User Manual

Model No. : <u>LM78</u>

Company Name: <u>Shenzhen Liangming Technology Co., Ltd.</u>

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FCC Statement

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 or more 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.

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1. Overview

LM78 module delivers highly integrated Wi-Fi SoC solution to meet users' continuous demands for efficient power usage, compact design and reliable performance in the Internet of Things industry.

With the complete and self-contained Wi-Fi networking capabilities, LM78 module can perform either as a standalone application or as the slave to a host MCU. When LM78 module hosts the application, it promptly boots up from the flash. The integrated high-speed cache helps to increase the system performance and optimize the system memory. Also,LM78 module can be applied to any microcontroller design as a Wi-Fi adaptor through SPI / SDIO or I2C / UART interfaces.

LM78 module integrates antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules. The compact design minimizes the PCB size and requires minimal external circuitries.

Besides the Wi-Fi functionalities, LM78 module also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor and on-chip SRAM. It can be interfaced with external sensors and other devices through the GPIOs. Software Development Kit (SDK) provides sample codes for various applications.

2. Wi-Fi Protocols

•802.11 b/g/n support

•2 x Wi-Fi interface, supports infrastructure BSS Station mode / P2P mode / SoftAP mode support

•Hardware accelerators for CCMP (CBC-MAC, counter mode), TKIP (MIC, RC4), WAPI (SMS4), WEP (RC4), CRC

•802.11n support (2.4 GHz)

•Supports MIMO 1×1 and 2×1, STBC, and 0.4 μs guard interval

•WMM

•UMA compliant and certified

•Antenna diversity and selection (software managed hardware)

•Configurable packet traffic arbitration (PTA) with dedicated slave processor based design provides flexible and exact timing Bluetooth co-existence support for a wide range of Bluetooth Chip vendor.

•Dual and single antenna Bluetooth co-existence support with optional simultaneous receive (Wi-Fi/Bluetooth) capability

3. Specifications

Categories	Items	Parameters
Wi-Fi	Certification	Wi-Fi Alliance
	Protocols	802.11 b/g/n
	Frequency Range	2.4G ~ 2.5G (2400M ~2483.5M)
	Tx Power	802.11 b: +20 dBm
		802.11 g: +17 dBm
		802.11 n: +14 dBm
	Rx Sensitivity	802.11 b: –91 dbm (11Mbps)
		802.11 g: –75 dbm (54Mbps)
		802.11 n: –72 dbm (MCS7)
	Antenna	PCB Trace, External, IPEX Connector, Ceramic Chip
Hardware	CPU	Tensilica L106 32-bit processor
	Peripheral Interface	UART/SDIO/SPI/I2C/I2S/IR Remote Control GPIO/ADC/PWM/LED Light &Button
	Operating Voltage	2.5V ~3.6V
	Operating Current	Average value: 80 mA
	Operating Temperature Range	–40°C ~ 125°C
	Storage Temperature Range	–40°C ~ 125°C
	Package Size	QFN32-pin (5 mm x 5mm)
	External Interface	-
Software	Wi-Fi Mode	Station/SoftAP/SoftAP+Station
	Security	WPA/WPA2
	Encryption	WEP/TKIP/AES
	Firmware Upgrade	UART Download / OTA (via network)
	Software Development	Supports Cloud Server Development / Firmware and SDK for fast on-chip programming
	Network Protocols	IPv4, TCP/UDP/HTTP/FTP
	User Configuration	AT Instruction Set, Cloud Server, Android/iOS App

4. Applications

- Home appliances

- Home automation

- Smart plugs and lights

- Mesh network

- Industrial wireless control

- Baby monitors

- IP cameras

- Sensor networks

- Wearable electronics

- Wi-Fi location-aware devices

- Security ID tags

- Wi-Fi position system beacons

If the FCC identification number is not visible when the module is installed inside the host, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

"Contains Transmitter Module Contains FCC ID: 2AQJL-LM78" or

"Contains FCC ID: 2AQJL-LM78" Any similar wording that expresses the same meaning may be used.

RF Exposure Statement

To maintain compliance with FCC's RF Exposure guidelines, this equipment should be installed and operated with minimum distance of 20cm the radiator your body. This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.