RADIO TEST REPORT

Test Report No. : 31DE0057-HO-01-A-R1

Applicant	:	**TAIYO YUDEN CO., LTD.**
Type of Equipment	:	**IEEE 802.11 a/b/g/n Wireless LAN Module**
Model No.	:	**WYPAEBUX4**
FCC ID	:	**RYYWYPAEBUX4**
Test regulation	:	**FCC Part 15 Subpart C: 2010** **(Permissive Change Class II Application)** (Maximum Peak Output Power and Radiated Spurious Emission tests only)
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 the 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.
6. This report is a revised version of 31DE0057-HO-01-A. 31DE0057-HO-01-A is replaced with this report.

Date of test: November 12 to 23, 2010

Representative test engineer:
Satofumi Matsuyama
Engineer of EMC Service

Approved by:
Mitsuru Fujimura
Manager of EMC Service

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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SECTION 1: Customer information

Company Name	:	TAIYO YUDEN CO., LTD.
Address	:	8-1 Sakae-cho Takasaki-shi Gunma 370-8522, Japan
Telephone Number	:	+81-27-324-2313
Facsimile Number	:	+81-27-324-2314
Contact Person	:	Mitsuo Takagi

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

2.1 Identification of E.U.T.

Type of Equipment	:	IEEE 802.11 a/b/g/n Wireless LAN Module
Model No.	:	WYPAEBUX4
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3V
Receipt Date of Sample	:	November 10, 2010
Country of Mass-production	:	China
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 No: WYPAEBUX4 (referred to as the EUT in this report) is the IEEE 802.11 a/b/g/n Wireless LAN Module which is installed in the Main Unit of Blu-ray Disc Home Theater Sound System (host device) manufactured by Panasonic Corporation.

General Specification

Clock frequency(ies) in the system	:	20MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2.4GHz: 2412-2462MHz 5.0GHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz
Modulation	:	DSSS, OFDM
Power Supply (radio part input)	:	DC 3.3V
Antenna type	:	Pattern antenna

Antenna Gain

	2.4GHz	5.18-5.32GHz	5.50-5.70GHz	5.745-5.825GHz
Antenna 0	1.3dBi	1.7dBi	2.7dBi	2.8dBi
Antenna 1	1.2dBi	2.4dBi	2.8dBi	2.8dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2010, final revised on October 13, 2010
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz
Purpose of test	:	The test is for confirmation of Spurious emission at simultaneous transmission of EUT and Digital Transmitter (FCC ID: ACJT10001). This test was performed based on FCC/TCBC Conference call (2006-1-10), although there were over 20cm between WLAN module and RF transmitter module. Power level measurement was only performed to confirm whether or not the same level against the original grant.

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	**FCC:** Section 15.207	N/A	N/A *1)	-
	IC: RSS-Gen 7.2.2	**IC:** RSS-Gen 7.2.2			
6dB Bandwidth	**FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"	**FCC:** Section 15.247(a)(2)	N/A	N/A *1)	Conducted
	IC: RSS-Gen 4.6.2	**IC:** RSS-210 A8.2(a)			
Maximum Peak Output Power	**FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"	**FCC:** Section 15.247(b)(3)	See data.	Complied	Conducted
	IC: RSS-Gen 4.8	**IC:** RSS-210 A8.4(4)			
Power Density	**FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"	**FCC:** Section 15.247 (e)	N/A	N/A *1)	Conducted
	IC: -	**IC:** RSS-210 A8.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247"	**FCC:** Section15.247(d)	0.1dB 2225.267MHz, AV, Hori.	Complied	Radiated
	IC: RSS-Gen 4.9 RSS-Gen 4.10	**IC:** RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3			

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.
*1) The test was not performed since the test was performed at the test report: RF991011C13 (issued by Bureau Veritas Consumer products Services (H.K.) Ltd., Taoyuan Branch).

