



## FCC PART 22 AND 90 TEST REPORT

For

### Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057  
China

**FCC ID: YAMBD30XU1**

<b>Report Type:</b> Class II Permissive Change	<b>Product Type:</b> Digital Portable Radio
<b>Test Engineer:</b> <u>Dean Liu</u> 	
<b>Report Number:</b> <u>RDG160905010-00A1</u>	
<b>Report Date:</b> <u>2016-09-12</u>	
<b>Reviewed By:</b> <u>Sula Huang</u>  RF Leader	
<b>Test Laboratory:</b> Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Hytera Communications Corporation Limited's* product, model: *BD302 U(1)* (FCC ID: *YAMBD30XU1*) (the "EUT") in this report is a *Digital Portable Radio*, which was measured approximately: 11.0 cm (H) x 5.3 cm (W) x 4.0 cm (D), rated input voltage: DC3.8V Li-ion battery or DC5V charging from adapter.

Adapter Information:

P/N: PS1030

MODEL: HKA00505010-XA

INPUT: AC 100-240V, 50/60Hz, 0.2A

OUTPUT: DC 5.0V, 1.0A

*Note: The series product, model BD302 U(1), BD305 U(1), BD306 U(1), BD308 U(1) are electrically identical, the difference between them are just the model name, we selected BD302 U(1) for fully testing, the details were explained in the declaration letter.*

*\* All measurement and test data in this report was gathered from production sample serial number: 160905010 (assigned by BACL, Dongguan). The EUT was received on 2016-09-05.*

### Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited*. in accordance with Part 2, Part 22 and Part 90 of the Federal Communications Commission rules.

This is the CIIPC application of the device. The difference between the original device and new device is as follows:

Changed the high power level to 2W.

Please refer to the Permissive Change Declaration Letter.

### Related Submittal(s)/Grant(s)

Original submission with FCC ID: YAMBD30XU1 which is granted on 2016-08-25.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Service

Part 90 – Private Land Digital Portable Radio Service

Applicable Standards: TIA-603-D.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2015. The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode.

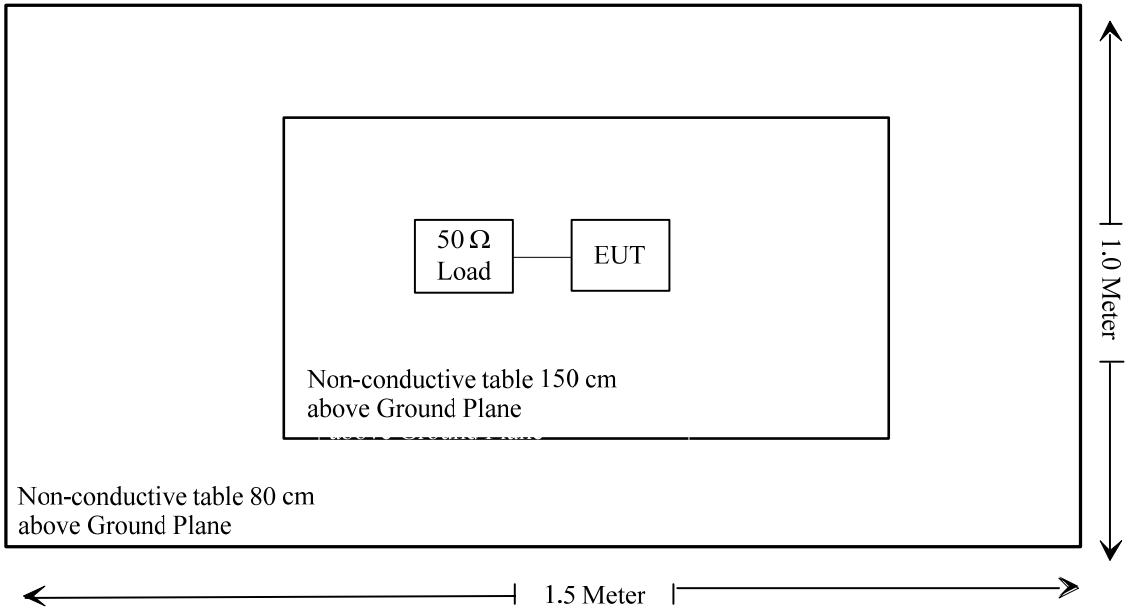
EUT Specification:

Operating Frequency Band	400-406 MHz; 406.1-470 MHz
Modulation Mode	FM/4FSK
Channel Spacing	12.5 kHz
Rated Output Power	High: 2W Low: 1W

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Results
§1.1310 and §2.1093	RF Exposure	Compliance
§2.1046; § 22.727;§90.205	RF Output Power	Compliance**
§2.1047;§90.207	Modulation Characteristic	Compliance*
§2.1049;§22.357;§ 22.731;§90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance**
§2.1051; §22.861;§90.210	Spurious Emission at Antenna Terminal	Compliance*
§2.1053; §22.861;§90.210	Spurious Radiated Emissions	Compliance*
§2.1055; § 22.355;§90.213	Frequency Stability	Compliance*
§90.214	Transient Frequency Behavior	Compliance*

Compliance\*: Please referred to FCC ID: YAMBD30XU1 granted on 2016-08-25., report No.: RDG160712002-00 that issued on 2016-08-03.

Compliance\*\*: Test result of low power Please referred to FCC ID: YAMBD30XU1 granted on 2016-08-25, report No.: RDG160712002-00 that issued on 2016-08-03.

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## **FCC §1.1310 & §2.1093 - RF EXPOSURE**

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliant, please refer to the SAR report: RDG160712002-20A.

**FCC §2.1046 &§ 22.727&§90.205- RF OUTPUT POWER****Applicable Standard**

FCC §2.1046, § 22.727 and §90.205.

**Test Procedure**

Conducted RF Output Power:

TIA-603-D section 2.2.1

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer setting:

RBW	VBW
100 kHz	300 kHz

**Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-07	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-05	2017-05-04

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

Temperature:	28.1 °C
Relative Humidity:	52 %
ATM Pressure:	99.8 kPa

*The testing was performed by Dean Liu on 2016-09-09.*



Test Result: Compliant. Please refer to following tables.

FCC Part 90:

Modulation	Channel Spacing (kHz)	f <sub>c</sub> (MHz)	Conducted Output Power(W)	Note
			High	
FM	12.5	400.0125	2.03	Not for FCC Review
		435	2.02	/
		469.9875	2.04	/
4FSK		400.0125	2.01	Not for FCC Review
		435	2.02	/
		469.9875	2.03	/

FCC Part 22:

Modulation	Channel Spacing (kHz)	f <sub>c</sub> (MHz)	Conducted Output Power(W)	Note
			High	
FM	12.5	454.0125	2.02	/
4FSK		454.0125	2.03	/

Note: The rated high power is 2W (33 dBm).

## FCC §2.1049 & §22.357 & § 22.731 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

### Applicable Standard

FCC §2.1049, §22.357, § 22.731, §90.209 and §90.210

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25	A or B	A or C
25-50	B	C
72-76	B	C
150-174	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854	B	H
809-824/854-869	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925		
All other bands	B	C

**Emission Mask D**—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

§22.357 Emission types.

Any authorized station in the Public Mobile Services may transmit emissions of any type(s) that comply with the applicable emission rule, i.e. §22.359, §22.861 or §22.917

§22.731 Emission limitations.

Upon application for multichannel operation, the FCC may authorize emission bandwidths wider than those specified in §22.357, provided that spectrum utilization is equal to or better than that achieved by single channel operation.

### Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
HP	RF Communications Test Set	8920A	00 235	2016-07-11	2017-07-11
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2016-05-07	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-05	2017-05-04

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

### Test Data

#### Environmental Conditions

Temperature:	28.1°C
Relative Humidity:	52 %
ATM Pressure:	99.8 kPa

*The testing was performed by Dean Liu on 2016-09-09.*

*Test Result: Compliant. Please refer to the following tables and plots.*

*FCC Part 90:*

Modulation Mode	Channel Spacing	$f_c$	26 dB Bandwidth	99% Occupied Bandwidth
		MHz	kHz	kHz
FM	12.5 kHz	435	10.300	5.5
		453.2125	10.300	5.3
4FSK	12.5 kHz	435	8.700	6.5
		453.2125	8.600	6.6

*FCC Part 22:*

Modulation Mode	Channel Spacing	$f_c$	26 dB Bandwidth	99% Occupied Bandwidth
		MHz	kHz	kHz
FM	12.5 kHz	454.0125	10.300	5.3
4FSK			9.100	6.9

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator

Per CFR 47 §2.201& §2.202&,  $B_n = 2M + 2D$

#### **For FM Mode (Channel Spacing: 12.5 kHz)**

Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = \rightarrow 11K0$

F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

#### **For Digital Mode (Channel Spacing: 12.5 kHz)**

Emission Designator 7K60FXD and 7K60FXW

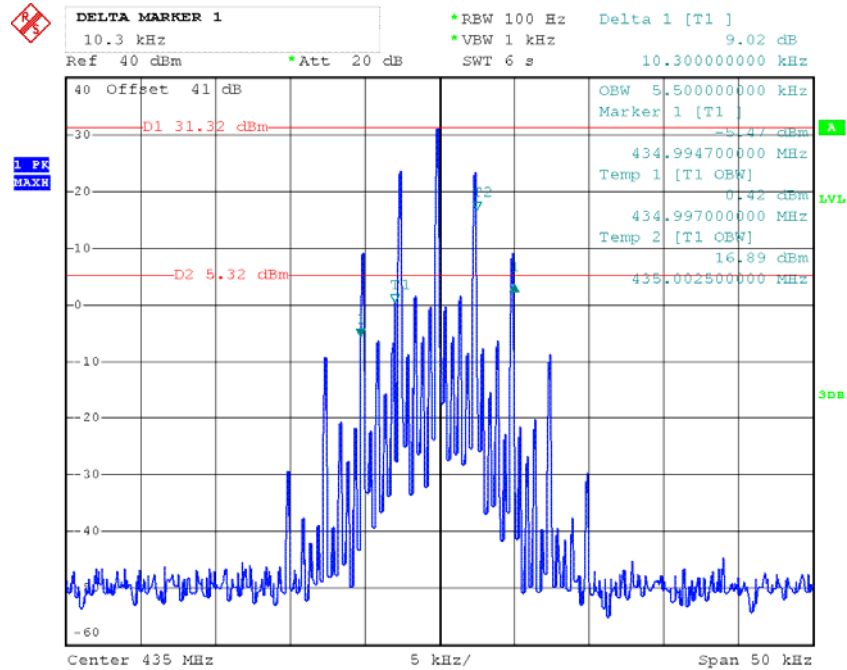
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.10 kHz. The emission mask was obtained from 47CFR 90.210(d).

FXD and FXW portion of the designator indicates digital information.

Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60FXD and 7K60FXW.

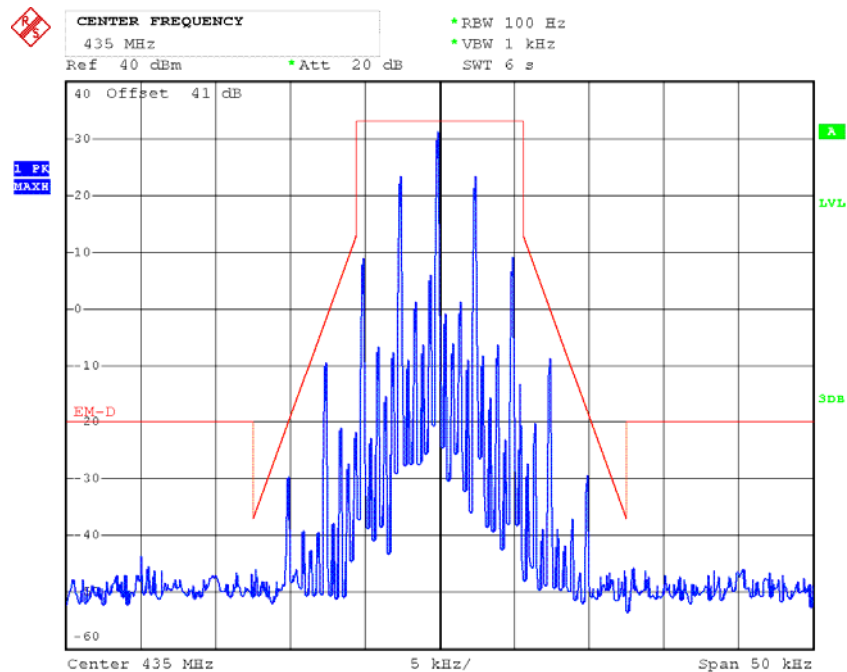
Part 90:

