OEM/Integrators Installation Manual

Version	Note	Time
V0.1	Create a first-edition document	2018.12.17
V0.2	Modify document plate, correct professional nouns	2019.1.22
V0.3	Add test data,	2019.2.14
V0.4	Updating module structure dimensions	2019.3.19
V0.5	Update module PIN definition to update module size	2019.4.13

NOTE: product certification information is detailed in the product label marking

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1. Product Overview

WM118 high-Performance Wi-Fi module , is a cost-effective module for the application of the Internet , the module built-in Power Management module (PMU), adaptive 3.3v supply system, to Shorten the development time for customers, Reduce material costs.

Product features:

Power Management Unit (PMU)
Integrated DCDC and LDO, no off-chip PMU chip required
Supports single power input with a range of 3.3V

IEEE 802.11 features
Integrated power Amplifier (PA) for set success rate detector and closed-loop power calibration
Integrated T/R switch and RF Barron do not require off-chip matching network
Support for 802.11 b/g/n protocol
Support for 802.11e QoS enhancements (WMM)
Support for 802.11i (WPA/WPA2 PSK), Open/WEP/TKIP/CCMP and other encryption modes
Support for power saving mode

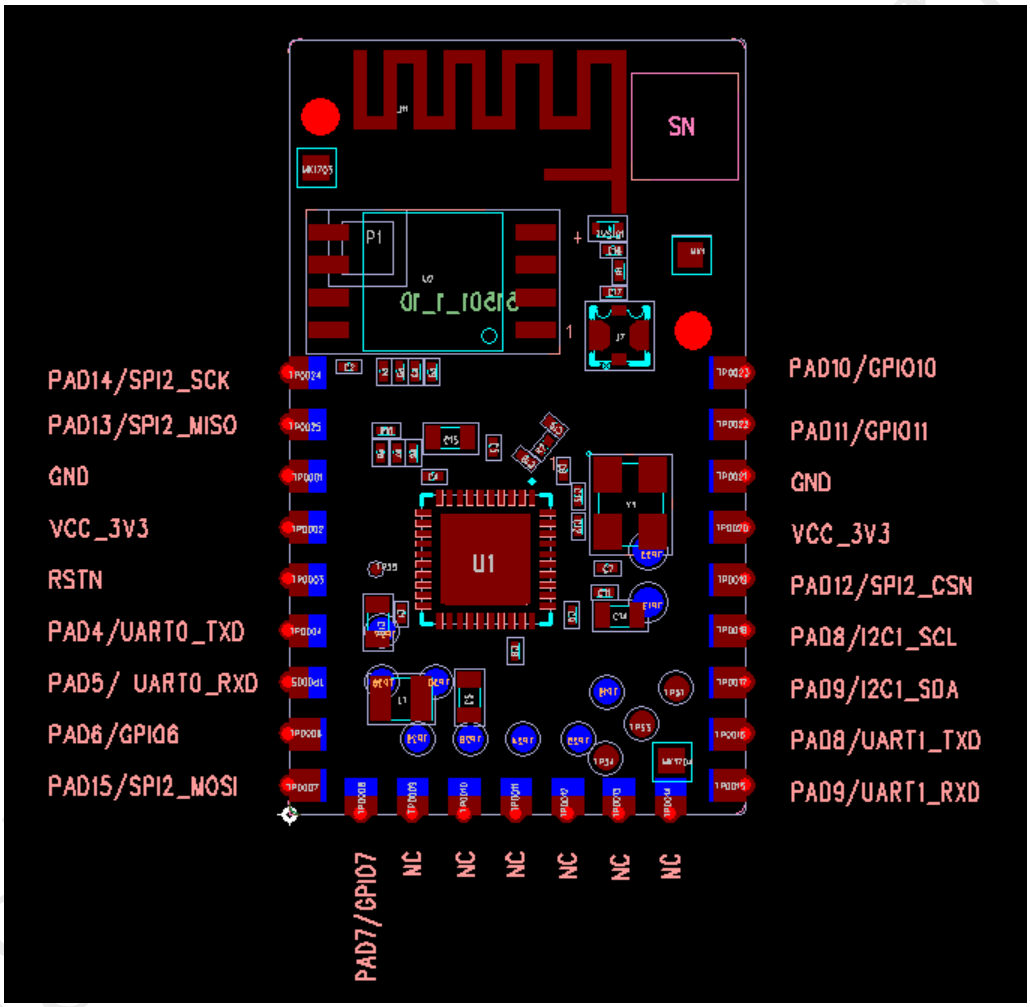
MCU features
ARM Cortex-M4F including 16kbyteCache
256K byte RAM, available storage instructions and data
Integrated 24kbyte Boot ROM
Integrated 4kbit OTP
MCU Main frequency:240MHz
XTAL clock: 26/40MHz Optional
Low power clock: RC 32.768kHz clock, eliminating external 32.768KHz XO Chip
Supports execution on SiP FLASH or external SPI flash inside THE chip (XIP)
Support for 4MBexternal SPI Flash
Support for OTA

Security
ARM Trust Zone,Crypto cell 310 security engine
AES/RSA/ECC/MAC
hmac/sha1/sha-224/sha256/sha512）库
True random number generator (TRNG)/PRNG
Flash encryption/Decryption
Dynamic addition/decryption of customer data
Integrated EFUSE OTP

Peripheral devices
UART/SPI/I2C/
Watchdog
RTC
DMA

Main application fields

- Smart Plugs and lamps
- Wearable Electronic Products
- Home appliances
- Home automation
- Positioning tags
- Industrial Wireless Control
- Sensor networks



2. Pin description

The Package definition diagram

PIN No.	PIN NAME	NOTE	
Pin1	GND		
Pin2	VCC	3.3 V	
Pin3	RST_N		
Pin4	UART0_TX		
Pin5	UART0_RX		
Pin6	GPIO	I/O	
Pin7	SPI_MOSI		Slava
Pin8	GPIO	I/O	
Pin9	GPIO		NC
Pin10	GPIO		NC
Pin11	GPIO		NC

Pin12	GPIO		NC
Pin13	GPIO		NC
Pin14	GPIO		NC
Pin15	LOG_RX		(Mass production, burning and hiring)
Pin16	LOG_TX		(Mass production, burning and hiring)
Pin17	I2C_SDA		
Pin18	I2C_SCL		
Pin19	SPI_CS		
Pin20	VCC	3.3 V	
Pin21	GND		
Pin22	GPIO	I/O	
Pin23	GPIO	I/O	
Pin24	SPI_CLK		
Pin25	SPI_MISO		

The Pin definition comparison table

3. Feature Introduction

3.1. MCU

The module's built -in arm cortex-m4f kernel has floating-POINT units (FPU) and Memory PROTECTION units (MPU), as well as the up –level ARM Cortex optimized for embedded applications THUMB® instruction set nested vector interrupt Controller (NVIC) is tightly integrated with the processor kernel for low latency and interrupt processing. Low cost debugging solution with Serial Line debug port (SW-DP) or serial line JTAG Debug Port (SWJ-DP) Debugging accesses multiple high-performance bus interfaces.

3.2. Storage

3.2.1 ROM

Built-in 24K byte ROM, which stores BootRom, is primarily used for image burning/secure boot/non-secureboot feature mode selection.

3.2.2 SRAM

Provides up to 256KB of on-chip SRAM. Internal RAM is used not only for code and data storage, but also for shared memory in WIFI packet buffers. Can be flexibly configured by the software. Internal SRAM can configure Data retention in powersaving mode.

3.2.3 FLASH

Provides built-in 2MBSIP Flash, supports up to 16MB QSPI flash memory, hardware encryption and flash remapping capabilities to protect user programs AND data, and accelerate OTA upgrades.

Soc Internal integration Cache to improve Flash access and operational efficiency.

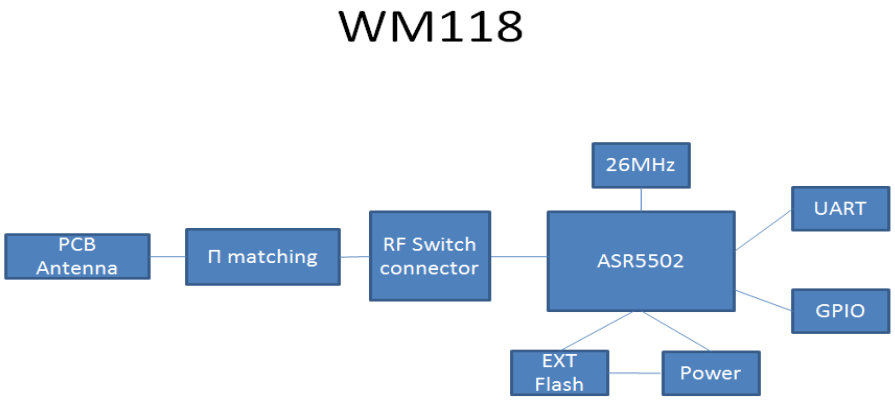
3.2.4 One-Time Programmable Memory

Provides 4Kbit disposable programmable (OTP) memory.

3.3. Peripheral list

Peripheral name	Number	Characteristics
UART	2	APB Peripheral.
		RTS/CTS included.
SPI	1	APB Peripheral.
		SPI + TI SSP + Microwire NS.
		Master x2, Slave x1
I2C	1	APB Peripheral.
GPIO	4	AHB Peripheral.
		Input / Output configurable.
		Rising/Falling edge detection and interrupt.

