



DATE: 12 March 2012

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report
for
Mobileye Technologies Ltd.

Equipment under test:
Driver Assistance System Mobileye5

Mobileye 560, Mobileye 550*

* See customer's declaration on page 6.

Written by:

D. Shidlowsky, Documentation

Approved by:

I. Siboni, Test Engineer

Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



Measurement/Technical Report for Mobileye Technologies Ltd.

Driver Assistance System Mobileye5

Mobileye 560

FCC ID: AECMOB005

This report concerns: Original Grant: X
Class I Change:
Class II Change:

Equipment type:

Limits used:

47CFR15 Section 15.247

Measurement procedure used is ANSI C63.4-2003.

Application for Certification

prepared by:

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Applicant for this device:

(different from "prepared by")

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1. General Information

1.1 Administrative Information

Manufacturer:	Mobileye Technologies Ltd.
Manufacturer's Address:	13 Hartum Str. Jerusalem 91450, Israel Tel: +972-2-5417333 Fax: +972-2-5417300
Manufacturer's Representative:	Roni Laxer
Equipment Under Test (E.U.T):	Driver Assistance System Mobileye5
Equipment Model No.:	Mobileye 560, Mobileye 550 (See customer's declaration on following page).
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	11.12.2011
Start of Test:	11.12.2011
End of Test:	14.12.2011
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 15, Subpart C Section 15.247



Date: 26/02/2012

DECLARATION

I hereby declare that

Mobileye 560

Is a full configuration model with the following functions:

Eyewatch Display, Bluetooth Connectivity, Forward Collision Warning (FCW), Urban Forward Collision Warning (UFCW), Lane Departure Warning (LDW), Pedestrian Collision Warning (PCW), Headway Monitoring and Warning (HMW), Intelligent High-Beam Control (IHC), and Speed Limit Indication (SLI) / Traffic Sign Recognition (TSR).

Another model

Mobileye 550

Differs from the Mobileye 560 only by the extraction of the Eyewatch Display.

Please relate to both of them from an EMC/Radio point of view as the same product.

Thank You,
Signature: 
Roni Laxer
Engineering Department
Mobileye Technologies Ltd.

Mobileye Vision Technologies
13 Hartom St. Har Hotzvim, P.O.B 45157, Jerusalem 91450, ISRAEL
Tel: +972-2-541-7333, Fax: +972-2-541-7300
www.mobileye.com Email: Israel.Office@Mobileye.com



1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

Mobileye 560 is a driver assistance system which is intended to alert drivers to certain potentially dangerous situations. It operates in 2.4GHz frequency band. The Mobileye 560 can be used with Smart Phones for displaying Mobileye5 Alerts.

It does not replace any functions drivers would ordinarily perform in driving a motor vehicle, **nor** does it decrease the need for drivers to stay vigilant and alert in all driving conditions, to conform to all safe driving standards and practices, and to obey all traffic laws, rules and regulations.

Mobileye 560 is not an automated driving system and it does not act as a substitute for any aspect of driver vehicle control or safe driving practices. Drivers are strongly cautioned not to rely on the Mobileye 560 as a substitution, to even the slightest degree, for the exercise of due caution in assuring that they are driving safely and avoiding accidents.

1.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

2. System Test Configuration

2.1 Justification

Radiated emission was performed in the installation orientation.
Unit was configured to transmit at 3 different channels.

2.2 EUT Exercise Software

The EUT was configured via the BLUE TEST 3 S/W

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

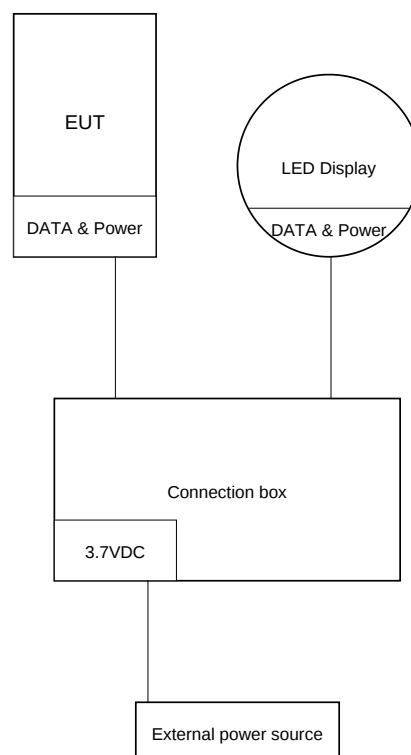


Figure 1. Configuration of Tested System

3. Radiated Measurement Test Set-up Photos



Figure 2. Radiated Emission Test



Figure 3. Radiated Emission Test

4. 6 dB Minimum Bandwidth

4.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(a)(2)

4.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters. The transmitter unit operated with normal modulation. The EMI receiver was set to 100 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. The EUT was set up as shown in Figure 3, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on modulation envelope. The E.U.T. was tested at 2402, 2441, and 2480 MHz.

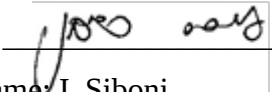
4.3 Test Results

Operation Frequency (MHz)	Bandwidth Reading (kHz)	Specification (kHz)
2402	510	500
2441	520	500
2480	518	500

Figure 4 — 6 dB Minimum Bandwidth Test Results Table

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

See additional information in Figure 5 to Figure 7.

6 dB Minimum Bandwidth

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

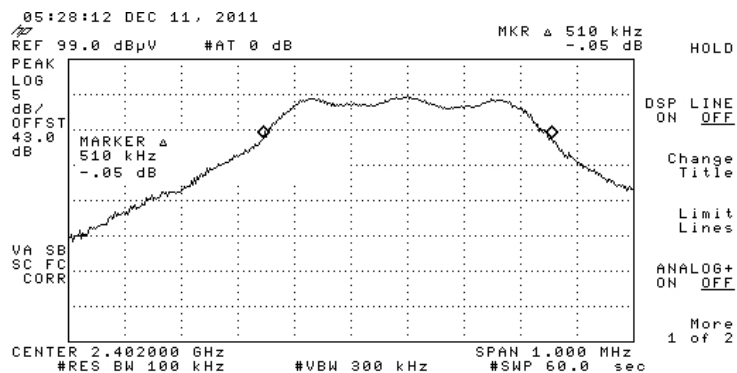


Figure 5 — 2402 MHz

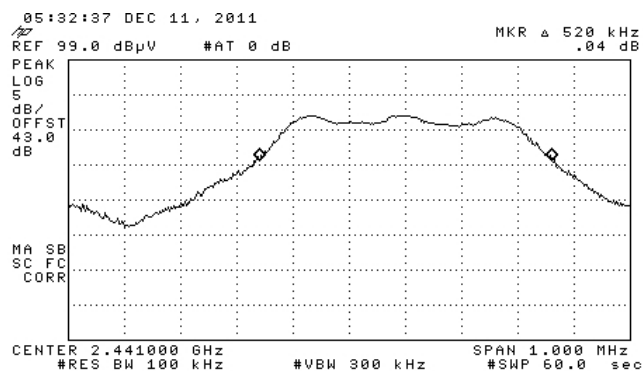


Figure 6 — 2441 MHz



6 dB Minimum Bandwidth

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

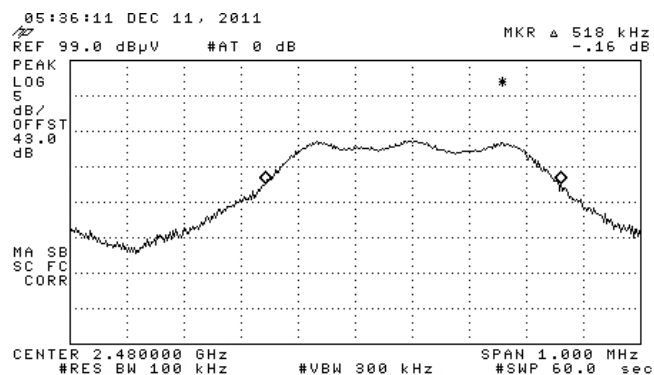


Figure 7 — 2481 MHz



6 dB Minimum Bandwidth

4.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	September 23, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

Figure 8 — Test Equipment Used

5. Number of Hopping Frequencies

5.1 Test Specification

F.C.C., Part 15, Subpart C Section 15.247 (a)(1)(iii)

5.2 Test Procedure

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Span: 20 MHz/division

Band of Operation: 2400-2483.5 MHz

RBW: 30kHz

VBW: 100kHz

Detector Function: Peak

Trace: Maximum Hold

5.3 Test Results

Band1 = 2400 – 2420 MHz = 19

Band2 = 2420 – 2440 MHz = 20

Band3 = 2440 – 2460 MHz = 20

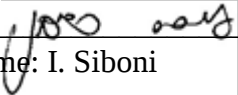
Band4 = 2460 – 2483.5 MHz = 20

See additional information in Figure 10 to Figure 13.

Number of Hopping Frequencies	Specification
79	>75

Figure 9 — Number of Hopping Frequencies Test results Table

TEST PERSONNEL:

