



LDTX-P18852E-V00

DATASHEET

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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2022.08.22	First release

1. Overview

The LDTX-P18852E-V00 is a highly integrated module that supports 2T2R 802.11ax solutions with MU-MIMO with wireless LAN (WLAN) PCI Express network interface controller and HS-UART mixed interface. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in the module.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and it can achieve up to a speed of 1201Mbps . The integrated module provides PCIe interface for Wi-Fi, UARTinterface for Bluetooth. And it provides a complete solution for a high-performance integrated wireless and Bluetooth device.

2. Features

WLAN

- IEEE 802.11a/b/g/n/ac/ax compliant WLAN
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHzbandwidth transmission
- Complies with PCI Express Base Specification Revision 2.1
- Dual-band 2T2R mode with data rate up to 1201Mbps
- Supports 802.11ac/ax 2*2 Wave-2 compliant with MU-MIMO
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble, OFDM with BPSK, QPSK, 16QAM,64QAM and 256QAM modulation.Convolutional Coding Rate: 1/2, 2/3, 3/4,and 5/6
- Maximum data rate 54Mbps in 802.11g,300Mbps in 802.11n and 866.7Mbps in 802.11ac,1201Mbps in 802.11ax

Bluetooth

- Supports Bluetooth 5 system(BT5.2 Logo Compliant)
- Compatible with Bluetooth v5.2 LE
- Integrated MCU to execute Bluetooth protocol stack
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different Profiles
- Single Mode support: Simultaneous LE

- Supports multiple Low Energy states
- Supports Enhanced Power Control
- Supports all packet types in basic rate and enhanced data rate
- Supports Secure Simple Pairing

