

# F900

DATASHEET

CONFIDENTIAL INFORMATION

## List of Contents

1. General.....	4
1.1 Overview .....	4
1.2 Block Diagram .....	4
1.2.1 F900 Block Diagram .....	4
1.2.2 F900D Block Diagram .....	4
1.3 Features .....	5
1.4 Application .....	5
1.5 Pin Configuration & Description .....	6
1.5.1 F900 Pin Configuration .....	6
1.5.2 F900 Pin Description .....	7
1.5.3 F900D Pin Configuration .....	8
1.5.4 F900D Pin Description .....	9
1.6 Dimensions .....	10
1.6.1 F900 Dimensions .....	10
1.6.2 F900D Dimensions .....	11
1.7 F900 Land Pattern.....	12
2. Characteristics.....	13
2.1 Electrical Characteristics .....	13
2.1.1 Absolute Maximum Ratings .....	13
2.1.2 Recommended Operating Conditions.....	13
2.1.2 Power Consumption .....	13
2.1.3 GPIO DC Characteristics .....	14
2.1.4 ADC Characteristics.....	14
2.2 RF Characteristics .....	14
3. Terminal Description.....	15
3.1 UART Setting.....	15

4. F900D Antenna selection .....	16
5. Application Schematic.....	17
6. Reflow Temperature Profiles .....	18

## 1. General

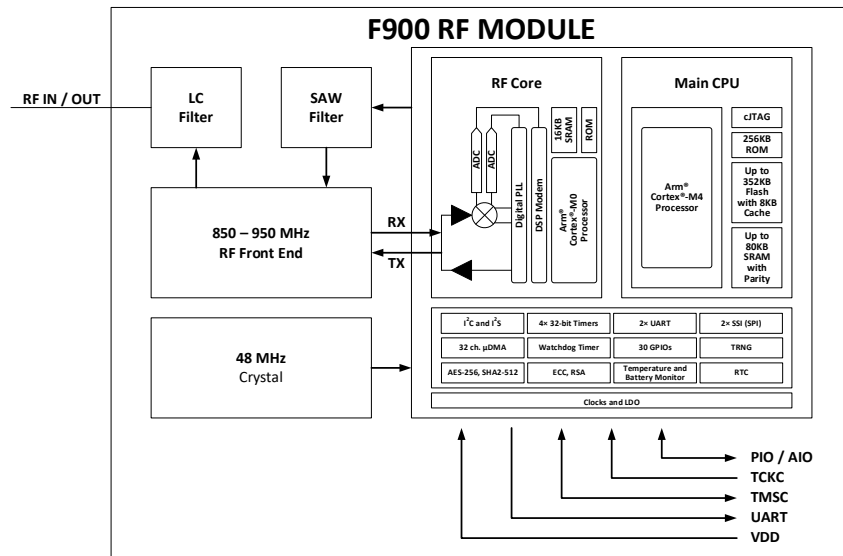
### 1.1 Overview

F900 Long Range Sub-1GHz Technology Transceiver module, provides an easy to use, small size for long range wireless data transmission.

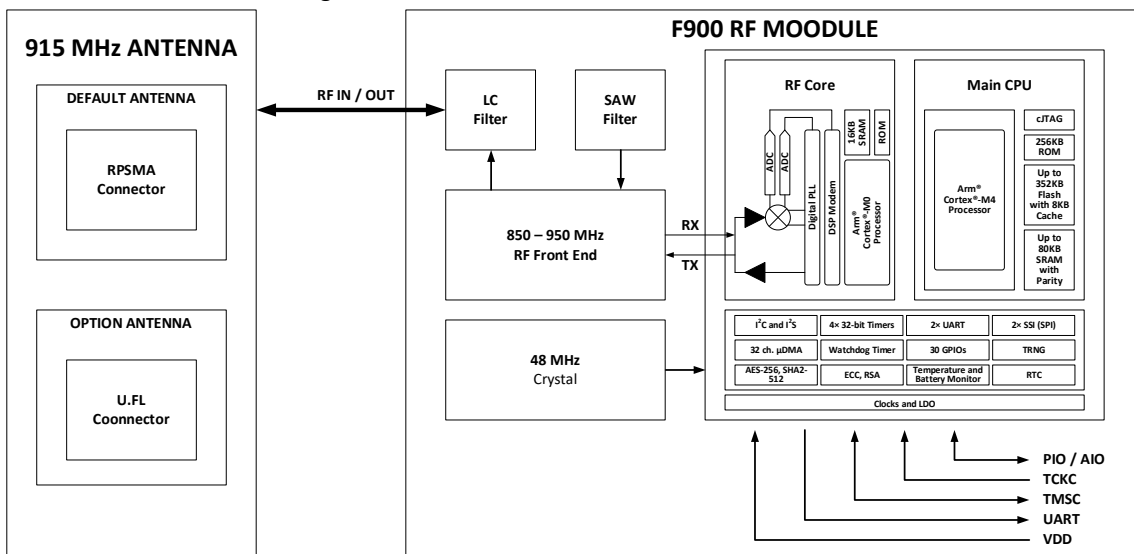
Sub-1GHz radio supporting industry standard 900MHz frequency band to meet industry requirements. The F900 module provides the user with serial AT Commands through UART interface.

