

Upper bound Transmission Duty Factor Calculation for the PRS-900

Manufacturer: Sony Electronics
Type of device: Wireless eBook Reader
Model name: PRS-900
FCC ID: AK8PRS900

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Contents

1. Executive Summary:	3
2. Product Overview:	3
3. Wireless Technology:	3
4. Radio Protocols:	3
5. Software Connection Manager:	4
6. Intended Use Cases:	4
7. Data Rates	5
8. HSPA UBTDF	6
8.1. Worst Case operation	6
8.2. Content categories	6
8.3. Upper bound transmission duration	6
8.4. Weighted download duration (HSPA)	7
8.5. Duration of Events - UBTDF calculation (HSPA)	9
8.6. Maximum Average Conducted Output Power (HSPA)	10
9. GPRS/EGPRS UBTDF	12
9.1. Worst Case operation	12
9.2. Download duration (GPRS/EGPRS)	12
9.3. Duration of Events - UBTDF calculation (GPRS/EGPRS)	13
9.4. Maximum Average Conducted Output Power (GPRS/EGPRS)	14
10. W-CDMA Rel. 99 UBTDF	15
10.1. Worst Case operation	15
10.2. Download duration (W-CDMA Rel. 99)	15
10.3. Duration of Events - UBTDF calculation (W-CDMA Rel. 99)	16
10.4. Maximum Average Conducted Output Power (W-CDMA Rel. 99)	17
Appendix (Measurement Plots)	18
1. HSPA Plots:	18
2. 2G Plots:	22

1. Executive Summary:

This document presents an analysis demonstrating that the Sony PRS-900 eReader (the “PRS-900”) qualifies for SAR test exclusion. It includes the calculation of an Upper Bound Transmission Duty Factor (“UBTDF”) for the PRS-900, based on FCC guidelines set forth in “Information requirements for FCC considerations of relevant upper bound transmission duty factors to qualify e-book devices/e-readers for SAR text exclusions,” dated January 7, 2010.

2. Product Overview:

PRS-900 is a hand-held content reader. Its relevant features are as follows:

- The PRS-900 allows an end user to browse, purchase and download books and periodicals from the Sony Reader Store via 3G wireless data access, subject to service availability.
- The wireless 3G data connection in the PRS-900 connects the end user to Sony’s proprietary Reader Store. It does not provide access to the public Internet generally, and does not, for example, permit Internet web browsing.
- The PRS-900 measures ___ x ___ x 0.6" thin and weighs 12.75 ounces. It features a 7" paper-like display and touch screen navigation.
- The PRS-900 allows an end user to read in either portrait or landscape format, using six adjustable font sizes.

3. Wireless Technology:

The PRS-900 uses 3G wireless mobile broadband module manufactured by Ericsson AB without voice communication capability. The wireless interface supports HSPA, UMTS, EDGE and GPRS data services.

4. Radio Protocols:

The PRS-900 supports following RF protocols:

1. GSM
 - GPRS(Class10)
 - EGPRS/EDGE(Class10)
2. UMTS / HSPA
 - FDD BAND II
 - FDD BAND V

Of these protocols, HSPA represents the worst case for the purposes of calculating the UBTDF for the PRS-900, because HSPA requires continual transmission during the data download process. This “always-transmitting” mode is due in part to the use of HARQ or “Hybrid Automatic Repeat Request” and results in a source-based time averaging duty factor of 100%.

5. Software Connection Manager:

The software connection manager sequence of the PRS-900 is as follows:

- The default mode of the PRS-900 wireless radio is OFF;
- When the PRS-900 receives any of the following requests, it powers ON the 3G module and prompts a download from the Sony eReader Store:
 1. A download request directly from the end user
 2. For subscribed content, where the end user has purchased a subscription to receive a new edition of periodical content on a daily, weekly or monthly basis, the Sony eReader Store server attaches a parameter to each edition of the downloaded content. This parameter designates the timing of the next download. The PRS-900 then activates the 3G module based on this parameter to access Sony eReader Store server and download the current edition.
- Following the completion of a download, and upon receipt of a command from the Sony eReader Store, the PRS-900 returns the 3G module to an IDLE state.
- After 10 minutes in the IDLE state without any further content requests, the PRS-900 switches OFF the 3G module off automatically.

6. Intended Use Cases:

PRS-900 uses its 3G network functionality to allow the user to use the Sony eReader Store as follows:

1. Browse and Search for content at Sony eReader Store.
 - The end-user may use the PRS-900 to access Sony eReader Store home page, which displays lists of available digital book content based on certain categories, such as bestsellers or new arrivals.
 - The user may also search for available digital book content by author or title.
2. Purchase and download the content from the Sony eReader Store.
 - After identifying a selection, the end user can view an overview of the content, information about the author of the content, user reviews of the content, and recommendations for additional content based on the title and the author of the selected content.
 - The end user may then select the content to buy on the store by following the purchase process and then will download the content to the device for reading.
3. Synchronize/Download previously purchased content from the Sony Reader Store to the PRS-900.
 - The end user may download content to a personal computer using the Reader Library PC software and then re-download the content to PRS-900 wirelessly
 - The end user may also transfer previously purchased content from a PC to the PRS-900 via USB cable.

- The end user may also schedule the PRS-900 to download periodical content at pre-determined times.

The PRS-900 does not allow wireless downloads of device software or firmware. The end user must perform any necessary software or firmware updates by downloading the update to a personal computer and then transferring the update to the PRS-900.

The PRS-900 does not support voice communication and does not allow access to the public Internet, including access via a web browser.

7. Data Rates

PRS-900 operates on the AT&T 3G Network in the USA and Puerto Rico and has no domestic or international roaming support. This SAR analysis is based on using this specific AT&T network configuration.

The AT&T 3G network allows the following data rates:

Data Protocol	Uplink	Downlink		
	Low-End Data Rate (kbps)	Low-End Data Rate (kbps)	High-End Data Rate (kbps)	Real-world Data Rate (kbps)
GPRS	9.05 (1 slot)	27	85.6 (4 slots)	35 (avg.)
EGPRS	10.6 (1 slot)	75	247.4 (4 slots)	75 – 135
WCDMA Rel. 99	128	220	384	220 – 320
HSDPA/HSUPA (HSPA)	500	700	7200	700 – 1700

In HSPA mode, where an uplink transmission occurs while downloading data, this analysis uses the lowest possible downlink data rate. For all other calculations, including those for WCDMA Rel. 99 and GPRS/EGPRS modes, this analysis uses the highest possible downlink data rate.

8. HSPA UBTDF

8.1. Worst Case operation

HSDPA requires the implementation of Hybrid Automatic Repeat Request (“HARQ”)¹ and Channel Quality Indicator (“CQI”)² functionality, both of which initiate uplink transmissions during a the receipt of downloaded data. Therefore, the highest UBTDF for HSPA occurs when the download takes the longest time, which in turn occurs when the available downlink data rate is the lowest. The lowest downlink data rate for HSPA is 700 kbps. This data rate is the theoretically lowest downlink data rate. Real-world downlink data rates will be normally higher, resulting in a decrease in download duration.

