THE STANDARDS INSTITUTION OF ISRAEL

Electronics & Telematics Laboratory

Test Report No. 8912330590/1

Applicant: Dmatek Ltd.

Equipment Under Test:

PW transmitter

Model: *830*

FCC ID: *QUX-PW-830*

From The Standards Institution
Of Israel
Industry Division
Electronics & Telematics Laboratory
EMC Section

ACLASS Accreditation Services

Certificate Number: AT-1359

Applicant:	Dmatek Ltd.
Address:	2 Habarzel Street, POB 13236, Tel-Aviv, Israel
Sample for test selected by:	The customer
The date of test:	31 May, 3 June 2009

Description of Equipment Under Test (EUT):	PW transmitter.
Model:	830
Serial Number:	NA
Software version:	0.6
Hardware version:	1.5
Manufactured by:	Homefree

Reference Documents:

- CFR 47 FCC: Rules and Regulations; Part 15. "Radio frequency devices";
  Subpart C: "Intentional radiators" (2009),
  Section 15.205. "Restricted bands of operations",
  Section 15.209. "Radiated emission limits, general requirements".
  "Radiated Emission Limits, Additional Provisions";
  Section 15.231. "Periodic operation in the bands 40.66 – 40.70 MHz, and above 70 MHz".

This Test Report contains 23 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

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1. EUT Description and operation

1.1. General description:

* Note: the customer supplied all information in clause below.

The PW-830 is a network transmitter at 318 MHz carrier frequency with special "Panic" button that is hidden in an analog wristwatch. The VVST contains a few more sensors like "Body" sensor, "Strap open/close" sensor, temperature and battery level sensors and tilt. The Tx shall transmit once every 9 –11 seconds (9 seconds and plus up 2 seconds random value) the identification data with additional data regarding tamper attempts and battery status to the AMS network. The PW-830 is a "safety of life" device, its continued operation enables the Area Monitoring System (AMS) to immediately alert when the person wearing the PW-830 Tag wonders off the system coverage area and therefore may put his own life at risk. Therefore the PW-830 falls under the safety of life alarm condition category of FCC 15.231 (a) (4).

Declare maximum EIRP power:	-2 dBm@ 318 MHz
Type of modulation:	FSK
Antenna type:	Internal

Power source: 3.6 Volt Lithium battery. The EUT's block diagram is shown in Figures 1 External and internal views are presented in Photo #1.

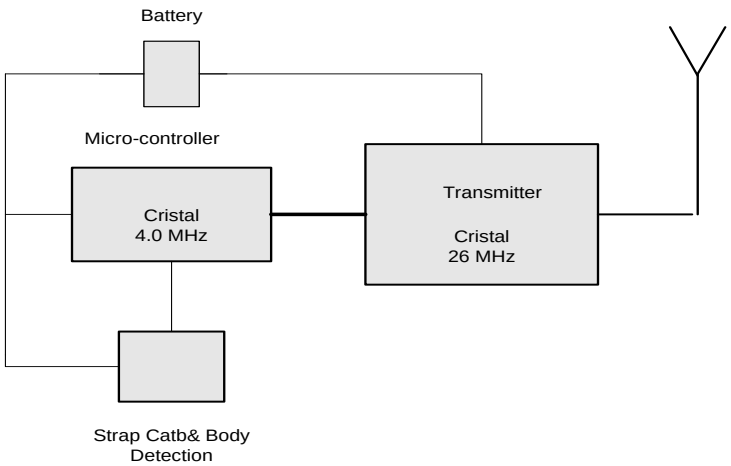


Figure 1. Transceiver block diagram.

2. Test summary

Parameter	FCC Part 15 Reference paragraph	Comply/not comply with the requirements
Radiated emission test.	Subpart B Section 15.209	Comply
Test of field strength emission from intentional radiators	"Radiated Emission Limits, Additional Provisions"; Section 15.231.	Comply
Radiated emission from intentional radiators in restricted bands	Subpart C Section 15.205	Comply
Occupied bandwidth	Subpart C Section 15.231	Comply

Telematics Laboratory

3 January 2010

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name: Michael Feldman
Position: Test Technician

