

## 4.5. Radiated Emissions in GPS Bands Measurement

### 4.5.1. Limit

In addition to the radiated emission limits specified in the table in paragraph 4.5.1 of this report, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz.

Freq. (MHz)	EIRP (dBm)	E- Field (dB $\mu$ V/m) at 3m	E- Field (dB $\mu$ V/m) at 1m	E- Field (dB $\mu$ V/m) at 0.5m
1164-1240	-85.3	9.9	19.44	25.46
1559-1610	-85.3	9.9	19.44	25.46

Note 1: This may be converted to a peak field strength level at 3 meters using  $E(\text{dB}\mu\text{V/m}) = P(\text{dBm EIRP}) + 95.2 \text{ dB}$ .

Note 2: Above 960MHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m. Distance extrapolation factor =  $20 \log(\text{specific distance [3m]} / \text{test distance [1m]})$  (dB); Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB]. form 3m to 0.5m. Distance extrapolation factor =  $20 \log(\text{specific distance [3m]} / \text{test distance [0.5m]})$  (dB); Limit line = specific limits (dBuV) + distance extrapolation factor [15.56 dB].

### 4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	0 dB
RB / VB	10 kHz / 10kHz for RMS for Average, 1 msec averaging time were used for these measurement frequencies

### 4.5.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Measurements frequencies were maximized using a spectrum analyzer with RMS detector capabilities. A spectrum analyzer was used for the final measurements utilizing an RMS detector at

the frequencies with the largest amplitudes. The prescribed RBW of 10 kHz and VBW of 10 kHz, and a 1 msec averaging time were used for these measurements.

6. Per 47 CFR, Part 15, Subpart F, §15.521(c) (§15.209) all digital emissions from the transmitter not intended to be radiated from the antenna port meet the 15.209 subpart C limits.

#### **4.5.4. Test Setup Layout**

This test setup layout is the same as that shown in section 4.4.4.

#### **4.5.5. Test Deviation**

There is no deviation with the original standard.

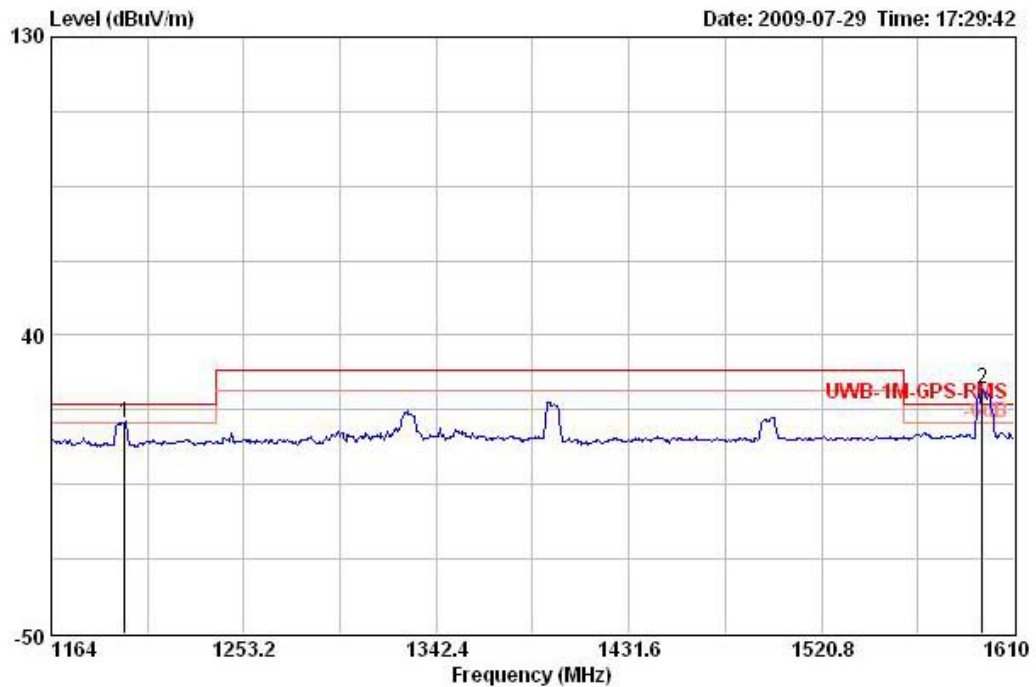
#### **4.5.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Results for Radiated Emissions in GPS Bands

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 1

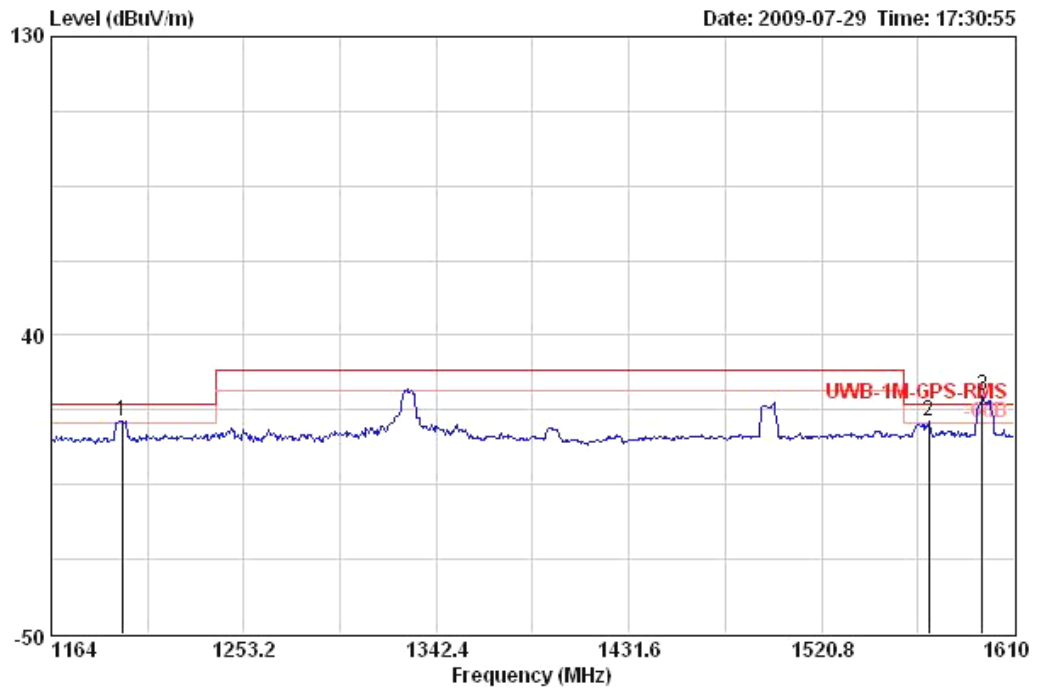
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 !	1197.896	13.68	-5.76	19.44	22.21	24.39	35.75	2.83	Peak	HORIZONTAL	360	100
2	1595.282	23.92	4.48	19.44	29.31	26.10	34.78	3.29	Peak	HORIZONTAL	360	100

Note: Measurements made with 10 kHz RBW/ 10 kHz VBW (RMS detector) at 1m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 2) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

**Vertical**



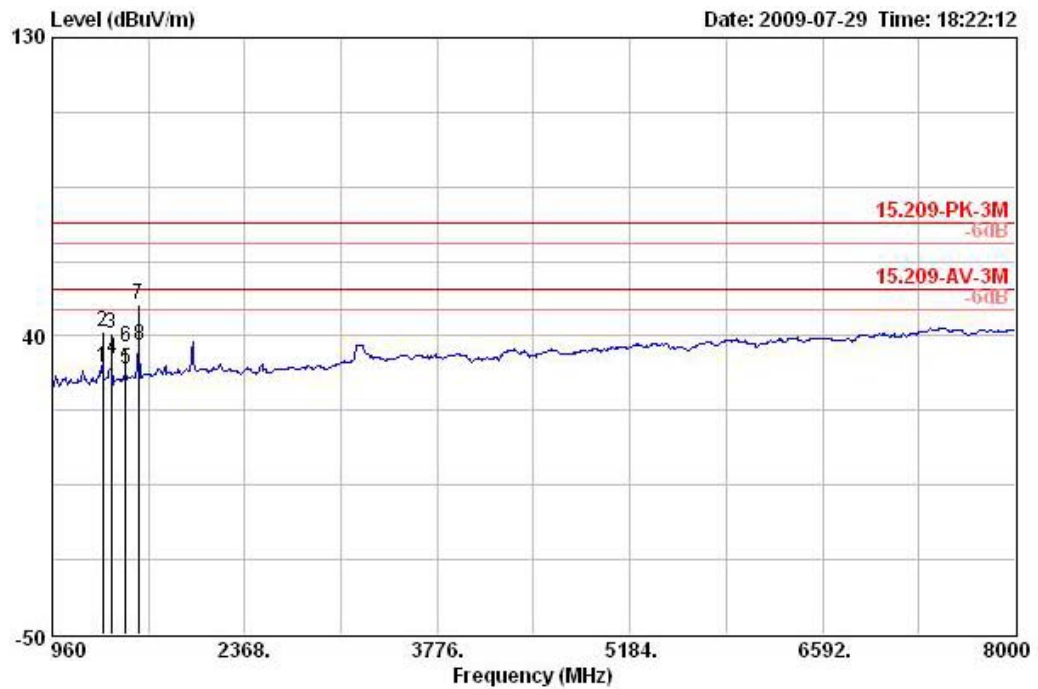
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 !	1197.004	14.28	-5.16	19.44	22.82	24.39	35.75	2.83	Peak	VERTICAL	0	100
2 !	1570.306	13.93	-5.51	19.44	19.44	26.00	34.77	3.26	Peak	VERTICAL	0	100
3	1595.282	21.81	2.37	19.44	27.20	26.10	34.78	3.29	Peak	VERTICAL	0	100

Note: Measurements made with 10 kHz RBW/ 10 kHz VBW (RMS detector) at 1m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 3) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

Emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 1

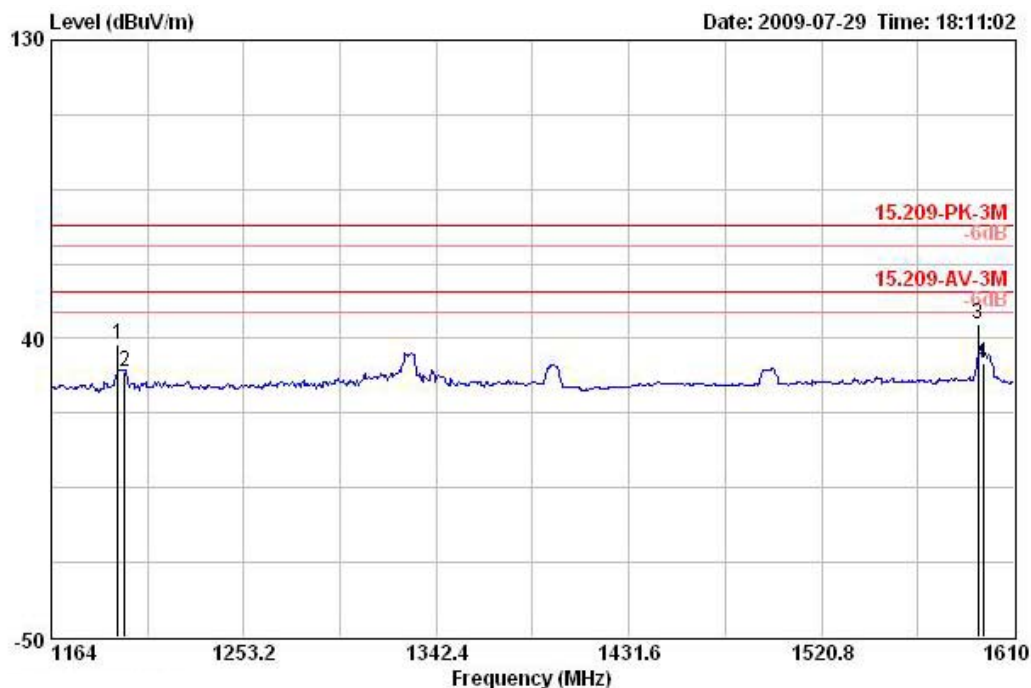
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB			deg	cm
1	1329.068	30.28	-23.72	54.00	37.62	24.91	35.22	2.97	AVERAGE	HORIZONTAL	65	100
2	1329.828	41.28	-32.72	74.00	48.62	24.91	35.22	2.97	PEAK	HORIZONTAL	65	100
3	1393.720	40.56	-33.44	74.00	47.23	25.11	34.83	3.05	PEAK	HORIZONTAL	307	100
4	1395.040	32.84	-21.16	54.00	39.44	25.17	34.83	3.05	AVERAGE	HORIZONTAL	307	100
5	1497.280	29.91	-24.09	54.00	35.86	25.62	34.73	3.17	AVERAGE	HORIZONTAL	228	100
6	1499.200	36.73	-37.27	74.00	42.67	25.62	34.73	3.17	PEAK	HORIZONTAL	228	100
7	1593.040	49.44	-24.56	74.00	54.82	26.10	34.78	3.29	PEAK	HORIZONTAL	300	100
8	1598.360	37.00	-17.00	54.00	42.39	26.10	34.78	3.29	AVERAGE	HORIZONTAL	300	100