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)
This EUT provides stable voltage (DC3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 / 212 Antenna requirement
It is impossible for end users to replace the antenna, because it is pattern antenna. Therefore the equipment complies with the requirement of 15.203/212.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Co-location & Co-operation (Confirmation testing for Radiated Spurious Emission at simultaneous transmission)	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(d) RSS-210 A8.5	0.1dB 2225.267MHz, AV, Hori.	Complied	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	2.9dB	4.8dB	5.0dB	3.9dB	4.3dB	4.5dB	4.3dB
No.2	3.5dB	4.8dB	5.1dB	4.0dB	4.2dB	4.4dB	4.2dB
No.3	3.8dB	4.6dB	4.7dB	4.0dB	4.2dB	4.5dB	4.2dB
No.4	3.5dB	4.4dB	4.9dB	4.0dB	4.2dB	4.6dB	4.2dB

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

Power meter (±dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (±dB)			Antenna terminal conducted emission (±dB)		Channel power (±dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Radiated emission test (3m)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

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	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 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11a (11a)	6Mbps, PN9
IEEE 802.11b (11b)	2Mbps, PN9
IEEE 802.11g (11g)	6Mbps, PN9
IEEE 802.11n SISO 20MHz BW (11n-20): 2.4GHz Band	MCS 0 (Long GI, 1 Stream), PN9
IEEE 802.11n SISO 20MHz BW (11n-20): 5GHz Band	MCS 0 (Long GI, 1 Stream), PN9
IEEE 802.11n SISO 40MHz BW (11n-40): 2.4GHz Band	MCS 0 (Long GI, 1 Stream), PN9
IEEE 802.11n SISO 40MHz BW (11n-40): 5GHz Band	MCS 0 (Long GI, 1 Stream), PN9
Simultaneous transmission mode	-
*Transmitting duty was 100% on all tests. *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Software: WLAN Test Tool Ver. 007 *Refer to the following list about power settings. *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.	

[2.4GHz Band]
*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna	Tested frequency	Power Settings
Maximum Peak Output Power	11b Tx	Ant 0 Ant 1	2412MHz	40
			2437MHz	40
			2462MHz	40
	11g Tx	Ant 0 Ant 1	2412MHz	54
			2437MHz	66
			2462MHz	50
	11n-20 Tx	Ant 0 Ant 1	2412MHz	46
			2437MHz	58
			2462MHz	54
	11n-40 Tx	Ant 0 Ant 1	2422MHz	38
			2437MHz	58
			2452MHz	50
Spurious Emission *1)	11g Tx	Ant 1	2412MHz	54
			2437MHz	60
			2462MHz	50
	11n-40 Tx	Ant 1	2422MHz	38
			2437MHz	58
			2452MHz	50

[5GHz Band]
*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna	Tested frequency	Power Settings
Maximum Peak Output Power	11n-20 Tx	Ant 0 Ant 1	5745MHz 5785MHz 5825MHz	56
	11n-40 Tx	Ant 0 Ant 1	5755MHz 5795MHz	60
	11a Tx	Ant 0 Ant 1	5745MHz 5785MHz 5825MHz	52

*The details of Simultaneous transmission mode

Test Item	Operating Mode		Tested Antenna *2)
	EUT	The other transmitter device	
Spurious Emission *1)	11g Tx 2412MHz * 11n-40 Tx 2422MHz*	Digital Transmitter Tx 2412MHz *	Ant 1
	11g Tx 2437MHz 11n-40 Tx 2437MHz	Digital Transmitter Tx 2438MHz	Ant 1
	11g Tx 2462MHz* 11n-40 Tx 2452MHz*	Digital Transmitter Tx 2462MHz *	Ant 1

* Band edge only
** iPhone setting: Normal operation (Standby mode)

*1) The test was performed in the representative mode which had the maximum power value.

*2) EUT and Digital Transmitter have two antennas (Ant 0 and Ant 1).
As a result of preliminary check for two antennas, the formal test was performed as above-mentioned table.

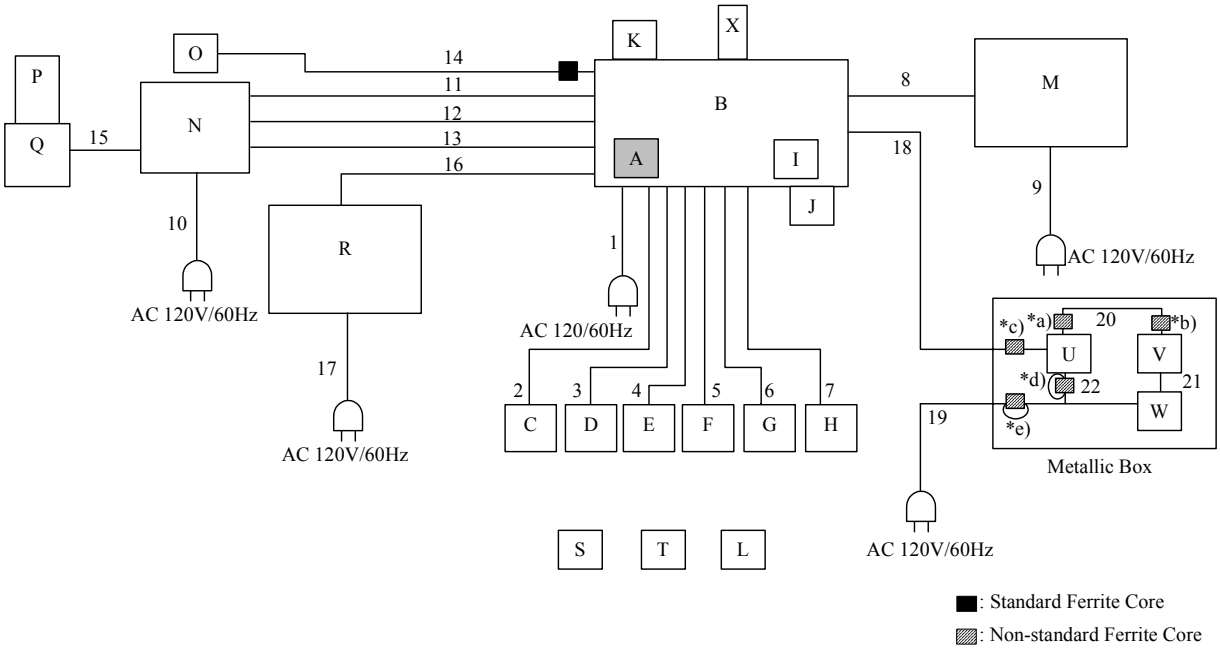
Preliminary check result (Worst antenna):

Antenna Terminal Conducted test: Ant 1

* Information of the host device.

Type of Equipment	:	Main Unit of Blu-ray Disc Home Theater Sound System
Model No.	:	SA-BTT370
Serial No.	:	001
Operating voltage	:	AC 120V
Clock frequency(ies) in the system	:	System (Video/Audio): 27MHz, System: 33MHz, Ethernet: 25MHz, DDR2: 400MHz, HDMI: 148.5MHz, SD: 22.2MHz, USB Controller: 24.0MHz, Main Control: 10.0MHz, Laser Module: 334-452MHz, Tuner: 87.628-107.872MHz

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	IEEE 802.11 a/b/g/n Wireless LAN Module	WYPAEBUX4	001	TAIYO YUDEN CO., LTD.	EUT *1)
B	Main Unit	SA-BTT370	001	Panasonic Corporation	*2)
C	Sub Woofer	SB-HW370	003	Panasonic Corporation	*2)
D	Front Speaker_L	SB-HF370	004	Panasonic Corporation	*2)
E	Surround Speaker_L	SB-HS270	006	Panasonic Corporation	*2)
F	Center Speaker	SB-HC370	002	Panasonic Corporation	*2)
G	Surround Speaker_R	SB-HS270	007	Panasonic Corporation	*2)
H	Front Speaker_R	SB-HF370	005	Panasonic Corporation	*2)
I	SD Card	RP-SDP08GJ1K	T4984824866706	Panasonic Corporation	-
J	iPhone	A1241	-	Apple	*3)
K	Digital Transmitter	RFAX1012	GZ0AA001026	Panasonic Corporation	*4), *5)
L	Remote Control	N2QAKB000073	-	GC	-
M	Blu-ray Disc Player	DMP-BD50	VA8CA001069	Panasonic Corporation	-
N	LCD TV	TC-L32X2	MP00960293	Panasonic Corporation	-
O	Skype	TY-CC10W	010	Panasonic Corporation	-
P	iPod	A1199	6U640NPUVQ5	Apple	-
Q	Universal Dock for iPod	TNM2AX0012	-	Panasonic Corporation	-
R	Blu-ray Disc Theater	SA-BTT350	GN0GA001270	Panasonic Corporation	-
S	Remote Control for LCD TV	N2QAYB000485	-	Panasonic Corporation	-
T	Remote Control for Main unit	N2QAYB000632	008	GC	*2)
U	LAN HUB	3CFSU05	9XUQ8P0012B91	3COM	-
V	Laptop PC	CF-W8EW3AJS	8JKSA08753	Panasonic Corporation	-
W	AC Adapter	CF-AA6372A	M208928521E	Panasonic Corporation	-
X	75Ω Terminator	65 BNC-75-0-7	-	SUHNER	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Power Cord for Main Unit	1.7	Unshielded	Unshielded	-
2	Speaker Cable	4.0	Unshielded	Unshielded	-
3	Speaker Cable	3.0	Unshielded	Unshielded	-
4	Speaker Cable	8.0	Unshielded	Unshielded	-
5	Speaker Cable	2.0	Unshielded	Unshielded	-
6	Speaker Cable	8.0	Unshielded	Unshielded	-
7	Speaker Cable	3.0	Unshielded	Unshielded	-
8	HDMI Cable	3.0	Shielded	Shielded	-
9	AC Power Cord	1.8	Unshielded	Unshielded	-
10	AC Power Cord for LCD TV	1.6	Unshielded	Unshielded	-
11	HDMI Cable	3.0	Shielded	Shielded	-
12	AUX Cable	3.0	Shielded	Shielded	-
13	Video Cable	1.2	Shielded	Shielded	-
14	USB Cable	1.8	Shielded	Shielded	-
15	Signal Cable	1.0	Shielded	Shielded	-
16	HDMI Cable	3.0	Shielded	Shielded	-
17	AC Cable	1.8	Unshielded	Unshielded	-
18	LAN Cable	3.0	Shielded	Shielded	*c)
19	AC Cable	1.4	Unshielded	Unshielded	*e)
20	LAN Cable	1.1	Shielded	Shielded	*a), *b)
21	DC Cable	1.0	Unshielded	Unshielded	-
22	AC Power Cord for LAN HUB	1.8	Unshielded	Unshielded	*d)

*1) IEEE 802.11 a/b/g/n Wireless LAN Module is installed in the Main Unit (Model number: SA-BTT370) of Blu-ray Disc Home Theater Sound System.
*2) Blu-ray Disc Home Theater Sound System is composed with these items and the system model number is SC-BTT370.
*3) Distance from the EUT: 10cm, State: Power is on only
*4) RF Transceiver Card (FCC ID: ACJT10001) is installed in Digital Transmitter (Model number: RFAX1012).
*5) Distance from the EUT: 25cm, State: Continuous transmitting

<Notes for Ferrite cores>
*a) 1 Ferrite Core, Model No. SFT59SN (Manufacturer: TKK), 5cm from Item T, 1 turn
*b) 1 Ferrite Core, Model No. SFT59SN (Manufacturer: TKK), 5cm from Item U, 1 turn
*c) 1 Ferrite Core, Model No. SFT59SN (Manufacturer: TKK), 8cm from Item T, 1 turn
*d) 1 Ferrite Core, Model No. SFT59SN (Manufacturer: TKK), 5cm from Item T, 2 turns
*e) 1 Ferrite Core, Model No. RFC-9 (Manufacturer: KG), 5cm from Metallic Box, 2 turns

SECTION 5: Radiated Spurious Emission

Test Procedure
It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
EUT was placed on a urethane platform of nominal size, 1.0m by 2.0m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna 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 with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 2 of RSS-210 2.7 (IC) and outside the restricted band of FCC15.205 / Table 1 of RSS-210 2.7 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz	RBW: 100kHz VBW: 300kHz
Test Distance	3m	3m (below 10GHz), 1m*1) (above 10GHz)		3m

*1) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-26.5GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass