Annex 1: Measurement diagrams to PARTIAL T E S T R E P O R T No.: 18-1-0097201T21a-C03

According to:
Title 47 CFR, Chapter I
FCC Regulations, Subchapter B
Part 22, Part 24

ISED-Regulations
RSS-132 Issue 3, RSS-133 Issue 6,
RSS-Gen Issue 5

for

Actia Nordic AB

103360002
Telematics Device

FCC-ID: 2AGKK103360002
ISED-ID: 20839-103360002

Laboratory Accreditation
ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01 D-PL-12047-01-03 D-PL-12047-01-04
accredited according to DIN EN ISO/IEC 17025:2018

CETECOM GmbH
Laboratory Radio Communications & Electromagnetic Compatibility
Im Teelbruch 116 • 45219 Essen • Germany
Registered in Essen, Germany, Reg. No.: HRB Essen 8984
Tel.: + 49 (0) 20 54 / 95 19-0 • Fax: + 49 (0) 20 54 / 95 19-150
E-mail: contact@cetecom.com • Internet: www.cetecom.com

Table of contents

1. Measurement diagrams

1.1. Conducted Power Verification (GSM 850)

EUT Information

Manufacturer:	Actia Nordic AB
Product:	103360002
Product type:	Telematics Device
SW version:	1
Serial number:	AN103350102B163
Power Supply:	13,8 V DC

GMSK-Modulation 850MHz Band			**CETECOM tested power_GSM850**		**Certified module power_GSM850**
	ARFCN-Frequency [MHz]	Peak detektor [dBm]	RMS detektor [dBm]	PAR Faktor [dB]	RMS detektor [dBm]
Channel 128	824.2	31.9	31.7	0.2	32.37
Channel 190	836.6	31.8	31.6	0.2	32.32
Channel 251	848.8	31.6	31.4	0.2	32.19

E-GPRS Mode 850MHz Band			**CETECOM tested power_GSM850**		**Certified module power_GSM850**
	ARFCN-Frequency [MHz]	Peak detektor [dBm]	RMS detektor [dBm]	PAR Faktor [dB]	RMS detektor [dBm]
Channel 128	824.2	28.8	25.6	3.2	26.19
Channel 190	836.6	28.6	25.4	3.2	26.36
Channel 251	848.8	28.5	25.3	3.2	26.14

Remarks:
Worst Case found by GSM 850

- Channel 128
- Modulation GMSK

1.2. Conducted Power Verification (GSM 1900)

GMSK-Modulation 1900MHz Band			**CETECOM tested power_GSM1900**		**Certified module power_GSM1900**
	ARFCN-Frequency [MHz]	Peak detector [dBm]	RMS detector [dBm]	PAR Factor [dB]	RMS detector [dBm]
Channel 512	1850.2	28.1	27.6	0.5	29.29
Channel 662	1880.0	28.4	28.0	0.4	29.34
Channel 810	1909.8	28.6	28.3	0.3	29.24

E-GPRS Mode 1900MHz Band			**CETECOM tested power_GSM1900**		**Certified module power_GSM1900**
	ARFCN-Frequency [MHz]	Peak detector [dBm]	RMS detector [dBm]	PAR Factor [dB]	RMS detector [dBm]
Channel 512	1850.2	26.7	23.1	3.6	25.44
Channel 662	1880.0	26.9	23.3	3.6	25.31
Channel 810	1909.8	27.2	23.7	3.5	25.35

Remarks:
Worst Case found by GSM 1900

- Channel 810
- Modulation GMSK

1.3. Magnetic field emissions radiated (GSM 850)

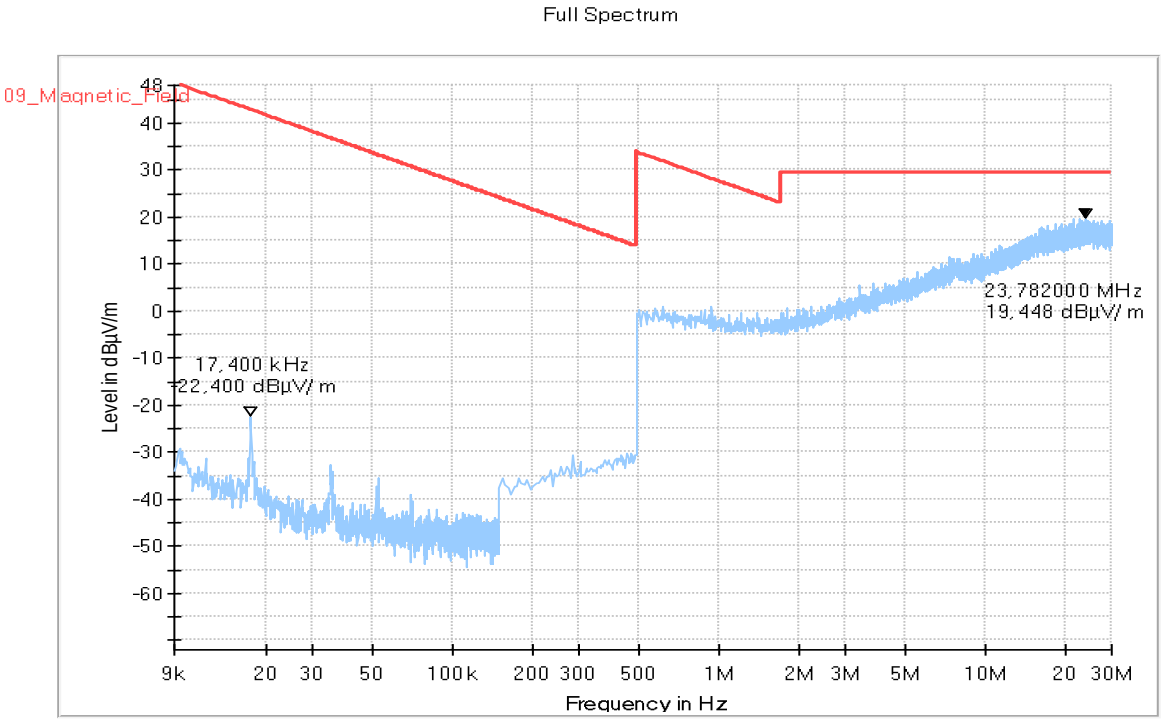
2.01_Magnetic_Emission_GSM_850_EUT_laying

Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	LKu
Operating Mode:	1
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	laying
Verdict:	Passed
Comment:	Internal Antenna

EUT Information

PMT number:	18-1-00972S20
Manufacturer:	Actia Nordic AB
Product:	103360002
Product type:	Telematics Device
SW version:	1
HW version:	H1
Serial number:	AN103350102B160
Power Supply:	13,8 V DC



2.02_Magnetic_Emission_GSM_850_EUT_standing

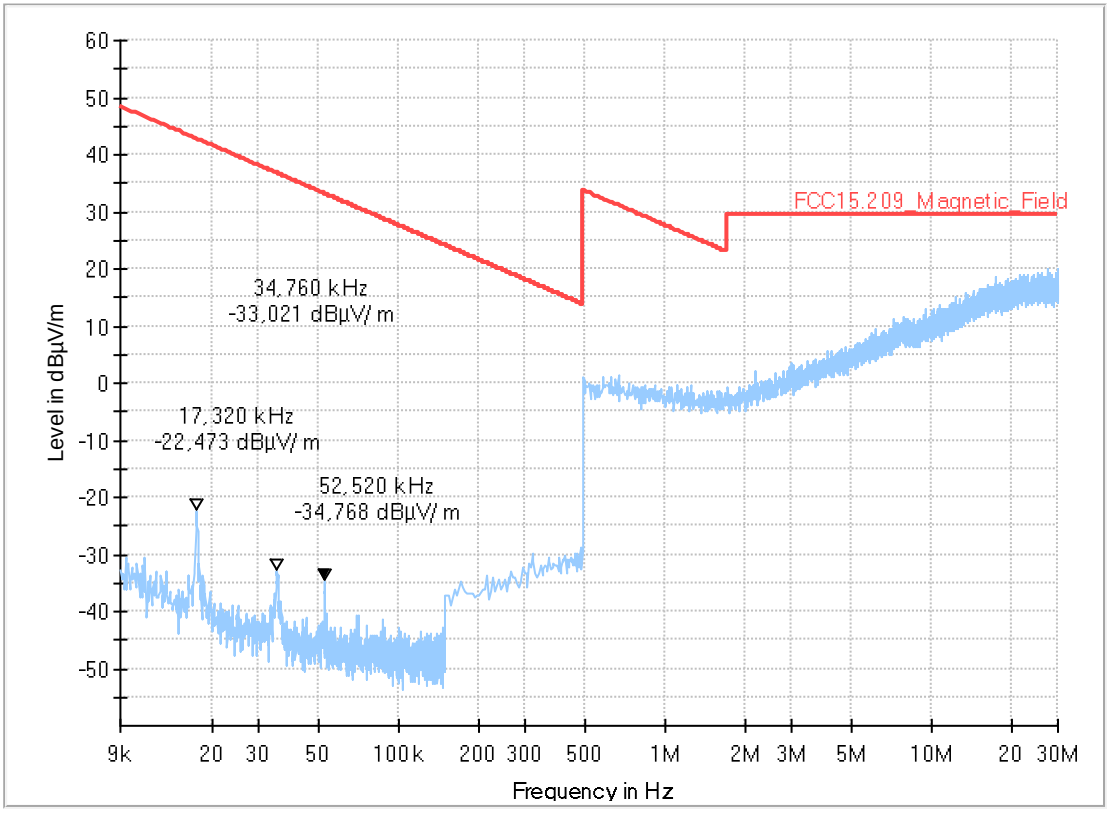
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	TFra
Operating Mode:	1
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	standing
Verdict:	Passed
Comment:	Internal Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



2.03_Magnetic_Emission_GSM_850_EUT_laying

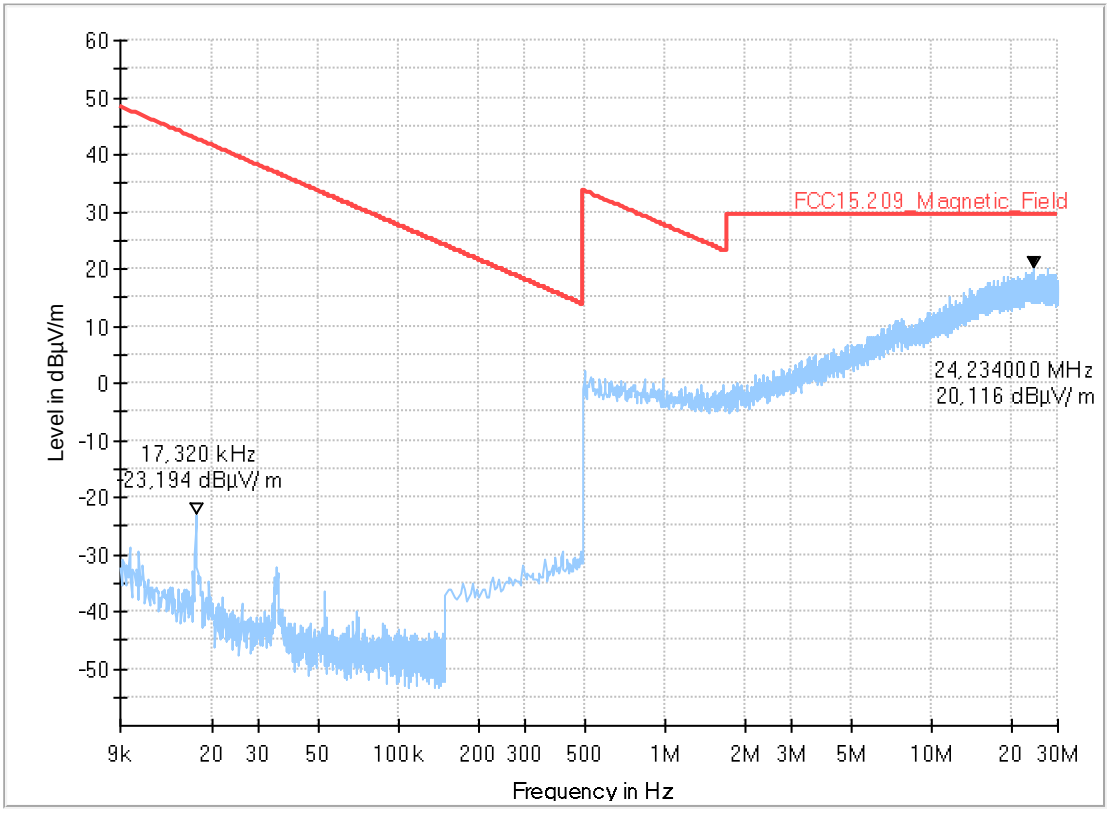
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	LKu
Operating Mode:	1
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	laying
Verdict:	Passed
Comment:	External Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



