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Location of test facility:

PKM electronic GmbH

Ohmstrasse 1

84160 Frontenhausen, Germany



## 1. CLIENT INFORMATION:

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E-mail:	Patrick.Engl@de.bosch.com

# 2. EQUIPMENT UNDER TEST (EUT):

2.1 Identification of the EUT		
Equipment:	Active Speaker	
Model:	ZLX	Brand: ELECTRO VOICE
Brand name:	ELECTRO VOICE	
Serial no.:	Version ZLX-12BT	
	Sample 01: 09541438533457	70006 / Sample 02: 095414385334570009
	Version ZLX-15BT Sample 01: 09541448533464	40005 / Sample 02: 095414485334640007
Manufacturer:	Bosch Security Systems, Inc.	
	130 Perinton Parkway, FAIRI	PORT, NY 14450, USA
Country of origin:	China	
Power rating:	100 – 240 V ~, 50 – 60 Hz, 0	.8 – 0.5 A

Highest frequency generated or used in the device or on which the device operates or tunes: 2480 MHz (Bluetooth)

2.2 Additional information about the EUT:

The ZLX is an active speaker with Bluetooth interface (Bluetooth Module BTM-630) operating as A2DP audio sink for music streaming with Basic Rate (GFSK with 1 MBit/s), EDR (PI/4-DQPSK with 2 MBit/s), EDR (8-DPSK with 3 MBit/s). The model ZLX was tested in the versions ZLX-12BT and ZLX-15BT which differs in design. The requested operation modes had been adjusted with CSR USB\_SPI\_TOOLS interface and CSR BLUE TEST3 software. FCC ID: ESVZLX

Tests are performed from June 11 2018 – March 11 2019

#### To duplicate parts of this test report needs the written confirmation of the test laboratory.

The test results relate only to the above mentioned test sample(s).



#### 3. Performed measurements and results

#### List of measurements

The list of measurements required in e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, Intentional Radiators for the EUT is given below

#### Subclause:

§15.203 §15.205 §15.207 §15.209 §15.215 §15.247	Antenna requirement Restricted bands of operation Conducted limits Radiated emission limits; general requirements Additional provisions to the general radiated emission limitations Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz	
915.247	and 5725-5850 MHz	$\ge$
0	Operation within the bands 902-928 MHz, 2400-2483.5 MHz,	

test re applica yes	quirem able no	ents fulfille yes	d: no
		$\mathbb{X}$	

All required / applicable tests according to the following standard(s) were performed.

e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, Intentional Radiators



#### 4. Antenna requirement §15.203

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 a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The used antenna is a PCB antenna which is inside the EUT's (Version ZLX-12BT, Version ZLX-15BT) and is not serviceable and can not be replaced by the user, so that the above mentioned requirements are fulfilled.



# 5. Restricted bands of operation §15.205

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	above 38.6
13.36-13.41			

The EUT's (Version ZLX-12BT, Version ZLX-15BT) are operating on frequencies between 2.402 GHz and 2.480 GHz and therefor not in a restricted band.



#### 6. Conducted limits (AC power line conducted emission measurements) §15.207

#### Test site

Measurements of conducted emission from EUT was made in the shielded chamber (DC - 10GHz) located in the test facility.

#### Detector function selection and bandwidth

In conducted emissions measurement CISPR quasi-peak- and average-detector were used. The bandwidth of the detector of instrument is 9 kHz over the frequency range of 150 kHz to 30 MHz.

#### Frequency range to be scanned

For conducted emission measurements, the spectrum in the range of 150 kHz to 30 MHz was investigated.

## Test conditions and configuration of EUT

The EUT was configured and operated with a pink noise input signal and an output power of 12.5 % of max. output power on internal speaker, so as to find the maximum conducted emission generated from EUT. Additional the Bluetooth transmitter was set to continuous transmission (hopping), receiving and link mode (connected to Smartphone with data transfer) using Basic Rate (GFSK with 1 MBit/s), EDR (PI/4-DQPSK with 2 MBit/s), EDR (8-DPSK with 3 MBit/s). These operation modes represents the normal operation. The procedure according to ANSI C63.10:2013 clause 6.2 is used with these modes of operation of the EUT, with typical cable positions and with a typical system equipment configuration and arrangement are investigated. For each AC power current-carrying conductor, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below. The corresponding configuration is shown in the "Photo(s) of test setup".

During test the EUT was operated with rated Power (120 V $_{\sim}$ , 60 Hz), as specified by client/in the user manual of the EUT. The EUT was placed on a 80 cm high non metallic table. Measurements on neutral (N)- and live (L1)-wire had been performed.

As worst case the mode EDR (8-DPSK with 3 MBit/s) continuous transmission (hopping) was documented.

#### Applied standards

e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart B, § 15.207 (a) Conducted limits, ANSI C63.10:2013

#### **Tested versions:**

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

#### Requirements

Frequency	Limits dBµV			
MHz	Quasi-peak	Average		
0.15–0.5	66–56 *	56-46 *		
0.5–5.0	56	46		
5.0-30.0	60	50		

\* Decreases with the logarithm of the frequency.



#### Measurements

The measurements for Version ZLX-12BT and ZLX-15BT had been performed on June 13, 2018.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005).

The measurement data please find annex 1 pages 1 to 3. It was found that there is no difference of the AC power line conducted emission values between Bluetooth transmitting, receiving and Bluetooth off. As worst case the mode EDR (8-DPSK with 3 MBit/s) continuous transmission (hopping) was documented.

The six highest emissions for each port (L/N)/detector are as following:

Frequency [MHz] (1)	Reading of test receiver	Detector (3)	Port (4)	loss of cable between LISN and test receiver	LISN correction [dB] (6)	AC power line conducted emission	Limit [dBµV] (8)	Result (9)
	[dBµV] (2)			(dB) (5)		[dBµV] (7)		
0.15	45.9	QP	Ν	0.1	0.1	46.1	66.0	PASS
0.20	44.4	QP	Ν	0.1	0.1	44.6	63.6	PASS
0.25	42.2	QP	Ν	0.1	0.1	42.4	61.7	PASS
0.30	40.1	QP	Ν	0.1	0.1	40.3	60.2	PASS
0.35	38.7	QP	Ν	0.1	0.1	38.9	58.9	PASS
0.65	36.0	QP	Ν	0.1	0.1	36.2	56.0	PASS
0.15	40.8	AV	Ν	0.1	0.1	41.0	56.0	PASS
0.20	37.3	AV	Ν	0.1	0.1	37.5	53.6	PASS
0.50	27.2	AV	Ν	0.1	0.1	27.4	46.0	PASS
0.55	27.3	AV	Ν	0.1	0.1	27.5	46.0	PASS
0.65	27.2	AV	Ν	0.1	0.1	27.4	46.0	PASS
all other values								
<0.5	<36.0	AV	Ν	0.1	0.1	<36.2	56.0 - 46.0	PASS
>0.5 - 30	<30.0	AV	Ν	0.3	0.4	<30.7	46.0, 50.0	PASS
all values								
<0.5	<36.0	QP	L1	0.1	0.1	<36.2	66.0 - 56.0	PASS
>0.5 - 30	<30.0	QP	L1	0.3	0.4	<30.7	56.0, 60.0	PASS
all values								
<0.5	<36.0	AV	L1	0.1	0.1	<36.2	56.0 - 46.0	PASS
>0.5 - 30	<30.0	AV	L1	0.3	0.4	<30.7	46.0, 50.0	PASS

AC power line conducted emission  $[dB\mu V]$  (7) = Reading of test receiver  $[dB\mu V]$  (2) + loss of cable between Line impedance stabilisation network (LISN) and test receiver (dB) (5) + LISN correction [dB] (6)

(1) = test frequency

(4) = tested port Phase (live, L1) or Neutral (N)

(8) = limit according to § 15.107 (a) Class B Conducted limits

(9) = comparison between Limit [dB $\mu$ V] (8) and AC power line conducted emission [dB $\mu$ V] (7)

#### Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the conducted emission measurements.



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

The measurement data please find annex 1 pages 4 to 7

The six highest emissions for each port (L/N)/detector are as following:

Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Detector (3)	Port (4)	loss of cable between LISN and test receiver (dB) (5)	LISN correction [dB] (6)	AC power line conducted emission [dBµV] (7)	Limit [dBµV] (8)	Result (9)
0.15	46.1	QP	Ν	0.1	0.1	46.3	66.0	PASS
0.20	44.5	QP	Ν	0.1	0.1	44.7	63.6	PASS
0.25	41.7	QP	Ν	0.1	0.1	41.9	61.7	PASS
0.30	39.4	QP	Ν	0.1	0.1	39.6	60.2	PASS
0.35	38.5	QP	Ν	0.1	0.1	38.7	58.9	PASS
0.65	35.9	QP	Ν	0.1	0.1	36.1	56.0	PASS
0.15	42.3	AV	N	0.1	0.1	42.5	56.0	PASS
0.20	38.2	AV	Ν	0.1	0.1	38.4	53.6	PASS
0.25	33.1	AV	Ν	0.1	0.1	33.3	51.7	PASS
all other values								
<0.5	<36.0	AV	Ν	0.1	0.1	<36.2	56.0 - 46.0	PASS
>0.5 - 30	<30.0	AV	Ν	0.3	0.4	<30.7	46.0, 50.0	PASS
0.15	45.9	QP	L1	0.1	0.1	46.1	66.0	PASS
0.21	52.8	QP	L1	0.1	0.1	53.0	63.2	PASS
0.46	36.5	QP	L1	0.1	0.1	36.7	56,7	PASS
0.51	35.7	QP	L1	0.1	0.1	35.9	56.0	PASS
0.56	35.8	QP	L1	0.1	0.1	36.0	56.0	PASS
21.26	39.5	QP	L1	0.3	0.4	40.2	60.0	PASS
0.15	39.2	AV	L1	0.1	0.1	39.4	55.8	PASS
0.21	34.9	AV	L1	0.1	0.1	35.1	53.5	PASS
0.46	27.4	AV	L1	0.1	0.1	27.6	46.8	PASS
0.51	27.5	AV	L1	0.1	0.1	27.7	46.0	PASS
0.56	26.7	AV	L1	0.1	0.1	26.9	46.0	PASS
0.62	28.4	AV	 L1	0.1	0.1	28.6	46.0	PASS

AC power line conducted emission  $[dB\mu V]$  (7) = Reading of test receiver  $[dB\mu V]$  (2) + loss of cable between Line impedance stabilisation network (LISN) and test receiver (dB) (5) + LISN correction [dB] (6)

(1) = test frequency

(4) = tested port Phase (live, L1) or Neutral (N)

(8) = limit according to § 15.207 Conducted limits (9) = comparison between Limit [dB $\mu$ V] (8) and AC power line conducted emission [dB $\mu$ V] (7)

#### Results

From the measurement data obtained, the tested sample was considered to have COMPLIED with the requirements for the conducted emission measurements.

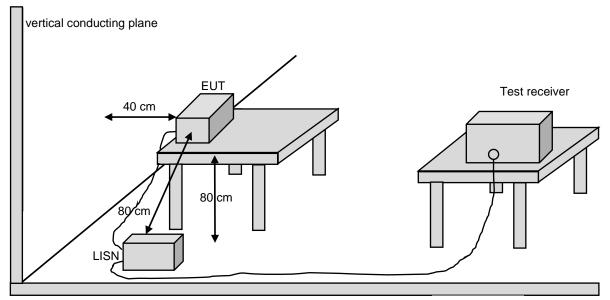
Kind of equipment	Manufacturer	Туре	PKM- ident no.	Serial no.	Calibrated on	Calibration interval
EMI-Test-Receiver	Rohde & Schwarz	ESR7 Instrument FW 3.36	11676	101694	2018-03-26	3 years
Software	PKM	PKM U5/6	-/-	V1.01.03	-/-	-/-
Line impedance stabilisation network (LISN)	Rohde & Schwarz	ESH2-Z5	10139	879675/028	2017-10-10	1 year
Shielded room	Siemens	(6,2 x 4,7 x 3,3) m (I x w x h) DC – 10 GHz	10113	1	-/-	-/-

#### Test equipment used:

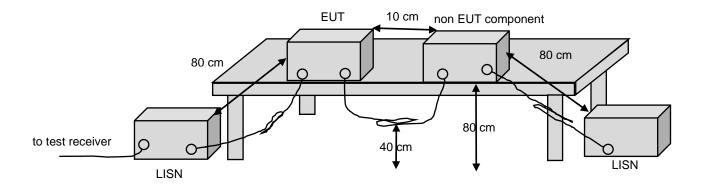


All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of conducted emissions was made with instruments conforming to American National Standard Specification, ANSI C63.10-2013.

#### **Block diagram Conducted emissions**



Groundplane



#### Measurement uncertainty according to CISPR 16-4-2 Edition 2.0 2011-06

Measurement	calculated uncertainty U <sub>lab</sub>	Specified CISPR uncertainty according CISPR 16-4-2 Edition 2.0 2011-06, table 1 U <sub>CISPR</sub>
Conducted disturbance at mains port using AMN 150 kHz – 30 MHz	3,2 dB	3,4 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

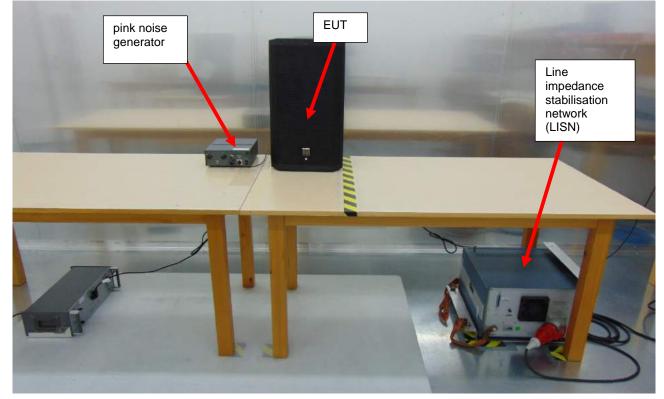
The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).

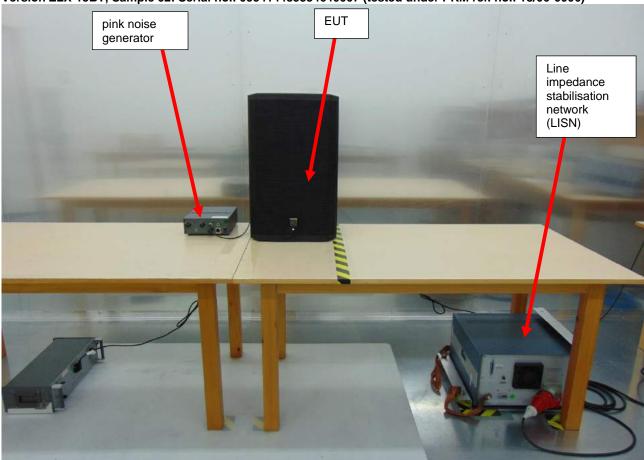


# Photo(s) of test setup

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)





#### 7. Radiated emission limits; general requirements §15.209

#### Test site

Measurement of radiated emissions from EUT was made in the semi-anechoic chamber SAC3 from DC to 26.5 GHz located in the test facility.

#### Detector function selection and bandwidth

For the radiated emissions measurement in the frequency range of 9 kHz to 1000 MHz, an EMI test receiver that have CISPR quasi-peak detector was used. The bandwidth of the detector of the EMI test receiver is 200 Hz over the frequency range of 9 kHz to 150 kHz, 9 kHz over the frequency range of 150 kHz to 30 MHz and 120 kHz over the frequency range of 30 to 1000 MHz. Emissions to be measured are detected in CISPR quasi peak mode, except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements with an average detector.

In the frequency range above 1 GHz the used bandwidth was 1000 kHz and emissions to be measured are detected in average and peak mode.

#### Antennas

Measurements were made using a calibrated loop antenna in the range of 9 kHz to 30 MHz, a calibrated bilog antenna in the range of 30 to 1000 MHz to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the EUT was 3 meters.

In the range above 1 GHz measurements were made using a calibrated horn antenna to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization. The horizontal distance between the receiving antenna and the EUT was 3 meters.

#### Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 9 kHz to 24.800 GHz (10<sup>th</sup> harmonic of highest frequency) was investigated as the highest frequency generated is 2480 MHz.

#### Test conditions and configuration of EUT

The EUT was configured and operated with a pink noise input signal and an output power of 12.5 % of max. output power on internal speaker, so as to find the maximum radiated emission generated from EUT. Additional the Bluetooth transmitter was set to continuous transmission (hopping), transmitting on fixed frequencies (low, middle, high), receiving and link mode (connected to Smartphone with data transfer) using Basic Rate (GFSK with 1 MBit/s), EDR (PI/4-DQPSK with 2 MBit/s), EDR (8-DPSK with 3 MBit/s). These operation modes represents the normal operation. The procedure according to ANSI C63.10:2013 clause 6.3, 6.4, 6.5 and 6.6 is used and this modes were investigated by operating the EUT with typical cable positions and with a typical system equipment configuration and arrangement. Cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below. The corresponding configuration is shown in the "Photo(s) of test setup".

During test the EUT was operated with rated Power (120 V~, 60 Hz), as specified in the user manual of the EUT. For frequencies up to 1000 MHz the EUT was placed on a 80 cm high non metallic table placed on the turntable. The EUT was rotated and the antenna height was varied between 1 m to 4 m to find the maximum RF energy generated from EUT.

For frequencies above 1000 MHz the EUT was placed on a 150 cm high non metallic table placed on the turntable. The EUT was rotated and the antenna height was varied between 1 m to 4 m to find the maximum RF energy generated from EUT.

As worst case the mode EDR (8-DPSK with 3 MBit/s) continuous transmission (hopping) was found and documented.

#### Applied standards

e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart B, § 15.209 Radiated emission limits



#### Requirements

Frequency MHz	Limits µV/m Quasi- peak	Limits dBµV/m Quasi-peak	Limits µV/m Average	Limits dBµV/m Average	Test distance m
0.009 – 0.090	-/-	-/-	2400/F (kHz)	48.5 – 28.5	300
0.090 - 0.110	2400/F (kHz)	28.5 – 26.8	-/-	-/-	300
0.110 – 0.490	-/-	-/-	2400/F (kHz)	26.8 – 13.8	300
0.490 - 1.705	24000/F (kHz)	33.8 – 23.0	-/-	-/-	30
1.705 - 30.0	30	29.5	-/-	-/-	30
30 - 88	100	40	-/-	-/-	3
88 - 216	150	43.5	-/-	-/-	3
216 - 960	200	46	-/-	-/-	3
960 - 1000	500	54	-/-	-/-	3
Above 1000	/-	-/-	500	54	3

#### Measurements

The measurements for Version ZLX-12BT and ZLX-15BT in the frequency range 9 kHz – 30 MHz had been performed on June 12, 2018.

The measurements for Version ZLX-12BT and ZLX-15BT in the frequency range 30 MHz – 24.800 GHz had been performed on June 11, 2018.

In the frequency range 9 kHz - 30 MHz the EUT'S had been scanned in a distance of 3 m and the relevant limit was adjused to this distance using a factor with 20 dB/decade. The values are detected in peak. Since all peak values are at least 10 dB below the relevant limit for both models, no further measurements had been performed.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)

The highest peak emissions in the frequency range 9 kHz – 30 MHz in 3 m distance are as following:

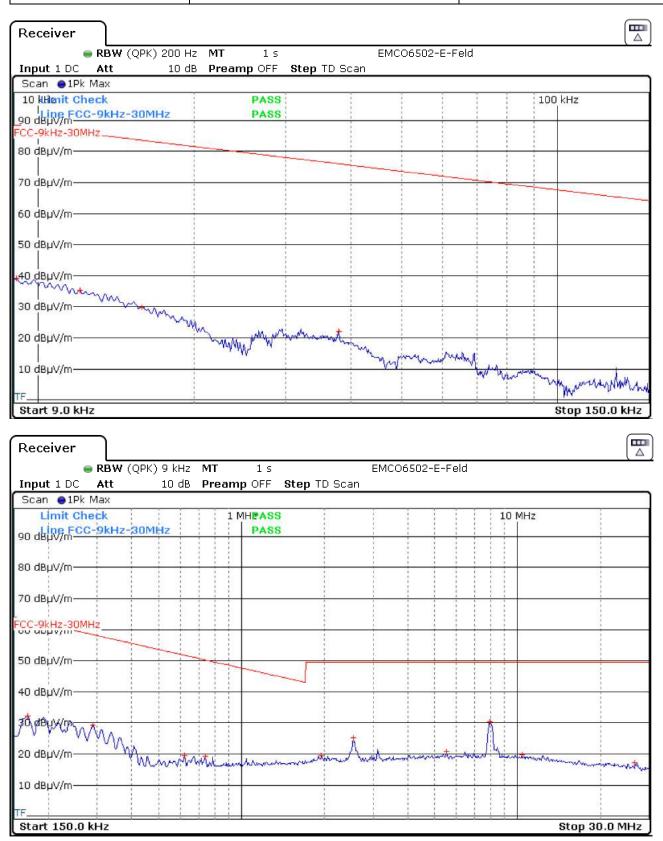
Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Antenna polarization (3)	Correction factor [dB/m] (4)	Radiated emission [dBµV/m] (5)	Limit [dBµV/m] (6)	Result (7)			
0.009100	21.3	vertical	17.7	39.0	88.4	PASS			
0.012050	19.0	vertical	16.3	35.3	86.0	PASS			
0.015850	15.3	vertical	14.6	29.9	83.6	PASS			
7.939500	19.8	vertical	10.6	30.4	49.5	PASS			
2.535000	14.3	vertical	10.9	25.2	49.5	PASS			
5.536500	10.1	vertical	10.7	20.8	49.5	PASS			
-/-	-/-	horizontal	-/-	-/-	-/-	PASS			
All other em limit.	All other emissions in the frequency range 9 kHz – 30 MHz are at least 20 dB below the relevant								

Radiated emission  $[dB\mu V/m]$  (5) = Reading of test receiver  $[dB\mu V]$  (2) + Correction factor [dB] (4) (= loss of cable between antenna and test receiver + antenna factor)

- (1) = test frequency
- (3) = polarization of the test antenna (Horizontal/Vertical)
- (6) = relevant limit according to §15.209 Radiated emission limits; general requirements corrected to 3 m test distance using a correction factor with 20 dB/decade (300 m to 3 m : +40 dB, 30 m to 3 m : +20 dB)
- (7) = comparison between Limit  $[dB\mu V/m]$  (7) and Radiated emission  $[dB\mu V/m]$  (6)

TESTED IN GERMANY Test report no.: **18/09-0026B** 

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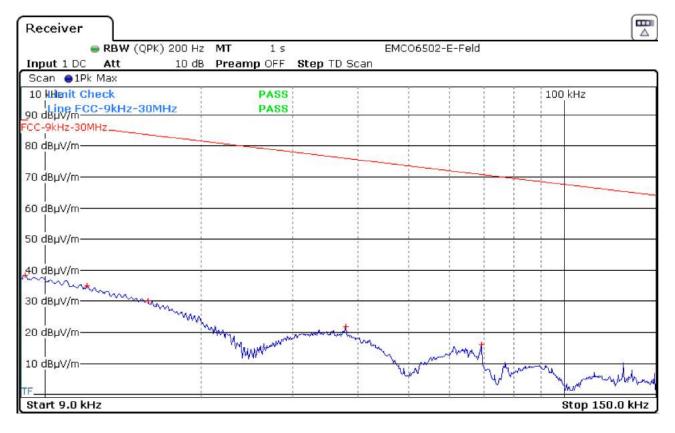
Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

The highest peak emissions in the frequency range 9 kHz – 30 MHz in 3 m distance are as following:

Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Antenna polarization (3)	Correction factor [dB/m] (4)	Radiated emission [dBµV/m] (5)	Limit [dBµV/m] (6)	Result (7)
0.009150	20.8	vertical	17.6	38.4	88.3	PASS
0.012050	18.7	vertical	16.3	35.0	85.9	PASS
0.015800	15.4	vertical	14.6	30.0	83.6	PASS
2.465250	15.3	vertical	10.9	26.2	49.5	PASS
3.169500	12.2	vertical	10.8	23.0	49.5	PASS
0.1041000	6.6	vertical	10.9	17.5	47.3	PASS
-/-	-/-	horizontal	-/-	-/-	-/-	PASS
All other em limit.	issions in the	frequency ran	ge 9 kHz – 30	MHz are at leas	t 20 dB below th	ne relevant

Radiated emission  $[dB\mu V/m]$  (5) = Reading of test receiver  $[dB\mu V]$  (2) + Correction factor [dB] (4) (= loss of cable between antenna and test receiver + antenna factor)

- (1) = test frequency
- (3) = polarization of the test antenna (Horizontal/Vertical)
- (6) = relevant limit according to §15.209 Radiated emission limits; general requirements corrected to 3 m test distance using a correction factor with 20 dB/decade (300 m to 3 m : +40 dB, 30 m to 3 m : +20 dB)
- (7) = comparison between Limit [dB $\mu$ V/m] (7) and Radiated emission [dB $\mu$ V/m] (6)





BW (QI	PK)9 kHz MT	1 s	EMC06502-	E-Feld	
Input 1 DC Att		mp OFF Step TD S			
Scan 😑 1Pk Max					
Limit Check 90 dBµV/m	)MHz	MHPASS PASS		10 MHz	
80 dBµV/m					
70 dBµV/m					
CC-9kHz-30MHz					
50 dBµV/m					
40 dBµV/m					
			t .		
	Munimum	mother which with me	Anduran	ant marting have a more and	hundredomater monor
10 dBµV/m					
rF Start 150.0 kHz					Stop 30.0 MH:

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)

Since all peak values are at least 6 dB below the relevant limit for both models, no further measurements had been performed. The six highest emissions for each polarization (H/V) in the frequency range 30 MHz – 1000 MHz are as following:

Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Antenna polarization (3)	loss of cable between antenna and test receiver (dB) (4)	Antenna factor [dB/m] (5)	Radiated emission [dBµV/m] (6)	Limit [dBµV/m] (7)	Result (8)
31.86	10.6	vertical	4.4	17.9	32.9	40.0	PASS
31.14	8.5	vertical	4.5	17.8	30.8	40.0	PASS
33.48	7.9	vertical	4.5	17.3	29.7	40.0	PASS
34.36	8.3	vertical	4.5	16.8	29.6	40.0	PASS
34.91	7.3	vertical	4.6	16.4	28.3	40.0	PASS
35.01	5.2	vertical	4.6	16.3	26.1	40.0	PASS
-/-	-/-	horizontal	-/-	-/-	-/-	-/-	PASS
All other em	issions in the	frequency ran	ge 30 MHz – 1000 M	Hz are at least	20 dB below the	e relevant limit.	

Radiated emission  $[dB\mu V/m]$  (6) = Reading of test receiver  $[dB\mu V]$  (2) + loss of cable between antenna and test receiver (dB) (4) + antenna factor [dB] (5)

- (1) = test frequency
- (3) = polarization of the test antenna (Horizontal/Vertical)
- (7) = relevant limit according to §15.209 Radiated emission limits; general requirements
- (8) = comparison between Limit [dB $\mu$ V/m] (7) and Radiated emission [dB $\mu$ V/m] (6)



vertical

Receiver	Spectrun	n 🛞					(m)
	RBW (EMI) 120	and the second second	100 ms		CBL6111		
Input 1 AC	75 621	0 dB Preamp		Step TD Scan	ODEOTT		
Scan 🔵 1 Pk	Max						
Limit Ch		100 MHz					
90 dBµV/m-	C Part 15		PASS				
80 dBµV/m—							
70 d0.4//m							
70 dBµV/m—							
60 dBµV/m—							
				1			
50 dBµV/m—							
FCC Part 15		0					
BO dBuV/m-						mai	nanonimina
· hours					mannon	mont	
20 dBµV/m	marie	mationstream	man man	"March in sour			
10 - 10 - 1/m	Jan Manun	when					
10 dBµV/m—							
				I I	1	TF	
Start 30.0 M	AHZ						Stop 1.0 GHz
Ionzonia							_
Receiver	Spectrun RBW (EMI) 120		100 ms		CBL6111		
	RBW (EMI) 120	and the second second		Step TD Scan	CBL6111		
Receiver	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp	OFF	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan @1Pk Limit Cf	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan @1Pk Limit Cf	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit CP Line FC 70 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit Cf Line FC 70 dBµV/m— 60 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Input 1 AC Scan ●1Pk Limit Cf Line FC 70 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit Cf Line FC 70 dBµV/m— 60 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit Cf Line FC 70 dBµV/m— 60 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan	CBL6111		
Receiver Input 1 AC Scan ●1Pk Limit CP Line FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan			
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan			
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF PASS	Step TD Scan		www.ww	
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF				
Receiver Input 1 AC Scan ●1Pk Limit Cl Line FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF	Step TD Scan		www.w	
Receiver Input 1 AC Scan ●1Pk Limit Cl Line:FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF				
Receiver Input 1 AC Scan ●1Pk Limit Cl Line:FC 70 dBµV/m— 60 dBµV/m— 50 dBµV/m— FCC Part 15 30 dBµV/m—	RBW (EMI) 120 Att Max	kHz MT 0 dB Preamp 100 MHz	OFF				

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Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

Since all peak values are at least 10 dB below the relevant limit for both models, no further measurements had been performed. The six highest emissions for each polarization (H/V) in frequency range 30 MHz – 1000 MHz are as following:

Frequency [MHz] (1)	Reading of test receiver [dBµV] (2)	Antenna polarization (3)	loss of cable between antenna and test receiver (dB) (4)	Antenna factor [dB/m] (5)	Radiated emission [dBµV/m] (6)	Limit [dBµV/m] (7)	Result (8)
30.09	4.2	vertical	4.4	17.9	26.5	40.0	PASS
30.84	5.5	vertical	4.5	17.8	27.8	40.0	PASS
31.11	5.8	vertical	4.5	17.3	27.6	40.0	PASS
31.44	8.2	vertical	4.5	16.9	29.6	40.0	PASS
31.83	7.2	vertical	4.6	16.5	28.3	40.0	PASS
31.98	7.4	vertical	4.6	16.4	28.4	40.0	PASS
-/-	-/-	horizontal	-/-	-/-	-/-	-/-	PASS
All other em	issions in the	frequency ran	ge 30 MHz – 1000 M	Hz are at least	10 dB below the	e relevant limit.	

Radiated emission  $[dB\mu V/m]$  (6) = Reading of test receiver  $[dB\mu V]$  (2) + loss of cable between antenna and test receiver (dB) (4) + antenna factor [dB] (5)

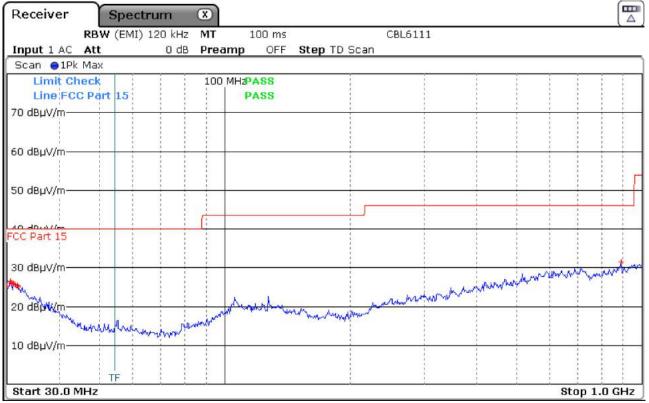
- (1) = test frequency
- (3) = polarization of the test antenna (Horizontal/Vertical)
- (7) = relevant limit according to §15.209 Radiated emission limits; general requirements
- (8) = comparison between Limit [dB $\mu$ V/m] (7) and Radiated emission [dB $\mu$ V/m] (6)

ve	rtı	ca	

Receiver Spectrum X	
RBW (EMI) 120 kHz MT 100 ms CBL6111	
Input 1 AC Att 0 dB Preamp OFF Step TD Scan	
Scan 🔵 1Pk Max	
Limit Check 100 MHzPASS	
Line FGC Part 15 PASS	
70 dBµV/m	_
60 dBµV/m	
	-
50 dBµV/m	+
40 dBu0/m	
FCC Part 15	
20 dBµV/m 20 dBµV/m	**
and the second s	
20 dBpW/a	
mon many many many	
10 dBµV/m	_
The second se	
Start 30.0 MHz Stop 1.0 GH	Iz



#### horizontal



The highest emissions for each polarization (H/V) in frequency range 1 GHz – 24.800 GHz are as following:

Lower Channe	ei 2402MHz							
Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/m]	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	(4)	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)			(5)		(7)		
4804	V	41.0	0.5	41.5	54.0	118.9	500	PASS
7206	V	39.9	3.1	43.0	54.0	141.3	500	PASS
9608	V	<38.1	4.7	<42.8	54.0	<138.0	500	PASS
12010	V	<37.2	5.8	<43.0	54.0	<141.3	500	PASS
14412	V	<36.2	6.5	<42.7	54.0	<136.5	500	PASS
16814	V	<36.9	7.1	<44.0	54.0	<158.5	500	PASS
19216	V	<38.1	6.4	<44.5	54.0	<167.9	500	PASS
21618	V	<38.6	7.2	<45.8	54.0	<195.0	500	PASS
24020	V	<38.9	7.6	<46.5	54.0	<211.3	500	PASS
4804	Н	48.0	0.5	48.5	54.0	266.1	500	PASS
7206	Н	42.8	3.1	45.9	54.0	197.2	500	PASS
9608	Н	<38.1	4.7	<42.8	54.0	<138.0	500	PASS
12010	Н	<37.2	5.8	<43.0	54.0	<141.3	500	PASS
14412	Н	<36.2	6.5	<42.7	54.0	<136.5	500	PASS
16814	Н	<36.9	7.1	<44.0	54.0	<158.5	500	PASS
19216	Н	<38.1	6.4	<44.5	54.0	<167.9	500	PASS
21618	Н	<38.6	7.2	<45.8	54.0	<195.0	500	PASS
24020	Н	<38.9	7.6	<46.5	54.0	<211.3	500	PASS

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Lower Channel 2402MHz



Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Middle Channel 2440MHz

Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	m]	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)		(4)	(5)		(7)		
4880	V	45.9	0.8	46.7	54.0	216.3	500	PASS
7320	V	<39.3	3.2	<42.5	54.0	<133.4	500	PASS
9760	V	<37.8	5.0	<42.8	54.0	<138.0	500	PASS
12200	V	<38.9	5.8	<44.7	54.0	<171.8	500	PASS
14640	V	<36.6	6.4	<43.0	54.0	<141.3	500	PASS
17080	V	<36.9	7.2	<44.1	54.0	<160.3	500	PASS
19520	V	<38.5	6.8	<45.3	54.0	<184.1	500	PASS
21960	V	<38.9	7.4	<46.3	54.0	<206.5	500	PASS
24400	V	<39.5	7.7	<47.2	54.0	<229.1	500	PASS
4880	Н	45.2	0.8	46.0	54.0	199.5	500	PASS
7320	Н	<39.8	3.2	<43.0	54.0	<141.3	500	PASS
9760	Н	<37.5	5.0	<42.5	54.0	<133.4	500	PASS
12200	Н	<39.1	5.8	<44.9	54.0	<175.8	500	PASS
14640	Н	<36.3	6.4	<42.7	54.0	<136.5	500	PASS
17080	Н	<37.6	7.2	<44.8	54.0	<173.8	500	PASS
19520	Н	<38.6	6.8	<45.4	54.0	<186.2	500	PASS
21960	Н	<39.3	7.4	<46.7	54.0	<216.3	500	PASS
24400	Н	<39.8	7.7	<47.5	54.0	<237.1	500	PASS

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Upper Channel 2480MHz

Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	m]	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)		(4)	(5)		(7)		
4960	V	43.7	1.0	44.7	54.0	171.8	500	PASS
7440	V	<38.1	3.2	<41.3	54.0	<116.1	500	PASS
9920	V	<39.8	5.2	<45.0	54.0	<177.8	500	PASS
12400	V	<39.2	5.7	<44.9	54.0	<175.8	500	PASS
14880	V	<36.3	6.3	<42.6	54.0	<134.9	500	PASS
17360	V	<36.8	7.2	<44.0	54.0	<158.5	500	PASS
19840	V	<38.7	6.9	<45.6	54.0	<190.5	500	PASS
22320	V	<39.0	7.5	<46.5	54.0	<211.3	500	PASS
24800	V	<39.4	7.8	<47.2	54.0	<229.1	500	PASS
4960	Н	48.3	1.0	49.3	54.0	291.7	500	PASS
7440	Н	<39.3	3.2	<42.5	54.0	<133.4	500	PASS
9920	Н	<38.7	5.2	<43.9	54.0	<156.7	500	PASS
12400	Н	<39.3	5.7	<45.0	54.0	<177.8	500	PASS
14880	Н	<36.7	6.3	<43.0	54.0	<141.3	500	PASS
17360	Н	<37.1	7.2	<44.3	54.0	<164.1	500	PASS
19840	Н	<38.6	6.9	<45.5	54.0	<188.4	500	PASS
22320	Н	<39.1	7.5	<46.6	54.0	<213.8	500	PASS
24800	Н	<39.4	7.8	<47.2	54.0	<229.1	500	PASS



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)
Lower Channel 2402MHz

Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/m]	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	(4)	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)	(-)	( )	(5)	(-)	(7)	(-)	
4804	V	43.7	0.5	44.2	54.0	162.2	500	PASS
7206	V	<38.9	3.1	<42.0	54.0	<125.9	500	PASS
9608	V	<38.0	4.7	<42.7	54.0	<136.5	500	PASS
12010	V	<37.4	5.8	<43.2	54.0	<144.5	500	PASS
14412	V	<36.2	6.5	<42.7	54.0	<136.5	500	PASS
16814	V	<36.9	7.1	<44.0	54.0	<158.5	500	PASS
19216	V	<38.1	6.4	<44.5	54.0	<167.9	500	PASS
21618	V	<38.6	7.2	<45.8	54.0	<195.0	500	PASS
24020	V	<38.9	7.6	<46.5	54.0	<211.3	500	PASS
4804	Н	44.8	0.5	45.3	54.0	184.1	500	PASS
7206	Н	<39.5	3.1	<42.6	54.0	<134.9	500	PASS
9608	Н	<41.1	4.7	<45.8	54.0	<195.0	500	PASS
12010	Н	<37.2	5.8	<43.0	54.0	<141.3	500	PASS
14412	Н	<36.2	6.5	<42.7	54.0	<136.5	500	PASS
16814	Н	<36.9	7.1	<44.0	54.0	<158.5	500	PASS
19216	Н	<38.1	6.4	<44.5	54.0	<167.9	500	PASS
21618	Н	<38.6	7.2	<45.8	54.0	<195.0	500	PASS
24020	Н	<38.9	7.6	<46.5	54.0	<211.3	500	PASS

Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006) Middle Channel 2440MHz

			0	Maria	1.1	N.4	1.1.1.10	Decult
Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/m]	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	(4)	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)			(5)		(7)		
4880	V	46.1	0.8	46.9	54.0	221.3	500	PASS
7320	V	44.0	3.2	47.2	54.0	229.1	500	PASS
9760	V	39.7	5.0	44.7	54.0	171.8	500	PASS
12200	V	<40.0	5.8	<45.8	54.0	<195.0	500	PASS
14640	V	<36.6	6.4	<43.0	54.0	<141.3	500	PASS
17080	V	<36.9	7.2	<44.1	54.0	<160.3	500	PASS
19520	V	<38.5	6.8	<45.3	54.0	<184.1	500	PASS
21960	V	<38.9	7.4	<46.3	54.0	<206.5	500	PASS
24400	V	<39.5	7.7	<47.2	54.0	<229.1	500	PASS
4880	Н	43.5	0.8	44.3	54.0	164.1	500	PASS
7320	Н	46.0	3.2	49.2	54.0	288.4	500	PASS
9760	Н	43.5	5.0	48.5	54.0	266.1	500	PASS
12200	Н	<40.8	5.8	<46.6	54.0	<213.8	500	PASS
14640	Н	<36.3	6.4	<42.7	54.0	<136.5	500	PASS
17080	Н	<37.6	7.2	<44.8	54.0	<173.8	500	PASS
19520	Н	<38.6	6.8	<45.4	54.0	<186.2	500	PASS
21960	Н	<39.3	7.4	<46.7	54.0	<216.3	500	PASS
24400	Н	<39.8	7.7	<47.5	54.0	<237.1	500	PASS

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Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006) Upper Channel 2480MHz

Test	Antenna	Reading	Corr.	Meas.	Limit	Meas.	Limit	Result
Frequency	Polarisation	[dBµV]	[dB/m]	value	[dBµV/m]	value	[µV/m]	(9)
[MHz]	(H/V)	(3)	(4)	[dBµV/m]	(6)	[µV/m]	(8)	
(1)	(2)			(5)		(7)		
4960	V	46.7	1.0	47.7	54.0	242.7	500	PASS
7440	V	48.7	3.2	51.9	54.0	393.6	500	PASS
9920	V	40.5	5.2	45.7	54.0	192.8	500	PASS
12400	V	<38.8	5.7	<44.5	54.0	<167.9	500	PASS
14880	V	<36.3	6.3	<42.6	54.0	<134.9	500	PASS
17360	V	<36.8	7.2	<44.0	54.0	<158.5	500	PASS
19840	V	<38.7	6.9	<45.6	54.0	<190.5	500	PASS
22320	V	<39.0	7.5	<46.5	54.0	<211.3	500	PASS
24800	V	<39.4	7.8	<47.2	54.0	<229.1	500	PASS
4960	Н	49.8	1.0	50.8	54.0	346.7	500	PASS
7440	Н	44.9	3.2	48.1	54.0	254.1	500	PASS
9920	Н	39.8	5.2	45.0	54.0	177.8	500	PASS
12400	Н	<39.4	5.7	<45.1	54.0	<179.9	500	PASS
14880	Н	<36.7	6.3	<43.0	54.0	<141.3	500	PASS
17360	Н	<37.1	7.2	<44.3	54.0	<164.1	500	PASS
19840	Н	<38.6	6.9	<45.5	54.0	<188.4	500	PASS
22320	Н	<39.1	7.5	<46.6	54.0	<213.8	500	PASS
24800	Н	<39.4	7.8	<47.2	54.0	<229.1	500	PASS

Measured value  $[dB\mu V/m]$  (5) = Reading of test receiver  $[dB\mu V]$  (3) + correction factor (dB) (4) (loss of cable between antenna and test receiver + antenna factor)

- (1) = test frequency
- (2) = polarization of the test antenna (Horizontal/Vertical)
- (6) = relevant limit [dB $\mu$ V/m]
- (7) = Measured value [ $\mu$ V/m] =10^[(Measured value [dB $\mu$ V/m] (5) /20)]
- (8) = relevant limit  $[\mu V/m]$
- (9) = comparison between Limit [ $\mu$ V/m] (7) and Radiated emission [ $\mu$ V/m] (7)

#### Results

From the measurement data obtained, the tested samples were considered to have **COMPLIED** with the requirements for the radiated emission measurements.

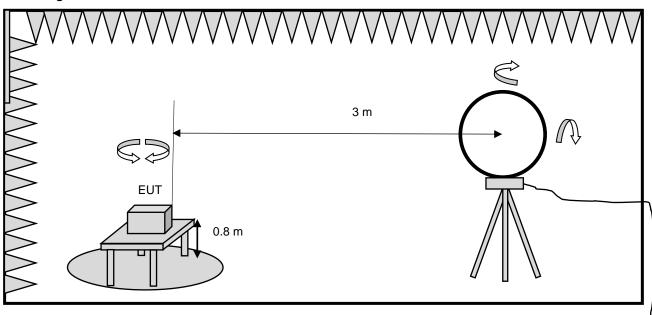


# Test equipment used:

Kind of equipment	Manufacturer	Туре	PKM- ident no.	Serial no.	Calibrated on (y-m-d)	Calibration interval
Signal Spectrum Analyzer 2Hz - 26,5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2017-12-13 2019-01-17	1 year
EMI-Test-Receiver	Rohde & Schwarz	ESR7 Instrument FW 3.36	11676	101694	2018-03-26	3 years
Software	PKM	PKM IT 5/6	-/-	V1.03.04	-/-	-/-
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-11-03	3 years
Antenna	Chase	CBL6111C	10022	1064	2017-01-30	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-11-06	3 years
Broadband- Hornantenne 15 - 26,5 (40) GHz	Schwarzbeck	BBHA 9170	11580	BBHA91706 21	2017-01-27	3 years
Broadband- Preamplifier 1-18 GHz	Schwarzbeck	BBV9718	11231	9718-002	2017-10-09	3 year
Preamplifier 18 - 40 GHz	CERNEX	CBM18403523	11679	29711	2018-05-07	1 year
Cable	el-spec GmbH	FlexCore-SMA11- SMA11-8000-ARM	11625	-/-	2017-12-07	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI- ANECHOIC- CHAMBER"	11609	004/16	2016-03-23	3 years

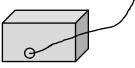
All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of radiated emissions was made with instruments conforming to American National Standard Specification, ANSI C63.10-2013.

### **Block diagram Radiated emissions**



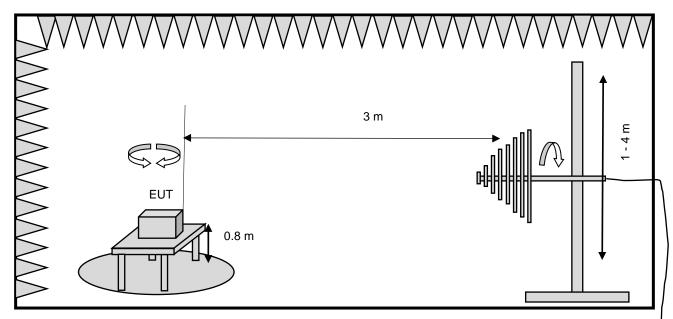
Semi anechoic chamber with absorber and ferrite tiles

Test receiver



tested frequency range 9 kHz - 30 MHz

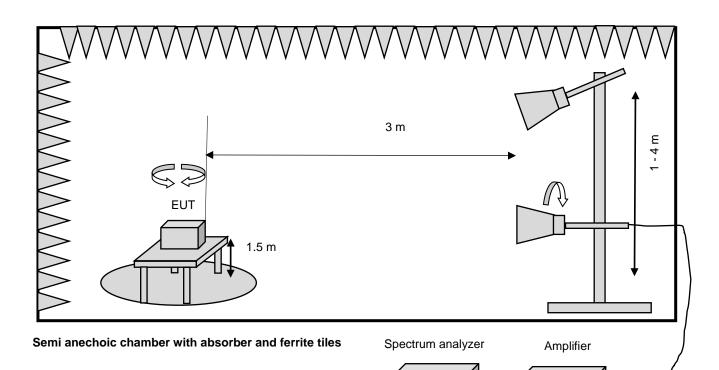




Test receiver

Semi anechoic chamber with absorber and ferrite tiles

tested frequency range 30 MHz - 1000 MHz



Θ

Ω

G

tested frequency range > 1000 MHz



#### Measurement uncertainty

# according to CISPR 16-4-2 Edition 2.0 2011-06

Measurement	calculated uncertainty U <sub>lab</sub>	Specified CISPR uncertainty according CISPR 16-4- 2 Edition 2.0 2011-06, table 1 U <sub>CISPR</sub>
Radiated disturbance (electric field strength in the SAC) 30 MHz to 1 000 MHz	4,7 dB	6,3 dB
Radiated disturbance (electric field strength in the SAC) 1 GHz to 26.5 GHz	4.1 dB	-/-

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).

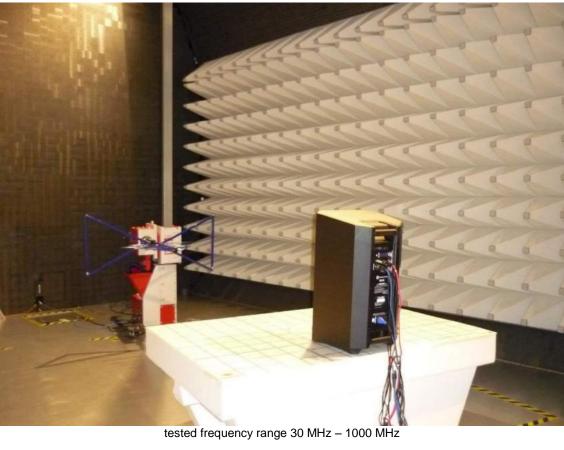
# Photo(s) of test setup

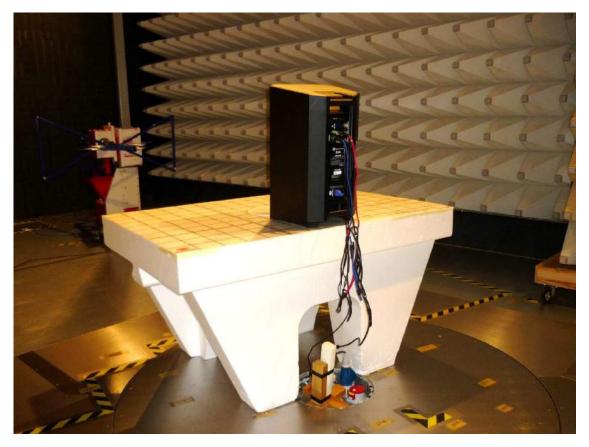
Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)



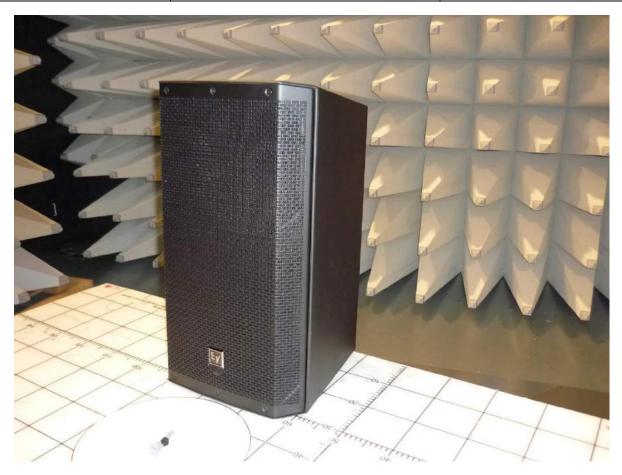
tested frequency range 9 kHz - 30 MHz













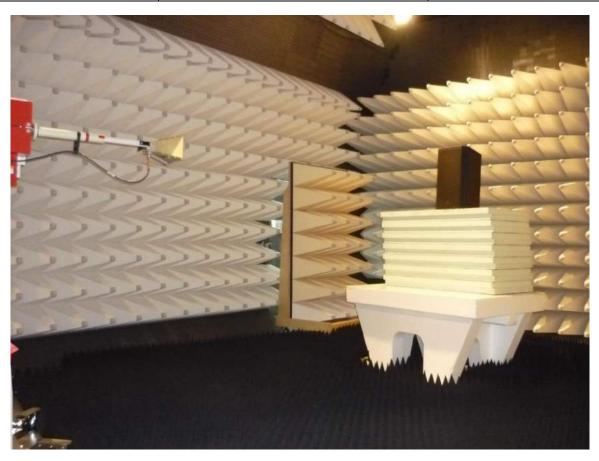




tested frequency range >1000 MHz





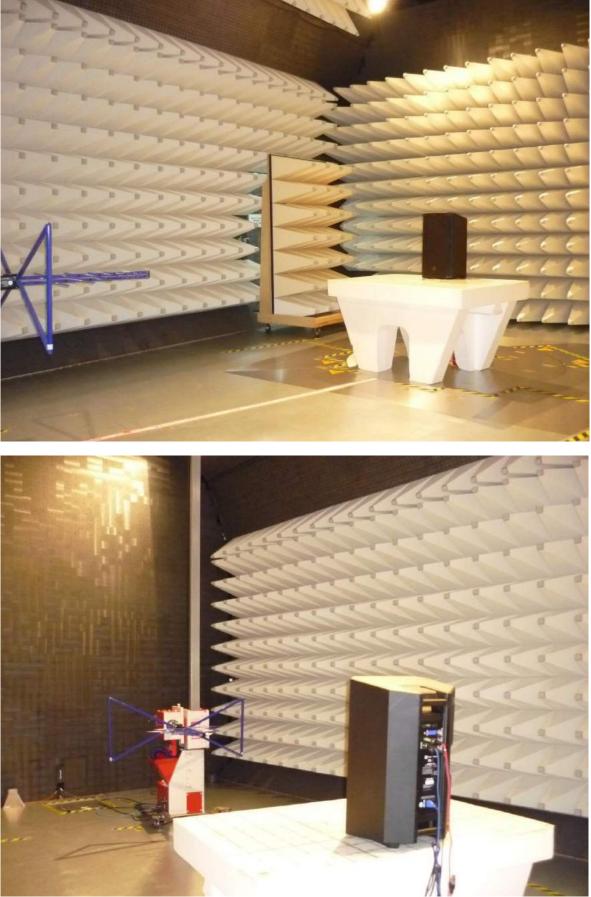


Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)



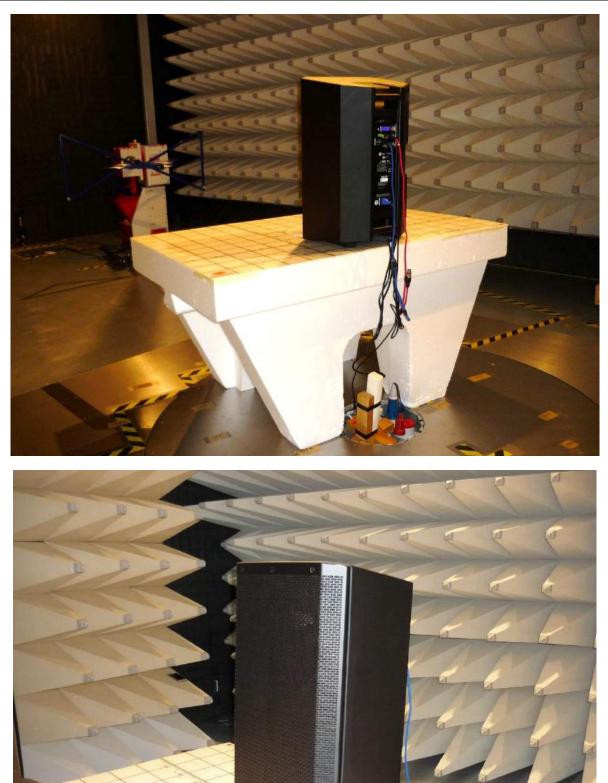
tested frequency range 9 kHz - 30 MHz



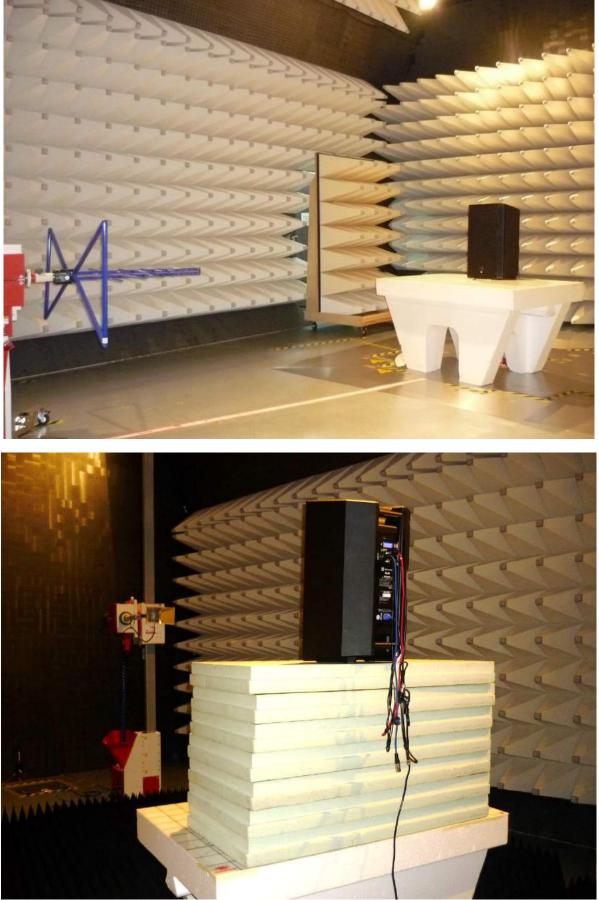


tested frequency range 30 MHz - 1000 MHz



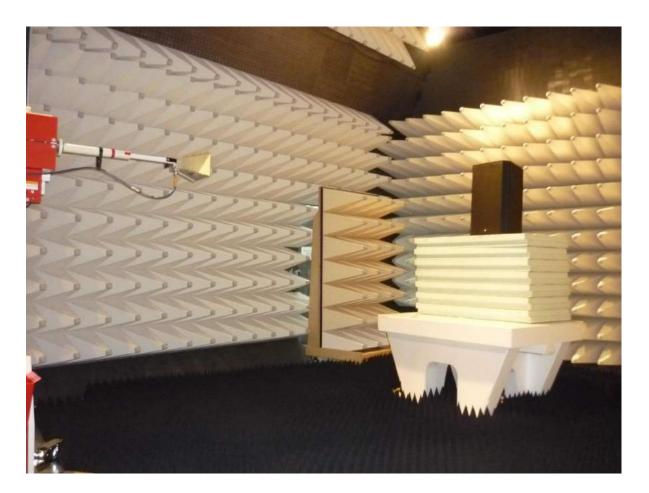






tested frequency range >1000 MHz





# 8. Additional provisions to the general radiated emission limitations §15.215

The additional provisions to the general radiated emission limitations are fulfilled.



### 9. Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz §15.247.

The measurements for Version ZLX-12BT and ZLX-15BT had been performed on: 20 dB/99 % Bandwidth: Mar 14, 2019. hopping channel carrier frequencies separation: Mar 18, 2019, Apr 02, 2019 hopping channel frequencies: June 11, 2018 Time of Occupancy (Dwell Time): Mar 15,2019 Maximum peak conducted output power: Mar 19, 2019 Conducted RF band edge emissions: Oct 25, 2018 Spurious emission: Mar 19,2019

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

The separation is 1 MHz, which is within the two-thirds of the 20 dB bandwidth (0.677 MHz) of the hopping channel and the 20 dB bandwidth (1.016 MHz) of the hopping channel.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)

Operating	Modulation	20 dB	99 %	channel	Channel separation limit (two-	Result
frequency	/Data rate	bandwidth	bandwidth	separation	thirds of the 20 dB bandwidth)/	
[MHz]		[MHz]	[MHz]	[MHz]	20 dB bandwidth [MHz]	
2402	Basic rate, GFSK with 1 MBit/s	0.9334	0.8683	1000	>0.9334 (20 dB bandwidth)	PASS
2441	Basic rate, GFSK with 1 MBit/s	0.9421	0.8596	1000	>0.9421 (20 dB bandwidth)	PASS
2480	Basic rate, GFSK with 1 MBit/s	0.9465	0.8640	1000	>0.9465 (20 dB bandwidth)	PASS
2402	EDR, π/4-DQPSK with 2 MBit/s	1.2373	1.1852	1000	>0.8249 (two-thirds of the 20 dB bandwidth)	PASS
2441	EDR, π/4-DQPSK with 2 MBit/s	1.2547	1.1852	1000	>0.8365 (two-thirds of the 20 dB bandwidth)	PASS
2480	EDR, π/4-DQPSK with 2 MBit/s	1.2504	1.1896	1000	>0.8336 (two-thirds of the 20 dB bandwidth)	PASS
2402	EDR, 8-DPSK with 3 MBit/s	1.2547	1.1679	1000	>0.8365 (two-thirds of the 20 dB bandwidth)	PASS
2441	EDR, 8-DPSK with 3 MBit/s	1.2634	1.1809	1000	>0.8423 (two-thirds of the 20 dB bandwidth)	PASS
2480	EDR, 8-DPSK with 3 MBit/s	1.2547	1.1852	1000	>0.8365 (two-thirds of the 20 dB bandwidth)	PASS

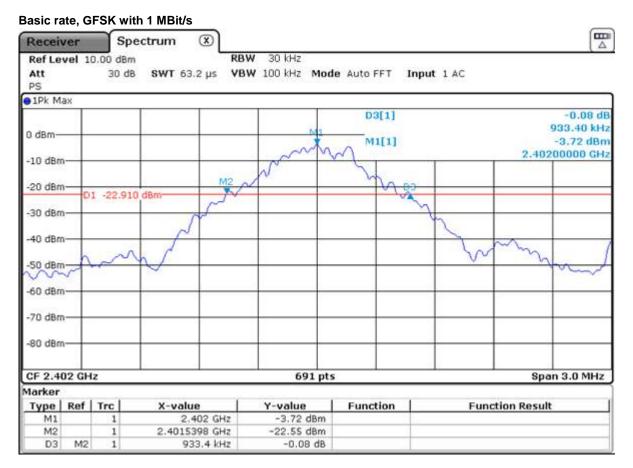
Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

Operating frequency	Modulation /Data rate	20 dB bandwidth	99 % bandwidth	channel separation	Channel separation limit (two- thirds of the 20 dB bandwidth)	Result
[MHz]		[MHz]	[MHz]	[MHz]	[MHz]	
2402	Basic rate, GFSK with 1 MBit/s	0.9030	0.8683	1000	>0.9030 (20 dB bandwidth)	PASS
2441	Basic rate, GFSK with 1 MBit/s	0.9204	0.8640	1000	>0.9204 (20 dB bandwidth)	PASS
2480	Basic rate, GFSK with 1 MBit/s	0.9161	0.8596	1000	>0.9161 (20 dB bandwidth)	PASS
2402	EDR, π/4-DQPSK with 2 MBit/s	1.2677	1.1809	1000	>0.8451 (two-thirds of the 20 dB bandwidth)	PASS
2441	EDR, π/4-DQPSK with 2 MBit/s	1.2417	1.1896	1000	>0.8278 (two-thirds of the 20 dB bandwidth)	PASS
2480	EDR, π/4-DQPSK with 2 MBit/s	1.2460	1.2113	1000	>0.8307 (two-thirds of the 20 dB bandwidth)	PASS
2402	EDR, 8-DPSK with 3 MBit/s	1.2547	1.1679	1000	>0.8365 (two-thirds of the 20 dB bandwidth)	PASS
2441	EDR, 8-DPSK with 3 MBit/s	1.2590	1.1896	1000	>0.8393 (two-thirds of the 20 dB bandwidth)	PASS
2480	EDR, 8-DPSK with 3 MBit/s	1.2634	1.2026	1000	>0.8423 (two-thirds of the 20 dB bandwidth)	PASS



#### a) 20 dB bandwidth:

# Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)



Receiv	ver	S	oectrum (	×						
Ref Le Att PS	vel 1	0.00 dB 30 d		RB µs VB	사람님은 사람은 것을 알았는 것이 좋다.	de Auto FFT	Inpu	t 1 AC		(=
●1Pk M	ах									
0 dBm-					MI	D3[1]			2.44	0.07 dB 942.10 kHz -2.45 dBm 100000 GHz
-20 dBm		1 -22.9	10 dBm	M2	N	~~	103			
-30 dBrr			1	5	-		N	2		
-40 dBm	6	~~	w					7	m	
-50 dBn	5								2	m
-70 dBm	+									
-80 dBrr	+				+ +					
CF 2.4	41 GH	z		-	691 p	ts		, i i i i i i i i i i i i i i i i i i i	Sp	an 3.0 MHz
Marker	21									
Type	Ref	Trc	X-value		Y-value	Function		Fun	ction Resu	lt
M1		1	2.44	1 GHz	-2.45 dBm	_				
M2		1	2,440531	and the local operation of the local distance	-22.34 dBm	-				
D3	M2	1	942	.1 kHz	0.07 dB	2	_			

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Recei	ver	Sp	ectrum	×					
Att PS		0.00 dBn 30 dI		RB µs VB	W 30 kHz W 100 kHz Mod	e Auto FFT I	nput 1 AC		
1Pk M	ax								
0 dBm-	0				m	D3[1]		-	-0.43 dB 46.50 kHz 2.91 dBm 0000 GHz
-20 dBn -30 dBn	n-D	1 -22.91	0 dBm	MZ	N	ma	<u></u>		
-30 dBn -40 dBn	n	$\sim$	h				1	~	
-40 dBn -50 dBn -60 dBn -70 dBn								h	m
-70 dBn	n						_		
-80 dBn	n								
CF 2.4	8 GHz				691 pts			Span	3.0 MHz
Marker			A-14-44-14-14-14-14	12					
Type	Ref	Trc	X-value		Y-value	Function	Fun	ction Result	
M1		1		H8 GHz	-2.91 dBm				
M2		1	2.479531	or other states and the second second	-22.83 dBm				
D3	M2	1	946	.5 kHz	-0.43 dB				

# EDR, $\pi$ /4-DQPSK with 2 MBit/s

Receiv	ver	Sp	ectrum	$\otimes$					
Ref Le Att PS	vel 1	0.00 dBm 30 dB		RB 2 µs VB	W 30 kHz W 100 kHz Mode	e Auto FFT I	nput 1 AC		
1Pk M	ax								
0 dBm—	-				M12	D3[1]		-0.34 dB 1,23730 MHz -5.68 dBm 2.40200000 GHz	
-10 dBm				m	which	Ann	~		
-20 dBm		1 -25.68	dBm-	1			No3		
-30 dBm			ſ						
-40 dBm	1-						1		
-50 dBm	2	S						tur lum	
-60 dBrr	-		-						
-70 dBm	-								
-80 dBm	+								
CF 2.4	02 GH	z			691 pts	8		Span 3.0 MHz	
Marker									
Type M1	Ref		2.402 GHz		-5.68 dBm	Function	Function Result		
M2		1	2.4013792 GHz		-24.76 dBm				
D3	M2	1	1.2373 MHz		-0.34 dB				

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D3

M2

1

1.2504 MHz

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Receive	er	Spectru	ım	×									
COLORADO DE MARINE	el 10.00	and the second second			RBW	30 kHz							[
Att	30	db SV	NT 63.	2 µs	VBW	100 kHz	Mode	Auto FF	т	Input 1 AC			
PS PS Max													
TPK Max						5	-	D3[	11				-0.26 dB
0 dBm							MI		-			3	.25470 MHz
0 ubin							X	M1	[1]			V. 1978	-3.87 dBm
-10 dBm-	-	-			0	A	An	And	2			2.44	100000 GHz
00 10-				1 m	~ ~	14 5	1.8		wh-	2			
-20 dBm-	D1 -23	.860 dBm					_			403			-
-30 dBm-			1	<u> </u>	-		+				_		-
10 10-		1	1										
-40 dBm-	ww	mm									2C	w	m
-50 dBm-	-			<u> </u>			+						-
-60 dBm-							1						
-70 dBm-				<u> </u>	_		+				_		
-80 dBm-													
05 0 111													0.0 000
CF 2.441 Marker	GHZ				_	69	1 pts		_			sp	an 3.0 MHz
	Ref   Trc	1 >	(-value		1	Y-value	1	Functi	on		Fund	tion Resu	lt
M1	1		2.4	41 GHz		-3.87 (	a ha shi da ba ana a a sha a						
M2 D3	M2 1		.44036	61 GHz 47 MHz		-24.16 (							
03	1912 1	4	1.20	47 MP12	61. <u> </u>	-0.26	ub		_	1	_		
Receive	Street and street	Spectru	ım	×									
Att PS	el 10.00 30		WT 63.		RBW VBW	30 kHz 100 kHz	Mode	Auto FF	т	Input 1 AC			
1Pk Max													
								D3[	1]				0.39 dB
0 dBm							MI					1	.25040 MHz
							Å	M1	[1]			2.48	-4.10 dBm 000000 GHz
-10 dBm-	-	-			~	2m	42	that	m				
-20 dBm-	_		MO	1						103	_		-
	D1 -24	.100 dBm	1		-	2	+			Mrs .			
-30 dBm-	-		1		-	5	-					2	2 0 2
-40.08m7		~	1			-	-			1	A		100000
~~~~			3								~	w	P
-50 dBm-	-				-		+				-		-
-60 dBm-						-						-	
-00 0011													
-70 dBm-	-			<u> </u>	-		+				_		-
-80 dBm-												_	
-80 08/11-													
CF 2.48	CH2					60	1 pts						an 3.0 MHz
Marker	0112					09	r pts					эр	
	Ref   Trc		(-value	3	1	Y-value	1	Functi	on		Fund	tion Resu	lt
	1			48 GHz	8	-4.10 (	fBm						
M1 M2	1		.47936	C 4	21	-24.42 (	in						

0.39 dB



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# EDR, 8-DPSK with 3 MBit/s

Receiv	er	Sp	ectrum 🗵	ס				E A
Ref Lev Att PS	el 10	).00 dBr 30 dI		RBW JS VBW		de Auto FFT	Input 1 AC	
1Pk Ma	x		78 De		85 IS			
0 dBm—					MI	D3[1] M1[1]		-0.46 dl 1.25470 MH -5.68 dBn
-10 dBm-	-				Ant	A		2.40200000 GH
-20 dBm-			M2	~~		m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-30 dBm-		-25.68	30 dBm				1	
-40 dBm-	~						1	mm
-50 dBm-		han						
-60 dBm-	+		+ +					
-70 dBm-	+							
-80 dBm-	-							
CF 2.40	2 GH:	z			691 p	ts		Span 3.0 MHz
Marker								
Type	Ref	Trc	X-value	1	Y-value	Function	F	unction Result
M1		1	2.402	and the second sec	-5.68 dBm		1.00	2011 XIII 2020 1020 1020 1020 1020 1020 1020 1
M2 D3		1	2.4013618	and the second sec	-24.80 dBm			
	M2	1	1.2547	MH2	-0.46 dB	01	1	

Receiv	/er	S	pectrum	(X)									
Ref Le	vel 1	0.00 dB 30 d		63.2 µs	RBW	30 kHz 100 kHz	Mode	Auto FF	ाः ।	Input 1	AC		
PS				p.									
91Pk M	эх		10.	100		3							
0 dBm—							Ma	D3[					-0.64 dB
-10 dBrr	1					A	A	A M1	11			2.4	-3.85 dBn +100000 GH:
-20 dBrr				MP	~~~	~		- ww	h	1			
-30 dBrr		1 -23.8	60 dBm	4				_		-			
-40 dBr	A	2-	N	<u> </u>			+			_	The	ma	· ·····
-50 dBm			-	-	_	-				_		- Y	
-60 dBrr	+		-			-	+	-		-		-	-
-70 dBm	+			-			-			+			-
-80 dBm	+			_			+-						
CF 2.4	+1 GH	z				69	01 pts	( )		-		S	pan 3.0 MHz
Marker													
Type	Ref	Trc	X-v	alue		Y-value	1	Function	on		Fur	nction Res	ult
M1		1		2.441 GH	z	-3.85	dBm			1	0,0103		
M2		1	2.44	03531 GH	z	-23.54	dBm						
D3	M2	1	1	.2634 MH	z	-0.64	4 dB						



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Receiv	ver	Spe	ectrum 🛞							
Ref Le Att PS	vel 1	0.00 dBm 30 dB		RBW 30 k VBW 100 k		Auto FFT	Input 1	AC		
91Pk M	ax									
0 dBm-	n				n An	D3[1]				-0.53 dB .25470 MHz -4.09 dBm 000000 GHz
-20 dBm	0	1 -24.090	M2 ) dBm			vin	- more			
-99.dBn	w	~~~	~~				X	200	www.v	mo.
-50 dBm										
-70 dBm	n				-	-				
-80 dBm	n									
CF 2.4	8 GHz			867/16	691 pts	¢1			Spa	an 3.0 MHz
Marker Type	Ref	Trc	X-value	Y-va	lue	Function	1	Fun	ction Resul	t
M1 M2		1	2.48 G 2.4793575 G	Hz -4.	09 dBm 06 dBm					
D3	M2	1	1.2547 M	Hz -I	0.53 dB					

### 20 dB bandwidth:

Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

### Basic rate, GFSK with 1 MBit/s

Receiv	ver	Sp	ectrum	×				
Ref Le Att PS	vel 1	0.00 dBm 30 dB		RB 2 µs VB	W 30 kHz W 100 kHz Mod	e Auto FFT I	nput 1 AC	
O 1Pk M	ах							
0 dBm-					Mª	D3[1]		-0.27 dB 903.00 kHz -0.76 dBm 2.40199570 GHz
-10 dBm	1			M2	N	U.		
-20 dBm	0	1 -20.76	) dBm	Jul		D3		
-30 dBm				5			7	
-40 dBm	1	m	5		-		h	m /
50 dBr	F	~	~					1 w
-60 dBm	+		-			-	-	
-70 dBm	-							
-80 dBrr	-						-	
CF 2.4	02 GH	z			691 pts		;	Span 3.0 MHz
Marker								
Туре	Ref		X-value		Y-value	Function	Fund	tion Result
M1		1	2.40199	and the barry has been been as the second second	-0.76 dBm			
M2	140	1	2.40154	And a second	-20.24 dBm			
D3	M2	1	903	3.0 kHz	-0.27 dB			

D3

M2

1

916.1 kHz

-0.19 dB

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Receiver	Spe	ectrum 🛞				
Ref Level 1		and a second	BW 30 kHz			
Att	30 dB			e Auto FFT	nput 1 AC	
1Pk Max						
			M1	D3[1]		-0.26 dB
0 dBm		<u> </u>	mt	M1[1]		920.40 kHz 0.71 dBm
-10 d8m-			1	M		2.44099570 GHz
		M2 /	~~	4 03		
-20 d8m-0	1 -19.300	dBm		200		
-30 dBm		1			Z	
		$\sim$			~	
-40 dBm	M	N		1		m
-40 dBm	<u>~</u>					- Chan
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
-60 dBm-						
-70 dBm					_	
-80 dBm						
-80 08m						
CF 2.441 GH	Iz		691 pts			Span 3.0 MHz
Marker				51		
Type   Ref	Tral	X-value	V uslus		Eup	ction Result
			Y-value	Function	run	ction nostin
M1	1	2.4409957 GHz	0.71 dBm	Function	run	crion no sur
M1 M2 D3 M2	1 1 1	2.4409957 GHz 2.4405355 GHz 920.4 kHz		Function	Pun	
M1 M2 D3 M2 Receiver Ref Level 1 Att	1 1 Spe	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum	0.71 dBm -19.40 dBm		nput 1 AC	
M1 M2 D3 M2 Receiver Ref Level 1 Att PS	1 1 0.00 dBm	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz		a concert	
M1 M2 D3 M2 Receiver Ref Level 1 Att PS	1 1 0.00 dBm	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod		a concert	-0.19 dB
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max 0 dBm	1 1 0.00 dBm	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz	e Auto FFT II	a concert	-0.19 dE 916.10 kHz
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max 0 dBm	1 1 0.00 dBm	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II	a concert	-0.19 dB
M1 M2 D3 M2 Receiver Ref Level 1 Att PS PIPk Max 0 dBm -10 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS PIPk Max 0 dBm -10 dBm	1 1 0.00 dBm	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS 1Pk Max 0 dBm -10 dBm -20 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS 1Pk Max 0 dBm -10 dBm -20 dBm 0 -30 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS 1Pk Max 0 dBm -10 dBm -20 dBm 0 -30 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS 1Pk Max 0 dBm -10 dBm -20 dBm 0 -30 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max • 1Pk Max • 0 dBm -10 dBm -20 dBm -30 dBm -30 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS 1Pk Max 0 dBm -10 dBm -20 dBm 0 -30 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max • 1Pk Max • 10 dBm -10 dBm -20 dBm -30 dBm -40 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Ref Level 1 Att PS • 1Pk Max • 10 dBm -10 dBm -20 dBm -30 dBm -30 dBm -40 dBm -70 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max • 10 dBm -10 dBm -20 dBm -30 dBm -40 dBm -60 dBm	1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II D3[1] M1[1]	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS PIPk Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -70 dBm -70 dBm	1 1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II	a concert	-0.19 dE 916.10 kHz 1.10 dBn 2.47999570 GHz
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max • 10 dBm -10 dBm -20 dBm -30 dBm -30 dBm -40 dBm -50 dBm -70 dBm -70 dBm	1 1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II	a concert	-0.19 dE 916.10 kHz 1.10 dBn
M1 M2 D3 M2 Receiver Ref Level 1 Att PS • 1Pk Max • 10 dBm -10 dBm -20 dBm -30 dBm -30 dBm -40 dBm -50 dBm -70 dBm -70 dBm	1 1 1 0.00 dBm 30 dB	2.4409957 GHz 2.4405355 GHz 920.4 kHz ectrum SWT 63.2 μs VI	0.71 dBm -19.40 dBm -0.26 dB BW 30 kHz BW 100 kHz Mod	e Auto FFT II		-0.19 dE 916.10 kHz 1.10 dBn 2.47999570 GHz

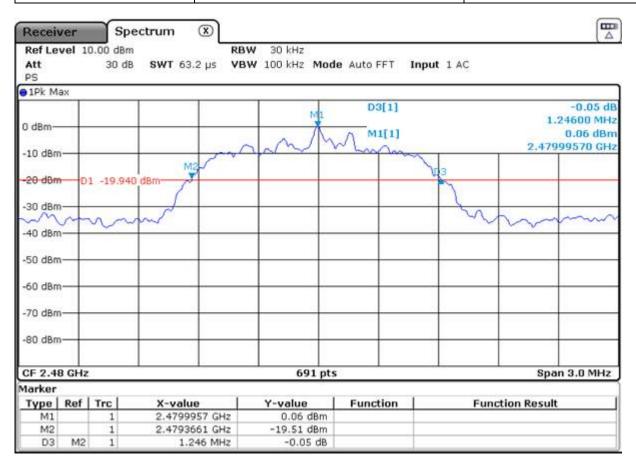


### EDR, $\pi$ /4-DQPSK with 2 MBit/s

Receiv	ver	Spe	ectrum 🛞				
Contraction of the		0.00 dBm	L,	RBW 30 kHz			1-
Att		30 dB	SWT 63.2 µs	BW 100 kHz Mo	de Auto FFT	Input 1 AC	
O 1Pk Ma	ах		92 - 24	N2 60			
-					D3[1]		-0.09 dB
0 dBm-	_			M1			1.26770 MHz
				A	M1[1]		-2.77 dBm 2.40199570 GHz
-10 dBm	n			non	polyn	m	2.40199370 GH2
-20 dBm	n	00 770	Ma			100	
		-22.770	dBm				
-30 dBm	n- -						
-40 dBm	n		1			-	the star of
m	S	sm	~				the second second
-50 dBm	n						
-60 dBm	n		-	_			_
1995 - 30							
-70 dBm	n						
-80 dBm							
CF 2.40	02 GH	z		691 pt	s		Span 3.0 MHz
Marker							
Туре	Ref		X-value	Y-value	Function	E FI	unction Result
M1 M2		1	2.4019957 GHz 2.4013705 GHz	-2.77 dBm -22.56 dBm			
D3	M2	1	1.2677 MHz	-0.09 dB			
Att	vel 10	0.00 dBm 30 dB		BW 30 kHz /BW 100 kHz Mod	le Auto FFT	Input 1 AC	
PS PS Ma	50						
DIPK M	ax		1 1		D3[1]		-0.04 dB
0.40				Ma	DOLL		1.24170 MHz
0 dBm-				. A.	A M1[1]		-0.57 dBm
-10 dBm	n			non	M1[1]	~	2.44099570 GHz
			Ma		2.53	13	
-20 d8m	D	-20.570	dBm	-		-	
-30 dBm	n						
m	m	s m	~			20	hann
-40 dBm							
-50 dBm	n						
-60 dBm	n						
-70 dBm	n						
-80 dBm	0						
CF 2.44	41 CH	7		691 pt			Span 3.0 MHz
Marker	ri un			bar ht			apon 3.0 MHz
Type	Ref	Trc	X-value	Y-value	Function	I Fu	Inction Result
M1		1	2.4409957 GHz	-0.57 dBm			
M2 D3	M2	1	2.4403661 GHz 1.2417 MHz	-19.95 dBm -0.04 dB		_	
	M2	1	1.2417 MH2	=11.04.dB			

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### EDR, 8-DPSK with 3 MBit/s

Receiv	/er	Spe	ectrum 🛞	Î				
Att PS		0.00 dBm 30 dB		RBW VBW	S 7878 (S. 177)	e Auto FFT In	nput 1 AC	
9 1Pk M	эх		1					
0 dBm-					Anth	D3[1]		-0.17 dB 1.25470 MHz -2.79 dBm 2.40199570 GHz
-20 dBm	D	1 -22.810	M2	~~~			he	
-30 dBn	+							
-40 dBm	~ ~	har					he	m
-60 d8n								
-70 dBr	+		· · · · ·				-	
-80 dBm	+							
CF 2.4	)2 GH	z			691 pts	3		Span 3.0 MHz
Marker				10				
Туре	Ref		X-value		Y-value	Function	Fun	ction Result
M1		1	2.4019957 G		-2.79 dBm			
M2 D3	M2	1	2.4013575 G		-22.10 dBm			
03	M2	1	1.2547 M	H2	-0.17 dB			

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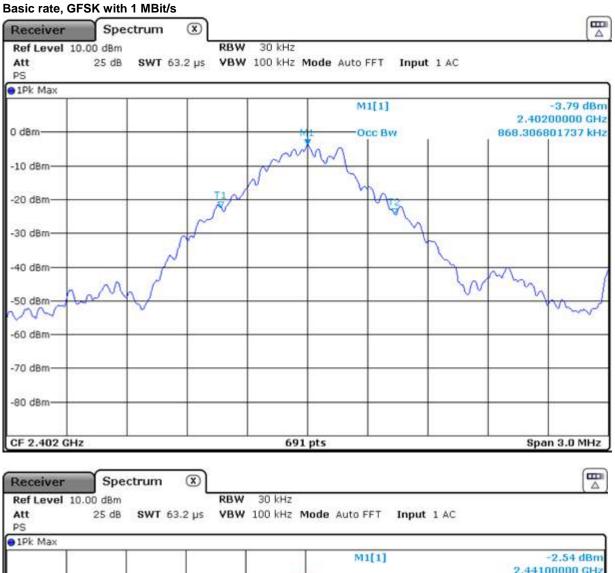
Recei	ver	Sp	ectrum	×				
Att PS		0.00 dBn 30 dB		RB µs VB		e Auto FFT I	nput 1 AC	Va Va
1Pk M	lax							
0 dBm-	n			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	D3[1]		0.27 d 1.25900 MF -0.56 dB 2.44099570 GF
-20 dBr	n - 0	1 -20.56	0 d8m	2			183 1	
-30 dBr	0	m					the	man
-40 dBr -50 dBr				-				
-60 dBr	n							
-70 dBr	n						2	
-80 dBr	n			-				
CF 2.4	41 GH	z			691 pts	1		Span 3.0 MHz
Marker	S		0.00					
Туре	Ref	Trc	X-value	2	Y-value	Function	Fur	nction Result
M1		1	2,440995		-0.56 dBm			
M2		1	2.440348		-20.28 dBm			
D3	M2	1	1,25	9 MHz	0.27 dB			

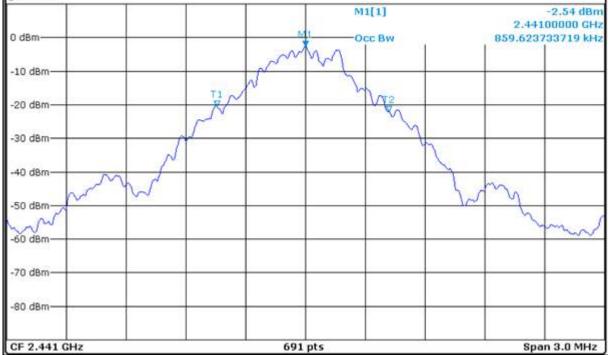
Receiv	ver	Sp	ectrum	X				
Ref Le Att PS	vel 1	0.00 dBr 30 d		RB µs VB	W 30 kHz W 100 kHz Mod	e Auto FFT	Input 1 AC	3.
O 1Pk M	ax							
0 dBm-	_				MI	D3[1]		-0.63 dE 1.26340 MHz 0.07 dBm
-10 dBm	-			sor and	m mm	- Lyn	$\sim$	2.47999570 GHz
-20 dBm	n D	1 -19.94	0 dBm	<u> </u>	-		No3	
-30 dBm	1	m		-	0		1 h	man
-40 dBm	1							
-50 dBm	1-							
-60 dBm	-				-	-		
-70 dBm								-
-80 dBn	,+-							_
CF 2.4	8 GHz				691 pts	. I		Span 3.0 MHz
Marker								
Туре	Ref		X-value		Y-value	Function	Fi Fi	unction Result
M1		1	2.479995		0.07 dBm			
M2		1	2.479348	and plane period of the state of the local	-19.56 dBm			
D3	M2	1	1.263	4 MHz	-0.63 dB	1	1	



### b) 99% bandwidth:

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)

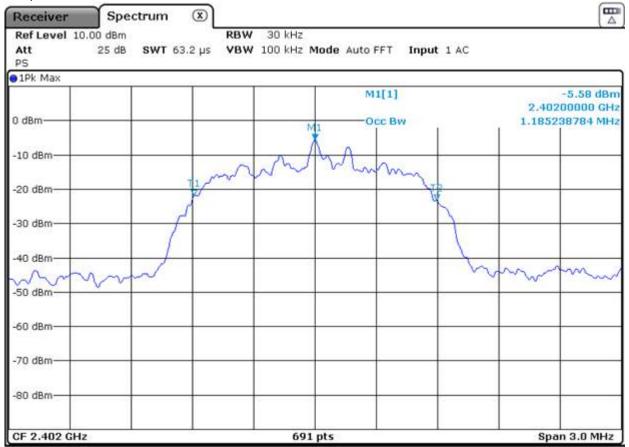




Test report no.: <b>18/09-0026B</b>	Page 45 of 94 pages

Receiver	Spect	rum	×						
Ref Level 10.0 Att PS		SWT 63.		W 30 kH W 100 kH	z z <b>Mode</b> Aut	o FFT Inpu	t 1 AC		
1Pk Max				27	2				
0 dBm					MI	M1[1] Occ Bw			-2.83 dBr 00000 GH 67728 kH
-10 dBm	-+			m	www	2			
-20 dBm			N			ME			
-30 d8m			1	-	1-	M	4		
-40 dBm-	m	1		-		-	1	m	
-50 dBm		~					1	h	m
-60 dBm									
-80 dBm									
CF 2.48 GHz					591 pts			Sna	n 3.0 MHz

### ι, π



TESTED IN GERMANY	Test report no.: <b>18/09-0026B</b>	Page 46 of 94 pag
Receiver Spectrum Ref Level 10.00 dBm Att 25 dB SWT 63. PS	RBW 30 kHz 2 µs VBW 100 kHz Mode Auto FFT Input 1	I AC
1Pk Max	M1[1]	-3.95 dBm
) dBm	Occ Bw	2.44100000 GHz 1.185238784 MHz
10 dBm	manum	
20 dBm		
30 dBm		
0 dBm mm		Munu
0 dBm		
0 dBm		
0 dBm		
30 dBm		
F 2.441 GHz	691 pts	Span 3.0 MHz
eceiver Spectrum	$\overline{\mathbf{x}}$	

🔵 1Pk Max							
0 dBm				M1[1]	, r		-4.01 dBm 000000 GHz 80318 MHz
-10 dBm		m	m	hann	~		
-20 dBm	Ţ	1/			- TE		
-30 dBm					1		
-40,68m	m		· · · · · ·		JV-	w	www
-50 dBm							
-60 dBm							
-70 dBm							
-80 dBm							1
CF 2.48 GHz			691	pts		Spa	in 3.0 MHz



# EDR, 8-DPSK with 3 MBit/s

Receiver	and the second second second	ctrum	×					
Ref Level Att	10.00 dBm 25 dB	SWT 63.	RBW 2 µs VBW		ode Auto FFT	Input 1 AC		
PS 1Pk Max								
					M1[1]		1.000	-5.56 dBm
0 dBm	· · · · · · · · ·				Occ By			200000 GHz 72648 MHz
545543				M1			1	
-10 dBm-				Ant	MA		-	
			in	w v.	m	V +0		
-20 dBm			Y			Vi		
-30 dBm	· ·		Y					
-50 0611		/				1		
-40 dBm-								
mon	han	M				m	mon	m
-50 dBm-		3 <sup>2</sup>	-	-			-	
			1					
-60 dBm								
-70 dBm								
2.5. TX TX TX 10. X								
-80 dBm								
CF 2.402 G	Hz			691 p	its		Spa	n 3.0 MHz
Receiver	Spe	ctrum	×					
Ref Level Att	10.00 dBm	ctrum SWT 63.	RBW		ode Auto FFT	Input 1 AC		
Att PS	10.00 dBm		RBW		ode Auto FFT	Input 1 AC		
Ref Level Att	10.00 dBm		RBW		ode Auto FFT M1[1]	Input 1 AC		-3.97 dBm
Ref Level Att PS 1Pk Max	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max	10.00 dBm		RBW				2.441	-3.97 dBm
Ref Level Att PS 1Pk Max 0 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level           Att           PS           IPk Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level           Att           PS           IPk Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level           Att           PS           1Pk Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm           -60 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level Att PS	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level           Att           PS           1Pk Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm           -60 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz
Ref Level           Att           PS           1Pk Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm           -60 dBm           -70 dBm	10.00 dBm		RBW		M1[1]		2.441	-3.97 dBm 00000 GHz

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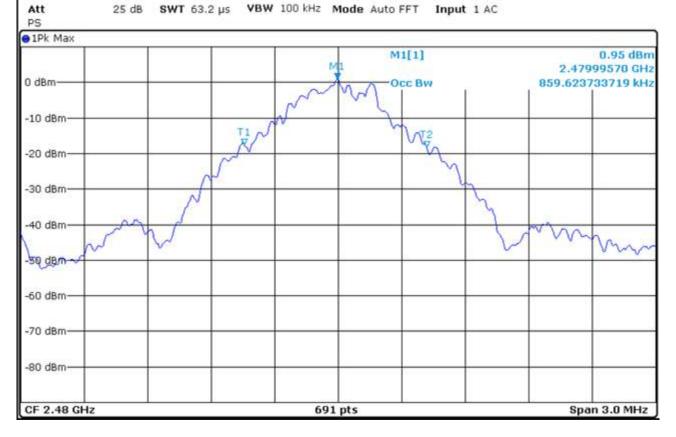
Receiver	Spee	trum	×					
Ref Level 10 Att PS		<b>SWT</b> 63	RBN 8.2 µs VB1		Mode Auto FFT I	nput 1 AC		
1Pk Max								
0 dBm					M1[1]			-4.00 dBm 000000 GHz 238784 MHz
-10 dBm			~~~~	And	ham			
-20 dBm						T		
-30 dBm		-				4	-	
vederer h	~~~	~	-	1		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	how
-50 d8m								
-60 dBm								
-80 dBm			-					
CF 2.48 GHz				69	L pts		Sn	an 3.0 MHz

**99% bandwidth:** Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

### Basic rate, GFSK with 1 MBit/s

Receiver	Spectru	um 🛞						
RefLevel 10.0 Att PS		WT 63.2 µs	RBW 30 kH VBW 100 kH	iz Iz <b>Mode</b> Auto	FFT Inpu	t 1 AC		
●1Pk Max								
0 dBm				M1	11[1] Dec Bw	1	2.401	-0.87 dBm 99570 GHz 01736 kHz
-10 dBm			T1 N	1	~			
-20 d8m		~	N N		Ma			
-30 dBm					(	1		
-40 dBm	~^	f -				Ja	an	(
350 UBm	my					V.*	h	had
-60 dBm								
-70 dBm				_	-		-	
-80 dBm								
CF 2.402 GHz				691 pts			Spa	n 3.0 MHz

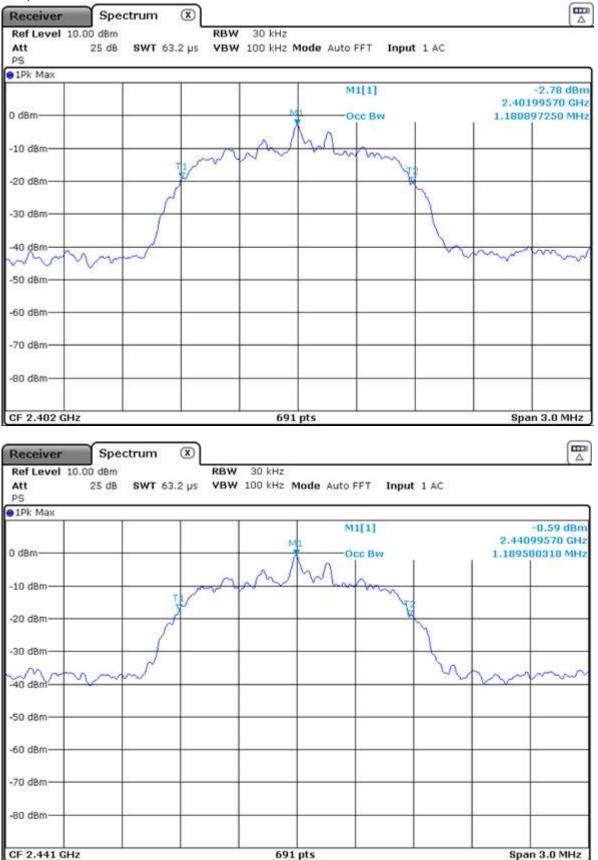
TESTED IN GERMANY	Test repor <b>18/09-00</b>		Page	e 49 of 94 p
Receiver Spectrum Ref Level 10.00 dBm	RBW 30 kHz		<i></i>	
Att 25 dB SWT 6. PS	3.2 μs <b>VBW</b> 100 kHz <b>M</b> α	ode Auto FFT Input 1 A	.C	
1Pk Max dBm	Ma	M1[1]		0.51 dBm 99570 GHz 67728 kHz
10 dBm-		- La		
20 dBm	N N	M2		
30 dBm	r <sup>u</sup>	- the		<u></u>
40 dBm			Im	1
50 dBm			V. V	m
60 dBm				
70 dBm				
80 dBm				1 <u></u>
CF 2.441 GHz	691 p	ts	Spa	n 3.0 MHz
Receiver Spectrum	×			





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### EDR, π/4-DQPSK with 2 MBit/s

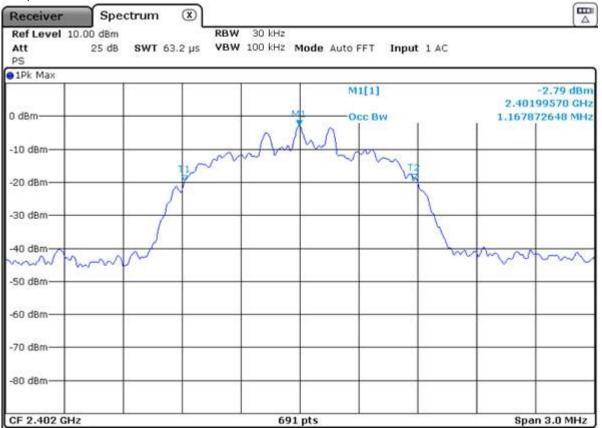


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Receiver	Spe	ctrum	×							
Ref Level 10 Att PS	0.00 dBm 25 dB	SWT 6	3.2 µs		kHz kHz <b>Mode</b>	Auto FFT	Input 1	AC		
1Pk Max										
0 dBm		1	-		MI	M1[1]	•			0.10 dBm 999570 GHz 87988 MHz
-10 dBm			- 7	m		han	$\sim$		12	
-20 dBm			7				The			
-30 dBm	u m	m			- 10 7.			h	000	·····
-40 dBm			-						~ v	
-50 dBm		6								
-60 d8m			-							
-70 dBm		-	-			-				
-80 dBm		17		1						
CF 2.48 GHz					691 pts				Snz	n 3.0 MHz

### EDR, 8-DPSK with 3 MBit/s



TESTED IN GERMANY	Test report no.: <b>18/09-0026B</b>	
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			_						
Receiver		ctrum	×						
Ref Level Att		OUT 63	RBW	/ 30 kHz / 100 kHz M	Indo Auto Ef	T Innut	1 40		5.°
PS	25 UB	SWI 03.	2 µ5 <b>40</b> M	100 KH2	IOUE AUTO FF	1 Input	IAC		
1Pk Max									
					MI	[1]		2.44	-0.58 dBm 099570 GHz
0 dBm					000	BW			580318 MHz
				And	hall				
-10 dBm			m	and V	- hope	m			-
100		1	Valle			V			
-20 dBm		1	1				1		
20 d0m							1		
-30 dBm	1						1		
-40 dBm-	m	~					5	ma	m
10 0011	-	č.							
-50 dBm								-	-
-60 dBm				-				-	-
The former of the state of the									
-70 dBm									1
-80 dBm	1						-		
		1							
CF 2.441 G	Hz		-	691	pts			Sp	an 3.0 MHz
				691	pts			Sp	
Receiver	Spe	ctrum	®		pts			Sp	an 3.0 MHz
Receiver Ref Level	Spe		RBW	30 kHz		T Input	1.40	Sp	
Receiver	Spe	ctrum SWT 63.	RBW			⊺ Input	1 AC	Sp	
Receiver Ref Level Att	Spe		RBW	30 kHz	ode Auto FF		1 AC	Sp	
Receiver Ref Level Att PS	Spe		RBW	30 kHz 100 kHz M	ode Auto FF		1 AC		0.10 dBm
Receiver Ref Level Att PS • 1Pk Max	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1]	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1]	1 AC	2.47	0.10 dBm
Receiver Ref Level Att PS • 1Pk Max	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS 1Pk Max 0 dBm -10 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1]	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver           Ref Level           Att           PS           • 1Pk Max           • 1Pk Max           • 0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver Ref Level Att PS • 1Pk Max 0 dBm -10 dBm -20 dBm -20 dBm -30 dBm -50 dBm -50 dBm	Spe		RBW	30 kHz 100 kHz M	ode Auto FF M1[	1] Bw	1 AC	2.47	0.10 dBm 099570 GHz
Receiver           Ref Level           Att           PS           • 1Pk Max           • 1Pk Max           • 0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm	Spe 10.00 dBm 25 dB		RBW	30 kHz 100 kHz M	ode Auto FF	1] Bw	1 AC	2.479	0.10 dBm 099570 GHz

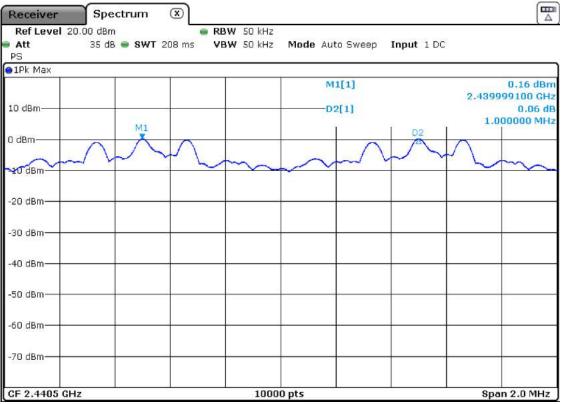


### c) hopping channel carrier frequencies separation

### The hopping channel carrier frequencies separation is for all modulations and bit rates same.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Receiver Spectrum X Ref Level 10.00 dBm RBW 10 kHz 30 dB SWT 568.7 µs VBW 100 kHz Mode Auto FFT Input 1 AC Att Count 1000/1000 PS ●1Av Max D5[1] 0.03 dB M D D5 D 4.000100 MHz 0 dBm-M1[1] 0.58 dBm 2.437991400 GHz -10 dBm--20 dBm--30 dBm--40 dBm--50 dBm--60 dBm--70 dBm-MUM AAM -80 dBm-10000 pts Span 10.0 MHz CF 2.44 GHz Marker Type | Ref | Trc X-value Y-value Function Function Result 2.4379914 GHz 0.58 dBm M1 1 -0.01 dB D2 M1 1 1.0001 MHz 2.0001 MHz -0.03 dB D3 M1 1 D4 Μ1 1 3.0001 MHz -0.06 dB D5 Μ1 1 4.0001 MHz 0.03 dB

only unmodulated carrier



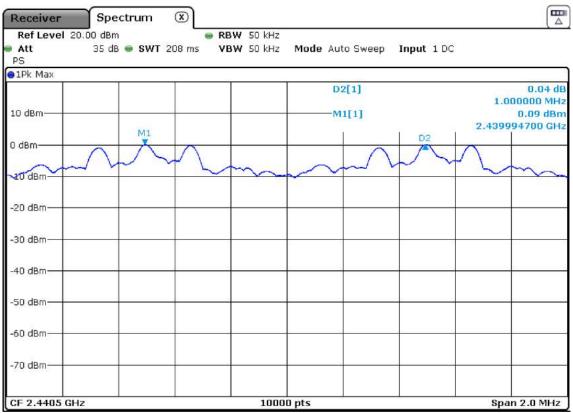
modulated EDR (8-DPSK with 3 MBit/s) – channel separation is 1 MHz



### hopping channel carrier frequencies separation

Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006) () Spectrum Receiver Ref Level 10.00 dBm RBW 10 kHz Att 30 dB SWT 568.7 µs VBW 100 kHz Mode Auto FFT Input 1 AC Count 1000/1000 PS ●1Av Max **P**5[1] -0.11 dB D DB D5 M1 4.000077 MHz 0 dBm-M1[1] 2.77 dBm 2.437991423 GHz -10 dBm--20 dBm--30 dBm--40 dBm--50 dBm--60 dBmmalas -70 dBm--80 dBm· CF 2.44 GHz 10000 pts Span 10.0 MHz Marker Type | Ref | Trc X-value Function **Function Result** Y-value 2.77 dBm 2.43799142 GHz M1 1 0.00 dB D2M1 1 1.00008 MHz D3 M1 1 2.00008 MHz -0.03 dB D4 M1 1 3.00008 MHz -0.07 dB 4.00008 MHz D5 M1 1 -0.11 dB

only unmodulated carrier



modulated EDR (8-DPSK with 3 MBit/s) - channel separation is 1 MHz

TESTED IN GERMANY	Test report no.: <b>18/09-0026B</b>	Page 55 of 94 pages
MOE 1979	10/05-00200	

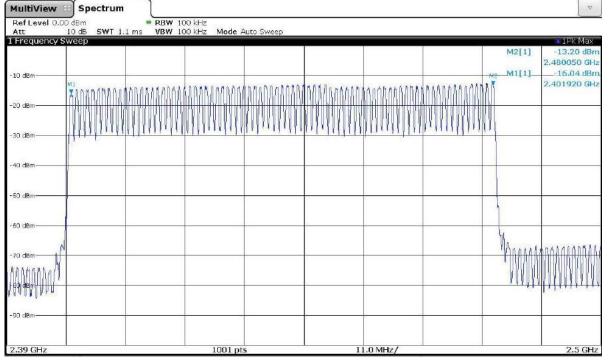
(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### d) hopping channel frequencies:

The number of hopping channel frequencies is 79 for all modes. The documented mode is BR (GFSK with 1MBit/s).

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2402 - 2480.0	79	>15	Pass

# Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

C 3

MultiView	Spectrum								4
Ref Level 0.0		BBW 1		luto Sweep					
Att I Frequency S	10 dB SWT 1. weep	1 ms VBW 1	OU KHZ MOde #	uto sweep					🔹 1Pk Max
								M2[1]	-11.51 dBm
								M2M1[1]	2.479950 GHz -15.54 dBm
-10 d8m	M1.			REARANT	Adhanser			no Milli	2.402030 GHz
	1 <u>7</u> 09001000000	ULAN ANDALOL	ALU MAGA	1/10/11/14/14	UND (CAAA B)	ADAAADAHAAA	N. 110,274		2.102000 014
-20 dBm			- <u>4               </u>						
	THUR D	(144-004))	A (17, 4) Y A (17, 17, 17, 17, 17, 17, 17, 17, 17, 17,	1448 11 1.1	17,171(1))	14171111	11111111	484	
-30 dBm	Millinger	I WALL IN	all an all all all all all all all all a	111	1 and d H	111111111111			
	0								
-40 d8m									
40 4011									
-50 dBm								1	<
-60 d8m								-	
N								MALLER	
-70 dBm			1					<u>'////////////////////////////////////</u>	14-14-14-14-14
IAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA								【【【】	N N N N N N
								664140	WAAAAAAAA waxaa ku
NAM AND ON	· · · · · · · · · · · · · · · · · · ·							10%	
-90 dBm							1		
2.39 GHz	ļ		1001 pt		1	1.0 MHz/			2.5 GHz

### e) Time of Occupancy (Dwell Time)

The average time of occupancy on any channel shall not be greater then 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Version ZLX-12BT, Sample 02, Serial no.: 09541438533457000	e (tested under PKM ref. no.: 18/06-0005)
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Channel No.	Frequency (MHz)	Modulation	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	GFSK with 1 MBit/s	309.4	< 400	Pass
39	2441	EDR (π/4- DQPSK with 2 MBit/s)	309.4	< 400	Pass
39	2441	EDR (8-DPSK with 3 MBit/s)	309.4	< 400	Pass

Test time period:  $0.4 \times 79 = 31.6 \text{ s}$ 

Hopping time of one hop: 3.75 ms

Hopping times within 1 s: 1000 ms/3.75 ms = 266.7 hops/sec.

Occupancy time per hop: 2.90 ms

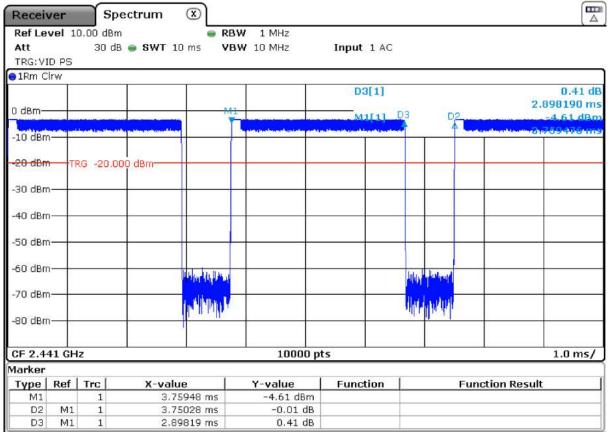
The maximum occupancy time within 31.6sec: [(2.90 ms x 266.7)/79] x 31.6 = 309.4 msec

### GFSK with 1 MBit/s

Receiv	/er	5	Spectrum	×					
Ref Lev Att SGL TR		30	Bm dB <del>e</del> SWT 1	1.1	BW 1 MHz BW 10 MHz	I	nput 1 AC		, , , , , , , , , , , , , , , , , , ,
●1Rm C	lrw		15	201	575				
.0 dBm—					41		D3[1]		0.77 dB 2.898190 ms
-10 dBm							wi[i] e		-4.64 dBm 3.759476 ms
-20 dBm		RG -20	.000 dBm			-			
-30 dBm	-								
-40 dBm									
-50 dBm									
-60 dBm				and could part				il all the all the	
-70 dBm	+			hiller ly rible		-		New Jackson Jackson	
-80 dBm	-+-								
CF 2.44	↓ 1 G⊢	Iz			100	00 pts		70	1.0 ms/
Marker		( <b>T</b> _	v. 1					_	
Type M1	Ref	Trc 1	X-valu	1e 5948 ms	<u>Y-value</u> -4.64 d		unction	Fu	nction Result
D2	M1	1		5948 ms	-4.64 u 0.01				
D3	M1	1		9819 ms	0.77				



### EDR ( $\pi$ /4-DQPSK with 2 MBit/s)



### EDR (8-DPSK with 3 MBit/s)

Receiv	ver	Spe	ectrum				
Att SGL TR	G: VID			BW 1 MHz BW 10 MHz	Input 1 AC		
●1Rm C 0 dBm-					D3[1]		0.71 dB 2.898190 ms =4.62 dBp =
-10 dBm -20 dBm		RG -20.00	0 dBm				
-30 dBm -40 dBm	8						
-50 dBm	1 <u></u> -						
-60 dBm			and shall be	1	5	apart love that	
-80 dBm							
CF 2.4	41 GH	z		10000 p	ts		1.0 ms/
Marker Type	Ref	Trc	X-value	Y-value	Function	Functio	on Result
M1 D2 D3	M1 M1	1 1 1	3.75948 ms 3.75028 ms 2.89819 ms	-4.62 dBm -0.01 dB 0.71 dB			

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Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

Channel No.	Frequency (MHz)	Modulation	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	GFSK with 1 MBit/s	309.4	< 400	Pass
39	2441	EDR (π/4- DQPSK with 2 MBit/s)	309.4	< 400	Pass
39	2441	EDR (8-DPSK with 3 MBit/s)	309.4	< 400	Pass

Test time period:  $0.4 \times 79 = 31.6 \text{ s}$ 

Hopping time of one hop: 3.75 ms

Hopping times within 1 s: 1000 ms/3.75 ms = 266.7 hops/sec.

Occupancy time per hop: 2.90 ms

The maximum occupancy time within 31.6sec: [(2.90 ms x 266.7)/79] x 31.6 = 309.4 msec

### GFSK with 1 MBit/s

Receiv	ver	S	pectrum 🗵				
Ref Le Att SGL TR				RBW 1 MHz /BW 10 MHz	Input 1 AC		<b>,</b>
⊖1Rm C	lrw		1 1		D3[1]		0.68 dE
				M1	Da[1]	_D2 _ Da	2,899190 ms
0 dBm—				Ť l	M1[1]		-1.50 dBm 3.759476 ms
-10 dBm	ו			1 + +	1		0.70947011
-20 dBn		RG -20.	000 dBm				
-30 dBm							
-40 dBm	1						
-50 dBm	n- -						
-60 dBm	η <u> </u>			1		White all the	
-70 dBm	η		Anally all t			and Andreas	
-80 dBm	۱ <u> </u>		4 date # 11.	1		and also here	
CF 2.4	41 GH	z	25. 81	10000	pts		1.0 ms/
Marker							
Туре	Ref	Trc	X-value	Y-value	Function	Functi	on Result
M1		1	3.75948 ms	-1.50 dBm	·		
D2	M1	1	3.75028 ms	-0.01 dE			
D3	M1	1	2.89919 ms	0.68 dB	3		



# EDR (π/4-DQPSK with 2 MBit/s)

Receiv	ver	Sp	ectrum	ເ							
Ref Le Att TRG: VI		0.00 dBr 30 di	n B 👄 SWT 10		BW 1 MHz BW 10 MHz		Input 1 AC				
<mark>⊜1</mark> Rm V	/iew										
A dam-				м	11		D3[1]	D3	D2		-0.11 dE 2.903190 ms
-		and a state of the		1.1	in the second		and and the first of the second se	1	4	interes and the second	3.759476 ms
-10 dBm	n		-			-					0.70577011.
-20 dBm	n T	RG -20.0	00 dBm								
-30 dBm	n					-					-
-40 dBm	n		-							-	
-50 dBm	n		-	-				-	3	-	
-60 dBm	n		-	a water and the second				-		+	
-70 dBm	n									-	-
-80 dBm	n										
CF 2.4		lz	D.C.		100	00 pt	5			Vero d	1.0 ms/
Marker											
Туре	Ref		X-valu		Y-value		Function		Fun	ction Res	ult
M1		1		948 ms	-1.45						
D2	M1	1		028 ms	0.00	Contraction of the local		-			
D3	M1	1	2.90	319 ms	-0.11	L dB					

### EDR (8-DPSK with 3 MBit/s)

Receiv	/er	S	pectrum	×										
Ref Lev Att SGL TR			m dB <b>e SWT</b> 10		BW 10 BW 10 M		Input	1 AC						,
●1Rm Cl	rw													
- <del>0</del> d8m-				N	11		D	3[1] [	03	D	2.		2.90	0.35 dB 3190 ms
-10 dBm		Hasherson	ileite teesetti esteren ester		a leebad	ent alle dans la das das	Maria M	ALL Deserved			llead	a fa fa fa fa dha dha a		.47 dBm 9476 ms
-10 dBm		RG -20,	000 dBm											
-30 dBm									+				_	
-40 dBm	-								-					
-50 dBm	-								-					
-60 dBm	-		_	L. While Louis					il p.U	(). Marine				
-70 dBm	+			-					ull	N. P. No.	,	2 1		
-80 dBm					·				1			2		
CF 2.44	11 GF	lz		I		10000 p	ts			L				1.0 ms/
Marker														
	Ref		X-value		Y-Va		Func	tion			Fund	ction Re	sult	
M1		1		948 ms		.47 dBm	-							
D2 D3	M1 M1			028 ms 319 ms		0.02 dB 0.35 dB								

### f) Maximum peak conducted output power

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

As the EUT's have a channel separation less than the 20 dB bandwidth, 0.125 W is the applicable limit.

All maximum peak conducted output power measurements had been performed with maximum output power setting of the EUT.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)

### GFSK with 1 MBit/s

Channel	Frequency	Measured	Cable	Corrected	Output	Limit	Result
No.	(MHz)	Output Power	correction	Output	Power	(mW)	(8)
(1)	(2)	(dBm)	(dB)	Power	(mW)	(7)	
		(3)	(4)	(dBm)	(6)		
				(5)			
0	2402	0.83	0.3	1.13	1.3	125	Pass
39	2441	2.36	0.3	2.66	1.8	125	Pass
78	2480	2.72	0.3	3.02	2.0	125	Pass

### EDR (π/4-DQPSK with 2 MBit/s)

Channel No. (1)	Frequency (MHz) (2)	Measured Output Power (dBm) (3)	Cable correction (dB) (4)	Corrected Output Power (dBm)	Output Power (mW) (6)	Limit (mW) (7)	Result (8)
0	2402	-0.08	0.3	(5) 0.22	1.1	125	Pass
39	2441	2.02	0.3	2.32	1.7	125	Pass
78	2480	2.53	0.3	2.83	1.9	125	Pass

### EDR (8-DPSK with 3 MBit/s)

Channel	Frequency	Measured	Cable	Corrected	Output	Limit	Result
No.	(MHz)	Output Power	correction	Output	Power	(mW)	(8)
(1)	(2)	(dBm)	(dB)	Power	(mW)	(7)	
		(3)	(4)	(dBm)	(6)		
				(5)			
0	2402	0.45	0.3	0.75	1.2	125	Pass
39	2441	2.68	0.3	2.98	2.0	125	Pass
78	2480	2.81	0.3	3.11	2.0	125	Pass

- (1) = Bluetooth channel number
- (2) = Corresponding Bluetooth channel frequency
- (3) = Measured output power on spectrum analyzer
- (4) = Cable loss between EUT and analyzer
- (5) = (3) + (4)
- (6) = Linear power  $(10^{(5)/10})$
- (7) = Limit
- (8) = Comparison between (6) and (7)



### GFSK with 1 MBit/s

Receiver	Spe	ctrum	×						
	10.00 dBm			BW 2 MHz					
Att PS	30 dB	<b>SWT</b> 966	i.4 ns 🛛 🗸	BW 20 MHz	Mode Au	to FFT	Input 1 AC		
●1Rm Max									
					M1 M	1[1]		2 4021	0.83 dBm 179700 GHz
0 dBm					Y		-	2.4021	
-10 dBm									
-20 dBm-							2	2	
-20 0811							3		
-30 dBm			2		8		-		
-40 dBm—			-		-	-			
14									
-50 dBm					-				
-60 dBm			2				2		
-70 dBm—			8		-	6) ()	2		
-80 dBm				2			÷		
CF 2.402 0	GHz			1000	0 pts			Spa	n 6.0 MHz
Receiver	11	ctrum	®						
	10.00 dBm 30 dB	ctrum SWT 966	e Ri	BW 2 MHz BW 20 MHz	Mode Aut	OFFT 1	Input 1 AC		
Ref Level Att PS	10.00 dBm		e Ri		Mode Aut	OFFT	Input 1 AC		
Ref Level Att	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC		
Ref Level Att PS 1Rm Max	10.00 dBm		e Ri			:0 FFT	Input 1 AC	2.4408	2.36 dBm 14300 GHz
