Dt&C

RF TEST REPORT

Test item	:	GNSS Data Collector
Model No.	:	FCC: Zeno 20
		IC: ZENO20G
Order No.	:	DTNC1503-00985, DTNC1503-00986
Date of receipt	:	2015-03-04
Test duration	:	2015-03-11 ~ 2015-03-16
Date of issue	:	2015-05-08
Use of report	:	FCC & IC Original Grant

Applicant : Leica Geosystems AG

Heinrich-Wild-Strasse Heerbrugg CH-9435 Switzerland

Test laboratory : DT&C Co., Ltd.

42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	§22(H), §24(E), RSS-132, RSS-133
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:

Engineer
HyunSu Son

Reviewed by:

Technical Manager
HongHee Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1505-0089	May 08, 2015	Initial issue

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1. GENERAL INFORMATION

Applicant Name: Leica Geosystems AG

Address: Heinrich-Wild-Strasse Heerbrugg CH-9435 Switzerland

FCC ID   :   RFD-ZENO20G

IC   :   3177A-ZENO20G

FCC Classification   :   PCS Licensed Transmitter (PCB)

EUT   :   GNSS Data Collector

Model Name   :   FCC: Zeno 20
     IC: ZENO20G

Add Model Name   :   N/A

Supplying power   :   DC 3.7V

Antenna Information   :   Internal Antenna
     - Type: Built-In type

Mode	Tx Frequency (MHz)	Emission Designator	ERP/EIRP	
			Max. Power (W)	Max. Power (dBm)
GSM850	824.2 ~ 848.8 MHz	249KGXW	0.927 W	29.67 dBm
EDGE850	824.2 ~ 848.8 MHz	235KG7W	0.230 W	23.62 dBm
WCDMA850	826.4 ~ 846.6 MHz	4M15F9W	0.136 W	21.34 dBm
HSUPA850	826.4 ~ 846.6 MHz	4M17F9W	0.129 W	21.09 dBm
GSM1900	1850.2 ~ 1909.8 MHz	247KGXW	1.358 W	31.33 dBm
EDGE1900	1850.2 ~ 1909.8 MHz	241KG7W	0.515 W	27.12 dBm
WCDMA1900	1852.4 ~ 1907.6 MHz	4M15F9W	0.353 W	25.48 dBm
HSUPA1900	1852.4 ~ 1907.6 MHz	4M17F9W	0.319 W	25.04 dBm

2. INTRODUCTION

2.1. EUT DESCRIPTION

The Equipment Under Test(EUT) supports a GSM/GPRS/EDGE /WCDMA/HSUPA and Bluetooth,
2.4GHz WLAN.

2.2. Support equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

Note: The above equipment were supported by manufacturer.

2.3. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been
calibrated in accordance with the manufacturer's recommendations for utilizing calibration
equipment, which is traceable to recognized national standards.

2.4. TEST FACILITY

The 3m test site and conducted measurement facility used to collect the radiated data are located
at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is
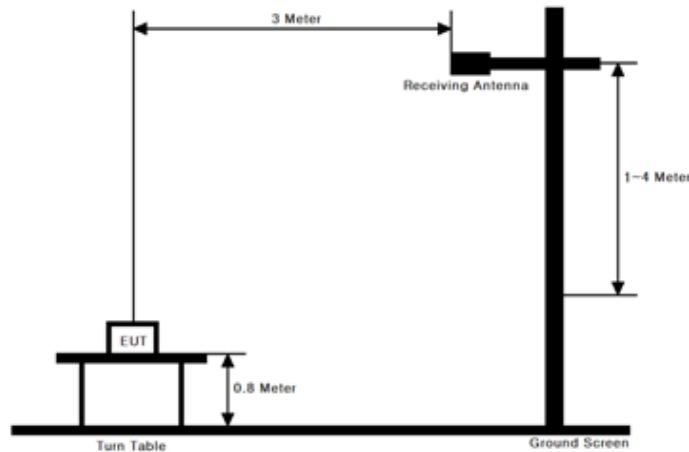constructed in conformance with the requirements.

