Installation Manual

Information of FCC ID Label of this device:
FCC ID: AK8145890811

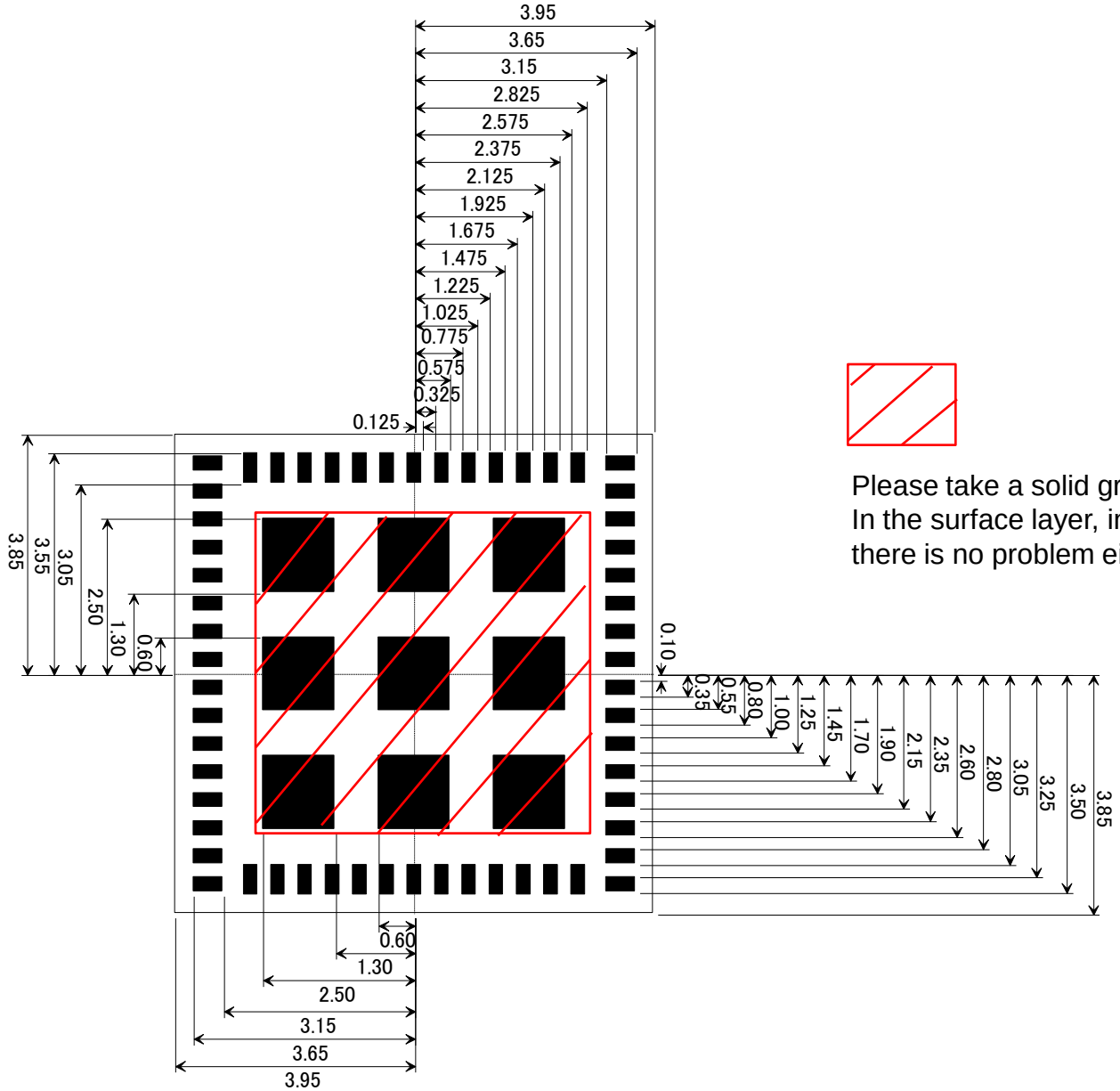
For OEM integration only – device cannot be sold to general public. Therefore we will ask OEM to include the following statements required by FCC on the product and in the Installation manual Notice.

Contents

1.Land Pattern (Recommended)
2.Supply Voltage
3.Antenna
4.Notice

**This module can only be installed in host powered by battery.

1.Land Pattern TOP View (Recommended)



Please take a solid ground this shaded area.
In the surface layer, in the inner layer,
there is no problem either.

Unit : mm

2.Supply Voltage

		min.	typ.	max.	unit
Operating Temperature		-20	+25	+85	deg.C
Supply Voltage	VBAT	3.13	3.2	4.4	V
	VDDXO*	1.70	1.8	1.9	V
	VIO *	1.71	1.8 or 3.3	3.63	V

*VDDXO and VIO don’t influence the RF characteristic.

This module can only be installed in host powered by battery.

3.Antenna

■ Please perform the antenna design that followed the specifications of the antenna.

■ About the signal line between an antenna and a module

It is a 50-ohm line design.

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.

The concrete contents of a check are the following three points.

１）It is the same type as the antenna type of antenna specifications.

２）An antenna gain is lower than a gain given in antenna specifications.

３）The emission level is not getting worse.

3.Antenna

Antenna gain

WLAN Main/Bluetooth

Frequency [MHz]	2402 - 2480
Peak Gain [dBi]	-8.0 (2480MHz)

2402	2441	2480
-8.8	-9.3	-8.0

3.Antenna(Trace design)

RF signal line stricture and characteristics

Micro Strip Line

	Gap※	Signal	Gap※			
Width[um]	279	183	279			
Thicness[um]				Material	ε	tanδ
22		L1		Cu		
35				Prepreg	3.5	0.012
20		L2				
35				Prepreg	3.5	0.012
20		L3		Cu		

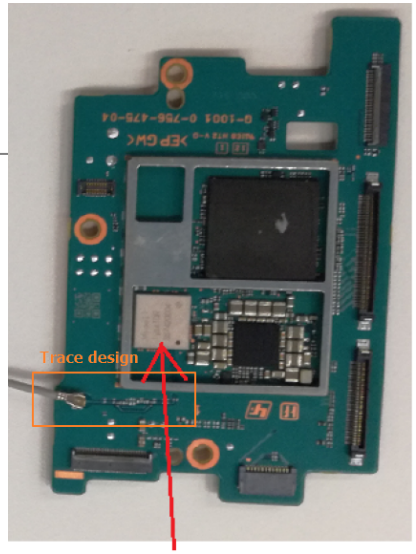
L1:Signal
L3:GND

Strip Line

	Gap※	Signal	Gap※			
Width[um]	110	73	110			
Thicness[um]				Material	ε	tanδ
22		L1		Cu		
35				Prepreg	3.5	0.012
20		L2				
35				prepreg	3.5	0.012
20		L3		Cu		
35				Prepreg	3.5	0.012
20		L4				
35				Prepreg	3.5	0.012
35		L5		Cu		