Tester Signature:  Date: 13.03.12
Typed/Printed Name: I. Siboni

Number of Hopping Frequencies

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

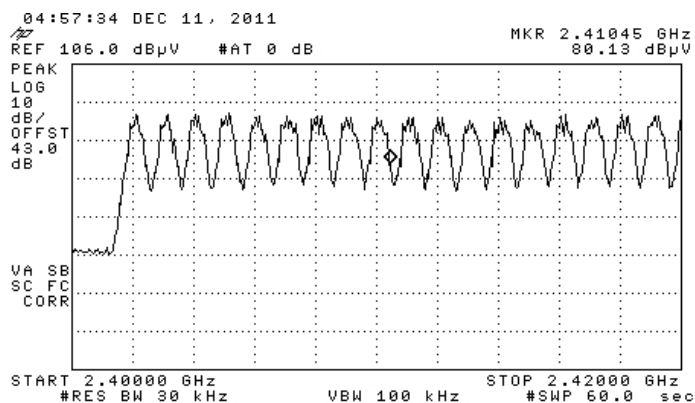


Figure 10 — 2400-2420 MHz

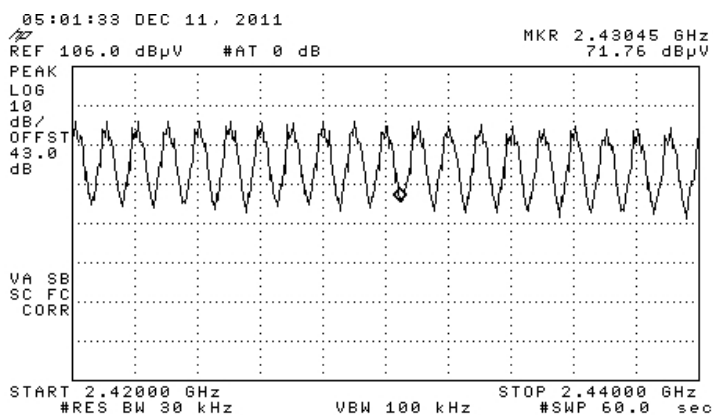


Figure 11 — 2420 - 2440 MHz

Number of Hopping Frequencies

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

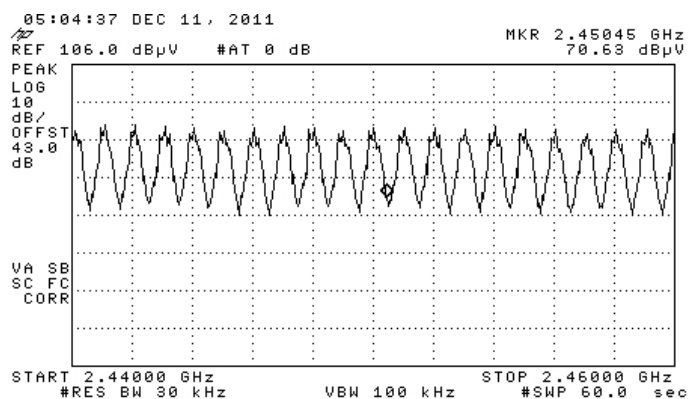


Figure 12 — 2440 - 2460 MHz

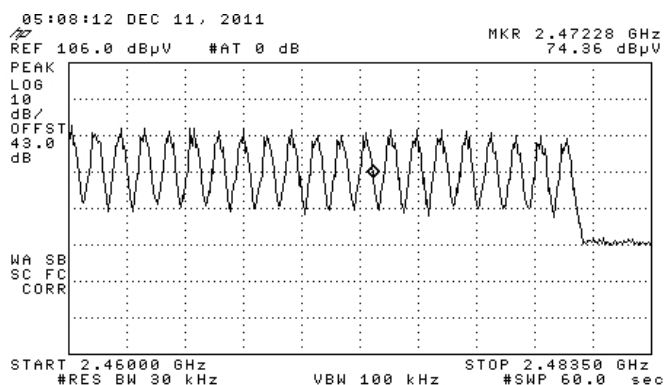


Figure 13 — 2460 - 2483.5 MHz

Number of Hopping Frequencies

5.4 Test Equipment Used

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	September 23, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

Figure 14 — Test Equipment Used

6. Channel Frequency Separation

6.1 Test Specification

Specification: FCC Part 15, Subpart C, 15.247(a) (1)

6.2 Test procedure

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Span: 3 MHz

RBW: 30kHz

VBW: 30kHz

Detector Function: Peak

Trace: Maximum Hold

The marker delta function to determine the separation between the peaks of the adjacent channels was used.

6.3 Test Results

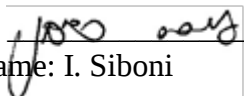
Channel Frequency Separation (kHz)	Specification (kHz)	Margin (kHz)
1018	>1000	18

Figure 15 Channel Frequency Separation Test Results Table

See additional information in Figure 16.

JUDGEMENT: Passed by 18 kHz

TEST PERSONNEL:

Tester Signature:  Date: 13.03.12
Typed/Printed Name: I. Siboni



Channel Frequency Separation

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

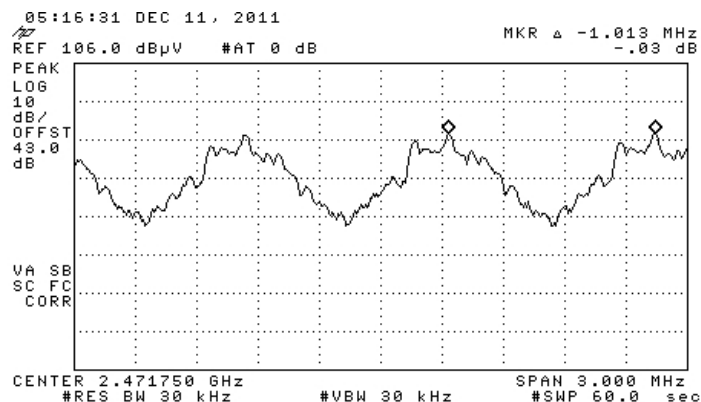


Figure 16. — 2401 - 2404 MHz.

6.4 Test Equipment Used

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	September 23, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

7. Radiated Power Output

7.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(b)

7.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.

The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The E.U.T. was tested in three operating channels and frequencies (1 (2.402 GHz); 8 (2.441 GHz); 14 (2.480 GHz)).

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} [W]$$

7.3 Test Results

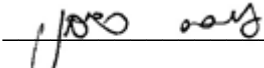
Operation Frequency (MHz)	Polarity (H/V)	Peak Reading (dBμV/m)	Peak Reading (V/m)	Transmitted Power (mW)	Limit (mW)	Margin (mW)
2402.00	V	95.6	0.06	1.08	1000	-998.92
2441.00	H	91.5	0.04	0.48	1000	-999.52
2480.00	V	92.2	0.04	0.48	1000	-999.52

Figure 17 Radiated Output Power Test Results Calculation Table

See additional information in Figure 18 to Figure 20.

JUDGEMENT: Passed by 999.52 mW

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

Radiated Power Output

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.402238 GHz
95.57 dB μ V/m

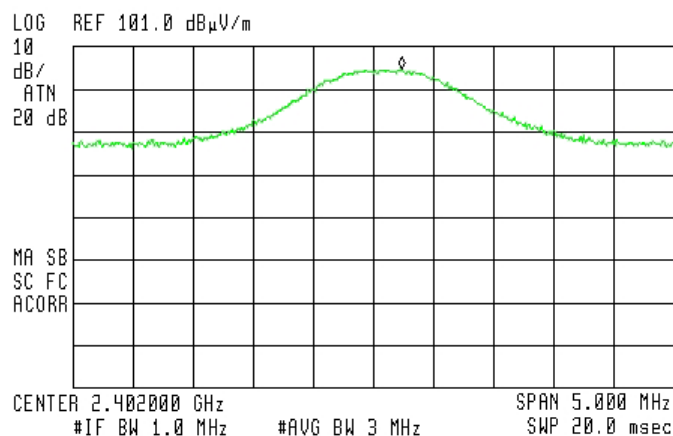


Figure 18 — 2402 MHz



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.440975 GHz
91.48 dB μ V/m

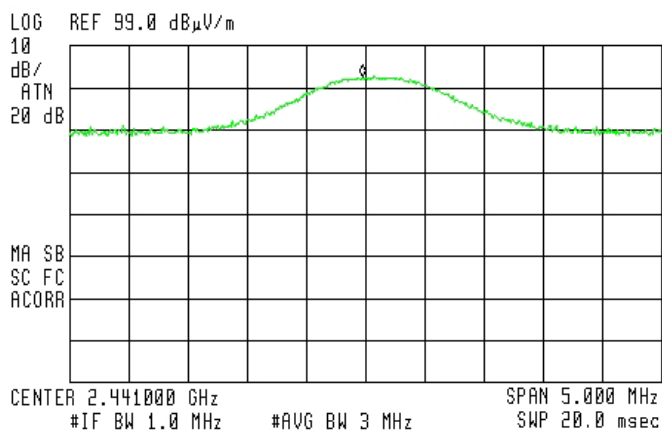


Figure 19 — 2441 MHz

Radiated Power Output

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.479875 GHz
92.28 dB μ V/m

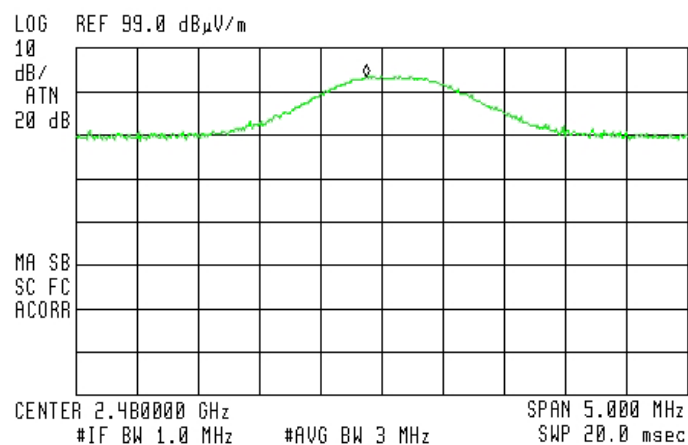


Figure 20 — 2480 MHz

Radiated Power Output

7.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 27, 2011	2 years

Figure 21 Test Equipment Used



8. Dwell Time on Each Channel

8.1 Test Specification

FCC Part 15, Section 15.247(a)(1)(iii)

8.1 Test Procedure

The E.U.T. was tested in radiated mode using the substitutional antenna. The spectrum analyzer was set to 10 kHz RBW and 30 kHz VBW.

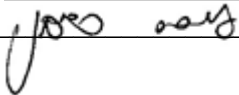
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

8.2 Test Results

The E.U.T met the requirements of the FCC Part 15, Section 15.247(a)(1)(iii).