   - Semi anechoic chamber registration Number: 165783 (FCC) & 5740A-3 (IC)

3. DESCRIPTION OF TESTS

3.1 ERP & EIRP
(Effective Radiated Power & Equivalent Isotropic Radiated Power)

Test Set-up

Test Procedure

-   **ANSI/TIA-603-C-2004 - Section 2.2.17**

-   **KDB971168 v02r02 - Section 5.2.1**

These measurements were performed at 3 &10 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

Test setting

1. Set span to at least 1.5 times the OBW.
2. Set RBW = 1-5 % of the OBW, not to exceed 1 MHz.
3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.
5. Sweep time = auto couple.
6. Detector = RMS (power averaging).
7. If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98 %), then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep.
   Ensure that the sweep time is less than or equal to the transmission burst duration.
9. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna`s terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

3.2 PEAK TO AVERAGE RATIO

Test set-up
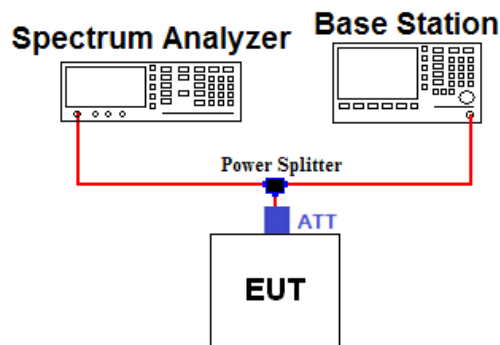
Test Procedure

A peak to average ratio measurement is performed using the following procedure**.**

▣CCDF Procedure

- **KDB971168 v02r02-Section 5.7.1**

1. Set resolution/measurement bandwidth ≥ signal`s occupied bandwidth
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Set the measurement interval as follows:
   1) For continuous transmissions, set to 1 ms
   2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1%

▣**Alternate Procedure**

  - **KDB971168 v02r02-Section 5.7.2**

Use one of the measurement procedures of the peak power and record as P_{Pk}.

Use one of the measurement procedures of the average power and record as P_{Avg}.

Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\textbf{PAPR (dB)} = \textbf{P}_{\textbf{Pk}} \textbf{ (dBm)} - \textbf{P}_{\textbf{Avg}} \textbf{ (dBm).}$$

- **Peak Power Measurement**
 1. Set the RBW ≥ OBW
  2. Set VBW ≥ 3 × RBW
  3. Set span ≥ 2 x RBW
  4. Sweep time = auto couple
  5. Detector = peak
  6. Ensure that the number of measurement points ≥ span/RBW.
  7. Trace mode = max hold
  8. Allow trace to fully stabilize.
  9. Use the peak marker function to determine the peak amplitude level.

- **Average Power Measurement**
  1. Set span to at least 1.5 times the OBW.
  2. Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
  3. Set VBW ≥ 3 x RBW.
  4. Set number of points in sweep ≥ 2 × span / RBW.
  5. Sweep time = auto-couple.
  6. Detector = RMS (power averaging).
  7. If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98%), then set the trigger to free run.
  8. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep.
     Ensure that the sweep time is less than or equal to the transmission burst duration.
  9. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
  10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

3.3 OCCUPIED BANDWIDTH.

Test set-up
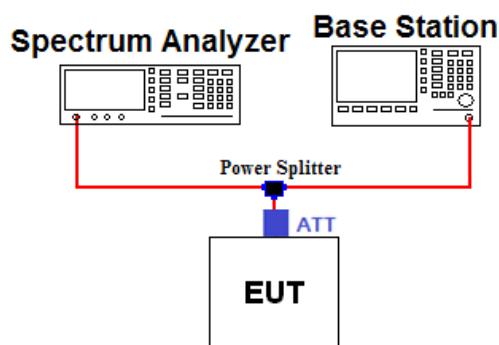
Offset value information

Frequency (MHz)	Offset Value (dB)	Frequency (MHz)	Offset Value (dB)
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Note. 1: The offset values from EUT to Spectrum analyzer were measured and used for test.
    Offset value = Cable A + Splitter +ATT+ Cable B

Test Procedure

- **KDB971168 v02r02-Section 4.2**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

1. The signal analyzer`s automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 ~ 5 % of the expected OBW   &   VBW ≥ 3 X RBW
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.

