



TEST REPORT

Ref. Report No.

02-341-035-02

This test report only responds to the tested sample and shall not be reproduced except

Name and address of the applicant

Felio Group(M) Sdn. Bhd.
Lot 5, Jalan Gudang 16/9 Seksyen 16,
Shah Alam, 40200 Malaysia

Standard / Test regulation

FCC Part 15, Subpart B

Test result

Pass

Incoming date : October 01, 2002

Test date : October 08, 2002

Test item(s) ;

Communication Receiver used with
Part 15 Tx
(Tire Pressure Monitoring System)

Model/type ref. ;

TPMS

Manufacturer ;

Felio Group(M) Sdn. Bhd.

Additional information ;

-Required Authorization : Certification

-FCC ID. : QN5XT400-R

-Note : Test report(Certification) of
Transmitter portion of this System is issued
on Ref. Report No. 02-341-035-01.

Issue date : October 16, 2002

in full without written approval of the Korea Testing Laboratory.

Tested and reported by

Reviewed by

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KOREA TESTING LABORATORY

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□. GENERAL INFORMATION

1. Grantee's Name and Mailing Address : Felio Group(M) Sdn. Bhd.
Lot 5, Jalan Gudang 16/9 Seksyen 16,
Shah Alam, 40200 Malaysia
2. Manufacturer's Name and Mailing Address : Felio Group(M) Sdn. Bhd.
Lot 5, Jalan Gudang 16/9 Seksyen 16,
Shah Alam, 40200 Malaysia
3. Equipment Descriptions
- 3.1 Operating Frequency : 433.92 MHz
3.2 Detect Method : Superheterodyne Detector
3.3 Local Oscillator : Local Osc. Frequency = Operating Frequency – 0.5 MHz (IF)
3.4 Power Supply : DC 12 V (Car Battery)
4. Rules and Regulations : FCC Part 15, Subpart B
5. Measuring Procedure : ANSI C63.4-1992
6. Place of Measurement : Absorber-lined Room (KTL)
7. Date of Measurement
- 7.1 Conducted Emission : Not Applicable
7.2 Radiated Emission : October 08, 2002

□. GENERAL REQUIREMENTS OF THE EUT

1. Labeling Requirement (Section 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interface, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.1 Location of Label : User's Guide Manual

1.2 How Applied : Printed

2. Information to User (Section 15.21)

The following or similar statements were provided in the manual for user instruction.

Please refer page 2 of the attached manual for details.

CAUTION : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. Special Accessories (Section 15.27)

3.1 Were the special Accessories provided? [] yes, [x] no

3.2 If yes, details for the special accessories are as follows :

3.3 If yes, were the appropriate instructions provided on the first page of the text concerned with the device?
[] yes, [] no

3.4 Are these accessories provided of the type which can be readily obtained from multiple retail outlets ?
[] yes, [] no

And therefore does the manual specify what additional components or accessories are required to used in order to comply with the Rules?
[] yes, [] no

□. RADIATED EMISSION MEASUREMENT (Section 15.109)

1. Test Procedure

1.1 Preliminary Testing for Reference

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna (Biconical antenna : 30 to 300 MHz, Log-periodic antenna : 200 to 1000 MHz or Horn Antenna : 1 to 18 GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT while rotating the table and varying antenna height.

Emission levels from the EUT with various configurations were examined on a Spectrum Analyzer connected with a RF amplifier and graphed by a plotter.

1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

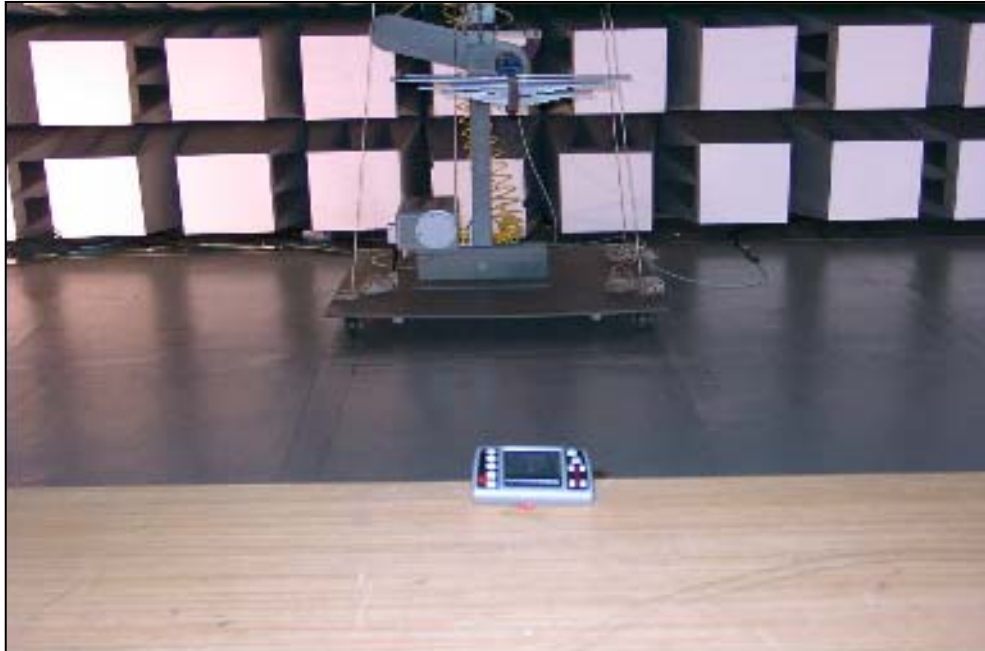
Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer with a RF amplifier.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

2. Photograph for the test configuration



3. Sample Calculation

The emission level measured in decibels above one microvolt ($\text{dB } \mu\text{V}$) was converted into microvolt per meter ($\mu\text{V}/\text{m}$) as shown in following sample calculation.

For example :

| | | | |
|-------|------------------------------|-------------------|------------------------------------|
| | Measured Value at | <u>866.68 MHz</u> | 12.4 dB $\mu\text{V}/\text{m}$ |
| + | Antenna Factor | | 23.0 dB |
| + | Cable Loss | | 5.3 dB |
| - | Preamplifier | | 0.0 dB |
| - | Distance Correction Factor * | | 0.0 dB |
| <hr/> | | | |
| = | Radiated Emission | | 40.7 dB $\mu\text{V}/\text{m}$ |
| | | | (= 108.4 $\mu\text{V}/\text{m}$) |

* Extrapolated from the measured distance to the specified distance by an inverse linear distance extrapolation.

4. Measurement Data

- Detect Mode and Resolution Bandwidth :
 CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz for ranges below 1 GHz)
 Average & Peak (6 dB Bandwidth: 1 MHz for ranges over 1 GHz)
- Measurement Distance : 3 Meter

| Frequency (MHz) | * D.M. | * A.P. | Measured Value (dB□) | * A.F. + C.L. (dB/m) | * A.G. (dB) | * D.C.F. (dB) | Emission Level | | Limit (dB□/m) | ** Margin (dB) |
|--------------------|-----------|-----------|----------------------------|----------------------------------|-------------------|---------------------|-------------------|-------|------------------|----------------------|
| | | | | | | | (dB□/m) | (□/m) | | |
| 433.34 | Q | H | 20.4 | 20.0 | - | - | 40.4 | 104.7 | 46.0 | - 5.6 |
| 866.68 | Q | V | 12.4 | 28.3 | - | - | 40.7 | 108.4 | 46.0 | - 5.3 |
| - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | | |
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Note

The upper frequency range of this test was 2 GHz. The observed EMI Test Receiver's noise floor level with RF preamplifier was 35.0 dB□. And all other emissions not reported on data were more than 20 dB below the permitted level.

* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)
 A.P. : Antenna Polarization (H : Horizontal, V : Vertical)
 A.F. : Antenna Factor
 C.L. : Cable Loss
 A.G. : Amplifier Gain
 D.C.F. : Distance Correction Factor
 < : Less than

** Margin (dB) = Emission Level (dB) - Limit (dB)

□. TEST EQUIPMENT USED FOR MEASUREMENTS

| <u>Equipment</u> | <u>Model No.</u> | <u>Manufacturer</u> | <u>Serial No.</u> | <u>Effective Cal. Duration</u> |
|--|------------------|---------------------|-------------------|--------------------------------|
| [x] EMI Receiver (20 MHz-1 GHz) | ESVS30 | R & S | 830516/002 | 06/13/02-06/13/03 |
| [x] EMI Receiver (20 Hz-7 GHz) | ESI | R & S | 835571/004 | 09/05/02-09/05/03 |
| [x] Spectrum Analyzer (9 kHz-26.5 GHz) | 8563A | H. P. | 3222A02069 | 03/27/02-03/27/03 |
| [x] Spectrum Analyzer (100 Hz-22 GHz) | 8566B | H. P. | 3014A07057 | 05/26/02-05/26/03 |
| [x] Quasi-Peak Adapter (10 kHz-1 GHz) | 85650A | H. P. | 3107A01511 | 05/26/02-05/26/03 |
| [x] RF-Preselector (20 Hz-2 GHz) | 85685A | H. P. | 3010A01181 | 05/26/02-05/26/03 |
| [] Test Receiver (9 kHz-30 MHz) | ESH3 | R & S | 860905/001 | 06/13/02-06/13/03 |
| [x] Pre-Amplifier (0.1-3000 MHz, 30 dB) | 8347A | H. P. | 2834A00543 | 05/26/02-05/26/03 |
| [x] Pre-Amplifier (1-26.5 GHz, 35 dB) | 8449B | H. P. | 3008A00302 | 05/26/02-05/26/03 |
| [] LISN(50 Ω , 50 μH) (10 kHz-100 MHz) | 3825/2 | EMCO | 9010-1710 | 05/26/02-05/26/03 |
| [x] Plotter | 7470A | H. P. | 3104A21292 | - |
| [] Tuned Dipole Ant. (30 MHz-300 MHz) | VHA 9103 | Schwarzbeck | - | * |
| [] Tuned Dipole Ant. (300 MHz-1 GHz) | UHA 9105 | Schwarzbeck | - | * |
| [x] Biconical Ant. (30 MHz-300 MHz) | BBA 9106 | Schwarzbeck | - | * |
| [x] Log Periodic Ant. (200 MHz-1 GHz) | 3146 | EMCO | - | * |
| [x] Horn Ant. (1 GHz-18 GHz) | 3115 | EMCO | - | * |
| [] Active Loop Ant. (9 kHz-30 MHz) | 6502 | EMCO | 2532 | * |
| [x] DC Power Supply | 6260B | H.P. | 1145A04822 | - |
| [] Shielded Room (5.0 m x 4.5 m) | - | SIN-MYUNG | - | - |

* Each set of antennas has been calibrated to ensure correlation with ANSI C63.5 standard. The calibration of antennas is traceable to Korea Standard Research Institute(KSRI).