8.2. Content categories

The available content in the bookstore is categorized according to sizes and types of content.

File size categories:

The following size categories can be found in the book store:

- < 1 MB
- 1 – 1.5 MB
- 1.5 – 2 MB
- 2 – 5 MB
- 5 – 10 MB

Downloads of file sizes bigger than 10MB are not supported by the wireless function of the eBook reader.

Content categories:

The contents are categorized in:

- Random content downloads (eBooks, short articles and on-demand news downloads)
- Periodicals (magazines and newspapers)

8.3. Upper bound transmission duration

For each file size category, it is possible to calculate the longest download time.

The transmission duration can be calculated according to the following formula:

¹ HARQ requests data blocks that are not correctly received by the mobile device to be transmitted again.

² HSDPA also measures the downlink physical channel quality and transmits the CQI in the uplink control channel to the Node B. The Node B calculates, according to these values, the number of physical channels, the modulation scheme and the data rate.

$$\text{Upper bound transmission duration} = \frac{\text{File size}}{\text{upper bound data rate}}$$

Example: File Category 5 – 10 MB

$$\text{Upper bound transmission duration} = \frac{10 \text{ MB} \cdot 1024 \frac{\text{KB}}{\text{MB}} \cdot 8 \frac{\text{bit}}{\text{byte}}}{700\text{kbps}} = 117.03 \text{ seconds}$$

The following table lists the upper bound transmission duration of each file size category and the percentage of the total downloads for each file size category.

File size [MB]	Upper bound transmission duration [sec.]	Random content Downloads (%)	Periodicals Downloads (%)
< 1	11.70	72.38	69.57
1 – 1.5	17.55	6.53	21.74
1.5 – 2	23.41	4.95	4.35
2 – 5	58.51	11.37	4.35
5 – 10	117.03	4.77	0.00

The above numbers are based on assumptions for current as well as future distributions in the book store.

8.4. Weighted download duration (HSPA)

The average download time of each type of downloadable content is calculated as follows:

$$\text{Download duration} = \text{upper bound transmission duration} \cdot \% \text{ of total downloads}$$

Example: File Category 2-5 MB

$$\text{Download duration} = 58.51 \text{ seconds} \cdot 11.37 \% = 58.51 \text{ seconds} \cdot 0.1137 = 6.66 \text{ seconds}$$

The total average download duration of each type of content equals the sum of all download durations of all different file size categories.

File size [MB]	Upper bound transmission duration [sec.]	Random content downloads % of total downloads	Random content Download durations [sec.]	Periodicals % of total downloads	Periodicals Download durations [sec.]
< 1	11.70	72.38	8.47	69.57	8.14
1 – 1.5	17.55	6.53	1.15	21.74	3.82
1.5 – 2	23.41	4.95	1.16	4.35	1.02
2 – 5	58.51	11.37	6.66	4.35	2.55
5 – 10	117.03	4.77	5.59	0.00	0.00
Total:			23.03		15.53

Based on recorded values by Sony, the percentage of types of content downloaded are the following:

- Radom content downloads: 55.09%
- Periodicals: 44.91%

These numbers were recorded directly in Sony’s Reader Store. It is foreseen that these numbers also will not have a noticeable change in the future. When multiplying these numbers with the download durations of the appropriate type of content, the result is the weighted download time per type of content:

$$\text{Weighted download time per type of content} = \text{download duration} \cdot \text{percentage of content}$$

Example: Random content downloads

$$\text{Weighted download time per type of content} = 23.03 \text{ sec} \cdot 0.5509 = 12.69 \text{ seconds}$$

The weighted download duration of all types of content is the sum of the different weighted download times.

Type of content	Average Download Duration [sec.]	Type of content (%)	Weighted Download Duration [sec.]
Random content downloads	23.03	55.09	12.69
Periodicals	15.53	44.91	6.98
Weighted download time			19.67

The weighted download time represents the average download duration regardless of its size or type.

8.5. Duration of Events - UBTF calculation (HSPA)

Calculation of the UBTF requires the definition of the various events that an end user follows when searching for and purchasing an random content downloads or periodical on the PRS-900.

The following table describes these events, and lists the duration of each event and the measured TX-ON time for each event. Both the measured TX-on times and event duration are conservative values that represent a worst-case condition.

STEP	EVENT	Event Duration [sec.]	TX-ON Duration [sec.]
1	Power up module and register on Network The wireless module is powered on and registers on the network.	29	9
2	Launch Store Application User presses the Store button the store menu appears on screen.	22	5
3	Review on Store Home menu User views the store home screen, checks the boxes for "Bestsellers" and "New Arrivals," and reads the list of available titles.	61	0
4-1	Search for content (1) User presses the search button, enters an author's name and presses enter. Device displays search results.	44	6
4-2	Review search results User sorts search results by title and reviews the list of available titles.	25	0
4-3	Select an item for purchase User selects an item for purchase.	11	6
4-4	Review search results User reads the following information: "Author", "Reviews", "Add info", "You may also like" and "More by this author".	164	0
5-1	Search for content (2) User presses the search button, enters an author's name and presses enter. Device displays search results.	33	9
5-2	Review search results User sorts search results by title and reviews the list of available titles.	10	0
5-3	Select an item for purchase User selects an item for purchase.	9	9
5-4	Review search results User reads the following information: "Author", "Reviews", "Add info", "You may also like", "Recently viewed" and "More by this author".	150	0
6-1	Purchase transaction User presses "buy now" and confirms.	20	10
6-2	Download content The selected content downloading to device.	28	20
6-3	Purchase completed User returns to the home menu by pressing the home button.	10	1
Total (sec.)		616	75
UBTF		<u>12.18 %</u>	

The plots of the measurements can be found in the appendix of this document.

Some steps require an action from a user. The duration of these events is based on the duration that a person needs to complete these actions. These duration values are derived from user program testing and reflect conservative usage durations to ensure upper bounds limitations are being tested. The TX-ON times have been all measured except for the event “Download content”. For this event, the duration is calculated by adding (8) seconds* to the weighted download time calculated in a previous section (19.67 seconds).

