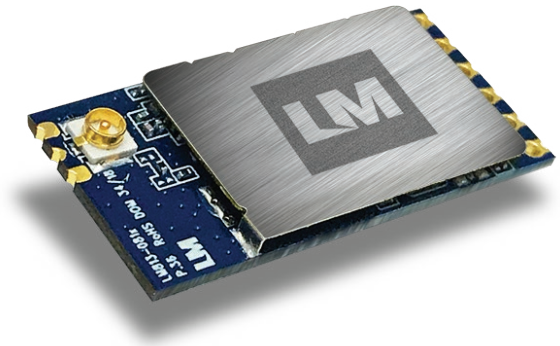
LM813 WiFi and Dual Mode Bluetooth® 4.2 Combination Module

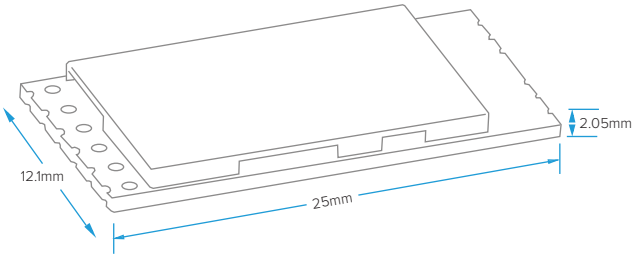
Host Controller Interface (HCI) via USB Interface

Product	LM813
Part No	See Last Page
Revised	24/JAN/2020
Version	v1.1

Linux Android Win 7 Win 8 Win 10

Bluetooth® WIFI





Features

1T1R One IPEX Antenna Output

802.11ac MIMO solution for 5G band

433Mbps High Speed WLAN

IEEE standards support: IEEE 802.11ac/a/b/g/n

WPA/WPA2 certification for WiFi

Bluetooth® 4.2 Dual Mode

5v or 3.3v Supply Options

USB 2.0 and PCM interface

Support for WiFi/Bluetooth® Coexistence, with both technologies active a slight drop in Wi-Fi throughput is noted.

Bluetooth® adaptive power management mechanism

Linux Support Kernel : 2.6.24 ~ 4.15.17
Supported for Windows 7, 8, 8.1 and 10

CE / FCC Certified Solution

SIG Certification & CCATS due shortly.

RoHS, REACH and WEEE Compliant Solution

Overview

The LM813 Series Combination Module supports both WiFi 802.11ac with data rates up to 433Mbps and Bluetooth® 4.2.

USB Interface module with added terminals for enabling GPIO's and Bluetooth Functions to enable coexistence.

This IPEX, module operates under 2.4GHz or 5Ghz. LM813 is compliant to IEEE 802.11ac/ a/b/g/n, and Bluetooth® v2.1, v3.0 and v4.2 standards.

Currently Bluetooth® includes EDR transmission and supports bandwidths up to 2Mbps, or in HS Mode up to 3Mbps.

The module design is based on a Realtek reference, which LM engineer's have made some modifications, which include; Upgrading the PCB material to -40°C rated components and using a high quality -40°C low temperature crystal. The main IC from Realtek is only rated at 0°C

Our temperature testing is conducted up to -40°C and the module has achieved good results. Although the testing period is only subject to a 72h test period, we have run previous modules using the same brand of BOM material in longer periods of temperature testing. These tests are continuous and enable us to support for -20°C Operating and -30°C Storage Temperature under our own 24 month warranty, from date of dispatch.
We have added a heat resistant coating to the bottom of the module enabling higher temperature protection during the re-flow processing in production.

