



RADIO TEST REPORT

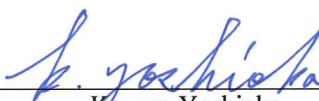
Test Report No. : 32BE0276-HO-01-A

Applicant : MITSUBISHI CABLE INDUSTRIES,LTD.
Type of Equipment : Remote starter unit
Model No. : PZ170-04021
Test regulation : FCC Part 15 Subpart C: 2011
FCC ID : WKE-PZ170-04021
Test Result : Complied


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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: October 5, 2011

Representative test engineer:


Kazuya Yoshioka
Engineer of WiSE Japan,
UL Verification Service

Approved by:


Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing	7
SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)	8
SECTION 6: Automatically deactivate	9
SECTION 7: -20dB and 99% Occupied Bandwidth	9
APPENDIX 1: Data of EMI test	10
Automatically deactivate	10
Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)	11
-20dB Bandwidth	12
99% Occupied Bandwidth	13
Duty Cycle	14
APPENDIX 2: Test Instruments	15
APPENDIX 3: Photographs of test setup	16
Radiated emission	16
Worst case position	17

SECTION 1: Customer information

Company Name : MITSUBISHI CABLE INDUSTRIES,LTD.
Address : 1-23-9, Imaike-Cho, Anjo-City, Aichi-pref. 446-0071 Japan
Telephone Number : +81-566-97-3222
Facsimile Number : +81-566-97-3251
Contact Person : Masahiro Hosaka

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Remote starter unit
Model No. : PZ170-04021
Serial No. : Refer to Clause 4.2
Rating : DC 13.5V
Receipt Date of Sample : October 5, 2011
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: PZ170-04021 (referred to as the EUT in this report) is a Remote starter unit.

This device is an in-vehicle unit of remote control starter for the vehicle.

It receives radio signal from portable device and controls vehicle according to it. And it transmits return signal to portable device.

General Specification

Clock frequency(ies) in the system : CPU: 8.000MHz, 32.768kHz
RF Transceiver: 14.7456MHz

Radio Specification

Equipment type : Transceiver
Frequency of operation : 429.2125MHz
Intermediate Frequency : 307.2kHz
Type of modulation : FSK
Antenna type : $\lambda/4$ monopole antenna
ITU code : F1D
Operation temperature range : -40 to + 85 deg.C

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2011, final revised on July 8, 2011
and effective August 8, 2011

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.231 Periodic operation in the band 40.66 - 40.70MHz
and above 70MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4	FCC: Section 15.207 IC: RSS-Gen 7.2.4	N/A	N/A*1)	-
Automatically Deactivate	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(a)(1) IC: RSS-210 A1.1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.8	FCC: Section 15.231(b) IC: RSS-210 A1.1.2	2.4dB 429.213MHz Horizontal, QP	Complied	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.9	FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.1.2, 2.5.1 RSS-Gen 7.2.5	10.8dB 4292.125MHz Vertical, PK with Duty factor	Complied	Radiated
-20dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(c) IC: Reference data	N/A	Complied	Radiated
Receiver Spurious Emissions	FCC: ANSI C63.4:2003 12. Measurement of unintentional radiators other than ITE IC: RSS-Gen 4.10	FCC: Section 15.109(a) Section 15.209 IC: RSS-Gen 6 RSS-210 2.3	-	Complied *2)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

*1) The test is not applicable since the EUT does not have AC Mains.

*2) For Receiver Spurious Emission test, please see the test report number 32BE0276-HO-01-B issued by UL Japan, Inc.

FCC 15.31 (e)

This test was performed with the DC Power Supply (DC 13.5V) and the constant voltage was supplied to the EUT during the tests. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is screwed inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	N/A	Radiated

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up.

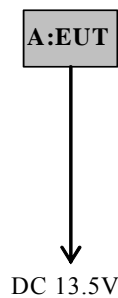
Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Test Item*	Mode
Automatically Deactivate	Normal use mode
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB Bandwidth 99% Occupied Bandwidth Duty Cycle	Transmitting mode (Tx)
<p>*Power of the EUT was set by the software as follows; Power settings: 1D Software: V01.00.07 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product. * The system was configured in typical fashion (as a customer would normally use it) for testing.</p>	

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Remote starter unit	PZ170-04021	47	MITSUBISHI CABLE INDUSTRIES,LTD.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.7	Unshielded	Unshielded	-

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SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The EUT was set on the center of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 3.

[Transmitting mode]

The Radiated Electric Field Strength has been measured on Semi anechoic chamber with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detector function of the test receiver/spectrum analyzer.

Test Antennas are used as below;

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

	Below or equal to 1GHz *1)	Above 1GHz
Detector Type	QP	Peak and Peak with Duty factor
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:3MHz

*1) The test below 1GHz was performed with QP detect because the transmitting duty was 100% on all tests. Frequency shift width is 3.7kHz, which is much lower than 120kHz. Therefore, the measurement was performed with duty 100%.

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.
Noise levels of all the frequencies were measured at the position.

*The result is rounded off to the second decimal place, so some differences might be observed.

Measurement range : 30MHz-4.3GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Automatically deactivate

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

Test data : APPENDIX
Test result : Pass

SECTION 7: -20dB and 99% Occupied Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
-20dB Bandwidth	100kHz	15kHz	51kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 % of Span	Three times of RBW	Auto (Single)	Sample	Clear Write	Spectrum Analyzer

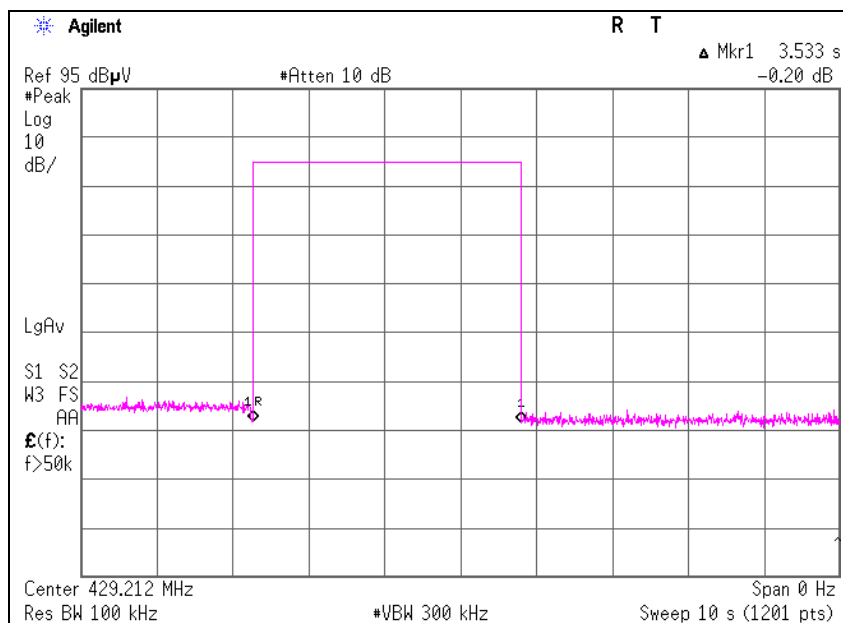
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Automatically deactivate

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32BE0276-HO-01
Date 10/05/2011
Temperature/ Humidity 22 deg.C/ 62% RH
Engineer Kazuya Yoshioka
Mode Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
3.533	5.000	Pass



Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32BE0276-HO-01
Date	10/05/2011
Temperature/ Humidity	22 deg.C/ 62% RH
Engineer	Kazuya Yoshioka
Mode	Transmitting mode

QP or PK

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit dBuV/m	Margin [dB]		Remark Inside or Outside of Restricted Bands
		Hor	Ver					Hor	Ver		Hor	Ver	
429.213	QP	81.6	81.5	18.1	10.6	32.1	-	78.2	78.1	80.6	2.4	2.5	Carrier
858.425	QP	28.6	27.2	23.6	12.8	31.5	-	33.5	32.1	60.6	27.1	28.5	Outside
1287.638	PK	46.9	48.0	24.7	1.6	33.9	-	39.3	40.4	80.6	41.3	40.2	Outside
1716.850	PK	49.6	47.7	25.7	1.8	32.9	-	44.2	42.3	80.6	36.4	38.3	Outside
2146.063	PK	43.8	42.8	27.0	2.1	32.3	-	40.6	39.6	80.6	40.0	41.0	Outside
2575.275	PK	42.4	41.4	28.6	2.3	32.1	-	41.2	40.2	80.6	39.4	40.4	Outside
3004.488	PK	41.1	41.2	28.7	2.5	32.0	-	40.3	40.4	80.6	40.3	40.2	Outside
3433.700	PK	42.8	42.7	28.8	2.7	31.8	-	42.5	42.4	80.6	38.1	38.2	Outside
3862.913	PK	40.4	40.3	29.7	2.8	31.7	-	41.2	41.1	73.9	32.7	32.8	Inside
4292.125	PK	41.0	41.4	30.2	3.0	31.5	-	42.7	43.1	73.9	31.2	30.8	Inside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

PK with Duty factor

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit dBuV/m	Margin [dB]		Remark
		Hor	Ver					Hor	Ver		Hor	Ver	
1287.638	PK	46.9	48.0	24.7	1.6	33.9	0.0	39.3	40.4	60.6	21.3	20.2	Outside
1716.850	PK	49.6	47.7	25.7	1.8	32.9	0.0	44.2	42.3	60.6	16.4	18.3	Outside
2146.063	PK	43.8	42.8	27.0	2.1	32.3	0.0	40.6	39.6	60.6	20.0	21.0	Outside
2575.275	PK	42.4	41.4	28.6	2.3	32.1	0.0	41.2	40.2	60.6	19.4	20.4	Outside
3004.488	PK	41.1	41.2	28.7	2.5	32.0	0.0	40.3	40.4	60.6	20.3	20.2	Outside
3433.700	PK	42.8	42.7	28.8	2.7	31.8	0.0	42.5	42.4	60.6	18.1	18.2	Outside
3862.913	PK	40.4	40.3	29.7	2.8	31.7	0.0	41.2	41.1	53.9	12.7	12.8	Inside
4292.125	PK	41.0	41.4	30.2	3.0	31.5	0.0	42.7	43.1	53.9	11.2	10.8	Inside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier) + Duty factor (Refer to Duty factor data sheet)

*It was confirmed by a search coil that there was no noise for spurious emission below 30MHz.

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

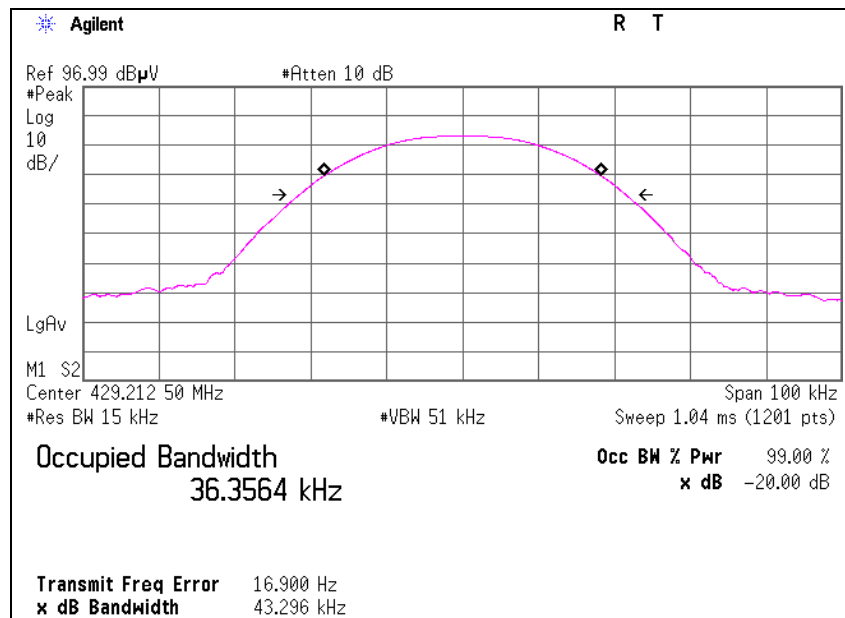
* The test above 1GHz was performed with PK detect. Average emission measurements were not calculated with PK detect and Duty cycle factor since the PK measurement value did not exceed the AV limit.

-20dB Bandwidth

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32BE0276-HO-01
Date 10/05/2011
Temperature/ Humidity 22 deg.C/ 62% RH
Engineer Kazuya Yoshioka
Mode Transmitting mode

Bandwidth Limit : Fundamental Frequency $429.213 \text{ MHz} \times 0.25\% = 1073.03 \text{ kHz}$

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
43.30	1073.03	Pass



*RBW was set at 1 to 5% of Bandwidth Limit (1073.03kHz) (RBW=15kHz).