Note: Digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

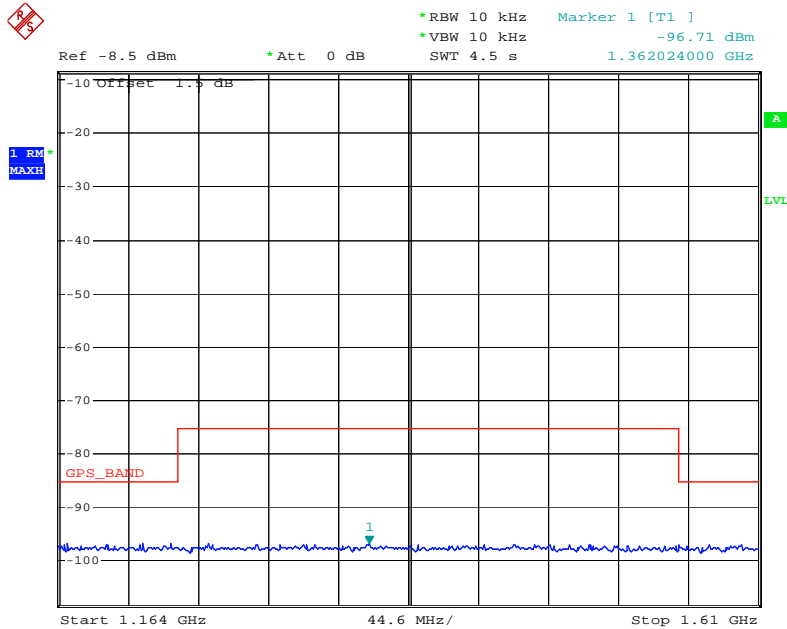
**Vertical**



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Remark	Pol/Phase	Table	Ant
	MHz	dBuV/m	Limit	Line	Level	Factor	Factor	Loss			Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1194.760	38.22	-35.78	74.00	46.75	24.39	35.75	2.83	PEAK	VERTICAL	250	100
2	1197.960	30.05	-23.95	54.00	38.58	24.39	35.75	2.83	AVERAGE	VERTICAL	250	100
3	1593.276	44.21	-29.79	74.00	49.60	26.10	34.78	3.29	PEAK	VERTICAL	281	100
4	1595.556	32.77	-21.23	54.00	38.16	26.10	34.78	3.29	AVERAGE	VERTICAL	281	100

Note: Digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 1

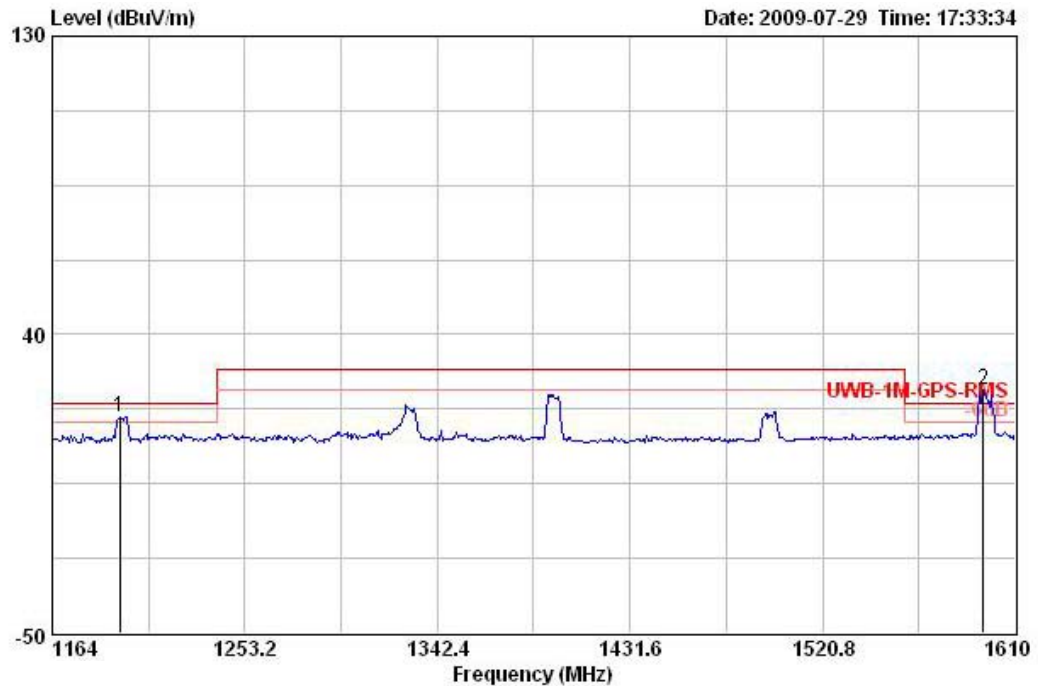


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Conducted antenna port measurements made with 10 kHz RBW/ 1kHz VBW at 1m distance, 1 msec averaging time were used for these frequencies per bin point measurements.

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 3

**Horizontal**

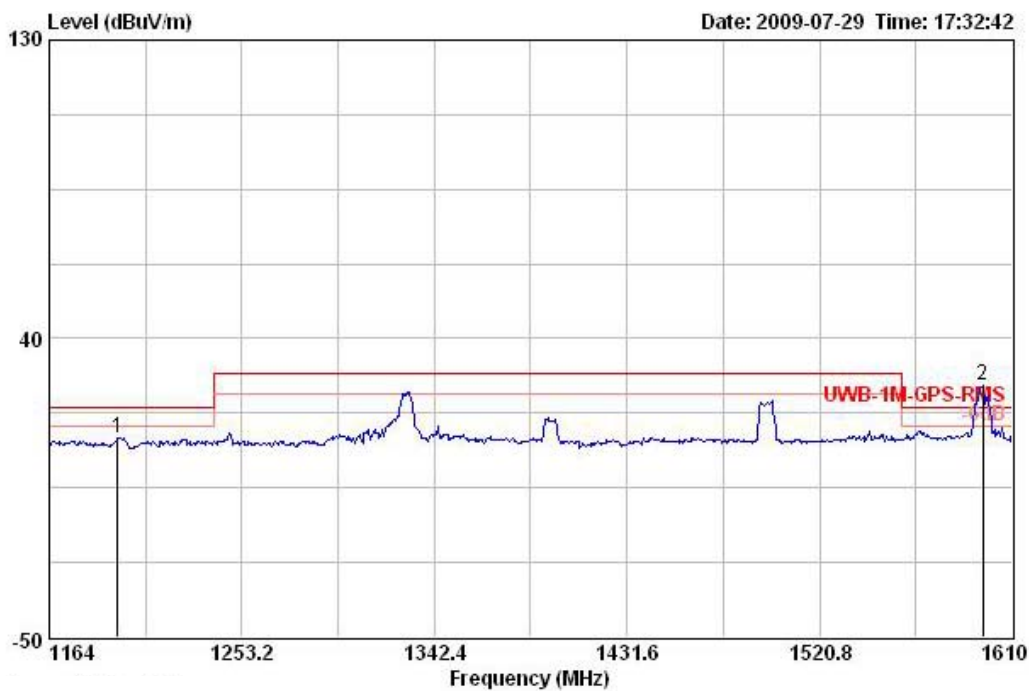


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBUV/m	dB	dBUV/m	dBUV	dB/m	dB	dB			deg	cm
1 !	1195.220	15.22	-4.22	19.44	23.76	24.39	35.75	2.83	Peak	HORIZONTAL	0	100
2	1595.282	23.51	4.07	19.44	28.90	26.10	34.78	3.29	Peak	HORIZONTAL	0	100

Note: Measurements made with 10 kHz RBW/ 10 kHz VBW (RMS detector) at 1m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 2) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.



**Vertical**



:GHORN ANT 3M VERTICAL 100cm 360deg

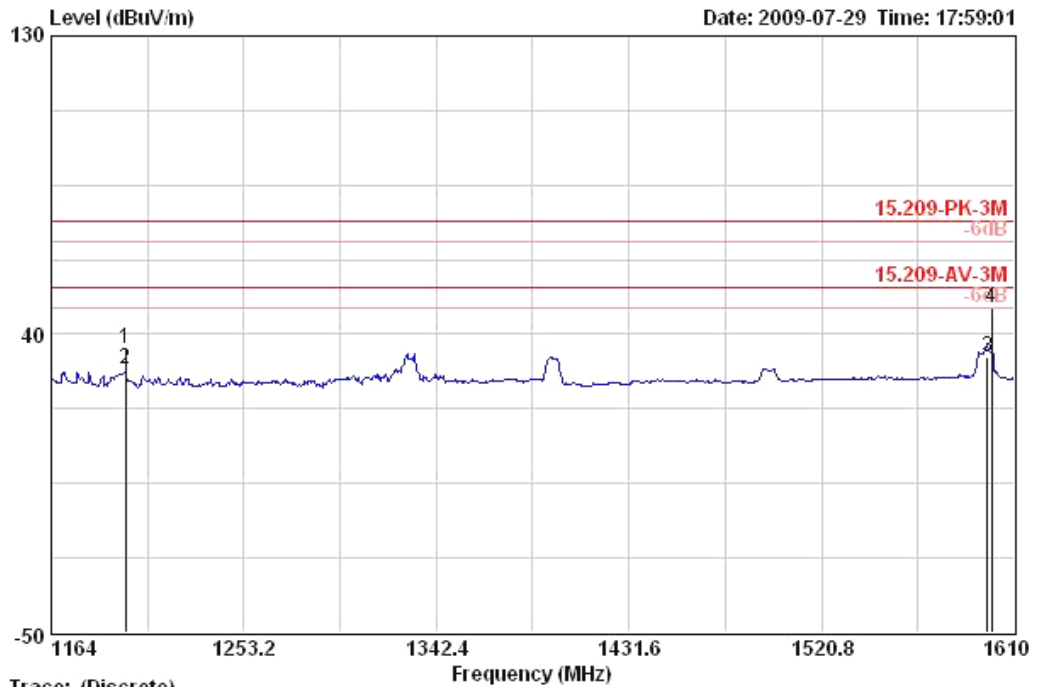
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1195.666	10.04	-9.40	19.44	18.57	24.39	35.75	2.83	Peak	VERTICAL	360	100
2	1596.620	25.86	6.42	19.44	31.25	26.10	34.78	3.29	Peak	VERTICAL	360	100

Note: Measurements made with 10 kHz RBW/ 10 kHz VBW (RMS detector) at 1m distance. 1 msec averaging time were used for these frequencies per bin point measurements. Emissions (Mark 2) from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.



Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 3

**Horizontal**



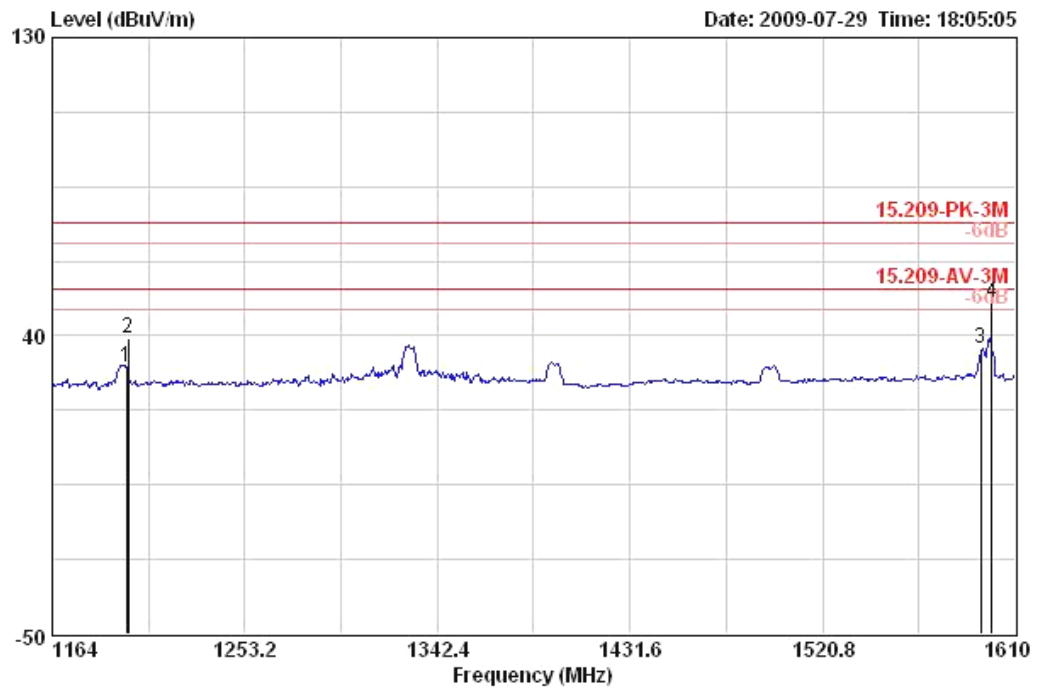
Trace: (Discrete)

Site : 03CH03-CB  
 Condition : 15.209-PK-3M 3m 18GHORN ANT 3M HORIZONTAL 100cm 360deg  
 Antenna : BG13HMC V4  
 Power : TPC3  
 Engineer :  
 Temp : 25.6 °C  
 Relative Humidity : 56%  
 Atmosphere : 98.6 Kpa  
 memo : BG3 TFC1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1198.460	35.44	-38.56	74.00	43.97	24.39	35.75	2.83	PEAK	HORIZONTAL	149	151
2	1198.460	29.31	-24.69	54.00	37.85	24.39	35.75	2.83	AVERAGE	HORIZONTAL	149	151
3	1597.600	33.01	-20.99	54.00	38.40	26.10	34.78	3.29	AVERAGE	HORIZONTAL	292	100
4	1599.480	47.71	-26.29	74.00	53.00	26.20	34.78	3.29	PEAK	HORIZONTAL	292	100

Note: Digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

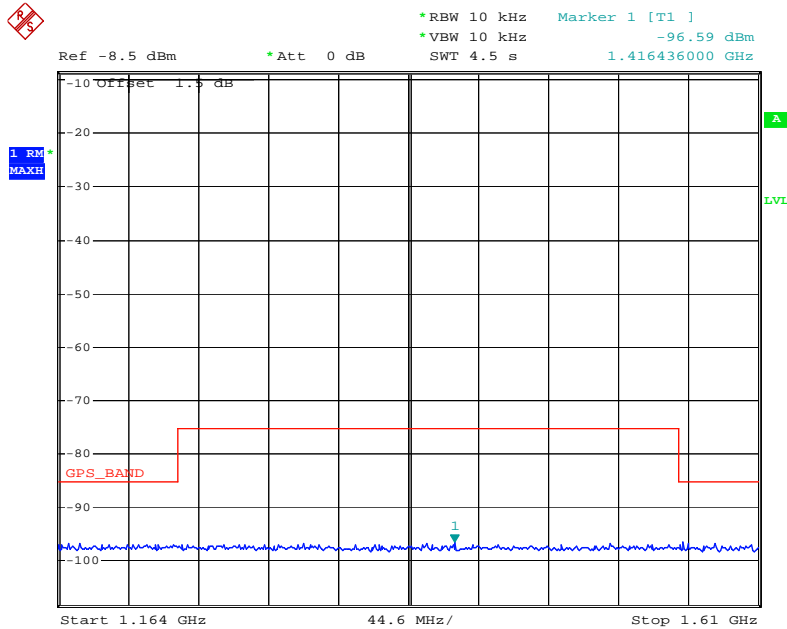
**Vertical**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1198.320	30.26	-23.74	54.00	38.79	24.39	35.75	2.83	AVERAGE	VERTICAL	252	100
2	1199.360	39.09	-34.91	74.00	47.62	24.39	35.75	2.83	PEAK	VERTICAL	252	100
3	1594.200	36.22	-17.78	54.00	41.61	26.10	34.78	3.29	AVERAGE	VERTICAL	242	100
4	1599.360	49.81	-24.19	74.00	55.10	26.20	34.78	3.29	PEAK	VERTICAL	242	100

Note: Digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in 47 CFR, Part 15, Subpart C, §15.209.

