

Answer

Applicant:

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Note :

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To: Torsten Lohoff, null
From: Joe Dichoso
jdichoso@fcc.gov
FCC Application Processing Branch

Re: FCC ID 020SYN8705A
Applicant: Digianswer A/S
Correspondence Reference Number: 17512
731 Confirmation Number: EA99205

Verify that the frequency range from the center frequency of the lowest channel to the center frequency of the highest channel is 2402-2480 MHz.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 2.

Provide a Manual.

7layers:

A manual has been uploaded seperately.

The requested conducted Output power is 2.43 mW. While the test data shows only .37 dBm(1.09 mW). Please explain/correct accordingly.

7layers:

Due to the fact that the conducted output power (max. on 2402 MHz is 0.37 dBm (1.09 mW), see test report 4_DIGI_0100_BT_FCCa) will be authorized in the grant, please change the output power in the application to 1,1 mW.

Verify that you are not requesting modular approval.

7layers:

We do not apply for modular approval.

Provide a technical description. If this is confidential, provide a new confidential letter.

7layers:

A technical description has been uploaded seperately.

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The RF safety requirements depend on whether or not you are requesting modular approval and if the device can transmit simultaneously with the mobile phone. Please explain. Further RF safety review will commence once this is clarified.

7layers:

The Bluetooth transmitter can transmit simultaneously with the mobile phone. Due to the low output power of the Bluetooth transmitter (1.09 mW) the Bluetooth device will not exceed the MPE and SAR limits.

Provide the following with regard to the device operating in the data mode(FHSS)

a) The transmitter cannot coordinate its hopping sequence with the hopping sequence of other transmitters, or vice versa, for the purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters. Provide a description on how the device complies with this rule.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 3.

b) The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Indicate how the pseudorandom hopping sequence is derived. Provide a list of channel frequencies and a sample of a few sequences.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 4.

c) Each frequency must be used equally on the average by each transmitter. Except for voice systems, each new transmission may not start at the same point in the sequence or the frequencies will not be used equally used. Therefore, Describe where the next transmission starts when all frequencies are not used for a previous message. This is required because some transmissions may need only a few frequency hops to be completed. i.e. If the transmission started on the same frequency each time, this frequency would be used more than the others if many short transmissions were sent.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 5.

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d) Section 15.247(a)1 indicates that the system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals. Please explain how the device complies with this rule when a packet is repeated or when multiple packets are sent. What is the receiver input bandwidth? How does the receiver shift frequencies and determine which frequency to shift to in order to synchronize with this transmitter?

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 6.

e) Compliance with the dwell time requirement.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 7.

Provide the following information with regard to the device operating in the page and inquiry mode under the Spread spectrum Hybrid requirements in Section 15.247(f) and Section 15.247(a)1.

f) Compliance with the minimal channel separation.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 8.

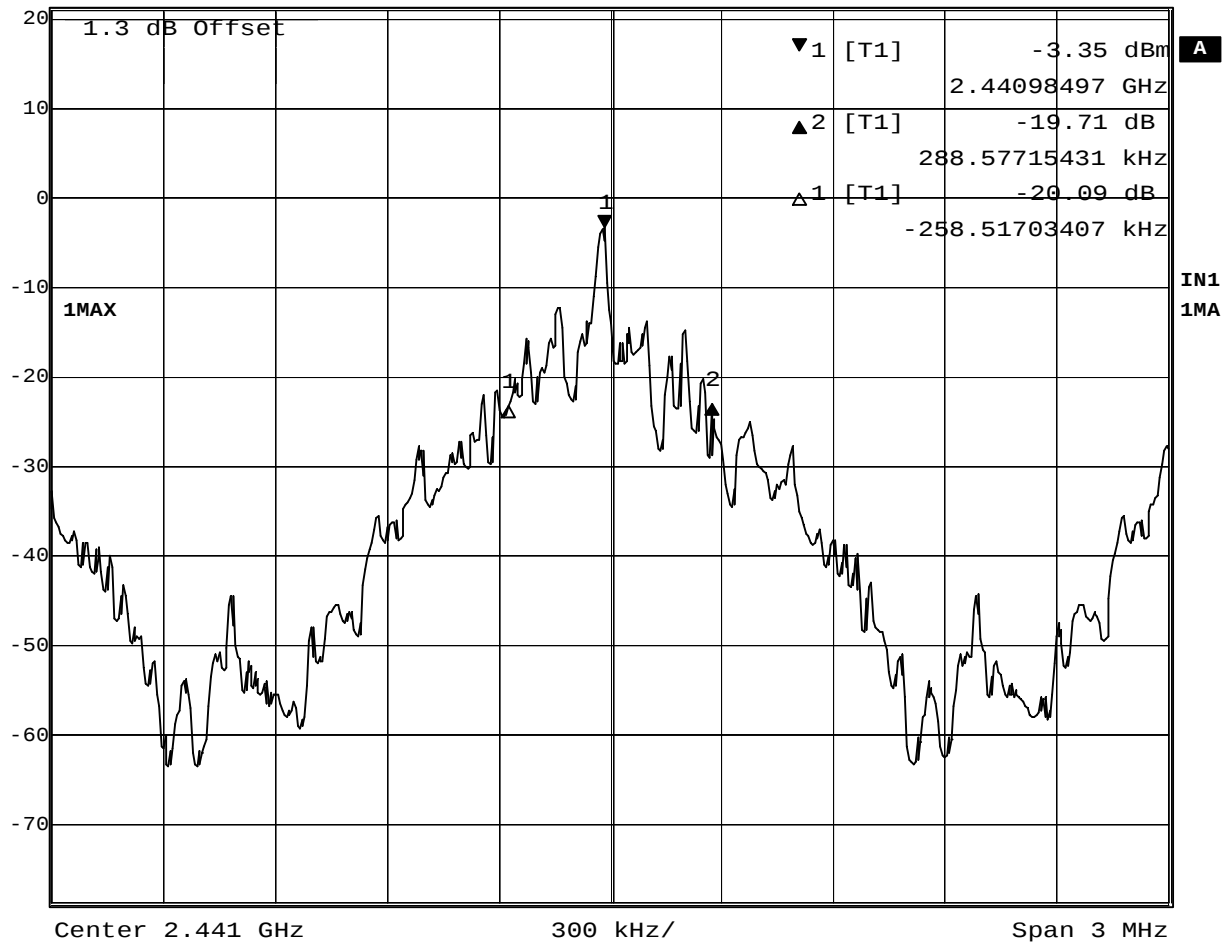
g) 20 dB bandwidth plot.

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Delta 2 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl -19.71 dB VBW 30 kHz
21.3 dBm 288.57715431 kHz SWT 76 ms Unit dBm



Date: 12.SEP.2000 19:30:33

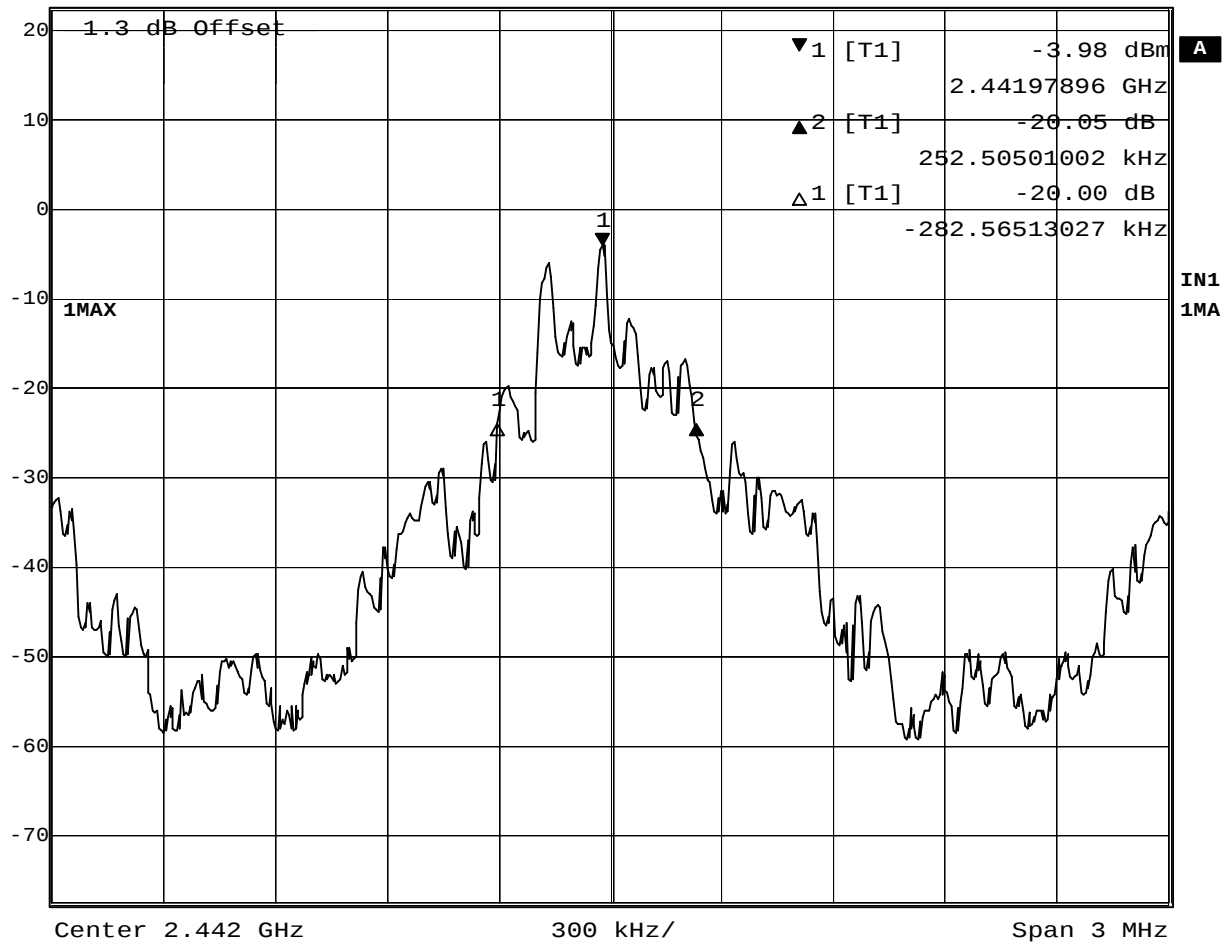
Plot of 20 dB bandwidth in inquiry mode = 547 kHz.

