ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No.	**: E092R-044**
AGR No	**: A091A-143**
Applicant	**: SHIMWOO ELECTRONICS CO., LTD.**
Address	**: 5F, Yongjin Bldg., 402-1, Yangjae2-dong, Seocho-gu, Seoul, Korea**
Manufacturer	**: SHIMWOO ELECTRONICS CO., LTD.**
Address	**: 5F, Yongjin Bldg., 402-1, Yangjae2-dong, Seocho-gu, Seoul, Korea**
Type of Equipment	**: Juke Box Remote Controller**
FCC ID.	**: WT9SE47TT**
Model Name	**: FGSE47-TT-03**
Serial number	**: None**
Total page of Report	**: 23 pages (including this page)**
Date of Incoming	**: February 18, 2009**
Date of issue	**: February 25, 2009**

SUMMARY

The equipment complies with the regulation; **FCC Part 15 Subpart C Section 15.227 and 15.231.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by: Young-Min, Choi / Asst. Chief Engineer
EMC/RF Center
ONETECH Corp.

Reviewed by: Y. K. Kwon / Managing Director
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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea.(TEL: 82-31-765-8289 FAX: 82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: SHIMWOO ELECTRONICS CO., LTD.
ADDRESS	: 5F, Yongjin Bldg., 402-1, Yangjae2-dong, Seocho-gu, Seoul, Korea
CONTACT PERSON	: Mr. Jung-Hwo, Kim / Chief Engineer
TELEPHONE NO	: +82-2-579-8512
FCC ID	: WT9SE47TT
MODEL NAME	: FGSE47-TT-03
BRAND NAME	: N/A
SERIAL NUMBER	: N/A
DATE	: February 25, 2009

EQUIPMENT CLASS	**DXX – Low Power Communications Transmitter**
KIND OF EQUIPMENT	Juke Box Remote Controller
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	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 SUBPART C §15.227 and §15.231
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER(S) 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.

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2. GENERAL INFORMATION

2.1 Product Description

The SHIMWOO ELECTRONICS CO., LTD., Model: FGSE47-TT-03 (referred to as the EUT in this report) is a Juke Box Remote Controller that has 2 carrier frequencies, 27.145 MHz and 433.92MHz, but the EUT shall not transmit simultaneously. Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
RF FREQUENCY	27.145 MHz and 433.92 MHz
MODULATION	ASK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	433.92 MHz, 4 MHz
ANTENNA TYPE	Inserted into the main board (Pattern Antenna)
TRANSMISSION TIME	Not longer than 5 s
RATED SUPPLY VOLTAGE	DC 3 V from a battery
NUMBER OF LAYERS	1 Layer: Main Board, 2 Layers: Antenna Board

2.2 Model Differences

-. None

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 15.227 and 15.231.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003 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, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

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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	SHIMWOO ELECTRONICS CO., LTD.	S-364GA 255 DT	N/A
Antenna Board	SHIMWOO ELECTRONICS CO., LTD.	S-362GA 255 DT	N/A

3.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested: None

3.3 Mode of operation during the test

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal. To activate continuous transmission, place a small plastic block between rubber band and the push button on the EUT. To get a maximum emission levels from the EUT, the EUT was moved throughout the X, Y, and Z axis and the worst case is “X” axis.

3.4. EUT MODIFICATIONS

-. None

3.5 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by DC battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

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. The plot is taken at 20 kHz/division frequency span, 10 kHz resolution bandwidth and 5 dB/division logarithmic display from the spectrum analyzer.

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3.6 Antenna Requirement

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:

The antenna of the EUT is a pattern antenna on the main board in the EUT, so no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 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)
It is not need to test this requirement, because the power of the EUT is supplied from a DC battery.	

4.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
TX Mode	X

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5. FINAL RESULT OF MEASURMENT

5.1 Test Data for Section 15.227

5.1.1 Field Strength of the Carrier Test

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

Humidity Level : 38 %R.H. Temperature: 15 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.227

Type of Test : INTENTIONAL RADIATOR

Result : PASSED BY –33.28 dB under average mode

EUT : Juke Box Remote Controller Date: February 20, 2009

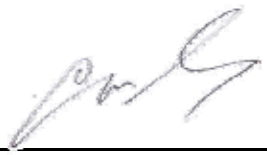
Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors			Total	FCC	
Carrier Freq. (MHz)	Amplitude (dBμV)	Detector Mode	Pol.	Antenna (dB/m)	Cable (dB)	Average Level Factor	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
27.145	34.70	Peak	H	21.33	0.00	-11.91	44.12	80.00	-35.88
	37.30	Peak	V			-11.91	46.72	80.00	-33.28

* Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

"H": Horizontal Polarization, "V": Vertical Polarization



Tested by: In-Sub, Youn / Project Engineer

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5.1.2 Maximum Modulation Percentage (MMP)

In order to determine possible Maximum Modulation Percentage from the EUT, we measured the duty cycle according to the clause H4.(j) in ANSI C63.4: 2003.

The pulse train from the EUT was consisting of long and short pulse. The measured values are as follows.

Long Pulse (LP)	Short Pulse (SP)	Total sum of LP	Total sum of SP	Pulse Width
8.867 ms	0.5 ms	1	33	106.67
Duty Cycle		((8.867 x 1) + (0.5 x 33)) / 100 = 0.253 67		
Maximum Modulation Percentage(MMP)		Duty Cycle x 100 % = 25.367 %		
Average Level Factor		-11.91 dB		

Remark: Please refer to Photo Data for MMP.

Tested by: In-Sub, Youn / Project Engineer

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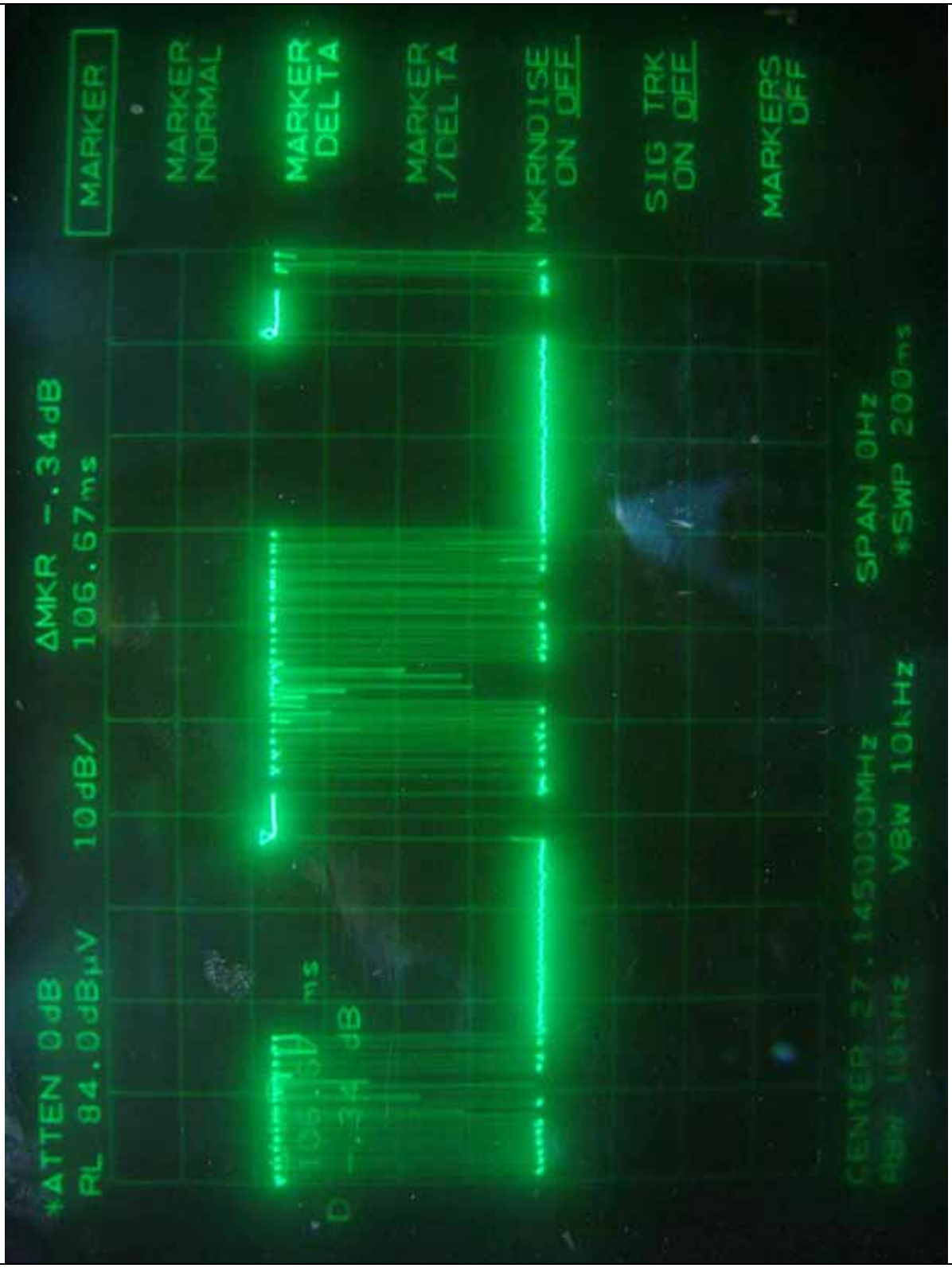
Photo Data for MMP



Pulse width

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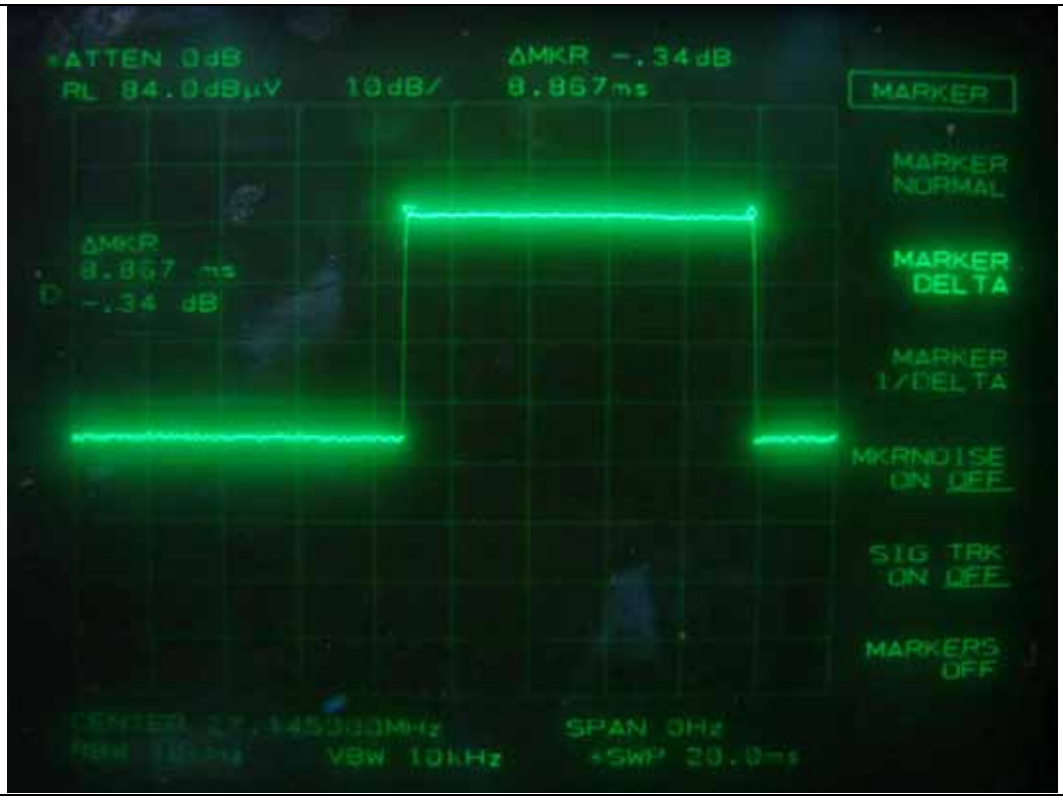
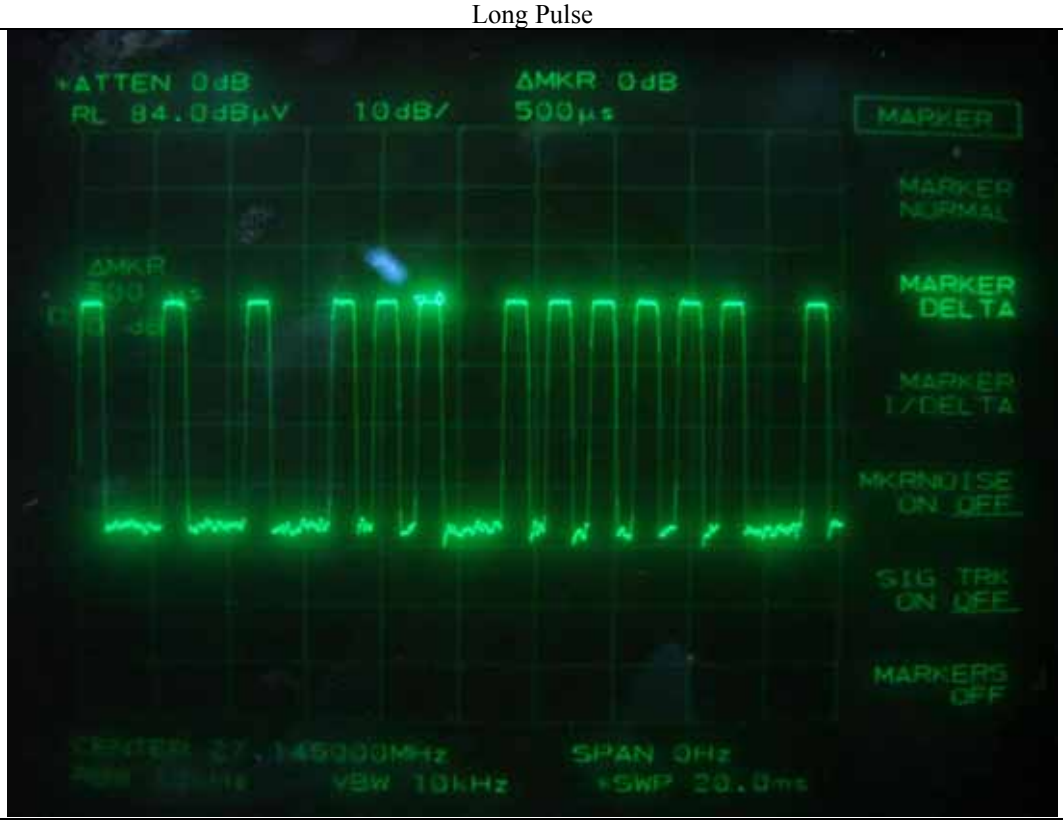


