MS5168-M00 Outline Drawing



Thickness: 2.8mm

Four corner of PCB are PCB V-Cut tolerance

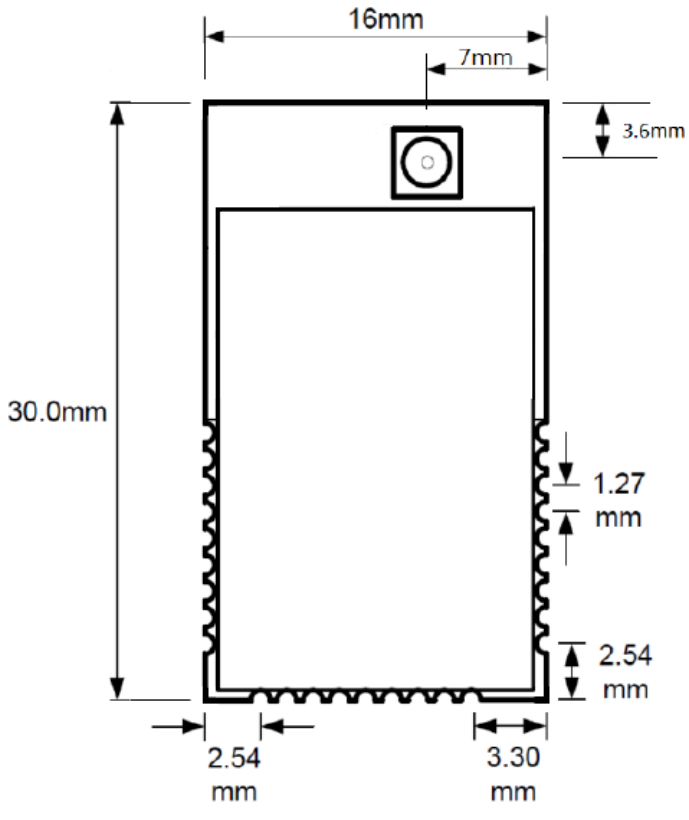
Figure 4 MS5168/MS5169-M03 outline drawing



