

Reply to an OET Inquiry Response

Currently Displaying Inquiry Tracking Number: 253219

Inquiry Details on 01/29/2013:

First category: Mfg/Test Lab Test Guidance – Evolving Technology
Second category: EMC/Radio Parameters
Third category:
Subject: Rule for the device using frequency hopping and non-hopping
Inquiry: Dear Sir or Madam,

I would like to ask your advice for the end product using 2.4 GHz band.

This device has 2 kind of spreading way, both FHSS and Non-FHSS.

At the beginning of paring to companion device, it use FHSS type.

But after they connected this device use Non-FHSS (DTS) way

Normally this device use Non-FHSS (DTS) way but FHSS at only beginning

It uses Bluetooth chipset therefore it's waveform is same to Bluetooth's whenever it works with hopping or non-hopping.

Frequeuncy band : 2402~2480 MHz

Channel space : 1 MHz

Modulation : GFSK only

Question 1)

If the operating mode is non-hopping mode,

which occupied bandwidth is right 6 dB bandwidth or 20 dB bandwidth?

Question 2)

If the operating mode is non-hopping mode and 6 dB bandwidth is right,

do I have to test it according to KBD558074 D01v02 for 6 dB bandwidth?

Pre-test result :

RBW < 80 kHz, the measured 6 dB bandwidth < 500 kHz (Fail)

RBW = 100 kHz, the measured 6 dB bandwidth > 500 kHz (Pass)

I am not sure it is against the KDB 558074 d01v02 to use 100 kHz RBW for this device.

Extract from KBD 558074 D01v02 :

7.0 DTS (6 dB) CHANNEL BANDWIDTH One of the following procedures can be used to determine the modulated DTS channel bandwidth:

7.1 Option 1:

1. Set resolution bandwidth (RBW) = 1–5% or DTS BW, not to exceed 100 kHz.

Question 3)

If this new device does not meet the 6 dB bandwidth, may it use 15.249 rule?

Best regards,

minchul

FCC Response on 01/30/2013:

In non-hopping mode, the only regulation regarding bandwidth is with regards to the 6 dB DTS bandwidth. To properly resolve all spectral components in the bandwidth test, the resolution bandwidth must be limited to a value that is between 1–5% of the emission bandwidth. Thus, for a 1 MHz emission bandwidth, the maximum RBW that can be used is 50 kHz.

---Reply from Customer on 01/31/2013---

Thanks for your response!

Regarding this issue, I would like to ask your decision.
Please find the attached the operational description to help your understanding.

I found out the KBD 453039 handled the similar to our issue.
There are three examples.

I would appreciate if you judge whether it is right or wrong to use third example.

If you have opinion that it is wrong to use the third example, may I use 15.249 rule instead of 15.247?

Extract from KBD 453039

First example:

We will allow a manufacturer of a combination DTS and FHSS system to demonstrate compliance with the rules required for DTS operation or for FHSS operation. There is no need to demonstrate compliance with both the FHSS standards and the DTS standards.

Second example:

Systems may employ two mutually exclusive operational modes. One mode would be as a FHSS system and the other would be as a DTS. For example, a device may be operated as a FHSS system while transmitting data and as a DTS while in the acquisition mode. When operating in this manner, the device must fully comply with the rules for a FHSS system when operating in that mode and as a DTS when operating in that mode. The two types of operation must be distinct so that each mode of operation can be distinguished and separately demonstrated to comply with the pertinent standards.

Third example:

The third method of authorizing a combination system is as a hybrid system under the provisions described in Section 15.247(f) of the rules. Before the new rules on DTS operation, a hybrid system consisted of a transmission system that employed a combination of both direct sequence and frequency hopping techniques. Such systems were required to show compliance with a 17 dB processing gain. This is no longer required since the processing gain requirement has been replaced by the DTS regulations. A hybrid system uses both digital modulation and frequency hopping techniques at the same time on the same carrier. This is similar to the combination DTS/FHSS system described above in the first example but the system is subject to slightly different standards. As shown in Section 15.247(f), a hybrid system must comply with the power density standard of 8 dBm in any 3 kHz band when the frequency hopping function is turned off. The transmission also must comply with a 0.4 second/channel maximum dwell time when the hopping function is turned on. There is no requirement for this type of hybrid system to comply with the 500 kHz minimum bandwidth normally associated with a DTS transmission; and, there is no minimum number of hopping channels associated with this type of hybrid system.

However, the hopping function must be a true hopping system, as described in Section 15.247(a)(1). The specific requirements in Section 15.247(a)(1) are: 1) a minimum channel separation; 2) pseudo-random hop sequence; 3) equal use of each frequency; 4) receiver matching bandwidth and Synchronization; The additional requirements in Section 15.247 for a hybrid transmitter include the requirements the 1 watt output limit and RF safety requirements in Section 15.247(b) and the spurious emission limits of Section 15.247(c).

Best regards,
minchul

FCC Response on 02/01/2013:

Based on the description that you've provided, the second example from KDB 453039 appears to be applicable. If the device radiates using both FHSS and non-FHSS (DTS), compliance must be shown to each of the applicable rule parts (i.e., 15.247(a)(1) and 15.247(a)(2), respectively. Compliance measurement guidance for the FHSS portion of the device is provided in DA 00-705 and C63.10-2009. Compliance measurement guidance for the non-FHSS device emissions can be found in KDB 558074.

---Reply from Customer on 02/02/2013---

Thanks for your kind response.

If this device does not meet the 6 dB bandwidth with non-hopping mode for narrow spectrum RBW, is it acceptable to use part 15.249 rule for non-hopping mode?

Best regards,
minchul

FCC Response on 02/12/2013:

Please ignore the previous responses to this KDB inquiry as there were some errors in them. After discussions with the author of KDB 453039, it has been determined that it does indeed provide the applicant with the choice of utilizing either the DTS guidance provided in KDB 558074 or the FHSS guidance provided in DA 00-705 and C63.10-2009 to demonstrate compliance to the DTS rules for combination/hybrid FHSS/DTS transmitters. However, the procedures must be utilized in total (i.e., no mixing of procedures from the different guidance documents). Also, 15.249 is an available option; however, the permissible output power levels are lower relative to those permitted under 15.247.