

Operational Description for Meural MB12X Module

This module provides the processing, memory and WiFi functionality for the larger sizes of the Netgear Meural picture frame product line and is not for sale as a separate product. The device provides WiFi client operation in 2.4GHz band & 5.0GHz bands and Bluetooth operation in 2.4GHz.

Model Name	MB12X
Power Supply	12Vdc from power adapter
Modulation Technology	Wifi: DSSS, OFDM, OFDMA, Bluetooth: GFSK (FHSS), $\pi/4$ DQPSK, 8PSK
Operating Frequency	Wifi: 2.4GHz: 2412 ~ 2462MHz Wifi: 5.0GHz: 5180 ~ 5240MHz, 5745 ~ 5825MHz Bluetooth: 2.402Ghz ~ 2.480Ghz
Transmitter	Wifi: 2.4/5.0GHz, MTK MT7921 with 40MHz crystal Bluetooth: MTK MT7921 with 40Mhz crystal
Antenna Type	Two dipole antennas with I-PEX connection (for 2.4Ghz and 5Ghz Wifi) One chip antenna soldered on the PCBA (for Bluetooth)

The device consists of a PCBA with on board power supply regulation, buffered data inputs and shielded RF circuitry.

2.4GHz Channels (wifi):

11 channels are provided for 802.11b, 802.11, 802.11n (HT20), 802.11 (VHT20), 802.11ax (HE20):			
Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		
7 channels are provided for 802.11n (HT40), 802.11n (VHT40), 802.11ax (HE40):			
Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

5.0GHz Channels:

FOR 5180 ~ 5240MHz (wifi)

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):			
Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz
2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):			
Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz
1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):			
Channel	Frequency	Channel	Frequency
42	5210MHz		

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FOR 5745 ~ 5825Mhz (wifi)

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		
2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):			
Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz
1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):			
Channel	Frequency	Channel	Frequency
155	5775MHz		

FOR 2402 ~ 2480Mhz (Bluetooth)

Bluetooth uses **Gaussian Frequency Shift Keying** (GFSK) as the main modulation technique, which is a form of Frequency Hopping Spread Spectrum (FHSS). Bluetooth also uses Phase Shift Keying (PSK) for higher data rates in the Enhanced Data Rate (EDR) mode.

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Integration Instructions

General Description

The MB12X module is a PCBA providing processing and WiFi function for the Meural picture frame devices when connected to a 12V DC external power Adapter, the Dipole antennas described below, suitable display and additional component to make up the end product.

KDB 996369 D03 OEM Manual v01 rule sections:

List of applicable FCC rules

This module has been tested for compliance to FCC Part 15

Summarize the specific operational use conditions

The module is tested for standalone mobile use condition. Any other usage conditions such as co-location with other transmitter(s) will need a separate reassessment through a class II permissive change application or new certification.

RF exposure considerations

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

Label and compliance information

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed and operated with greater than 20cm between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions cannot be met, then the FCC and ISSED authorization is no longer considered valid and the FCC ID and ISSED ID cannot be used on the final product. In these circumstances the final product will need re-evaluating and obtaining a separate FCC authorization.

Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower net gain may also be used with this module.

Antenna NO.	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type
MC321-Ant0	907X00747X22(580)	1.03	2.4~2.4835	Dipole	ipex(MHF)
		1.36	5.15~5.25		
		1.78	5.725~5.85		
MC321-Ant1	907X00747X11(580)	1.33	2.4~2.4835	Dipole	ipex(MHF)
		2.22	5.15~5.25		
		2.24	5.725~5.85		
MC327-Ant0	907X00747X88	0.64	2.4~2.4835	Dipole	ipex(MHF)
		1.24	5.15~5.25		
		1.51	5.725~5.85		
MC327-Ant1	907X00747X35	1.61	2.4~2.4835	Dipole	ipex(MHF)
		2.03	5.15~5.25		
		2.33	5.725~5.85		
BT	ACA-5036-A2-CC-S	2.1	2.4~2.4835	Chip	None

Label information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: PY323200597". This FCC ID can be used only when all FCC compliance requirements are met.

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Additional testing, Part 15 Subpart B Note

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

Manual Information to the End User

The product manual shall not provide information to the end user regarding how to install or remove this RF module. The end user manual shall include all required regulatory information/warnings in accordance with Netgear standard practice.

Final product responsibilities

Manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

Federal Communication Commission Interference Statement

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.

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 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.

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FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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

Radiation Exposure Statement:

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

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2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 15.

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

Not applicable.

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

Antenna Type (wifi)	Dipole
Antenna connector (wifi)	ipex
Antenna type (Bluetooth)	Chip
Antenna connector (Bluetooth)	Soldered on PCBA

2.8 Label and compliance information

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The final end product must be labeled in a visible area with the following: "Contains FCC ID: PY323200597". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential

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requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment

Industry Canada statement:

This device complies with ISED'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 aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

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

Déclaration d'exposition aux radiations:
Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following conditions: (For module device use)

- 1) The antenna must be installed and operated with greater than 20cm between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée et exploitée avec plus de 20 cm entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

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Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 4054A-23200597".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l'antenne peut être installée et utilisée à plus de 20 cm entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4054A-23200597".

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

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Caution :

- (i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- (ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate;
- (iii) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Avertissement:

- (i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
- (ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;
- (iii) lorsqu'il y a lieu, les types d'antennes (s'il y en a plusieurs), les numéros de modèle de l'antenne et les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués.