Compliance Testing, LLC
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Test Report

Prepared for: Taser International, Inc.

Model: T00378

Description: Body Worn Video Camera

Serial Number: X78000000

FCC ID: X4GS01000-A
IC: 8803A-S01000A

To

FCC Part 15.247 FHSS

Date of Issue: February 26, 2016

On the behalf of the applicant:

Taser International, Inc.
17800 N. 85th St.
Scottsdale, AZ 85260

Attention of:

Bryan Chiles, Technical Compliance Manager
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Prepared by
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Project No: p1620004

Alex Macon
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	February 9, 2016	Alex Macon	Original Document
2.0	February 26, 2016	Amanda Reed	Updated standards used table to reflect the correct version

Table of Contents

Description **Page**

ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted in the table below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

ACCREDITED
TESTING CERT
#2152.01

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The applicant has been cautioned as to the following

15.21 - Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) - Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions and Engineering Practices

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2 and the following individual Part 15.247 Operation within bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-2009, ANSI C63.10-2009, FCC DA 00-705, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10 to 40C (50 to 104F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temperature (°C)	**Humidity (%)**	**Pressure (mbar)**
20.6 – 21.7	44.7 – 47.2	975.7 – 980.4

Measurement results, unless otherwise noted, are worst case measurements.

Model: T00378
Description: Body Worn Video Camera
Firmware: N/A
Software: N/A
Serial Number: NX78000000
Additional Information: None

EUT Operation during Tests
The EUT was placed into test mode using a command interface.
Test Modes:

Data Rate Scheme	Bits Per Symbol	Modulation
Basic Data Rate	1	GFSK
EDR	2	π/4 DQPSK
EDR	3	8DPSK

15.203: Antenna Requirement:

X	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
	The EUT must be professionally installed
	The antenna requirement does not apply

Accessories: None

Cables: None

Modifications: None

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(d)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Undesirable Emissions Radiated	Pass	
15.247(d), 15.209(a), 15.205	Undesirable Emissions Conducted	Pass	
15.247(a)	Occupied Bandwidth	Pass	
15.247(a)	Dwell Time	Pass	
15.247(a)	Number of Hopping Channels	Pass	
15.207	A/C Powerline Conducted Emissions	N/A	Radio disabled when AC applied

Standards Applied

References	Description
CFR47, Part 15, Subpart B	Unintentional Radiators
CFR47, Part 15, Subpart C	Intentional Radiators
ANSI C63.10-2009	American National standard for testing Unlicensed Wireless Devices
ANSI C63.4-2009	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ISO/IEC 17025:2005	General requirements for the Competence of Testing and Calibrations Laboratories
RSS-210	License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS-GEN	General Requirements for Compliance of Radio Apparatus

Peak Output Power
Engineer: Alex Macon
Test Date: 2/10/16

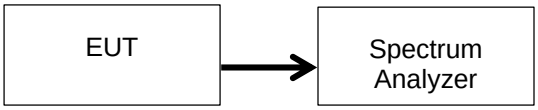
Test Procedure

The EUT was connected directly to the input of a power meter. The peak readings were taken and the result was then compared to the limit.

The Spectrum Analyzer was set to the following:

a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Peak Detector
d. Max Hold

Test Setup



See Annex A for output power plots

Transmitter Peak Output Power

GFSK

Tuned Frequency (MHz)	Packet Mode	Recorded Measurement (dBm)	Specification Limit (dBm)	Result
2402	DH1	1.612	30	Pass
2441	DH3	1.075	30	Pass
2480	DH5	-0.438	30	Pass

QPSK

Tuned Frequency (MHz)	Packet Mode	Recorded Measurement (dBm)	Specification Limit (dBm)	Result
2402	DH1	0.734	30	Pass
2441	DH3	-0.021	30	Pass
2480	DH5	-2.013	30	Pass

8PSK

Tuned Frequency (MHz)	Packet Mode	Recorded Measurement (dBm)	Specification Limit (dBm)	Result
2402	DH1	0.605	30	Pass
2441	DH3	-0.301	30	Pass
2480	DH5	-2.287	30	Pass

Conducted Spurious Emissions

Engineer: Alex Macon

Test Date: 2/10/16

Test Procedure

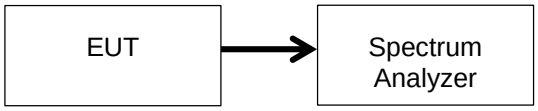
The EUT was connected directly to a spectrum analyzer. The EUT was configured to operate in a continuous modulation on the low, mid and high channels as well as hopping mode. Spurious emissions were investigated from 30 MHz to the 10th harmonic of the fundamental transmitter.

Note: an offset on the spectrum analyzer may have been used however results are relative not absolute.

The Spectrum Analyzer was set to the following:

a. RBW = 100KHz
b. VBW ≥ 300KHz
c. Peak Detector
d. Max Hold

Test Setup



See Annex B for Conducted Spurious Emission plots

Undesirable Emissions Radiated
Engineer: Alex Macon
Test Date: 2/10/16

Test Procedure

The provision of §15.209 were applied. In addition the requirements of §15.205 were also applied.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits

Frequency (MHz)	Frequency (microvolts/meter)	Frequency (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBµV/m) = 20 log E field strength (µV/m)

Test Procedure

The EUT was setup in accordance with ANSI C63.10 2013. The antenna was replaced with non-radiating matched load. The EUT is placed on non-conductive platform at a height of 0.8 m above the ground plane for measurements < 1GHz and at a height of 1.5m above the ground plane for measurements > 1GHz. The EUT was rotated 360 degrees and the receive antenna raised and lowered to find the maximum emissions from 30MHz to the 10th harmonic of the fundamental. The EUT was set to the maximum power at the low, mid, and high channels as well as in hopping mode.

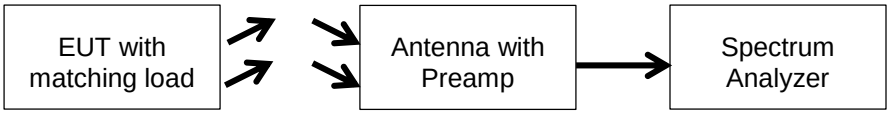
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

a. (RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak.
d. Sweep time = auto.
e. Trace mode = max hold.
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10Hz

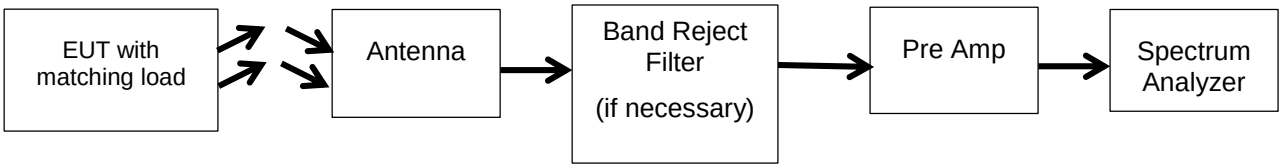
For emissions below 1000MHz the Spectrum Analyzer settings were as follows:

a. RBW = 100 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak.
d. Sweep time = auto.
e. Trace mode = max hold.
    1. Note: A quasi peak detector was used for emissions where the peak exceeded that of the average 15.209 emission limits

Test Setup below 1000MHz



Test Setup above 1000MHz



Note: No emissions were found above 18GHz

See Annex C for Undesirable Emissions Radiated

Undesirable Emissions Conducted

Engineer: Alex Macon

Test Date: 2/10/16

Test Requirements

The field strength was determined by the following equations:
E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3m
E[dBµV/m] = EIRP[dBm] + 95.2, for d = 3 meters

For emissions <1000MHz an offset of 4.7dB was added to account for ground plane contributions.
For all other emissions an additional offset was used to account for the maximum in band antenna gain.

Test Procedure

The EUT was connected to a spectrum analyzer and configured to transmit with a continuous modulated carrier on the low, mid and high channels as well as in hopping mode. Emissions were investigated from 30MHz to the 10th harmonic of the fundamental.

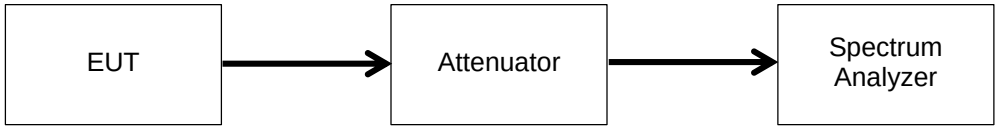
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak.
d. Sweep time = auto.
e. Trace mode = max hold.
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz.

For emissions < 1000MHz the Spectrum Analyzer settings were as follows:

a. RBW = 120 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak.
d. Sweep time = auto.
e. Trace mode = max hold.

Test Setup



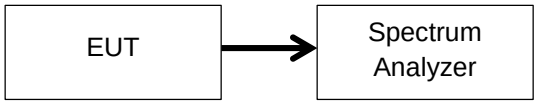
See Annex D for Undesirable Emissions Conducted

Occupied Bandwidth
Engineer: Alex Macon
Test Date: 2/10/16

Test Procedure

The EUT was connected directly to a spectrum analyzer. The Span was set wide enough to capture the entire transmitting spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold and when the entire spectrum was captured, the 20dB and 99% bandwidths were measured to verify that the bandwidth met the specification.

Test Setup



See Annex E for Occupied Bandwidth Test data

20 dB and 99% Bandwidth Summary

Frequency (MHz)	Pack Mode	Bandwidth (MHz)
2402	DH1	1.267
2441		1.232
2480		1.226

Frequency (MHz)	Pack Mode	Bandwidth (MHz)
2402	DH3	1.290
2441		1.302
2480		1.261

Frequency (MHz)	Pack Mode	Bandwidth (MHz)
2402	DH5	1.284
2441		1.267
2480		1.313

Dwell Time

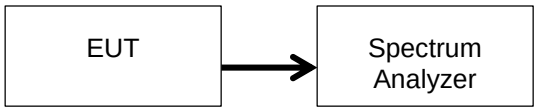
Engineer: Alex Macon

Test Date: 2/10/16

Test Procedure

The EUT was connected directly to a spectrum analyzer. The EUT was set to hopping mode with the spectrum analyzer set to a 0 Hz span. A single transmission was captured and the dwell time was recorded.

Test Setup



GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)
DH1	0.400	32	0.128	0.4
DH3	1.642	17	0.279	0.4
DH5	2.869	11	0.316	0.4

QPSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)
DH1	0.430	31	0.133	0.4
DH3	1.670	16	0.267	0.4
DH5	2.925	11	0.322	0.4

8PSK

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)
DH1	0.410	32	0.131	0.4
DH3	1.660	16	0.266	0.4
DH5	2.925	10	0.293	0.4

See Annex F for Dwell time and number of pulses

Number of Hopping Channels

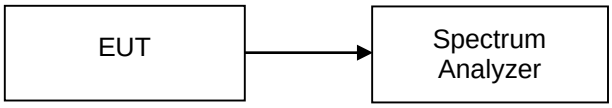
Engineer: Alex Macon

Test Date: 2/10/16

Test Procedure

The EUT was connected directly to a spectrum analyzer. The Span was set to the specified band end points. The EUT was then set to operate in hopping mode. The MAX HOLD function of the spectrum analyzer was utilized to verify the number of hopping cannels.

Test Setup



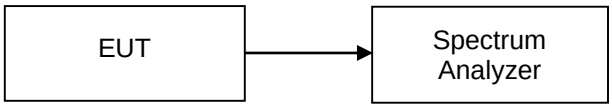
See Annex G for Number of Hopping Channels

Channel Separation
Engineer: Alex Macon
Test Date: 2/10/16

Test Procedure

The EUT was connected directly to a spectrum analyzer. The EUT was set to hopping mode. The MAX HOLD function of the spectrum analyzer was utilized to verify the channel separation.

Test Setup



See Annex H for Channel Separation

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna, Amplified	ARA	DRG-118/A	i00271	5/8/14	5/8/16
Bilog Antenna	Teseq	CBL 6111Dk	i00349	10/8/15	10/8/16
EMI Analyzer	Agilent	E7405A	i00379	2/5/15	2/10/16
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	11/26/13	11/26/16
Horn Antenna	ETS Lindgren	3115	i00273	05/08/14	05/08/16
Horn Antenna	ETS Lindgren	3116	i00085	01/29/15	01/29/17

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT