

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

**Test Report No.** : E063R-041

**AGR No.** : A062A-148

**Applicant** : SAROTECH CO., LTD.

**Address** : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea

**Manufacturer** : SAROTECH CO., LTD.

**Address** : Hanlim Venture Town #204, 689-6, Gumjeong-Dong, Gunpo-City, Kyungki-Do, Korea

**Type of Equipment** : Multimedia Player (FM Transmitter)

**FCC ID.** : PBCDVP-370

**Model Name** : DVP-370

**Serial number** : N/A

**Total page of Report** : 15 pages (including this page)

**Date of Incoming** : February 24, 2006


**Date of Issuing** : March 27, 2006

## SUMMARY

The equipment complies with the regulation of *FCC CRF 47 PART 15, SUBPART C, SECTION 15.239*.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

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**1. VERIFICATION OF COMPLIANCE**

- APPLICANT : SAROTECH CO., LTD.  
- ADDRESS : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea  
- CONTACT PERSON : Mr. Yong-Woo, Lee / Manager  
- TELEPHONE NO : +82-2-480-5140  
- FCC ID : PBCDVP-370  
- MODEL NO/NAME : DVP-370  
- SERIAL NUMBER : N/A  
- DATE : March 27, 2006

DEVICE TYPE	Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Multimedia Player (FM Transmitter)
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	Charter 7 and 13 of ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.239
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The SAROTECH CO., LTD., Model DVP-370 (referred to as the EUT in this report) is a Multimedia Player that has a function for transmitting of FM broadcasting frequency range and PC peripheral. This report covers the FM transmitter from 88.1 MHz to 88.9 MHz with 400Hz step for audio signal of FM radio receiver. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Metal
TRANSMITTING FREQUENCY	88.1MHz, 88.5MHz and 88.9MHz
LIST OF EACH OSC. or CRY. FREQ.(FREQ.>=1MHz)	12 MHz and 27 MHz
POWER REQUIREMENT	AC 95-240V, 50/60Hz, 0.5A
FM TRANSMITTER	BKM, Model BP-155MD
NUMBER OF LAYERS	1 Layer: Power Board, 2 Layers: Key Board and Sub Board, 4 Layers: Main Board
EXTERNAL CONNECTOR	AC In, DC In, Ext. IR In, USB, Video Composite Out, Video Component Out, Video S-Vide Out, Audio R/L Out, Optical Out, Coaxial Out, FM Ant.

### 2.2 Model Differences

-. The difference(s) compared to the EUT is as follows: None

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

-. Original submittal only

### 2.4 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
DVP-370	SAROTECH CO., LTD.	PBCDVP-370	Multimedia Player (EUT)	-
N/A	SAROTECH CO., LTD.	N/A	FM Transmitter Antenna	EUT
LT201CL	KTV	N/A	TV	EUT

### 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

### 2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on

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**HEAD OFFICE** : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea  
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April 04, 2003. (Registration Number: 340658)

### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	SAROTECH CO., LTD.	DVP-370 Main V1.01	N/A
Key Board	SAROTECH CO., LTD.	DVP-370A Key V1.0	N/A
Sub Board	N/A	Sub V1.0	N/A
Power Board	SEYANG TECH	SY0103RC Rev.A	N/A
HDD	Seagate	ST380011A	N/A

#### 3.2 EUT exercise Software

The EUT is included a FM transmitter designed to transmit function in the 88.1 ~ 88.9 MHz with 400 kHz step. During the testing, the EUT was set on audio setup with FM transmission and the transmitter function is activated and then the volume control of the EUT was set at maximized position during the testing.

#### 3.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Hood	Length (m)	Connected to
Audio Out	N	N	BOTH END	1.5	TV
Video Out	N	N	BOTH END	1.5	TV
AC In	N	N	EUT END	1.2	-
USB	Y	Y	BOTH END	1.5	-
FM Out	N	N	EUT END	1.2	FM Ant.

#### 3.4 Equipment Modifications

- The R7, 8, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24(key connector line) on the main board were changed to the bead(2000 ohm).
- The R12, 13(key connector line) on the main board were changed to the bead(1000 ohm).
- The bead(1000 ohm) was added to the R42(22ohm) that is U9 CLKE line on the main board.
- The bead(120 ohm) was added to the R34, 35(22ohm) that is U3 SYS FL line on the main board.
- The R37, 38, 39(U5 SYS line) were changed to the bead(1000 ohm) on the main board.
- The bypass capacitor(27pF) was added to the connector J6, pins 3~18, 21, 23, 25, 27, 29, 31 and 33~38 on the main board.
- The rating of bead(connector CON1 line, L30) was changed from 1000 ohm to 2000 ohm on the main board.
- The rating of bead(connector CON1 line, R36) was changed from 0 ohm to 1000 ohm on the main board.
- The L15, 17, 18(S-Video Socket line) were changed to the bead(2000 ohm) on the main board.
- The L7, 9, 11(RCA Socket line) were changed to the bead(2000 ohm) on the main board.

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- The B21, 22, 29(Connector J3 line, 0.1uF) were changed to the resistor(0 ohm) on the main board.
- The rating of bead(USB 5V line, L25) was changed from 1000 ohm to 2000 ohm on the main board.
- The CMF(90 ohm) was added to the USB D+/- line on the main board.
- The bead(Connector J7 line, D5, 6, 1000 ohm) were deleted on the main board.
- The bypass capacitor(0.01uF) was added to the connector J6, pins 1 and 39 on the main board.
- The D1, 2(Connector J2 line) were deleted on the main board.
- The rating of bead(VCC 3.3V line, L4, 31) was changed from 1000 ohm to 2000 ohm on the main board.
- The rating of bead(VCC line and AUDVCC line, L2, 3) was changed from 1000 ohm to 2000 ohm on the main board.
- The L27(USB GND line) was deleted on the main board.
- The L23, 24 were deleted on the main board.
- The analog GND was connected to the digital GND on the main board.
- The rating of bead(Connector JACK1 line, L1) was changed from 1000 ohm to 2000 ohm on the main board.
- The EMI gasket was added between the HDD and inside of top enclosure.
- The ferrite core(E-tech, SH2915C) was added to the key connector cable.
- The GND wire was connected to the GND of key board.

### 3.5 Configuration of Test System

**Line Conducted Test:** The EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2001 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2001 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

#### Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer.

### 3.6 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### Antenna Construction:

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.

#### 4. PRELIMINARY TEST

##### 4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmit the RF Signal continuously	X

##### 4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmit the RF Signal continuously	X

## 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

### 5.1 Conducted Emission Test

Humidity Level : 42 %

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY -9.31 dB at 21.90 MHz under average mode

EUT : Multimedia Player

Date: March 14, 2006

Operating Condition : Transmit RF signal.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

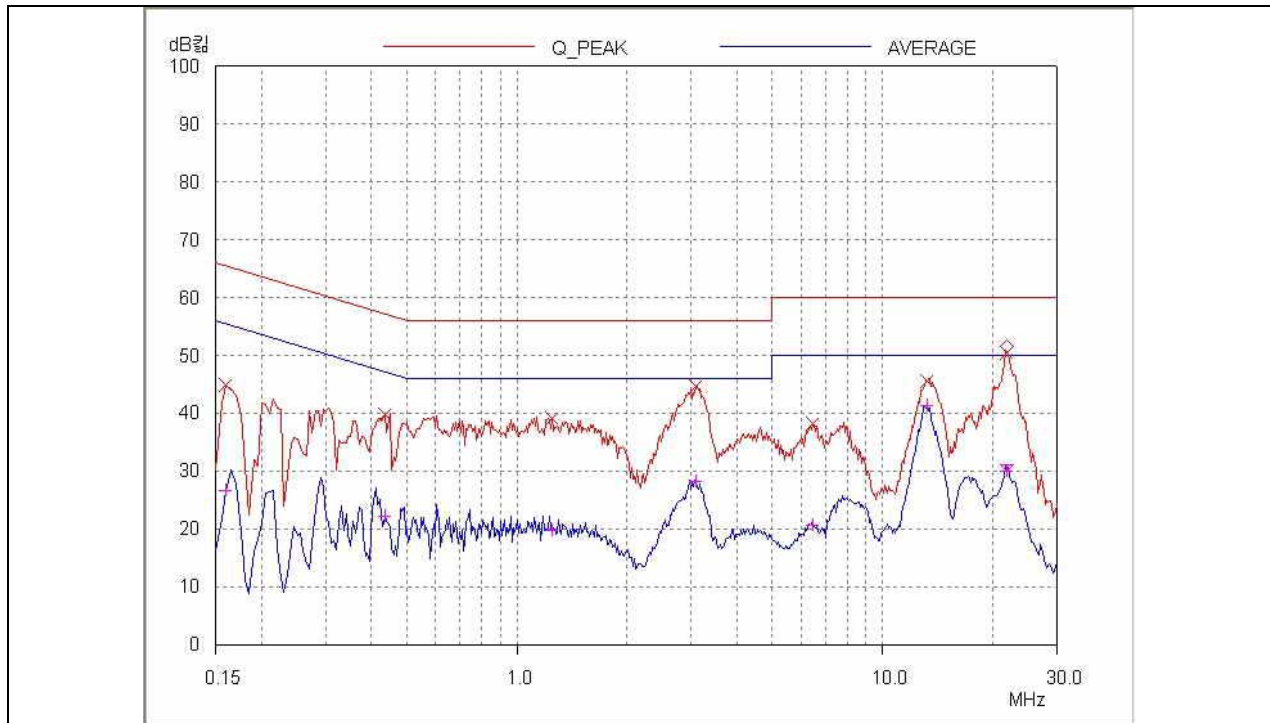
Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.15	N	50.68	65.73	-15.05
3.07	H	44.74	56.00	-11.26
3.14	N	43.99	56.00	-12.01
13.16	H	45.51	60.00	-14.49
21.70	H	50.47	60.00	-9.53
21.90	N	50.69	60.00	-9.31
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
3.07	H	28.25	46.00	-17.75
3.14	N	29.25	46.00	-16.75
21.70	H	29.89	50.00	-20.11
21.90	N	32.17	50.00	-17.83

Line Conducted Emission Tabulated Data

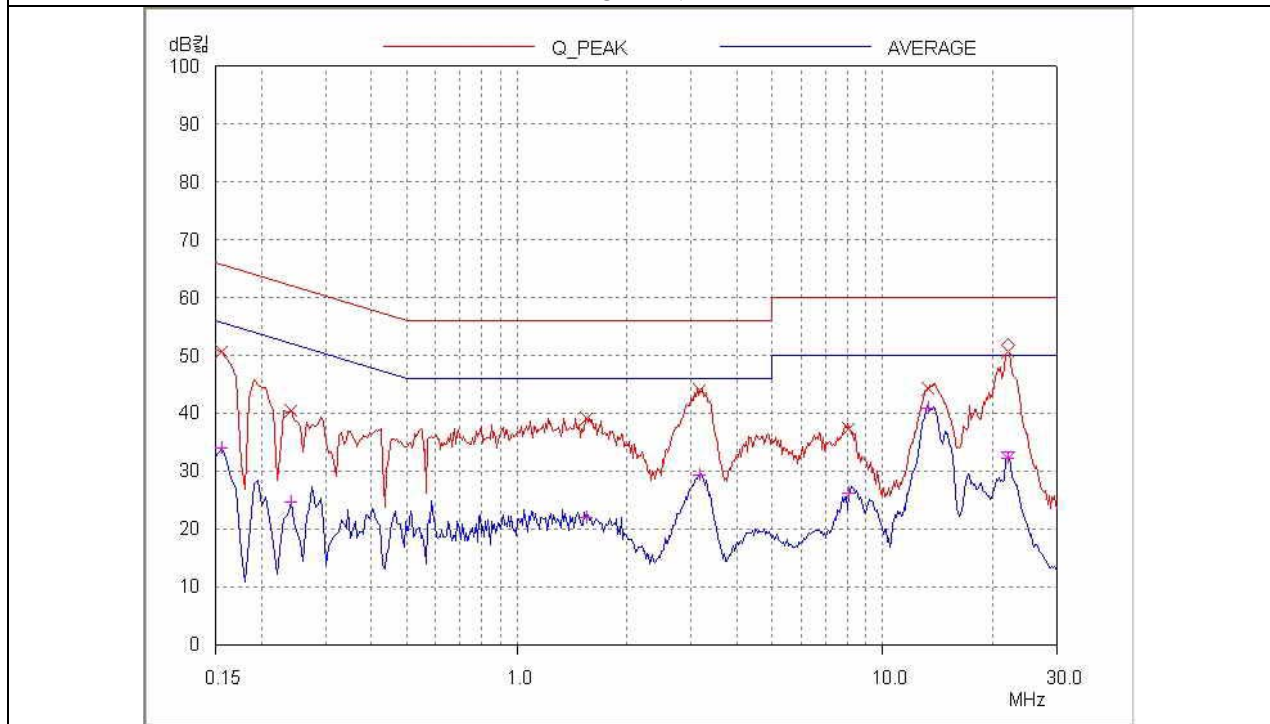
Remark : "H": Hot Line, "N": Neutral line

See next page for an overview sweep performed with peak and average detector.

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## HOT LINE



## NEUTRAL LINE

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## 5.2 Radiated Emission Test (Within the permitted 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % Temperature: 18 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (b)  
Type of Test : Low Power Communication Device Transmitter  
Result : PASSED BY – 5.50 dB at 88.90 MHz

EUT : Multimedia Player Date: March 16, 2006  
Operating Condition : Transmit the RF signal.  
Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit (dBuV/m)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)		
88.50	32.46	Peak	H	7.97	1.73	42.16	48.00	-5.84
88.50	29.44	Peak	V	7.97	1.73	39.14	48.00	-8.86
88.90	32.74	Peak	H	8.04	1.72	42.50	48.00	-5.50
88.90	29.81	Peak	V	8.04	1.72	39.57	48.00	-8.43

Radiated Emission Tabulated Data

Remark: The EUT's frequency range is not more than 1 MHz, only middle channel shall be tested according to the Section 15.31(m), but middle and high frequencies were observed.



Tested by: Sue-Young, Lee/ Test Engineer

### 5.3 Radiated Emission Test (Outside of the specified 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % Temperature: 18 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)  
Type of Test : Low Power Communication Device Transmitter  
Result : PASSED BY -5.38dB at 161.78MHz

EUT : Multimedia Player Date: March 16, 2006  
Operating Condition : Transmit the RF signal.  
Frequency range : 30MHz – 1000MHz  
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)  
Distance : 3 Meter  
Remark : Other emissions

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dB/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
67.50	26.13	V	6.02	1.50	33.65	40.00	-6.35
161.78	20.69	V	15.05	2.40	38.14	43.52	-5.38
187.75	15.47	H	15.79	2.80	34.06	43.52	-9.46
216.05	17.44	H	16.63	2.93	37.00	46.02	-9.02
431.17	15.60	V	17.65	4.46	37.71	46.02	-8.31
566.84	15.10	V	19.73	5.30	40.13	46.02	-5.89



Tested by: Sue-Young, Lee/ Test Engineer

**5.4 Bandwidth of the operating frequency**

Humidity Level : 41 % Temperature: 18 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)  
Result : PASSED

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EUT : Multimedia Player Date: March 16, 2006  
Operating Condition : Transmit the RF signal.  
Minimum Resolution  
Bandwidth : 10 kHz  
Remark : Refer to test data in next page.



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According to Section 15.31(m), only middle channel was observed.

## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

---

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

**7. LIST OF TEST EQUIPMENT**

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/05	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/05	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUL/05	12MONTH	
4.	Spectrum analyzer	HP	8568B	3109A05456	APR/05	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	APR/05	12MONTH	■
6.	Quasi-Peak Adapter	HP	8574B	2811A01432	APR/05	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	APR/05	12MONTH	
8.	Biconical antenna	EMCO	3110	9003-1121	FEB/06	12MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/06		■
9.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/06	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/06		■
10.	LISN	EMCO	3825/2	9109-1867	JUL/05	12MONTH	■
				9109-1869	JUL/05		
		Schwarzbeck	NSLK 8126	8126-404	AUG/05		■
11.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
12.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
13.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■