



ENDURANCE COMMITTEE DECISION



To: Teams Manufacturers
Category: LM P1 LM P2 LM GTE Pro LM GTE Am
Decision N°: **14-D0002-All categories - Amended**
Date: 17/02/2014
Re: Official on board cameras
Amended 06/03/2014

Mission concerned

Article: **89**

- 2014 FIA World Endurance Championship Sporting Regulations**
- 2014 Technical Regulations for Prototypes LMP1
- 2014 Technical Regulations for Prototypes LMP2
- 2014 Technical Regulations for Le Mans Grand Touring Cars - LM GTE Pro & LM GTE Am
- Internal Regulations of the FIA Endurance Commission

Decision

Amended: please see in red color the modifications:

A new official camera system will be operated in 2014.

Technical description is summarized in document "WEC-On board system.pdf"

With a minimum weight of all cars defined and maintained without camera **system**, it is considered of major importance that the cars equipped with camera **system** do not suffer any performance penalty.

The following will be put in place, **considering the weight of camera system = 3kg (1.5 kg antenna and loom + 1.5 kg TS1 + camera)**

- Cars without camera will need to have ballast on board **(total 3kg). When removed, cars must be at least at the minimum weight defined by the regulations.**
- LMP1 cars: all cars to be equipped with antennas and looms
If no camera, a dummy box to be installed in due position in cockpit (same dimensions as TS1 box, weight of TS1 + camera = 1.5kg).
- LMP2 and LMGTE: no necessity to equip all cars
If no camera, a dummy box to be installed in cockpit (same dimensions as TS1 box, weight same as complete system = 3.0kg)

Period of validity/application of the decision

This decision comes into effect:

- with immediate application
 from:
 from the following event :

And is applicable:

- until further notice
 for the above-mentioned event(s) only

Committee Members



Denis CHEVRIER



Vincent BEAUMESNIL

Any decision taken by the Endurance Committee is not subject to appeal, in accordance with Article 88 B of the WEC Sporting Regulations.

This decision is available on the following websites:

- www.fia.com
- <http://sport.lemans.org/login.php>



Let's explore tomorrow's television



*FIA WORLD **ENDURANCE**
CHAMPIONSHIP*

On-board camera system

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 - 3.2- VHF antenna
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 - 4.2- Caméra loom,
 - 4.3- Antenna loom
- 5-Weight and consumption

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1-TS1

The TS1 is the “what drives” the on-board camera system. It processes and transmits the images produced by the cameras. It enables interaction between the cameras and the other devices (lens cleaning, remote control, etc.),

-The box has to be placed inside the car in a dry and accessible place and in an ambient temperature of between -10 and +55°C,

-It should be fixed on an anti-vibration base,

-The box needs space for the fans (not on the model): 30mm on the top is enough.

-Its also needs space to fix connectors. 50mm on the connectors side.

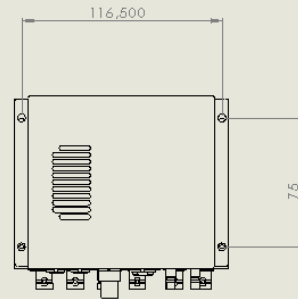
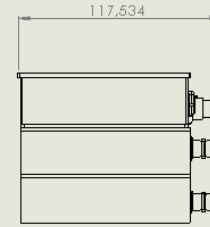
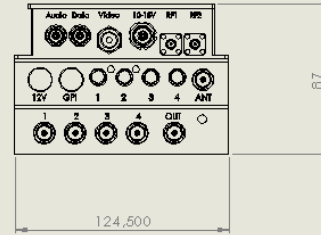
-B-box mounting holes are: -Length : 116,5mm

-Width : 75mm

-Power supply voltage required for the box to function: between 11 and 16 volts DC.

The system has to be powered by the car in order to function for a complete race without any interruption.





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Kit Ob XpuHD

A3

2- The cameras

The TS1 can control between 1 and 3 cameras. The cameras can be controlled from the OB van in terms of colormetrics, diaphragm and electronic zoom. As they are installed in different places in the car, they enable a diverse range of views: cockpit, driver, rear, subjective view, etc.

2.1 P.O.V camera

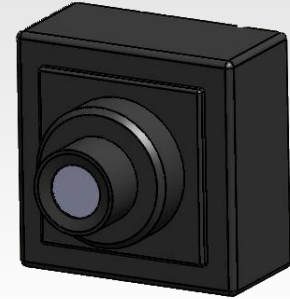
It's the Point Of View camera. It's a very high quality camera with high sensitivity for night time operation. To install it, we need to find a cool and dry place where the spectator can think he is the driver. Due to its price, it also needs to be in a safe place.