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	ALL BAND / Band group 3



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Conducted antenna port measurements made with 10 kHz RBW/ 1kHz VBW at 1m distance, 1 msec averaging time were used for these frequencies per bin point measurements.

## 4.6. Peak Emissions within a 50 MHz Bandwidth Measurement

### 4.6.1. Limit

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs,  $f_M$ . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, EIRP limit has to be adjusted by the resolution bandwidth ratio of  $20\log(\text{RBW}/50)$  dB, where RBW is the resolution bandwidth used for the measurement expressed in MHz. In addition, This may be converted to a peak field strength level at 3 meters using  $E(\text{dB}\mu\text{V}/\text{m}) = P(\text{dBm EIRP}) + 95.2$  dB. And Peak emission shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m. Distance extrapolation factor =  $20 \log(\text{specific distance [3m]} / \text{test distance [1m]})$  (dB); Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB]

Peak EIRP limit dBm (RB / VB : 50MHz)	Peak EIRP limit dBm (RB / VB: 10MHz)	E- Field (dB $\mu$ V/m) at 3m (RB / VB: 10MHz)	E- Field (dB $\mu$ V/m) at 1m (RB / VB: 10MHz)
0	-13.97	81.23	90.77

### 4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Sweep Time	Auto
RB / VB	10MHz / 10MHz for Peak

### 4.6.3. Test Procedures

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1 meters far away from the turntable.
2. The horn receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
3. For maximum peak emission amplitude, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading and was used to determine the frequency at which the highest radiated emission occurs,  $f_M$ .
4. The individual UWB bandwidths were measured for each BAND\_ID ( $n_b$ ) of the UWB spectrum. Both horizontal and vertical polarizations were taken into account to determine the full UWB BW on the maximized (in azimuth and elevation) signals.
5. A spectrum analyzer was used for the final measurement utilizing a peak detector at the frequency with the largest amplitude. The prescribed resolution bandwidth of 50 MHz was not supported by the spectrum analyzer. However, when a peak measurement is required, The resolution bandwidth for

this measurement was set to 10 MHz, and the measurement was centered on the frequency at which the highest radiated emission occurred, fM. The video bandwidth was 10 MHz.

#### **4.6.4. Test Setup Layout**

This test setup layout is the same as that shown in section 4.3.4.

#### **4.6.5. Test Deviation**

There is no deviation with the original standard.

#### **4.6.6. EUT Operation during Test**

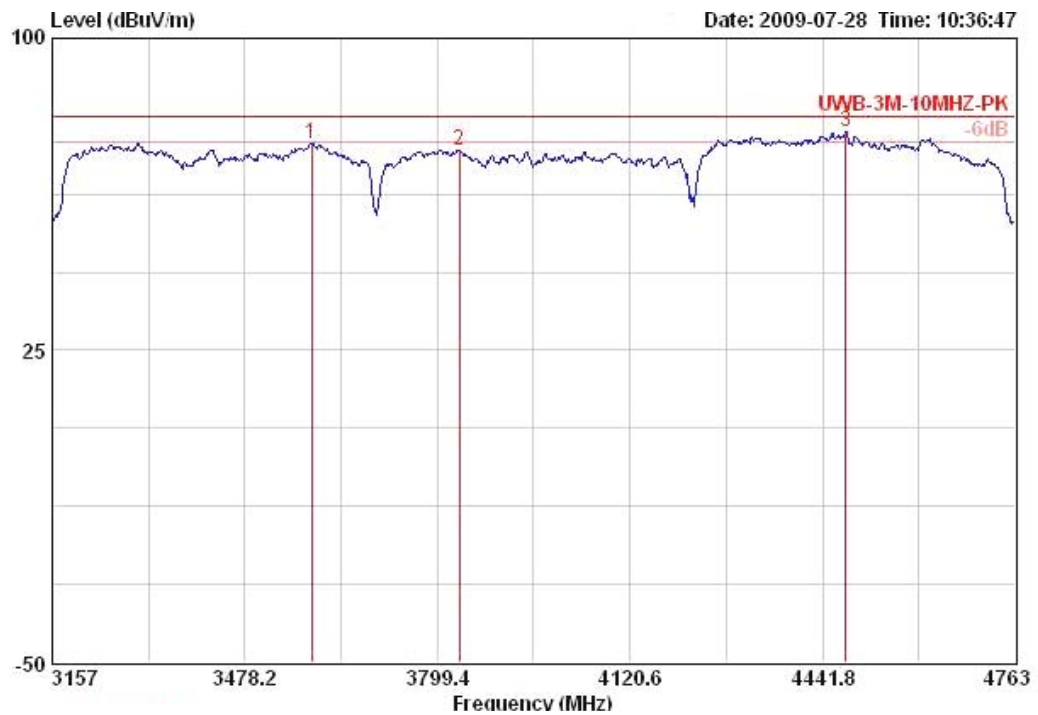
The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Peak Emissions within a 10 MHz Bandwidth

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	Band group 1

Horizontal

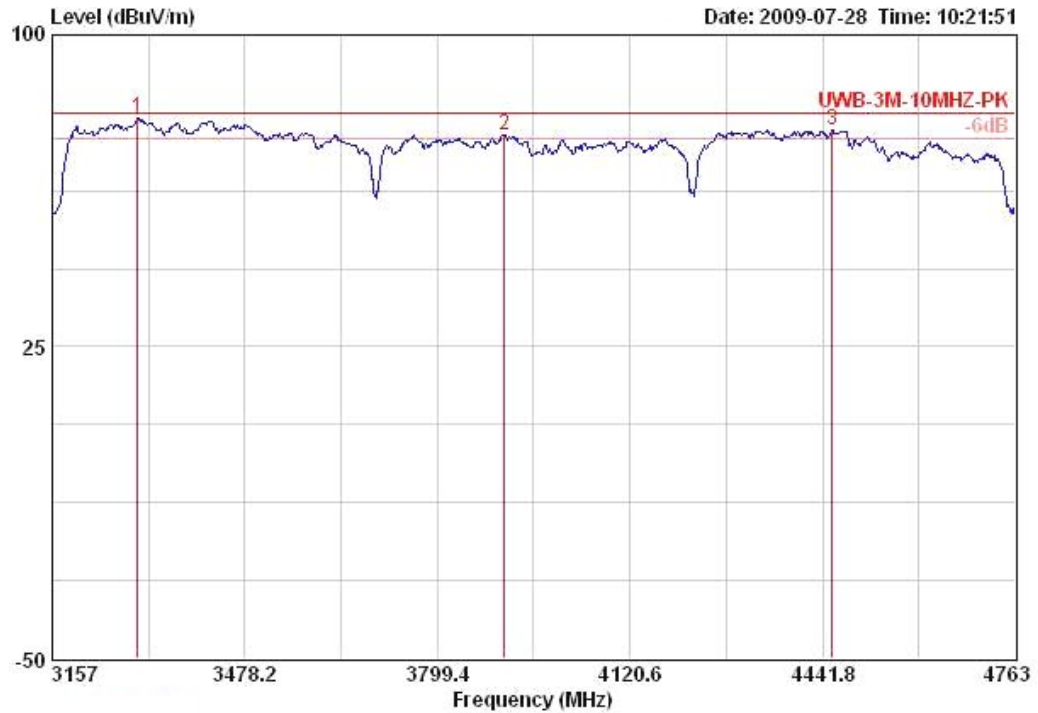
UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC1(3432MHz,3960MHz,4488MHz)



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3589.300	74.85	81.23	-6.38	76.26	3.43	35.27	30.43	229	146	Peak	HORIZONTAL
2	3835.700	73.19	81.23	-8.04	73.10	3.54	35.17	31.72	108	164	Peak	HORIZONTAL
3	4480.300	77.55	81.23	-3.68	76.31	3.91	35.10	32.43	61	153	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC1(3432MHz,3960MHz,4488MHz)**

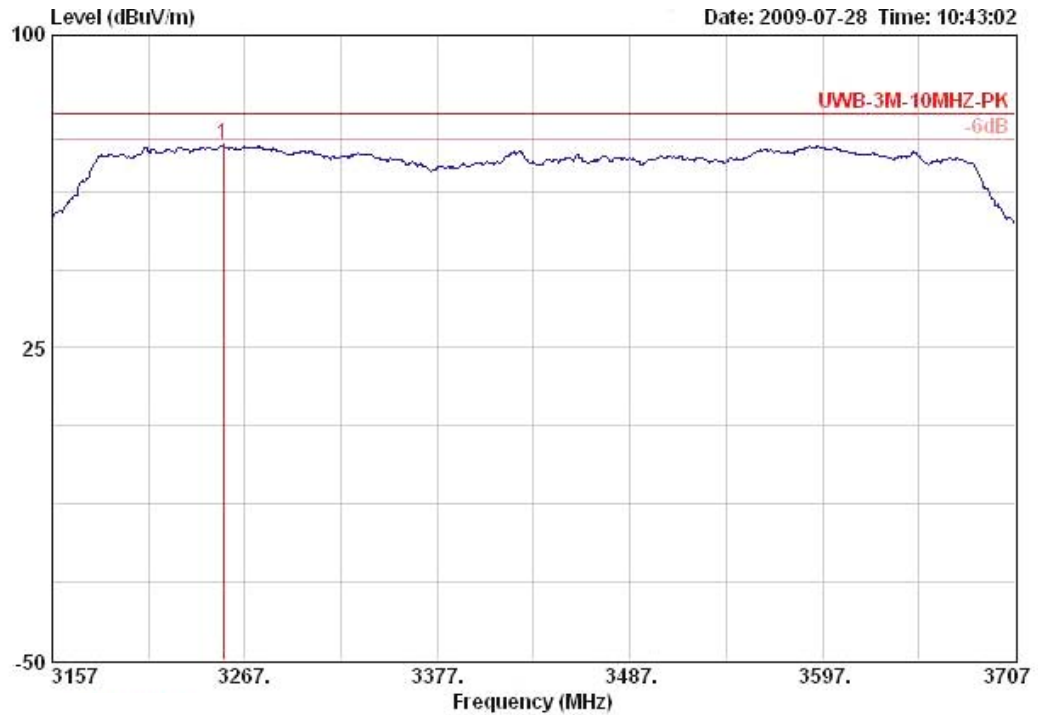


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Table Pos	Ant Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3299.450	79.97	81.23	-1.26	82.05	3.26	35.34	30.00	344	103	Peak	VERTICAL
2	3910.500	75.89	81.23	-5.34	75.39	3.58	35.14	32.07	357	100	Peak	VERTICAL
3	4458.300	77.22	81.23	-4.01	76.00	3.90	35.10	32.41	71	100	Peak	VERTICAL



**Horizontal**

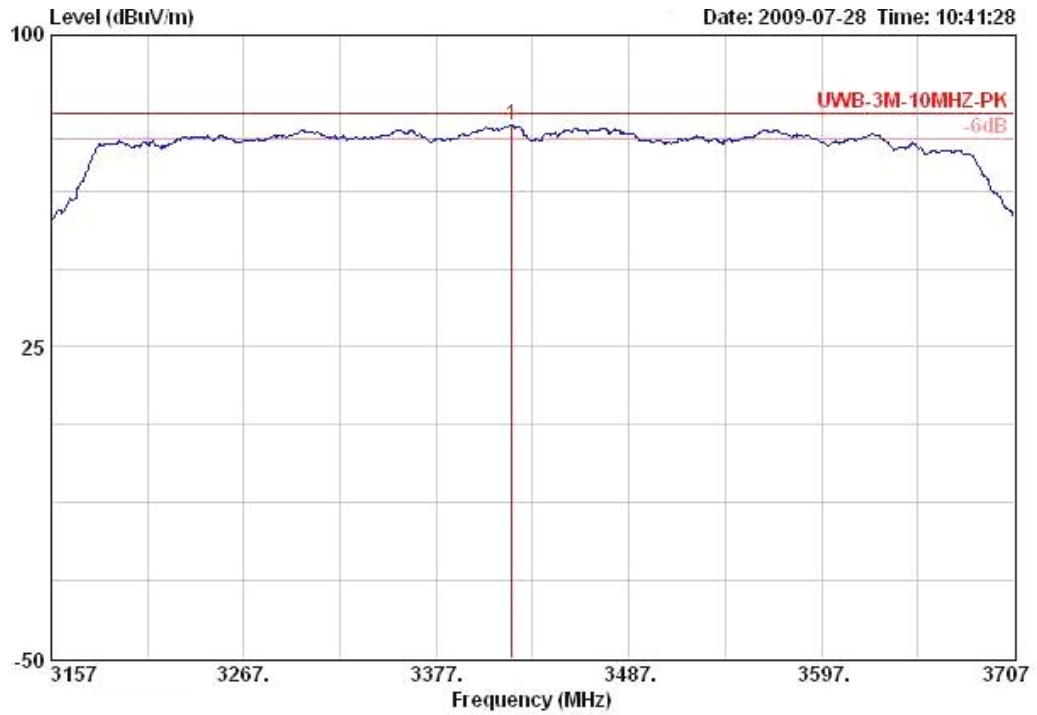
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC5(3432MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3254.900	73.64	81.23	-7.59	75.77	3.22	35.35	30.00	338	139	Peak	HORIZONTAL

**Vertical**

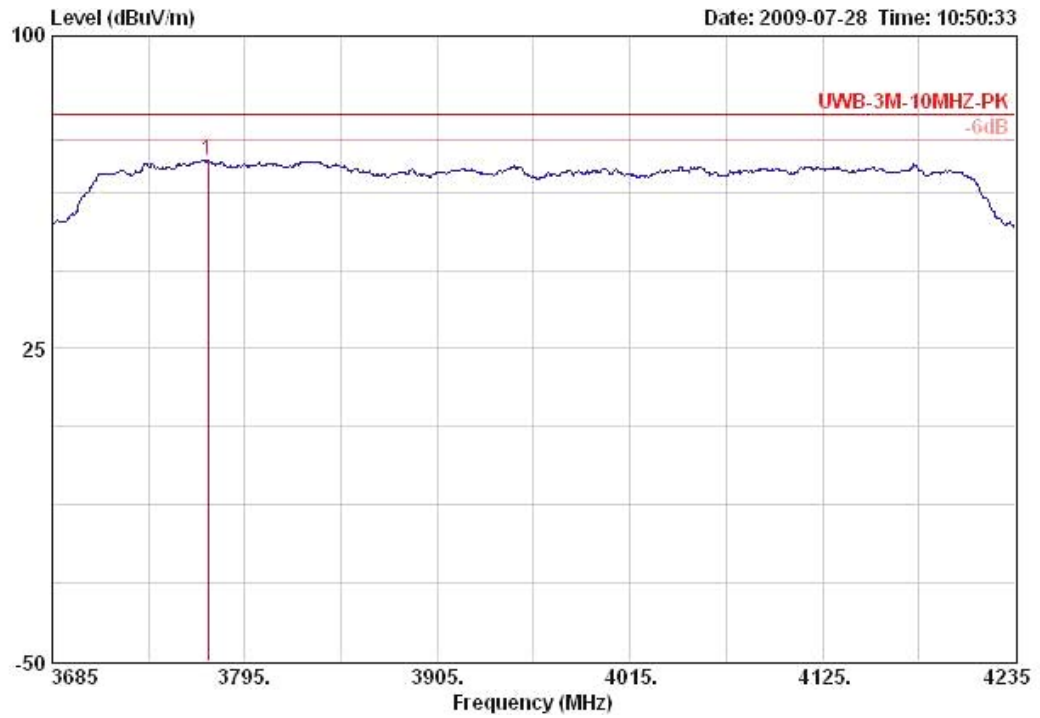
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC5(3432MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3419.900	78.42	81.23	-2.81	80.41	3.32	35.32	30.00	350	100	Peak	VERTICAL

**Horizontal**

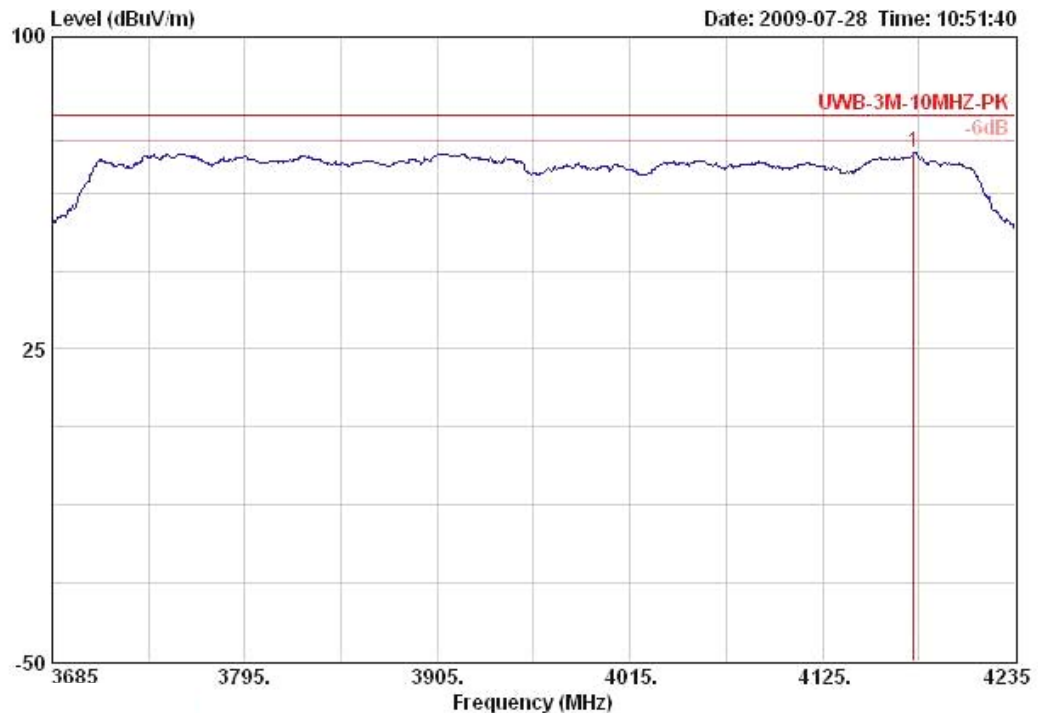
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC6(3960MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3774.100	70.18	81.23	-11.05	70.48	3.51	35.19	31.38	110	100	Peak	HORIZONTAL

**Vertical**

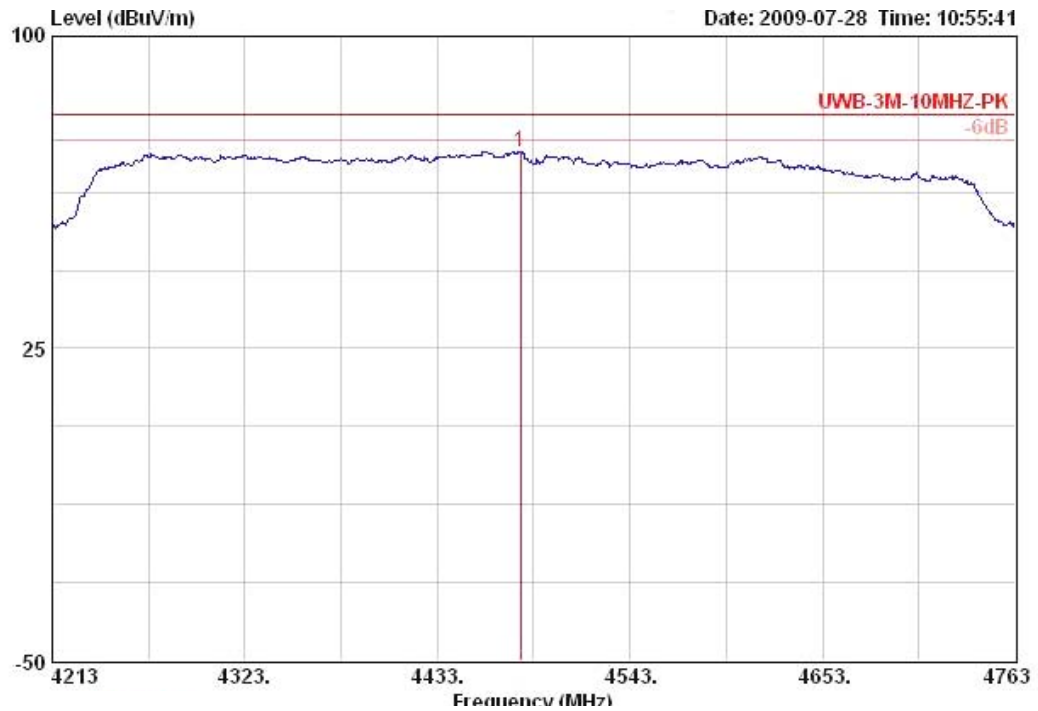
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC6(3960MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	4177.250	72.27	81.23	-8.96	71.19	3.72	35.10	32.46	360	119	Peak	VERTICAL

**Horizontal**

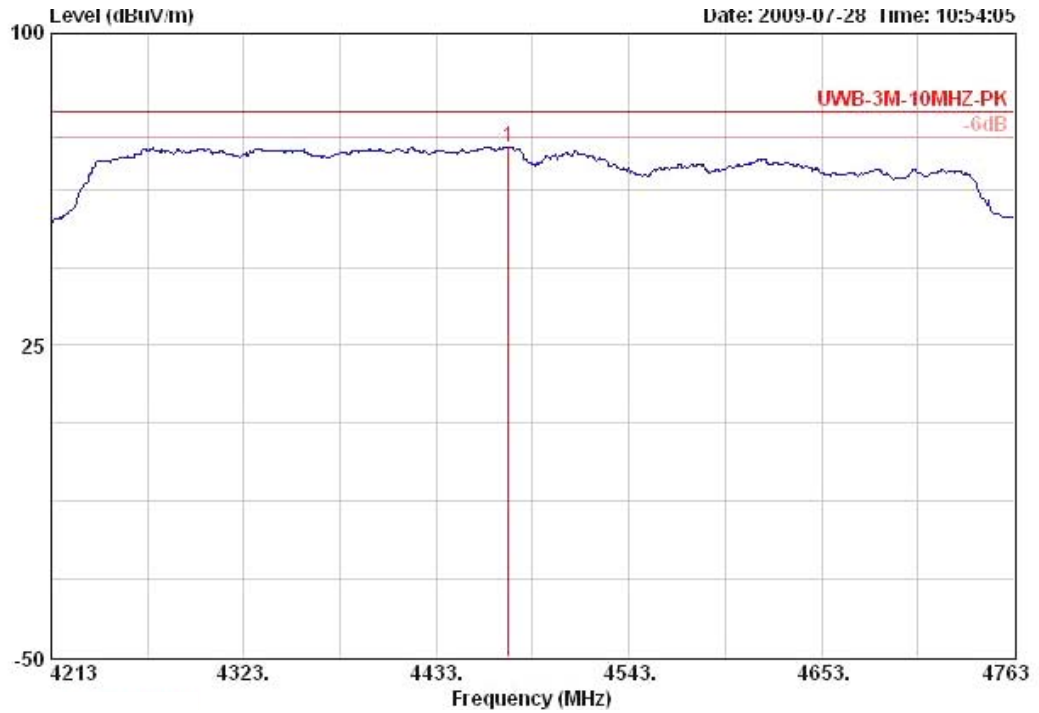
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC7(4488MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	4480.300	72.36	81.23	-8.87	71.12	3.91	35.10	32.43	61	152	Peak	HORIZONTAL

**Vertical**

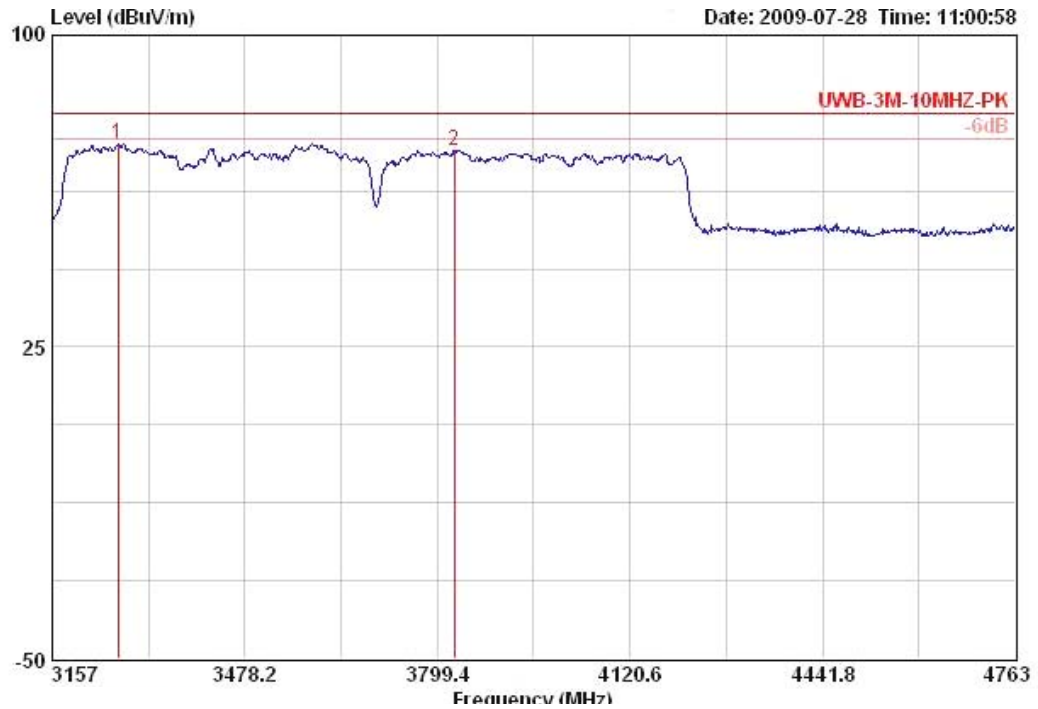
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC7(4488MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	4474.250	72.71	81.23	-8.52	71.49	3.91	35.10	32.41	73	100	Peak	VERTICAL

