SG901-1203 Intelligent Wi-Fi Module

Overview

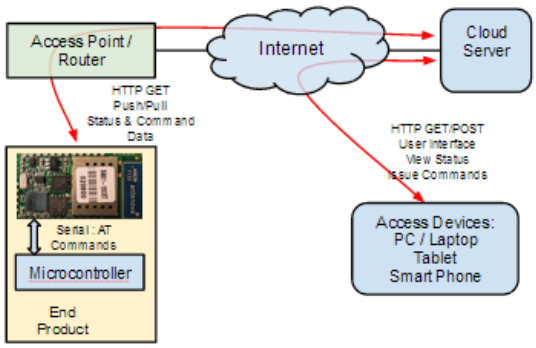
The SG901-1203 intelligent Wi-Fi Module is a standalone 802.11 b/g/n web content solution. With low power consumption and small form factor, the SG901-1203 is ideal for fixed and mobile wireless applications; especially challenging battery operated applications that can leverage the SG901-1203's 200 uA sleep current mode.

The SG901-1203 provides the full TCP/IP stack enabling end products to leverage AT Commands for wireless internet connectivity. Configured around a single-chip 802.11 transceiver, 32-bit microcontroller with extensive GPIO suite, 4Mb Program Flash, 8Mb Flash, and 64KB RAM, the SG901-1203 enables easy integration of wireless web access into exiting or new products with minimal software development.

The module is housed in a 28-pin LGA and incorporates required timing clocks and voltage regulators. The module is available with either an embedded micro 2.45GHz ISM band antenna, or u.FL connector for external antenna connection; as well as commercial and industrial temperature ranges.

Applications

- Deeply embedded wireless
- Home/Industrial automation
- Wireless remote sensors
- iPad/Android remote control



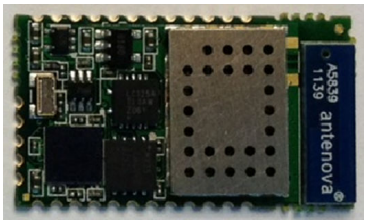
Features

- 2.4GHz IEEE 802.11 b/g/n transceiver FCC/CE/IC certified
- 26.92 x 15.24 x 2.35 mm small form factor
- 200 uA sleep, 125 mA Rx, 330 mA Tx ultra-low power consumption
- Embedded and u.FL configurations
- 8Mb flash memory
- 4Mb program flash memory
- 64KB RAM
- Real-time clock
- 3.3V regulated power supply operation
- Ad hoc and infrastructure modes
- WEP, WPA, WPA2, WPA2 Enterprise support
- TCP/IP stack based on lwIP
- Simple AT command set with Over-the-Air FW update capability
- Web Server/client
- DHCP/DNS client
- HTTP client
- Web server
- RoHS compliant

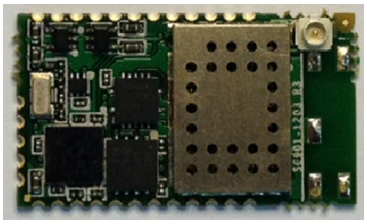
Supporting Documents

- SG922-0006 EVK User's Guide
- SG914-0040 EVK Datasheet
- SG922-0007 AT Command Set
- SG922-0008 FW Update Procedure

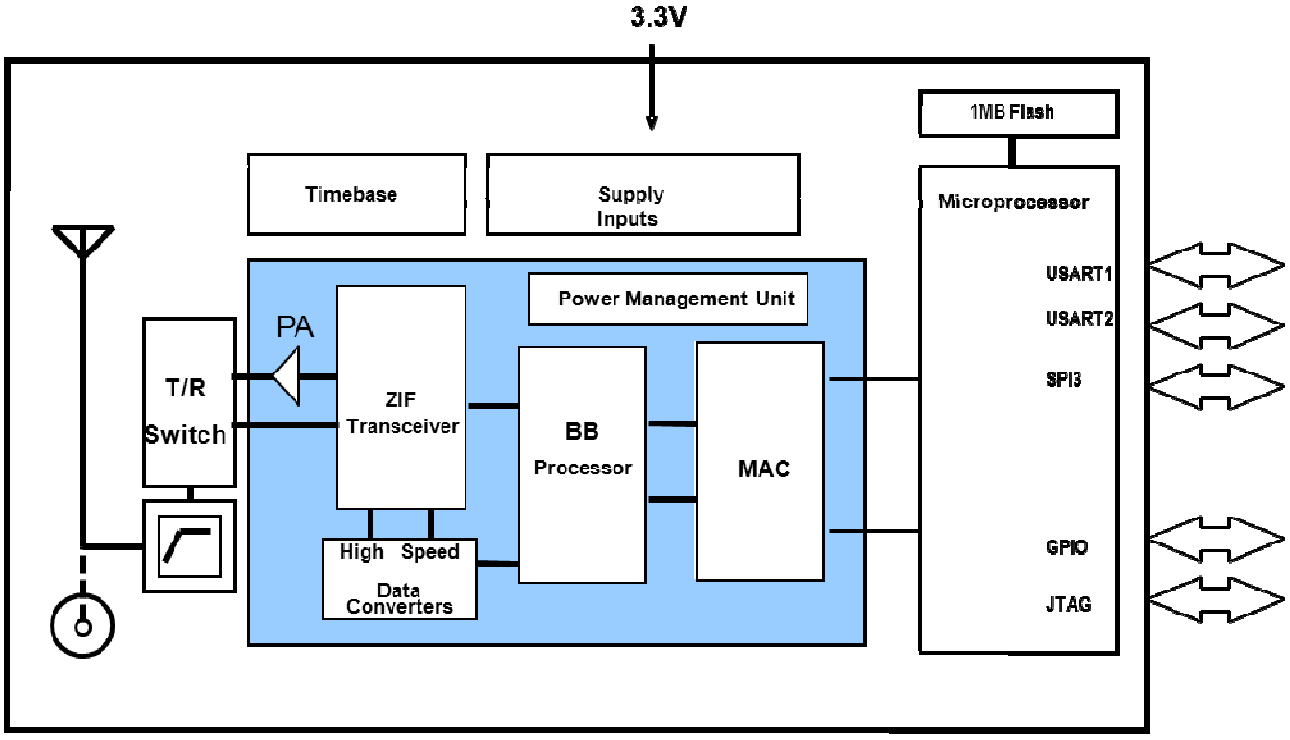
SG901-1203



SG901-1203U



SG901-1203 Block Diagram



Certifications

		Comment
FCC ID	VRA-SG9011203	On board antenna and external SG901-1066 with connector versions
IC ID	7420A-SG9011203	On board antenna and external SG901-1066 with connector versions
ETSI	Compliant	Approved with on board antenna and connector versions

Note: Sagrad SG901-1066 is the only approved antenna using the UFL connector version of the SG923-0011

Ordering Information

Description	Order Number	Notes
Commercial temperature range module with embedded antenna configuration	SG901-1203-CT	0° to 70°C Packaging: Cut tape/TR
Industrial temperature range module with embedded antenna configuration	SG901-1203-ET	-40° to 85°C Packaging: Cut tape/TR
Commercial temperature range module with u.FL antenna configuration	SG901-1203u-CT	0° to 70°C Packaging: Cut tape/TR
Industrial temperature range module with u.FL antenna configuration	SG901-1203u-ET	-40° to 85°C Packaging: Cut tape/TR
SG901-1203 EVK	SG923-0011	
Note: For orders less than 500 units, Sagrad ships in cut tape, otherwise Tape and Reel (TR) packaging is used.		

General Electrical Specifications (Typical results are at room temperature only

for all specifications)

Parameter		Test Condition / Comment	Min.	Typ.	Max.	Units
Absolute Maximum Ratings						
3.3V Supply			-0.3		4.0	V
Vin for 5V tolerant pins			-0.3		5.5	V
Vin for all other pins			-0.3		2.8	V
Operating Conditions and Input Power Specifications						
Operating Temperature Range		Commercial	0		70	°C
		Extended Temperature	-40		85	°C
3.3V Supply	Input Supply Voltage	3.3V Supply input	3.1	3.3	3.6	V
	Power Save Mode Current	100mS beacon period, 75 byte beacons @ 1Mbps, short Preamble, DTIM = 3		20		mA
	Sleep Current	3.3V 25°C, no data retention, wakeup on events		200		uA
	Active RX w/power save (Note1)	DTIM 1, All beacons Received, no active data (average value)		900		uA
	Average TX Current	Peak, transmitting packets, 3.3V, 25°C		330		mA
	Average RX Current	Peak, Receiving packets, 3.3V, 25°C		125		mA

Note1: Calculated from measurements of each subsection

Digital Interface Specifications

Parameter		Test Condition / Comment	Min.	Typ.	Max.	Units
Digital Interface Specifications, I/O pins						
Inputs	VIH		1.4			V
	VIL		0.6			V
Outputs	VOH	IOH = 4mA	1.8			V
	VOL	IOL = 4mA			.4	V
Programmable Pull Up or Down Resistors		When turned on	80		120	Kohms

RF Characteristics

Parameter		Test Condition / Comment	Min.	Typ.	Max.	Units
RX Sensitivity (note 2)	11b, 1Mbps			-96		dBm
	11b, 2 Mbps			-93		dBm
	11b, 5.5 Mbps			-91		dBm
	11b, 11 Mbps			-87		dBm
	11g, 9Mbps			-89.5		dBm
	11g, 18Mbps			-86		dBm
	11g, 36Mbps			-80		dBm
	11g, 54Mbps			-74.5		dBm
	11n, MCS1, 13Mbps			-86.5		dBm
	11n, MCS3, 26Mbps			-81.5		dBm
	11n, MCS5, 52Mbps			-74		dBm
	11n, MCS7, 65Mbps			-71		dBm
Channel to Channel De-sensitivity	CH1 to 14	11g, 54Mbps 10% PER		1		dB
Maximum Input Signal	CH7	11g, 54Mbps		-20		dBm
Adjacent Channel Rejection	11Mbps			38		dBc
	9Mbps			20		dBc
	54Mbps			4		dBc
	MCS1			24		dBc
	MCS7			3		dBc
TX Output Power (Note 2)	11b, 1Mbps	@802.11b spectral mask		18.3		dBm
	11b, 11Mbps			18.3		dBm
	11g, 9Mbps	@802.11g spectral mask		18.3		dBm
	11g, 54Mbps	EVM = -27dB, 4.5%		13.7		dBm
	802.11n MCS1	@802.11n spectral mask		18.3		dBm
	802.11n MCS7	EVM = -27dB		13.5		dBm
On Board Antenna Gain		Average		-1.2		dBi
External Antenna Gain		SG901-1066 average including cable loss		2.8		dBi

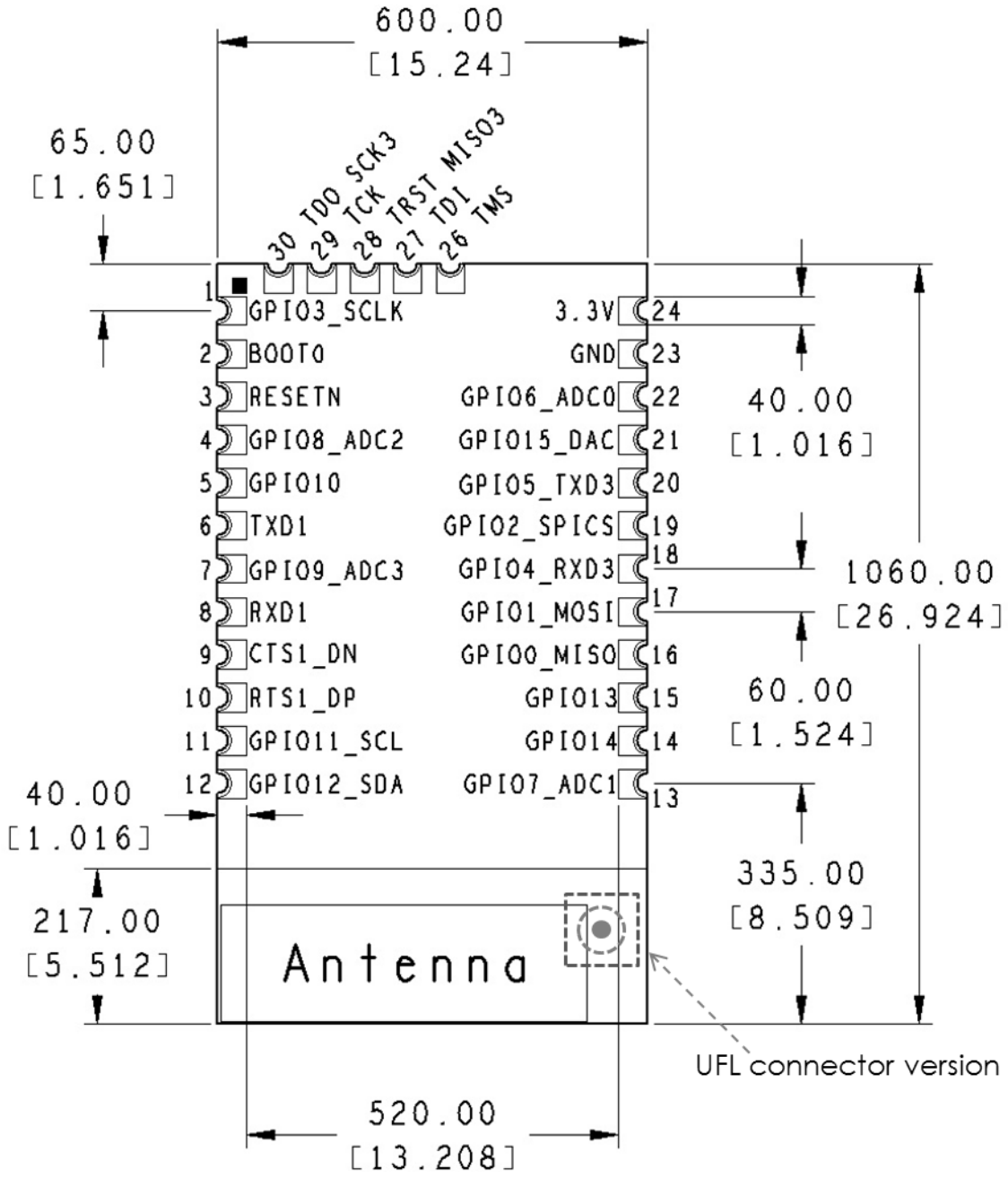
Note 2: Output Power and sensitivities are measured with a 50 ohms connection at the antenna port.

LGA Pin Out and Description

SIGNAL NAME	PIN NUMBER	DESCRIPTION	NOTES
GPIO Pins and alternate SPI functions			
GPIO0_MISO	16	Alternate SPI MISO pin. Pull High on power up to reset settings	Input pull down and 5V tolerant
GPIO1_MOSI	17	Alternate SPI MOSI	Input pull down and 5V tolerant
GPIO2_SPICS	19	Alternate SPI Chip Select	Floating and 5V tolerant
GPIO3_SCLK	1	Alternate SPI Clock	Input pull down and 5V tolerant
GPIO6_ADC0	22	Wake Up/Sleep Inhibit	Input pull down and 5V tolerant
Reserved Pins for future use			
GPIO4_RXD3	18		
GPIO5_TXD3	20		
GPIO7_ADC1	13		
GPIO8_ADC2	4		
GPIO9_ADC3	7		
GPIO11_SCL	11		
GPIO12_SDA	12		
GPIO15_DAC	21		
Monitoring purpose with no alternate function			
GPIO10	5	LED drive, Blinking while run	
GPIO13	15	LED drive, WIFI Link	
GPIO14	14	LED drive, Power up	
UART Pins			
RXD1	8	UART Receive data input	5V tolerant
TXD1	6	UART Transmit data output	5V tolerant
CTS1_DN	9	UART Clear to Send input	Active low, 5V tolerant
RTS1_DP	10	UART Request to send output	Active low, 5V tolerant
RESET			
RESETn	3	Reset input (See firmware load description)	Active low for 5ms with pull up to 2.5VDC. Not 5V tolerant.
JTAG Test Pins (NOTE)			
TRST_MISO3	28	JTAG TRST_N, Used for 1M Flash	5V tolerant
TDI	27	JTAG TDI	5V tolerant
TMS	26	JTAG TMS	5V tolerant
TCK	29	JTAG TCK	5V tolerant
TDO_SCK3	30	JTAG TDO, Used for 1M Flash	5V tolerant
SUPPLY Pins and paddle			
3.3V	24	Voltage supply	Decouple with 10uF capacitor
Ground	23	Ground	
Ground Paddle (NOTE)	25	Ground	Add plenty of ground vias for thermal dissipation and ground return
Firmware load Pin access			
BOOT0	2	(See firmware load description)	
NOTE: Pins 26 to 30 and the Module Paddle, labeled Pin 25 are additional pins when compared to available Bluetooth Modules in the market.			
NOTE: To enable the firmware download, Pin BOOT0 needs to be high during power up. RESETn pin need to be pulled low at least 5ms to initiate the firmware download sequence. The latest firmware is available at www.sagrad.com for download. Please refer to SG922-0008 document for full description			

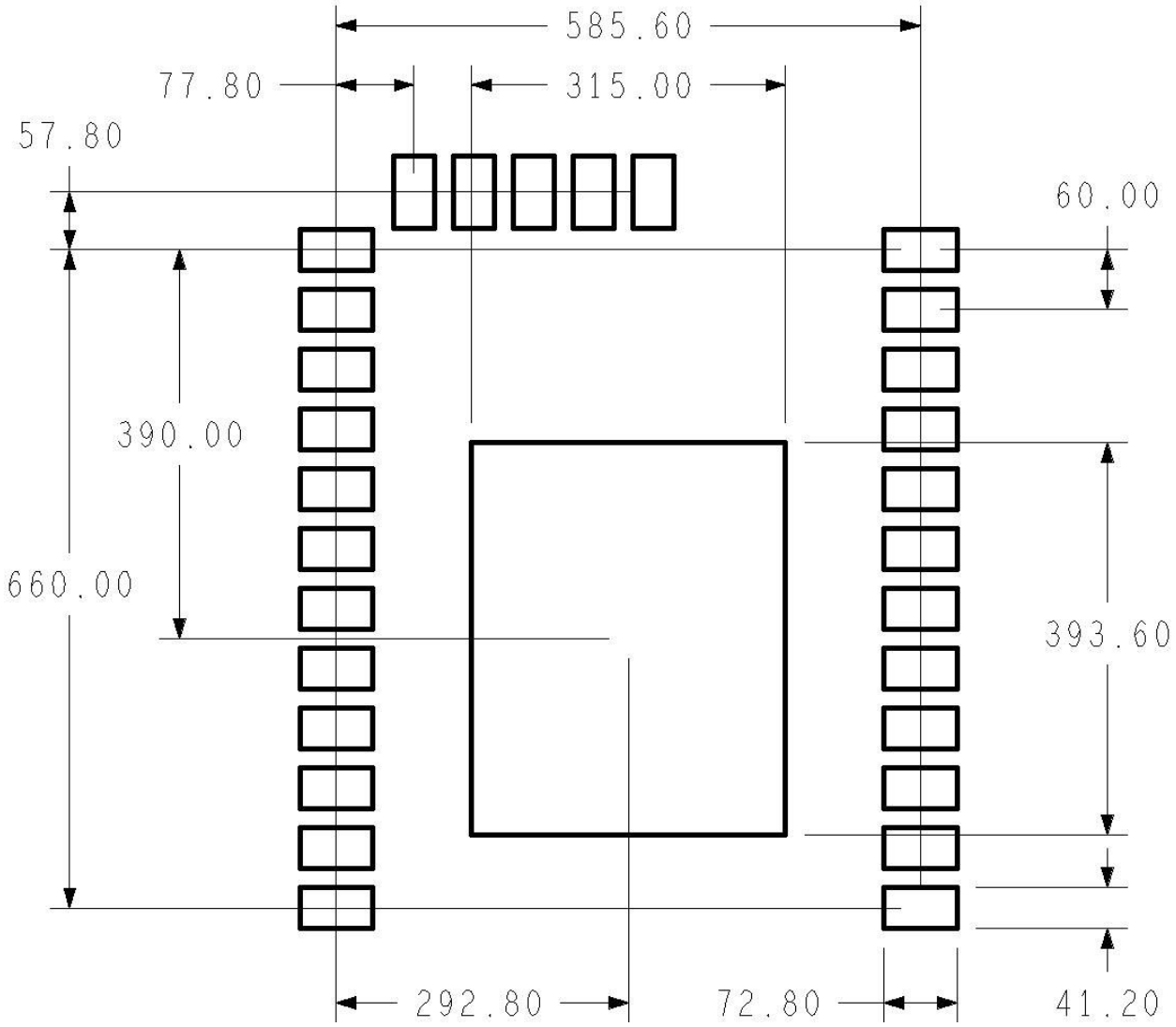
Top View

Dimensions: L: 26.92mm W: 15.24mm H: 2.35mm



NOTE: An antenna area of 217X520 mils need to be free of any ground metallization or traces under the unit. The area extending away from the antenna should be free from metal on the PCB and housing to meet expected performance.
Pin 25 is the required paddle ground and is not shown in this diagram.

Recommended Layout (Top View)

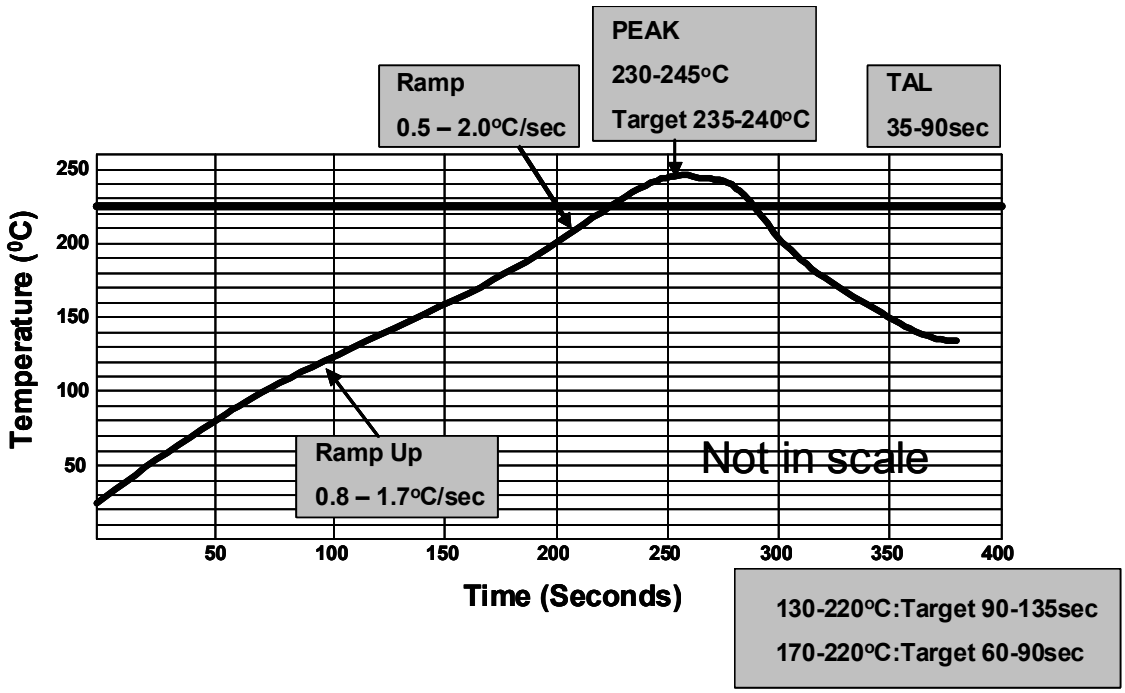


PCB design requires detailed review of center exposed pad. This pad requires good thermal conductivity. Soldering coverage should be maximized and checked via x-ray for proper design. There is a trade off in providing enough soldering for conductivity and too much which allows the module to “float” on the paddle creating reliability issues. Sagrad recommends two approaches, a large center via that allows excess soldering to flow down into the host PCB with smaller vias arount it. Or many smaller vias with just enough space for the viscosity of the chosen solder/flux to allow some solder to flow into the smaller vias. Each of these approaches need to result in 60% or more full contact solder coverage on the paddle after reflow. Sagrad strongly encourages PCB layout teams to work with their EMS providers to ensure vias and solder paste designs will result in satisfactory performance.

Note: Pin 1 is on the top left corner of this diagram. **See note on the Top View Pin out for antenna to PCB interference requirements for the layout.**

Mechanical

- Maximum Peak Reflow Temperature: 240°C
- Recommended Reflow Profile:

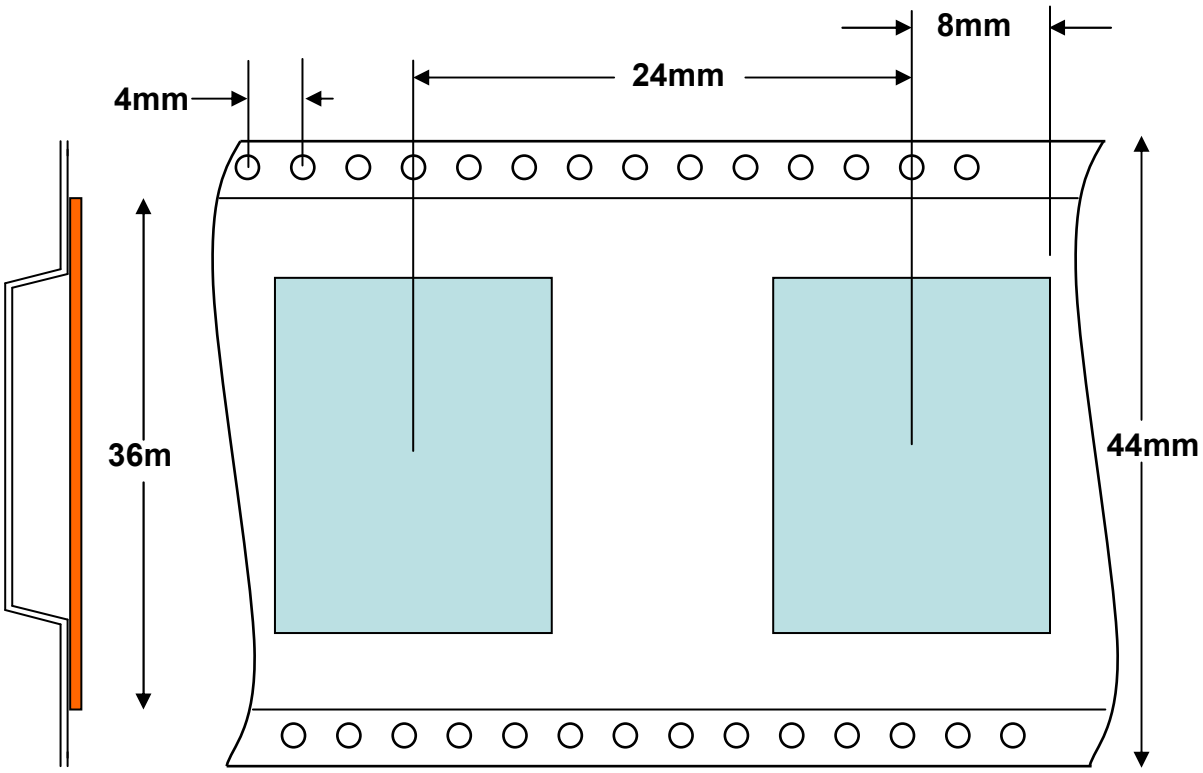


Moisture Level Sensitivity: 3

Limiting component for moisture is the PCB used in the module.

Packaging

The part comes packaged in Tape and Reel



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