2.04_Magnetic_Emission_GSM_850_EUT_standing

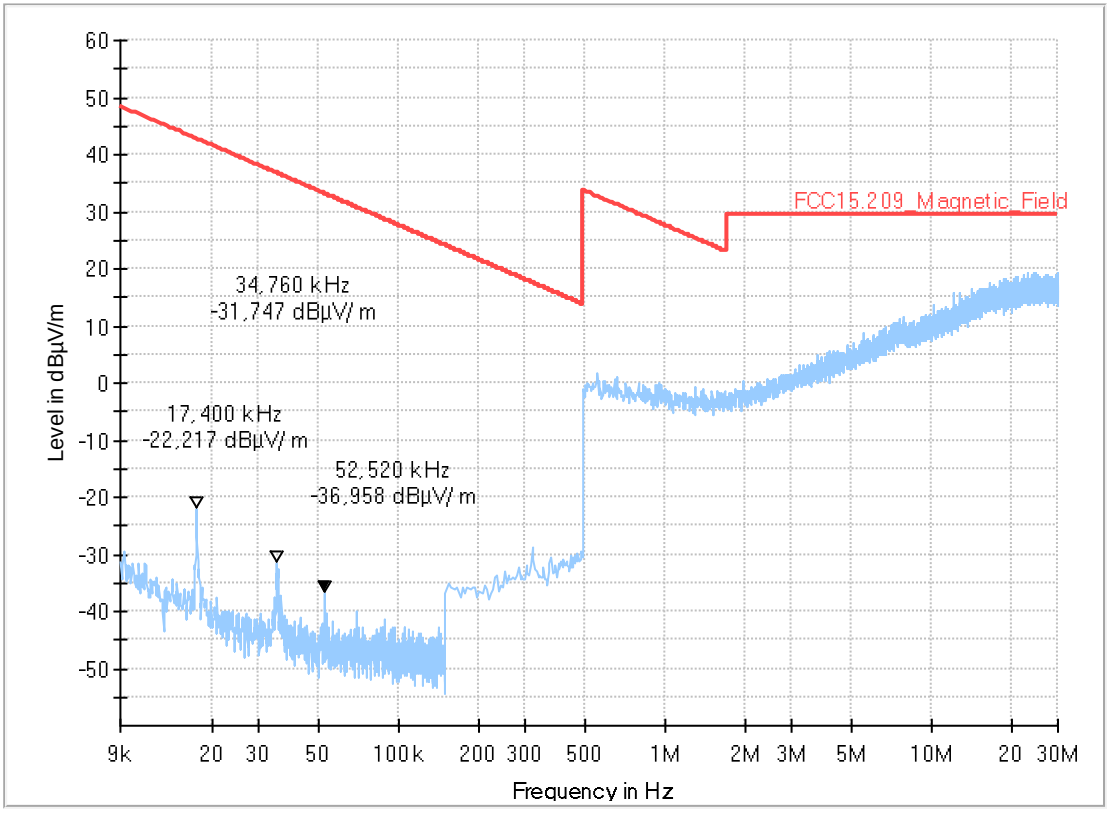
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	TFra
Operating Mode:	GSM 850
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	standing
Verdict:	Passed
Comment:	Internal Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



1.4. Magnetic field emissions radiated (GSM 1900)

2.05_Magnetic_Emission_GSM_1900_EUT_laying

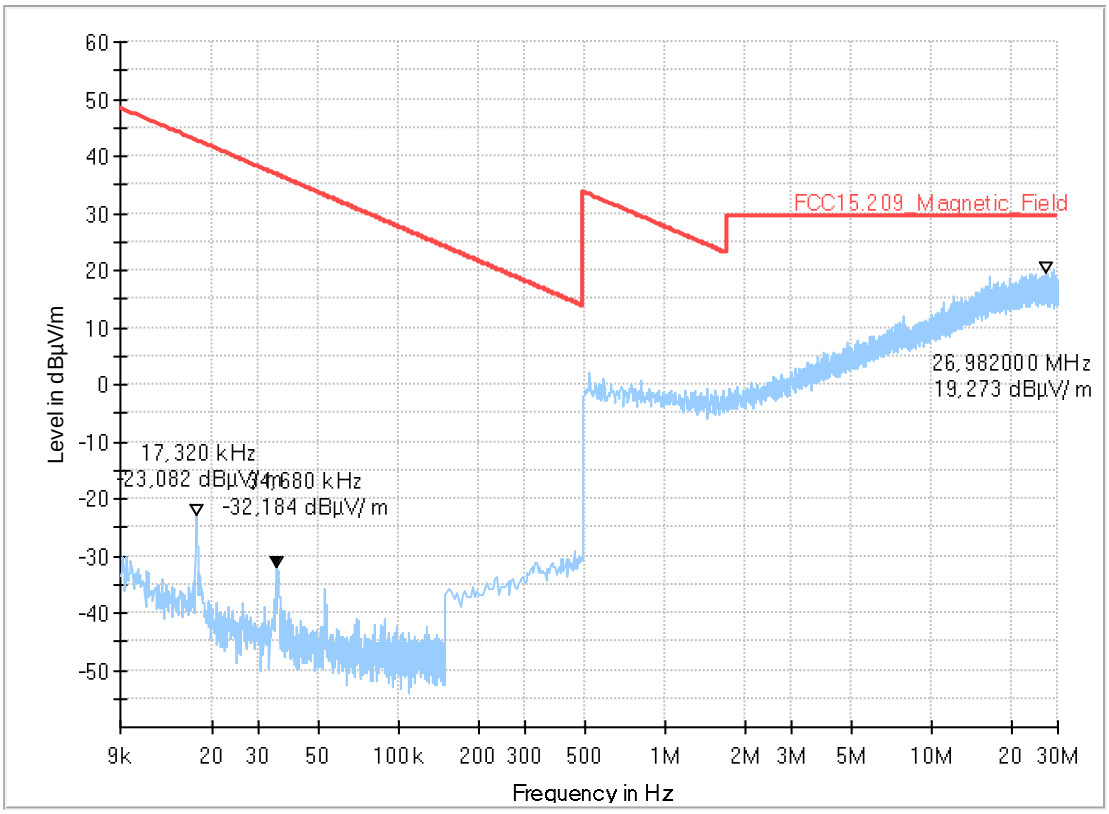
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	LKu
Operating Mode:	2
Power during tests:	12V DC, 110V/60Hz, full loaded batteries
Environmental Conditions::	Humidity : 39%rH; Temperature: 21°C
EUT Setup:	laying
Verdict:	Passed
Comment:	Internal Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



2.06_Magnetic_Emission_GSM_1900_EUT_standing

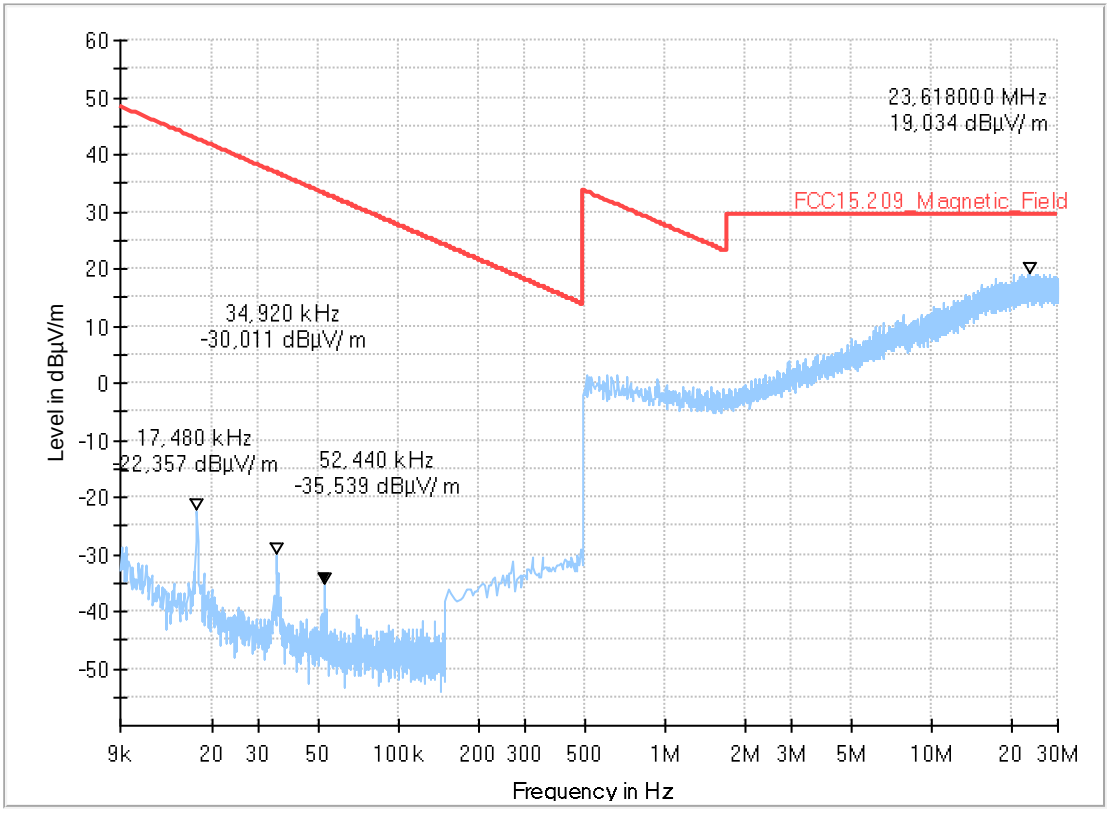
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	TFra
Operating Mode:	2
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	standing
Verdict:	Passed
Comment:	Internal Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



2.07_Magnetic_Emission_GSM_1900_EUT_laying

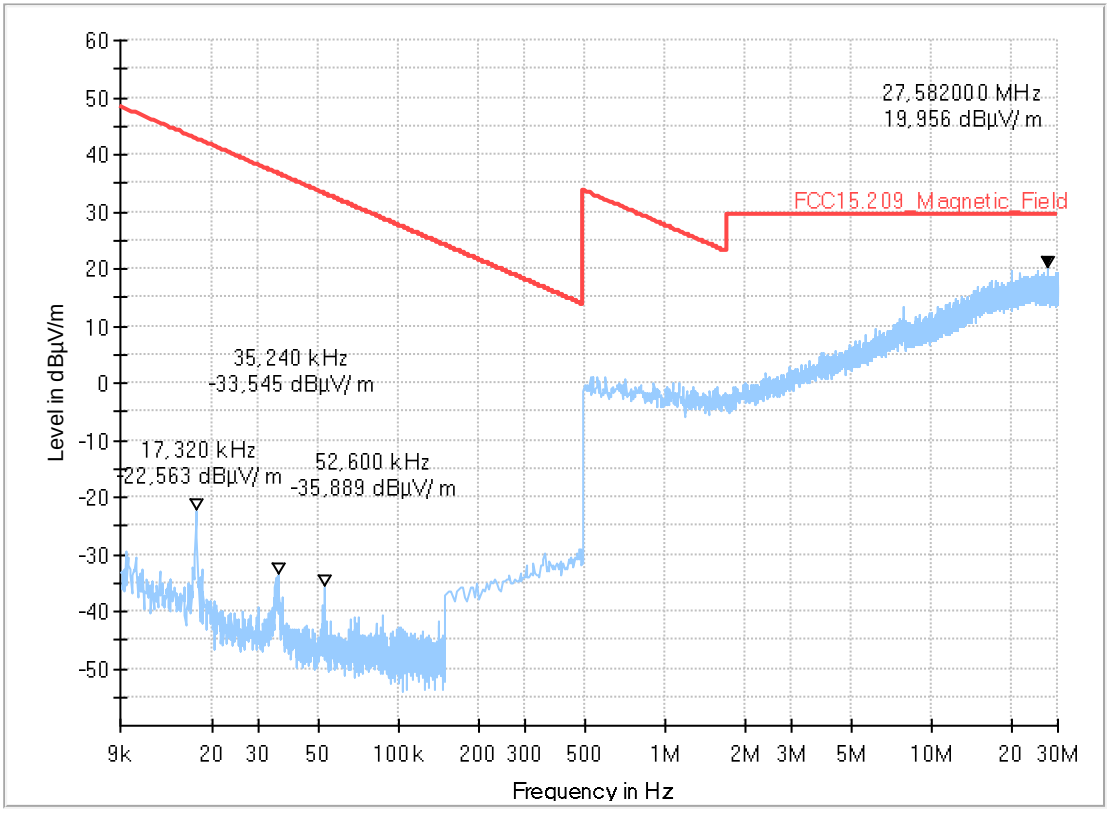
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	LKu
Operating Mode:	2
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	laying
Verdict:	Passed
Comment:	External Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