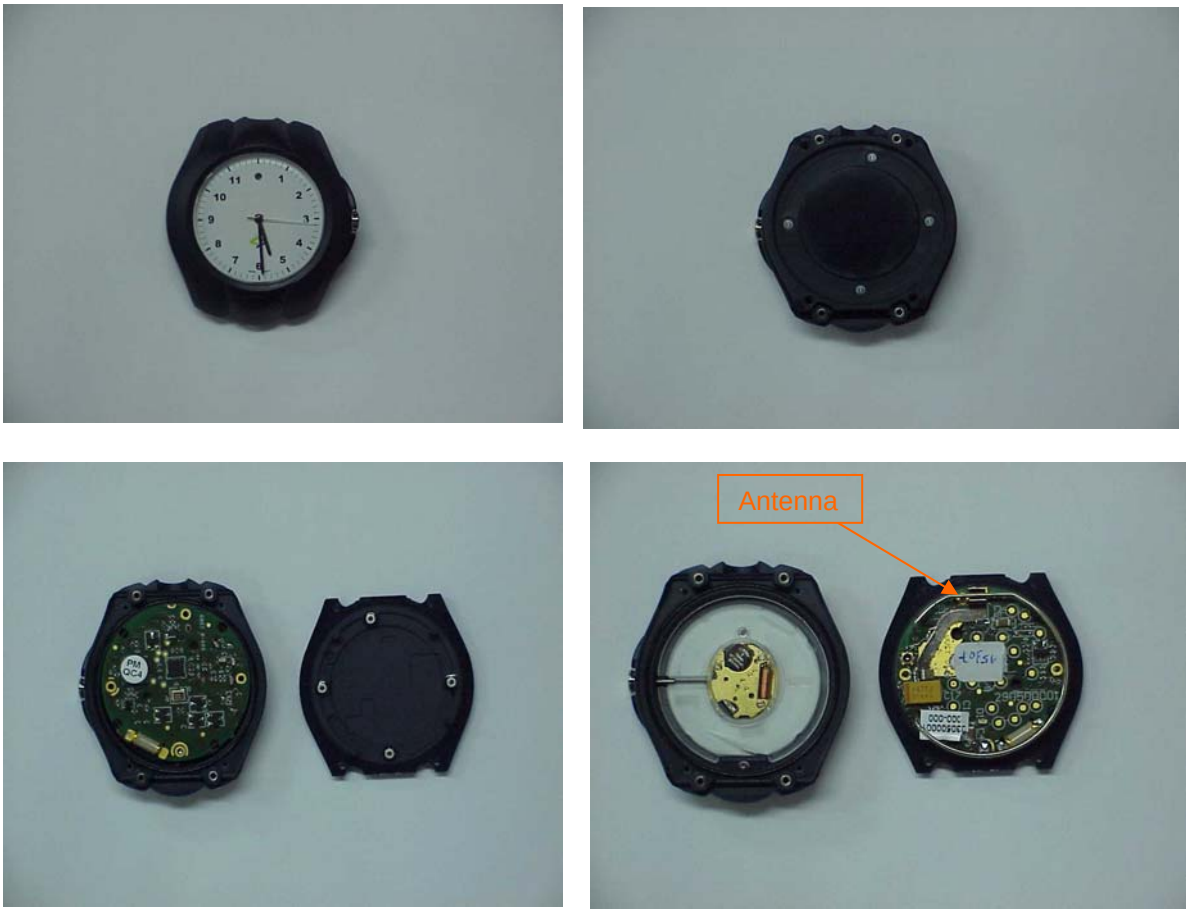
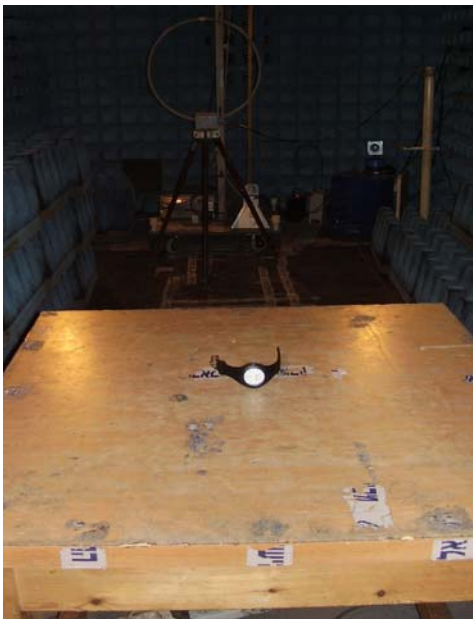


Photo 1. EUT's external and internal view



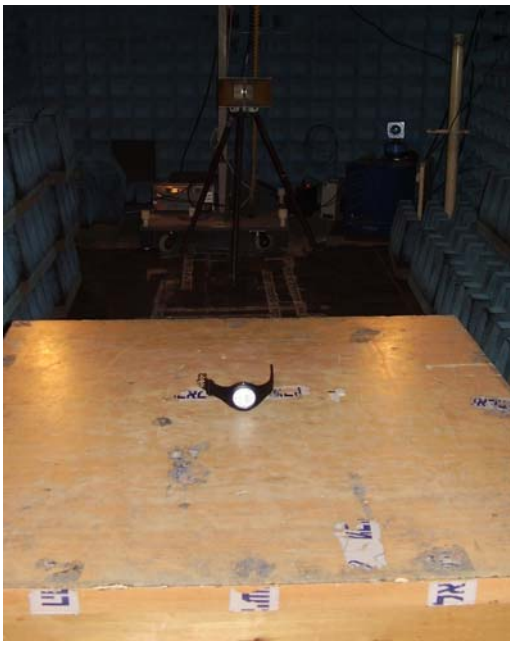


Photo 2. Spurious emissions test setup.

2.1. Potential emission sources:

The potential emission sources are detailed in Table 1.

Table 1. Potential emission sources

Frequency	Location
4.0 MHz crystal	Microcontroller
26.0 MHz crystal	CC1101 transmitter
318 MHz RF signal	Base unit

2.2. EUT setup and operation:

Respective tests were performed in Transmission (Tx) and Stand-by modes.
Measurements of transmitter were performed in continue transmition mode.

3. Measurements, examinations and derived results

3.1. Location of the Test Site:

Preliminary radiated test was conducted at the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

Final tests were conducted in an Open Area Test Site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

3.2. Test condition:

Temperature: 23 °C. Humidity: 62 %. Atmospheric pressure: 1009 mbar.

3.3. Initial visual check and functional test:

Initial visual check and brief built- in- test of the EUT was performed before testing.

- No external damages were found.
- The test on the EUT passed successfully.

3.4. Radiated emission test.

3.4.1. General:

Per FCC Part 15 Subpart C Sections 15.209, 15.231.

- Initial scans were made using a peak detector but still using the appropriate ANSI IF bandwidth.
- A tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Peak detector.

3.4.2. Preliminary radiated emission tests:

Preliminary investigation was performed up to ten harmonic of carrier frequency. Test was conducted in a semi-anechoic chamber at distance 3 meters. The EUT was setup in its typical configuration and operated in its various modes. For each mode of operation the frequency spectrum was monitored. EUT configuration, cable configuration and mode of operation, which produced the maximum level of emission, were documented. A list of frequencies to be tested was prepared.

3.4.3. Final measurements:

The final radiated emission measurements were performed at the Open Area Test Site at the same (3 m) test distance. Test was started with a fresh battery. Measured voltage was 3.6V The EUT was operated as described above. The EUT was installed on a turn - table. Biconilog and Double Ridged Guide antennas were used. The measurements were performed at each frequency that founded previously at which the signal level was 10 dB below the limit or less. The levels were maximized by rotating through three orthogonal axes, rotating turntable through 360° and changing antenna-to-EUT polarization from vertical to horizontal. The worse case result was noted in tables.

3.4.4. Radiated emission test results:

Test result in stand-by mode was found below SA noise floor and at least 10 dB under the section 15.209 specified limit. For plot result in stand-by mode refer to plots #9 and #10. Final result measurements in transmit mode are presented in tables and plots #2 - #8 in section 3.6.5.

3.5. Common conditions for operation in the band above 70MHz.

3.5.1. General:

Per FCC Part 15 Subpart C clause 15.231 (a).

3.5.2. Requirements:

15.231(a) – Transmitter is defined as a part of alarm system.

15.231(a)(1) – Duration of manual transmission is limited by program and is less than 5 second

15.231(a)(2) – Transmission duration is limited by program and after activation is less than 5 second.

15.231(a)(3) – Transmitter not intended for regular predetermined interval transmissions.

15.231(a)(4) – Transmitter continuously operates during a pendency of an alarm condition.

15.231(a)(5) - Transmitter doesn't exceed the limits of this section.

3.5.3. Summary:

The EUT is complies with the requirements of clause 15.231(a).

3.6. Test of field strength emission from intentional radiator.

3.6.1. General:

Per FCC Part 15 Subpart C clause 15.231 (b)

3.6.2. Requirements:

The EUT's operation frequency is 318 MHz.
The field strength emissions from intentional radiators operated on this frequency shall comply with the limit based on the average value.

Fundamental Frequency	Calculated Field Strength limit of Fundamental dB (μV/m)	Calculated Field Strength limit of Harmonics dB (μV/m)
318 MHz	75.8	55.8

Note: Peak field strength shall not exceed the maximum permitted specified limit by more than 20 dB.
Field strength limits are specified at a distance of 3 meters.