2- The cameras

2.2 Driver camera.

It needs to see the driver. It's smaller than the POV camera. Its place is in the cockpit.

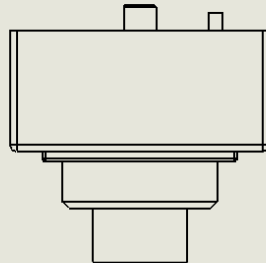
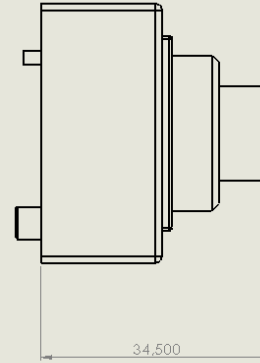
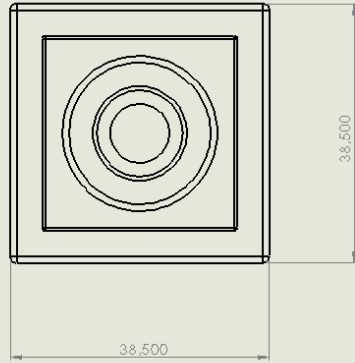


2.3 Beauty shot camera.

At least 1 position per car for a beauty shot. It could be a rear shot, a technical shot, or a front shot...

It just needs to be spectacular!!!

Technically, the camera are the same as the driver camera.



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| SANS INDICATION CONTRAIRE: TOUTES DIMENSIONS EN MILLIMÈTRE | | UNITE: | | CASSERIE ANGLE VIS | | NE PAS CHANGER TECHNIQUE | | REVEDN | |
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| | | | | | | HEBILÉ 5071 | | | |

3- The antennas

Two antennas are used: one to transmit the digital signal (active antenna) and the other to receive data from the OB van.

3.1 Active antenna

As it transmits the digital signal ground-to-ground, its position on the car is crucial. It has to be visible to the reception antennas. This means that it must be fixed on the outside of the car, in a horizontal position in the highest and least obstructed place. Its also requires a ground plane for operation.

Frequency: between 2.2 and 2.7 GHz

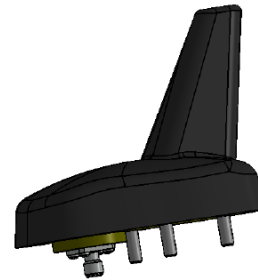
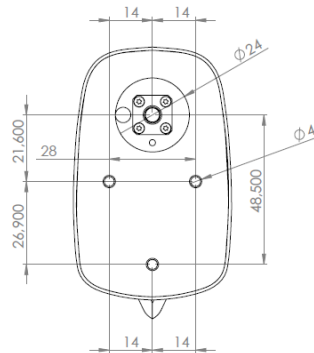
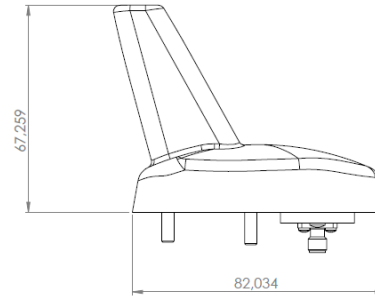
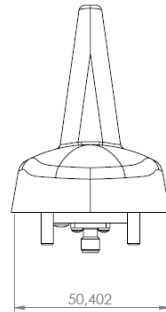
Power: + 19 dBm max

Size (LxWxH): 85x54x77

Weight: 102g

This antenna needs 4 holes, 1 for the cable, 3 for the screws.





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| SAUF INDICATION CONTRAIRE: LES COSES SONT EN MILLIMETRES ETAT DE SURFACE: TOLERANCES: LINEAIRES: ANGULAIRES: | | | | FINITEK | | CASER LES ANGES VPS | | NE PAS CHANGER L'ECHELLE | | REVISION | |
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| | | | | | | MATERIAU: | | CarAntenna1 | | | |
| | | | | | | MASSE: | | ECHELLE:1:2 | | FEUILLE 1 SUR 1 | |

3- The antennas

3.2 UHF antenna

As it receives the data signal transmitted by the OB van, it has to be fixed on the outside of the car. The antenna requires a ground plane so that it remains within the following dimensions:

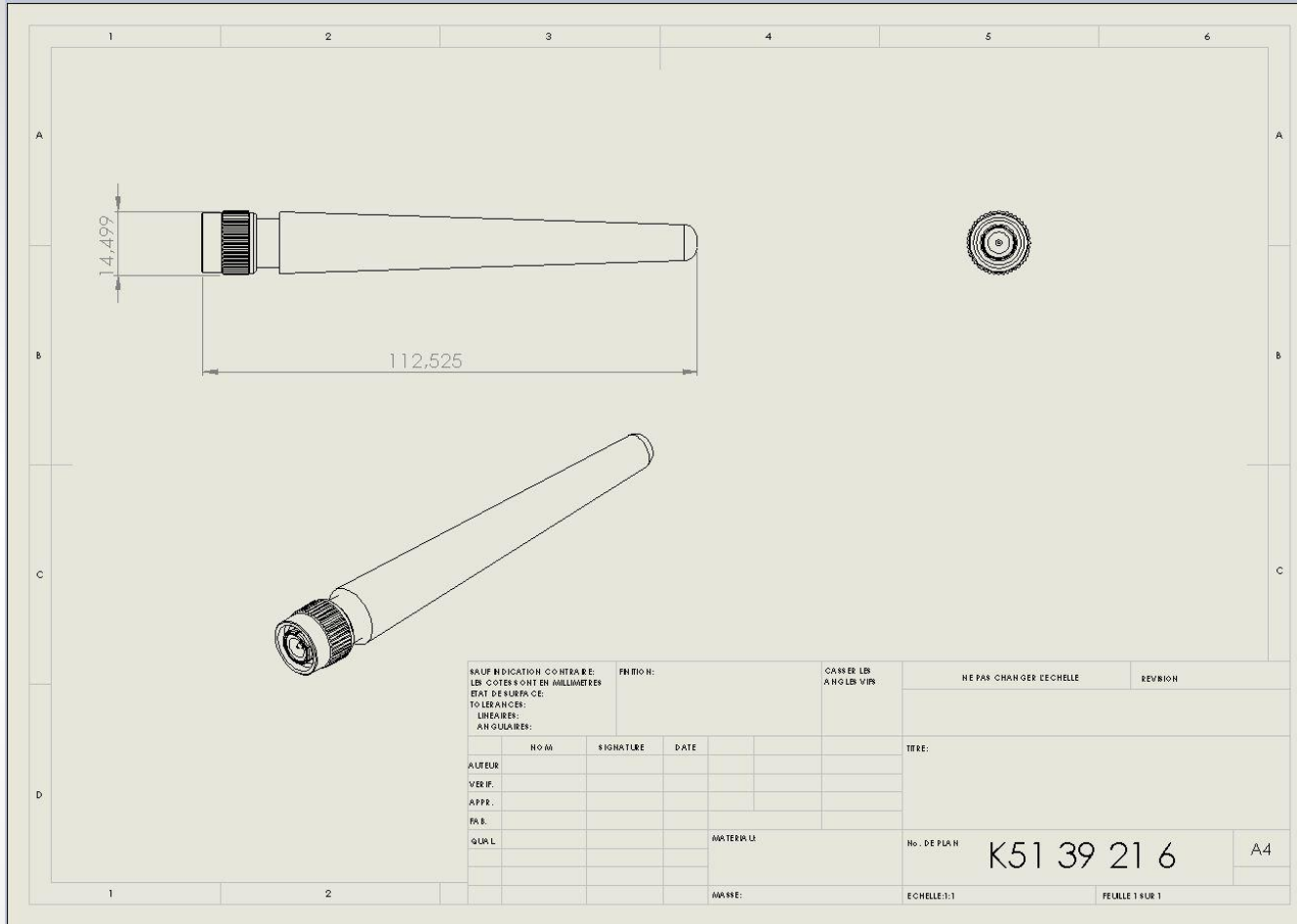
Frequency: between 146 and 174 MHz in reception mode (not in transmission mode)

Size (LxWxH): 110x15

Weight: 70g

This antenna needs 1 hole with 11mm diameter



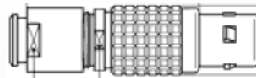


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4- The looms

4.2 Power loom

The system needs power from the car. The connector needs to be a Lemo 1b series:



| Data sheets | |
|------------------------|---------|
| Lemo FGG.1B.304.CLAD52 | |
| Pin | Contact |
| 1 | Ground |
| 2 | - |
| 3 | - |
| 4 | +12V |

4- The looms

4.2 Camera loom

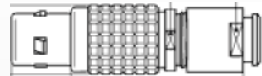


| Type | Manufacturer | Reference |
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| HD connector | Neutrik | BNC 0,6/2,8 |

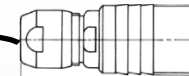
| Type | Manufacturer | Reference |
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| HD cable | DRAKA | 0,6/2,8 |



