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# Test report

**325978-1TRFWL**

Date of issue: **May 11, 2017**

Applicant:

**Nuran Wireless**

Product:

**GSM Base Station**

Model:

**GSM310-850 Litecell**

FCC ID:

**2AD2F-GSM310-850**

Specifications:

◆ **FCC Part 22 Subpart H**

Cellular radiotelephone service.

[www.nemko.com](http://www.nemko.com)

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

*FCC 22H and 24 E.docx; Date: Jan 2016*



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**Test location**

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Company name:	Nemko Canada Inc.
Address:	303 River Road
City:	Ottawa
Province:	Ontario
Postal code:	K1V 1H2
Country:	Canada
Telephone:	+1 613 737 9680
Facsimile:	+1 613 737 9691
Toll free:	+1 800 563 6336
Website:	<a href="http://www.nemko.com">www.nemko.com</a>
Site number:	FCC: 176392; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by:	Kevin Rose, Wireless/EMC Specialist
Reviewed by:	Andrey Adelberg, Senior Wireless/EMC Specialist
Date:	May 11, 2017
Signature:	

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**Limits of responsibility**

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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 1. Report summary

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### 1.1 Applicant/Manufacturer

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Company name:	Nuran
Address:	2150 Cyrille-Duquet,
City:	Quebec City
Province/State:	Quebec
Postal/Zip code:	G1N 2G3
Country:	Canada

### 1.2 Test specifications

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FCC Part 22 Subpart H      Cellular radiotelephone service.

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### 1.3 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

### 1.4 Exclusions

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None

### 1.5 Test report revision history

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Revision #	Details of changes made to test report
TRF	Original report issued

## Section 2. Summary of test results

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### 2.1 FCC Part 22 Subpart H, test results

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Part	Test description	Verdict
22.913(a)	Effective Radiated Power Limits	Pass
22.917(a)	Field strength of spurious radiation	Pass
22.355(a)	Transmitter frequency stability	Pass

## Section 3. Equipment under test (EUT) details

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### 3.1 Sample information

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Receipt date	March 20, 2017
Nemko sample ID number	1

### 3.2 EUT information

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Product name	GSM Base Station
Model	GSM310-850 Litecell
Part number	GSM310-850

### 3.3 Technical information

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Operating band	869 – 894 MHz
Operating frequencies	869.2 – 893.8 MHz
Modulation type	GMSK and 8PSK
Channel bandwidth	320 kHz
Emission designator	GXW and G7W
Power requirements	24 Vdc
Antenna information	8 dBi. The external antenna is not always sold with the product.

### 3.4 Product description and theory of operation

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GSM 850 Base station

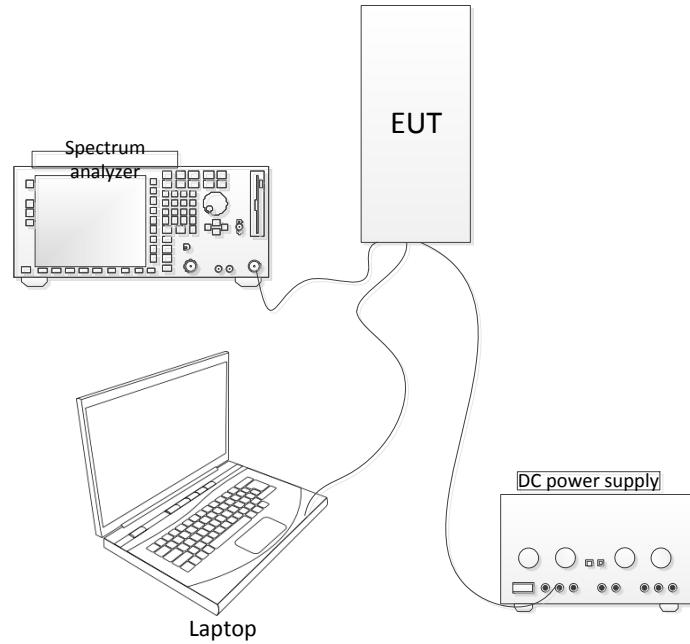
### 3.5 EUT exercise details

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Operated a maximum rf output power in each modulation mode.

### 3.6 EUT setup diagram

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*Figure 3.6-1: Setup diagram*

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5. Test conditions

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### 5.1 Atmospheric conditions

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Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

## Section 7. Test equipment

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### 7.1 Test equipment list

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*Table 7.1-1: Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Dec. 1/17
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 31/18
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	April 15/17
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	April 26/17
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	April 28/17
Pre-amplifier (1–18 GHz)	JCA	JCA118-503	FA002091	1 year	April 26/17
50 Ω coax cable	Huber + Suhner	None	FA002074	1 year	April 26/17
50 Ω coax cable	Huber + Suhner	None	FA002830	1 year	July 29/17

Note: NCR - no calibration required

## Section 8. Testing data

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### 8.1 FCC part 22 913 Effective Radiated Power

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#### 8.1.1 Definitions and limits

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FCC §22.913 Effective radiated power limits.

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 W (57 dBm). However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

- (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
- (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 W (60 dBm). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 W (38.45 dBm).

#### 8.1.2 Test summary

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Verdict	Pass		
Test date	March 20, 2017	Temperature	22 °C
Test engineer	Kevin Rose	Air pressure	1001 mbar
Test location	Ottawa	Relative humidity	34 %

#### 8.1.3 Observations settings and special notes

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TRX1 was found to have the highest power output all tests are based on this output.

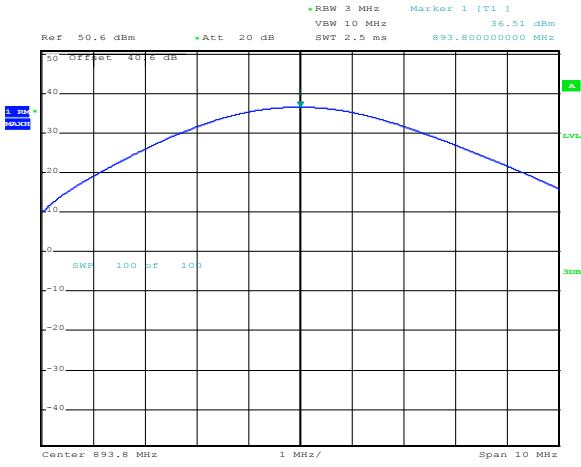
**Table 8.1-1:** ERP measurement results for GSM 850 TRX1 GSMK as per FCC Part 22

Frequency, MHz	Measured level, dBm	Antenna Gain, dBd	ERP, dBm	ERP limit, dBm	Margin, dB
869.2	39.60	5.85 (8 dBi)	45.45	57	5.70
881.4	39.56	5.85 (8 dBi)	45.41	57	5.74
893.8	38.64	5.85 (8 dBi)	44.49	57	6.66

Note: High Channel was reduced to comply with out of band spurious

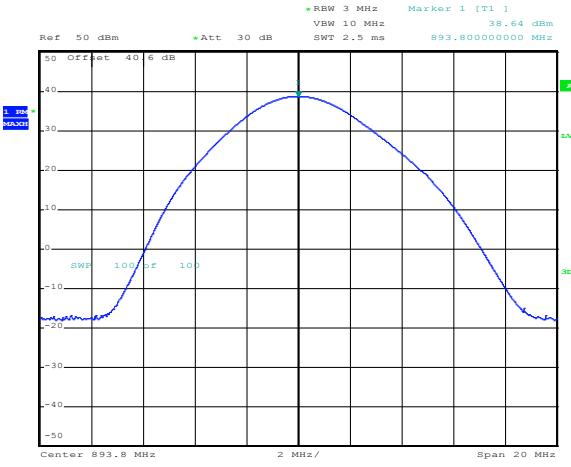
**Table 8.1-2:** ERP measurement results for GSM 850 TRX1 8PSK as per FCC Part 22

Frequency, MHz	Measured level, dBm	Antenna Gain, dBd	ERP, dBm	ERP limit, dBm	Margin, dB
869.2	36.60	5.85 (8 dBi)	42.45	57	8.70
881.4	36.59	5.85 (8 dBi)	42.44	57	8.71
893.8	36.51	5.85 (8 dBi)	42.36	57	8.79



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**Figure 8.1-1:** Conducted power Example



Date: 20.MAR.2017 18:27:10

**Figure 8.1-2:** Conducted power Example

## 8.2 FCC §22.917 Emission limitations for cellular equipment.

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### 8.2.1 Definitions and limits

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Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log_{10} (P)$  dB or  $-13$  dBm.

### 8.2.2 Test summary

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Verdict	Pass		
Test date	March 20, 2017	Temperature	22 °C
Test engineer	Kevin Rose	Air pressure	1001 mbar
Test location	Ottawa	Relative humidity	34 %

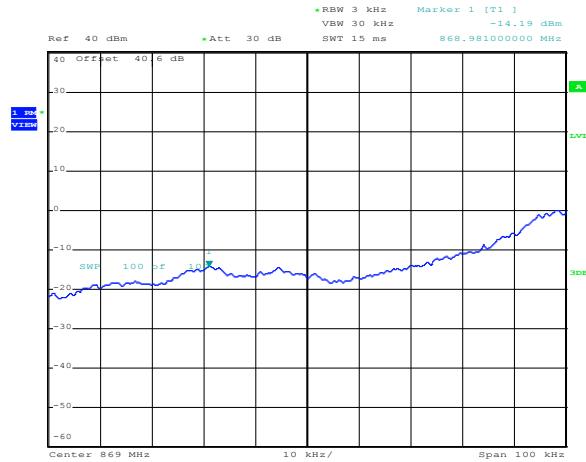
### 8.2.3 Observations settings and special notes

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The Spectrum was searched from 30 MHz to the 10<sup>th</sup> Harmonic.

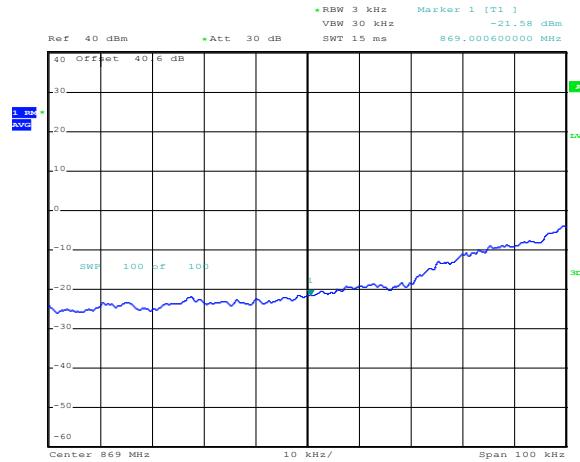
All measurements were performed using a RMS Detector with 100 kHz RBW below 1 GHz and a 1 MHz RBW above 1 GHz at 3 meters.  
In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter was employed.  
Low, Middle, and High channels for GSM 850.

#### 8.2.4 Test Data



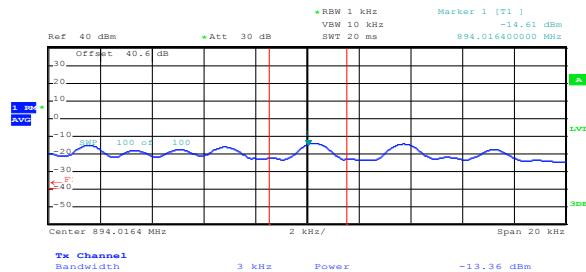
Date: 20.MAR.2017 18:06:57

**Figure 8.2-1:** Conducted emissions lower band edge GSMK



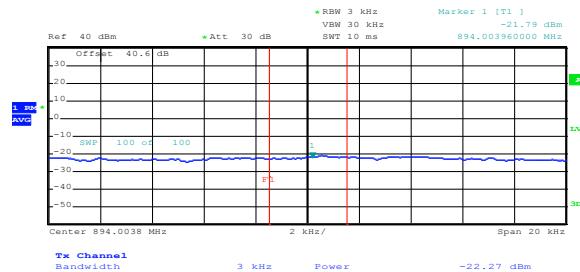
Date: 20.MAR.2017 18:04:58

**Figure 8.2-2:** Conducted emissions lower band edge 8PSK



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**Figure 8.2-3:** Conducted emissions upper band edge GSMK

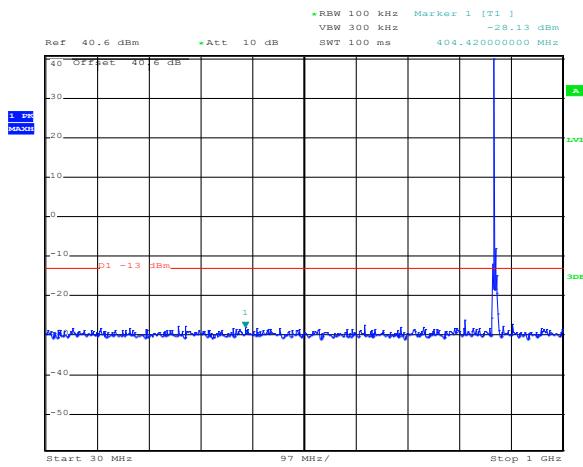


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**Figure 8.2-4:** Conducted emissions upper band edge 8PSK

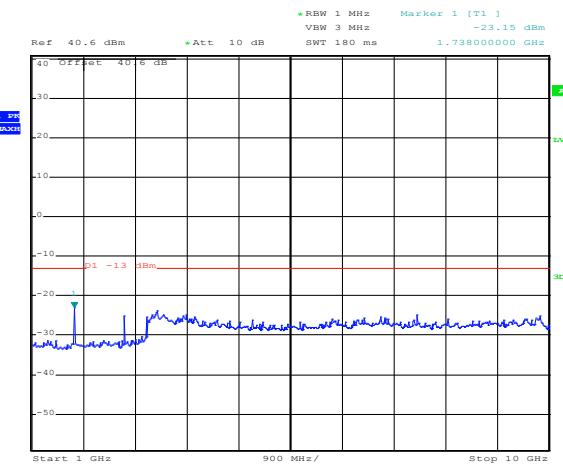
**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC §22.917 Emission limitations for cellular equipment.  
 FCC Part 22



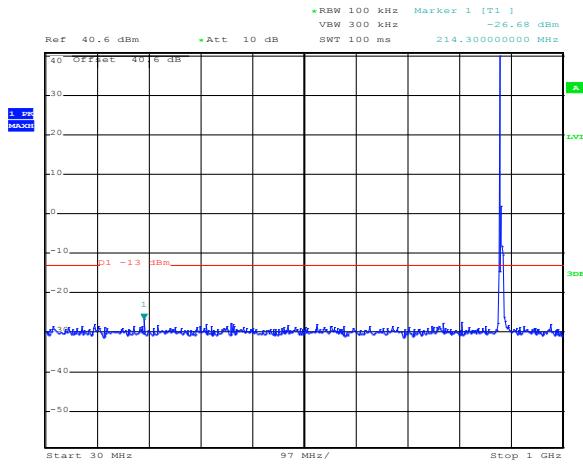
Date: 20.MAR.2017 19:35:45

**Figure 8.2-5:** Conducted emissions low channel GSMK 30-1000 MHz



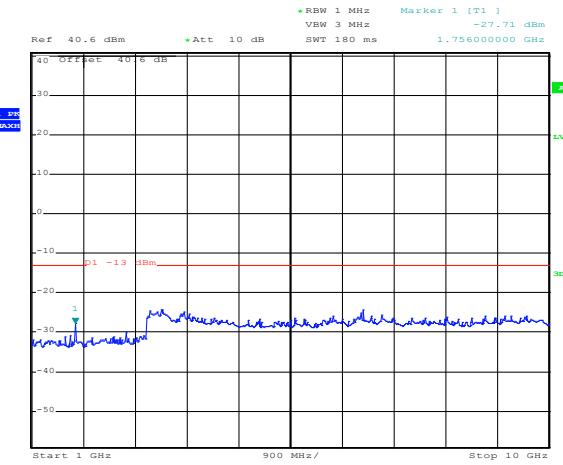
Date: 20.MAR.2017 19:36:23

**Figure 8.2-6:** Conducted emissions low channel GSMK 1-10 GHz



Date: 20.MAR.2017 19:34:40

**Figure 8.2-7:** Conducted emissions mid channel GSMK 30-1000 MHz

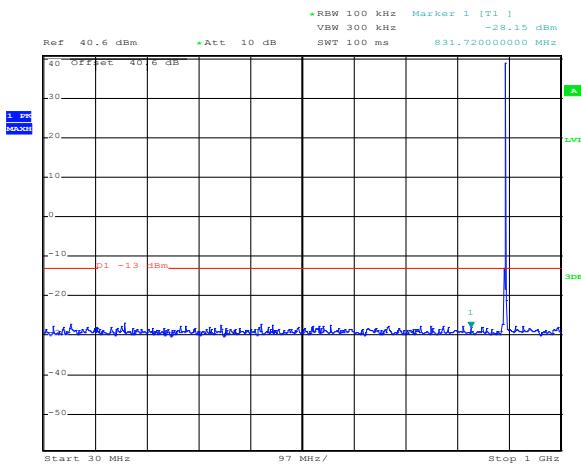


Date: 20.MAR.2017 19:42:37

**Figure 8.2-8:** Conducted emissions mid channel GSMK 1-10 GHz

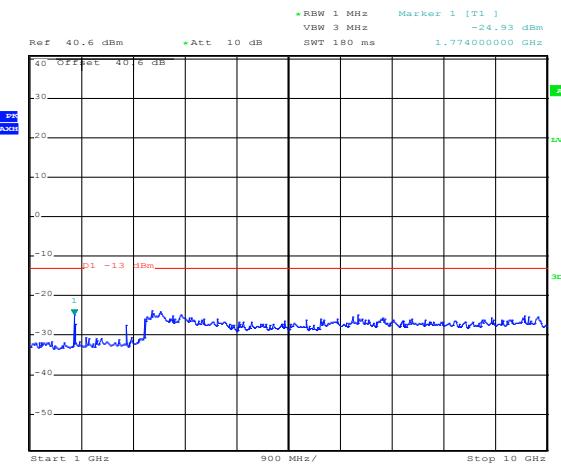
**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC §22.917 Emission limitations for cellular equipment.  
 FCC Part 22



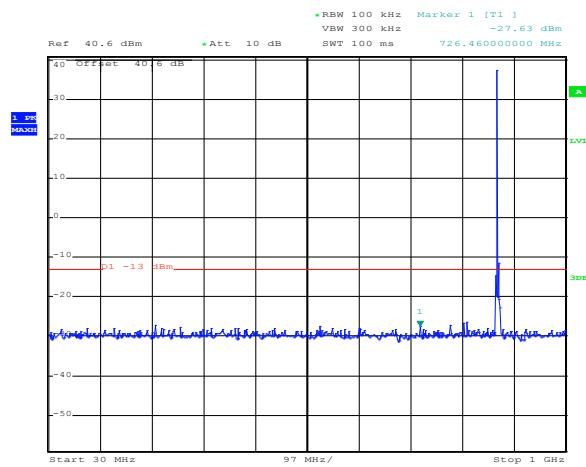
Date: 20.MAR.2017 19:30:27

**Figure 8.2-9:** Conducted emissions high channel GSMK 30-1000 MHz



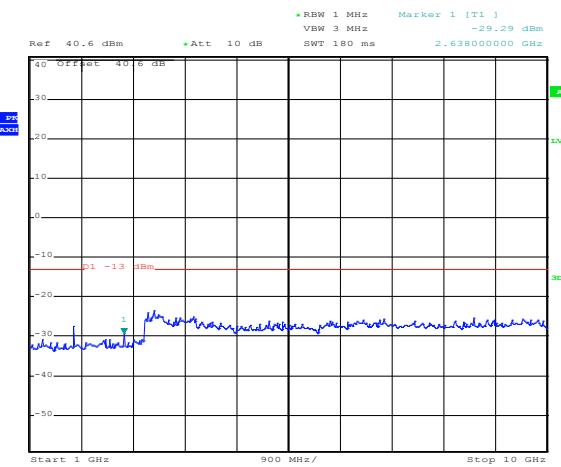
Date: 20.MAR.2017 19:31:32

**Figure 8.2-10:** Conducted emissions high channel GSMK 1-10 GHz



Date: 20.MAR.2017 19:37:58

**Figure 8.2-11:** Conducted emissions low channel 8PSK 30-1000 MHz

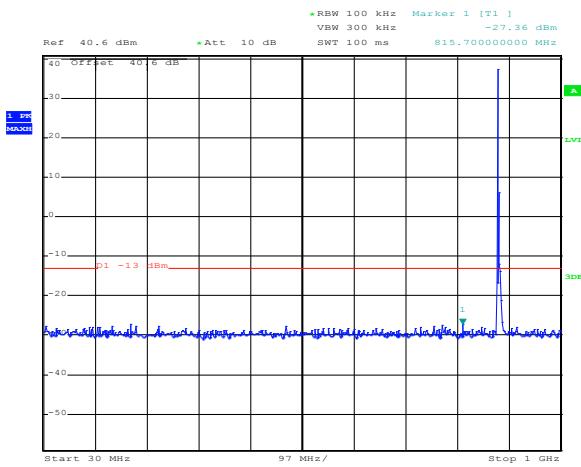


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**Figure 8.2-12:** Conducted emissions low channel 8PSK 1-10 GHz

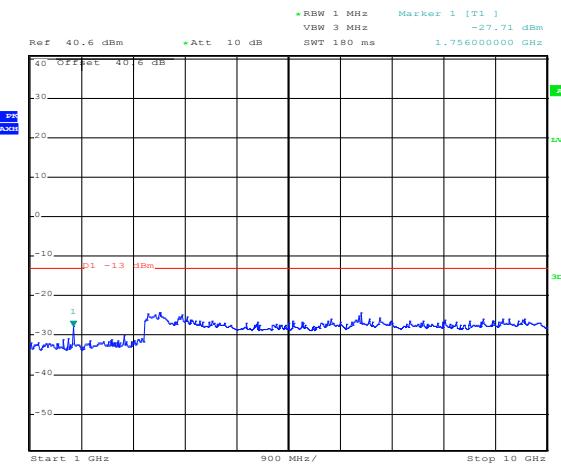
**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC §22.917 Emission limitations for cellular equipment.  
 FCC Part 22



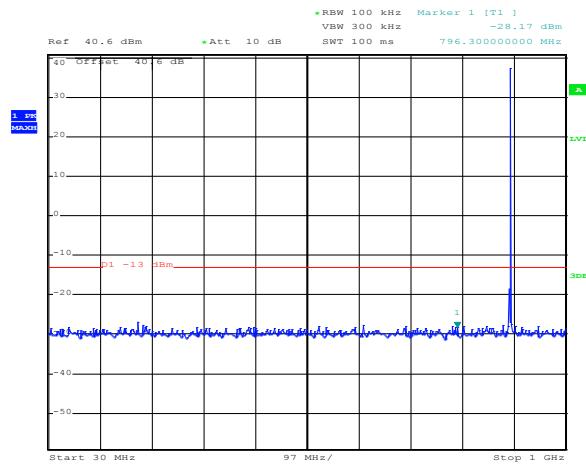
Date: 20.MAR.2017 19:40:47

**Figure 8.2-13:** Conducted emissions mid channel 8PSK 30-1000 MHz



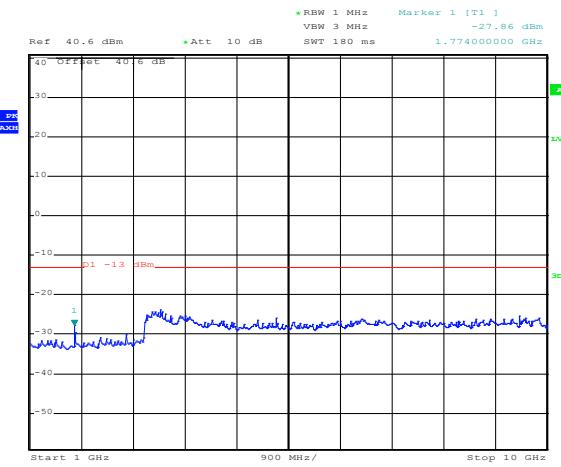
Date: 20.MAR.2017 19:42:37

**Figure 8.2-14:** Conducted emissions mid channel 8PSK 1-10 GHz



Date: 20.MAR.2017 19:41:24

**Figure 8.2-15:** Conducted emissions high channel 8PSK 30-1000 MHz



Date: 20.MAR.2017 19:41:53

**Figure 8.2-16:** Conducted emissions high channel 8PSK 1-10 GHz

## 8.3 FCC §22.355 Frequency tolerance.

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### 8.3.1 Limits

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Frequency range, MHz	Base, fixed, ppm	Mobile >3 watts (ppm)	Mobile ≤3 watts, ppm
0	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

### 8.3.2 Test summary

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Verdict	Pass	Temperature	22 °C
Test date	March 20, 2017	Air pressure	1001 mbar
Test engineer	Kevin Rose	Relative humidity	34 %
Test location	Ottawa		

### 8.3.3 Observations settings and special notes

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None

### 8.3.4 Test Data

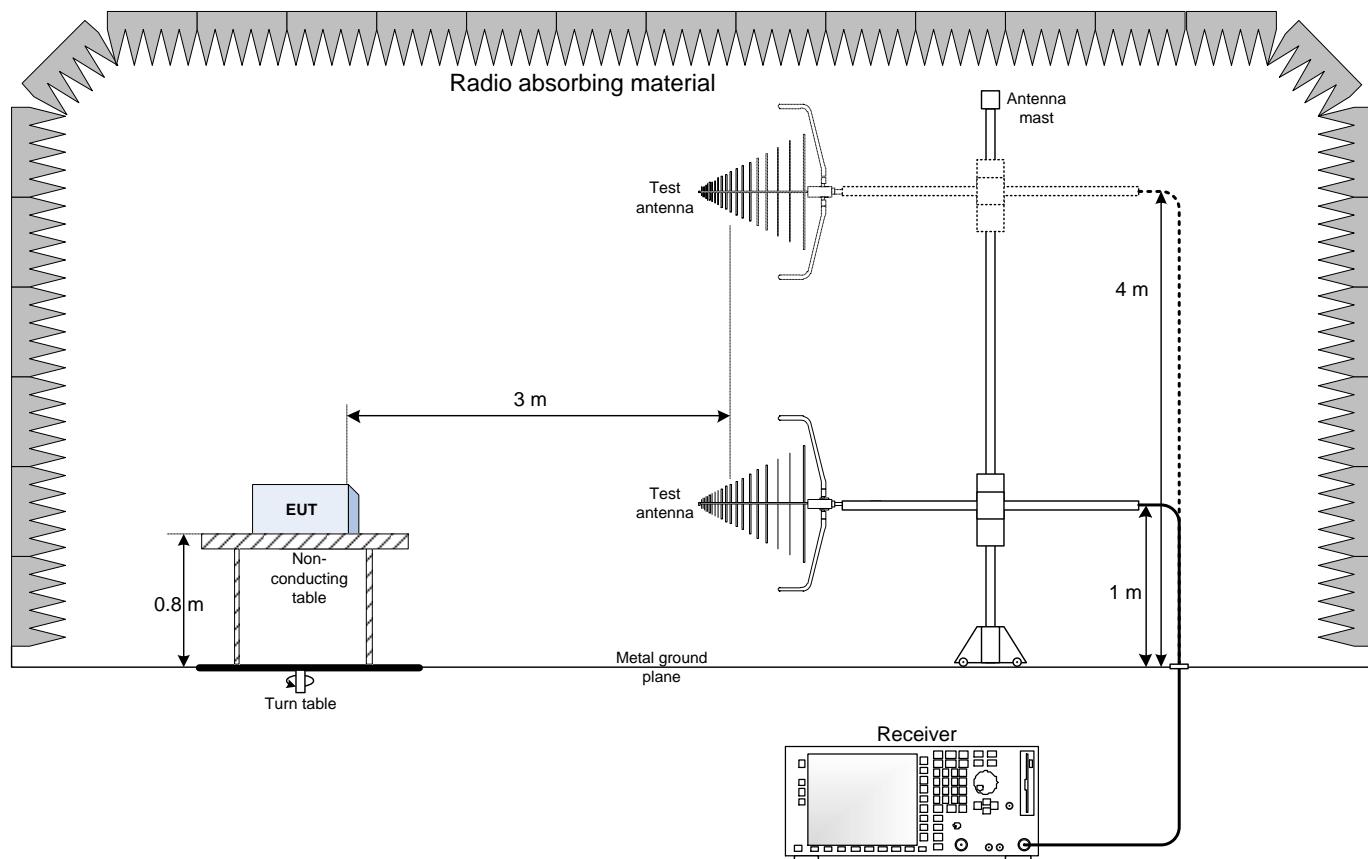
Table 8.3-1: Frequency tolerance

Conditions	Frequency, Hz	Offset, ppm	Limit, ppm	Margin, ppm
+50 °C, Nominal power	881.400000975	0.000737463	1.5	1.499262537
+40 °C, Nominal power	881.400000650	0.000368732	1.5	1.499631268
+30 °C, Nominal power	881.400000325	0	1.5	1.5
+20 °C, +10% power	881.400000325	0	1.5	1.5
+20 °C, Nominal power	881.400000325	Reference	Reference	Reference
+20 °C, -10% power	881.400000325	0	1.5	1.5
+10 °C, Nominal power	881.400003250	0.003318584	1.5	1.496681416
0 °C, Nominal power	881.400001300	0.001106195	1.5	1.498893805
-10 °C, Nominal power	881.400002600	0.002581121	1.5	1.497418879
-20 °C, Nominal power	881.400004550	0.00479351	1.5	1.495206490
-30°C, Nominal power	881.400006825	0.007374631	1.5	1.492625369

Note: Offset calculation: 
$$\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 1 \cdot 10^6$$

## Section 9. Block diagrams of test set-ups

### 9.1 Radiated emissions set-up 30 MHz to 1 GHz



## 9.2 Radiated emissions set-up above 1 GHz