2.08_Magnetic_Emission_GSM_1900_EUT_standing

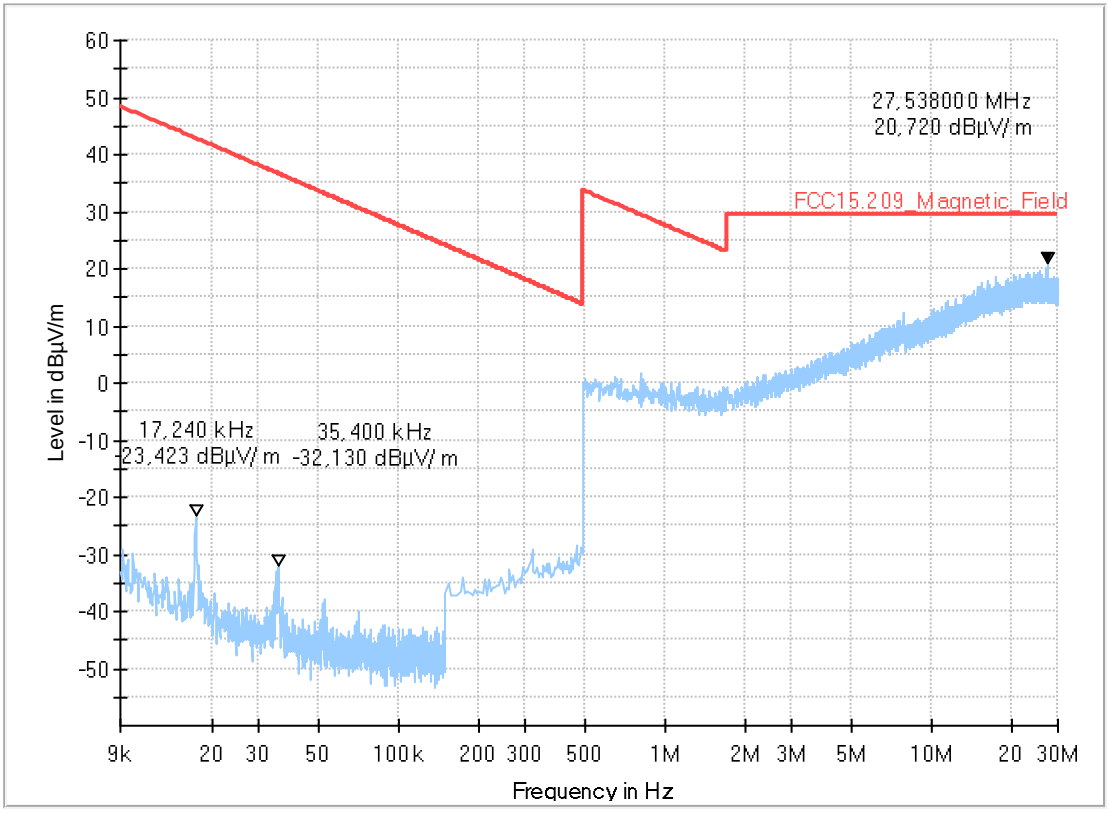
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Test software:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarization
Used Filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	TFra
Operating Mode:	2
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	standing
Verdict:	Passed
Comment:	External Antenna

EUT Information

please see the Diagram 2.01

Full Spectrum



1.5. Spurious emissions radiated (GSM 850)

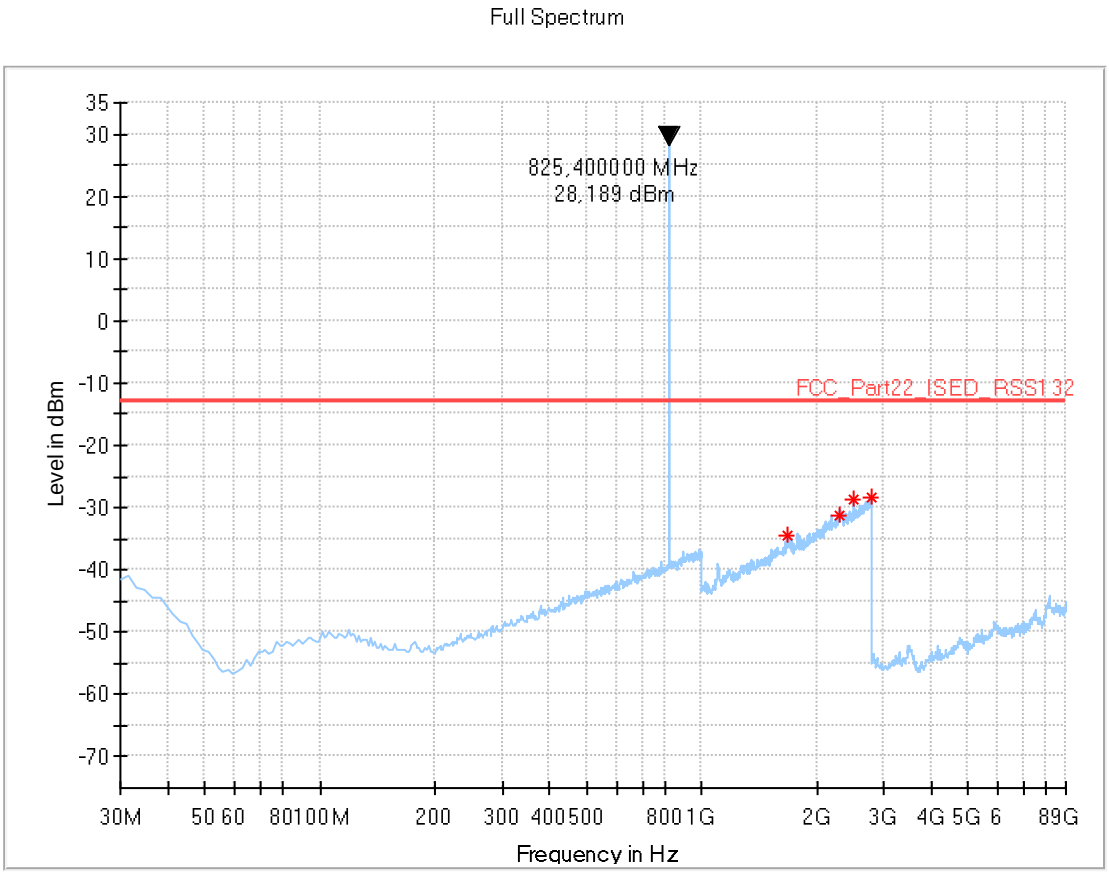
8.01_Traffic_mode_GSM_850_laying

Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	1
Operator:	RIs
Environmental Conditions::	Humidity : 40%rH; Temperature: 20°C
EUT Setup:	2

EUT Information

please see the Diagram 2.01



Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB)
1684.000000	-34.35	-13.00	21.35	---	---	H	75.0	-61
2284.000000	-31.31	-13.00	18.31	---	---	V	210.0	-59
2500.000000	-28.63	-13.00	15.63	---	---	V	30.0	-59
2785.000000	-28.49	-13.00	15.49	---	---	V	345.0	-56

Remarks:

- Emission at 825,400000MHz is Uplink frequency from GSM 850 band, no influence to Result.

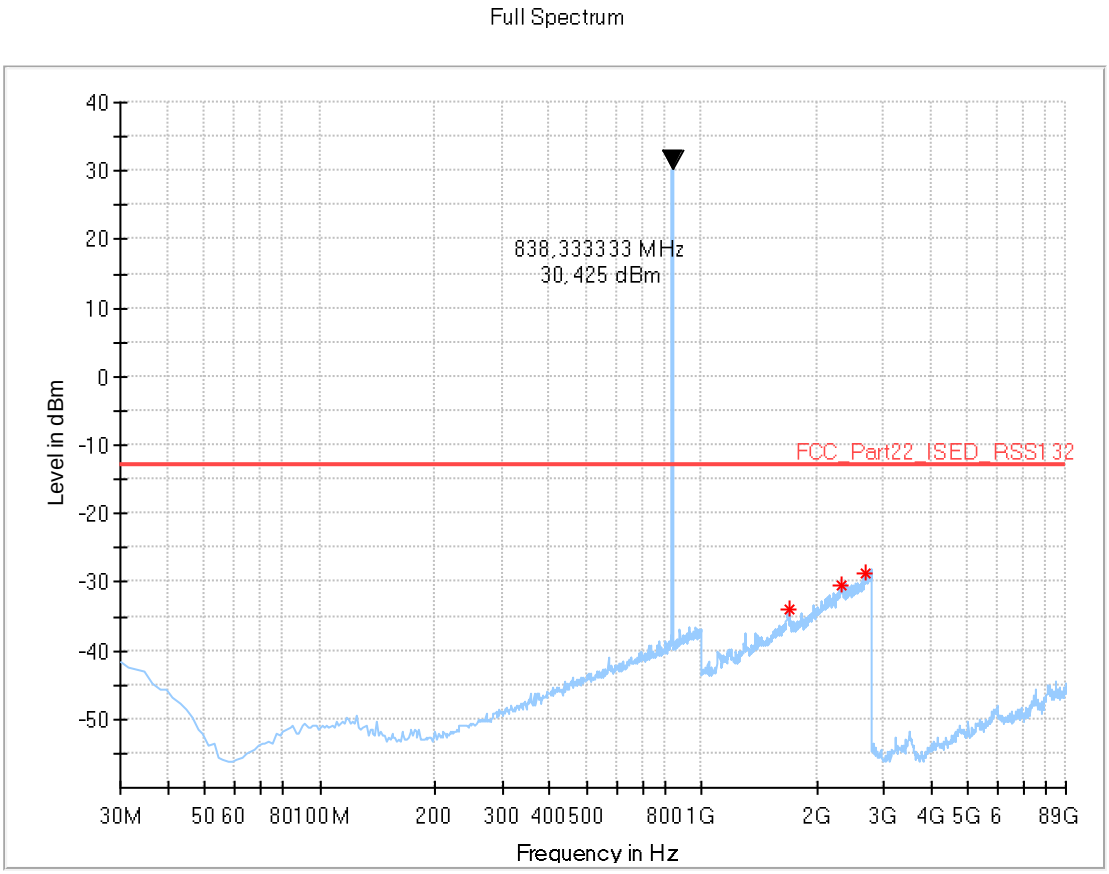
8.02_Traffic_mode_GSM_850_standing

Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	1
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	2

EUT Information

please see the Diagram 2.01



Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB)
1690.000000	-34.12	-13.00	21.12	---	---	H	30.0	-61
2320.000000	-30.45	-13.00	17.45	---	---	V	255.0	-58
2701.000000	-28.70	-13.00	15.70	---	---	V	210.0	-57

Remarks:

- Emission at 838,333333MHz is Uplink frequency from GSM 850 band, no influence to Result.

8.03a_Traffic_mode_GSM_850_laying_30MHz_1GHz

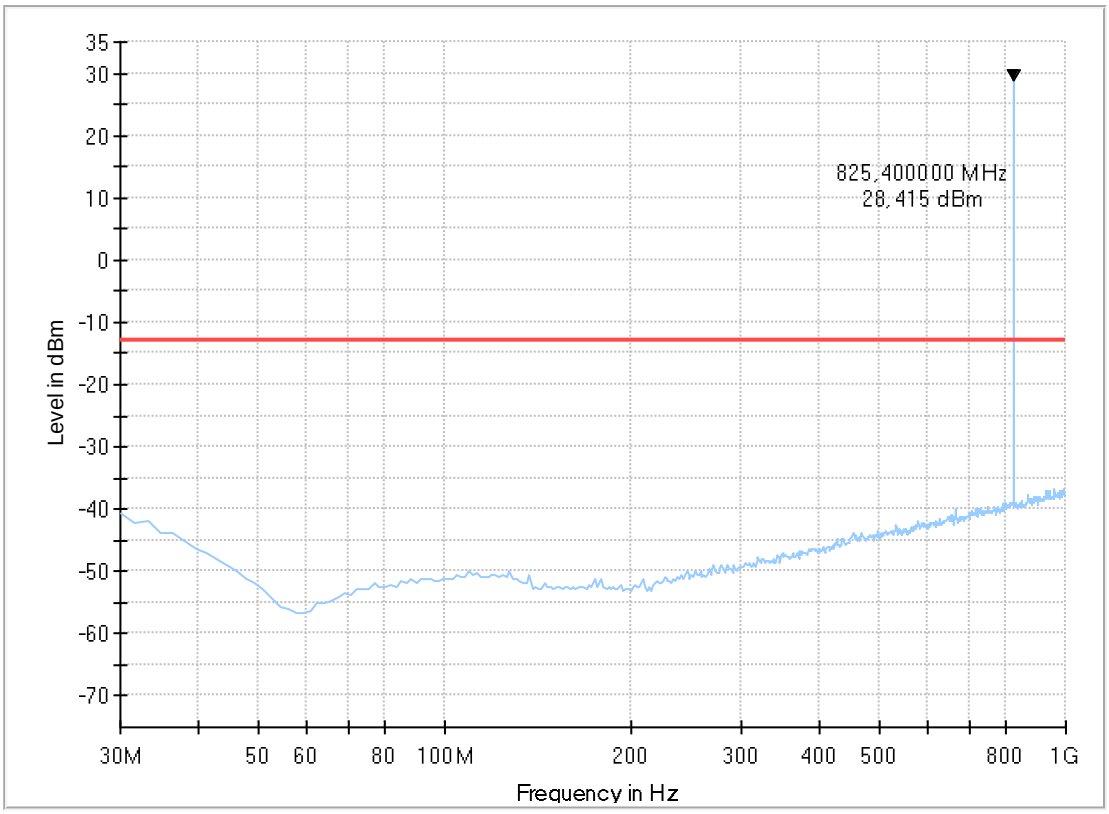
Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	1
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	1

EUT Information

please see the Diagram 2.01

Full Spectrum



Remarks:

- Emission at 825,400000MHz is Uplink frequency from GSM 850 band, no influence to Result.

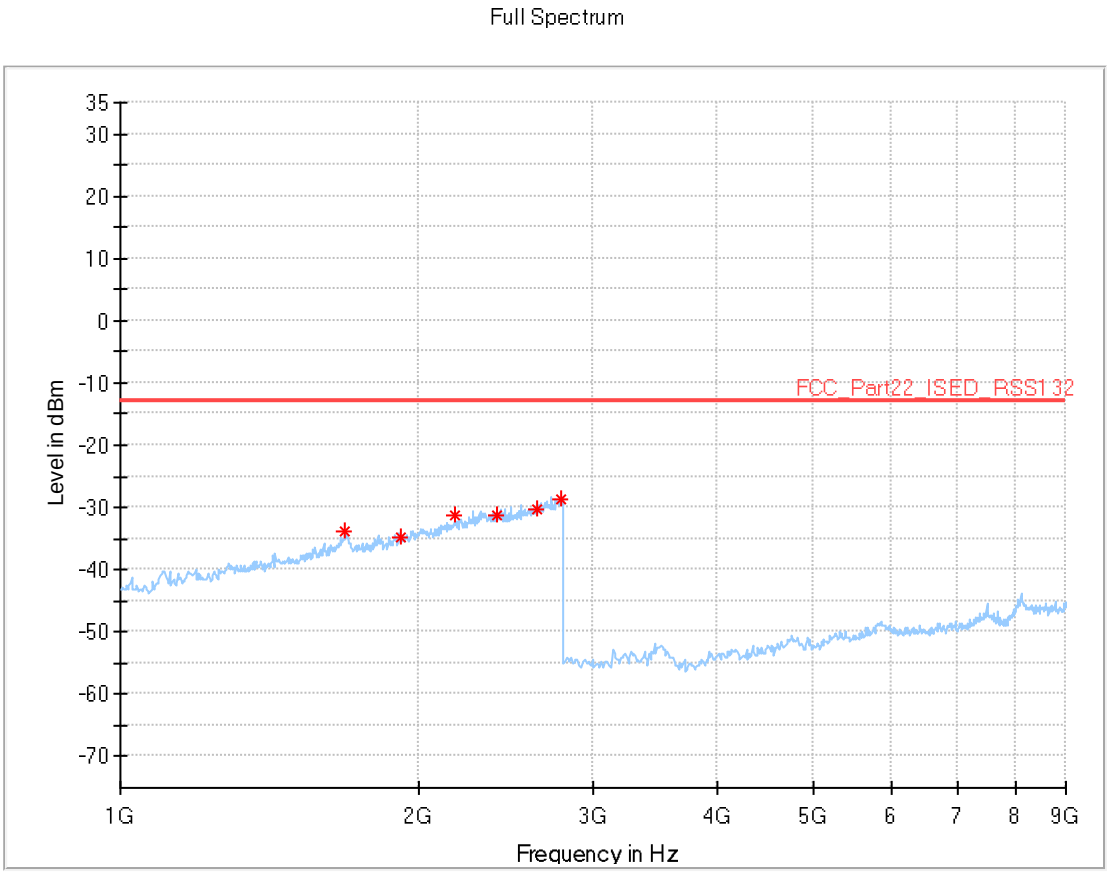
8.03b_Traffic_mode_GSM_850_laying

Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	1
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	1

EUT Information

please see the Diagram 2.01



Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB)
1684.000000	-33.80	-13.00	20.80	---	---	V	75.0	-61
1921.000000	-34.77	-13.00	21.77	---	---	H	345.0	-62
2176.000000	-31.26	-13.00	18.26	---	---	V	165.0	-60
2401.000000	-31.30	-13.00	18.30	---	---	V	210.0	-59
2629.000000	-30.41	-13.00	17.41	---	---	H	345.0	-58
2782.000000	-28.55	-13.00	15.55	---	---	V	165.0	-56

8.04_Traffic_mode_GSM_850_standing

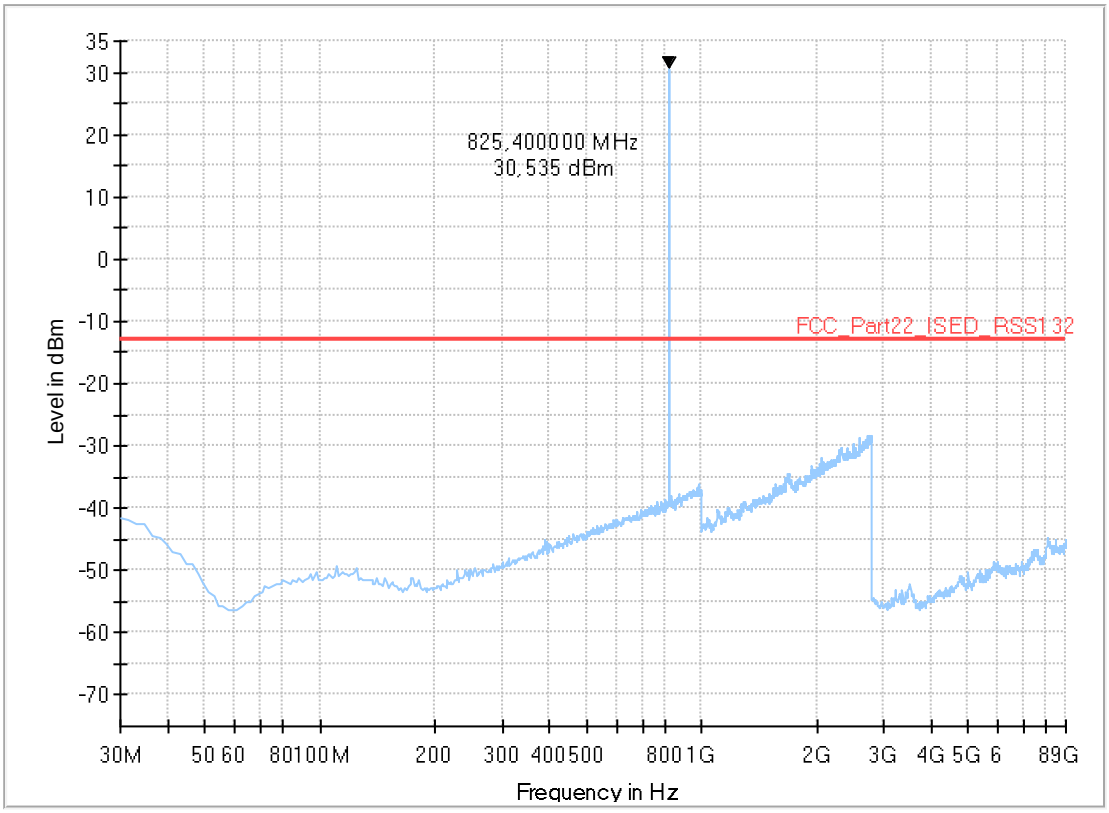
Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	1
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	1

EUT Information

please see the Diagram 2.01

Full Spectrum



Remarks:

- Emission at 825,400000MHz is Uplink frequency from GSM 850 band, no influence to Result.

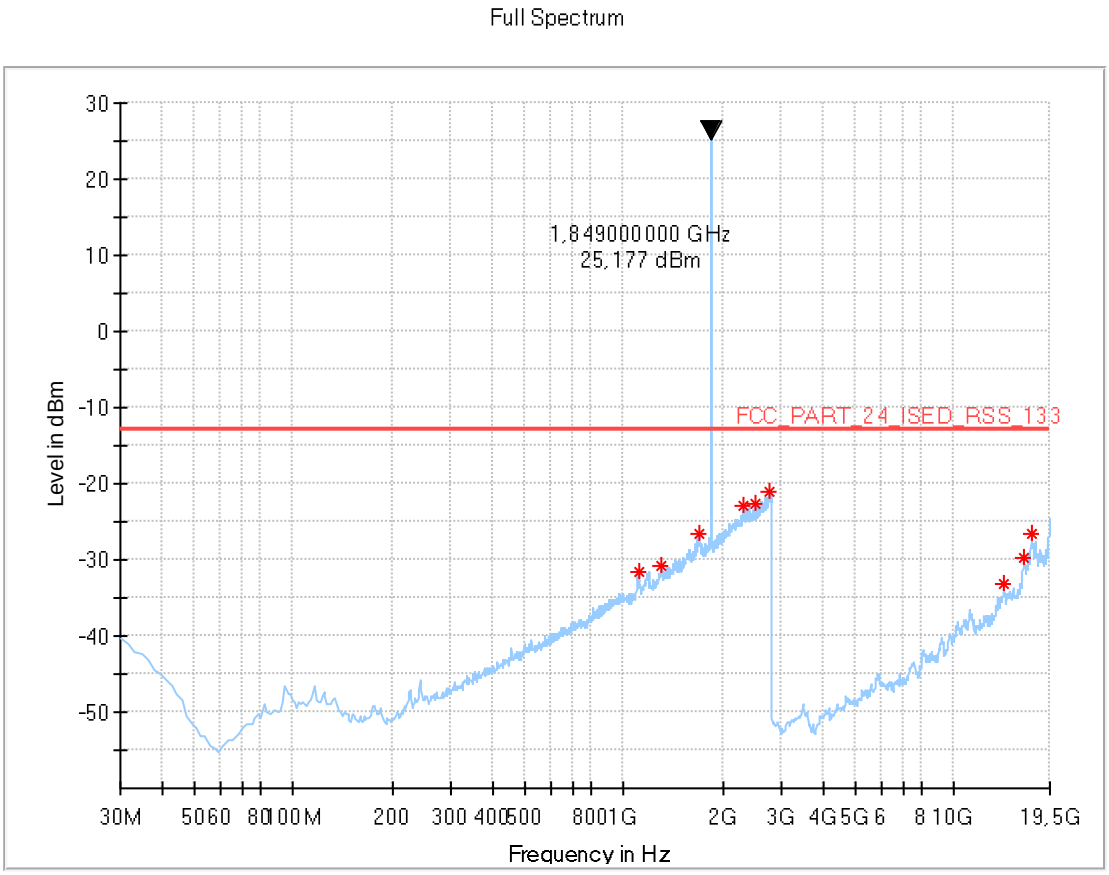
1.6. Spurious emissions radiated (GSM 1900)

8.05_Traffic_mode_GSM_1900_laying

Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	2
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	2

EUT Information please see the Diagram 2.01



Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1108.000000	-31.65	-13.00	18.65	---	---	155.0	V	75.0
1309.000000	-30.81	-13.00	17.81	---	---	155.0	H	30.0
1690.000000	-26.55	-13.00	13.55	---	---	155.0	V	345.0
2320.000000	-22.87	-13.00	9.87	---	---	155.0	V	210.0
2518.000000	-22.52	-13.00	9.52	---	---	155.0	H	300.0
2767.000000	-20.98	-13.00	7.98	---	---	155.0	V	75.0
14183.833333	-33.11	-13.00	20.11	---	---	155.0	V	345.0
16299.166667	-29.75	-13.00	16.75	---	---	155.0	H	255.0
17245.500000	-26.70	-13.00	13.70	---	---	155.0	H	75.0

Remarks:

- Emission at 1,849000000GHz is Uplink frequency from GSM 1900 band, no influence to Result.

8.06_Traffic_mode_GSM_1900_standing

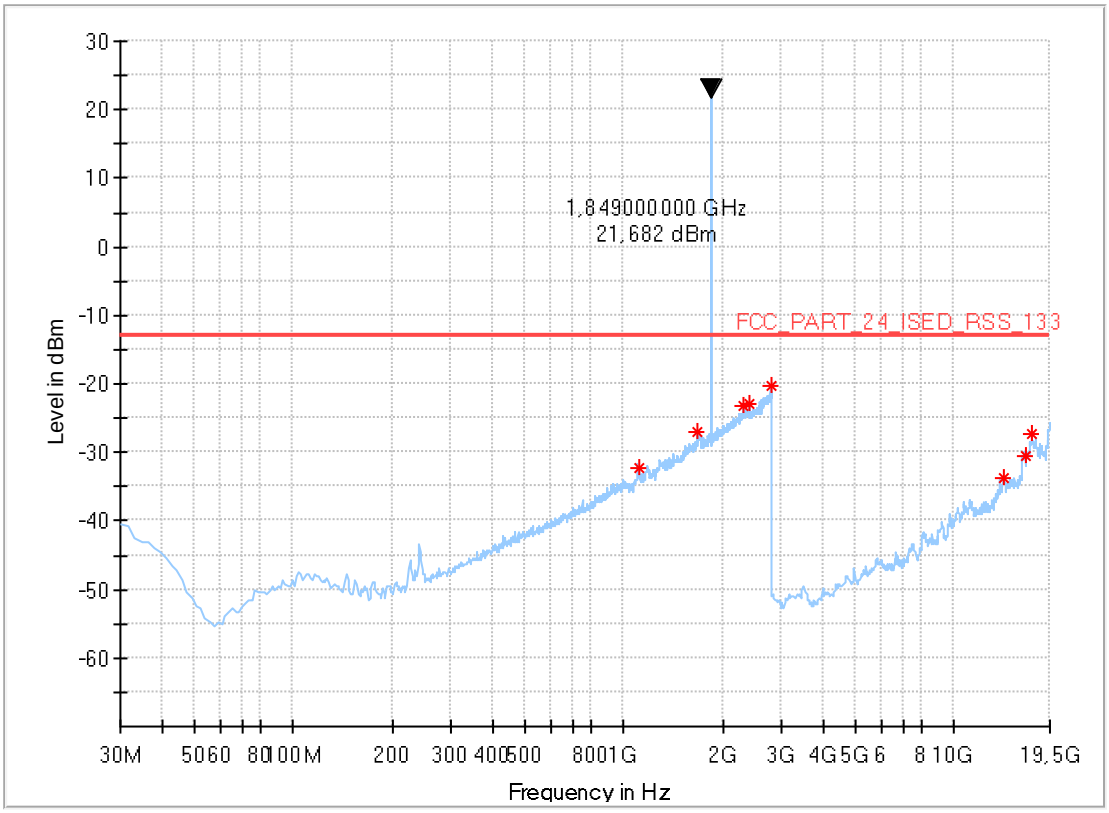
Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	2
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	2

EUT Information

please see the Diagram 2.01

Full Spectrum



Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1117.000000	-32.22	-13.00	19.22	---	---	155.0	V	345.0
1678.000000	-26.99	-13.00	13.99	---	---	155.0	V	165.0
2317.000000	-23.27	-13.00	10.27	---	---	155.0	H	120.0
2389.000000	-22.88	-13.00	9.88	---	---	155.0	H	165.0
2782.000000	-20.31	-13.00	7.31	---	---	155.0	H	120.0
14072.500000	-33.77	-13.00	20.77	---	---	155.0	V	300.0
16410.500000	-30.41	-13.00	17.41	---	---	155.0	V	210.0
17217.666667	-27.21	-13.00	14.21	---	---	155.0	H	120.0

Remarks:

- Emission at 1,849000000GHz is Uplink frequency from GSM 1900 band, no influence to Result.

8.07_Traffic_mode_GSM_1900_laying

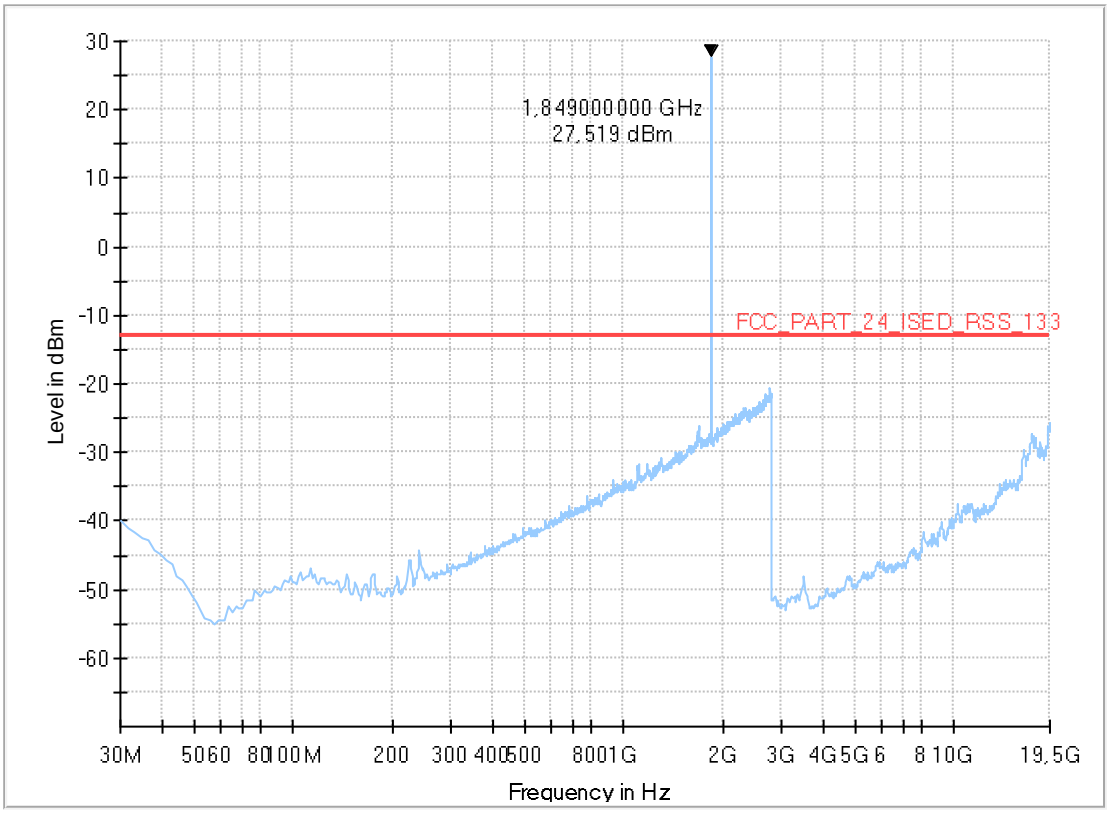
Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	2
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	1

EUT Information

please see the Diagram 2.01

Full Spectrum



Remarks:

- Emission at 1,849000000GHz is Uplink frequency from GSM 1900 band, no influence to Result.

8.08_Traffic_mode_GSM_1900_standing

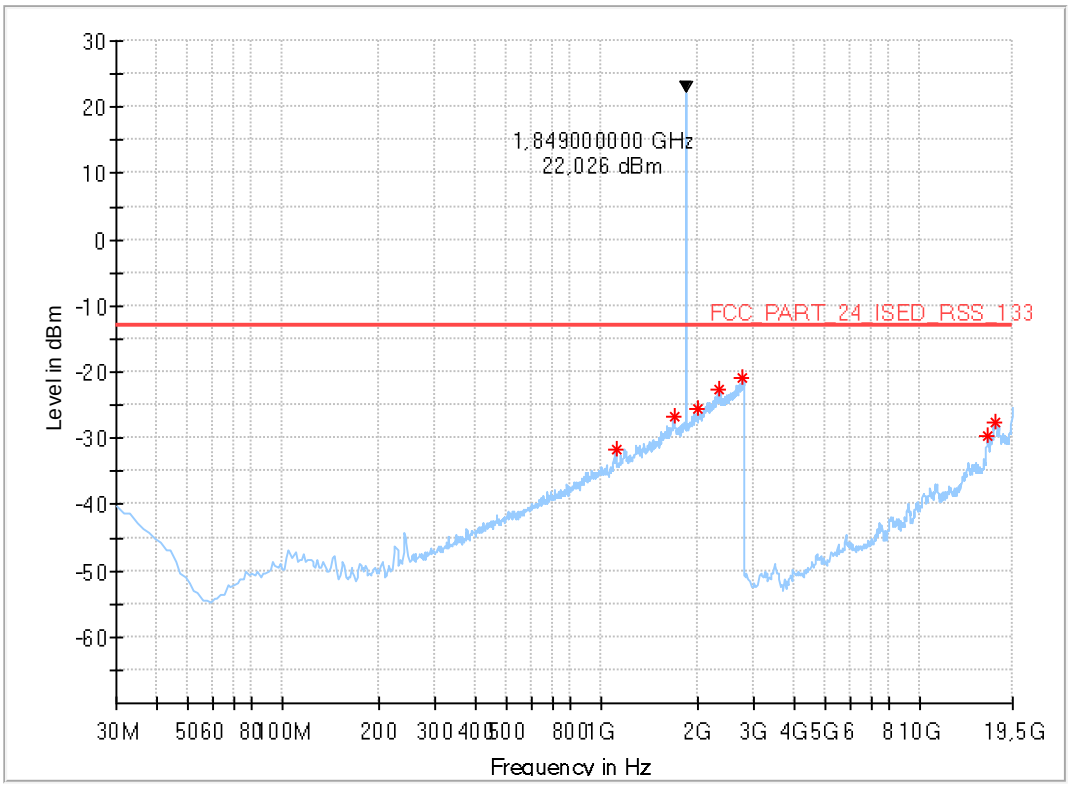
Common Information

Test Description:	Radiated emission related to 3m
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC FCC Part 24.238 Broadband PCS
Antenna polarization:	vertical / horizontal
Operating Mode:	2
Operator:	RIs
Environmental Conditions::	Humidity : 46%rH; Temperature: 20°C
EUT Setup:	1

EUT Information

please see the Diagram 2.01

Full Spectrum



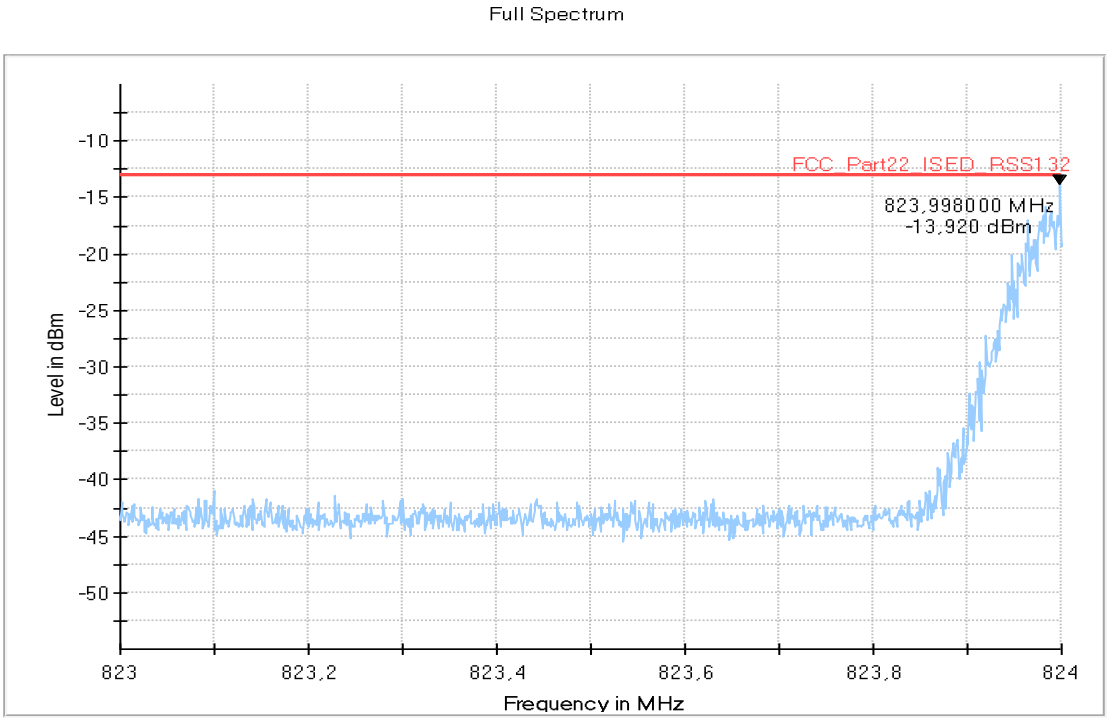
Maximum Emission Table

Frequency (MHz)	MaxPeak (dBm)	Limit (dBm)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB)
1111.000000	-31.79	-13.00	18.79	---	---	155.0	H	75.0	-66
1687.000000	-26.67	-13.00	13.67	---	---	155.0	V	75.0	-61
2008.000000	-25.67	-13.00	12.67	---	---	155.0	V	255.0	-61
2323.000000	-22.67	-13.00	9.67	---	---	155.0	V	210.0	-58
2764.000000	-20.96	-13.00	7.96	---	---	155.0	H	300.0	-57
16243.500000	-29.76	-13.00	16.76	---	---	155.0	H	30.0	-67
17189.833333	-27.56	-13.00	14.56	---	---	155.0	V	75.0	-65

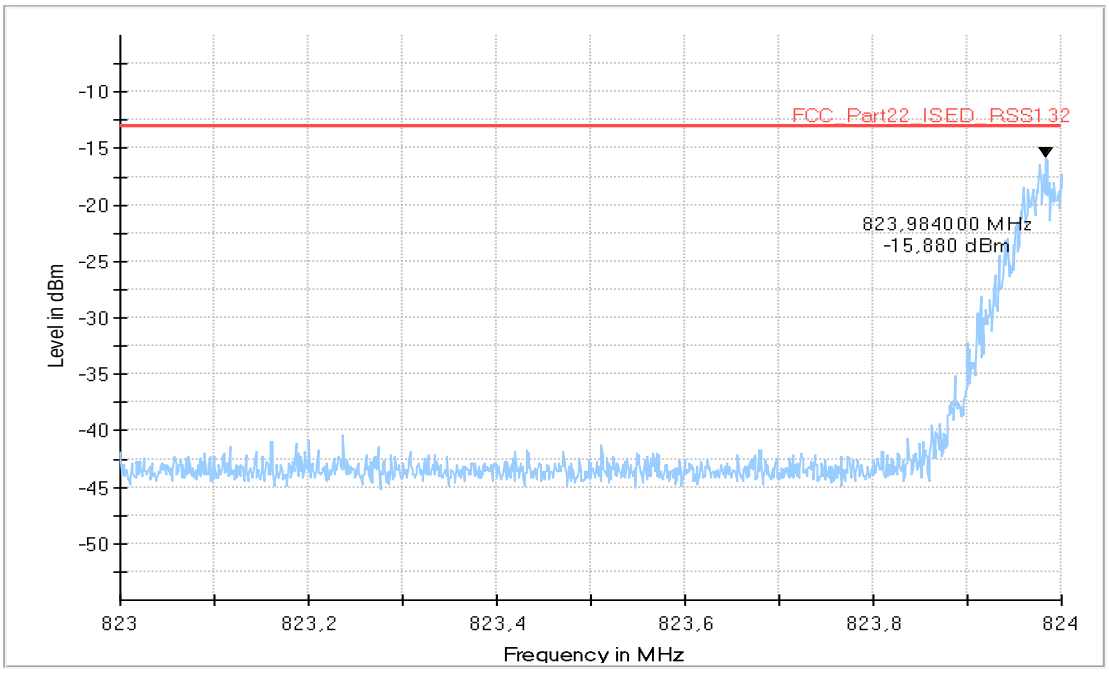
Remarks:

- Emission at 1,849000000GHz is Uplink frequency from GSM 1900 band, no influence to Result.

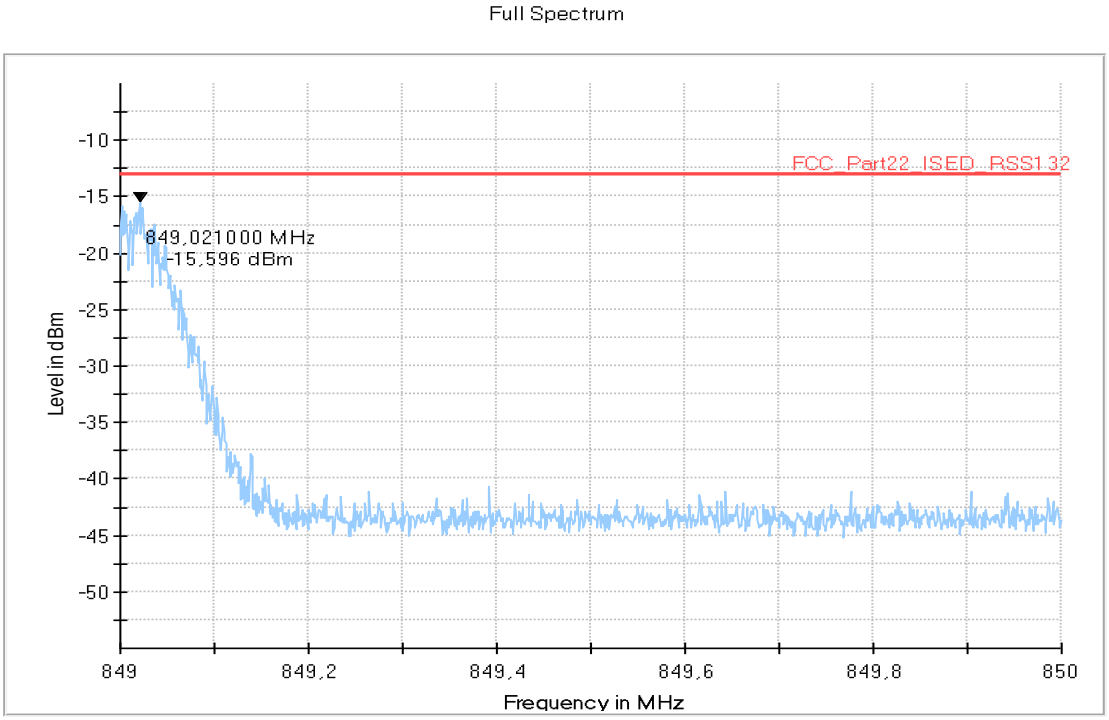
1.7. Radiated emissions on GSM 850 band-edge, EUT Internal Antenna



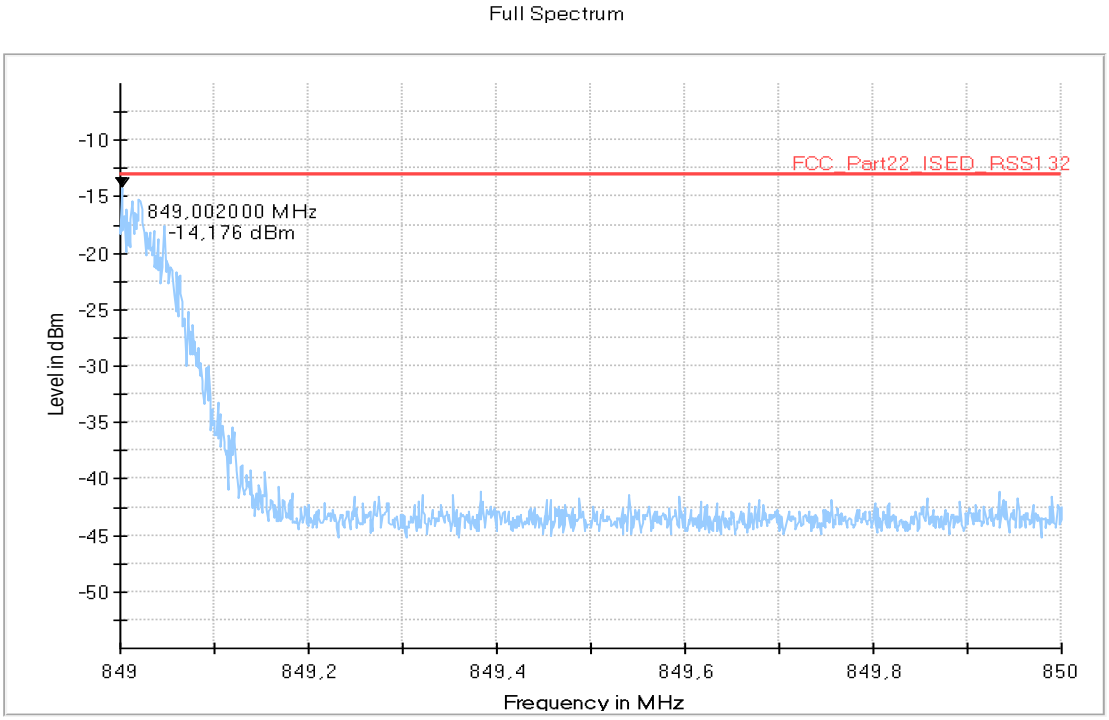
9.1201a_Band-Edge_Channel_128_UL_824.2MHz__EUT_position_laying



