

LM825 Wi-Fi 6 (802.11ax) USB Module

WLAN SMT USB Module

Revised 01/JUL/2026

Datasheet Version 1.1

Ordering Options See last page



Features

- Wi-Fi 6 (IEEE 802.11ax) compliant
- 2T2R (2x2) MU-MIMO configuration offers extended bandwidth for reception and throughput
- USB 3.0 interface with USB 2.0 backwards compatibility
- ISM Bands (2.4GHz or 5GHz)
- IEEE support: 802.11b/g/n/a/ac/ax
- Cross Standard Connections
802.11ax connection and/or connected to 802.11a/b/g/n/ac devices
- Two antenna options are available: 2x IPEX, or 2x RF line out
- Theoretical maximum bandwidths
 - 286.8 Mbps using 20MHz
 - 573.5 Mbps using 40MHz
 - 1201 Mbps using 80MHz
- Designed for embedded, industrial, medical and commercial applications requiring reliable wireless connectivity and long term deployment stability
- Delivers PHY data rates up to 1201Mbps on 5GHz and 573.5Mbps on 2.4GHz for demanding wireless applications
- Engineered to simplify regional FCC and CE certifications

Overview

The LM825 is a high performance dual band Wi-Fi 6 (IEEE 802.11ax) embedded USB module designed for OEM, industrial, medical, scientific and commercial wireless applications. The module integrates a complete 2x2 MIMO wireless subsystem supporting operation across both 2.4GHz and 5GHz frequency bands, delivering significantly higher throughput, improved spectrum efficiency and lower latency compared to previous Wi-Fi 5 generation products.

The LM825 incorporates advanced Wi-Fi 6 technologies including OFDMA (Orthogonal Frequency Division Multiple Access), MU-MIMO (Multi-User Multiple Input Multiple Output), 1024-QAM modulation, beamforming support, LDPC error correction and WPA3 security. These technologies improve network efficiency, increase wireless capacity and provide more reliable operation in congested RF environments where multiple devices are competing for network resources.

Designed for embedded integration, the module features a high-speed USB 3.0 host interface while remaining backward compatible with USB 2.0 systems. The compact surface mount form factor enables straightforward integration into space constrained products while providing excellent RF performance through dual antenna connections. Available with either RF connector or RF line out options, the LM825 offers flexibility for a wide range of antenna designs and enclosure configurations.

The LM825 has been developed to provide a versatile, dependable connectivity solution for industrial and commercial deployments requiring high throughput, low latency and robust operation. Its combination of Wi-Fi 6 performance, mature driver support and compact design makes it an ideal choice for next generation connected products, embedded computing platforms, networking equipment and intelligent edge devices.

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General Specification

Wireless

Wireless Standards	IEEE 802.11a/b/g/n/ac/ax
Module Type	WLAN USB Module
OS Compatibility	Linux Kernel 3.13 - 6.6 (Kernel 4.20 + for Wi-Fi 6), Android 8 - 14, Windows XP - 11
Security	WPA, WPA2, WPA3 , WEP (64bit & 128bit), TKIP, AES, 802.1x
Network Architecture	Ad hoc mode (Peer-to-Peer) and Infrastructure mode Software AP; WiFi Direct

Hardware

Chipset	Realtek
Antenna	2 x IPEX Antennas, or 2 x RF Line Out
Interfaces	USB 3.0 / USB 2.0 Compliant Maximum wireless link speed: Up to 1201 Mbps (5GHz 2T2R 802.11ax)

Physical Characteristics

Operating Temperature	-20°C to +70°C ambient temperature 5 to 90 % (non-condensing)
Storage Temperature	-55°C to +125°C ambient temperature 5 to 90 % (non-condensing)
Dimensions (L x W x H)	L: 27mm x W: 16.5mm x H:1.8mm +/- 0.2 tolerance
Weight	1.87g (+/- 0.2g tolerance)
Certifications	FCC / CE. See our website for further updates.
Compliance	RoHS, REACH and WEEE
Power Supply	DC 3.3V
Operating Voltage Range	3.0V (Min) / 3.3V (Typ) / 3.6V (Max)
Peak Current Draw	2A Maximum



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General Specification (Continued)

