EN 62311 RF Exposure Report

Product Name : AIS Class B Transponder
Model No. : CAMINO-108, CAMINO-108W
According To : EN62311: Jan 2008

Applicant : Alltek Marine Electronics Corp.
Address : 7F, No.605, Ruei Guang Rd., Neihu, Taipei, Taiwan, 114 R.O.C.

Date of Receipt : 2013/05/06
Date of Declaration : 2013/10/25
Report No. : 135096R-HPCEP04V01
Report Version : V2.0

Testing Laboratory
0914

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Address	7F, No.605, Ruei Guang Rd., Neihu, Taipei, Taiwan, 114 R.O.C.
Manufacturer	Alltek Marine Electronics Corp.
Model No.	CAMINO-108, CAMINO-108W
Trade Name	AMEC
Applicable Standard	EN62311: Jan 2008
Test Result	Complied

Documented By : April Chen

(Adm. Specialist / April Chen)

Technical Acceptance By : Paddy Chen

(Engineer / Paddy Chen)

Approved By :

(Manager /Vincent Lin)

Revision History

Rev.	Issue Date	Revisions	Effect page
V1.0	August 28, 2013	Initial Issue	All
V2.0	October 25, 2013	1. Add “Revision History” 2. Modify section 2.2 separation distance. It should be 60 cm instead of 20 cm. 3. Modify section 2.3 Result	3 7 8

GENERAL INFORMATION

1.1. EUT Description

Product Name	AIS Class B Transponder
Trade Name	AMEC
Model No.	CAMINO-108, CAMINO-108W
Frequency Range	WLAN: 2412-2472MHz for 802.11b/g/n-20BW VHF : 156.025MHz~162.025MHz
Number of Channels	802.11b/g/n-20MHz: 13
Data Rate	WLAN: 802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps VHF : 9600bps/per channel
Channel Separation	WLAN: 802.11b/g/n: 5 MHz VHF : 25KHz
Type of Modulation	WLAN: 802.11b:DBPSK, DQPSK, CCK 802.11g/n:OFDM, BPSK, QPSK, 16QAM, 64QAM VHF : GMSK/FM
Antenna Type	Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
VHF Cable	Shielded, 10m
GPS Cable	Shielded, 10m
Hardware	M-PCB-B108MBV1
Software	V1.2.6

1.2. Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	Alltek Marine Electronics Corp.	M-ANT-SAA04-05005G-01	Dipole	2dBi for 2.4 GHz

2. RF Exposure Measurement

The scope of this standard is limited to apparatus which is intended for use by the general public as defined in the Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (Official Journal L 199 of 30 July 1999).
This generic standard applies to electronic and electrical apparatus for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.
This generic standard does not cover equipment, which fulfils the requirements given in EN 50371 or is medical equipment as defined in the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.
The frequency range covered is 0 Hz to 300 GHz.
The object of this standard is to demonstrate the compliance of such apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields and induced and contact current.

2.1. Limits

The electronic and electrotechnical apparatus shall comply with the basic restriction as specified in Annex II of Council Recommendation 1999/519/EC.
The reference levels in the Council Recommendation 1999/519/EC on public exposure to electromagnetic fields are derived from the basic restrictions using worst-case assumptions about exposure.

Council Recommendation 1999/519/EC of 12 July 1999

Table 2

Reference levels for electric, magnetic and electromagnetic fields

(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m2)
0-1 Hz	–	3.2×10^4	4×10^4	–
1-8 Hz	10000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	–
8-25 Hz	10000	4000/f	5000/f	–
0.025-0.8 KHz	250/f	4/f	5/f	–
0.8-3 KHz	250/f	5	6.25	–
3-150 KHz	87	5	6.25	–
0.15-1 MHz	87	0.73/f	0.92/f	–
1-10 MHz	$87/f^{1/2}$	0.73/f	0.92/f	–
10-400 MHz	28	0.73	0.092	2
400-2000 MHz	$1.375\ f^{1/2}$	$0.0037\ f^{1/2}$	$0.0046\ f^{1/2}$	f/200
2-300GHz	61	0.16	0.20	10

Notes:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, S_{eq}, E^2, H^2, and B^2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, S_{eq}, E^2, H^2, and B^2 are to be averaged over any $68/f^{1.05}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

2.2. Assessment methods

The choice of assessment methods in EN62311: Jan 2008is Far field calculation. Under normal use of condition, this device has a separation distance of at least 60cm between the antenna and the body of the user. A radiation exposure statement "this equipment should be installed and operated with minimum distance between the antenna and your body" is shown on the user manual. So human exposure to the electromagnetic field of this product is at far-field region under normal use.

Far-field region Calculation Formula:

P watts is radiated, from a point, uniformly over the surface of sphere of radius r.

The POYNTING VECTOR gives the power flux density: $S=E \wedge H=E^2/ =P/4 \pi r^2$

In free space

$$E = \eta_0 H = \frac{\sqrt{30PG(\theta,\phi)}}{r}$$

Where

G = antenna gain relative to an isotropic antenna

θ ,ϕ = elevation and azimuth angles to point of investigation

r = distance from observation point to the antenna (m)

η_0 = characteristic impedance of free space

2.3. Result

Product	:	AIS Class B Transponder
Test Item	:	RF Exposure

FOR WLAN

802.11b-Peak Gain: 2.0dBi

Frequency (MHz)	Conducted Power (dBm)	Output Power to Antenna (mW)	E-Field Strength (V/m)	E-Field Strength (V/m)Limit	Pass/Fail
2412	16.24	42.1	2.3573	61	Pass
2442	15.87	38.6	2.2590	61	Pass
2472	15.13	32.6	2.0745	61	Pass

802.11g-Peak Gain: 2.0dBi

Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	E-Field Strength (V/m)	E-Field Strength (V/m)Limit	Pass/Fail
2412	14.58	27.9	1.9197	61	Pass
2442	14.11	25.0	1.8186	61	Pass
2472	14.05	24.7	1.8061	61	Pass

802.11n(20M)-Peak Gain: 2.0dBi

Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	E-Field Strength (V/m)	E-Field Strength (V/m)Limit	Pass/Fail
2412	12.85	18.7	1.5714	61	Pass
2442	12.41	16.9	1.4938	61	Pass
2472	12.07	15.6	1.4365	61	Pass

Note: The conducted output power is refer to report No.: 135096R-RFCEP14V01 from the QuieTek.

FOR VHF

Peak Gain: 2.86dBi

Frequency (MHz)	Conducted Power (dBm)	Output Power to Antenna (mW)	E-Field Strength (V/m)	E-Field Strength (V/m)Limit	Pass/Fail
156.025	33.70	2344.2	19.4272	28	Pass
162.025	33.80	2398.8	19.6521	28	Pass

Note: The conducted output power is refer to report No.: F130840E1 from the PHOENIX.