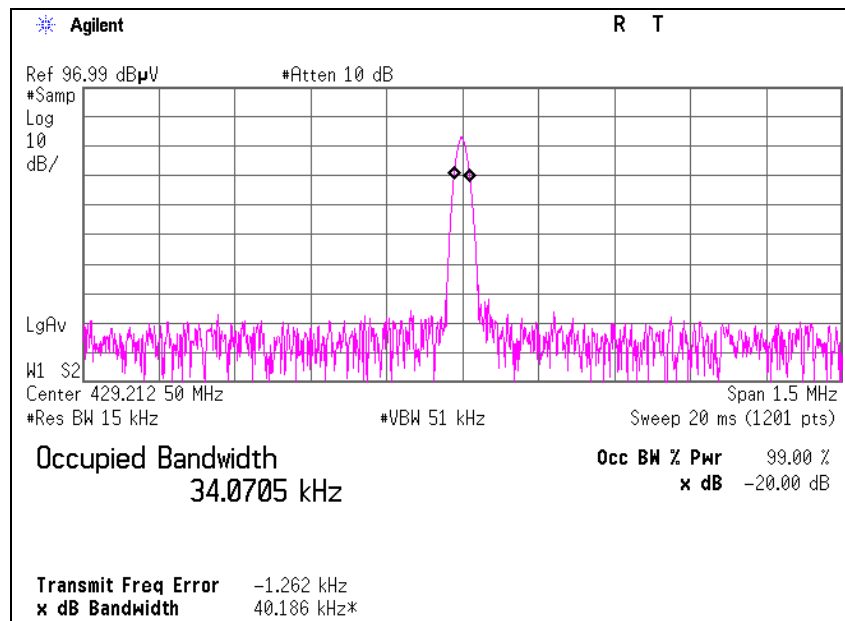
Span was set at 2 to 3.5 times Occupied Bandwidth (Span=100kHz), because this equipment is a narrowband equipment.

99% Occupied Bandwidth

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 32BE0276-HO-01
Date 10/05/2011
Temperature/ Humidity 22 deg.C/ 62% RH
Engineer Kazuya Yoshioka
Mode Transmitting mode

Bandwidth Limit : Fundamental Frequency $429.213 \text{ MHz} \times 0.25\% = 1073.03 \text{ kHz}$

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
34.07	1073.03	Pass

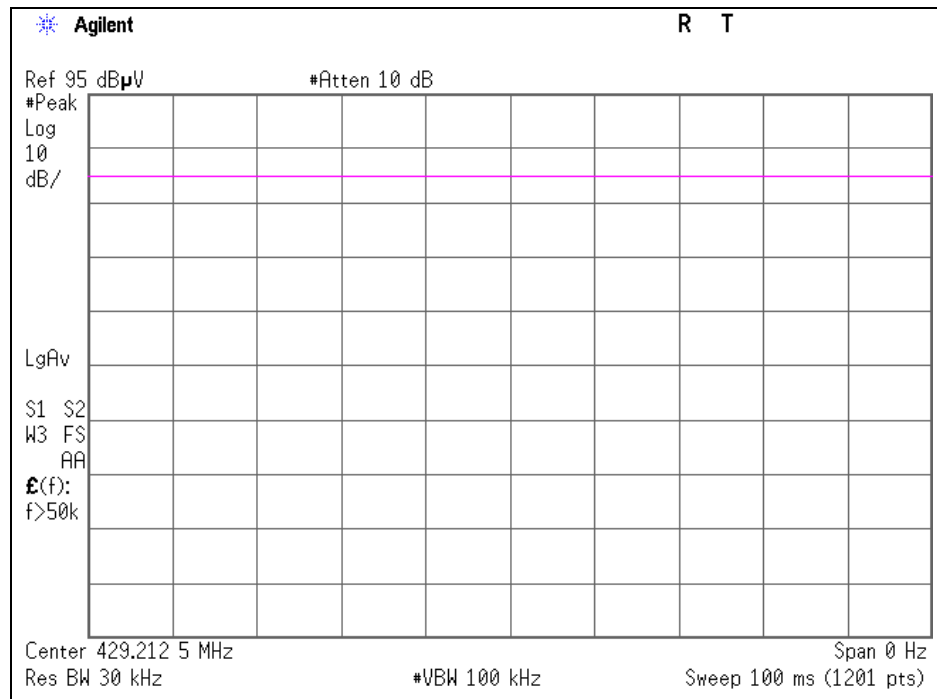


Duty Cycle

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32BE0276-HO-01
Date	10/05/2011
Temperature/ Humidity	22 deg.C/ 62% RH
Engineer	Kazuya Yoshioka
Mode	Transmitting mode

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
100.00	100.00	1.00	0.0

*1)Duty = 20log₁₀(ON time/Cycle)



APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2011/03/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2011/02/23 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185820	RE	2011/06/30 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2010/10/27 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/08/17 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/08/17 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2011/03/25 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2011/01/14 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2011/03/04 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2011/08/11 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2011/03/10 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission, 99% Occupied Bandwidth, -20dB bandwidth , Automatically deactivate and Duty cycle tests

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

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