

Integration Instructions

This is the integration instructions for host product manufacturers to use when integrating the module in a host product.

2.1 General

This integration instructions describes the integration procedure per Sec. 2.2 to 2.12 of KDB 996369 D03.

This is Limited modular approval as this module is limited to installation by the grantee into our host systems.

2.2 List of applicable FCC rules

This device complies with below part 15 of the FCC Rules.

Part 15 Subpart C

Part 15 Subpart E

2.3 Summarize the specific operational use conditions

This module designed for mounting inside of the end product by us professionally.

Therefore, it complies with the antenna and transmission system requirements of §15.203.

This module is certified as limited modular approval as it does not have its own power supply regulator, therefore regulated 3.3V must be supplied by a host device using voltage regulator, e.g. RT5784 or equivalent.

Application conditions: Mobile – 20 cm from a person's body

Modules can only be used in a host for the conditions that it was granted for. To be used in any other way than granted, such as mobile to portable or with other transmitters simultaneously, requires additional evaluation, testing, or testing and Class 2 permissive change.

Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

Client device (per definition in 47 CFR § 15.202) is limited to indoor locations, does not connect directly to the internet nor to other clients.

No vehicular use, except large aircrafts above 10000 ft.

2.4 Limited Modular procedures

This module is certified as limited modular approval as it does not have its own power supply regulator, therefore regulated 3.3V must be supplied by a host device using voltage regulator, e.g. RT5784 or equivalent.

How to attach the module

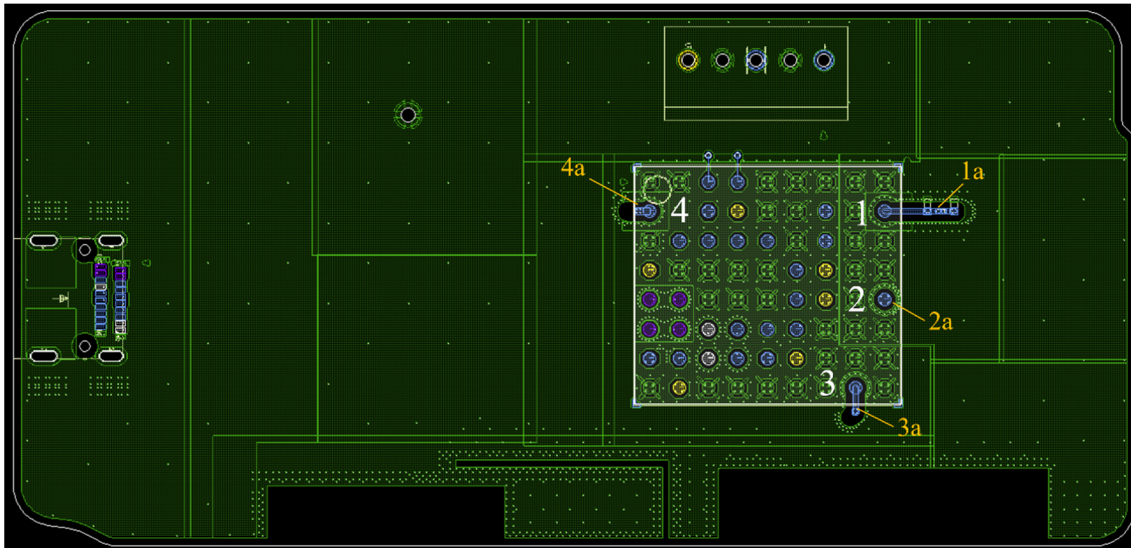
Refer to pin assignment

	1	2	3	4	5	6	7	8	9
A	 GND	 GND	 GPIO_1	 GPIO_2	 GND	 GND	 GND	 GND	 GND
B	 BT2		 NC	 3.3V	 GND	 GND	 NC	 GND	 2.4G/5G/6G_A
C	 GND	 PMU_EN	 WAKEUP	 USB_EN	 PCI_RST	 GND	 NC	 GND	 GND
D	 3.3V	 GND	 GND	 GND	 GND	 TMS	 3.3V	 GND	 GND
E	 PCI_Rx_P	 PCI_Rx_N	 GND	 GND	 GND	 TDO	 3.3V	 GND	 2.4G_B
F	 PCI_Tx_P	 PCI_Tx_N	 PCI_CLK_N	 USB_DM	 TCK	 TDI	 GND	 GND	 GND
G	 NC	 PCI_CLKREQ	 PCI_CLK_P	 USB_DP	 NC	 3.3V	 GND	 GND	 GND
H	 GND	 3.3V	 GND	 GND	 GND	 GND	 GND	 BT1/5G/6G_B	 GND

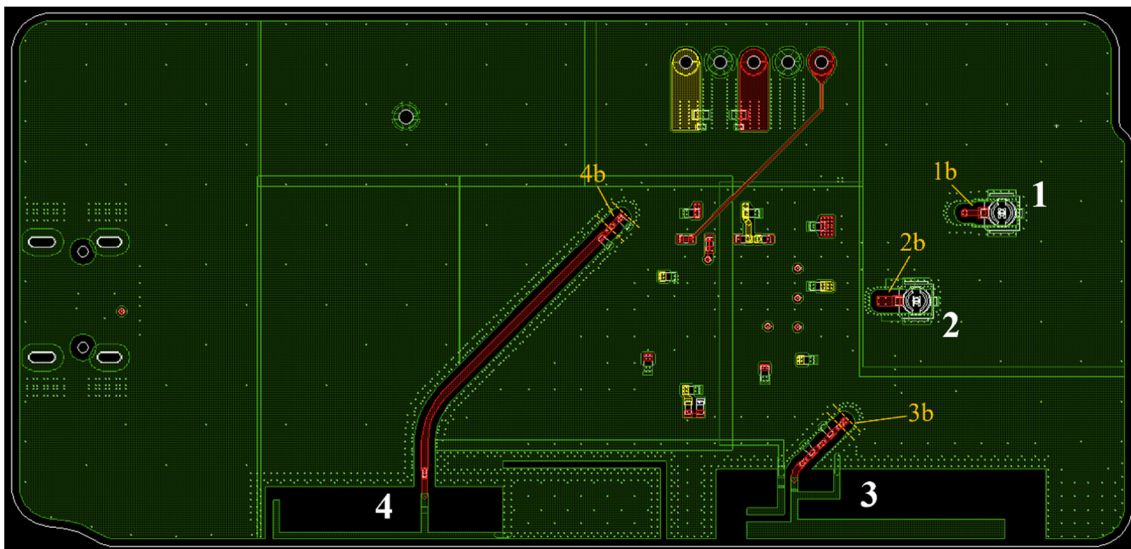
2.5 Trace antenna designs

The antenna trace design shall be constructed as below:

(top)



(bottom)



Total trace length (Include the via (=PCB thickness)):

- 1: for ANT1: $1a + 1b = 8.8\text{mm}$
- 2: for ANT2: $2a + 2b = 2.5\text{mm}$
- 3: for ANT3: $3a + 3b = 4.7\text{mm}$
- 4: for ANT4: $4a + 4b = 4.8\text{mm}$

Trace line should be terminated at 50 ohm

BOM:

- 1: coaxial connector (U.FL) ANT1
- 2: coaxial connector (U.FL) ANT2
- 3: Pattern ANT3
- 4: Pattern ANT4

Fine tuning of return loss etc. can be performed using a matching network. However, it is required to check "Class1 change" and "Class2 change" which the authorities define then.

Trace antenna designs information

Thickness : 1.50mm (PCB), 0.045mm (trace)

Length : See above picture for each connector port

Width : 0.496mm

Shapes : See above picture for each connector port

2.6 RF Exposure considerations

Application conditions: Mobile – 20 cm from a person's body

Modules can only be used in a host for the conditions that it was granted for. To be used in any other way than granted, such as mobile to portable or with other transmitters simultaneously, requires additional evaluation, testing, or testing and Class 2 permissive change.

The following statements must be described on the user manual of the host device of this module;

[for FCC]

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

[for ISED]

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment must be installed and operated keeping the radiator at least 20cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

2.7 Antennas

[for FCC]

The device is designed to use the antennas listed below. Do not modify the antenna or any other part of the module. Any modifications will invalidate the modular certifications and require new approvals for the host system.

	Model No.	Type	Gain
ANT1	L34RF084 or ANTS2M2-CSG06	PIFA	4.0dBi (2.4GHz) / 5.5dBi (5GHz) / 6.5dBi (6GHz)
ANT2		PIFA	4.0dBi (2.4GHz)
ANT3	(PWB printed antenna)	IFA	4.0dBi (2.4GHz) / 5.0dBi (5GHz) / 6.8dBi (6GHz)
ANT4		IFA	3.5dBi (2.4GHz)

[for ISED]

The following notice is not for end users but for the manufacturer of the host device.

Therefore, it isn't described on the user manual of the host device.

This radio transmitter (IC: 409B-M23TFU1) has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antennas

	Model No.	Type	Gain	Impedance
ANT1	L34RF084 or ANTS2M2-CSG06	PIFA	4.0dBi (2.4GHz) / 5.5dBi (5GHz) / 6.5dBi (6GHz)	
ANT2		PIFA	4.0dBi (2.4GHz)	
ANT3	(PWB printed antenna)	IFA	4.0dBi (2.4GHz) / 5.0dBi (5GHz) / 6.8dBi (6GHz)	
ANT4		IFA	3.5dBi (2.4GHz)	

Le présent émetteur radio (IC: 409B-M23TFU1) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Antennas

	Model No.	Typeype d'antenne	Gain	l'impédance
ANT1	L34RF084 or ANTS2M2-CSG06	PIFA	4.0dBi (2.4GHz) / 5.5dBi (5GHz) / 6.5dBi (6GHz)	
ANT2		PIFA	4.0dBi (2.4GHz)	
ANT3	(PWB printed antenna)	IFA	4.0dBi (2.4GHz) / 5.0dBi (5GHz) / 6.8dBi (6GHz)	
ANT4		IFA	3.5dBi (2.4GHz)	

2.8 Label and compliance information

The following information must be indicated on the host device of this module;

[for FCC]

Contains Transmitter Module FCC ID: AK8M23TFU1
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or

Contains FCC ID: AK8M23TFU1

[for ISED]

Contains IC: 409B-M23TFU1

2.9 Information on test mode and additional testing requirements

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.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant (FCC Part 15.247 and FCC part 15.407), and 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.

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

2.11 Note EMI Considerations

We recommend to use "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

The host manufacturer is responsible for ensuring compliance with the applicable FCC rules for the transmitters operating individually and simultaneously. This includes compliance for the summation of all emissions from all outputs occupying the same or overlapping frequency ranges, as defined by the applicable rules.

2.12 How to make changes

Not applicable.

***This module is limited to installation by the grantee into our host systems.**