**Horizontal**

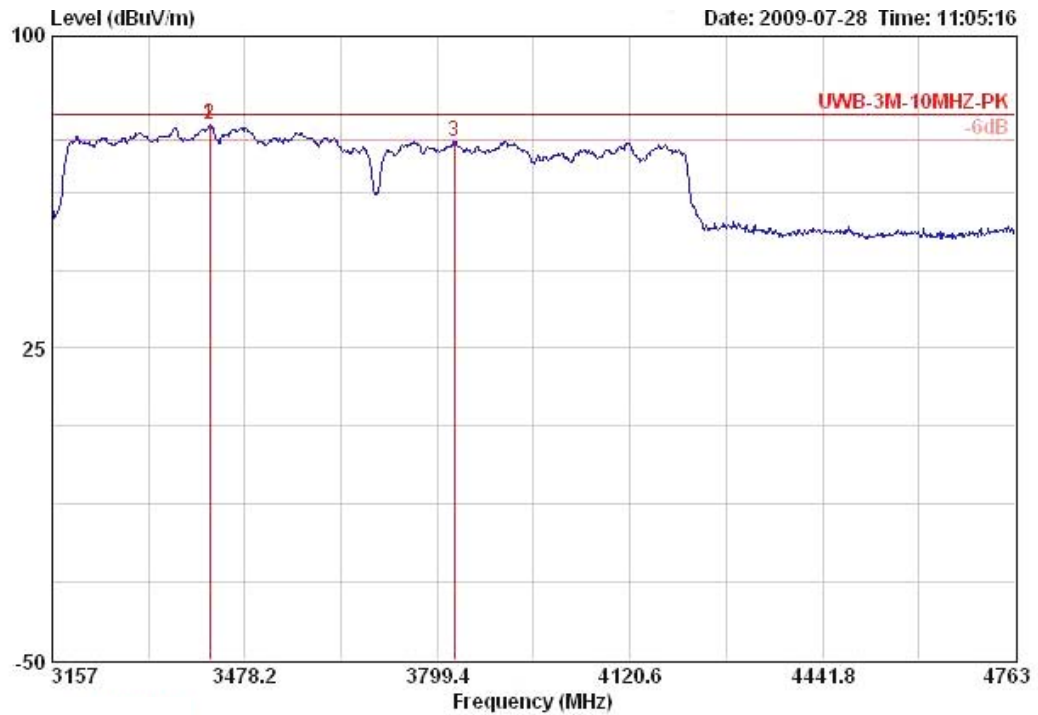
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC8(3432MHz,3960MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3266.450	73.89	81.23	-7.34	76.02	3.22	35.35	30.00	161	100	Peak	HORIZONTAL
2	3827.450	72.38	81.23	-8.85	72.39	3.53	35.17	31.64	114	100	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC8(3432MHz,3960MHz)**

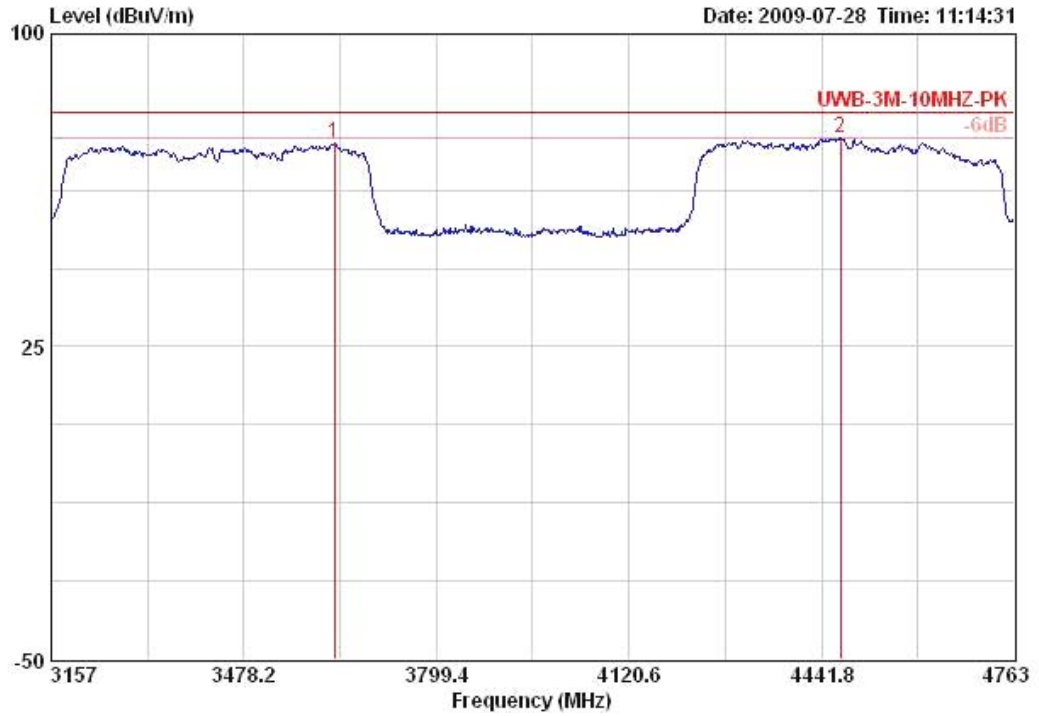


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3419.900	78.72	81.23	-2.51	80.72	3.32	35.32	30.00	353	131	Peak	VERTICAL
2	3419.900	78.72	81.23	-2.51	80.72	3.32	35.32	30.00	353	131	Peak	VERTICAL
3	3827.450	74.82	81.23	-6.41	74.83	3.53	35.17	31.64	360	111	Peak	VERTICAL



**Horizontal**

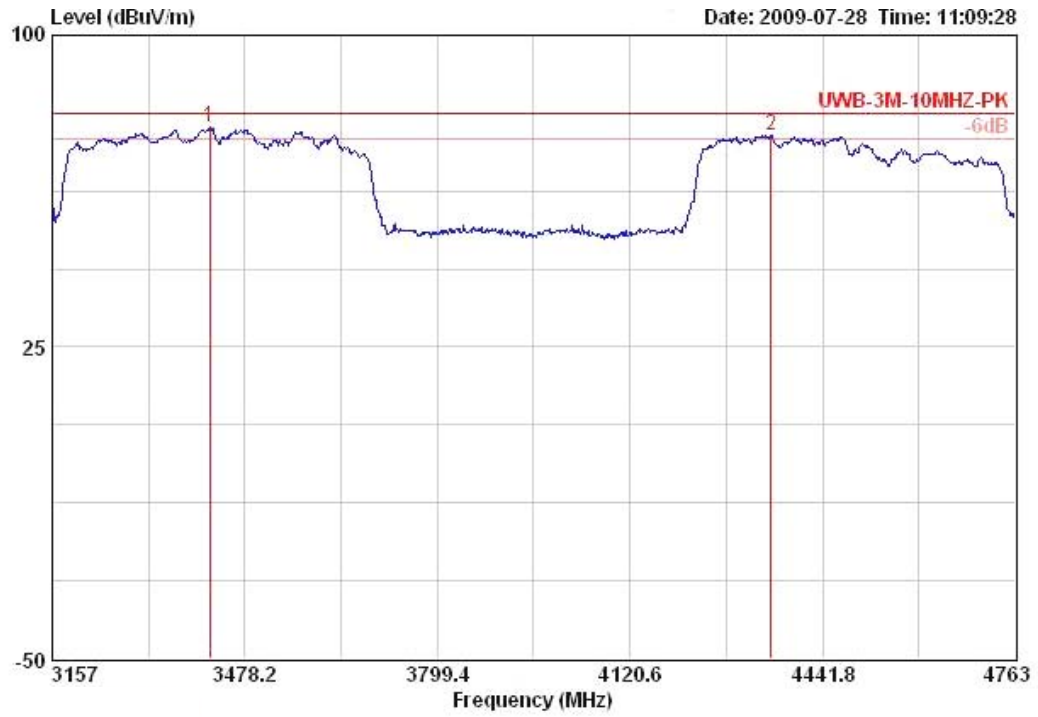
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC9(3432MHz,4488MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3629.450	73.65	81.23	-7.58	74.77	3.45	35.25	30.69	53	151	Peak	HORIZONTAL
2	4473.700	75.01	81.23	-6.22	73.78	3.91	35.10	32.43	63	139	Peak	HORIZONTAL

**Vertical**

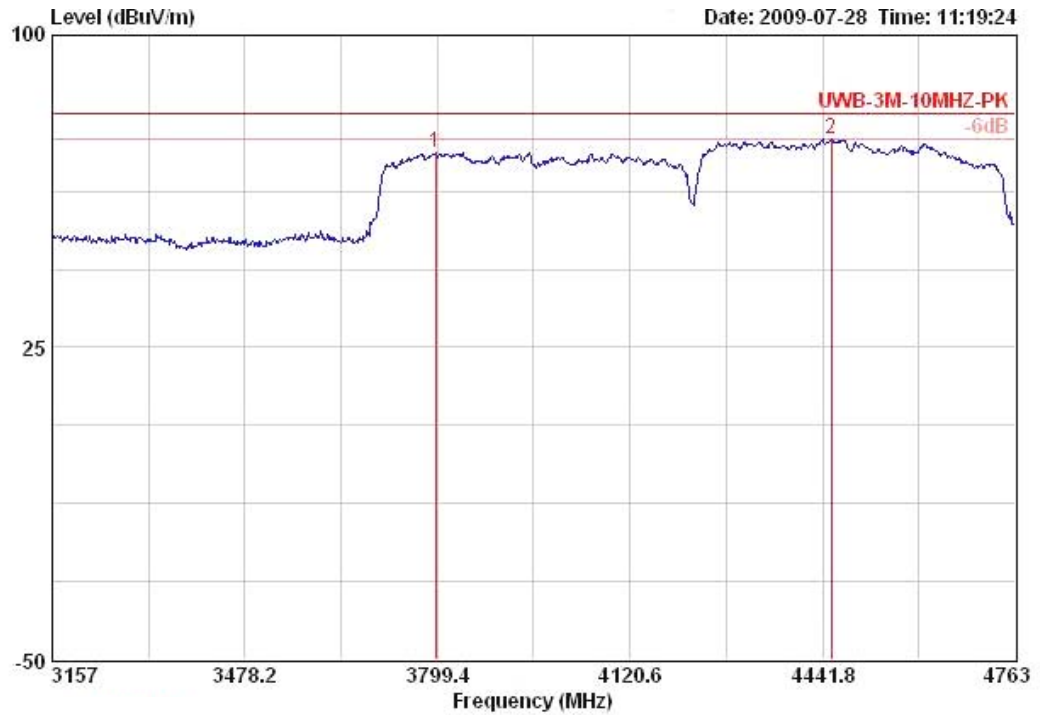
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC9(3432MHz,4488MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant		
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	Pos	Remark	Pol/Phase
1	3419.900	77.81	81.23	-3.42	79.80	3.32	35.32	30.00	351	148	Peak	VERTICAL
2	4355.450	75.89	81.23	-5.34	74.72	3.84	35.10	32.43	73	152	Peak	VERTICAL

**Horizontal**

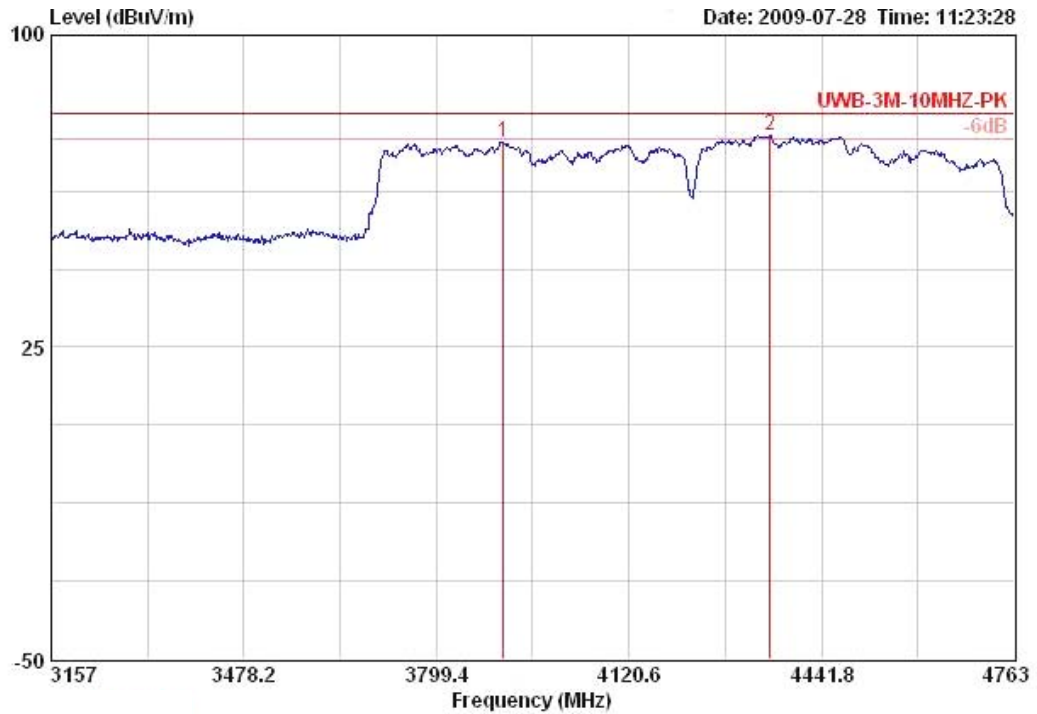
**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC10(3960MHz,4488MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3796.100	71.80	81.23	-9.43	72.01	3.52	35.19	31.47	113	100	Peak	HORIZONTAL
2	4456.650	74.91	81.23	-6.32	73.69	3.90	35.10	32.42	61	163	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC10(3960MHz,4488MHz)**

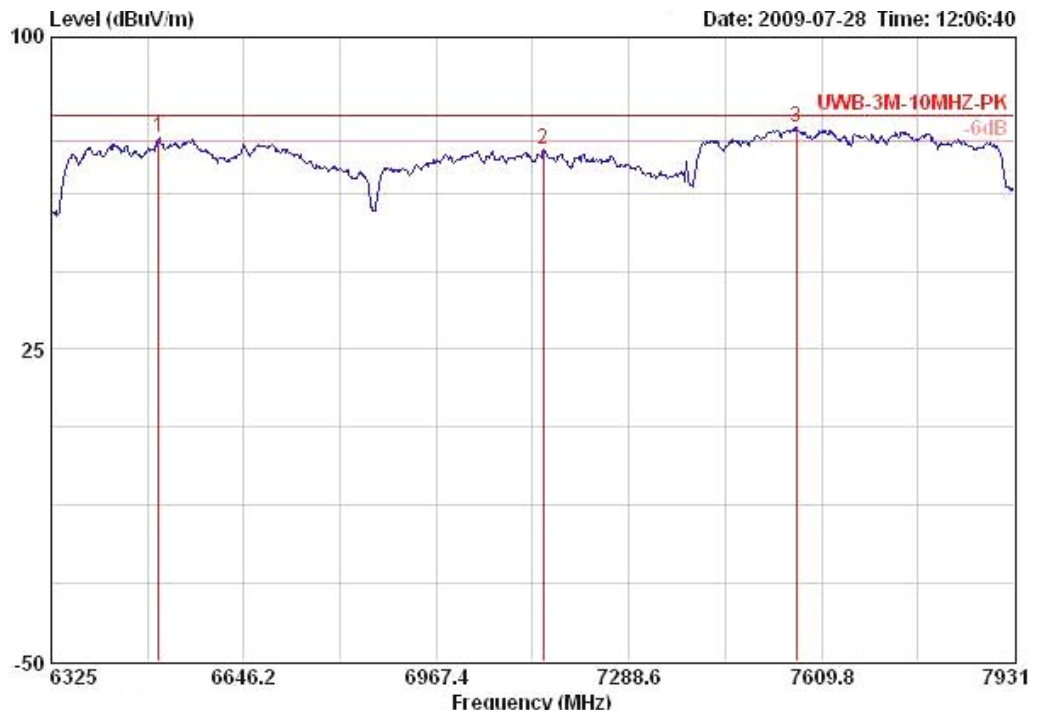


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	3910.500	74.40	81.23	-6.83	73.89	3.58	35.14	32.07	360	168	Peak	VERTICAL
2	4355.450	75.83	81.23	-5.40	74.66	3.84	35.10	32.43	73	155	Peak	VERTICAL

Temperature	23°C	Humidity	51%
Test Engineer	Alan Huang	Configurations	Band group 3

**Horizontal**

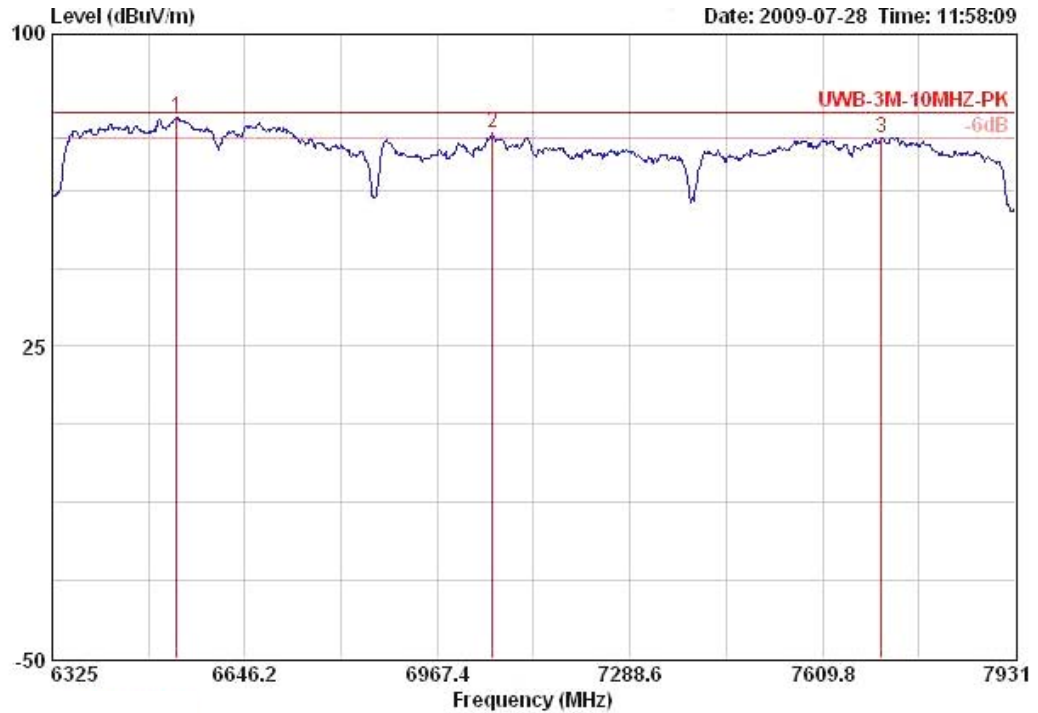
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC1(6600MHz,7128MHz,7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6504.300	75.77	81.23	-5.46	71.97	4.77	35.30	34.33	330	100	Peak	HORIZONTAL
2	7145.050	72.93	81.23	-8.30	67.57	5.15	35.40	35.61	339	100	Peak	HORIZONTAL
3	7567.450	78.40	81.23	-2.83	72.23	5.22	35.41	36.37	360	100	Peak	HORIZONTAL

**Vertical**

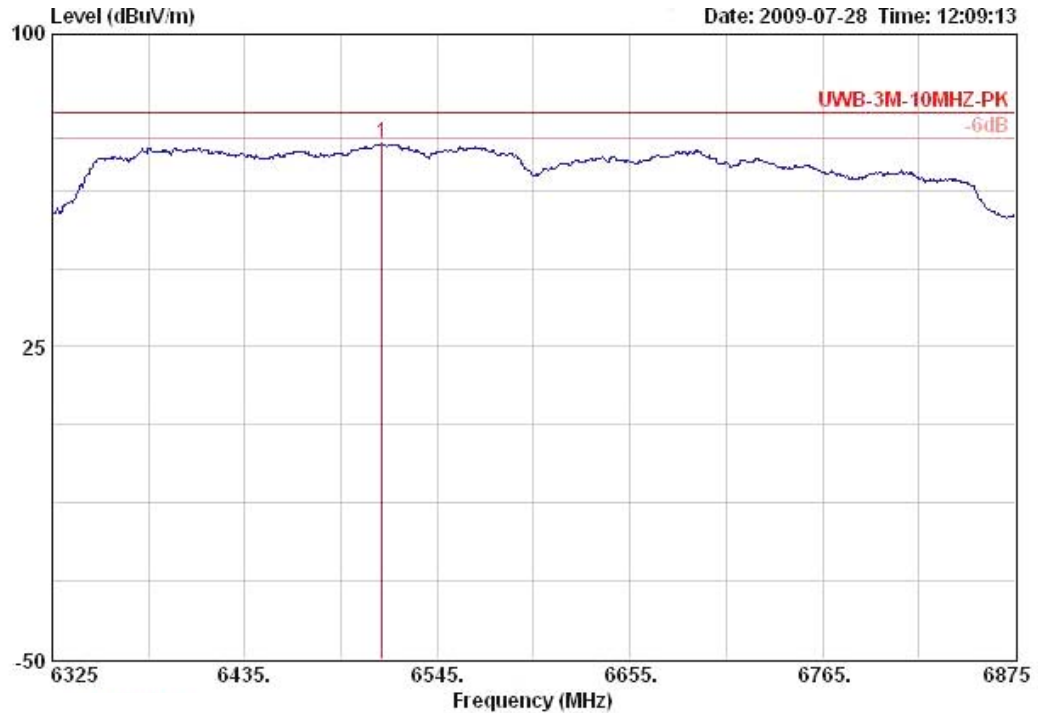
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC1(6600MHz,7128MHz,7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6532.900	80.05	81.23	-1.18	76.20	4.78	35.31	34.37	34	138	Peak	VERTICAL
2	7058.700	76.12	81.23	-5.11	70.98	5.14	35.40	35.40	40	148	Peak	VERTICAL
3	7707.700	75.27	81.23	-5.96	68.99	5.24	35.44	36.47	8	100	Peak	VERTICAL

**Horizontal**

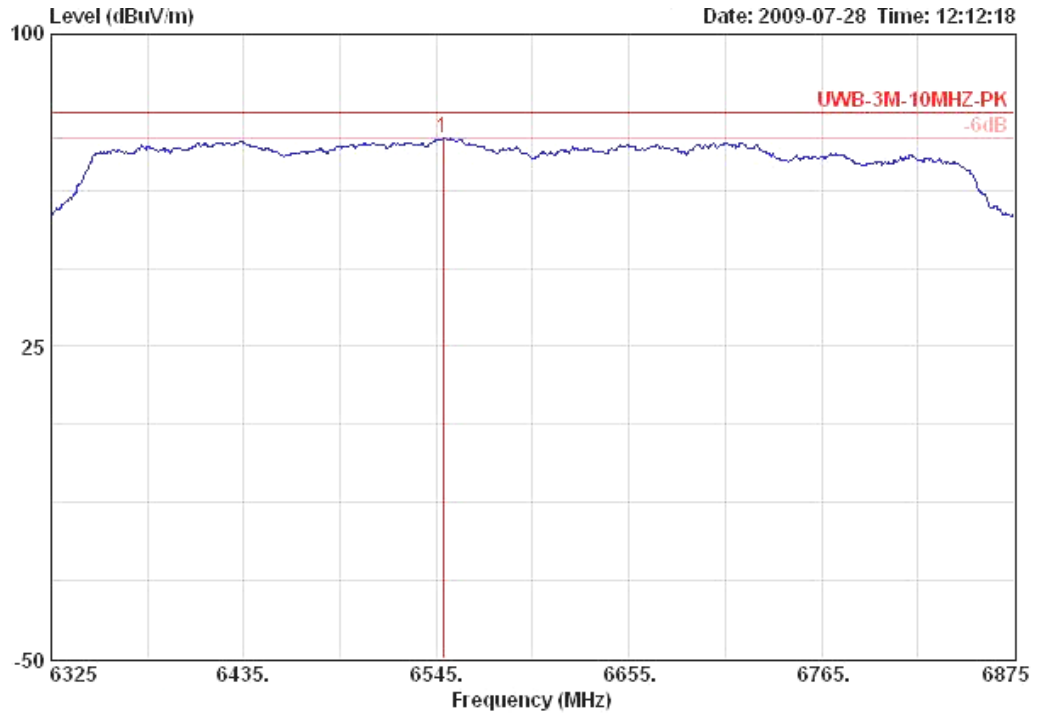
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC5(6600MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6513.650	73.74	81.23	-7.49	69.92	4.77	35.30	34.36	59	157	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 3 GHz to 5 GHz (PEAK)/ TFC5(6600MHz)**

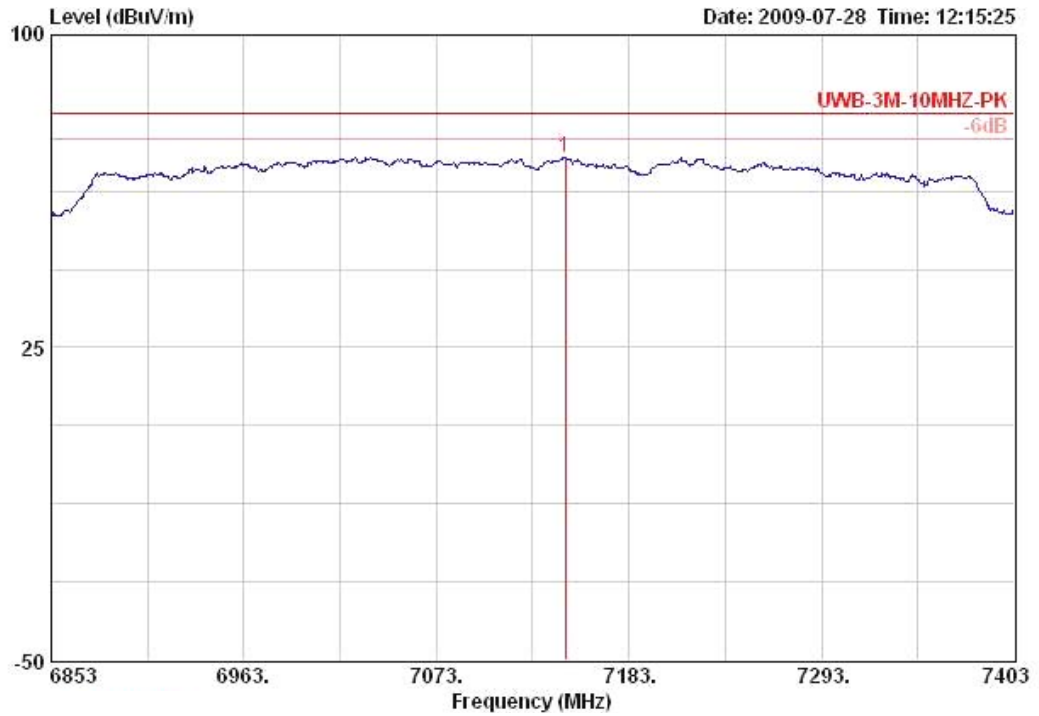


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6548.850	75.10	81.23	-6.13	71.22	4.80	35.31	34.39	39	117	Peak	VERTICAL



**Horizontal**

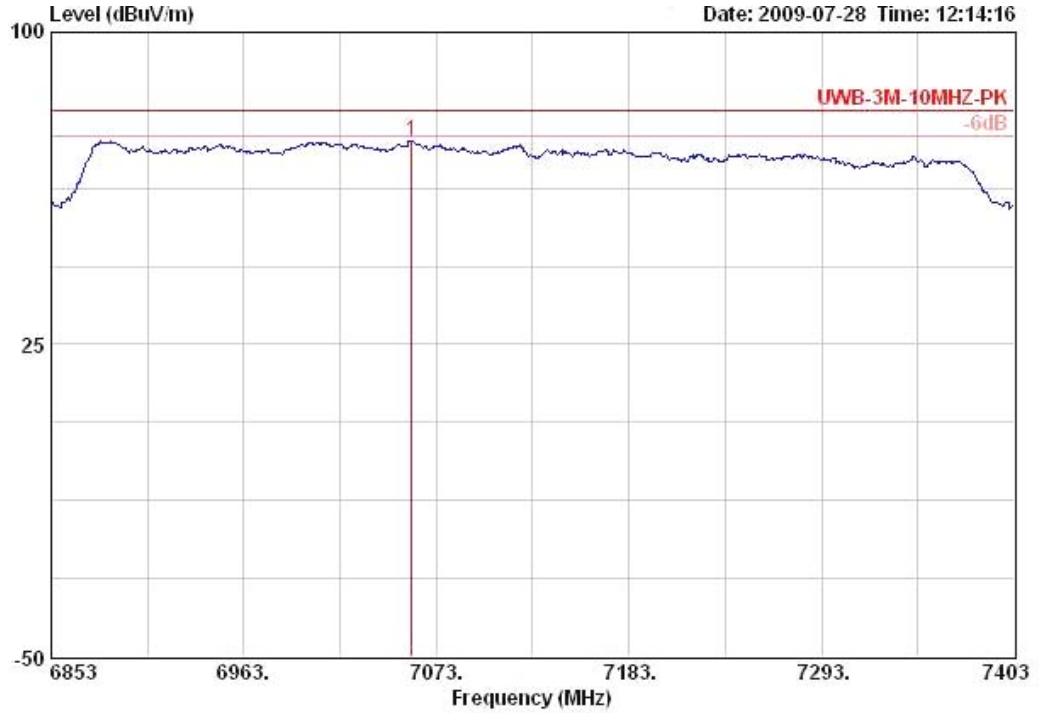
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC6(7128MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	7146.700	70.64	81.23	-10.59	65.28	5.15	35.40	35.61	339	100	Peak	HORIZONTAL

**Vertical**

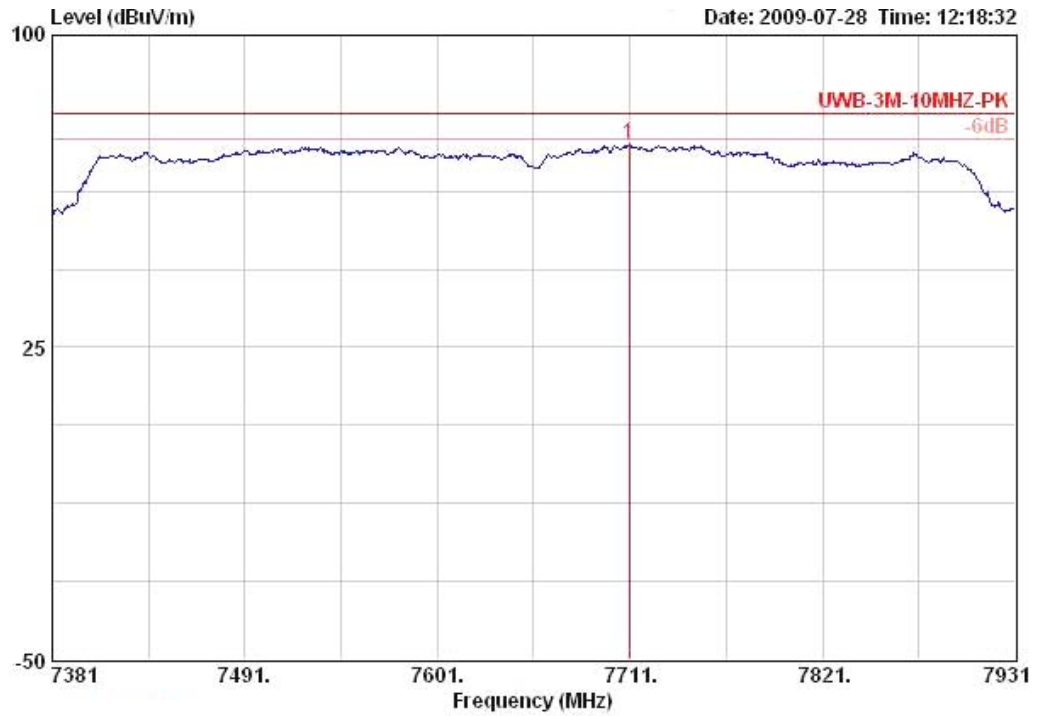
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC6(7128MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	7058.700	73.99	81.23	-7.24	68.84	5.14	35.40	35.40	41	100	Peak	VERTICAL

**Horizontal**

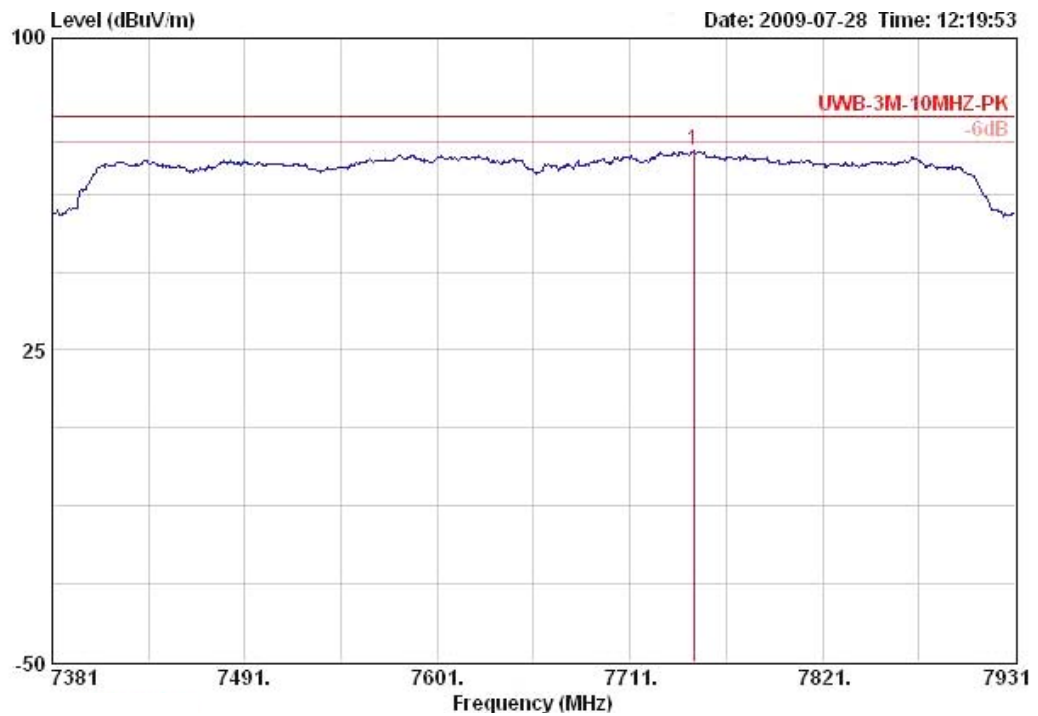
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC7(7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	7710.450	73.74	81.23	-7.49	67.47	5.24	35.44	36.47	61	171	Peak	HORIZONTAL

**Vertical**

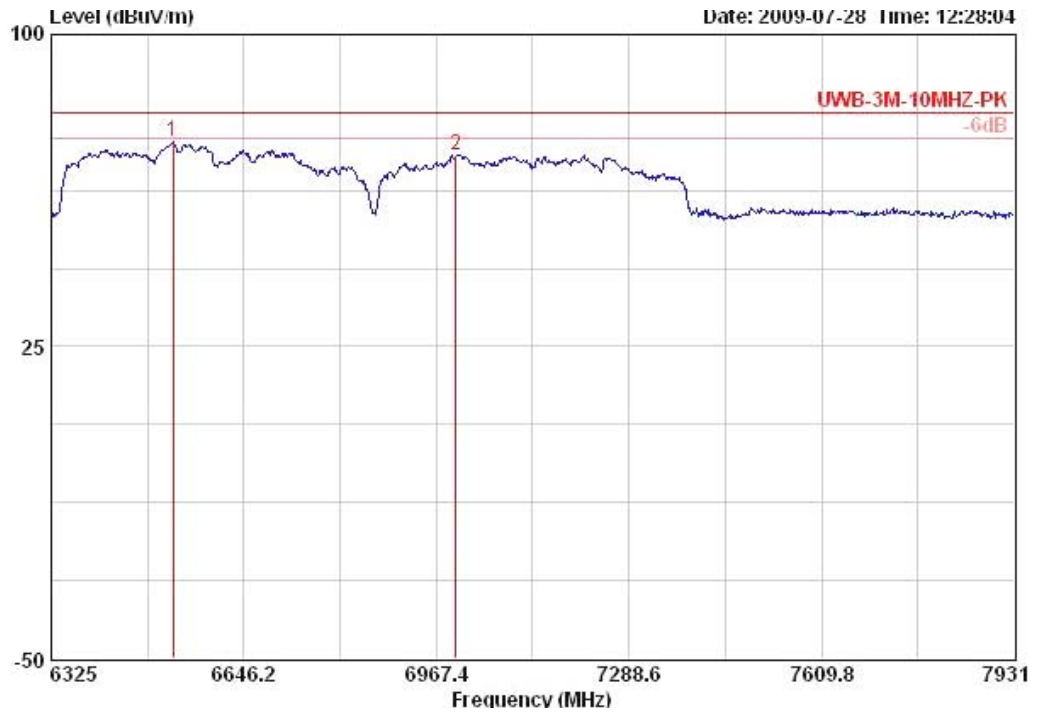
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC7(7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	7747.300	72.86	81.23	-8.37	66.55	5.26	35.45	36.50	315	169	Peak	VERTICAL

**Horizontal**

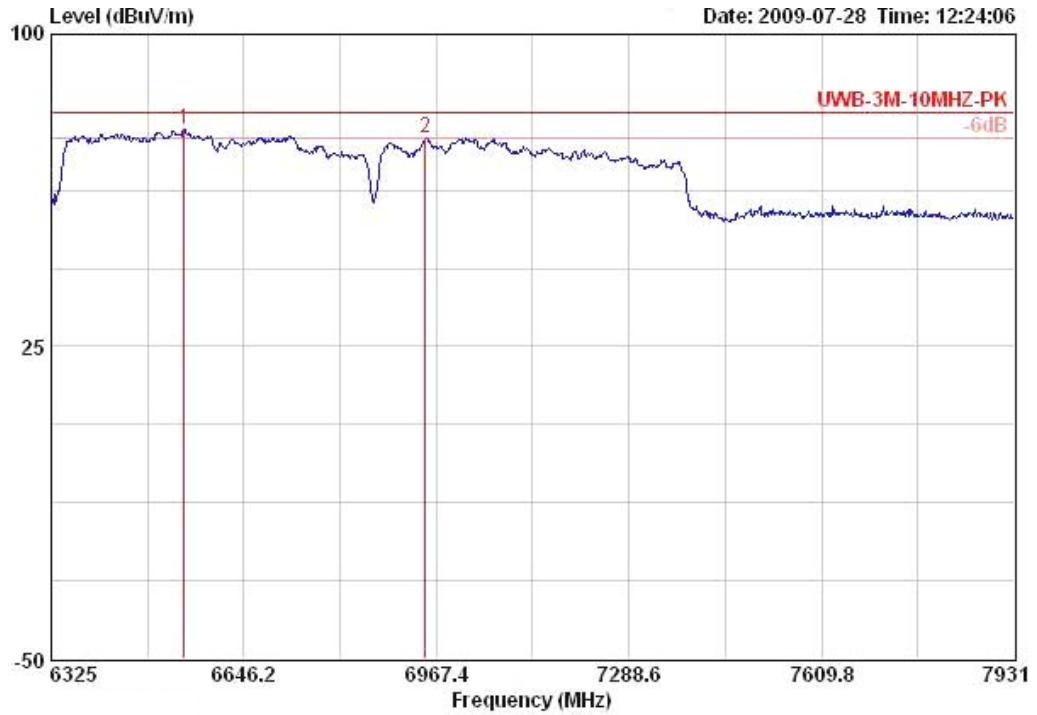
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC8(6600MHz,7128MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6528.500	74.11	81.23	-7.12	70.25	4.78	35.31	34.38	327	149	Peak	HORIZONTAL
2	6999.850	71.18	81.23	-10.05	66.18	5.13	35.40	35.27	337	155	Peak	HORIZONTAL

**Vertical**

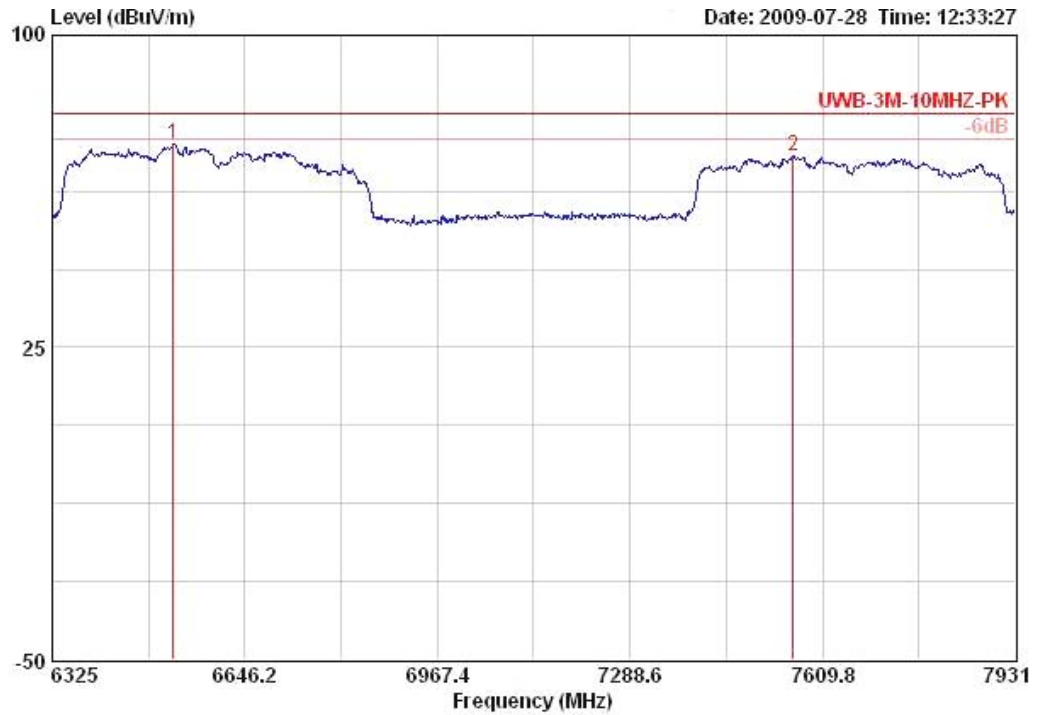
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC8(6600MHz,7128MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6546.650	77.11	81.23	-4.12	73.23	4.80	35.31	34.39	30	130	Peak	VERTICAL
2	6949.250	75.05	81.23	-6.18	70.17	5.11	35.39	35.16	31	121	Peak	VERTICAL

**Horizontal**

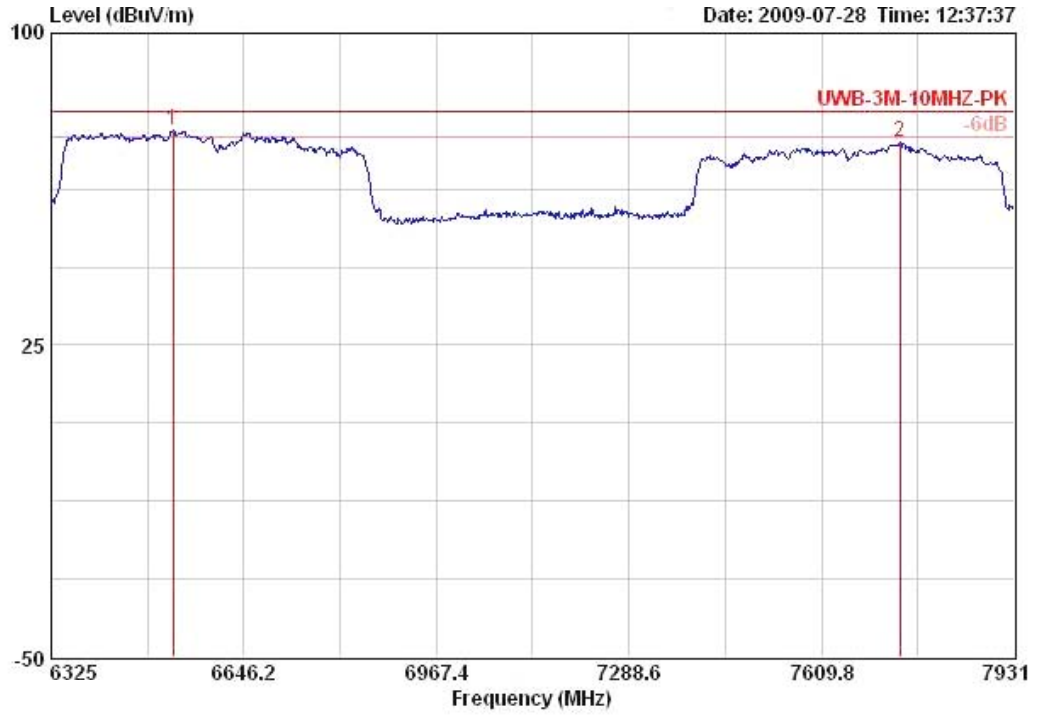
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC9(6600MHz,7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6526.850	73.98	81.23	-7.25	70.12	4.78	35.31	34.38	326	123	Peak	HORIZONTAL
2	7560.850	71.00	81.23	-10.23	64.84	5.21	35.41	36.35	168	100	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC9(6600MHz,7656MHz)**

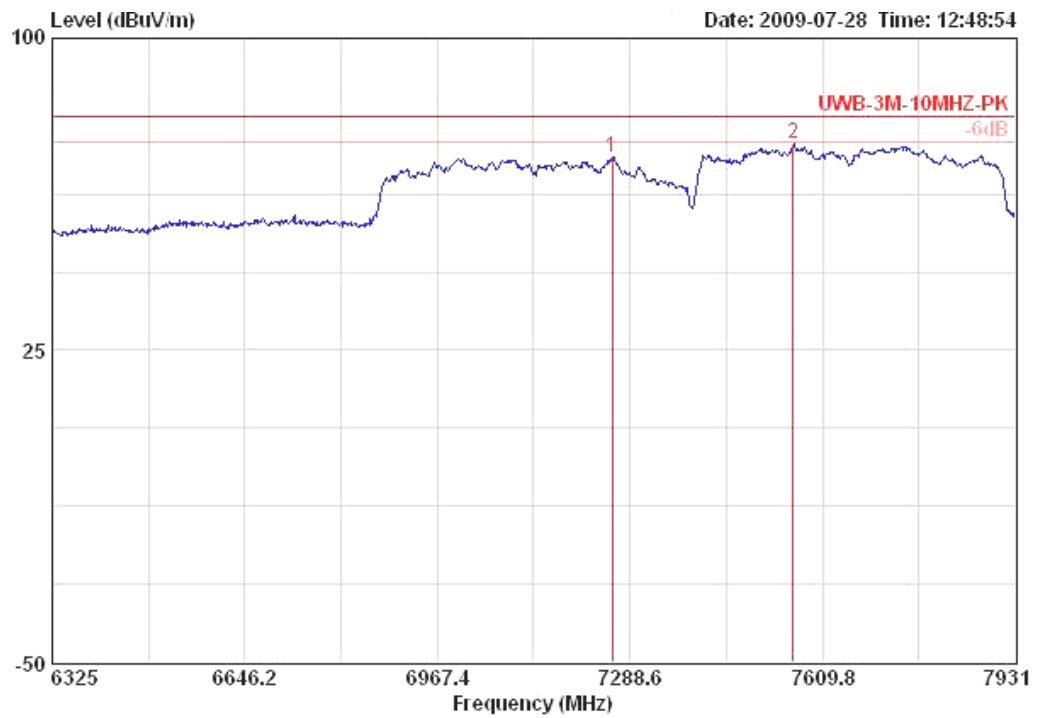


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBUV/m	dBUV/m	dB	dBUV	dB	dB	dB/m	deg	cm		
1	6528.500	76.66	81.23	-4.57	72.81	4.78	35.31	34.37	32	100	Peak	VERTICAL
2	7740.700	73.74	81.23	-7.49	67.43	5.25	35.45	36.50	11	131	Peak	VERTICAL



**Horizontal**

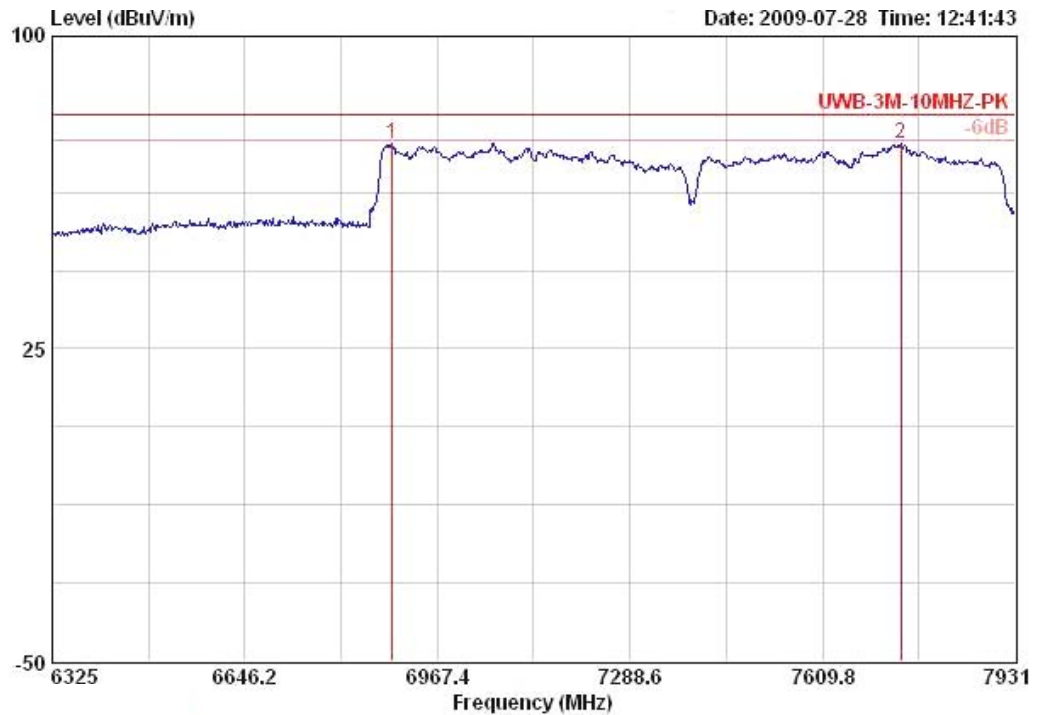
**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC10(7128MHz,7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	7259.450	71.31	81.23	-9.92	65.69	5.17	35.40	35.85	337	133	Peak	HORIZONTAL
2	7560.850	74.54	81.23	-6.69	68.38	5.21	35.41	36.35	61	100	Peak	HORIZONTAL

**Vertical**

**UWB Radiated Emissions 6 GHz to 8 GHz (PEAK)/ TFC10(7128MHz,7656MHz)**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	Table	Ant	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	6891.500	74.26	81.23	-6.97	69.53	5.05	35.38	35.06	33	161	Peak	VERTICAL
2	7740.700	74.26	81.23	-6.97	67.95	5.25	35.45	36.50	316	149	Peak	VERTICAL

#### 4.7. Labeling and Instruction Manual Requirements

UWB device subject to certification shall be labeled as followed in a conspicuous location on the device:

"This device complied with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

(1) Where a device is constructed in two or more sections connected by wires

and marketed together, the statement specified directly above this section is required to be affixed only to the main control unit.

(2) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

The users' manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## 4.8. Antenna Requirements

### 4.8.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### 4.8.2. Antenna Connector Construction

Please refer to section 3.1 in this test report, antenna connector complied with the requirements.

## 5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 15, 2009	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 23, 2009	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2009	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2009	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz –30MHz	Jun. 11, 2009	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 07, 2009	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 23, 2009	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2009	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Apr. 06, 2009*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100023	9 kHz - 30 GHz	Feb. 02, 2009	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 28, 2008*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 12, 2009	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 28, 2009	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.16, 2009	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 29, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 11, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jul. 11, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 11, 2009	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 12, 2009*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Jul. 18, 2009	Conducted (TH01-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2008	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Dec. 14, 2008	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 25, 2009	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Note: \*Calibration Interval of instruments listed above is two year.

## 6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 728, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

## 7. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-070110

財團法人全國認證基金會  
Taiwan Accreditation Foundation

### Certificate of Accreditation

This is to certify that

**Sporton International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	: ISO/IEC 17025:2005
Accreditation Number	: 1190
Originally Accredited	: December 15, 2003
Effective Period	: January 10, 2007 to January 09, 2010
Accredited Scope	: Testing Field, see described in the Appendix
Specific Accreditation Program	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection : Accreditation Program for Telecommunication Equipment Testing Laboratory

  
Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : January 10, 2007

PI, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.