EMC
TEST REPORT

Report No. : TS10120145-EME
Model No. : ZS-3000E
Issued Date : Jan. 04, 2011

Applicant:	**Gao Jin Industrial Co., Ltd.** **No. 18, Lane 1020, Ta-Wan Rd., Yung-Kang District, Tainan City, Taiwan.**
Test Method/ Standard:	**47 CFR FCC Part 15.249 & ANSI C63.4 2003**
Test By:	**Intertek Testing Services Taiwan Ltd.** **No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan**

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Summary of Tests

Test	Reference	Results
Radiated Emission test	15.249(a), (c), (d), 15.209	Pass
Emission on the Band Edge	15.209	Pass
Conducted Emission of AC Power	15.207	Pass
Calculation of Average Factor	15.35	Pass

1. General information

1.1 Identification of the EUT

Product:	Bluetooth Helmet
Model No.:	ZS-3000E
FCC ID.:	Y6EZLINK10
Frequency Range:	2402~2480MHz
Channel Number:	78 channels
Frequency of Each Channel:	2402 + 1k MHz, k = 0~78
Type of Modulation:	GFSK，π/4DPSK，8DPSK
Rated Power:	1. DC 5 V from adapter 2. DC 3.7V from Battery
Power Cord:	N/A
Data Cable:	N/A
Sample Received:	Sep. 17, 2010
Test Date(s):	Oct. 07, 2010~ Oct. 13, 2010
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Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT is a Bluetooth Helmet, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain	: 2.3 dBi max
Antenna Type	: PCB printed
Connector Type	: N/A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was continuously transmitting during the test.

The EUT have two power form adapter and battery, the worst case was adapter.

The EUT was supplied with DC 5 V from adapter (Test voltage: 120 Vac, 60 Hz) and the transmission mode was running in control “Bluetest” program.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Last Cal.	Cal. interval
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	2010/9/3	1 year
EMI Test Receiver	Rohde & Schwarz	9kHz~3GHz	ESCI	2010/12/03	1 year
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	2010/8/16	1 year
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	2010/1/18	1 year
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA9120D	2010/8/31	2 years
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9168	2009/9/22	2 years
Turn Table	HDGmbH	N/A	DS 420S	N/A	N/A
Antenna Tower	HDGmbH	N/A	MA 240	N/A	N/A
Pre-Amplifier	MITER	100MHz~26.5GHz	AFS42-00102650	2009/10/27	2 years
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	2009/3/13	2 years
Power Meter	Anritsu	N/A	2495A	2010/10/20	1 year
Power Senor	Anritsu	N/A	2411B	2010/10/20	1 year

Note: The above equipments are within the valid calibration period.

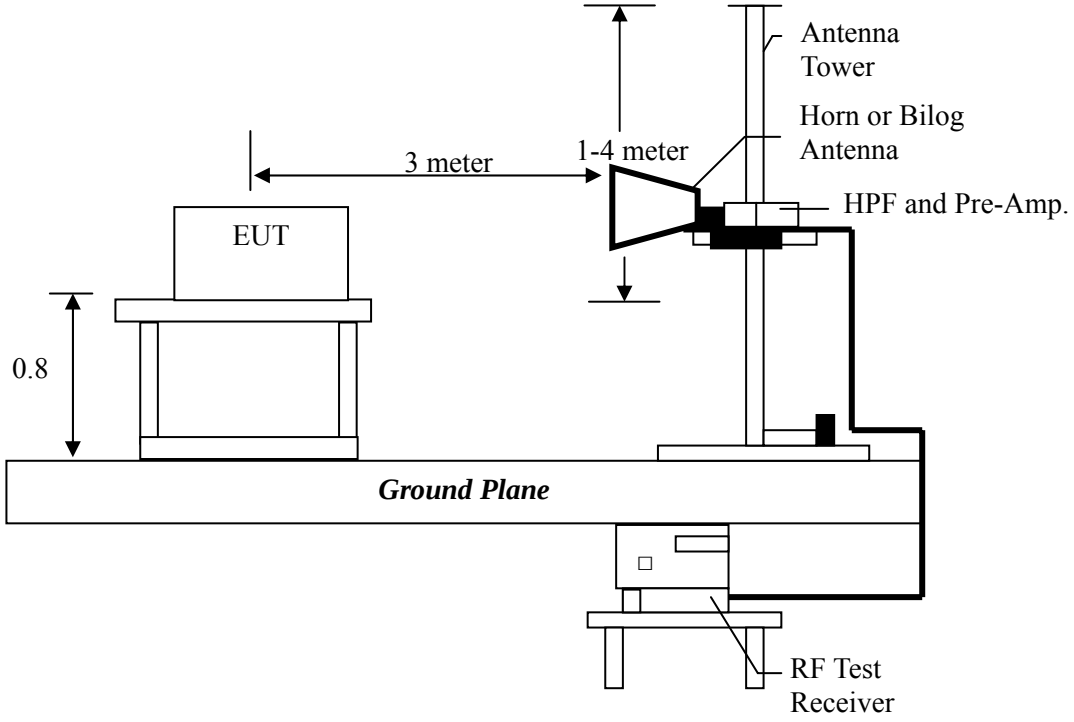
3. Radiated emission test

3.1 Operating environment

Temperature:	22	℃
Relative Humidity:	56	%
Atmospheric Pressure	1008	hPa

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



The signal is maximized through rotation and placement in the three orthogonal axes.

Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three- meter reading using inverse scaling with distance.

The EUT configuration please refer to the "Spurious set-up photo.pdf".

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

Parameter	Uncertainty
Radiated Emission	± 5.17 dB
Conducted Emission	± 2.786 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under continuously transmitting mode. GFSK, π/4DPSK and 8DPSK were verified. The worst case occurred GFSK ch0 mode.

EUT : ZS-3000E
Worst Case : Tx at GFSK ch0 Mode

Frequency (MHz)	Detector	Polarization (circle)	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
166.68	QP	V	15.70	24.59	40.29	43.50	-3.21
416.06	QP	V	16.47	24.31	40.78	46.00	-5.22
436.43	QP	V	17.64	25.02	42.66	46.00	-3.34
448.07	QP	V	17.64	23.87	41.51	46.00	-4.49
468.44	QP	V	17.68	25.78	43.46	46.00	-2.54
480.08	QP	V	18.43	24.72	43.14	46.00	-2.86
511.12	QP	V	18.56	23.42	41.97	46.00	-4.03
202.66	QP	H	10.78	25.62	36.39	43.50	-7.11
266.68	QP	H	12.88	25.19	38.07	46.00	-7.93
300.63	QP	H	14.32	29.53	43.84	46.00	-2.16
436.43	QP	H	18.12	26.78	44.90	46.00	-1.10
447.10	QP	H	18.12	25.26	43.38	46.00	-2.62
468.44	QP	H	18.16	21.58	39.74	46.00	-6.26
500.45	QP	H	18.77	21.25	40.02	46.00	-5.98
888.45	QP	H	24.62	15.96	40.57	46.00	-5.43

Remark:
1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

3.4.2 Measurement results: frequency above 1GHz

EUT : ZS-3000E
Test Condition : Tx at GFSK ch0 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3180.00	PK	V	33.8	36.24	43.87	-	46.31	74	-27.69
3180.00	AV	V	33.8	36.24	43.87	-30.79	15.52	54	-38.48
4804.00	PK	V	35.1	38.54	68.88	-	72.32	74	-1.68
4804.00	AV	V	35.1	38.54	68.88	-30.79	41.53	54	-12.47
4804.00	PK	H	35.1	38.54	64.72	-	68.16	74	-5.84
4804.00	AV	H	35.1	38.54	64.72	-30.79	37.37	54	-16.63

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at GFSK ch39 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4882.00	PK	V	35.1	38.54	66.86	-	70.30	74	-3.70
4882.00	AV	V	35.1	38.54	66.86	-30.79	39.51	54	-14.49
4882.00	PK	H	35.1	38.54	61.38	-	64.82	74	-9.18
4882.00	AV	H	35.1	38.54	61.38	-30.79	34.03	54	-19.97

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at GFSK ch78 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4960.00	PK	V	35.1	38.54	61.54	-	64.98	74	-9.02
4960.00	AV	V	35.1	38.54	61.54	-30.79	34.19	54	-19.81
4960.00	PK	H	35.1	38.54	53.24	-	56.68	74	-17.32
4960.00	AV	H	35.1	38.54	53.24	-30.79	25.89	54	-28.11

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at π/4DPSK ch0 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4804.00	PK	V	35.1	38.54	69.59	-	73.03	74	-0.97
4804.00	AV	V	35.1	38.54	69.59	-30.73	42.30	54	-11.70
4804.00	PK	H	35.1	38.54	65.87	-	69.31	74	-4.69
4804.00	AV	H	35.1	38.54	65.87	-30.73	38.58	54	-15.42