3.6.3. Test procedure:

The test was conducted according to clause 15.231.

3.6.4. Test summery:

The tested unit meets the standard requirement.

3.6.5. Test results:

Carrier frequency MHz	Peak Ampl. dB (μV/m)	Peak Limit dB (μV/m)	Margin dB	Avg Ampl.* dB (μV/m)	Specified @3m limit, dB (μV/m	Margin dB
318.0	93.0	95.8	2.8	70.0	75.8	5.8

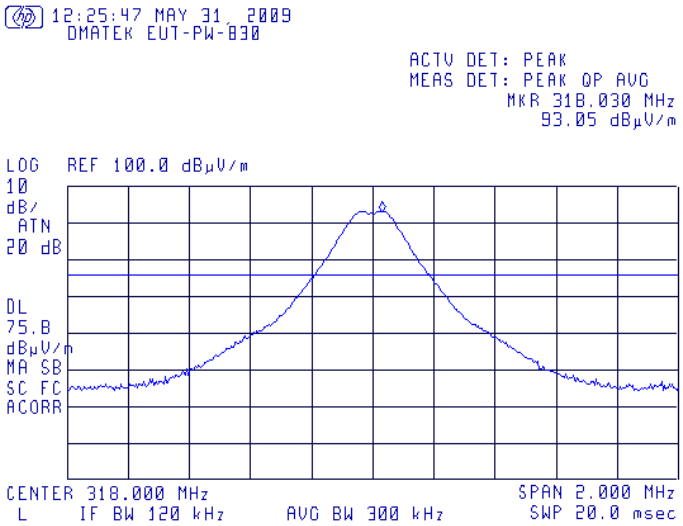
*Average amplitude result was calculated from measured Peak value – Average factor.

For recorded Fundamental frequencies result see plot #1.
All received spurious emissions were found below the specified limit.
Founded spurious emissions results presented in tables below.

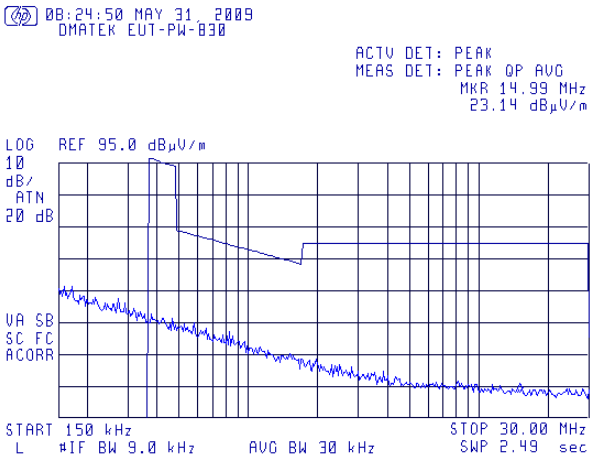
Spurious emissions test result.

Freq. MHz	Peak Ampl dB (μV/m)	Peak limit dB (μV/m)	Margin dB	Avg Ampl** dB (μV/m)	Specified @3m limit, dB (μV/m)	Margin dB	Reference Plot
636.0	58.5	75.8	17.3	35.5	55.8	20.3	Plot #4
954.0	44.4	75.8	31.4	21.4	55.8	34.4	Plot #5
1272.1	46.9	75.8	28.9	23.9	55.8	31.9	Plot #7
1589.9	44.5	74.0	29.5	21.5	54.0*	32.5	Plot #8

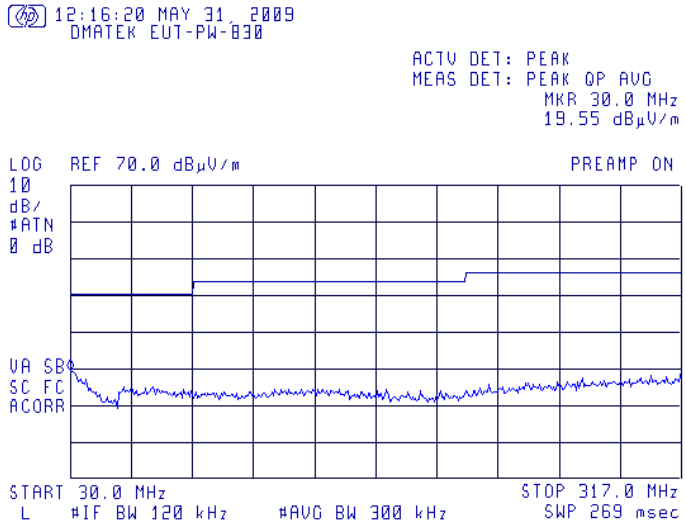
*Limit 15.205 restricted bands.
**Average amplitude result was calculated from measured Peak value – Average factor.
Average factor = 20 Log Tx on/100msec = 20 Log [7 ms/100] = -23 dB
For transmitter average factor calculation see plot # 11.