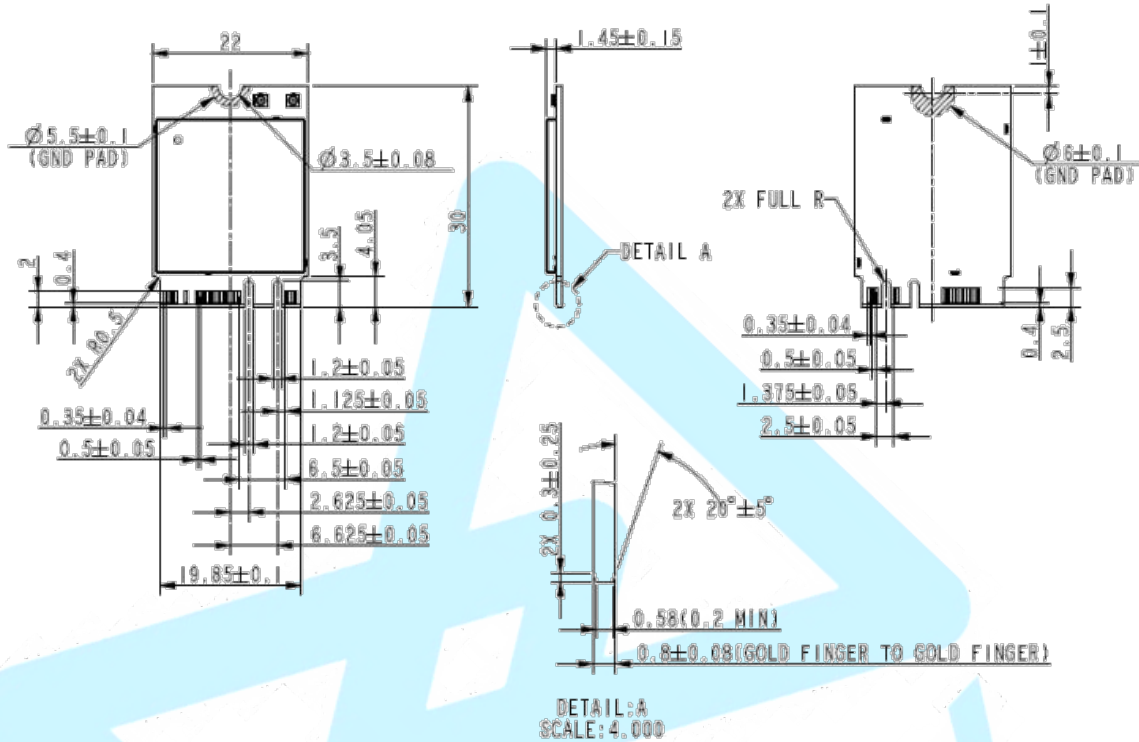
3. General Specification

Model	LDTX-P18852E-V00
Product Name	WiFi 11a/b/g/n/ac/ax 2T2R and BT 5.2 Module
Major Chipset	Realtek RTL8852BE-CG
Standard	IEEE802.11a/b/g/n/ac/ax, BT V5.2 LE
Data Transfer Rate	Max:1201 Mbps
Modulation Method	DSSS/DBPSK/DQPSK/16-QAM/ 64-QAM/256QAM/1024QAM
Frequency Band	2.4~2.4835GHz , 5.0~5.8 GHz
Spread Spectrum	IEEE802.11b: DSSS(Direct Sequence Spread Spectrum) IEEE802.11a/g/n/ac/ax: OFDM (Orthogonal rthogonal Frequency Division Multiplexing)
Operation Mode	Ad hoc, Infrastructure
Security	WEP, TKIP,AES, WPA, WPA2
Interface	Wi-Fi : PCI-E, Bluetooth : USB2.0
Operating Temperature	-20~ +70° C ambient temperature
Storage Temperature	-40 ~+90°C ambient temperature
Humidity	5 to 90 % maximum (non-condensing)
Dimension	22mm x30mm x 0.8mm (LxWxH)±0.15mm

4. DC Characteristics

Symbol	Parameter	Min.	Typ.	Max	Units
VD33	3.3V I/O supply Voltage	3.0	3.3	3.6	V
VD10	1.05V Core Supply Voltage	0.945	1.05	1.155	V
VIH	Input high Voltage	2.0	3.3	3.6	V
VIL	Input low Voltage	--	0	0.9	V
VOH	output high Voltage	2.97	--	3.3	V
VOL	output low Voltage	--	--	0.33	V

5. Dimension & Pin Assignments

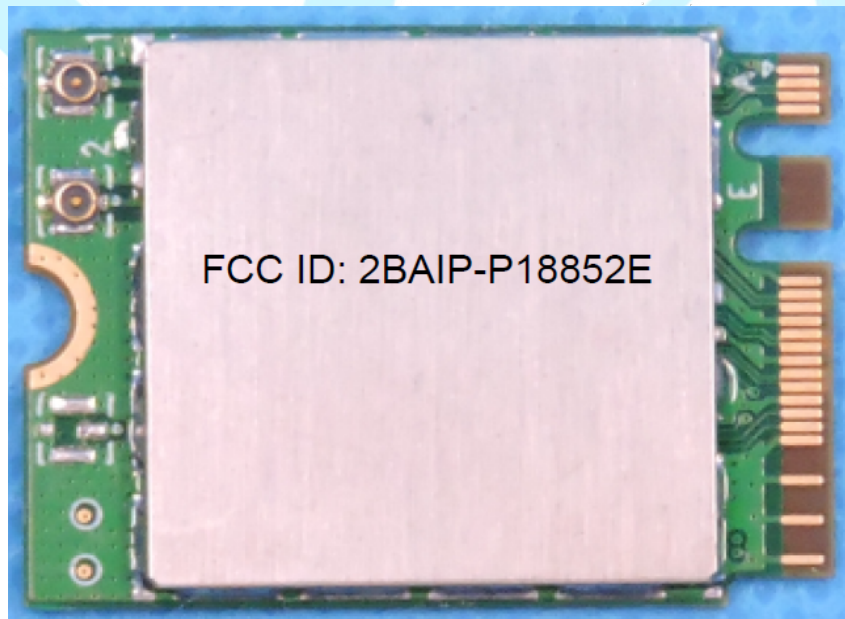


NO	Name	Description
1	GND	Ground connections
2	3.3V	3.3V power supply
3	NC	Floating Pin, No connect to anything.
4	3.3V	3.3V power supply.
5	NC	Floating Pin, No connect to anything.
6	WL_LED	WLAN LED signal
7	GND	Ground connections.
16	BT_LED	WLAN LED signal
17	NC	Floating Pin, No connect to anything.
18	GND	Ground connections.
19	NC	Floating Pin, No connect to anything.
20	BT_WAKE_HOST	BT wake up Host signal.
21	NC	Floating Pin, No connect to anything.

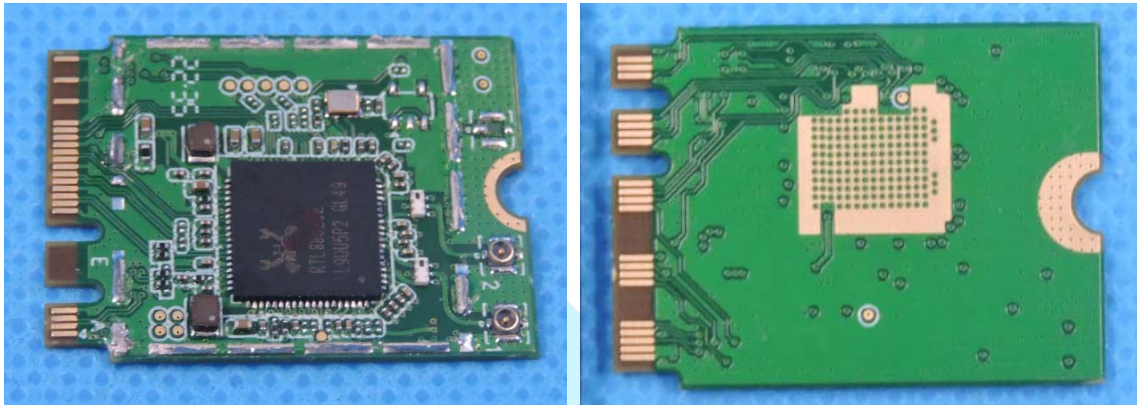
22	NC	Floating Pin, No connect to anything.
23	NC	Floating Pin, No connect to anything.
32	NC	Floating Pin, No connect to anything.
33	GND	Ground connections.
34	NC	Floating Pin, No connect to anything.
35	PERp0	Differential receive
36	NC	Floating Pin, No connect to anything.
37	PERn0	Differential receive
38	HOST_WAKE_BT	Host wake up BT signal.
39	GND	Ground connections
40	NC	Floating Pin, No connect to anything.
41	PETp0	Differential transmit.
42	NC	Floating Pin, No connect to anything.
43	PETn0	Differential transmit
44	NC	Floating Pin, No connect to anything.
45	GND	Ground connections
46	LTE_TXD	Coexistence.
47	REFCLKP	Differential reference clock.
48	LTE_RXD	Coexistence.
49	REFCLKN	Differential reference clock.
50	SUSCLK	32KHz clock input.
51	GND	Ground connections
52	PERST0	PE-Reset is a functional reset to the card as defined by the PCI Express Mini Card CEM specification.
53	CLKREQ0	Reference clock request
54	WL_DIS_N	WLAN disable control.
55	PEWAKE0	Open Drain active Low signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event.
56	BT_DIS_N	BT disable control.
57	GND	Ground connections
58-62	NC	Floating Pin, No connect to anything.
63	GND	Ground connections

64	NC	Floating Pin, No connect to anything.
65	NC	Floating Pin, No connect to anything.
66	GPIO0	RESERVED
67	NC	Floating Pin, No connect to anything.
68	GPIO1	RESERVED
69	GND	Ground connections
70	GPIO2	RESERVED
71	NC	Floating Pin, No connect to anything.
72	3.3V	3.3V power supply
73	NC	Floating Pin, No connect to anything.
74	3.3V	3.3V power supply
75	GND	Ground connections
76	GND	Ground connections
77	GND	Ground connections

Label



6. Modular photo



7. Electrical Characteristics

WiFi Section:

7.1 2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n/ax WiFi compliant
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz: CH1 ~ CH14
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11ax : OFDMA /1024-QAM、256-QAM、64-QAM、16-QAM
Output Power	802.11b /11Mbps : 17dBm $\pm$ 2 dB @ EVM $\leq$ -15dB 802.11g /54Mbps : 15 dBm $\pm$ 2 dB @ EVM $\leq$ -25dB 802.11n /MCS7 : 14 dBm $\pm$ 2 dB @ EVM $\leq$ -28dB 802.11ax /MCS11 : 14 dBm $\pm$ 2 dB @ EVM $\leq$ -35dB
Receive Sensitivity (11b,20MHz)	- 1Mbps PER $\leq$ 8% @ -98 dBm $\leq$ -83 dBm - 11Mbps PER $\leq$ 8% @ -90 dBm $\leq$ -76 dBm
Receive Sensitivity (11g,20MHz)	- 6Mbps PER $\leq$ 10% @ -94 dBm $\leq$ -85 dBm - 54Mbps PER $\leq$ 10% @ -77 dBm $\leq$ -68 dBm
Receive Sensitivity (11n,20MHz)	- MCS=0 PER $\leq$ 10% @ -94 dBm $\leq$ -85 dBm - MCS=7 PER $\leq$ 10% @ -76 dBm $\leq$ -67dBm
Receive Sensitivity (11n,40MHz)	- MCS=0 PER $\leq$ 10% @ -91 dBm $\leq$ -82dBm - MCS=7 PER $\leq$ 10% @ -73 dBm $\leq$ -64dBm