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at π/4DPSK ch39 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4882.00	PK	V	35.1	38.54	69.77	-	73.21	74	-0.79
4882.00	AV	V	35.1	38.54	69.77	-30.73	42.48	54	-11.52
4882.00	PK	H	35.1	38.54	61.34	-	64.78	74	-9.22
4882.00	AV	H	35.1	38.54	61.34	-30.73	34.05	54	-19.95

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at π/4DPSK ch78 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4960.00	PK	V	35.1	38.54	59.83	-	63.27	74	-10.73
4960.00	AV	V	35.1	38.54	59.83	-30.73	32.54	54	-21.46
4960.00	PK	H	35.1	38.54	55.57	-	59.01	74	-14.99
4960.00	AV	H	35.1	38.54	55.57	-30.73	28.28	54	-25.72

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at 8DPSK ch0 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4804.00	PK	V	35.1	38.54	66.46	-	69.90	74	-4.10
4804.00	AV	V	35.1	38.54	66.46	-30.73	39.17	54	-14.83
4804.00	PK	H	35.1	38.54	62.76	-	66.20	74	-7.80
4804.00	AV	H	35.1	38.54	62.76	-30.73	35.47	54	-18.53

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at 8DPSK ch39 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4882.00	PK	V	35.1	38.54	66.28	-	69.72	74	-4.28
4882.00	AV	V	35.1	38.54	66.28	-30.73	38.99	54	-15.01
4882.00	PK	H	35.1	38.54	62.37	-	65.81	74	-8.19
4882.00	AV	H	35.1	38.54	62.37	-30.73	35.08	54	-18.92

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at 8DPSK ch78 Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4960.00	PK	V	35.1	38.54	61.45	-	64.89	74	-9.11
4960.00	AV	V	35.1	38.54	61.45	-30.73	34.16	54	-19.84
4960.00	PK	H	35.1	38.54	53.39	-	56.83	74	-17.17
4960.00	AV	H	35.1	38.54	53.39	-30.73	26.10	54	-27.90

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

3.4.3 Measurement results: Fundamental emission

EUT : ZS-3000E
Test Condition : Tx at GFSK Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402.00	PK	H	30.35	50.58	-	80.93	114	-33.07
2402.00	AV	H	30.35	50.58	-30.79	50.14	94	-43.86
2441.00	PK	H	30.35	49.46	-	79.81	114	-34.19
2441.00	AV	H	30.35	49.46	-30.79	49.02	94	-44.98
2480.00	PK	H	30.35	47.04	-	77.39	114	-36.61
2480.00	AV	H	30.35	47.04	-30.79	46.60	94	-47.40

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at π/4DPSK Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402.00	PK	H	30.35	49.54	-	79.89	114	-34.11
2402.00	AV	H	30.35	49.54	-30.73	49.16	94	-44.84
2441.00	PK	H	30.35	49.00	-	79.35	114	-34.65
2441.00	AV	H	30.35	49.00	-30.73	48.62	94	-45.38
2480.00	PK	H	30.35	47.11	-	77.46	114	-36.54
2480.00	AV	H	30.35	47.11	-30.73	46.73	94	-47.27

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

EUT : ZS-3000E
Test Condition : Tx at 8DPSK Mode

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402.00	PK	H	30.35	49.59	-	79.94	114	-34.06
2402.00	AV	H	30.35	49.59	-30.73	49.21	94	-44.79
2441.00	PK	H	30.35	49.19	-	79.54	114	-34.46
2441.00	AV	H	30.35	49.19	-30.73	48.81	94	-45.19
2480.00	PK	H	30.35	48.43	-	78.78	114	-35.22
2480.00	AV	H	30.35	48.43	-30.73	48.05	94	-45.95

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

4. Radiated emission on the band edge FCC 15.209

Method of Measurement:

The frequency range is from 30 MHz to 1000 MHz using Bilog Antenna.
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were invested cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report.

Test Unit : GFSK

Channel	Measurement Freq.Band (MHz)	Detector	Average Factor (dB)	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402 MHz	2310-2390	PK	-	58.34	74	-15.66
2402 MHz	2310-2390	AV	-30.79	27.55	54	-26.45
2480 MHz	2483.5-2500	PK	-	57.73	74	-16.27
2480 MHz	2483.5-2500	AV	-30.79	26.94	54	-27.06

Test Unit : π/4DPSK

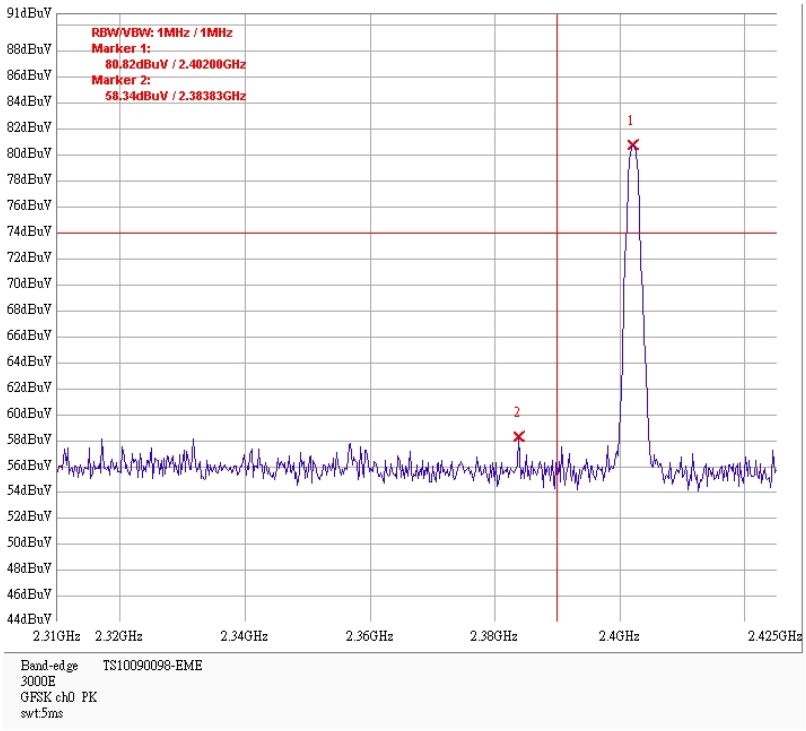
Channel	Measurement Freq.Band (MHz)	Detector	Average Factor (dB)	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402 MHz	2310-2390	PK	-	58.04	74	-15.96
2402 MHz	2310-2390	AV	-30.73	27.31	54	-26.69
2480 MHz	2483.5-2500	PK	-	57.94	74	-16.06
2480 MHz	2483.5-2500	AV	-30.73	27.21	54	-26.79

Test Unit : 8DPSK

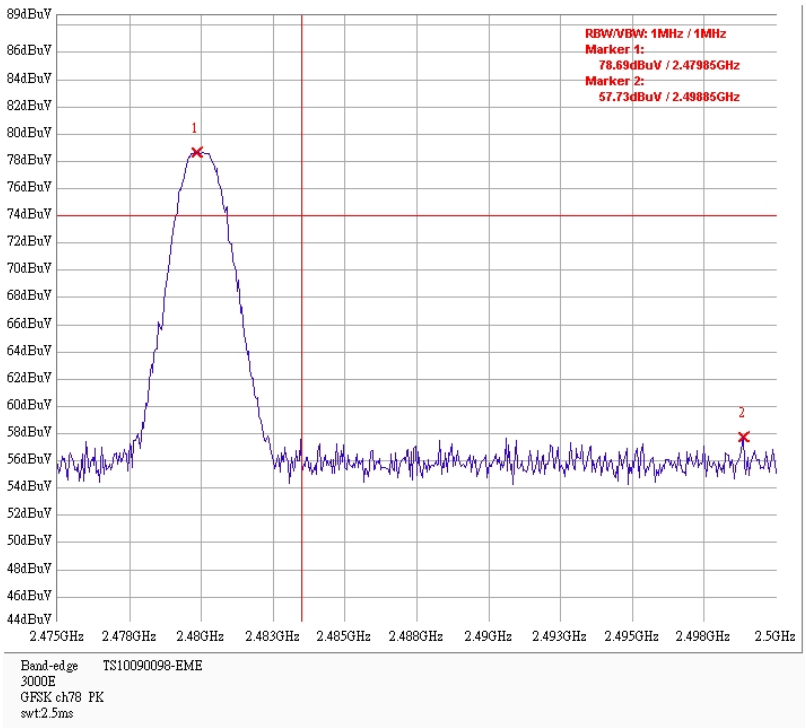
Channel	Measurement Freq.Band (MHz)	Detector	Average Factor (dB)	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402 MHz	2310-2390	PK	-	57.76	74	-16.24
2402 MHz	2310-2390	AV	-30.73	27.03	54	-26.97
2480 MHz	2483.5-2500	PK	-	58.06	74	-15.94
2480 MHz	2483.5-2500	AV	-30.73	27.33	54	-26.67

Please see the plots below.