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Delta 2 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -20.05 dB VBW 30 kHz
22.6 dBm 252.50501002 kHz SWT 76 ms Unit dBm



Date: 12.SEP.2000 18:40:08

Plot of 20 dB bandwidth in paging mode = 535,1 kHz.

h) pseudorandom sequence examples and explanation of its derivation.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 9.

i) How the frequencies in the hybrid mode meets the equally used on average requirement.

7layers:

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See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 9 4th paragraph.

State the receiver Input bandwidth and synchronization requirement in the hybrid mode.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 10.

Verify that the output power in the hybrid mode is the same as in the Data mode.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 1.

With regard to Process gain in the hybrid mode_

j) The test report indicates the Process gain test was performed in Op mode 2 which is the data mode. This is not applicable in the data mode. It is applicable in the Hybrid mode or Op mode 4 and/or 5. Please explain.

7layers:

It is technically not possible to perform the tests in hybrid mode (op mode 4,5). Therefor we performed the process gain test for the DSS part on a single frequency and added/calculated the FHSS part of the process gain with 15 dB to obtain the overall process gain in hybrid mode (see processing gain calculation in our processing gain measurement report). A Bluetooth device in hybrid mode is always a FHSS device hopping on 32 frequencies.

k) Indicate the Spread rate/data rate of the direct sequence signal.

7layers:

See separate document Annex „Additional declaration part according FCC 15.247 for BT devices „ section 11.

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l) The process gain configuration indicates two types of jammer sources a signal generator and a noise source generator. A CW signal must be used for the jammer. Please explain what was used for the test.

7layers:

For the jammer we used a continuous wave signal generator.

m) Page 6 of the Process gain test indicates a Jammer ratio of -52.6 dBm but in the Process gain calculation -15 dB was inexplicably used. Using the data of -52.6 dBm, the device would not comply $\text{Process gain} = 16 + -52.6 + 2 = -34.6 \text{ dB}$. This is not in compliance with the 10 dB requirement. Please explain.

7layers:

There is an error in the processing gain measurement report.

The table on page 5 contains in the second column the absolute value of the jammer signal in dBm and not the jammer/signal ratio. The wanted signal level for all measurements was -40 dBm.

Therefore the calculation of the processing gain on page 6 is wrong and must be changed to:

Processing gain calculation

With these values we calculated the processing gain:

$M_j = \text{JSR}$

$G_p = S/N + M_j + L_{\text{sys}} = 16.6 + (-52.6 - (-40)) + 2.0 = 6.0 \text{ dB}$

The processing gain for the DSS is 6.0 dB.

The processing gain for FHSS part is calculated as:

$10 * \log 32 = 15 \text{ dB}$ (32 hopping channels in hybrid mode)

This means for the total processing gain of the hybrid system:

$15 \text{ dB} + 6.0 \text{ dB} = 21.0 \text{ dB}$

This is above the minimum value of 17 dB stated in FCC rules.

The device passes the requirement of this clause.

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days of the original e-mail date may result in application dismissal pursuant to Section 2.917 (c) and forfeiture of the filing fee pursuant to section 1.1108.

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