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Mobileye 8 Connect

Standard Output Protocol v1.0

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Approved by:	
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Change Control

VERSION	DATE	UPDATED BY	CHAPTER	ESSENCE OF THE CHANGE	APPROVED BY
0.1	March 2021	Eran Levy	All		Mickael Cohen
0.9	September 2022	Eran Levy		Removed data of messages 0x720-0x726	Eran Levy
1.0	February 2023	Eran Levy		Time Indicator	Eran Levy

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1.   General Information

Since the Mobileye® 8-Series systems are supportive of Over-The-Air updates, the system parameters and therefore the information included in this user manual may be changed from time to time. The information included in this user manual is correct for the date of its issuance. For the most up to date user manual, please be referred to our ftp site or contact support@mobileye.com.

2. Introduction

The purpose of this document is to describe in detail the CAN output data from Mobileye 8 Connect system.

This document applies to code residing in the ME8 Aftermarket tree for version 4.19.6 and up.

3. Acronyms & Terminology

Term	Description
ME	Mobileye
CAN	Controller Area Network
SeeQ	Mobileye 8 driver assistance system
FMS	Fleet Management System
CIPV	Close-in Path Vehicle
LDW	Lane Departure Warning
FCW	Forward Collision Warning
HMW	Headway Monitor Warning
Ped	Pedestrian
DZ	Danger Zone (for Pedestrian detection)
TSR	Traffic Sign Recognition
TFL	Traffic light
SLI	Speed limit indication

4. CAN output message overview

Message	Code	Description
ME8 Display & Warnings	0x700	Provides data about: • sound type • LDW • HMW • FCW • PCW • IHC • SLI • Failsafe • Tamper alert • Error validation and code
Car Signals	0x760	Provides signals availability & status from the vehicle • Speed • Left Blinker • Right Blinker • High Beam • Wipers • Brake • Gyro • Shield+ settings (if installed)
TSR	0x727	Provides data about • Sign Type – Display 1 • Supplementary Sign Type – Display 1 • Sign Type – Display 2

		- Supplementary Sign Type – Display 2 - Sign Type – Display 3 - Supplementary Sign Type – Display 3 - Sign Type – Display 4 - Supplementary Sign Type – Display 4
Gyro	0x703	Provides data about: Gyro data
SeeQ info	0x410-0x411	Provides data about: System s/n
IMS KeepAlive	0x412	Provides data about: - Up time - Session id

5. Message ID 0x700

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every 27-110ms.

Message 0x700 overview

Message ID 0x700 provides CAN output data regarding both audio & visual Mobileye 8 alerts.

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	N/A			Time indicator		Sound Type		
Byte 1	FLA armed	Hi Low beam	Zero speed	SLI Alert	TSR Shape			
Byte 2	Headway measurements							Headway valid
Byte 3	Error Code							Error active
Byte 4	Fail safe	Mainte nance	Reserved		FCW	R-LDW	L-LDW	L-LDW availability
Byte 5	Reserved	Speed format	Tamper Alert		N/A	Peds in DZ	PCW	R-LDW availability
Byte 6	Reserved					TSR warning level		
Byte 7	Reserved					HW warning level		

The following describes in detail the data and description for each Mobileye 8 alert:

Sound Type

Type: unsigned char

Value	Description of "sound" channel
0	Silent
1	Left LDW
2	Right LDW
3	HMW
4	SLI
5	UFCW
6	FCW & PCW
7	invalid

Time indicator

Type: unsigned char

Value (Binary)	Description
00	Day
01	Dusk
10	Night

TSR Shape (relevant only for speed sign)

This will indicate the shape of the TSR sign according to the country code.

Type: Boolean, unsigned int

Bit value= 0 – detected speed sign is circle

Bit value = 1 – detected speed sign is rectangle

SLI Alert

Type: Boolean, unsigned int

Bit value= 0

Bit value = 1 – when SLI alert is active (SLI alert is blinking on the EyeWatch)

Zero speed

Type: Boolean, unsigned int

Bit value= 0

Bit value = 1 – Current speed is 0km/h

Hi low beam

Type: Boolean, unsigned int

Bit value= 0

Bit value = 1 when IHC is armed and activated (blue IHC icon on display unit)

FLA (IHC) armed

Type: Boolean, unsigned int

Bit value= 0

Bit value = 1 when IHC (Intelligent high-beam control) is armed (green IHC icon on display unit)

Headway valid

Type: Boolean, unsigned int

Bit value= 0

Bit value = 1 – when CIPV valid

Headway measurements

Type: unsigned int

The measurement of the headway in tenths of seconds.
The value is truncated to [0, 99] and rounded to 10.

Also, if speed is less than 30 km/h the value will be zero.

Error validation

Type: Boolean, unsigned int
Bit value = 0 – error is valid and error code field will contain the error code
Bit value= 1 – no error

Error code

See basic error code list in the user manual.

L-LDW availability

Type: Boolean, unsigned int
Bit value = 0 – L-LDW is disabled when one of the following occur:
- Speed is low (less than the speed activation threshold)
- Lane confidence of at least one lane mark is less than 2 (this is the brain decision. This data is not available in the standard CAN output protocol)

Bit value = 1 LDW is enabled

L-LDW

Type: Boolean, unsigned int
Indicator of LEFT LDW event. Will be **ON** for 5 consecutive frames. No matter how long the event really is.
Bit value = 0 – no Left LDW alert
Bit value = 1 – Left LDW alert is active

R-LDW

Type: Boolean, unsigned int
Indicator of RIGHT LDW event. Will be **ON** for 5 consecutive frames. No matter how long the event really is.
Bit value = 0 – no Right LDW alert
Bit value = 1 – Right LDW alert is active

FCW

Type: Boolean, unsigned int
Indicator of FCW
Bit value = 0 – no FCW alert
Bit value = 1 – FCW/ Soft FCW (UFCW)

Maintenance

Indication of an internal error. Same as error validation

Failsafe

Type: Boolean, unsigned int
Bit value = 0 – system is ok
Bit value = 1 – system in failsafe, e.g., low visibility.

R-LDW availability

Type: Boolean, unsigned int
Bit value = 0 – R-LDW is disabled when one of the following occur:
- Speed is low (less than the speed activation threshold)
- Lane confidence of at least one lane mark is less than 2 (this is the brain decision. This data is not available in the standard CAN output protocol)

Bit value = 1 R-LDW is enabled

Ped in DZ

Type: Boolean, unsigned int
Indication of pedestrian in the danger zone
Bit value = 0 – no ped in DZ
Bit value = 1 – Ped detected in DZ

PCW

Type: Boolean, unsigned int
Indicator of PCW (Red pedestrian icon will be display on the Eyewatch & sound will emitted from the buzzer)
Bit value = 0 – no PCW alert
Bit value = 1 – PCW alert is active

Tamper alert

Type: Boolean, unsigned int
When 0 = No Tamper Alert
When 1 = Tamper Alert is ON
Note: Tamper Alert will be activated if there is no vehicle or lane detection for duration of 10 minutes. Tamper Alert is active above 15 km/h (9 mph).
Details:
Tamper Alert will function when:
- If speed >= 55 km/h & no lane and vehicle detection for a duration of 10 minutes.
If a Lane or Vehicle are detected in any Frame during the 10 minutes duration, the 10 minutes duration will be prolonged by a factor of the "Time past until the
detected Frame divided by 2.
For example, if there was no detection for 9 minutes and then a Lane was detected in 1 frame, the 10 minutes duration will resume from 4.5 minutes, meaning the time left for receiving the Tamper

alert is now 5.5 minutes.
- If speed >= 15 km/h, and there is No Vehicle detection of any kind for a duration of 10 minutes. From the moment Wipers are active, the 10 minutes duration will be multiplied by 2 to 20 minutes.

