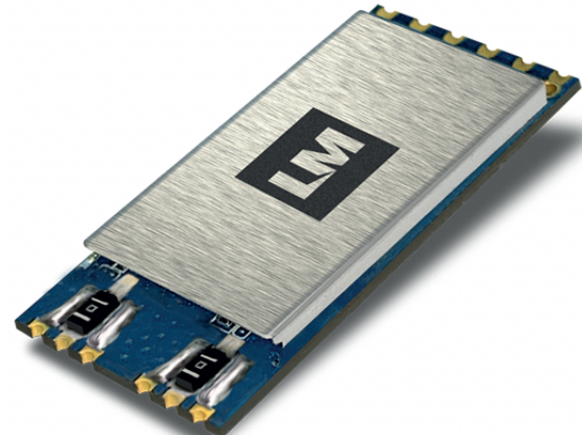
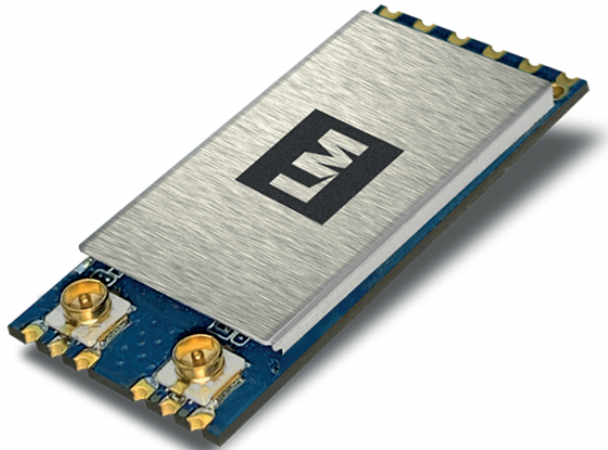




# LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

Revised 24/JAN/2021  
Datasheet Version 1.8  
Ordering Options See last page



## Features

- 802.11ac standard + MIMO on 5G
- 2T2R, Wave-2 Compliant + (2x2) MU-MIMO. MIMO offers extended bandwidth for reception and throughput
- USB 2.0 Maximum Throughput 480Mbps (58.7MBps)
- ISM Bands (2.4GHz or 5GHz)
- IEEE support: 802.11 a/ b/ g/ n/ ac/
- Cross Standard Connections  
802.11n connection and/or connected to 802.11a/b/g devices
- Two options are available; 2x IPEX, or 2x RF Line Out
- Theoretical Maximum Bandwidths
  - 173.3 Mbps using 20MHz
  - 400. Mbps using 40MHz
  - 866.7Mbps using 80MHz
- Transmission Modulation 5MHz / 10MHz / 20MHz / 40MHz / 80MHz  
OFDM with BPSK, QPSK, 16QAM, 64QAM and 256QAM.
- Bluetooth® 5.0 Dual Mode  
Support for simultaneous connections over LE and BR/EDR
- Enhanced BT/WiFi Coexistence Control to improve transmission quality in different profiles and support for multiple Low Energy positions (Sniff / Sniff Sub-rating)
- REACH / RoHS / Low Halogen compliant.

## Overview

Our LM843 Series WiFi 802.11ac + Bluetooth® 5.0 (Dual Mode) Combination SMT Module, offers a wide range of solutions and can support 2-stream 802.11ac with Multi-user MIMO (Multiple-Input, Multiple-Output) connections, while operating under enhanced power management.

Released under BT5.0 the products hardware is compliant to Bluetooth® 5.0 and offers Dual Mode compatibility with; Classic; 2.1 / 3.0 / 3.0+HS using either BR/EDR radio's and Low Energy [LE] connections under Bluetooth® 4.0, 4.1, 4.2 & 5.0 Classic and LE can operate multiple connections simultaneously using the USB 2.0 interface, onboard management for maximising throughput while multiple connections are open under WiFi and/or Bluetooth®.

## Certification

The LM843 series will have United States of America FCC and European CE certifications completed prior to release. Further countries will be added during the course of the products life and or by request. Our company has a wealth of experience and has certified products all over the world, with access to a global network of local representatives, enabling fast certification processing when requested. Please enquire with us for further details.





# LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

## General Specification

### Wireless

|                      |   |
|----------------------|---|
| Wireless Standards   | <p><b>WiFi:</b></p> <p>802.11ac, a b g n</p> <p><b>Bluetooth®:</b></p> <p>• Class 1. Dual Mode: 5.0, v4.2, v4.0 • Classic 2.1, 3.0, 3.0HS, +EDR</p>           |
| Module Type          | Host Controller Interface (HCI)   |
| OS Compatibility     | Android, Linux, Windows 7, Windows 10   |
| Security             | <p><b>WiFi;</b></p> <p>WPA, WPA-PSK, WPA2, WPA2 -PSK and WEP (64bit &amp; 128bit)</p> <p><b>Bluetooth®;</b></p> <p>Simple Paring</p>                          |
| Network Architecture | <p><b>WiFi;</b></p> <p>Ad hoc mode (Peer-to-Peer) and Infrastructure mode Software AP; WiFi Direct</p> <p><b>Bluetooth®;</b></p> <p>Pico Net; Scatter Net</p> |

### Hardware

|            |   |
|------------|---|
| Chipset    | Realtek   |
| Antenna    | 2 x IPEX Antennas, or 2 x RF Line Out   |
| Interfaces | USB 2.0 Maximum Throughput 480Mbps (58.7Mbps) / Host Controller Interface (HCI) |

### Physical Characteristics

|                        |   |                          |         |
|------------------------|---|--------------------------|---------|
| Operating Temperature  | -20°C to +60°C ambient temperature 5 to 90 % (non-condensing) |                          |         |
| Storage Temperature    | -20°C to +70°C ambient temperature 5 to 90 % (non-condensing) |                          |         |
| Dimensions (L x W x H) | L: 25mm x W:12mm x H:2mm +/- 0.2 tolerance                    |                          |         |
| Weight                 | 6.5g  |                          |         |
| Certifications         | FCC / CE. See our website for further updates.                |                          |         |
| Compliance             | RoHS, REACH and WEEE  |                          |         |
| Warranty               | 2 Year Manufacturer RTB                                       |                          |         |
| Power Supply           | DC 3.3v   |                          |         |
| Power Consumption      | <b>Input Voltage</b>  | <b>Power Consumption</b> |         |
|                        | Minimum   | 3.135v                   | Minimum |
|                        | Typical   | 3.300v                   | Typical |
|                        | Maximum   | 3.465v                   | Maximum |



**LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module**  
 XCVR SMT USB Module

**General Specification (Continued)**

|                    |   |
|--------------------|---|
| RF Characteristics | <p><b>WiFi:</b></p> <p>802.11b: 11, 5.5, 2, 1 Mbps</p> <p>802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps</p> <p>802.11n: MCS0 to 7 for HT20MHz, MCS0 to 7 for HT40MHz</p> <p>802.11ac: MCS0 to 8 for HT20MHz, MCS0 to 9 for HT40MHz, NSS1 MCS0 to 9 for VHT80MH</p> |
| Data Transfer Rate | <p><b>Bluetooth®:</b></p> <p>Basic Rate up to 1Mbps, EDR up to 3Mbps</p> <p>Low Energy: LE 1M: 1Mbps</p> <p>LE Coded S=8: 125kbps,</p> <p>LE Coded S=2: 500kbps,</p> <p>LE 2M: 2Mbps</p>  |
| Frequency          | 2.4GHz and 5GHz ISM Band  |
| Modulation Method  | <p><b>WiFi:</b></p> <p>CCK, DQPSK, DBPSK, BPSK, QPSK, 16QAM, 64QAM, 256QAM</p> <p><b>Bluetooth®:</b></p> <p>8DPSK, <math>\pi/4</math> DQPSK, GFSKFSK</p>  |
| Spread Spectrum    | <p><b>WiFi:</b></p> <p>IEEE 802.11b: CCK (Complementary Code Keying)</p> <p>IEEE 802.11g/n/a/ac: OFDM (Orthogonal Frequency Division Multiplexing)</p> <p><b>Bluetooth®:</b></p> <p>FHSS (Frequency Hopping Spread Spectrum)</p>                                |
| Operating Channel  | <p><b>WiFi (2.4GHz &amp; 5GHz):</b></p> <p>11: (Ch. 1-11) – US (United States)</p> <p>13: (Ch. 1-13) – ETSI</p> <p>14: (Ch. 1-14) – TELEC</p> <p><b>Bluetooth® (2.4GHz):</b></p> <p>Ch. 0 to 78</p>   |



# LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

## General Specification (Continued)

### RF Characteristics

Tx Output Power (Typical)

WiFi;

17dBm, EVM < 8% – 802.11b@CCK 11Mbps

15dBm, EVM < -25dB – 802.11g@OFDM 54Mbps

14dBm, EVM < -28dB – 802.11n@MCS7\_HT20

14dBm, EVM < -28dB – 802.11n@MCS7\_HT40

15dBm, EVM < -25dB – 802.11a@OFDM 54Mbps

12dBm, EVM < -32dB – 802.11ac@NSS1 MCS9\_BW80

Bluetooth®:

Maximum Max +8dBm

Rx Sensitivity (Typical)

WiFi;

<-76dBm – 802.11b@11Mbps

<-65dBm – 802.11g@54Mbps

<-64dBm – 802.11n@MCS7\_BW20

<-61dBm – 802.11n@MCS7\_BW40

<-51dBm – 802.11ac@NSS1\_MCS9\_BW80

Bluetooth®:

<-85dBm, BER < 0.01% – Basic rate @1Mbps

<-80dBm, BER < 0.1% – Enhanced data rate @2,3Mbps

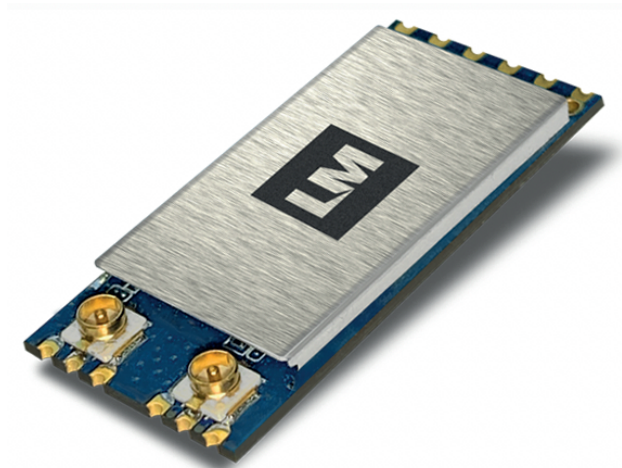
<-85dBm, BER <= -30.8% – Low Energy @1Mbps, 125kbps, 500kbps, 2Mbps



## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

### Pin Outs

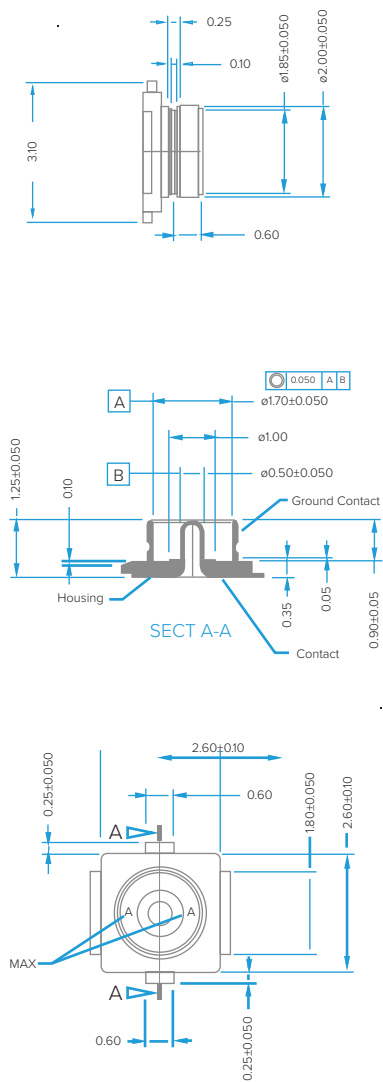


### Pin Assignments

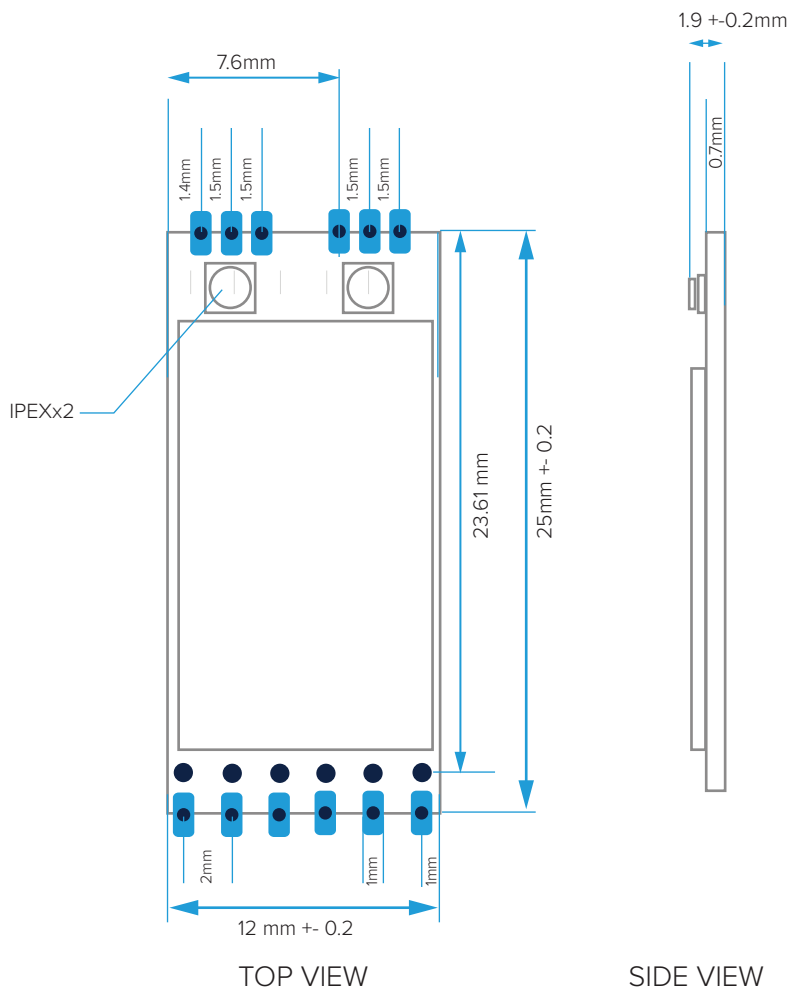
| Pin | Signal        | Type   | Description  |
|-----|---------------|--------|--|
| 1   | GPIO3 /WPS    | Output | GPIO3. General Purpose Input/ Output Pin Shared with WPS Pin (Active Low). |
| 2   | VDD           | Power  | DC 3.3V  |
| 3   | HSDM          | I/O    | USB 2.0 Transceiver Differential Pair                                      |
| 4   | HSDP          | I/O    | USB 2.0 Transceiver Differential Pair                                      |
| 5   | GND           | -      | Ground   |
| 6   | GPIO8 /WL_LED | I/O    | GPIO8. General Purpose Input / Output Pin / WL LED Pin (Active Low).       |
| 7   | GND           | -      | Ground   |
| 8   | RF_S0         | RF     | WLAN RF port (if not using IPEX connector)                                 |
| 9   | GND           | -      | Ground   |
| 10  | GND           | -      | Ground   |
| 11  | RF_S1         | RF     | WLAN / BT RF port (if not using IPEX connector)                            |
| 12  | GND           | -      | Ground   |

**LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module**  
XCVR SMT USB Module

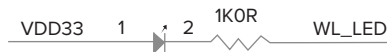
**IPEX Connector Dimensions**



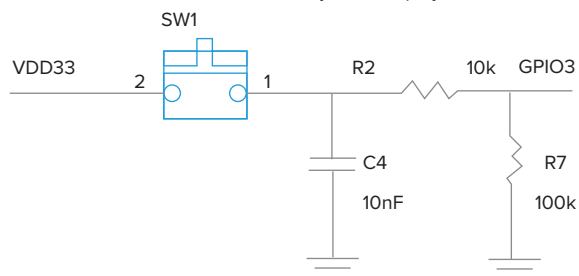
**Physical Dimensions / PCB Footprint**



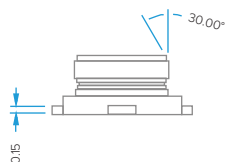
- The external circuit for WiFi activity LED (factory option)



- The external circuit for WiFi activity WPS display



**GPIO8 Pin Out**  
Option for WiFi activity LED (factory option)



## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

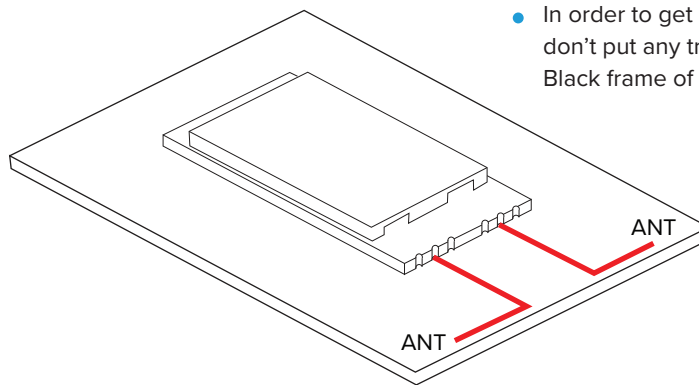
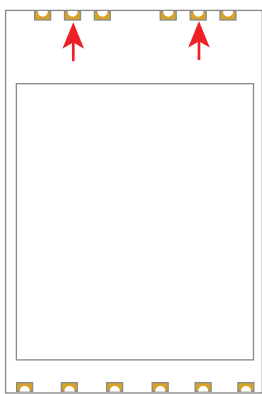
### Antenna Output Options

RF Output is offered as either 2x IPEX or 2x Half Hole Terminal

Neither of these modules have an antenna, for certification purposes we have certified these using an IPEX 3dBi IPEX to SMA Antenna, this enables your design to use any antenna up to a maximum of 3dBi Gain, above this level and our certification will not be valid.

We offer free design in support, either to assist you or your third-party to ensure the correct placement and/or advice on how best an antenna should be supported.

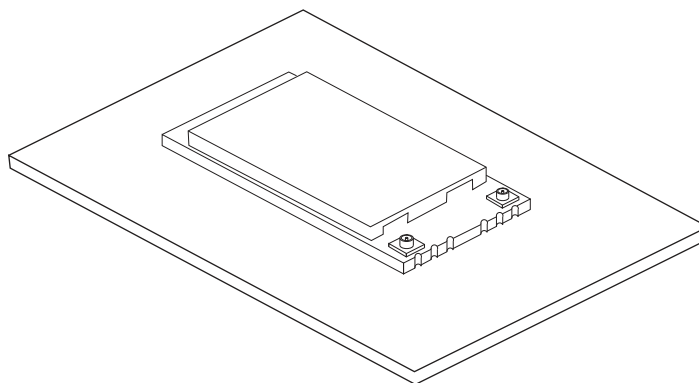
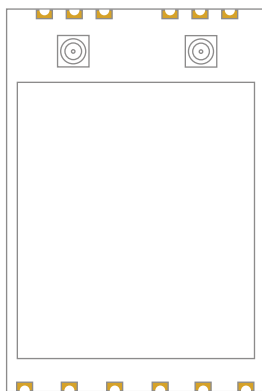
RF Line Out Option



- In order to get a better RF performance, please don't put any trace or copper plane under the Black frame of the module.

- Please have the impedance of feed lines to be 50 ohms from the RF output pin to Antenna.

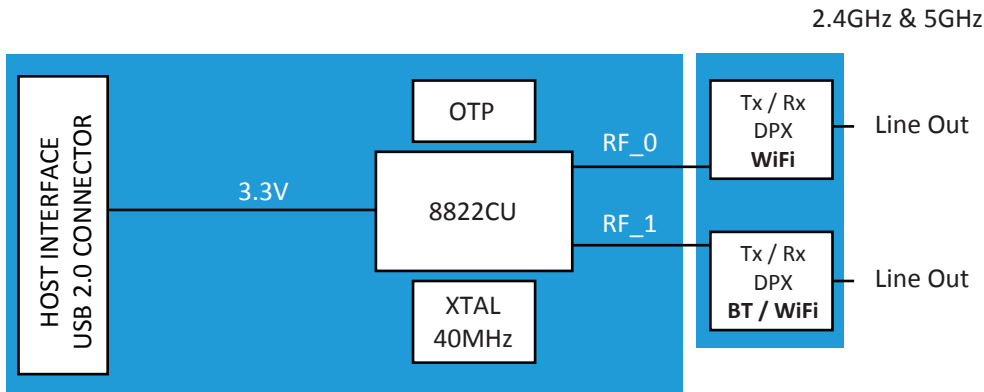
2 x IPEX Option



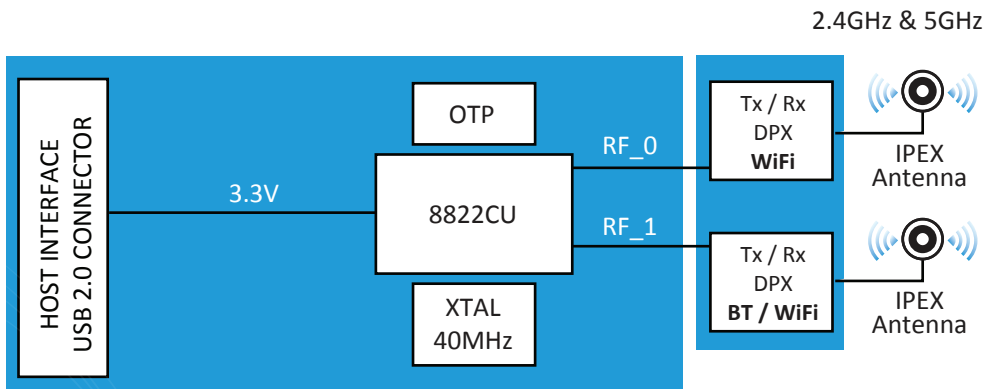
## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

### XCVR Block Diagram (2 x RF Half Hole Line Out)



### XCVR Block Diagram (2 x IPEX Antennas)



### Extended Temperature Range

Our SMT Module Low Temperature Product Update is changing a 0c rated product into a -20c rated product.

In this update we ensure all items in the BOM except the main IC, are components rated at -40c, the Realtek IC is made from material tested and approved for -30c, rated at 0 due to a range of factors, such as low demand for -40 compliance, cost of -40c rated material is approved and tested at -60c and is expensive to manage.

Our products undergo an intensive test regime within which we temperature test and conduct a range of functions via our test program continuously for 72 hours at -40c, -20x 0c and 20c. If during this test we see no gradual drop off in performance and any initial drop off is less than 15% we will then pass the product as approved to support -20c.

We provide warranty on all LM843 -20c products for 2 years.



## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

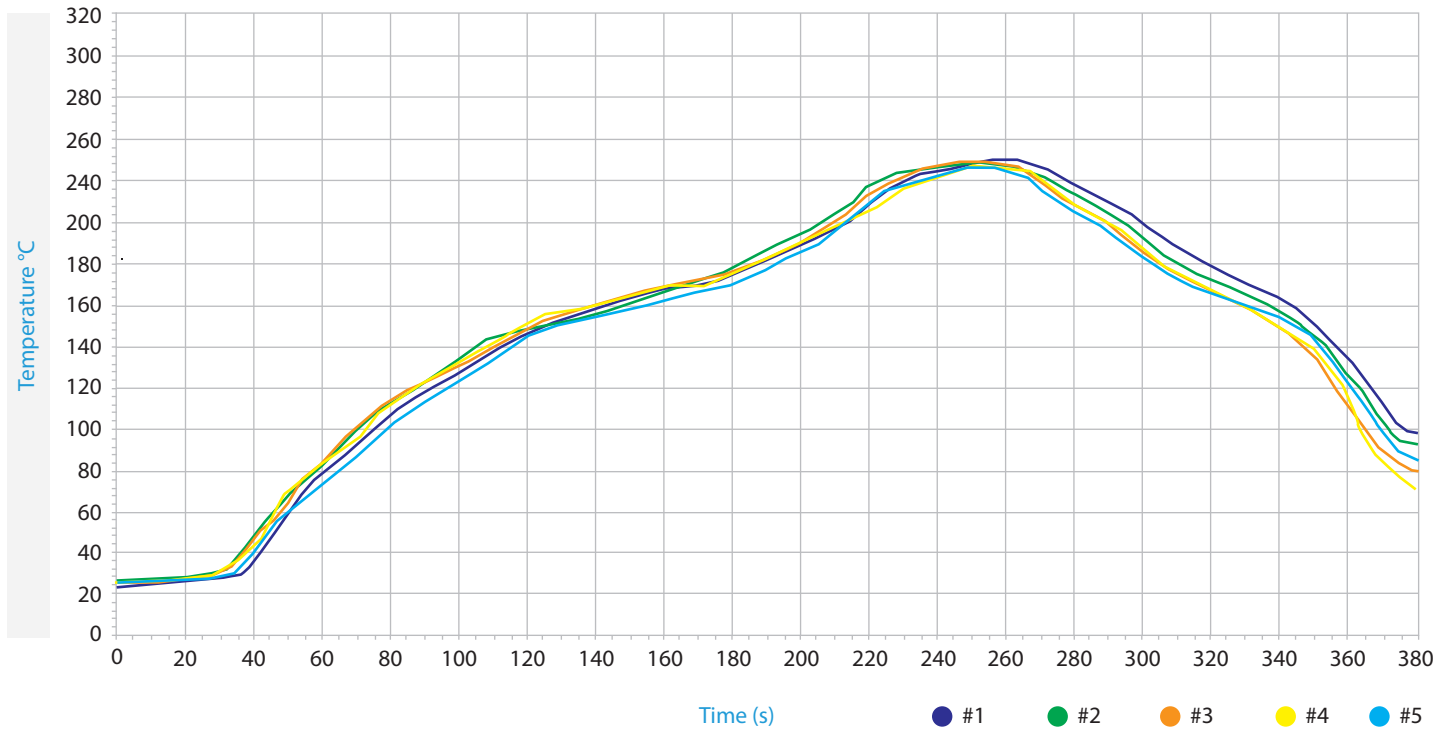
### PCB Drying Conditions

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

1. If the system PCBA is double side design please reflow the side without this module first.
2. Don't let the solder machine temperature over 250 °C or follow solder paste vender's recommended temperature.
3. The Ramp-up temperature speed is 1~4 °C per second, the Ramp-down temperature speed is 1~4 °C per second.
4. This temperature reflow chart is for reference only, it depends on the manufacturing machine's characters requirement.

| 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                        |

### Soldering Reflow 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    |

# LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

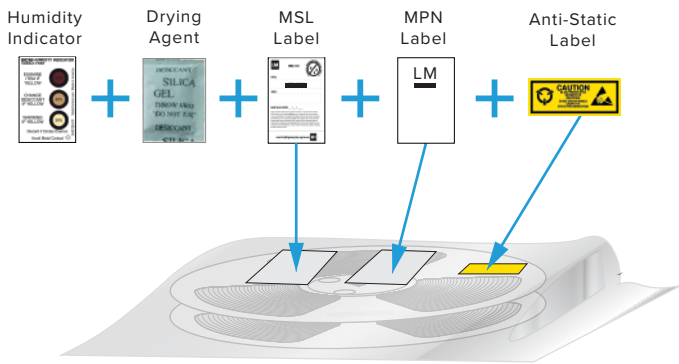
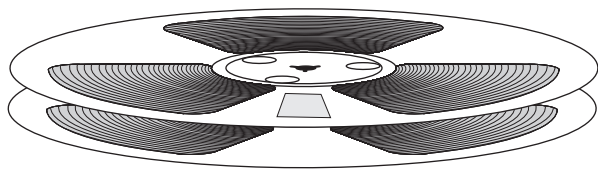
XCVR SMT USB Module

## Packaging for Tape & Reel / Tray

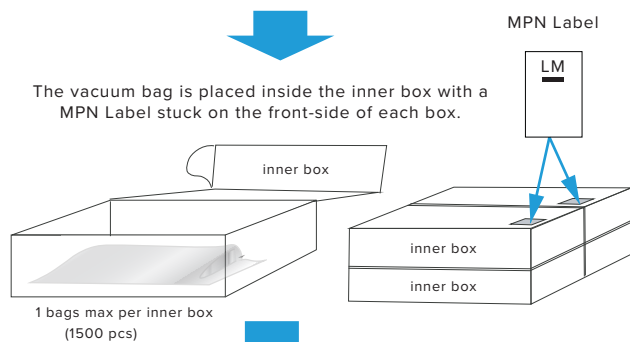
The Tape & Reel / Tray are inserted into an anti-static vacuum bag with a Humidity Indicator Card and Drying Agent. On the outside of the vacuum bag are MSL (Moisture Sensitivity Levels), MPN and an Anti-Static Labels.

### Tape & Reel

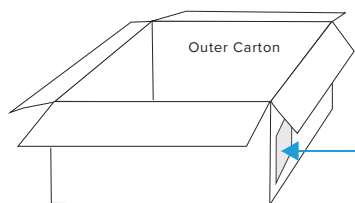
Reels are placed within a vacuum bag.



Vacuum bag.



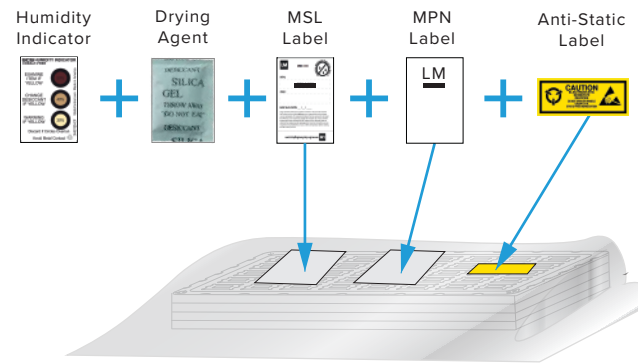
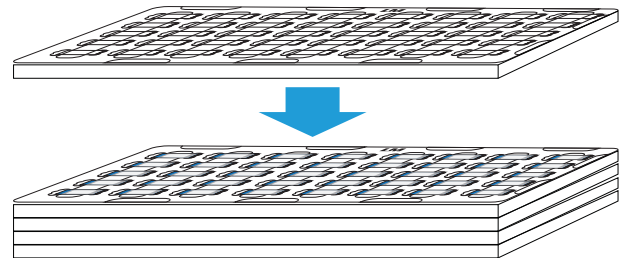
1 bags max per inner box  
(1500 pcs)



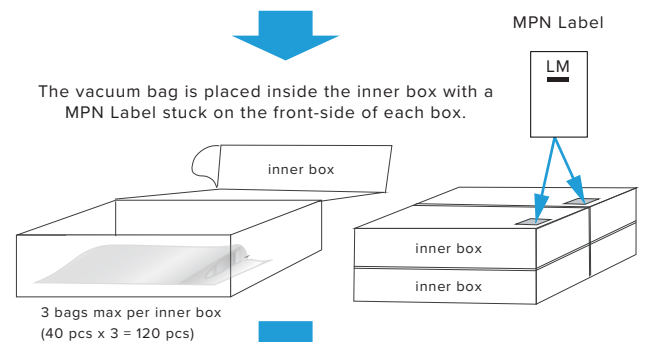
Each Outer Carton contain 5 inner boxes max  
(7500 pcs)

### Tray

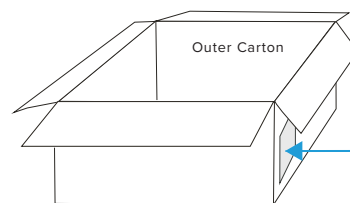
Trays are stacked with an empty tray on the top and placed within a vacuum bag.



Vacuum bag.



3 bags max per inner box  
(40 pcs x 3 = 120 pcs)



Each Outer Carton contain 8 inner boxes max  
(120 pcs x 8 = 960 pcs)



## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

### Datasheet Version Notes

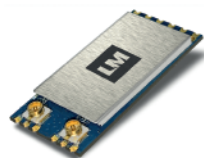
|      |             |  |
|------|-------------|--|
| v0.2 | 27 SEP 2019 | Revised information throughout.  |
| v0.3 | 03 OCT 2019 | Revised information throughout.  |
| v1.0 | 29 NOV2019  | Win 10 removal. Antenna Option diagrams added.   |
| v1.1 | 24 FEB 2020 | New image.   |
| v1.2 | 17 MAR 2020 | Antenna Option Revisions.  |
| v1.3 | 11 MAY 2020 | Physical Dimensions and Diagram updated.   |
| v1.4 | 15 MAY 2020 | Removed PCB Footprint, appended PCB Footprint title to Physical Dimensions illustration. |
| v1.5 | 30 JUL 2020 | Android, Linux, Windows 7, Windows 10.   |
| v1.6 | 10 AUG 2020 | Flip Block Diagram layout.   |
| v1.7 | 21 OCT 2020 | Amended certified antenna gain.  |
| v1.8 | 24 JAN 2021 | Datasheet branding update.   |



## LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module

XCVR SMT USB Module

### Ordering Options



| MFT Part No. | Product Description                     | Invoice Description | RF Bands | Packaging | Expected EOL |
|--------------|---|---------------------|----------|-----------|--------------|
| 843-8430     | MOD 802.11ac BT5.0 USB 2T2R IPEX PCS/SP |                     | ETSI     | S/SP      | 2029         |
| 843-8431     | MOD 802.11ac BT5.0 USB 2T2R IPEX PCS/SP |                     | US       | S/SP      | 2029         |
| 843-8432     | MOD 802.11ac BT5.0 USB 2T2R IPEX TRAY   |                     | ETSI     | TRAY      | 2029         |
| 843-8433     | MOD 802.11ac BT5.0 USB 2T2R IPEX TRAY   |                     | US       | TRAY      | 2029         |
| 843-8434     | MOD 802.11ac BT5.0 USB 2T2R IPEX T&R    |                     | ETSI     | T&R       | 2029         |
| 843-8435     | MOD 802.11ac BT5.0 USB 2T2R IPEX T&R    |                     | US       | T&R       | 2029         |



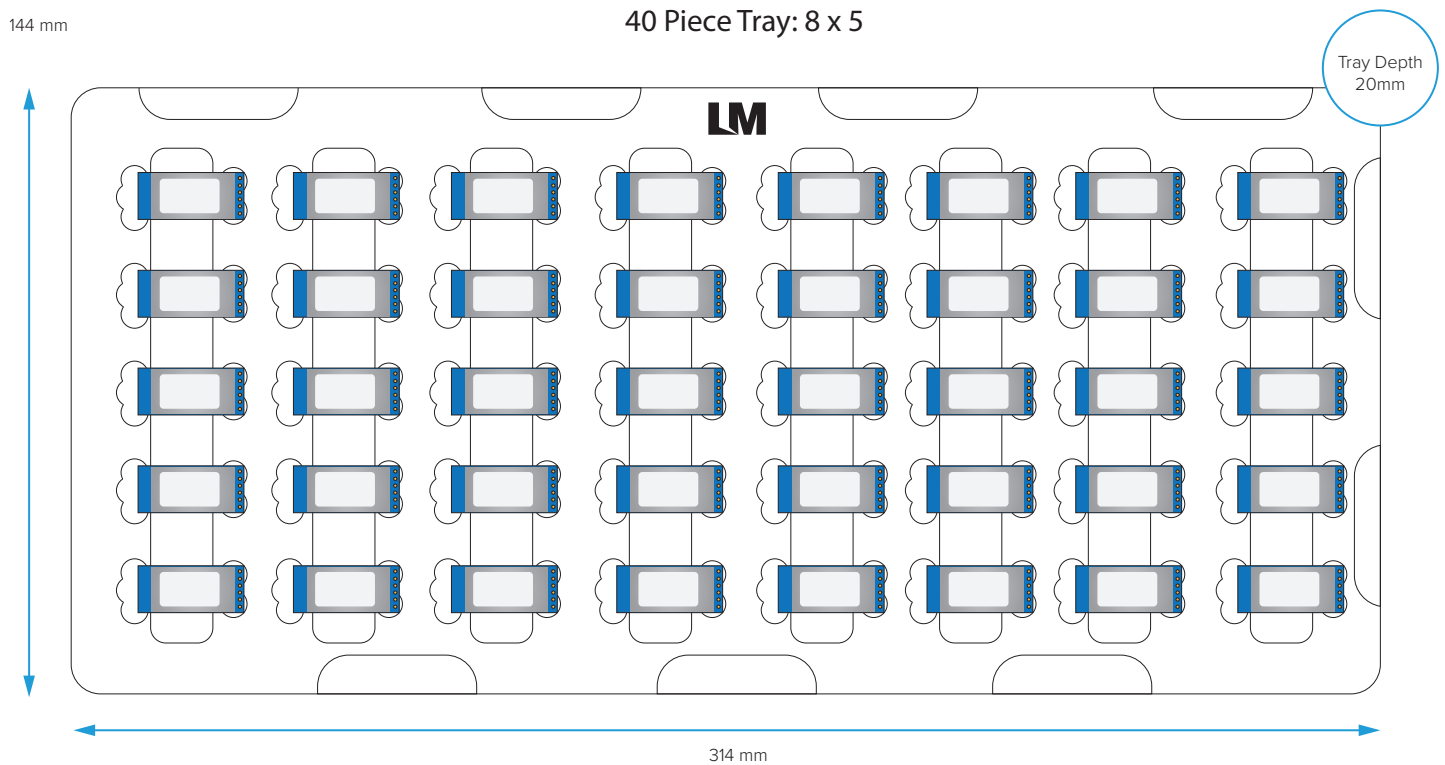
|          |  |  |      |      |      |
|----------|--|--|------|------|------|
| 843-8436 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE PCS/SP |  | ETSI | S/SP | 2029 |
| 843-8437 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE PCS/SP |  | US   | S/SP | 2029 |
| 843-8438 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE TRAY   |  | ETSI | TRAY | 2029 |
| 843-8439 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE TRAY   |  | US   | TRAY | 2029 |
| 843-8440 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE T&R    |  | ETSI | T&R  | 2029 |
| 843-8441 | MOD 802.11ac BT5.0 USB 2T2R RF_LINE T&R    |  | US   | T&R  | 2029 |

- See LM240 IPEX Cable for SMA Antennas - <https://www.lm-technologies.com/product/ipex-to-rp-sma-male-jack-cable-100mm-lm240/>
- Product User Guides, Manuals and Configuration Software can be downloaded via our website - <http://www.lm-technologies.com/downloads>

**LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module**  
 XCVR SMT USB Module

**Tray Packaging**

Tray Dimensions



**Quantities**

- 40 modules per Tray
- 3 Trays per Inner Box
- 120 modules per Inner Box
- 8 Inner Boxes per Outer Carton
- 960 modules per Outer Carton

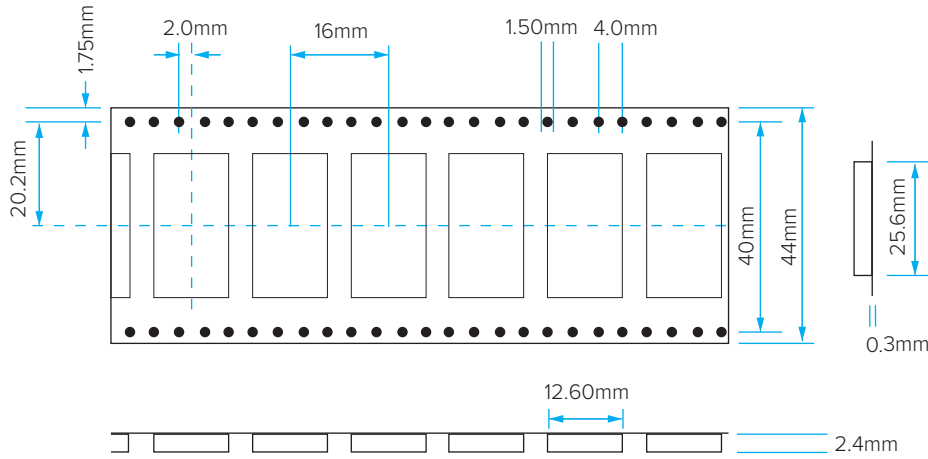
**Notes**

- Anti-Static PS Tray, Black.
- Material Thickness: 1mm
- Height of Tray: 20mm
- Carton Dimensions (L x W x H):  
340mm x 290mm x 385mm

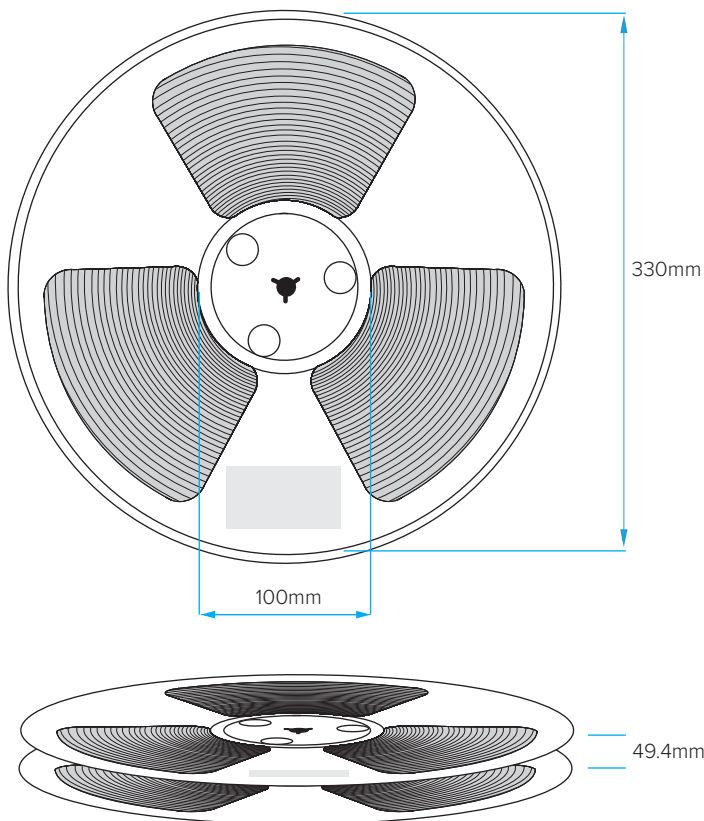
**LM843 WiFi 802.11ac / Bluetooth® 5.0 2T2R Combi USB Module**  
XCVR SMT USB Module

**Tape and Reel Packaging**

**Tape Dimensions**



**Reel Dimensions**



**Quantities**

- 1500 modules per Tape & Reel
- 1 Tape & Reel per Inner Box
- 5 Inner Boxes per Outer Carton
- 7500 modules per Outer Carton

**Notes**

- Inner Box Dimensions (L x W x H):  
360mm x 360mm x 60mm
- Outer Carton Dimensions (L x W x H):  
395mm x 360mm x 305mm