### Occupied Bandwidth – FM, 435 MHz, High Power Level

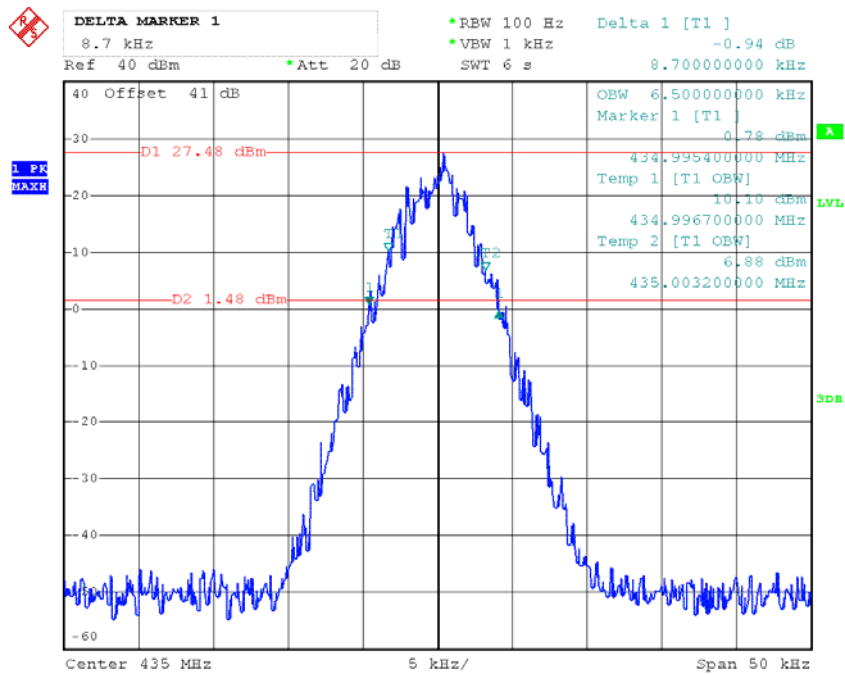


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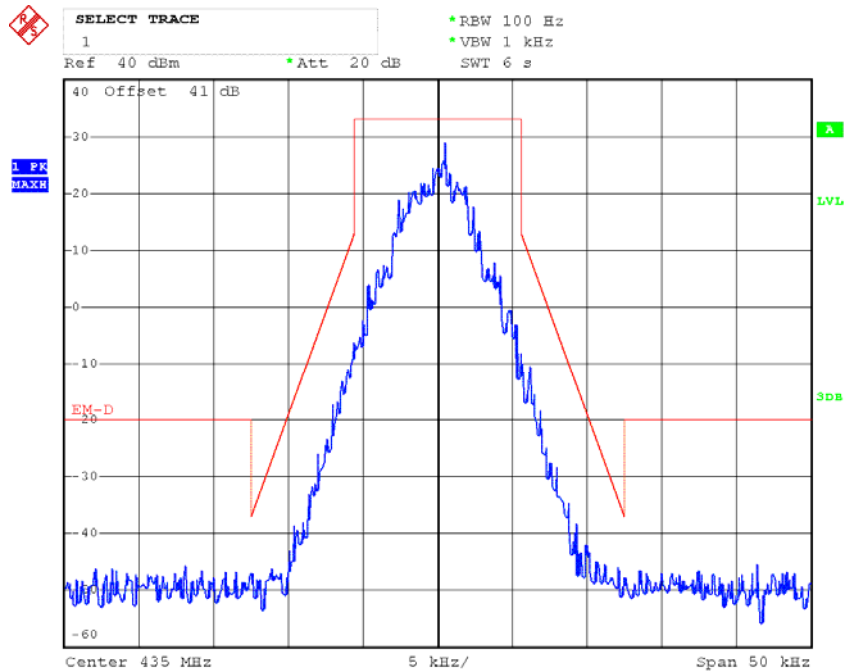
### Emission Mask - Type D



