LTM4136 single band module

Datasheet

V1.3

Feb. 2018

Document Revision History

Revision	Date	Description
V1.0	2017/12/25	Initial release
V1.1	2018/01/03	1. Update Ambient temperature 2. Add current consumption in Table 5.3
V1.2	2018/01/17	1. Modify module pin out and pin assignments 2. Update power consumption
V1.3	2018/02/06	1. Modify Table 4.1 "EXT_PMU_EN" description 2. Modify Table 4.2 "DEBUG_RTS" description 3. Modify RF characteristics in Table 6.1&6.2

Notice

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1. Introduction

1.1 General Description

The LTM4136 IOT module is based on the MediaTek MT3620AN single chip tri-core WiFi MCU. It applies the Microsoft Azure Sphere security architecture to provide an unprecedented level of security to connected device manufacturers.

Azure Sphere is a solution for creating highly-secured, connected MCU powered devices. The Azure Sphere solution brings together the best of Microsoft's expertise in cloud, software, and silicon—resulting in a unique approach to security that starts in the silicon and extends to the cloud. Azure Sphere contains three components that work together to keep devices protected and secured in today's dynamic threat landscape: Azure Sphere certified MCUs, the Azure Sphere OS and the Azure Sphere Security Service.

For more information please visit the Azure Sphere website. (link to www.microsoft.com/azure-sphere)

1.2 Hardware Description

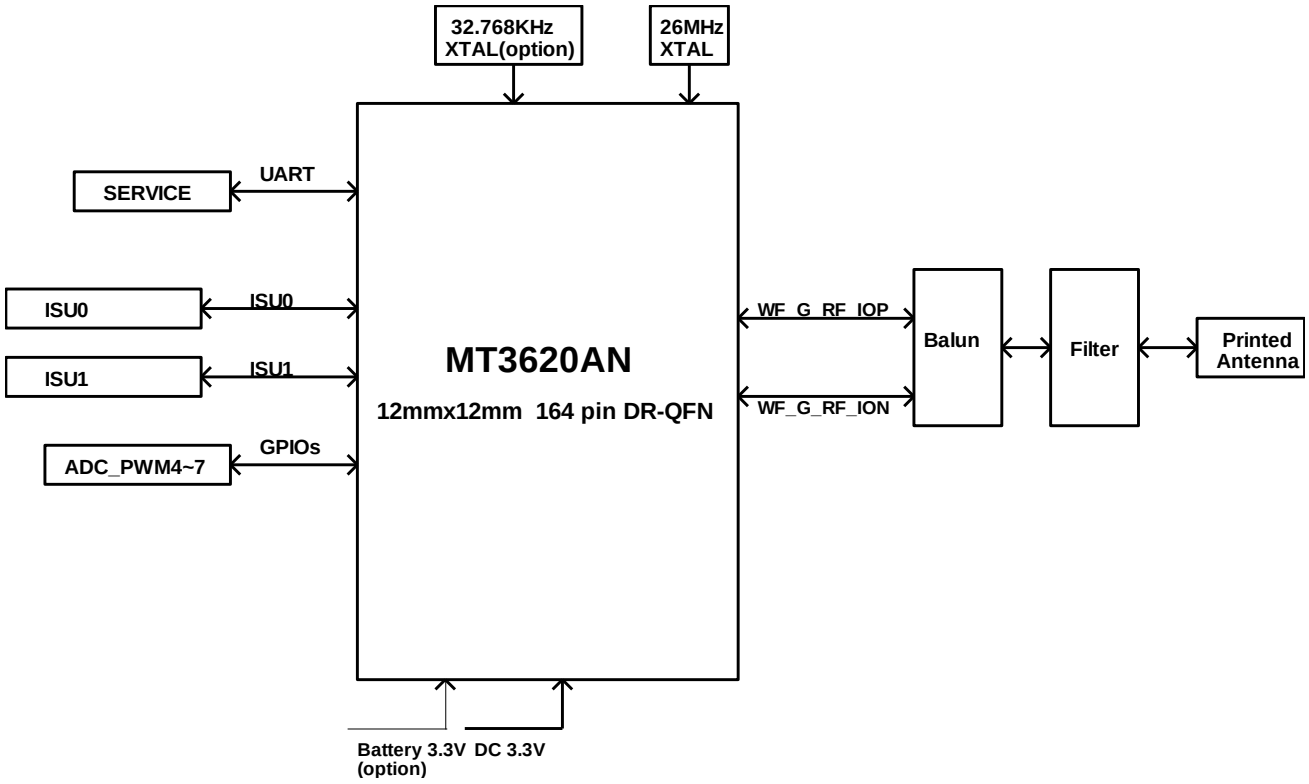
- Size: 30 x 22 x 2.5mm ±0.1mm
- Operating voltage: 3.3V ± 5%
- Internal 2.5V LDO for ADC requirement
- NOR-flash capacity: 16MB
- Operating temperature range: -40°C ~ +85°C
- Package: stamp hole with 28 pads
- Host interface[1]:
    - UART X 2
    - PWM X 4 (Future release)
    - ADC X 4 (Future release)
    - GPIO: 10 GPIO pins with multi-functions

[1] Not all these interfaces will be available for use with initial Codename 4x4 software releases. Please refer to the "Codename 4x4 MT3620 Support Status" document from Microsoft for information about how much memory and which hardware features are available to end-user applications.

1.3 Wireless Specification

- Standard supported: IEEE802.11n
- Frequency: 2.412 to 2.484GHz
- Channels: up to 13 channels

2. System Block Diagram



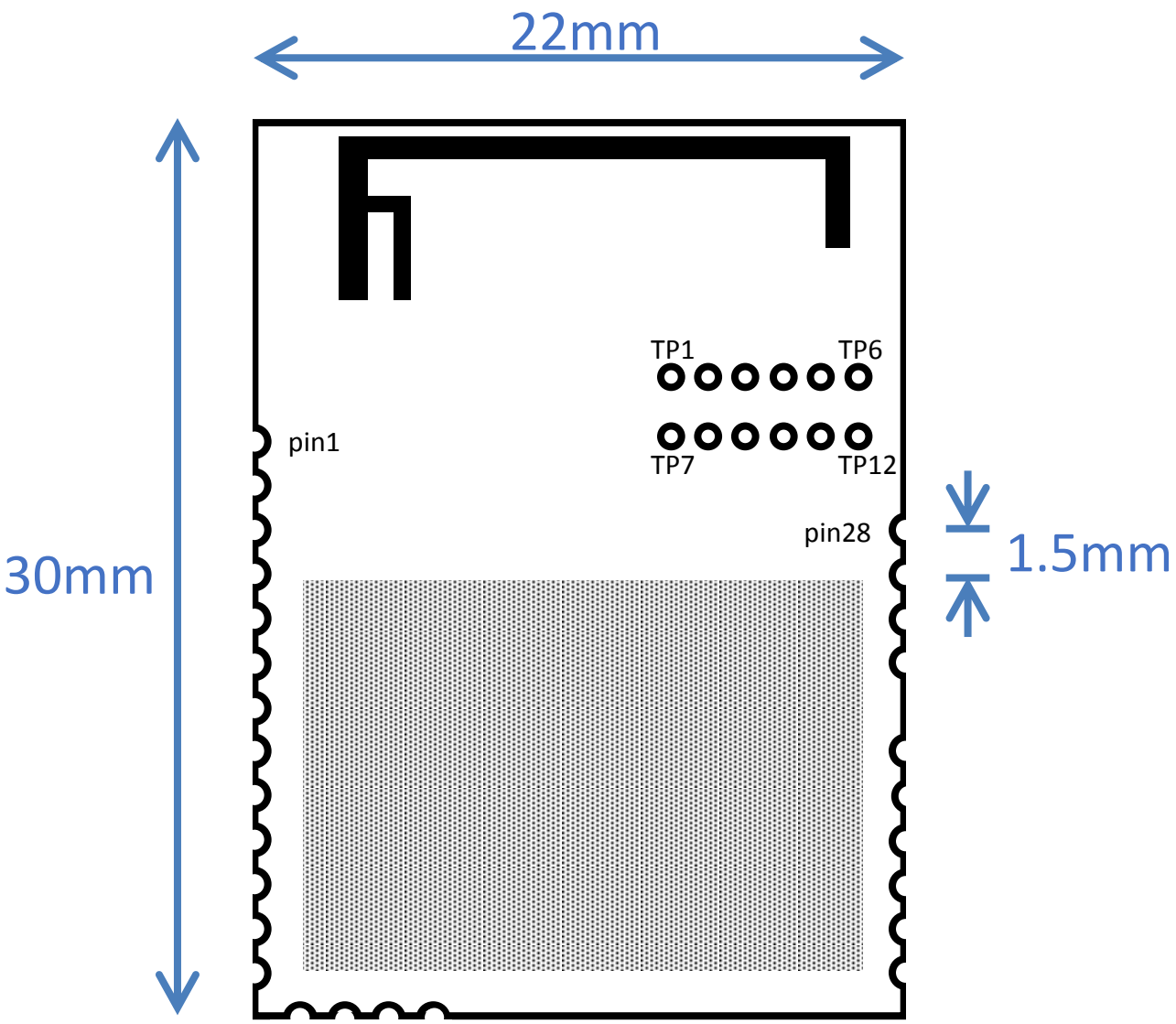
3. Features

- Single band 2.4GHz WiFi module
- Single PCB trace antenna (no antenna diversity)
- Option to fit U.FL/IPX connector for external antenna instead of trace antenna

- Option to fit 32kHz crystal for lower power RTC
- Integrated PA/LNA

4. LTM4136 Pin-out

4.1 Pin-out top view—28 stamp-hole pins



4.2 Pin assignment and descriptions

Table 4-1 Stamp-hole pins

Signal Name	Type	Pin	Description	
ADC0_PWM4	AI/DIO	1	Configurable as GPIO, ADC input or PWM/timer	
ADC1_PWM5	AI/DIO	2	Configurable as GPIO, ADC input or PWM/timer	
ADC2_PWM6	AI/DIO	3	Configurable as GPIO, ADC input or PWM/timer	
ADC3_PWM7	AI/DIO	4	Configurable as GPIO, ADC input or PWM	
GPIO26_SCLK0_TX0	DIO	5	Configurable as GPIO or ISU0 SPI CLK or UART TX	
GPIO27_MOSI0_RTS0_CLK0	DIO	6	Configurable as GPIO or ISU0 SPI MOSI, UART RTS or I2C CLK	
GPIO28_MISO0_RX0_DATA0	DIO	7	Configurable as GPIO or ISU0 SPI MISO, UART RX or I2C DATA	
GPIO29_CSA0_CTS0	DIO	8	Configurable as GPIO or ISU0 SPI CS or UART CTS	
GPIO30_CSB0	DIO	9	Configurable as GPIO or ISU0 SPI CS	
GPIO32_MOSI1_RTS1_CLK1	DIO	10	Configurable as GPIO or ISU1 SPI MOSI, UART RTS or I2C CLK	
GPIO34_CSA1_CTS1	DIO	11	Configurable as GPIO or ISU1 SPI CS or UART CTS	
GPIO31_SCLK1_TXD1	DIO	14	Configurable as GPIO or ISU1 SPI CLK or UART TX	
GPIO33_MISO1_RXD1_DATA1	DIO	15	Configurable as GPIO or ISU1 SPI MISO, UART RX or I2C DATA	
GPIO35_CSB1	DIO	16	Configurable as GPIO or ISU1 SPI CS	
SERVICE_TXD	DO	23	Codename 4x4 Service UART TXD	The Codename 4x4 Service UART supports provisioning, app updates, manufacturing test and in-field debugging.
SERVICE_RTS	DO	24	Codename 4x4 Service UART RTS	
SERVICE_RXD	DI	25	Codename 4x4 Service UART RXD	
SERVICE_CTS	DI	26	Codename 4x4 Service UART CTS	
SYSRST_N	DI	22	System reset	
WAKEUP	DI	21	Wake from deep sleep (RTC mode)	
EXT_PMU_EN	DO	20	Enable/disable external PMU when in deep sleep mode (RTC mode)	
3V3_RTC	P	19	3.3V for real-time clock	
3V3	P	17	3.3V power	
GND	P	12,13, 18, 27,28	Ground	

P=power, A=analog, D=digital, I=input, O=output.

4.3 Debugging/manufacturing test point assignment and descriptions

Table 4-2 Test points

Signal Name	Type	TP	Description	
3V3	P	1	3.3V power	
GND	P	2	Ground	
DEBUG_RTS	DO	3	Codename 4x4 OS debug RTS/Strapping pin when MT3620 boot up	
SYSRST_N	DI	4	System reset	
RECOVERY_TXD	DO	5	Codename 4x4 flash re-imaging Recovery UART TXD	
RECOVERY_RXD	DI	6	Codename 4x4 flash re-imaging Recovery UART RXD	
RECOVERY_CTS	DI	7	Codename 4x4 flash re-imaging Recovery UART CTS	
RECOVERY_RTS	DO	8	Codename 4x4 flash re-imaging Recovery UART RTS	
SWO	DO	9	ARM SWO debug output	For IO CM4F cores only; a single SWD channel is shared between them.
SWD_CLK	DI	10	ARM SWD clock	
SWD_DIO	DIO	11	ARM SWO debug output	
DEBUG_TXD	DO	12	Codename 4x4 OS debug TXD	

5. Electrical Specifications

5.1 Absolute maximum ratings

Table 5-1 summarizes the absolute maximum ratings and Table 5-2 lists the recommended operating conditions for the LTM4136.

Absolute maximum ratings are those values beyond which damage to the device can occur. Functional operation under these conditions, or at any other condition beyond those indicated in the operational sections of this document, is not recommended.

NOTE The maximum rating for input signals follows the supply domain of the module.

Table 5-1 Absolute maximum ratings

Symbol	Description	Range	Unit
VDD33	VDD supply for module	–0.3 to 4.0	V
VIH MIN	Minimum digital I/O input voltage (VDD=3.3 V)	–0.3	V
3.3 V I/O VIH MAX	Maximum digital I/O input voltage (VDD=3.3 V)	VDD +0.3	V
RFin	Maximum RF input (50Ω input)	+10	dBm
Tstore	Storage temperature	–45 to 135	°C

Tj	Junction temperature		125	℃
ESD	Electrostatic discharge tolerance	HBM	2000	V
		CDM	500	

5.2 Recommended operating conditions

These conditions apply to all DC characteristics unless otherwise specified. Tamb = 25 °C, VDD33= 3.3 V.

Table 5-2 Recommended operating conditions

Symbol	Parameter	Min	Typ	Max	Unit
VDD33	VDD supply for module	3.14	3.3	3.46	V
$T_{AMBIENT}$	Ambient temperature	-40	-	85	℃

5.3 Current consumption

Table 5-3 Current consumption

Power Mode	Description	Typical Current Consumption	Remark
Without WiFi	WiFi is under sleep mode when rest of subsystem is running.	230mA Max 390mA	
Full Function	All subsystems running at full speed, including WiFi.	530mA Max 765mA	

Note *1: 0.01mA/0.02mA with/without external 3.3v source PMIC control switch respectively. (For A0 silicon it's 0.01/0.04mA.)
Note *2: The current values are measured under typical case (TT silicon and 25C/1.15V) and the TDP (maximum thermal design power) includes simulation worst case condition (TT/125C/1.15V/MC99, MC99 is PTPX power simulation library).
Note *3: It depends on how busy the peripherals are and how they are configured.
Note *4: This data is based on 100% Wi-Fi transmission on the 5GHz band at 14dBm.
Note *5: It depends on the I/O loading and flash power consumption.

6. RF Parameters

6.1 Transmitter characteristics for 2.4GHz operation

Table 6-1 summarizes the transmitter characteristics for the LTM4136.

Table 6-1 Transmitter characteristics

Mode	Data Rate	Power (dBm)	EVM (dB)
B	DSSS 1M	16±2	-10
	DSSS 2M	16±2	-10
	DSSS 5.5M	16±2	-10
	DSSS 11M	16±2	-10
G	OFDM 6M	16±2	-8
	OFDM 9M	16±2	-11
	OFDM 12M	16±2	-13
	OFDM 18M	16±2	-16
	OFDM 24M	16±2	-19
	OFDM 36M	16±2	-22
	OFDM 48M	16±2	-25
	OFDM 54M	16±2	-28
HT20	HT20 MCS0	16±2	-22
	HT20 MCS1	16±2	-22
	HT20 MCS2	16±2	-22
	HT20 MCS3	16±2	-22
	HT20 MCS4	16±2	-30
	HT20 MCS5	16±2	-31
	HT20 MCS6	16±2	-31
	HT20 MCS7	16±2	-31

6.2 Receiver characteristics for 2.4GHz operation

Table 6-2 summarizes the receiver characteristics for the LTM4136.

Table 6-2 Receiver characteristics

Mode	Data Rate	RX Sensitivity (dBm)
B	DSSS 1M	-92
	DSSS 2M	-90
	DSSS 5.5M	-86
	DSSS 11M	-84
G	OFDM 6M	-90
	OFDM 9M	-87
	OFDM 12M	-86
	OFDM 18M	-82
	OFDM 24M	-82
	OFDM 36M	-78
	OFDM 48M	-73
	OFDM 54M	-72
N	HT20 MCS0	-87
	HT20 MCS1	-86
	HT20 MCS2	-84
	HT20 MCS3	-81
	HT20 MCS4	-77
	HT20 MCS5	-74
	HT20 MCS6	-71
	HT20 MCS7	-69