LM813 WiFi and Dual Mode Bluetooth® Combination Module

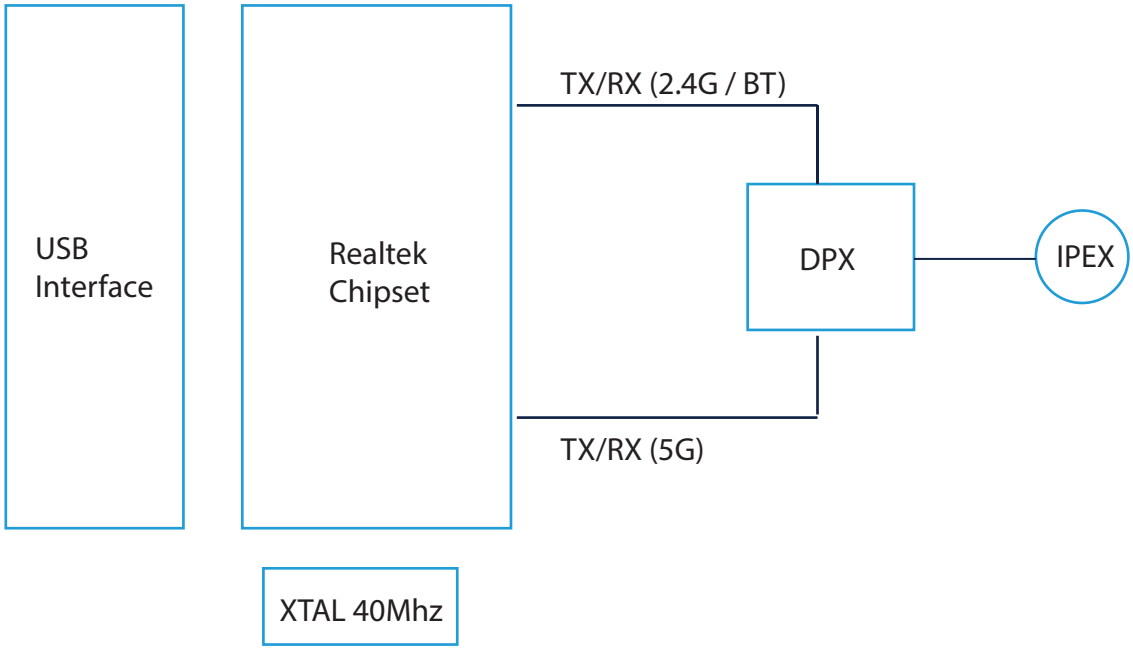
Host Controller Interface (HCI) via USB Interface

Product LM813
Part No See Last Page

General Specification

Wireless	
Wireless Standard	WiFi: 802.11 a/b/g/n/ac Bluetooth®: v2.1+EDR/v3.0+HS/v4.0/4.2
Module Type	Host Controller Interface (HCI)
OS Compatibility	Linux, and Windows versions to be confirmed.
Security	WiFi; WPA, WPA-PSK, WPA2, Bluetooth®; Simple Paring
Network Architecture	WiFi; Ad hoc mode (Peer-to-Peer) and Infrastructure mode Software AP; WiFi Direct Bluetooth®; Pico Net; Scatter Net, Low Power Mode(Sniff Mode)
Hardware	
Chipset	Realtek Chipset
Antenna	Single IPEX Connector
Interfaces	USB 2.0

Block Diagram



LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

Product LM813
Part No See Last Page

General Specification (Continued)

RF Characteristics	
Range (in open space)	WiFi: Up to 180m Bluetooth®: Up to 10m
Data Transfer Rate	WiFi: 802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n MCS0 to 7 for HT20MHz, MCS0 to 7 for HT40MHz Bluetooth®: Basic Rate 1Mbps; Enhanced Rate 2, 3Mbps; High Speed 6, 9, 12, 18, 24, 36, 48, 54Mbps
Frequency	2.4GHz and 5GHz ISM Band
Modulation Scheme	WiFi: CCK, DQPSK, DBPSK, BPSK, QPSK,16QAM, 64QAM, 256QAM Bluetooth®: 8DPSK, π/4 DQPSK, GFSKFSK
Spread Spectrum	WiFi: IEEE 802.11b: CCK (Complementary Code Keying) IEEE 802.11g/n/a/ac:OFDM (Orthogonal Frequency Division Multiplexing) Bluetooth®: FHSS (Frequency Hopping Spread Spectrum)
Antenna	IPEX Antenna x 2
Security	WPA, WPA2
RF Output Power (tolerance ± 2dBm)	WiFi 17dBm – 802.11b@CCK 11Mbps 15dBm – 802.11g@OFDM 54Mbps 13dBm – 802.11n@MCS7_HT20 13dBm – 802.11n@MCS7_HT40 13dBm – 802.11a@OFDM 54Mbps 9dBm – 802.11ac@NSS1 MCS9_BW20, BW40, BW80 Bluetooth Max + 8dBm

LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

Product LM813
Part No See Last Page

Receiver Sensitivity	WiFi -80dBm – 802.11b@11Mbps -71dBm – 802.11g@54MBps -67dBm – 802.11n@MCS7_BW20 -64dBm – 802.11n@MCS7_BW40 -57dBm – 802.11ac@NSS1_MCS9_BW20 -54dBm – 802.11ac@NSS1_MCS9_BW40 -51dBm – 802.11ac@NSS1_MCS9_BW80 Bluetooth -89dBm@1Mbps -90dBm@2Mbps -83dBm@3Mbps
Operating Temperature	-20°C to +85°C ambient temperature 0 to 95 % (non-condensing)
Storage Temperature	-30°C to +95°C ambient temperature 0 to 95 % (non-condensing)
Dimensions (L x W x H)	25mm x 12mm x 2.05mm
Weight	0.82 g
Certifications	See our website for certifications
Compliance	RoHS, REACH and WEEE

Power Consumption

DC power for 5V	Performance	
Description	Typ	Units
Off	10	uA
Unassociated idle	40	mA
Associated idle for 2.4GHz band	70	mA
Data transfer for 2.4GHz	103	mA

Note: Data transfer test using the Linux driver: Linux_v4.3.6_11841.20140714

DC power for 3.3V	Performance	
Description	Typ	Units
Off	16	uA
Unassociated idle	90	mA
Associated idle for 2.4GHz band	141	mA
Data transfer for 2.4GHz	168	mA

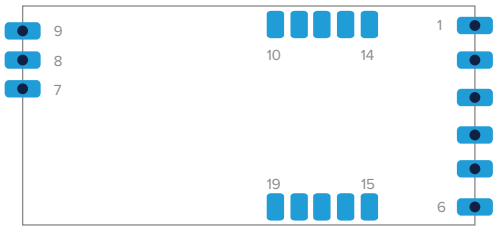
Note: Data transfer test using the Linux driver: Linux_v4.3.6_11841.20140714

LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

Product LM813
Part No See Last Page

Pin Outs



Pin Assignments

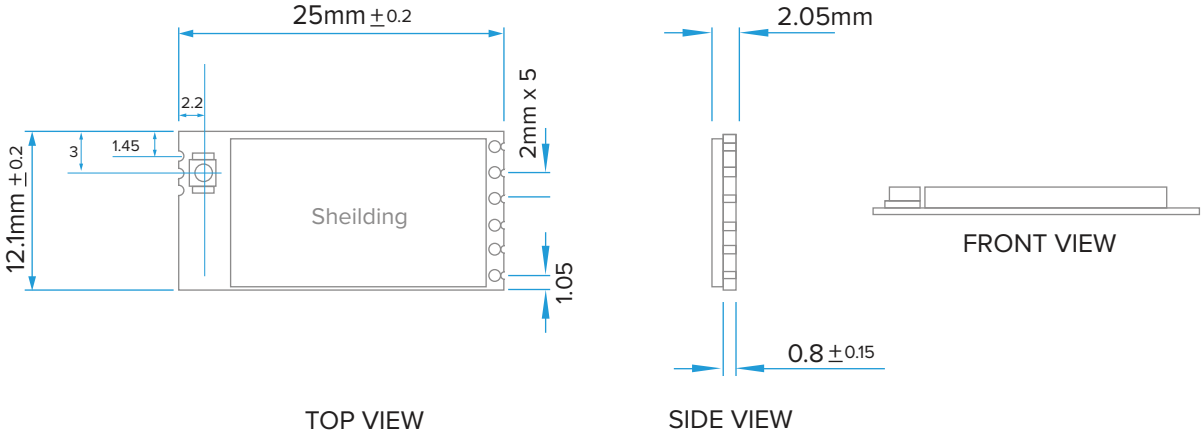
Pin	Signal	Type	Description
1	BT_LED	Output	BT LED Pin(Active Low)
2	VDD	Power	3.3V or 5V by factory option
3	HSDM	I/O	High-Speed USB D- Signal
4	HSDP	I/O	High-Speed USB D+ Signal
5	GND		Ground
6	WL_LED	I/O	WLAN LED Pin(Active Low), General Purpose Input/ Output Pin
7	GND		Ground
8	RFIO_OUT	RF	WLAN(2.4G/5G)/BT RF port (if don't using IPEX connector)
9	GND		Ground
10	BT_WAKE_HOST	Output	Signal from module to wake up host,refer driver source code for details.
11	GPIO2	I/O	General Purpose Input/ Output Pin
12	CHIP_EN	Input	This Pin Can externally shut down the RTL8821CU-CG(No Extra Power Switch Required).
13	GPIO1	I/O	General Purpose Input/ Output Pin
14	BT_DIS	Input	Shared with GPIO11. This pin can externally shut down the RTL8821CU-CG BT function when BT_DIS is pulled Low. When this pin is pulled low. USB interface will be also disabled. This pin can be also defined as the BT Radio-off function with host interface remaining connected
15	GPIO8	I/O	WLAN LED Pin(Active Low), shared with GPIO8 General Purpose Input/ Output Pin
16	HOST_WAKE_BT	Input	Signal from host to wake up module,refer driver source code for details.
17	WL_DIS	Input	Shared with GPIO9. This pin can externally shut down the RTL8821CU-CG WLAN function when WL_DIS is pulled Low. When this pin is pulled low. USB interface will be also disabled. This pin can also be configured as the WLAN Radio-off function with host interface remaining connected
18	HOST_WAKE_WL	Input	
19	WL_WAKE_HOST	Output	

LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

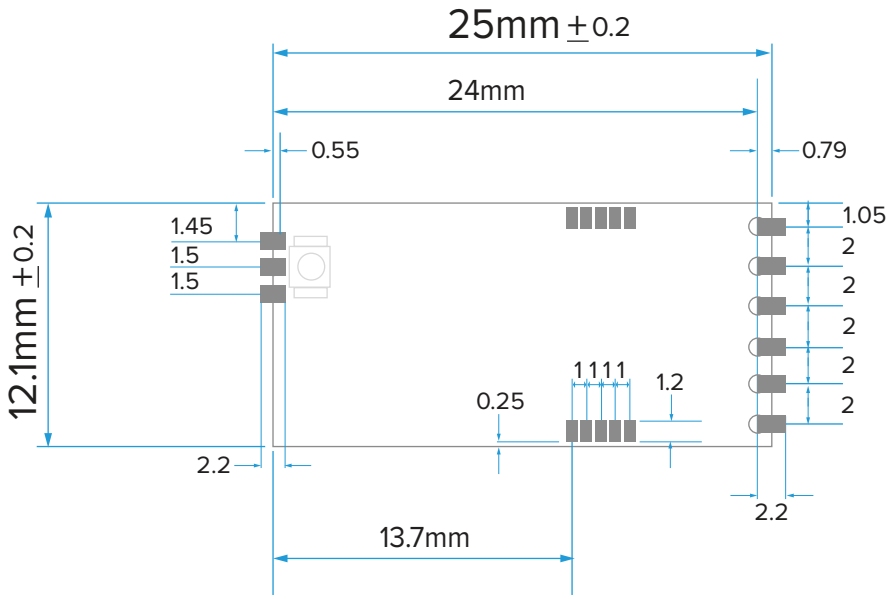
Product LM813
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Physical Dimensions



TOP VIEW SIDE VIEW

PCB Layout



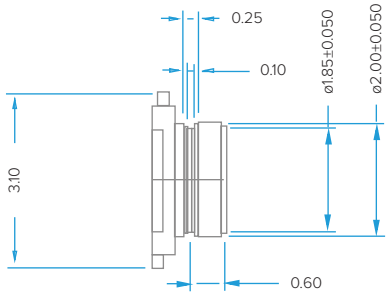
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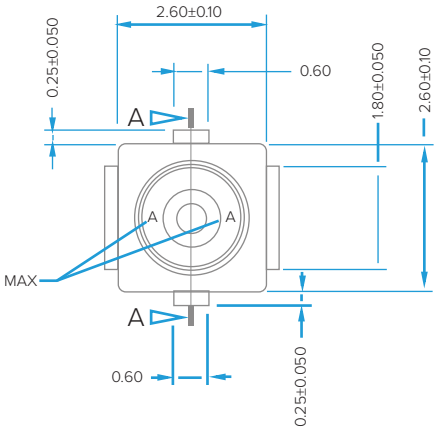
LM813 WiFi and Dual Mode Bluetooth® Combination Module

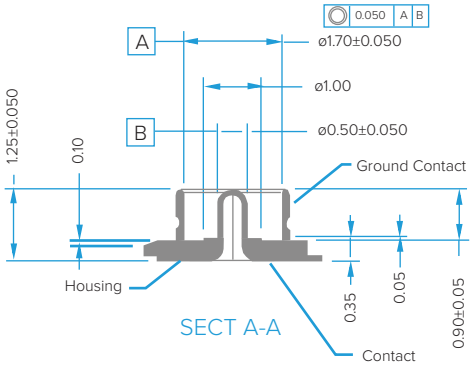
Host Controller Interface (HCI) via USB Interface

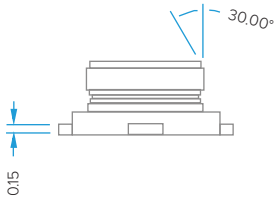
Product LM813
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RF Connector Dimensions









LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

Product	LM813
Part No	See Last Page

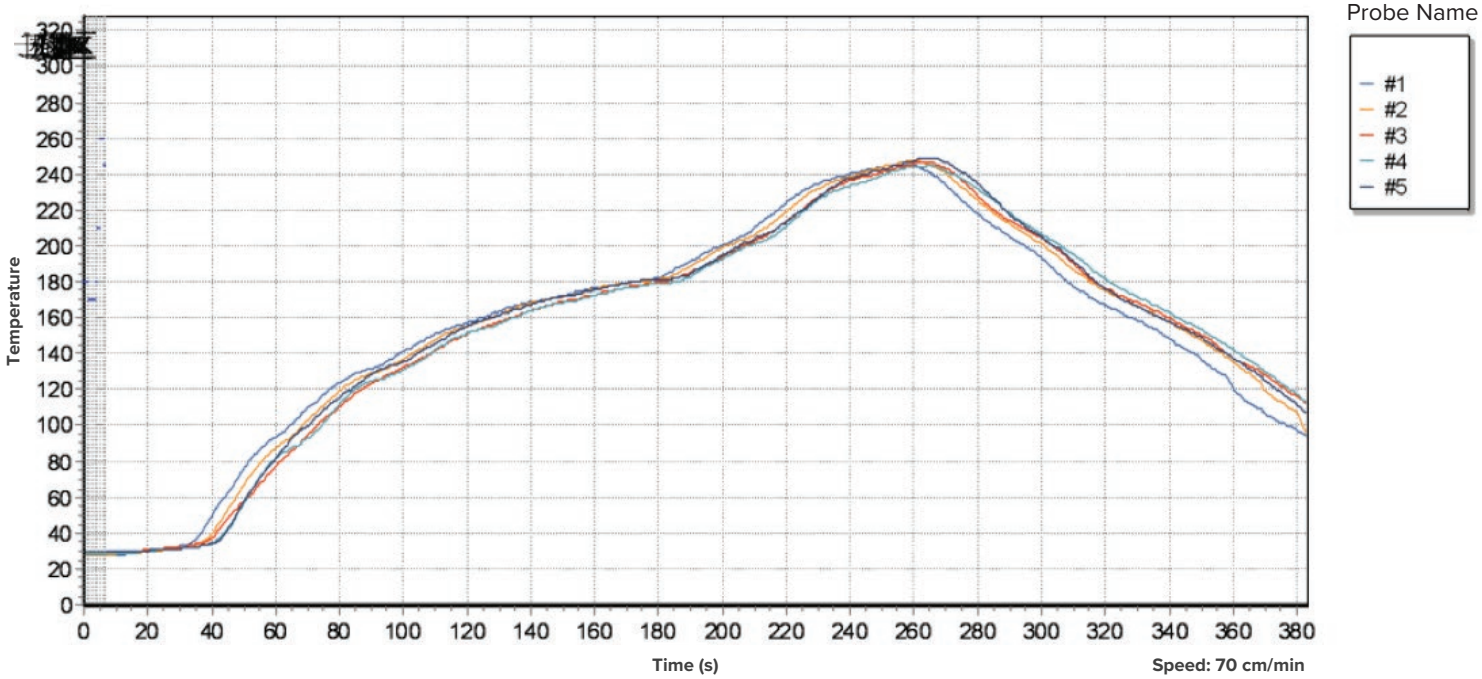
PCB Drying Conditions

Please refer below to the conditions for drying before the solder reflow processes. (Extracted from IPC/JEDEC J-STD-033B.1)

Bake @ 125 °C		Bake @ 90 °C		Bake @ 40 °C	
Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h	Exceeding floor Life By > 72h	Exceeding floor Life By ≤ 72h
9 hours	7 hours	33 hours	23 hours	13 days	9 days

Temperature Analysis Report

Temperature Curve Chart



Name	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Max	180.0	180.0	170.0	170.0	180.0	210.0	260.0	245.0
Min	180.0	180.0	170.0	170.0	180.0	210.0	260.0	245.0
Length	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Probe	Liquidus Line		Maximum / Minimum		Slope	
	Rising 110.00-190.00	Above 230.0	Max	Min	Positive	Negative
#1	119.00	47.50	245.50	27.30	2.56	-1.69
#2	116.50	49.00	247.10	27.70	2.69	-1.60
#3	116.00	46.50	245.80	29.30	2.04	-1.57
#4	117.00	46.50	244.90	29.20	2.60	-1.31
#5	119.50	50.00	248.10	29.60	2.44	-1.64

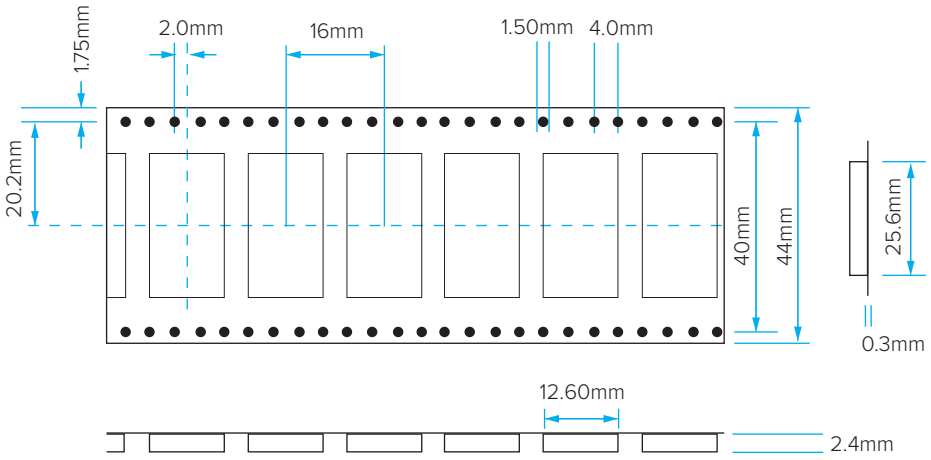
LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