9.1201b_Band-Edge_Channel_128_UL_824.2MHz__EUT_position_standing

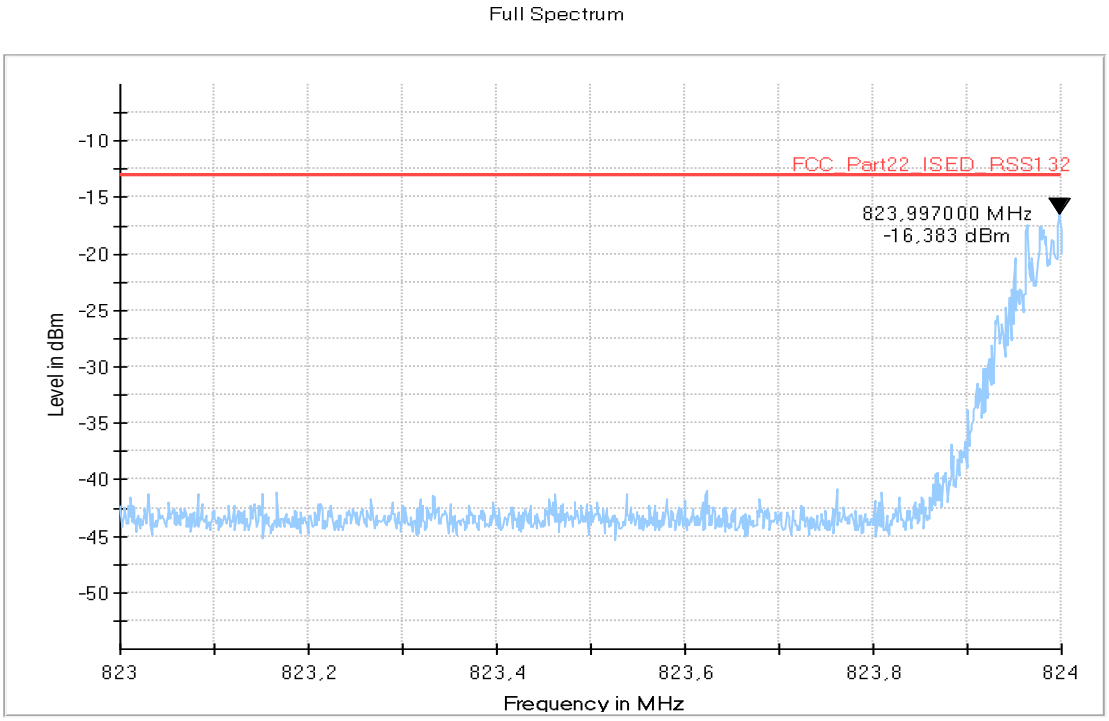


9.1202a_Band-Edge_Channel_251_UL_848.8MHz__EUT_position_laying

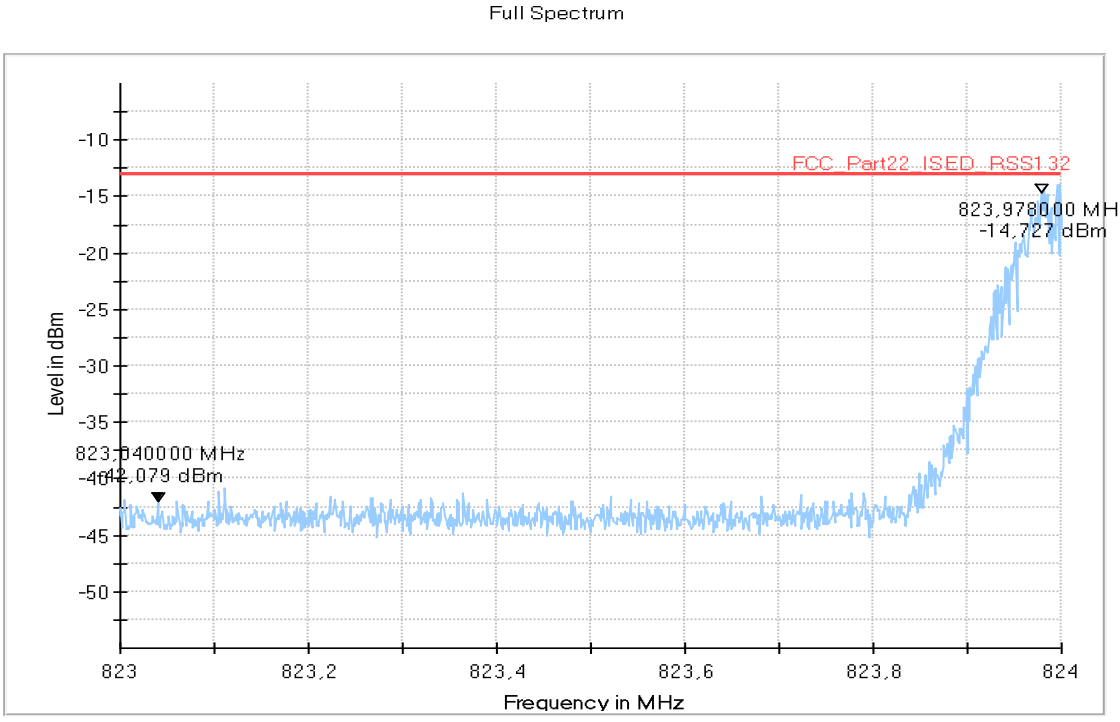


9.1202b_Band-Edge_Channel_251_UL_848.8MHz__EUT_position_standing

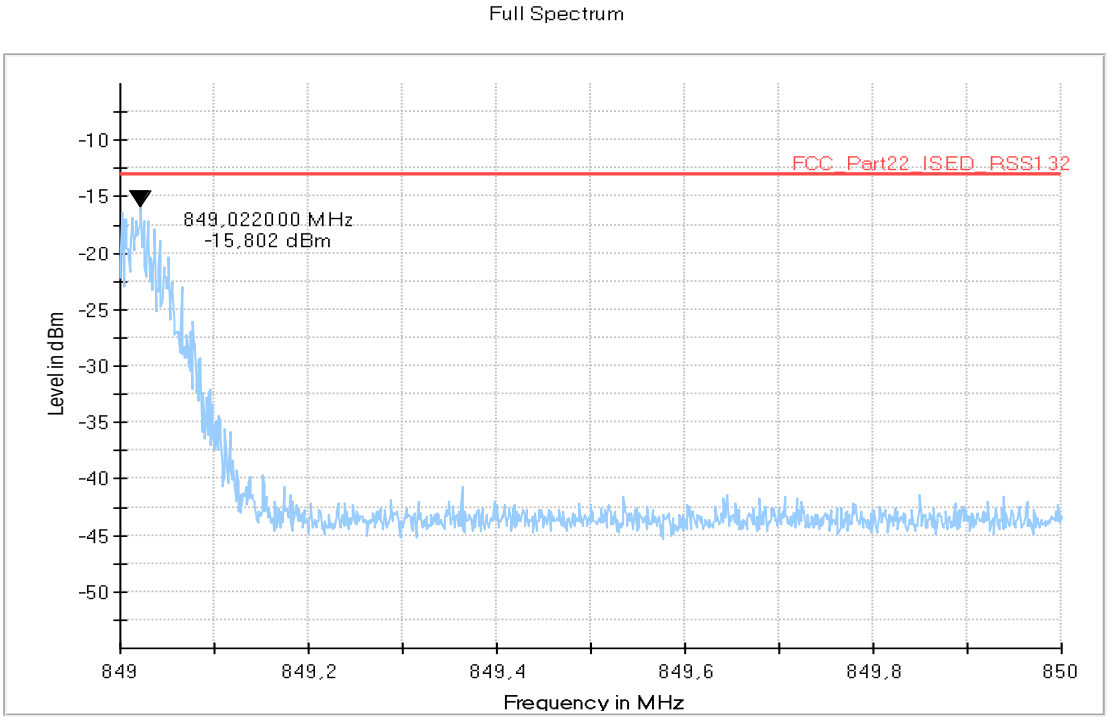
1.8. Radiated emissions on GSM 850 band-edge, EUT External Antenna



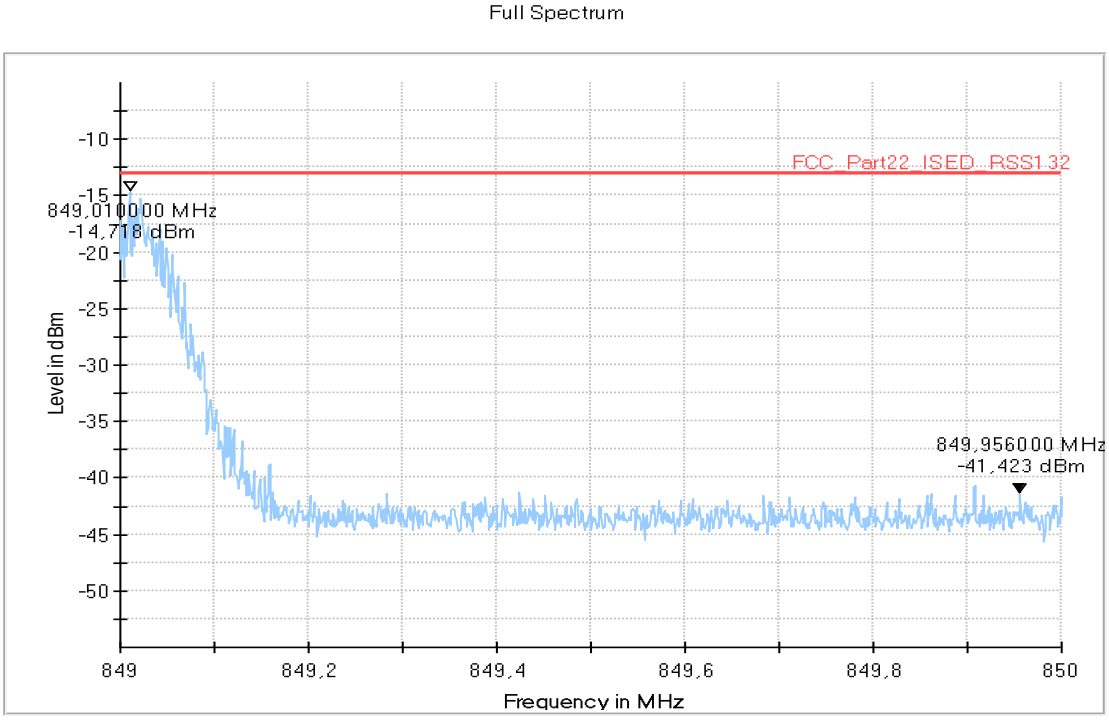
9.1203a_Band-Edge_Channel_128_UL_824.2MHz__EUT_position_laying



9.1203b_Band-Edge_Channel_128_UL_824.2MHz__EUT_position_standing



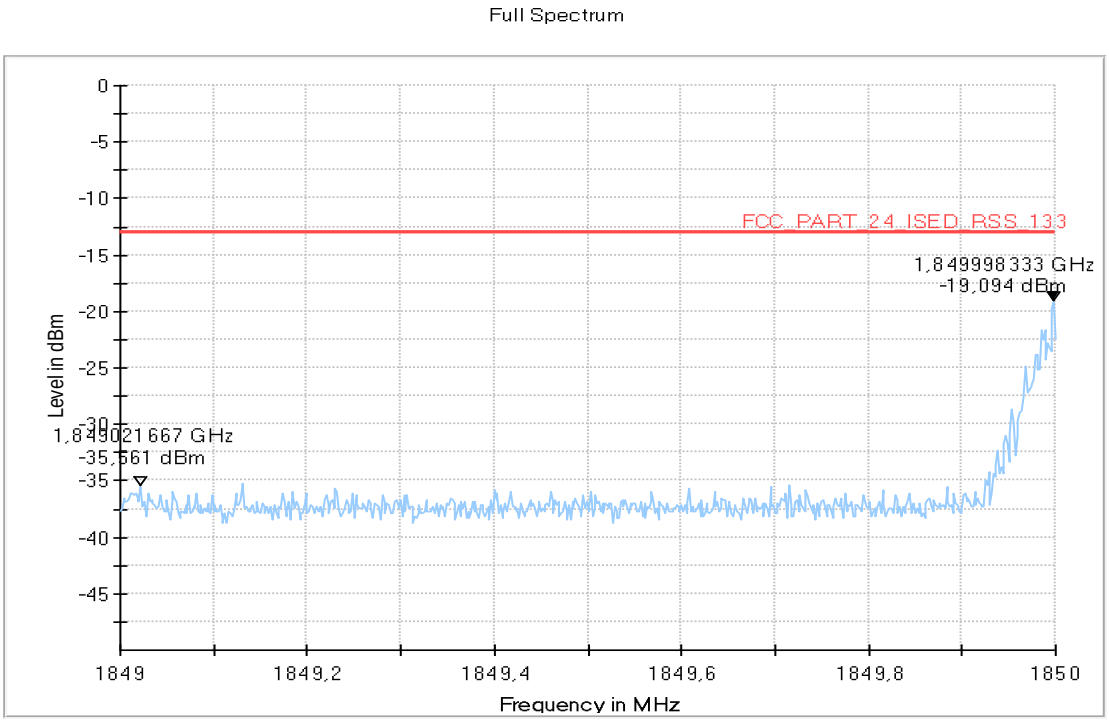
9.1204a_Band-Edge_Channel_251_UL_848.8MHz__EUT_position_laying



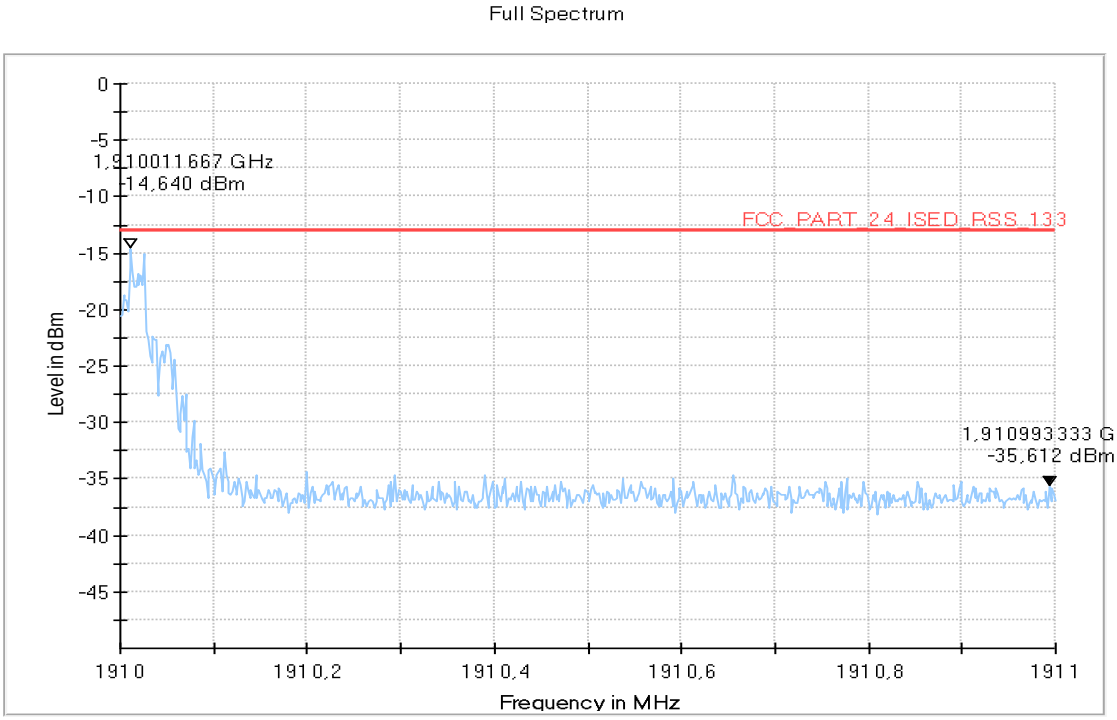
9.1204b_Band-Edge_Channel_251_UL_848.8MHz__EUT_position_standing

