

# FCC PART 22H, PART 24E MEASUREMENT AND TEST REPORT

For

## MAXWEST INTERNATIONAL LIMITED.

No.1, Longgang Road, Buji, Longgang, Shenzhen, China

#### FCC ID: 2AEN3NITRO55N

Report Type: Product Type:
Original Report Mobile Phone

**Report Number:** RDG171207006-00D

**Report Date:** 2018-01-8

Jerry Zhang

**Reviewed By:** EMC Manager

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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.(Dongguan).

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#### **GENERAL INFORMATION**

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

The *MAXWEST INTERNATIONAL LIMITED*.'s product, model number: *Nitro 55N* (*FCC ID: 2AEN3NITRO55N*) (the "EUT") in this report was a *Mobile Phone*, which was measured approximately: 15.5 cm (L) x 7.7 cm (W) x 0.9 cm (H), rated input voltage: DC3.8V from Battery or DC 5V from adapter.

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Adapter Information: INPUT: AC 100-240V 50/60Hz OUTPUT: DC 5V±5%,1000mA

\*All measurement and test data in this report was gathered from production sample serial number: 171207006 (Assigned by BACL, Dongguan). The EUT was received on 2017-12-07.

#### **Objective**

This report is prepared on behalf of *MAXWEST INTERNATIONAL LIMITED*. in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.

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

#### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AEN3NITRO55N. FCC Part 15C DSS submissions with FCC ID: 2AEN3NITRO55N. FCC Part 15B JBP submissions with FCC ID: 2AEN3NITRO55N.

#### **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-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

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## **Measurement Uncertainty**

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

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#### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, 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. : 897218,the FCC Designation No. : CN1220.

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

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## SYSTEM TEST CONFIGURATION

#### Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode.

## **Equipment Modifications**

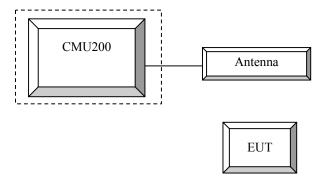
No modification was made to the EUT.

## **Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	109038
N/A	ANTENNA	N/A	N/A

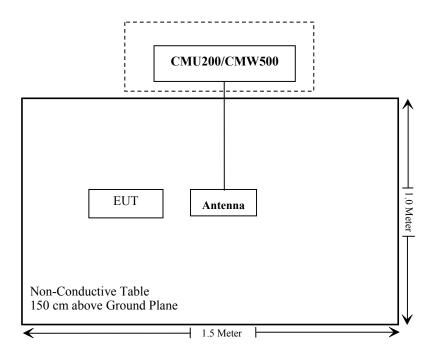
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## **Configuration of Test Setup**



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## **Block Diagram of Test Setup**



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## **SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	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 Radiation Emissions	Compliance
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

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## FCC §1.1310 & §2.1093- RF EXPOSURE

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## **Applicable Standard**

FCC§1.1310 and §2.1093.

## **Test Result**

Compliant, please refer to the SAR report: RDG171207006-20.

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## FCC §2.1047 - MODULATION CHARACTERISTIC

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

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## 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.

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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.

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### **Test Procedure**

#### GSM/GPRS/EGPRS

Menu select > GSM Mobile Station > GSM 850/1900 Function:

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

Press Slot Config Bottom on the right twice to select and change the number of time slots MS Signal

and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850 > 30 dBm for GPRS 1900 > 27 dBm for EGPRS 850 > 26 dBm for EGPRS 1900

Enter the same channel number for TCH channel (test channel) and BCCH channel BS Signal

Frequency Offset > +0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test

channel) and BCCH channel]

Channel Type > Off P0 >

Slot Config > Unchanged (if already set under MS signal)

TCH >choose desired test channel

Off Hopping > Main Timeslot >

Coding Scheme > Network CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream

AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal on to turn on the signal and change settings

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#### **WCDMA-Release 99**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

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WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc / βd	8/15

#### WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
	Loopback Mode			Test Mode 1	
	Rel99 RMC			12.2kbps RM	C
	HSDPA FRC			H-Set1	
WCDM	Power Control Algorithm			Algorithm2	
WCDMA	βς	2/15	12/15	15/15	15/15
General Settings	βd	15/15	15/15	8/15	4/15
Settings	βd (SF)			64	
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
	DACK	8			
	DNAK			8	
HSDPA	DCQI			8	
Specific	Ack-Nack repetition	3			
Settings	factor	3			
bettings	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc			30/15	

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#### WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

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	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA		
	Subset	Subset 1 2 3			4	5		
	Loopback Mode Test Mode 1							
	Rel99 RMC	12.2kbps RMC						
	HSDPA FRC			H-Set1				
	HSUPA Test	HSUPA Loopback						
WCDM	Power Control			Algorithm2				
WCDMA	Algorithm							
General Settings	βс	11/15	6/15	15/15	2/15	15/15		
Settings	βd	15/15	15/15	9/15	15/15	0		
	βec	209/225	12/15	30/15	2/15	5/15		
	βc/ βd	11/15	6/15	15/9	2/15	-		
	βhs	22/15	12/15	30/15	4/15	5/15		
	CM(dB)	1.0	3.0	2.0	3.0	1.0		
	MPR(dB)	0	2	1	2	0		
	DACK			8				
	DNAK			8				
HSDPA	DCQI			8				
Specific	Ack-Nack repetition							
Settings	factor	3						
Seeings	CQI Feedback			4ms				
	CQI Repetition Factor			2				
	Ahs=βhs/ βc			30/15	Γ	1		
	DE-DPCCH	6	8	8	5	7		
	DHARQ	0	0	0	0	0		
	AG Index	20	12	15	17	21		
	ETFCI	75	67	92	71	81		
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9		
	Data Kate Kops							
		E-TFC	Y 11 E	E-TFCI	E TEC	ZI 11 E		
		E-TFC		11		I PO 4		
HSUPA			CI 67	E-TFCI		CI 67		
Specific		E-TFC		PO4		I PO 18		
Settings		E-TF		E-TFCI		CI 71		
	Reference E FCls	E-TFC		92		I PO23		
	_	E-TF		E-TFCI	E-TF	CI 75		
		E-TFC		PO 18		I PO26		
		E-TF				CI 81		
		E-TFC	I PO 27		E-TFC	I PO 27		
				1	<u> </u>			

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#### HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

β <sub>c</sub> (Note3)	β <sub>d</sub>	βнs (Note1)	$\beta_{ec}$	β <sub>ed</sub> (2xSF2) (Note 4)	β <sub>ed</sub> ( <b>2xSF4)</b> (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	0	30/15	30/15	β <sub>ed</sub> 1: 30/15 β <sub>ed</sub> 2: 30/15	β <sub>ed</sub> 3: 24/15 β <sub>ed</sub> 4: 24/15	3.5	2.5	14	105	105
Note 1: $\Delta_{ACK}$ , $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ . Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1.0).										
Note 4: β <sub>ed</sub> can not be set directly; it is set by Absolute Grant Value.										
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-										
3 ,										
	(Note3)  1  Δ <sub>ACK</sub> ,  CM =  DPD  β <sub>ed</sub> c  All th  DPD	(Note3)  1 0  ΔΑCK, ΔΝΑCI  CM = 3.5 ε  DPDCH is  β <sub>ed</sub> can not  All the sub DPDCH ca	$ \begin{array}{c ccc} \textit{(Note3)} & \textit{(Note1)} \\ \hline 1 & 0 & 30/15 \\ \hline \vdots & \Delta_{ACK},  \Delta_{NACK}  \text{and}  \Delta_{CQI} \\ \vdots & CM = 3.5  \text{and the MF} \\ \vdots & DPDCH  \text{is not config} \\ \vdots & \beta_{ed}  \text{can not be set dii} \\ \vdots & All  \text{the sub-tests requ} \\ DPDCH  \text{category 7}. \\ \hline \end{array} $	(Note3) (Note1)  1 0 30/15 30/15  : $\Delta_{ACK}$ , $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 v  : $CM$ = 3.5 and the MPR is bas : DPDCH is not configured, the : $\beta_{ed}$ can not be set directly; it is : All the sub-tests require the UDPDCH category 7. E-DCH T	(Note3) (Note1) (2xSF2) (Note 4)  1 0 30/15 30/15 $\beta_{ed}1:30/15$ $\beta_{ed}2:30/15$ $\Delta_{ACK}$ , $\Delta_{NACK}$ and $\Delta_{CQI} = 30/15$ with $\beta_{hz} = 30/15$ $\Delta_{PDCH}$ is not configured, therefore the $\beta_c$ is s $\beta_{ed}$ can not be set directly; it is set by Absolute All the sub-tests require the UE to transmit 2S DPDCH category 7. E-DCH TTI is set to 2ms	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(Note 3) (Note 1) (Note 1) (2xSF2) (2xSF4) (dB) (Note 2) 1 0 30/15 30/15 $\beta_{ed}1:30/15$ $\beta_{ed}3:24/15$ 3.5 $\beta_{ed}3:30/15$ $\beta_{ed}4:24/15$ 3.5 $\beta_{ed}3:30/15$ $\beta_{ed}3:30/15$ $\beta_{ed}4:30/15$ $\beta_{ed}3:30/15$ $\beta_{ed}4:30/15$ $\beta_{ed}3:30/15$ $\beta_{ed}3:30/$	(Note 3) (Note 1) (2xSF2) (2xSF4) (dB) (dB) (dB) (Note 2) 1 0 30/15 30/15 $\beta_{ed}1:30/15$ $\beta_{ed}3:24/15$ 3.5 2.5 $\beta_{ed}2:30/15$ $\beta_{ed}4:24/15$ $\beta_{ed}4:24/15$ $\beta_{ed}4:24/15$ $\beta_{ed}6:3.5$ $\beta_{e$	(Note 3) (Note 1) (Note 2) (Note 4) (Note 4) (Note 2) (Note 2) (Note 4) (Note 4) 1 0 30/15 $\beta_{ed}$ 1: 30/15 $\beta_{ed}$ 3: 24/15 3.5 2.5 14 $\beta_{ed}$ 3: 30/15 $\beta_{ed}$ 4: 24/15 3.5 2.5 14 $\beta_{ed}$ 5: $\beta_{ed}$ 6: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). DPDCH is not configured, therefore the $\beta_{e}$ is set to 1 and $\beta_{ed}$ = 0 by default. $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value. All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support the	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

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#### DC-HSDPA

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

	Parameter	Unit	Value			
Nominal	Avg. Inf. Bit Rate	kbps	60			
Inter-TTI	Distance	TTľs	1			
Number	of HARQ Processes	Proces	6			
		ses	0			
Informati	on Bit Payload ( $N_{\mathit{INF}}$ )	Bits	120			
Number	Code Blocks	Blocks	1			
Binary C	hannel Bits Per TTI	Bits	960			
Total Ava	ailable SML's in UE	SML's	19200			
Number	of SML's per HARQ Proc.	SML's	3200			
Coding F	Rate		0.15			
Number	of Physical Channel Codes	Codes	1			
Modulation			QPSK			
Note 1: The RMC is intended to be used for DC-HSDPA						
mode and both cells shall transmit with identical						
parameters as listed in the table.						
Note 2: Maximum number of transmission is limited to 1, i.e.,						
	retransmission is not allowed. The redundancy and					
	constellation version 0 shall be used.					

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## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-06	2020-11-05
R&S	Spectrum Analyzer	FSU 26	200256	2017-12-08	2018-12-08
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2017-12-14	2018-12-14
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	Chamber A-1	4m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-1	0.75m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-2	8m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31

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#### **Test Data**

#### **Environmental Conditions**

Temperature:	26.2°C
Relative Humidity:	30.3 %
ATM Pressure:	102.2 kPa

<sup>\*</sup> The testing was performed by Blake Yang on 2017-12-17.

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<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## **Conducted Output Power**

## Cellular Band & PCS Band

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	Channal	Channel Conducted Peak Output Power (dBm)				
Band	No.	GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
	128	31.20	31.19	29.62	28.05	26.31
Cellular	190	31.30	31.23	29.66	28.08	26.35
	251	31.20	31.22	29.63	28.06	26.35
	512	29.30	29.28	27.39	25.98	24.14
PCS	661	29.30	29.31	27.28	25.89	24.06
	810	29.20	29.16	27.11	25.73	23.88

## WCDMA Band II

	3GPP	Low C	hannel	Middle (	Channel	High Channel	
Mode	Sub Test	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	21.91	3.32	22.03	3.40	22.01	3.28
	1	21.11	4.28	21.35	4.24	21.21	3.64
HSDPA	2	21.21	4.18	21.04	4.51	21.43	2.97
HSDPA	3	21.66	4.88	21.02	3.59	21.52	2.96
	4	20.60	4.38	21.92	4.62	20.88	3.85
	1	21.20	4.44	21.26	4.16	21.24	4.00
	2	20.83	4.99	20.8	3.98	20.73	3.76
HSUPA	3	20.69	4.44	20.61	4.72	21.35	4.19
	4	21.53	4.38	21.72	3.88	21.45	3.86
	5	20.64	3.92	21.16	3.85	20.66	3.61
	1	20.63	4.87	21.46	3.88	21.7	4.12
DC HCDDA	2	20.81	4.03	21.46	3.74	20.87	3.44
DC-HSDPA	3	21.69	3.90	21.35	4.47	20.95	3.43
	4	21.49	4.03	20.82	4.67	21.72	4.20
HSPA+	1	20.96	4.02	21.66	4.51	21.08	3.48

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## WCDMA Band V

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	3GPP	Low C	hannel	Middle (	Channel	High C	hannel
Mode	Sub Test	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	21.58	3.28	21.80	3.20	21.52	3.24
	1	20.65	4.08	20.82	4.20	20.81	4.04
HCDDA	2	21.24	4.47	20.68	4.53	20.43	3.76
HSDPA	3	21.22	4.46	20.88	4.29	20.20	3.69
	4	21.19	3.89	20.68	4.62	21.31	4.21
	1	22.32	3.68	22.43	4.64	22.46	3.36
	2	22.76	3.18	21.93	3.99	22.08	3.90
HSUPA	3	22.70	3.59	22.32	4.34	22.97	3.67
	4	22.35	4.01	23.03	4.13	23.01	3.58
	5	22.24	3.56	21.94	4.03	22.73	3.58
	1	22.07	3.18	22.86	4.21	22.26	3.86
DC-HSDPA	2	21.98	4.27	22.38	4.49	22.24	3.17
DC-HSDPA	3	22.12	3.80	22.55	4.24	22.83	3.46
	4	21.91	4.16	22.52	4.21	22.12	2.88
HSPA+	1	21.81	4.07	22.10	3.94	22.58	3.95

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#### ERP & EIRP

#### Part 22H

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		D	Su	bstituted Met	thod	A11 4.		
Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
GSM 850 Middle Channel								
836.600	Н	97.21	22.3	0.0	1	21.3	38.5	17.2
836.600	V	104.11	32.3	0.0	1	31.3	38.5	7.2
	WCDMA Band V Middle Channel							
836.600	Н	84.85	9.9	0.0	1	8.9	38.5	29.6
836.600	V	94.56	22.8	0.0	1	21.8	38.5	16.7

#### Part 24E

		Receiver	Substituted Method		Absolute			
Frequency (MHz)	Polar (H/V)	Reading (dBµV)	Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Level (dBm)	Limit (dBm)	Margin (dB)
PCS 1900 Middle Channel								
1880.000	Н	95.01	22.1	11.1	1.6	31.6	33.0	1.4
1880.000	V	90.79	17.6	11.1	1.6	27.1	33.0	5.9
	WCDMA Band II Middle Channel							
1880.000	Н	87.22	14.3	11.1	1.6	23.8	33.0	9.2
1880.000	V	84.24	11.1	11.1	1.6	20.6	33.0	12.4

#### Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz
- 2) Absolute Level = Substituted Level Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

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

Report No.: RDG171207006-00D

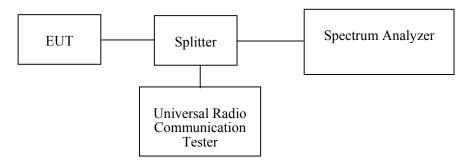
## **Applicable Standard**

FCC §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 26 dB & 99% bandwidth was recorded.



