



Test Report No.8012307599

***On TETRA Electronics Ind. Ltd.
Emergency Tag***

Model: T-4004A

***From The Standards Institution
Of Israel***

Industry Division

Telematics Laboratory

EMC Section



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Title: Test on Emergency Tag

Model: T-4004A

Order placed by: TETRA Electronics Ind. Ltd.

Address: 5 Hasadan str., Industrial zone. Holon 58117. Israel

Sample for test selected by: The orderer

The date of test: 04/01/2001.

Description of Equipment Under Test (EUT): Emergency Tag

Model: T-4004A

Manufactured by: TETRA Electronics Ind. Ltd.

Reference documents:

- ❖ **CFR 47 FCC** Rules and Regulations:
 - Part 15. Radio frequency devices.
 - Subpart B: Unintentional radiators Sec.15.109
 - Subpart C: Intentional radiators. Sec. 15.231

This Test Report contains 23 pages
and may be used only in full.

This Test Report applies only to the specimen tested and may not
be applied to other specimens of the same product.

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1. EUT Description and operation

1.1. *General description:*

Description of Equipment Under Test (EUT): Emergency Tag

Model: T-4004A

Manufactured by: TETRA Electronics Ind. Ltd.

The EUT is an Emergency Tag, attached to the human body and interacting with a base telephone unit.

The EUT contains a low power transmitter.

The EUT's basic parameters are :

Fundamental frequency - 433.92 MHz.

Type of modulation used: ASK

Rated RF power 0.001 WT

The EUT's dimensions are: 5 x 2.4 x 0.8 cm approx.

The EUT's power consumption from two 3.0 VDC battery : 0.015A

The EUT's block diagram is shown in Figure 1.

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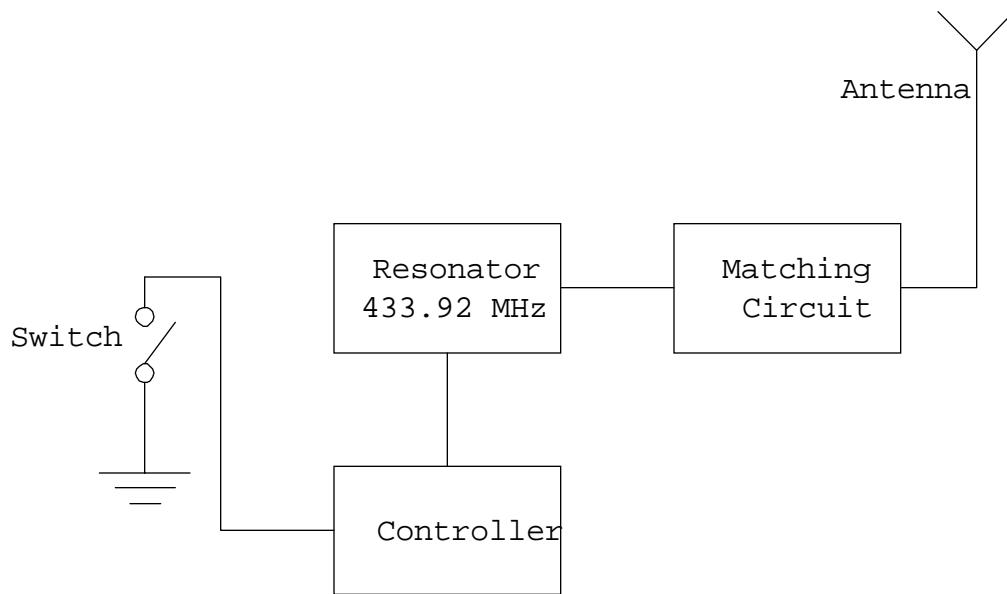