3.4. Block diagram



4. Electrical parameters

4.1. Electrical characteristic

Parameters	Name	Min_ Value	Type_ Value	Max_ Value	Unit
Storage temperature		-55		125	℃
Operating temperature		-40		85	℃
Storage humidity		0		85	%
Supply voltage	VBAT_IN	3	3.3	3.6	V

4.2. Power Consumption Description

Conditions	Current (mA)
Deep-sleep	0.01
Light-sleep	0.35
RX (11b, 1Mbps)	31.2
RX (11b, 11Mbps)	31.2
RX (11g, 54Mbps)	33.4
RX (11n, MCS7)	34.4
TX (11b, 1Mbps, 20dBm)	232
TX (11b, 11Mbps, 20dBm)	232
TX (11g, 54Mbps, 16dBm)	156.5
TX (11n, MCS7, 15dBm)	163.3

4.3. Wi-Fi RF

Wi-Fi RF Information

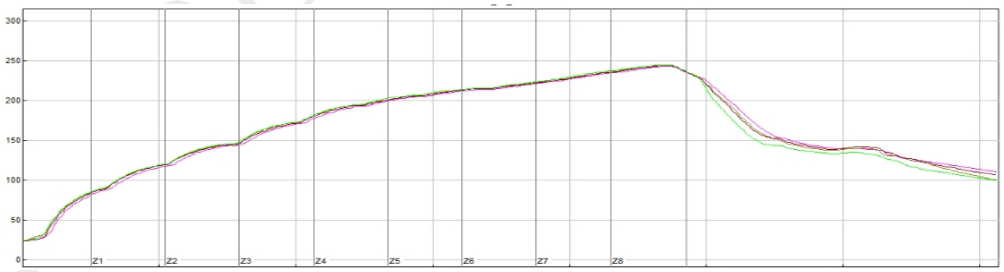
Name	Detailed features
freq_ band	2412-2462MHz
Wi-Fi Standard	IEEE 802.11b/g/n
Modulation mode	11b: DBPSK, DQPSK,CCK for DSSS 11g: BPSK, QPSK, 16QAM, 64QAM for OFDM 11n: MCS0~7,OFDM
Data rate	11b：1,2,5.5和11Mbps 11g : 6,9,12,18,24,36,48,54Mbps 11N_ht20:mcs0~7, Max 72.2Mbps

Wi-Fi receivesensitivity reference table

Against	Rate (Mbps)	Channel	RX Sensitivity (dBm)
	1	1	-97.8
		4	-98.3
		7	-98.3
		10	-98.3
		13	-97.8
		1	-94.3
		4	-93.8
		7	-94.3

11b	2	10	-94.3
		13	-93.8
	11	1	-89.8
		4	-88.8
		7	-89.3
		10	-89.8
		13	-88.8
11g	6	1	-92.8
		4	-92.8
		7	-93.3
		10	-94.3
		13	-93.3
	54	1	-75.8
		4	-76.8
		7	-75.8
		10	-76.3
		13	-75.8
11n	MCS0	1	-92.8
		4	-92.3
		7	-92.8
		10	-93.3
		13	-92.3
	MCS7	1	-71.8
		4	-72.8
		7	-72.8
		10	-72.3
		13	-71.3

