



FCC PART 22H, PART 24E  
TEST REPORT

For

**Panasonic India Pvt Ltd**

12th Floor , Ambience Tower, Ambience Island, NH-8, Gurgaon, Haryana-122002, India.

**FCC ID:2APTI-S55EY7**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Smartphone
<b>Report Number:</b> RSZ180507007-00D	
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<b>Reviewed By:</b> RF Engineer	Rocky Kang <i>Rocky Kang</i>
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Panasonic India Pvt Ltd's* product, model number: Panasonic ELUGA I7 (FCC ID: 2APTI-S55EY7) or the "EUT" in this report was a *Smartphone*, which was measured approximately: 148.8mm (L) × 70.9 mm (W) × 9.25 mm (H), rated with input voltage: DC 3.85V battery or DC5.0V from Adapter.

#### Adapter Information:

Model:NB-A520A USB-A-Z

Input: AC 100-240V, 50/60Hz, 300mA

Output: DC 5.0V, 2000mA

*\*All measurement and test data in this report was gathered from production sample serial number: 1800619 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-05-07.*

### Objective

This test report is prepared on behalf of *Panasonic India Pvt Ltd* in accordance with Part 2-Subpart J, Part 22-Subpart H and Part 24-Subpart E of the Federal Communication Commissions rules.

The objective is to determine the compliance of the 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 15.247 DSS, Part 15.247 DTS and Part 15B JBP submissions with FCC ID: 2APTI-S55EY7.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - Personal Communication Services

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
Emissions, radiated	Below 1GHz	±4.70dB
	Above 1GHz	±4.80dB
Temperature		±1 °C
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.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

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.

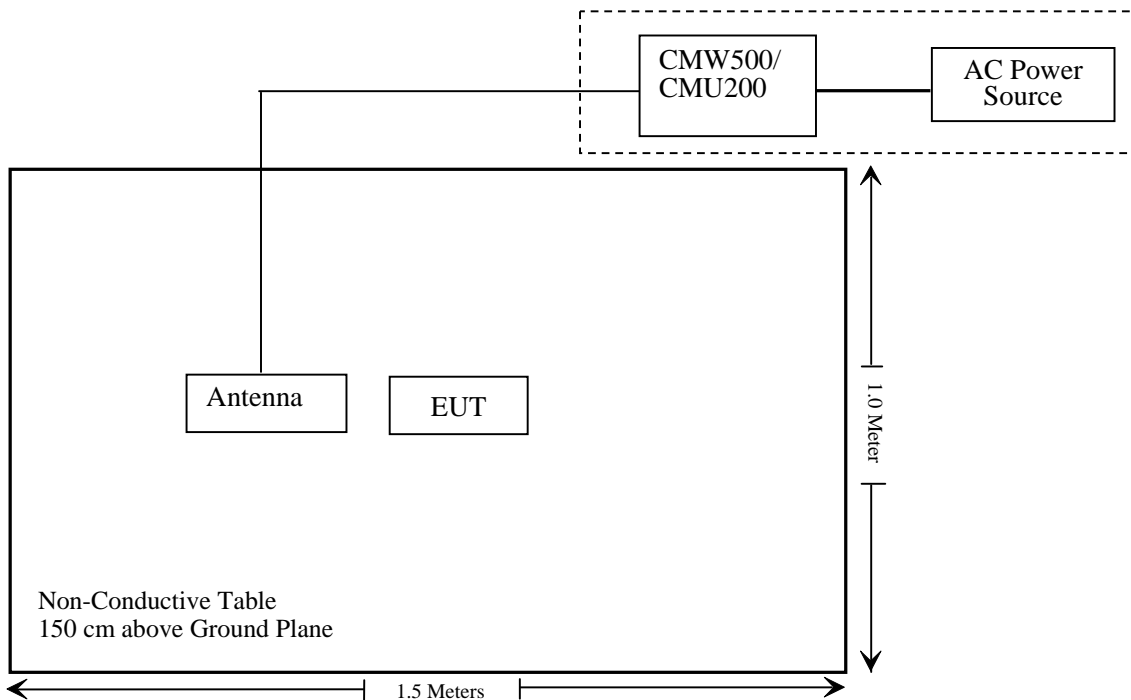
### Equipment Modifications

No modification was made to the EUT.

### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§ 1.1307 , §2.1093	RF Exposure (SAR)	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);	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a);	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	Frequency stability	Compliance

Note: \* Please refer to SAR report released by BACL, report number: RSZ180507007-20

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Rohde & Schwarz	Signal ANALYZER	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-11-19	2018-05-21
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Anritsu	Signal Generator	68369B	004114	2017-12-07	2018-12-07
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	2	2017-11-22	2018-05-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2017-12-29	2020-12-28
Ducommun technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>RF Conducted Test</b>					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2017-12-24	2018-12-24
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2017-12-21	2018-12-21
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Aglient	ESG Vector Signal Generator	E4438C	MY42080875	2018-05-09	2019-05-09
Rohde & Schwarz	Wideband Radio Communication Tester	CMU200	106891	2017-12-14	2018-12-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-146520-wh	2018-04-24	2019-04-24
Ducommun technologies	RF Cable	RG-214	3	2017-11-22	2018-05-22
WEINSCHEL	10dB Attenuator	5324	AU 3842	2017-11-22	2018-05-23
WEINSCHEL	3dB Attenuator	N/A	N/A	2017-11-22	2018-05-23
N/A	Power Splitter	N/A	N/A	2017-05-21	2018-05-21

\* 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).



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

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliance, please refer to the SAR report: RSZ180507007-20.

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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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

**FCC § 2.1046, § 22.913 (a) & § 24.232 (c); - RF OUTPUT POWER**

**Applicable Standard**

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

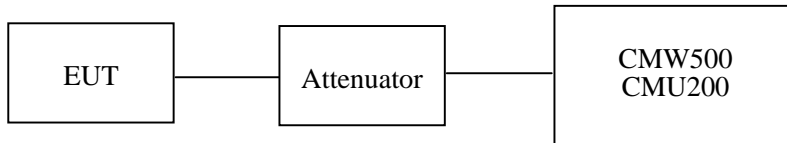
According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

**Test Procedure**

*Conducted method:*

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.



*Radiated method:*

TIA 603-D section 2.2.17

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2018-05-13.*

**Conducted Power**

**Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	31.34	38.45
	190	836.6	31.40	38.45
	251	848.8	31.36	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	31.38	30.55	28.75	27.52	38.45
	190	836.6	31.42	30.60	28.77	27.57	38.45
	251	848.8	31.42	30.60	28.72	27.59	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.58	25.36	23.63	22.92	38.45
	190	836.6	26.48	25.29	23.63	22.78	38.45
	251	848.8	26.55	25.39	23.86	22.85	38.45

**PCS Band (Part 24E)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.32	33
	661	1880.0	28.51	33
	810	1909.8	28.45	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.37	27.62	26.06	24.98	33
	661	1880.0	28.56	27.83	26.21	25.11	33
	810	1909.8	28.51	27.79	26.15	25.05	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	24.49	23.56	21.59	20.64	33
	661	1880.0	24.69	23.80	21.95	20.95	33
	810	1909.8	25.32	24.29	22.61	21.52	33

**Peak-to-average ratio (PAR)**

**Cellular Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.03	13
	Middle	1.26	13
	High	1.30	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.05	13
	Middle	1.09	13
	High	1.24	13

**PCS Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	1.03	13
	Middle	1.23	13
	High	1.26	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	1.16	13
	Middle	1.09	13
	High	1.20	13

**Radiated Power  
GSM Mode:**

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H/24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	84.63	231	2.3	H	22.2	0.7	0.0	21.50	38.45	16.95
836.6	90.55	191	1.2	V	30.1	0.7	0.0	29.40	38.45	9.05
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	85.71	197	1.9	H	15.7	1.30	9.40	23.80	33	9.20
1880.00	88.69	1	1.9	V	18.4	1.30	9.40	26.50	33	6.50

**EDGE 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	83.24	62	1.8	H	20.8	0.7	0.0	20.10	38.45	18.35
836.6	87.37	164	2.4	V	26.9	0.7	0.0	26.20	38.45	12.25
EIRP, PCS Band (Part 24E), Middle Channel										
1880	85.91	60	2.5	H	17.2	1.40	7.30	23.10	33	9.90
1880	83.24	262	1.3	V	14.0	1.40	7.30	19.90	33	13.10

**LTE Band 5:**

**Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	22.83	22.85	22.74
		RB Size=1, RB Offset=2	21.98	22.23	22.73
		RB Size=1, RB Offset=5	21.82	21.83	21.93
		RB Size=3, RB Offset=0	21.84	20.92	20.94
		RB Size=3, RB Offset=1	20.82	20.64	20.90
		RB Size=3, RB Offset=2	20.79	20.64	20.78
		RB Size=6, RB Offset=0	20.90	20.51	20.89
	16QAM	RB Size=1, RB Offset=0	21.77	21.70	21.82
		RB Size=1, RB Offset=2	21.65	21.61	21.66
		RB Size=1, RB Offset=5	21.76	21.83	20.82
		RB Size=3, RB Offset=0	20.80	20.67	20.74
		RB Size=3, RB Offset=1	20.74	20.71	20.75
		RB Size=3, RB Offset=2	20.79	20.63	20.77
		RB Size=6, RB Offset=0	20.86	20.38	20.92
3.0	QPSK	RB Size=1, RB Offset=0	22.85	22.84	22.89
		RB Size=1, RB Offset=7	21.90	21.98	21.86
		RB Size=1, RB Offset=14	21.97	21.74	21.86
		RB Size=8, RB Offset=0	21.95	22.00	22.04
		RB Size=8, RB Offset=4	20.95	20.88	20.93
		RB Size=8, RB Offset=7	20.00	20.23	20.93
		RB Size=15, RB Offset=0	20.95	20.76	20.06
	16QAM	RB Size=1, RB Offset=0	22.87	22.82	22.91
		RB Size=1, RB Offset=7	21.84	21.83	21.87
		RB Size=1, RB Offset=14	21.87	21.85	21.87
		RB Size=8, RB Offset=0	21.95	21.84	20.77
		RB Size=8, RB Offset=4	20.98	20.95	20.03
		RB Size=8, RB Offset=7	20.02	20.95	20.19
		RB Size=15, RB Offset=0	20.88	20.96	20.89

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	22.85	22.84	22.89
		RB Size=1, RB Offset=12	21.90	21.98	21.86
		RB Size=1, RB Offset=24	21.97	21.74	21.86
		RB Size=12, RB Offset=0	21.95	22.00	22.04
		RB Size=12, RB Offset=6	20.95	20.88	20.93
		RB Size=12, RB Offset=11	20.00	20.23	20.93
		RB Size=25, RB Offset=0	20.95	20.76	20.06
	16QAM	RB Size=1, RB Offset=0	22.87	22.82	22.91
		RB Size=1, RB Offset=12	21.84	21.83	21.87
		RB Size=1, RB Offset=24	21.87	21.85	21.87
		RB Size=12, RB Offset=0	21.95	21.84	20.77
		RB Size=12, RB Offset=6	20.98	20.95	20.03
		RB Size=12, RB Offset=11	20.02	20.95	20.19
		RB Size=25, RB Offset=0	20.88	20.96	20.89
10.0	QPSK	RB Size=1, RB Offset=0	22.84	22.86	22.91
		RB Size=1, RB Offset=24	21.91	22.05	21.88
		RB Size=1, RB Offset=49	22.03	21.88	22.01
		RB Size=25, RB Offset=0	21.88	21.97	21.97
		RB Size=25, RB Offset=12	21.90	20.93	21.81
		RB Size=25, RB Offset=24	20.86	20.74	20.78
		RB Size=50, RB Offset=0	20.94	20.51	20.80
	16QAM	RB Size=1, RB Offset=0	22.72	22.91	22.81
		RB Size=1, RB Offset=24	22.34	22.74	22.75
		RB Size=1, RB Offset=49	21.72	21.56	21.79
		RB Size=25, RB Offset=0	21.83	21.71	21.93
		RB Size=25, RB Offset=12	21.06	21.01	21.95
		RB Size=25, RB Offset=24	20.88	20.69	20.90
		RB Size=50, RB Offset=0	20.86	20.58	20.95



**Peak-to-average ratio (PAR)**

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.02	13	Pass
QPSK (50RB Size)	5.97	13	Pass
16QAM (1RB Size)	6.65	13	Pass
16QAM (50RB Size)	6.68	13	Pass

**QPSK:**

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
836.5	79.51	177	2.2	H	17.5	0.7	0.0	16.80	38.45
836.5	81.82	146	2.5	V	21.4	0.7	0.0	20.70	38.45
3 MHz Bandwidth									
836.5	79.02	32	2.2	H	16.6	0.7	0.0	15.90	38.45
836.5	81.03	272	1.1	V	20.6	0.7	0.0	19.90	38.45
5 MHz Bandwidth									
836.5	78.89	230	1.7	H	16.5	0.7	0.0	15.80	38.45
836.5	80.98	262	1.3	V	20.5	0.7	0.0	19.80	38.45
10 MHz Bandwidth									
836.5	78.69	341	2.3	H	16.3	0.7	0.0	15.60	38.45
836.5	80.56	77	1.9	V	20.1	0.7	0.0	19.40	38.45