Speed format

Type: Boolean, unsigned int
Bit value = 0 - kph
Bit value = 1 –mph

SLI enabled

Type: Boolean, unsigned int
Indicator of SLI feature
Bit value = 0 – SLI is disabled
Bit value = 1 – SLI is enabled

SLI warning level

Type: unsigned int

Provides delta data of the vehicle speed over the speed limit in manner of ticks.

Every time the vehicle speed is greater than the Legal Speed limit Sign by 5 (km/h or mph) then a BIT will turn On and will grow by +1 with every 5 (km/h or mph) growth.
This is limited up to 35 (km/h or mph)

Value	description
0 (000)	When Speed <= road speed
1 (001)	When Speed > road speed +[0-5kmh]
2 (010)	When Speed > road speed +[5-10kmh]
3 (011)	When Speed > road speed +[10-15kmh]
4 (100)	When Speed > road speed + [15-20kmh]
5 (101)	When Speed > road speed +[20-25kmh]
6 (110)	When Speed > road speed +[25-30kmh]
7 (111)	When Speed > road speed + [30-35kmh] or [+35kmh]

HW warning level

Type: unsigned int

Value	description
0 (000)	Off
1 (001)	HW icon is Green
2 (010)	HW icon is Red
3 (011)	Invalid

6. Message ID 0x760 (car info)

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every 27ms-110ms.

Message 0x760 overview

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	N/A		High Beam ON	N/A	Wipers	Right Blinker	Left Blinker	Brake
Byte 1	Speed available	Gyro available	High Beam available	N/A	Wipers available	R-Blinker availability	L-Blinker available	Brake available
Byte 2	Speed							
Byte 3	N/A							
Byte 4								
Byte 5	Gyro value							
Byte 6								
Byte 7	Shield+ camera settings							

The following describes in detail the data and description for each Mobileye 8 alert:

Brake

Type: Boolean, unsigned int

Bit value = 0 – Brake signal is OFF

Bit value = 1 – Brake signal is ON

Left Blinker

Type: Boolean, unsigned int

Bit value = 0 – left indicator signal is OFF

Bit value = 1 – left indicator is signal is ON

Right Blinker

Type: Boolean, unsigned int

Bit value = 0 – right indicator signal is OFF

Bit value = 1 – right indicator signal is ON

Wipers

Type: Boolean, unsigned int

Bit value = 0 – wipers signal is OFF

Bit value = 1 – wipers signal is ON

High Beam

Type: Boolean, unsigned int

Bit value = 0 – high beam signal is OFF

Bit value = 1 – high beam signal is ON

Brake availability

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 –Signal set to enable (either by CAN or analogue) during IC

L-Blinker available

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 – Signal set to enable (either by CAN or analogue) during IC

R-Blinker available

Type: Boolean, unsigned int

Bit value = 0 – Brake signal is disabled

Bit value = 1 – Signal set to enable (either by CAN or analogue) during IC

Speed available

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 – Signal set to enable (either by CAN or analogue) during IC

Wipers available

Type: Boolean, unsigned int

Availability of Wipers signal if connected during the installation

Bit value = 0 –

Bit value = 1 – Signal set to enable (either by CAN or analogue) during IC

High Beam available

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 – high beam signal is configured as enable (either by CAN or analogue) during calibration (IC)

Gyro available

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 – Gyro sensor exist in Mobileye system

Speed available

Type: Boolean, unsigned int

Bit value = 0

Bit value = 1 – Speed signal is configured as enable (either by CAN or analogue) during calibration (IC)

Speed

Type: unsigned byte

Unit: km/h

Range: 0-255 km/h

Gyro Value

Unit: °/sec

Range: -180:180

MSB*256+LSB and then seen as yaw rate as signed value scaled up by dividing by -0.00875

Shield+ settings

Type: unsigned int

Displaying the connection status of each camera (as part of the shield+ V4.0)

Bit 0 value = 1 – Master System is connected
Bit 1 value = 1 – left camera is connected
Bit 2 value = 1 – right camera is connected
Bit 3 value = 1 – left corner camera is connected
Bit 4 value = 1 – right corner camera is connected
Bit 5 value = 1 – rear left corner camera is connected
Bit 6 value = 1 – rear right corner camera is connected

7. Message ID 0x727

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every 27ms-110ms.