Date: 8.SEP.2016 21:04:20

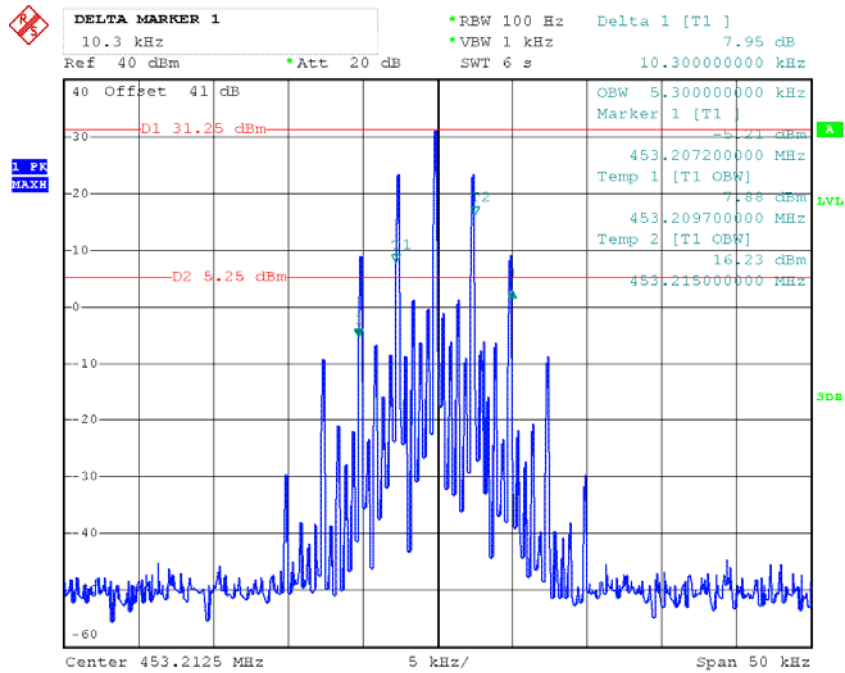
**Occupied Bandwidth –4FSK, 435 MHz, High Power Level**

Date: 8.SEP.2016 20:42:53

**Emission Mask - Type D**

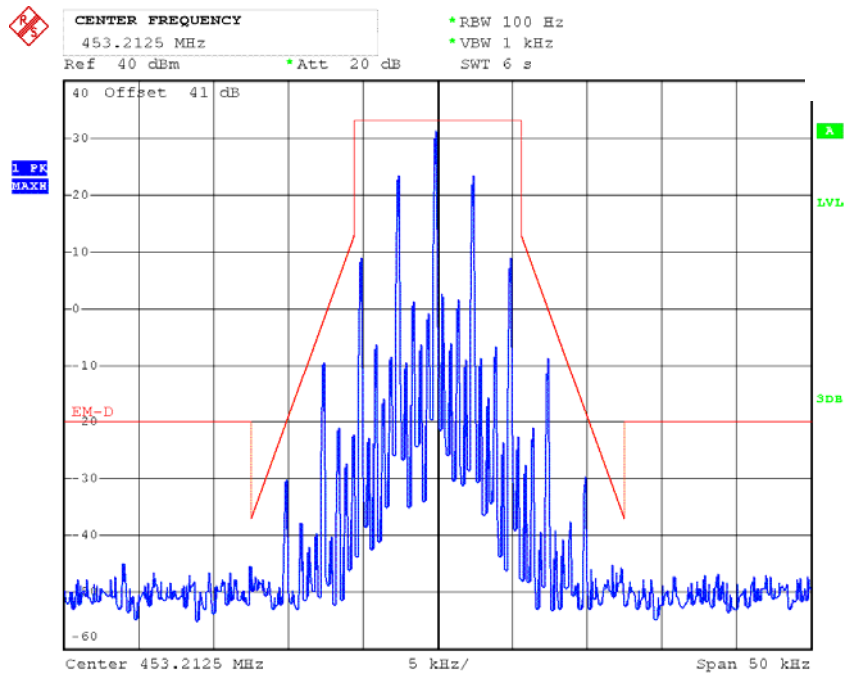
Date: 8.SEP.2016 18:42:26

### Occupied Bandwidth – FM, 453.2125 MHz, High Power Level



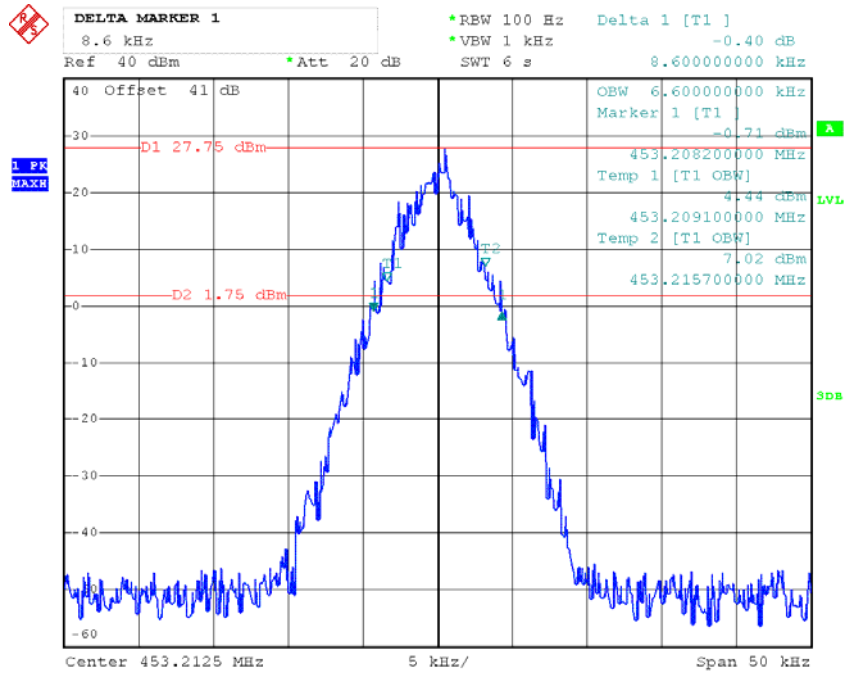
Date: 8.SEP.2016 21:00:24

### Occupied Bandwidth – FM, 453.2125 MHz, Low Power Level



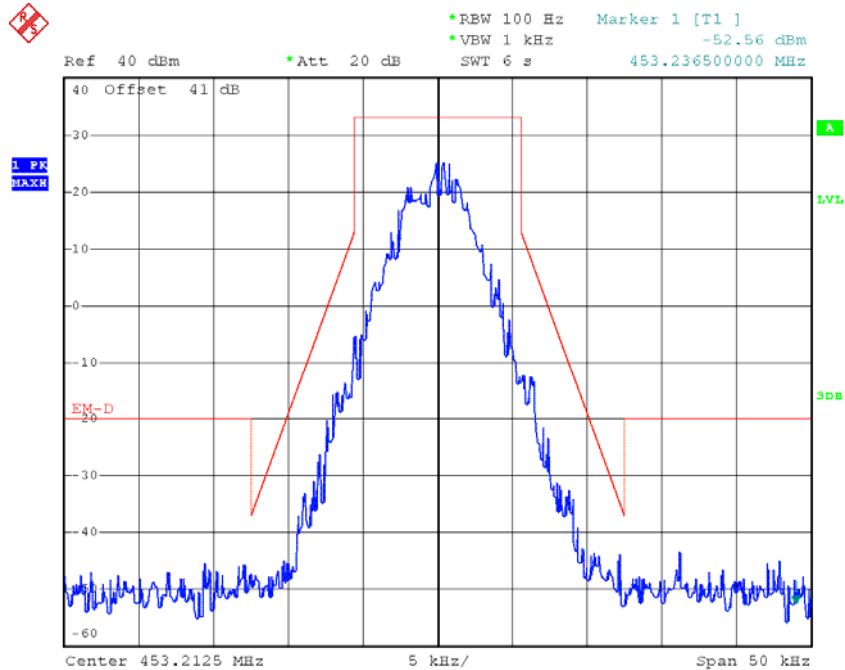
Date: 8.SEP.2016 21:03:39

### Occupied Bandwidth –4FSK, 453.2125 MHz, High Power Level



Date: 8.SEP.2016 20:41:12