### 1.2 Block Diagram

#### 1.2.1 F900 Block Diagram



#### 1.2.2 F900D Block Diagram



### 1.3 Features

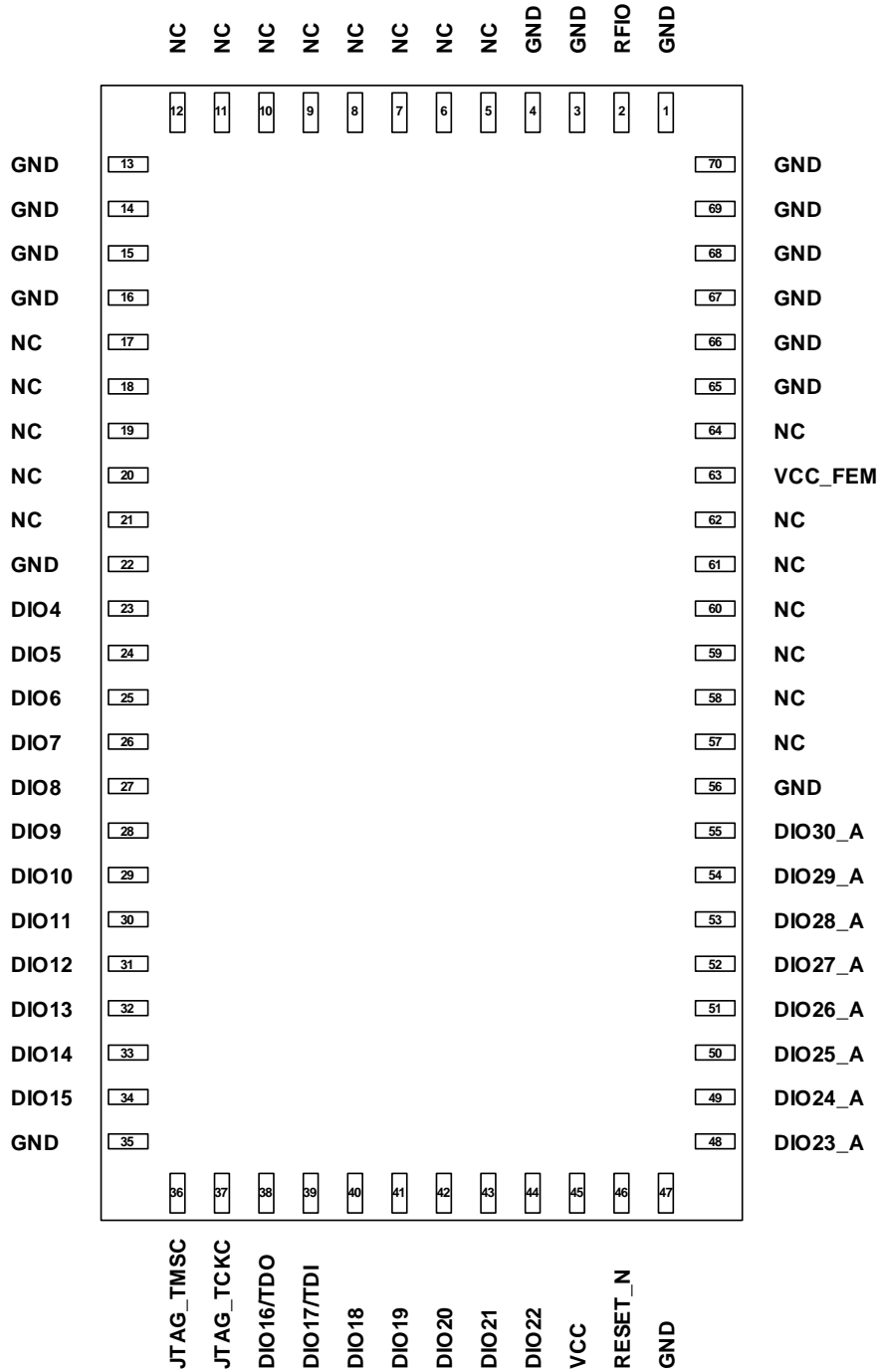
- Frequency Range : 922.1 ~ 923.3 MHz (26 ~ 32 CH.)
- Powerful 48 MHz ARM® Cortex®-M4F 32-bit processor with FPU
- Memory: 352 kB Flash / 80 kB RAM
- RF Output Power: MAX +14 dBm
- RF Receive Sensitivity:
  - 50 kbps 2-GFSK : -111 dBm
  - SimpleLink LRM 5 kbps : -121 dBm
- Fully automatic LDO and DC/DC regulator system (Used LDO by Default)
- Temperature Sensor
- UART (CTS/RTS) with SPI, and I2C data interfaces.
- 12-Bit 200 ksps ADC with - 8 channels
- Size:
  - F900 : 13 X 23 X 2.2 mm
  - F900D : 23 X 41.5 (50.4 Included SMA Connector ) X 5.2 (9.3 Included 2.0mm Pitch Header)
- Operating Voltage: 3.0V to 3.6V
- Operating Temperature: -40 to +85°C
- RoHS compliant

### 1.4 Application

- Building automation
  - Building security systems
  - Motion Detector
  - Electronic Smart Lock
- Grid Infrastructure
  - Water Meter
  - Gas Meter
- Factory Automation
- Personal electronics
  - Connected Peripherals
  - Home Theater & Entertainment
  - Gaming
- Elevators and escalators

## 1.5 Pin Configuration & Description

### 1.5.1 F900 Pin Configuration

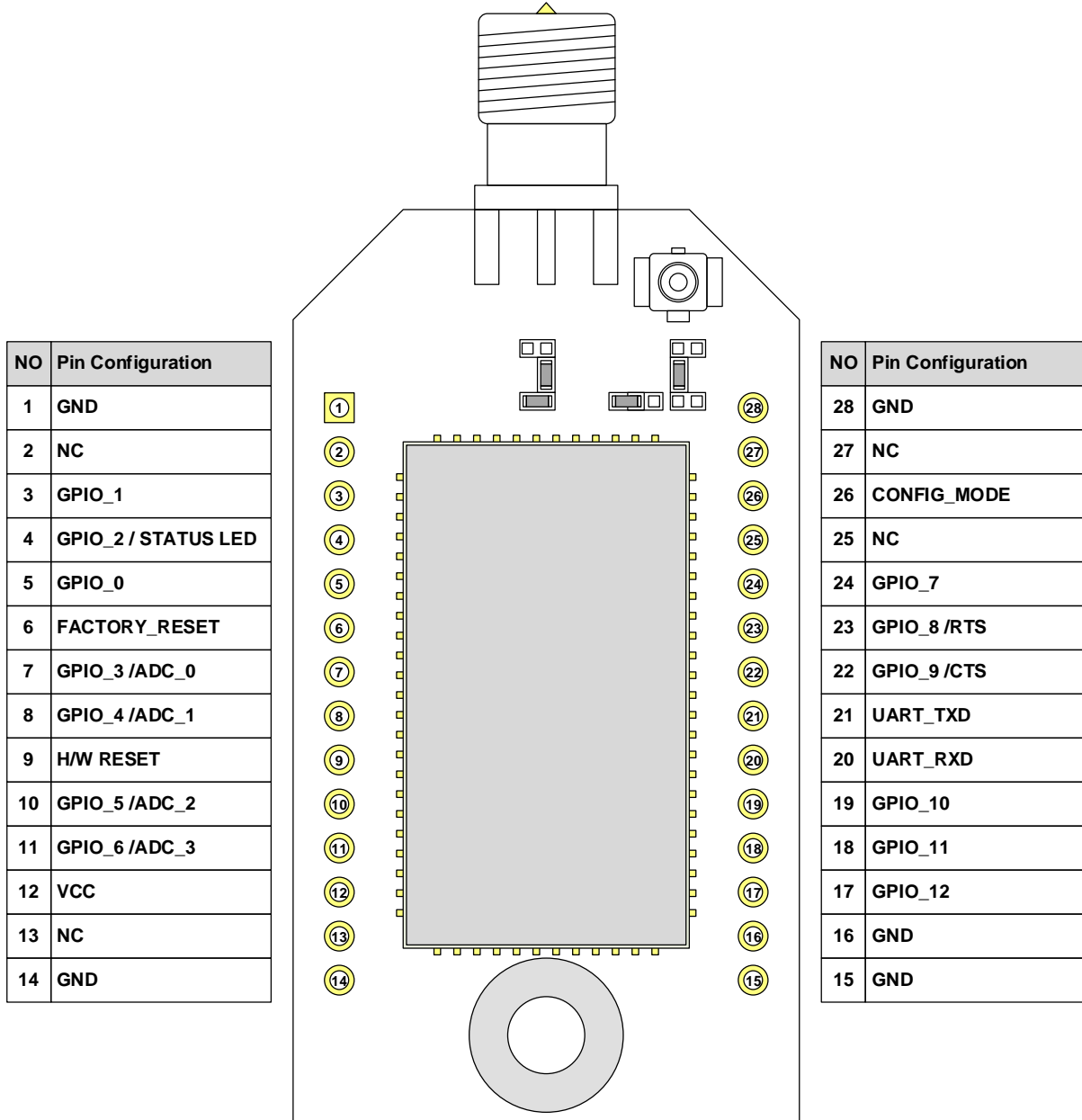


< TOP VIEW >

## 1.5.2 F900 Pin Description

Function		Pin Name	Pin No.	Pin Type	Description	Note	
RF	RF	RF	2	RF	RF IN/OUT		
PIO & AIO	DIO_4	DIO_4	23	Digital	GPIO		
	DIO_5	DIO_5	24	Digital	GPIO, high-drive capability		
	DIO_6	DIO_6	25	Digital	GPIO, high-drive capability		
	DIO_7	DIO_7	26	Digital	GPIO, high-drive capability		
	DIO_8	DIO_8	27	Digital	GPIO		
	DIO_9	DIO_9	28	Digital	GPIO		
	DIO_10	DIO_10	29	Digital	GPIO		
	DIO_11	DIO_11	30	Digital	GPIO		
	DIO_12	DIO_12	31	Digital	GPIO		
	DIO_13	DIO_13	32	Digital	GPIO		
	DIO_14	DIO_14	33	Digital	GPIO		
	DIO_15	DIO_15	34	Digital	GPIO		
	DIO_16	TDO	DIO_16	38	Digital	GPIO, JTAG_TDO, high-drive capability	
	DIO_17	TDI	DIO_17	39	Digital	GPIO, JTAG_TDI, high-drive capability	
	DIO_18		DIO_18	40	Digital	GPIO	
	DIO_19		DIO_19	41	Digital	GPIO	