**16QAM:**

Frequency (MHz)	Receiver Reading (dBµV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
836.5	79.11	167	2.2	H	17.1	0.7	0.0	16.40	38.45
836.5	82.3	81	2.4	V	21.9	0.7	0.0	21.20	38.45
3 MHz Bandwidth									
836.5	78.76	270	1.6	H	16.4	0.7	0.0	15.70	38.45
836.5	81.49	102	1.9	V	21.1	0.7	0.0	20.40	38.45
5 MHz Bandwidth									
836.5	78.49	178	1.3	H	16.1	0.7	0.0	15.40	38.45
836.5	80.43	175	2.3	V	20.0	0.7	0.0	19.30	38.45
10 MHz Bandwidth									
836.5	78.49	178	1.3	H	16.1	0.7	0.0	15.40	38.45
836.5	80.43	175	2.3	V	20.0	0.7	0.0	19.30	38.45

**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**

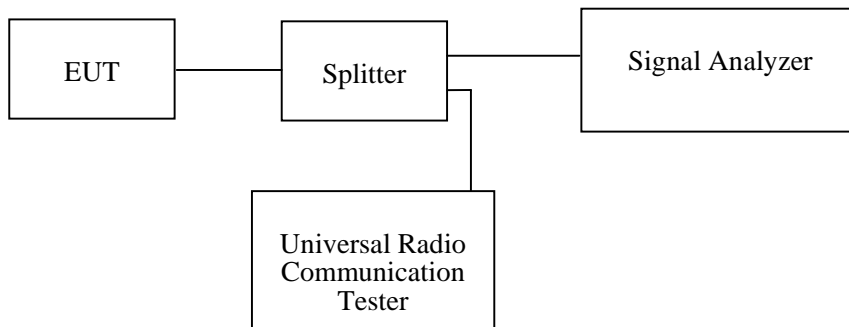
**Applicable Standard**

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



**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	21~25 °C
<b>Relative Humidity:</b>	51~52 %
<b>ATM Pressure:</b>	100.5~101.0 kPa

*The testing was performed by Kiki Kong from 2018-05-11 to 2018-05-17.*

*EUT operation mode: Transmitting*

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

**Cellular Band (Part 22H)**

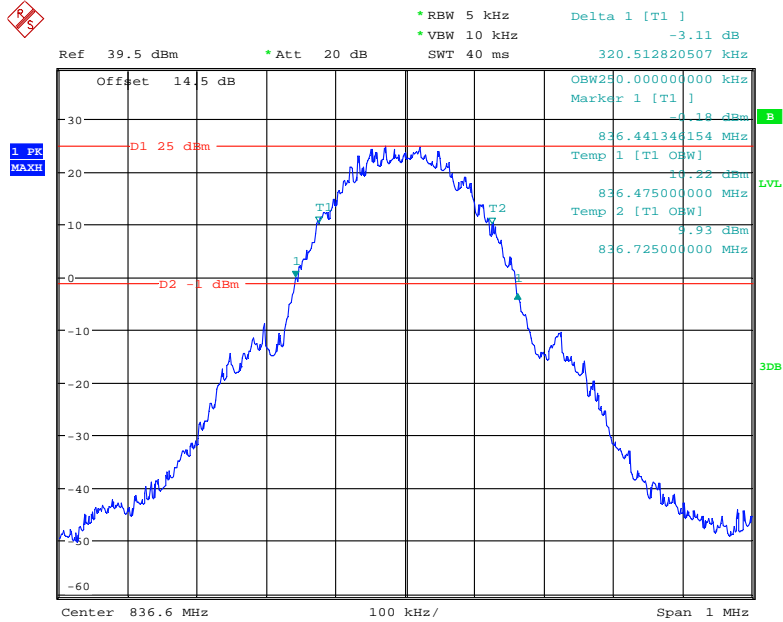
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>99% Occupied Bandwidth (kHz)</b>	<b>26 dB Emission Bandwidth (kHz)</b>
GSM(GMSK)	836.6	250.00	320.51
EGPRS(8PSK)	836.6	258.01	323.72

**PCS Band (Part 24E)**

<b>Mode</b>	<b>Frequency (MHz)</b>	<b>99% Occupied Bandwidth (kHz)</b>	<b>26 dB Emission Bandwidth (kHz)</b>
GSM(GMSK)	1880.0	245.19	315.71
EGPRS(8PSK)	1880.0	250.00	315.71

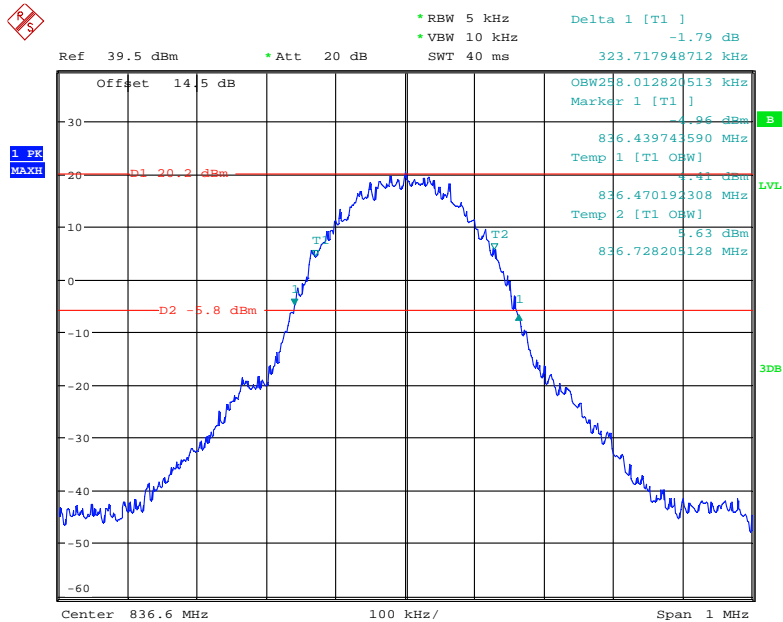
**Cellular Band (Part 22H)**

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



Date: 11.MAY.2018 21:35:02

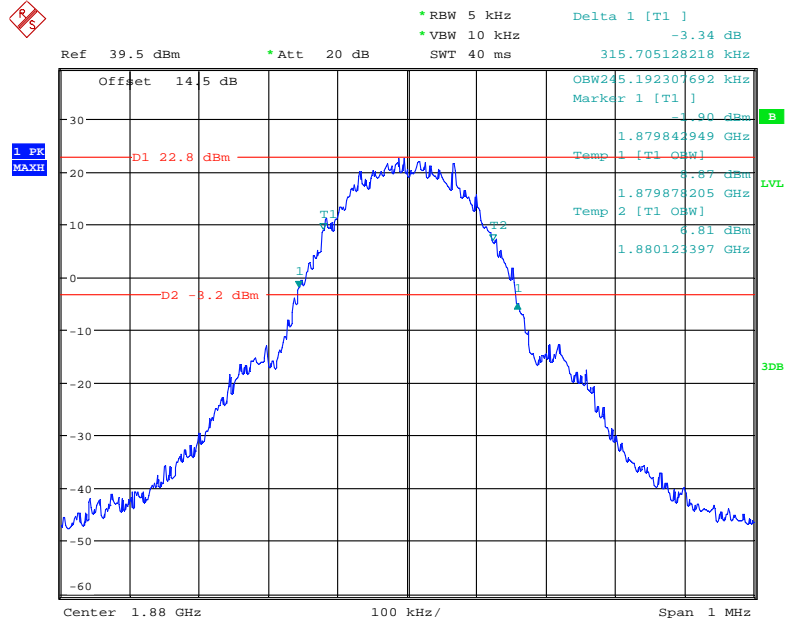
**26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode**



Date: 11.MAY.2018 21:40:52

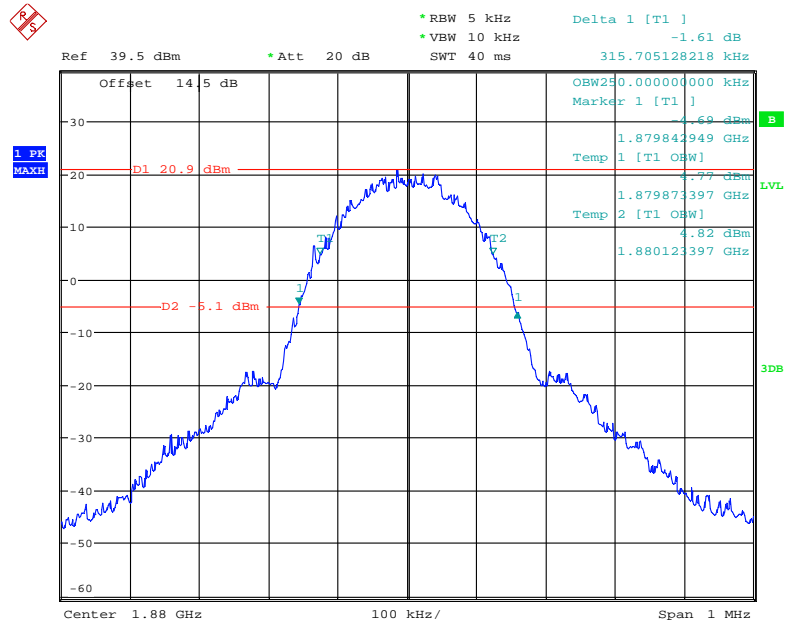
**PCS Band (Part 24E)**

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



Date: 11.MAY.2018 21:33:24

**26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode**

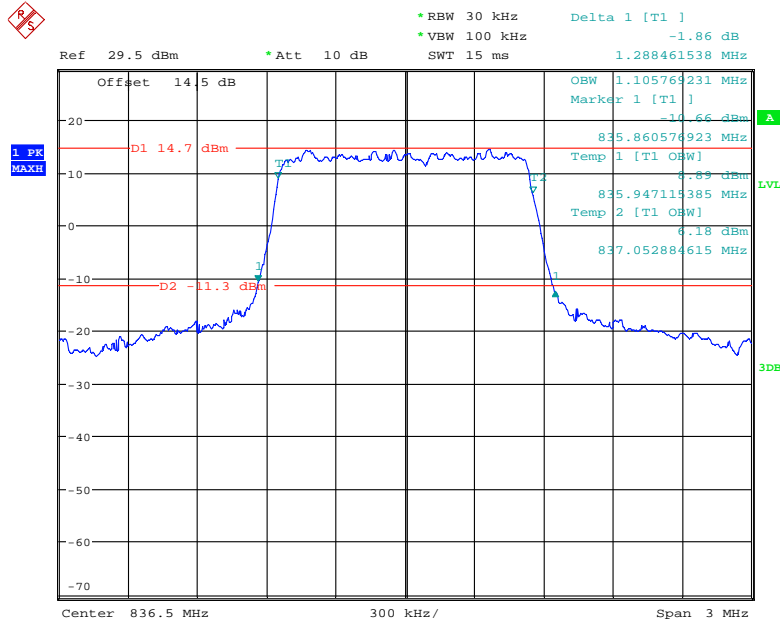


Date: 11.MAY.2018 21:32:05

**LTE Band 5: (Middle Channel)**

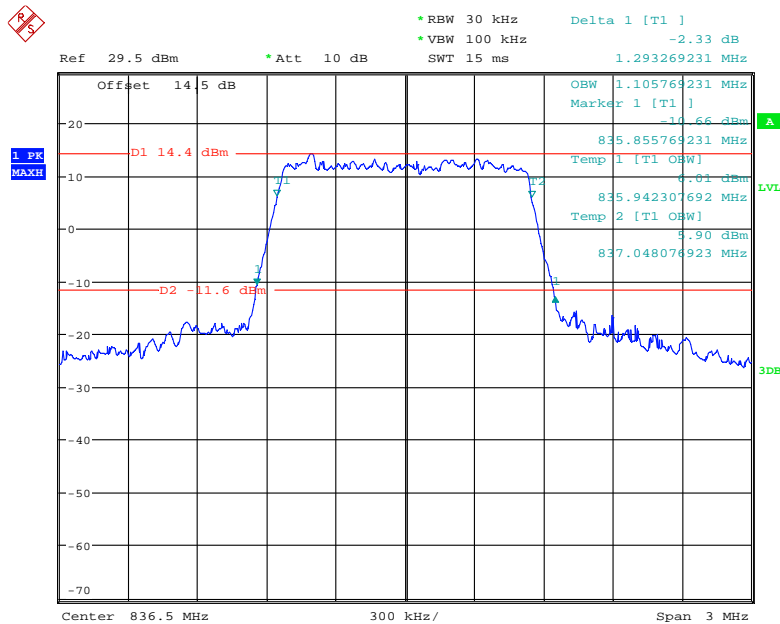
<b>Bandwidth (MHz)</b>	<b>Modulation</b>	<b>99% Occupied Bandwidth (MHz)</b>	<b>26 dB Emission Bandwidth (MHz)</b>
1.4	QPSK	1.106	1.288
	16QAM	1.106	1.293
3.0	QPSK	2.692	2.928
	16QAM	2.692	2.959
5.0	QPSK	4.535	5.034
	16QAM	4.535	5.066
10.0	QPSK	8.974	9.841
	16QAM	8.974	9.649

**QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



Date: 13.MAY.2018 13:20:38

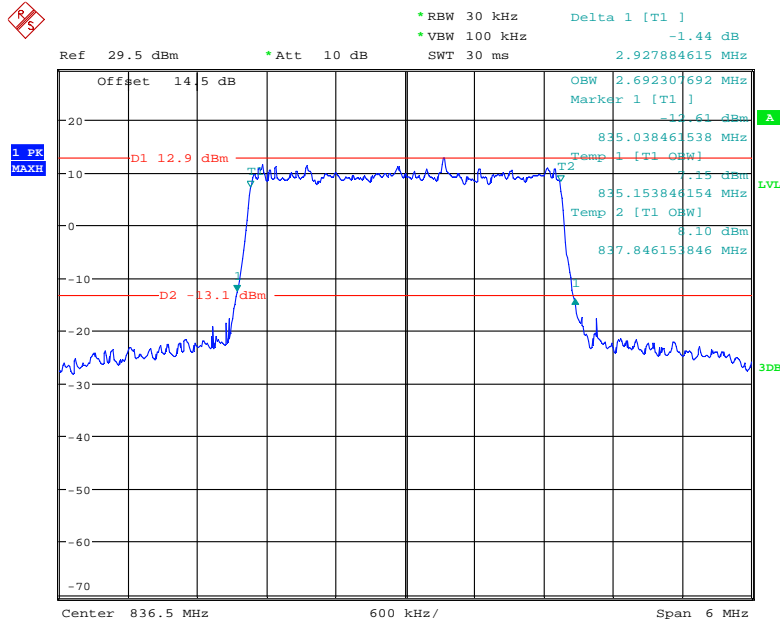
**16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



Date: 13.MAY.2018 13:22:47

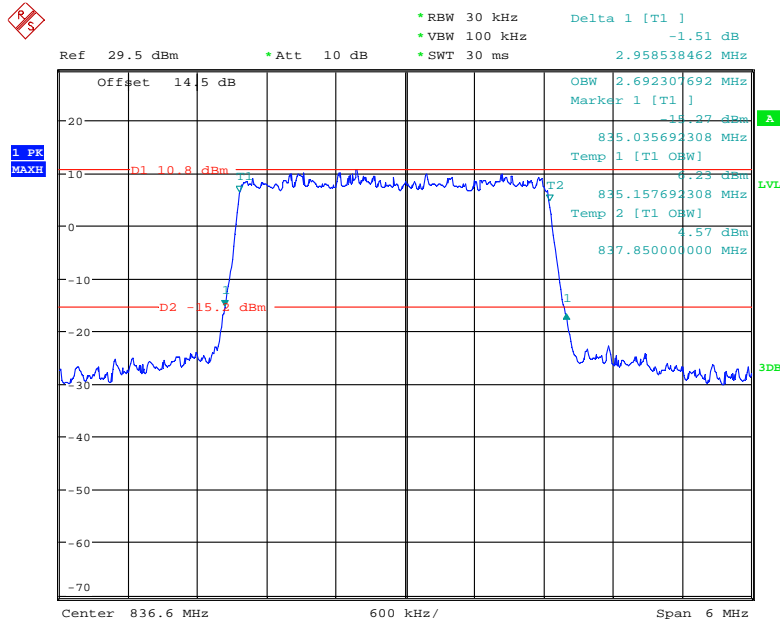


**QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



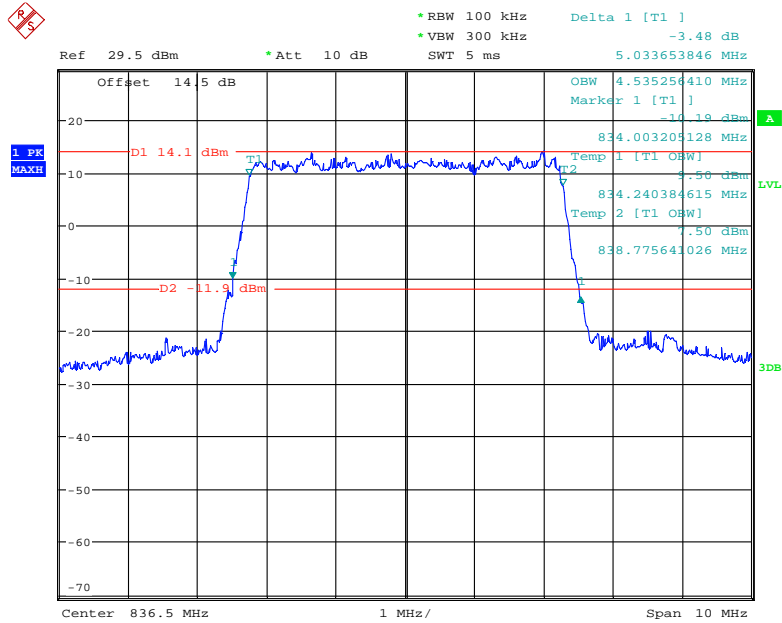
Date: 13.MAY.2018 13:24:41

**16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



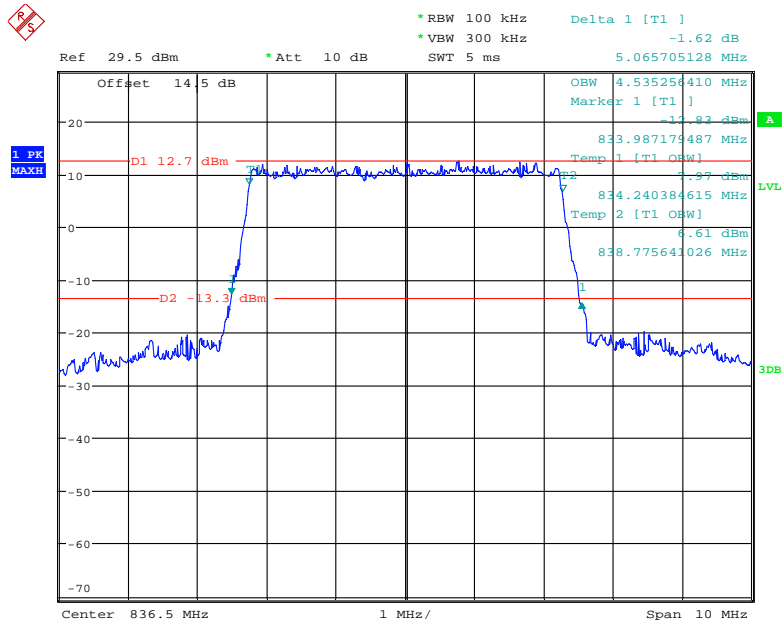
Date: 17.MAY.2018 18:20:05

**QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



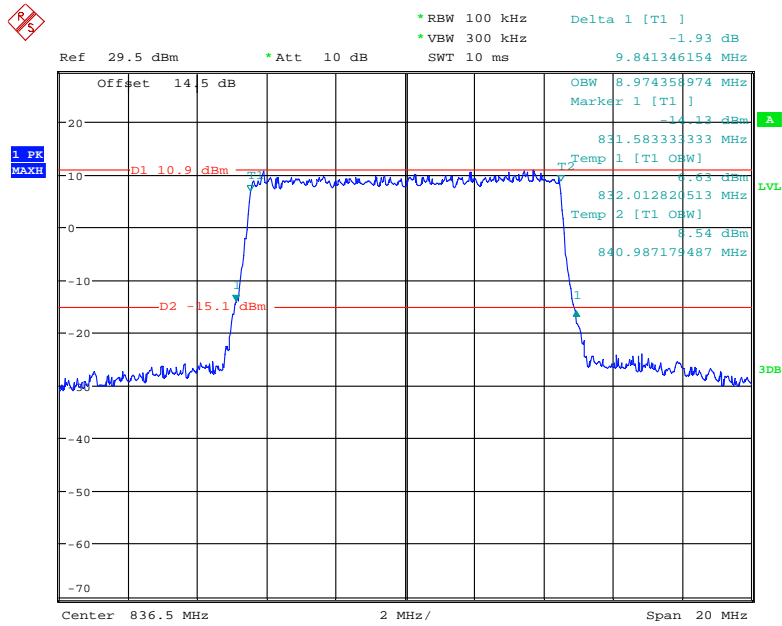
Date: 13.MAY.2018 13:32:35

**16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



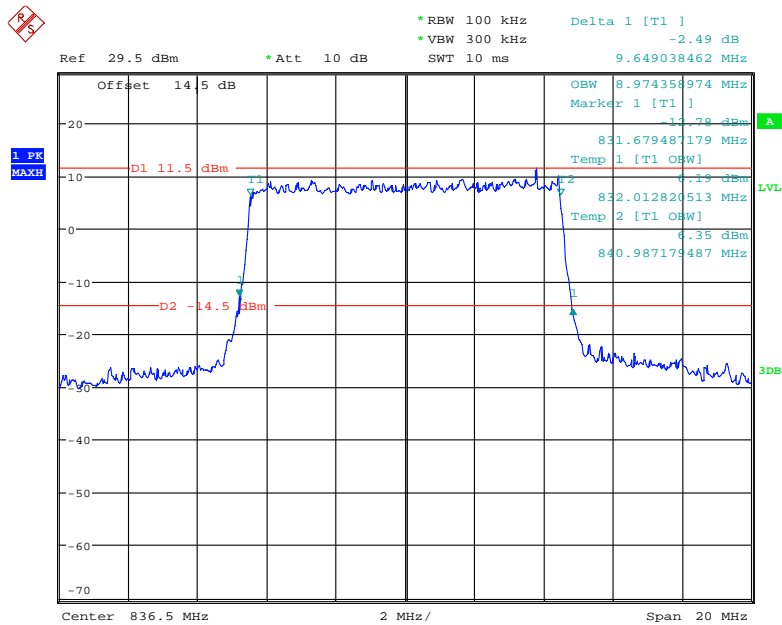
Date: 13.MAY.2018 13:33:32

**QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



Date: 13.MAY.2018 13:37:11

**16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel**



Date: 13.MAY.2018 13:39:11

**FCC §2.1051, §22.917(a) & §24.238(a); §27.53 (h) (m) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

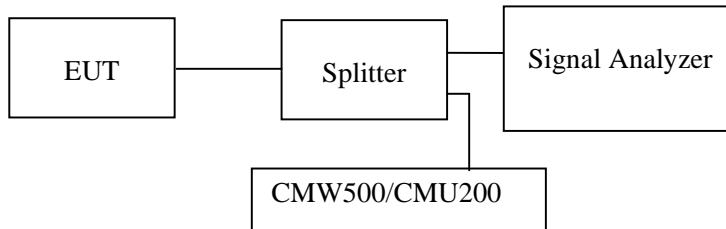
**Applicable Standard**

FCC §2.1051, §22.917(a) and §24.238(a) and §27.53(h) (m).

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 10<sup>th</sup> harmonic.



**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25~26 °C
<b>Relative Humidity:</b>	52~54 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong from 2018-05-11 to 2018-05-17.*

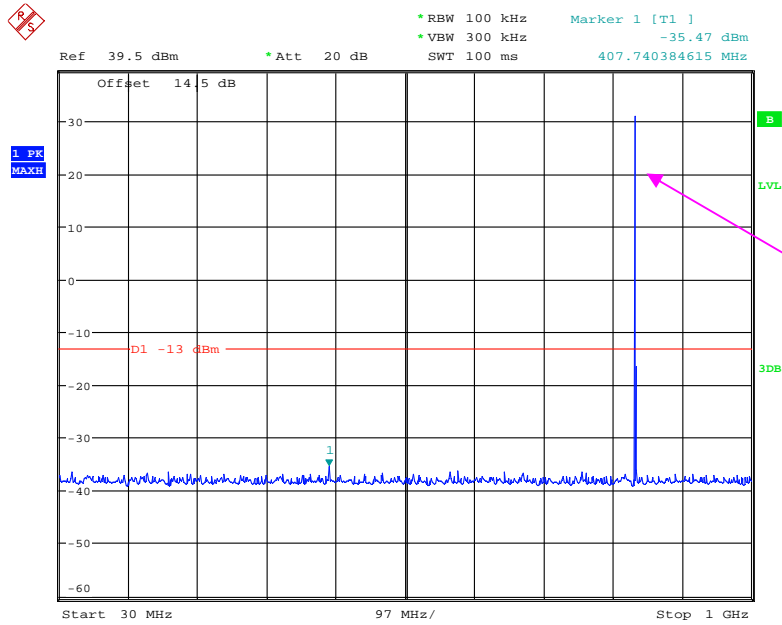
*Test result: Compliance.*

*EUT operation mode: transmitting*

*Please refer to the following plots.*

Cellular Band (Part 22H)

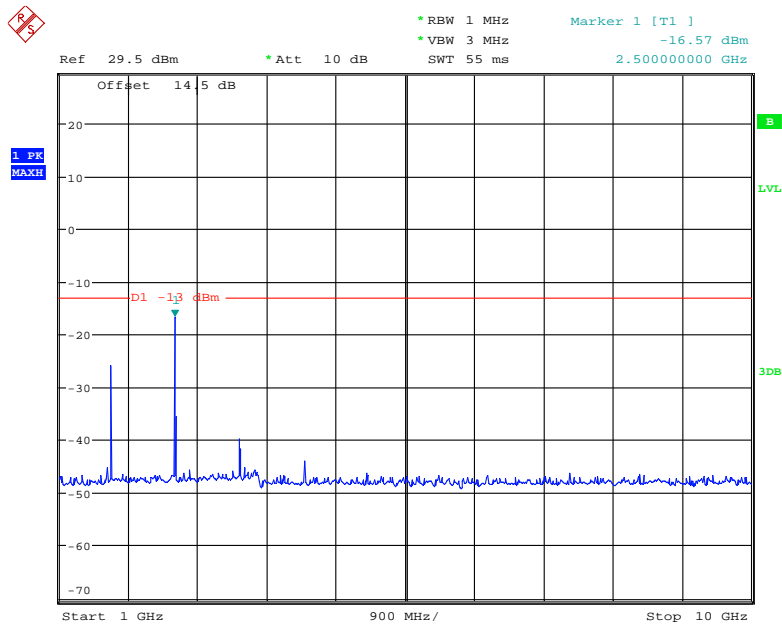
30 MHz – 1 GHz (GSM Mode)



Fundamental test

Date: 11.MAY.2018 21:44:48

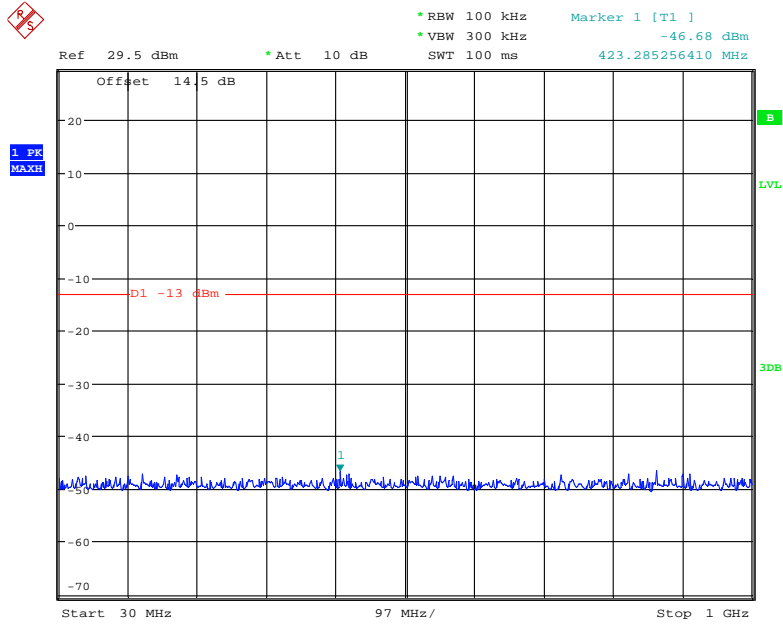
1 GHz – 10 GHz (GSM Mode)



Date: 11.MAY.2018 21:46:19

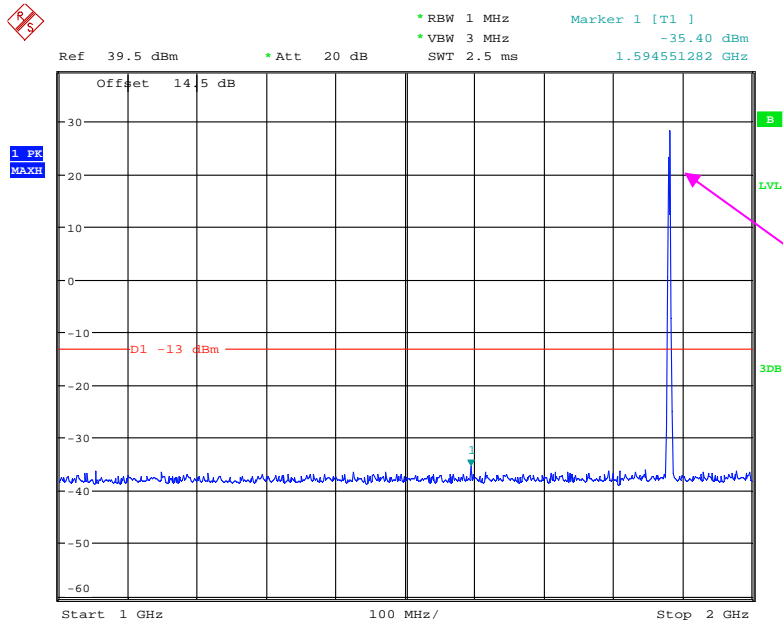
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



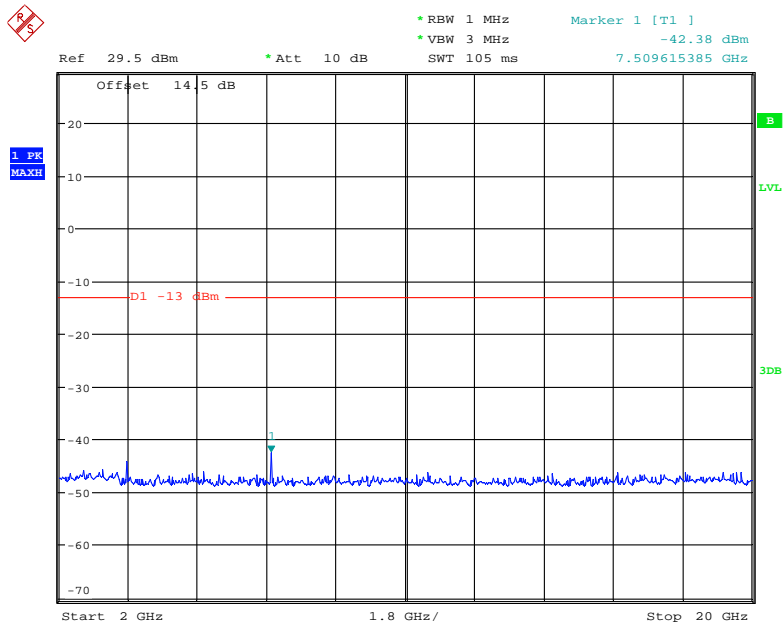
Date: 11.MAY.2018 21:48:03

1 GHz – 2 GHz (GSM Mode)



Date: 11.MAY.2018 21:49:18

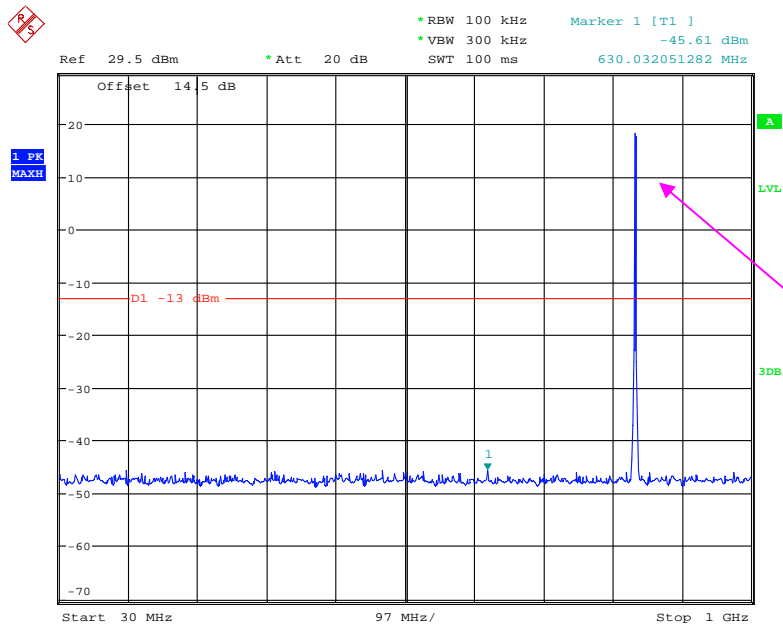
### 2 GHz – 20 GHz (GSM Mode)



Date: 11.MAY.2018 21:50:01

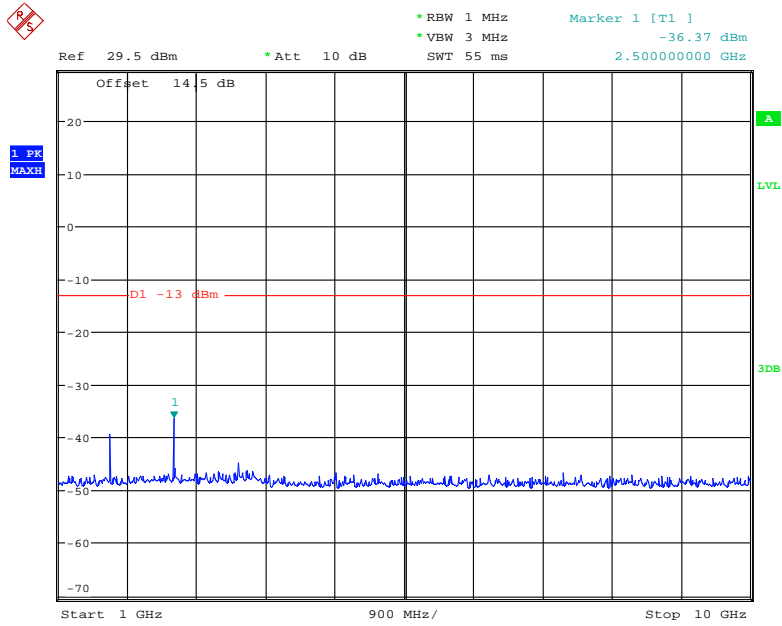
### LTE Band 5:

### 30 MHz - 1 GHz (1.4 MHz, Middle Channel)



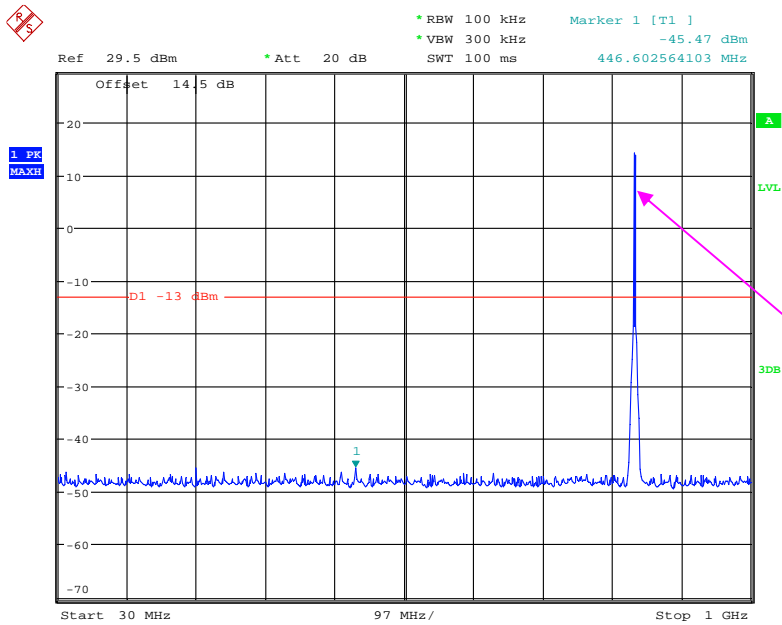
Date: 17.MAY.2018 18:24:25

### 1 GHz – 10 GHz (1.4 MHz, Middle Channel)



Date: 17.MAY.2018 18:27:25

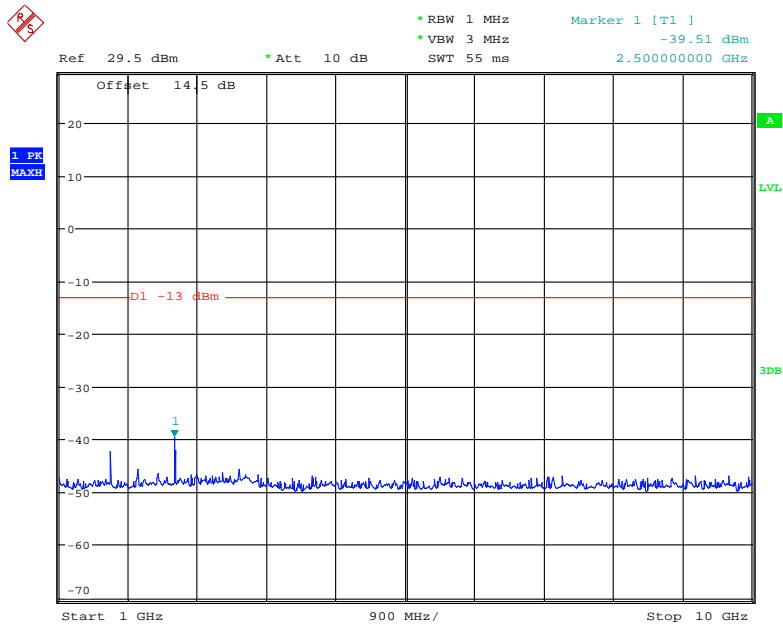
### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)



Date: 17.MAY.2018 18:25:18

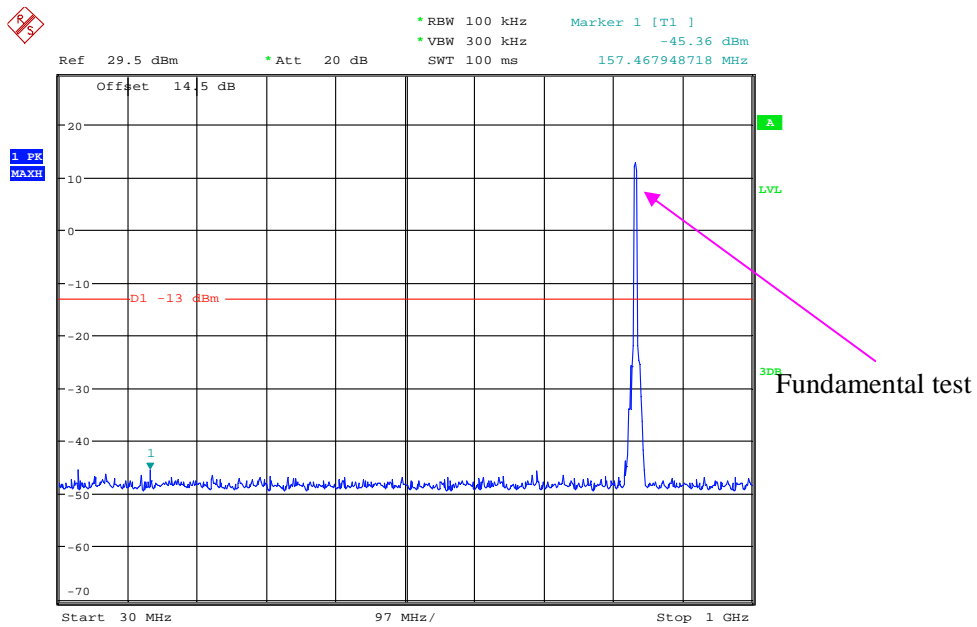


### 1 GHz –10 GHz (3.0 MHz, Middle Channel)



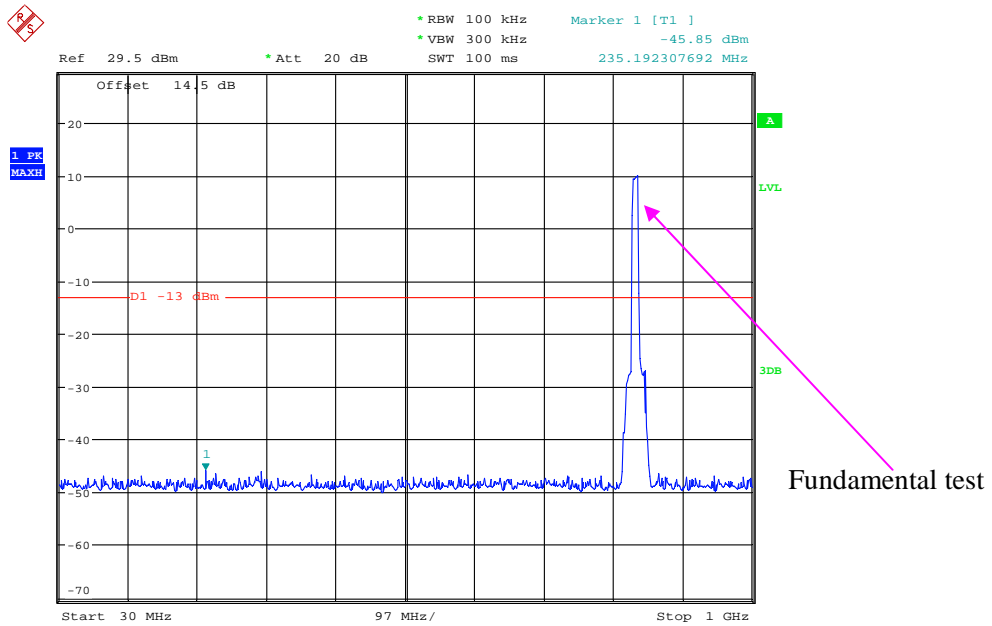
Date: 17.MAY.2018 18:27:14

### 30 MHz - 1 GHz (5.0 MHz, Middle Channel)



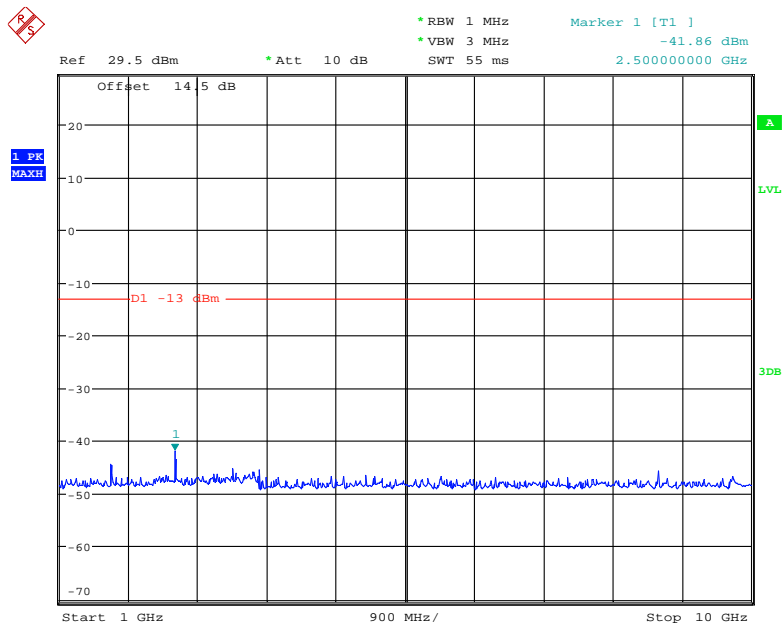
Date: 17.MAY.2018 18:25:39

### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)



Date: 17.MAY.2018 18:26:03

### 1 GHz - 10 GHz (10.0 MHz, Middle Channel)



Date: 17.MAY.2018 18:26:47

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

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 receiving 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.

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2018-05-16.*

*EUT operation mode: Transmitting*

Pre-scan with Low, Middle and High channel, the worst case as below:

30 MHz ~ 10 GHz:

**Cellular Band (Part 22H)**

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
267.31	34.25	185	2.4	H	-62.7	0.32	0	-63.02	-13	50.02
267.31	33.98	66	1.8	V	-63.0	0.32	0	-63.32	-13	50.32
1673.20	53.68	214	1.7	H	-53.4	1.30	8.90	-45.80	-13	32.80
1673.20	47.91	4	2.5	V	-58.6	1.30	8.90	-51.00	-13	38.00
2509.80	57.66	100	1.8	H	-45.9	2.60	10.20	-38.30	-13	25.30
2509.80	62.20	63	1.9	V	-40.7	2.60	10.20	-33.10	-13	20.10

30 MHz ~ 20 GHz:

**PCS Band (Part 24E)**

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, middle channel										
267.31	34.28	37	1.3	H	-62.7	0.32	0	-63.02	-13	50.02
267.31	33.15	10	2.2	V	-63.8	0.32	0	-64.12	-13	51.12
3760.00	49.99	69	2.2	H	-51.2	1.50	11.80	-40.90	-13	27.90
3760.00	50.35	304	2.4	V	-50.4	1.50	11.80	-40.10	-13	27.10
5640.00	50.37	100	2.2	H	-47.2	1.70	12.40	-36.50	-13	23.50
5640.00	49.29	185	2.0	V	-48.0	1.70	12.40	-37.30	-13	24.30

**LTE Band:** (Pre-scan with all the bandwidth, and worse case as below)

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	(dBµV)	(Degree)	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
<b>Band5</b>										
<b>Test frequency range: 30 MHz ~ 10GHz</b>										
267.31	34.29	296	2.2	H	-62.7	0.32	0	-63.02	-13	50.02
267.31	31.59	193	1.9	V	-65.4	0.32	0	-65.72	-13	52.72
1673.00	52.49	342	1.5	H	-54.6	1.30	8.90	-47.00	-13	34.00
1673.00	51.03	69	2.1	V	-55.4	1.30	8.90	-47.80	-13	34.80
2509.50	48.87	24	2.3	H	-54.7	2.60	10.20	-47.10	-13	34.10
2509.50	46.95	166	2.1	V	-56.0	2.60	10.20	-48.40	-13	35.40

**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 Standard**

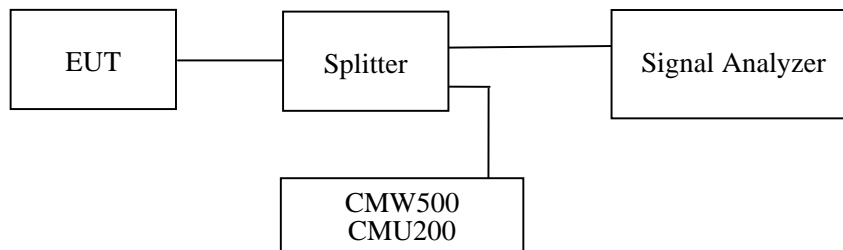
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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**

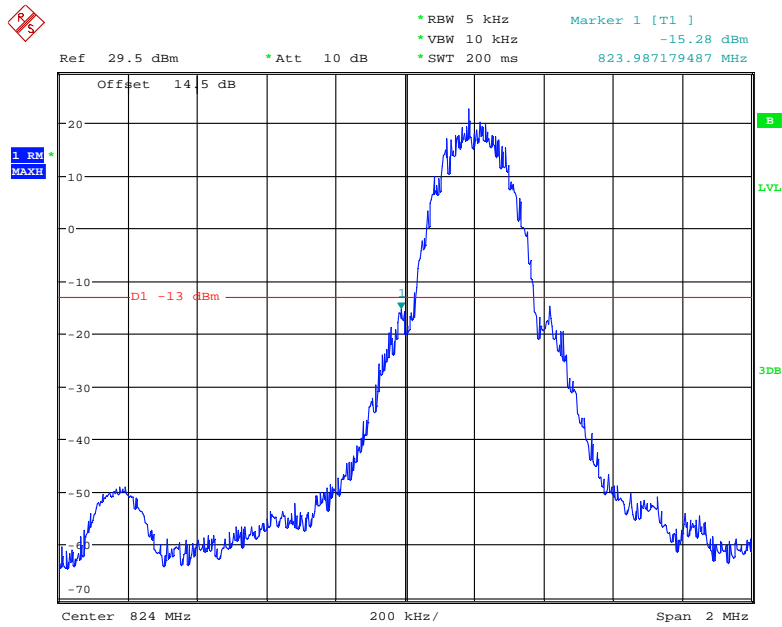
<b>Temperature:</b>	21~25 °C
<b>Relative Humidity:</b>	51~52 %
<b>ATM Pressure:</b>	100.5~101.0 kPa

*The testing was performed by Kiki Kong from 2018-05-11 to 2018-05-13*

*EUT operation mode: Transmitting*

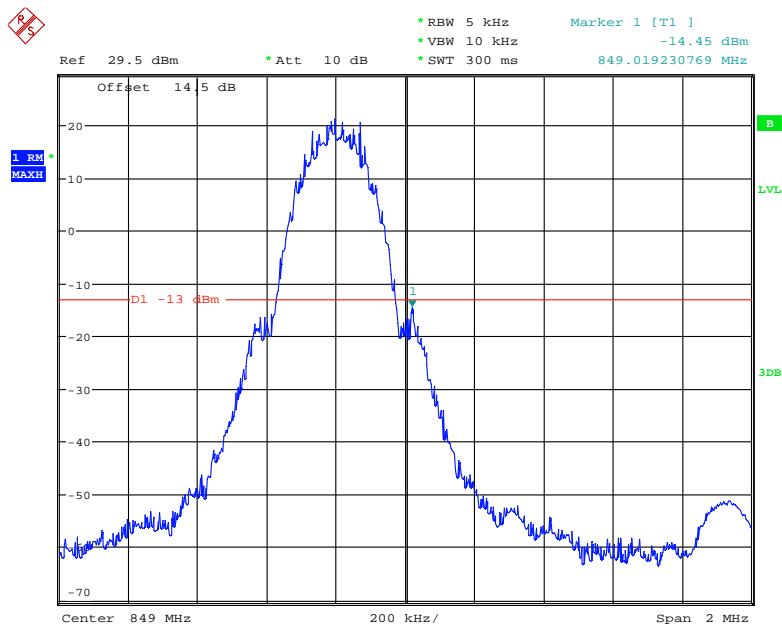
*Test Result: Compliance. Please refer to the following plots.*

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



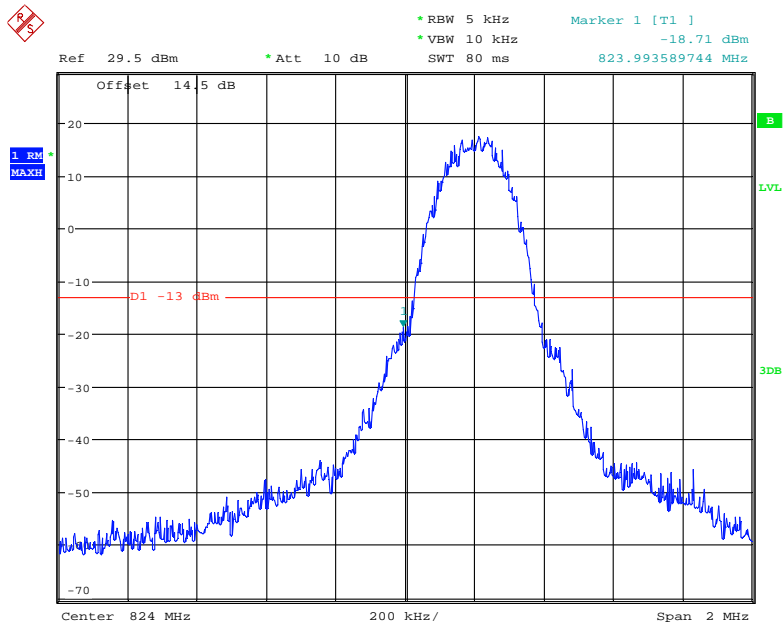
Date: 11.MAY.2018 21:21:11

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



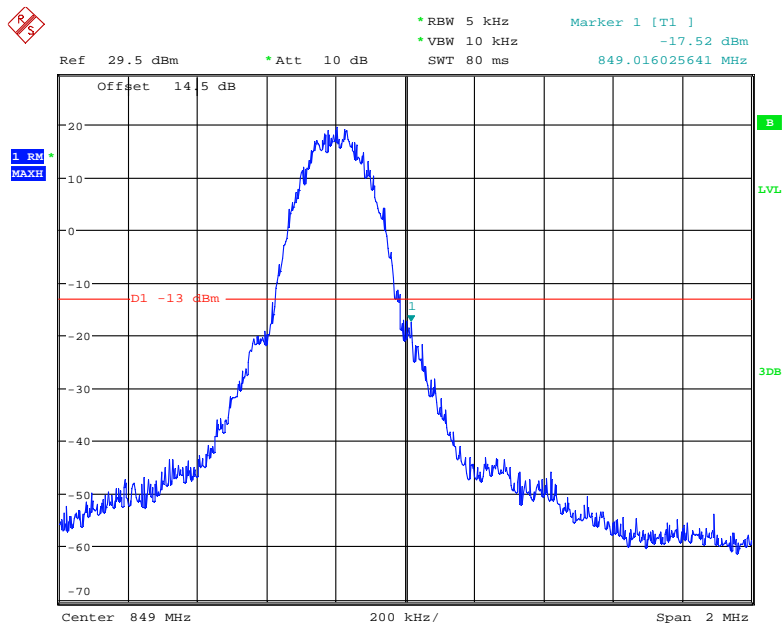
Date: 11.MAY.2018 21:20:19

### Cellular Band, Left Band Edge for EDGE Mode



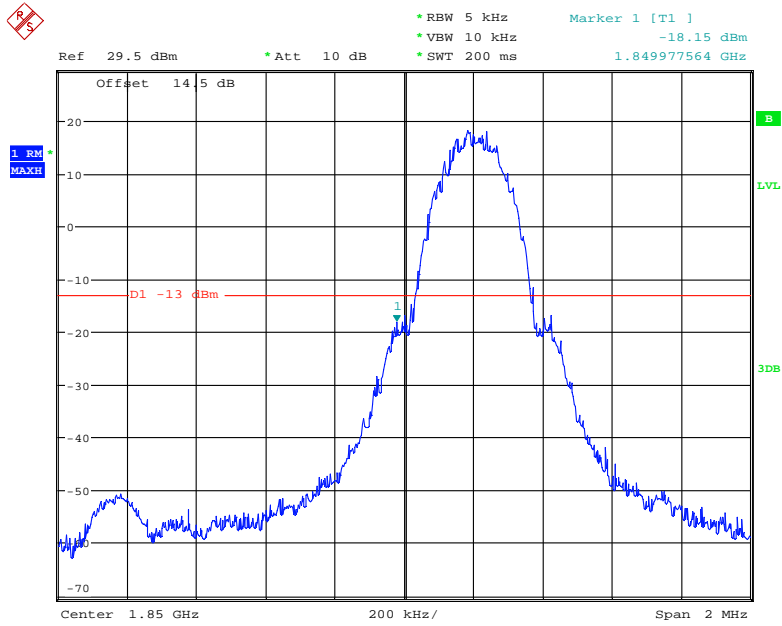
Date: 11.MAY.2018 21:12:57

### Cellular Band, Right Band Edge for EDGE Mode



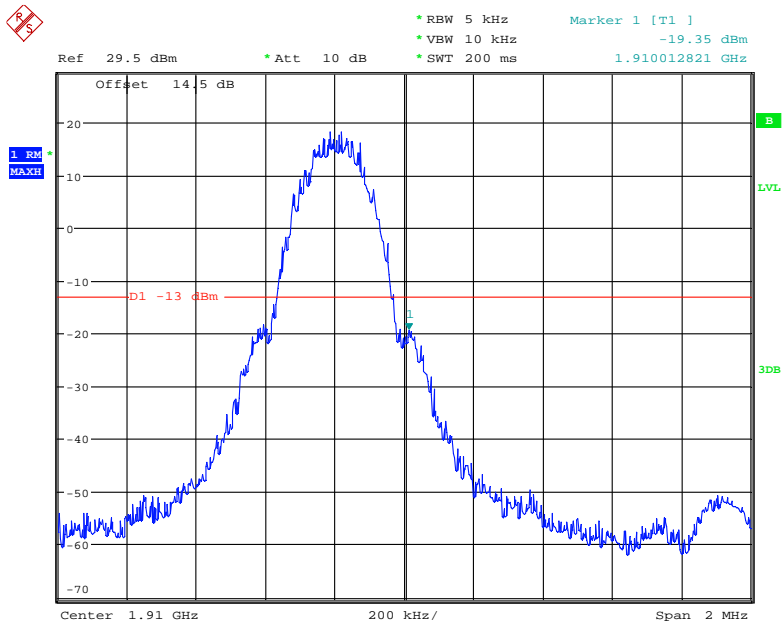
Date: 11.MAY.2018 21:14:15

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



Date: 11.MAY.2018 21:23:27

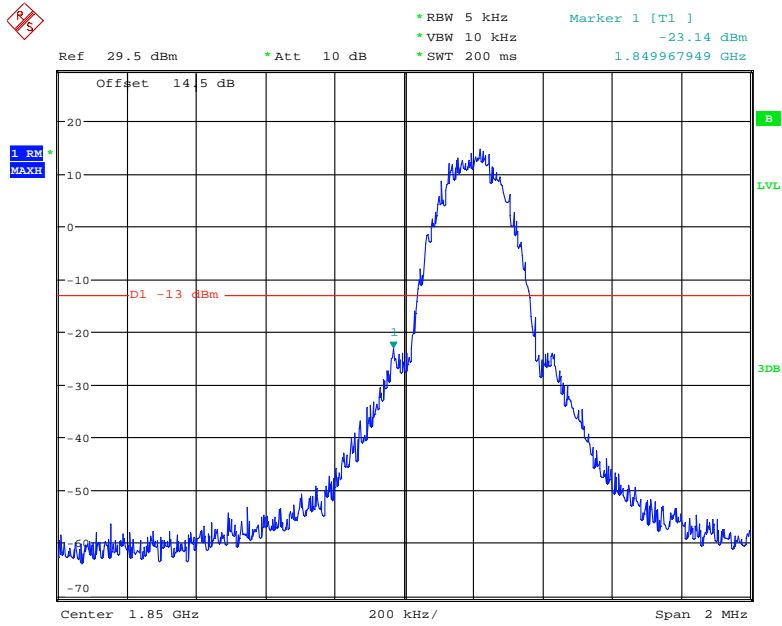
### PCS Band, Right Band Edge for GSM (GMSK) Mode



Date: 11.MAY.2018 21:24:07

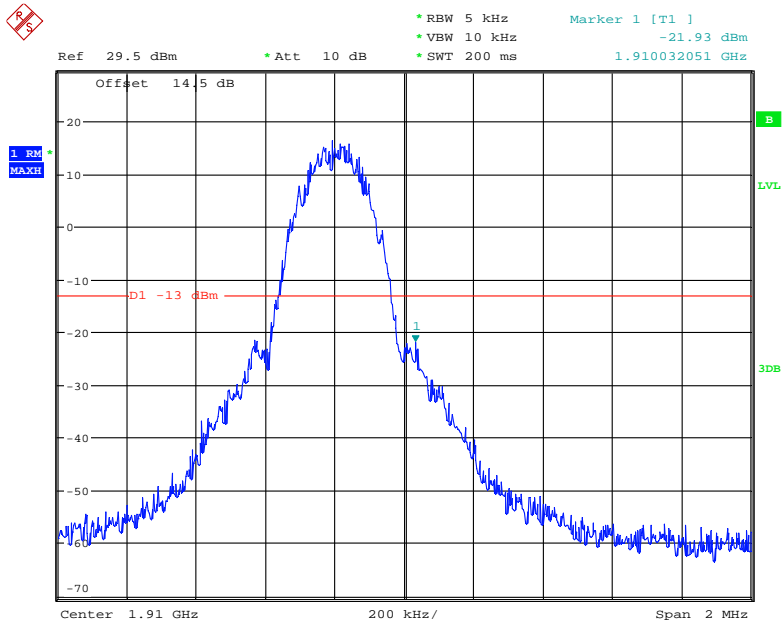


### PCS Band, Left Band Edge for EDGE Mode



Date: 11.MAY.2018 21:25:48

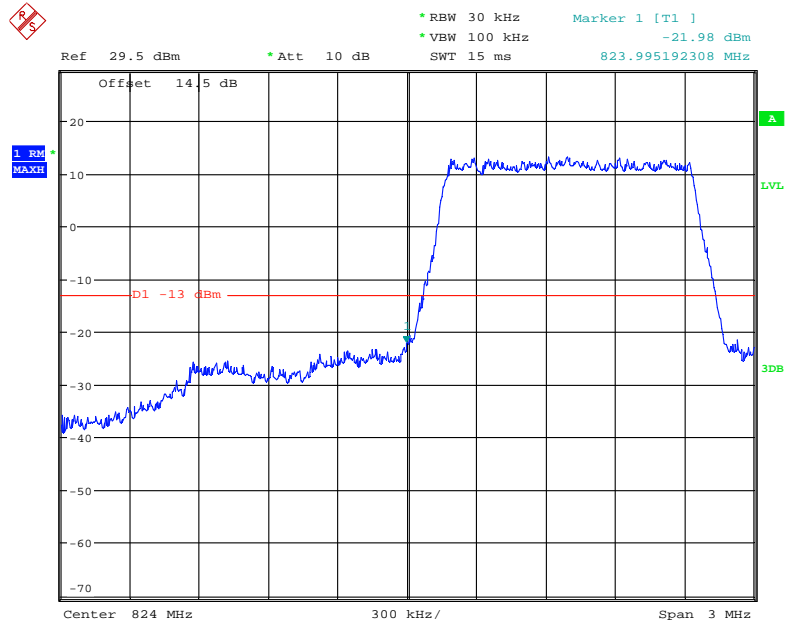
### PCS Band, Right Band Edge for EDGE Mode



Date: 11.MAY.2018 21:26:29

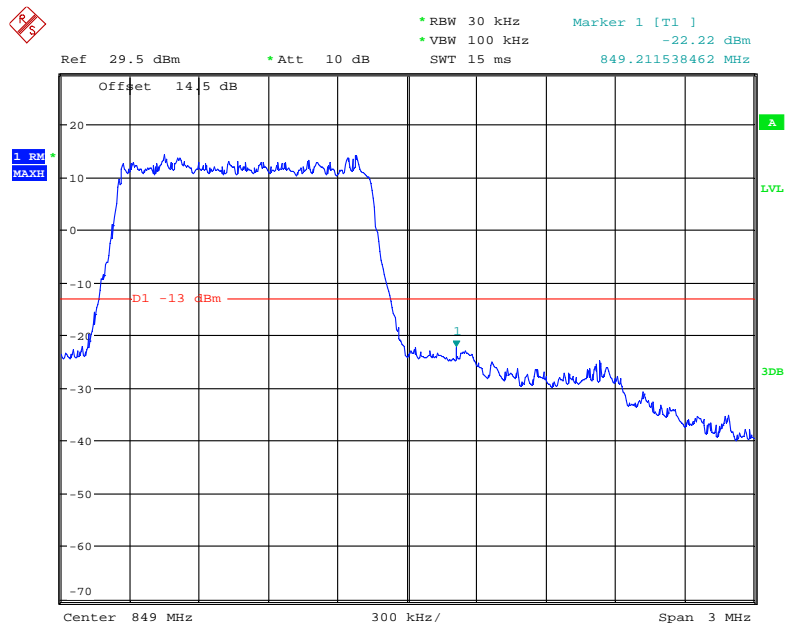
**Band 5:**

**QPSK (1.4 MHz, FULL RB) - Left Band Edge**



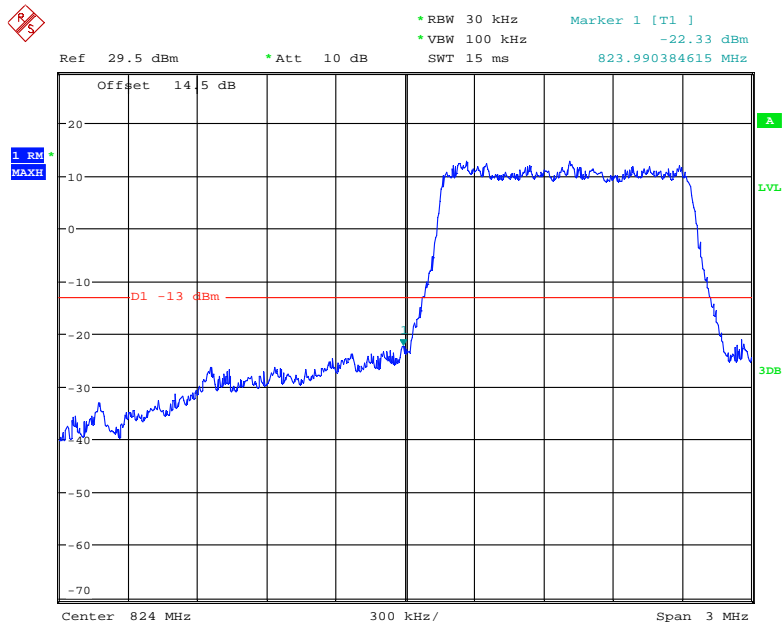
Date: 13.MAY.2018 14:15:26

**QPSK (1.4 MHz, FULL RB) - Right Band Edge**



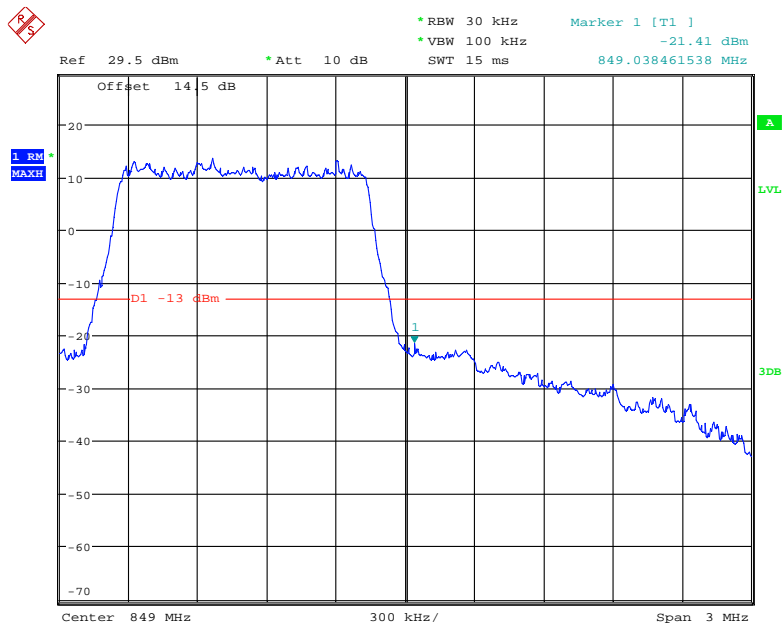
Date: 13.MAY.2018 14:16:27

### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



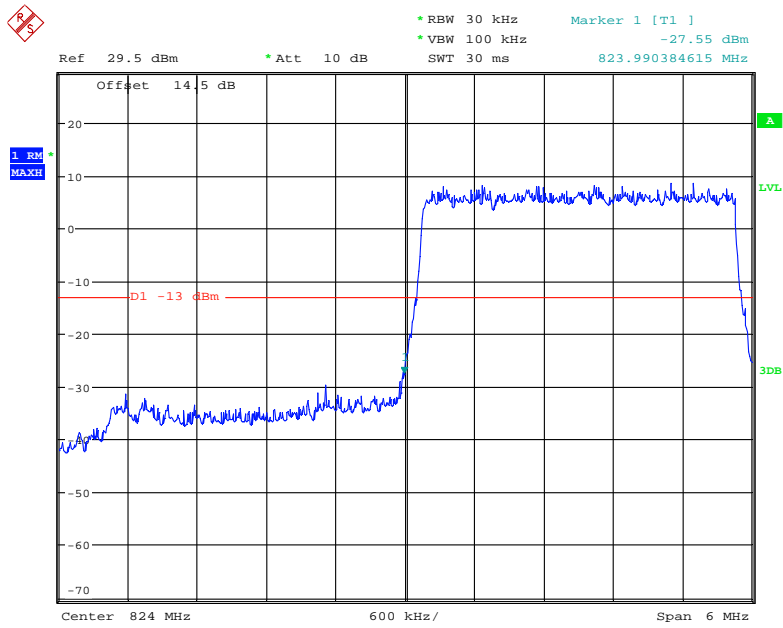
Date: 13.MAY.2018 14:14:09

### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



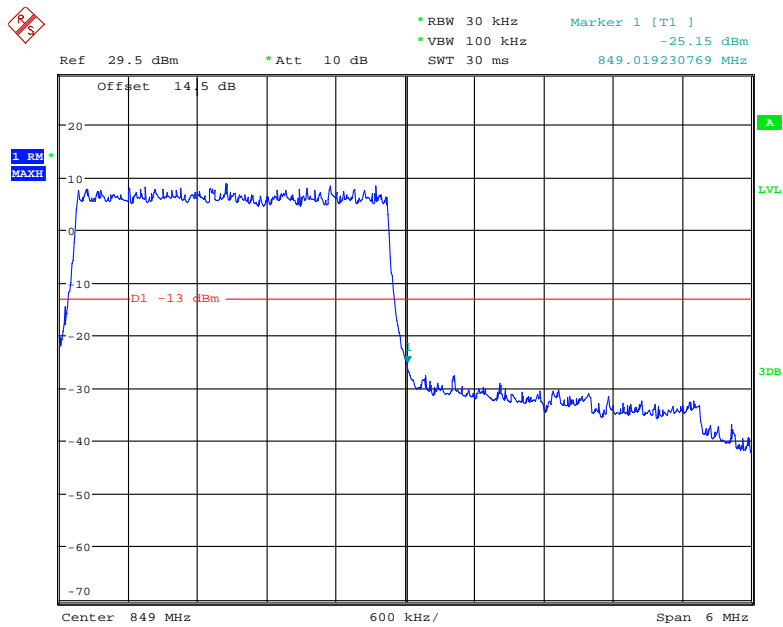
Date: 13.MAY.2018 14:17:28

### QPSK (3.0 MHz, FULL RB) - Left Band Edge



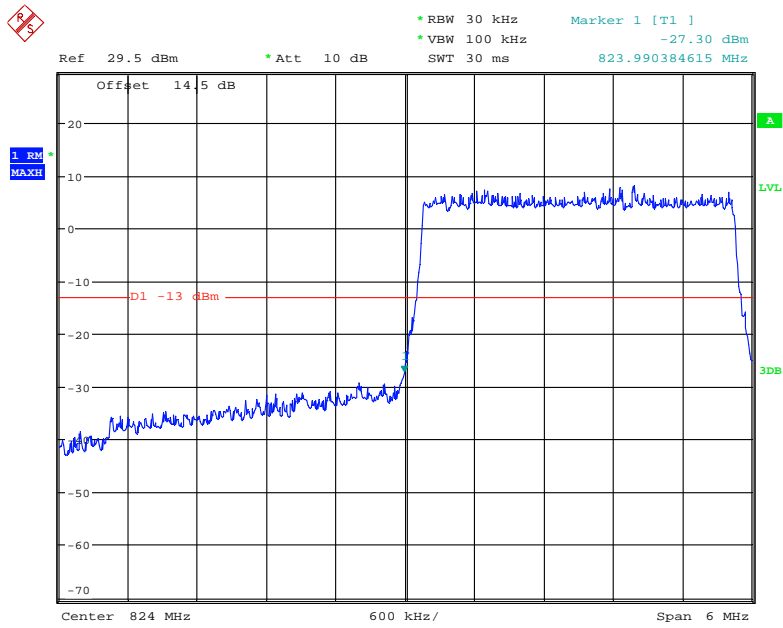
Date: 13.MAY.2018 14:11:18

### QPSK (3.0 MHz, FULL RB) - Right Band Edge



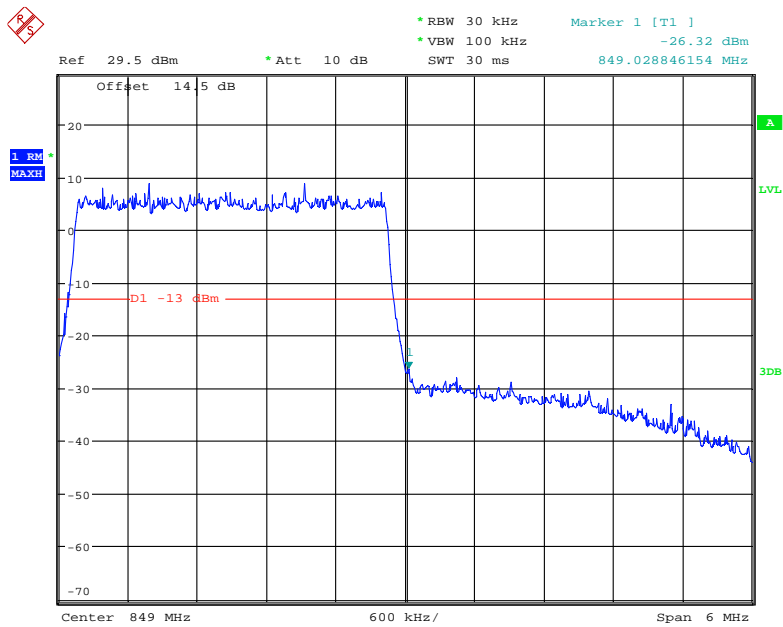
Date: 13.MAY.2018 14:12:12

### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



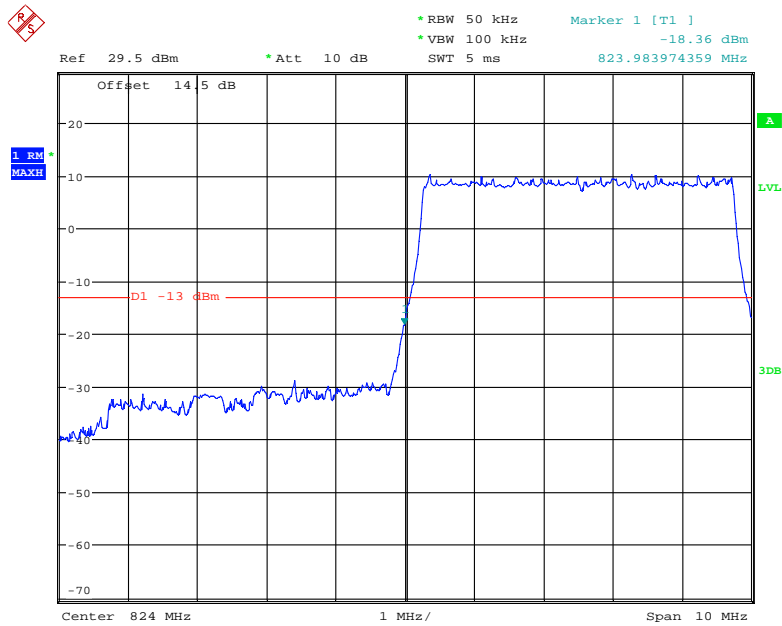
Date: 13.MAY.2018 14:10:45

### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



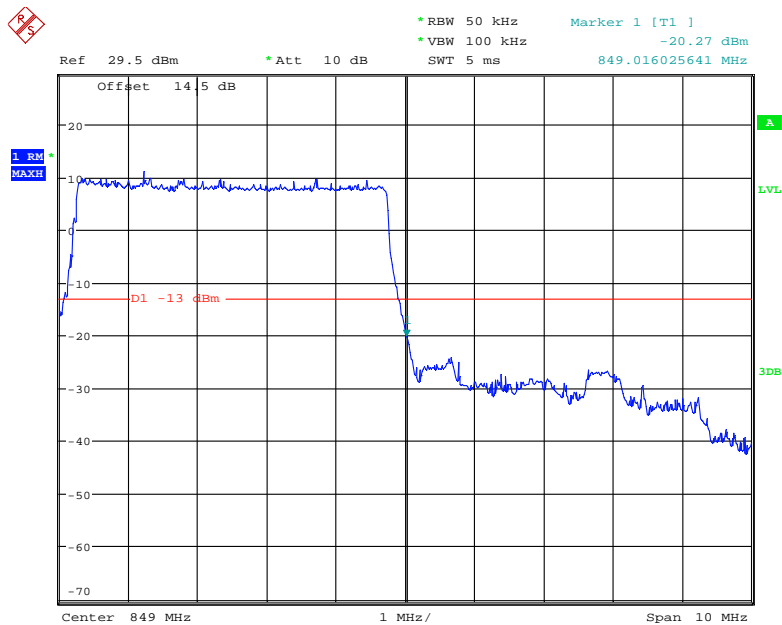
Date: 13.MAY.2018 14:12:41

### QPSK (5.0 MHz, FULL RB) - Left Band Edge



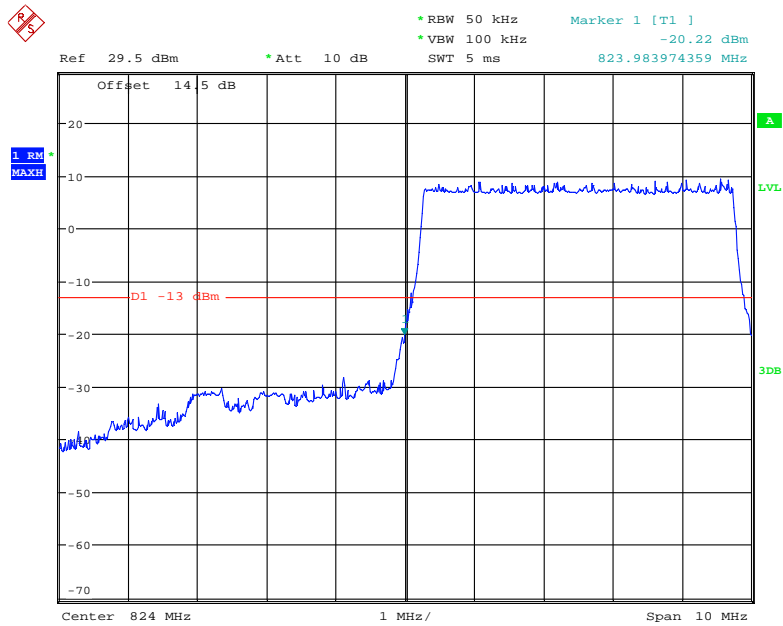
Date: 13.MAY.2018 14:07:22

### QPSK (5.0 MHz, FULL RB) - Right Band Edge



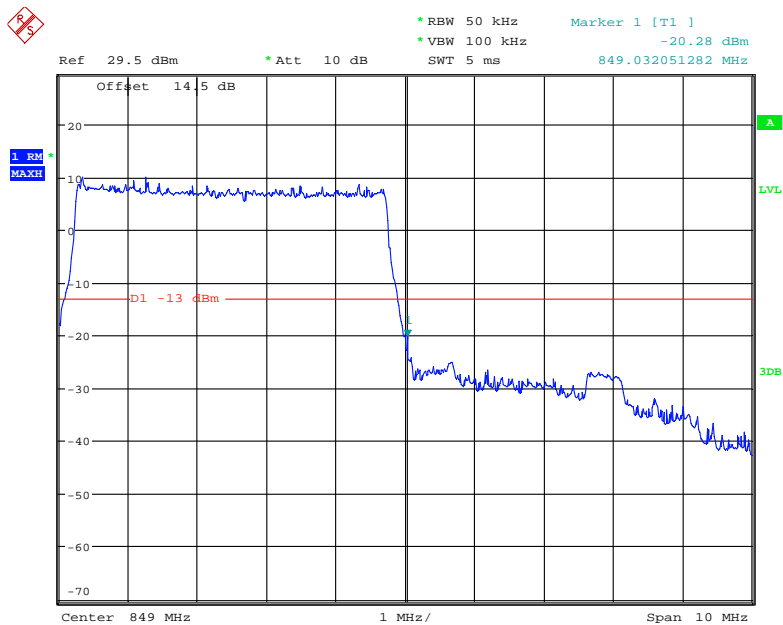
Date: 13.MAY.2018 14:08:40

### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



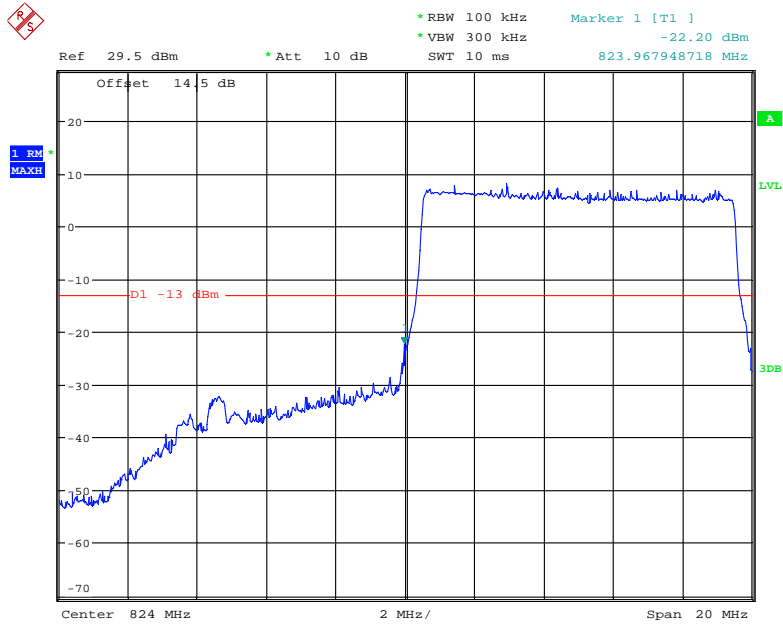
Date: 13.MAY.2018 14:05:07

### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



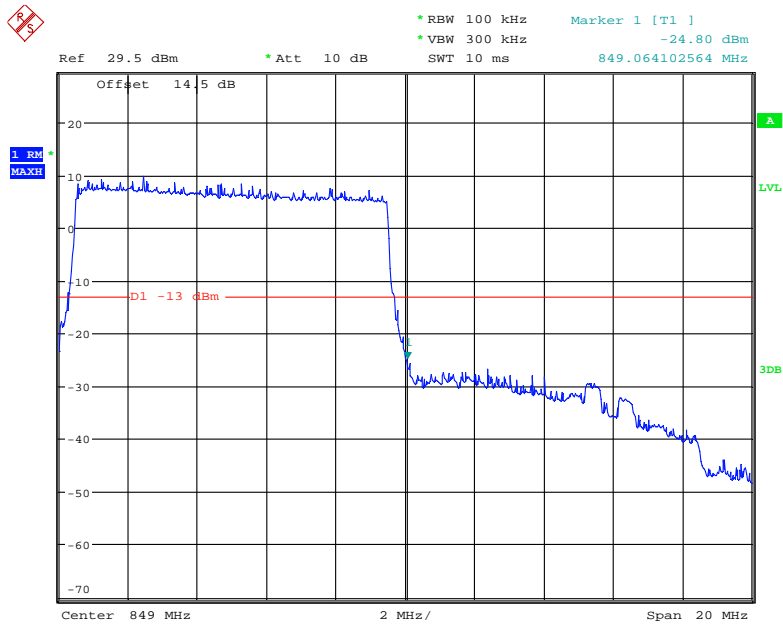
Date: 13.MAY.2018 14:09:13

### QPSK (10.0 MHz, FULL RB) - Left Band Edge



Date: 13.MAY.2018 13:52:45

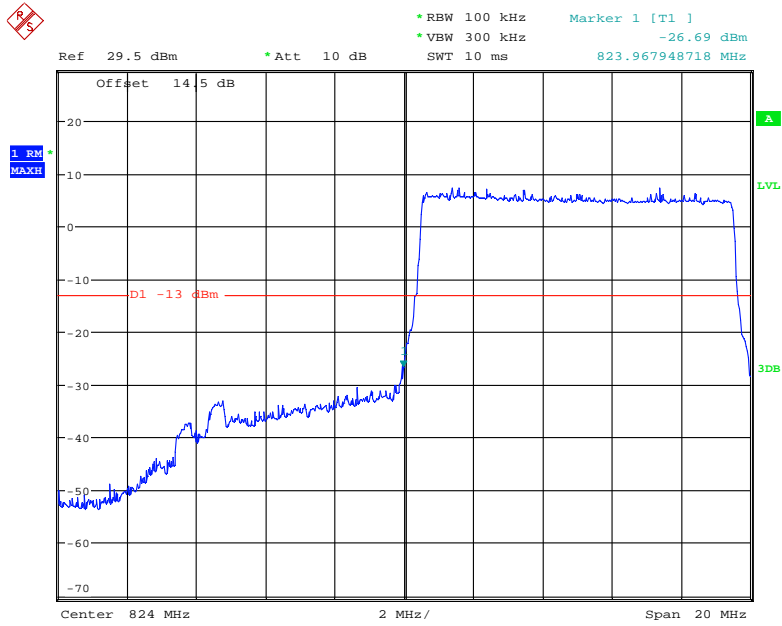
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



Date: 13.MAY.2018 13:55:48

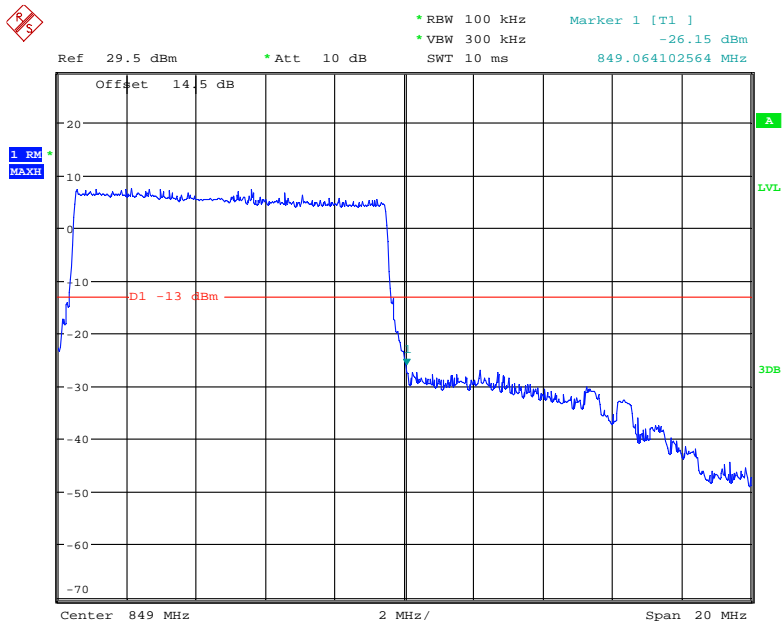


### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



Date: 13.MAY.2018 13:54:02

### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



Date: 13.MAY.2018 13:55:09

**FCC § 2.1055; § 22.355; § 24.235; §27.54 - FREQUENCY STABILITY**

**Applicable Standard**

FCC § 2.1055, §22.355, §24.235 and & §27.54.

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

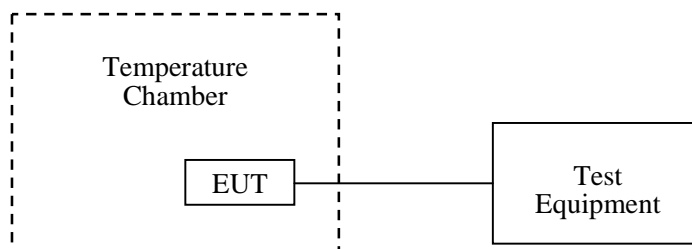
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**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**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Kiki Kong on 2018-05-15.*

*EUT operation mode: Transmitting*

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

## Cellular Band (Part 22H)

## GSM Mode

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.85	-1	-0.0012	2.5
-20		5	0.0060	2.5
-10		-3	-0.0036	2.5
0		-5	-0.0060	2.5
10		-2	-0.0024	2.5
20		5	0.0060	2.5
30		-4	-0.0048	2.5
40		4	0.0048	2.5
50		2	0.0024	2.5
25		V min.= 3.6	1	0.0012
	V max.= 4.3	3	0.0036	2.5

## EDGE Mode

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.85	-6	-0.007170	2.5
-20		4	0.004781	2.5
-10		1	0.001195	2.5
0		-2	-0.002390	2.5
10		-4	-0.004780	2.5
20		-1	-0.001200	2.5
30		5	0.005977	2.5
40		3	0.003586	2.5
50		7	0.008367	2.5
25		V min.= 3.6	8	0.009563
	V max.= 4.3	-3	-0.003590	2.5

**PCS Band (Part 24E)****GSM Mode**

<b>Middle Channel, <math>f_0=1880.0</math> MHz</b>				
<b>Temperature (°C)</b>	<b>Voltage Supplied (V<sub>DC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Result</b>
-30	3.85	8	0.00426	pass
-20		5	0.00266	pass
-10		3	0.00160	pass
0		1	0.00053	pass
10		2	0.00106	pass
20		-1	-0.00053	pass
30		-3	-0.00160	pass
40		-7	-0.00372	pass
50		-4	-0.00213	pass
25		V min.= 3.6	-5	-0.00266
	V max.= 4.3	1	0.00053	pass

**EDGE Mode**

<b>Middle Channel, <math>f_0=1880.0</math> MHz</b>				
<b>Temperature (°C)</b>	<b>Voltage Supplied (V<sub>DC</sub>)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Limit (ppm)</b>
-30	3.85	7	0.00372	pass
-20		9	0.00479	pass
-10		11	0.00585	pass
0		15	0.00798	pass
10		21	0.01117	pass
20		17	0.00904	pass
30		19	0.01011	pass
40		16	0.00851	pass
50		8	0.00426	pass
25		V min.= 3.6	12	0.00638
	V max.= 4.3	2	0.00106	pass

**LTE:  
Band 5**

**QPSK:**

**GSM Mode**

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.85	7	0.00837	2.5
-20		4	0.00478	2.5
-10		6	0.00717	2.5
0		3	0.00359	2.5
10		2	0.00239	2.5
20		5	0.00598	2.5
30		-1	-0.00120	2.5
40		-2	-0.00239	2.5
50		-4	-0.00478	2.5
25		V min.= 3.6	-3	-0.00359
	V max.= 4.3	-7	-0.00837	2.5

**16QAM:**

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.85	2	0.002391	2.5
-20		6	0.007173	2.5
-10		4	0.004782	2.5
0		3	0.003586	2.5
10		-2	-0.00239	2.5
20		1	0.001195	2.5
30		-1	-0.0012	2.5
40		-4	-0.00478	2.5
50		-6	-0.00717	2.5
25		V min.= 3.6	-5	-0.00598
	V max.= 4.3	-8	-0.00956	2.5

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