Test Report No. S07EEC00276/01
dated 15 Jan 2008

PSB Singapore

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC Parts 15B & C : 2007
OF A
ThermoSENSOR
[Model : TSS-2400]
[FCC ID : VPE-TSS2400]

TEST FACILITY	TÜV SÜD PSB Pte Ltd, Electrical & Electronics Centre (EEC), Product Services, 1 Science Park Drive, Singapore 118221
FCC REG. NO.	90937 (3m & 10m OATS) 99142 (10m Anechoic Chamber) 871638 (3m Anechoic Chamber) 325572 (10m Anechoic Chamber) C-2305 (C.E @ Lab 6), C-2306 (C.E @ Lab 3) T-212 (Telecom Ports @ Lab 6), T-213 (Telecom Ports @ Lab 3)
IND. CANADA REG. NO.	IC 4257 (3m and 10m Anechoic Chambers)
PREPARED FOR	Mr Ng Wai Mun Cadi Scientific Pte Ltd 1003 Bukit Merah Central #04-40 Singapore 159836 Tel : (65) 6276 2676 Fax : (65) 6276 6216
QUOTATION NUMBER	56Q0700440
JOB NUMBER	S07EEC00276
TEST PERIOD	03 Jan 2008 – 09 Jan 2008

PREPARED BY

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LA-2007-0380-A
LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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TÜV®

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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

Test Standard	Description	Pass / Fail
FCC Part 15: 2007		
15.107(a), 15.207	Conducted Emissions	Not Applicable *See Note 4
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.249(a)	Radiated Emissions (Fundamental and Harmonics)	Pass
15.249(d)	Band Edge Compliance (Radiated) - @ Restricted Bands	Pass
15.35(c)	Duty Cycle Factor Computation	Refer to page 27 for details

Notes

1. Three channels as listed below, which respectively represent the lower, middle and upper channels of the Equipment Under Test (EUT) were chosen and tested. For each channel, the EUT was configured to operate in the test mode.

Transmit Channel	Frequency (GHz)
Channel 1	2.402
Channel 3	2.450
Channel 5	2.481

2. The EUT is a Class B device when in non-transmitting state and meets the FCC Part15B Class B requirements.

3. All test measurement procedures are according to ANSI C63.4: 2003.

4. The Equipment Under Test (EUT) is a battery operated device and contains no provision for public utility connections.

5. The declaration of Cadi Scientific Pte Ltd is shown below:
   The models STG-2400 and TSS-2400 are identical models in term of components, circuitry design, PCB layout and mechanical structure, and the differences between these models are:
   a. Casing
   b. Temperature measuring functions.
   The model **TSS-2400** is the worst case model between the declared models in view of EMC, and if the model **TSS-2400** passes the EMC test, the declared model **STG-2400** is deemed to pass the same test.

TEST SUMMARY

Modifications

No modifications were made.

PRODUCT DESCRIPTION

Description	:	The Equipment Under Test (EUT) is a **ThermoSENSOR. The** EUT is able to transmit temperature information wirelessly via RF or Infra-Red (IR).
Manufacturer	:	Cadi Scientific Pte Ltd 1003 Bukit Merah Central #04-40 Singapore 159836
Model Number	:	TSS-2400
FCC ID	:	VPE-TSS2400
Serial Number	:	Nil
Microprocessor	:	PIC16F690
Operating / Transmitting Frequency	:	2.402GHz - 2.481GHz
Clock / Oscillator Frequency	:	31kHz, 8MHz & 16MHz
Modulation	:	Frequency Shift Key (FSK)
Antenna Gain	:	0 dBi
Port / Connectors	:	Nil
Rated Input Power	:	2.3Vdc - 3.6Vdc
Accessories	:	Nil

SUPPORTING EQUIPMENT DESCRIPTION

The EUT was tested as a stand-alone unit without any supporting equipment.

EUT OPERATING CONDITIONS

FCC Part 15
1. Conducted Emissions **2. Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)** **3. Radiated Emissions (Fundamental and Harmonics)** **4. Duty Cycle Factor Computation**
The EUT was exercised by in following modes during the test: **RF Mode** The maximum RF continuous transmission / receiving, i.e transmitting / receiving at lower, middle and upper channels respectively at one time. **Infra-Red (IR) Mode** The maximum IR continuous transmission.

RADIATED EMISSION TEST

FCC Part 15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6
13.36 - 13.41			

FCC Parts 15.109(a) and 15.209 Radiated Emission Limits

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*
* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.	

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz–26.5GHz) – ESMI2	ESMI	829214/006 829550/001	10 May 2008
Schaffner Preamplifier (9kHz-2GHz) – PA19	CPA9231A	18763	12 Jan 2008
MITEQ Preamplifier (0.1-26.5GHz) – PA3	NSP2650-N	592346	26 Jan 2008
Schaffner Bilog Antenna –BL	CBL6112D	22020	14 May 2008
EMCO Horn Antenna – H5 (Ref)	3115	6214	19 Mar 2008
Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	13 Aug 2008

RADIATED EMISSION TEST

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Parts 15.109(a) and 15.209 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 10th harmonics of the EUT fundamental frequency, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz Q-P limit (Class B) = 200 μV/m = 46.0 dBμV/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 40.0 dBμV/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 40.0 - 46.0 = -6.0 i.e. **6 dB below Q-P limit**

Radiated Emissions Test Setup (Front View)

Radiated Emissions Test Setup (Rear View)

FCC Parts 15.109(a), 15.205 and 15.209 Radiated Emission Results

Test Input Power	3.6Vdc	Temperature	24°C
Test Distance	3m	Relative Humidity	57%
Operating Mode	RF Transmitting	Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Channel
174.9204	18.7	-24.8	54	100	V	1
339.1634	18.7	-27.3	195	100	V	1
563.3068	27.7	-18.3	336	100	V	1
698.5658	23.6	-22.4	78	100	H	1
837.6893	37.4	-8.6	125	100	V	1
911.1156	27.3	-18.7	103	100	V	1

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dBµV/m)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
1.2022	53.8	34.1	-19.9	177	100	H	1
1.2322	54.1	34.4	-19.6	156	100	H	3
1.2411	56.3	36.6	-17.4	166	100	H	5
2.3333	64.5	44.8	-9.2	178	100	V	1
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Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. "--" indicates no emissions were found and shows compliance to the limits.
3. The EUT was tested using a fully charged internal battery which was at 3.6Vdc during the measurement.
4. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
5. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.

6. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
7. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
8. The channel in the table refers to the transmit channel of the EUT.
9. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz (QP only @ 3m & 10m) is ±4.6dB (for EUTs < 0.5m X 0.5m X 0.5m).

FCC Parts 15.109(a), 15.205 and 15.209 Radiated Emission Results

Test Input Power	3.6Vdc	Temperature	24°C
Test Distance	3m	Relative Humidity	57%
Operating Mode	RF Receiving	Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Channel
159.4622	22.8	-20.7	26	100	V	1
277.3307	17.6	-28.4	66	100	V	1
524.6614	21.3	-24.7	69	100	V	1
663.7849	22.8	-23.2	156	100	V	1
783.5857	26.2	-19.8	133	100	V	1
901.4542	31.8	-14.2	112	100	V	1

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
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Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. "--" indicates no emissions were found and shows compliance to the limits.
3. The EUT was tested using a fully charged internal battery which was at 3.6Vdc during the measurement.
4. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
5. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.

6. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
7. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
8. The channel in the table refers to the transmit channel of the EUT.
9. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz (QP only @ 3m & 10m) is ±4.6dB (for EUTs < 0.5m X 0.5m X 0.5m).

RADIATED EMISSION TEST

FCC Parts 15.109(a), 15.205 and 15.209 Radiated Emission Results

Test Input Power	3.6Vdc	Temperature	24°C
Test Distance	3m	Relative Humidity	57%
Operating Mode	Infra-Red (IR)	Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
250.2789	22.5	-23.5	145	100	H
358.4861	18.0	-28.0	178	100	V
638.6654	24.0	-22.0	59	100	V
727.5499	23.6	-22.4	60	100	v
845.4184	29.8	-16.2	98	100	V
920.7769	33.7	-12.3	80	100	V

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Channel
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Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. "--" indicates no emissions were found and shows compliance to the limits.
3. The EUT was tested using a fully charged internal battery which was at 3.6Vdc during the measurement.
4. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
5. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.

6. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
7. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
8. The channel in the table refers to the transmit channel of the EUT.
9. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz (QP only @ 3m & 10m) is ±4.6dB (for EUTs < 0.5m X 0.5m X 0.5m).

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) Radiated Emission (Fundamental and Harmonics) Limits

Fundamental Frequency (MHz)	Field Strength of Fundamental Limit Values @ 3m (dBµV/m) *	Field Strength of Harmonics Limit Values @ 3m (dBµV/m) *
902 - 928	94.0	54.0
2400 - 2483.5	94.0	54.0
5725 - 5875	94.0	54.0
24000 - 24250	108.0	68.0
* Quasi peak detector was employed for frequency up to 1GHz. For above 1GHz frequency, average detector was used. A peak limit of 20dB above the average limit does apply.		

FCC Parts 15.249(a) Radiated Emission (Fundamental and Harmonics) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz–26.5GHz) – ESMI2	ESMI	829214/006 829550/001	10 May 2008
MITEQ Preamplifier (0.1-26.5GHz) – PA3	NSP2650-N	592346	26 Jan 2008
EMCO Horn Antenna – H5 (Ref)	3115	6214	19 Mar 2008

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) Radiated Emission (Fundamental and Harmonics) Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

FCC Part 15.249(a) Radiated Emission (Fundamental and Harmonics) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the fundamental and harmonics emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from the EUT fundamental frequency until its 10th harmonics, using the Bi-log antenna for frequencies from 30MHz up to 3GHz, and the Horn antenna above 3GHz.

Sample Calculation Example

At 300 MHz	Q-P limit (Class B) = 200 μV/m = 46.0 dBμV/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 40.0 - 46.0 = -6.0	i.e. **6 dB below Q-P limit**

Radiated Emissions Test Setup (Front View)

Radiated Emissions Test Setup (Rear View)

RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

FCC Part 15.249(a) Radiated Emission (Fundamental and Harmonics) Results

Test Input Power	3.6Vdc	Temperature	24°C
Test Distance	3m	Relative Humidity	57%
		Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

Channel 1

Frequency (GHz)	Peak Value (dBµV/m)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Note
2.4022	102.2	82.5	-11.5	78	100	H	Fundamental
4.8042	64.0	44.3	-9.7	60	100	H	Harmonic
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Channel 3

Frequency (GHz)	Peak Value (dBµV/m)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Note
2.4502	97.6	77.9	-16.1	80	100	H	Fundamental
4.9021	63.0	43.3	-10.7	55	100	H	Harmonic
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Channel 5

Frequency (GHz)	Peak Value (dBµV/m)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Note
2.4812	98.4	78.7	-15.3	81	100	H	Fundamental
4.9622	64.8	45.1	-8.9	57	100	H	Harmonic
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RADIATED EMISSION (FUNDAMENTAL AND HARMONICS) TEST

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. "--" indicates no emissions were found and shows compliance to the limits.
3. The EUT was tested using a fully charged internal battery which was at 3.6Vdc during the measurement.
4. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
5. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
6. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
   30MHz - 1GHz
   RBW: 120kHz VBW: 1MHz
   >1GHz
   RBW: 1MHz VBW: 1MHz
7. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
8. The channel in the table refers to the transmit channel of the EUT.
9. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz (QP only @ 3m & 10m) is ±4.6dB (for EUTs < 0.5m X 0.5m X 0.5m).

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 15.249(d) Band Edge Compliance (Radiated) Limits

The EUT shows compliance to the requirements of this section, which states emissions radiated outside of the specified frequency bands, expect for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emissions limits in section 15.209, whichever is the lesser attenuation.

FCC Part 15.249(d) Band Edge Compliance (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz–26.5GHz) – ESMI2	ESMI	829214/006 829550/001	10 May 2008
MITEQ Preamplifier (0.1-26.5GHz) – PA3	NSP2650-N	592346	26 Jan 2008
EMCO Horn Antenna – H5 (Ref)	3115	6214	19 Mar 2008

FCC Part 15.249(d) Band Edge Compliance (Radiated) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to following setting to show compliance of spurious emissions at band edges to the restricted bands:
   a. Peak Plot:
      RBW = VBW = 1MHz
   b. Average Plot
      RBW = 1MHz, VBW = 10Hz
4. All other supporting equipment were powered separately from another filtered mains.

FCC Part 15.249(d) Band Edge Compliance (Radiated) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 2.400GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 2.4835GHz and the any spurious emissions at the band-edge.

BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Test Setup

BAND EDGE COMPLIANCE (RADIATED) TEST

FCC Part 15.249(d) Band Edge Compliance (Radiated) Results

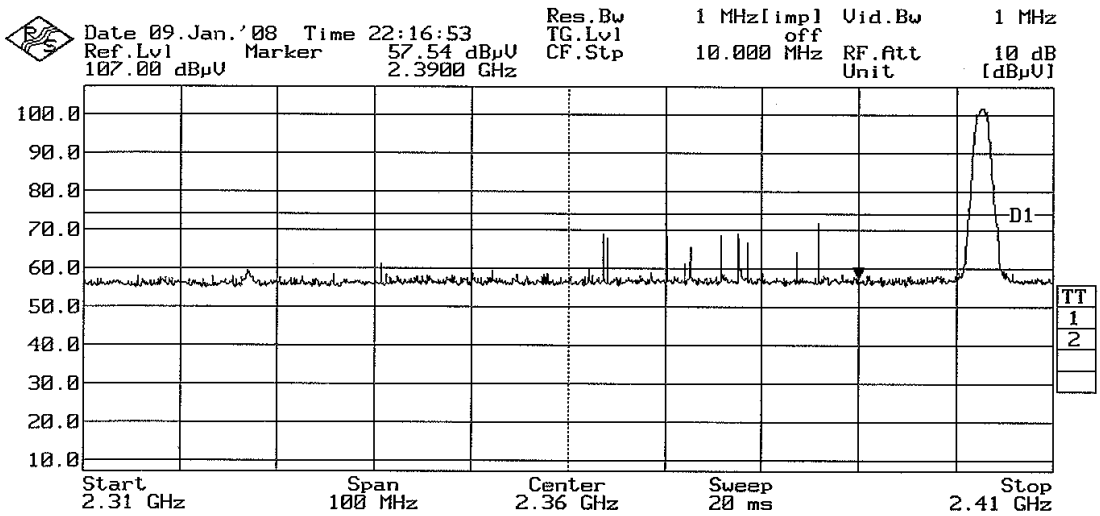
Test Input Power	3.6Vdc	Temperature	24°C
Attached Plots	1 - 4	Relative Humidity	57%
		Atmospheric Pressure	1030mbar
		Tested By	Lucas Beh

No significant signal was found and they were below the specified limit.

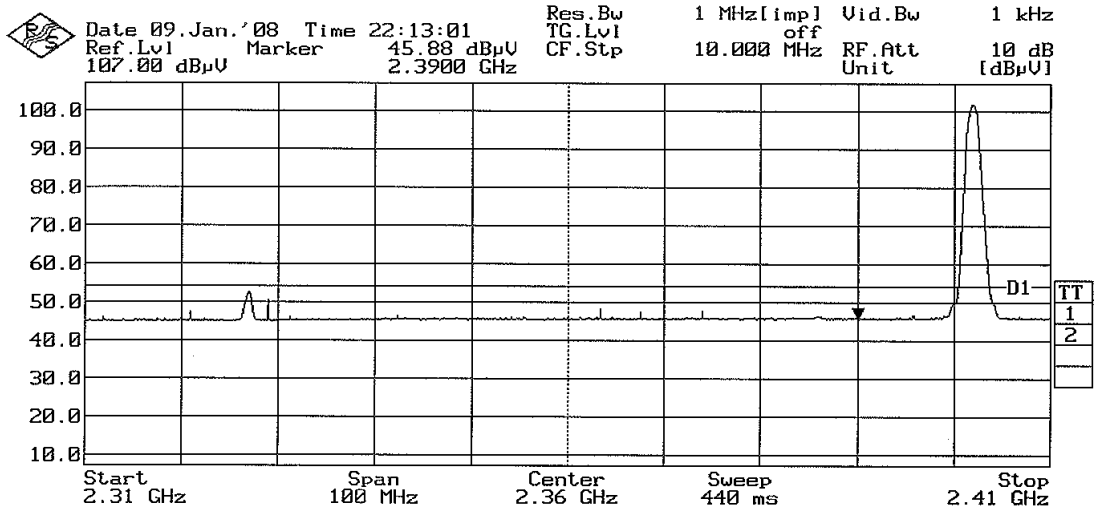
Notes

1. The EUT was tested using a fully charged internal battery which was at 3.6Vdc during the measurement.

Band Edge Compliance (Radiated) Plots (Restricted Band)

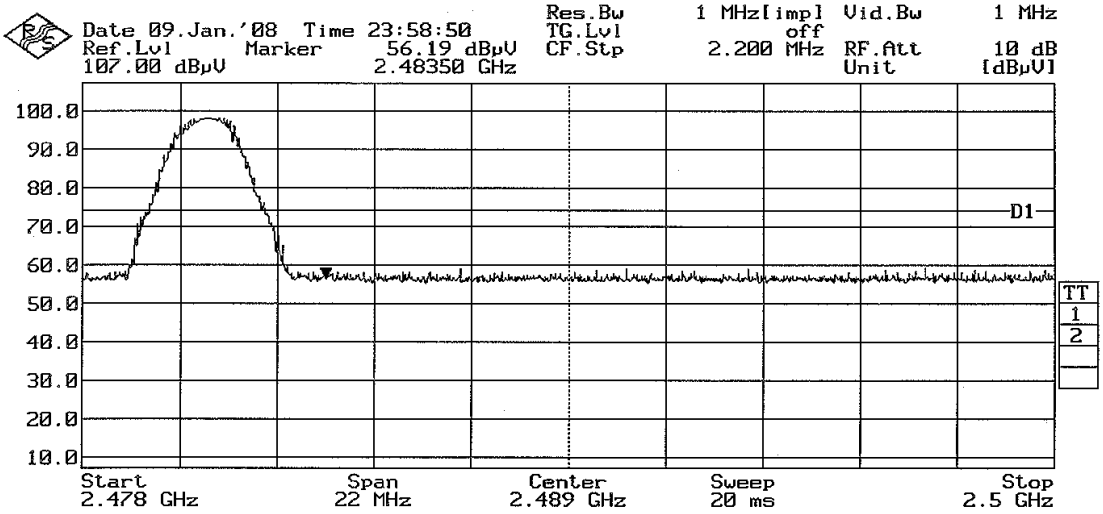


Plot 1 – Peak Plot at Lower Band Edge at 2.4000GHz

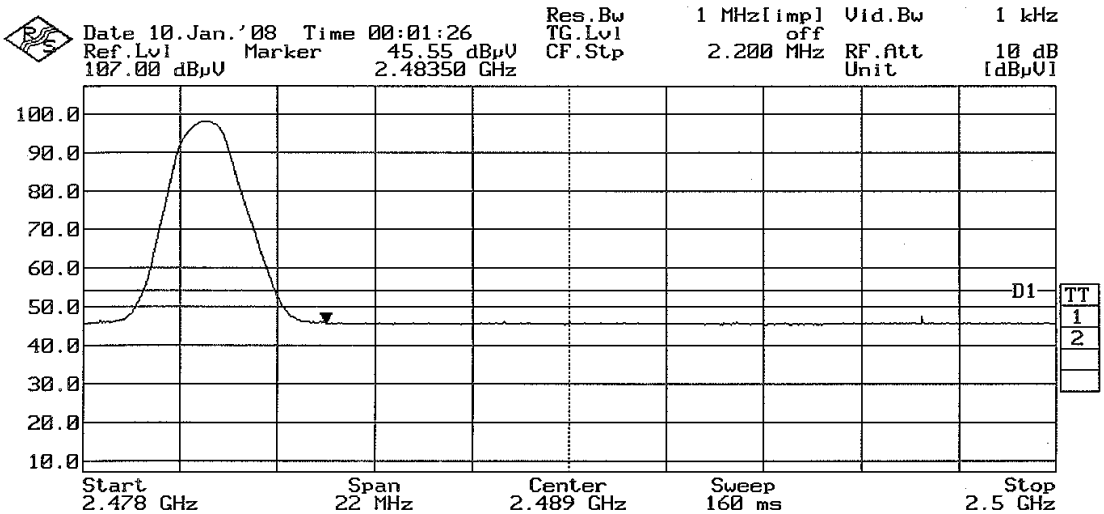


Plot 2 – Average Plot at Lower Band Edge at 2.4000GHz

Band Edge Compliance (Radiated) Plots (Restricted Band)



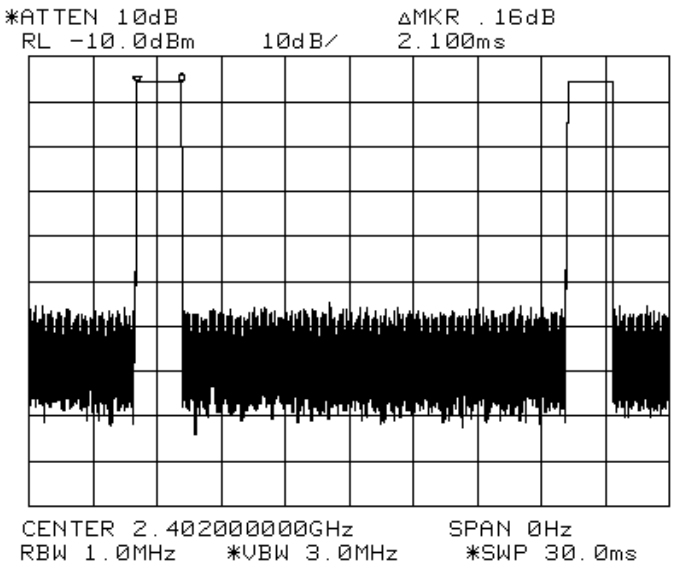
Plot 3 – Peak Plot at Upper Band Edge at 2.4835GHz



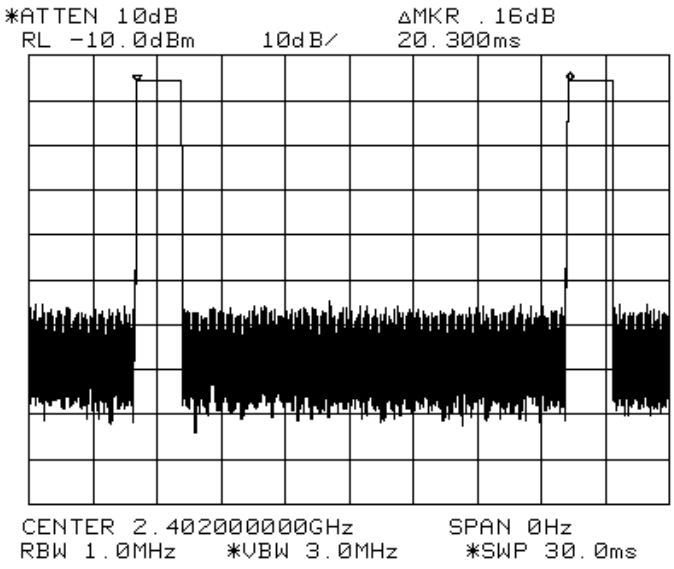
Plot 4 – Average Plot at Upper Band Edge at 2.4835GHz

DUTY CYCLE FACTOR COMPUTATION

FCC Part 15.35(c) Duty Cycle Correction Factor (Worst Case)



On Time



Period

Duty Cycle Factor (worst- case) = 20 log [Total On time / Period]
= 20 log [(2.100 / 20.300)]
= **-19.7dB**

This Report is issued under the following conditions:

1. Results of the testing/calibration in the form of a report will be issued immediately after the service has been completed or terminated.

2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.

3. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment.

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10. Unless otherwise stated, the tests are carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

May 2007

ANNEX A

EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS

Front view

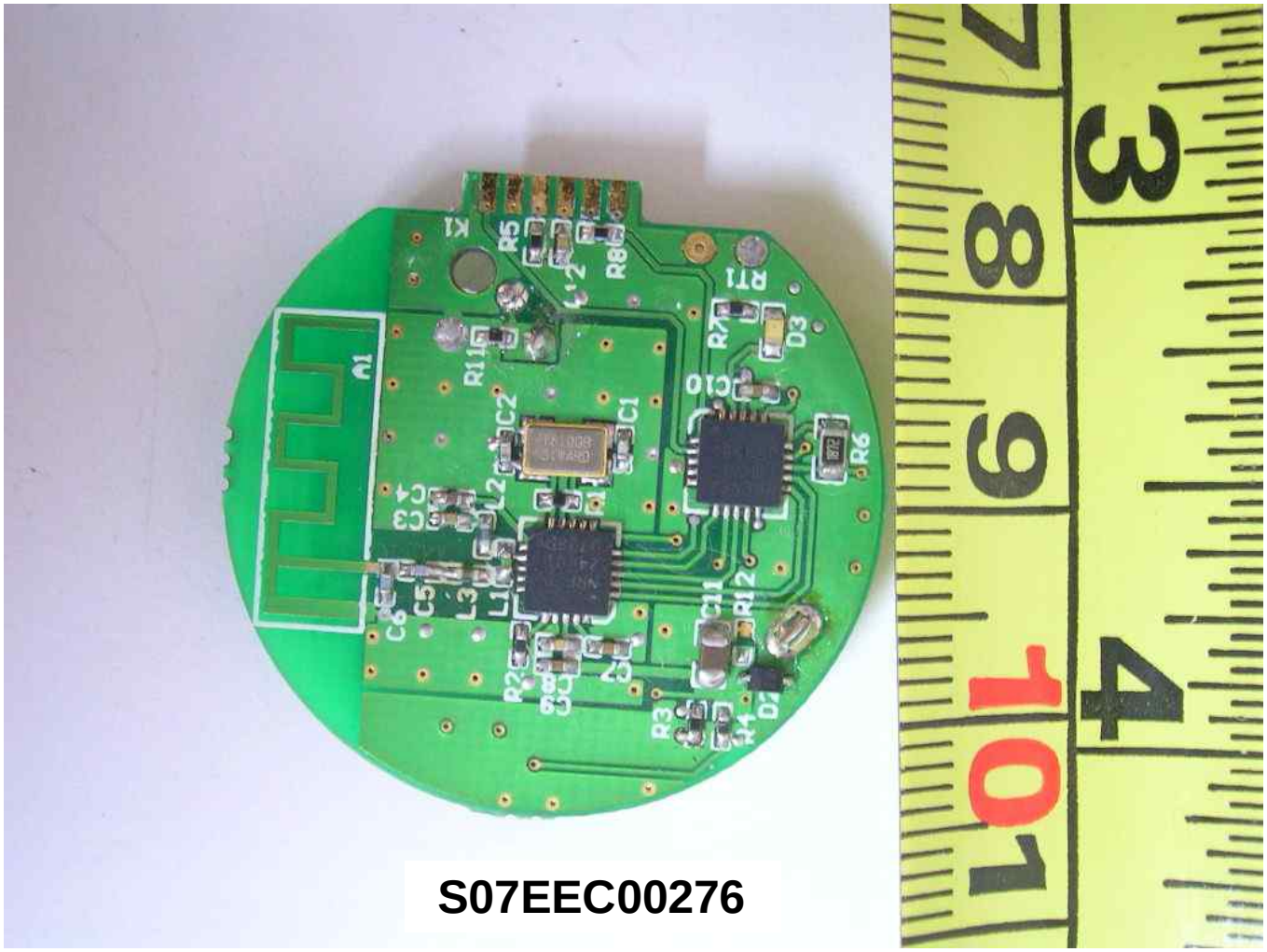
EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS

Internal View

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

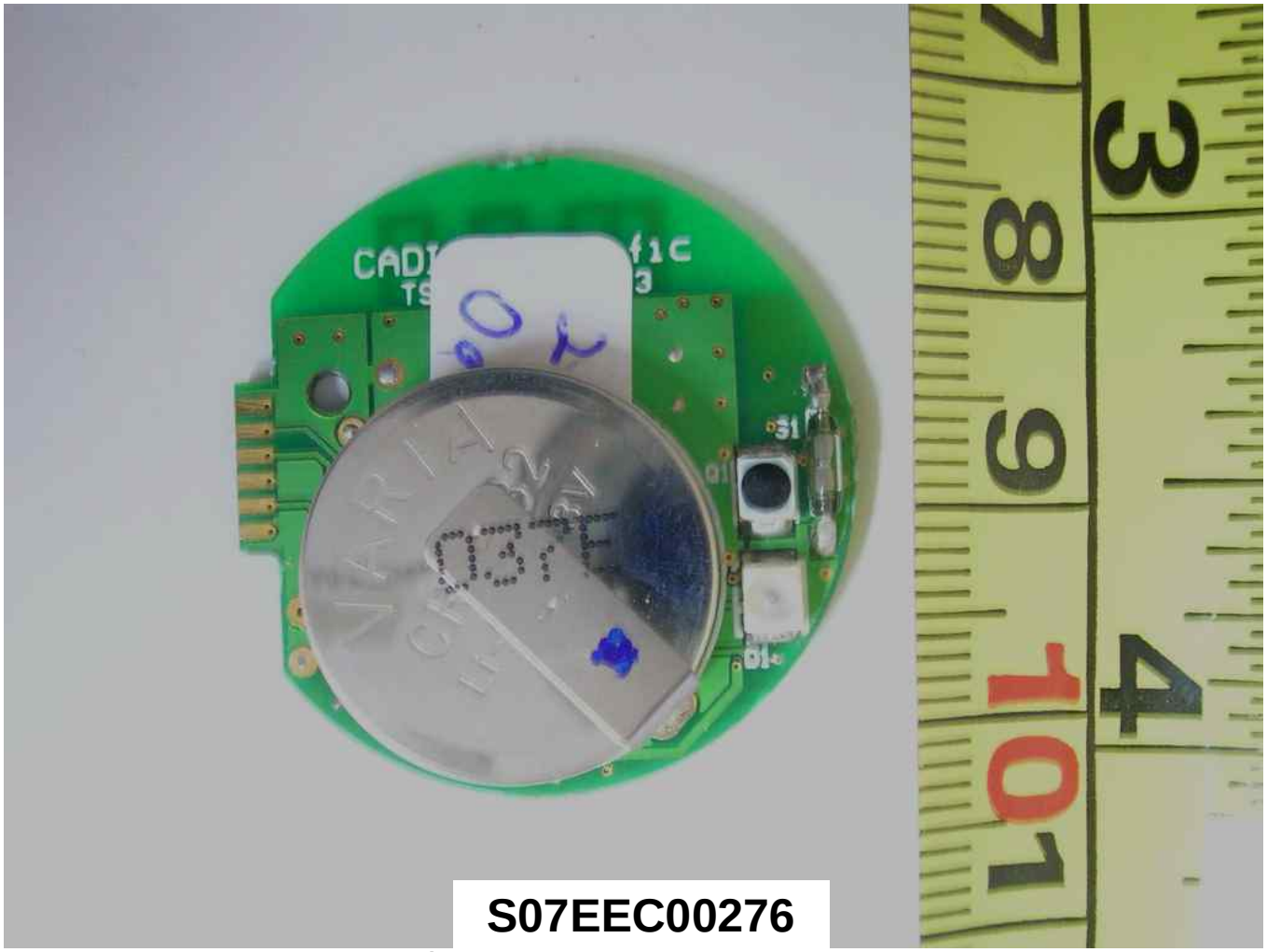
EUT PHOTOGRAPHS



Main-Board PCB – View 1

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

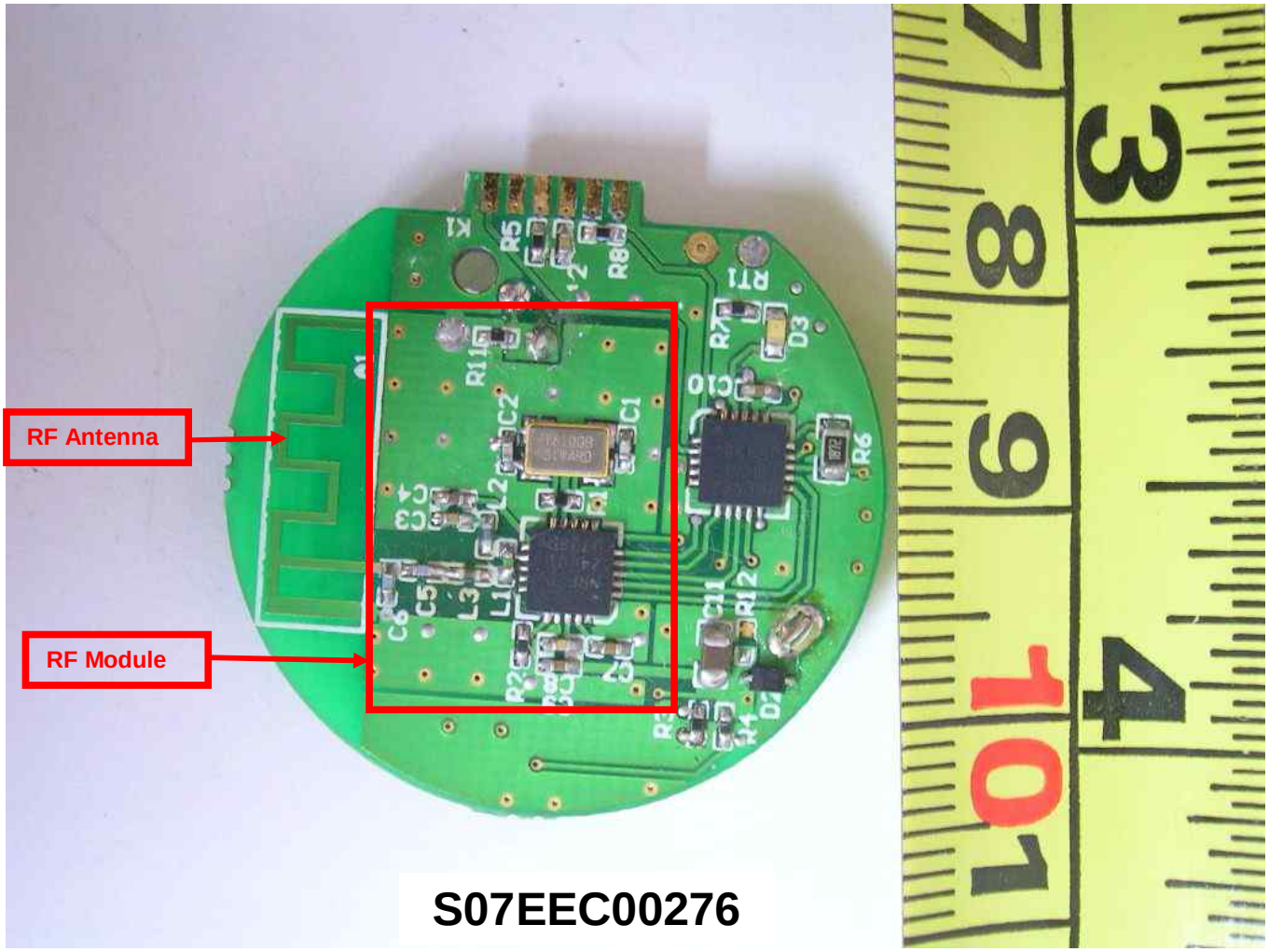
EUT PHOTOGRAPHS



Main-Board PCB – View 2

EUT PHOTOGRAPHS / DIAGRAMS — ANNEX A

EUT PHOTOGRAPHS



RF Module Circuit

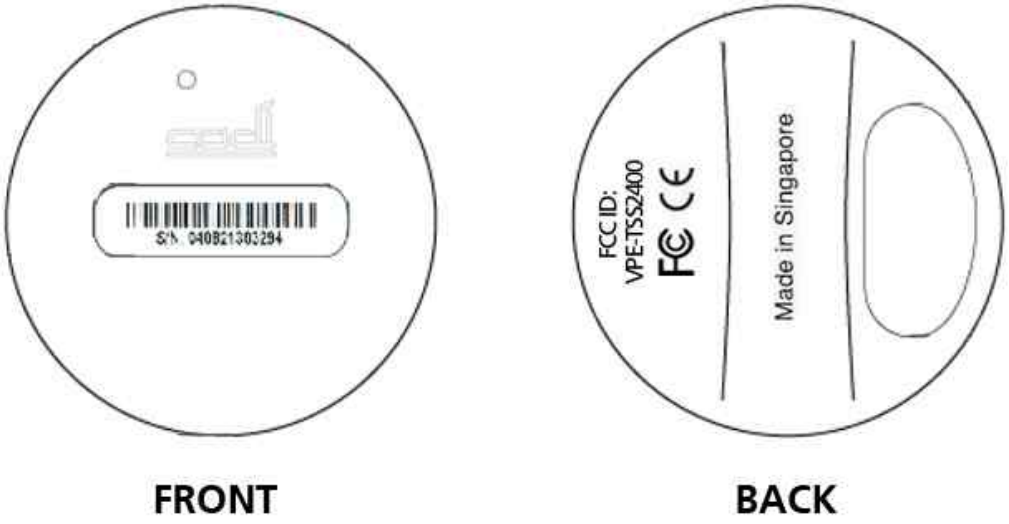
ANNEX B

FCC LABEL & POSITION

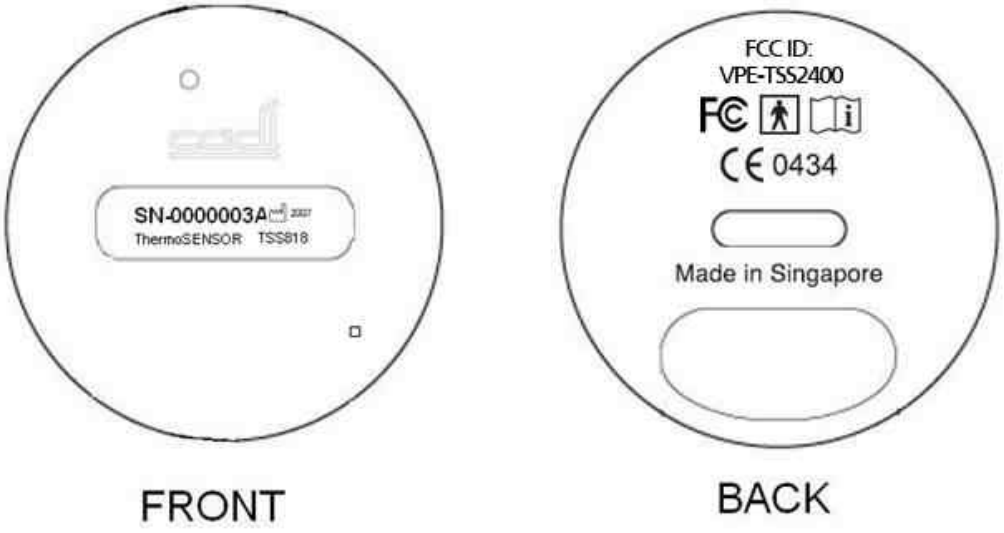
FCC LABEL & POSITION — ANNEX B

Labelling requirements per Section 2.925 & 15.19

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



Sample Label & Physical Location of FCC Label on EUT for STG-2400



Sample Label & Physical Location of FCC Label on EUT for TSS-2400

FCC LABEL & POSITION — ANNEX B

Labelling requirements per Section 2.925 & 15.19

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.

Packaging FCC Label for STG-2400 & TSS-2400

ANNEX C

USER MANUAL
TECHNICAL DESCRIPTION
BLOCK & CIRCUIT DIAGRAMS

(Please refer to manufacturer for details)

USER MANUAL TECHINCAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS **ANNEX C**

STG-2400 SmartTAG

General Description

STG-2400 SmartTAG is a wireless location tracking sensor for determining patients' location. It is part of the SmartSense Wireless Integrated Sensing System – a system designed for monitoring of vital signs, tracking of the location of people and equipment, contact-tracing between people, and providing alert notification of people or equipment that has arrived at designated locations.

The SmartTAG is to be attached to patients' wrist, with the use of a patient ID wrist band, to continuously track patient's location.

Every 30 seconds, the sensor will transmit a data packet to the SmartSense system to update location of patients.

Features

- Each SmartTAG has a unique ID
- Wirelessly transmits ID SmartSense system
- Sensor is activated or deactivated using a SmartSwitch
- Sensor has a lifespan of up to 12 months of continuous usage (based on 30 seconds transmit interval)
- Water-resistant encapsulation that allows cleaning using water or alcohol

Technical Data

General		
	Unique Sensor ID	24 bits
Transmission Rate		
	Data transmission rate	Every 30 seconds (on average)
RF		
	RF Frequency	2.402 – 2.481GHz
	Typical transmission range	10m (unblocked)
Power Source		
	Power source	Internal 3V lithium cell
	Estimated battery life	12 months @ 30 second transmission rate
Environment		
	Operating temperature range	10 – 50°C
	Water resistant	Yes
Physical		
	Dimension	DIA 36mm, HT 11.6mm
	Weight	12g
Compliance		
	Certification	CE, FCC
	RF Compliance	ETSI EN 300 220
	EMC Compliance	ETSI EN 301 489

Important safety information

In line with general safety practices, SmartTAG is not recommended for use on patients with pacemakers.

USER MANUAL TECHINCAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS — ANNEX C

TSS-2400 ThermoSENSOR™

General Description

TSS-2400 ThermoSENSOR™ is a wireless temperature sensor for measuring a patient's body temperature. It is part of the SmartSense Wireless Integrated Sensing System – a system designed for monitoring of vital signs, tracking of the location of people and equipment, contact-tracing between people, and providing alert notification of people or equipment that has arrived at designated locations.

The ThermoSENSOR™ is to be attached to patients' body, at the lower abdomen region, with the use of a comfortable and hypoallergenic dressing, such as the 3M Tegaderm, to continuously measure patient's body temperature.

Every 30 seconds, the sensor will take temperature measurement and transmits measured temperature to the SmartSense system.

Features

- Each ThermoSENSOR™ has a unique ID
- Measures patient's body temperature by direct contact with patient's skin
- Wirelessly transmits ID and temperature data to SmartSense system
- Sensor is activated or deactivated using a SmartSwitch
- Sensor has a lifespan of up to 12 months of continuous usage (based on 30 seconds transmit interval)
- Water-resistant encapsulation that allows cleaning using water or alcohol

Technical Data

General		
	Unique Sensor ID	24 bits
	Thermistor accuracy	+/- 0.2°C (32.0 to 42.0°C)
Transmission Rate		
	Data transmission rate	Every 30 seconds (on average)
RF		
	RF Frequency	2.402 – 2.481GHz
	Typical transmission range	10m (unblocked)
Power Source		
	Power source	Internal 3V lithium cell
	Estimated battery life	12 months @ 30 second transmission rate
Environment		
	Operating temperature range	10 – 50°C
	Water resistant	Yes
Physical		
	Dimension	DIA 36mm, HT 11.6mm
	Weight	12g
Compliance		
	Certification	CE, FCC
	RF Compliance	ETSI EN 300 220
	EMC Compliance	ETSI EN 301 489

Important safety information

In line with general safety practices, ThermoSENSOR™ is not recommended for use on patients with pacemakers.

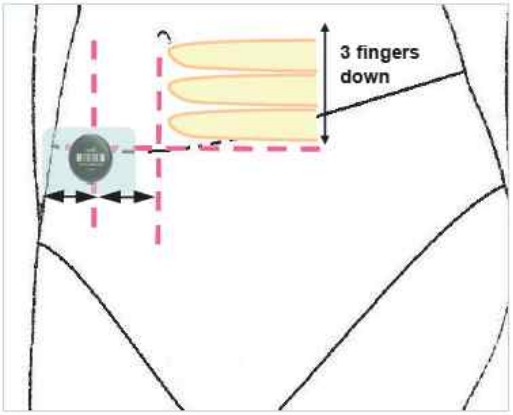
USER MANUAL TECHINCAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS — ANNEX C

How to Place ThermoSENSOR™ (TSS-24XX)

Identify an area for ThermoSENSOR™ (TSS-24XX) to be pasted.

1. Place 3 fingers down from the navel.
   Refer to diagram.

2. Place the first layer of adhesive dressing about half the distance from the center to the side of the body.
   Refer to diagram.



3. Place ThermoSENSOR™ on another layer of adhesive dressing*.
   The second layer of dressing should be pasted over the front of the sensor. Do not paste the dressing on the metal part of the sensor. You may use any suitable medical adhesive dressing e.g. 3M tegaderm

4. Place ThermoSENSOR™ (with the second layer of adhesive dressing) over the first layer of adhesive dressing.

5. For cleaning before use, wipe the ThermoSENSOR™ with an alcohol swab.

Please Note:
Cadi Scientific recommends 3M Tegederm dressing for use with the ThermoSENSOR as it has been tested to have no adverse effect on the user/ThermoSENSOR.

CADI SCIENTIFIC PTE LTD
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Tel: (65) 62762676 Fax: (65) 62766216
Email: info@cadi.com.sg URL: www.cadi.com.sg
Made in Singapore

CE 0434

EC REP Medical Device Safety Service GmbH
Schiffgraben 41, 30175 Hannover, Germany

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 interference, and
(2) this device must accept any interference
received, including interference that may cause undesired operation.

FCC ID:
VPE-TSS2400