	DIO_20		DIO_20	42	Digital	GPIO	
	DIO_21		DIO_21	43	Digital	GPIO	
	DIO_22		DIO_22	44	Digital	GPIO	
	DIO_23	AIO	DIO_23	48	Digital or Analog	GPIO, analog capability	
	DIO_24	AIO	DIO_24	49	Digital or Analog	GPIO, analog capability	
	DIO_25	AIO	DIO_25	50	Digital or Analog	GPIO, analog capability	
	DIO_26	AIO	DIO_26	51	Digital or Analog	GPIO, analog capability	
	DIO_27	AIO	DIO_27	52	Digital or Analog	GPIO, analog capability	
	DIO_28	AIO	DIO_28	53	Digital or Analog	GPIO, analog capability	
	DIO_29	AIO	DIO_29	54	Digital or Analog	GPIO, analog capability	
	DIO_30	AIO	DIO_30	55	Digital or Analog	GPIO, analog capability	
	Control	JTAG_TMSC	JTAG_TMSC	36	Digital	JTAG TMSC, high-drive capability	
		JTAG_TCKC	JTAG_TCKC	37	Digital	JTAG_TCKC	
		RESET_N	RESET_N	46	Digital	Reset, active low. internal 100k pullup resistor	
Power & ETC	VCC	VCC	45	Power	3.3V Main Power		
	VCC_FEM	VCC_FEM	63	Power	3.3V Front-End Module Power		
	GND	GND	1,3,4,13,14,15,16, 22,35,47,56,65, 66,67,68,69,70	GND	Ground		
	NC	NC	5,6,7,8,9,10,11, 12,17,18,19,20, 21,57,58,59,60, 61,62,64	—	No connect		

## 1.5.3 F900D Pin Configuration



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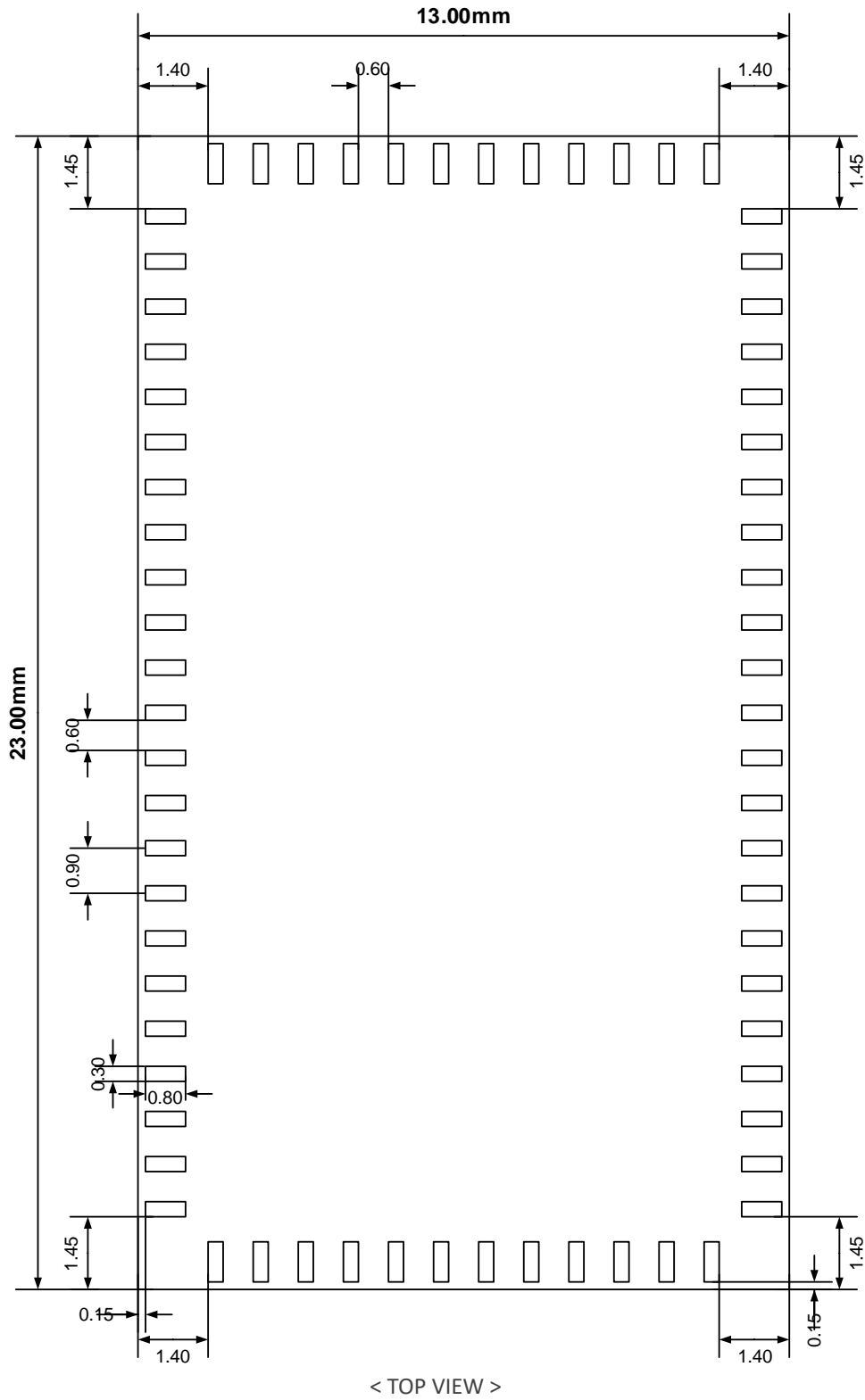


## 1.5.4 F900D Pin Description

Pin No.	Pin Name	Default Function	IN/OUT	Description	Note
1	GND	-	-	Ground	
2	NC	-	-	No connect	
3	GPIO_1	DIO_1	IN/OUT	GPIO	
4	GPIO_2 / STATUS LED	DIO_2	IN/OUT	GPIO	
5	GPIO_0	Status LED	OUT	GPIO, Status LED	Device Connection High output
6	FACTORY_RESET	FACTORY_RESET	IN	DISCONNECT & FACTORY_RESET	Active low, > 5ms to cause a reset
7	GPIO_3 /ADC_0	DIO_3	IN/OUT	GPIO, ADC_0	
8	GPIO_4 /ADC_1	DIO_4	IN/OUT	GPIO, ADC_1	
9	H/W RESET	H/W RESET	IN	Main Chipset HW Reset	Active low, > 5ms to cause a reset
10	GPIO_5 /ADC_2	DIO_5	IN/OUT	GPIO, ADC_2	
11	GPIO_6 /ADC_3	DIO_6	IN/OUT	GPIO, ADC_3	
12	VCC	-	IN	Power supply for system, 3.3V	
13	NC	-	-	No connect	
14	GND	-	-	Ground	
15	GND	-	-	Ground	
16	GND	-	-	Ground	
17	GPIO_12	DIO_12	IN/OUT	GPIO	
18	GPIO_11	DIO_11	IN/OUT	GPIO	
19	GPIO_10	DIO_10	IN/OUT	GPIO	
20	UART_RXD	UART_RXD	IN	UART_RXD	
21	UART_TXD	UART_TXD	OUT	UART_TXD	
22	GPIO_9 /CTS	DIO_9	IN/OUT	GPIO, UART_CTS	
23	GPIO_8 /RTS	DIO_8	IN/OUT	GPIO, UART_RTS	
24	GPIO_7	DIO_7	IN/OUT	GPIO	
25	NC	-	-	No connect	
26	CONFIG_MODE	CONFIG_MODE	IN	AT Command & PIO Setting Mode	High = Setting Mode, Low= General Mode
27	NC	-	-	No connect	
28	GND	-	-	Ground	

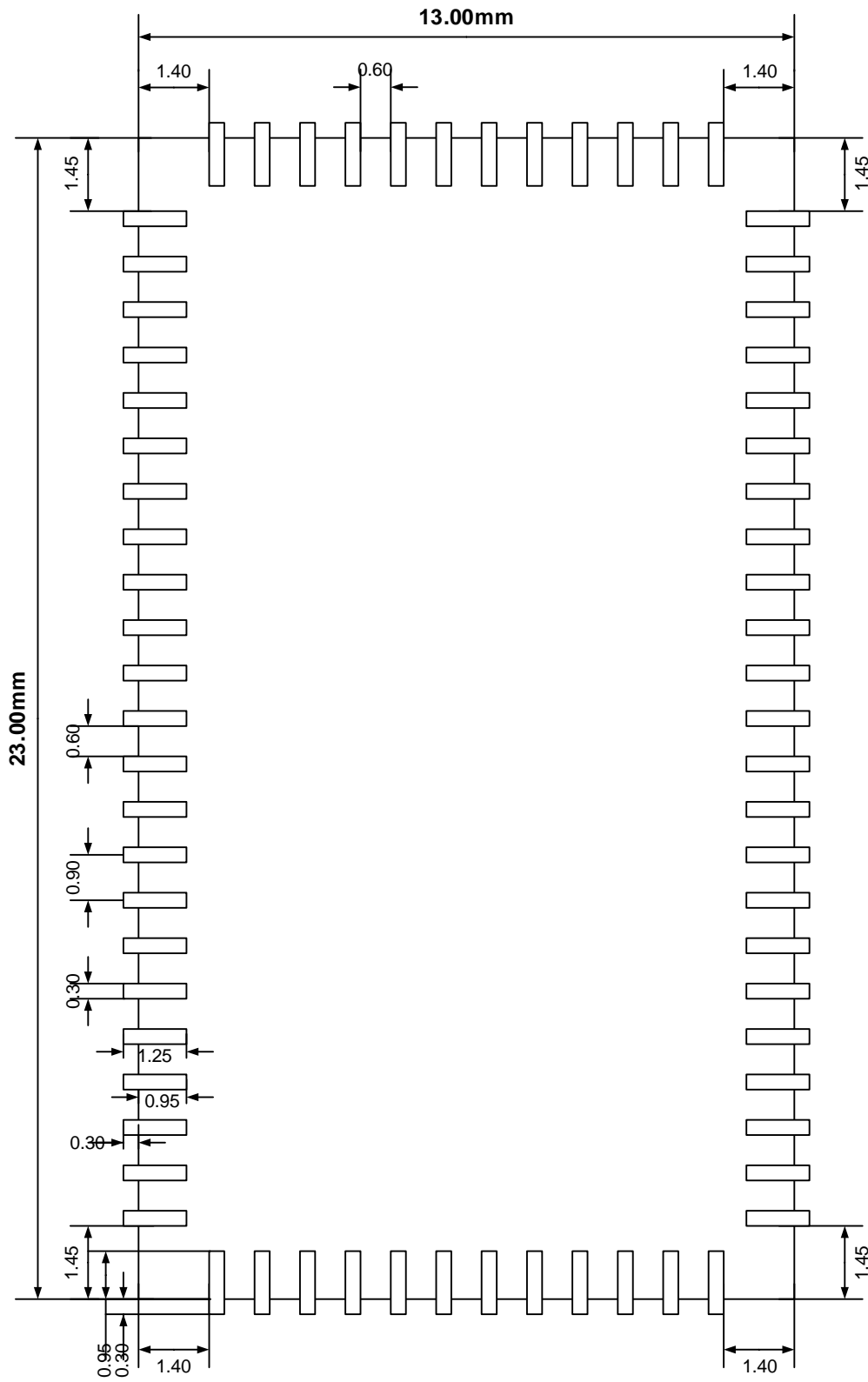
1.6 Dimensions

1.6.1 F900 Dimensions





## 1.7 F900 Land Pattern



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## 2. Characteristics

### 2.1 Electrical Characteristics

#### 2.1.1 Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Units
VCC	Supply voltage	-0.3	3.8	V
V <sub>I/O</sub>	Voltage on any digital pin	-0.3	VCC+0.3, MAX3.8	V
V <sub>In</sub>	Voltage on ADC input	-0.3	1.49	V
RF	Input level, RF pins	-	10	dBm
T <sub>stg</sub>	Storage temperature	-40	150	°C

#### 2.1.2 Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Units
Operating junction temperature	-30	25	85	°C
Operating supply voltage (VCC)	3.0	3.3	3.6	V
GPIO INPUT	3.0	3.3	3.6	V
ADC INPUT	0	-	1.48	V
Rising supply voltage slew rate	0	-	100	mV/μs
Falling supply voltage slew rate	0	-	20	mV/μs

#### 2.1.2 Power Consumption

Symbol	Parameter	Current	Unit
TX	Trnasmit MAX Power	330	mA
	Trnasmit MAX Power + UART 9600 bps		mA
RX	Receive		mA
Idle	Not connect, Receiver off		mA
Sleep	Interval(Sleep= ? ms, Wake-up= ? ms)		mA
Power-down	Shutdown-mode		mA
Reset	Quiescent, nReset asserted		mA

## 2.1.3 GPIO DC Characteristics

Parameter (VCC = 3.3V, 25°C)	Min.	Typ.	Max.	Units
VIH (Lowest GPIO input voltage reliably interpreted as a High)	0.8 * VCC	3.3	3.6	V
VIL (Highest GPIO input voltage reliably interpreted as a Low)	0		0.2 * VCC	V
VOH (Lowest GPIO output voltage reliably interpreted as a High)		2.88		V
VOL (Highest GPIO output voltage reliably interpreted as a Low)		0.46		V
F900 GPIO Current, DIO[5,6,7,16,17]			8	mA
F900 GPIO Current, DIO[8:15], DIO[28:32]			4	mA
F900D GPIO Current, GPIO[0,1,2]			8	mA
F900D GPIO Current, GPIO[3:12]			4	mA

## 2.1.4 ADC Characteristics

Parameter (VCC = 3.3V, 25°C)	Min.	Typ.	Max.	Units
Reference voltage (Fixed internal reference)		1.48	1.49	V
Input voltage range	0		1.49	V
Resolution		12		Bits
Sample Rate			200	ksps
Input impedance	200 kSamples/s, voltage scaling enabled. Capacitive input, Input impedance depends on sampling frequency and sampling time		>1	MΩ

## 2.2 RF Characteristics

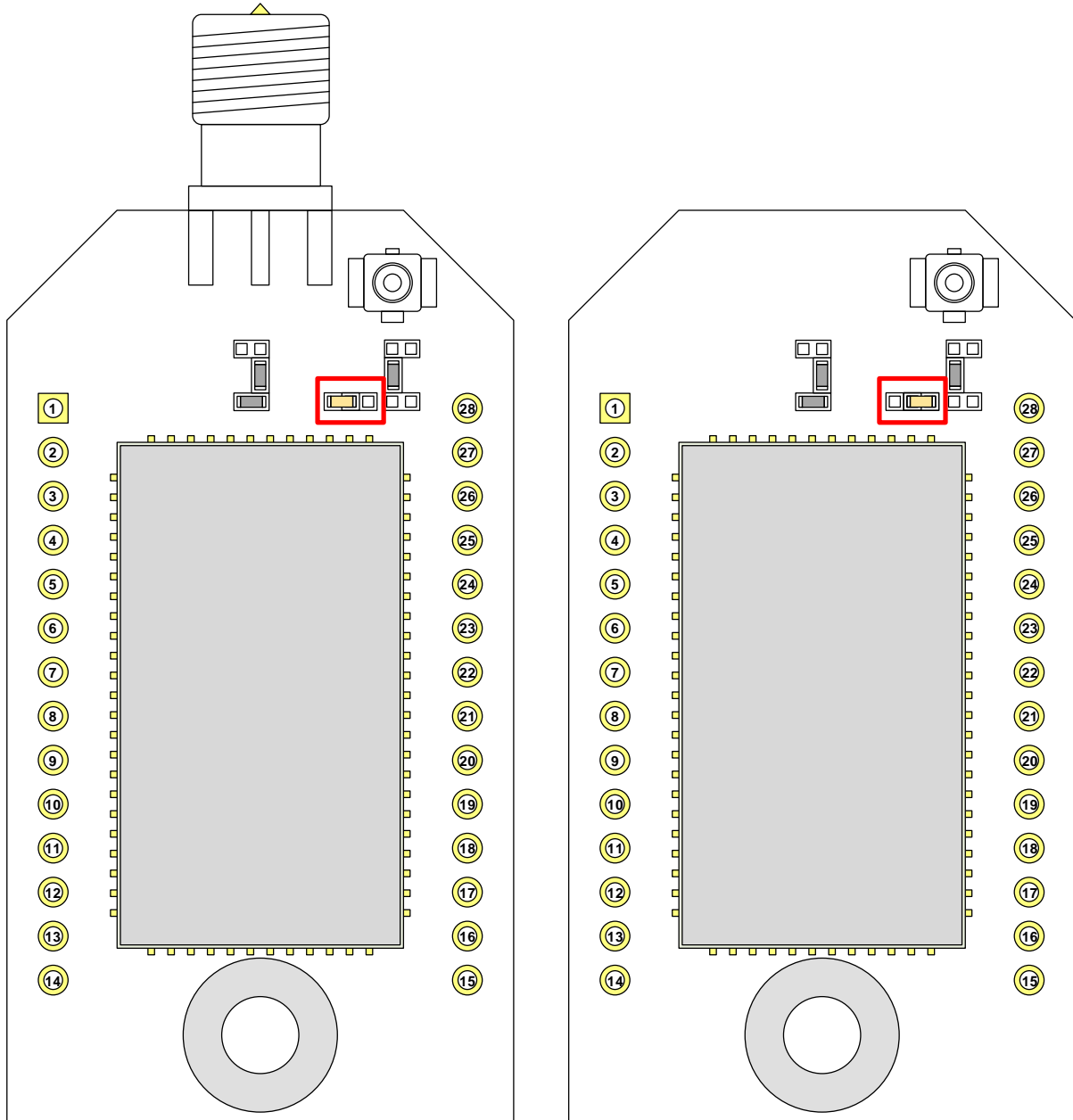
Parameter	Min.	Typ.	Max.	Units
Operating frequency	920.9		923.3	MHz
Max output power			18	dBm
Output power variation over temperature		±2		dBm
Harmonics	Second harmonic		< -30	dBm
	Third harmonic		< -30	dBm
Sensitivity	50 kbps 2-GFSK		-111	dBm
	SimpleLink LRM 5 kbps		-121	dBm
Saturation	Maximum input power level for 1% BER		+10	dBm
Selectivity and blocking,	±1 MHz from wanted signal		54	dB
	±2 MHz from wanted signal		59	dB
	±5 MHz from wanted signal		65	dB
	±10 MHz from wanted signal		80	dB

## 3. Terminal Description

### 3.1 UART Setting

Parameter		Remark
Baud Rate	2400 bps	The UART baud rate has nothing to do with wireless transmission parameters & won't affect the wireless transmit / receive features.
	4800 bps	
	9600 bps (Default)	
	19200 bps	
	38400 bps	
	57600 bps	
	115200 bps	
	230400 bps	
Flow Control	None (Default) or RTS/CTS(Optional)	
Parity	None( Default), Odd or Even	
Number of Stop Bits	1 ( Default) or 2	
Bits per Channel	8 ( Default)	

## 4. F900D Antenna selection



<SMA Antenna Mode>

<U.FL Antenna Mode>

The F900 default antenna is SMA Connector Antenna.  
If you need to change the antenna interface to U.FL, Please change the position of 100pF as shown on the right.