Receive Sensitivity (11ax,20MHz)	- MCS=0 PER ≤10%@ -94 dBm ≤ -82 dBm
	- MCS=11 PER ≤10%@ -66 dBm ≤ -52dBm
Receive Sensitivity (11ax,40MHz)	- MCS=0 PER ≤10%@ -91 dBm ≤ -79dBm
	- MCS=11 PER ≤10%@ -64 dBm ≤ -49dBm
Maximum Input Level	802.11b : -10 dBm
	802.11g/n/ax : -20 dBm
Antenna Reference	

7.2 5GHz RF Specification

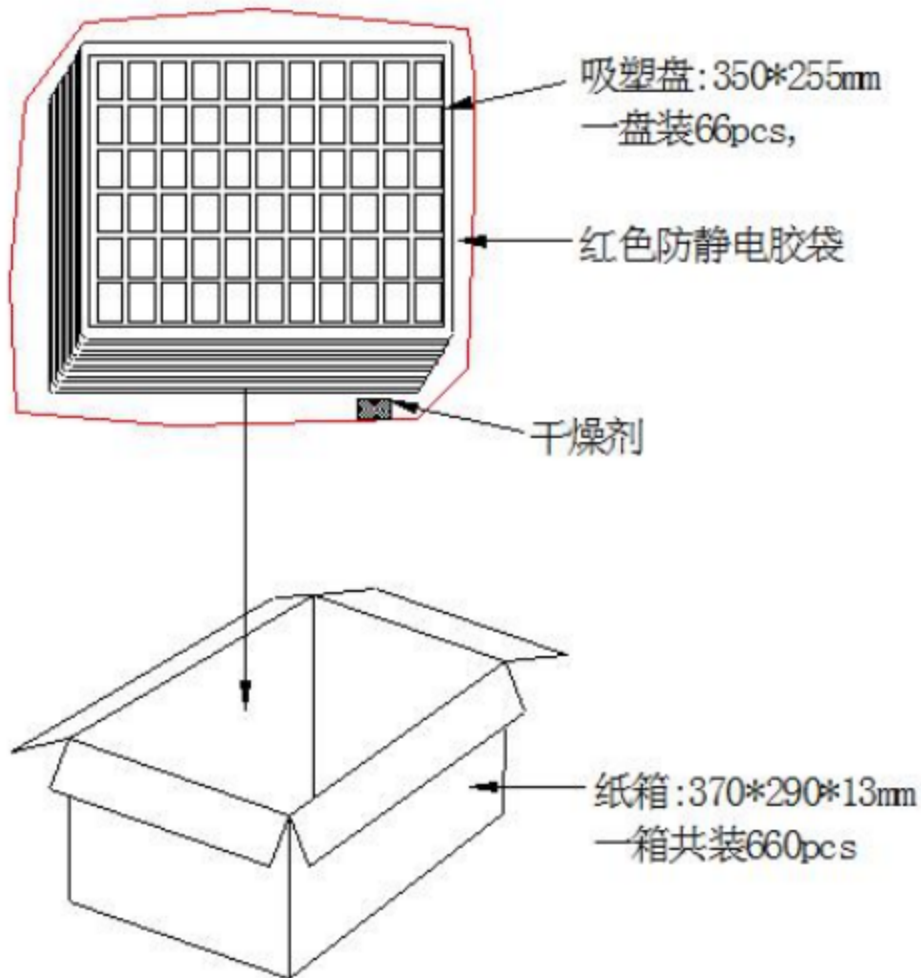
Feature	Description
WLAN Standard	IEEE 802.11a/n/ac 2x2, WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	CH36-CH165
Modulation	802.11a : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11ac : OFDM /256-QAM/64-QAM,16-QAM, QPSK, BPSK 802.11ax: OFDM /1024-QAM/256-QAM/64-QAM,16-QAM,QPSK, BPSK
Output Power	802.11a /54Mbps : 14 dBm ± 2 dB @ EVM ≤ -25dB
	802.11n HT20 /MCS7 : 13 dBm ± 2 dB @ EVM ≤ -28dB
	802.11n HT40 /MCS7 : 12 dBm ± 2 dB @ EVM ≤ -28dB
	802.11ac VHT20 /MCS8 : 12 dBm ± 2 dB @ EVM ≤ -30dB
	802.11ac VHT40 /MCS9 : 11 dBm ± 2 dB @ EVM ≤ -32dB
	802.11ac VHT80 /MCS9 : 11 dBm ± 2 dB @ EVM ≤ -32dB
	802.11ax HE20 /MCS11 : 12 dBm ± 2 dB @ EVM ≤ -35dB
	802.11ax HE40 /MCS11 : 11 dBm ± 2 dB @ EVM ≤ -35dB
	802.11ax HE80 /MCS11 : 11 dBm ± 2 dB @ EVM ≤ -35dB
Receive Sensitivity (11a,20MHz)	- 6Mbps PER ≤10% @ -94 dBm ≤ -85 dBm
	- 54Mbps PER ≤10% @ -76 dBm ≤ -68 dBm
Receive Sensitivity (11n,20MHz)	- MCS=0 PER ≤10%@ -92 dBm ≤ -85 dBm
	- MCS=7 PER ≤10%@ -74 dBm ≤ -67 dBm
Receive Sensitivity (11n,40MHz)	- MCS=0 PER ≤10%@ -90 dBm ≤ -82 dBm
	- MCS=7 PER ≤10%@ -71 dBm ≤ -64dBm
Receive Sensitivity (11ac,20MHz)	- MCS=0, NSS1 PER ≤10%@ -94 dBm ≤ -82 dBm
	- MCS=8, NSS1 PER ≤10%@ -70 dBm ≤ -60 dBm
Receive Sensitivity	- MCS=0, NSS1 PER ≤10%@ -90 dBm ≤ -79 dBm

(11ac,40MHz)	- MCS=9, NSS1	PER ≤10% @ -66 dBm	≤ -55 dBm
Receive Sensitivity (11ac,80MHz)	- MCS=0, NSS1	PER ≤10% @ -88 dBm	≤ -79 dBm
	- MCS=9, NSS1	PER ≤10% @ -62 dBm	≤ -54 dBm
Receive Sensitivity (11ax,20MHz)	- MCS=0	PER ≤10% @ -94 dBm	≤ -82 dBm
	- MCS=11	PER ≤10% @ -65 dBm	≤ -52 dBm
Receive Sensitivity (11ac,40MHz)	- MCS=0	PER ≤10% @ -92 dBm	≤ -79 dBm
	- MCS=11	PER ≤10% @ -61 dBm	≤ -49 dBm
Receive Sensitivity (11ac,80MHz)	- MCS=0	PER ≤10% @ -89 dBm	≤ -73 dBm
	- MCS=11	PER ≤10% @ -57 dBm	≤ -43 dBm
Maximum Input Level	802.11a/n/ac/ax : -20 dBm		
Antenna Reference			

7.3 Bluetooth Section:

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.2 LE		
Host Interface	USB2.0		
Antenna Reference			
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	40 channels		
Modulation	GFSK		
RF Specification			
	Min	Min	Max
Output Power		6 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-88 dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		

8. Packing information



ESD CAUTION

The LDTX-P15852E-V00 is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although LDTX-P18852E-V00 is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

FCC Caution.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

Integration instructions for host product manufacturers according to KDB 996369
D03 OEM Manual v01

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.

Explanation: FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 & 15.407

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The module comply with all specific rules applicable to the transmitter including all the conditions provided in the integration instructions by the grantee, Refer to test report.

EUT does not contain an antenna. Collocation test antenna designation is SMA antenna, Antenna gain: BLE: 5dBi; 2.4G WLAN/5G WLAN: ANT A:5 dBi, ANT B:5dBi, MIMO A+B:8.01dBi. The host provider to use this module is required to use this exactly[e of antenna . Any other antenna would violate the certification.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The Module is not a limited module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: EUT does not contain an antenna. Collocation test antenna designation is SMA antenna, Antenna gain: BLE: 5dBi; 2.4G WLAN/5G WLAN: ANT A:5 dBi, ANT B:5dBi, MIMO A+B:8.01dBi. The host provider to use this module is required to use this exactly the same of antenna. Any other antenna would violate the certification.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: Transmitter meets MPE calculation of 47 CFR 1.1307 and KDB 447498. Refer to MPE Reports

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration

instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: EUT does not contain an antenna, Collocation test antenna designation is SMA antenna, Antenna gain: BLE: 5dBi; 2.4G WLAN/5G WLAN: ANT A:5 dBi, ANT B:5dBi, MIMO A+B:8.01dBi. The host provider to use this module is required to use this exactly [e] of antenna . Any other antenna would violate the certification.



2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The modular has a permanent fixed label, and below statement was listed in the User Manual ;The host device must be labeled to display the FCC ID of the module “Contains FCC ID: 2BAIP-P18852E”

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: The module comply with all specific rules applicable to the transmitter including all the conditions provided in the integration instructions by the grantee, Refer to test report

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the

grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 & 15.407) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.