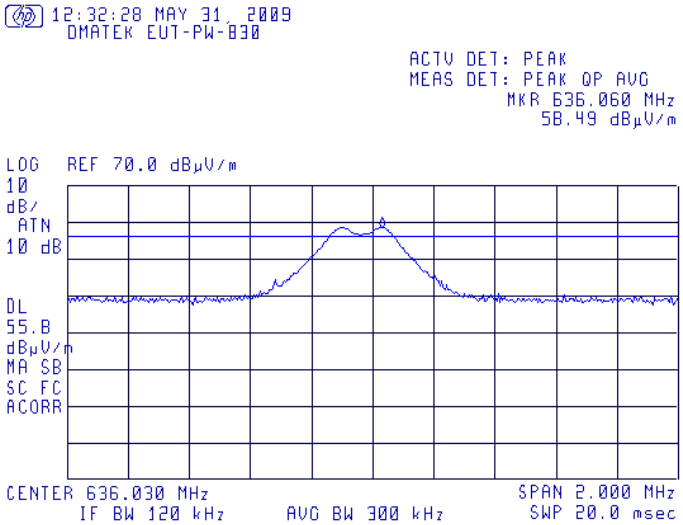
Plot # 1. Field strength of fundamental frequency 318 MHz.



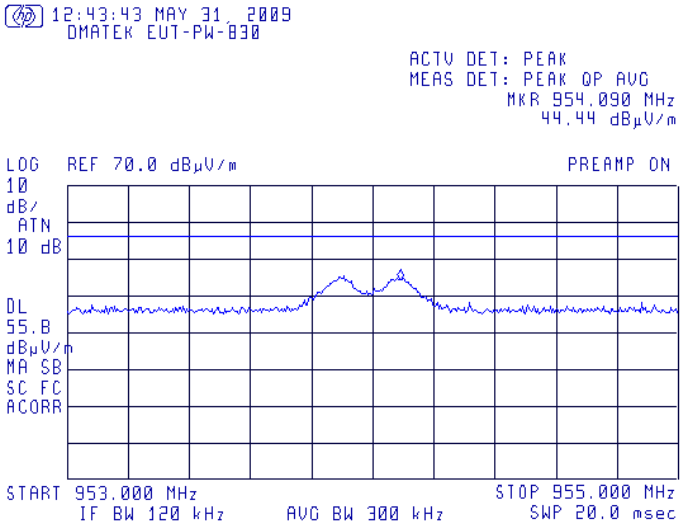
Plot # 2. Spurious emissions scan 0.15 – 30 MHz. Test distance =3m.



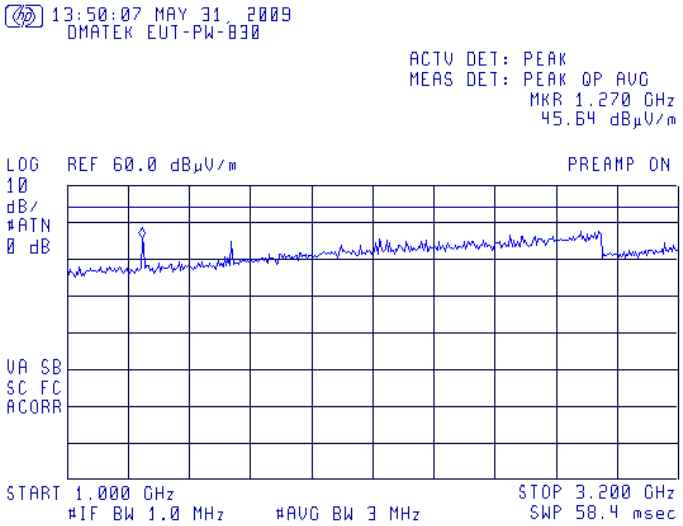
Plot # 3. Spurious emissions scan 30 – 317 MHz. Test distance =3m.



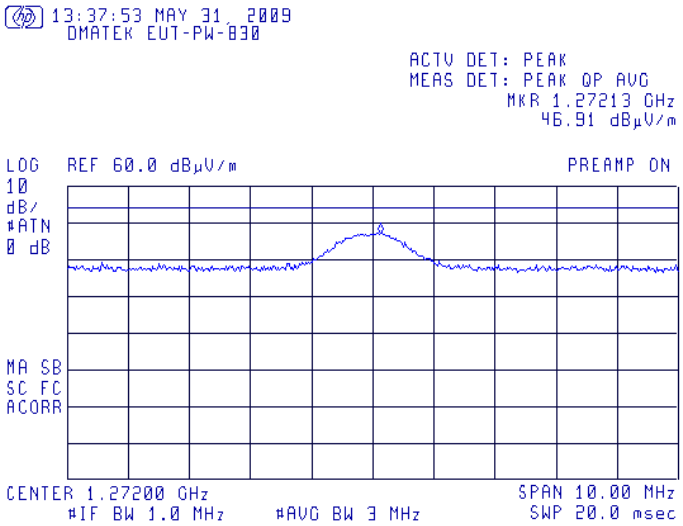
Plot # 4. The carrier frequency second harmonic. Detector peak.



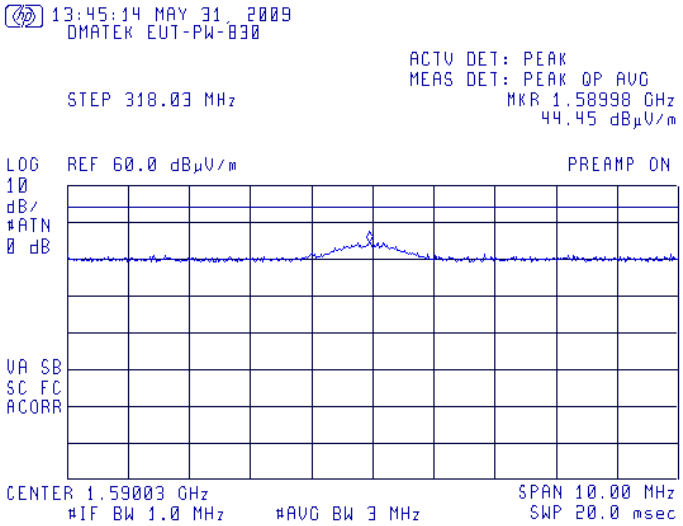
Plot # 5. The carrier frequency third harmonic. Detector peak.



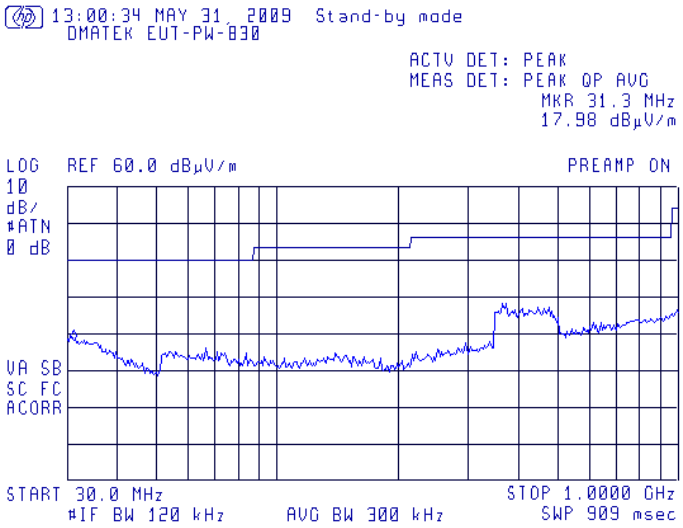
Plot # 6. Spurious emissions scan at 1 GHz – 3.2 GHz frequency range.



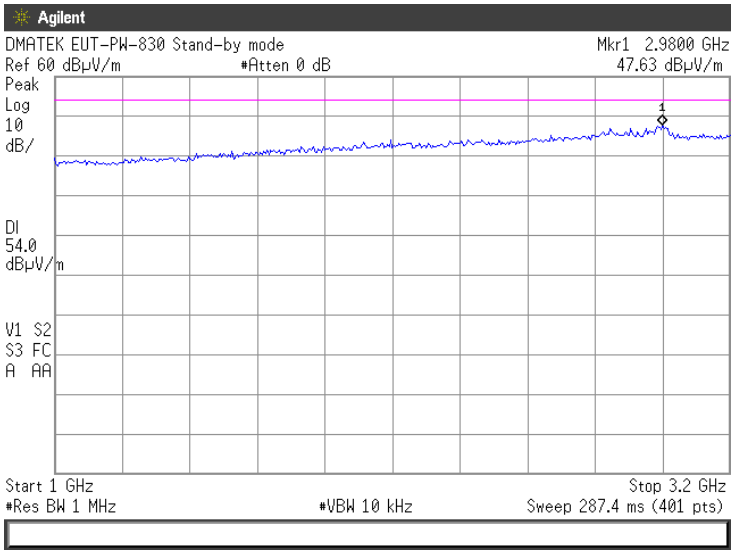
Plot # 7. The carrier frequency fourth harmonic. Detector peak.



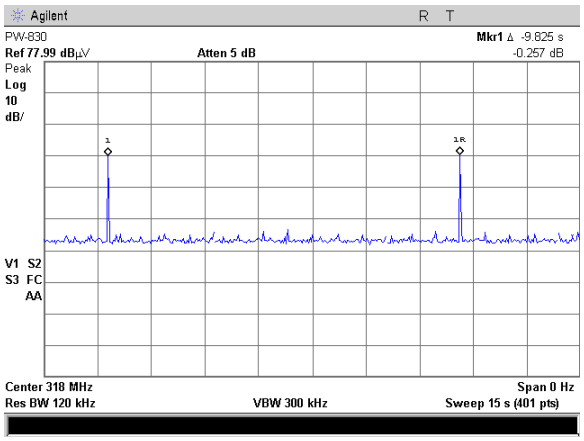
Plot # 8. The carrier frequency 5 th harmonic. Detector peak



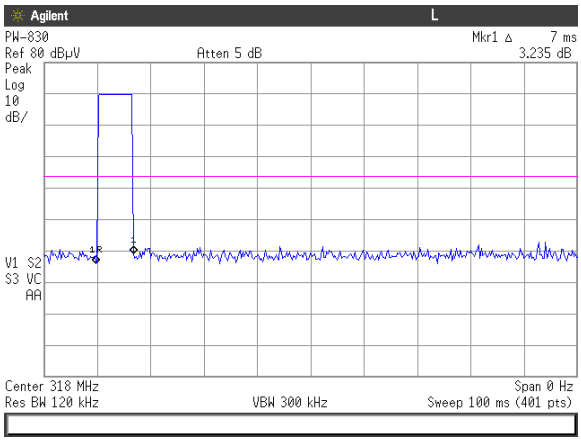
Plot # 9. Stand-by mode. Scan of spurious emissions Frequency range from 30 MHz to 1000 MHz.



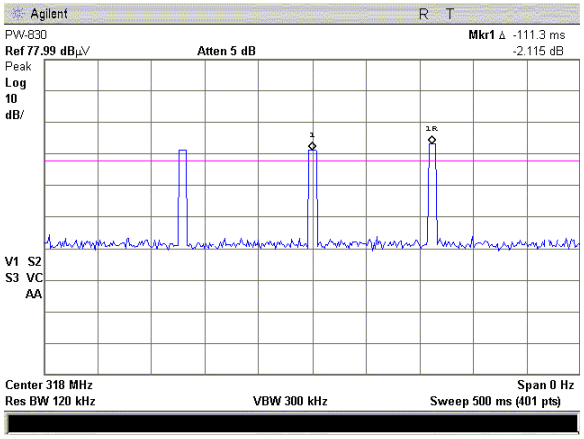
Plot # 10. Stand-by mode. Scan of spurious emissions. Frequency range from 1 GHz to 3.2 GHz.



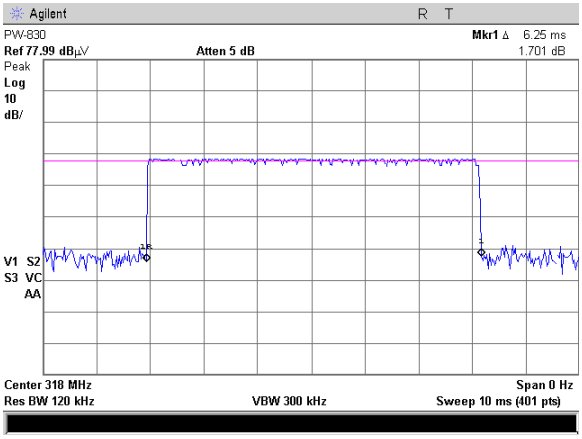
Continuously transmission mode.



Time transmission in 100 msec interval.



Activated mode.



Duration of data transmissions.

Plot # 11. Transmission duration (Tx on) test.

AVG factor was calculated as 20 Log (Tx on/100 msec).
Where Tx on = 7 msec (worst case).
20 Log [(7 ms)/100] = -23 dB.

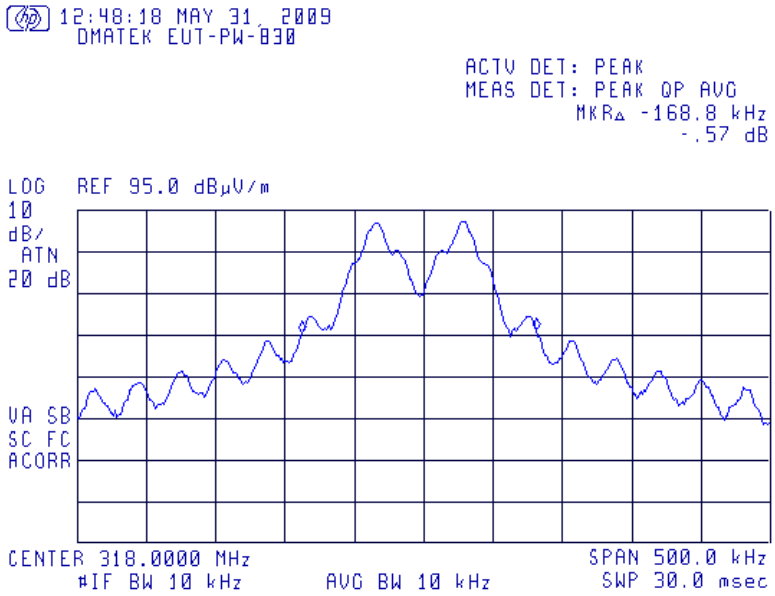
3.7. Test of occupied bandwidth per 15.231(c)

3.7.1. Requirements:

The bandwidth of the emissions shall be no wide than 0.25% of the center frequency for devises operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the centre of modulated carrier.
For 318 MHz centre frequency allowed occupied bandwidth shell be less than (318/100) 0.25 = 0.795 MHz.

3.7.2. Test results:

Test result is presented in plot # 12 below.



Plot # 12. Occupied bandwidth test result

3.7.3. Test summary:

20 dB occupied bandwidth is 168.8 kHz.
The tested unit meets the standards requirements.

4. Appendix 1. Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

Instrument	MFR	Model	Serial No.	Due calibration date
EMI Receiver 9 kHz – 6.5 GHz	HP	8546A+85460A	SII 4068	April 2010
Biconilog Antenna 30 – 2000 MHz	Teseq GmbH	CBL 6112D	S/N 23181	Aug 2009
EMI Analyser 9 kHz - 26.5 GHz	HP	E7405A	SII 4944	April 2010
Antenna Double Ridged Guide, 1-18 GHz	EMCO	3115	SII4873	Aug 2009
Active Loop antenna 10 kHz – 30 MHz	EMCO	6502	SII 4874	Oct 2009
Oscilloscope	HP	54610B	US37340682	May 2010
RF cable, 4m	Sucoflex	104PE	21328/4PE	Oct 2009
Antenna Mast	R&S	HCM	100002	N/A
Metallic turntable	R&S	HCT12	100001	N/A
Positioning controller	R&S	HCC	100002	N/A

5. Appendix 2: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.20	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84

Table 2. Antenna Factor

For Bilog Antenna, Model Number: CBL 6112D, S/N: 23181

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25

Antenna factor
Active Loop antenna mfr.EMCO mod. 6502 S/N 3424

Frequency (MHz)	Magnetic Antenna factor (dBS/m)	Electric Antenna factor (dB/m)
0.009	-31.46	20.07
0.010	-32.34	19.18
0.020	-36.15	15.38
0.050	-38.57	12.96
0.075	-38.78	12.75
0.100	-39.07	12.46
0.150	-39.07	12.45
0.250	-39.18	12.35
0.500	-39.29	12.24
0.750	-39.38	12.14
1.000	-39.57	11.95
2.000	-39.84	11.69
3.000	-40.09	11.44
4.000	-40.13	11.40
5.000	-40.24	11.28
10.000	-40.26	11.27
15.000	-40.70	10.83
20.000	-41.02	10.51
25.000	-41.94	9.59
30.000	-43.39	8.14

Antenna Factor
Double Ridged Guide Antenna mfr EMCO model 3115 1m calibration

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

Cable Loss
Type: Sucoflex 104PE; Ser.No.21328/4PE; 4 m length

Point	Frequency (GHz)	Cable Loss (dB)
1	0.0-1.0	1.7
2	1.0– 3.5	3.2
3	3.5– 5.5	4.0
4	5.5 – 7.5	4.7
5	7.5 – 9.5	5.3
6	9.5 – 10.5	5.6
7	10.5 – 12.5	6.2
8	12.5 – 14.5	6.8
9	14.5 – 16.5	7.5
10	16.5 – 18.0	8.1