Thickness: 2.8mm

Four corner of PCB are PCB V-Cut tolerance

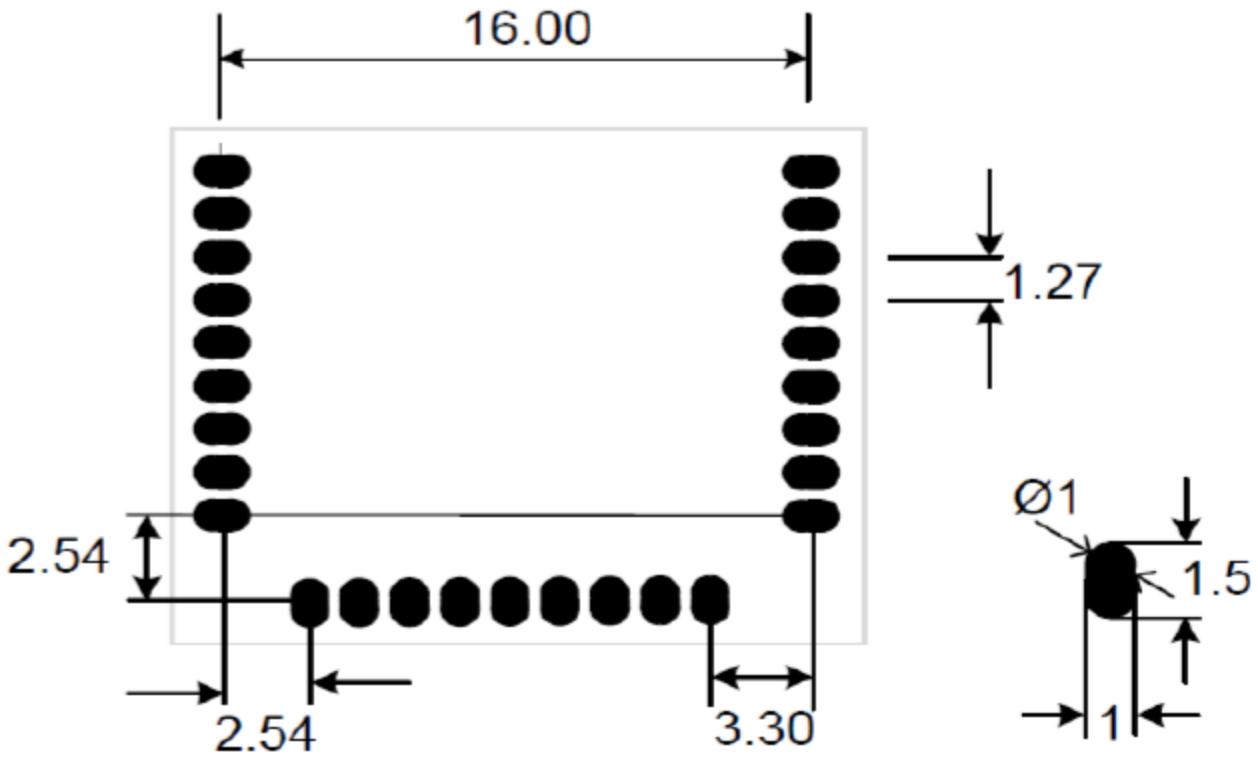
Figure 5 MS5168-M04/M05 Outline Drawing



Thickness: 2.8mm

Figure 6 MS5168-M06 Outline Drawing

4.1 Module PCB Footprint



Note 1: All modules have the same footprint

Note 2: All Dimensions are mm

Figure 7 PCB footprint

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TUV SUD BABT
Forsyth House Churchfield Road
Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 10/07/2014

Application Dated: 10/07/2014

Meshreen Technology Ltd.
No.11-3, Xiashe, Guishan Township,
Taoyuan County, 333
Taiwan

Attention: Bruce Chen , Director

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER:	2AC2E-68M03
Name of Grantee:	Meshreen Technology Ltd.
Equipment Class:	**Part 15 Low Power Communication Device Transmitter**
Notes:	**JN5168 Standard Power ZigBee Module with u-FL connector**
Modular Type:	**Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	**2405.0 - 2480.0**	**0.0005**		

Modular Approval. Output power is conducted. The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter RF Exposure procedures. End users must be informed of the requirements for satisfying RF Exposure compliance.

TCB

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EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER:	2AC2E-68M04
Name of Grantee:	Meshreen Technology Ltd.
Equipment Class:	**Part 15 Low Power Communication Device Transmitter**
Notes:	**JN5168 High Power ZigBee Module with u-FL connector/with embedded antenna**
Modular Type:	**Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	**2405.0 - 2475.0**	**0.118**		

Modular Approval. Output power is conducted. The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter RF Exposure procedures. End users must be informed of the requirements for satisfying RF Exposure compliance.

telefication

TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TCB

Telefication B.V.
Edisonstraat 12a
Zevenaar, NL-6902 PK
Netherlands

Date of Grant: 07/07/2016

Application
Dated: 06/28/2016

Meshreen Technology Ltd.
No.11-3, Xiashe, Guishan Township,
Taoyuan County, 333
Taiwan

Attention: Bruce Chen , Director

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER:	2AC2E-69M03
Name of Grantee:	Meshreen Technology Ltd.
Equipment Class:	**Digital Transmission System**
Notes:	**ZigBee Module**
Modular Type:	**Single Modular**