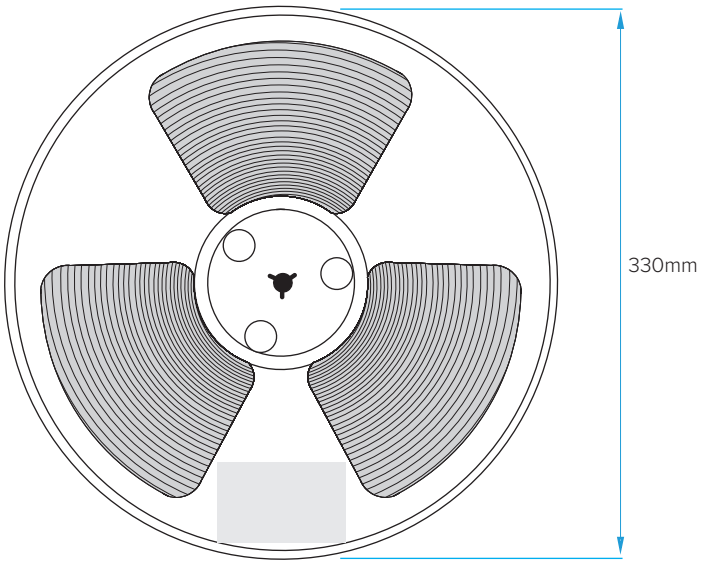
Product	LM813
Part No	See Last Page

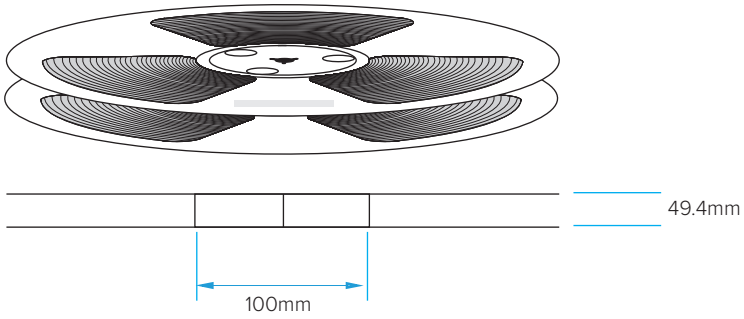
Tape and Reel Packaging

Tape Dimensions



Reel Dimensions





Notes

- Carton Dimensions (L x W x H): 395mm x 360mm x 305mm

Quantities

- 1500 modules per Tape
- 5 Boxes per Carton
- 7500 modules per carton

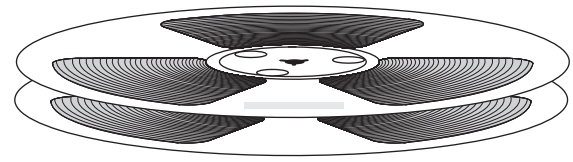
LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

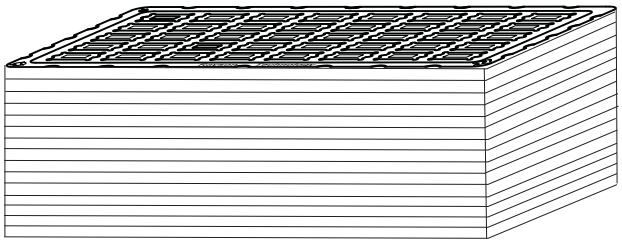
Product LM813
Part No See Last Page

Packaging for Tape & Reel / Tray

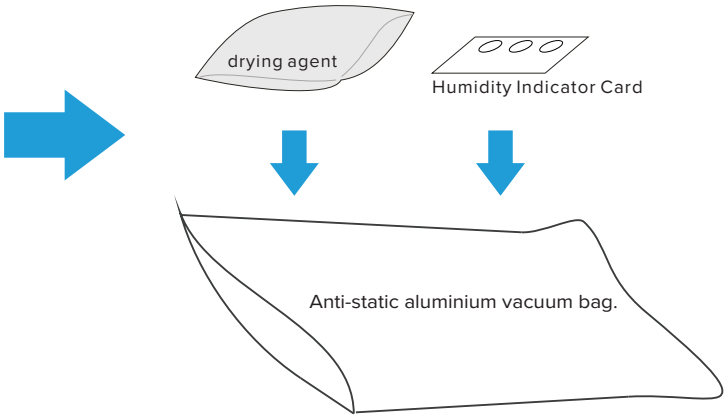
The trays/reels are stacked and inserted into an anti-static vacuum bag with a Humidity Indicator Card.
On the outside of the bag are labels for Anti-Static, Model Name and Moisture Sensitivity Levels.



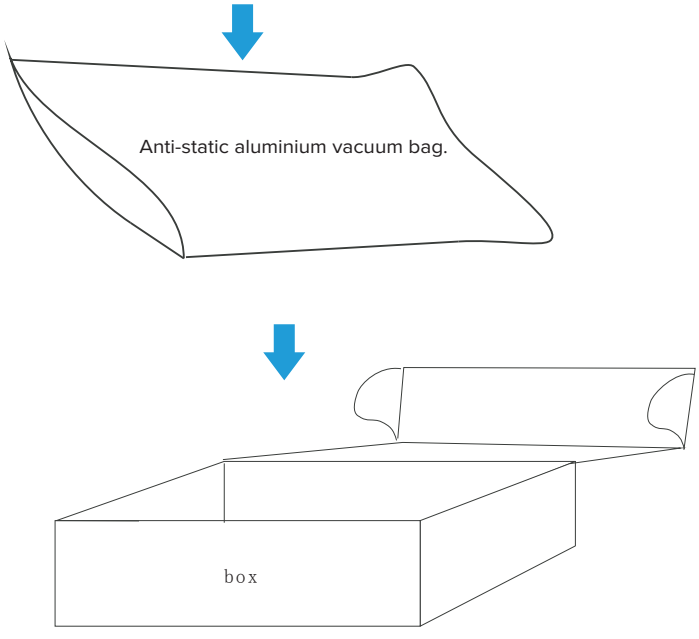
Reels are place within a vacuum bag.

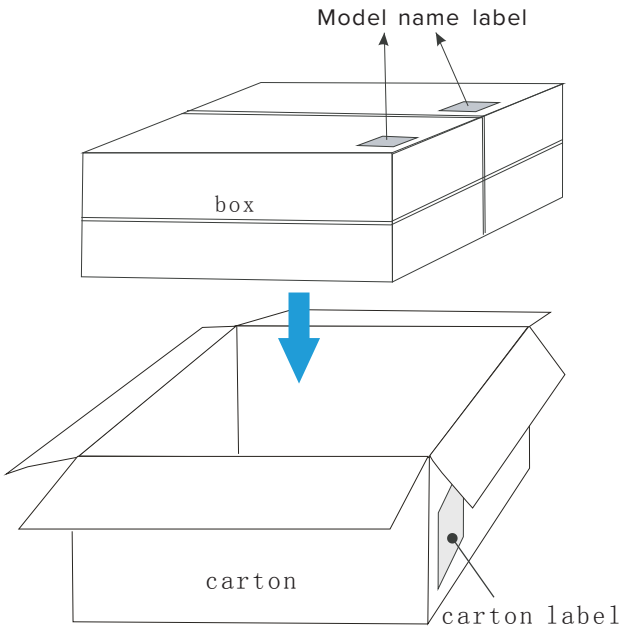


Trays are stacked up with an empty tray on the top.



The vacuum bag is placed inside the box and a Model Name Label stuck on the front-side of each box.





Each carton contains 4 boxes.

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LM813 WiFi and Dual Mode Bluetooth® Combination Module

Host Controller Interface (HCI) via USB Interface

Product	LM813
Part No	See Below

LM813 Packaging Options

	813-0813	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 150Mbps USB IPEX Module TRAY	ETSI
	813-0814	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 150Mbps USB IPEX Module SAMPLE PACK	ETSI
	813-0815	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 5v 150Mbps IPEX Module TAPE & REEL	ETSI
	813-0816 US	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 150Mbps USB IPEX Module TRAY	US
	813-0817 US	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 150Mbps USB IPEX Module SAMPLE PACK	US
	813-0818 US	**5V Module with IPEX Connector** 1 x LM813 SMT HCI 802.11ac BT4.2 -20C 5v 150Mbps IPEX Module TAPE & REEL	US

- Product User Guides, Manuals and Configuration Software can be downloaded via our website - http://www.lm-technologies.com/downloads