3.4 BAND EDGE EMISSIONS AT ANTENNA TERMINAL.

Test set-up

Offset value information

Frequency (MHz)	Offset Value (dB)	Frequency (MHz)	Offset Value (dB)
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Note. 1: The offset value from EUT to Spectrum analyzer was measured and used for test.
Offset value = Cable A + Splitter +ATT+ Cable B

Test Procedure
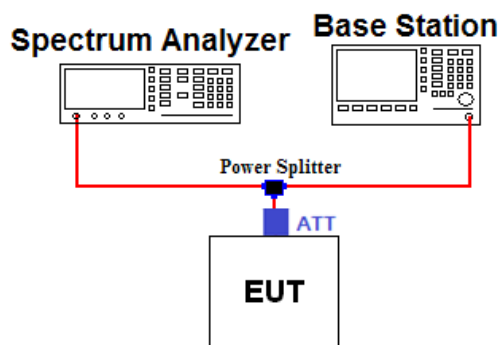
- **KDB971168 v02r02 - Section 6.0**

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all modulations.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB

Test setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1 % of the emission
4. VBW ≥ 3 X RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point ≥ 2 X span / RBW
8. The trace was allowed to stabilize

   Note 1: 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 may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test set-up
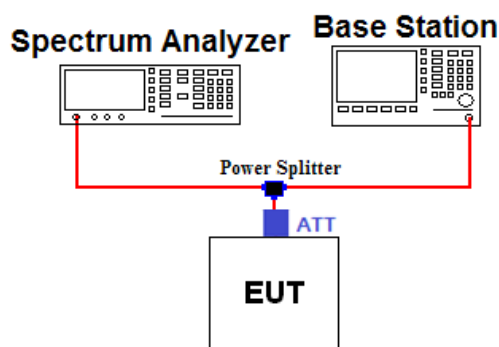
Offset value information

Frequency (MHz)	Offset Value (dB)	Frequency (MHz)	Offset Value (dB)
-	-	-	-
-	-	-	-
-	-	-	-

Note. 1: The offset value from EUT to Spectrum analyzer was measured and used for test.
Offset value = Cable A + Splitter +ATT+ Cable B

Test Procedure

- **KDB971168 v02r02 - Section 6.0**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB

Test setting

1. RBW = 100 KHz or 1 MHz   &   VBW ≥ 3 X RBW (Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24.

3.6 RADIATED SPURIOUS EMISSIONS

Test Set-up
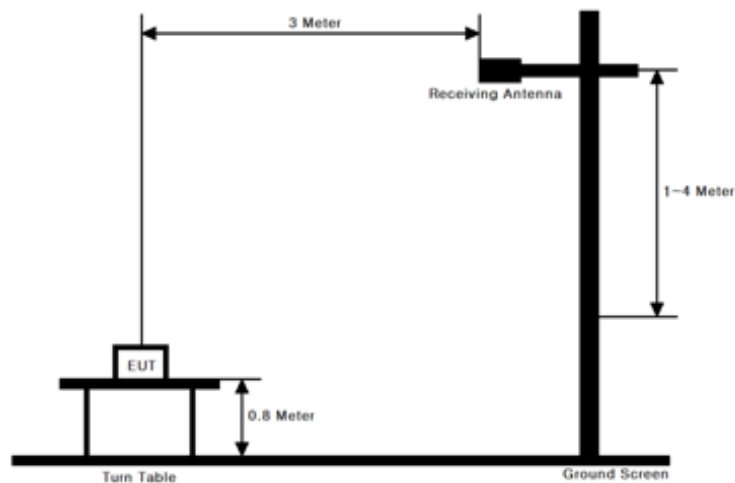
Test Procedure

-    **ANSI/TIA-603-C-2004 - Section 2.2.12**

-    **KDB971168 v02r02 - Section 5.8**

These measurements were performed at 3 & 10m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz   /   VBW ≥ 3 X RBW
2. Detector = Peak & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.
This measurement was performed with the EUT oriented in 3 orthogonal axis.

3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up
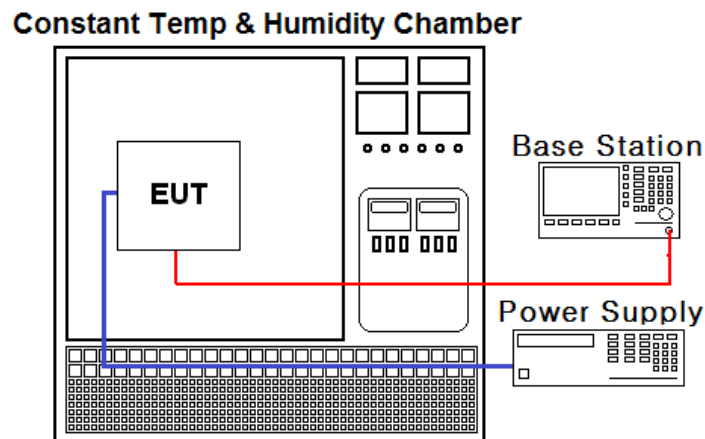
Test Procedure
- **ANSI/TIA-603-C-2004**

- **KDB971168 v02r02 - Section 9.0**

The frequency stability of the transmitter is measured by:
　a.) **Temperature:**
　　The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

　b.) **Primary Supply Voltage:**
　　The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification:
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24. The frequency stability of the transmitter shall be maintained within ± 0.000 25 % (± 2.5 ppm) of the center frequency for Part 22.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.
　(25 °C to provide a reference)

2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
　A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	14/10/21	15/10/21	US45303022
Dynamic Measurement DC Source	Agilent	66332A	15/01/06	16/01/06	GB37470190
Dynamic Measurement DC Source	Agilent Technologies	66332A	14/09/11	15/09/11	MY43000211
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Multimeter	HP	34401A	15/01/06	16/01/06	US36099541
8960 Series 10 Wireless Comms Test Set	Agilent Technologies	E5515C	14/09/12	15/09/12	GB41321164
Power Splitter	Anritsu	K241B	14/10/21	15/10/21	1701102
2W 3dB Attenuator	SMAJK	SMAJK-2-3	14/10/21	15/10/21	3
2W 3dB Attenuator	SMAJK	SMAJK-2-3	14/10/21	15/10/21	4
Thermo hygrometer	BODYCOM	BJ5478	14/05/13	15/05/13	120612-2
Vector Signal Generator	Rohde Schwarz	SMBV100A	15/01/06	16/01/06	255571
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
Dipole Antenna	Schwarzbeck	VHA9103	13/10/24	15/10/24	2116
Dipole Antenna	Schwarzbeck	VHA9103	14/04/01	16/04/01	2117
Dipole Antenna	Schwarzbeck	UHA9105	13/10/24	15/10/24	2261
Dipole Antenna	Schwarzbeck	UHA9105	14/04/01	16/04/01	2262
HORN ANT	ETS	3115	15/02/09	17/02/09	00021097
HORN ANT	ETS	3115	14/02/26	16/02/26	6419
HORN ANT	Schwarzbeck	BBHA 9170	13/09/06	15/09/06	BBHA9170440
HORN ANT	A.H.Systems	SAS-574	13/05/27	15/05/27	155
Low Noise Pre Amplifier	TSJ	MLA-010K01-B01-27	14/04/09	15/04/09	1844538
			15/04/09	16/04/09	
Amplifier (30dB)	Agilent	8449B	14/11/06	15/11/06	3008A02108
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	14/09/11	15/09/11	7
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	14/09/11	15/09/11	3
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB 9160	14/04/04	16/04/04	3357
Amplifier	EMPOWER	BBS3Q7ELU	14/09/12	15/09/12	1020

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	RSS Section(s)	Parameter	Status Note 1
2.1046	RSS-132 (5.4) RSS-133 (4.1)	Conducted Output Power	**C**^{Note 2}
22.913(a) 24.232(c)	RSS-132 [5.4] [SRSP-503(5.1.3)] RSS-133 [6.4] [SRSP-510(5.1.2)]	Effective Radiated Power Equivalent Isotropic Radiated Power	**C**
22.917(a) 24.238(a) 2.1049	RSS-Gen [6.6]	Occupied Bandwidth	**NA** ^{Note 3}
22.917(a) 24.238(a) 2.1051	RSS-132 [5.5] RSS-133 [6.5]	Band Edge Spurious and Harmonic Emissions at Antenna Terminal	**NA** ^{Note 3}
24.232(d)	RSS-133 [6.4]	Peak to Average Ratio	**NA** ^{Note 3}
22.917(a) 24.238(a) 2.1053	RSS-132 [5.5] RSS-133 [6.5]	Radiated Spurious and Harmonic Emissions	**C**
22.355 24.235 2.1055	RSS-132 [5.3] RSS-133 [6.3]	Frequency Stability	**NA** ^{Note 3}

Note 1: **C**=Comply   **NC**=Not Comply   **NT**=Not Tested   **NA**=Not Applicable

Note 2: Refer to RF Exposure Report (Test Report_SAR)
Note 3: These test items were not performed because this device uses the granted module.
    (FCCID: QIPPHS8-P)
    Please refer to the test report of the granted module.
    The module test report number:
    -    MDE_CINTE_1108_FCCd, MDE_CINTE_1108_FCCe (By 7Layers AG)

 The sample was tested according to the following specification:
 ANSI/TIA/EIA-603-C-2004 and KDB 971168 D01 v02r02

6. SAMPLE CALCULATION

A. Emission Designator

GSM850 Emission Designator

Emission Designator = **249KGXW**

GSM1900 Emission Designator

Emission Designator = **247KGXW**

EDGE850 Emission Designator

Emission Designator = **235KG7W**

EDGE1900 Emission Designator

Emission Designator = **241KG7W**

WCDMA850 Emission Designator

Emission Designator = **4M15F9W**

WCDMA1900 Emission Designator

Emission Designator = **4M15F9W**

HSUPA850 Emission Designator

Emission Designator = **4M17F9W**

HSUPA1900 Emission Designator

Emission Designator = **4M17F9W**

Note: Emission designators of the granted module were used.

B. ERP Sample Calculation

MODE	Ch./ Freq		Spectrum Reading	EUT Axis	Ant Pol (H/V)	Level(dBm)	TX Ant	Result	
	channel	Freq.(MHz)	Value(dBm)			@ Ant Terminal	Gain(dBd)	(dBm)	(W)
GSM850	128	824.2	-7.33	Y	H	28.42	1.19	29.61	0.914

ERP = @ Ant Terminal LEVEL(dBm) + Ant. Gain

1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain is the rating of effective radiated power (ERP).

7. TEST DATA

7.1 PEAK TO AVERAGE RATIO

- Not Applicable

7.2 OCCUPIED BANDWIDTH

- Not Applicable

7.3 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

- Not Applicable

7.4 BAND EDGE

- Not Applicable

7.5 EFFECTIVE RADIATED POWER

- GSM850

CH.	EUT Position (Axis)	Test mode						
		Pol. (H/V)	LEVEL @ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Rated Voltage	Note.
824.2 128	Y	H	28.42	1.19	29.61	0.914	DC 3.7V	GSM
836.6 190	X	H	27.93	1.19	29.12	0.817	DC 3.7V	GSM
848.8 251	*Y*	*H*	*28.48*	*1.19*	*29.67*	*0.927*	*DC 3.7V*	*GSM*
848.8 251	Y	H	22.43	1.19	23.62	0.230	DC 3.7V	EDGE

- WCDMA850 data

CH.	EUT Position (Axis)	Test mode 12.2 kbps RMC						
		Pol. (H/V)	LEVEL @ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBd)	ERP (dBM)	ERP (W)	Rated Voltage	Note.
826.4 4132	Y	H	19.41	1.19	20.60	0.115	DC 3.7V	-
836.6 4183	Y	H	19.65	1.19	20.84	0.121	DC 3.7V	-
846.6 4233	*Y*	*H*	*20.15*	*1.19*	*21.34*	*0.136*	*DC 3.7V*	*-*

- HSUPA850 data

CH.	EUT Position (Axis)	Test mode subtest 1						
		Pol. (H/V)	LEVEL @ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Rated Voltage	Note.
826.4 4132	Y	H	18.98	1.19	20.17	0.104	DC 3.7V	-
836.6 4183	Y	H	19.27	1.19	20.46	0.111	DC 3.7V	-
846.6 4233	*Y*	*H*	*19.90*	*1.19*	*21.09*	*0.129*	*DC 3.7V*	*-*

NOTES:

This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.

The worst case data is reported.

7.6 EQUIVALENT ISOTROPIC RADIATED POWER

- GSM1900 data

CH.	EUT Position (Axis)	Test mode						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage	Note.
1850.2 512	Z	H	22.32	8.89	31.21	1.321	DC 3.7V	GSM
1880.0 661	*Z*	*H*	*22.41*	*8.92*	*31.33*	*1.358*	*DC 3.7V*	*GSM*
1909.80 810	Z	H	21.33	8.96	30.29	1.069	DC 3.7V	GSM
1880.0 661	Z	H	18.20	8.92	27.12	0.515	DC 3.7V	EDGE

- WCDMA1900 data

CH.	EUT Position (Axis)	Test mode 12.2 kbps RMC						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage	Note.
1852.4 9262	*Y*	*V*	*16.59*	*8.89*	*25.48*	*0.353*	*DC 3.7V*	*-*
1880.0 9400	Z	H	16.14	8.92	25.06	0.321	DC 3.7V	-
1907.6 9538	X	H	15.73	8.95	24.68	0.294	DC 3.7V	-

- HSUPA1900 data

CH.	EUT Position (Axis)	Test mode subtest 1						
		Pol. (H/V)	LEVEL@ TX ANTENNA TERMINAL (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Rated Voltage	Note.
1852.4 9262	*X*	*H*	*16.15*	*8.89*	*25.04*	*0.319*	*DC 3.7V*	*-*
1880.0 9400	Z	H	16.07	8.92	24.99	0.316	DC 3.7V	-
1907.6 9538	Y	V	15.43	8.95	24.38	0.274	DC 3.7V	-

NOTES:
This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

7.7 RADIATED SPURIOUS EMISSIONS

7.7.1 RADIATED SPURIOUS EMISSIONS (GSM850)

Channel (ERP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBd)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
128 (0.914 W)	1648.30	Y	H	-57.84	6.50	-51.34	80.95	
	2472.52	X	H	-48.30	7.53	-40.77	70.38	42.61
	-	-	-	-	-	-	-	
190 (0.817 W)	1673.09	Z	V	-56.98	6.53	-50.45	79.57	
	2509.70	Z	V	-50.79	7.57	-43.22	72.34	42.12
	-	-	-	-	-	-	-	
251 (0.927 W)	1697.66	Z	V	-57.10	6.56	-50.54	80.21	
	2546.35	X	H	-48.80	7.59	-41.21	70.88	42.67
	-	-	-	-	-	-	-	

- Limit Calculation= $43 + 10 \log_{10}(ERP [W])$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:
This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

7.7.2 RADIATED SPURIOUS EMISSIONS (WCDMA850)

Channel (ERP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBd)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
4132 (0.115 W)	1654.82	X	H	-54.51	6.51	-48.00	68.60	33.60
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
4183 (0.121 W)	1671.30	X	H	-54.49	6.53	-47.96	68.80	33.84
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
4233 (0.136 W)	1691.33	X	H	-53.72	6.55	-47.17	68.51	34.34
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation= $43 + 10 \log_{10}(ERP [W])$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:
This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

7.7.3 RADIATED SPURIOUS EMISSIONS (HSUPA850)

Channel (ERP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBd)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
4132 (0.104 W)	1654.90	X	H	-54.93	6.51	-48.42	68.59	33.17
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
4183 (0.111 W)	1672.33	X	H	-54.17	6.53	-47.64	68.10	33.46
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
4233 (0.129 W)	1692.32	X	H	-53.50	6.55	-46.95	68.04	34.09
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation= $43 + 10 \log_{10}(ERP [W])$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:
This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

7.7.4 RADIATED SPURIOUS EMISSIONS (GSM1900)

Channel (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBi)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
512 (1.321 W)	3700.37	Y	V	-46.68	9.78	-36.90	68.11	44.21
	5550.67	Z	H	-54.12	11.04	-43.08	74.29	
	-	-	-	-	-	-	-	
661 (1.358 W)	3759.84	Z	V	-45.50	9.72	-35.78	67.11	44.33
	5640.49	Z	H	-53.06	11.14	-41.92	73.25	
	-	-	-	-	-	-	-	
810 (1.069 W)	3819.57	Z	V	-44.33	9.66	-34.67	64.96	43.29
	5729.31	Z	H	-56.20	11.23	-44.97	75.26	
	-	-	-	-	-	-	-	

- Limit Calculation = $43 + 10 \log_{10}(\text{EIRP [W]})$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:

This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

7.7.5 RADIATED SPURIOUS EMISSIONS (WCDMA1900)

Channel (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBi)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
9262 (0.353 W)	3702.83	X	H	-47.68	9.78	-37.90	63.38	38.48
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9400 (0.321 W)	3761.84	Y	V	-47.78	9.72	-38.06	63.12	38.06
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9538 (0.294 W)	3817.06	Y	V	-48.16	9.66	-38.50	63.18	37.68
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation = $43 + 10 \log_{10}(\text{EIRP [W]})$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:

This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

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7.7.6 RADIATED SPURIOUS EMISSIONS (HSUPA1900)

Channel (EIRP)	Freq. (MHz)	EUT Position (Axis)	POL (H/V)	LEVEL@ ANTENNA TERMINAL (dBm)	Substitute Antenna Gain (dBi)	Correct Generator Level (dBm)	Result (dBc)	Limit (dBc)
9262 (0.319 W)	3703.91	X	H	-47.61	9.78	-37.83	62.87	38.04
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9400 (0.316 W)	3759.18	Y	V	-47.37	9.72	-37.65	62.64	37.99
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	
9538 (0.274 W)	3817.05	Y	V	-47.98	9.66	-38.32	62.70	37.38
	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	

- Limit Calculation = $43 + 10 \log_{10}(\text{EIRP [W]})$ [dBc]

- No other spurious and harmonic emissions were reported greater than listed emissions above table.

NOTES:

This EUT was tested under all configurations and the highest power is reported in GSM mode and WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1" and HSUPA mode with 12.2 kbps + HSPA and subtest 1 and in GSM mode using a Power Control Level of "0" in PCS Band and "5" in the Cellular Band. This EUT was tested with the fully charged battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna.
The worst case data is reported.

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