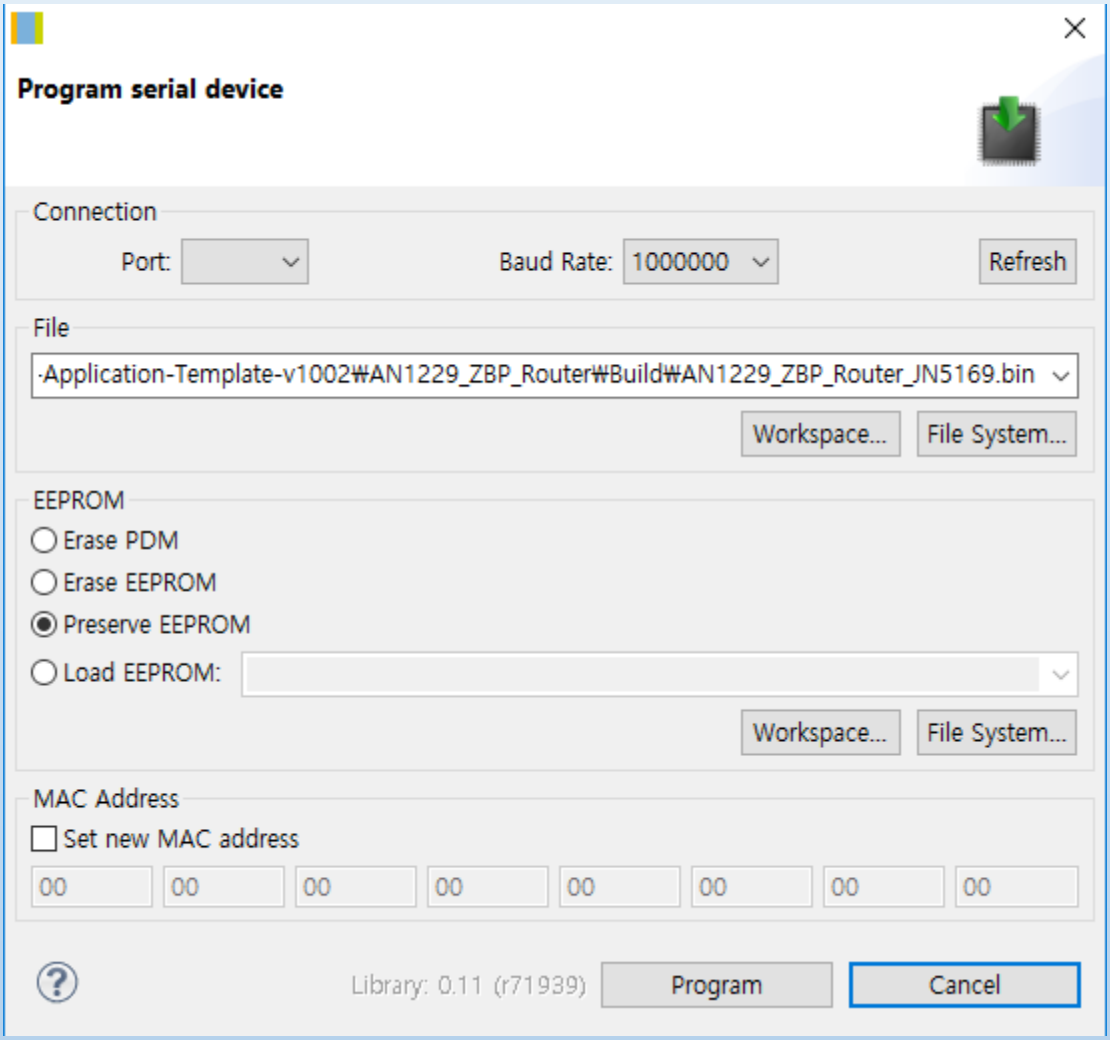
Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	**2405.0 - 2480.0**	**0.012**		

Output power listed is conducted. This grant is valid only when the module is sold to OEM integrators and must be installed by the OEM or OEM integrators. The antenna's as listed in this application must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users may not be provided with the module installation instructions. OEM integrators and end-users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

Certificate No.: 162180926/AA/00	Gürhan Vural Product Assessor	

펌웨어 업데이트, 다운로드 방법

- BeyondStudio for NXP 실행 후 Devices 메뉴 – Program Device 실행
- 다운로더의 ISP점퍼를 L에 놓고 RST버튼 눌러 ISP모드 진입
- Bin파일 고르고 아래 화면과 같이 세팅 후 Program 버튼 눌러 다운로드
- ISP점퍼를 H에 놓고 RST눌러 다운로드 된 프로그램 동작



ZigBeePRO 특성

Coordinator(Master)의 Short(Network) Address는 0000으로 고정
Router(Slave) 및 End Device의 Short(Network) Address는 Stack에 의한 Random Address 할당
모든 Device의 Long(IEEE) Address는 최초 펌웨어 다운로드 시 고정 입력

