



# FCC/IC Certification Guidelines for End Products Using the DM3730/AM3703 Torpedo + Wireless SOM

## Application Note 538

Beacon EmbeddedWorks  
Published: September 2012  
Last revised: October 2021

This document contains valuable proprietary and confidential information, and the attached file contains source code, ideas, and techniques that are owned by Logic PD, Inc., dba Beacon EmbeddedWorks (collectively "Beacon EmbeddedWorks' Proprietary Information"). Beacon EmbeddedWorks' Proprietary Information may not be used by or disclosed to any third party except under written license from Logic PD, Inc.

Logic PD, Inc. makes no representation or warranties of any nature or kind regarding Beacon EmbeddedWorks' Proprietary Information or any products offered by Logic PD, Inc. Beacon EmbeddedWorks' Proprietary Information is disclosed herein pursuant and subject to the terms and conditions of a duly executed license or agreement to purchase or lease equipment. The only warranties made by Logic PD, Inc., if any, with respect to any products described in this document are set forth in such license or agreement. Logic PD, Inc. shall have no liability of any kind, express or implied, arising out of the use of the Information in this document, including direct, indirect, special or consequential damages.

Logic PD, Inc. may have patents, patent applications, trademarks, copyrights, trade secrets, or other intellectual property rights pertaining to Beacon EmbeddedWorks' Proprietary Information and products described in this document (collectively "Beacon EmbeddedWorks' Intellectual Property"). Except as expressly provided in any written license or agreement from Logic PD, Inc., this document and the information contained therein does not create any license to Beacon EmbeddedWorks' Intellectual Property.

The Information contained herein is subject to change without notice. Revisions may be issued regarding changes and/or additions.

© Copyright 2021, Logic PD, Inc. All Rights Reserved.



## Revision History

| REV | EDITOR  | DESCRIPTION   | APPROVAL        | DATE          |
|-----|---------|---|-----------------|---------------|
| A   | KJH     | - Initial release   | NJK, RAH        | Sept 06, 2012 |
|     |         | -Section 3.1: Added FCC ID for -31 version of SOM;<br>-Section 3.2: Added IC certification number for -31 version of SOM;<br>-Added Section 4.2.1.2 regarding antenna system for -31 version of SOM;<br>-Section 4.2.4: Added software requirements for -31 version of SOM;<br>-Section 4.3.1: Added FCC labeling guidelines for -31 version of SOM;<br>-Section 4.3.2: Added IC labeling guidelines for -31 version of SOM;<br>-Section 4.4: Added note to each end-product user manual statement indicating use of the 5150-5250 MHz band is limited to indoor use only |                 |               |
| B   | NJK     | -Section 3.1: Added FCC ID for -32 version of SOM;<br>-Section 3.2: Added IC certification number for -32 version of SOM;<br>-Added Section 4.2.1.2 regarding antenna system for -32 version of SOM;<br>-Section 4.2.1.2: Updated chip antenna guidelines<br>-Section 4.2.4: Added software requirements for -32 version of SOM;<br>-Section 4.3.1: Added FCC labeling guidelines for -32 version of SOM;<br>-Section 4.3.2: Added IC labeling guidelines for -32 version of SOM;   | KJH, RAH,<br>SO | Jul 15, 2013  |
| C   | AF, BSB | -Section 4.3.2: Added IC labeling guidelines for -32 version of SOM;  | BSB, JMC        | Jun 22, 2015  |
| D   | BSB     | -Added Section 5: Recertification   | NJK, RF         | Oct 14, 2021  |



## Table of Contents

|  |          |
|--|----------|
| <b>1. Introduction</b>                             | <b>1</b> |
| <b>2. Certification Overview</b>                   | <b>1</b> |
| 2.1 Unintentional vs. Intentional Radiation        | 1        |
| 2.2 Modular Transmitter Approval                   | 1        |
| <b>3. Product Approvals</b>                        | <b>2</b> |
| 3.1 United States – FCC                            | 2        |
| 3.2 Canada – IC                                    | 2        |
| <b>4. Compliance Guidelines</b>                    | <b>3</b> |
| 4.1 Overview                                       | 3        |
| 4.2 Integration Requirements                       | 3        |
| 4.2.1 Antenna Systems                              | 3        |
| 4.2.2 Substitute Antennas/Cables                   | 6        |
| 4.2.3 SAR Testing Requirements for End Products    | 6        |
| 4.2.4 Software Requirements                        | 6        |
| 4.3 End-Product Labeling Requirements              | 7        |
| 4.3.1 FCC Labeling Guidelines                      | 7        |
| 4.3.2 IC Labeling Guidelines                       | 7        |
| 4.4 End-Product User Manual Statement Requirements | 8        |
| 4.4.1 FCC User Manual Guidelines                   | 8        |
| 4.4.2 IC User Manual Guidelines                    | 8        |
| <b>5. Recertification</b>                          | <b>9</b> |
| <b>6. Disclaimer</b>                               | <b>9</b> |
| <b>7. Summary</b>                                  | <b>9</b> |



## 1. Introduction

The DM3730/AM3703 Torpedo + Wireless SOM is a modular transmitter. Therefore, customers who wish to use the DM3730/AM3703 Torpedo + Wireless SOM and 802.11a/b/g/n and/or Bluetooth in their end product must follow region-specific regulations.

This application note provides guidelines for the specific United States of America Federal Communications Commission (FCC) and Industry Canada (IC) regulations that pertain to the DM3730/AM3703 Torpedo + Wireless SOM. End products may be subject to additional regulations, and it is the responsibility of the end-product manufacturer to determine and comply with those regulations.

## 2. Certification Overview

### 2.1 Unintentional vs. Intentional Radiation

The FCC and IC require end products to comply with both unintentional and intentional radiation regulations.

Unintentional radiation occurs from a product that inherently or unwillingly transmits RF signals.

Intentional radiation occurs from a product that is designed to radiate or transmit RF signals for the purpose of wireless communication. The DM3730/AM3703 Torpedo + Wireless SOM is an intentional radiation emitter.

### 2.2 Modular Transmitter Approval

A modular transmitter is an intentional radiator device, such as the DM3730/AM3703 Torpedo + Wireless SOM that is designed to be installed in a host device. Obtaining modular transmitter approval allows the modular transmitter to be integrated into an end product without the need for additional intentional radiation testing of the final end-product assembly, as long as the modular transmitter is installed and operated in accordance with certain guidelines.

**NOTE:** Unintentional conducted and radiated emissions testing of the end product is still required to ensure compliance with the rules governing unintentional radiators. It is the responsibility of the end-product manufacturer to verify the end product meets these regulations. Additionally, the customer is responsible for any and all tests and/or certifications pertaining to their end product. This may include, but is not limited to, Specific Absorption Rate (SAR) compliance and potential recertification as an intentional radiation emitter if the DM3730/AM3703 Torpedo + Wireless SOM is installed or operated in a manner that differs from the instructions herein.



## 3. Product Approvals

### 3.1 United States – FCC

The DM3730/AM3703 Torpedo + Wireless SOM has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and has been assigned the following FCC identification numbers (FCC ID):

- YKP1021149<sup>1</sup> for the -30 version of the SOM
- YKP1024119<sup>2</sup> for the -31 and -32 version of the SOM

Operation of the module is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by Beacon EmbeddedWorks could void the user's authority to use this device.

In addition, the DM3730/AM3703 Torpedo + Wireless SOM has been tested to comply with FCC CFR47, Part 15, Sub-Part C "Intentional Radiators" and meets the requirements for modular transmitter approval as detailed in FCC Public Notice DA 00-1407, released June 26, 2000.

### 3.2 Canada – IC

The DM3730/AM3703 Torpedo + Wireless SOM has been certified for use in Canada under the IC Radio Standards Specification (RSS) RSS-210, RSS-102, and RSS-Gen. The IC has granted the DM3730/AM3703 Torpedo + Wireless SOM modular approval for Category I equipment under the following IC certification numbers:

- 10029A-1021149<sup>3</sup> for the -30 version of the SOM
- 10029A-1024119<sup>4</sup> for the -31 and -32 version of the SOM

---

<sup>1</sup> <https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm>

<sup>2</sup> <https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm>

<sup>3</sup> <http://www.ic.gc.ca/app/sitt/reitel/srch/nwRdSrch.do?lang=eng>

<sup>4</sup> <http://www.ic.gc.ca/app/sitt/reitel/srch/nwRdSrch.do?lang=eng>



## 4. Compliance Guidelines

### 4.1 Overview

Modular approval permits the DM3730/AM3703 Torpedo + Wireless SOM to be integrated into an end product without the need to recertify the end product as long as the following guidelines are followed by the module integrator.

### 4.2 Integration Requirements

#### 4.2.1 Antenna Systems

##### 4.2.1.1 -30 Model Numbers

The -30 version of the DM3730/AM3703 Torpedo + Wireless SOM has been approved using the antenna and coaxial cable specified below. Use of this antenna and cable will satisfy FCC/IC modular transmitter requirements. Substituting a different antenna of the same type with a peak gain of 2.5 dBi or less at 2.4 GHz or 3.5 dBi or less at 5 GHz is permitted. Also, substituting a different cable of the same loss at the frequencies of interest is permitted. **NOTE:** Both the antenna and cable are required per the FCC/IC certifications obtained by Beacon EmbeddedWorks.

- Antenna:
  - Manufacturer: Ethertronics Inc.
  - Model number: 1000418
  - Description: Prestta embedded antenna
  - Type: Isolated magnetic dipole
  - Gain: 2.5 dBi peak gain at 2.4 GHz and 3.5 dBi peak gain at 5 GHz
- Coaxial cable:
  - Manufacturer: Sunridge Corporation
  - Model number: MCD-R1-60-105-MCBG
  - Description: Coax, MCD/W.FL to MCB/U.FL, 105 mm, R1 orientation
  - Cable Loss: .47 dB at 2.39-2.49 GHz and .78 dB at 4.9-5.9 GHz

##### 4.2.1.2 -31 and -32 Model Numbers

The -31 and -32 versions of the DM3730/AM3703 Torpedo + Wireless SOM have been approved using the antenna and coaxial cable specified below. Use of this antenna and cable will satisfy FCC/IC modular transmitter requirements. Substituting a different antenna of the same type with a peak gain of 2.5 dBi or less at 2.4 GHz or 3.5 dBi or less at 5 GHz is permitted. Also, substituting a different cable of the same loss or more at the frequencies of interest is permitted. **NOTE:** Both the antenna and cable are required per the FCC/IC certifications obtained by Beacon EmbeddedWorks.

- Antenna:
  - Manufacturer: Ethertronics Inc.
  - Model number: 1000418
  - Description: Prestta embedded antenna
  - Type: Isolated magnetic dipole
  - Gain: 2.5 dBi peak gain at 2.4 GHz and 3.5 dBi peak gain at 5 GHz
- Coaxial cable:
  - Manufacturer: Sunridge Corporation
  - Model number: MCD-R1-60-105-MCBG



## FCC/IC Certification Guidelines for End Products Using the DM3730/AM3703 Torpedo + Wireless SOM

- Description: Coax, MCD/W.FL to MCB/U.FL, 105 mm, R1 orientation
- Cable Loss: .47 dB at 2.39-2.49 GHz and .78 dB at 4.9-5.9 GHz

The -31 and -32 versions of the DM3730/AM3703 Torpedo + Wireless SOM have also been approved using the chip antenna, coaxial cable, and feed trace specified below. Use of this antenna and cable will satisfy FCC/IC modular transmitter requirements. Substituting a different cable of the same loss or more at the frequencies of interest is permitted. **NOTE:** The antenna, cable, and feed trace are required per the FCC/IC certifications obtained by Beacon EmbeddedWorks.

**IMPORTANT NOTE:** All host board designs using a feed trace with chip antenna Pulse W3006 must be approved and signed off by Beacon EmbeddedWorks prior to production. [Contact Beacon EmbeddedWorks<sup>5</sup>](#) before choosing this antenna.