L1:GND
L3:Signal
L5:GND

※Gap from signal line to side gnd

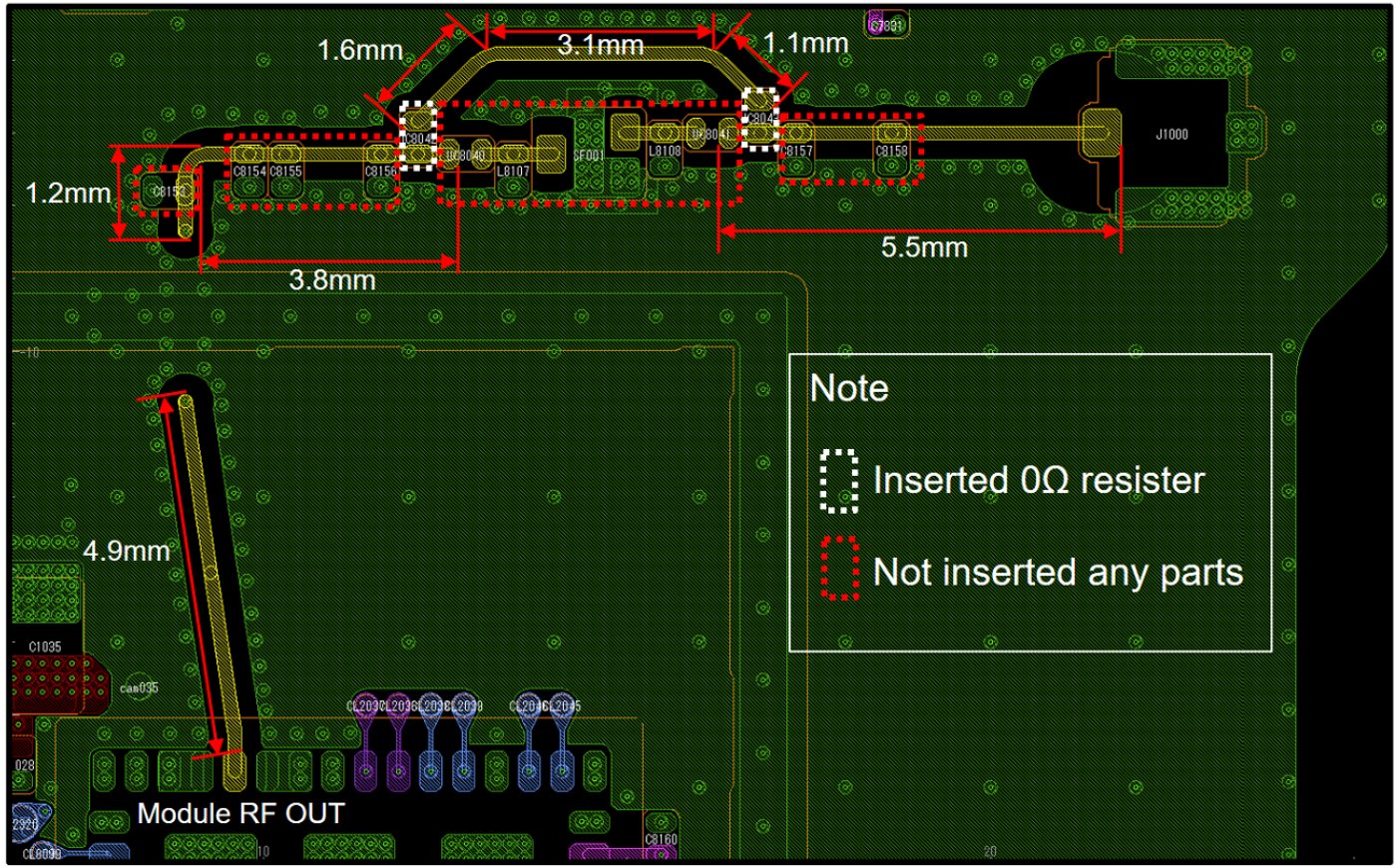


AL1DR(HVIM)

Characteristic Impedance : 50Ω
Insertion Loss(L1+L3) : 0.5dB

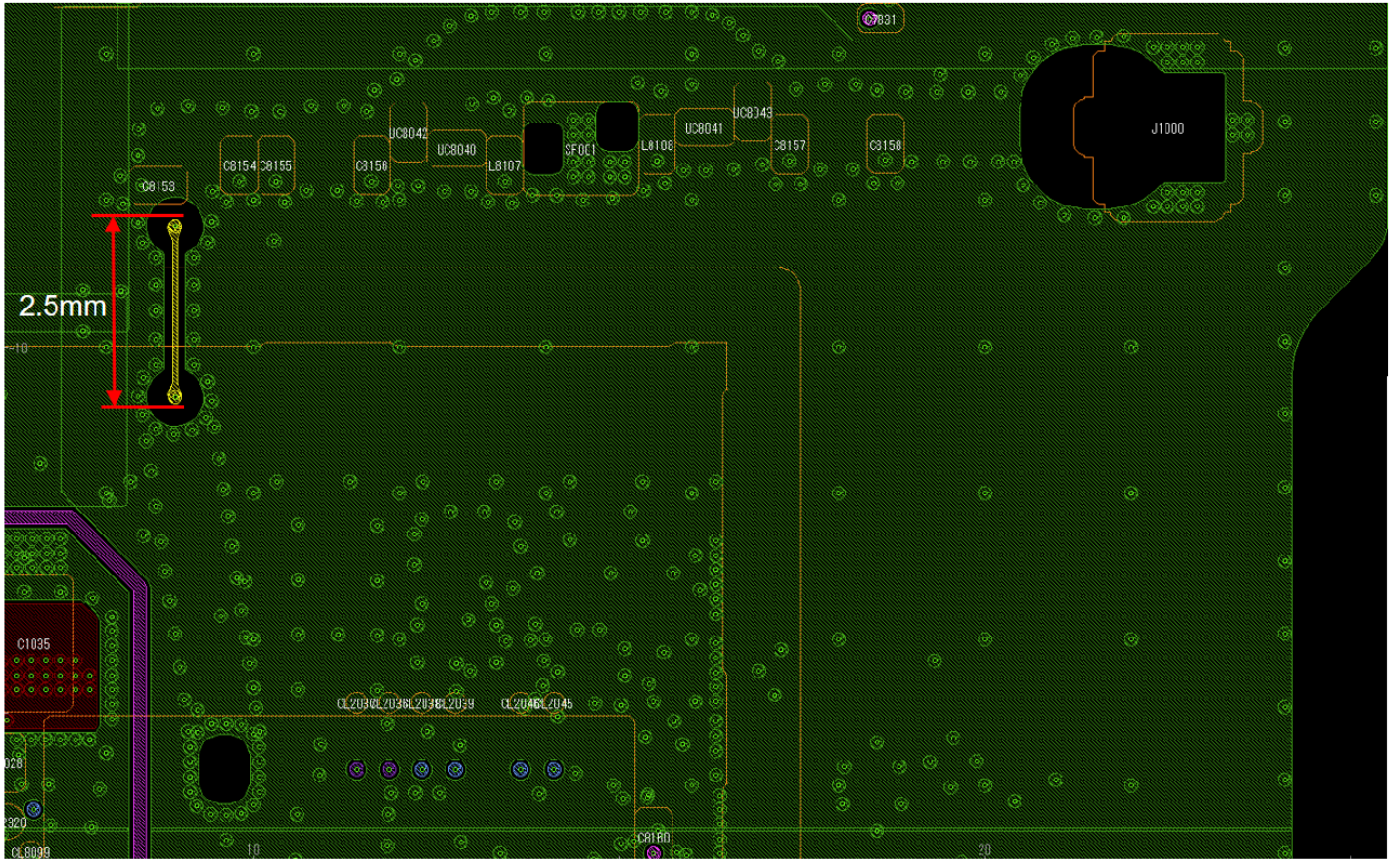
3.Antenna(Trace design)

RF signal line Length(L1)



3.Antenna(Trace design)

RF signal line Length(L3)



4. Notice

Please describe the following warning on the final product which contains this module.

Contains Transmitter Module FCC ID:AK8145890811

or

Contains FCC ID: AK8145890811

This device complies with Part 15 of FCC Rules and Industry Canada's licence-exempt RSSs. 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.
Le présent appareil est conforme à la partie 15 des règles de la FCC et aux normes des CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

※When the product is small, as for these words mentioned above, the posting to a manual is possible.

● Please describe the following warning to the manual.

FCC CAUTION Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

4. Notice

- Please describe the following statement to the manual.

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.

4. Notice

● When installing it in a mobile equipment. Please describe the following warning to the manual.

If mobile equipment use only low power BT/BLE or low power Wi-Fi.

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). When installing this module in host with multiple or additional transmitters, additional RF exposure evaluation is required.
Cet équipement est conforme aux limites d’exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles les radioélectriques (RF) de la FCC lignes directrices d'exposition et d’exposition aux fréquences radioélectriques (RF) CNR-102 de l’IC. Cet équipement émet une énergie RF très faible qui est considérée conforme sans évaluation de l’exposition maximale autorisée (MPE). Lors de l'installation de ce module sur un hôte avec plusieurs émetteurs ou plus, une évaluation d'exposition RF supplémentaire est requise.

In the case of conditions other than the above

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person’s body. When installing this module in host with multiple or additional transmitters, additional RF exposure evaluation is required.
Cet équipement est conforme aux limites d’exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles les radioélectriques (RF) de la FCC lignes directrices d'exposition et d’exposition aux fréquences radioélectriques (RF) CNR-102 de l’IC. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain. Lors de l'installation de ce module sur un hôte avec plusieurs émetteurs ou plus, une évaluation d'exposition RF supplémentaire est requise.

Note)
Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm.
Mobile equipment : Equipment used at position in which the spaces between human body and antenna exceeded 20cm.

4. Notice

● When installing it in a portable equipment.

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radio frequency (RF) Exposure rules. To ensure RF exposure compliance the antenna(s) used with this module must be installed in host platforms to provide a minimum 5mm separation distance, in all operating modes and orientations of the host platform. The separation distance is measured from the antenna and the outer surface of host platform in all directions for portable exposure conditions. The antenna separation distance applies to both horizontal and vertical orientation of the antenna when installed in the host system. Additional SAR evaluation would be required if other RF modules or transmitters are co-located with this module. When installing this module in host with multiple or additional transmitters, additional RF exposure evaluation is required.
Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles les radioélectriques (RF) de la FCC lignes directrices d'exposition et d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Pour assurer la conformité à l'exposition aux radiofréquences, les antennes utilisées avec ce module doivent être installées dans des plates-formes hôtes afin de fournir une distance de séparation minimale de 5 mm, dans tous les modes de fonctionnement et orientations de la plate-forme hôte. La distance de séparation est mesurée à partir de l'antenne et de la surface extérieure de la plate-forme hôte dans toutes les directions pour les conditions d'exposition portables. La distance de séparation de l'antenne s'applique à l'orientation horizontale et verticale de l'antenne lorsqu'elle est installée dans le système hôte. Une évaluation SAR supplémentaire serait nécessaire si d'autres modules RF ou émetteurs sont co-localisés avec ce module. Lors de l'installation de ce module sur un hôte avec plusieurs émetteurs ou plus, une évaluation d'exposition RF supplémentaire est requise.

Note)
Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm.
Mobile equipment : Equipment used at position in which the spaces between human body and antenna exceeded 20cm.