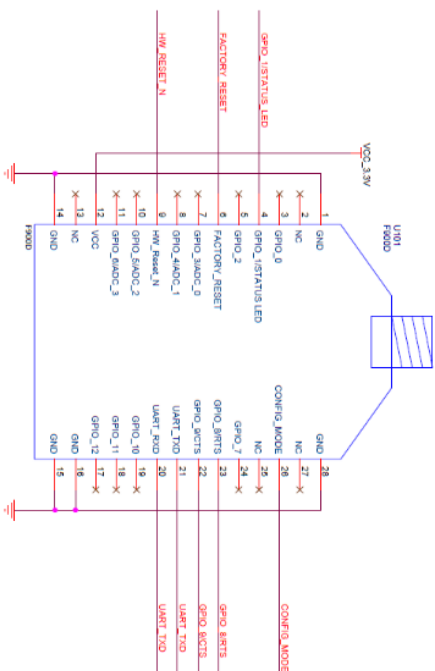
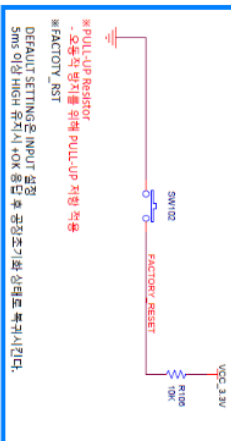
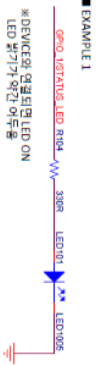


## 5. Application Schematic

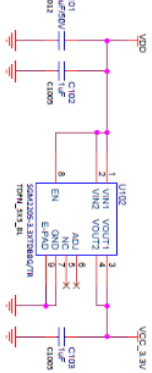
### ■ F900D REF. APPLICATION

#### CONNECTION STATUS LED OPTION

CONNECTION STATE	DESCRIPTION
HIGH	DEVICE CONNECTION
LOW	DEVICE DISCONNECTION



#### 3.3V Reference LDO



※ F900D Reference LDO  
-> Sgmicro  
-TPS79601DRR  
-> TI  
위 2가지 LDO 또는 500mA 이상 UltraLow-Noise, High PSRR LDO 사용

#### UART PORT



※ FLOW Control  
- 기본적으로 None이다, 설정 프로그램 Option 설정으로 사용 가능

#### CONFIG\_MODE



※ 위시  
- GPIO\_2JANC 0에서는 GPIO\_2JANC Config Mode로 High 입력 후  
AT Command으로 ACC 기능으로 변경할 수 있다.

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Revision: 1.0  
Date: Tuesday, March 05, 2025

Sheet 1 of 1

## 6. Reflow Temperature Profiles

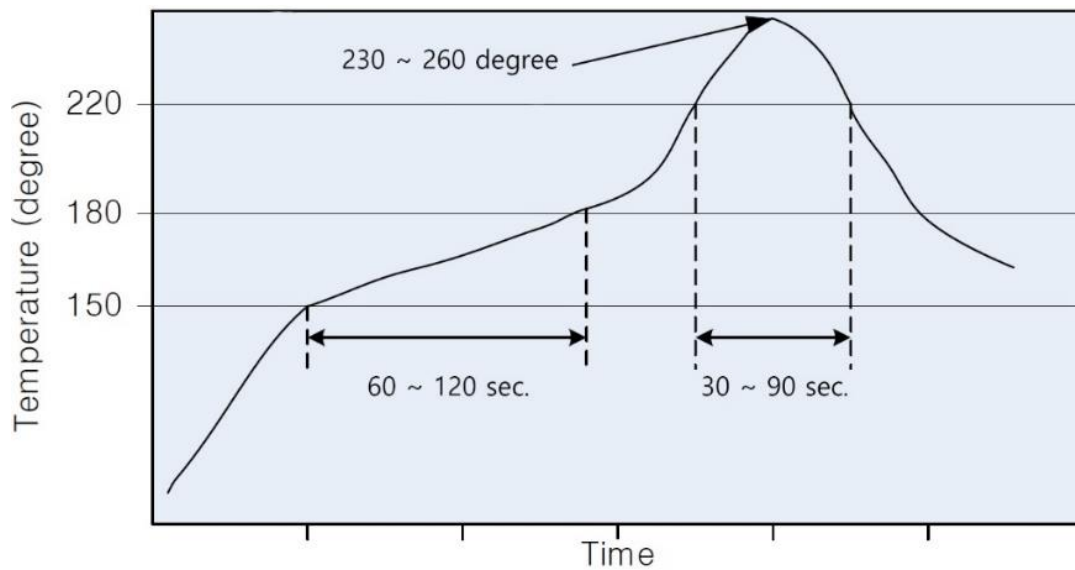
Recommended solder reflow profile are shown in below and follow the lead-free profile I accordance with JEDEC Std 20C.

Table lists the critical reflow temperatures.

Flux residue remaining from board assembly can contribute to electrochemical migration over time.

This depends on number of factors, including flux type, amount of flux residue remaining after reflow, and stress conditions during product use, such as temperature, humidity, and potential difference between pins.

Care should be taken in selecting production board/module assembly processes and materials, taking into account these factors.



Process Step	Lead-Free Solder
Ramp rate	3°C/sec
Preheat	Max. 150°C to 180°C, 60 to 180 sec
Time above liquidus	+220°C 30 to 90 sec
Peak temperature	+255°C ±5°C
Time within 5°C of peak temperature	10 to 20 sec
Ramp-down rate	6°C/sec max

**WARNING:** For F900

If you have reflow process multiple times in your product, you must be proceed this module in the final reflow process. If not the Shield can will drop out if shield-can adopted .