

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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CERTIFICATION

Manufacture;
AVC Technology Limited

6/F, Enterprise Square Three, 39 Wang Chiu Road,
Kowloon Bay, Hong Kong

AVC FRN : 0009178559

Date of Issue : July 25, 2005

Test Report No.: HCT-F05-0708

Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.

HCT FRN : 0005-8664-21

FCC ID :

Q93SNM500

MODEL /TYPE:

SN-M500

Rule Part(s):	Part 15 & 2
Equipment Class:	FCC Class B Peripheral Device (JBP)
Standard(s):	FCC Class B: (CISPR 22)
EUT Type:	MP3 Player
Memory:	128, 256, 512MB, 1GB
Model(s):	SN-M500
Port/Connector(s)	AUDIO IN/OUT, USB

This equipment has been shown to be in compliance 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

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.



Report prepared by : Ki-Soo Kim
Manager of EMC Tech. Part



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MEASUREMENT REPORT

1. Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Applicant Name: AVC Technology Limited

Address: 6/F, Enterprise Square Three, 39 Wang Chiu Road,
Kowloon Bay, Hong Kong

- **FCC ID : Q93SNM500**
- Equipment Class: FCC Class B Peripheral Device (JBP)
- EUT Type: MP3 Player
- Model(s): SN-M500
- Memory : 128,256,512MB,1GB
- Rule Part(s): FCC Part 15 Subpart B
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Tests: July 14, 2005 ~ July 18, 2005
- Place of Tests: 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA

2. INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2001) was used in determining radiated and conducted emissions emanating from **AVC Technology Limited MP3 Player FCC ID: Q93SNM500**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 23, 2003 (Confirmation Number: EA90661)

3. PRODUCT INFORMATION

3.1 Equipment Description

Equipment Under Test (EUT) is the **AVC Technology Limited (Model : SN-M500) MP3 Player**

FCC ID: Q93SNM500

Category		Specifications
Audio	Frequency range	20Hz - 20KHz
	Earphone output	10mW+10mW, 16ohm
	Signal/Noise ratio	85dB
File Support	Format	MP3, WMA, WAV
	ID3 Tag	ID3 V1, ID3 V2 2.0, 3.0, 4.0
FM Radio	FM Frequency range	76MHz - 108 MHz
	Signal/Noise ratio	55dB
Dimension		85 x 31 x 18mm
Weight		Approx. 60g
Battery		Internal Lithium Polymer rechargeable battery
LCD		Graphic Color Display
USB		USB 2.0
Internal Memory		128MB / 256MB / 512 MB / 1G
Continuous Playtime		Over 30 hours(128kbps, MP3 standard)
Operating System		Win 98SE (requires driver)
		Microsoft Windows ME/2000/XP Mac OS X 10.2.8 and above
Firmware Upgrade		possible
Operating temperature		-5℃ ~ 40℃

EMI Suppression Devices:

None

4. Description of Tests(Conducted)

4.1 Powerline Conducted RFI (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to CISPR 22.

The EUT was placed on a non-conducting 1.0 by 1.5 meter table which is 0.8 meters in height and 0.40 meters away from the vertical wall of the shielded enclosure. Power to the EUT is provided through a Rohde & Schwarz 50 Ω / 50 uH Line Impedance Stabilization Network (LISN) and the support equipment through a separate Solar 50 Ω / 50 uH Line- Conducted Test Facility LISN. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME. The spectrum was scanned from 150kHz to 30 MHz. Each maximum EME was remeasured using an EMI receiver. The detector function of the receiver was set to CISPR quasi- peak and average mode with the bandwidth set to 9 kHz. Each emission was maximized consistent with the typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum Diagram emission. Excess cable lengths were bundled at the center with 30- 40cm. in length. The worst-case configuration is noted in the test report and the photographs are attached. Each EME reported was calibrated using the Rohde & Schwarz SMX signal generator and are listed on Table 1. RFI Conducted FCC Class B

RFI CONDUCTED	CISPR 22 CLASS B	
	Limits dB(uV/m)	
Freq. Range	CISPR 22 Quasi-Peak	CISPR 22 Average
150kHz - 0.5MHz	66-56**	56-46**
0.5MHz - 5MHz	56	46
5MHz - 30MHz	60	50
**Limits decreases linearly with the logarithm of frequency		

Table 1. RFI Conducted Limits

4.2 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The spectrum was scanned from 30 to 300 MHz using biconical antenna, 300 to 1000 MHz using log- periodic antenna, and above 1 GHz using linearly polarized horn antennas. Final measurements were made outdoors at 10-meter test range using Dipole antennas and EMI receiver. For frequencies above 1 GHz, horn antennas were used. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The EMI receiver detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz. The EUT, support equipment, and interconnecting cables were arranged to the configuration that produces the maximum EME emission found during preliminary scan. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Horizontal and vertical antenna polarizations were checked. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/ or support equipment, and powering the monitor the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