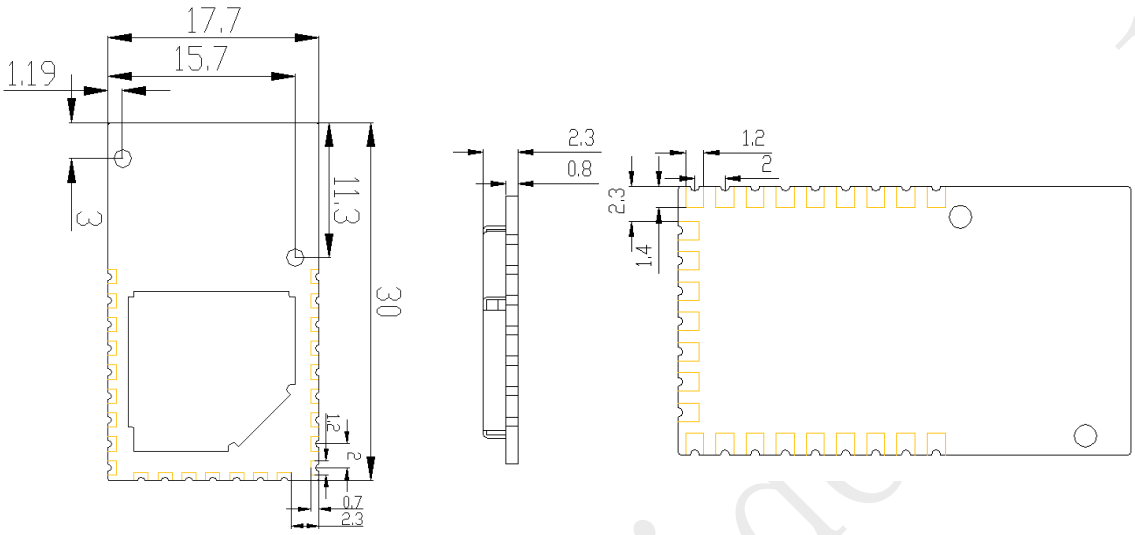
4.4. Reflow Welding Temperature curve



Module Reflow Welding temperatureReference

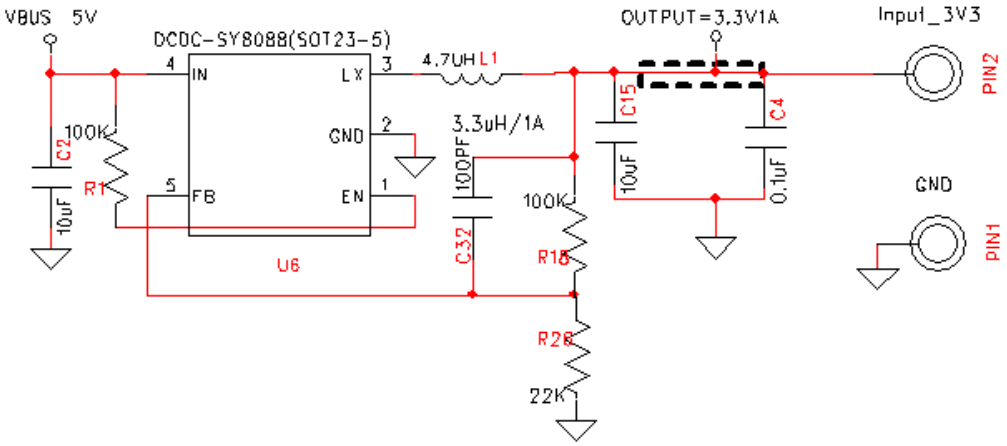
5. Module Mechanical Dimensions

Dimensions (length ×width ×height):30x17.7x2.3mm



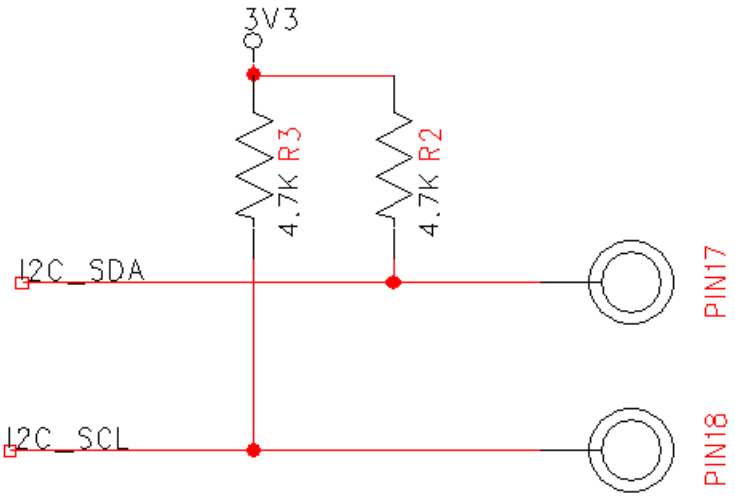
6. Reference Circuits

6.1. External Power Referencedesign



6.2. External interface Reference Design

I2C Reference Circuit:



7. Warning

Important Notice to OEM integrators

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part
15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s).
The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

End Product Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: 2APXW-WM118”
The FCC ID can be used only when all FCC compliance requirements are met.

Antenna Installation

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,
(2) The transmitter module may not be co-located with any other transmitter or antenna.

(3) Only antennas of the same type and with equal or less gains as shown below may be used with this module. Other types of antennas and/or higher gain antennas may require additional authorization for operation.

Antenna type	2.4GHz band Peak Gain (dBi)
PCB	2.61dBi

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

List of applicable FCC rules

This module has been tested and found to comply with part 15C requirements for Modular Approval.

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter
rules) listed on the grant, and that the host product manufacturer is responsible for compliance to
any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also
contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that
the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.
As long as 2 conditions above are met, further transmitter test will not be required. However, the
OEM integrator is still responsible for testing their end-product for any additional compliance
requirements required with this module installed.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.