- Antenna:
  - Manufacturer: Pulse Electronics
  - Model number: W3006
  - Description: Ceramic chip antenna
  - Type: Ceramic chip antenna
  - Gain: 3.2 dBi peak gain at 2.4 GHz and 4.2 dBi peak gain at 5 GHz
- Coaxial cable:
  - Manufacturer: Sunridge Corporation
  - Model number: MCD-DH-68-035A
  - Description: Coax, MCD/W.FL to MCD/W.FL, 35mm
  - Cable Loss: .20 dB at 2.39-2.49 GHz and .33 dB at 4.9-5.9 GHz
- Feed trace must follow these guidelines:
  - The -31 and -32 versions of the DM3730/AM37033 Torpedo + Wireless SOM must have a cable, Sunridge Corporation MCD-DH-68-035A of length 35 mm or longer (same or more dB loss), attached to the W.FL antenna connector on the SOM. The other end of this cable must connect to a W.FL connector on the host board.
  - The trace on the host board shall be 50 ohms microstrip over a continuous ground plane. That ground plane shall be the same ground plane to which the chip antenna is coupled.
  - There shall be no other traces within four times the width of the feed trace, and no traces between the feed trace and the continuous ground plane.
  - The feed trace must be routed on the outside layers of the board with ground guard vias every .100 in. or less with a hole dimension of 0.5mm or larger.
  - The feed trace may have one through-hole via allowing the trace to transition from the top to the bottom (or vice versa).
  - The feed trace must be less than 1 in. in length.
  - The feed trace may include passive components for impedance-matching purposes.
  - The ground plane must be cleared under the chip antenna for an area of 11.60 x 6.00 mm. The cleared ground plane must follow the guidelines in Figure 4.1 below (dimensions in mm).

<sup>5</sup> <http://support.beaconembedded.com/support/askaquestion.php>



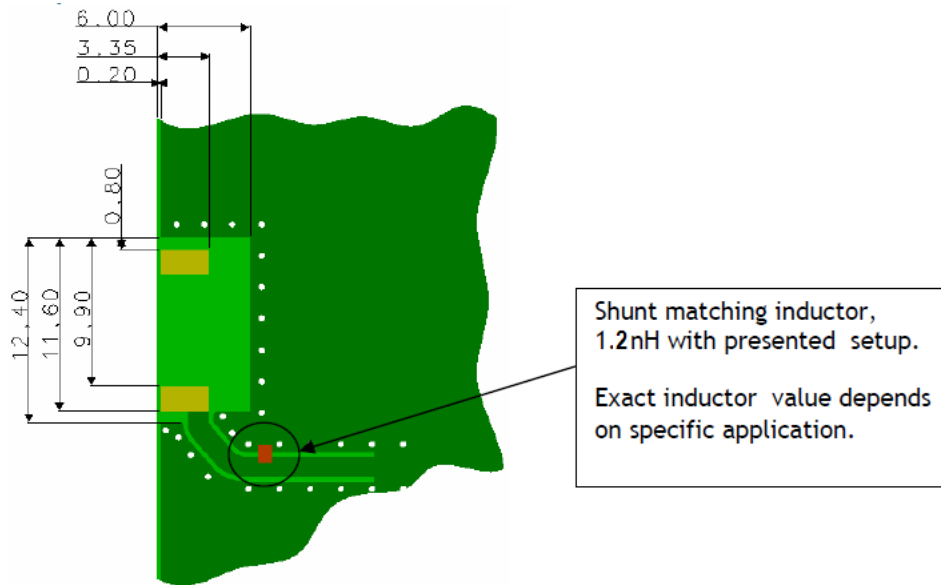


Figure 4.1: Cleared Ground Plane Guidelines

■ Design Tips:

- Multilayer board (Vias and Ground Clearance Area on PCB layers).
  - Top layer, bottom layer, and all inner layers should have a ground clearance area as shown in Figure 4.1.
  - Around the ground clearance area, the ground pour needs to be solid.
  - All layers around the ground clearance area must be connected together to avoid signal coupling/leaking into gaps between the layers
  - DC voltage layers can be left floating as long as metal of that layer does not overlap with the ground clearance area
- Pin 2 of the W3006 Antenna only connects to a 3.55 x 1.70 mm pad. No trace is connected to the pin 2 pad.
- Customers looking for guidance when selecting an antenna for their design may consider referencing the [TI Antenna Selection Guide application note](#)<sup>6</sup>.
- The minimum ground area for the best performance is 45 mm x 35 mm. For additional information from Pulse on the Effects of PCB Ground on the W3006 [contact Beacon EmbeddedWorks](#)<sup>7</sup> and reference ticket PRODUCTSDOCS-1044.

**Note:** The 1.2uH inductor in Figure 4.1 and Figure 4.2 was used to help achieve the 50 ohm impedance matching of the feed trace and was present during FCC compliance testing. The inductor was sized based on the characteristics of the PCB including the chosen dielectric, distance in thickness of the PCB between layers and the size of the trace. Changing any of these could cause the customer to change their inductor value for optimal performance. The

<sup>6</sup> <http://www.ti.com/lit/an/swra161b/swra161b.pdf>

<sup>7</sup> <https://beaconembedded.com/contact/>





inductor is not required for FCC compliance but is recommended, if needed, to assist with creating a 50 ohm impedance matching feed trace.

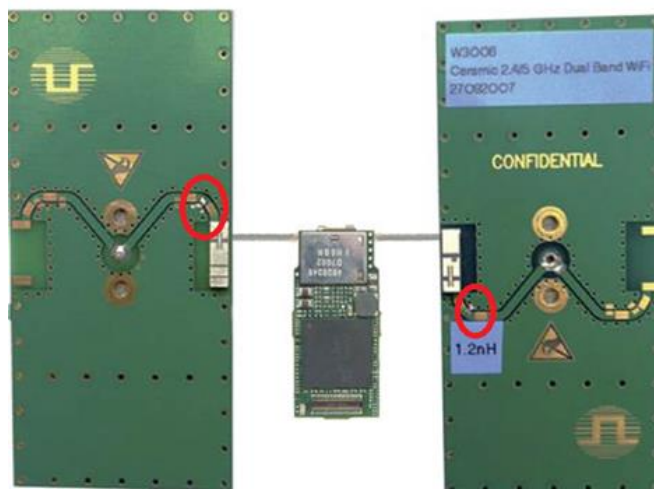


Figure 4.2: FCC Testing Image

#### 4.2.2 Substitute Antennas/Cables

If an antenna with a higher gain, of a different type, or with a shorter MCD/W.FL to MCB/U.FL coaxial cable (i.e., less cable loss) is used, the end product must be put through intentional radiation testing at a qualified test lab.

Please refer to FCC rules 47 CFR § 15.204 and IC rules RSS-Gen, Issue 3, Section 7.1.2 for more information.

If a different antenna is desired, please [contact Beacon EmbeddedWorks](#) for assistance with certification.

#### 4.2.3 SAR Testing Requirements for End Products

This device is to be used in mobile configurations. To comply with FCC/IC RF exposure limits for general population/uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

As long as the two conditions above are met, further transmitter testing will not be required. However, the Original Equipment Manufacturer (OEM) integrator is still responsible for testing the end product for any additional compliance requirements that are necessary when this module is installed (e.g., digital device emissions, PC peripheral requirements).

**IMPORTANT NOTE:** In the event that these conditions cannot be met (for certain configurations or because of co-location with another transmitter), the FCC/IC authorizations are no longer considered valid, and the FCC ID and IC certification number cannot 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/IC authorization.

#### 4.2.4 Software Requirements

The DM3730/AM3703 Torpedo + Wireless SOM has been tested using the following approved Logic PD Board Support Packages (BSPs):



For the -30 version of the SOM:

- DM37x Linux BSP v2.2-x or later
- DM3730/AM3703 Android Gingerbread 2.3.4 BSP v1.3 or later

For the -31 version of the SOM:

- DM37x Linux BSP v2.4-2 or later
- DM3730/AM3703 Android Gingerbread 2.3.4 BSP v1.5 or later
- DM3730 Android Ice Cream Sandwich 4.0.4 BSP v1.0-4 or later

For the -32 version of the SOM:

- DM37x Linux BSP v2.4-4 or later
- DM3730/AM3703 Android Gingerbread 2.3.4 BSP v1.6 or later
- DM3730 Android Ice Cream Sandwich 4.0.4 BSP v1.0-5 or later

Modular approval applies as long as these approved Logic PD BSPs are used to create the end product and radio initialization parameters are not modified. If other software is desired, please [contact Beacon EmbeddedWorks](#) for assistance with certification.

## 4.3 End-Product Labeling Requirements

### 4.3.1 FCC Labeling Guidelines

The DM3730/AM3703 Torpedo + Wireless SOM has been certified by the FCC as a modular transmitter. As such, the FCC ID assigned to the product is printed on a label permanently affixed to the SOM.

If the FCC ID label is not visible when the DM3730/AM3703 Torpedo + Wireless SOM is installed in the end product, this FCC ID must be located on the exterior surface of the end product where users can easily access it. The end product's exterior label or etching should use wording similar to one of the examples below.

For the -30 version of the SOM:

- Contains FCC ID: YKP1021149
- Contains Transmitter Module FCC ID: YKP1021149

For the -31 and -32 versions of the SOM:

- Contains FCC ID: YKP1024119
- Contains Transmitter Module FCC ID: YKP1024119

Please refer to FCC rules 47 CFR § 15.212(vi)(A) for additional information.

### 4.3.2 IC Labeling Guidelines

The IC certification number is printed on a label permanently affixed to the DM3730/AM3703 Torpedo + Wireless SOM. The label shall be clearly visible at all times when the DM3730/AM3703 Torpedo + Wireless SOM is installed in the end product. If this is not possible, the end product must be labeled to display the IC



certification number of the module, preceded by the words “Contains transmitter module” or “Contains” or similar wording expressing the same meaning. Examples are provided below.

For the -30 version of the SOM:

- Contains IC: 10029A-1021149
- Contains Transmitter Module IC: 10029A-1021149

For the -31 and -32 versions of the SOM:

- Contains IC: 10029A-1024119
- Contains Transmitter Module IC: 10029A-1024119

## 4.4 End-Product User Manual Statement Requirements

The following section outlines statements that are required to appear in the end-product user manual in order to maintain modular transmitter approval.

### 4.4.1 FCC User Manual Guidelines

For products marketed and used in the United States, the end-product user manual must include the following caution statement in a prominent location:

*To satisfy FCC RF exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Use of the 5150-5250 MHz band must also be limited to indoor use only.*

### 4.4.2 IC User Manual Guidelines

For products marketed and used in Canada, the end-product user manual must include the statement below in a prominent location. The statement must be provided in both English and French.

*Notice: To satisfy IC RF exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Use of the 5150-5250 MHz band must also be limited to indoor use only.*

*Avis: Pour répondre à la IC d'exposition pour les besoins de base et mobiles dispositifs de transmission de la station, sur une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de cet appareil et les personnes en cours de fonctionnement. Pour assurer le respect, l'exploitation de plus près à cette distance n'est pas recommandée. L'antenne (s) utilisé pour cet émetteur ne doit pas être co-localisés ou fonctionner conjointement avec une autre antenne ou transmetteur. L'utilisation de la bande de 5150-5250 MHz doit également être limitée à l'utilisation d'intérieur seulement.*



## 5. Recertification

Additional testing was required due to changes to the oscillator documented in PCN 634 on the Torpedo + Wireless -32 SOMs. No other SOMs are impacted by this recertification. The SOM selected was one that provided the most power of others being considered prior to testing. As a result the WiFi power had to be lowered slightly due to spurious emissions and Classic Bluetooth power had to be lowered by 1 dBm but only during the 1Mb transfer rate.

The files provided within this application note can be used to replace those released within the DM37x Linux 2.4-4 BSP. To replace the WIFI and Bluetooth firmware files within the LTIB build environment one can copy them to the merge folder (*config/platform/omap\_logic/merge*) prior to performing the build. See the procedures documented in the updated Software Test Plan for verifying the correct firmware files are loaded into the updated Linux image.

```
# Copy the updated firmware files to merge folder
root@hostpc: mkdir -p config/platform/omap_logic/merge/lib/firmware/ti-
connectivity
root@hostpc: cp WL128x_BT_Service_Pack_2.14_LogicPD_20210715.bts
config/platform/omap_logic/merge/lib/firmware/Logic_TTInit_tw32_10.6.15.bts
root@hostpc: cp 1031274_RevA_nvs.bin
config/platform/omap_logic/merge/lib/firmware/ti-connectivity/wl128x-nvs-
tw32.bin

# Rebuild to Linux image to include the updated firmware.
root@hostpc: ./ltib -b --preconfig config/platform/omap_logic/defconfig
```

## 6. Disclaimer

The FM transmitter and receiver functions are not supported and the DM3730/AM3703 Torpedo + Wireless SOM is not certified for their application.

## 7. Summary

Using the DM3730/AM3703 Torpedo + Wireless SOM with 802.11a/b/g/n and/or Bluetooth in an end product requires compliance with region-specific regulations pertaining to certified modular transmitters. This compliance includes, but is not limited to, following the integration, end-product labeling, and user manual statement requirements outlined in this document.

