FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

Hyundai Corporation

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FCC ID: RQQHLT-FSE275A

Report Type:	**Product Type:**
Original Report	Feature Phone

Report Number:	RSZ170712009-00C
Report Date:	2017-08-04
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hyundai Corporation's* product, model number: *E275 (FCC ID: RQQHLT-FSE275A)* or the "EUT" in this report was a *Feature Phone*, which was measured approximately: 9.18 cm (L) × 4.56 cm (W) × 1.18 cm (H) for Close the phone lid, 17.38 cm (L) × 4.56 cm (W) × 0.78 cm (H) for open the phone lid. rated with input voltage: DC 3.7 V battery or DC 5V from adapter.

Adapter Information:
Model: XAP-L05Y05-00AFC
Input: AC 100-240V, 50/60Hz
Output: DC 5V, 500 mA

**All measurement and test data in this report was gathered from production sample serial number: 1701644 (Assigned by applicant).The EUT supplied by the applicant was received on 2017-07-12*

Objective

This type approval report is prepared on behalf of *Hyundai Corporation* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP, Part 15.247 DTS submissions with FCC ID: RQQHLT-FSE275A.

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 parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-D.

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

Measurement Uncertainty

Parameter	uncertainty
Occupied Channel Bandwidth	±5%
RF output power, conducted	±1.5dB
Unwanted Emission, conducted	±1.5dB
All emissions, radiated	±4.88dB
Temperature	±1℃
Supply voltages	±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L2408). And accredited to ISO/IEC 17025 by NVLAP(Lab code: 200707-0), the FCC Designation No. CN5001 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Shenzhen) was registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

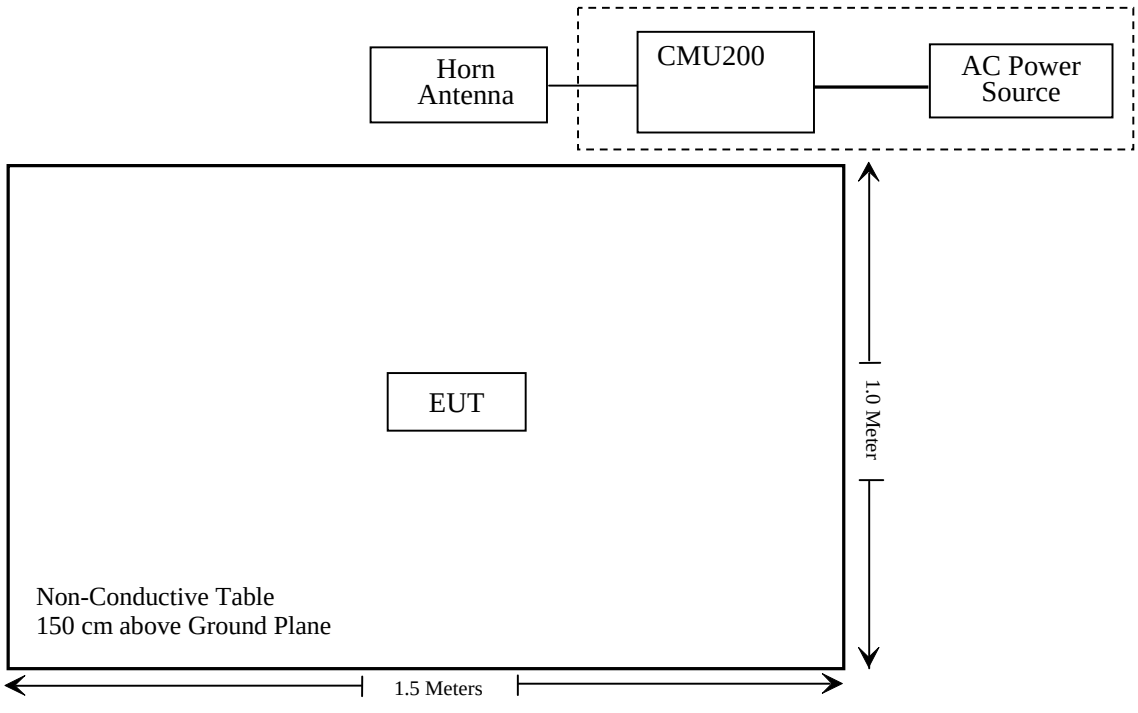
Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b)(1), §2.1093	RF Exposure Information	Compliance*
§2.1046; § 22.913 (a); § 24.232 (c);	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238;	Occupied Bandwidth	Compliance
§ 2.1051; § 22.917 (a); § 24.238 (a);	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a);	Spurious Radiated Emissions	Compliance
§ 22.917 (a); § 24.238 (a);	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	Frequency stability	Compliance

Compliance*: Please refer to SAR report released by BACL, report number: RSZ170712009-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-02-14	2018-02-14
HP	Amplifier	HP8447E	1937A01046	2017-05-21	2017-11-19
Anritsu	Signal Generator	68369B	004114	2016-12-05	2017-12-05
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
R & S	Wideband Radio Communication Tester	CMW500	146520	2017-02-14	2018-02-14
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	1	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	2	2017-05-22	2017-11-22
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2016-11-22	2017-11-22
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Aglient	ESG Vector Signal Generator	E4438C	MY42080875	2017-05-09	2018-05-09
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2017-04-24	2018-04-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMU200	106891	2016-10-18	2017-10-18
Ducommun technologies	RF Cable	RG-214	3	2017-05-22	2017-11-22
WEINSCHEL	10dB Attenuator	5324	AU0709	2017-06-15	2018-06-15

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

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1307, §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ170712009-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d) , Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

§2.1046; § 22.913 (a); § 24.232 (c) - RF OUTPUT POWER

Applicable Standards

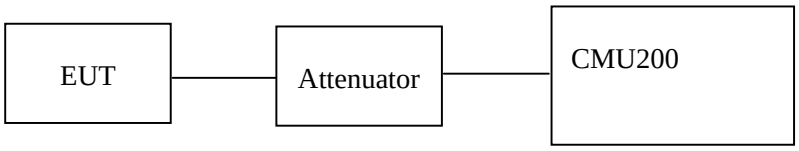
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMU200 through sufficient attenuation.



Radiated method:

TIA603-D section 2.2.17

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-08-02.

Conducted Power

Cellular Band (Part 22H)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.38	38.45
	190	836.6	32.38	38.45
	251	848.8	32.45	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	33.69	32.92	31.17	30.00	38.45
	190	836.6	33.67	32.91	31.15	30.02	38.45
	251	848.8	33.66	32.90	31.19	30.05	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2		22.08	21.78	22.01
		HSDPA	1	21.00	20.69	21.05
			2	21.03	20.60	21.01
			3	21.04	20.80	21.15
			4	20.93	20.65	21.04
		HSUPA	1	20.96	20.72	20.98
			2	20.92	20.60	20.91
			3	21.03	20.79	21.02
			4	20.89	20.68	20.94
			5	21.01	20.84	21.02

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.60	33
	661	1880.0	28.90	33
	810	1909.8	28.95	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.63	28.89	27.18	26.10	33
	661	1880.0	29.61	28.84	27.14	26.04	33
	810	1909.8	29.58	28.81	27.08	25.98	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC12.2		22.69	22.68	22.59
		HSDPA	1	21.52	21.65	21.58
			2	21.51	21.62	21.45
			3	21.60	21.76	21.63
			4	21.12	21.06	21.01
		HSUPA	1	21.50	21.65	21.60
			2	21.51	21.53	21.57
			3	21.60	21.72	21.69
			4	21.46	21.60	21.55
			5	21.02	21.04	21.12

Peak-to-average ratio (PAR)

Cellular Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.26	13
	Middle	0.23	13
	High	0.31	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.62	13
	Middle	2.68	13
	High	2.59	13
HSDPA (16QAM)	Low	2.48	13
	Middle	2.45	13
	High	2.47	13
HSUPA (BPSK)	Low	2.31	13
	Middle	2.34	13
	High	2.35	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.22	13
	Middle	0.21	13
	High	0.27	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.84	13
	Middle	2.81	13
	High	2.79	13
HSDPA (16QAM)	Low	2.56	13
	Middle	2.54	13
	High	2.57	13
HSUPA (BPSK)	Low	2.61	13
	Middle	2.63	13
	High	2.68	13

Radiated Power

GSM Mode:

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	84.73	331	2.0	H	24.7	0.60	0.0	24.1	38.45	14.35
836.6	91.59	15	1.4	V	32.3	0.60	0.0	31.7	38.45	6.75
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	89.66	125	2.2	H	19.4	1.30	8.50	26.6	33	6.4
1880.00	91.79	278	1.4	V	21.7	1.30	8.50	28.9	33	4.1

WCDMA Mode:

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, WCDMA Band V (Part 22H), Middle Channel										
836.6	80.27	140	1.6	H	20.2	0.60	0.0	19.6	38.45	18.85
836.6	80.88	124	1.9	V	21.6	0.60	0.0	21	38.45	17.45
EIRP, WCDMA Band II (Part 24E), Middle Channel										
1880.00	82.29	160	2.4	H	12.2	1.30	8.50	19.40	33	13.60
1880.00	83.53	145	1.7	V	13.3	1.30	8.50	20.50	33	12.50

Note:
All above data were tested with no amplifier.
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

Applicable Standards

FCC 47 §2.1049, §22.917, §22.905, §24.238.

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.
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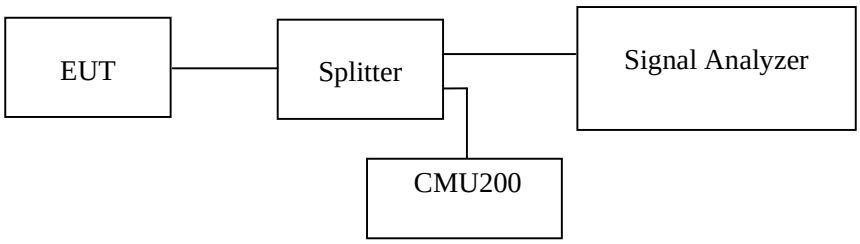


Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-07-15.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	248.5	315.4

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.11	4.67
HSUPA (BPSK)	836.6	4.21	4.84
HSDPA (16QAM)	836.6	4.21	4.87

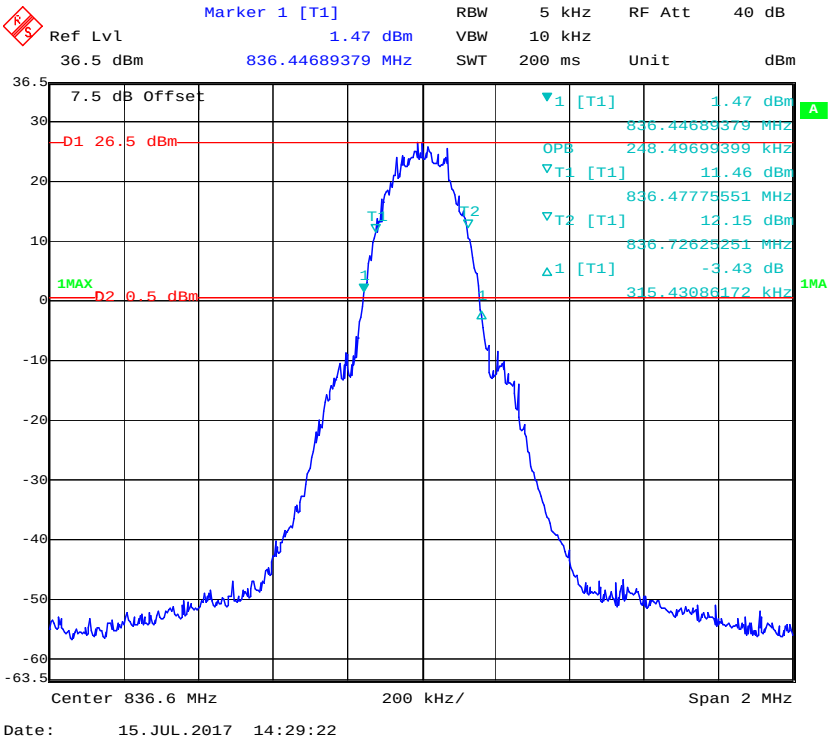
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	240.5	316.6

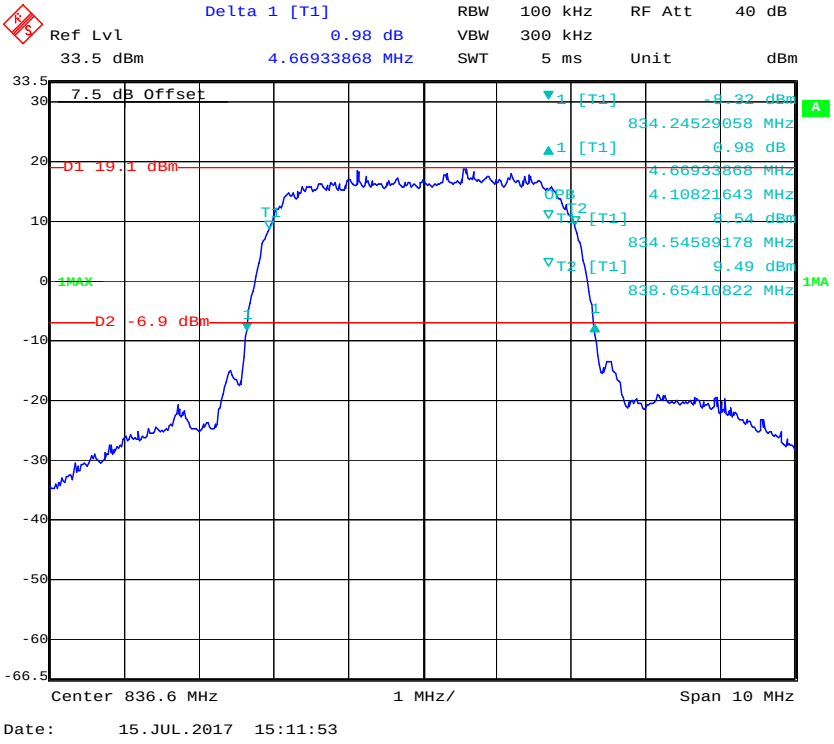
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.11	4.69
HSUPA (BPSK)	1880.0	4.21	4.87
HSDPA (16QAM)	1880.0	4.21	4.89

Cellular Band (Part 22H)

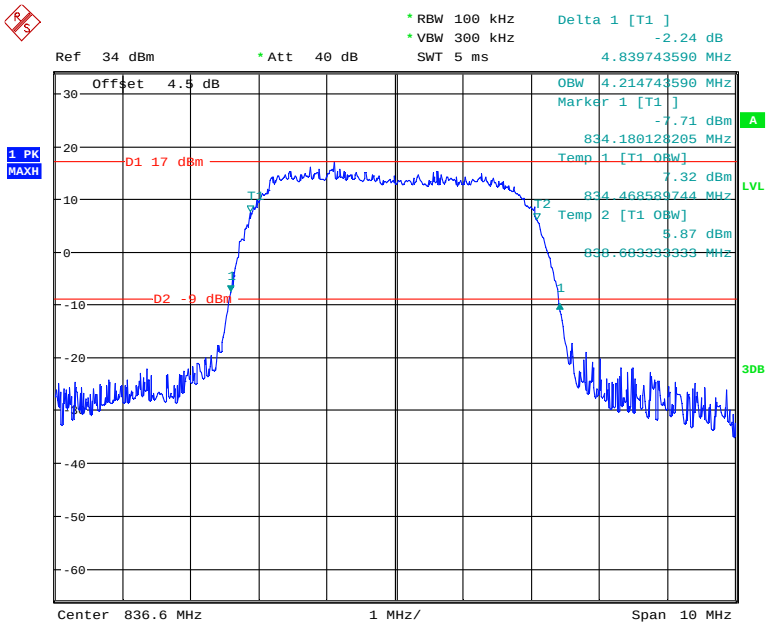
26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



99% Occupied Bandwidth for RMC (BPSK) Mode



26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



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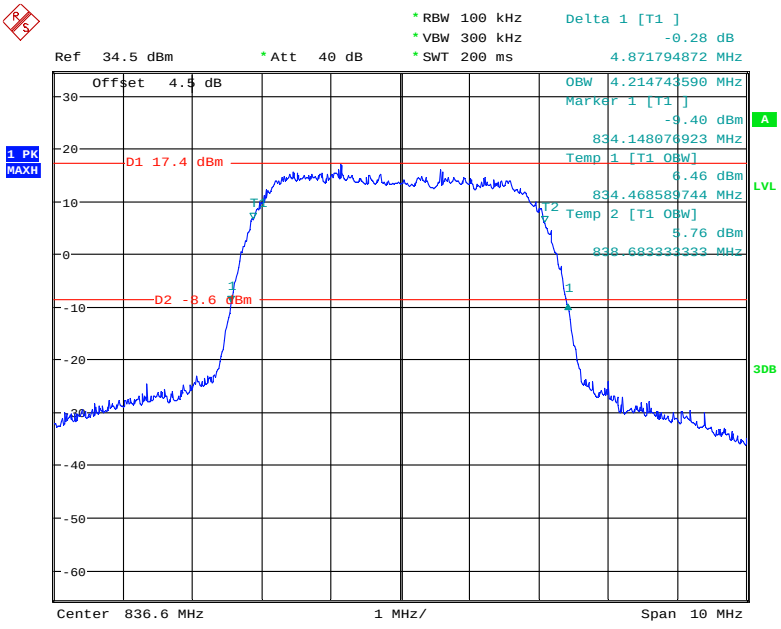
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



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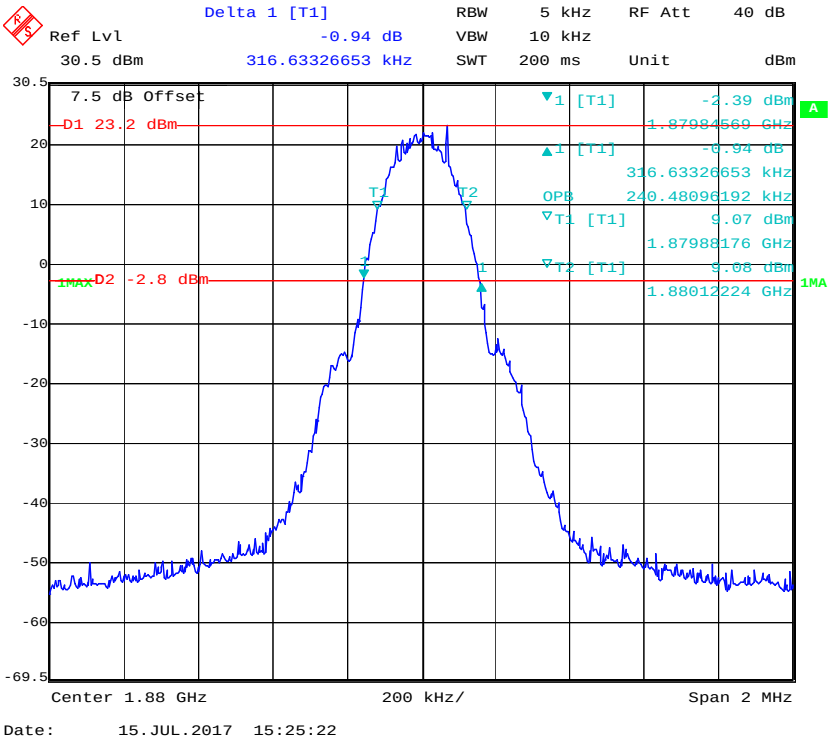
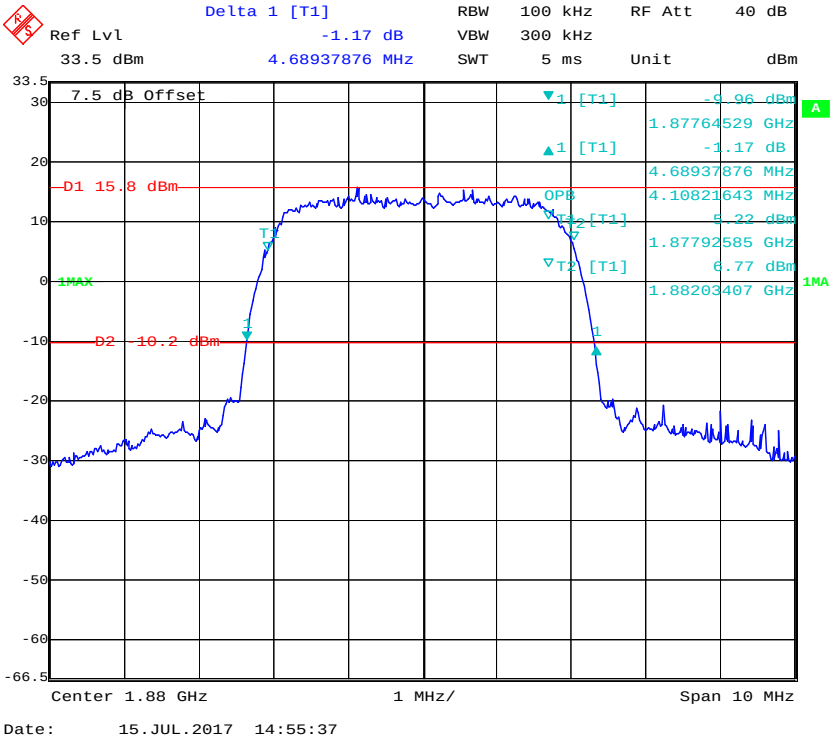
PCS Band (Part 24E)

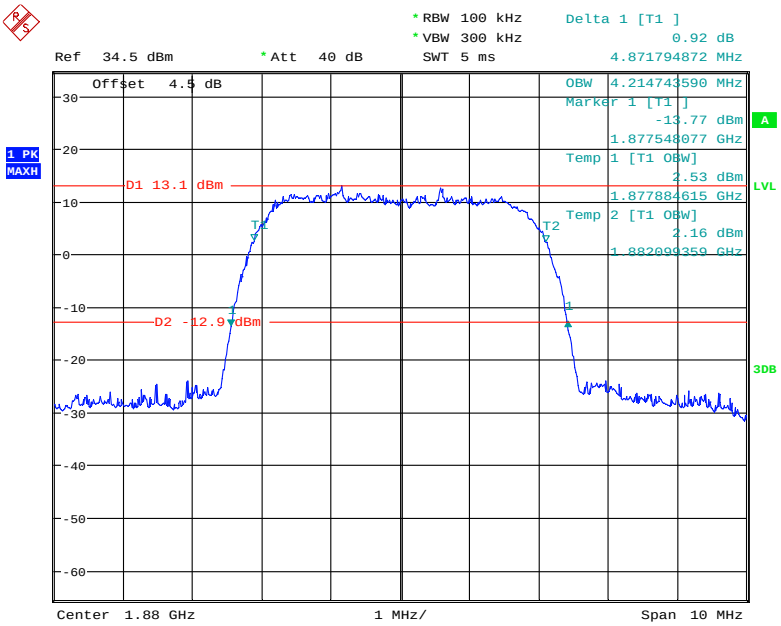
26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode



26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



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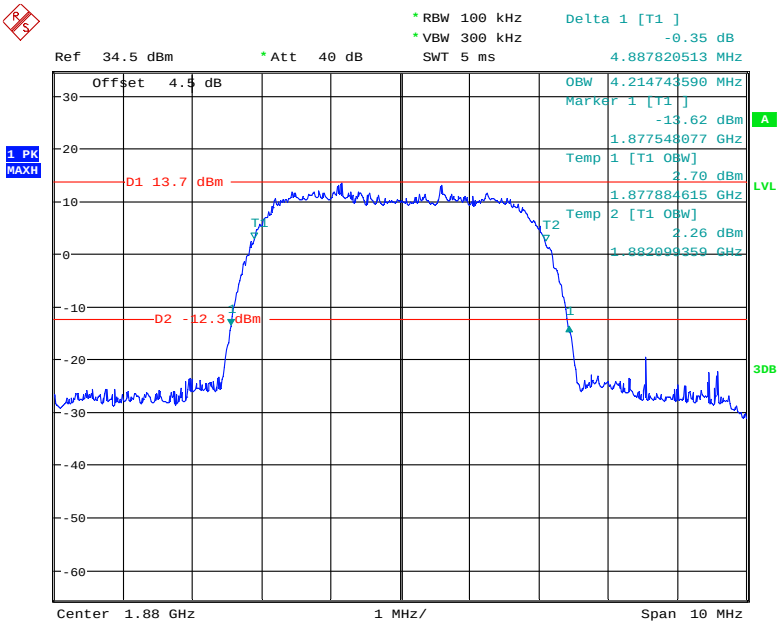
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



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§ 2.1051; § 22.917 (a); § 24.238 (a) SPURIOUS EMISSIONS AT ANTENNA TERMINALS

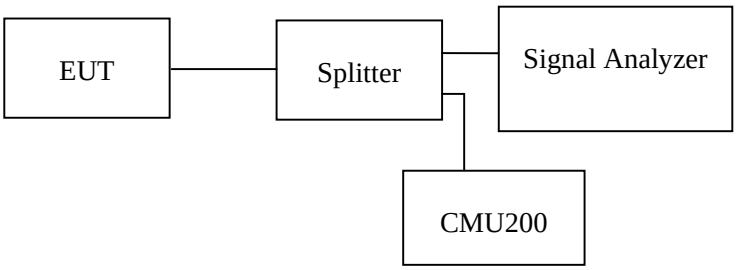
Applicable Standards

FCC §2.1051, §22.917(a) and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

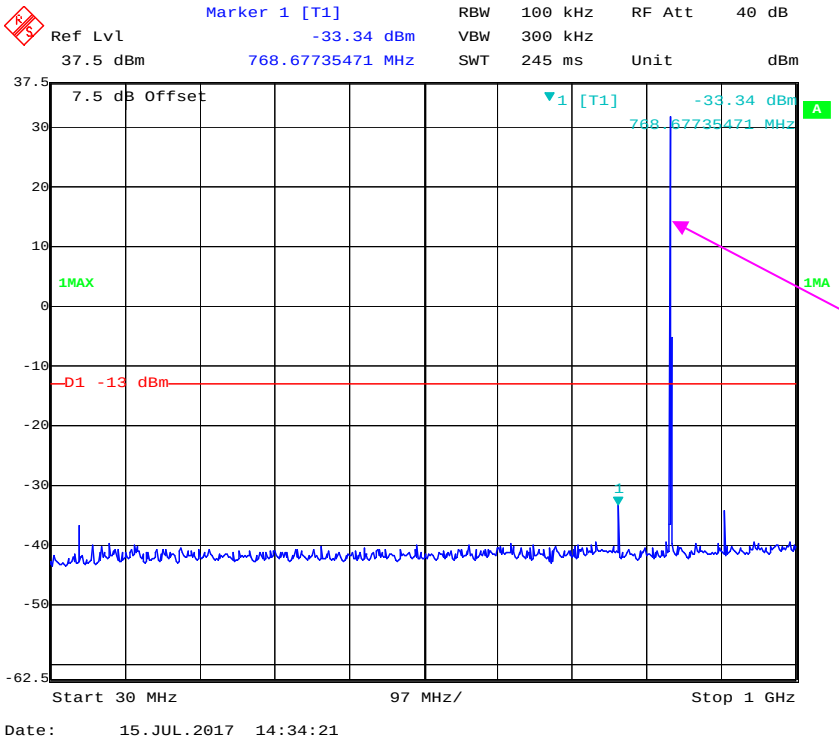
Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	53~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-07-15 and 2017-08-02.

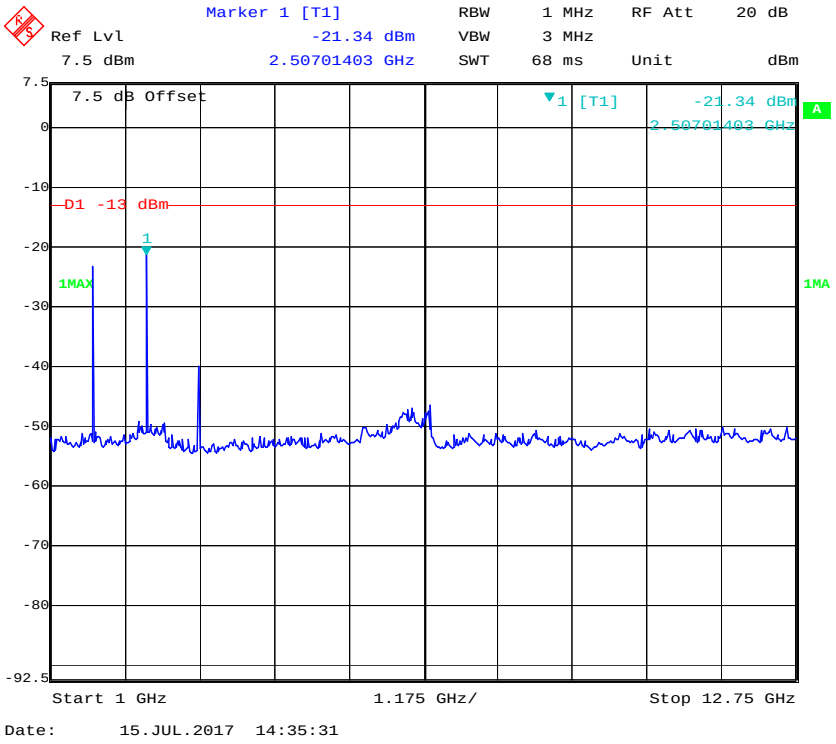
Cellular Band (Part 22H)

30 MHz – 1 GHz (GSM Mode)

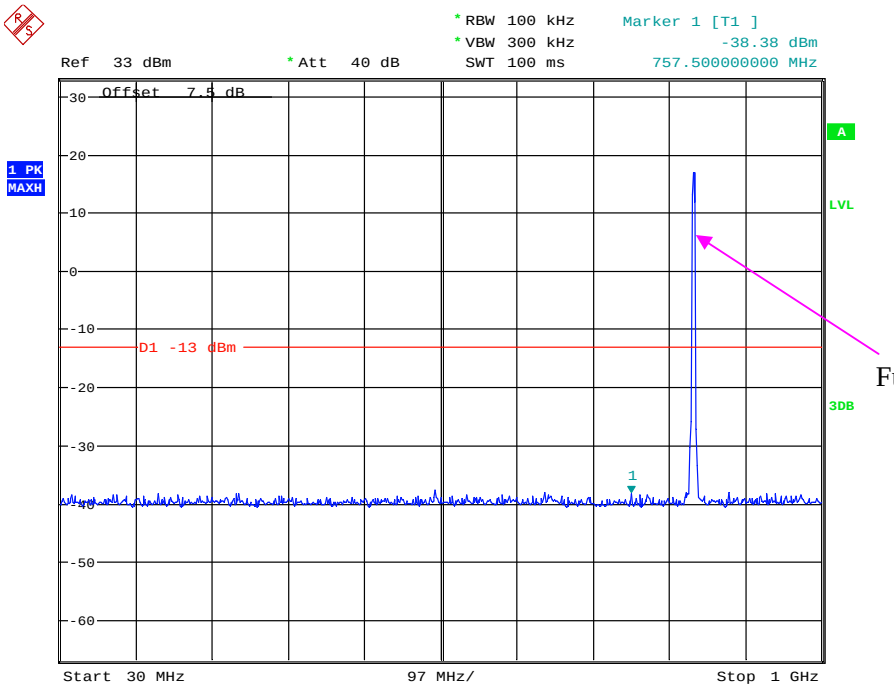


Fundamental test

1 GHz – 12.75 GHz (GSM Mode)



30 MHz – 1 GHz (WCDMA Mode)



Fundamental test

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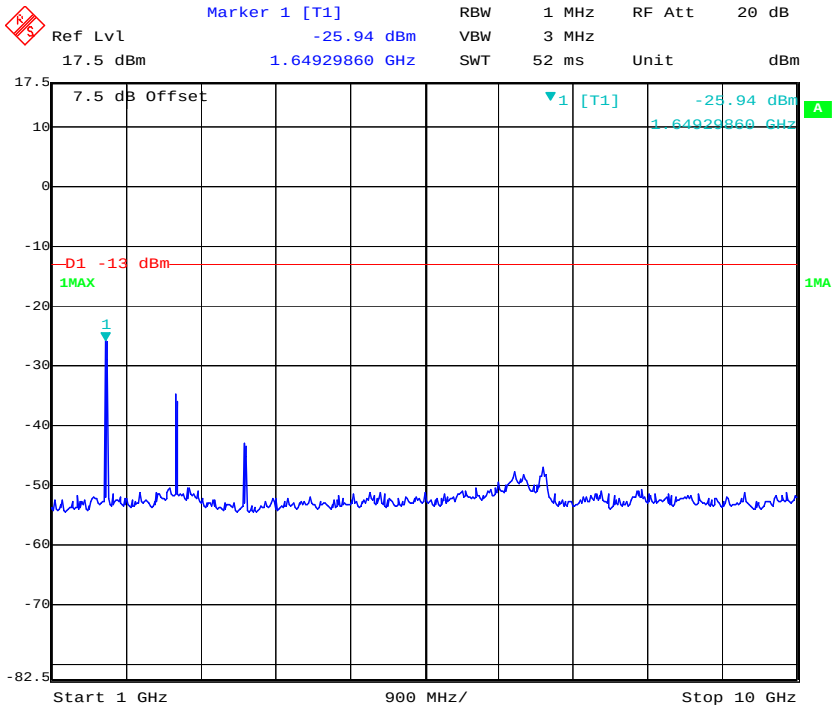
1 GHz – 10 GHz (WCDMA Mode)



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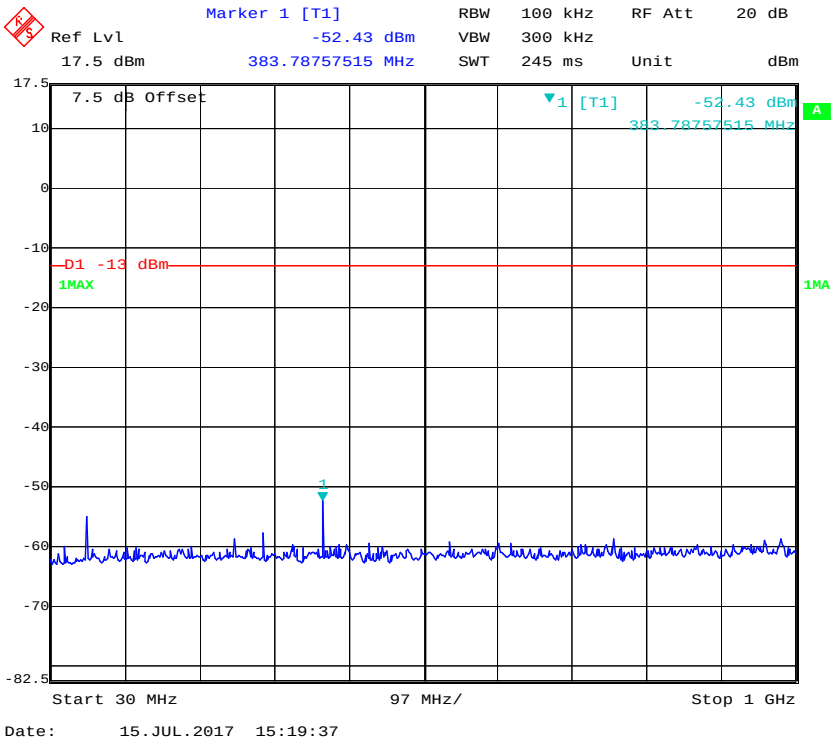
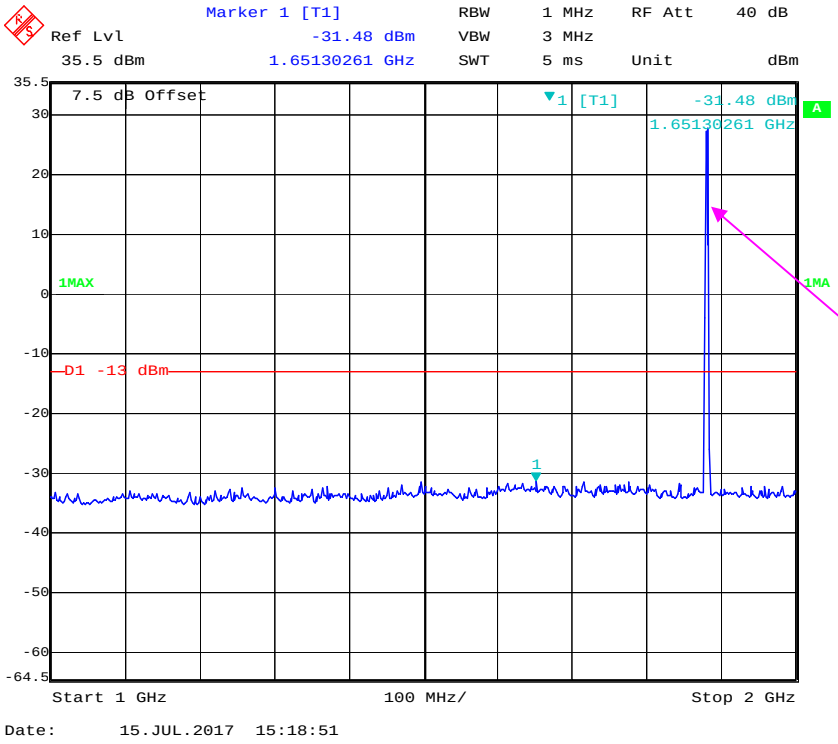
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)

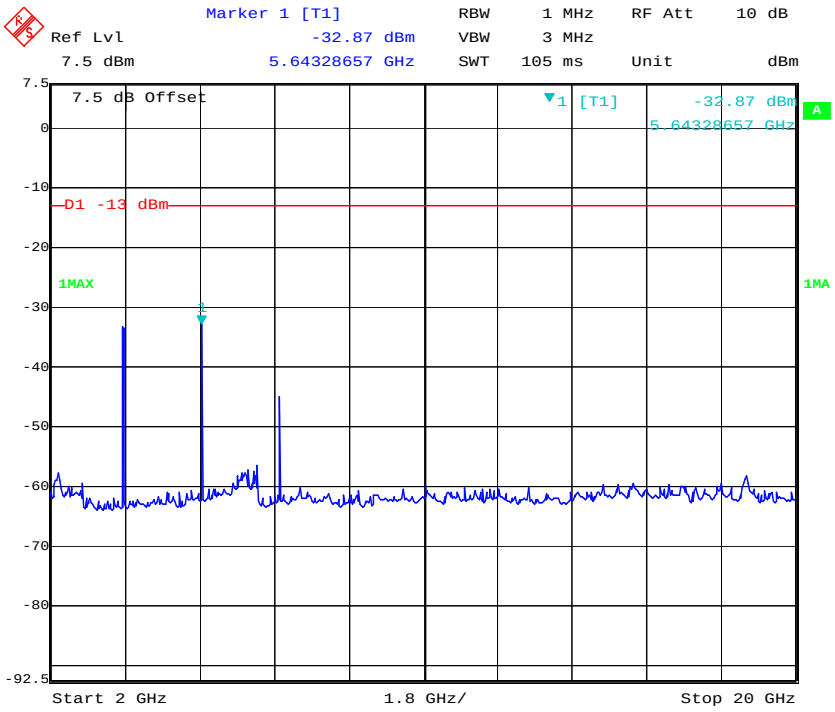


1 GHz – 2 GHz (GSM Mode)

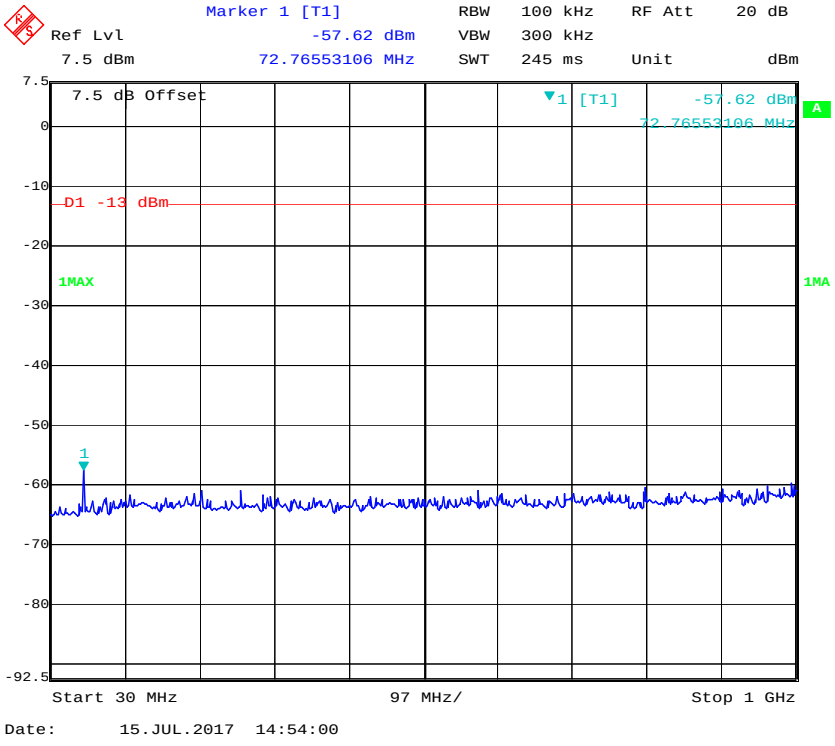


Fundamental test

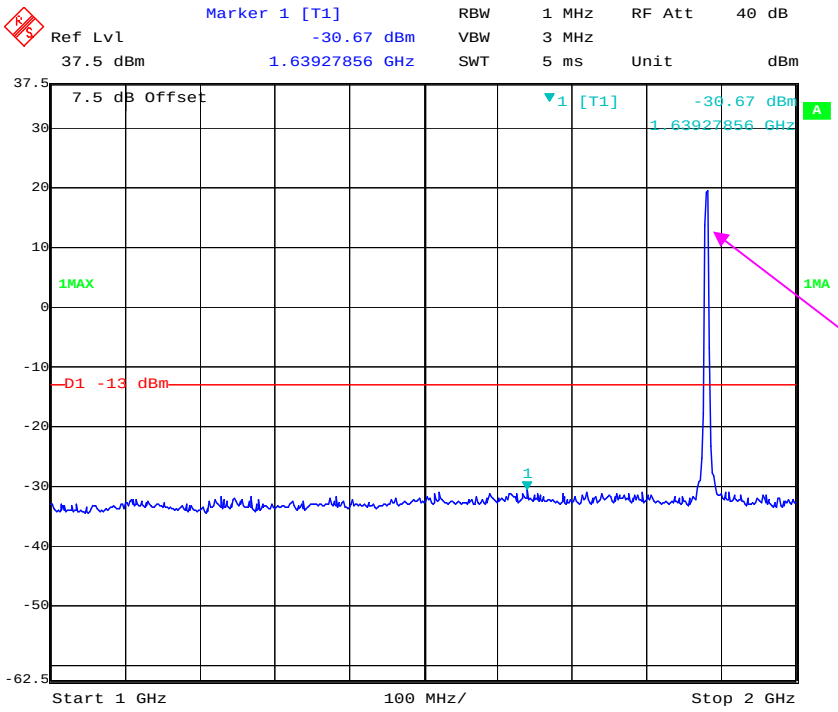
2 GHz – 20 GHz (GSM Mode)



30 MHz – 1 GHz (WCDMA Mode)

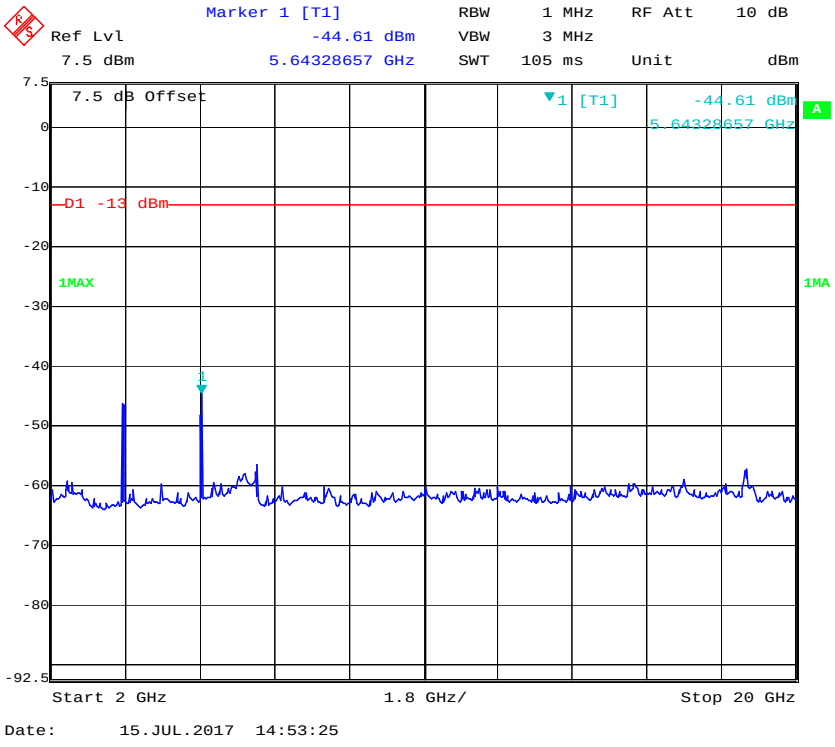


1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

2 GHz – 20 GHz (WCDMA Mode)



FCC § 2.1053; § 22.917 (a); § 24.238 (a) SPURIOUS RADIATED EMISSIONS

Applicable Standards

FCC § 2.1053, §22.917(a) and § 24.238(a)

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TX pwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts) or,

Spurious attenuation limit in dB = 55 + 10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-07-15.

Test mode: Transmitting

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

30 MHz ~ 10 GHz:

Cellular Band (Part 22H)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM 850 Mode										
254.46	33.54	219	2.4	H	-61.5	0.30	0.0	-61.80	-13	48.80
254.46	32.15	314	1.8	V	-62.9	0.30	0.0	-63.20	-13	50.20
1673.20	68.12	57	1.8	H	-39.0	1.30	9.10	-31.20	-13	18.20
1673.20	69.81	306	1.6	V	-36.7	1.30	9.10	-28.90	-13	15.90
2509.80	56.65	125	1.3	H	-46.9	2.60	9.30	-40.20	-13	27.20
2509.80	62.04	112	1.5	V	-40.9	2.60	9.30	-34.20	-13	21.20
3346.40	56.60	285	2.2	H	-43.7	1.50	9.60	-35.60	-13	22.60
3346.40	54.54	124	1.2	V	-45.8	1.50	9.60	-37.70	-13	24.70
WCDMA 850 Mode										
254.46	34.61	167	1.9	H	-60.4	0.30	0.0	-60.70	-13	47.70
254.46	33.47	81	2.0	V	-61.5	0.30	0.0	-61.80	-13	48.80
1673.20	60.41	234	2.4	H	-46.7	1.30	9.10	-38.90	-13	25.90
1673.20	60.34	200	1.4	V	-46.1	1.30	9.10	-38.30	-13	25.30
2509.80	52.53	266	1.9	H	-51.0	2.60	9.30	-44.30	-13	31.30
2509.80	50.44	287	2.1	V	-52.5	2.60	9.30	-45.80	-13	32.80
3346.40	43.35	142	1.0	H	-57.0	1.50	9.60	-48.90	-13	35.90
3346.40	43.04	236	2.1	V	-57.3	1.50	9.60	-49.20	-13	36.20

30 MHz ~ 20 GHz:

PCS Band (Part 24E)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM 1900 Mode										
254.46	34.61	228	2.3	H	-60.4	0.30	0.0	-60.70	-13	47.70
254.46	33.47	249	2.1	V	-61.5	0.30	0.0	-61.80	-13	48.80
3760.00	55.02	72	1.7	H	-46.2	1.50	9.70	-38.00	-13	25.00
3760.00	56.14	106	1.5	V	-44.6	1.50	9.70	-36.40	-13	23.40
WCDMA 1900 Mode										
254.46	35.01	109	2.0	H	-60.0	0.30	0.0	-60.30	-13	47.30
254.46	34.16	51	1.0	V	-60.8	0.30	0.0	-61.10	-13	48.10
3760.00	47.51	12	1.8	H	-53.7	1.50	9.70	-45.50	-13	32.50
3760.00	45.98	250	1.7	V	-54.8	1.50	9.70	-46.60	-13	33.60

Note:
1) Absolute Level = Substituted Level - Cable loss + Antenna Gain
2) Margin = Limit- Absolute Level

FCC § 22.917 (a);§ 24.238 (a) - BAND EDGES

Applicable Standards

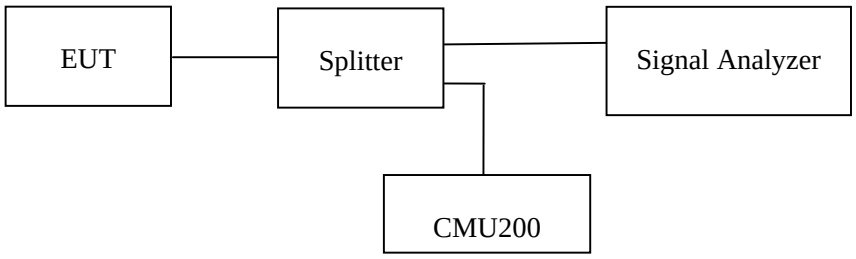
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Test Procedure

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

The center of the spectrum analyzer was set to block edge frequency



Test Data

Environmental Conditions

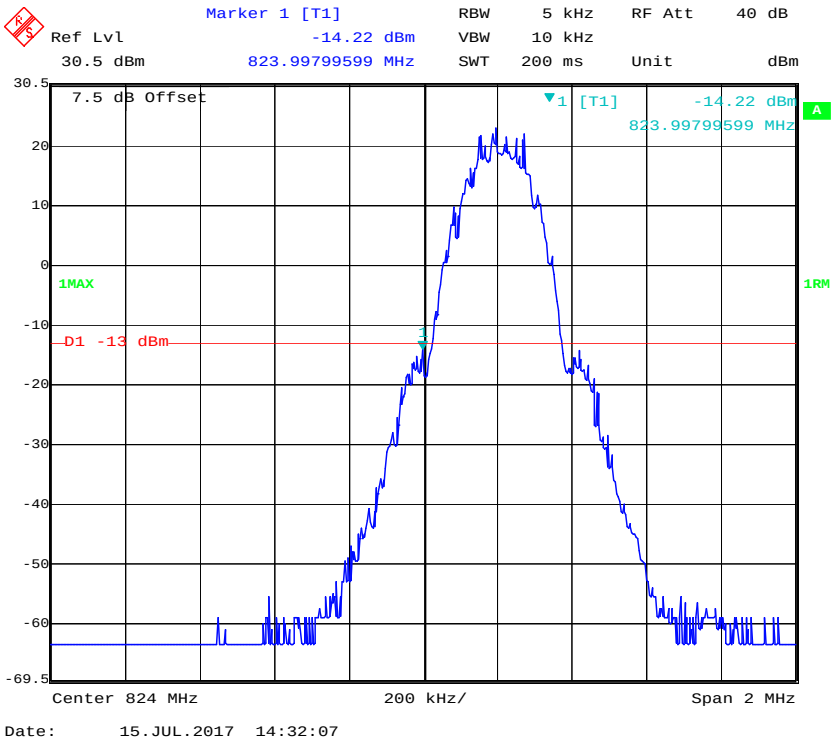
Temperature:	25~26 ℃
Relative Humidity:	55~56 %
ATM Pressure:	101.0~101.5 kPa

The testing was performed by Dylan Li from 2017-07-15 to 2017-07-29.

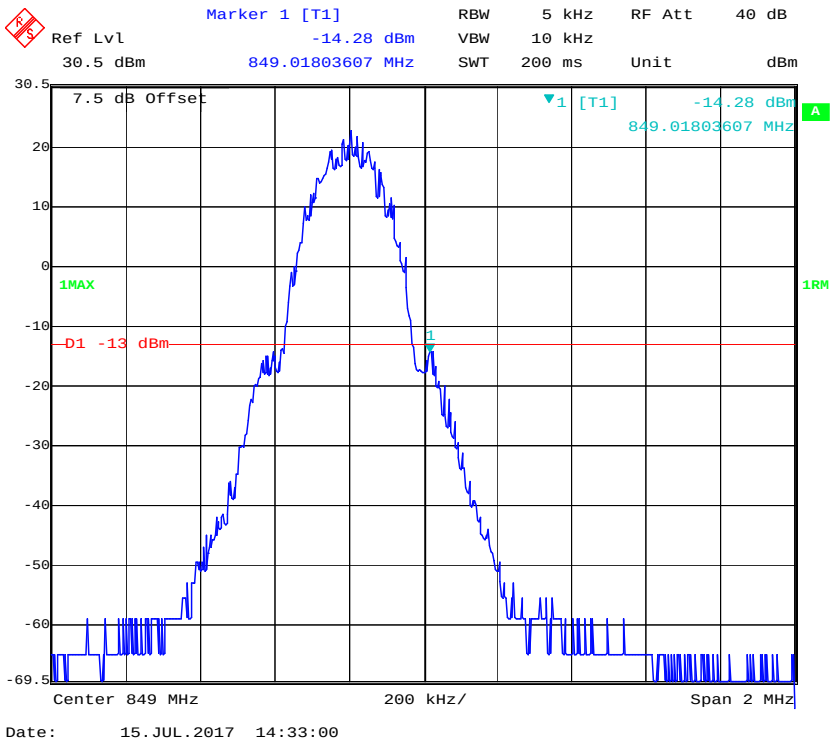
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following plots.

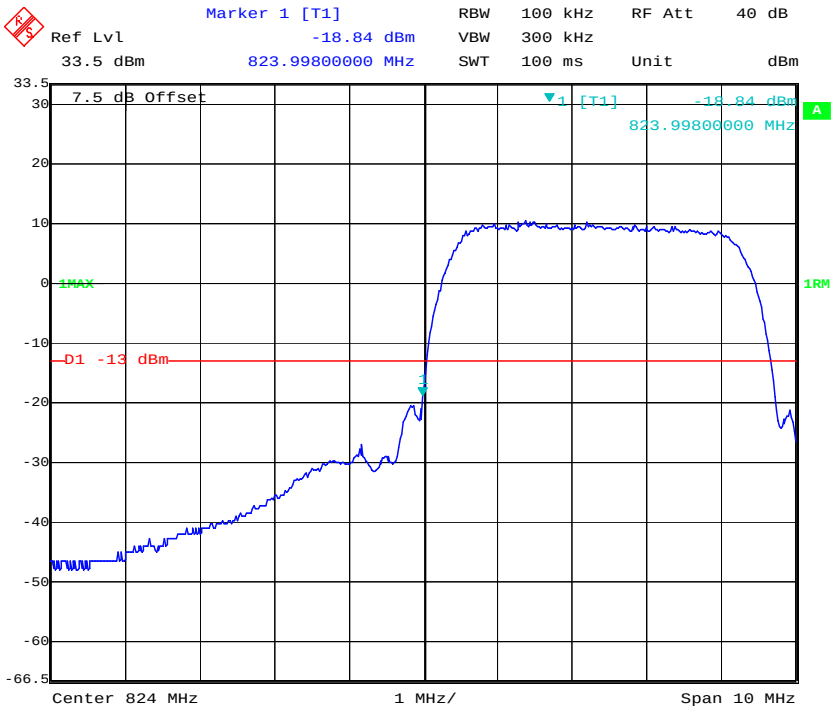
Cellular Band, Left Band Edge for GSM (GMSK) Mode



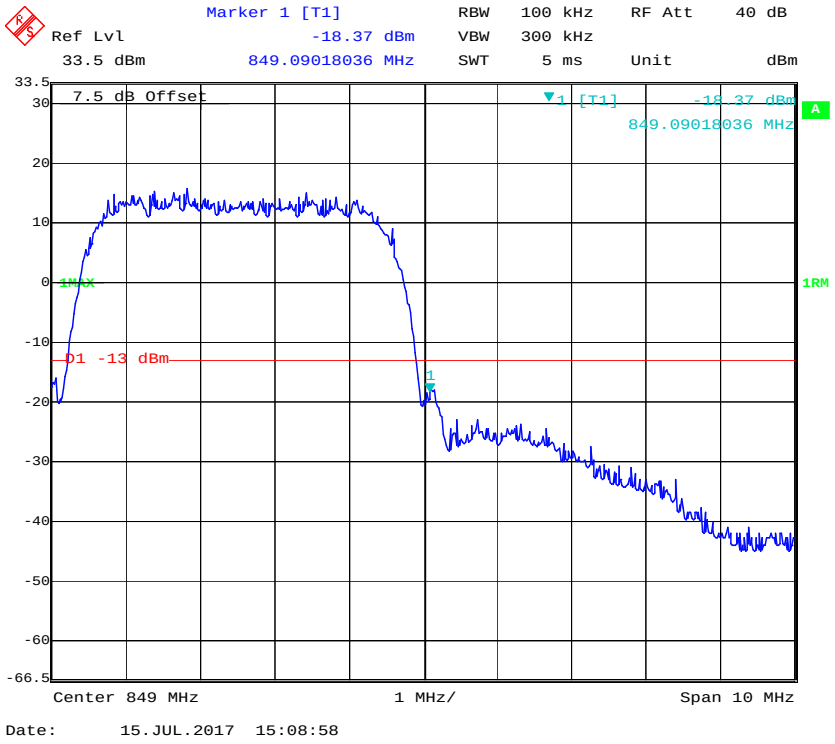
Cellular Band, Right Band Edge for GSM (GMSK) Mode



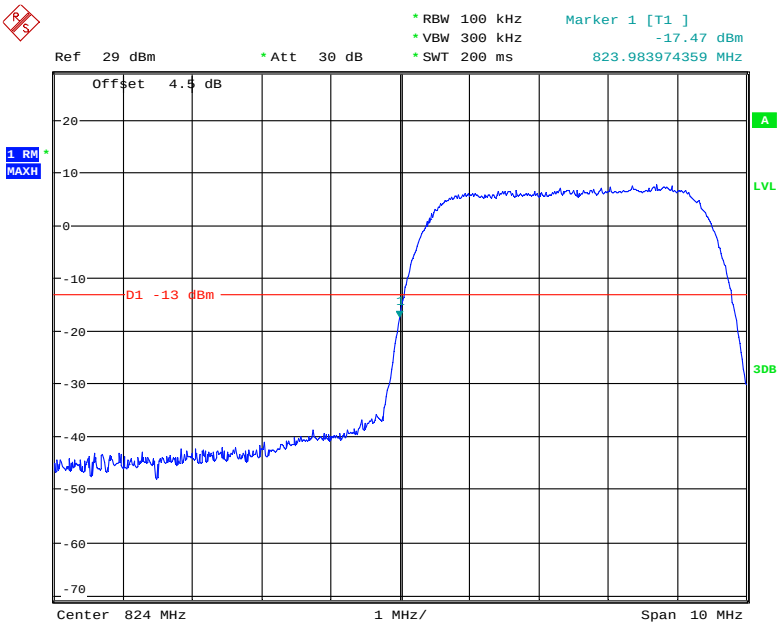
Cellular Band, Left Band Edge for RMC (BPSK) Mode



Cellular Band, Right Band Edge for RMC (BPSK) Mode



Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



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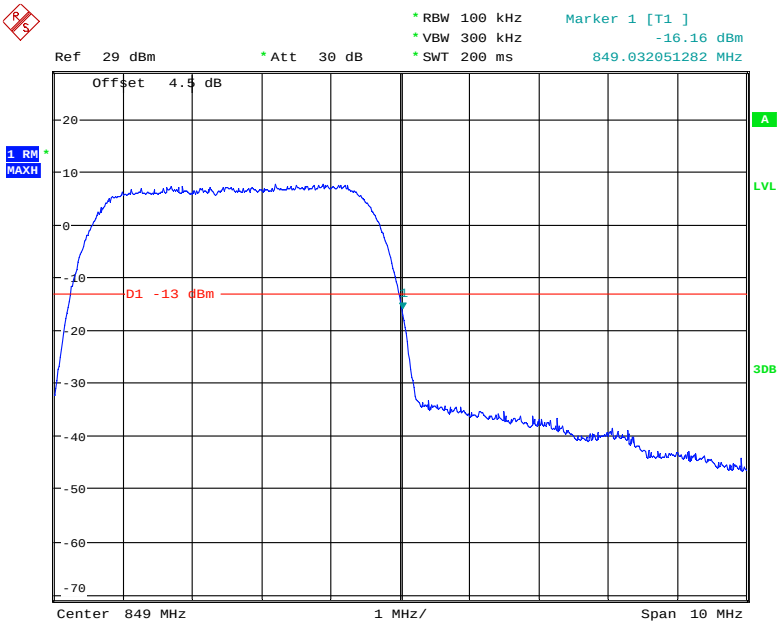
Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



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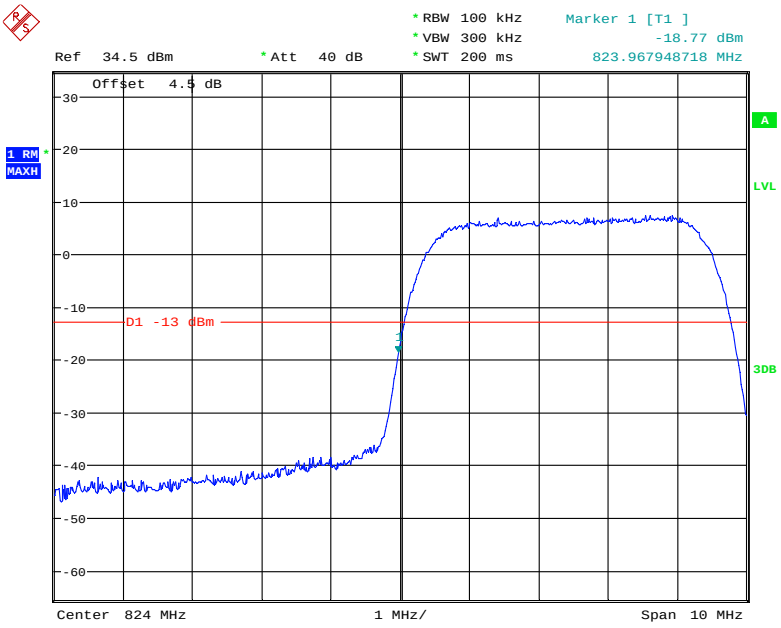
Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



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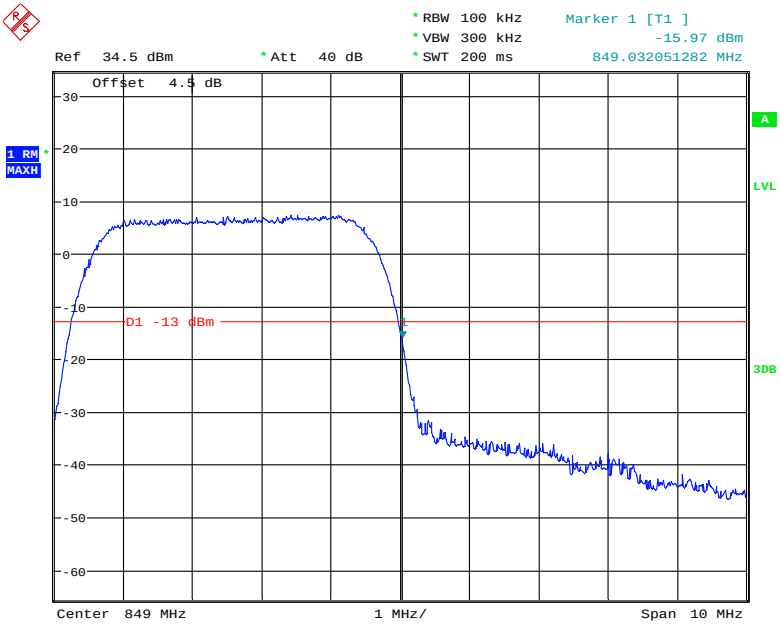
Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



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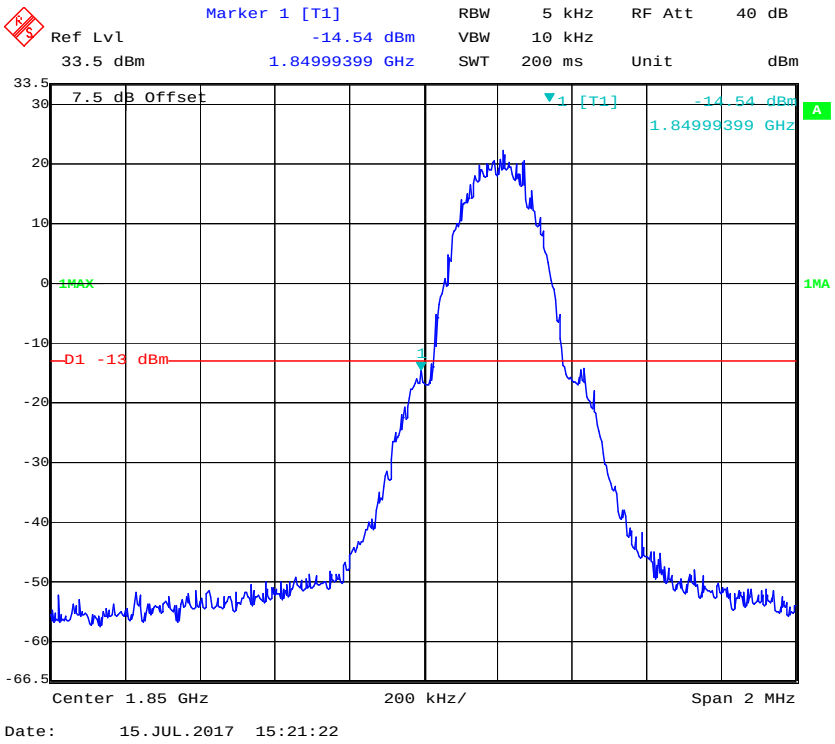
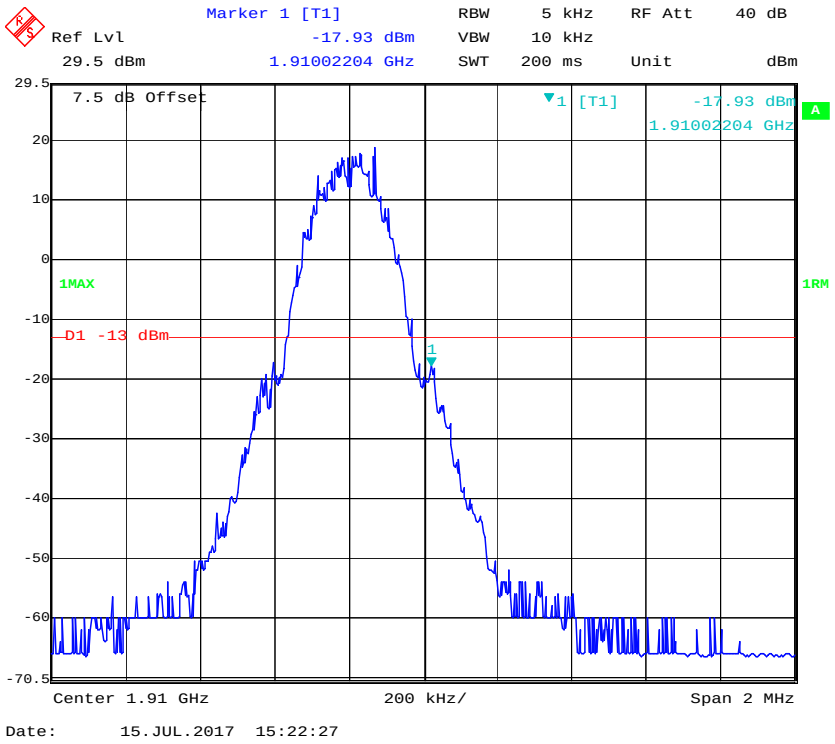
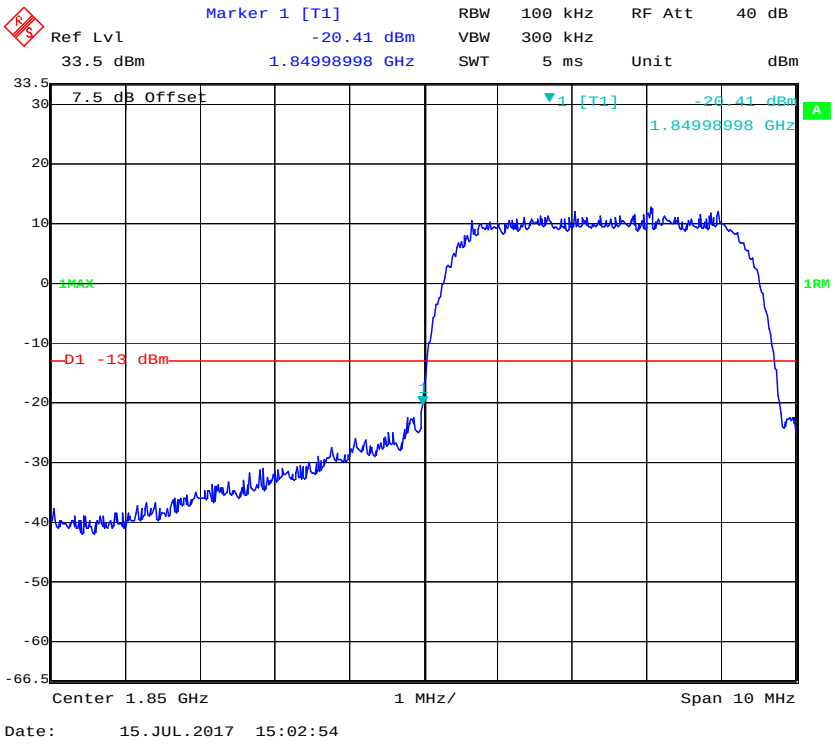
PCS Band, Left Band Edge for GSM (GMSK) Mode



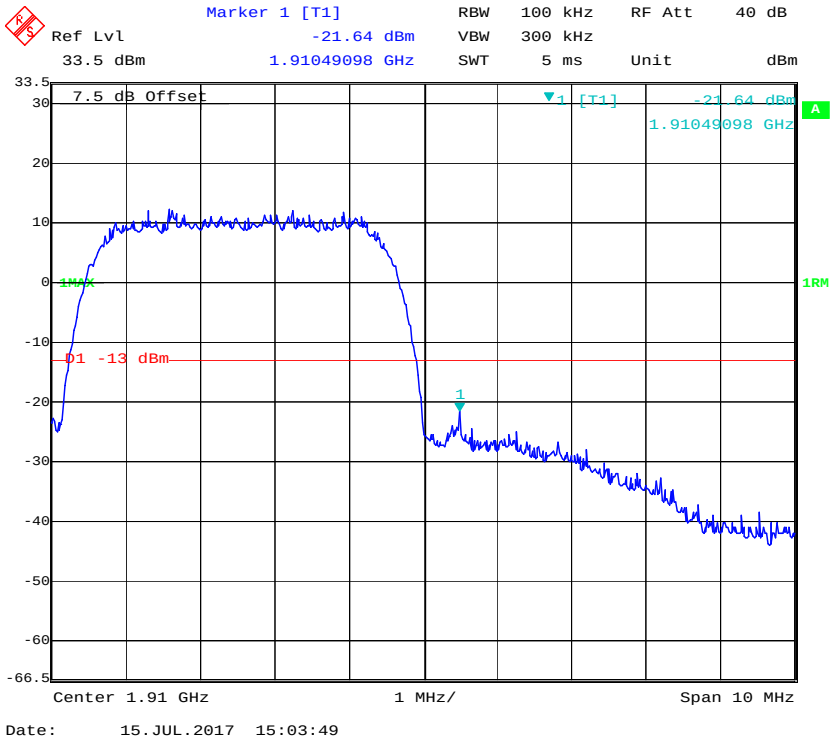
PCS Band, Right Band Edge for GSM (GMSK) Mode



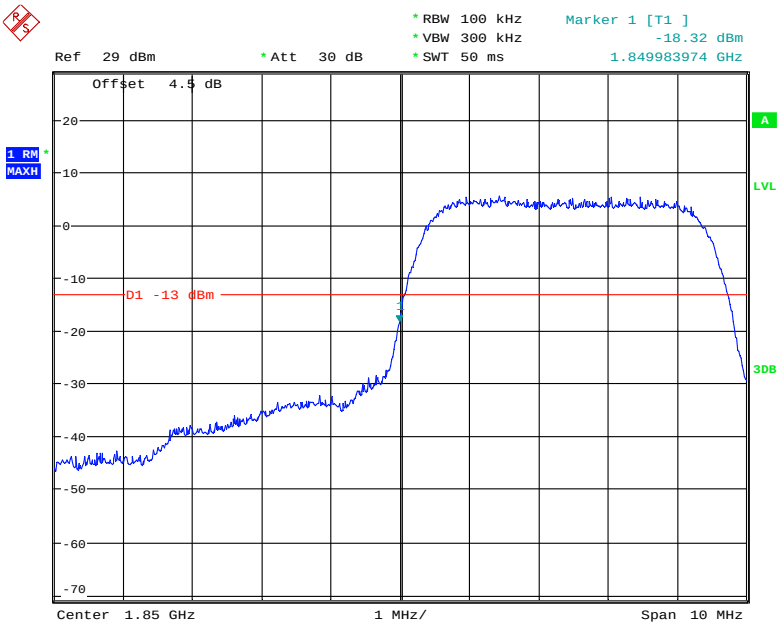
PCS Band, Left Band Edge for RMC (BPSK) Mode



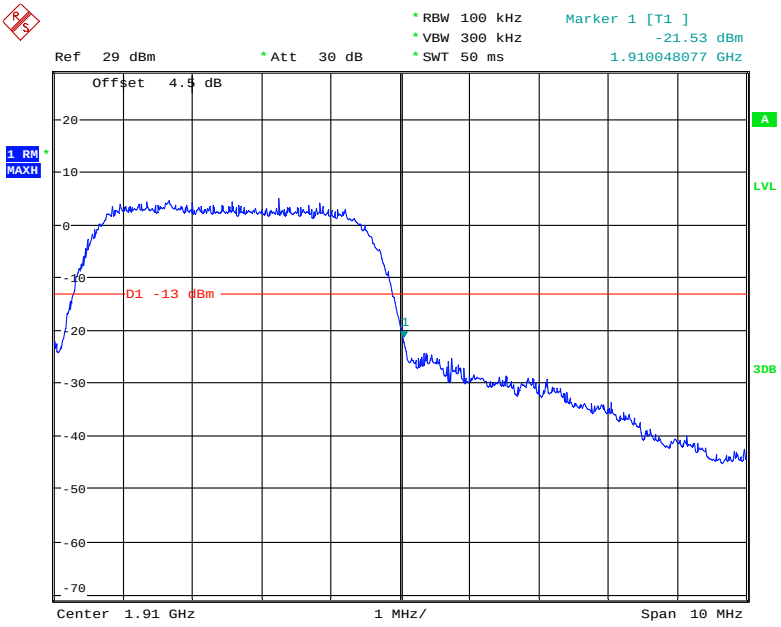
PCS Band, Right Band Edge for RMC (BPSK) Mode



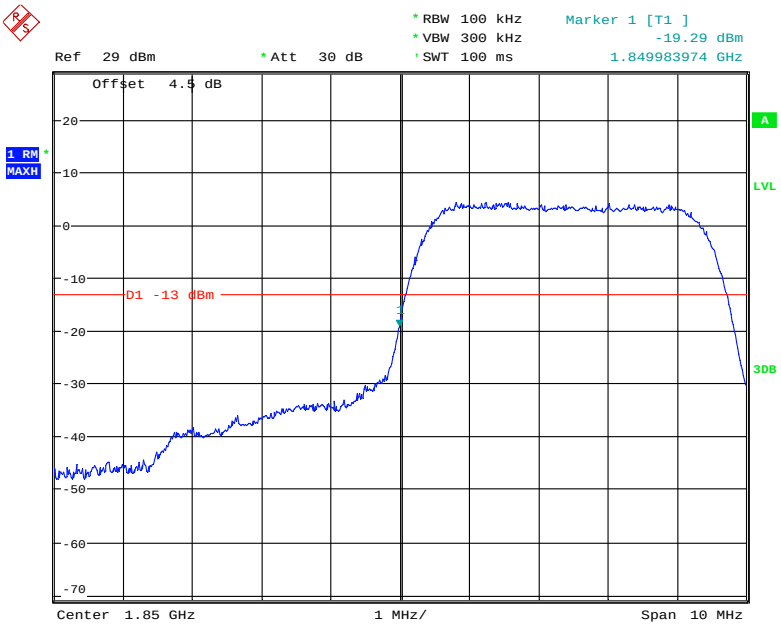
PCS Band, Left Band Edge for HSDPA (16QAM) Mode



PCS Band, Right Band Edge for HSDPA (16QAM) Mode



PCS Band, Left Band Edge for HSUPA (BPSK) Mode



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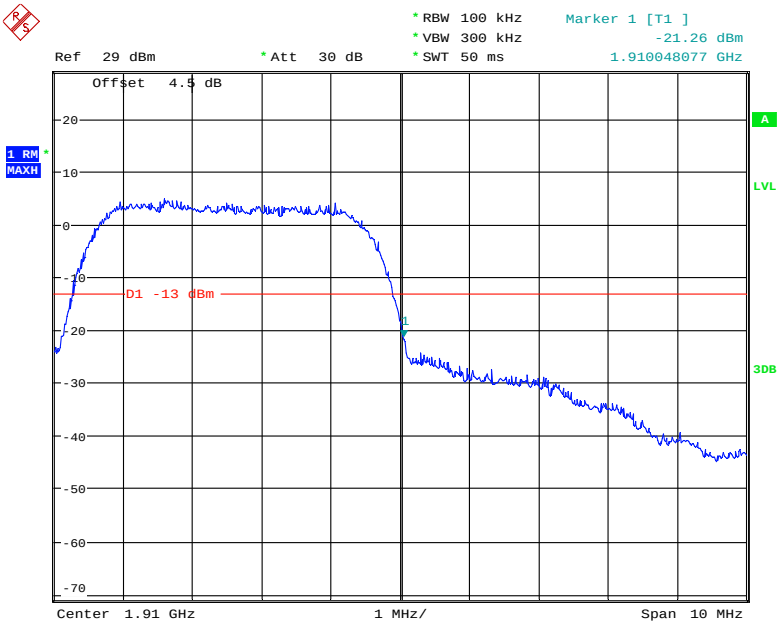
PCS Band, Right Band Edge for HSUPA (BPSK) Mode



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FCC § 2.1055; § 22.355; § 24.235; - FREQUENCY STABILITY

Applicable Standards

FCC § 2.1055, §22.355, §24.235.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	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

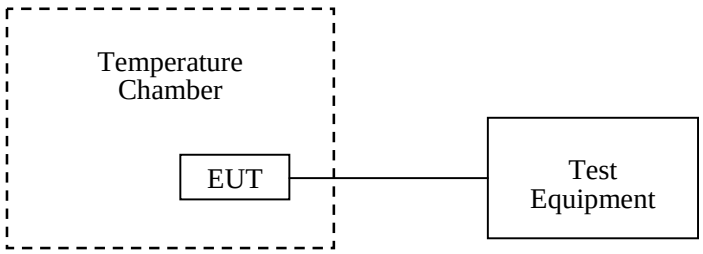
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-07-28.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

Cellular Band (Part 22H)

GSM Mode

Middle Channel, f_o =836.6 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-9	-0.010758	2.5
-20		-12	-0.014344	2.5
-10		-11	-0.013148	2.5
0		-8	-0.009563	2.5
10		-14	-0.016734	2.5
20		-10	-0.011953	2.5
30		-11	-0.013148	2.5
40		-15	-0.017930	2.5
50		-14	-0.016734	2.5
25	$V_{min.}$= 3.5	-10	-0.011953	2.5
	$V_{max.}$= 4.2	-11	-0.013148	2.5

WCDMA Mode

Middle Channel, f_o =836.6 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	2	0.0023906	2.5
-20		1	0.0011953	2.5
-10		4	0.0047813	2.5
0		3	0.0035859	2.5
10		3	0.0035859	2.5
20		2	0.0023906	2.5
30		4	0.0047813	2.5
40		1	0.0011953	2.5
50		3	0.0035859	2.5
25	$V_{min.}$= 3.5	-1	-0.0011953	2.5
	$V_{max.}$= 4.2	2	0.0023906	2.5

PCS Band (Part 24E)

GSM Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	-13	-0.006915	pass
-20		-16	-0.008511	pass
-10		-21	-0.011170	pass
0		-16	-0.008511	pass
10		-18	-0.009574	pass
20		-22	-0.011702	pass
30		-16	-0.008511	pass
40		-17	-0.009043	pass
50		-24	-0.012766	pass
25	$V_{min.}$= 3.5	-23	-0.012234	pass
	$V_{max.}$= 4.2	-27	-0.014362	pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	4	0.0021277	pass
-20		12	0.0063830	pass
-10		9	0.0047872	pass
0		3	0.0015957	pass
10		7	0.0037234	pass
20		5	0.0026596	pass
30		6	0.0031915	pass
40		7	0.0037234	pass
50		10	0.0053191	pass
25	$V_{min.}$= 3.5	5	0.0026596	pass
	$V_{max.}$= 4.2	8	0.0042553	pass

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