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

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## **Test Data**

#### **Environmental Conditions**

Temperature:	25.4°C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

The testing was performed by Harry Yang on 2017-12-13.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

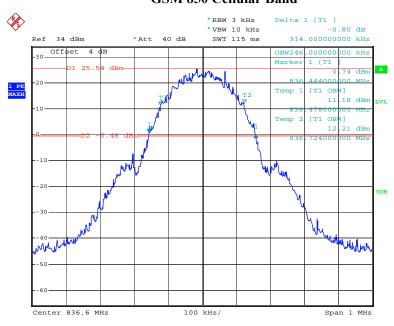
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular		GSM	0.246	0.314
PCS	М	PCS	0.248	0.316
WCDMA Band		Rel 99	4.12	4.66
		HSDPA	4.12	4.7
11		HSUPA	4.1	4.7
WCDMA Band		Rel 99	4.12	4.7
		HSDPA	4.12	4.7
v		HSUPA	4.12	4.68

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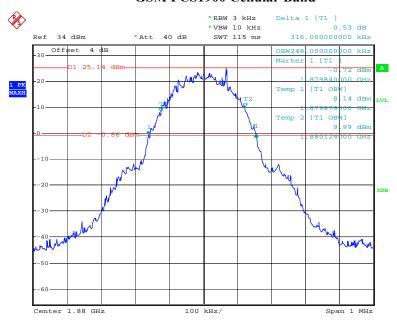
## **GSM 850 Cellular Band**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 11:08:26

#### **GSM PCS1900 Cellular Band**

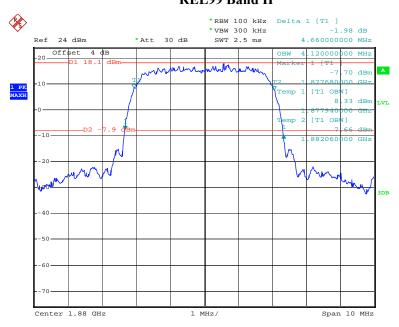


Date: 13.DEC.2017 11:13:29

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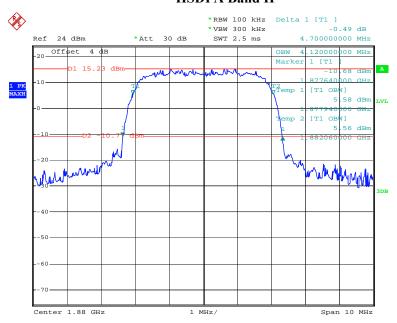
#### **REL99 Band II**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:53:22

#### **HSDPA Band II**

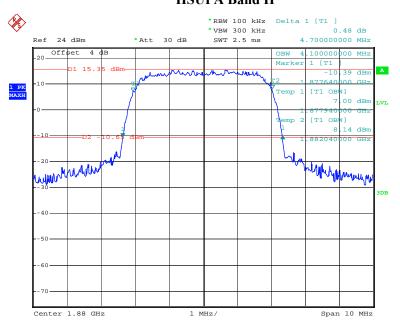


Date: 13.DEC.2017 16:32:04

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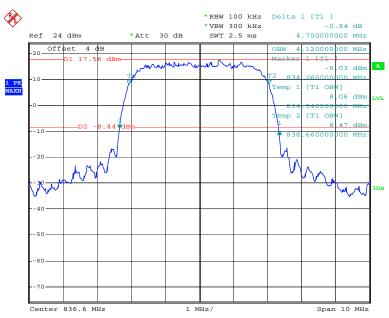
## **HSUPA Band II**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 16:31:03

#### **REL99 Band V**

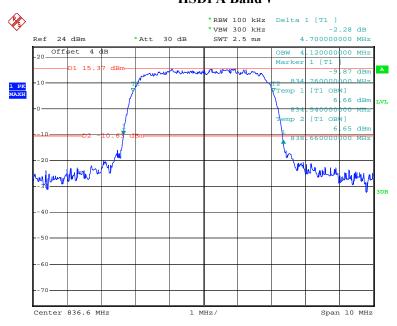


Date: 13.DEC.2017 10:45:49

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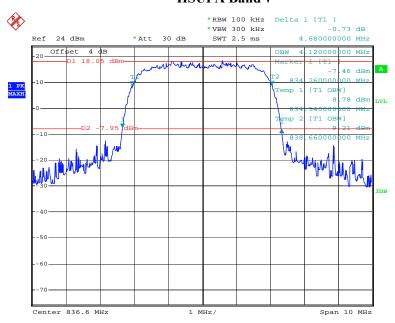
## **HSDPA Band V**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 16:34:03

#### **HSUPA Band V**



Date: 13.DEC.2017 16:35:48

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# FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Report No.: RDG171207006-00D

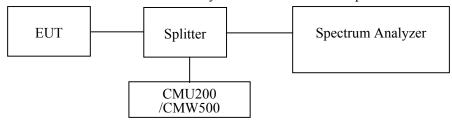
## **Applicable Standard**

FCC §2.1051, §22.917(a), §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. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	149216	2017-10-08	2018-10-08
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data**

#### **Environmental Conditions**

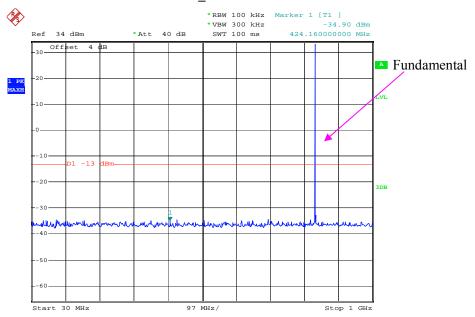
Temperature:	22.3 ~ 26.3 °C
Relative Humidity:	26 ~ 45 %
ATM Pressure:	100.7 ∼ 101 kPa

The testing was performed by Harry Yang from 2017-12-13 to 2018-01-08.

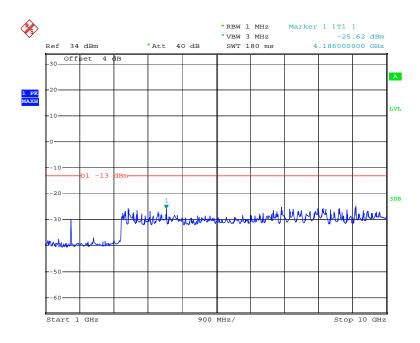
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Please refer to the following plots.

#### **GSM850\_Middle Channel**



Date: 13.DEC.2017 11:06:02

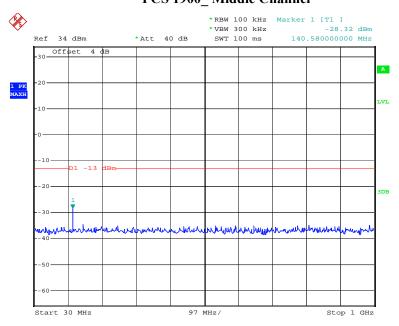


Date: 13.DEC.2017 11:06:37

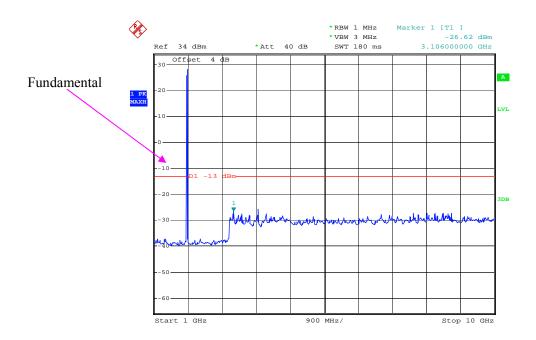
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## PCS 1900\_ Middle Channel

Report No.: RDG171207006-00D

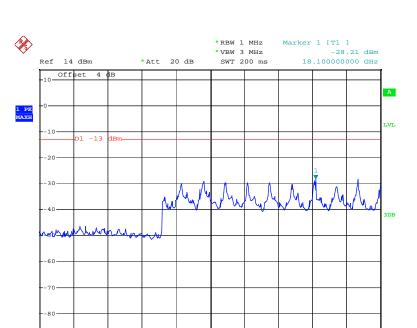


Date: 13.DEC.2017 11:16:10



Date: 8.JAN.2018 16:58:24

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1 GHz/

Report No.: RDG171207006-00D

Stop 20 GHz

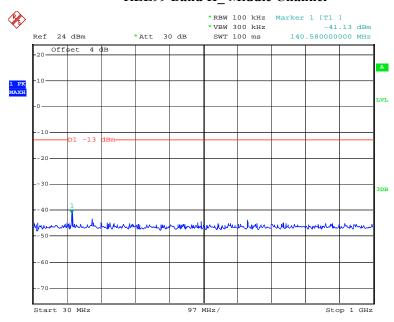
Date: 8.JAN.2018 16:58:55

Start 10 GHz

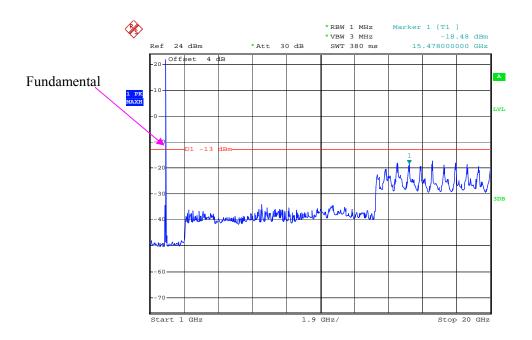
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## **REL99 Band II\_ Middle Channel**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:54:08

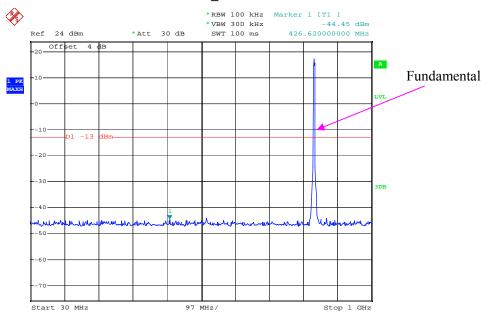


Date: 13.DEC.2017 10:54:31

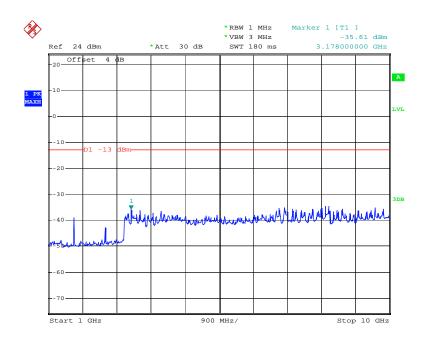
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## Report No.: RDG171207006-00D

## Rel 99 Band V\_ Middle Channel



Date: 13.DEC.2017 10:42:40



Date: 13.DEC.2017 10:43:28

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## FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

#### **Applicable Standard**

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

#### **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.

Report No.: RDG171207006-00D

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 (TXpwr in Watts/0.001) - the absolute level

Spurious attenuation limit in  $dB = 43 + 10 \text{ Log}_{10}$  (power out in Watts)

#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-06	2020-11-05
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
R&S	Spectrum Analyzer	FSU 26	200256	2017-12-08	2018-12-08
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Mini-Circuit	Amplifier	AFS42-00101800- 25-S-42	2001271	2017-09-05	2018-09-05
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	Chamber A-1	4m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-1	0.75m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber B-2	8m	2017-09-05	2018-09-05

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

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## **Test Data**

#### **Environmental Conditions**

Temperature:	26.3 ~ 26.8°C
Relative Humidity:	29.8 ~ 30.8 %
ATM Pressure:	101.3 ∼ 102 kPa

<sup>\*</sup> The testing was performed by Blake Yang from 2017-12-14 to 2017-12-17.

EUT Operation Mode: Transmitting

## Cellular Band (PART 22H)

Report No.: RDG171207006-00D

#### 30 MHz-10 GHz:

		D	Su	bstituted Met	hod	A11 4.		
Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			GSM850, Fre	quency:836.60	00 MHz			
382.000	Н	43.82	-61.7	0.0	0.6	-62.3	-13.0	49.3
382.000	V	46.57	-61.9	0.0	0.6	-62.5	-13.0	49.5
1673.200	Н	47.65	-55	10.5	1.5	-46.0	-13.0	33.0
1673.200	V	45.32	-57.3	10.5	1.5	-48.3	-13.0	35.3
2509.800	Н	46.57	-54.2	12.2	1.8	-43.8	-13.0	30.8
2509.800	V	44.28	-57.9	12.2	1.8	-47.5	-13.0	34.5
2912.000	Н	44.66	-55.2	12.4	1.9	-44.7	-13.0	31.7
2912.000	V	42.51	-57.5	12.4	1.9	-47.0	-13.0	34.0
		WCI	MA Band V R	99,Frequency	:836.600 MHz			
376.000	Н	43.62	-62.1	0.0	0.6	-62.7	-13.0	49.7
376.000	V	46.29	-62.3	0.0	0.6	-62.9	-13.0	49.9
1673.200	Н	46.22	-56.5	10.5	1.5	-47.5	-13.0	34.5
1673.200	V	43.91	-58.7	10.5	1.5	-49.7	-13.0	36.7
2509.800	Н	47.31	-53.4	12.2	1.8	-43.0	-13.0	30.0
2509.800	V	44.18	-58	12.2	1.8	-47.6	-13.0	34.6
2964.000	Н	46.03	-53.8	12.4	1.9	-43.3	-13.0	30.3
2964.000	V	42.08	-57.7	12.4	1.9	-47.2	-13.0	34.2

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## PCS Band (PART 24E)

Report No.: RDG171207006-00D

#### 30 MHz-20 GHz:

		D .	Su	bstituted Met	hod	41 14		
	Polar (H/V)	Panding	Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			GSM1900, Fre	quency:1880.	000 MHz			
483.000	Н	44.58	-59.7	0.0	0.7	-60.4	-13.0	47.4
483.000	V	46.61	-60.8	0.0	0.7	-61.5	-13.0	48.5
3760.000	Н	48.67	-49	12.3	2.1	-38.8	-13.0	25.8
3760.000	V	45.36	-52.1	12.3	2.1	-41.9	-13.0	28.9
5640.000	Н	47.25	-45.1	13.0	2.4	-34.5	-13.0	21.5
5640.000	V	45.17	-47.5	13.0	2.4	-36.9	-13.0	23.9
5815.000	Н	45.26	-46.6	13.2	2.4	-35.8	-13.0	22.8
5815.000	V	43.19	-48.8	13.2	2.4	-38.0	-13.0	25.0
		WCD:	MA Band II, R	99, Frequency	:1880.000 MHz			
425.000	Н	43.61	-61.1	0.0	0.6	-61.7	-13.0	48.7
425.000	V	45.35	-62.6	0.0	0.6	-63.2	-13.0	50.2
3760.000	Н	48.72	-49	12.3	2.1	-38.8	-13.0	25.8
3760.000	V	45.22	-52.2	12.3	2.1	-42.0	-13.0	29.0
5640.000	Н	46.72	-45.7	13.0	2.4	-35.1	-13.0	22.1
5640.000	V	43.24	-49.5	13.0	2.4	-38.9	-13.0	25.9
6531.000	Н	45.14	-44.7	14.1	2.5	-33.1	-13.0	20.1
6531.000	V	43.05	-46.8	14.1	2.5	-35.2	-13.0	22.2

#### Note:

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<sup>1)</sup> The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

<sup>2)</sup> Absolute Level = Substituted Level - Cable loss + Antenna Gain

<sup>3)</sup> Margin = Limit-Absolute Level

## FCC §22.917(a) & §24.238(a)- BAND EDGES

#### **Applicable Standard**

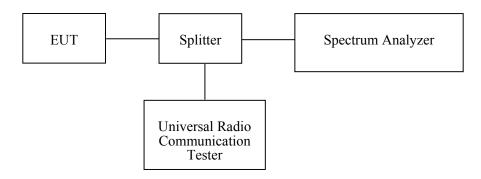
FCC § 2.1053, §22.917, § 24.238.

#### **Test Procedure**

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

Report No.: RDG171207006-00D

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



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

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#### **Test Data**

#### **Environmental Conditions**

Temperature:	25.4 °C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

Report No.: RDG171207006-00D

The testing was performed by Harry Yang on 2017-12-13.

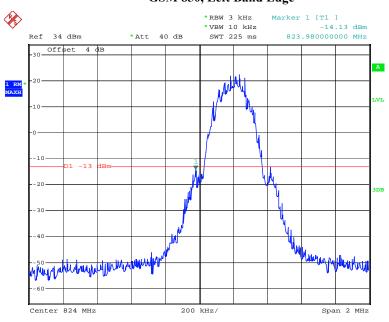
Test Mode: Transmitting

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

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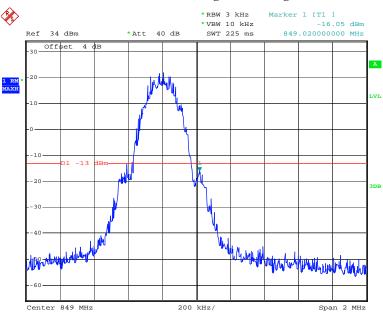
## GSM 850, Left Band Edge

Report No.: RDG171207006-00D



Date: 13.DEC.2017 11:04:15

#### GSM 850, Right Band Edge

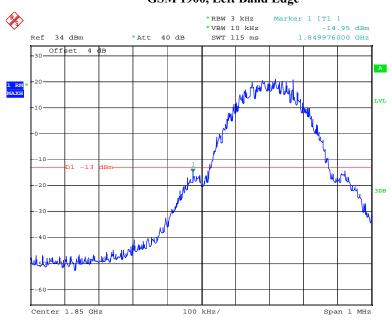


Date: 13.DEC.2017 11:04:45

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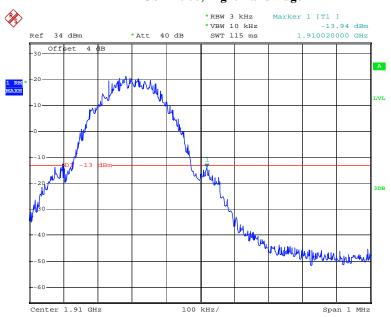
## GSM 1900, Left Band Edge

Report No.: RDG171207006-00D



Date: 13.DEC.2017 11:14:54

#### GSM 1900, Right Band Edge



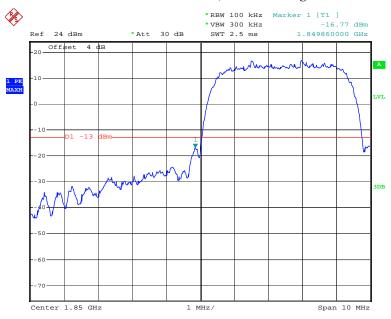
Date: 13.DEC.2017 11:15:37

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#### WCDMA Band II:

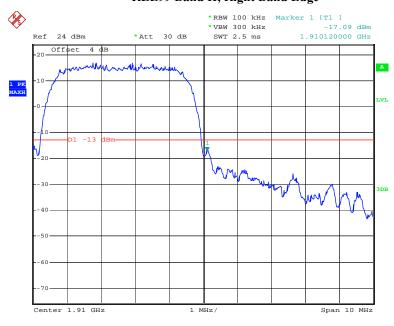
#### **REL99 Band II, Left Band Edge**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:55:45

#### **REL99 Band II, Right Band Edge**

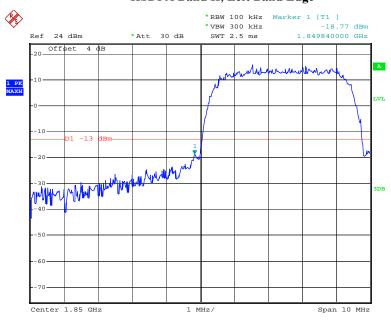


Date: 13.DEC.2017 10:56:11

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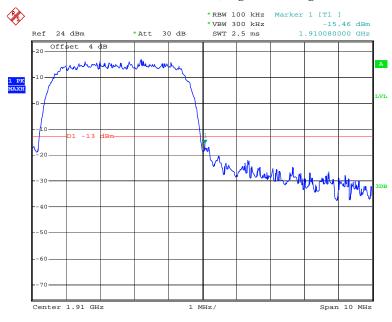
## **HSDPA Band II, Left Band Edge**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:57:59

#### **HSDPA Band II, Right Band Edge**

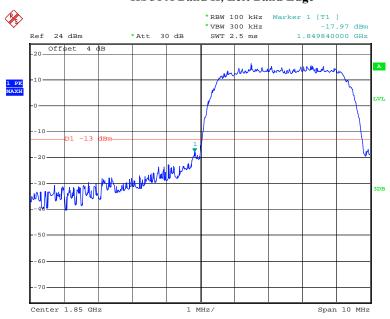


Date: 13.DEC.2017 10:58:26

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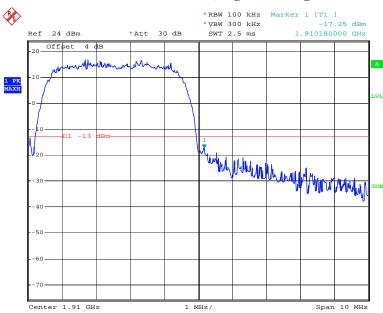
#### **HSUPA Band II, Left Band Edge**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:57:27

#### **HSUPA Band II, Right Band Edge**



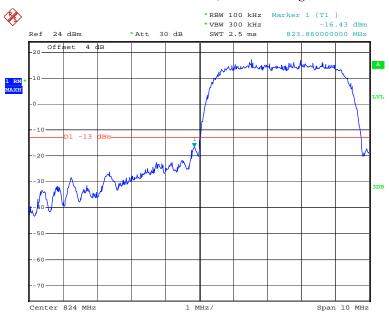
Date: 13.DEC.2017 10:56:42

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#### WCDMA Band V

#### REL99 Band V, Left Band Edge

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:37:41

#### **REL99 Band V Right Band Edge**

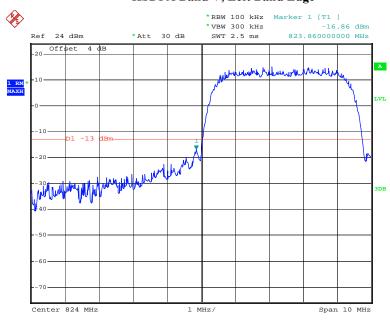


Date: 13.DEC.2017 10:38:18

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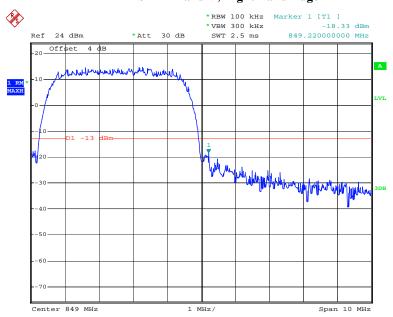
## **HSDPA Band V, Left Band Edge**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:39:32

#### HSDPA Band V, Right Band Edge

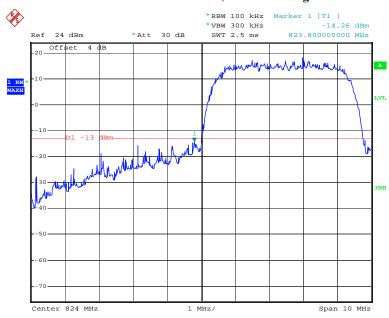


Date: 13.DEC.2017 10:39:00

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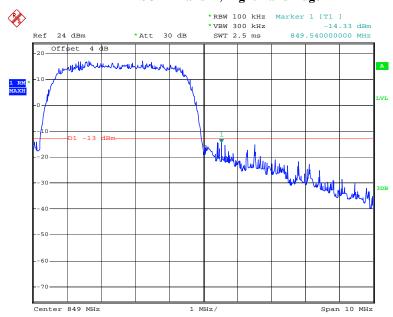
#### **HSUPA Band V, Left Band Edge**

Report No.: RDG171207006-00D



Date: 13.DEC.2017 10:40:23

#### **HSUPA Band V, Right Band Edge**



Date: 13.DEC.2017 10:40:53

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## FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY

#### **Applicable Standard**

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

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 T	ransmitters	in the	Public	Mohile	Services
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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

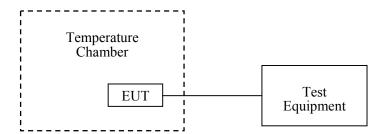
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

#### **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: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



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## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A

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#### **Test Data**

#### **Environmental Conditions**

Temperature:	25.4 °C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

The testing was performed by Harry Yang on 2017-12-13.

## Cellular Band (Part 22H)

G	GMSK, Middle Channel, f <sub>c</sub> = 836.6 MHz							
Temperature	Voltage	Frequency Error	Frequency Error	Limit				
C	$V_{DC}$	Hz	ppm	ppm				
-30		-1	-0.001					
-20		-1	-0.001					
-10		-1	-0.001					
0		0	0.000					
10	3.8	-1	-0.001					
20		-2	-0.002	2.5				
30		-3	-0.004					
40		-2	-0.002					
50		-3	-0.004					
25	4.35	-2	-0.002					
25	3.6	-2	-0.002					

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<sup>\*</sup> **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## PCS Band (Part 24E)

GMSK, Middle Channel, f <sub>c</sub> = 1880.0 MHz							
Temperature	Voltage	Frequency Error	Frequency Error	Results			
ပ	V <sub>DC</sub>	Hz	ppm				
-30		1	0.001				
-20		2	0.001				
-10		3	0.002				
0		2	0.001				
10	3.8	4	0.002				
20		1	0.001	Pass			
30		2	0.001				
40		2	0.001				
50		3	0.002				
25	4.35	3	0.002				
25	3.6	2	0.001				

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#### **WCDMA Band II: R99**

	Middle Channel, f <sub>c</sub> = 1880.0 MHz							
Temperature	Voltage	Frequency Error	Frequency Error	Results				
${\mathbb C}$	$V_{DC}$	Hz	ppm					
-30		1	0.001					
-20		10	0.005					
-10		7	0.004					
0		9	0.005					
10	3.8	8	0.004					
20		-1	-0.001	Pass				
30		6	0.003					
40		5	0.003					
50		6	0.003					
25	4.35	9	0.005					
25	3.6	5	0.003					

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Middle Channel, f <sub>c</sub> = 836.6 MHz							
Temperature	Voltage	Frequency Error	Frequency Error	Limit			
ဗ	V <sub>DC</sub>	Hz	ppm	ppm			
-30		7	0.008				
-20		3	0.004				
-10		6	0.007				
0		5	0.006				
10	3.8	7	0.008				
20		4	0.005	2.5			
30		5	0.006				
40		4	0.005				
50		7	0.008				
25	4.35	5	0.006				
25	3.6	3	0.004				

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Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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

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