Figure 1 :EUT's block diagram

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1.2. *EUT's General View:*



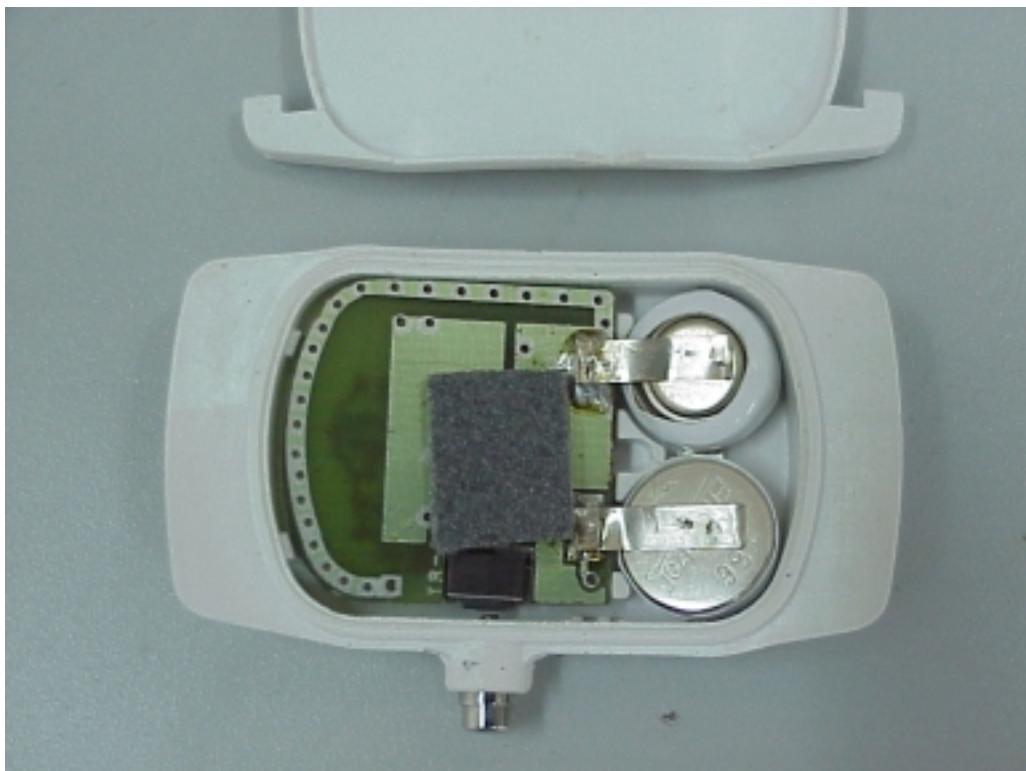
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1.3. *EUT's Internal View:*



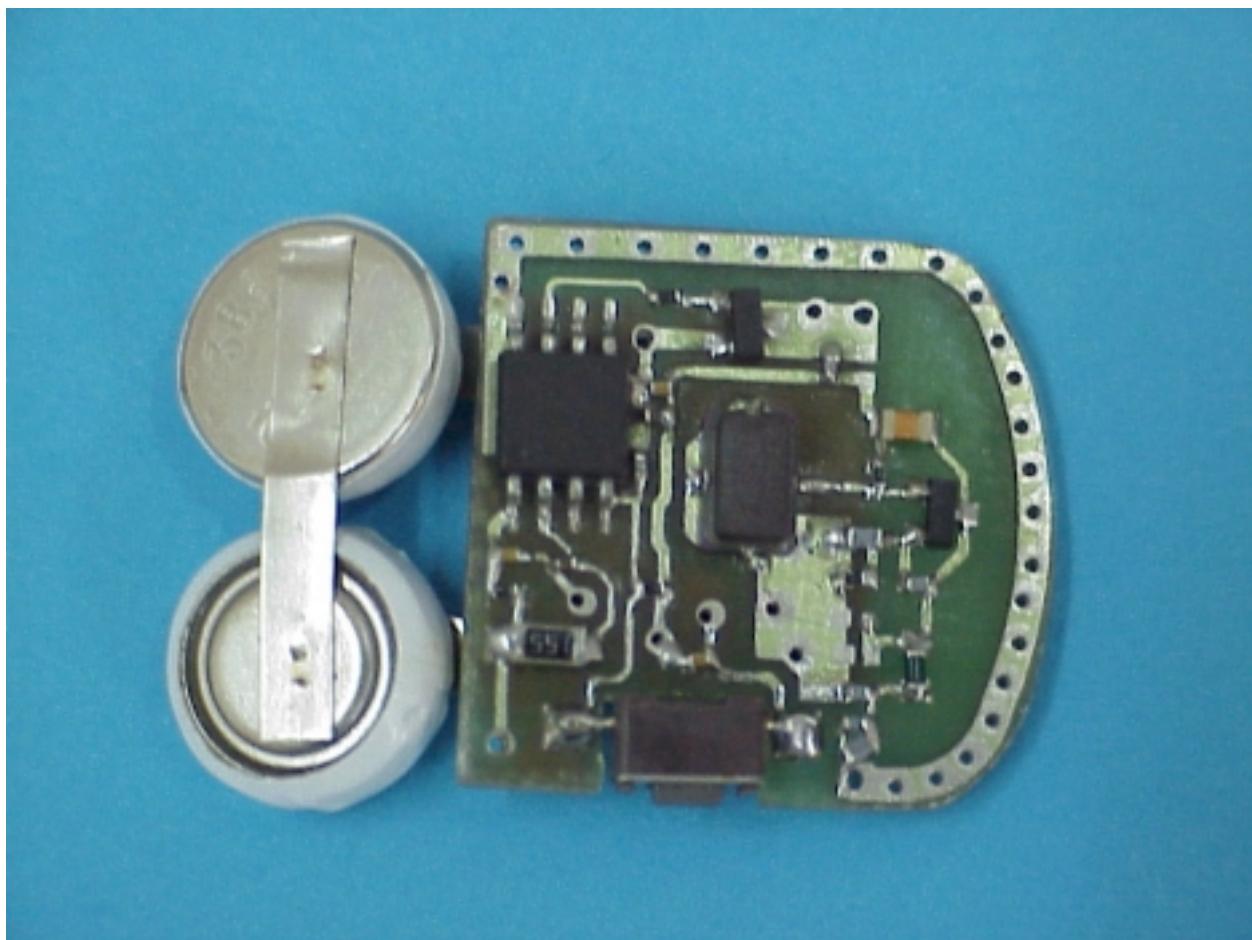
Main board. Printed side

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Main board. Component side



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1.4. **EUT's sub-assemblies list:**

EUT's sub-assemblies list is detailed in table 1.

Table 1- Sub-assemblies list

Function	Marking/Serial No./ Model
Main board	Tetra P/N 84T8521S01
Batteries	2X Model 386

1.5. **EUT setup and operation:**

The EUT was operated in operation modes as detailed in table 2.

Table 2 - Modes of operations

No.	Mode of operation	Emissions Measurements
1	Normal operation –Standby	per FCC Part 15 Subpart B
2	Normal operation Transmission	per FCC Part 15 Subpart C



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2. Test specification, Methods and Procedures

Test Specification:

- ❖ **CFR 47 FCC** Rules and Regulations:
 - Part 15. Radio frequency devices.
 - Subpart B: Unintentional radiators. Sec.15.109
 - Subpart C: Intentional radiators. Sec. 15.231

Methods and Procedures:

- ❖ **ANSI C63/4/1992:** "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

3. Additional deviations or exclusions from the test specifications

Not applicable.

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4. Measurements, examinations and derived results

4.1. *Location of the Test Site:*

Radiated emission tests were conducted in an Open Area Test Site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

4.2. *Test condition:*

Temperature: 22 °C

Humidity: 60 %

4.3. *Emission tests:*

- * The initial scans were made using a peak detector but still using the appropriate CISPR (Quasi-Peak) detector IF bandwidth.
- * The tolerance limit was set 6 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector or an average detector.
- * The tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector.
- * If the result with a Quasi-Peak detector exceeds the specification limit, it is marked with "Fails" in the margin, if it is within the limits of uncertainty for the measurement, it is marked with a "**".

4.4. *Initial visual check and functional test :*

Initial visual check and brief built- in- test (BIT) of the EUT was performed before testing.- No external damages were found. - The BIT test on the EUT passed successfully.

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4.5. ***Radiated emission test:***

4.5.1. *Preliminary radiated emission tests:*

Preliminary radiated measurements were performed in a shielded chamber at a distance of 3 meters.

Operation modes: transmission, standby.

For each mode of operation the frequency spectrum was monitored.

4.5.2. *Final measurements:*

The EUT was arranged on a turntable at the Open Area Test Site. The test layout is presented in Appendix 2.

All measurements at the Open Area Test Site were performed at a 10 m measurement distance. The antennas used for this measurement were:

1. Antenna biclog - in the frequency range 30-1000 MHz.
2. Antenna Double Ridge - above 1000 MHz.

The EUT was operated on fundamental frequency 433.995 MHz, the frequency range was investigated up to 2 GHz.

Unless stated otherwise, the measuring equipment settings were:

Initial scan:

Detector type	Peak
Mode	Max hold
Bandwidth	120 kHz
Step size	Continuous sweep
Sweep time	>1 seconds/MHz

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Measurements:

Detector type	Quasi-peak (CISPR)
Bandwidth	120 kHz
Measurement time	20 seconds/MHz
Observation	>15 seconds
Sweep time	>1 seconds/MHz

4.5.3. Radiated emission test results:

1. Standby mode: No emissions from the EUT were found
2. Transmission mode: Test results are presented in table #6.

4.5.4. Bandwidth measurements:

According to sec.15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The measurements were performed on modulated carrier.

The result is presented in plots #1, #2.

The required 0.25% bandwidth from 434 MHz is 1.085 MHz

The real bandwidth obtained graphically equal to 300 kHz.

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Table 6- Radiated emission test results**FCC Part 15 Subpart C Sec.15.231 (b)**

Frequency (MHz)	Turn-table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level (dB μ V/m)	Limit of fundamental @ 3 meter distance (dB μ V/m)	Margin (dB)	Results
433.995	171	H	3.12	71.5	80.8	9.3	Complies

Frequency (MHz)	Turn-table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level (dB μ V/m)	Limit of spurious @ 3 meter distance (dB μ V/m)	Margin (dB)	Results
868	166	H	3.22	47.3	61.9	14.6	Complies
1302	140	H	2.24	44.5	61.9	17.4	Complies
1736	145	H	2.84	45.5	61.9	16.	Complies

Note 1: Emission level = E Reading (dB μ V) + Cable loss (dB) + Antenna Factor (dB/m) For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: The measurements were performed at 10 m distance and the results were extrapolated to 3 m distance.

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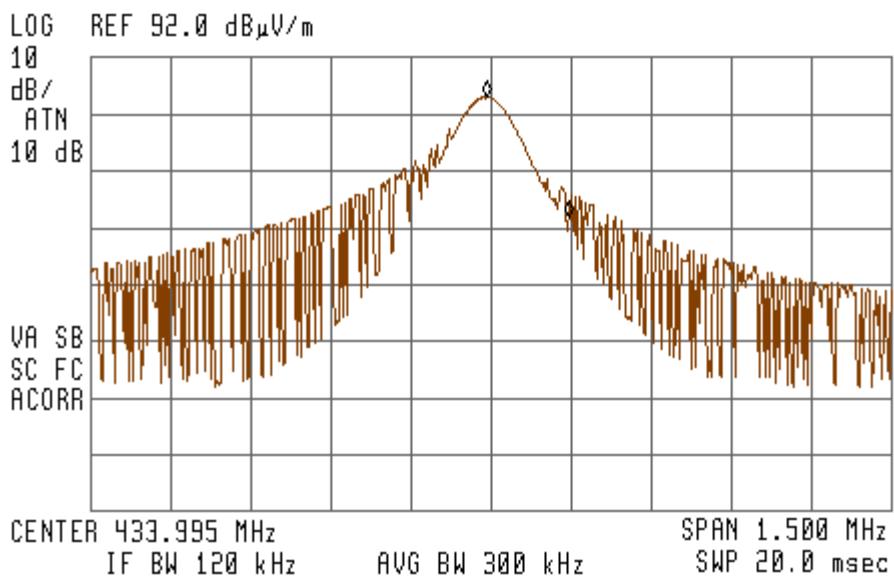
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13:29:40 JAN 08, 2001

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR_A 154 kHz
-20.88 dB



Plot #1. Bandwidth of the fundamental emissions.

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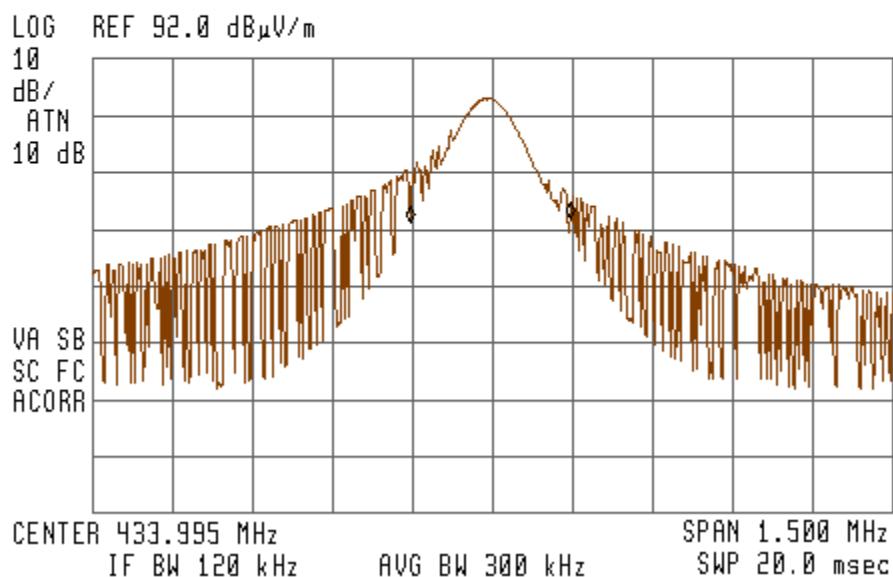
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13:35:35 JAN 08, 2001

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR_Δ -300 kHz
-.98 dB



Plot #2. Bandwidth of the fundamental emissions.

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5. Compliance with specification

Test	Reference Standard	Class	Test result
Radiated emission Frequencies range of 30-1000 MHz	FCC Part 15 Subpart B	Class B	Complies
Radiated emission from fundamental and spurious	FCC Part 15 Subpart C Sec.15.231 (b)	NA	Complies
The bandwidth of the emission	FCC Part 15 Subpart C Sec.15.231 (c)	NA	Complies

Telematics Laboratory

11 January 2001

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name: Leonid Feldman
Position: Test Engineer

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6. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding once a year.

FCC Part 15

Instrument	Manufacturer	Model	Serial No.	Last calibration date	Next calibration date
Spectrum analyzer	HP	8568B	SII 2371	01/00	01/01
RF preselector	HP	85685A	SII 2371	01/00	01/01
Quasi-Peak adapter	HP	85650A	SII 2371	01/00	01/01
EMI Receiver	HP	8546A	SII 4068	11/99	11/00
LISN	FCC	LISN-2	SII4025	01/00	01/01
Antenna Biclog	Chase	CBL6112B	SII2146	03/00	03/01
Antenna Double Ridge	EMCO	3115	SII4873	10/99	10/00
Antenna Mast	R&S	HCM	100002	NA	NA
Metallic turntable	R&S	HCT12	100001	NA	NA
Positioning controller	R&S	HCC	100002	NA	NA

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7. Appendix 2: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)
1	30	-0.95
2	50	-1.2
3	100	-1.8
4	200	-2.5
5	300	-3.2
6	400	-3.6
7	500	-4.1
8	600	-4.3
9	700	-4.9
10	800	-5.2
11	900	-5.5
12	1000	-5.9

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Antenna Factor

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	25	19.9
2	30	18
3	40	15.4
4	50	14.5
5	60	13.5
6	70	9.9
7	80	9.6
8	90	8.9
9	100	9.3
10	110	9.7
11	120	10
12	130	9
13	140	7.7
14	150	9.4
15	160	7
16	170	9.1
17	180	9.3
18	190	9.5
19	200	9.2
20	250	10.6
21	300	11.5
22	400	14.7
23	500	16.2
24	600	17.8
25	700	19.3
26	850	20.9
27	1000	21.6
28	1100	23.3
29	1200	24.6
30	1300	26.5



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8. Appendix 3: Test configuration illustration

This appendix contains the following illustrations:

- * Three photos of the radiated emission test setup:.

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Photo #1. Radiated emission test setup

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Photo #2. Radiated emission test setup

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Photo #3. Radiated emission test setup