

# Swarm Tile Integration Guide

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The Swarm Tile is a flexible, cost-efficient, Part 25 FCC certified satellite radio transceiver, which readily integrates into host systems to support satellite-based connectivity for customer operations or retail products. After integrating the Tile into a product (i.e., host system), manufacturers need to ensure the resulting product meets FCC regulations regarding testing, labeling, and integration.



## Applicability of this Guide

Swarm is providing this informal guide to help customers more quickly satisfy FCC requirements when integrating a Tile into their product. Most integrator’s products are composite devices that include digital circuitry and radio transceivers. For these devices, the digital circuitry portion of the host device can be certified under a Supplier Declaration of Conformity (SDoC). Modules like the Tile that are integrated and operating in their authorized configuration are already certified. Swarm has completed certification for the Swarm Tile module. Accordingly, this guide applies for the following two specific scenarios:

1. when integrating the Swarm Tile into a host with no other intentional or unintentional radiators
2. when integrating the Swarm Tile into a host with other certified radiating devices (e.g., certified Bluetooth or WiFi module [licensed with the FCC OET](#)) and no other uncertified intentionally radiating devices

In these two cases, customers may follow this guide to ensure FCC Part 15B compliance through the SDoC process for the host device with a certified modular Tile transmitter. When a host device is integrated with other uncertified radiating components, manufacturers are urged to consult an FCC accredited testing laboratory for guidance. Manufacturers are responsible for additional equipment authorization and testing.

Your Digital Circuitry, Plus ...	Can I follow this guide?
+ Tile	<b>Yes*</b> follow this guide (Part 15B, SDoC)
+ Tile + other certified modules (e.g., WiFi)	<b>Yes*</b> follow this guide (Part 15B, SDoC)
+ Tile + any single non-certified radio emitter	<b>No</b> , perform full testing at an FCC accredited test and certification lab

\* This document is provided for informational purposes only. Product manufacturers and customers are solely responsible for meeting and maintaining the FCC requirements and other such mandated items at their own expense.

## Overview of Integration Requirements

These are the minimum necessary steps required to successfully integrate the Swarm Tile into your product.

- Step 1. Review the Swarm Tile Product Manual (Rev. 0.95, May 2020) and follow all operational instructions
- Step 2. Label the host device with an appropriate label
- Step 3. Include necessary compliance disclaimers in your product manual
- Step 4. Perform unintentional radiated emissions testing as needed

### Step 1: Review the Swarm Tile Product Manual

The Swarm Tile Product Manual contains essential information for successful integration. In particular, note sections on safety along with mechanical, electrical, RF, and software interfaces.

Per FCC regulations, operation of the certified Swarm Tile with the existing Part 25 certification requires use of one of the three certified transmit antennas:

- Swarm Coiled  $\frac{1}{4}$ -Wave Antenna, 2 dBi, omni-directional, 22 cm length (Manufacturer: Smiley; Part number: 15036A)
- Swarm  $\frac{1}{4}$ -Wave Antenna, 2 dBi, omni-directional, 49 cm length (Manufacturer: Laird; Part number: Spring B132S)
- Swarm  $\frac{1}{2}$ -Wave Antenna: 2 dBi, omni-directional, 108 cm length (Manufacturer: Larsen; Part number: NMOWB150B)

The Tile and its antenna must be installed to provide a separation distance of at least 29 cm from all persons. Additional approval is required for all other operating configurations.

### Step 2: Apply Appropriate Labels

The FCC ID for the Tile is **2AVE9-TILE01**. All manufacturers integrating the Tile into their products are required to provide a physical or e-label stating “Contains Transmitter Module FCC ID: 2AVE9-TILE01.”

### Step 3: Compliance Disclaimers

The host product manual must include language informing users that the product meets FCC Part 15 limits and a compliance statement that identifies a responsible party who is located in the United States and can be contacted for FCC compliance needs.

An example “Compliance Information Statement” follows:

**Supplier's Declaration of Conformity**  
**47 CFR § 2.1077 Compliance Information**

**Unique Identifier:** (e.g., Trade Name, Model Number)

**Responsible Party – U.S. Contact Information**

ABC Corporation  
Street Address  
City, State  
Zip Code

Telephone number or internet contact information

**FCC Compliance Statement** (e.g., products subject to Part 15)

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.

