



HCT CO., LTD.

CERTIFICATION DIVISION

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EMI CERTIFICATION REPORT

Applicant:

LG Electronics MobileComm U.S.A., Inc.

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: December 23, 2013

Test Report No.: HCTE1312FE28

Test Site: HCT CO., LTD.

HCT FRN: 0005-8664-21

FCC ID:

ZNFD685

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B
Equipment Type : GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz_ HT40), VoIP, Hotspot support
Model Name : LG-D685
Additional Model Name : LGD685, D685
Port / Connector(s) : USB / Earphone Port
Date of Test : December 18, 2013 - December 20, 2013

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4/2003. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HCT certifies that no party to application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862


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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCTE1312FE28	December 23, 2013	Initial Release

TABLE OF CONTENTS

	PAGE
1. GENERAL INFORMATION	4
1.1 Product Description	4
1.2 Related Submittal(s) / Grant(s)	4
1.3 Tested System Details	5
1.4 Cable Description	6
1.5 Noise Suppression Parts on Cable. (I/O cable)	6
1.6 Test Methodology	7
1.7 Test Facility	7
1.8 Frequency Range of Radiated Measurements	7
2. SYSTEM TEST CONFIGURATION	8
2.1 Configuration of Test System	8
3. PRELIMINARY TEST	9
3.1 Conducted Emission Test	9
3. 2 Radiated Emission Test	9
4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY	10
4.1 Conducted Emission Test	10
4.2 Radiated Emission Test	11
5. FIELD STRENGTH CALCULATION	17
6. TEST EQUIPMENT	18
7. CONCLUSION	19

ATTACHMENT: TEST SETUP PHOTOGRAPHS

1. GENERAL INFORMATION

1.1 Product Description

Equipment Under Test is manufactured by **LG Electronics MobileComm U.S.A., Inc.**
Its basic purpose is used for communications.

Model Name	LG-D685
Additional Model	LGD685, D685
FCC ID	ZNFD685
EUT Type	GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n(2.4GHz_HT40), VoIP, Hotspot support
TX Frequency	824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900) 826.40 MHz to 846.60 MHz (WCDMA 850) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900)
RX Frequency	869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900) 871.40 MHz to 891.60 MHz (WCDMA 850) 1 932.4 MHz to 1 987.6 MHz (WCDMA 1 900)

1.2 Related Submittal(s) / Grant(s)

Original submittal only.

1.3 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Manufacturer	FCC ID / DoC	Connected To
EUT	LG-D685	LG	ZNFD685	Notebook PC Ear-phone
USB cable	EAD62185901	CRESYN	-	E.U.T Notebook PC
Ear-phone	EAB62209201	I-SOUND	-	E.U.T
Notebook PC	ProBook6560b	H.P	DoC	EUT Notebook PC adaptor
Notebook PC adaptor	PPP009D	DELTA Electronics (JIANGSU)LTD	-	Notebook PC
Gateway	MV440	Axesstel	PH7MV440	Notebook PC, Adaptor
Mouse	Serial 2 button mouse	Radio shack	FSUGMZE3	Notebook PC
Adaptor	DA-60M12	Yang Ming Industrial	-	Gateway
RJ45 cable	-	-	-	Notebook PC, Gateway
Micro SD card	8 GB	SanDisk	-	EUT

1.4 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	Micro USB	Y	Y	(P,D)1.2
	Ear-phone	N/A	Y	(D)1.2
Notebook PC	RJ 45	N/A	N	(D)1.5
	Serial (Mouse)	N/A	Y	(D)1.8
	DC in	N	N/A	(P)1.8
Gateway	DC in	N	N/A	(P)1.8

* The marked "(D)" means the data cable and "(P)" means the power cable.

1.5 Noise Suppression Parts on Cable. (I/O cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	Micro USB	N	N/A	Y	Both End
	Ear-phone	N	N/A	Y	EUT End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook PC End

1.6 Test Methodology

Both Conducted and Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to EUT distance of 3 m.

1.7 Test Facility

Chamber used to collect the test data is located at the 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, KOREA. Those measurement facilities are constructed in conformance with the requirements of C63.4/2003.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3m)	90661 (June 21, 2011)
Radiated Field strength measurement facility (10m)	90661 (June 21, 2011)

1.8 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

2. SYSTEM TEST CONFIGURATION

2.1 Configuration of Test System

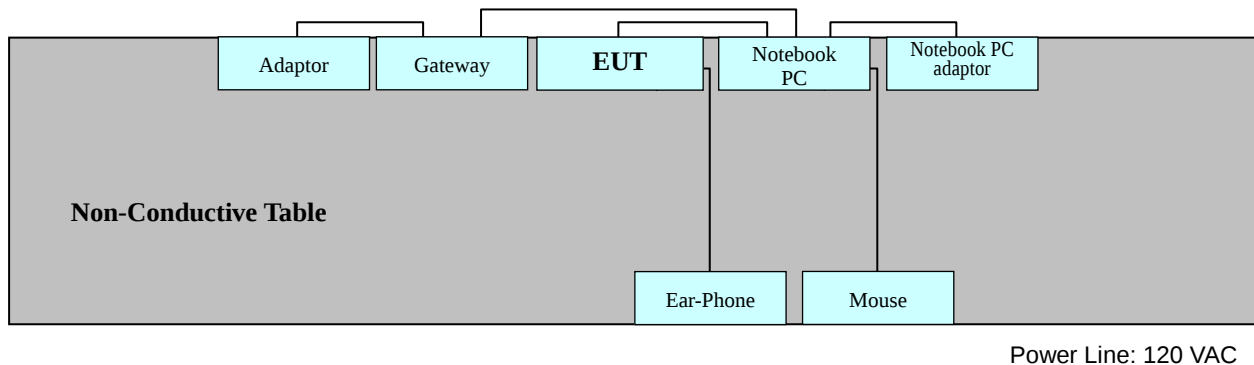
2.1.1 Conducted Emission Test

EUT was connected to LISN via Notebook PC adaptor and Base Station. Preliminary Power Line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

2.1.2 Radiated Emission Test

Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition. Final Radiated Emission tests were performed at 3 m semi-anechoic chamber.

[Configuration of Tested System]



3. PRELIMINARY TEST

3.1 Conducted Emission Test

- It was tested Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode

3. 2 Radiated Emission Test

- It was tested Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode

4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak, Average (6 dB Bandwidth: 9 kHz)
Operation Mode	: Data Communication mode
Temperature	: 19.0°C
Humidity Level	: 33.5 %
Test Date	: December 18, 2013

Frequency (MHz)	Transd (dB)	Conductor	Quasi-Peak			Average		
			Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)	Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)
0.202	9.8	H	64	43.3	53.1	54	26.3	36.1
0.202	10.0	N	64	41.9	51.9	54	-	-
0.470	10.0	N	57	34.2	44.2	47	-	-
0.482	9.8	H	56	34.2	44.0	46	12.5	22.3
0.772	9.8	H	56	34.7	44.5	46	14.8	24.6
4.300	10.3	N	56	-	-	46	23.7	34.0

※ **NOTE:** Refer to page 11 to page 14 for details.

1. Line H = Hot, Line N = Neutral
2. Transd = LISN factor + Cable Loss factor

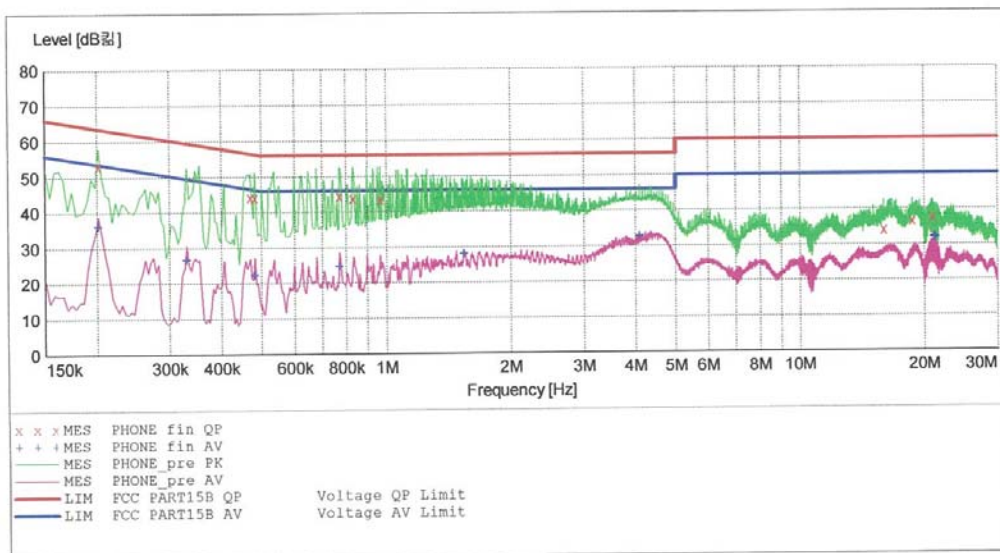
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EMC

EUT: LG-D685
 Manufacturer: LG
 Operating Condition: DATA MODE
 Test Site: SHIELD ROOM
 Operator: GC YOON
 Test Specification: FCC PART15B
 Comment: H
 Start of Test: 2013-12-18 / 4:23:01 오후

SCAN TABLE: "FCC CLASS B(H)"

Short Description:			FCC CLASS B(H)				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				



MEASUREMENT RESULT: "PHONE_fin QP"

2013-12-18 4:25 오후

Frequency MHz	Level dB	Transd dB	Limit dB	Margin dB	Line	PE
0.202000	53.10	9.8	64	10.4	---	---
0.470000	44.20	9.8	57	12.4	---	---
0.482000	44.00	9.8	56	12.3	---	---
0.772000	44.50	9.8	56	11.5	---	---
0.832000	43.80	9.8	56	12.2	---	---
0.968000	43.50	9.8	56	12.5	---	---
15.948000	34.20	10.8	60	25.8	---	---
18.696000	36.60	10.9	60	23.4	---	---
20.912000	37.80	11.0	60	22.2	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-18 4:25 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.202000	36.10	9.8	54	17.4	---	---
0.330000	26.60	9.8	50	22.8	---	---
0.482000	22.30	9.8	46	24.0	---	---
0.772000	24.60	9.8	46	21.4	---	---
1.544000	28.10	9.9	46	17.9	---	---
4.100000	32.70	10.1	46	13.3	---	---
21.124000	31.90	11.0	50	18.1	---	---
21.192000	32.10	11.0	50	17.9	---	---
21.260000	31.90	11.0	50	18.1	---	---

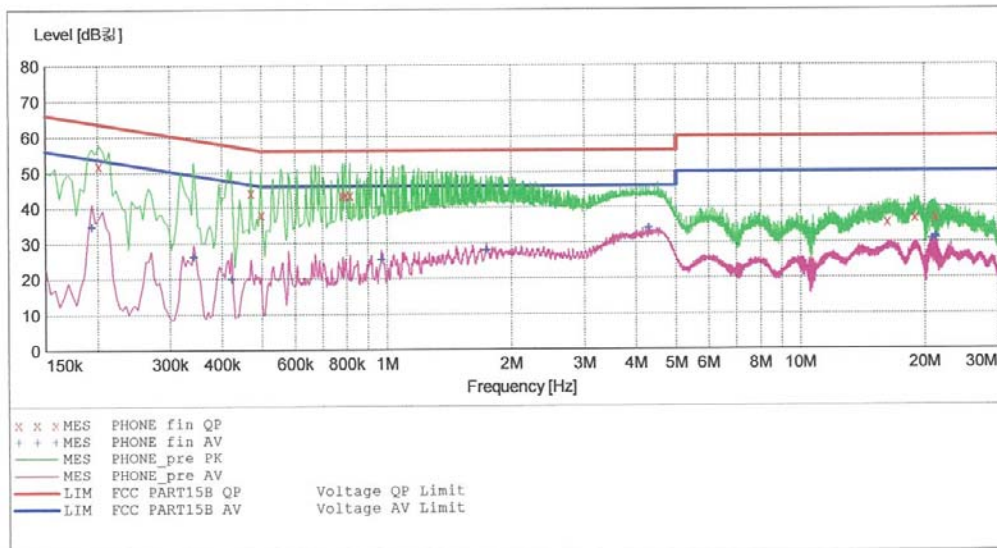
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EMC

EUT: LG-D685
 Manufacturer: LG
 Operating Condition: DATA MODE
 Test Site: SHIELD ROOM
 Operator: GC YOON
 Test Specification: FCC PART15B
 Comment: N
 Start of Test: 2013-12-18 / 4:28:04 오후

SCAN TABLE: "FCC CLASS B(N)"

Short Description:			FCC CLASS B(N)			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

2013-12-18 4:30 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.202000	51.90	10.0	64	11.6	---	---
0.470000	44.20	10.0	57	12.3	---	---
0.498000	38.20	10.0	56	17.8	---	---
0.784000	43.50	10.0	56	12.5	---	---
0.796000	43.60	10.0	56	12.4	---	---
0.816000	43.50	10.0	56	12.5	---	---
16.248000	35.70	11.1	60	24.3	---	---
18.936000	36.90	11.2	60	23.1	---	---
21.188000	36.90	11.3	60	23.1	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-18 4:30 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.194000	34.60	10.0	54	19.3	---	---
0.342000	26.20	10.0	49	22.9	---	---
0.422000	19.90	10.0	47	27.5	---	---
0.972000	25.30	10.0	46	20.7	---	---
1.744000	28.00	10.1	46	18.0	---	---
4.300000	34.00	10.3	46	12.0	---	---
20.844000	30.70	11.3	50	19.3	---	---
21.196000	31.60	11.3	50	18.4	---	---
21.264000	31.00	11.3	50	19.0	---	---

4.2 Radiated Emission Test

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

-For measurement below 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Quasi-Peak (6 dB Bandwidth: 120 kHz)

Operation Mode : Data Communication mode

Temperature : 20.9°C

Humidity Level : 31.0 %

Test Date : December 20, 2013

Frequency (MHz)	Reading (dB μ V)	Polarity (H/V)	Antenna Height (m)	Correction Factor		Limit (dB μ V/m)	Level (dB μ V/m)	Margin (dB)
				Antenna (dB/m)	Cable (dB)			
108.2	17.03	H	1.0	10.27	3.81	43.5	31.11	12.39
125.0	19.03	V	1.0	12.01	3.90	43.5	34.94	8.56
275.0	14.96	V	1.0	12.59	4.45	46.0	32.00	14.00
375.0	19.63	V	1.3	15.08	4.79	46.0	39.50	6.50
400.2	9.47	V	1.0	15.63	4.87	46.0	29.97	16.03
625.0	13.63	V	1.0	19.97	5.39	46.0	38.99	7.01

※ **NOTE:** Polarity H = Horizontal, Polarity V = Vertical

-For measurement above 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz, VBW: 1 MHz)
: Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)

Operation Mode : Data Communication mode

Temperature : 20.9°C

Humidity Level : 31.0 %

Test Date : December 20, 2013

Frequency (GHz)	Peak			POL	Average		
	Total (dBμV/m)	Limit (dBμV/m)	Margin (dB)		Total (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.3285	52.3	74	21.7	V	28.2	54	25.8
1.9964	55.5	74	18.5	V	31.4	54	22.6
2.0325	49.4	74	24.6	V	29.6	54	24.4
2.1104	51.8	74	22.2	V	29.9	54	24.1
2.6565	51.8	74	22.2	V	31.0	54	23.0

※ NOTE:

1. Measurement above 1 GHz was performed from 1 GHz to the 5th harmonic of highest fundamental frequency. Test was measured by 12 GHz.

5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dB μ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB μ V/m value is mathematically converted to its corresponding level in μ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dB}\mu\text{V/m}$$

[Radiated Emission Limits]

Frequency of Emission (MHz)	Field Strength	
	μ V/m	dB μ V/m
30 to 88	100	40.0
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

6. TEST EQUIPMENT

Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	Next CAL Date
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Conducted Emission

☒	EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	2014.04.25
☒	LISN	EMCO	3816/2SH	9706-1070	1 year	2014.04.26
☒	LISN	Rohde & Schwarz	ENV216	100073	1 year	2014.02.06
☐	EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	2014.06.23
☐	LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2014.07.03
☐	Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2014.07.03

Radiated Emission (30 Mhz to 1 GHz)

☒	EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
☒	Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	2014.12.17
☒	Antenna master	HD GmbH	MA240	240/520	N/A	-
☒	Turn Table	HD GmbH	2090	9702/1224	N/A	-
☐	EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
☐	Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	2015.04.16
☐	Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐	Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-

Radiated Emission (1 GHz to 12 GHz)

☒	EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
☒	Antenna master	HD GmbH	MA240	240/520	N/A	-
☒	Turn Table	HD GmbH	2090	9702/1224	N/A	-
☒	Power Amplifier	CERNEX	CBLU1183540	21690	1 year	2014.07.12
☒	Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	2014.12.13
☐	EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
☐	Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐	Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-

7. CONCLUSION

The data collected shows that the **EUT type: GSM/WCDMA Phone with Bluetooth3.0, WIF1802.11 b/g/n(2.4GHz_HT40), VoIP, Hotspot support, FCC ID: ZNFD685, Model: LG-D685** complies with §15.107 and §15.109 of the FCC rules.