Long Pulse



Shot Pulse

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5.1.3 Spurious Emission Test

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

Humidity Level : 38 % Temperature: 15 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Type of Test : Intentional Radiator

Result : PASSED BY –9.42 dB at 515.69 MHz

EUT : Juke Box Remote Controller Date: February 20, 2009

Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total(dBµV/m)	FCC Limit(dBµV/m)	
Freq. (MHz)	Amp. (dBµV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Peak	Limit	Margin(dB)
271.42	9.10	Peak	H	18.01	3.23	30.34	46.02	-15.68
407.62	8.40	Peak	H	17.43	4.05	29.88	46.02	-16.14
433.27	13.40	Peak	H	18.18	4.20	35.78	46.02	-10.24
461.40	12.70	Peak	H	18.86	4.37	35.93	46.02	-10.09
515.69	12.50	Peak	H	19.28	4.82	36.60	46.02	-9.42
569.97	7.60	Peak	H	19.06	5.30	31.96	46.02	-14.06
Other spurious frequencies were not found up to 3 000 MHz.								

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

"H": Horizontal Polarization, "V": Vertical Polarization

Tested by: In-Sub, Youn / Project Engineer

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5.1.4 Bandwidth of the operating frequency

Humidity Level : 39 %R.H. Temperature: 21 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.227
Type of Test : INTENTIONAL RADIATOR
Result : PASSED

EUT : Juke Box Remote Controller Date: February 20, 2009
Operating Condition : TX mode
Minimum Resolution Bandwidth : 1 kHz

Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
27.145	7.00	None	The point 20 dB down from the modulated carrier

Remark: Please refer to Photo Data for bandwidth for test data.

Tested by: In-Sub, Youn / Project Engineer

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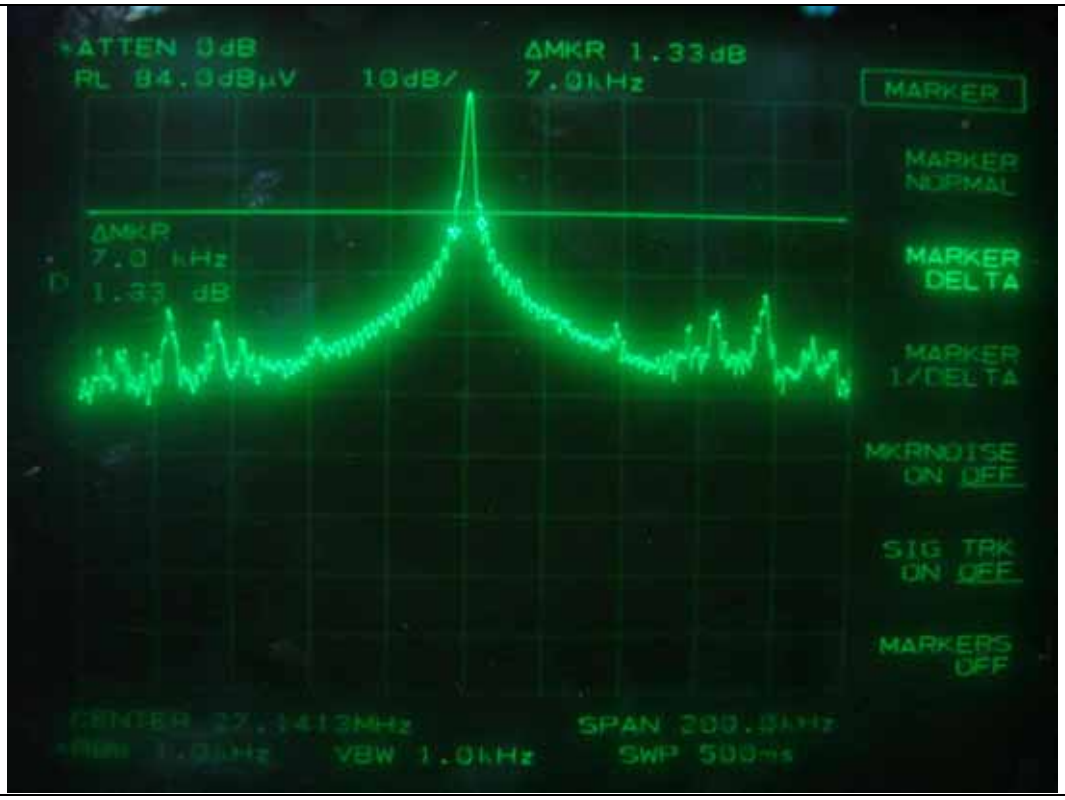
Photo Data for bandwidth



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5.2 Test Data for Section 15.231

5.2.1 Field Strength of the Carrier Test

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

Humidity Level : 38 %R.H. Temperature: 15 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)

Type of Test : INTENTIONAL RADIATOR

Result : PASSED BY –21.73 dB under average mode

EUT : Juke Box Remote Controller Date: February 20, 2009

Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors			Total	FCC	
Carrier Freq. (MHz)	Amplitude (dBμV)	Detector Mode	Pol.	Antenna (dB/m)	Cable (dB)	Average Level Factor	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
433.92	48.60	Peak	H	18.20	4.20	-11.90	59.10	80.83	-21.73
	42.30	Peak	V			-11.90	52.80	80.83	-28.03

* Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

"H": Horizontal Polarization, "V": Vertical Polarization

Tested by: In-Sub, Youn / Project Engineer

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5.2.2 Maximum Modulation Percentage (MMP)

In order to determine possible Maximum Modulation Percentage from the EUT, we measured the duty cycle according to the clause H4.(j) in ANSI C63.4: 2003.

The pulse train from the EUT was consisting of long and short pulse. The measured values are as follows.

Long Pulse (LP)	Short Pulse (SP)	Total sum of LP	Total sum of SP	Pulse Width
8.9 ms	0.5 ms	1	33	106.67
Duty Cycle		((8.9 x 1) + (0.5 x 33)) / 100 = 0.254		
Maximum Modulation Percentage(MMP)		Duty Cycle x 100 % = 25.4 %		
Average Level Factor		-11.90 dB		

Remark: Please refer to Photo Data for MMP.

Tested by: In-Sub, Youn / Project Engineer

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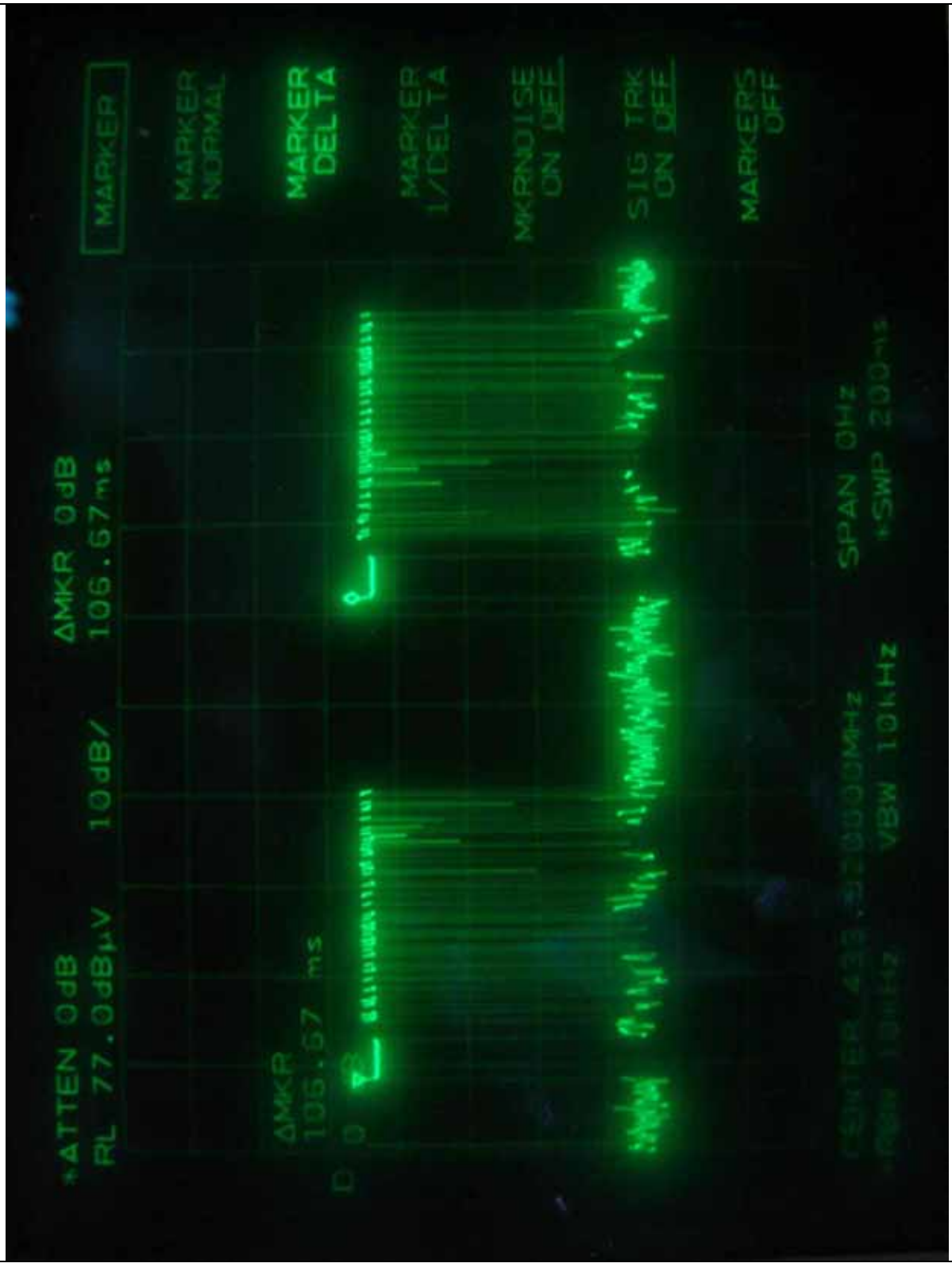
Photo Data for MMP



Pulse width

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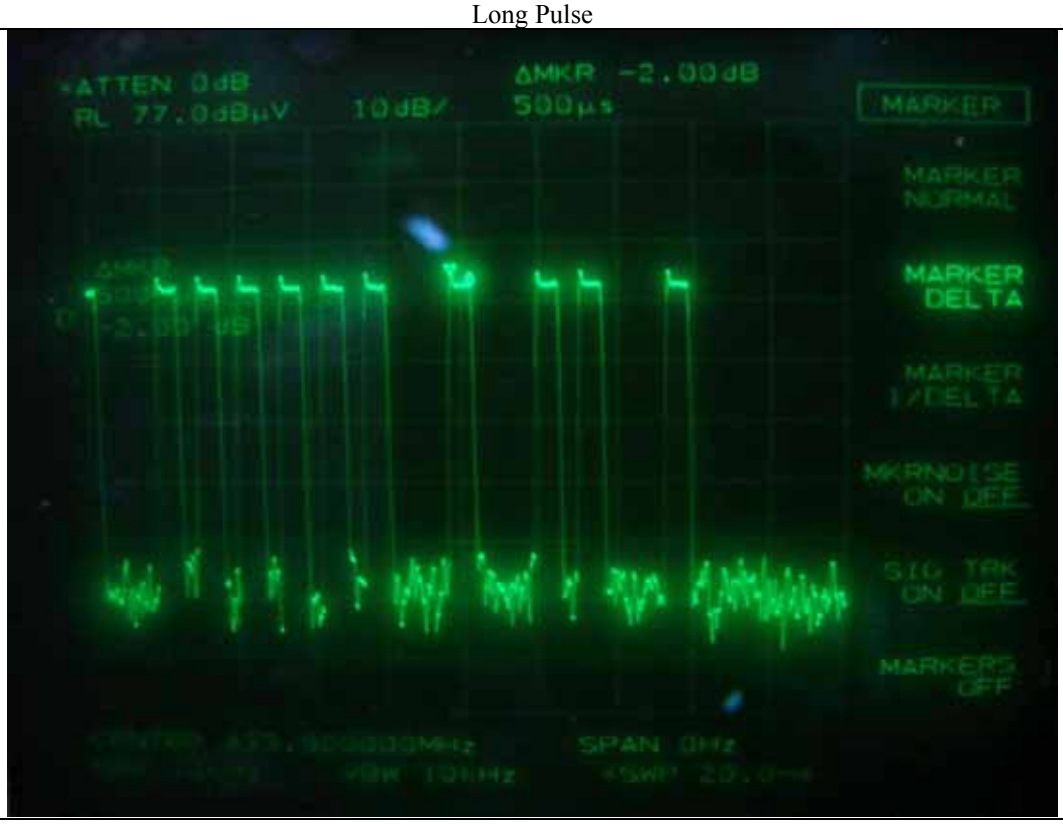
Long Pulse



Shot Pulse

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5.2.3 Transmitter Transmission Duration

Humidity Level : 39 %R.H. Temperature: 21 °C

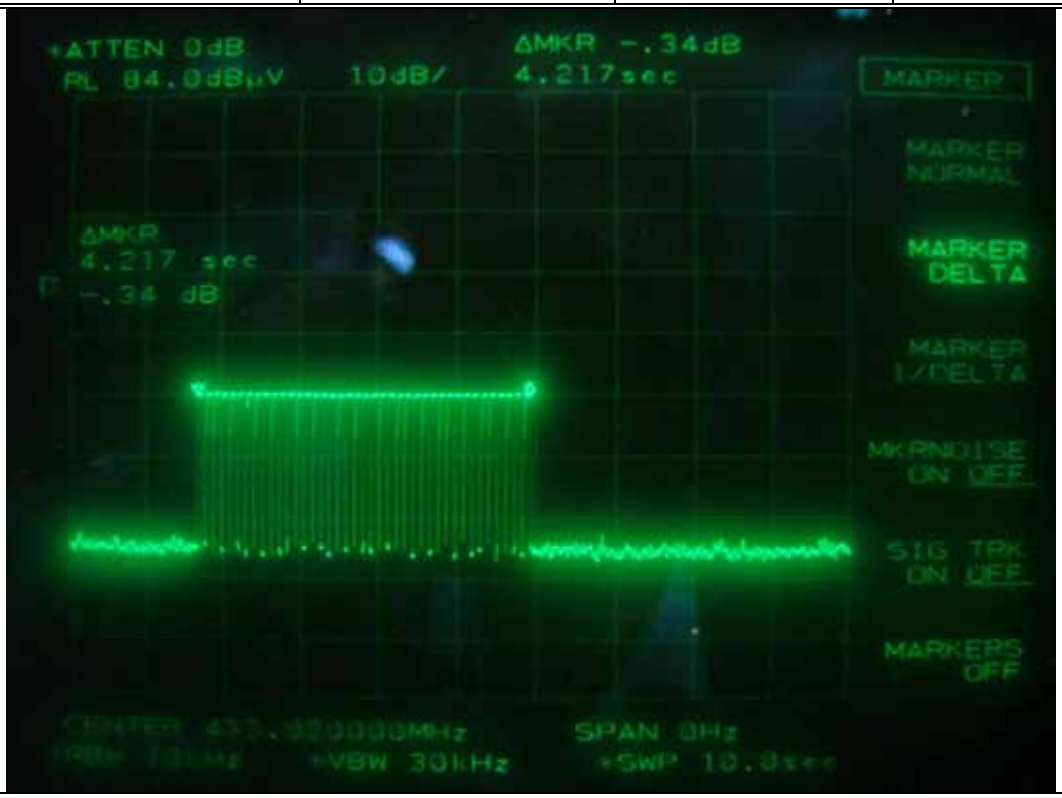
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (a)

Type of Test : INTENTIONAL RADIATOR

EUT : Juke Box Remote Controller Date: February 20, 2009

Operating Condition : Switch on the EUT was continuously pushed

Manually Activated Duration (s)	Limit (s)	Margin (s)	Result
4.217	5.0	-0.783	Pass



Tested by: In-Sub, Youn / Project Engineer

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5.2.4 Spurious Emission Test

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

Humidity Level : 35 %R.H. Temperature: 18 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)

Type of Test : INTENTIONAL RADIATOR

Result : PASSED BY –28.98 dB at 867.84 MHz

EUT : Juke Box Remote Controller Date: February 20, 2009

Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors			Total	FCC	
Freq. (MHz)	Amplitude (dBμV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Average Level Factor	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
867.84	14.20	Peak	H	22.71	6.84	-11.90	31.85	60.83	-28.98
867.84	3.90	Peak	V			-11.90	21.55	60.83	-39.28
Other spurious frequencies were not found up to 4 400 MHz.									

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.
"H": Horizontal Polarization, "V": Vertical Polarization

Tested by: In-Sub, Youn / Project Engineer

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5.2.5 Bandwidth of the operating frequency

Humidity Level : 39 %R.H. Temperature: 21 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (c)
Type of Test : INTENTIONAL RADIATOR
Result : PASSED

EUT : Juke Box Remote Controller Date: February 20, 2009
Operating Condition : TX mode
Minimum Resolution Bandwidth : 10 kHz

Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
433.92	51.50	1 084.80	The point 20 dB down from the modulated carrier

Remark: Please refer to Photo Data for bandwidth for test data.

Tested by: In-Sub, Youn / Project Engineer

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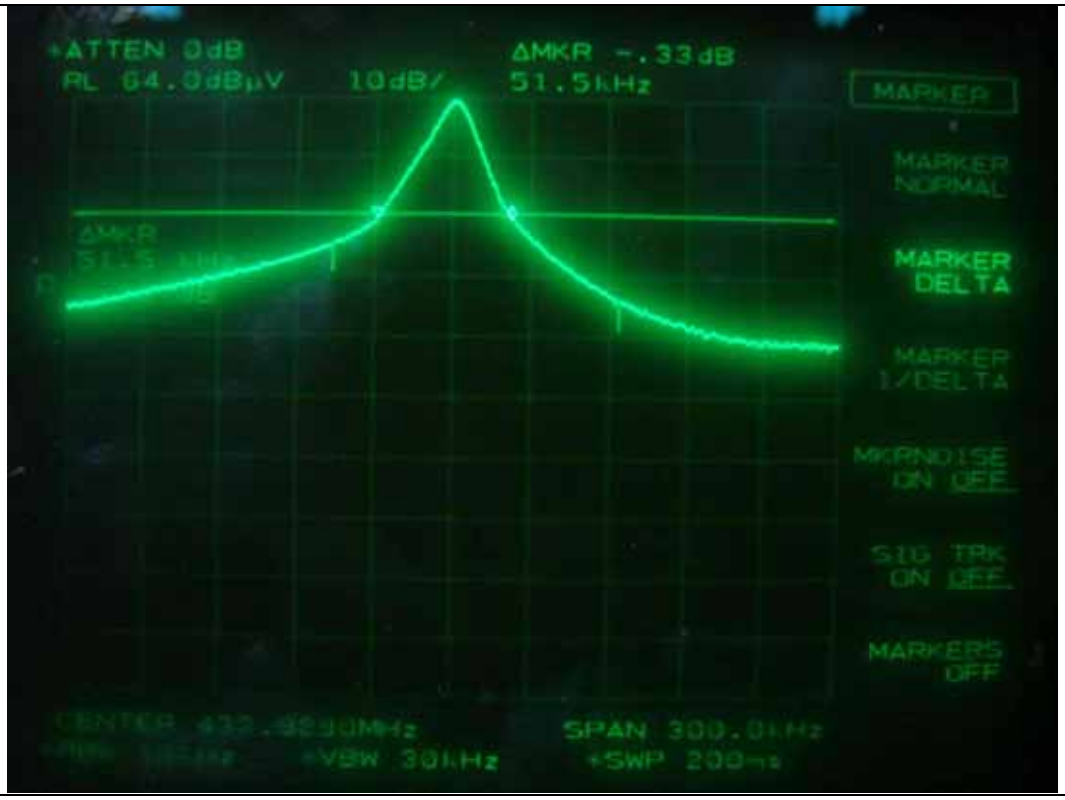
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea.(TEL: 82-31-765-8289 FAX: 82-31-766-2904)

Photo Data for bandwidth



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6. FIELD STRENGTH CALCULATION

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

+	Meter reading	(dBμV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBμV/meter)
-	Specification Limit	(dBμV/meter)
=	dB Relative to Spec	(+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVD	838453/018	NOV/08	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/08	12MONTH	
3.	Spectrum analyzer	HP	8566B	2516A01677	JUN/08	12MONTH	■
4.	Loop Antenna	R/S	HFH 2-Z2	889 285 / 26	OCT/08	12MONTH	■
5.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 202	APR/08	24MONTH	
6.	Biconical antenna	EMCO	3110	9003-1121	JAN/08	24MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/08		■
7.	Log Periodic antenna	Schwarzbeck	9108-A(494)	62281001	FEB/08	24MONTH	■
8.	LISN	EMCO	3825/2	9109-1867	JUN/08	12MONTH	
				9109-1869	JUN/08		
		Schwarzbeck	NSLK 8128	8128-216	JUN/08		
9.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
10.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
11.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■
12.	RF Amplifier	HP	8447D	2727A04987	JUN/08	12MONTH	■
13.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D294	JUL/06	36MONTH	■
14.	Spectrum Analyzer	HP	8564E	3650A00756	JUN/08	12MONTH	■
15.	Isolation Transformer	Digitek Power	DPT	DPF-22027	N/A	N/A	■
16.	Isolation Transformer	Digitek Power	DPT	DPF-22028	N/A	N/A	■
17.	Frequency Converter	Digitek Power	VFS/DEFC	N/A	N/A	N/A	■

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