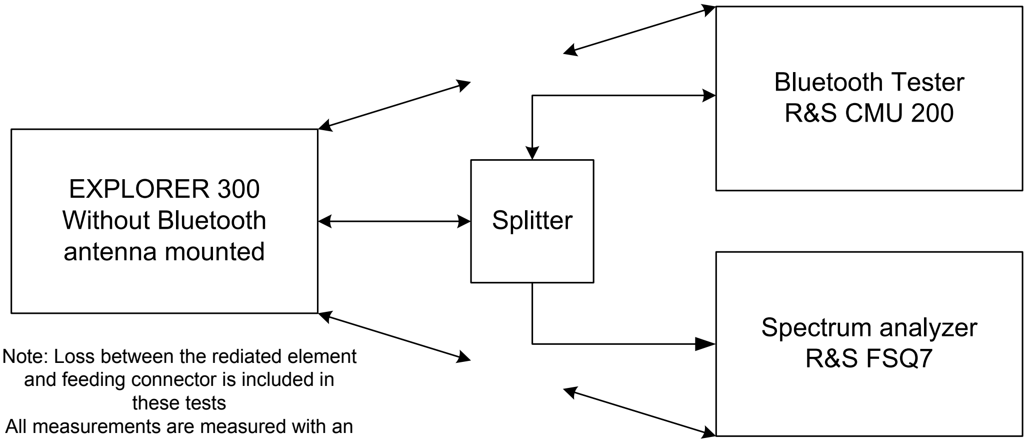
Test set up



Insertion

Note: Loss between the rediated element
and feeding connector is included in
these tests
All measurements are measured with an
offset off: 7,1dB

Tr1 S21 Log Mag 10.00dB/ Ref 0.000dB [RT D&M]

```
 1  2.400000000 GHz -6.8822 dB
>2  2.483000000 GHz -7.1032 dB
```

1 Center 2.441 GHz IFBW 70 kHz Span 100 MHz

Failed to write file

2006-03-24 12:48

Insertion lo

Plot of Insertion Loss between Explorer300 and CMU 220 / FSQ7

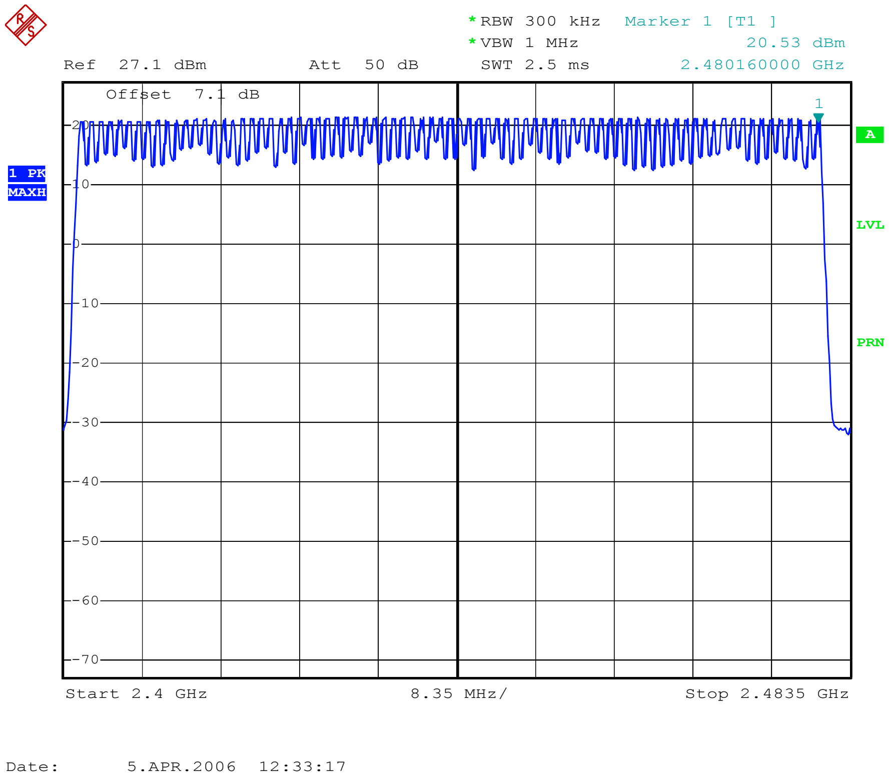
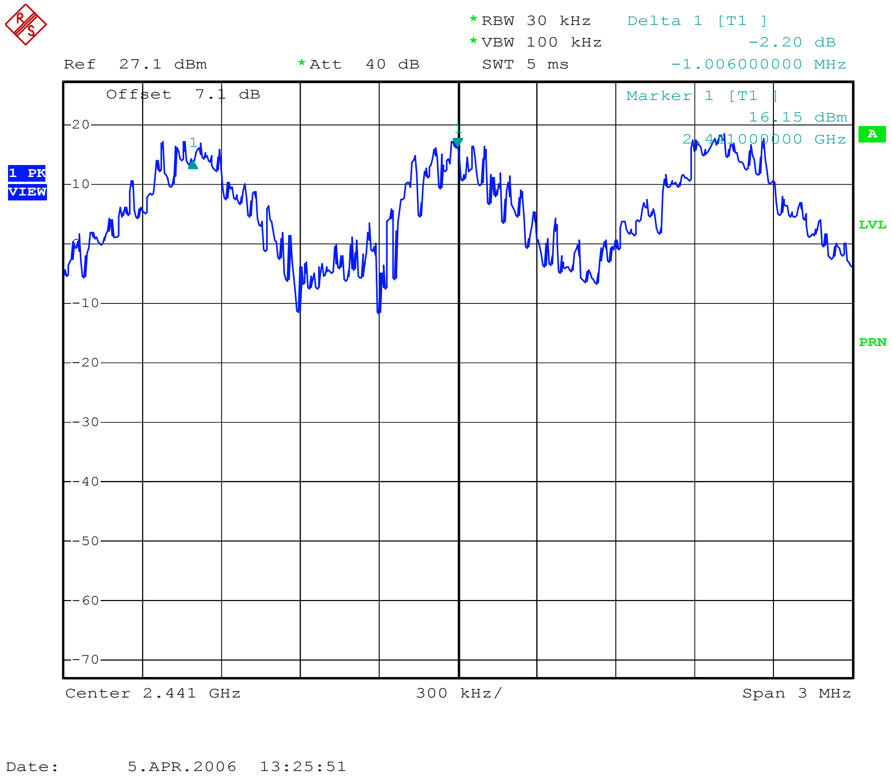


Figure 1. Numbers of hopping = 79



*RBW 30 kHz

*VBW 100 kHz

Ref 27.1 dBm *Att 40 dB SWT 5 ms

Delta 1 [T1]

-2.20 dB

-1.006000000 MHz

Offset 7.1 dB

Marker 1 [T1]

16.15 dBm

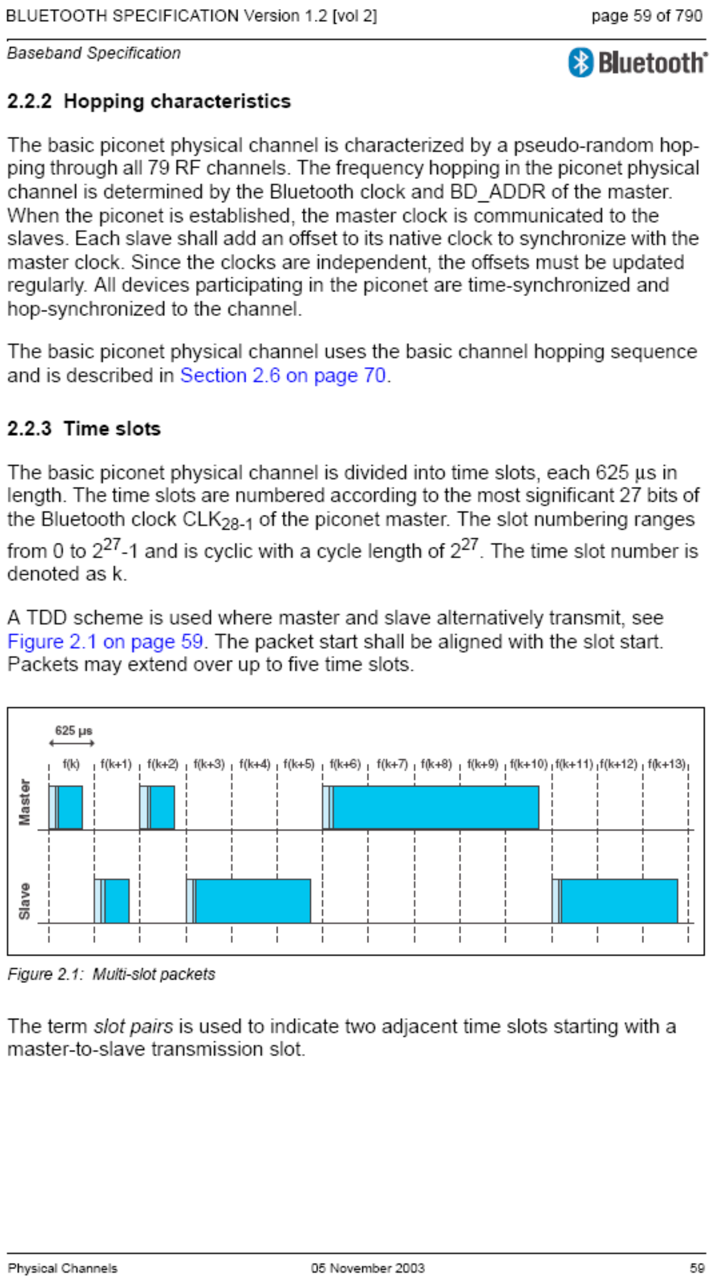
2.441000000 GHz

Center 2.441 GHz 300 kHz/ Span 3 MHz

Date: 5.APR.2006 13:25:51

Figure 2. Channel seperation

Regarding Part 15.247 (a) (1) Hopping sequence.
As stated in the Bluetooth standard that can be seen below on “page59 of 790”. The hopping sequence is Random through all 79 RF channels. The hopping sequence is determined by the Bluetooth Clock and BD_ADDR of the master.



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2.2.2 Hopping characteristics

The basic piconet physical channel is characterized by a pseudo-random hopping through all 79 RF channels. The frequency hopping in the piconet physical channel is determined by the Bluetooth clock and BD_ADDR of the master. When the piconet is established, the master clock is communicated to the slaves. Each slave shall add an offset to its native clock to synchronize with the master clock. Since the clocks are independent, the offsets must be updated regularly. All devices participating in the piconet are time-synchronized and hop-synchronized to the channel.

The basic piconet physical channel uses the basic channel hopping sequence and is described in Section 2.6 on page 70.

2.2.3 Time slots

The basic piconet physical channel is divided into time slots, each 625 µs in length. The time slots are numbered according to the most significant 27 bits of the Bluetooth clock CLK_{28-1} of the piconet master. The slot numbering ranges from 0 to 2^{27}-1 and is cyclic with a cycle length of 2^{27}. The time slot number is denoted as k.

A TDD scheme is used where master and slave alternatively transmit, see Figure 2.1 on page 59. The packet start shall be aligned with the slot start. Packets may extend over up to five time slots.

Figure 2.1: Multi-slot packets

The term *slot pairs* is used to indicate two adjacent time slots starting with a master-to-slave transmission slot.

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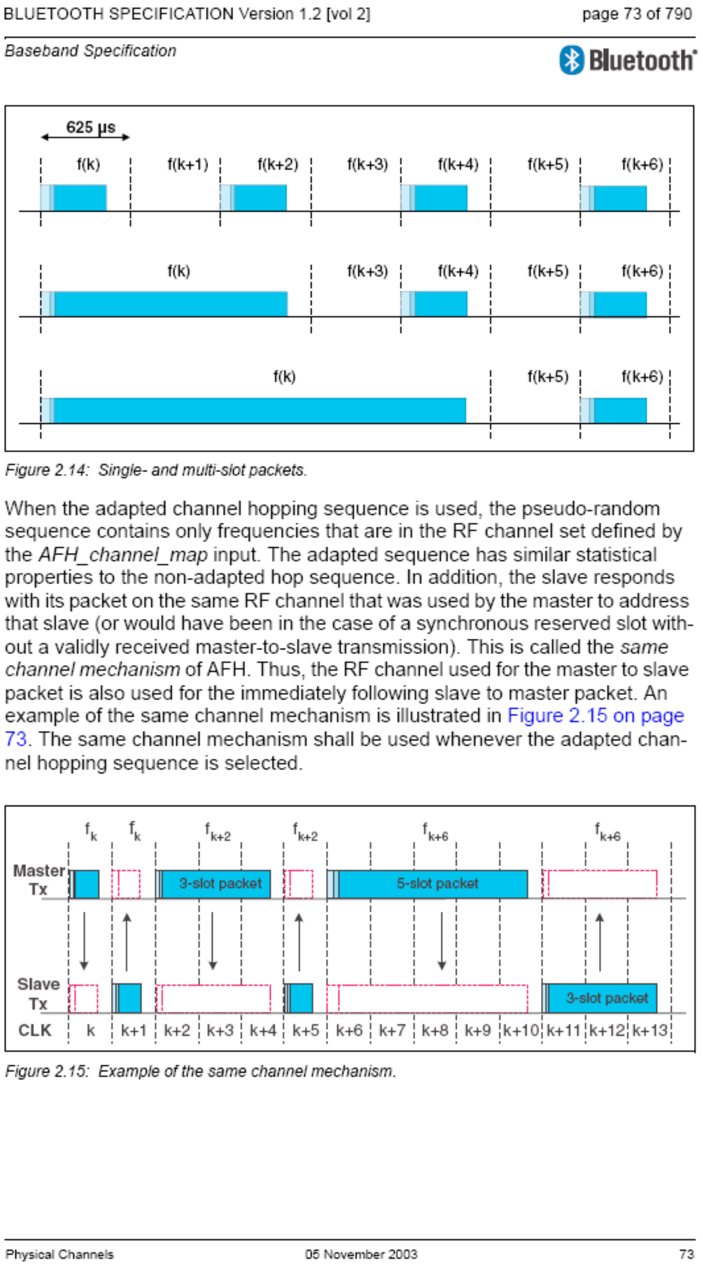
Regarding Dwell Time.
On the physical layer 3 types of bursts is used in the Bluetooth standard. These can be seen below on “page 73 of 790”



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Baseband Specification

Figure 2.14: Single- and multi-slot packets.

When the adapted channel hopping sequence is used, the pseudo-random sequence contains only frequencies that are in the RF channel set defined by the *AFH_channel_map* input. The adapted sequence has similar statistical properties to the non-adapted hop sequence. In addition, the slave responds with its packet on the same RF channel that was used by the master to address that slave (or would have been in the case of a synchronous reserved slot without a validly received master-to-slave transmission). This is called the *same channel mechanism* of AFH. Thus, the RF channel used for the master to slave packet is also used for the immediately following slave to master packet. An example of the same channel mechanism is illustrated in Figure 2.15 on page 73. The same channel mechanism shall be used whenever the adapted channel hopping sequence is selected.

Figure 2.15: Example of the same channel mechanism.

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In the following 3 plot measurements of the burst type can be seen.

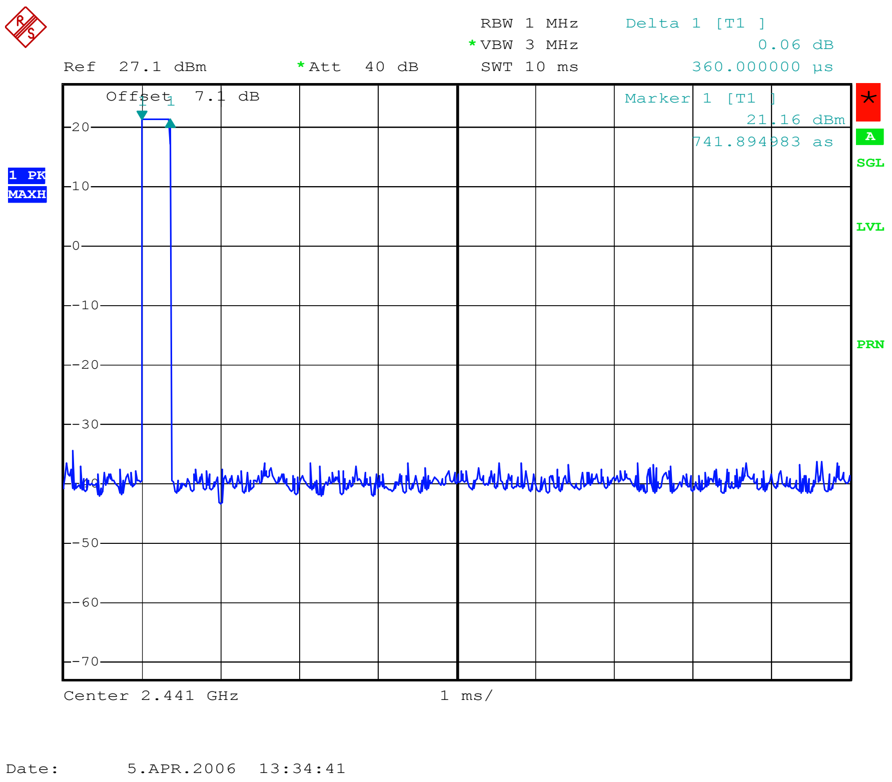

Figure 3. DH 1 (1 Burst long)

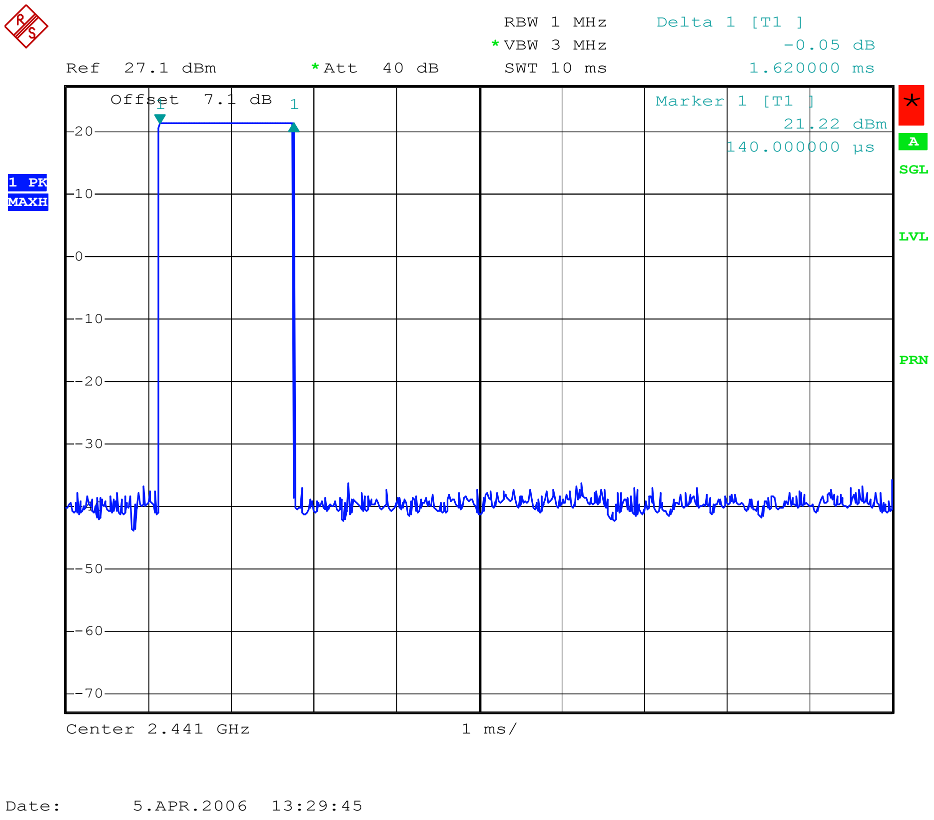

Figure 4. DH3 (3 Burst long)

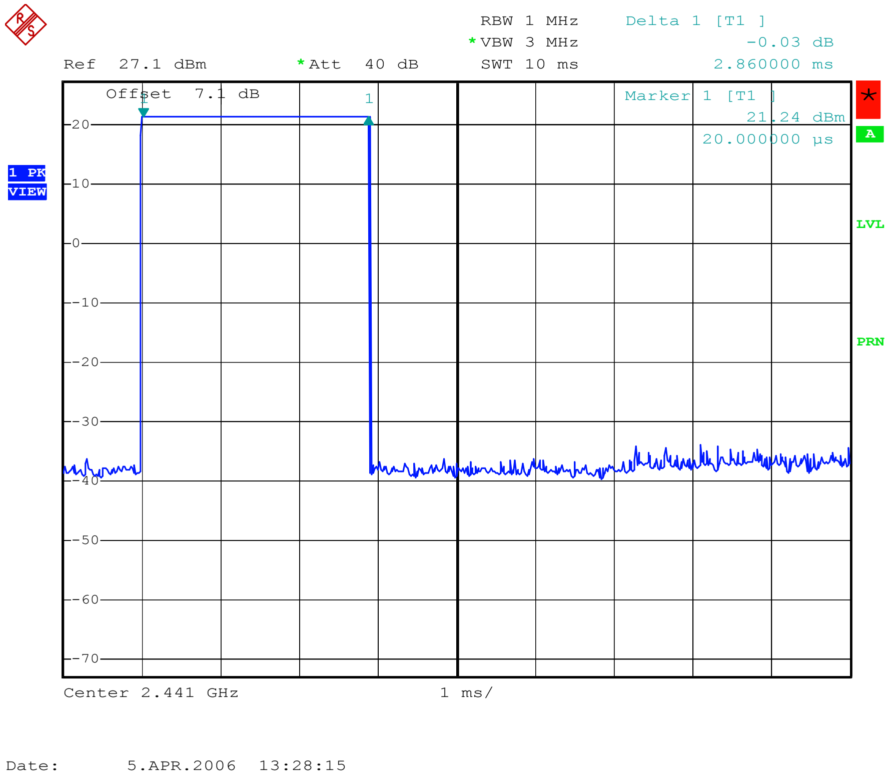

Figure 5. DH5 (5 burst long)

As seen in the Bluetooth standard "page 73 of 790" When a transmitter is transmitting continually DH1 bursts. 800 bursts are bursted per second.
The 800 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 800/79 per second.

To illustrate this, 2 examples are shown on the following two plots .
Note that only the bursts at +10dBm is the channel. Bursts below 10dBm are adjacent channels. It can be seen that the measured burst count on the plots are equal to the Calculated. 800/79 = 10.13bursts.

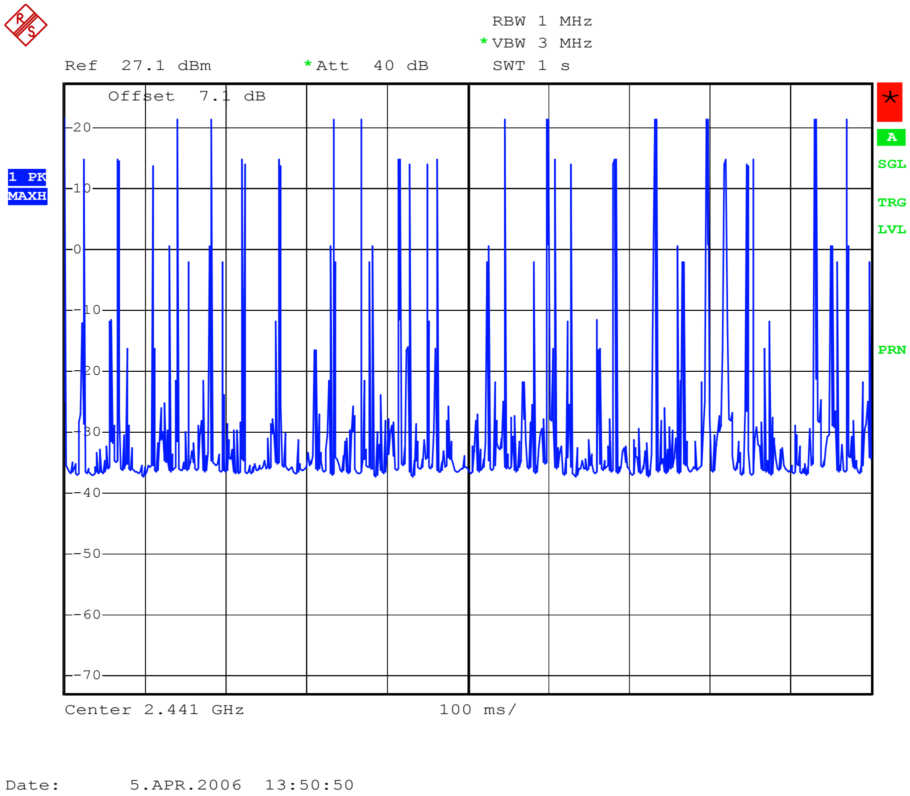

Figure 6. 10 DH 1 bursts

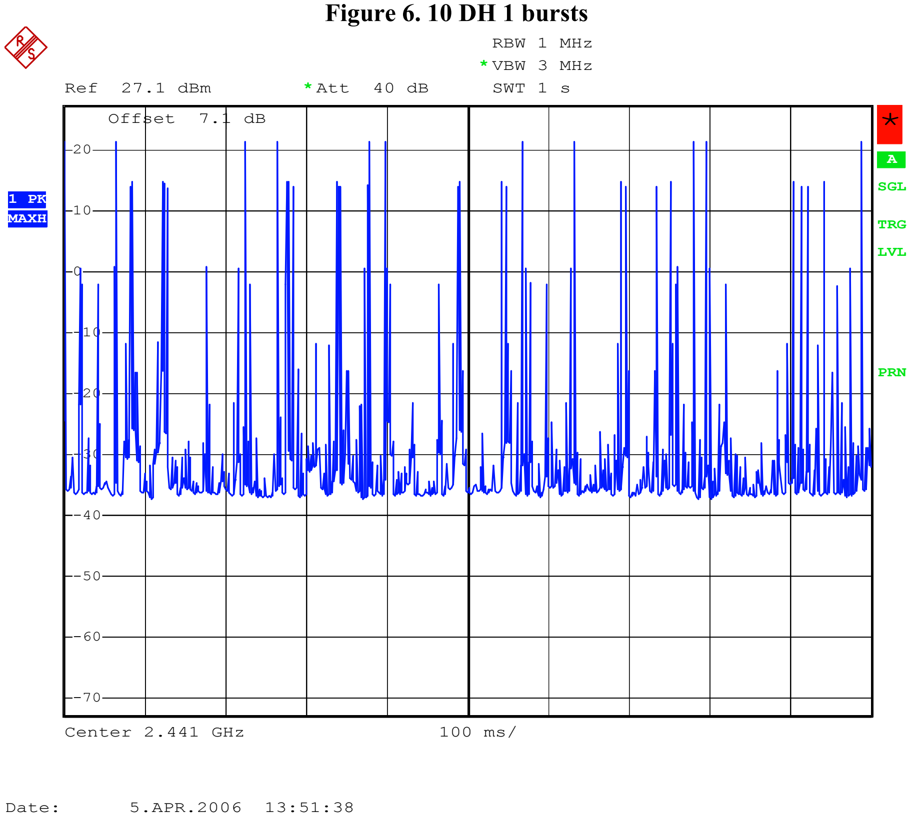

Figure 7. 10 DH 1 bursts

The same calculation can be done on DH3, when a transmitter is transmitting continually DH3 bursts. 400 bursts are bursted per second.
The 400 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 400/79 per second.

To illustrate this, 2 examples are shown on the following two plots .
Note that only the bursts at +10dBm is the channel. Bursts below 10dBm are adjacent channels. It can be seen that the measured burst count on the plots are equal to the Calculated. 400/79 = 5.06bursts.

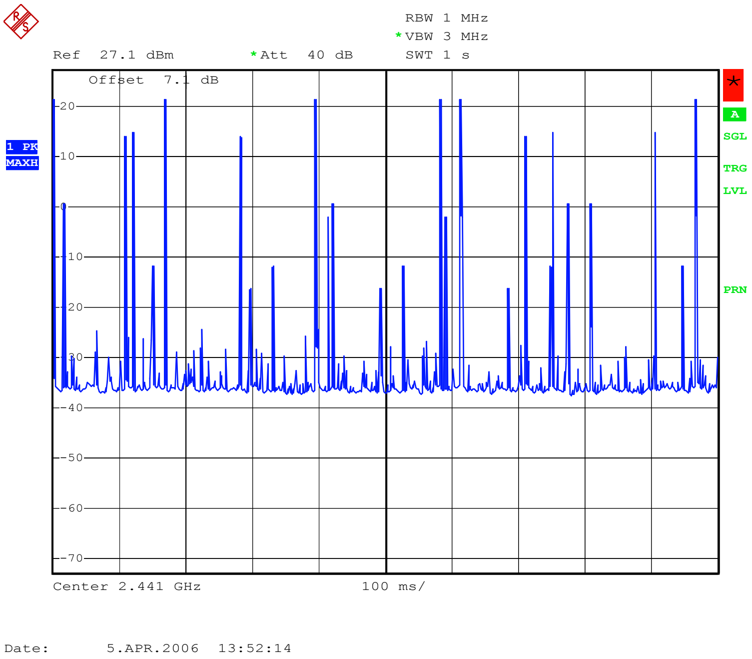

Figure 8. 5 DH 3 bursts

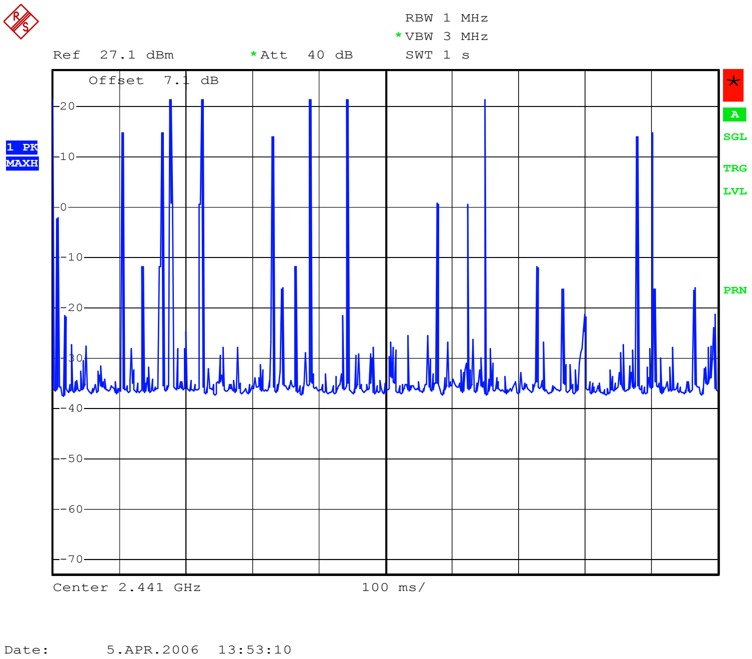

Figure 9. 5 DH 3 bursts

The same calculation can be done on DH5, when a transmitter is transmitting continually DH5 bursts. 267 bursts are bursted per second.
The 400 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 267/79 per second.

To illustrate this, 2 examples are shown on the following two plots .
Note that only the bursts at +10dBm is the channel. Bursts below 10dBm are adjacent channels. It can be seen that the measured burst count on the plots are equal to the Calculated. 267/79 = 3.75bursts.

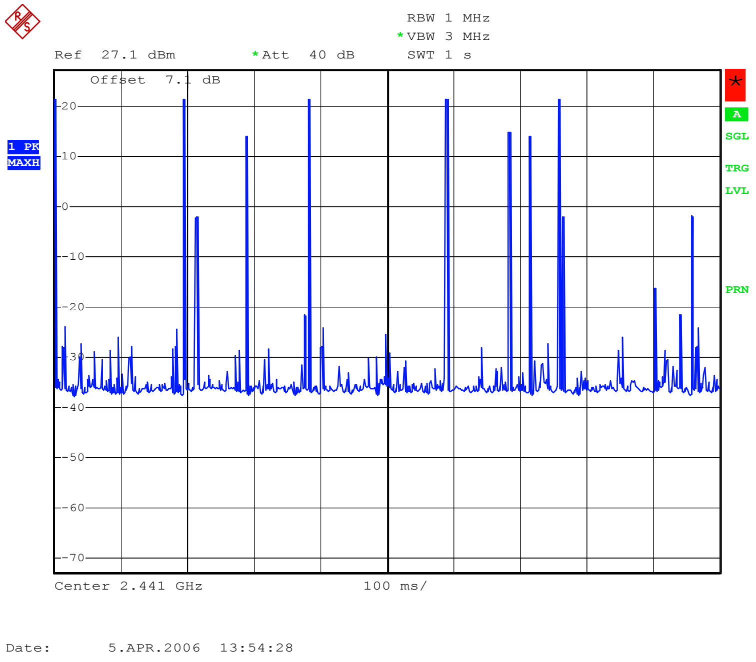

Figure 10. 4 DH 5 bursts

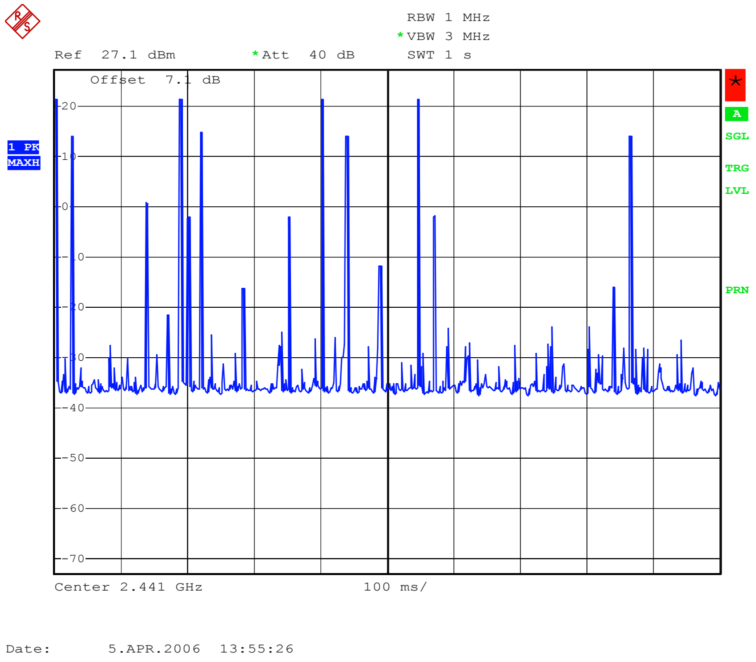

Figure 11. 4 DH 5 bursts