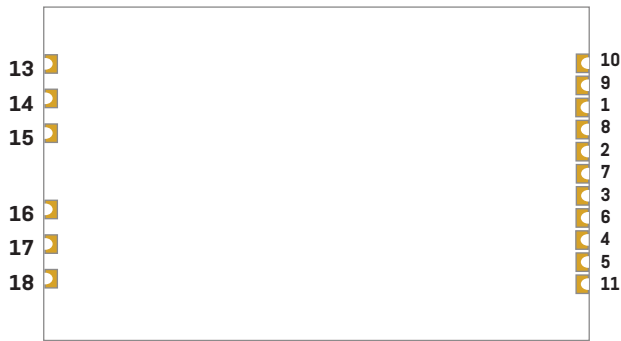
RF Characteristics

Data Transfer Rate	Wi-Fi: 802.11b: 11, 5.5, 2, 1 Mbps 802.11g/a: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: MCS0 ~ 15 802.11ac: MCS0 ~ 9 802.11ax: HE0 ~ 11
Frequency	2.4GHz and 5GHz ISM Band
Modulation Method	CCK, DQPSK, DBPSK, BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Spread Spectrum	IEEE 802.11b: CCK (Complementary Code Keying) IEEE 802.11g/n/a/ac/ax: OFDM (Orthogonal Frequency Division Multiplexing)
Operating Channel	Wi-Fi (5GHz): U-NII-1 (Band 1): 5180 ~ 5240MHz (Channels 36, 40, 44, 48) U-NII-3 (Band 4): 5745 ~ 5825MHz (Channels 149, 153, 157, 161, 165) Wi-Fi (2.4GHz): 11: (Ch. 1-11) – US (United States) 13: (Ch. 1-13) – ETSI 14: (Ch. 1-14) – TELEC (Factory Option)
TX Output Power (Typical)	Wi-Fi: 18dBm,EVM< 8% – 802.11b@CCK 11Mbps 17dBm,EVM< -25dB – 802.11g@OFDM 54Mbps 16dBm,EVM< -28dB – 802.11n@MCS7_HT20 16dBm,EVM< -28dB – 802.11n@MCS7_HT40 16dBm, EVM< -25dB – 802.11a@OFDM 54Mbps 14dBm, EVM< -32dB – 802.11ac@NSS1 MCS9_BW80 13dBm, EVM < -35dB – 802.11ax@MCS11_HE40 13dBm, EVM < -35dB – 802.11ax@MCS11_HE80
Rx Sensitivity (Typical)	Wi-Fi: <-86dBm – 802.11b@11Mbps <-72dBm – 802.11a/g@54Mbps <-61dBm – 802.11n_HT40@MCS7 <-58dBm – 802.11ac@MCS9_VHT80 <-56dBm – 802.11ax@MCS11_HE80