#### Step 4: Conduct Radiated Emissions / Electromagnetic Compatibility (EMC) Testing

SDoC is an FCC equipment authorization procedure that requires the party responsible for compliance (e.g., the integrator) to ensure that the equipment complies with the appropriate technical standards. The responsible party is not required to file an equipment authorization application with the FCC or a Telecommunication Certification Body (TCB); therefore, equipment approved under the SDoC procedure is not listed in any Commission database. However, the responsible party must provide a test report and other information demonstrating compliance with the rules upon request by the Commission.

In the context of this guide, the integrator needs to perform EMC testing on the complete integrated device, although the Tile functions and any other certified module functions need not be tested again if they are integrated into the host product in accordance with integration guidance and existing certification for those devices.

#### *Testing Laboratory Standards*

Products authorized under the SDoC procedure shall be tested at a suitable laboratory that meets the requirements of [IEEE/ANSI C63.4-2014](#) and has compiled the required site description per [47 CFR §2.948 \(Measurement facilities\)](#). FCC laboratory accreditation is *not* required.

Swarm suggests that manufacturers search for “2.948 Compliant EMC Labs” where Part 15B SDoC-type testing can be performed for approximately \$2,000 per device at a qualified certification company.

Product manufacturers can also conduct testing themselves (in house) provided they follow the above referenced standards for their facility and perform the appropriate radiated and conducted emissions tests.

The FCC also provides a [search tool](#) to find only authorized testing laboratories (although not required to perform the Part 15B SDoC testing).

#### *Emissions Limits*

The FCC has different EMC limits for equipment depending on the environment in which they will be used in. Class A limits are designed for devices that are used in commercial, industrial, or businesses and which are not marketed for use in a residential setting or by the general public. Class B limits are used for devices which are marketed for primary usage in a residential setting and for use by the general public. The FCC permits higher levels of electromagnetic interference for Class A limits than Class B limits.

The test and technical standards can be found in [47 CFR §15.31 \(Measurement Standards\)](#) which lists [IEEE/ANSI C63.4-2014](#) as the applicable measurement methods for unintentional radiators. Power-line conducted and radiated field strength emissions measurements are required and the applicable limits can be found in [47 CFR §15.107 \(Conducted Limits\)](#) and [47 CFR § 15.109 \(Radiated emission limits\)](#).

### *EMC Report*

The FCC requires a detailed test report of formal EMC measurements demonstrating that the product meets either Class A or Class B Part 15 EMC limits. The testing should demonstrate results from both radiated emissions and conducted emissions tests. The technical test report, along with any additional documentation, should be kept on file to be made available to the FCC within 14 days upon request.

### *Summarize EMC Results in Host Device Product/User Manual*

Include language regarding the EMC levels passed. For example, for a Class A digital device, include the following text:

*“Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.”*

## Additional Resources and References

Swarm Tile's [FCC Grant of Equipment Authorization](#)

Celetronics Learning Center, "[FCC authorization method guide Supplier's Declaration of Conformity](#)"

U.S. Code of Federal Regulations (CFR)

- 47 CFR § 2.906 - [Supplier's Declaration of Conformity](#)
- 47 CFR § 2.909 - [Responsible party](#)
- 47 CFR § 2.948 - [Measurement facilities](#)
- 47 CFR § 15.3 - [Definitions](#)
- 47 CFR § 15.31 - [Measurement standards](#)
- 47 CFR § 15.107 - [Conducted limits](#)
- 47 CFR § 15.109 - [Radiated emission limits](#)
- 47 CFR § 68.324 - [Supplier's Declaration of Conformity requirements](#)

Further information is available from the FCC [Office of Engineering and Technology](#) (OET) Laboratory Division

- FCC OET Lab Division, "[General Guidelines for Labeling and Other Information Required to Be Provided to Users](#)," 784748 D01 General labeling and Notification v09r01 (July 2, 2018).
- FCC OET Lab Division, "[Supplier's Declaration of Conformity – Frequently Asked Questions](#)," 896810 D02 SDoC FAQ v01r02 (July 2, 2018).
- FCC OET Lab Division, "[Modular Transmitter Integration Guide – Guidance for Host Product Manufacturers](#)," 996369 D04 Module Integration Guide v01 (February 1, 2019).
- FCC OET Lab Division, "[Supplier's Declaration of Conformity Guidance](#)," 896810 D01 SDoC v02 (December 20, 2019).

[IEEE/ANSI C63.4-2014](#) – "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (June 20, 2014).