### Emission Mask - Type D

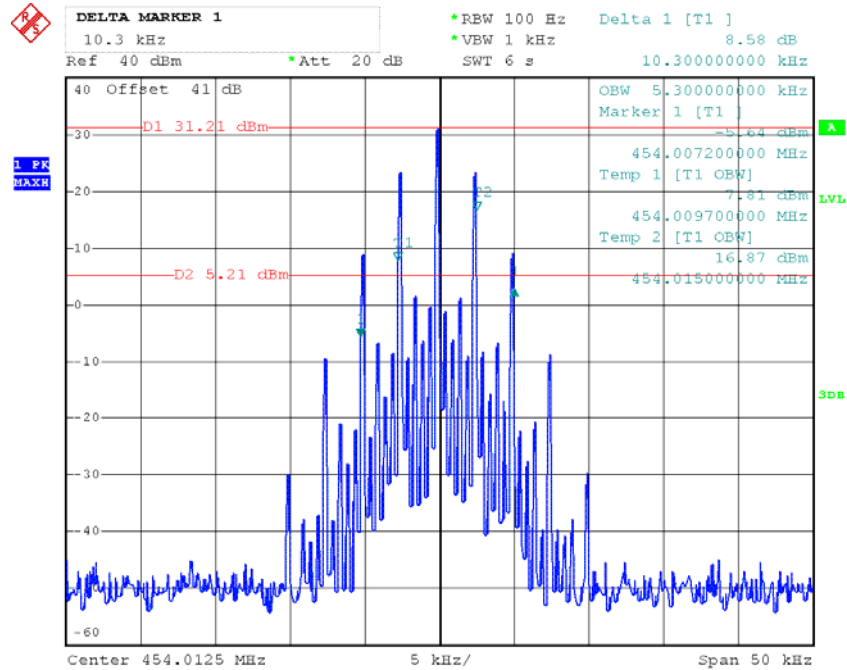


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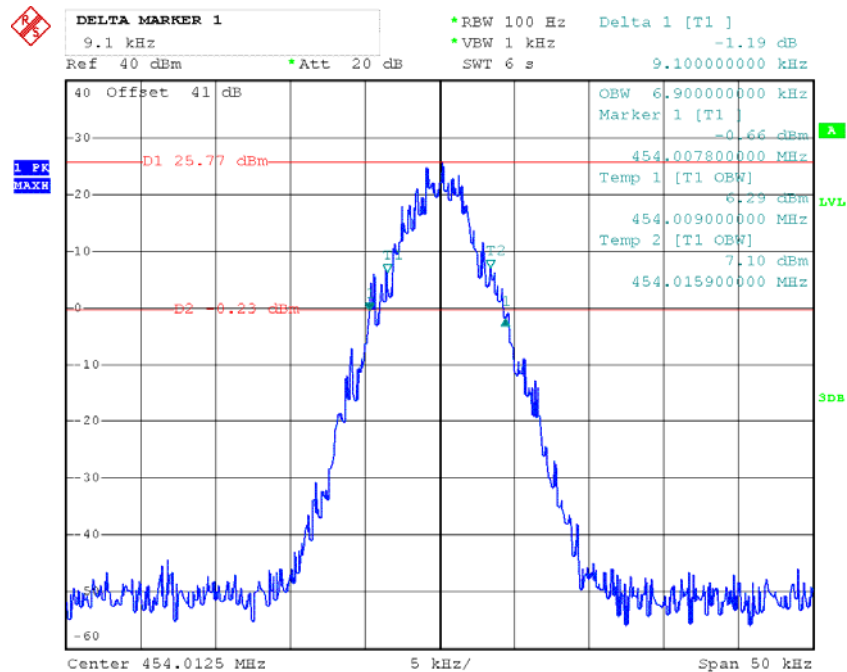
## Part 22:

## Occupied Bandwidth –FM, 454.0125 MHz, High Power Level



Date: 8.SEP.2016 21:01:47

## Occupied Bandwidth –4FSK, 454.0125 MHz, High Power Level



Date: 8.SEP.2016 20:39:41

\*\*\*\*\* END OF REPORT \*\*\*\*\*