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Pin Outs



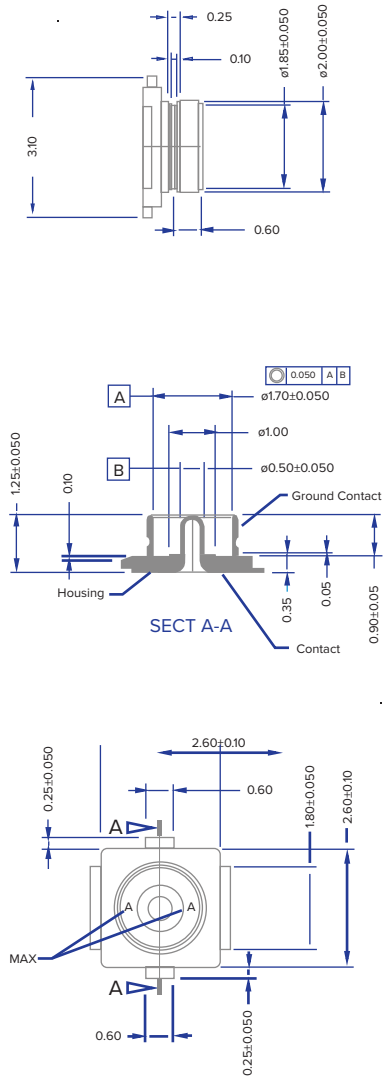
Pin Assignments

Pin	Signal	Type	Description
1	VDD	Power	DC 3.3V Supply Input
2	HSDM	I/O	USB 2.0 Differential Data Pair (DM)
3	HSDP	I/O	USB 2.0 Differential Data Pair (DP)
4	GND	Ground	Ground
5	HSOP	I/O	USB 3.0 Transmit Differential Pair (TX-)
6	HSOP	I/O	USB 3.0 Transmit Differential Pair (TX+)
7	GND	Ground	Ground
8	HSIN	I/O	USB 3.0 Receive Differential Pair (RX-)
9	HSIP	I/O	USB 3.0 Receive Differential Pair (RX+)
10	WPS	GPIO	General Purpose Input / Output Pin. Shared with WPS Function
11	LED_WL	NA	NA
13	GND	Ground	Ground
14	RF_S1	RF	WLAN RF Port 1 (Used when RF line-out option is selected)
15	GND	Ground	Ground
16	GND	Ground	Ground
17	RF_S0	RF	WLAN RF Port 0 (Used when RF line-out option is selected)
18	GND	Ground	Ground

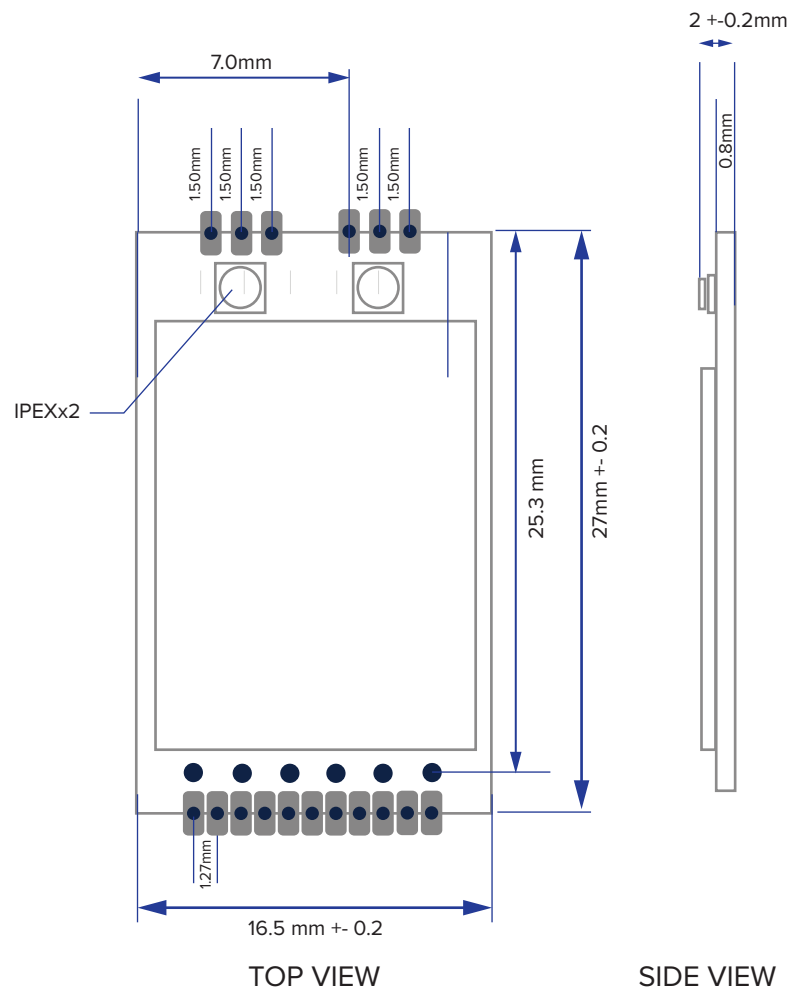
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IPEX Connector Dimensions



Physical Dimensions / PCB Footprint



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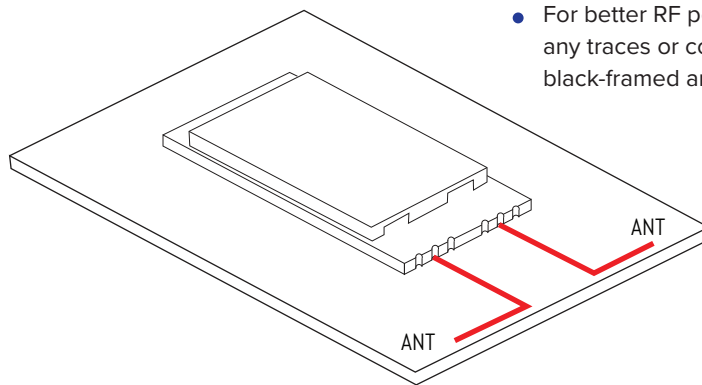
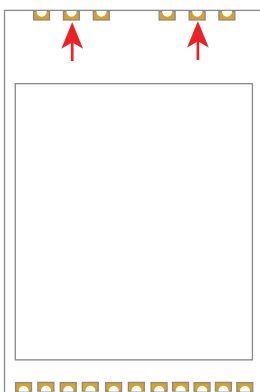
Antenna Output Options

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

Neither of these modules includes an antenna. For certification purposes, they have been tested and certified using a IPEX cable connected to a 3dBi SMA Antenna. This allows your design to use any antenna with a maximum gain of 3 dBi. If an antenna with a gain above 3 dBi is used, our certification will no longer be valid and additional certification may be required.

We also offer free design-in support to help ensure the module and antenna are correctly integrated into your product.

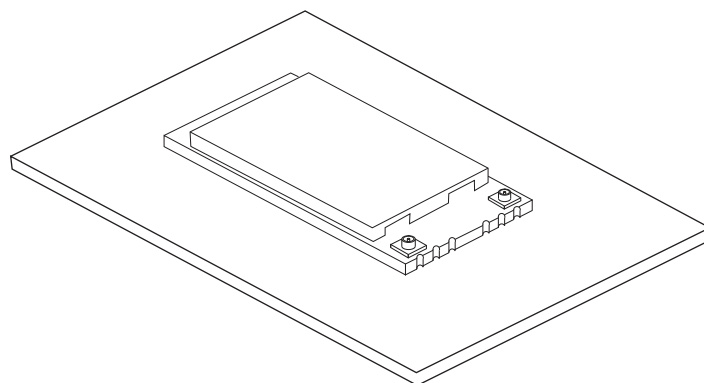
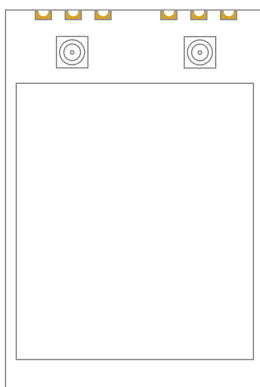
RF Line Out Option



- For better RF performance, please avoid placing any traces or copper planes underneath the black-framed area of the module

- For optimum RF performance, the feed line from the RF output pin to the antenna should be designed with a 50-ohm impedance

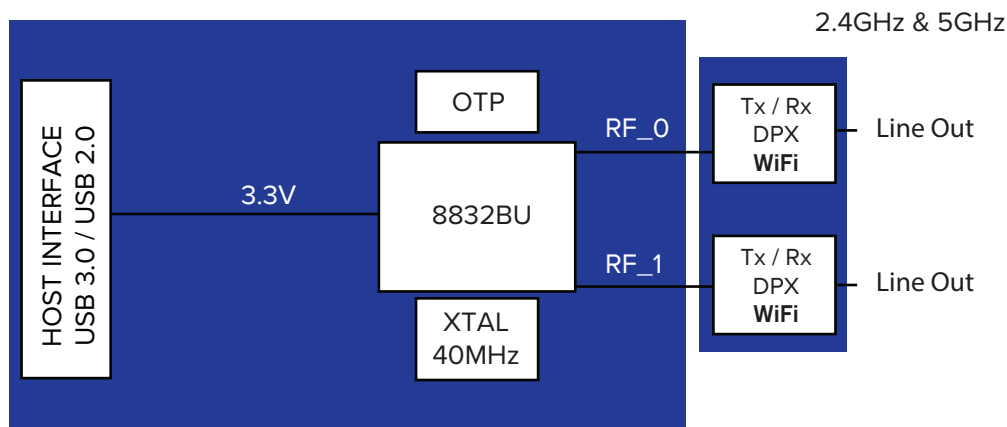
2 x IPEX Option



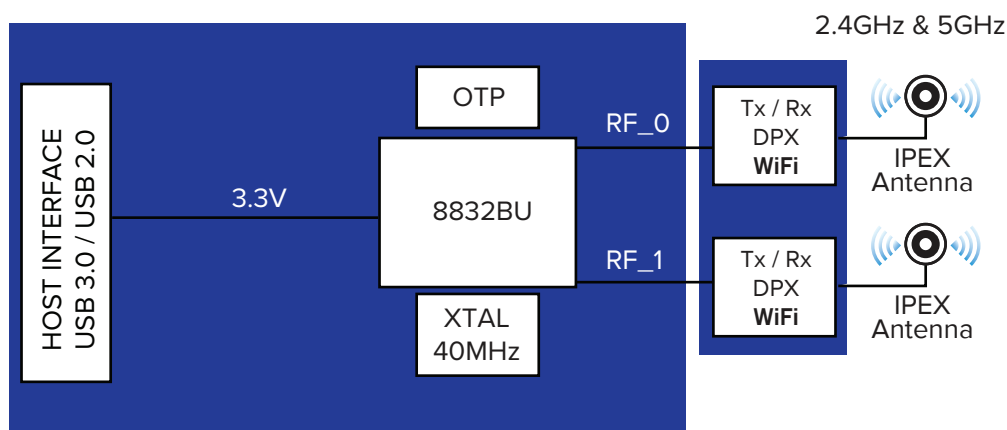
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XCVR Block Diagram (2 x RF Half Hole Line Out)



XCVR Block Diagram (2 x IPEX Antennas)



Note: The diagram above reflects the primary 11-Half Hole pad configuration, which supports full dual-mode (USB 3.0 / USB 2.0) interface functionality. Alternative 4-Pin Header configurations are available as a factory option upon customer request and are restricted to USB 2.0 operation only.

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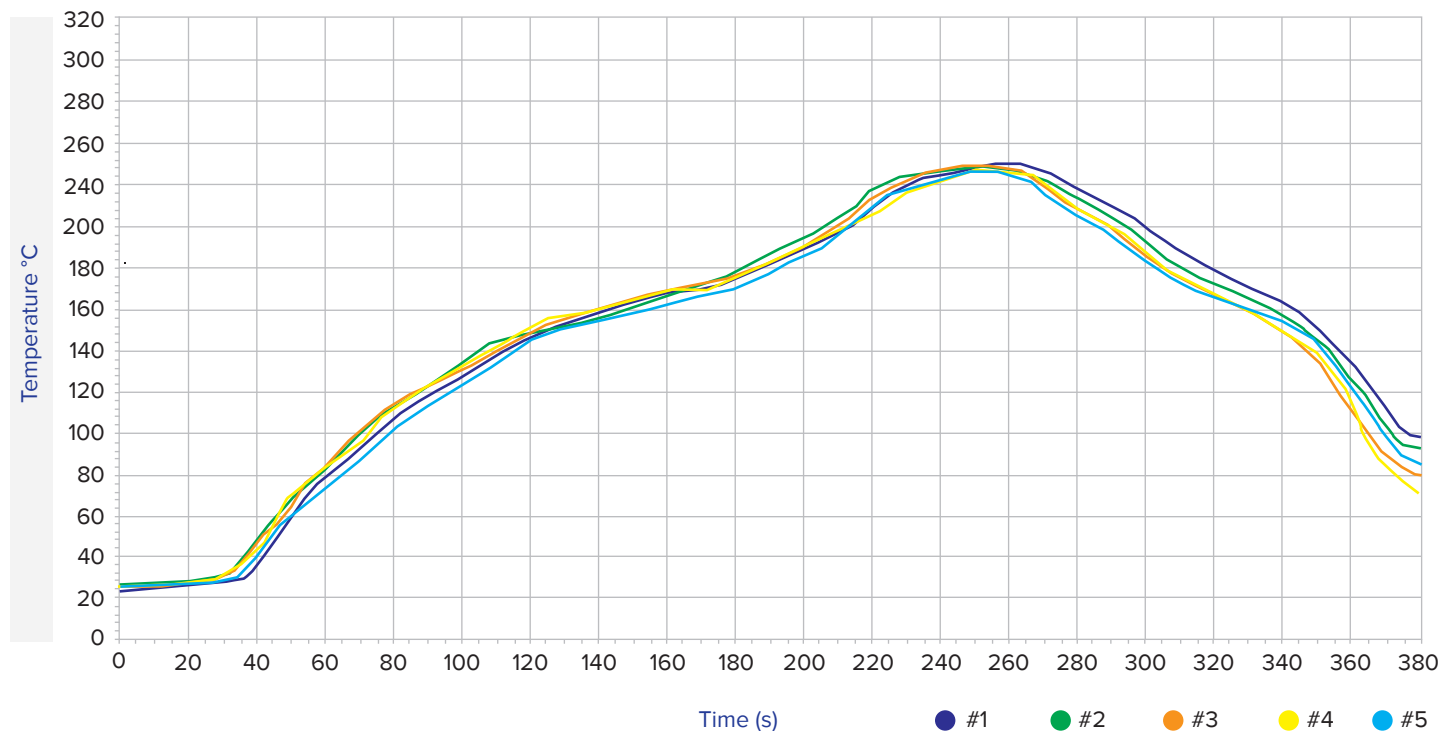
PCB Drying Conditions

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

1. If the system PCBA is a double-sided design, please reflow the side without this module first.
2. Do not allow the soldering machine temperature to exceed 250°C. Alternatively, follow the temperature profile recommended by the solder paste vendor.
3. The ramp-up temperature rate should be 1–4°C per second, and the ramp-down temperature rate should also be 1–4°C per second.
4. The reflow temperature profile shown is for reference only. The final profile should be adjusted according to the requirements and characteristics of the manufacturing equipment.

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

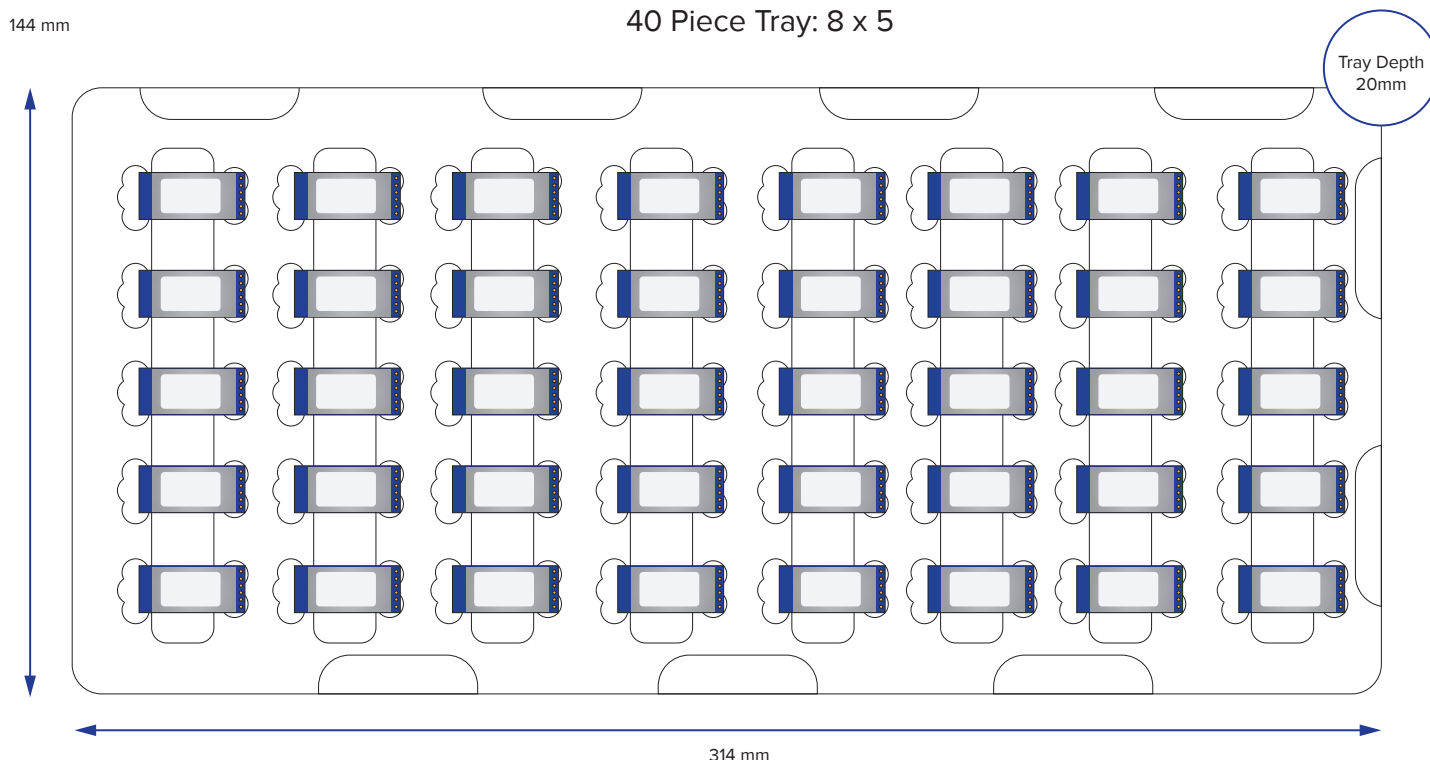
Probe	Liquidus Line		Maximum / Minimum		Slope	
	Rising 110.00-190.00	Above 230.0	Max	Min	Positive	Negative
#1	119.00	47.50	245.50	27.30	2.56	-1.69
#2	116.50	49.00	247.10	27.70	2.69	-1.60
#3	116.00	46.50	245.80	29.30	2.04	-1.57
#4	117.00	46.50	244.90	29.20	2.60	-1.31
#5	119.50	50.00	248.10	29.60	2.44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

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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

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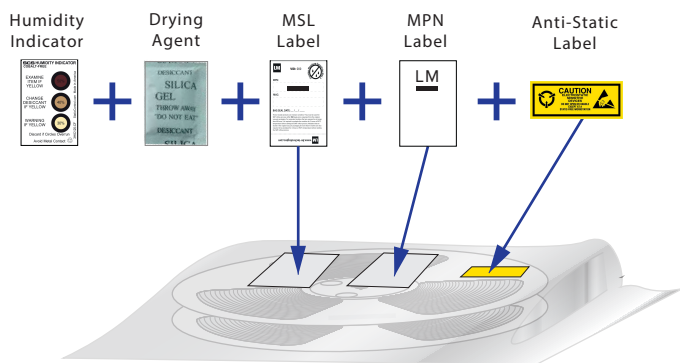
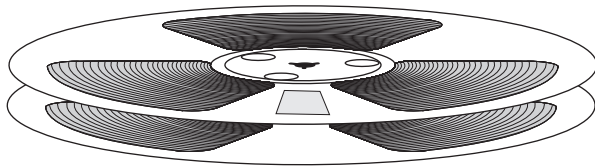
Packaging for Tape & Reel / Tray

The Tape & Reel / Tray are inserted into an anti-static vacuum bag with a Humidity Indicator Card and Drying Agent.

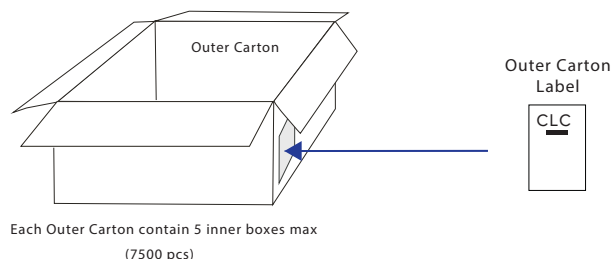
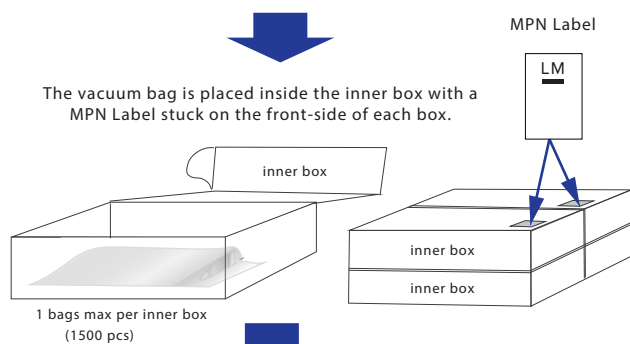
On the outside of the vacuum bag are MSL (Moisture Sensitivity Levels), MPN and an Anti-Static Labels.

Tape & Reel

Reels are placed within a vacuum bag.

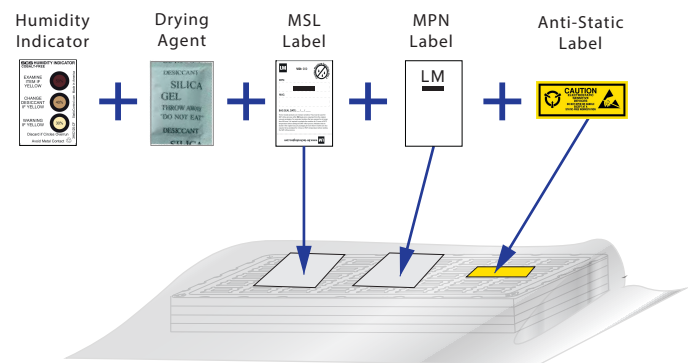
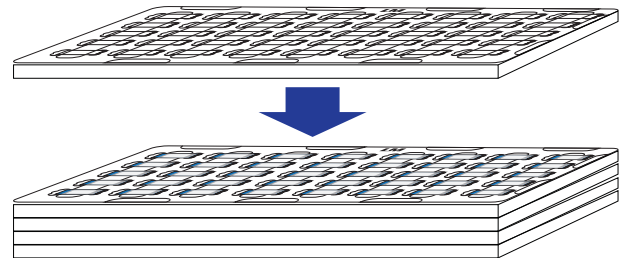


Vacuum bag.

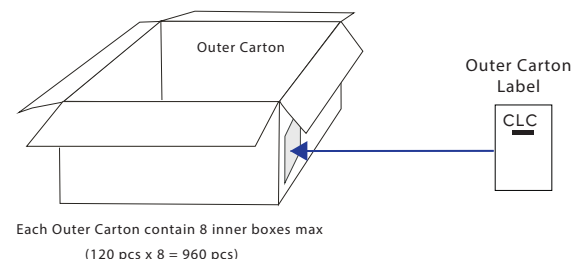
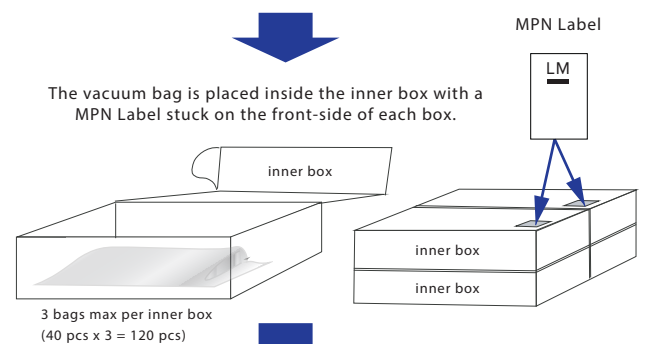


Tray

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



Vacuum bag.



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Datasheet Version Notes

v1.0	25 MAY 2026	Initial release.
v1.1	01 JUL 2026	Revised information throughout.

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Though every effort has been made to ensure that this document is current and accurate, additional information may have become available subsequent to the production of this guide. Please consult with LM Technologies for the latest information regarding this product.

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Ordering Options

MFT Part No.	Product Description	Invoice Description	RF Bands	Packaging
825-8250	MOD 802.11ax USB 2T2R IPEX TRAY		ETSI	TRAY
825-8251	MOD 802.11ax USB 2T2R IPEX TRAY		US	TRAY
825-8252	MOD 802.11ax USB 2T2R IPEX T&R		ETSI	T&R
825-8253	MOD 802.11ax USB 2T2R IPEX T&R		US	T&R
825-8254	MOD 802.11ax USB 2T2R RF_LINE TRAY		ETSI	TRAY
825-8255	MOD 802.11ax USB 2T2R RF_LINE TRAY		US	TRAY
825-8256	MOD 802.11ax USB 2T2R RF_LINE T&R		ETSI	T&R
825-8257	MOD 802.11ax USB 2T2R RF_LINE T&R		US	T&R

- 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>

