

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE TEAM
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
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CERTIFICATION

Manufacture; CAS Corporation #19 Ganap-ri Gwangjuk-Myoun Yangju-gun Gyeonggi-do, 482-840 Korea CAS FRN : 0007-1276-16	Date of Issue: MAY 27, 2002 Test Report No.: HCT-F02-0511 Test Site: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD. HCT FRN : 0005-8664-21
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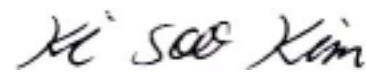
FCC ID :**QD8CFF****APPLICANT :****CAS Corporation**

FCC Rule Part(s): FCC Part 15.249 Subpart C
Equipment Class: Low Power Communication Device Transmitter (DXX)
Frequency Range: 32 ch, 903.000Mhz 918.500Mhz
Standard(s): FCC Class B: 2001
Equipment(EUT) Type: INDUSTRIAL SCALE
Model(s): CFF

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 C63.4-1992.(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.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988,21 U.S.C.853(a).



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



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1. GENERAL INFORMATION

1.1 Product Description

This goods has held excellent performance and splendid properties through strike tests as well as devoting ourselves under severe quality management

Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	METAL
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. 1MHz)	2.4576MHz , 22.1184MHZ
CHIPSET BRAND AND PART NO.	AT89C55 : ATMEL OP177 : FZ OPT0031 :AD
NUMBER OF LAYER	MAIN BOARD 4LAYER
Channel(TX)	32 channels
Operation temperature	-10 to +40
FREQUENCY RANGE	903.000Mhz 918.500Mhz
Power	12 VDC

1.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

1.3 Tested System Details

The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
INDUSTRIAL SCALE (EUT)	CAS Corporation	CFF	QD8CFF	N/A

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

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 24,2000(Confirmation Number: EA90661)

2.SYSTEM TEST CONFIGURATION

2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components inside the E.U.T were used.

DEVICE TYPE	MANUFACTURE	MODEL/PART NUMBER
MIAN BOARD	CAS Corporation	6100-PRF-1001-0

2.2 EUT exercise Software

N/A

2.3 Cable Description

DEVICE TYPE	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
INDUSTRIAL SCALE (EUT)	N	N/A	N/A

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

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

DEVICE TYPE	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
INDUSTRIAL SCALE (EUT)	N	N/A	N	N/A

2.5 Equipment Modifications

N/A

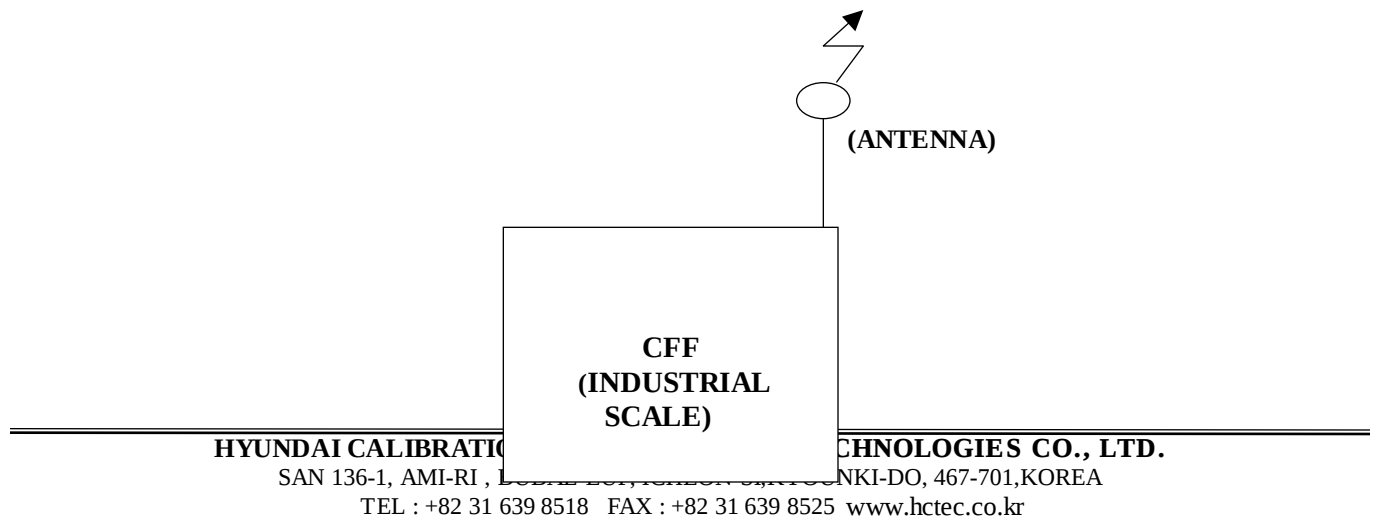
2.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.

Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating condition. Final Radiated Emission tests were conducted at 3 meter open area test site.

[Configuration of Tested System]



3. FINAL RADIATED EMISSION TESTS SUMMAR (TX-MODE)

3.1 Radiated Power Output -(TX MODE)

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

Humidity Level : 35 % Temperature : 20
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.249
 Type of Tests : CLASS B
 Date : May 01, 2002
 Result : PASSED

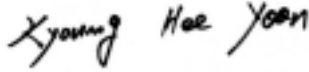
EUT : INDUSTRIAL SCALE / CFF

Detector : CISPR Quasi-Peak (6dB Bandwidth : 120KHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
903.0	56.86	25.14	7.00	V	89.0	93.9	-4.9
911.0	57.38	25.12	7.10	V	89.6	93.9	-4.3
918.5	58.29	25.11	7.10	V	90.5	93.9	-3.4

NOTE :

1 CHANNEL : 903.0MHz(Low) , 16CHANNEL : 911.0MHz(MIDDLE) , 32 CHANNEL : 918.5MHz(HIGH)



Measured by : Kyoung Hee Yoon / Engineer

Date : May 01, 2002

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3.2 Radiated Emissions-(TX MODE)-SPURIOUS (1)

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

Humidity Level : 34 % Temperature : 22
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : May 01, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 1)

Detector : CISPR Quasi-Peak (6dB Bandwidth : 120KHz)

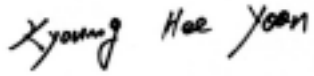
CHANNEL : 1 (903.0MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit DB	Margin dB
64.3	21.91	6.59	1.70	V	30.2	40.0	-9.8
309.3	12.52	15.78	3.80	V	32.1	46.0	-13.9
352.7	13.60	16.60	4.00	H	34.2	46.0	-11.8
376.2	12.45	16.55	4.10	V	33.1	46.0	-12.9
397.2	12.77	16.53	4.20	H	33.5	46.0	-12.5
403.3	12.65	16.55	4.20	V	33.4	46.0	-12.6
451.3	12.00	17.70	4.70	H	34.4	46.0	-11.6

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

ALL other spurious emissions were 20dB lower than limit



Measured by : Kyoung Hee Yoon / Engineer

Date : May 01, 2002

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3.3 Radiated Emissions-(TX MODE)-SPURIOUS (2)

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

Humidity Level : 34 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : May 01, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 16)

Detector : CISPR Quasi-Peak (6dB Bandwidth : 120KHz)

CHANNEL : 16 (911.0MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dB	Margin dB
64.3	21.91	6.59	1.70	V	30.2	40.0	-9.8
309.3	12.42	15.78	3.80	V	32.0	46.0	-14.0
352.7	12.80	16.60	4.00	H	33.4	46.0	-12.6
376.1	12.55	16.55	4.10	V	33.2	46.0	-12.8
397.2	12.87	16.53	4.20	H	33.6	46.0	-12.4
403.3	12.45	16.55	4.20	V	33.2	46.0	-12.8
451.3	11.80	17.70	4.70	H	34.2	46.0	-11.8

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

ALL other spurious emissions were 20dB lower than limit

Kyoung Hee Yoon

Measured by : Kyoung Hee Yoon / Engineer

Date : May 01, 2002

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3.4 Radiated Emissions-(TX MODE)-SPURIOUS (3)

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

Humidity Level : 34 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : May 01, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 32)

Detector : CISPR Quasi-Peak (6dB Bandwidth : 120KHz)

CHANNEL : 32 (918.5MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dB	Margin dB
64.3	22.21	6.59	1.70	V	30.5	40.0	-9.5
309.3	12.02	15.78	3.80	V	31.6	46.0	-14.4
352.7	12.70	16.60	4.00	H	33.3	46.0	-12.7
376.1	12.45	16.55	4.10	V	33.1	46.0	-12.9
397.2	12.57	16.53	4.20	H	33.3	46.0	-12.7
403.2	12.35	16.55	4.20	V	33.1	46.0	-12.9
451.2	12.00	17.70	4.70	H	34.4	46.0	-11.6

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

ALL other spurious emissions were 20dB lower than limit

Kyoung Hee Yoon

Measured by : Kyoung Hee Yoon / Engineer

Date : April 30, 2002

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3.5 Radiated Emissions-(TX MODE)-HARMONICS(1)

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

Humidity Level : 33 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 30, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 1) - 903.0MHz

Detector : Peak mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1805.6	13.62	27.28	7.80	V	48.7	74.0	-25.3
2707.4	15.4	29.80	8.40	V	53.6	74.0	-20.4

Humidity Level : 33 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 30, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 1) -903.0MHz

Detector : Average mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1805.6	7.22	27.28	7.80	V	42.3	54.0	-11.7
2707.4	10.4	29.80	8.40	V	48.6	54.0	-5.4

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD.

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ALL other spurious emissions were 20dB lower than limit

Kyoung Hee Yoon

Measured by : Kyoung Hee Yoon / Engineer

Date : April 25, 2002

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3.6 Radiated Emissions-(TX MODE)-HARMONICS(2)

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

Humidity Level : 34 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 25, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 16) - 911.0MHz

Detector : Peak mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1817.6	13.82	27.38	7.80	V	49.0	74.0	-25.0
2728.6	16.2	30.00	8.40	V	54.6	74.0	-19.4

Humidity Level : 34 % Temperature : 21
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 25, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 16) -911.0MHz

Detector : Average mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1817.6	8.82	27.38	7.80	V	44.0	54.0	-10.0
2728.6	11.6	30.00	8.40	V	50.0	54.0	-4.0

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

ALL other spurious emissions were 20dB lower than limit

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Kyoung Hee Yoon

Measured by : Kyoung Hee Yoon / Engineer

Date : April 25, 2002

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3.7 Radiated Emissions-(TX MODE)-HARMONICS(3)

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

Humidity Level : 35 % Temperature : 20
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 25, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 32) - 918.5MHz

Detector : Peak mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1837.0	14.62	27.58	7.80	V	50.0	74.0	-24.0
2755.5	17.5	30.10	8.40	V	56.0	74.0	-18.0

Humidity Level : 35 % Temperature : 20
 Limit apply to : FCC CFR 47, PART 15, SUBPART B §15.209
 Type of Tests : CLASS B
 Date : April 23, 2002
 Result : PASSED

EUT : INDUSTRIAL SCALE / CFF -(CHANNEL : 32) - 918.5MHz

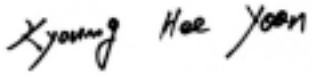
Detector : Average mode (6dB Bandwidth : 1MHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
1837.0	10.02	27.58	7.80	V	45.4	54.0	-8.6
2755.5	12.5	30.10	8.40	H	51.0	54.0	-3.0

NOTE :

The frequency range investigated during radiated emission test was from 30MHz to 10GHz.

ALL other spurious emissions were 20dB lower than limit



Measured by : Kyoung Hee Yoon / Engineer

Date : April 23, 2002

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3.8 Antenna Requirement

Since the antenna in the box set is specially manufactured, no other products can be substituted. And the warning statement for using the supplied antenna will be inserted in the User's manual.

CONCLUSION

The CAS Corporation wireless transmitter complies with the antenna requirement having an Rod antenna uniquely designed for the transmitter unit.

4. 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 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

5. LIST OF TEST EQUIPMENT

<u>TYPE</u>		<u>MANUFACTURE</u>		<u>MODEL</u>	<u>CAL.DUE DATE</u>	
EMI Test Receiver		Rohde & Schwarz		ESI40	2002.11.5	
EMI Test Receiver		Rohde & Schwarz		ESVS30	2003.3.6	Graphic
Plotter	HP	7440+	N.A			
Printer	Rohde & Schwarz		PDN	N.A		
Spectrum Analyzer		H.P	8591EM		2002.7.11	
LISN	EMCO		3825/2		2003.2.7	
LISN	Rohde & Schwarz		ESH2-Z5		2002.8.12	
Amplifier	Hewlett-Packard		8447E		2003.3.2	
Dipole Antennas		Rohde & Schwarz		VHAP	2002.6.28	
Dipole Antennas		Rohde & Schwarz		UHAP	2002.6.28	
Biconical Antenna		Rohde & Schwarz		BBA-9106	2002.6.28	
Log-Periodic Antenna		Rohde & Schwarz		UHALP-9107	2002.6.26	
Broadband Horn Antenna		Rohde & Schwarz		BBHA 9120 D(1099)	2002.10.26	
Antenna Position Tower		EMCO	1051-12	N.A		
Turn Table	EMCO	1060-06	N.A			
Line Filter	KEENE		ULW 2X30-60	N.A		