1.9. Radiated emissions on GSM 1900 band-edge, EUT Internal Antenna

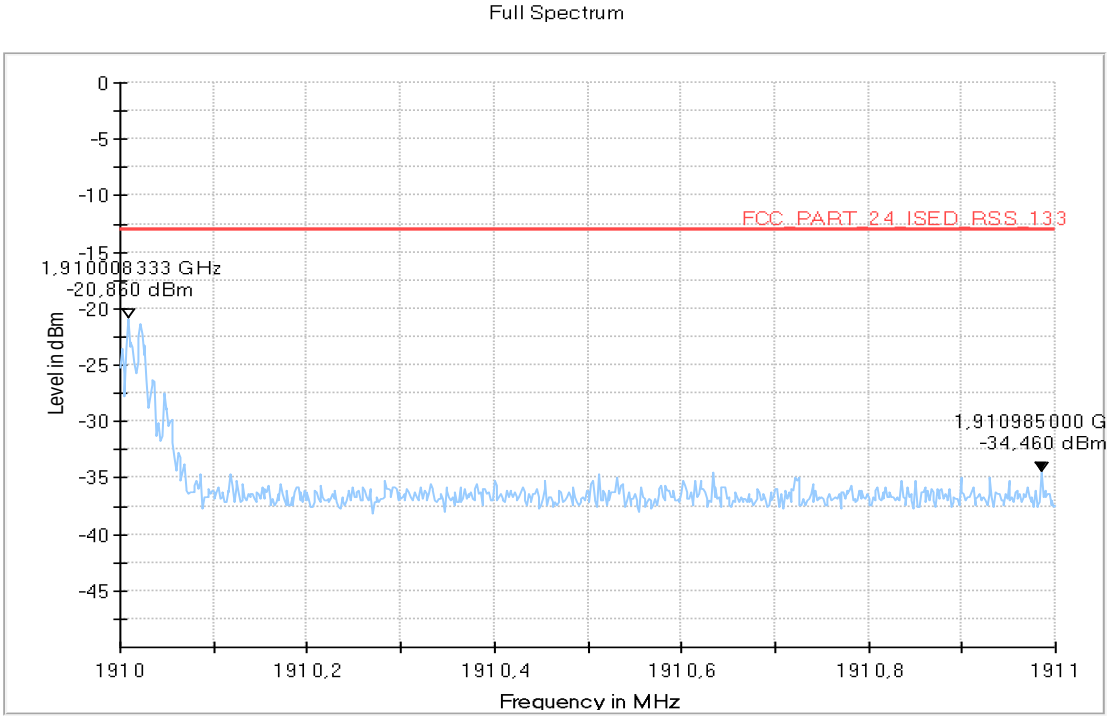
9.1205a_Band-Edge_Channel_512_UL_1850.2MHz__EUT_position_laying



9.1205b_Band-Edge_Channel_512_UL_1850.2MHz__EUT_position_standing

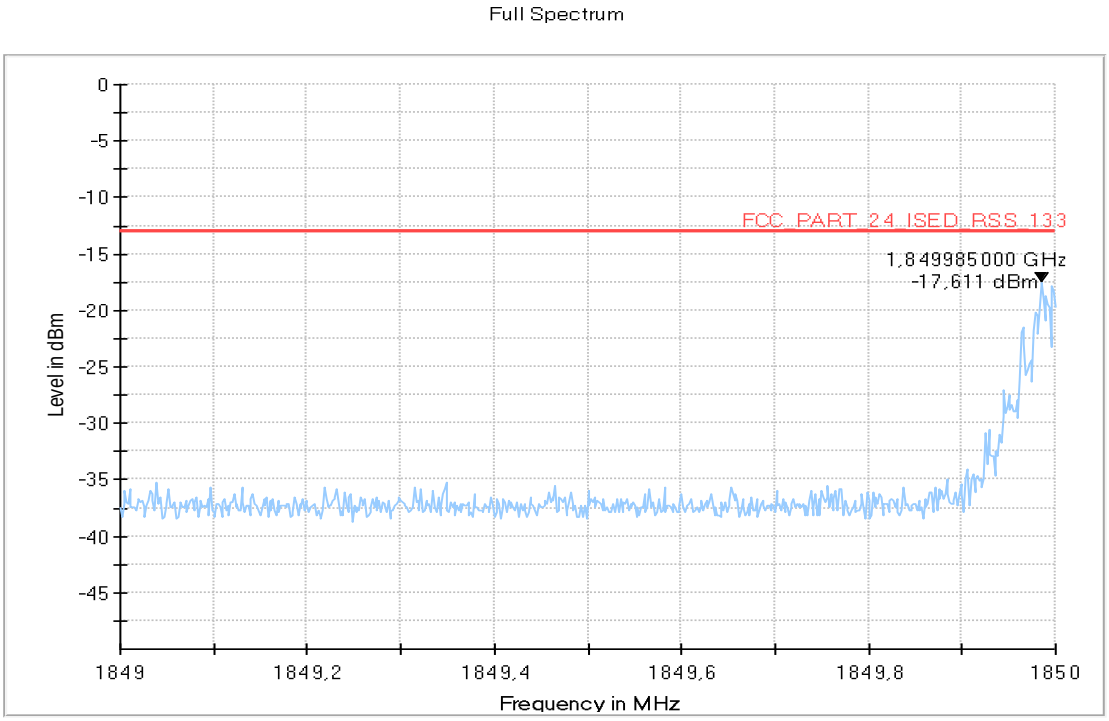


9.1206a_Band-Edge_Channel_810_UL_1909.8MHz__EUT_position_laying

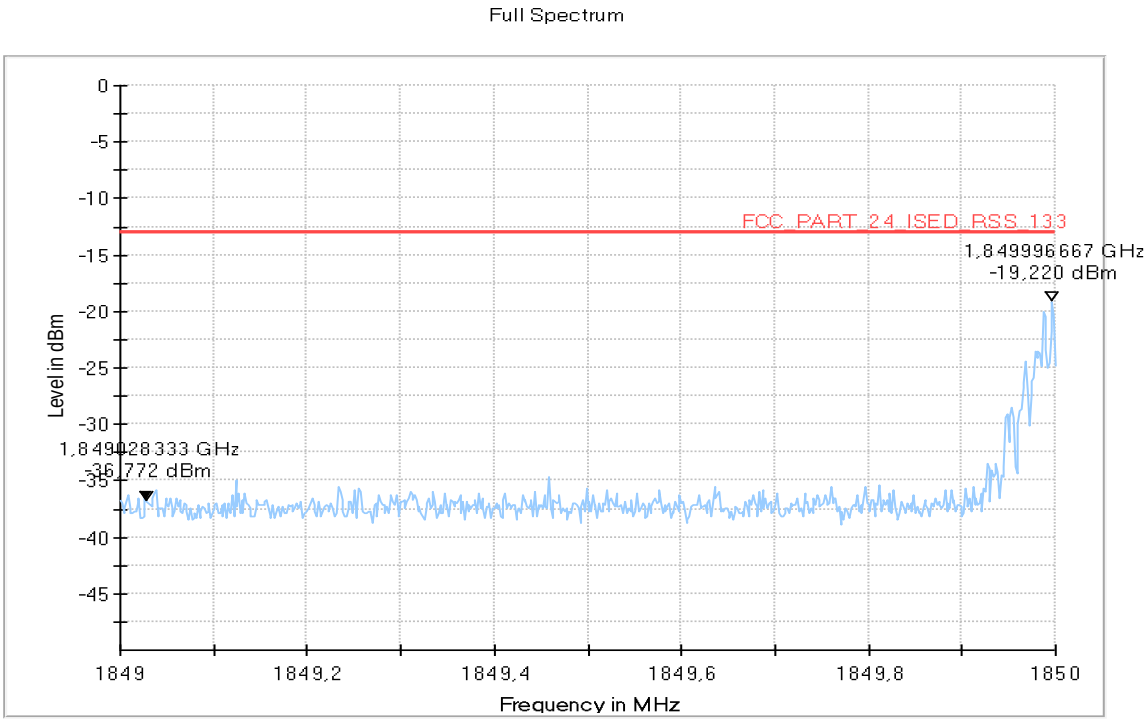


9.1206b_Band-Edge_Channel_810_UL_1909.8MHz__EUT_position_standing

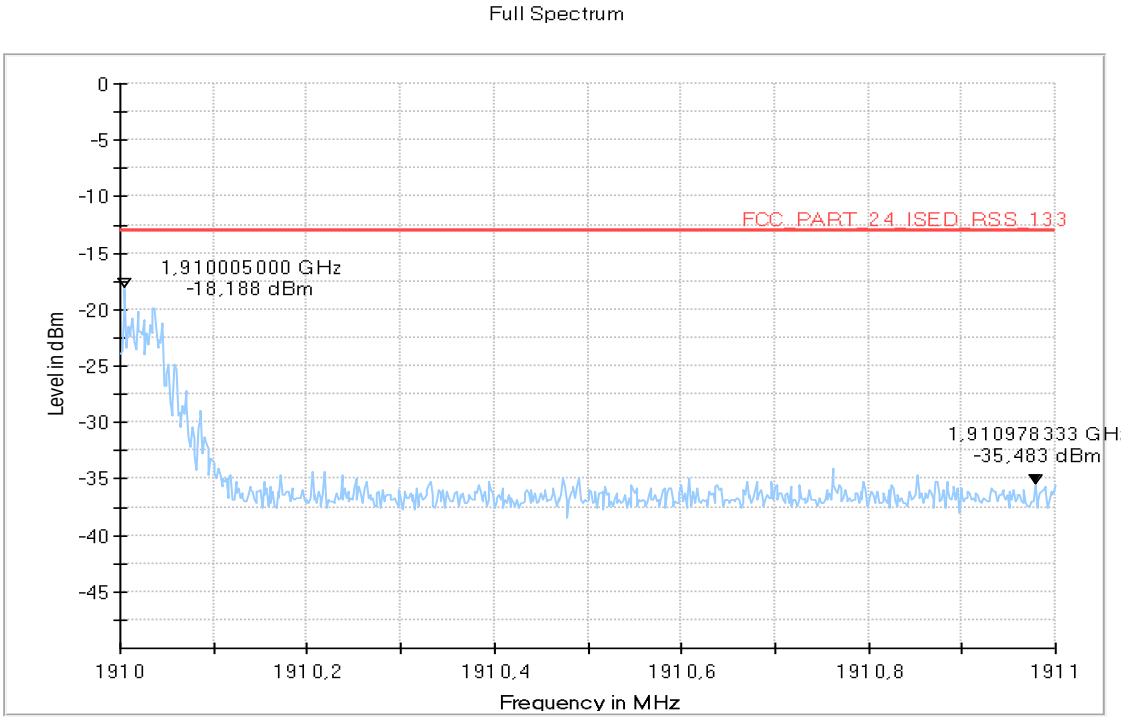
1.10. Radiated emissions on GSM 1900 band-edge, EUT External Antenna



9.1207a_Band-Edge_Channel_512_UL_1850.2MHz_EUT_position_laying



9.1207b_Band-Edge_Channel_512_UL_1850.2MHz__EUT_position_standing



9.1208a_Band-Edge_Channel_810_UL_1909.8MHz__EUT_position_laying

9.1208b_Band-Edge_Channel_810_UL_1909.8MHz__EUT_position_standing