** Eight (*) seconds are needed for the PDP (Packet Data Protocol) context to be finished.*

8.6. Maximum Average Conducted Output Power (HSPA)

According to the test report of the integrated radio module, the maximum average conducted output power values are the following:

HSDPA:

		[dBm]			
Channel	Frequency [MHz]	Sub-test 1	Sub-test 2	Sub-test 3	Sub-test 4
4132	826.4	23.22	22.72	22.54	22.61
4180	836.0	23.49	23.00	22.70	22.77
4233	846.6	23.17	22.71	22.39	22.48
9262	1852.4	23.00	22.67	22.49	22.64
9400	1880.0	22.82	22.57	22.30	22.47
9538	1907.6	22.92	22.75	22.39	22.61

HSUPA:

		[dBm]				
Channel	Frequency [MHz]	Sub-test 1	Sub-test 2	Sub-test 3	Sub-test 4	Sub-test 5
4132	826.4	22.86	21.59	21.72	21.72	22.78
4180	836.0	23.08	21.68	21.68	21.80	22.88
4233	846.6	23.02	21.31	21.62	21.88	22.61
9262	1852.4	22.80	21.93	22.05	22.33	22.68
9400	1880.0	22.68	21.99	22.14	22.38	22.51
9538	1907.6	22.81	22.04	22.09	22.29	22.56

The highest values (marked in bold in the table) are:

- 23.49 dBm for WCDMA Band V
- 23.00 dBm for WCDMA Band II

The average output power values can be calculated, considering the UBTDF, as follows:

$$\text{Correction factor [dBm]} = 10 \cdot \log(\text{UBTDF}) = 10 \cdot \log(0.1218) = -9.1 \text{ dBm}$$

Average output power values for HSPA:

- WCDMA Band V: 23.49 dBm – 9.1 dBm = 14.39 dBm = 27.48 mW
- WCDMA Band II: 23.00 dBm – 9.1 dBm = 13.90 dBm = 24.55 mW

RF Low Power Threshold:

The RF low power threshold (in mW) is defined by FCC as $\frac{60}{f[\text{GHz}]}$:

- WCDMA Band V: $\frac{60}{f[\text{GHz}]} = \frac{60}{0.836 \text{ GHz}} = 71.77 \text{ mW} > 27.48 \text{ mW}$
- WCDMA Band II: $\frac{60}{f[\text{GHz}]} = \frac{60}{1.88 \text{ GHz}} = 31.91 \text{ mW} > 24.55 \text{ mW}$

Conclusion: Since the calculated average output power values are lower than the RF low power threshold, this device should qualify for SAR test exclusion.

9. GPRS/EGPRS UBTDF

9.1. Worst Case operation

Unlike HSPA, in this mode, there is no continuous uplink transmission while downloading data. Therefore, the worst case occurs when the download time is as short as possible and this happen with the highest downlink data rate.

As previously indicated, the highest possible downlink data rates for 2G are:

- 85.6 kbps for GPRS.
- 247.4 kbps for EGPRS.

9.2. Download duration (GPRS/EGPRS)

For the download duration calculation this time, a file size of 0.5 MB is used, since it represents the worst-case condition. The average file size that a user downloads will be normally higher.

The conservative download time for 2G operations is the following:

$$\text{Download duration (GPRS)[sec]} = \frac{0.5 \text{ MB} \cdot 1024 \frac{\text{KB}}{\text{MB}} \cdot 8 \frac{\text{bit}}{\text{byte}}}{85.6 \text{ kbps}} = 47.85 \text{ sec}$$

$$\text{Download duration (EGPRS)[sec]} = \frac{0.5 \text{ MB} \cdot 1024 \frac{\text{KB}}{\text{MB}} \cdot 8 \frac{\text{bit}}{\text{byte}}}{247.4 \text{ kbps}} = 16.55 \text{ sec}$$

9.3. Duration of Events - UBTDF calculation (GPRS/EGPRS)

The same events as for the HSPA case are indicated. All TX-ON times have been also measured for 2G operations. The values in the table below correspond to the longest transmitter on-time and shortest event duration expected for each event. The event duration and TX-ON times for both GPRS and EGPRS are similar for most events. The only difference between the two modes occurs in the download duration time, as calculated in the previous section.

<u>STEP</u>	<u>EVENT</u>	<u>Event Duration</u> <u>[sec.]</u>	<u>TX-ON Duration</u> <u>[sec.]</u>
1	Power up module and register on Network The wireless module is powered on and registers on the network.	29	4
2	Launch Store Application User presses the Store button the store menu appears on screen.	22	3
3	Review on Store Home menu User views the store home screen, checks the boxes for “Bestsellers” and “New Arrivals,” and reads the list of available titles.	61	0
4-1	Search for content (1) User presses the search button, enters an author’s name and presses enter. Device displays search results.	44	11
4-2	Review search results User sorts search results by title and reviews the list of available titles.	25	0
4-3	Select an item for purchase User selects an item for purchase.	11	8
4-4	Review search results User reads the following information: “Author”, “Reviews”, “Add info”, “You may also like” and “More by this author”.	164	0
5-1	Search for content (2) User presses the search button, enters an author’s name and presses enter. Device displays search results.	33	12
5-2	Review search results User sorts search results by title and reviews the list of available titles.	10	0
5-3	Select an item for purchase User selects an item for purchase.	9	9
5-4	Review search results User reads the following information: “Author”, “Reviews”, “Add info”, “You may also like”, “Recently viewed” and “More by this author”.	150	0
6-1	Purchase transaction User presses “buy now” and confirms.	20	10
6-2	Download content The selected content downloading to device.	47 for GPRS 16 for EGPRS	0
6-3	Purchase completed User returns to the home menu by pressing the home button.	10	1
Total (sec.)		635 (GPRS) 604 (EGPRS)	58
UBTDF		<u>9.14 % for GPRS</u> <u>9.61 % for EGPRS</u>	

The plots of these measurements can also be found in the Appendix of this document.

9.4. Maximum Average Conducted Output Power (GPRS/EGPRS)

According to the test report of the integrated radio module, the maximum average conducted output power values (2G) are the following:

Frequency [MHz]	GPRS Average output power [dBm]	EGPRS Average output power [dBm]
824.2	32.8	27.9
836.4	32.8	27.8
848.8	32.8	27.8
1850.2	29.2	25.5
1880.0	29.0	25.5
1909.8	29.3	25.1

The highest output power values are marked bold in this table. These maximum average output power values do not consider that the integrated module is multi-slot CL10 for GPRS/EGPRS. This means that in the worst case condition two (2) out of eight (8) timeslots in upload direction can be used. Therefore, the worst case duty cycle would be 25%, that is, six (6) dBm can be subtracted from these values:

- GPRS 850 MHz: 32.8 dBm – 6 dBm = 26.8 dBm
- GPRS 1900MHz: 29.3 dBm – 6 dBm = 23.3 dBm
- EGPRS 850MHz: 27.9 dBm – 6 dBm = 21.9 dBm
- EGPRS 1900MHz: 25.5 dBm – 6 dBm = 19.5 dBm

The average output power values can be calculated, considering the UBTDF, as follows:

$$\text{Correction factor [dBm]}(\text{GPRS}) = 10 \cdot \log(\text{UBTDF}) = 10 \cdot \log(0.0914) = -10.39 \text{ dBm}$$

$$\text{Correction factor [dBm]}(\text{EGPRS}) = 10 \cdot \log(\text{UBTDF}) = 10 \cdot \log(0.0961) = -10.17 \text{ dBm}$$