Ref Level Att PS	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level           Att           PS           • 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level           Att           PS           1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS ● 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm		e Ri	BW 20 MHz				2.4408	2.36 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	10.00 dBm		e Ri	BW 20 MHz				2.4408	2.36 dBm
Ref Level Att PS ● 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	10.00 dBm		e Ri	BW 20 MHz			Input 1 AC	2.4408	2.36 dBm
Ref Level         Att         PS         ● 1Rm Max         0 dBm         -10 dBm         -20 dBm         -30 dBm         -30 dBm         -50 dBm         -50 dBm         -70 dBm	10.00 dBm 30 dB		e Ri	BW 20 MHz	M.				2.36 dBm

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Receiver	Spec	trum	×						
Ref Level Att PS	10.00 dBm 30 dB	<b>SWT</b> 9		RBW 2 MHz VBW 20 MHz	Mode Au	to FFT	input 1 AC		
●1Rm Max									
				M1	М	1[1]		2,4798	2.72 dBm 70100 GHz
0 dBm									
-10 dBm			-						
-20 dBm-									
-30 dBm					-	2			
-40 dBm									
-50 dBm									
-60 dBm			-	1. 			_		
-70 dBm		2			×				
-80 dBm									
CF 2.48 GH	lz			1000	)0 pts			Spa	n 6.0 MHz

# EDR (π/4-DQPSK with 2 MBit/s)

Receiver Spe	ectrum 🗵			
Ref Level 10.00 dBm Att 30 dB PS	SWT 966.4 ns VBV		uto FFT Input 1 AC	
1Rm Max				
0 - 10		M1	M1[1]	-0.08 dBm 2.402147900 GHz
0 dBm				
-10 dBm				
-20 dBm				
-30 dBm				
-40 dBm				
-50 dBm				
-60 dBm				
-70 dBm				
-80 dBm				
CF 2.402 GHz		10000 pts		Span 6.0 MHz

IN GERMANY 18/09-0026B
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Receiver		ctrum	×						
	10.00 dBm 30 dB	our o		RBW 2 MHz	Mada Auto F		1.40		
Att PS	30 QB	<b>SWT</b> 9	66.4 ns	VBW 20 MHz	Mode Auto FF	- input	IAC		
⊖1Rm Max					26				
			1000	M1	M1[1]			2.4408	2.02 dBm 74300 GHz
0 dBm								_	
-10 dBm-									
-20 dBm-	3							3	
-30 dBm									
-40 dBm				-					
-50 dBm—								2	
-60 dBm									
-70 dBm			_						
-80 dBm	2		_					1	
CF 2.441	GHz	4	10	1000	0 pts	22		Spa	n 6.0 MHz
			_						
Receiver		ctrum	×						
Ref Level Att	5pe 10.00 dBm 30 dB	ctrum swт 9		RBW 2 MHz VBW 20 MHz	Mode Auto Ff	-⊤ Input	1 AC		
Ref Level Att PS	10.00 dBm				Mode Auto FF	-⊤ Input	1 AC		
Ref Level Att	10.00 dBm			<b>VBW</b> 20 MHz	7.	S32	1 AC		
Ref Level Att PS ●1Rm Max	10.00 dBm				Mode Auto Ff	S32	1 AC	2.4797	2.53 dBm 98700 GHz
Ref Level Att PS IRm Max 0 dBm-	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS ●1Rm Max	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS IRm Max 0 dBm-	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm -60 dBm	10.00 dBm			VBW 20 MHz	7.	S32	1 AC	2.4797	2.53 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -50 dBm -70 dBm	10.00 dBm 30 dB			VBW 20 MHz	M1[1]	S32	1 AC		2.53 dBm

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CF 2.441 GHz

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Span 6.0 MHz

### EDR (8-DPSK with 3 MBit/s)

Deselves	- Cro	ctrum	×						
Receiver		cuum							
Att	10.00 dBm 30 dB	<b>SWT</b> 966	e RE		Mode A	ito FFT In	nut 1 AC		
PS	50 UB	8W1 900	7.4115 ¥L	377 20 MINZ	HOUE AU		put I AC		
⊖1Rm Max	x -				0				
						11[1]		0.02104020	0.45 dBm
0.40				N	11	1	i i	2.4020	14700 GHz
0 dBm									
to do-									
-10 dBm									-
				c					
-20 dBm—									
20 dBm									
-30 dBm						8			
40 dBm	÷		-	×					
-40 dBm									
-50 dBm				0					
-30 ubm				().		8			
-60 dBm									
-00 0011									
-70 dBm			_	8		-			
yo dom									
-80 dBm									
-00 0011									
CF 2.402 0	GHz			1000	0 pts			Spa	n 6.0 MHz
			_						$\frown$
Receiver	Spe	ctrum	×						
Ref Level	10.00 dBm		🔵 RE	W 2 MHz					
Att	30 dB	<b>SWT</b> 966	0.4 ns VE	3W 20 MHz	Mode Au	ito FFT In	put 1 AC		
PS									
	<u> </u>				N	11[1]			2.68 dBm
			17	M				2.4409	70300 GHz
0 dBm				-	-				
-10 dBm-	-								
						1			
-20 dBm-									
	2								
-20 dBm—									
-30 dBm							-		
-30 dBm									
-30 dBm									
-30 dBm -40 dBm -50 dBm									
-30 dBm									
-30 dBm -40 dBm -50 dBm -60 dBm									
-30 dBm -40 dBm -50 dBm									
-30 dBm -40 dBm -50 dBm -60 dBm									

10000 pts

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Receiver	Spe	ctrum	×				
RefLevel 1 Att PS	10.00 dBm 30 dB	<b>SWT</b> 966	<b>e RB</b> 5.4 ns <b>VB</b>		ode Auto FFT	Input 1 AC	
<mark>⊜1</mark> Rm Max							
0 dBm				M1	M1[1]	I	2.81 dBm 2.479928900 GHz
2000 (2000) 2000 2000							
-10 dBm							
-20 dBm							
-30 dBm							
-40 dBm		c.					
-50 dBm							
-60 dBm		0					
-70 dBm		-					
-80 dBm		0					
CF 2.48 GHz	z			10000 pts	s		Span 6.0 MHz



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

### GFSK with 1 MBit/s

Channel	Frequency	Measured	Cable	Corrected	Output	Limit	Result
No.	(MHz)	Output Power	correction	Output	Power	(mW)	(8)
(1)	(2)	(dBm)	(dB)	Power	(mW)	(7)	
		(3)	(4)	(dBm)	(6)		
				(5)			
0	2402	1.24	0.3	1.54	1.4	125	Pass
39	2441	2.83	0.3	3.13	2.1	125	Pass
78	2480	3.25	0.3	3.55	2.3	125	Pass

### EDR ( $\pi$ /4-DQPSK with 2 MBit/s)

Channel	Frequency	Measured	Cable	Corrected	Output	Limit	Result
No.	(MHz)	Output Power	correction	Output	Power	(mW)	(8)
(1)	(2)	(dBm)	(dB)	Power	(mW)	(7)	
		(3)	(4)	(dBm)	(6)		
				(5)			
0	2402	0.22	0.3	0.52	1.1	125	Pass
39	2441	2.52	0.3	2.82	1.9	125	Pass
78	2480	2.84	0.3	3.14	2.1	125	Pass

### EDR (8-DPSK with 3 MBit/s)

Channel	Frequency	Measured	Cable	Corrected	Output	Limit	Result
No.	(MHz)	Output Power	correction	Output	Power	(mW)	(8)
(1)	(2)	(dBm)	(dB)	Power	(mW)	(7)	
		(3)	(4)	(dBm)	(6)		
				(5)			
0	2402	0.28	0.3	0.58	1.1	125	Pass
39	2441	2.63	0.3	2.93	2.0	125	Pass
78	2480	2.99	0.3	3.29	2.1	125	Pass

- (1) = Bluetooth channel number
  (2) = Corresponding Bluetooth channel frequency
  (3) = Measured output power on spectrum analyzer
- (4) = Cable loss between EUT and analyzer
- (5) = (3) + (4)
- (6) = Linear power  $(10^{(5)/10})$
- (7) = Limit
- (8) = Comparison between (6) and (7)



# GFSK with 1 MBit/s

Receiver	Spe	ctrum	×						
	10.00 dBm			3W 2 MHz	-	antata ana ang tang tang tang tang tang			(=)
Att PS	30 dB	<b>SWT</b> 966	.4 ns VE	3W 20 MHz	Mode Au	to FFT Inj	put 1 AC		
●1Rm Max				1					
And the Prop					M1	1[1]		2.4021	1.24 dBm 80900 GHz
0 dBm									
-10 dBm									
10 0011									
-20 dBm-					s		2	-	
-30 dBm									
-50 0011							°'		
-40 dBm									
E0 d0m									
-50 dBm								-	
-60 dBm									
70 40									
-70 dBm									
-80 dBm							7		
CF 2.402 (	GHz			1000	D pts		2.4 2.4	Spar	n 6.0 MHz
	Y a	-							(IIII)
Receiver		ectrum	®						
Ref Level Att	10.00 dBm 30 dB		e R	BW 2 MHz BW 20 MHz	Mode Au	ito FFT In	put 1 AC		
Ref Level Att PS	10.00 dBm		e R		Mode Au	ito FFT In	put 1 AC		
Ref Level Att	10.00 dBm		e R	BW 20 MHz		ito FFT In	put 1 AC		2.83 dBm
Ref Level Att PS 1Rm Max	10.00 dBm		e R				put 1 AC	2.4408	
Ref Level Att PS 1Rm Max 0 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max 0 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level           Att           PS           IRm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS           • 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -30 dBm           -40 dBm           -50 dBm           -70 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	10.00 dBm		e R	BW 20 MHz			put 1 AC	2.4408	2.83 dBm
Ref Level Att         PS         IRm Max         0 dBm         -10 dBm         -20 dBm         -30 dBm         -40 dBm         -50 dBm         -70 dBm	10.00 dBm 30 dB		e R	BW 20 MHz			put 1 AC		2.83 dBm

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Receiver	Spe	ct <b>ru</b> m	×					
Ref Level Att PS	10.00 dBm 30 dB	<b>SWT</b> 960	e RBW 5.4 ns VBW	/ 2 MHz / 20 MHz	Mode Auto FFT	Input 1 AC		
●1Rm Max								
				M1	M1[1]		3.2 2.4798503	25 dBm 00 GHz
0 dBm								
-10 dBm								
-28 dBm-								X
-30 dBm								
-40 dBm								
-50 dBm								
-60 dBm								
-70 dBm								
-80 dBm								
CF 2.48 GH	z			10000	pts		Span 6.0	0 MHz

# EDR (π/4-DQPSK with 2 MBit/s)

Receiver	Spectrum 🗵			
Ref Level 10.00 Att 3 PS	dBm 0 dB <b>SWT</b> 966.4 ns	RBW 2 MHz VBW 20 MHz Mod	e Auto FFT Input 1	AC
●1Rm Max		MI	M1[1]	0.22 dBm 2.402128700 GHz
0 dBm -10 dBm				
-20.dBm				
-30 dBm				
-50 dBm				
-60 dBm				
-80 dBm				
CF 2.402 GHz		10000 pts		Span 6.0 MHz

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Receiver	Spee	ctrum	×							
Ref Level	10.00 dBm			e RB	A 2 MHz					()
Att	30 dB	SWT	966.4 ns	VB	₩ 20 MHz	Mode Au	uto FFT	Input 1 AG	3	
PS										
					M1	N	41[1]			2.52 dBm
0 dBm			-				T	- 1	2.4408	55700 GHz
U UBIII										
-10 dBm							-			
	-								5.7	
-20 dBm-			-			8	-			
-30 dBm						-	-			
-40 dBm										
-50 dBm										
-50 0011										
-60 dBm		2				·	-			
-70 dBm		-	2			6	5		_	
advantant tanà ao amin'										
-80 dBm					5	2	- 2		_	-
										I
									1	
CF 2.441 C	GHz	-	<u>0</u>		1000	0 pts		1.0	Spa	n 6.0 MHz
CF 2.441 (	iHz				1000	0 pts			Spa	
CF 2.441 C Receiver		ctrum	×		1000	0 pts			Spa	
Receiver Ref Level	5pe 10.00 dBm			e RBV	W 2 MHz					
Receiver Ref Level Att	Spec		(X) 966.4 ns				uto FFT	Input 1 A		
Receiver Ref Level	5pe 10.00 dBm				W 2 MHz		uto FFT	Input 1 A		
Receiver Ref Level Att PS	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A	uto FFT 11[1]	Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS • 1Rm Max	5pe 10.00 dBm				₩ 2 MHz ₩ 20 MHz	Mode A		Input 1 A	c	
Receiver Ref Level Att PS	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS • 1Rm Max	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm -10 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm -30 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	5pe 10.00 dBm				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm -30 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A			c	2.84 dBm
Receiver           Ref Level           Att           PS           ● 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver           Ref Level           Att           PS           ● 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A			c	2.84 dBm
Receiver           Ref Level           Att           PS           ● 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm           -70 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A			c	2.84 dBm
Receiver           Ref Level           Att           PS           ● 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm	5pe				W 2 MHz W 20 MHz M1	Mode A		Input 1 A	c	2.84 dBm
Receiver           Ref Level           Att           PS           ● 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm           -70 dBm	Spectronal				W 2 MHz W 20 MHz M1	Mode Ar			C 2.4798	2.84 dBm

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# EDR (8-DPSK with 3 MBit/s)

Receiver	Spe	ctrum	×						
Ref Level Att	10.00 dBm 30 dB	<b>SWT</b> 966	e RE	3W 2 MHz 3W 20 MHz	Mode Aut	to FFT In	put 1 AC		
PS									
⊜1Rm Max	2		T	1	M	1[1]			0.28 dBm
				M		*[*]	2 A	2.4019	81700 GHz
0 dBm	14				-				
10/01/0-01/0.001 (	5.5								
-10 dBm				-	Ċ.	12			_
	0.94								
-20 dBm		2							
-30 dBm	3	9				1			
-50 0011									
-40 dBm									
10 0.011									
-50 dBm		-							
Fishes Soles									
-60 dBm		2	-						
-70 dBm	0	5	-						g.
-80 dBm	i	<u>.</u>			è		-		
CF 2.402 G	Hz			1000	) pts			Spar	n 6.0 MHz
Receiver	Spe	ctrum	×						
Receiver Ref Level	3	ctrum		BW 2 MHz					
Ref Level Att	3	ctrum SWT 960	e RE	<b>BW</b> 2 MHz <b>BW</b> 20 MHz	Mode Au	to FFT II	nput 1 AC		
Ref Level Att PS	10.00 dBm		e RE		Mode Au	to FFT II	nput 1 AC		
Ref Level Att	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC		
Ref Level Att PS ●1Rm Max	10.00 dBm		e RE		M	to FFT II	nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS IRm Max	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS ●1Rm Max	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS IRm Max	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS IRm Max 0 dBm -10 dBm -20 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level           Att           PS           • 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm
Ref Level           Att           PS           • 1Rm Max           0 dBm           -10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm	10.00 dBm		e RE	BW 20 MHz	M			2.4409	2.63 dBm
Ref Level Att PS 1Rm Max 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm	10.00 dBm		e RE	BW 20 MHz	M		nput 1 AC	2.4409	2.63 dBm

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Receiver	Spe	ctrum	×						
Ref Level 1				W 2 MHz	alata 207 - 20		Neo es sub cou		
Att PS	30 dB	SWT 966	.4 ns <b>VB</b>	<b>W</b> 20 MHz	Mode Au	to FFT	Input 1 AC		
91Rm Max									
				[M1	M	1[1]			2.99 dBm
22-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2				<b>V</b>			6	2.4799	43900 GHz
0 dBm								2	
10 40									
-10 dBm									
-20 dBm									1
20 0011									
-30 dBm	-								
-40 dBm								G	
-50 dBm								2) 2)	
-60 dBm					-			8 8	
-70 dBm									
-80 dBm									
-00 UBIII									
CF 2.48 GH	2			1000	0 pts	· · · ·		Spa	n 6.0 MHz

### g) Conducted RF band edge emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in §15.209(a) is not required.

All conducted measured radio frequency power that is produced by the intentional radiator is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Measurement had been performed with GFSK with 1 MBit/s as worst case.

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Band-edge-low-non-hopping

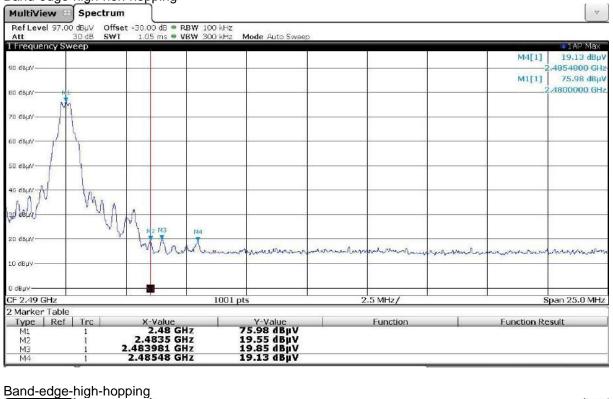
MultiView 🗄 Sp	ectrum			v
Ref Level 100.10 dB				
Att 30 a 1 Frequency Sweep	36 SWT 1.05 ms 🛡 VBW 3	00 kHz Mode Auto Sweep		I AP Max
Threquency Sweep				M4[1] 33.57 dBµV
				2,3991690 GHz
90 dBµV				M1[1] 77.52 dBµV
8 (2) ( - 4) ( - 1) ( - 1)				2,4020000 GHz
80 dBµV				M1
				run -
70 dBµV-				
in rehv.				A A
60 dBµV-				
50 dBµV				
				l la
40 dBµV				where the second
				MALA NO TALA
эр d8µV				AT N V W
and the second s				WALL N
20 dBuV-				N N N
120 UDHV	mare harrington my harring	warman marken marken and	man hour hours	22
Contraction of the second s				
10 dBµ9				
CF 2.3935 GHz		1001 pts	2.5 MHz/	Span 25.0 MHz
2 Marker Table		1001 pts	2.3 MHZ/	apan 25/0 MHz
Type Ref Tro	X-Value	Y-Value	Function	Function Result
M1 1	2.402 GHz	77.52 dBµV	- uncuorr	T uncdoff Result
M2 1	2.4 GHz	34.89 dBµV		
M3 1	2.399494 GHz	30.40 dBµV		
M4 1	2.399169 GHz	33.57 dBµV		

## Band-edge-low-hopping

MultiView 🖯 Spe	ctrum			∀
Ref Level 100.10 dBµV				
Att 30 dB 1 Frequency Sweep	SWT 1.05 ms 🛡 VBW 30	10 kHz Mode Auto Sweep		1 AP Max
T Frequency Sweep				M3[1] 23.56 dBµV
				2.3991440 GHz
90 dBpV				M1[1] 75.12 dBµV
				2.4020000 GHz
80 d8µV				MI
				The my my my my
70 dBµV	-			
60 dBµV				
on cohk		3		
- Sec.				1
50 dBµV				
40 dBµV				
				N
30 d8µV				
			B14	Condition of the series
20 dBuk	Mary mary and around a more	the phy phy phy phy	Man Marine Marine Port	Sur .
hand hold have have	white has not a have have	i was made that the	I had had here have	× ·
10 dBµV-				
CF 2.3935 GHz		1001 pts	2.5 MHz/	Span 25.0 MHz
2 Marker Table Type   Ref   Trc	X-Value	Y-Value	Function	Function Result
Type Ref Trc M1 1	2.402 GHz	75.12 dBµV	Function	runcdon Result
M2 1	2.4 GHz	26.25 dBuV		
M3 1	2.399144 GHz	23.56 dBµV		
M4 1	2.397821 GHz	20.19 dBµV		



#### Band-edge-high-non-hopping



	Spectrum								$\bigtriangledown$
Ref Level 97.00	dBµV Offset 30 dB SWT	-30.00 dB • R 1.05 ms • V		<b>Iode</b> Auto Swee	p				
1 Frequency Sw	eep					<u> </u>			💿 1 AP. Max
								M4[1]	21,78 dBµV
90 dBµV								M1[1]	4859790 GHz 75.22 dBμV
00.45.41								WILLI	2.4800000 GHz
80 dBµV									
to abov My My	-								
60 dB	1		÷						
co obyp	1								
50 dBµV	l'								
	1								
40 dBµV	1								
000000000000	in .								
30 dBµV	4					-	-		
	NM	A M2 M	M4						The Designation of the second
20 dBµV	- Vily	in the p	a by but	my my r	in the but	mmp	n m	MAR	n pro pro
		4 W	had had h	of the had	and had h	at had had	the has to	of had had	had had b
10 dBµV									
o dayy-									
CF 2,49 GHz			1001 pt	S	2	2.5 MHz/	1.	5	pan 25.0 MHz
2 Marker Table	1 The L		1	12 11-1			C	C	
Type Ref M1	Trc 1	X-Value 2.48 GH	z 7	Y-Value 5.22 dBµV		Function		Function Re	esuit
M2		483975 GH	lz 2	1.70 dBuV					
M3 M4		2.48498 GH 485979 GH	z 2	2.02 dBµV 1.78 dBµV					
D.let	_1 <b>Z</b> .	40 <i>3373</i> Gr	12 <u>2</u>	7120 00044			(i)		

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## Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006) Band-edge-low-non-hopping

MultiView	Spectru	um )				~
BefLevel 102		offset -25.00 dB	100 kHz			10
Att	30 dB S		300 kHz Mode Auto Sweep			-
I Frequency Sv	weep					1AP Max
100 dBµV						M2[1] 37.66 dBµV
						2.4000000 GHz
эр двру						-M1[1]
						M1 2.4020000 GHz
80 dBµY						
an asha						line (
100000 De						
70 d8µY			-			1 5
						2
60 dBµV						
50 dBµV						
40 d8µV					M2 A	14000
40.0004					M3 T DIV	4 [m/ by/]
					AAAP	Y (
ар двру					14010	2.
						1.01
20, deluman	and the states	and month of the	all and the second and the second and the second se	1. A provident and a second	yw.	ww.
10 dBµV						
CF 2.3935 GHz			1001 pts	2.5 MHz/	-	Span 25.0 MHz
2 Marker Table						
Type   Ref		X-Value	Y-Value	Function		Function Result
Mi	1	2.402 GHz	80.41 dBµV			
M2	1	2.4 GHz	37.66 dBµV			
M3	1	2.399494 GHz	34.08 dBµV			
M4	1	2.399144 GHz	36.06 dBµV			

## Band-edge-low-hopping

MultiView Spec				▽
	Offset -25.00 dB RBW 10			
Att 30 dB Frequency Sweep	SWT 1.05 ms = VBW 30	0 kHz Mode Auto Sweep		a 1AP Max
100 depv				
con appr				M3[1] 23.76 dBpV 2.3995190 GHz
A. 2002				
90 dBµV	2			M1[1] 77.91 dBpV
				2.4020000 GHz
30 dBµV				M1
1775 AND 1				m m m m
70 dBµV	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)			
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ou deba				
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				Ja AV
30 dBµV			Md	in of
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LO deuv-				
CF 2.3935 GHz	I	001 pts	2.5 MHz/	Span 25.0 MHz
2 Marker Table				
Type   Ref   Trc	X-Value	Y-Value	Function	Function Result
M1 1	2.402 GHz	77.91 dBµV		Contractory Constants
M2 1	2.4 GHz	29.57 dBuV		
M3 1	2.399519 GHz	23.76 dBµV 26.49 dBµV		
M4 1	2.399144 GHz	26.49 dBuV		



## Band-edge-high-non-hopping

Offset -25.00 dB • RBW 10 SWT 1.05 ms • VBW 30	00 kHz Mode Auto Sweep		M4[1] 24.50 dBµ 2.48548000 dBµ M1[1] 81.38 dBµ 2.4800000 GH
SWT 1.05 ms VBW 30	DD kHz Mode Auto Sweep		М4[1] 24.50 dBµ 2.4854800 GH М1[1] 81.38 dBµ
			M4[1] 24.50 dBµ 2.4854800 GH M1[1] 81.38 dBµ
			2.4854800 GH M1[1]81.38 dBµ
			M1[1] 81.38 dBµ
5	-		
1 1 4 6			
V V M2 M3 M4			
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		and the states of the states o	and the second s
	1001 pts	2.5 MHz/	Span 25.0 MH
	1001 pts	210 00 127	5pan 23/6 Min
X-Value	Y-Value	Function	Function Result
2.48 GHz	81.38 dBµV		
	24.84 dBµV		
	X-Value	X-Value         Y-Value           2.48 GHz         81.38 dBµV           2.4835 GHz         24.84 dBµV           2.4838 GHz         25.41 dBµV           2.48548 GHz         24.50 dBµV	X-Value         Y-Value         Function           X-Value         Y-Value         Function           2.48 GHz         81.38 dBµV         2.4835 GHz           2.483981 GHz         25.41 dBµV           2.48548 GHz         24.50 dBµV

Type Ref M1 M2 M3 M4		8 GHz 4 GHz 5 GHz	<u>Y-Value</u> 80.41 dBµ¥ 27.22 dBµ¥ 27.43 dBµ¥ 27.38 dBµ¥	1	Function		Function Re	esult
CF 2.49 GHz 2 Marker Table	10 OC	1001	pts	2	.5 MHz/		S	pan 25.0 MH;
10 dBµV								
20 dBµY	W" W	had had had		h V h		W W L	100	UW
30 авµч	Wayny ?	12 M3 M4	n m m m	y my My	my my my	a my my	M M M	of had bud
40 dBµv	-h							
sa двих								2
<u>V</u> V 50 dBµV						- 8		-
to day								
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#### h) Spurious emission

All radio frequency power that is produced in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power (0.1 dBm, smallest wanted power value, worst case), based on the RF conducted/radiated measurements and comply with the limits.

## All radiated emissions including emissions which fall in the restricted bands comply with the radiated emission limits specified in §15.209 (see clause 7 in this thest report).

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005) Hopping with GFSK with 1 MBit/s, which is the worst case as the distance between desired power and the power that is produced in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating shows the smallest distance. The smallest distance in this case is more than 50 db.

MultiView	Spectrum					V
Ref Level 10.00 Att DC	) dBm 30 dB <b>SWT</b> 24 ms	<ul> <li>RBW 100 kHz</li> <li>VBW 300 kHz</li> <li>Mode</li> </ul>	Auto Sweep			
Frequency Sw	eep					💿 1Pk Mas
0 dBm						-
- 10 dBm						 
-20 dBm					_	
-30 d8m						 
-40 d8m			-			 _
-50 dBm						 
-60 d9m				The second s		 - out
70 den		Wedle and an an an an a start of the start	dell'en and solved and solved	temelei distrikas (peratinistan	heritentheterate beck so	
-80 dem					-	
9.0 kHz		20000 p		240.0 MHz/	1	 2.4 GH

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MultiView 🕒 Spectrum				[
RefLevel 10.00 dBm Att 30 dB SWT 3	<ul> <li>RBW 100 kHz</li> <li>224 ms</li> <li>VBW 300 kHz</li> <li>Mo</li> </ul>	de Auto Sweep		
Frequency Sweep				∎1Pk Ma
) dBm		-		
10 dBm				
20 dBm				
ao dem				
40 dBm				
SD dBm				
60 dBm	منعا وعلام المسالي المسلحا	المريحين المراجع المحمد المحمد المراجع	Well and the second	and the second states a
70 dBm				
9D dBm				

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Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006) Hopping with GFSK with 1 MBit/s, which is the worst case as the distance between desired power and the power that is produced in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating shows the smallest distance. The smallest distance in this case is more than 50 db.

MultiView	Spectrum	ר							~
RefLevel 10.0 Att DC	00 dBm 30 dB <b>SWT</b> 24 m	s BW 3		Auto Sweep					
1 Frequency Sv	veep								1Pk Max
			8		2	· · · · · · · · · · · · · · · · · · ·			
0 d8m			1					2.1	
-10 dBm-			1				2	2	
-20 dBm							-		
-30 d8m			(			-			
-40 dBm									
-50 dBm									
-60 dBm-									
-70 dBm	فعيده فتقرف المستنفين	Little Balling	a landa yang balandara ta data banganga nanya papa bayang		the still of the second start	na malana shalandinshi da	entite on the model of the		
-80 d8m-									
-ou dam-									
9.0 kHz			20000 p	S	24	10.0 MHz/			2.4 GH

MultiView 🖽 Spectri					
RefLevel 10.00 dBm Att 30 dB SV	● RBW 100 kHz VT 224 ms ● VBW 300 kHz 1	Mode Auto Sweep			
DC. Frequency Sweep					1Pk Max
n equency sweep					THK ING
d8m					
dom					
10 dBm-					
20 dBm	-				
20 35/11					
30 dBm					
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	and the state of t	And a state of the second s	anten alle States (States States and States a	A REAL PROPERTY OF A REAL PROPER	
70 dBm-					
30 dBm					
.4835 GHz	2000	10 pts	2.23 GHz/		24.8 G



The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

The hopping algorithm of the EUT is dictated by the Bluetooth specification according to which the EUT is certified, so that the above mentioned requirements are fulfilled.



#### Results

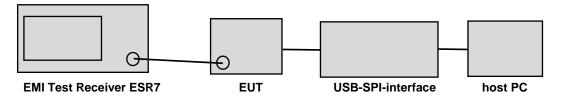
From the measurement data obtained, the tested samples were considered to have COMPLIED with the requirements for the operation within the band 2400-2483.5 MHz according to §15.247.

#### Test equipment used:

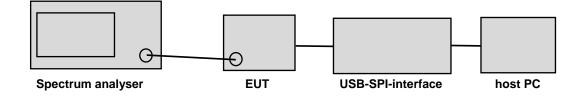
Kind of equipment	Manufacturer	Туре	PKM- ident no.	Serial no.	Calibrated on (y-m-d)	Calibration interval
Signal Spectrum Analyzer 2Hz - 26,5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2017-12-13 2019-01-17	1 year
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ERS7	11676	101694	2018-03-26	3 years
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-11-03	3 years
Antenna	Chase	CBL6111C	10022	1064	2017-01-30	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-11-06	3 years
Broadband- Hornantenne 15 - 26,5 (40) GHz	Schwarzbeck	BBHA 9170	11580	BBHA91706 21	2017-01-27	3 years
Broadband- Preamplifier 1-18 GHz	Schwarzbeck	BBV9718	11231	9718-002	2017-10-09	3 year
Preamplifier 18 - 40 GHz	CERNEX	CBM18403523	11679	29711	2018-05-07	1 year
Cable	el-spec GmbH	FlexCore-SMA11- SMA11-8000-ARM	11625	-/-	2017-12-07	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI- ANECHOIC- CHAMBER"	11609	004/16	2016-03-23	3 years

All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of radiated emissions was made with instruments conforming to American National Standard Specification, ANSI C63.10-2013.

Block diagram for conducted measurements (20 dB bandwidth, 99 % bandwidth, hopping channel separation, hopping channel frequencies, time of occupancy, Maximum peak conducted output power, Conducted RF band edge emissions).



Block diagram for spurious emission conducted (radiated emissions see clause 7 in this thest report)





#### Measurement uncertainty

according to CISPR 16-4-2 Edition 2.0 2011-06

Measurement	calculated uncertainty U <sub>lab</sub>	Specified CISPR uncertainty according CISPR 16-4-2 Edition 2.0 2011-06, table 1 U <sub>CISPR</sub>
Conducted disturbance at mains port using AMN 150 kHz – 30 MHz	3,2 dB	3,4 dB
Radiated disturbance (electric field strength in the SAC) 30 MHz to 1 000 MHz	4,7 dB	6,3 dB
Radiated disturbance (electric field strength in the SAC) 1 GHz to 26.5 GHz	4.1 dB	-/-
		Maximum measurement uncertainty according to EN300328:V2.1.1, table 17
Channel Bandwidth	1.17 %	±5 %
RF output power, conducted	±1,36 dB	±1,5 dB
Power Spectral Density, conducted	±1.99 dB	±3 dB
Unwanted Emissions, conducted	±1.71 dB	±3 dB
All emissions, radiated	±4.8 dB	±6 dB
Temperature	±0.72 °C	±3 °C
Supply voltages	±0.76 % (DC up to 40V) ±1.74 % (AC 50Hz up to 400V)	±3 %
Time	±0.012 %	±5 %

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).



### Photo(s) of test setup

Version ZLX-12BT, Sample 02, Serial no.: 095414385334570009 (tested under PKM ref. no.: 18/06-0005)



spurious emission conducted with spectrum analyzer







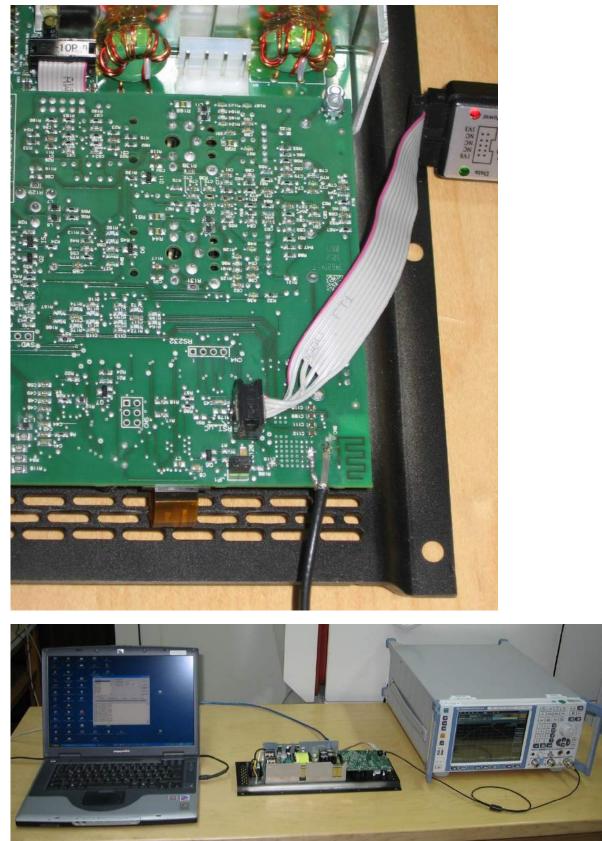
20 dB bandwidth, 99 % bandwidth, hopping channel separation, hopping channel frequencies, time of occupancy, Maximum peak conducted output power, Conducted RF band edge emissions with ESR7 EMI Testreceiver



Version ZLX-15BT, Sample 02: Serial no.: 095414485334640007 (tested under PKM ref. no.: 18/06-0006)

spurious emission conducted with spectrum analyzer





20 dB bandwidth, 99 % bandwidth, hopping channel separation, hopping channel frequencies, time of occupancy, Maximum peak conducted output power, Conducted RF band edge emissions with ESR7 EMI Testreceiver



#### **10. CONCLUSIONS**

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the following clauses of Federal Communications Commission Rules for intentional radiators e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C and Part 2.

- §15.203 Antenna requirement
- §15.205 Restricted bands of operation
- §15.207 Conducted limits
- §15.209 Radiated emission limits; general requirements
- §15.215 Additional provisions to the general radiated emission limitations
- §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,

and 5725-5850 MHz

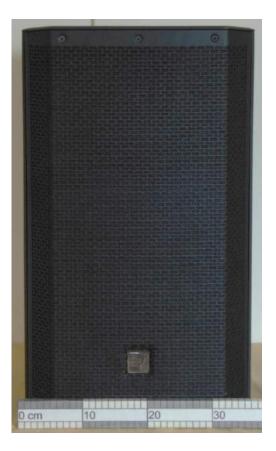
Following specific modifications and/or special attributes are necessary to pass the above mentioned requirements: none

05.04.2019 prepared on	G. Raithel DiplIng. (FH), Head of Laboratory (name / position)	electronic GmbH a member of the STC IF Annual (signature)
05.04.2019 released on	K. Simon, Deputy Head of Laboratory (name / position)0	Karl Simon (signature)
		(0.9.1.4.4.10)



## 11. Photos of tested sample(s)

## Version ZLX-12BT





















## Mat/N: F01U348781 CTN: ZLX-12BT-EU SN: 095414385334570009

POWER RATING / TEGANGAN: 100-240V~ 50-60Hz 0.8-0.5A FUSE: T4A/L/250V BOSCH SECURITY SYSTEMS, INC. 130 PERINTON PARKWAY

FAIRPORT, NY, 14450 USA EU IMPORTER: BOSCH SICHERHEITSSYSTEME GMBH

R.-BOSCH-RG 5, D-85626 GRASBRUNN FOR INDONESIA ONLY: IMPORTED BY / DIIMPOR OLEH PT ROBERT BOSCH, JAKARTA, INDONESIA

WWW.ELECTROVOICE.COM | MADE IN CHINA







## Version ZLX-15BT

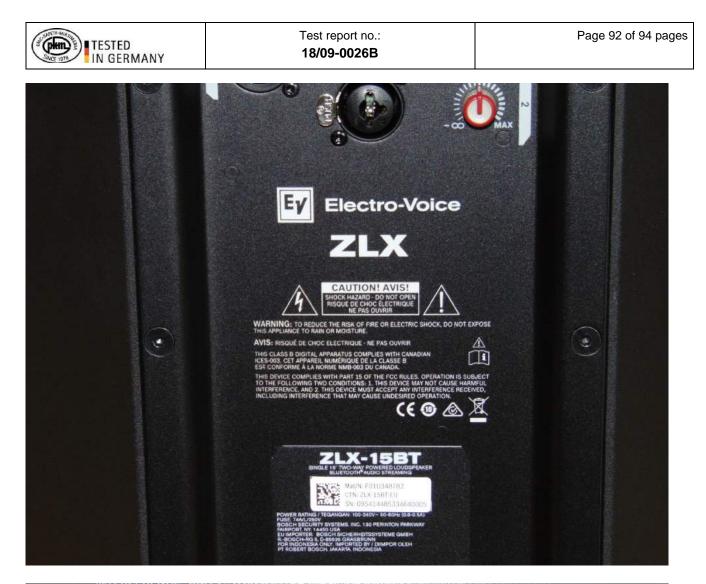






















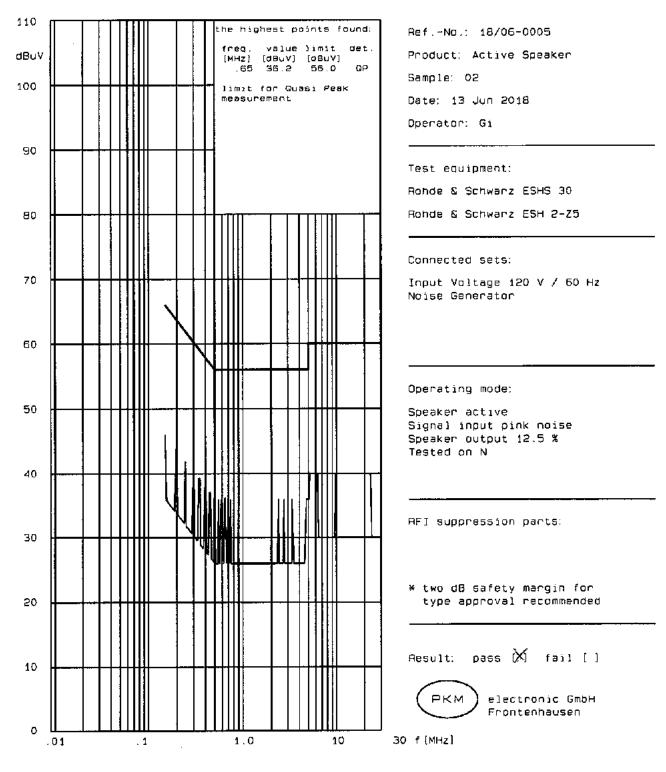
End of test report



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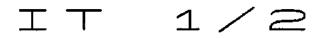
Interference Voltage 150 KHz - 30 MHz acc. FCC PART 15.107(a) Class B ICES-003





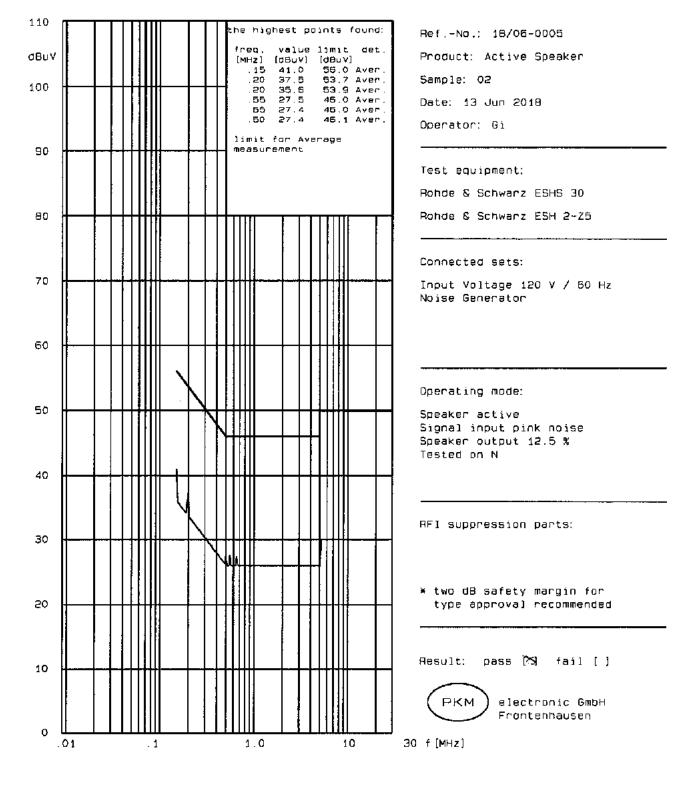
Annex 1 Test report no.: 18/09-0026

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Interference Voltage 150 KHz - 30 MHz acc, FCC PART 15.107(a) Class B

ICES-003

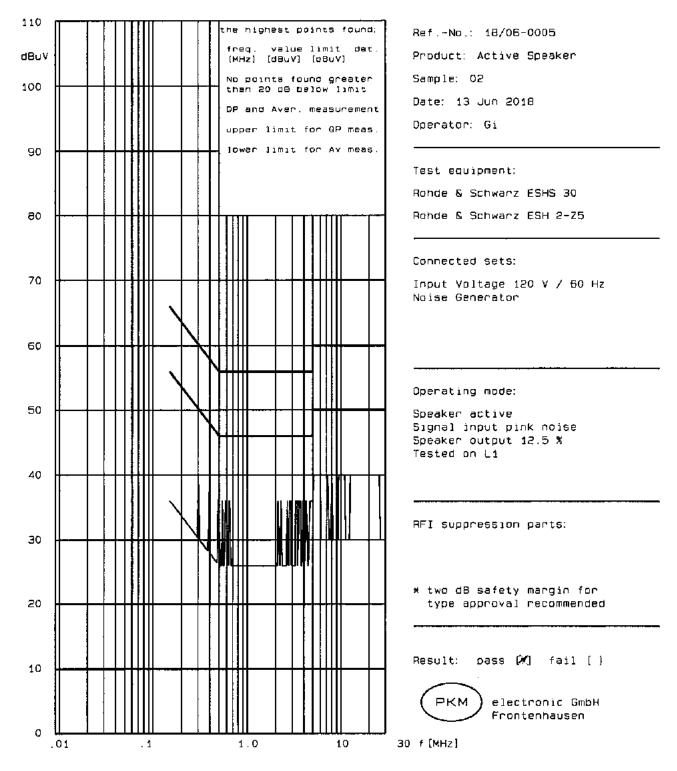




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Interference Voltage 150 KHz - 30 MHz acc. FCC PART 15.107 (a) Class B ICES-003



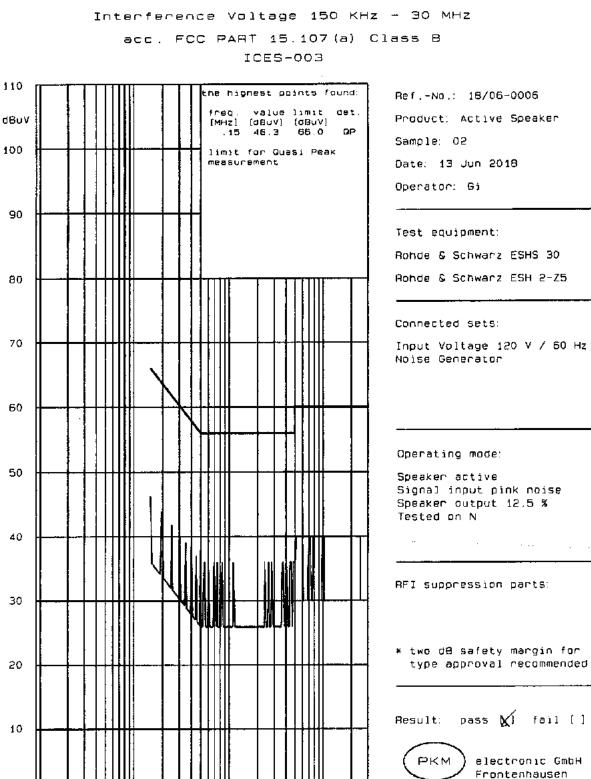


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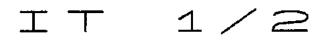
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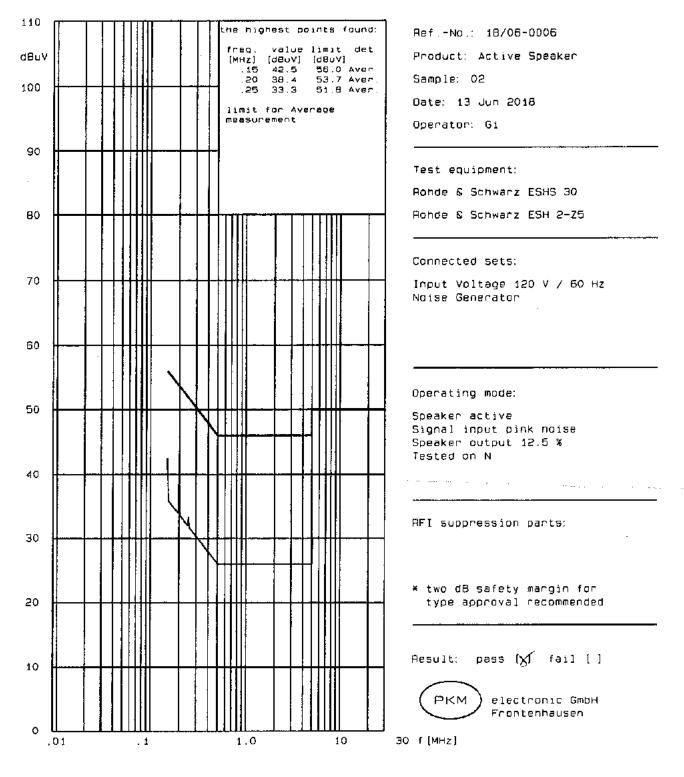


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Interference Voltage 150 KHz - 30 MHz acc. FCC PART 15.107(a) Class B

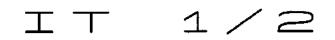
ICES-003





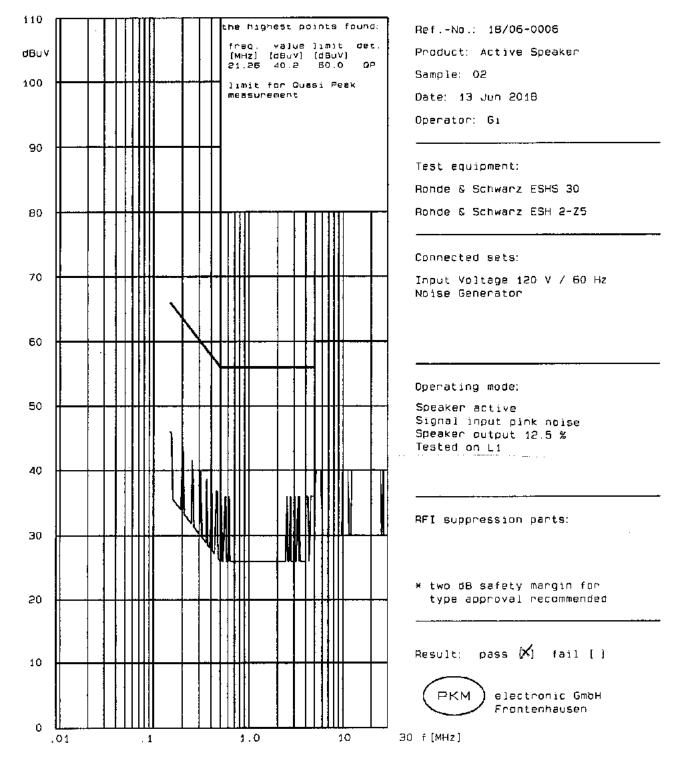
Annex 1 Test report no.: 18/09-0026

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Interference Voltage 150 KHz - 30 MHz acc. FCC PART 15.107(a) Class B

ICES-003





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Interference Voltage 150 KHz - 30 MHz acc. FCC PART 15.107(a) Class B ICES-003