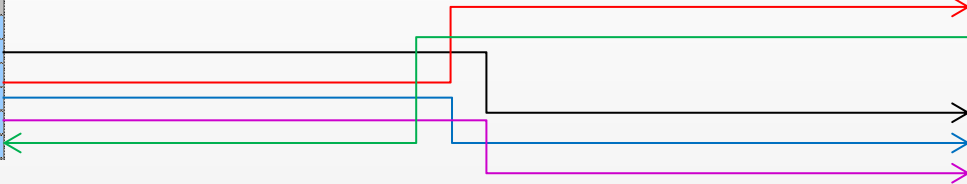
| Type | Manufacturer | Reference |
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| HD connector | Neutrik | BNC 0,6/2,8 |



| FGG,0B,305,CLAD52 | | |
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| Gnd | | 2 |
| GND | | 3 |
| 12 Volts | | 4 |
| RX | | 5 |



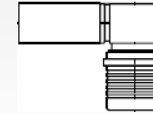
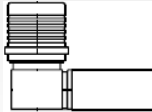
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| 2 | | Gnd |
| 3 | | TX - (232) |
| 4 | | RX - |
| 5 | | TX + |
| 6 | | RX + (232) |
| 7 | | GND |
| 8 | | 12 Volts |
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4- The looms

4.3 Antenna loom

4.3.1 Active antenna loom

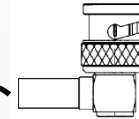
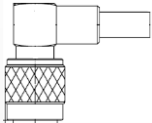


| Type | Manufacturer | Reference |
|---------------|---------------|----------------------|
| QMA Connector | Hubert&Suhner | 16_QMA-50-3-2/133_NE |

| Reference |
|------------|
| RG58 Cable |

| Type | Manufacturer | Reference |
|---------------|---------------|----------------------|
| QMA Connector | Hubert&Suhner | 16_QMA-50-3-2/133_NE |

4.3.2 VHF Antenna



| Type | Manufacturer | Reference |
|---------------|--------------|-----------|
| TNC Connector | | |

| Reference |
|------------|
| RG58 Cable |

| Type | Manufacturer | Reference |
|---------------|--------------|-----------|
| BNC Connector | | |

5- Weight & consumption

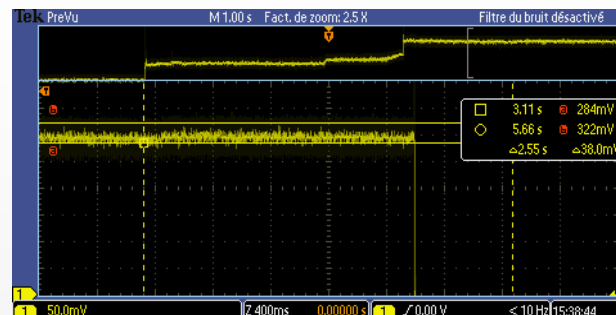
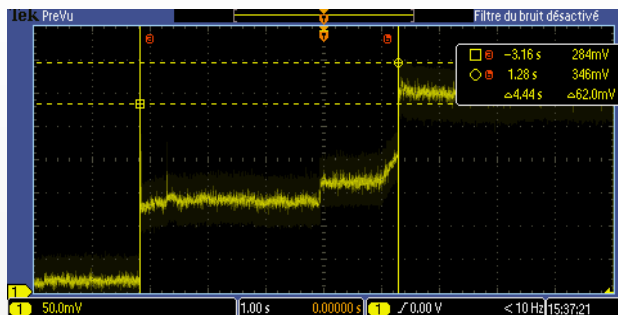
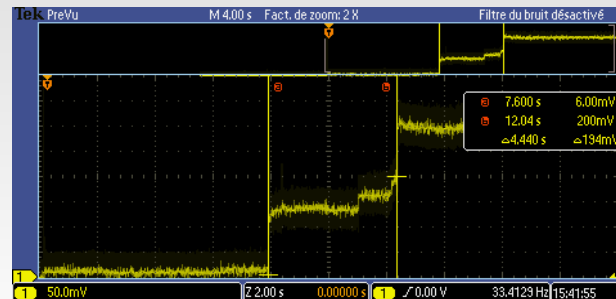
Weight : ≈ 3400 g (depends of the looms)

Consumption (12V):

T1: 0s to 7,6s, the car turns on the TS1: 0,3A

T2: 7,6s to 12,04s, TS1 turns on cameras and Tx with 2,85 peak at 7,6s.

T3: 3,5A peak at 12,04, then, 3,2A stabilization



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