Average output power values (GPRS/EGPRS):

- GPRS 850 MHz: 26.80 dBm – 10.39 dBm = 16.41 dBm = 43.76 mW
- GPRS 1900 MHz: 23.30 dBm – 10.39 dBm = 12.91 dBm = 19.55 mW
- EGPRS 850 MHz: 21.90 dBm – 10.17 dBm = 11.73 dBm = 14.90 mW
- EGPRS 1900 MHz: 19.50 dBm – 10.17 dBm = 9.33 dBm = 8.58 mW

RF Low Power Threshold:

The RF low power threshold (in mW) is defined by FCC as $\frac{60}{f[\text{GHz}]}$:

$$\text{GPRS/EGPRS 850 MHz: } \frac{60}{f[\text{GHz}]} = \frac{60}{0.836 \text{ GHz}} = \mathbf{71.77 \text{ mW}} > \mathbf{43.76 \text{ mW}} \text{ and } \mathbf{14.90 \text{ mW}}$$

$$\text{GPRS/EGPRS 1900 MHz: } \frac{60}{f[\text{GHz}]} = \frac{60}{1.88 \text{ GHz}} = \mathbf{31.91 \text{ mW}} > \mathbf{19.55 \text{ mW}} \text{ and } \mathbf{8.58 \text{ mW}}$$

Conclusion: Since the calculated average output power values are lower than the RF low power threshold, this device should qualify for SAR test exclusion.

10. W-CDMA Rel. 99 UBTDF

10.1. Worst Case operation

As in the case of 2G operations, there is no continuous transmission when downloading data. Therefore, the worst case for WCDMA Release 99 is also when the download time is as short as possible and the downlink data rate as high as possible. The highest possible downlink data rate for WCDMA Release 99 is 384 kbps.

10.2. Download duration (W-CDMA Rel. 99)

For the download duration calculation this time, a file size of 0.5 MB is used, since it represents a worst-case condition. The average file size that a user downloads will be normally higher. The conservative download time for 2G operations is the following:

$$\text{Download duration [sec]} = \frac{\text{File size}}{\text{data rate}}$$
$$\text{Download duration [sec]} = \frac{0.5 \text{ MB} \cdot 1024 \frac{\text{KB}}{\text{MB}} \cdot 8 \frac{\text{bit}}{\text{byte}}}{384 \text{ kbps}} = 10.66 \text{ sec}$$

10.3. Duration of Events - UBTDF calculation (W-CDMA Rel. 99)

The same events as for the previous cases are indicated. All TX-ON times have been also measured.

<u>STEP</u>	<u>EVENT</u>	<u>Event Duration [sec.]</u>	<u>TX-ON Duration [sec.]</u>
1	Power up module and register on Network The wireless module is powered on and registers on the network.	29	4
2	Launch Store Application User presses the Store button the store menu appears on screen.	22	3
3	Review on Store Home menu User views the store home screen, checks the boxes for "Bestsellers" and "New Arrivals," and reads the list of available titles.	61	0
4-1	Search for content (1) User presses the search button, enters an author's name and presses enter. Device displays search results.	44	11
4-2	Review search results User sorts search results by title and reviews the list of available titles.	25	0
4-3	Select an item for purchase User selects an item for purchase.	11	8
4-4	Review search results User reads the following information: "Author", "Reviews", "Add info", "You may also like" and "More by this author".	164	0
5-1	Search for content (2) User presses the search button, enters an author's name and presses enter. Device displays search results.	33	12
5-2	Review search results User sorts search results by title and reviews the list of available titles.	10	0
5-3	Select an item for purchase User selects an item for purchase.	9	9
5-4	Review search results User reads the following information: "Author", "Reviews", "Add info", "You may also like", "Recently viewed" and "More by this author".	150	0
6-1	Purchase transaction User presses "buy now" and confirms.	20	10
6-2	Download content The selected content downloading to device.	10	0
6-3	Purchase completed User returns to the home menu by pressing the home button.	10	1
Total		598	58
UBTDF		<u>9.70 %</u>	

10.4. Maximum Average Conducted Output Power (W-CDMA Rel. 99)

The maximum average conducted output power values for WCDMA Release 99 are taken directly from the integrated module's test report:

Channel	Frequency [MHz]	Average output power [dBm]
4132	826.4	23.28
4180	836.0	23.62
4233	846.6	23.37
9262	1852.4	22.80
9400	1880.0	22.53
9538	1907.6	22.56

The highest output power values are marked bold in this table.

The average output power values can be calculated, considering the UBTDF, as follows:

$$\text{Correction factor [dBm]} = 10 \cdot \log(\text{UBTDF}) = 10 \cdot \log(0.0970) = -10.13 \text{ dBm}$$

Average output power values (W-CDMA Rel. 99):

- WCDMA Band V: 23.62 dBm – 10.13 dBm = 13.49 dBm = 22.34 mW
- WCDMA Band II: 22.80 dBm – 10.13 dBm = 12.67 dBm = 18.50 mW

RF Low Power Threshold:

The RF low power threshold (in mW) is defined by FCC as $\frac{60}{f[\text{GHz}]}$:

$$\text{WCDMA Band V: } \frac{60}{f[\text{GHz}]} = \frac{60}{0.836 \text{ GHz}} = \mathbf{71.77 \text{ mW}} > 22.34 \text{ mW}$$

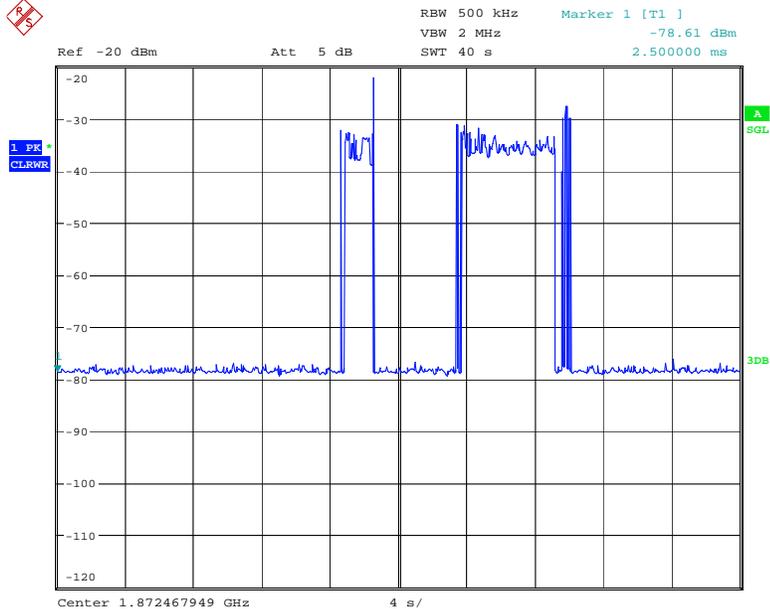
$$\text{WCDMA Band II: } \frac{60}{f[\text{GHz}]} = \frac{60}{1.88 \text{ GHz}} = \mathbf{31.91 \text{ mW}} > 18.50 \text{ mW}$$

Conclusion: Since the calculated average output power values are lower than the RF low power threshold, this device should qualify for SAR test exclusion.

Appendix (Measurement Plots)

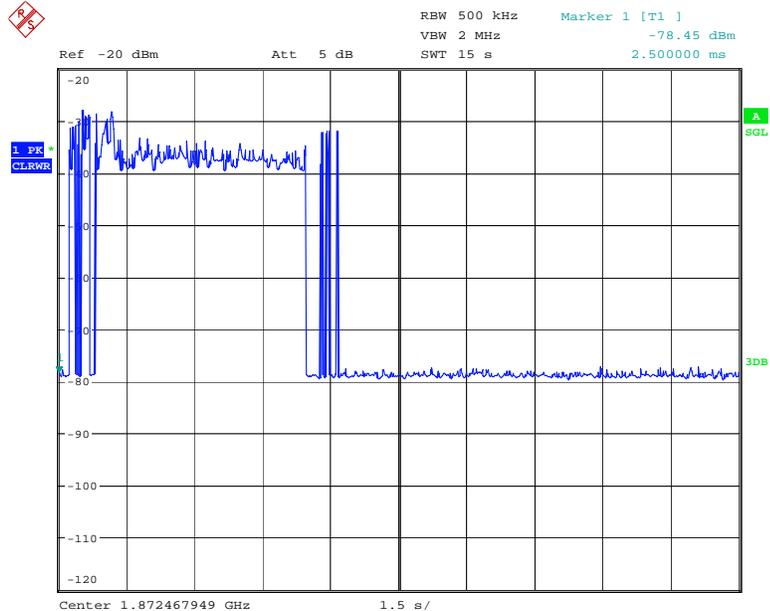
1. HSPA Plots:

**Step 1: Power up module and register on network (HSPA)
TX-ON duration = 9 sec**



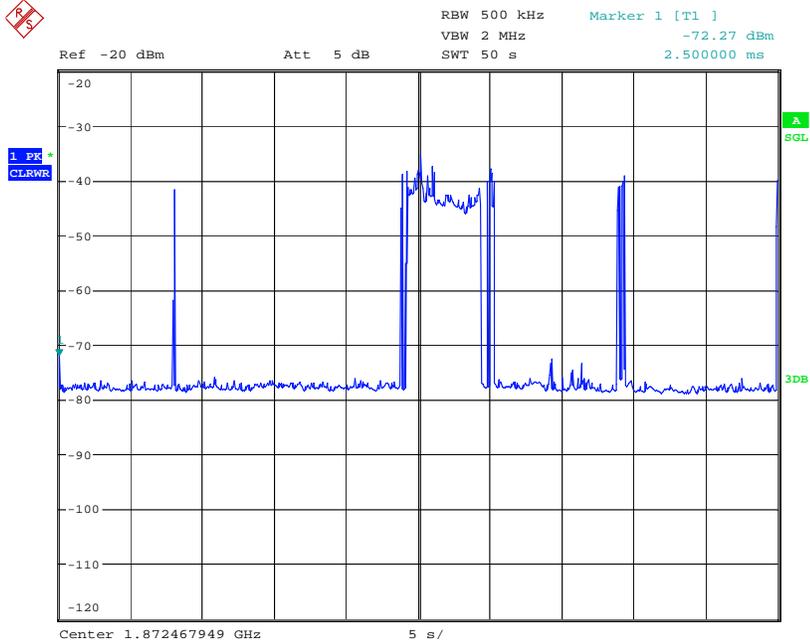
Date: 8.APR.2010 10:34:00

**Step 2: Launch Store Application (HSPA)
TX-ON duration = 5 sec**



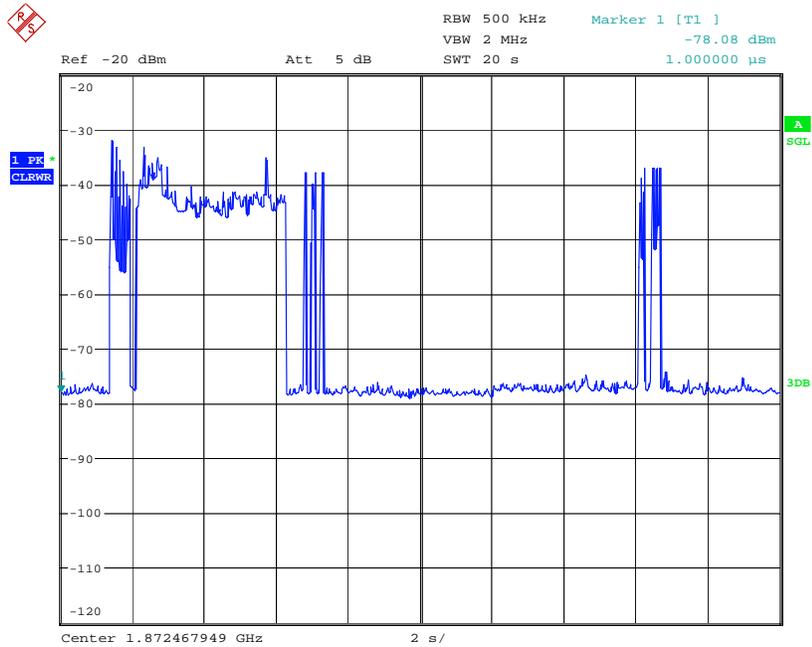
Date: 8.APR.2010 10:36:57

Step 4-1: Search for Content (1) (HSPA)
TX-ON duration = 6 sec



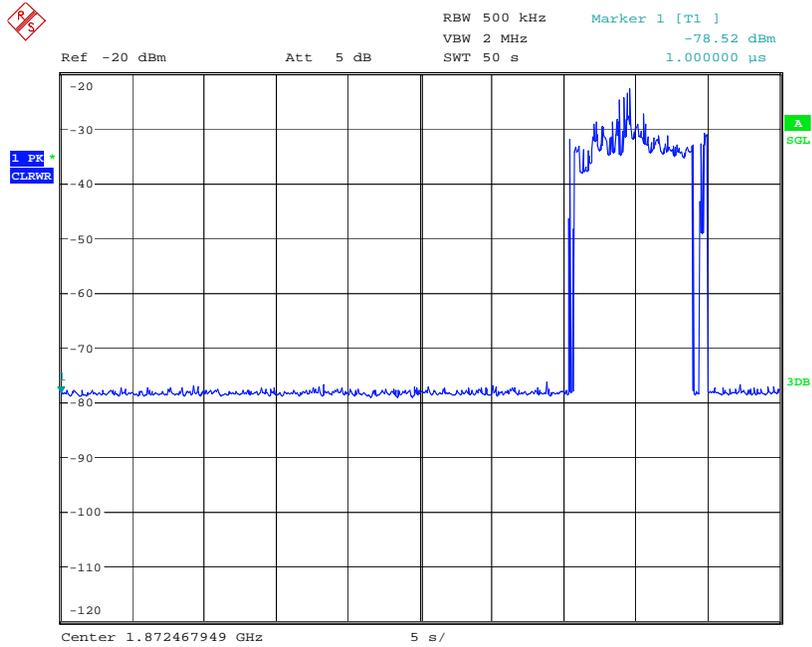
Date: 8.APR.2010 10:44:25

Step 4-3: Select an item for purchase (HSPA)
TX-ON duration = 6 sec



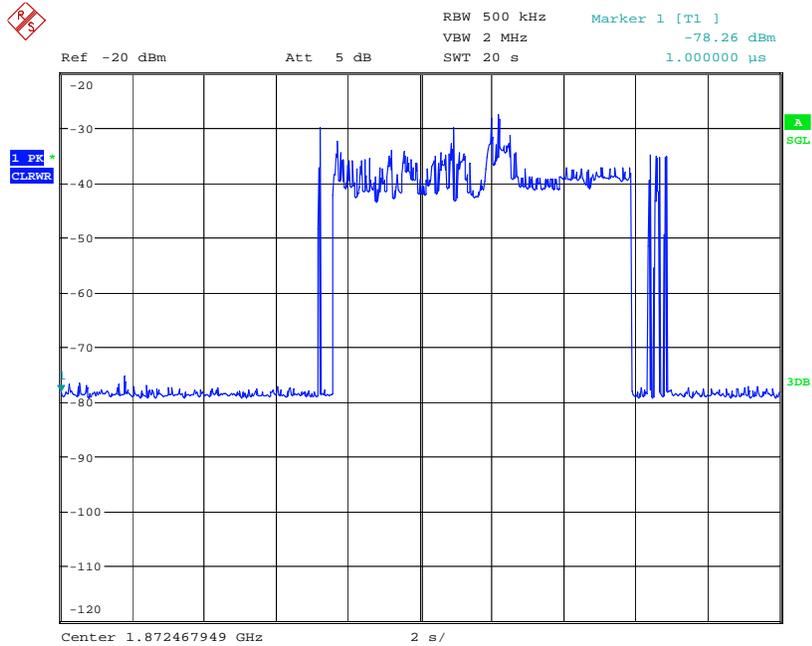
Date: 8.APR.2010 10:51:55

Step 5-1: Search for content (2) (HSPA)
TX-ON duration = 9 sec



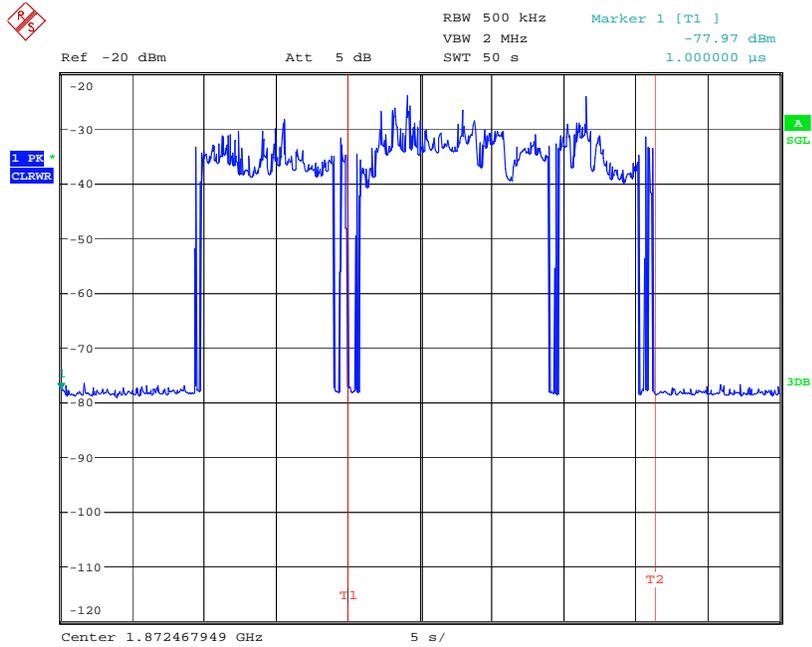
Date: 8.APR.2010 10:57:44

Step 5-3: Select an item for purchase (HSPA)
TX-ON duration = 9 sec



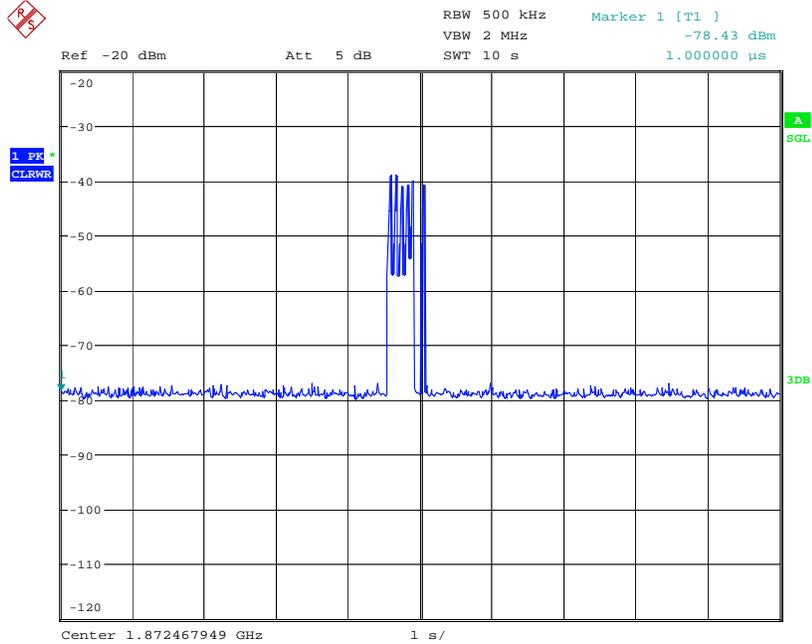
Date: 8.APR.2010 11:00:48

**Step 6-1: Purchase transaction (HSPA) (before first red line)
TX-ON duration = 10 sec**



Date: 8.APR.2010 11:08:55

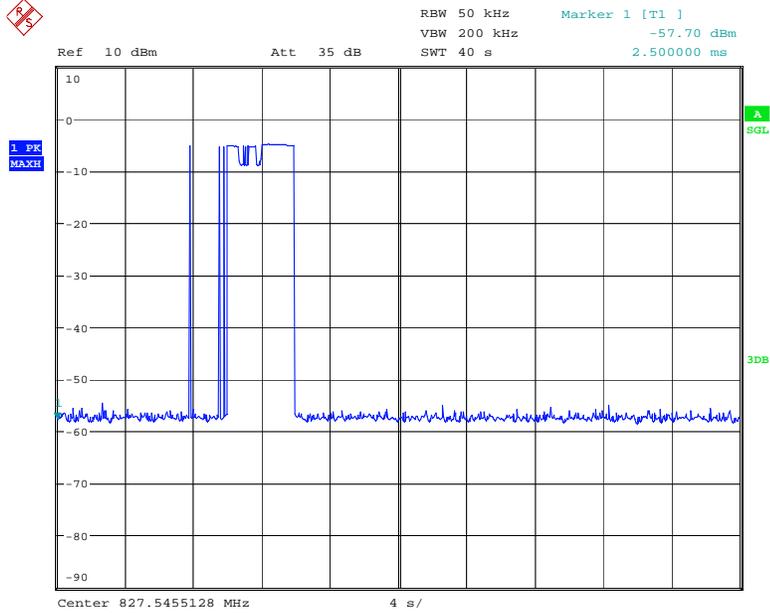
**Step 6-3: Purchase completed (HSPA)
TX-ON duration = 1 sec**



Date: 8.APR.2010 11:14:40

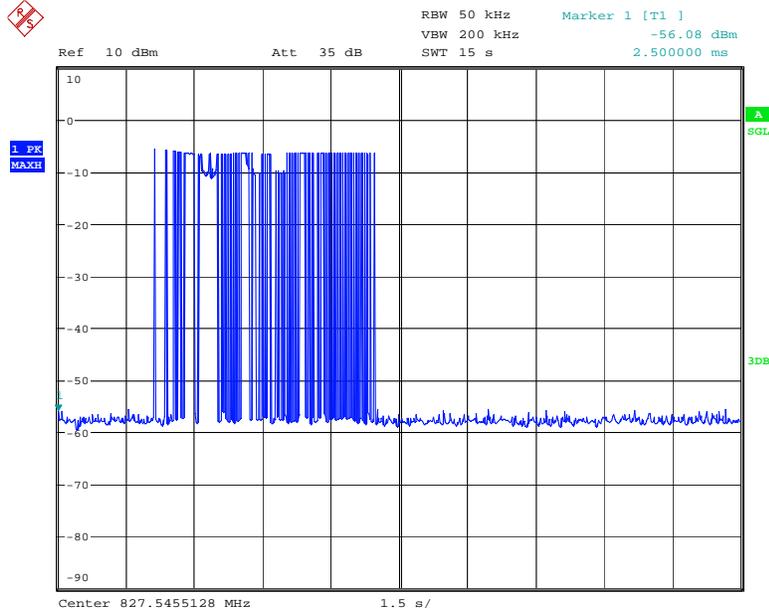
2. 2G Plots:

Step 1: Power up module and register on network (2G) TX-ON duration = 4 sec



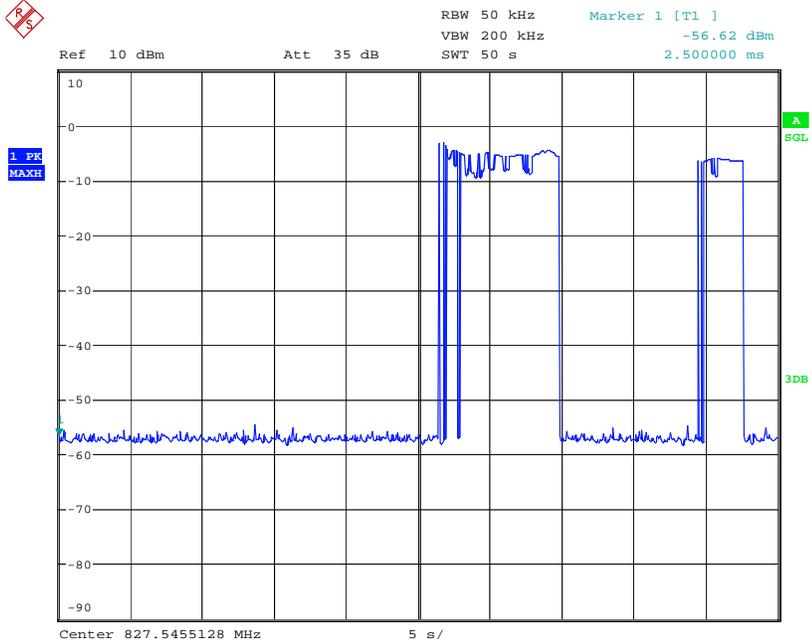
Date: 8.APR.2010 11:32:06

Step 2: Launch store application (2G) TX-ON duration = 3 sec



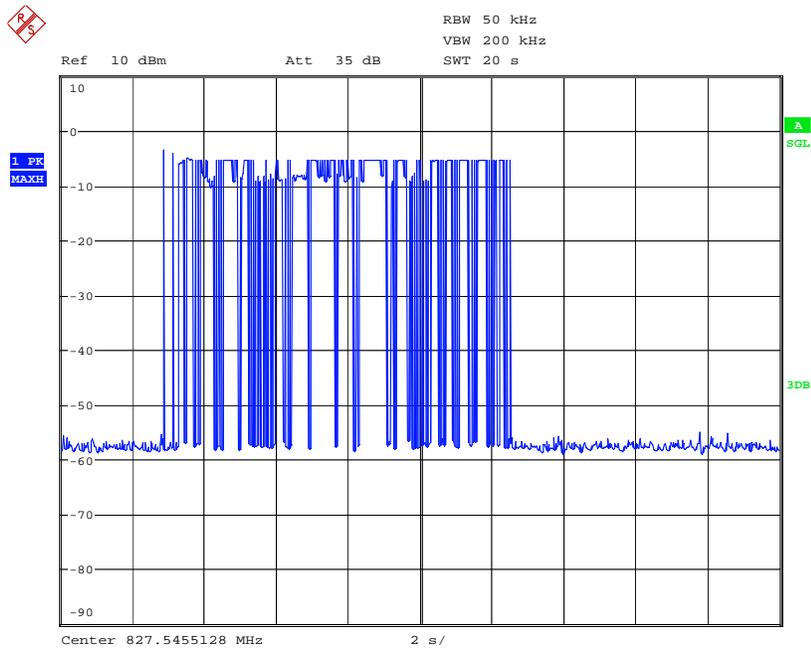
Date: 8.APR.2010 11:33:08

Step 4-1: Search for content (I) (2G)
TX-ON duration = 11 sec



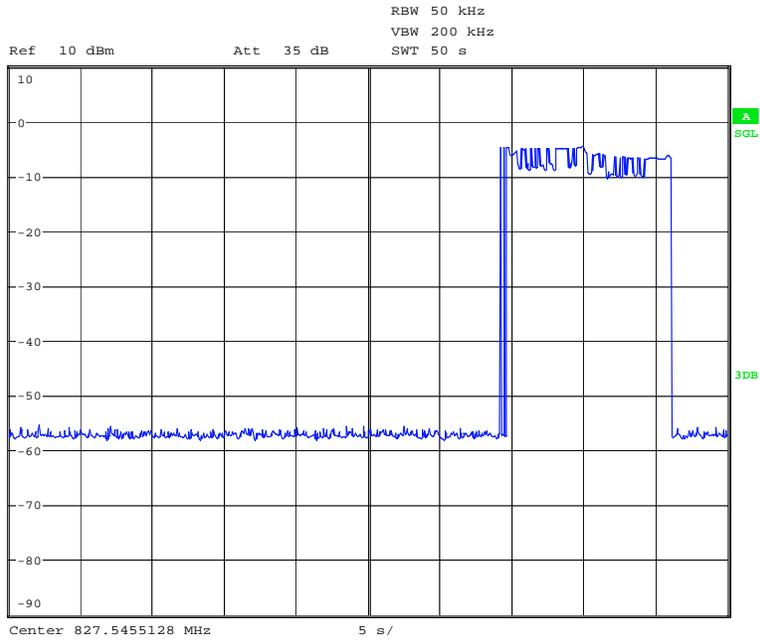
Date: 8.APR.2010 11:36:47

Step 4-3: Select an item for purchase (2G)
TX-ON duration = 8 sec



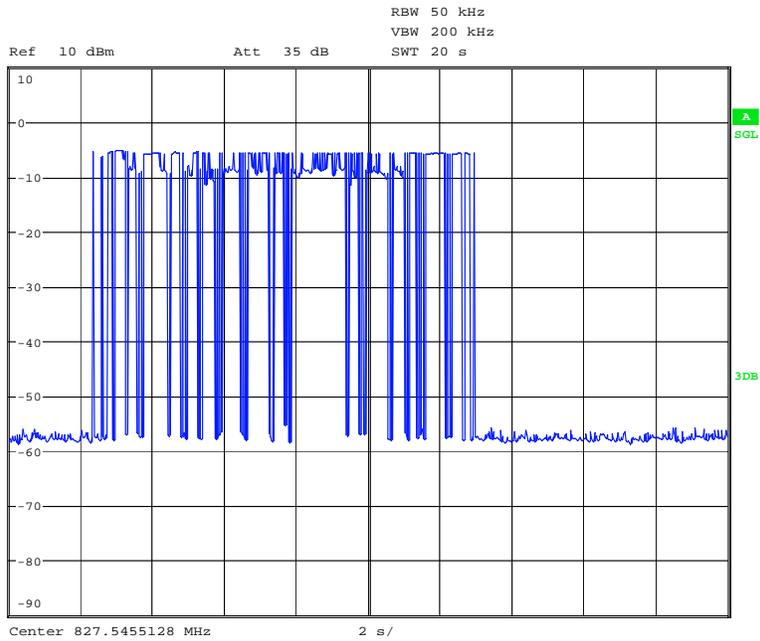
Date: 8.APR.2010 11:43:34

Step 5-1: Search for content (2) (2G)
TX-ON duration = 12 sec



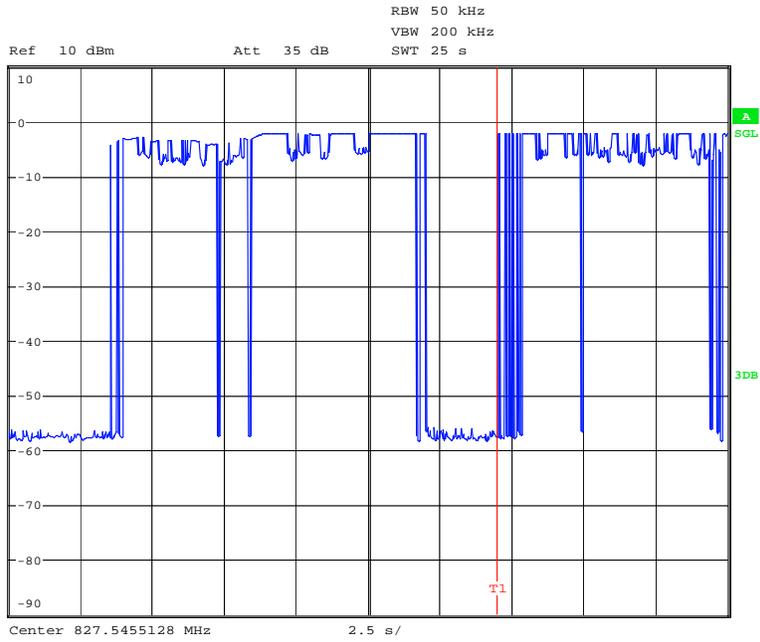
Date: 8.APR.2010 11:49:08

Step 5-3: Select an item for purchase (2G)
TX-ON duration = 9 sec



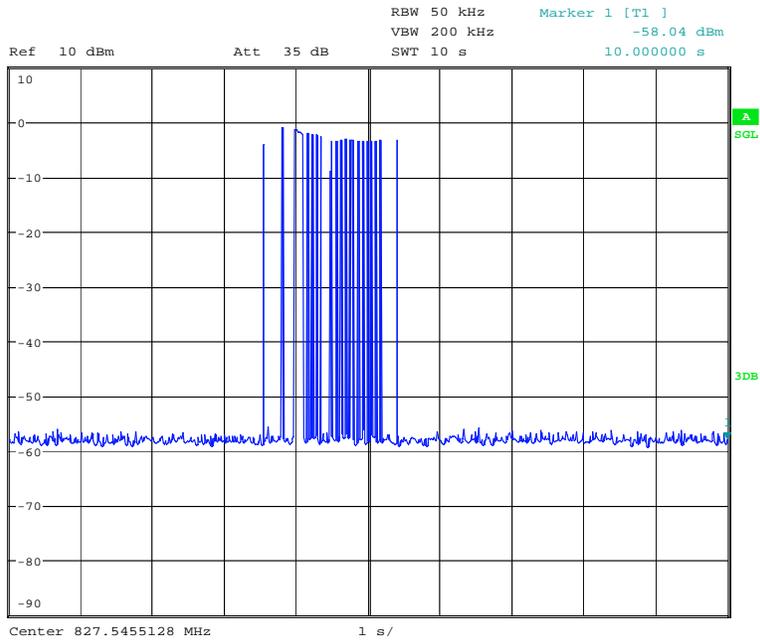
Date: 8.APR.2010 11:54:49

**Step 6-1: Purchase transaction (2G) (before red line)
TX-ON duration = 10 sec**



Date: 8.APR.2010 12:14:00

**Step 6-3: Purchase completed (2G)
TX-ON duration = 1 sec**



Date: 8.APR.2010 12:18:23