AT Command 사양

UART
3VTTL
115200-8-N-1
흐름 제어 없음

AT Command 목록

at+rst<CR><LF> response : boot ok	Module Reset
at+txp=dd<CR><LF> response : ok	RF 출력 설정 00~63까지 설정 가능 하지만 MS5168은 32 까지, MS5169는 42 까지 유효. 모듈에 관계없이 63으로 설정하면 최대 출력 됨
at+chn=bbbbbbbbbbbbbbbb<CR>LF> response : ok response : chn=nn	채널 scan 범위 설정 (bit masking) 채널11~26번까지의 bit masking 방식 사용 Ex) 채널 11번, 26번 사용 시 1000000000000001 해당 채널 설정을 해야 네트워크 구성을 시작 함
at+dst=xxxx<CR><LF> response : ok	패킷을 송신 할 상대방 Address를 설정 0000~ffff까지 설정 ffff는 Broadcast
at+pkt=nn<CR><LF> response : ok	설정 된 상대방 addr로 송신 할 패킷의 바이트 수 설정 이 후 설정 된 바이트 수 만큼 UART로 받으면 상대방에게 RF로 송출 한다.

<CR> = 0x0D , <LF> = 0x0A

Command Example

순서1 : 네트워크 구성

```
at+rst<CR><LF>                          // 리셋 명령 (하드웨어 리셋 시 생략)
boot ok<CR><LF>                         // Response
at+txp=63<CR><LF>                       // RF 출력 최대
ok<CR><LF>                              // Response
at+chn=0100000000000001<CR><LF>         // 채널 범위 설정 (11, 25번)
ok<CR><LF>                              // Response
chn=11<CR><LF>                          // Response (해당 채널로 구성되면 출력후
                                        // join 기다림)
```

순서2 : join processing (Coordi, Router 모두 순서1이 끝나면 자동으로 Coordi에게 Router가 join 함)

Coordinator 일 경우 Router가 자신에게 join하면

```
join=0x11ab                             // Response (Coordi에게 0x11ab라는
                                        // Router가 조인하였을 때 출력)
```

Router 일 경우 Coordi에게 join되면

```
Joined=0x11ab                           // Response (Router 자신이 0x11ab이며
                                        // Coordi에게 join 하였을 때 출력)
```

순서3 : 패킷 송신 (순서2 까지 다 된 상태에서)

```
at+dst=0000<CR><LF>                     // Coordinator에게 송신준비
ok<CR><LF>                              // Response
at+pkt=50<CR><LF>                       // 50바이트 송신준비
ok<CR><LF>                              // Response
50바이트 패킷 입력                       // ASCII, HEX 상관없음
ok<CR><LF>                              // Response (50바이트 다 보내면 출력)
수신패킷은 받는 즉시 출력 함
```

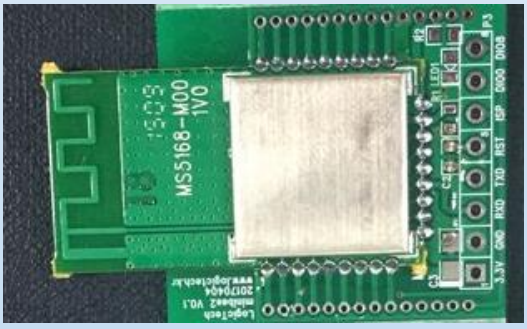
주의 사항

1. 패킷을 broadcasting모드로 송신 후 다음 broadcasting 송신 까지의 텀을 1초 이상으로 해야 한다. ZigBee tack에서 broadcasting은 오래 걸리기 때문이다.

추가 구성품

- 외부 안테나형 지그비 모듈

- 패턴 안테나형 지그비 모듈



- 외부 안테나 모듈용 케이블

- 5dB 안테나

LogicTech Inc
Nuvoton MCU 대리점
Nuvoton MCU 샘플 및 대량 판매 및 기술지원
산업, 가전, 완구용 제품 및 윈도우 어플리케이션 개발 전문

서울시 금천구 가산동 685
가산디지털엠파이어 1004호

Tel : 070-7526-1209
Fax : 02-2675-1209

Sales : martin.shin@logictech.kr
Tech : dennis.ahn@logictech.kr
albatini.song@logictech.kr

커스터마이징 및 신규 개발 문의 환영합니다.