



## FCC PART 22H, PART 24E

## MEASUREMENT AND TEST REPORT

For

### SHEN ZHEN HENG FENG DAS CO., LIMITED

16 Floor, Room, 16H Block A modern of windows Building Futian District, Shenzhen, Guangdong province, China

**FCC ID: 2ALEIA9A3**

<b>Report Type:</b> Original Report	<b>Product Name:</b> mobile phone
<b>Test Engineer:</b> <u>Kevin Hu</u>	
<b>Report Number:</b> <u>RDG170330006C</u>	
<b>Report Date:</b> <u>2017-04-12</u>	
<b>Reviewed By:</b> <u>Henry Ding</u>	<b>Reviewed By:</b> EMC Leader 
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## GENERAL INFORMATION

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

The **SHEN ZHEN HENG FENG DAS CO., LIMITED**'s product, model number: **A9** (**FCC ID: 2ALEIA9A3**) (the "EUT") in this report was a **mobile phone**, which was measured approximately: 13.1 cm (L) x 5.6 cm (W) x 1.1 cm (H), rated input voltage: DC3.7V battery or DC5V from adapter.

Adapter information:

INPUT: AC100-240V 50/60Hz

OUTPU: DC5.0V 500mA

*Note: The series product, model A9, A10, A2 are electrically identical, the difference them is the model name and color, we selected A9 for fully testing, the details was explained in the attached declaration letter.*

*\*All measurement and test data in this report was gathered from final production sample, serial number: 170330006 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-03-31, and EUT conformed to test requirement.*

### Objective

This report is prepared on behalf of **SHEN ZHEN HENG FENG DAS CO., 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 15B JBP submissions with FCC ID: 2ALEIA9A3.

FCC Part 15C DSS submissions with FCC ID: 2ALEIA9A3.

### 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, Part 22 Subpart H, Part 24 Subpart E.

Applicable Standards: TIA/EIA 603-D-2010.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu).

## **Test Facility**

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

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### 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.

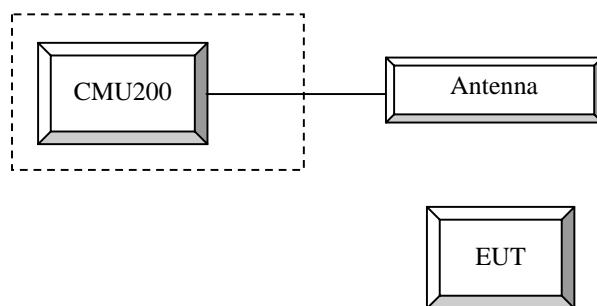
### Equipment Modifications

No modification was made to the EUT.

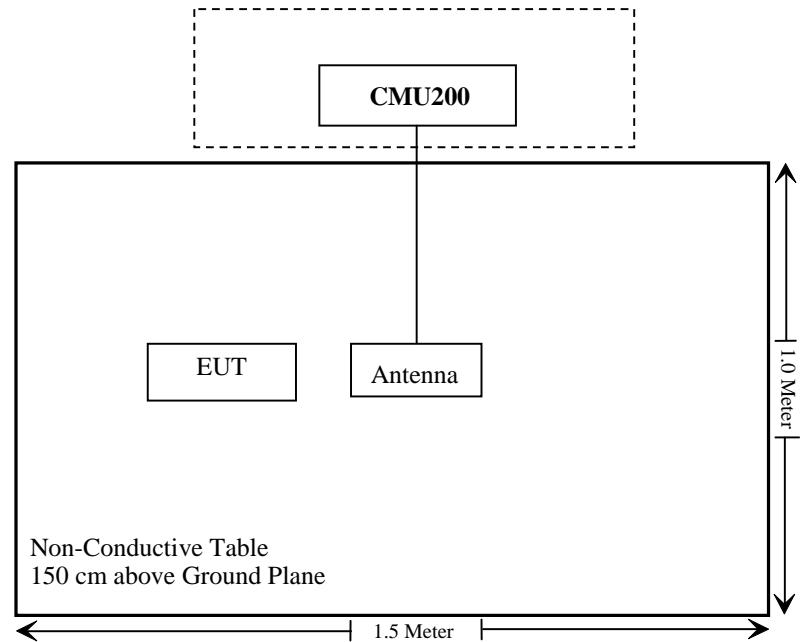
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	11-9435686-0111

### Configuration of Test Setup



## Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

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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)	Field Strength of Spurious Radiation	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

Bay Area Compliance Laboratories Corp. (Chengdu)

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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: RDG170330006-20.

## **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**

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### **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..

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**

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

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

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

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

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 > TCH > Hopping > Main Timeslot > Network	4 dB Unchanged (if already set under MS signal) choose desired test channel Off 3 Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)
Bit Stream > AF/RF Connection	2E9-1 PSR Bit Stream Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input Press Signal on to turn on the signal and change settings

*Radiated method:*

ANSI/TIA-603-D section 2.2.17

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	6751	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18
R&S	Universal Radio Communication Tester	CMU200	11-9435686-0111	2016-07-28	2017-07-27

**\* Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	20 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

The testing was performed by Kevin Hu on 2017-04-10.

### Conducted Output Power

#### Cellular Band (Part 22H) & PCS Band (Part 24E)

Band	Channel No.	Peak Output Power (dBm)				
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
Cellular	128	31.10	31.82	29.64	27.68	25.65
	190	31.20	30.98	29.59	27.61	25.61
	251	31.30	31.15	29.54	27.56	25.85
PCS	512	29.10	29.06	27.71	25.75	26.63
	661	28.60	28.50	27.22	25.23	23.17
	810	28.50	28.46	26.88	24.74	23.33

Peak-to-average ratio (PAR)<13dB

EIRP/ERP:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
<b>GSM 850 Middle Channel</b>								
836.600	H	94.49	19.6	0.0	1	18.6	38.5	19.9
836.600	V	102.46	27.7	0.0	1	29.7	38.5	8.8
<b>PCS 1900 Middle Channel</b>								
1880.000	H	91.33	18.7	11.7	2.7	27.7	33.0	5.3
1880.000	V	89.15	16.7	11.7	2.7	25.7	33.0	7.3

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 = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

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

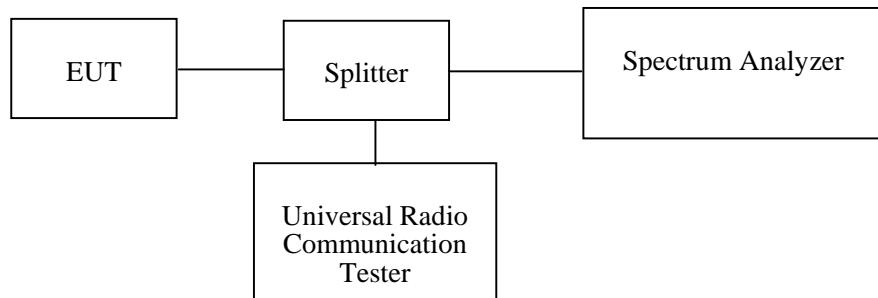
### **Applicable Standard**

FCC §2.1049, §22.917 and §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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Splitter	N/A	OE0120121	Each Time	/

**\* Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.2 kPa

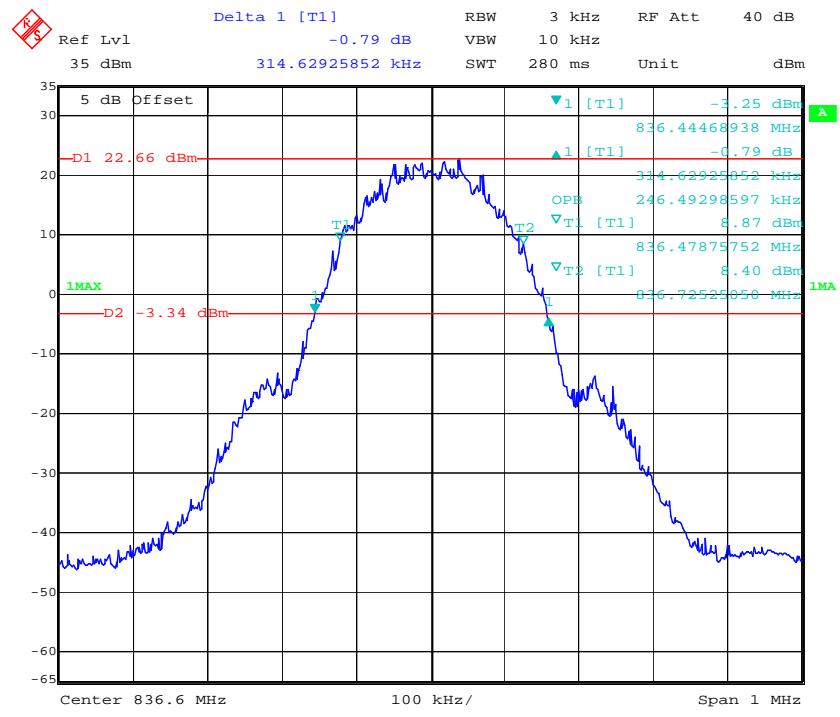
The testing was performed by Kevin Hu on 2017-04-08.

Test Mode: Transmitting

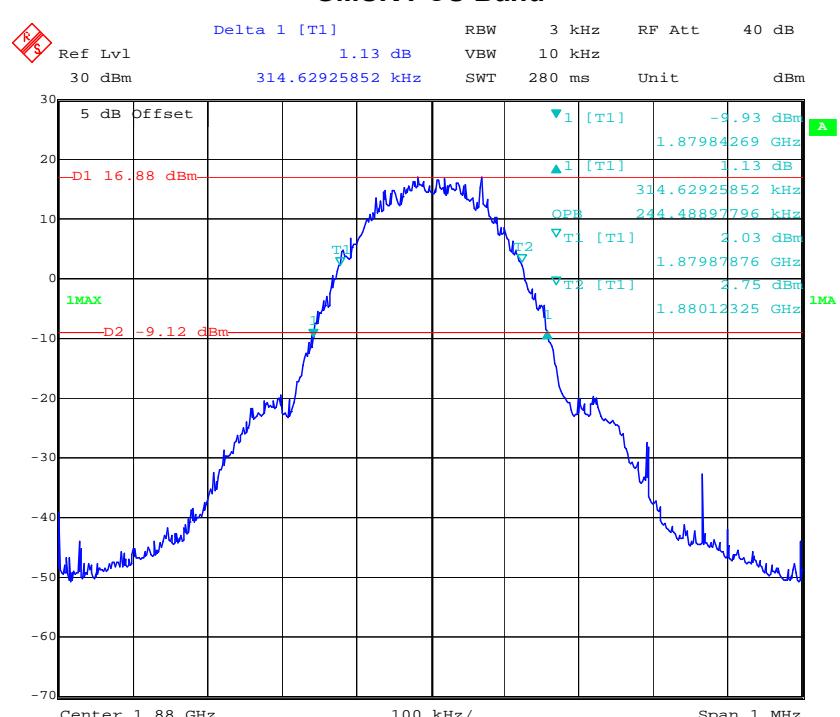
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (kHz)	26 dB Occupied Bandwidth (kHz)
Cellular	M	GSM	246	315
PCS		PCS	244	315

### GMSK 850 Cellular Band



### GMSK PCS Band



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

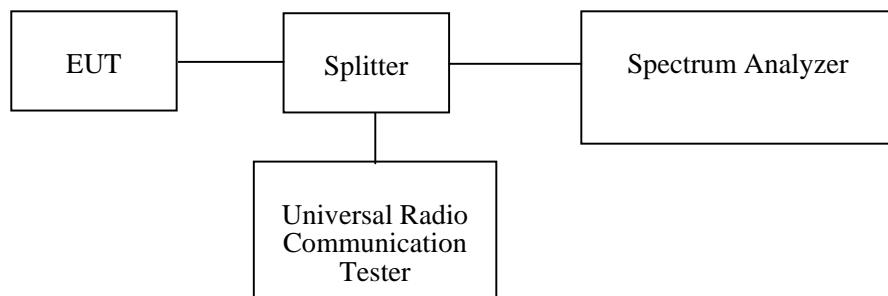
### Applicable Standard

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. 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Splitter	N/A	OE0120121	Each Time	/

**\* Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

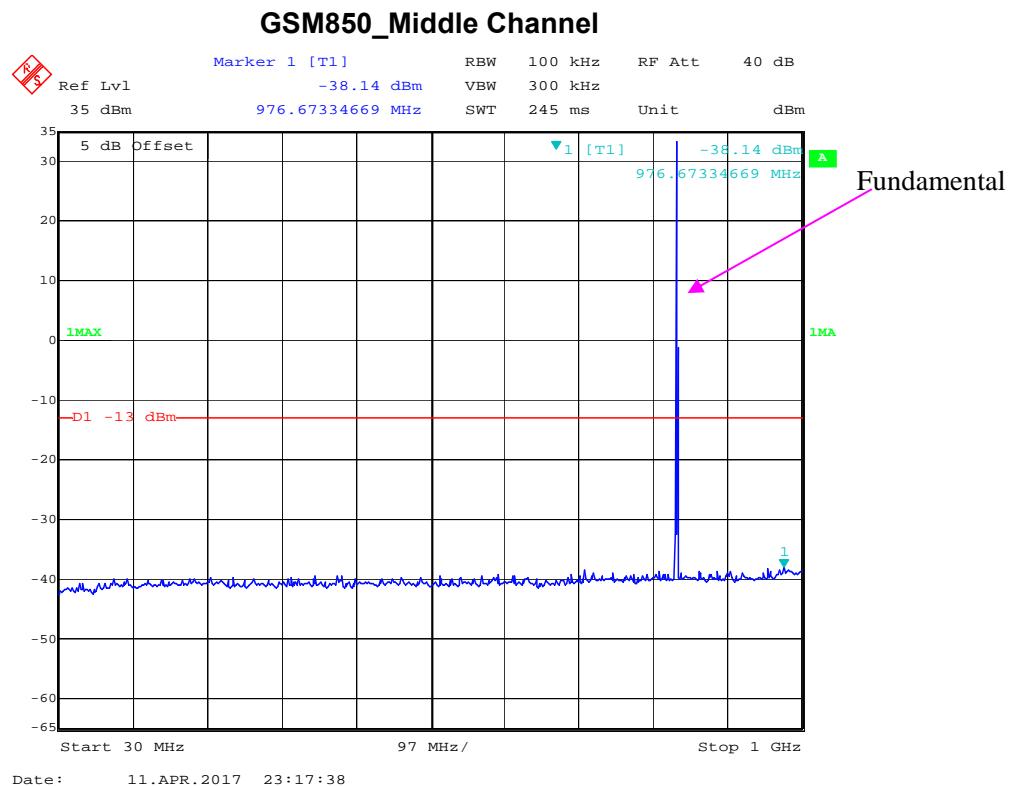
## Test Data

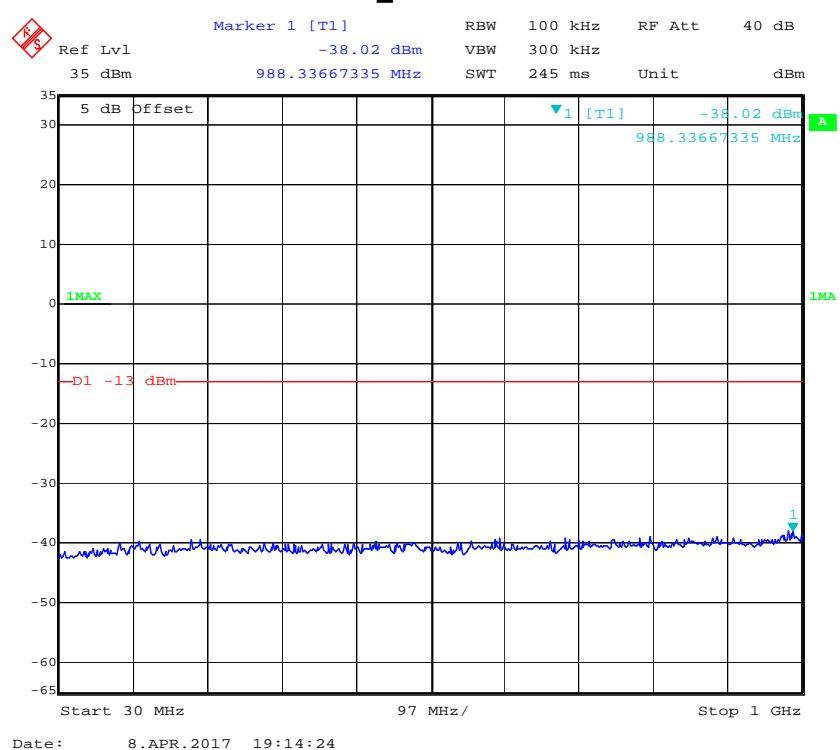
### Environmental Conditions

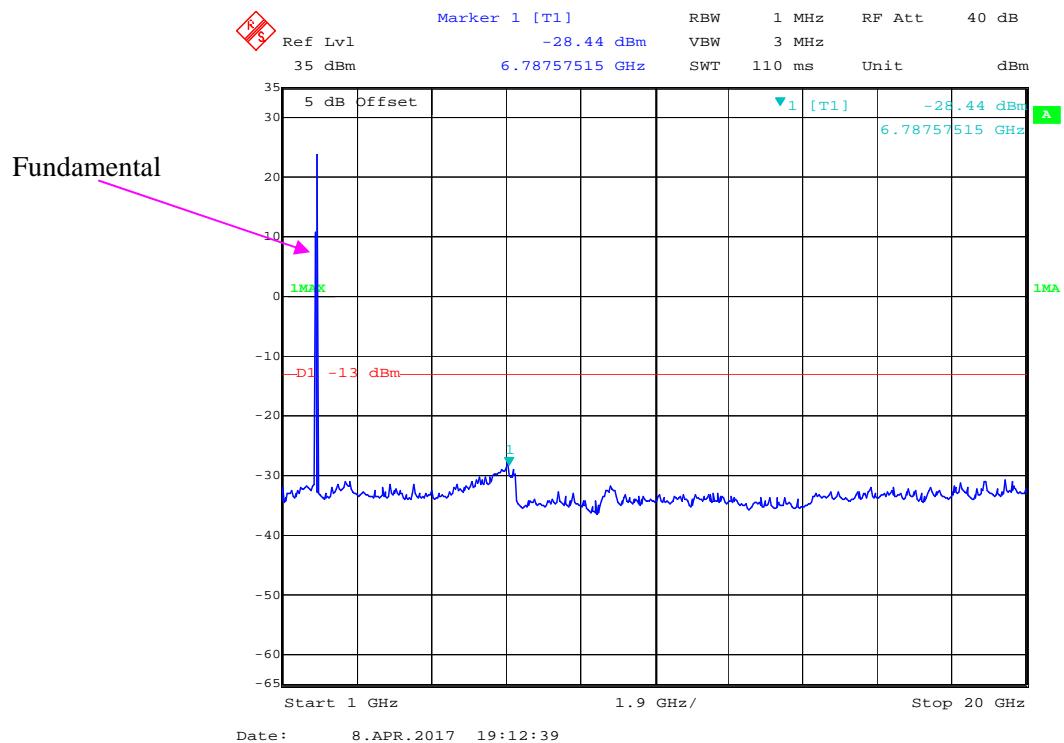
Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.2 kPa

The testing was performed by Kevin Hu from 2017-04-08 to 2017-04-11.

Please refer to the following plots.







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

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### **Applicable Standard**

FCC § 2.1053, §22.917 and § 24.238.

### **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 =  $10 \lg (\text{TXpwr in Watts}/0.001)$  – the absolute level

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

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	6751	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18

**\* Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	19°C
Relative Humidity:	58 %
ATM Pressure:	95.2 kPa

The testing was performed by Kevin Hu on 2017-04-08.

EUT Operation Mode: Transmitting

**Cellular Band (PART 22H)****30 MHz-10 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
332.000	H	45.75	-57.4	0.0	0.5	-57.9	-13.0	44.9
353.000	V	55.17	-49.5	0.0	0.6	-50.1	-13.0	37.1
1673.200	H	67.46	-34.6	10.6	2.5	-26.5	-13.0	13.5
1673.200	V	64.27	-38.1	10.6	2.5	-30.0	-13.0	17.0
2509.800	H	50.44	-49	13.1	3.1	-39.0	-13.0	26.0
2509.800	V	45.68	-52.8	13.1	3.1	-42.8	-13.0	29.8

**PCS Band (PART 24E)****30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
426.000	H	34.62	-65.4	0.0	0.6	-66.0	-13.0	53.0
526.000	V	38.63	-63.3	0.0	0.7	-64.0	-13.0	51.0
3760.000	H	54.36	-41.5	13.8	3.8	-31.5	-13.0	18.5
3760.000	V	50.42	-44.2	13.8	3.8	-34.2	-13.0	21.2
5640.000	H	47.65	-46.7	14.0	4.6	-37.3	-13.0	24.3
5640.000	V	43.87	-50.5	14.0	4.6	-41.1	-13.0	28.1

## 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 = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

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

### Applicable Standard

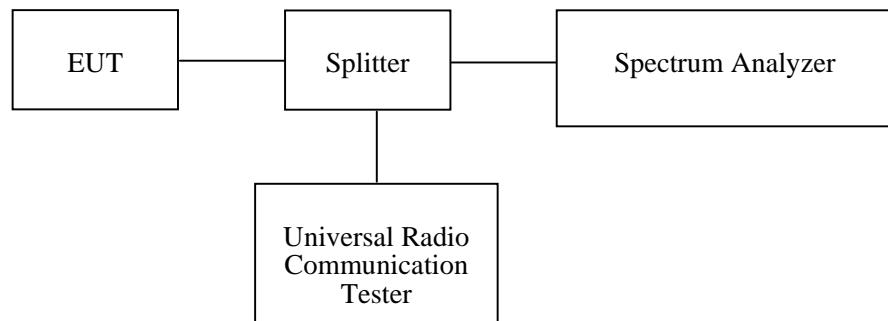
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Splitter	N/A	OE0120121	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

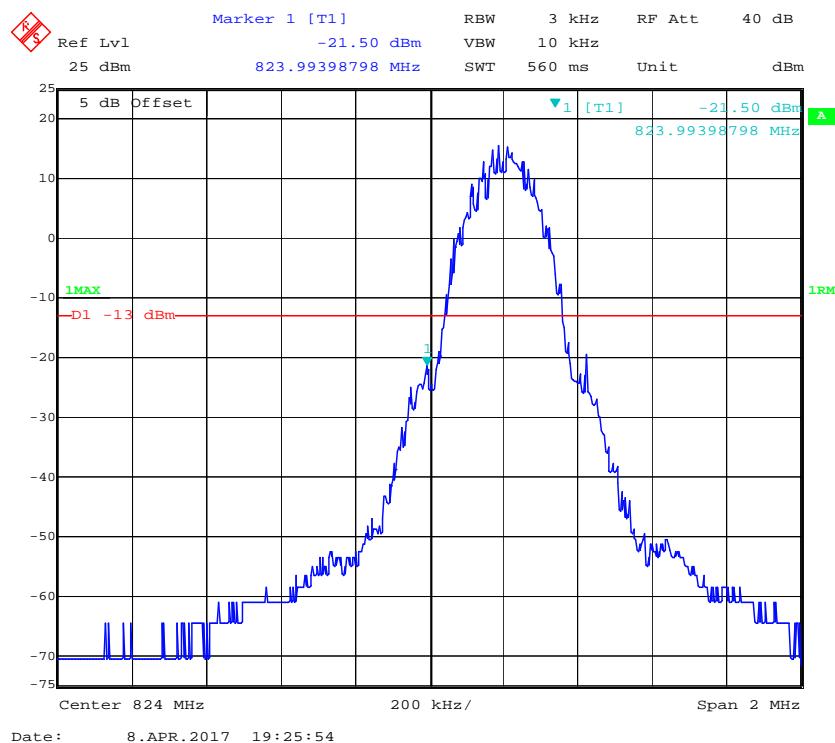
Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.2 kPa

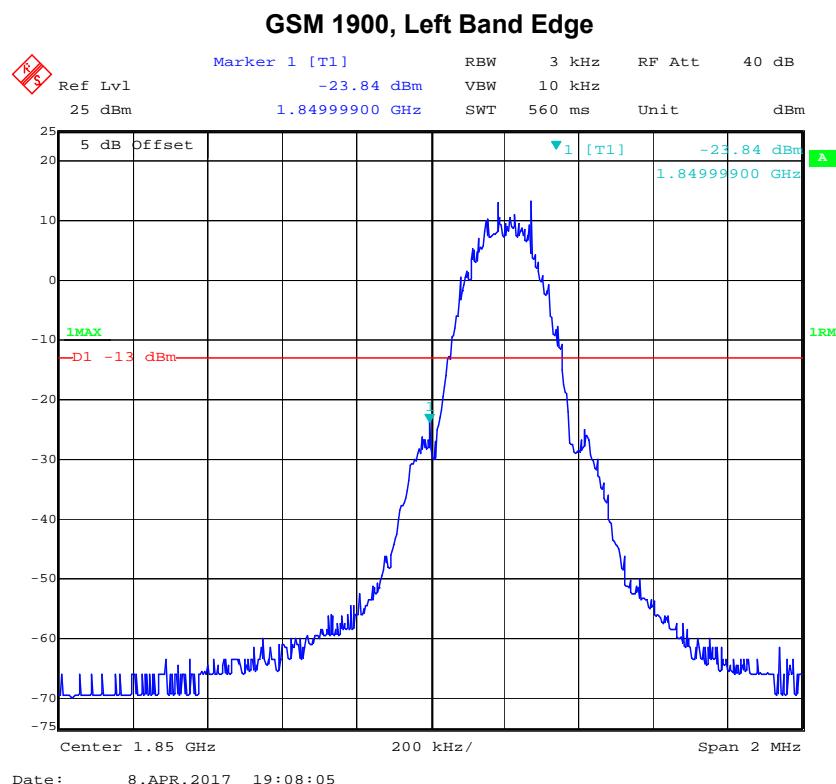
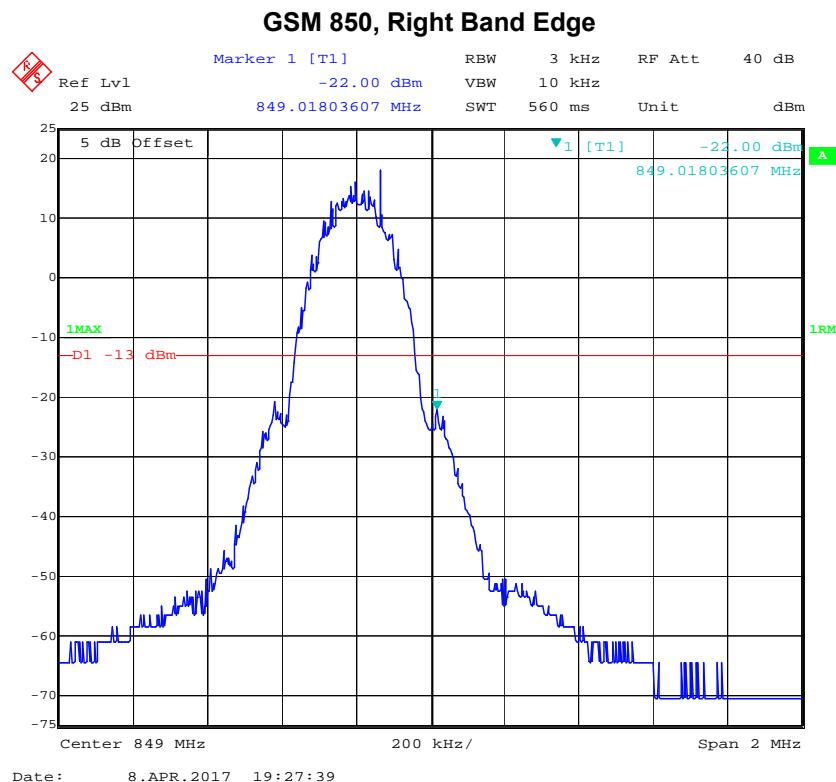
The testing was performed by Kevin Hu on 2017-04-08.

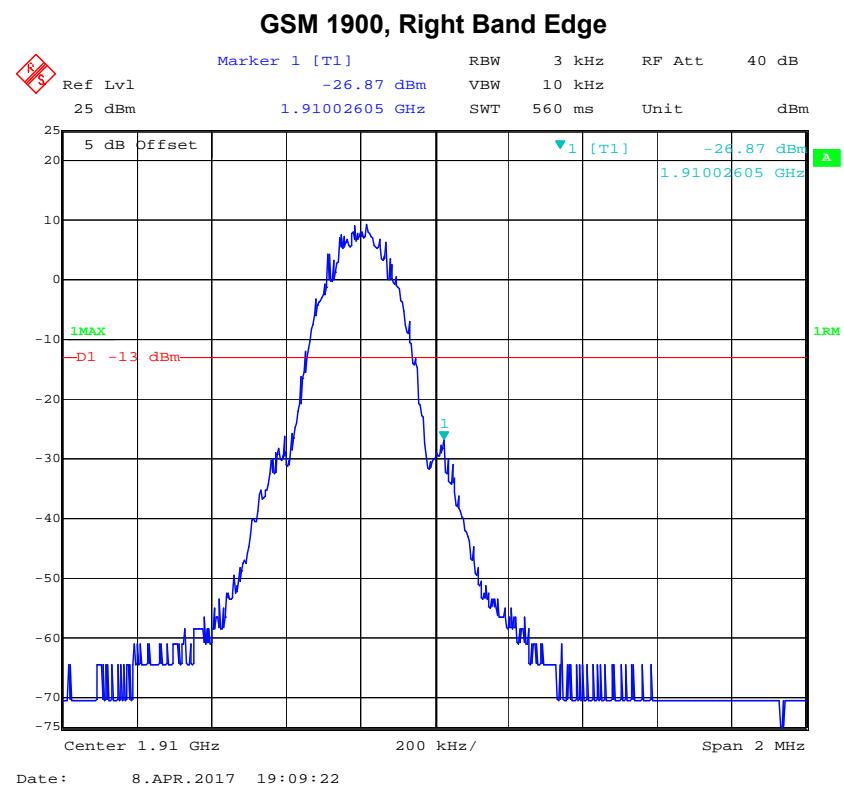
Test Mode: Transmitting

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

### GSM 850, Left Band Edge







## 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 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

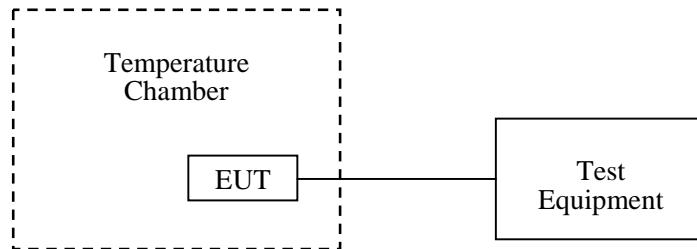
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### 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: 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.



## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
FLUKE	Multimeter	1587	27870099	2016-12-02	2017-12-01
R&S	Universal Radio Communication Tester	CMU200	11-9435686-0111	2016-07-28	2017-07-27
N/A	RF Cable	N/A	N/A	Each Time	/

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

Temperature:	19 °C
Relative Humidity:	58 %
ATM Pressure:	95.2 kPa

*The testing was performed by Kevin Hu on 2017-04-08.*

**Cellular Band (Part 22H)**

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-20	3.7	-7	-0.008	2.5
-10		-4	-0.005	
0		-5	-0.006	
10		-6	-0.007	
20		-8	-0.010	
30		-3	-0.004	
40		-5	-0.006	
50		-7	-0.008	
55		-9	-0.011	
25	3.5	-11	-0.013	
25	4.2	-6	-0.007	

**PCS Band (Part 24E)**

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-20	3.7	-2	-0.001	Compliance
-10		-7	-0.004	
0		-4	-0.002	
10		-10	-0.005	
20		-14	-0.007	
30		-10	-0.005	
40		-6	-0.003	
50		-4	-0.002	
55		-8	-0.004	
25	3.5	-9	-0.005	
25	4.2	-16	-0.009	

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