

FCC PART 22 and 90 TEST REPORT

For

Sepura plc

9000 Cambridge Research Park Beach Drive, Waterbeach, Cambridge, CB25 9TL, UK

FCC ID: XX6SEP8010

Report Type: Class II permissive change	Product Type: DMR Two Way Radio
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Report Number: <u>RDG150907001-00A1</u>	
Report Date: <u>2016-02-25</u>	
Reviewed By: <u>Sula Huang RF Leader</u>	<i>Sula Huang</i>
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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.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Sepura plc*'s product, model: *SEP8010* (FCC ID: *XX6SEP8010*) (the "EUT") in this report is a *DMR Two Way Radio*, which was measured approximately: 14.9 cm (L) x 6.4 cm (H) x 3.7 cm (T), rated input voltage: DC7.4 V from rechargeable Li-ion battery.

** All measurement and test data in this report was gathered from production sample serial number: 7PR931608GA0001 (assigned by applicant). The EUT was received on 2016-02-23.*

Objective

This test report is prepared on behalf of *Sepura plc* in accordance with Part 2, Part22, and Part 90 of the Federal Communications Commission rules.

1. Updated the occupied bandwidth&emission mask
2. Updated the emission designator.

According to the changes, it will impact the test results of occupied bandwidth&emission mask, so in this report, we update the test data of occupied bandwidth&emission mask.

Related Submittal(s)/Grant(s)

Original submission with FCC ID: *XX6SEP8010* which is granted on 2014-12-24.
Class II Permissive Change submission with FCC ID: *XX6SEP8010* which is granted on 2015-01-28.

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 Mobile Radio Service

Applicable Standards: TIA-603-D.

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 06, 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	136-174MHz
Modulation Mode	FM, 4FSK
Channel Spacing	12.5 kHz
Transmitter Power	High: 5W Low: 1W

Equipment Modifications

No modifications were made to the unit tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

SUMMARY OF TEST RESULTS

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

Compliance*: Please refer to the report number RDG140811007-00 granted on 2014-12-24, with FCC ID: XX6SEP8010.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
HP	RF Communications Test Set	8920A	00 235	2015-05-09	2016-05-09
Weinschel Corp	Attenuator(20dB)	53-20-34	LN749	2015-05-08	2016-05-08
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06
Pasternack	RF Coaxial Cable	RF-01(30cm)	/	2015-05-06	2016-05-06
Pasternack	RF Coaxial Cable	RF-02(30cm)	/	2015-05-06	2016-05-06

* **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:	20.1°C
Relative Humidity:	59%
ATM Pressure:	99.6 kPa

The testing was performed by Dean Lau on 2016-02-24.

Test Mode: Transmitting

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

FCC Part 90:

Modulation Mode	Channel Separation	f_c	26 dB Bandwidth	99% Occupied Bandwidth	Power Level
	kHz	MHz	kHz	kHz	
FM	12.5	155	10.32	9.92	High
4FSK			9.22	6.81	
FM			10.32	9.92	Low
4FSK			9.72	7.11	

FCC Part 22:

Modulation Mode	Channel Separation	f_c	26 dB Bandwidth	99% Occupied Bandwidth	Power Level
	kHz	MHz	kHz	kHz	
FM	12.5	161.65	10.32	9.92	High
4FSK			8.82	6.91	
FM			10.32	9.92	Low
4FSK			9.62	6.91	

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)

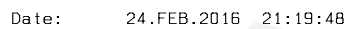
Emission Designator 7K60FXD and 7K60FXW

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, 7.11 kHz. The emission mask was obtained from 47CFR 90.210(d).

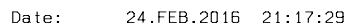
FXD and FXW portion of the designator indicates digital information.

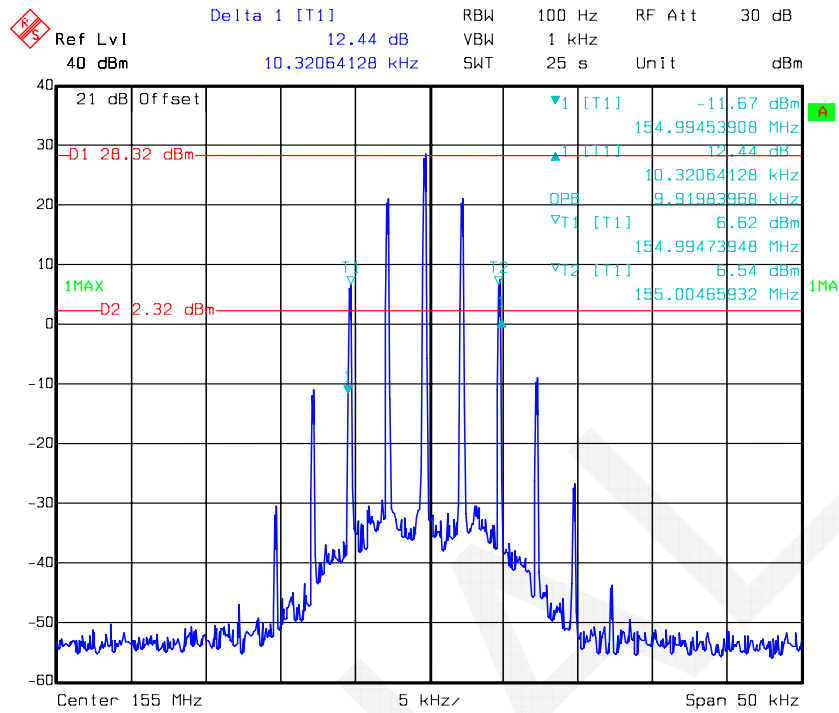
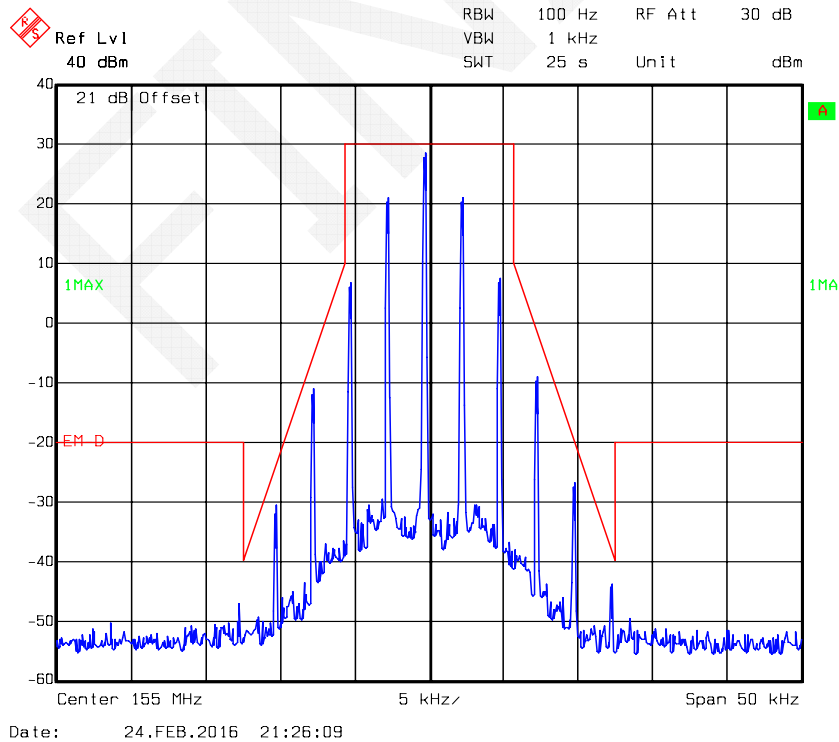
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60FXD and 7K60FXW.

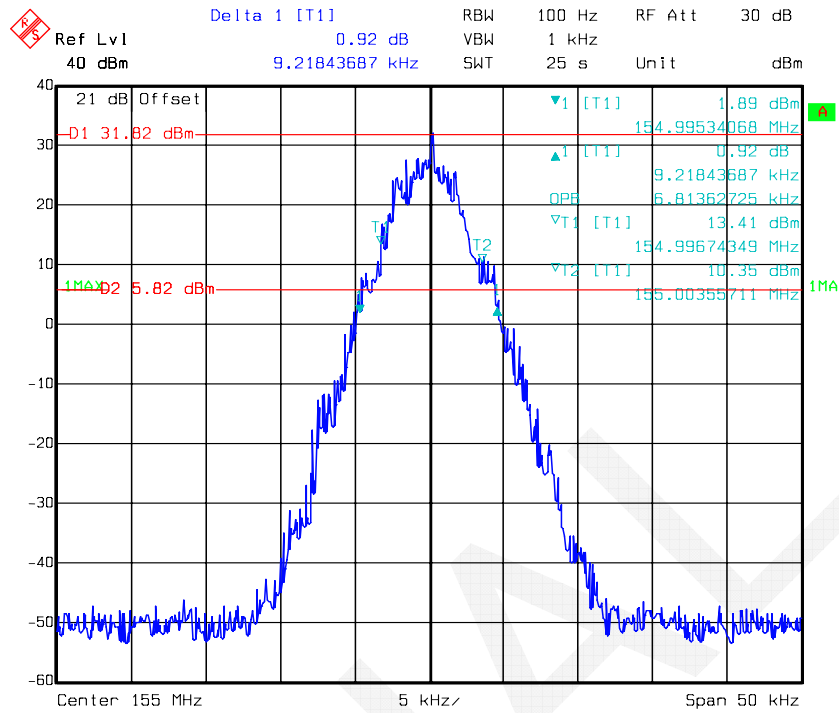
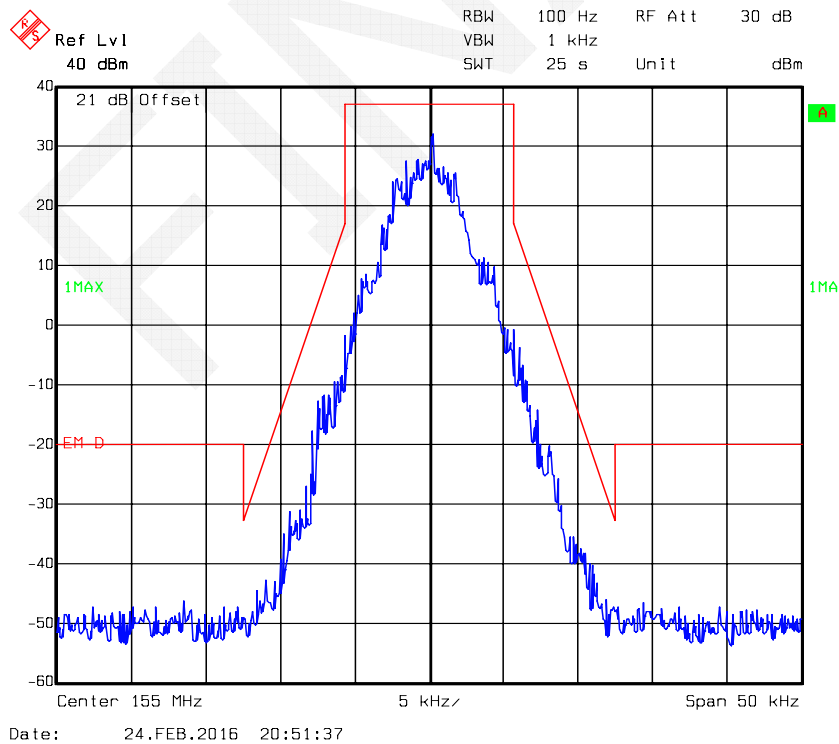
Occupied Bandwidth – FM, 155 MHz, High Power Level



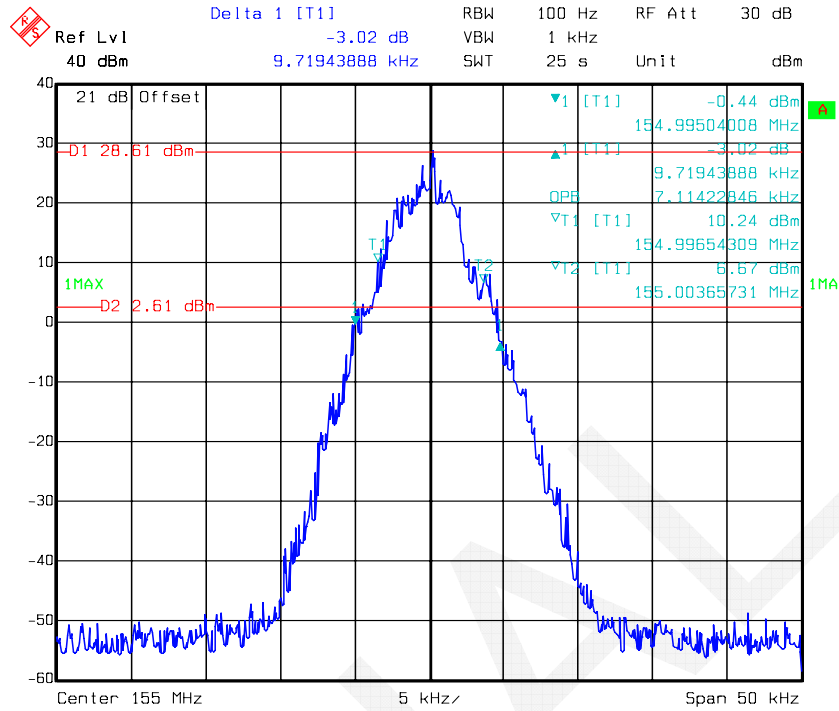
Emission Mask - Type D



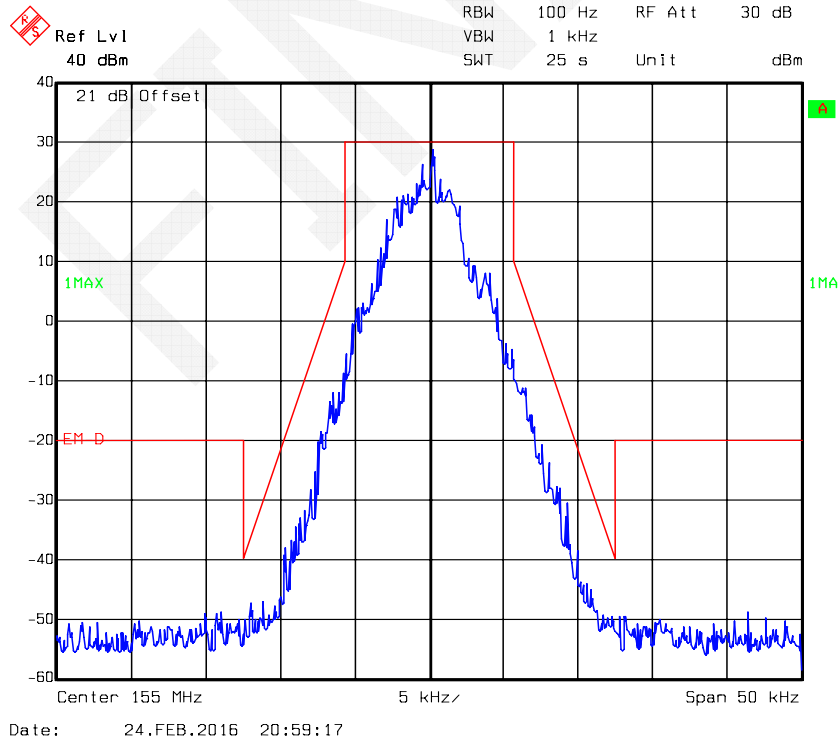
Occupied Bandwidth – FM, 155 MHz, Low Power Level**Emission Mask - Type D**

Occupied Bandwidth –4FSK, 155 MHz, High Power Level**Emission Mask - Type D**

Occupied Bandwidth – 4FSK, 155 MHz, Low Power Level

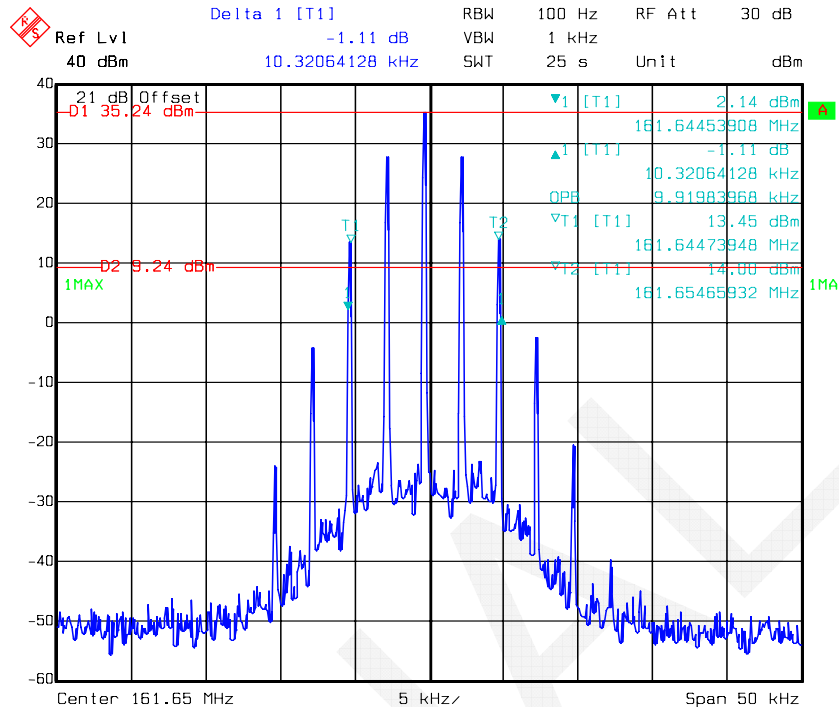


Emission Mask - Type D

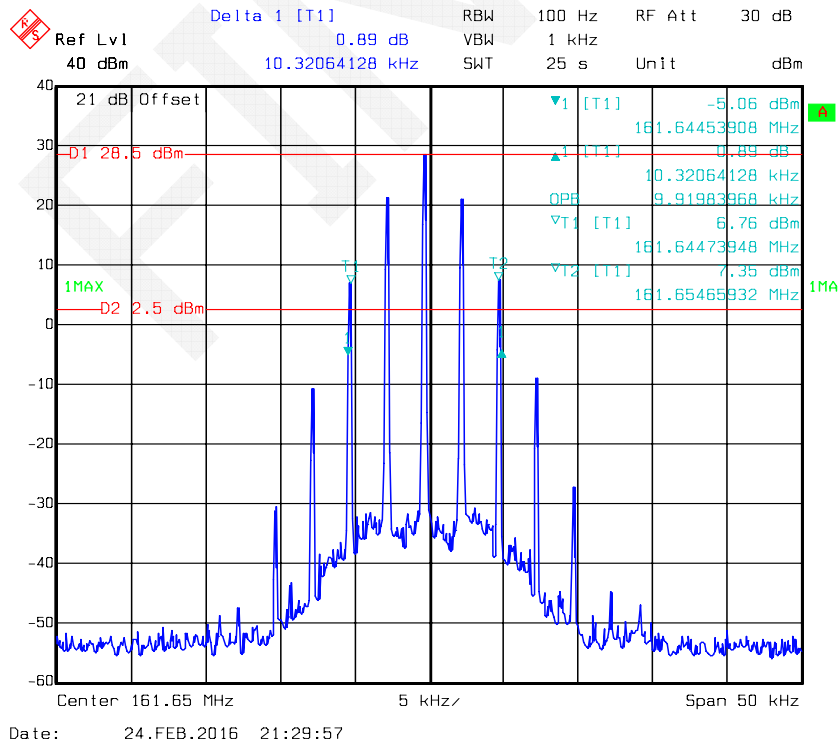


Part 22:

Occupied Bandwidth – FM, 161.65 MHz, High Power Level



Occupied Bandwidth – FM, 161.01 MHz, Low Power Level



Delta 1 [T1]

RBW 100 Hz RF Att 30 dB

Ref Lvl -0.55 dB VBW 1 kHz

40 dBm 8.81763527 kHz SWT 25 s Unit dBm

21 dB Offset

-D1 31.94 dBm

161.64534068 MHz

-0.55 dB

8.81763527 kHz

OPB 6.91382766 kHz

T1 [T1] 12.71 dBm

161.64654309 MHz

T2 [T1] 11.20 dBm

161.65345691 MHz

161.65 MHz

5 kHz/

Span 50 kHz

Ref Lvl 40 dBm

Delta 1 [T1] -1.45 dB

RBW 100 Hz

RF Att 30 dB

VBW 1 kHz

SWT 25 s

Unit dBm

21 dB Offset

D1 28.29 dBm

1MAX

D2 2.29 dBm

1MA

Center 161.65 MHz

5 kHz/

Span 50 kHz

161.64493988 MHz

-1.45 dB

9.61923848 kHz

6.91382766 kHz

10.12 dBm

161.64664329 MHz

7.78 dBm

161.65355711 MHz

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