Additional information of the results is given in Figure 22 to Figure 23.

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

Dwell Time on Each Channel

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

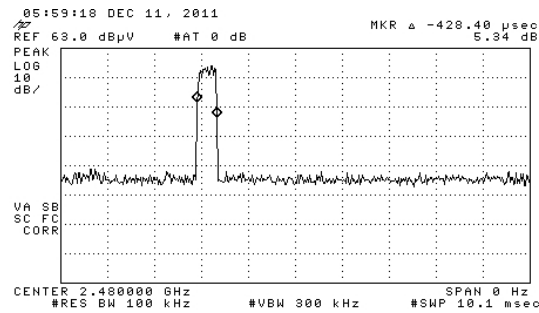


Figure 22 — $T_{on} = 0.428\text{msec}$

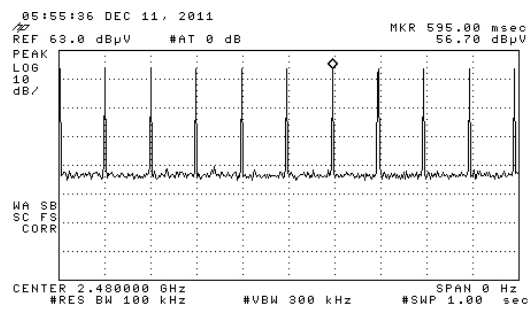


Figure 23 — Number of Channels in 1 sec. =11

$[31.6 \times 11 = 347.6, 347.6 \times 0.667\text{msec} = 0.148\text{sec}, \text{spec}=0.4 \text{ sec}]$



Dwell Time on Each Channel

8.3 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	September 23, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

9. 26 dB Bandwidth

9.1 Test Specification

Specification: FCC Part 15, Subpart C (15.247-a2)

9.2 Test procedure

The E.U.T. was set to the applicable test frequency. The spectrum analyzer was set to 100 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 26 dB below maximum peak power was measured and recorded.

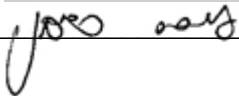
9.3 Test Results

Operation Frequency (MHz)	Reading (MHz)
2402	1.325
2441	1.363
2480	1.338

Figure 24 20 dB Bandwidth Test Results Table

See additional information in Figure 25 to Figure 27.

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

26 dB Bandwidth

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

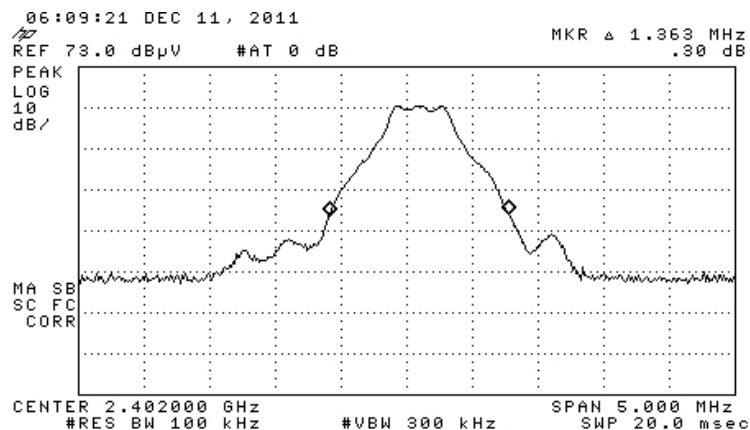


Figure 25 — 2402.0 MHz

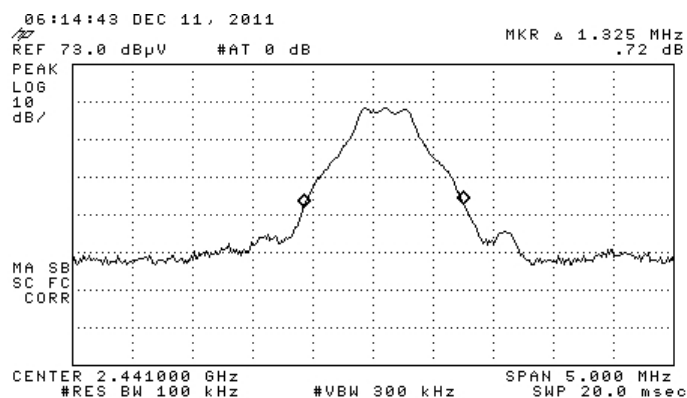


Figure 26 — 2441.0 MHz



26 dB Bandwidth

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

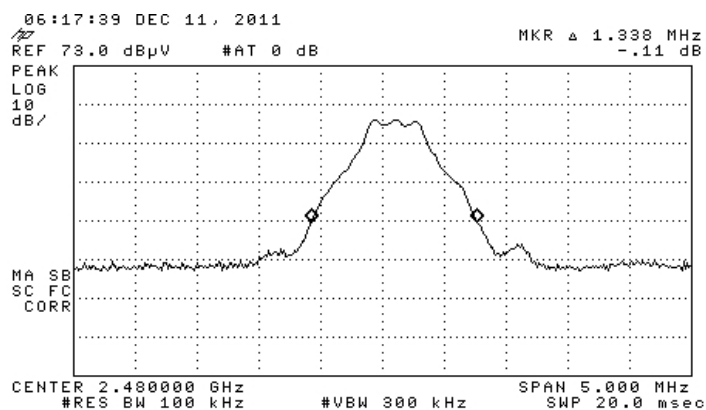


Figure 27 — 2480.0 MHz

9.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 11, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Cable	Rhophase	KPS-5000-KPS	A1674	September 23, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

10. Band Edge

10.1 Test Specification

Specification: FCC Part 15, Subpart C 15.247(d)

10.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.

The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 1, and its proper operation was checked.

The EMI receiver was adjusted to the transmission channel at the maximum radiated level. The display line was set to 20 dBc and the EMI receiver was set to the band edge frequencies.

Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2400 MHz, and 2483.5 MHz correspondingly.

The E.U.T. was tested in 2 operating frequencies
2400 and 2483.5 MHz.

10.3 Test Results

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2402.00	2400.00	62.5	75.6	-13.1
2480.00	2483.50	63.0	72.3	-8.7

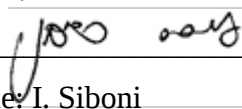
Figure 28 Band Edge Test Results Table

See additional information in Figure 29 to Figure 30.

JUDGEMENT: Passed by 8.7 dB

TEST PERSONNEL:

Tester Signature:



Date: 13.03.12

Typed/Printed Name: I. Siboni

Band Edge

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

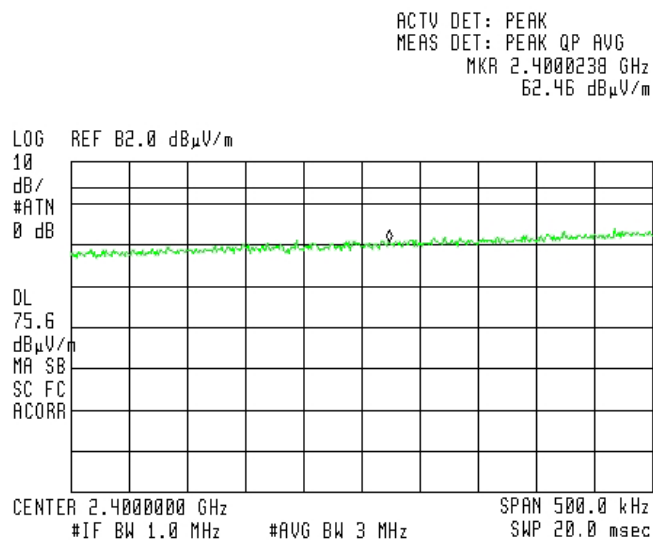


Figure 29 — 2402 MHz

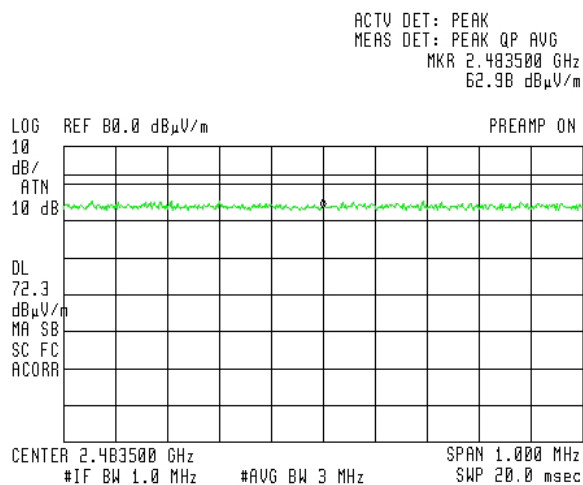


Figure 30 — 2483.5 MHz



Band Edge

10.4 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 27, 2011	2 years

Figure 31 Test Equipment Used

11. Spurious Radiated Emission, 9 kHz – 30 MHz

11.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

11.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was tested in three operating frequencies, 2402, 2441, and 2480 MHz. Measurement was performed using a peak detector.

11.3 Test results

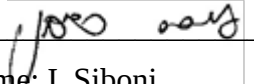
JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all three operating frequencies were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni



Spurious Radiated Emission, 9 kHz – 30 MHz

11.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2009	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

Spurious Radiated Emission, 9 kHz – 30 MHz

11.5 *Field Strength Calculation*

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dB μ V/m]
RA:	Receiver Amplitude [dB μ V]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: $FS = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

12. Spurious Radiated Emission 30 – 25000 MHz

12.1 Test Specification

30 MHz-25000 MHz, F.C.C., Part 15, Subpart C

12.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 30 MHz-25000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 30-1000 MHz, the readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.

In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.

The test distance was 3 meters.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested in three operating frequencies, 2402, 2441, and 2480 MHz.



12.3 Test Results

JUDGEMENT: Passed by 9.5 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

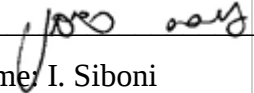
For the operation frequency of 2402 MHz, the margin between the emission level and the specification limit is 9.5 dB in the worst case at the frequency of 2390.00 MHz, horizontal and vertical polarizations.

For the operation frequency of 2441 MHz, the margin between the emission level and the specification limit is 13.4 dB in the worst case at the frequency of 4882.00 MHz, vertical polarization.

For the operation frequency of 2480 MHz, the margin between the emission level and the specification limit is 11.7 dB in the worst case at the frequency of 2483.50 MHz, vertical polarization.

The details of the highest emissions are given in Figure 32 to Figure 33.

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

Spurious Radiated Emission 30 – 25000 MHz

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Peak

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Reading (dBμV/m)	Peak Specification (dB μV/m)	Peak Margin (dB)
2402.00	2390.00	H	58.9	74.0	-15.1
2402.00	2390.00	V	58.1	74.0	-15.9
2402.00	4804.00	H	58.8	74.0	-15.2
2402.00	4804.00	V	57.2	74.0	-16.8
2441.00	4882.00	H	56.2	74.0	-17.8
2441.00	4882.00	V	56.4	74.0	-17.6
2480.00	2483.50	H	56.1	74.0	-17.9
2480.00	2483.50	V	56.7	74.0	-17.3
2480.00	4960.00	H	58.0	74.0	-16.0
2480.00	4960.00	V	56.2	74.0	-17.8

**Figure 32. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak**

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Reading” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Spurious Radiated Emission 30 – 25000 MHz

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Average

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Average Reading (dB μ V/m)	Average Specification (dB μ V/m)	Average Margin (dB)
2402.00	2390.00	H	44.5	54.0	-9.5
2402.00	2390.00	V	44.5	54.0	-9.5
2402.00	4804.00	H	41.7	54.0	-12.3
2402.00	4804.00	V	39.9	54.0	-14.1
2441.00	4882.00	H	39.6	54.0	-14.4
2441.00	4882.00	V	40.6	54.0	-13.4
2480.00	2483.50	H	41.7	54.0	-12.3
2480.00	2483.50	V	42.3	54.0	-11.7
2480.00	4960.00	H	39.8	54.0	-14.2
2480.00	4960.00	V	39.3	54.0	-14.7

**Figure 33. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Average**

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

“Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



Spurious Radiated Emission 30 – 25000 MHz

12.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	December 12 2011	1 Year
RF Filter Section	HP	85420E	3705A00248	December 12 2011	1 Year
Antenna Biconical	ETS	3109	002-3244	August 31, 2011	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 29, 2011	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2010	2 Years
Horn Antenna	ARA	SWH-28	1008	January 26, 2011	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 8, 2011	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 8, 2011	1 Year
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	30.10.2011	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

Spurious Radiated Emission 30 – 25000 MHz

12.5 *Field Strength Calculation 30 – 1000 MHz*

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{V/m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

FS:	Field Strength [dB $\mu\text{V/m}$]
RA:	Receiver Amplitude [dB μV]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: $\text{FS} = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

13. Radiated Power Spectral Density

13.1 Test Specification

Specification: FCC Part 15, Subpart C 15.247(d)

13.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.

The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The E.U.T. was tested in three operating frequencies 2402, 2441, and 2480 MHz.

Then the EMI receiver was set to 3 kHz resolution BW, span of 300.0 kHz, and sweep time of 100 seconds. The spectrum peaks were located at each of the 3 operating frequencies.

Radiated peak output power levels were converted to power level according to the formula as shown below:

$$P = \frac{(E_{v/m} \times d)^2}{(30 \times G)} [\text{W}]$$



Radiated Power Spectral Density

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

13.3 Test Results

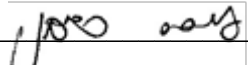
Operation Frequency (MHz)	Peak Reading (dBuV/m)	Peak Reading (V/m)	Spectral Density Result (mW)	Specification (mW)	Margin (dB)
2402	90.9	0.04	0.5	6.3	-5.8
2440	87.1	0.02	0.1	6.3	-6.2
2480	88.6	0.03	0.3	6.3	-6.0

Figure 34 Test Results

See additional information in Figure 35 to Figure 37.

JUDGEMENT: Passed by

TEST PERSONNEL:

Tester Signature: 

Date: 13.03.12

Typed/Printed Name: I. Siboni

Radiated Power Spectral Density

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4020983 GHz
90.87 dB μ V/m

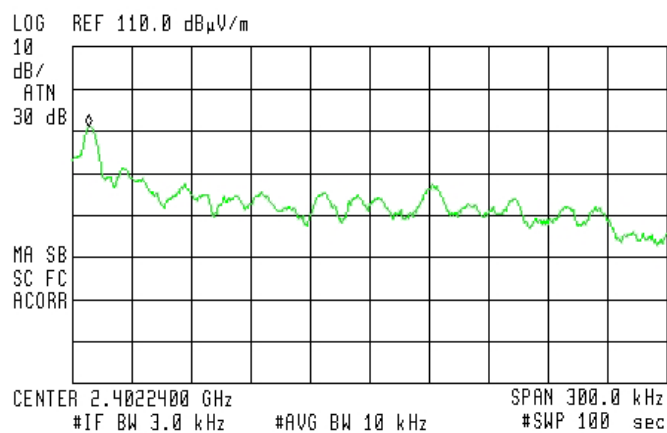


Figure 35 — 2401 MHz



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4411013 GHz
87.03 dB μ V/m

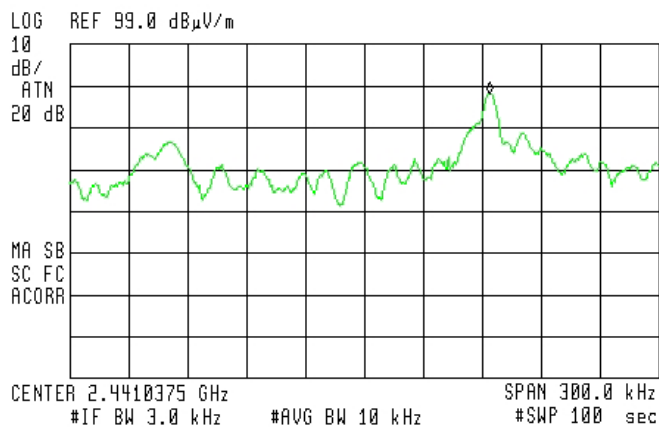


Figure 36 — 2440 MHz

Radiated Power Spectral Density

E.U.T Description Driver Assistance System Mobileye5
Type Mobileye 560
Serial Number: Not Designated

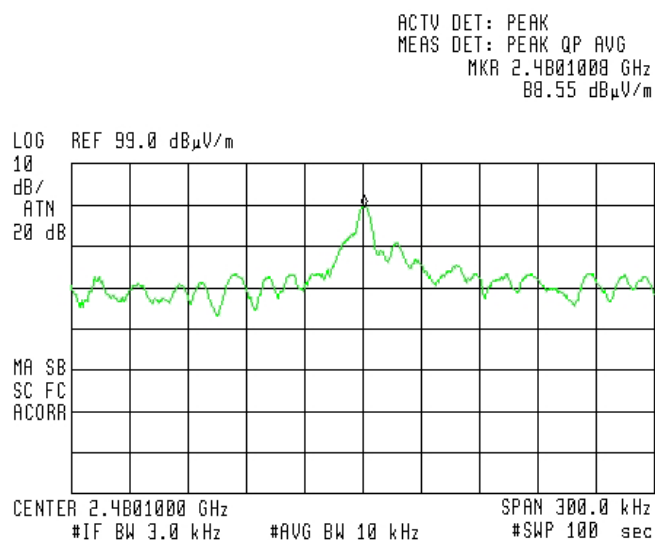


Figure 37 — 2480 MHz

Radiated Power Spectral Density

13.4 Test Equipment Used

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 27, 2011	2 years

Figure 38 Test Equipment Used



14. Antenna Gain/Information

The antenna gain is 0 dBi.

15. R.F Exposure/Safety

The typical placement of the E.U.T. is in a motor vehicle. The typical distance between the E.U.T. and the user is 0.25m.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b)(1) Requirements

(a) FCC limits at 2441 MHz is: $1 \frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

$P_t G_t$ - Transmitted Power + Antenna Gain 1.08 mw (Peak)

R- Distance from Transmitter using 0.25 m worst case

(c) The peak power density is :

$$S_p = \frac{1.08}{4\pi(25)^2} = 0.00014 \frac{mW}{cm^2}$$

(d) This is below the FCC limit.

16. APPENDIX A - CORRECTION FACTORS

16.1 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

16.2 Correction factors for CABLE
from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.

16.3 Correction factors for CABLE
from spectrum analyzer
to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.

12.6 Correction factors for LOG PERIODIC ANTENNA

**Type LPD 2010/A
at 3 and 10 meter ranges.**

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range,
and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission
Test EMI Receiver".

16.4 Correction factors for

LOG PERIODIC ANTENNA

**Type SAS-200/511
at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

16.5 Correction factors for BICONICAL ANTENNA

**Type 3109,
at 3 meter range**

FREQUENCY (MHz)	AFE (dB/m)
30.0	13.3
40.0	12.7
50.0	11.0
60.0	9.2
70.0	10.0
80.0	7.2
90.0	7.9
100.0	9.4
120.0	11.9
140.0	13.1
160.0	12.3
180.0	12.4
200.0	14.8
250.0	15.3
300.0	17.9

NOTE:

1. Antenna serial number is 002-3244.

16.6 Correction factors for Double-Ridged Waveguide Horn

**Model: 3115, S/N 29845
at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENN A Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

16.7 Correction factors for

Horn Antenna

**Model: SWH-28
at 1 meter range.**

FREQUENCY (GHz)	APE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4



16.8 Correction factors for ACTIVE LOOP ANTENNA
Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2