ITE Radiated Limits			
Frequency (MHz)	FCC Limit @ 3m. Quasi-Peak dB[μV/m]	FCC Limit @ 10m.* Quasi – Peak dB [μV/m]	CISPR Limit @ 10m. Quasi-Peak dB [μV/m]
30-88	40.0	29.5	30.0
88-216	43.5	33.0	30.0
216-230	46.0	35.6	30.0
230-960	46.0	35.6	37.0
960-1000	54.0	43.5	37.0
> 1000	54.0	43.5	No Specified Limit
* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5. Support Equipment Used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MP3 Player (EUT)	AVC Technology Limited	SN-M500	Q93SNM500	NOTEBOOK
MOUSE	Microsoft	IntelliMouse optical USB and PS/2 Compatible	DoC	NOTEBOOK
PRINTER	H/P	C4569A	DoC	NOTEBOOK
NOTEBOOK PC	TOSHIBA	PAS50K-04W007	DoC	EUT
NOTEBOOK PC ADAPTOR	DELTA ELECTRONICS (JIANG SU),LTD	ADP-60RH A	DoC	NOTEBOOK
EAR PHONE	-	-	-	EUT

5.1 Cable Description

- DATA UP/DOWN Load Mode

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MP3 Player (EUT)	USB	N/A	Y	1.0(D)
	Audio in	N/A	Y	0.5(D)
	Audio out	N/A	N	1.5(D)
NOTE BOOK	USB	N/A	Y	1.8(D)
	Parallel	N	Y	1.8(P,D)
	DC in	N	N/A	1.8(P)
PRINTER	AC in	N	N/A	1.8(P)

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

5.2 Noise Suppression Parts on Cable. (I/O CABLE)

- DATA UP/DOWN Load Mode

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MP3 Player (EUT)	USB	Y	BOTH END	N	N/A
	Audio in	N	N/A	N	N/A
	Audio out	N	N/A	N	N/A
NOTE BOOK	USB	Y	NOTE BOOK END	N	N/A
	Parallel	Y	BOTH END	N	N/A
	DC in	Y	NOTE BOOK END	N	N/A
PRINTER	AC in	N	N/A	N	N/A

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1GB	X
512MB	
256MB	
128MB	

6.2 Radiated Emission Test

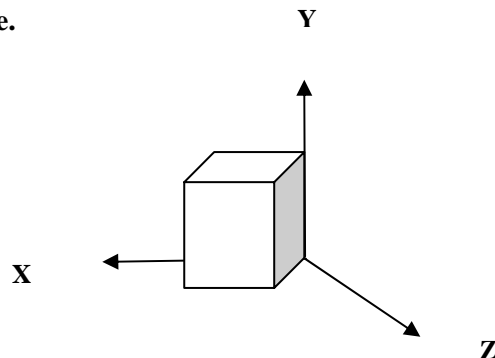
During Preliminary Test, the Following operation mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1GB	X
512MB	
256MB	
128MB	

During Preliminary Tests, the following operating conditions were investigated

Axes	The worst operating condition
X	X
Y	
Z	

Note : This transmitter has been investigated with three axes and the reported readings are the worse case.



7. LINE-CONDUCTED TEST DATA

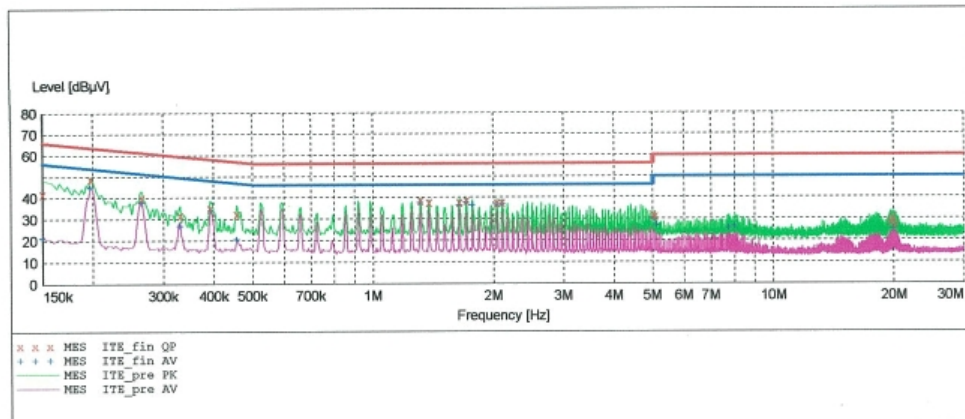
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EMC TEST LAB

EUT: SN-M500
Manufacturer: AVC Technology Limited
Operating Condition: NORMAL
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: CISPR 22 CLASS B
Comment: N

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ITE_fin QP"

7/14/2005 5:56PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	41.80	10.1	66	24.2	---	---
0.197600	49.10	10.1	64	14.6	---	---
0.265100	40.20	10.1	61	21.0	---	---
0.330100	32.00	10.1	59	27.4	---	---
0.392600	35.20	10.1	58	22.8	---	---
0.457600	32.40	10.1	57	24.3	---	---
1.315000	38.70	10.2	56	17.3	---	---
1.380000	37.90	10.2	56	18.1	---	---
1.645000	37.70	10.2	56	18.3	---	---
1.710000	38.80	10.2	56	17.2	---	---
2.040000	37.60	10.3	56	18.4	---	---
2.105000	37.90	10.3	56	18.1	---	---
5.000000	31.90	10.3	56	24.1	---	---
5.065000	31.30	10.3	60	28.7	---	---
19.665000	28.60	10.5	60	31.4	---	---
19.865000	30.20	10.5	60	29.8	---	---
19.930000	30.30	10.5	60	29.7	---	---
20.190000	27.20	10.5	60	32.8	---	---

MEASUREMENT RESULT: "ITE_fin AV"

7/14/2005 5:56PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	21.30	10.1	56	34.7	---	---
0.197600	44.70	10.1	54	9.0	---	---
0.265100	37.70	10.1	51	13.6	---	---
0.330100	26.90	10.1	49	22.6	---	---
0.395100	34.10	10.1	48	13.9	---	---
0.457600	20.60	10.1	47	26.1	---	---
1.315000	37.60	10.2	46	8.4	---	---
1.645000	36.40	10.2	46	9.6	---	---
1.710000	37.90	10.2	46	8.1	---	---
1.775000	36.50	10.3	46	9.5	---	---
2.040000	36.60	10.3	46	9.4	---	---
2.105000	37.00	10.3	46	9.0	---	---
5.000000	30.10	10.3	46	15.9	---	---
5.065000	29.80	10.3	50	20.2	---	---
5.130000	27.10	10.3	50	22.9	---	---
7.760000	25.50	10.4	50	24.5	---	---
8.025000	26.50	10.4	50	23.5	---	---
19.995000	25.20	10.5	50	24.8	---	---

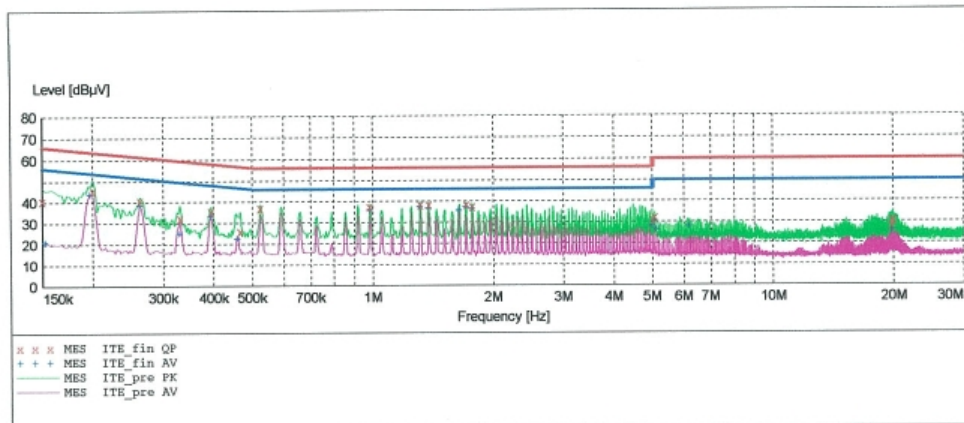
HCT

EMC TEST LAB

EUT: SN-M500
Manufacturer: AVC Technology Limited
Operating Condition: NORMAL
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: CISPR 22 CLASS B
Comment: H

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ITE_fin QP"

7/14/2005 5:52PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	40.80	10.1	66	25.2	---	---
0.200100	45.40	10.1	64	18.2	---	---
0.262600	40.80	10.1	61	20.6	---	---
0.330100	32.40	10.1	59	27.0	---	---
0.395100	35.70	10.1	58	22.2	---	---
0.467600	26.10	10.1	57	30.5	---	---
0.525000	37.10	10.1	56	18.9	---	---
0.985000	37.50	10.1	56	18.5	---	---
1.315000	38.40	10.2	56	17.6	---	---
1.380000	38.40	10.2	56	17.6	---	---
1.710000	38.50	10.2	56	17.5	---	---
1.775000	37.60	10.3	56	18.4	---	---
5.000000	30.90	10.3	56	25.1	---	---
5.060000	32.40	10.3	60	27.6	---	---
19.780000	27.90	10.5	60	32.1	---	---
19.850000	30.30	10.5	60	29.7	---	---
19.915000	30.10	10.5	60	29.9	---	---
19.985000	30.90	10.5	60	29.1	---	---

MEASUREMENT RESULT: "ITE_fin AV"

7/14/2005 5:52PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.152600	21.10	10.1	56	34.8	---	---
0.197600	43.90	10.1	54	9.9	---	---
0.262600	38.40	10.1	51	13.0	---	---
0.330100	25.10	10.1	49	24.4	---	---
0.395100	33.40	10.1	48	14.6	---	---
0.460100	22.60	10.1	47	24.1	---	---
0.985000	36.00	10.1	46	10.0	---	---
1.315000	37.50	10.2	46	8.5	---	---
1.380000	36.90	10.2	46	9.1	---	---
1.645000	35.80	10.2	46	10.2	---	---
1.710000	37.60	10.2	46	8.4	---	---
1.775000	36.70	10.3	46	9.3	---	---
5.000000	28.30	10.3	46	17.7	---	---
5.060000	30.50	10.3	50	19.5	---	---
5.125000	26.40	10.3	50	23.6	---	---
6.180000	28.00	10.3	50	22.0	---	---
19.850000	25.90	10.5	50	24.1	---	---
19.915000	25.80	10.5	50	24.2	---	---

NOTES:

1. All modes(128,256, 512MB,1GB) of operation were investigated and the worst-case emissions are reported.
2. The CISPR RFI conducted limits are listed on Table 1 (Page 6).
3. Line H = Phase Line N = Neutral

** Measurements using CISPR quasi-peak mode.

8. RADIATED TEST DATA

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
36.8	10.5	11.3	1.3	V	23.1	30.0	6.9
74.7	11.6	8.9	1.9	V	22.4	30.0	7.6
86.9	15.8	7.7	2.1	H	25.6	30.0	4.4
166.5	10.7	12.4	2.9	V	26.0	30.0	4.0
171.8	9.2	12.0	3.0	V	24.2	30.0	5.8
195.4	12.7	10.0	3.2	V	25.9	30.0	4.1
260.6	10.7	11.6	3.7	V	26.0	37.0	11.0
302.1	12.3	13.1	4.0	H	29.4	37.0	7.6
325.7	13.6	13.5	4.1	V	31.2	37.0	5.8
390.9	11.7	14.8	4.5	V	31.0	37.0	6.0
399.1	12.7	15.0	4.6	V	32.3	37.0	4.7
498.9	11.1	16.9	5.1	V	33.1	37.0	3.9

Radiated Measurements at 10-meters.

NOTES:

1. All modes(128, 256, 512MB,1GB) of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 7).

** AFCL = Antenna Factor (Roberts dipole) and Cable Loss .

*** Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

9. Sample Calculations

$$\text{dB } \mu\text{V} = 20 \log_{10} (\text{mV/m})$$

9.1 Example 1:

@ 197.6 MHz

Class B limit	= 64.0 dB μV
Reading	= 49.1 dB μV (calibrated level)

Margin	= 49.1 – 64 = -14.9 dB μV
	= 14.9 dB below limit

9.2 Example 2:

@ 498.9 MHz

Class B limit	= 37 dB $\mu\text{V/m}$
Reading	= 11.1 dB $\mu\text{V/m}$ (calibrated level)
Antenna Factor + Cable Loss	= 22.0 dB
Total	= 33.1 dB $\mu\text{V/m}$

Margin	= 33.1 - 37.0 = - 3.9
	= 3.9 dB below limit

10. Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
EMI Test Receiver	Rohde & Schwarz	ESCI40	2005.11.16
EMI Test Receiver	Rohde & Schwarz	ESVS30	2006.07.01
EMI Test Receiver	Rohde & Schwarz	ESCI	2005.09.13
LISN	Rohde & Schwarz	ESH2-Z5	2006.04.26
Attenuator	Rohde & Schwarz	ESH3-Z2	2005.11.16
TRILOG Antenna	Schwarzbeck	9160	2006.03.31
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Power Analyzer	Voltech	PM 3300	2006.03.22
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2005.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2005.11.16

11. Test Software Used

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

NOTE: This is a sample of the basic program used during the test. However, during testing, a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

12. Conclusion

The data collected shows that the **AVC TECHNOLOGY LIMITED** MP3 Player **FCC ID:Q93SNM500** complies with §15.107 and §15.109 of the FCC Rules.