Message 0x727 overview

This message contains the TSR Vision only decision – continues value based on real decision. This message will be reported if the sign is relevant (until different TS is recognized or disabled by Turn, Timer, etc.….)

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Vision only Sign Type – Display 1							
Byte 1	Vision only Supplementary Sign Type – Display 1							
Byte 2	Vision only Sign Type – Display 2							
Byte 3	Vision only Supplementary Sign Type – Display 2							
Byte 4	Vision only Sign Type – Display 3							
Byte 5	Vision only Supplementary Sign Type – Display 3							
Byte 6	Vision only Sign Type – Display 4							
Byte 7	Vision only Supplementary Sign Type – Display 4							

Vision only Sign Type – Display 1-4

Type: Enum

Range: 0-255

Invalid value = 0xFF = 255 – No speed limit sign was detected.

Note: the values are the traffic sign (speed sign) numerical values. there is no reference to speed format (km/h or mph)

Enum	Speed sign numerical value
0	Standard regular 10
1	Standard regular 20
2	Standard regular 30
3	Standard regular 40
4	Standard regular 50
5	Standard regular 60
6	Standard regular 70
7	Standard regular 80
8	Standard regular 90
9	Standard regular 100
10	Standard regular 110
11	Standard regular 120
12	Standard regular 130
13	Standard regular 150
20	Standard regular end restriction of number e.g. 60 "end of restriction"
28	Standard electronic 10

29	Standard electronic 20
30	Standard electronic 30
31	Standard electronic 40
32	Standard electronic 50
33	Standard electronic 60
34	Standard electronic 70
35	Standard electronic 80
36	Standard electronic 90
37	Standard electronic 100
38	Standard electronic 110
39	Standard electronic 120
40	Standard electronic 130
41	Standard electronic 140
50	standard electronic end restriction of number e.g., 60 "end of restriction"
64	standard regular general - end all restriction
65	standard electronic general - end all restriction
100	standard regular 5
101	standard regular 15
102	standard regular 25
103	standard regular 35
104	standard regular 45
105	standard regular 55
106	standard regular 65

107	standard regular 75
108	standard regular 85
109	standard regular 95
110	standard regular 105
111	standard regular 115
112	standard regular 125
113	standard regular 135
114	standard regular 145
115	standard electronic 5
116	standard electronic 15
117	standard electronic 25
118	standard electronic 35
119	standard electronic 45
120	standard electronic 55
121	standard electronic 65
122	standard electronic 75
123	standard electronic 85
124	standard electronic 95
125	standard electronic 105
126	standard electronic 115
127	standard electronic 125
128	standard electronic 135
129	standard electronic 145

171	standard regular motorway begins
172	standard regular end of Motorway
173	standard regular expressway begins
174	standard regular end of Expressway
175	standard regular Playground area begin
176	standard regular End of playground area
200	standard regular no passing start
201	standard regular end of no passing
220	standard electronic no passing start
221	standard electronic end of no passing
254	No sign detected
255	e_invalid_sign

Vision only supplementary sign type – Display 1-4

Type: Enum

Range: 0-255

Invalid value = 0xFF = 255 – No supplementary sign was detected.

Enum	Speed sign numerical value
0	None
1	Rain
2	Snow
3	Trailer
4	Time

5	Arrow_Left
6	Arrow_Right
7	BendArrow left
8	BendArror right
9	Truck
10	Distance arrow (distance for)
11	Weight
12	Distance in
13	Tractor
14	Snow_Rain
15	School
16	Rain_Cloud
17	Fog
18	Hazardous_materials
19	Night
20	Supp_sign_generic
21	E_rappel
22	E_zone
255	Invalid_supp

8. Message ID 0x703

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every -110ms.

Message 0x703 overview

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Gyro availability	N/A						
Byte 1	Yaw rate data (MSB)							
Byte 2	Yaw rate data (LSB)							
Byte 3	Roll rate data (MSB)							
Byte 4	Roll rate data (LSB)							
Byte 5	Pitch rate data (MSB)							
Byte 6	Pitch rate data (LSB)							

Gyro sensor data availability

Type: Boolean, unsigned char

Bit value = 0 – Gyro data not available

Bit value = 1 – Gyro data is available

Yaw rate

One-byte value MSB of yaw angular rate, it has sense only with the following byte. The value of yaw angular rate is calculated like (yaw MSB)*256+(yaw LSB). It is a signed number in two bytes; units are grad/s, limits -180 until +180. Conversion: (HEX)* (-0.00875)

Roll rate

One-byte value MSB of roll angular rate, it has sense only with the following byte. The value of roll angular rate is calculated like (roll MSB)*256+(roll LSB). It is a signed number in two bytes; units are grad/s, limits -180 until +180. Conversion: (HEX)* (-0.00875)

Pitch rate

One-byte value MSB of pitch angular rate, it has sense only with the following byte. The value of pitch angular rate is calculated like (pitch MSB)*256+(pitch LSB). It is a signed number in two bytes; units are grad/s, limits -180 until +180. Conversion: (HEX)* (-0.00875)

9. Message ID 0x410-0x411

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every 27-110ms.

Message 0x410-0x411 overview

	0x410							
Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Production date - week							
Byte 1	Production date - week							
Byte 2	Production date - year							
Byte 3	Production date - year							
Byte 4	Product							
Byte 5	Product							
Byte 6	Product							
Byte 7	Manufacture id							

0x411							
Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Manufacture id						
Byte 1	N/A						
Byte 2	N/A						
Byte 3	Serial number						
Byte 4	Serial number						
Byte 5	Serial number						
Byte 6	Serial number						
Byte 7	Serial number						

Production date week

Type: array of two bytes.

Value is forced to be stored (and read) as Little-endian.

Production date year

Type: array of two bytes.

Value is forced to be stored (and read) as Little-endian.

product

Type: array of three bytes.

Value is forced to be stored (and read) as Little-endian.

Manufacture id

Type: array of two bytes.

1st byte is byte #7 of massage 0x410

2nd byte is byte #1 of message 0x411

Value is forced to be stored (and read) as Little-endian.

Serial number

Type: array of five bytes.

Value is forced to be stored (and read) as Little-endian.

Example:		
System serial number structure is WWYY011MMRRXXXXX	WW	Work week
	YY	Year
	011	Constant ID
	MM	Manufacture id
	RR	Bom revision
	XXXXX	Running number

10. Message ID 0x412

CAN Parameters

- The messages are transmitted in an 11bit CAN header format.

- The default baud rate is 500Kbps.

- The CAN message is transmitted approximately every 27-110ms.

Message 0x412 overview

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Up time							
Byte 1	Up time							
Byte 2	Up time							
Byte 3	Up time							
Byte 4	N/A							
Byte 5	N/A							
Byte 6	Running mode							
Byte 7	reserved							

Up Time

Type: array of four bytes, milliseconds since initialization of the system (after system boot-up).

Value is forced to be stored (and read) as Little-endian.

Running Mode

Type: one byte

Value is 1 - 'Regular' mode

11. Physical connection (EyeWatch8)

Mobileye 8 connect CAN interface is in the unit`s main cable and labeled as "EyeWatch8".

The default baud rate is 500Kbps and **cannot be modified**.

> 📄 **Note**
>
> Insert Compatible connectors and other connections methods to EyeWatch8 connector are not supplied by Mobileye.

Mobileye 8 Connect – EyeWatch8 pin layout (CAN-A port)

Pin number	Function	Connector Front view
#1	CAN High	
#2	CAN Low	
#3	RS485 GND	
#4	Ignition	
#5	5VDC	
#6	BAT+	

> 📄 **Note**
>
> Due to the pin layout functionality of Mobileye 8 CAN A connector, it is up to the integrator to pay attention to avoid damaging the integration 3rd party device.

Mobileye recommend using the below cable (CAB000743 – sold separately) when integrating with a 3rd party device.