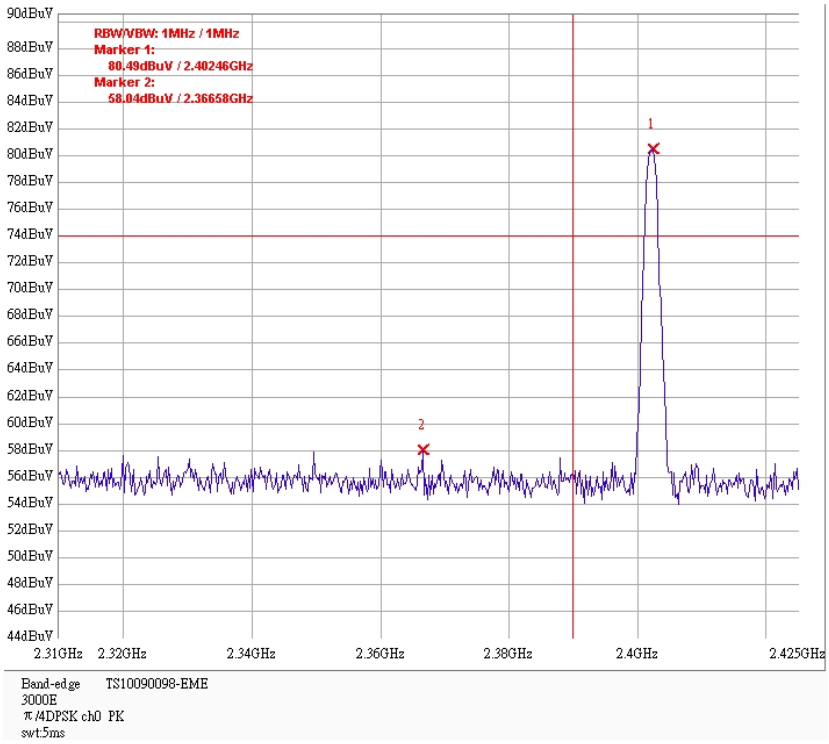
Band edge @ GFSK mode channel 0 PK



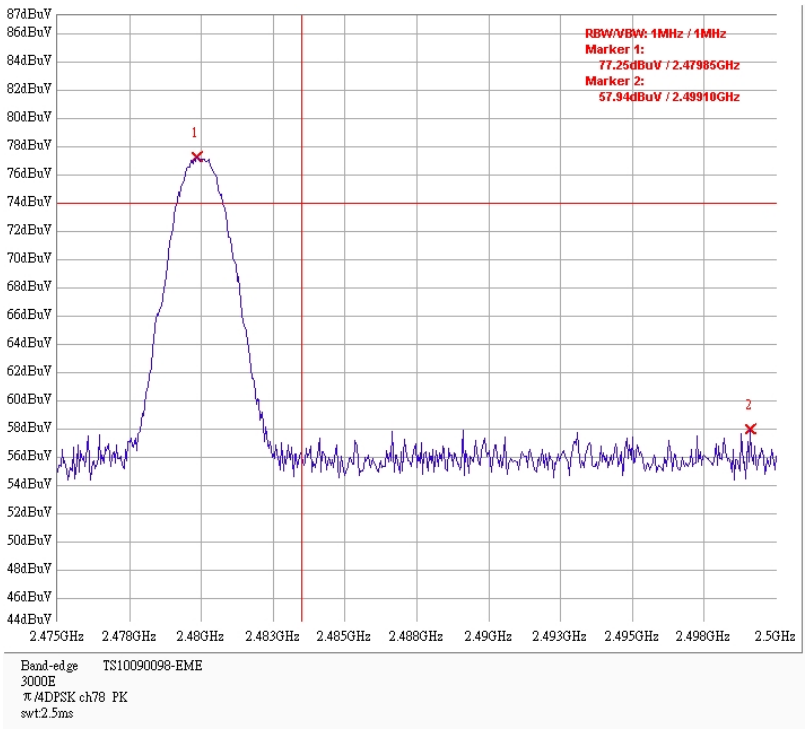
Band edge @ GFSK mode channel 78 PK



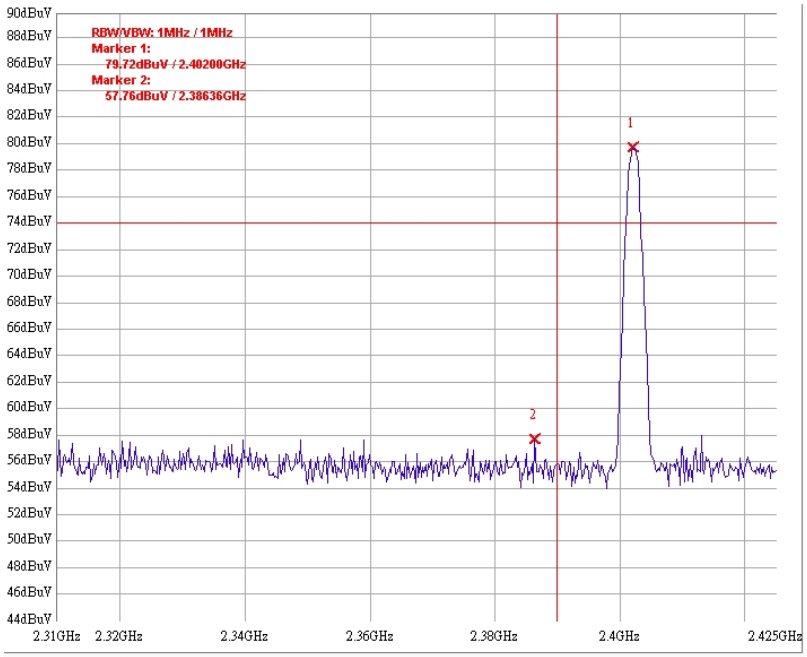
Band edge @π/4DPSK mode channel 0 PK



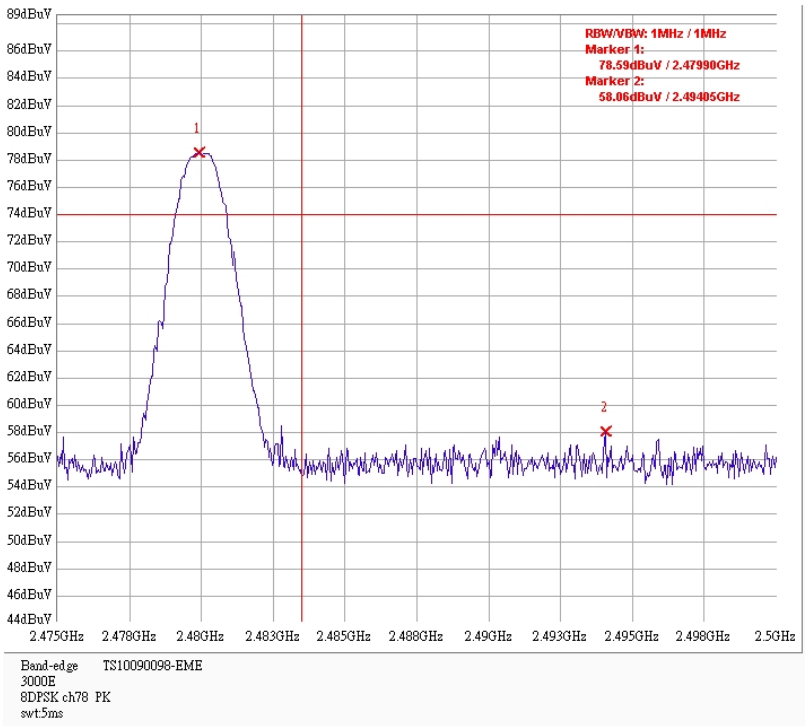
Band edge @π/4DPSK mode channel 78 PK



Band edge @ 8DPSK mode channel 0 PK



Band edge @ 8DPSK mode channel 78 PK

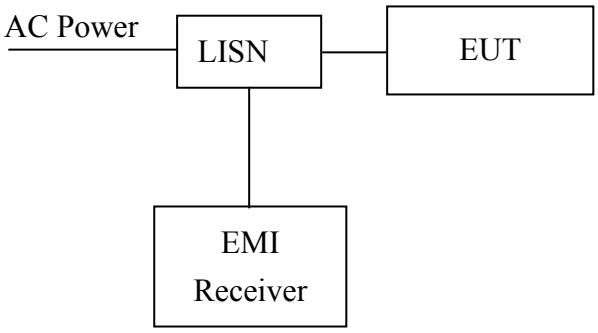


5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature:	29	℃
Relative Humidity:	43	%
Atmospheric Pressure	1008	hPa

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the "Conducted set-up photo.pdf".

5.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

5.4 Uncertainty of Conducted Emission

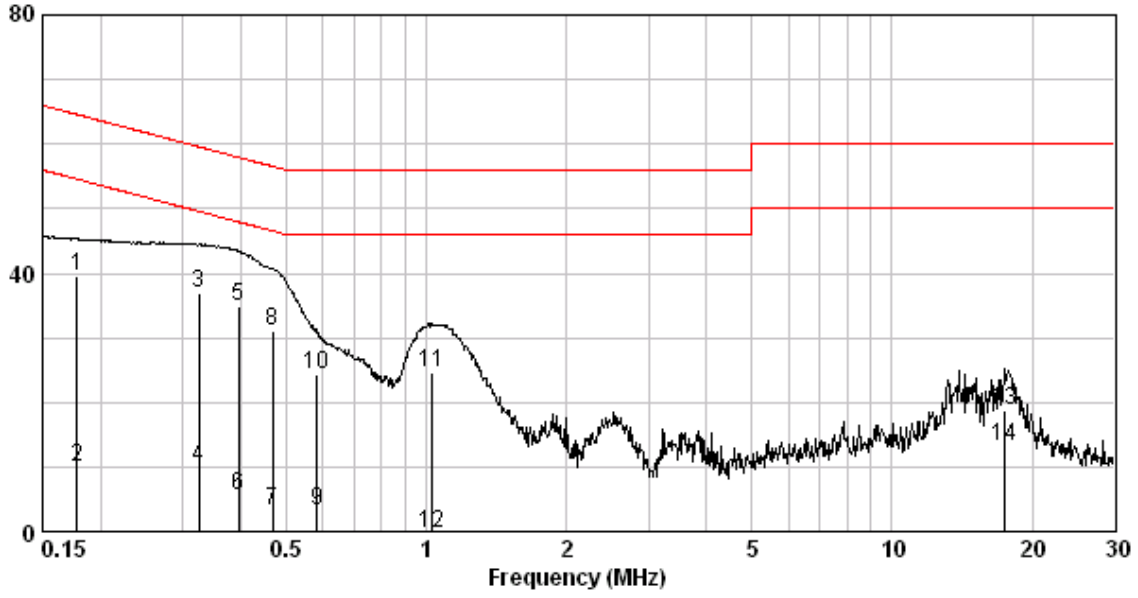
Expanded uncertainty (k=2) of conducted emission measurement is ± 2.786 dB.

5.5 Conducted emission data FCC 15.207

Phase: Line
Model No.: ZS-3000E
Test Condition: Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.36	0.22	43.35	58.74	28.59	48.74	-15.39	-20.15
0.41	0.11	49.39	57.59	34.12	47.59	-8.21	-13.48
0.60	0.11	40.58	56.00	27.57	46.00	-15.42	-18.43
0.70	0.11	40.26	56.00	28.28	46.00	-15.74	-17.72
0.82	0.11	39.75	56.00	25.16	46.00	-16.25	-20.84
1.56	0.12	32.41	56.00	19.61	46.00	-23.59	-26.39

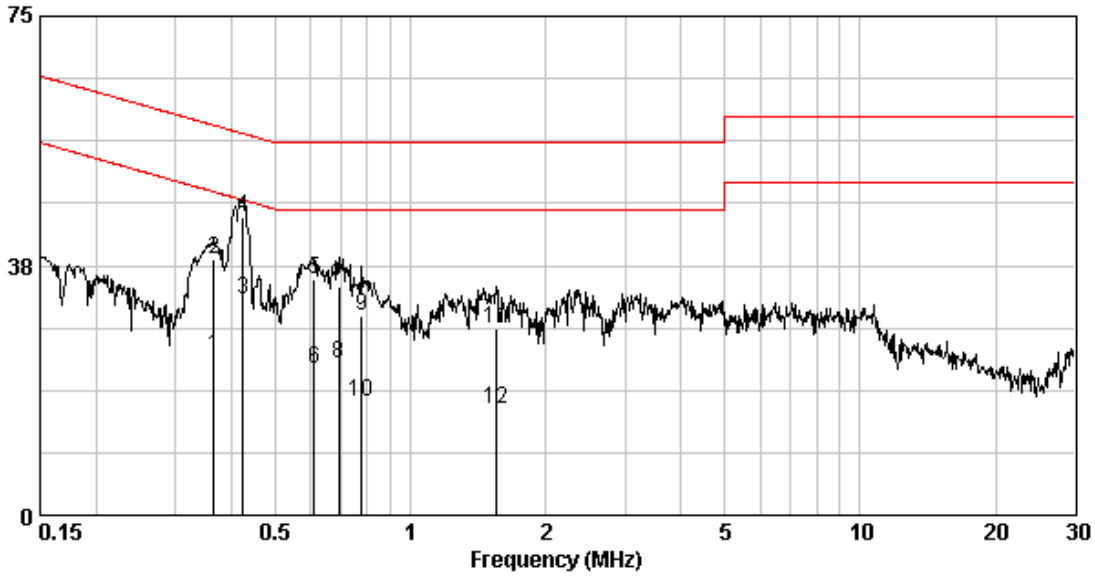
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral
Model No.: ZS-3000E
Test Condition: Standby mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.37	0.11	38.60	58.61	23.85	48.61	-20.01	-24.76
0.42	0.11	44.80	57.37	32.38	47.37	-12.58	-15.00
0.61	0.11	35.36	56.00	21.93	46.00	-20.64	-24.07
0.69	0.11	34.45	56.00	22.67	46.00	-21.55	-23.33
0.78	0.11	29.99	56.00	17.13	46.00	-26.01	-28.87
1.55	0.12	28.03	56.00	16.04	46.00	-27.97	-29.96

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



6. Calculation of Average Factor

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

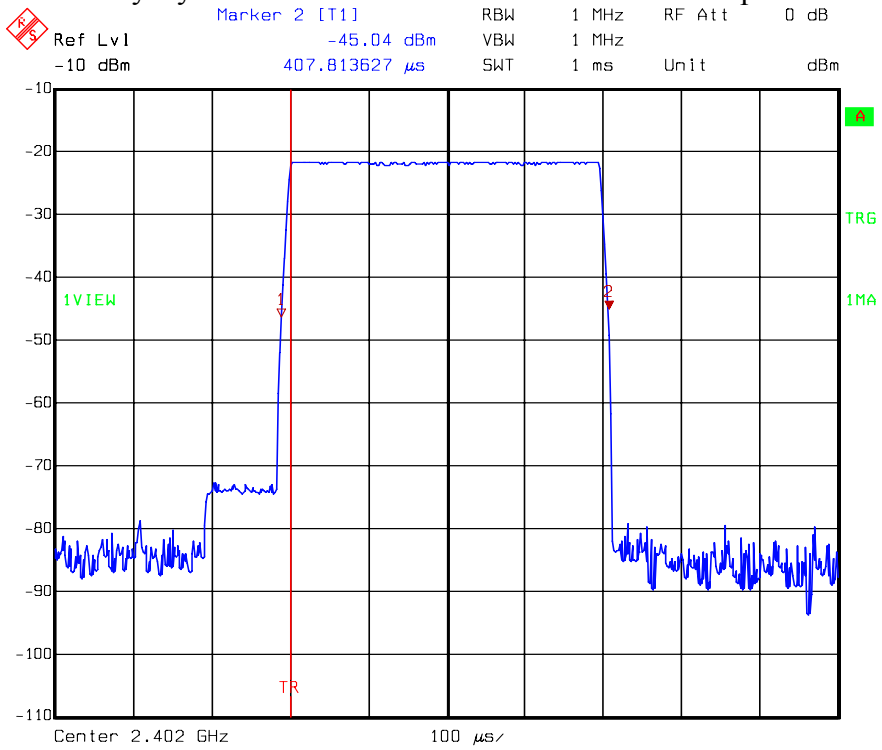
The time period over which the duty cycle is measured in 100 ms or the repetition cycle, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer in zero span mode.

Mode	Mode	Pulse time (ms)	Number of pulse during 100ms	dutycycle %	dutycycle correction factor
GFSK	DH1	0.4078	1	0.4078	-47.79
	DH3	1.6643	1	1.6643	-35.58
	DH5	2.8878	1	2.8878	-30.79
π/4-DPSK	DH1	0.4218	1	0.4218	-47.50
	DH3	1.6786	1	1.6786	-35.50
	DH5	2.9078	1	2.9078	-30.73
8-DPSK	DH1	0.4138	1	0.4138	-47.66
	DH3	1.6703	1	1.6703	-35.54
	DH5	2.9078	1	2.9078	-30.73

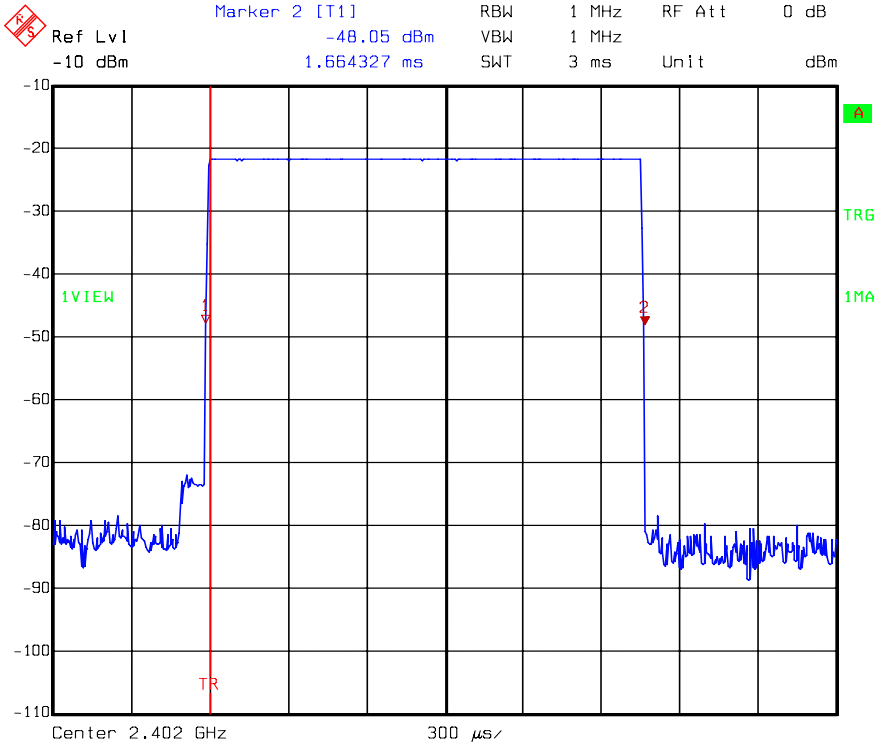
The test was performed GFSK mode, π/4-DPSK mode and 8-DPSK mode on EUT continuously transmitting mode. The worst case occurred GFSK at DH5, π/4-DPSK at DH5, 8-DPSK at DH5.

Please see the plot below.

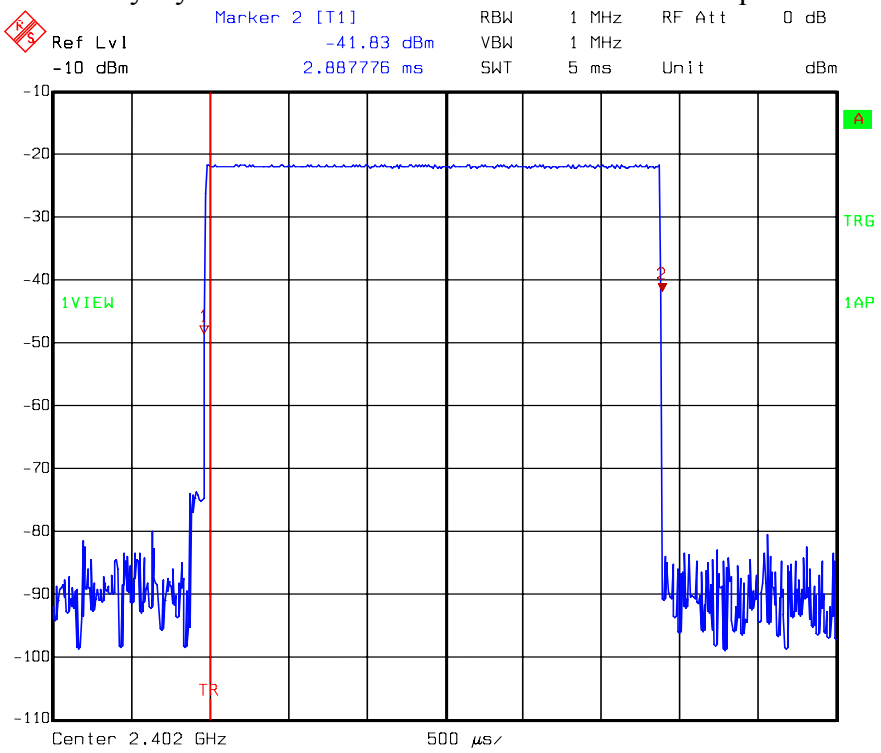
Duty Cycle at GFSK ch0 DH1 channel: number of pulse



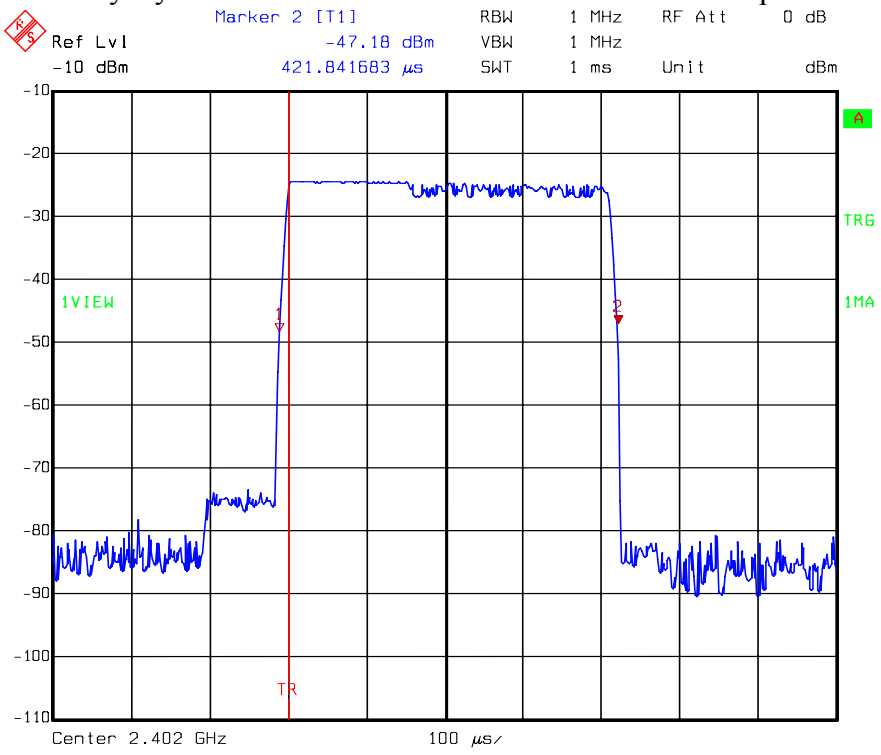
Duty Cycle at GFSK ch0 DH3 channel: number of pulse



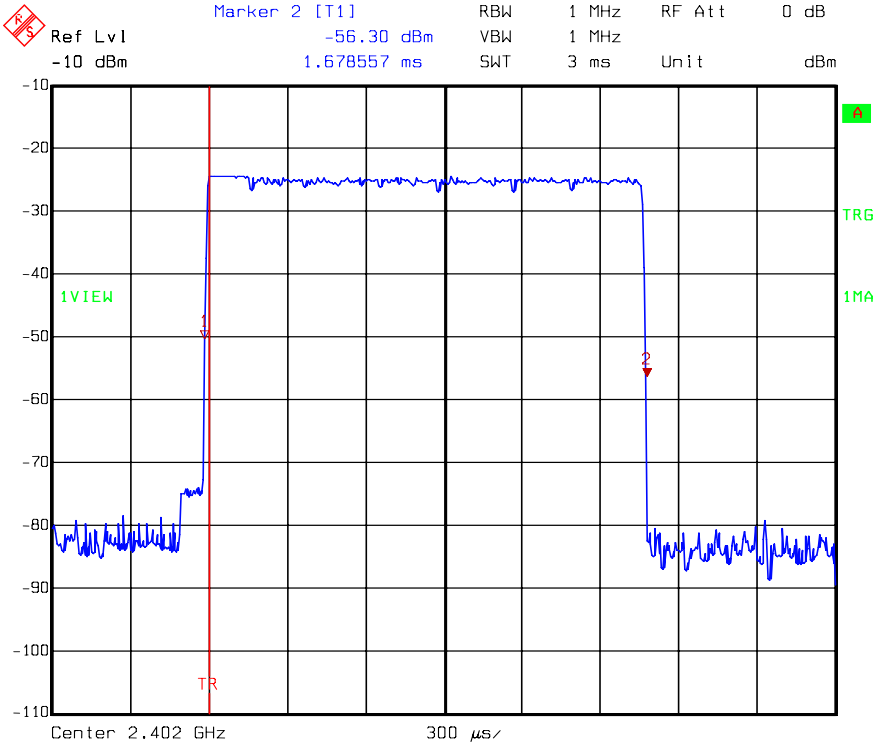
Duty Cycle at GFSK ch0 DH5 channel: number of pulse



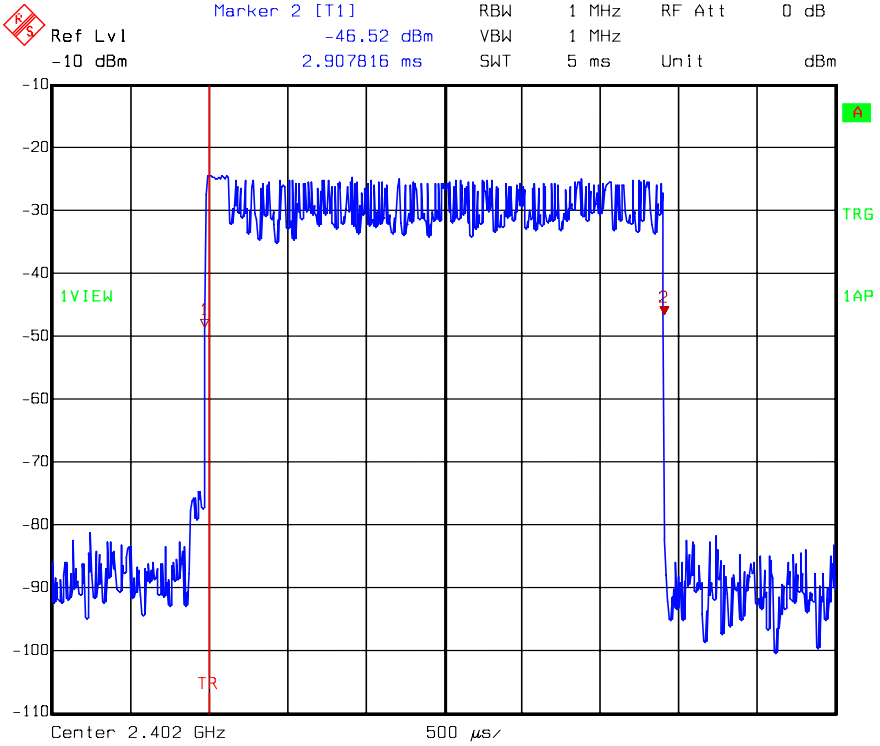
Duty Cycle at π/4DPSK ch0 DH1 channel: number of pulse



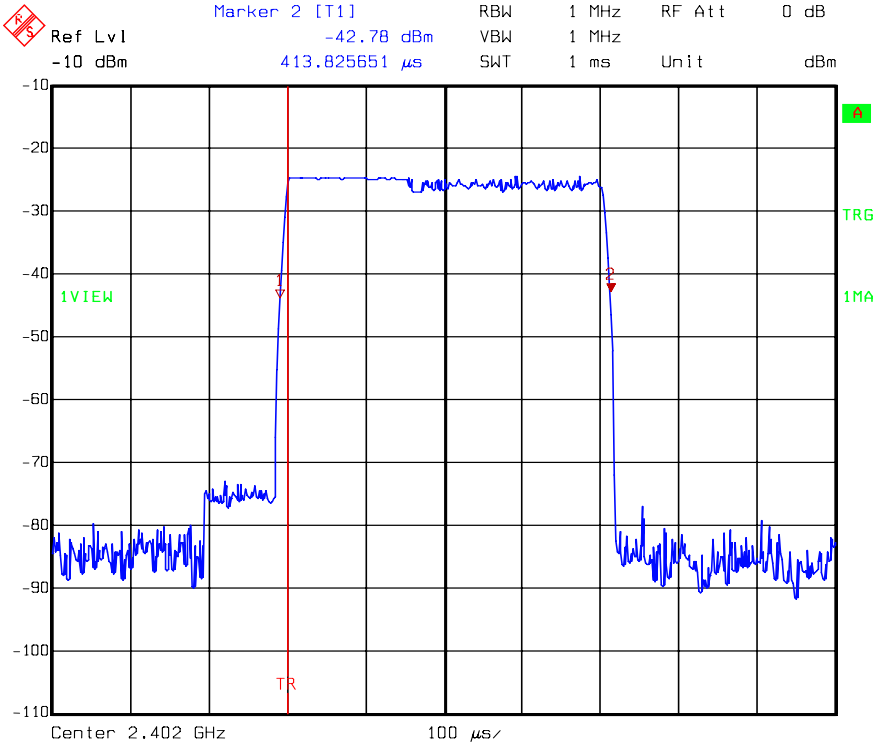
Duty Cycle at π/4DPSK ch0 DH3 channel: number of pulse



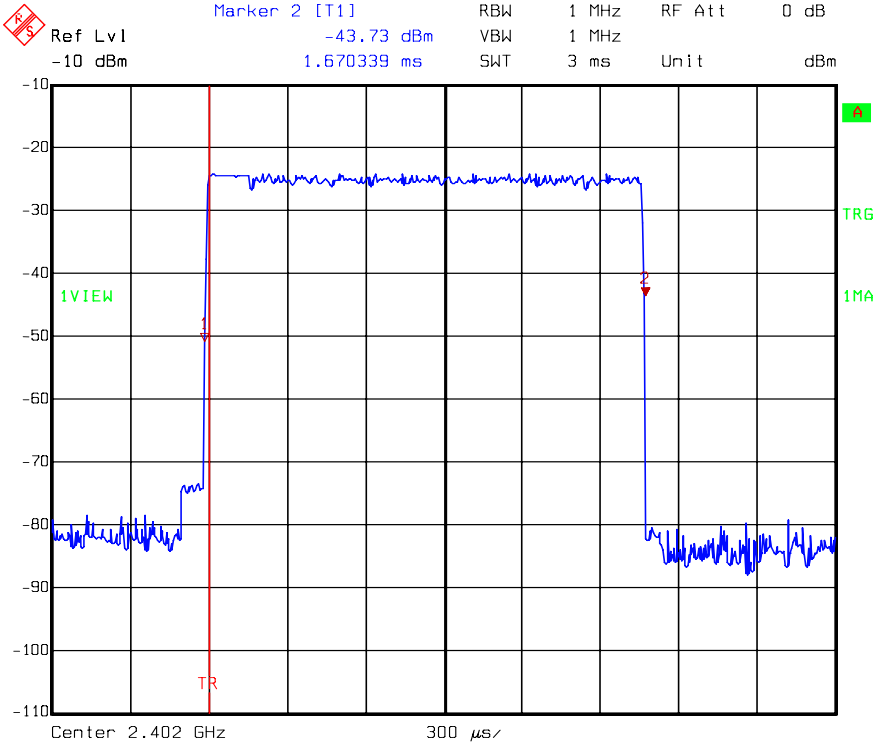
Duty Cycle at π/4DPSK ch0 DH5 channe5: number of pulse



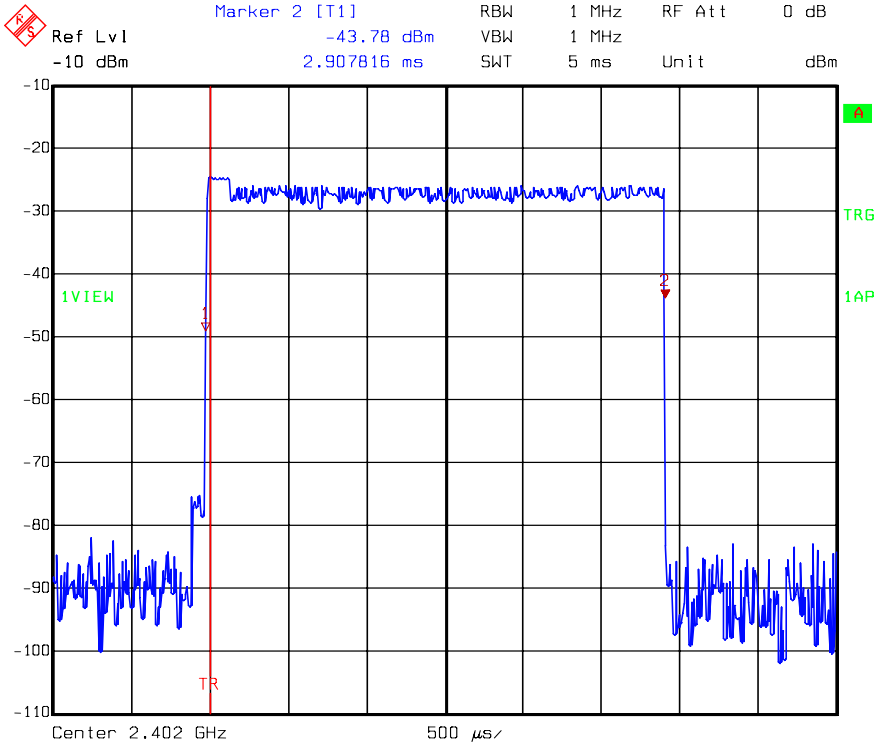
Duty Cycle at 8DPSK ch0 DH1 channel: number of pulse



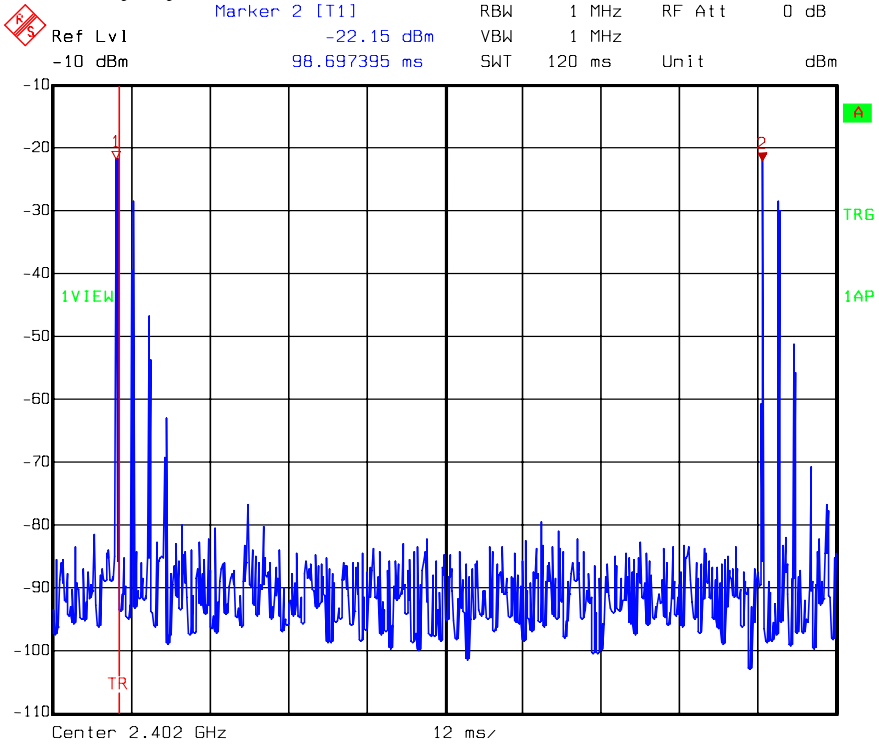
Duty Cycle at 8DPSK ch0 DH3 channel: number of pulse



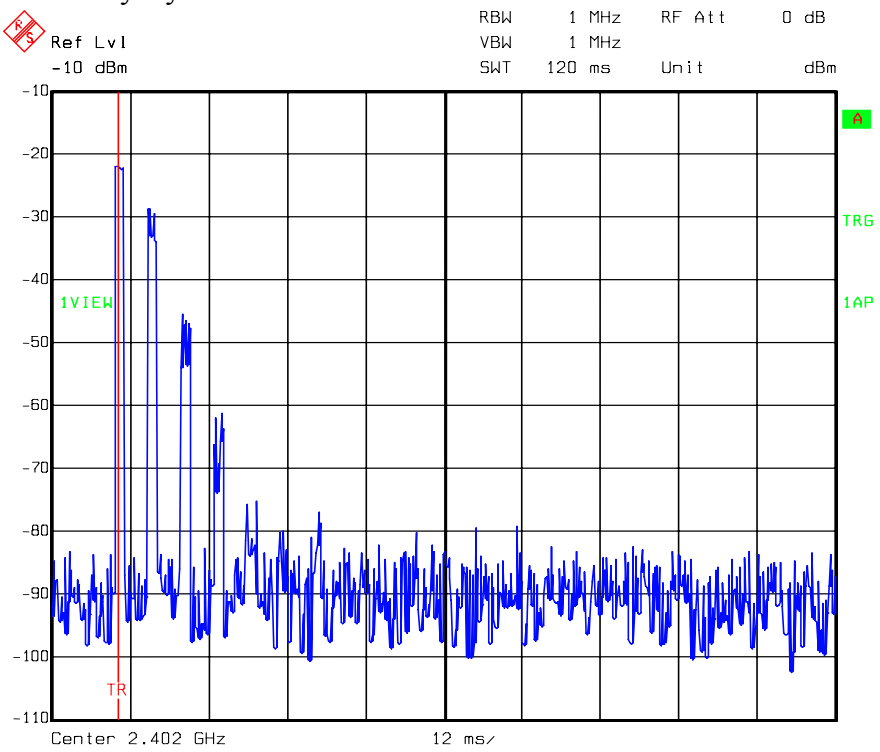
Duty Cycle at 8DPSK ch0 DH5 channel: number of pulse



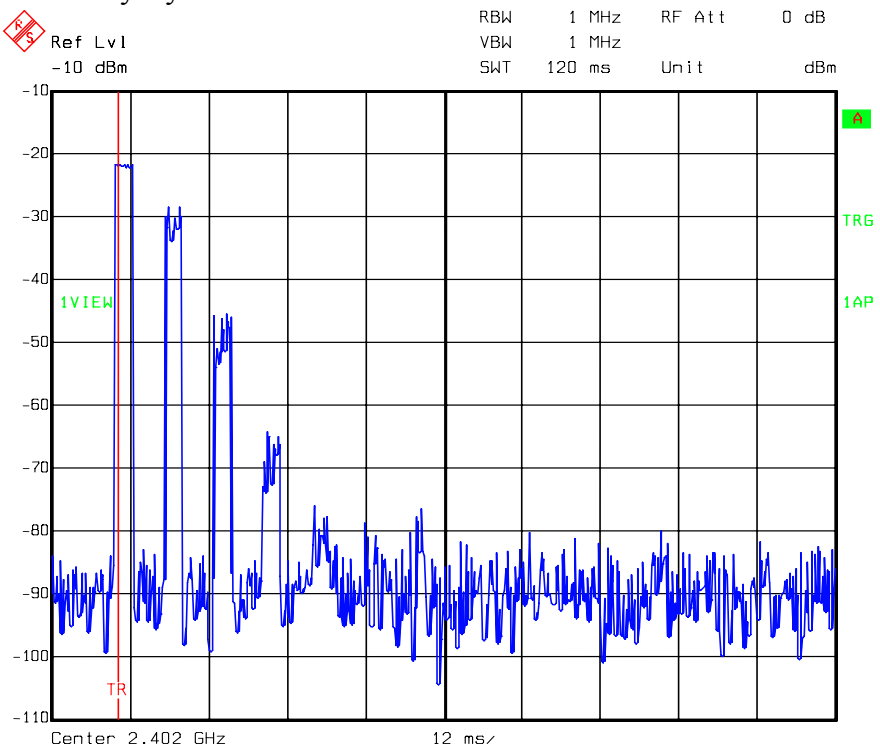
Duty Cycle at GFSK ch0 DH1 channel: number of 100ms



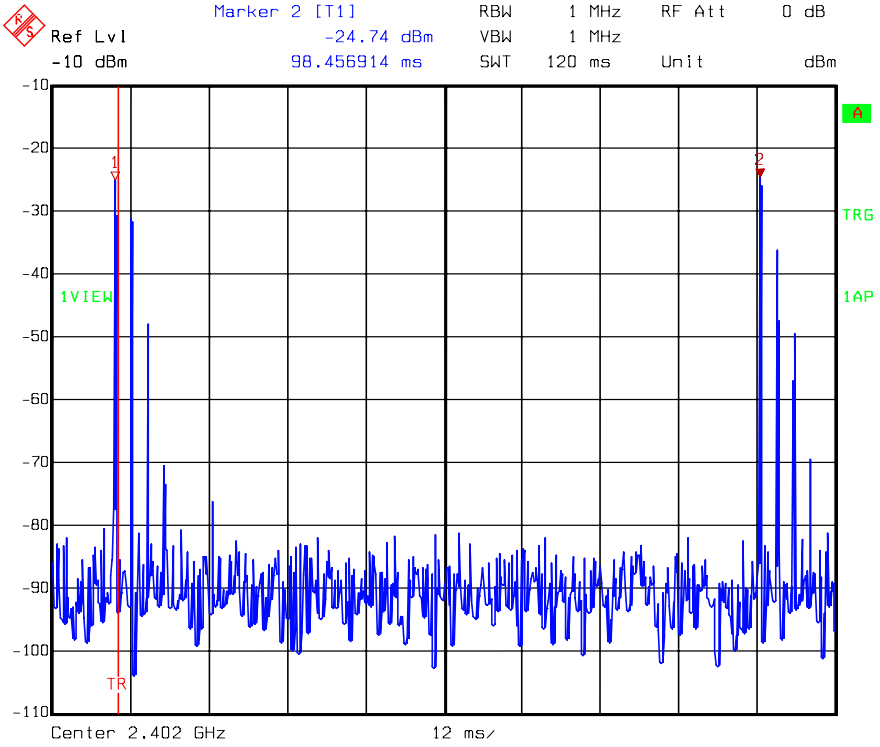
Duty Cycle at GFSK ch0 DH3 channel: number of 100ms



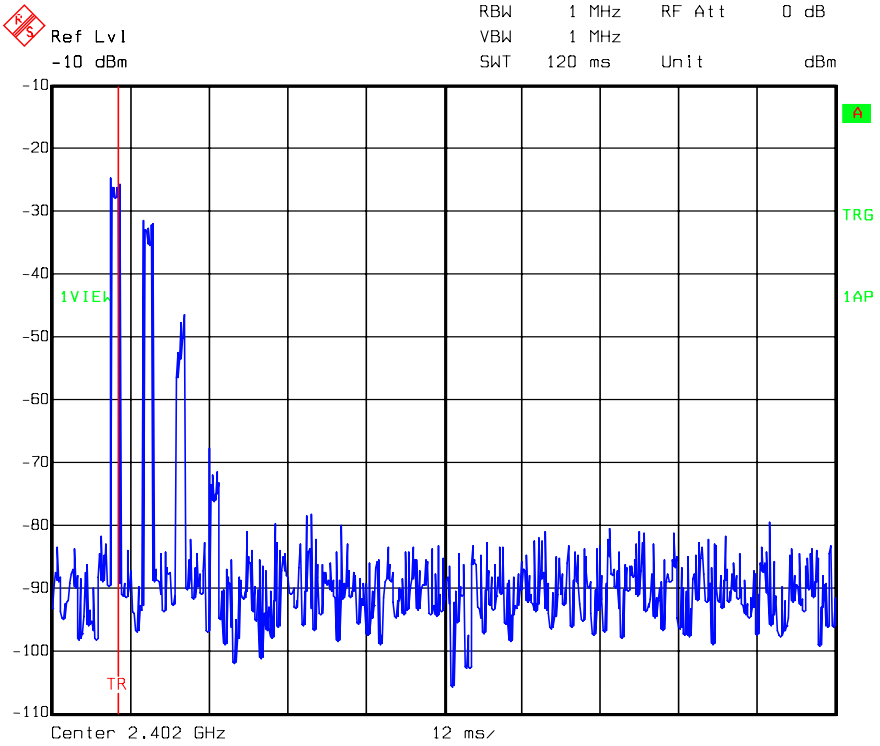
Duty Cycle at GFSK ch0 DH5 channel: number of 100ms



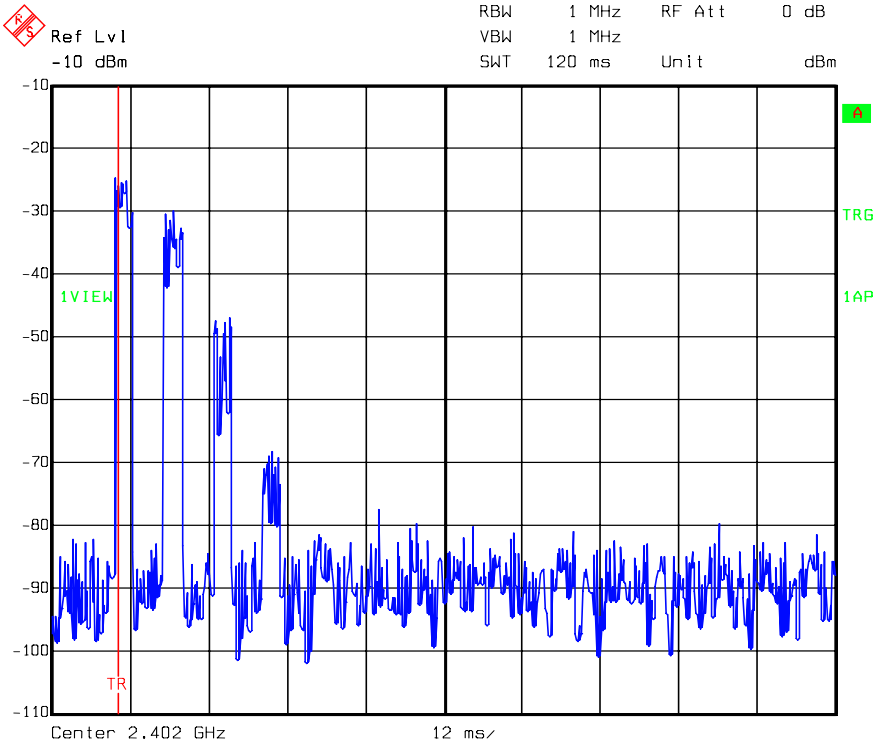
Duty Cycle at π/4DPSK ch0 DH1 channel: number of 100ms



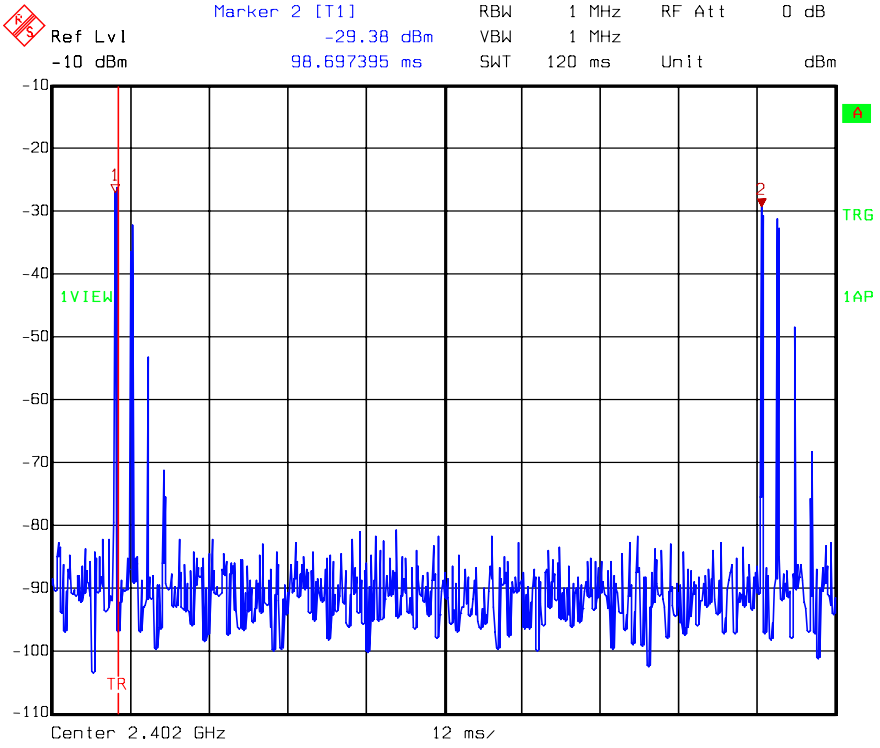
Duty Cycle at π/4DPSK ch0 DH3 channel: number of 100ms



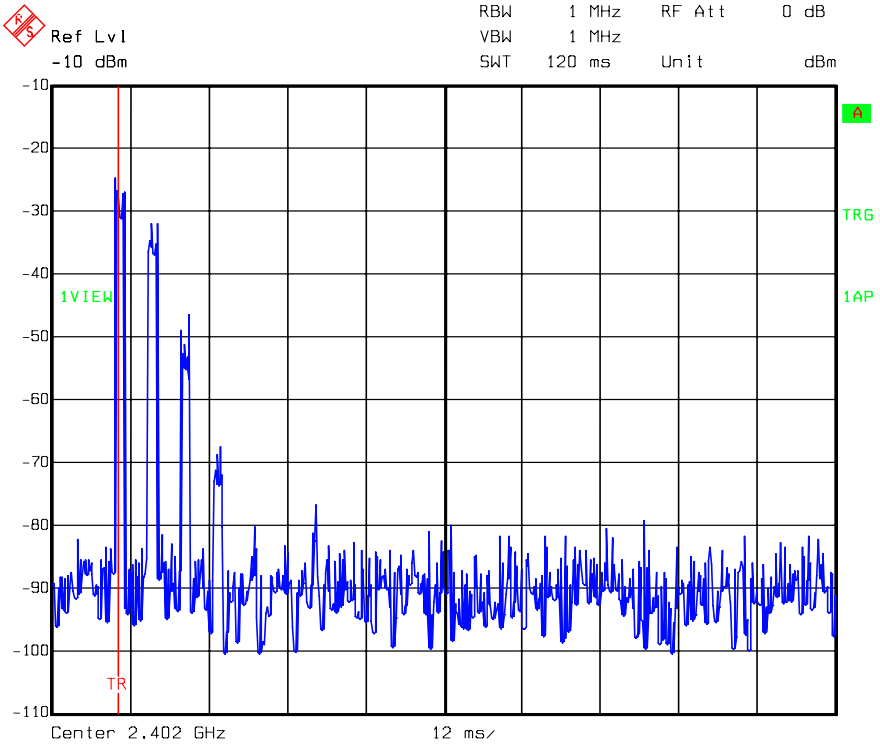
Duty Cycle at π/4DPSK ch0 DH5 channe5: number of 100ms



Duty Cycle at 8DPSK ch0 DH1 channel: number of 100ms



Duty Cycle at 8DPSK ch0 DH3 channel: number of 100ms



Duty Cycle at 8-DPSK ch0 DH5 channel: number of 100ms