



# RADIO TEST REPORT

**Test Report No.: 29HE0111-YK-01-A**

**Applicant** : ALPINE ELECTRONICS, INC.  
**Type of Equipment** : Bluetooth Module  
**Model No.** : PF240009  
**FCC ID** : A269ZUA129  
**Test regulation** : FCC Part15 Subpart C: 2010  
**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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:** November 6, 9, and 13, 2009 and August 6, 2010

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**JAB**  
Testing  
RTL02610

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## 1 Applicant information

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## 2 Equipment under test (E.U.T.)

### 2.1 Identification of E.U.T.

Type of Equipment : Bluetooth Module  
Model No. : PF240009  
Serial No. : P1040114AA  
Rating : DC3.4V  
Country of Mass-production : China  
Condition of EUT : Production model  
Modification of EUT : No modification by the test lab.  
Receipt Date of Sample : October 23, 2009

### 2.2 Product description

Model: PF240009 (referred to as the EUT in this report) is a Bluetooth Module.  
On the label, Control No. is added after Model No. PF240009.

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Clock frequency : 26MHz (CPU)  
Bandwidth & channel spacing : 1MHz  
Type of modulation : FHSS  
Antenna model & type : External antenna  
Antenna gain with cable loss : 4.6dBi  
Antenna connector type : UFL (Coaxial connector)  
ITU code : F1D, G1D  
Operation temperature range : -40 to +85 deg.C.

#### FCC Part15.31 (e)

This module provides the Bluetooth part with regulated power supply (DC3.4V). Therefore, the equipment complies with power supply regulation.

#### FCC Part15.203 Antenna requirement

Bluetooth Transceiver Module complies with the requirement. When it is put up for sale, one of the antennas is attached and the antenna is with a unique coupling to the intentional radiator.

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### 3 Test specification, procedures and results

#### 3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2010, final revised on January 22, 2010 and effective March 1, 2010

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
 Section 15.207 Conducted limits  
 Section 15.209 Radiated emission limits, general requirements  
 Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

\*The revision on February 27, 2009 does not influence the test specification applied to the EUT.

The EUT complies with FCC Part 15 Subpart B: 2009, final revised on December 2, 2009. Refer to the test report 29HE0111-YK-01-B.

#### 3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section 15.207	-	N/A *1)	N/A	N/A
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A		Complied
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (b)(1)	Conducted	N/A		Complied
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (d) Section15.209	Conducted/ Radiated	N/A *2)		4.8dB (79.028MHz, QP, Vertical, Tx 2480MHz, 3DH5)

Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15.

\*1) The test is not applicable since the EUT has no AC mains.

### 3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	Complied

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

### 3.4 Uncertainty

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

	No.1 Semi-anechoic chamber (±)	No.2 Semi-anechoic chamber (±)	No.3 Semi-anechoic chamber (±)
<b>Radiated emission (3m)</b>			
30-300MHz	4.4 dB	4.3 dB	4.5 dB
300-1000MHz	4.3 dB	4.2 dB	4.5 dB
1GHz<	5.7 dB	5.6 dB	5.6 dB

The data listed in this test report has enough margin, more than site margin.

Antenna port conducted test	(±)
Below 1GHz	1.1dB
1-3GHz	1.2dB
3-18GHz	2.9dB
18-26.5GHz	3.4dB

Power Measurement uncertainty above 1GHz (with a 95% confidence level) for this test was: (±) 0.8dB

Frequency Measurement uncertainty (with a 95% confidence level) for this test was: (±) 2.1%

Bandwidth Measurement uncertainty (with a 95% confidence level) for this test was: (±) 5.4%

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### 3.5 Test location

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JAB Accreditation No. : RTL02610

No.1/ No.2/ No.3 Semi-anechoic chamber has been fully described in a report submitted to FCC office, and accepted on April 17, 2009 (Registration No.: 697847).

IC Registration No. : 2973D-1 (No1 Semi-anechoic chamber)

2973D-2 (No2 Semi-anechoic chamber)

2973D-3 (No3 Semi-anechoic chamber)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Full-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7

### 3.6 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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## 4 System test configuration

### 4.1 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

Test item	Operating mode	Tested frequency
Carrier frequency separation	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
20dB bandwidth	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON) -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5 -Inquiry	-
Maximum peak output power	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9 -DH5 -2DH5 -3DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted)	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON/Inquiry -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9	Spurious emission: 2402MHz, 2441MHz, 2480MHz(Tx)
99% occupied bandwidth	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	2402MHz, 2441MHz, 2480MHz

\*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test)

\*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

However, the limit level 125mW of AFH mode was used due to the overlap of the bandwidth.

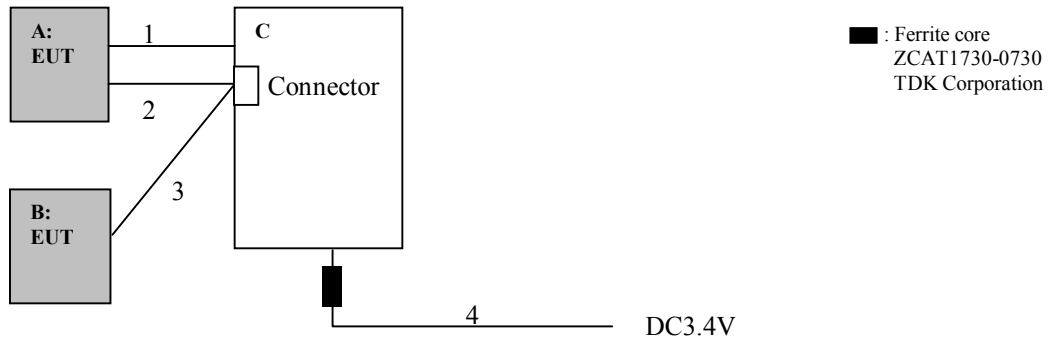
\*Software for testing: Tera Term (Rev: 4.63)

Power settings: Fixed (The setting is not controlled by the software and it is equivalent to that of mass-produced items.)

Above setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

## 4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.

### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Bluetooth Module	PF240009	P1040114AA	ALPINE ELECTRONICS, INC.	-
B	Antenna	MCR	112-04	ALPINE ELECTRONICS, INC.	-
C	Test jig	-	-	ALPINE ELECTRONICS, INC.	-

### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Ribbon Cable	0.2	Unshielded	Unshielded	-
2	U-FL Cable	0.65	Shielded	Shielded	-
3	Antenna cable	0.5	Shielded	Shielded	-
4	DC cable	2.2	Unshielded	Unshielded	-

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## 5 Carrier frequency separation

### Test procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

## 6 20dB bandwidth & Occupied bandwidth (99%)

### Test procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

The channel separation in Hopping mode and Inquiry mode was separated by 25kHz and 2/3 of the 20dB bandwidth.

Summary of the test results: Pass

## 7 Number of hopping frequency

### Test procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

## 8 Dwell time

### Test procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

## 9 Maximum peak output power

### Test procedure

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass

## 10 Out of band emissions (Antenna port conducted)

### Test procedure

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.

In any 100kHz bandwidth outside the frequency 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 conducted measurement.

Summary of the test results: Pass

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## 11 Out of band emissions (Radiated)

### 11.1 Operating environment

The test was carried out in No.3 Semi-anechoic chamber.

### 11.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The configuration was set in accordance with ANSI C63.4: 2003. Photographs of the set up are shown in Appendix 1.

### 11.3 Test conditions

Frequency range : 30MHz - 26GHz  
 Test distance : 3m

### 11.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m. (Refer to Figure 1)

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 intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz, AV: PK with Dwell Factor
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

	Below 1GHz	Above 1GHz
Module	Horizontal: Y, Vertical: Y	Horizontal: Z, Vertical: Z
Antenna	Horizontal: Z, Vertical: Z	Horizontal: Y, Vertical: Z

### 11.5 Band edge

Band edge level at 2390MHz, 2400MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data.

### 11.6 Results

Summary of the test results : Pass \*No noise was detected above the 5<sup>th</sup> order harmonics.

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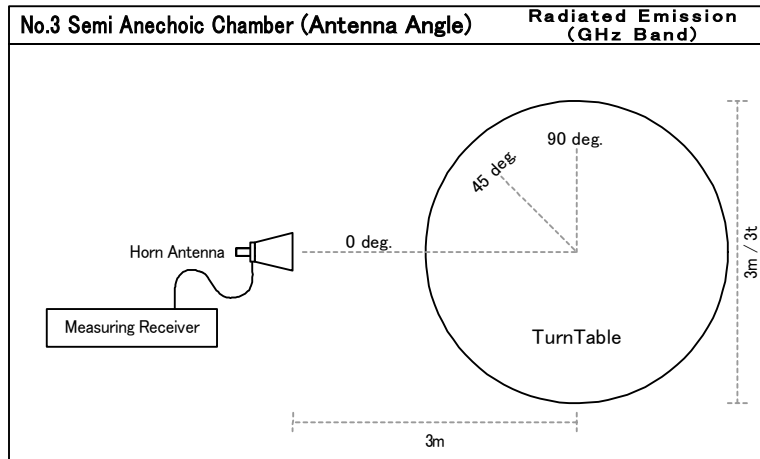
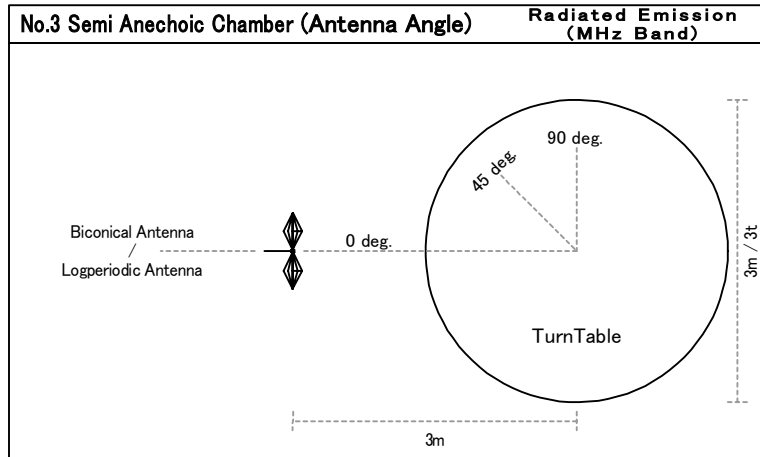
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Figure 1. Antenna angle



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### **APPENDIX 1: Photographs of test setup**

Page 13	:	Radiated emission
Page 14 - 15	:	Pre-check of the worst position

### **APPENDIX 2: Test data**

Page 16 - 19	:	20dB bandwidth and Carrier frequency separation
Page 20 - 22	:	Number of hopping frequency
Page 23 - 26	:	Dwell time
Page 27	:	Maximum peak output power
Page 28 - 38	:	Out of band emissions (Antenna Port Conducted)
Page 39 - 51	:	Out of band emissions (Radiated)
Page 52 - 53	:	Occupied bandwidth (99%)

### **APPENDIX 3: Test instruments**

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