



GRAND-DUCHÉ DE LUXEMBOURG

Ministère du Développement durable  
et des Infrastructures  
Département des Transports

L-2938 Luxembourg

SOCIÉTÉ NATIONALE DE  
CERTIFICATION ET D'HOMOLOGATION  
s.à r.l.

Registre de Commerce: B 27180



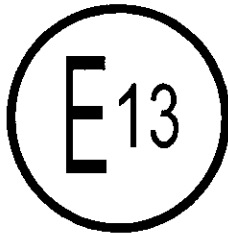
L-5201 Sandweiler

**Référence:** E13\*10R00\*10R03\*10255\*00

**Annexes:** - Rapport Technique  
- Fiche de Renseignements du constructeur

Sandweiler, le 30 avril 2010

**Communication concernant:**<sup>(2)</sup>  
Communication concerning:




- **la délivrance d'une homologation**  
approval granted  
- **l'extension d'homologation**  
approval extended  
- **le refus d'homologation**  
approval refused  
- **le retrait d'homologation**  
approval withdrawn  
- **l'arrêt définitif de la production**  
production definitely discontinued

**d'un type de sous-ensemble électrique/électronique<sup>(2)</sup> en ce qui concerne le Règlement N° 10**  
of a type of electrical/electronic sub-assembly with regard to Regulation N° 10

**Numéro d'homologation par type:**  
Approval number:

E13\*10R00\*10R03\*10255\*00

**Marque d'homologation:**  
Approval mark:

 10R - 03 10255

**1. Fabricant (marque commerciale du constructeur):**  
Make (trade name of manufacturer):

Coligen

**2. Type:**  
Type:

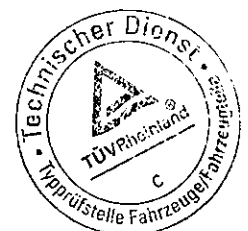
FXECUV-KMP/KMMA

**Dénomination(s) commerciale(s) générale(s):**  
General commercial description(s):

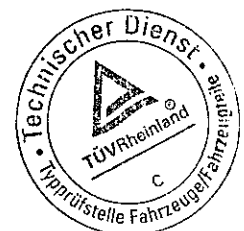
*Parking Sensor*

**Version(s)/Variante(s):**  
Version(s)/Variant(s):

1. FXECUV-KMP/KMMA  
2. FXECUV-KMP/KMM  
3. FXECUV-KMP  
4. FXECUV-KBPF1



3. **Moyens d'identification du type, s'ils sont marqués sur le véhicule / composant / entité technique<sup>(2)</sup>:**  
Means of identification of type, if marked on the vehicle / component / separate technical unit: See item 6.
- 3.1. **Emplacement de ce marquage:**  
Location of that marking: See item 6.
4. **Catégorie du véhicule:**  
Category of vehicle: Not applicable
5. **Nom et adresse du constructeur:**  
Name and address of manufacturer: Coligen Corp.  
No. 1 bldg., Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650, P.R. CHINA
6. **Dans le cas de composants ou d'entités techniques, emplacement et procédé de fixation de la marque d'homologation CEE:**  
In the case of components and separate technical units, location and method of affixing of the ECE approval mark: Rating label affixed to top housing
7. **Adresse(s) de l' (des) usine(s) d'assemblage:**  
Address(es) of assembly plant(s): Coligen Corp.  
No. 1 bldg., Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650, P.R. CHINA
8. **Informations supplémentaires (s'il y a lieu):**  
Additional informations (where applicable): See appendix
9. **Autorité déléguée:**  
*Assigned authority:* Société Nationale de Certification et d'Homologation  
L-5230 Sandweiler
- Service technique responsable de l'exécution des essais:**  
Technical service responsible for carrying out the tests: TÜV Rheinland Luxemburg GmbH  
2a, Kalchesbruck  
L-1852 Luxembroug
10. **Date du rapport d'essai:**  
Date of test report: 19.04.2010
11. **Numéro du rapport d'essai:**  
Number of test report: 85-R10-221/10
12. **Remarques (s'il y a lieu):**  
Remarks (if any): See appendix



13. **Lieu:** Sandweiler  
Place:
14. **Date:** 30 avril 2010  
Date:
15. **Signature:**  
Signature:

Pour le Département des Transports



Handwritten signature of Marco FELTES.

Marco FELTES  
Inspecteur Principal

Pour la SNCH

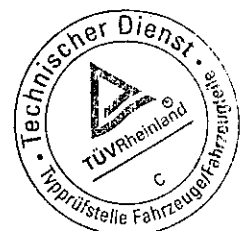


Handwritten signature of Claude LIESCH.

Claude LIESCH  
Directeur

16. **L'index de l'ensemble des renseignements déposé chez l'autorité de réception, qui peut être obtenu sur demande, est joint.**  
The index to the information package lodged with the approval authority, which may be obtained on request, is attached.  
See index to type-approval report

17. **Raison(s) de l'extension:** Not applicable  
Reason(s) for extension:



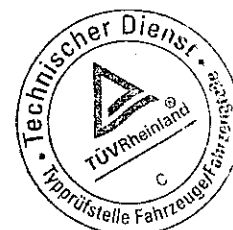
## Appendice

Appendix

au certificat d'homologation par type N° E13\*10R00\*10R03\*10255\*00  
to type-approval certificate N° E13\*10R00\*10R03\*10255\*00  
concernant l'homologation par type d'un sous ensemble électrique/électronique selon le Règlement N° 10.  
concerning the type-approval of an electrical/electronic sub-assembly under Regulation N° 10.

- |               |  |  |
|---------------|--|--|
| <b>1.</b>     | <b>Informations supplémentaires.</b><br>Additional information.  |  |
| <b>1.1.</b>   | <b>Tension nominale du système électrique [V]:</b><br>Electrical system rated voltage [V]:   | DC 12V   |
|               | <b>Masse:</b><br>Ground:   | <i>Negative</i>                                    |
| <b>1.2.</b>   | <b>Ce SEEE peut être utilisé sur n'importe quel type de véhicule avec les restrictions suivantes:</b><br>This ESA can be used on any vehicle type with the following restrictions:   | See item 1.2.1.                                    |
| <b>1.2.1.</b> | <b>Conditions d'installation, s'il y a lieu:</b><br>Installation conditions, if any:   | Connected to battery and/or reversing lamp circuit |
| <b>1.3.</b>   | <b>Ce SEEE peut seulement être utilisé sur les types de véhicules suivants:</b><br>This ESA can be used only on the following vehicle types:   | Not applicable                                     |
| <b>1.3.1.</b> | <b>Conditions d'installation, s'il y a lieu:</b><br>Installation conditions, if any:   | Not applicable                                     |
| <b>1.4.</b>   | <b>La (les) méthode(s) spécifique(s) d'essais utilisée(s) et les bandes de fréquences couvertes pour déterminer l'immunité étai(ent): (indiquez s'il vous plaît à partir de l'annexe 9 la méthode précise utilisée).</b><br>The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from annex 9). | Not applicable                                     |
| <b>1.5.</b>   | <b>Laboratoire accrédité au titre de la norme ISO 17025 et reconnu par l'autorité d'homologation chargé d'effectuer les essais:</b><br>Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests:   | Not applicable                                     |
| <b>2.</b>     | <b>Commentaires:</b><br>Remarks:   | Not applicable                                     |

<sup>2</sup> **Biffer la mention inutile**  
Strike out what does not apply





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Registre de Commerce: B 27180

L-5201 Sandweiler



**Référence:** E13\*10R00\*10R03\*10255\*00

**Annexes:** - Rapport Technique  
- Fiche de Renseignements du constructeur

Sandweiler, le 30 avril 2010

### Index du dossier d'homologation

Index to type-approval report

<b>Numéro d'homologation:</b> Approval number:	E13*10R00*10R03*10255*00
<b>Révision:</b> Revision:	00
<b>Marque de fabrique ou de commerce:</b> Trade name or mark:	Coligen
<b>Type:</b> Type:	FXECUV-KMP/KMMA
<b>1. Procès-verbal d'essai:</b> Test report:	No. 85-R10-221/10
- Technical report:	Page 1 to 4;
- Technical informations:	Appendix L - Page 5 & 6;
- List of modifications:	Appendix 0 - Page 7;
- Test protocol:	Appendix 1 - Page 8 to 13.
<b>2. Dossier du constructeur:</b> Report of the manufacturer:	No. FXECUV-KMP/KMMA
- Index:	Refer to 1 <sup>st</sup> side in Information Document
<b>3. Autres documents annexés:</b> Other documents annexed:	Not applicable
<b>4. Date de délivrance de l'homologation initiale:</b> Date of issue of initial type approval:	30.04.2010
<b>5. Date de la dernière délivrance de pages révisées:</b> Date of last issue of revised pages:	Not applicable
<b>6. Date de la dernière délivrance d'une homologation révisée:</b> Date of last extension:	Not applicable



## TECHNICAL REPORT

According to ECE-Regulation

### UNIFORM PROVISIONS CONCERNING THE APPROVAL OF VEHICLES WITH REGARD TO ELECTROMAGNETIC COMPATIBILITY

#### ECE R10

including all amendments until

**Supplement 1 to the 03 series of amendments**

**Corrigendum 2 to the 03 series of amendments**

Previously granted	
EEC - system type approval	: ---

Structure of report :

1. Test object(s) and general test information
2. Test minutes
3. Remarks concerning tested object(s)
4. Appendices

E13\*10R00\*10R03\*10255\*00  
Société Nationale de Certification et d'Homologation  
L-5201 SANDWEIHER (Luxembourg)  
Organisme accrédité OLAS EN 45011  
Accréditation N° 5/001 (Portée communiquée sur demande)

## 1. Test object(s) and general test information

### 1.1. Test object(s)

- identification no. : not applicable
- version(s) : Version 1: FXECUV-KMP/KMMA  
Version 2: FXECUV-KMP/KMM  
Version 3: FXECUV-KMP  
Version 4: FXECUV-KBPF1
- sort : ~~motor vehicle~~/component/separate technical unit

### 1.2. General test information

- 1.2.1. Order issued by : ---  
(if different from manufacturer)
- 1.2.2. Test object / test vehicle : ---  
received on
- 1.2.3. Test date : April 01, 2010
- 1.2.4. Test site : TÜV Rheinland (Guangdong) Ltd. EMC Laboratory  
Guangzhou Auto Market, Yuan Gang Section of Guangshan Road  
Guangzhou 510650 P.R. China
- 1.2.5. Remark : The results of the test refer exclusively to the object(s) mentioned  
under point 1.1. of this report.

## 2. Test minutes

2.1. Test facilities : The measurement equipment used was in compliance with the test requirements.

2.2. Test results : ~~The ESA type has been tested according to the amendments mentioned in Appendix 0.~~

~~The actual test of the ESA was not required and results of the previous tests are still valid.~~

Tests of immunity to radiation, immunity to conducted transients, radiated narrow band / broadband electromagnetic emissions and conducted emission have been conducted.

2.2.1. Test data : see Appendix 1



### 3. Remark concerning tested object(s)

All versions of the ESA type as stated in the information document are covered with the tested version(s) and test object(s) respectively.

### 4. Appendices

- L Technical information about the separate technical unit according to annex 3B of the Communication concerning EEC-type approval
- 0 List of modifications
- 1 Test protocol

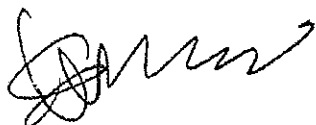
Information document no. : FXECUV-KMP/KMMA

### 5. Statement of conformity

The type referred to above complies with the requirements mentioned on page 1.

The technical report comprises - incl. apps. L, 0 and 1 - the pages 1 to 13 and shall not be reproduced except in full without the written approval of the testing laboratory.

Luxemburg, April 19, 2010  
SP



Shawn Peng

Technical information about the type according to  
annex 3B of the Communication concerning ECE-type approval

Appendix L

- 1 Make (trade name of the manufacturer) : Coligen
- 2 Type and general commercial description(s) : FXECUV-KMP/KMMA
  - commercial description(s) : Parking Sensor
  - version(s) : 1: FXECUV-KMP/KMMA  
2: FXECUV-KMP/KMM  
3: FXECUV-KMP  
4: FXECUV-KBPF1
- 3 Means of identification of type if marked on the component : see item 0.3.1
- 4 Location of that marking : see item 6
- 5 Name and address of the manufacturer : Coligen Corp.  
No. 1 bldg. ,Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650 P.R. China
- 6 Location and method of affixing of the EEC approval mark : Rating label affixed to top housing
- 7 Address(es) of assembly plant(s) : Coligen Corp.  
No. 1 bldg. ,Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650 P.R. China
- 8 Additional information : see appendix
- 9 Date of test report : April 19,2010
- 10 Number of test report : 85-R10-221/10
- 11 Remarks : see appendix

E13\*10R00\*10R03\*10255\*00  
Société Nationale de Certification et d'Homologation  
L-5201 SANDWEHLER (Luxembourg)  
Organisme accrédité OLAS EN 45011  
Accréditation N° 5/001 (Portée communiquée sur demande)

## Appendix

- 1 Additional information
  - 1.1 Electrical system rated voltage : DC 12V, negative ground
  - 1.2 This ESA can be used on any vehicle type with the following restrictions : No restrictions
    - 1.2.1 Installation conditions : connected to battery and/or reversing lamp circuit
  - 1.3 This ESA can be used on the following vehicle types : not applicable
    - 1.3.1 Installation conditions : ---
  - 1.4 The specific test method(s) used and the frequency ranges covered to determine immunity were : not applicable
    - frequency range : ---
  - 1.5 Approved/recognised laboratory responsible for carrying out the test : TÜV Rheinland Luxembourg GmbH
  - 1.6 Remarks : ---

List of modifications

Appendix 0

Correction of : ---

Modification of : ---

Addition of : ---

Deletion of : ---

Manufacturer : Coligen Corp.  
ESA-Type : FXECUV-KMP/KMMA

**Test protocol**

**Appendix 1**

**Test object**

Tradename/version : Coligen  
1: FXECUV-KMP/KMMA  
2: FXECUV-KMP/KMM  
3: FXECUV-KMP  
4: FXECUV-KBPF1

Technical data of the tested ESA-type : see Appendix L

Rated voltage : DC 12V

**1. Radiated narrow band / broadband electromagnetic emissions**

Radiated broadband electromagnetic emissions : As shown in the table

Radiated narrowband electromagnetic emissions : no measurable narrowband emission were emitted

Antenna position : horizontal and vertical

Measurement result (under DC 13V input condition):

Peak value scan graph (Horizontal)

Manufacturer : Coligen Corp.  
ESA-Type : FXECUV-KMP/KMMA

TUV Rheinland (Guangdong) Ltd.

EMC Test Service Hotline: +86-20-28391188

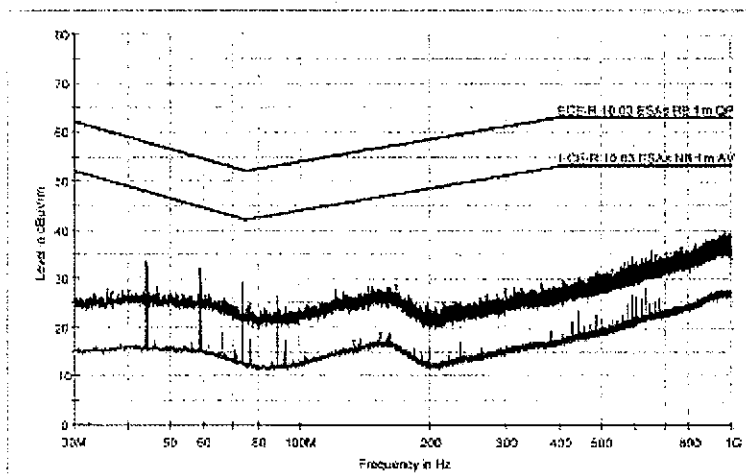
## EMC Test Record (EMISSION)

### Test Information

Manufacturer: Coligen  
Test Item: FXECUV  
Identification: ECER 10-03 ESAS  
Test Standard: ECER 10-03 ESAS  
Test Detail: RE  
Operation Mode:  
Climate Condition: 23 °C; 50 %RH; 101 kPa.  
Test Voltage / Freq.: DC13V  
Receipt No.: 173051863  
Report No.:  
Result: Pass  
Comment: horizontal

#### Subrange 1

Frequency Range: 30MHz - 1GHz  
Receiver: TUV ESCI 3  
Transducer: TUV SAC UVLB 9168 / TUV ESCI 3 -TUV SAC UVLB 9168



Sign-off Test Data

E13\*10R00\*10R03\*10255\*00  
Société Nationale de Certification et d'Homologation  
L-5201 SANDWEIJER (Luxembourg)  
Organisme accrédité OLAS EN 45011  
Accréditation N° 5/001 (Portée communiquée sur demande)

Manufacturer : Coligen Corp.  
ESA-Type : FXECUV-KMP/KMMA

Peak value scan graph (Vertical)

TUV Rheinland (Guangdong) Ltd.

EMC Test Service Hotline: +86-20-26391188

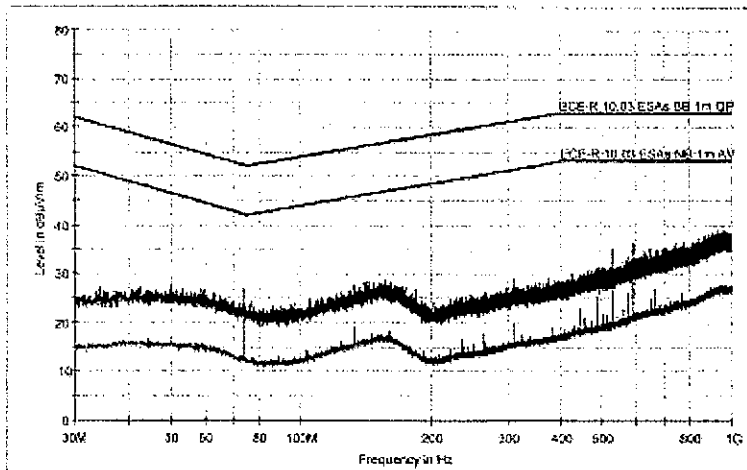
### EMC Test Record (EMISSION)

#### Test Information

Manufacturer: Coligen  
Test Item: FXECUV  
Identification: ECUV  
Test Standard: ECUV  
Test Detail: RE  
Operation Mode:  
Climate Condition: 23 °C; 50 %RH; 101 kPa.  
Test Voltage / Freq.: DC 13V  
Receipt No.: 173051863  
Report No.:  
Result: Pass  
Comment: vertical

Sign-off Test Data

Subrange 1  
Frequency Range: 30MHz - 1GHz  
Receiver: TUV ESCI 3  
Transducer: TUV SAC UVLB 9188 / TUV ESCI 3 - TUV SAC UVLB 9168



Maximum value:

Frequenz frequency [MHz]	Test results [dBµV/m]		Reference QP Limit [dBµV/m]	Margin to reference value [dBµV/m]
	hor.	vert.		
59.00	28.1	---	54.6	26.5
88.50	22.4	---	53.1	30.6
73.75	---	22.6	52.2	29.6
589.80	---	32.0	63.0	31.0

E13\*10R00\*10R03\*10255\*00  
Société Nationale de Certification et d'Homologation  
L-5201 SANDWEHLER (Luxembourg)  
Organisme accrédité O.I.A.S EN 45011  
Accréditation N° 5/001 (Portée communiquée sur demande)

2. Conducted emissions

Test method : ISO 7637-2 2nd edition: 2004

Measurement result (under DC 12V input condition):

Polarity of pulse amplitude	Maximum allowed value for vehicles with 12V systems	Measured Pulse amplitude True value
Positive	+ 75	+ 0.6
Negative	- 100	- 14.6



### 3. Immunity to electromagnetic radiation

Test method : ISO 11452-4 3rd edition: 2005  
Bulk current injection testing method (from 20 to 400MHz)

ISO 11452-2 2nd edition: 2004  
Free field testing method (from 400 to 2000MHz)

Frequency range (MHz)	Test level	Type of modulation	Test distance	Antenna position	Result
20~400	60 mA	/	150mm	/	Passed *
400~800	30volts/m	AM, 80%	1 m	Vertical	Passed *
800~2000	30volts/m	PM, 577µs	1 m	Vertical	Passed *

Remark:

\* - no degradation of performance of 'immunity-related functions'.

Manufacturer : Coligen Corp.  
ESA-Type : FXECUV-KMP/KMMA

**4. Immunity to transient disturbances**

Test method : ISO 7637-2 2nd edition: 2004

Measurement result (under DC 12V input condition):

Test pulse	Test level	Number of pulse / test time	Burst cycle / pulse repetition time	Required minimum function status**	Status of function true value	Result
1	-75V	5000 pulses	0.5 s	C	C	passed
2a	+37V	5000 pulses	0.5 s	B	A	passed
2b	+10V	10 pulses	2 s	C	C	passed
3a	-112V	1 h	90 ms	A	A	passed
3b	+75V	1 h	90 ms	A	A	passed
4	-6V	1 pulse	2 s	C	C	passed

**Remark:**

\*\* Class A: all functions of a device/system perform as designed during and after exposure to disturbance.

Class B: all functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.

Class C: one or more functions of a device/system do not perform as designed during exposure but return automatically to normal operation after exposure is removed.

Class D: one or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple "operator/use" action.

Class E: one or more functions of a device/system do not perform as designed during and after exposure and cannot be returned to proper operation without repairing or replacing the device/system.

*Content*

**DOCUMENT PAGE**

Content	1
Technical description	2-3
Dimension drawing	4
Rating label drawing	5
Circuit Diagram	6
PCB layout	7-8
Bill of materials	9-10
Remark	11

INFORMATION DOCUMENT FOR TYPE-APPROVAL OF AN ELECTRIC/ELECTRONIC  
SUB-ASSEMBLY WITH RESPECT TO ELECTROMAGNETIC COMPATIBILITY  
ACCORDING ANNEX 2B

- 1 Make (trade name of the manufacturer) :COLIGEN
- 2 Type and general commercial description(s) :FXECUV-KMP/KMMA
- commercial description(s) :Parking Sensor
- version(s) :V1:FXECUV-KMP/KMMA  
V2:FXECUV-KMP/KMM  
V3:FXECUV-KMP  
V4:FXECUV-KBPF1
- 3 Name and address of the manufacturer :Coligen Corp.  
No. 1 bldg. ,Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650 P.R. China
- 4 In the case of components and separate technical units, location and method of affixing of the approval mark :Rating label affixed to top housing
- 5 Address(es) of assembly plant(s) :Coligen Corp.  
No. 1 bldg. ,Guantang Ind. Park,  
Jingding Zhuhai, Guangdong Province,  
Guangzhou 510650 P.R. China
- 6 This ESA shall be approved as a :component
- 7 Any restrictions of use and conditions for fitting :no restrictions

Additional information

Electrical system rated voltage : DC12V, negative ground

This ESA can be used on any vehicle type : no restrictions  
with the following restrictions

Installation conditions : connected to battery and/or reversing lamp circuit

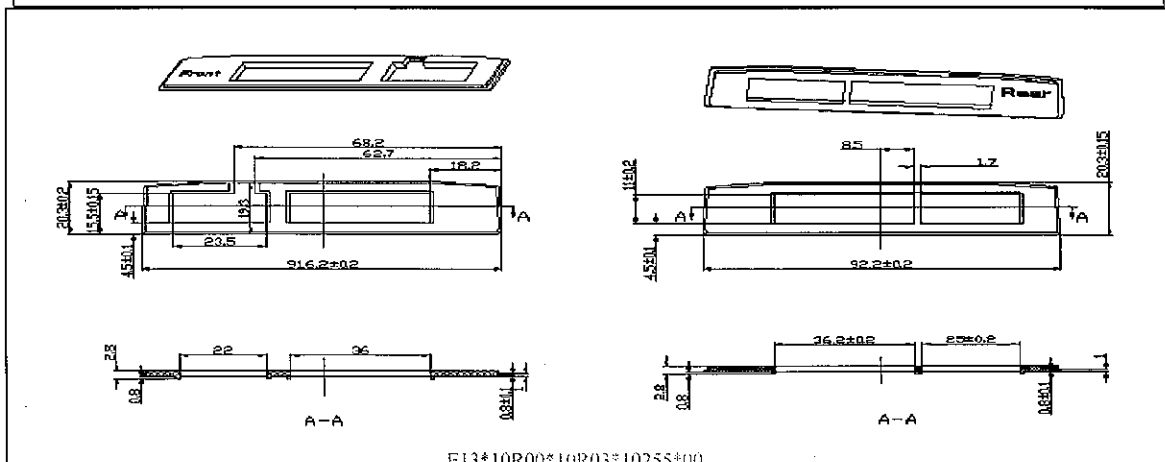
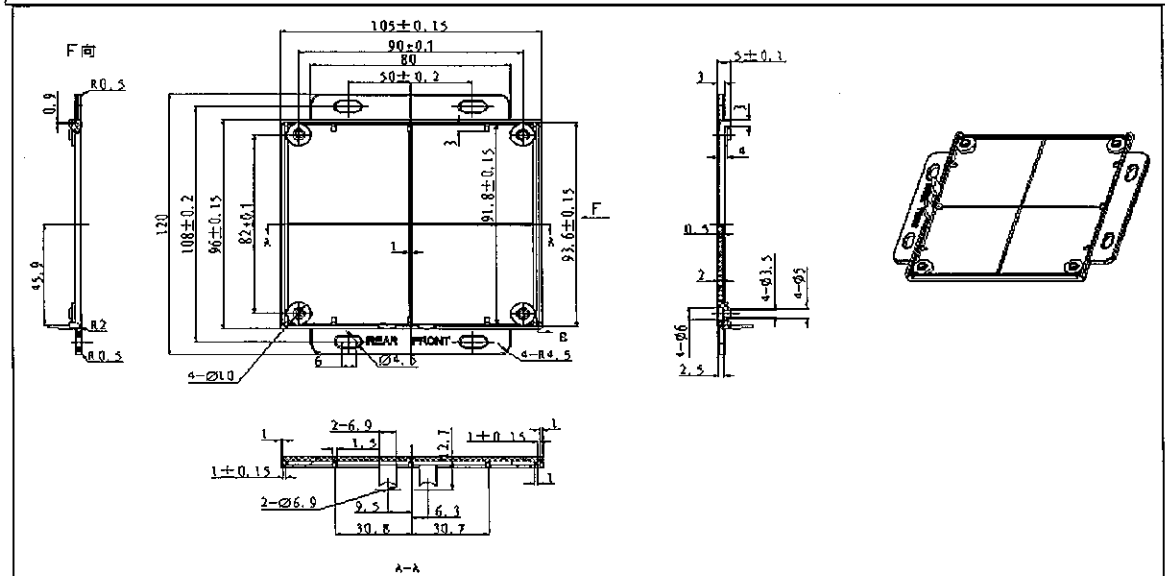
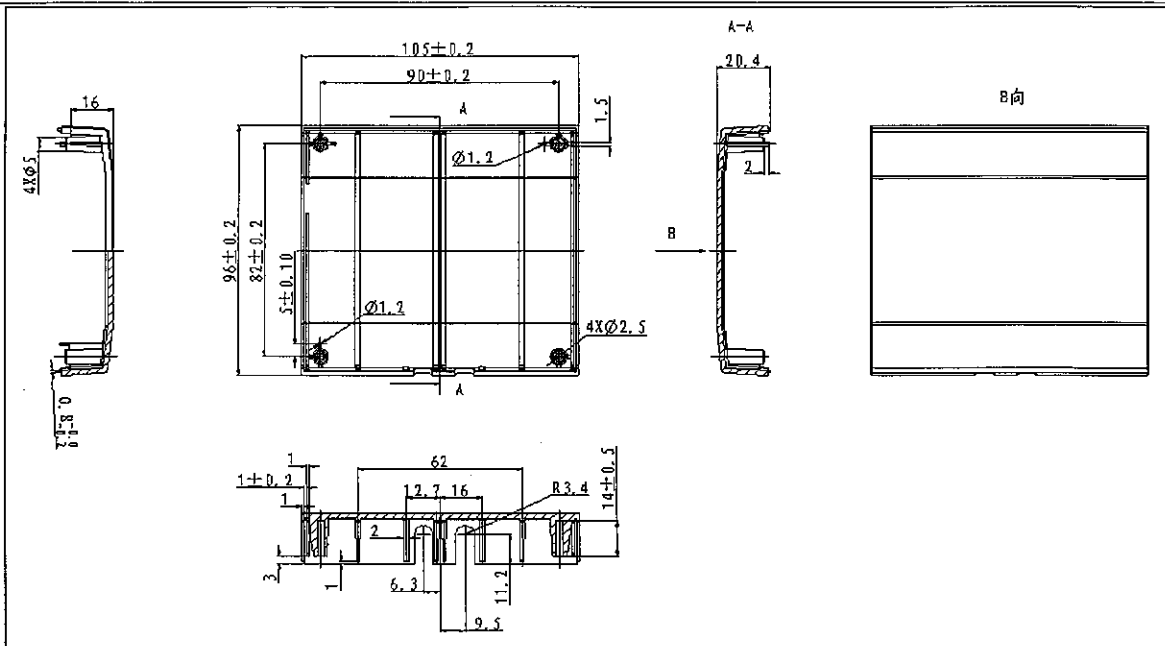
This ESA can be used on the following : not applicable  
vehicle types

Installation conditions : ---

The specific test method(s) used and the : not applicable  
frequency ranges covered to determine  
immunity were

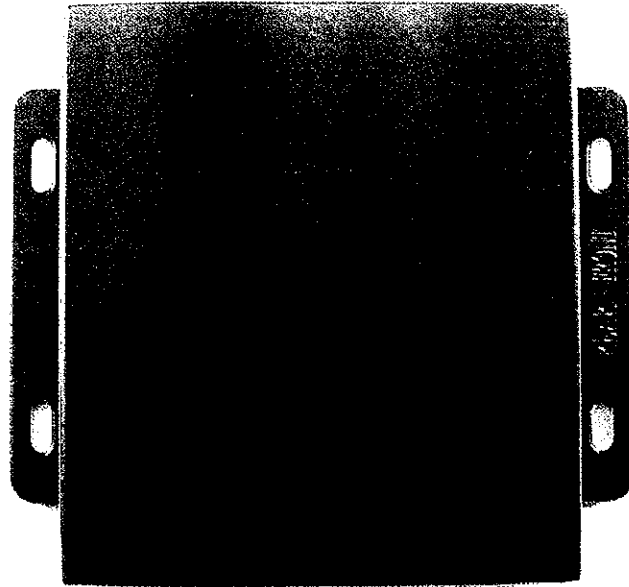
frequency range : ---

Remark : rating current: 200mA,  
The difference of version is different appearance of  
sensor.



E13\*10R00\*10R03\*10255\*00

Société Nationale de Certification et d'Homologation  
L-5201 SANDWEILER (Luxembourg)  
Organisme accrédité OLAS EN 45011  
Accréditation N° 5/001 (Portée communiquée sur demande)



**Label For All Versions**

**PARKING SENSOR  
Front & Rear System**

**E 13** 10R-03 XXXX

**Voltage: DC 12V**

**Power Consumption: below 3W**

**Operationg Temperature: -30°C ~ +60°C**

**Operationg Frequency: 40KHz ±1KHz**

**MADE IN CHINA**

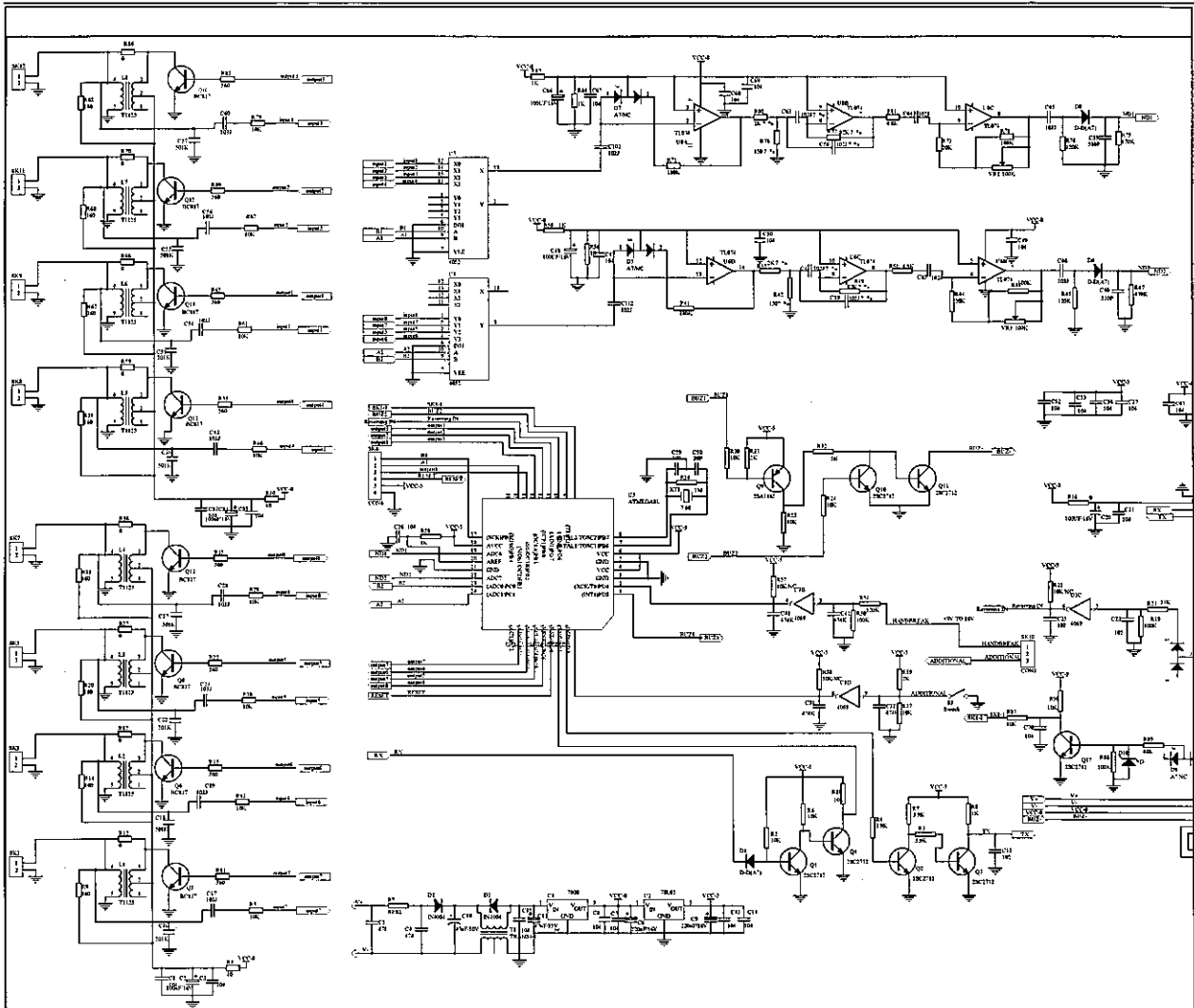


DRW.

FXECUV-KMP/KMMA -02

Rating Label Drawing

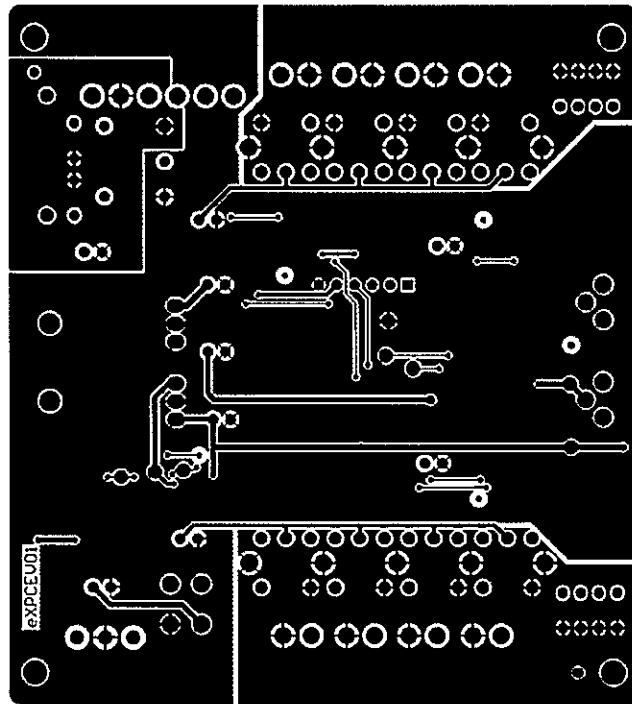
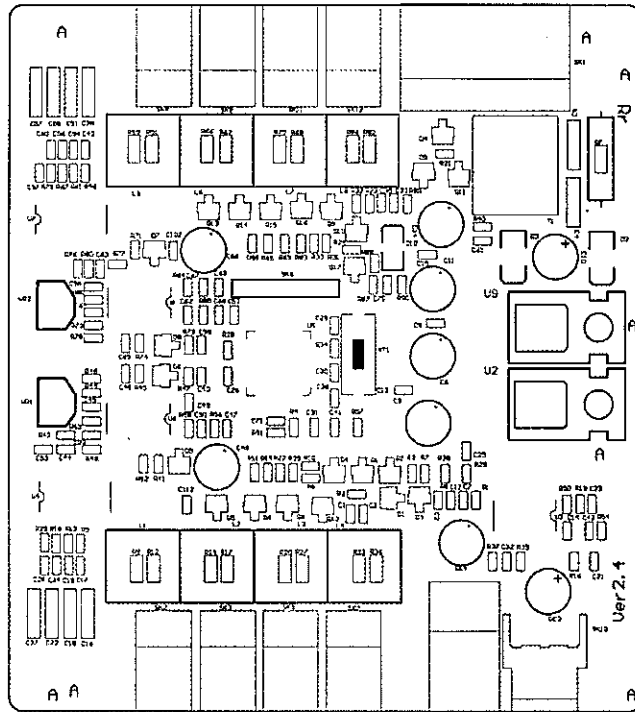
E13\*10R00\*10R03\*10255\*00



DRW.	FXECUV-KMP/KMMA -03	Circuit Diagram
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E13\*10R00\*10R03\*10255\*00  
 Société Nationale de Certification et d'Homologation  
 L-5201 SANDWEILER (Luxembourg)  
 Organisme accrédité OLAS EN 45011  
 Accréditation N° 5/001 (Portée communiquée sur demande)



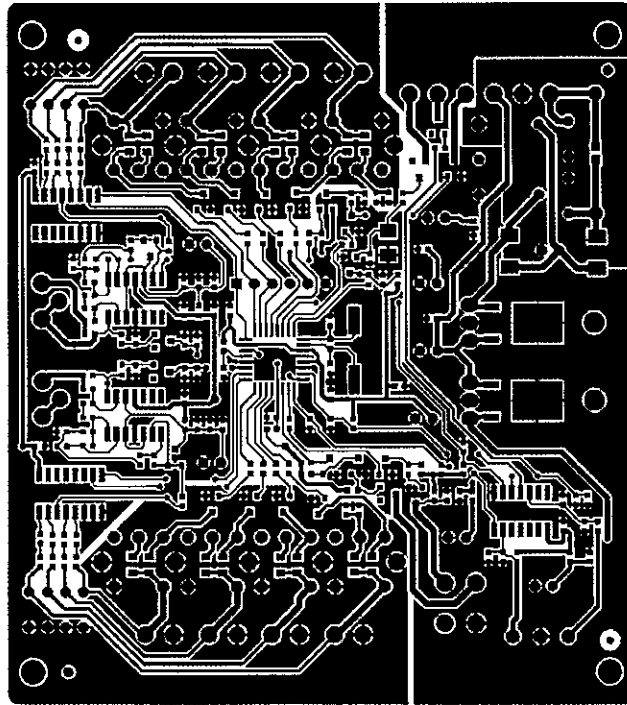


DRW.

FXECUV-KMP/KMMA -04

PCB layout

E13\*10R00\*10R03\*10255\*00  
 Société Nationale de Certification et d'Homologation  
 L-5201 SANDWEILER (Luxembourg)  
 Organisme accrédité OLAS EN 45011  
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DRW.	FXECUV-KMP/KMMA -05	PCB layout
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# Coligen Corp.

Information folder No. FXECUV-KMP/KMMA

EL310R00910R03\*10255\*00

Societe Nationale de Certification et d'Homologation

Issuing date: April 19, 2010

1-5267-30-1701111111(Luxembourg)

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## Bill of materials

Accreditation N° 54001 (Portee communiquee sur demande)

Name	Model	QTY.	Remark
monolithic capacitor	474M	1	C5
Electrolytic Capacitor	100UF/16V	5	C2, C20, C34, C48, C66
Electrolytic Capacitor	220UF/16V	2	C6, C9
Electrolytic Capacitor	47UF/35V	2	C10, C11
Regulator	7805	1	U2
Regulator	7808	1	U9
Inductance	E13-2	1	T1
Bolt	PM3*6	2	
Nut	M3	2	
Ceramic Capacitor	102J/50V	7	C12, C23, C25, C45, C64, C102, C112
Ceramic Capacitor	103J/50V	10	C17, C19, C24, C28, C43, C46, C54, C56, C60, C65
Ceramic Capacitor	104J/50V	25	C1 C3 C7 C8 C13 C14 C15 C21 C26 C33 C35 C36 C37 C47 C49 C50 C52 C53 C61 C62 C67 C68 C69 C70 C71
Ceramic Capacitor	152J/50V	4	C39, C44, C58, C63
Ceramic Capacitor	22P/50V	2	C29, C30
Ceramic Capacitor	474M/50V	4	C31, C32, C41, C42
Ceramic Capacitor	510P/50V	2	C40, C59
Double Diode	BAV99	7	D1, D4, D5, D6, D7, D8, D9
Diode	ST4004	2	D2, D3
Integrated circuit	HEF4052BT	2	U4, U7
Integrated circuit	4069	1	U3
Integrated circuit	TL074	2	U6, U8
Integrated circuit	ATMEGA168V-10AU	1	U5
PCB	eXPCEV01Ver2.4	1	eXPCEV01Ver2.4
Resistor	0 Ω	8	R12, R17, R27, R36, R59, R66, R70, R86
Resistor	0 Ω	1	R16
Resistor	10 Ω	2	R1, R40
Resistor	1K Ω	2	R52, R80
Resistor	1K Ω	7	R8, R28, R32, R56, R58, R84, R85
Resistor	10K Ω	20	R2 R5 R6 R10 R18 R13 R23 R24 R25 R29 R30 R37 R46 R61 R67 R79 R87 R90 R57 R91
Resistor	100K Ω	5	R19, R48, R50, R78, R88
Resistor	1M Ω	1	R34
Resistor	120K Ω	3	R45, R54, R74
Resistor	160 Ω	8	R9, R33, R51, R62, R68, R82, R14, R20
Resistor	180K Ω	2	R41, R71
Resistor	2K Ω	3	R31, R39, R81
Resistor	20K Ω	2	R49, R77
Resistor	20K Ω	2	R44, R73
Resistor	3.6K Ω	1	R53
Resistor	3.9K Ω	3	R3, R4, R7
Resistor	470K Ω	2	R47, R75
Resistor	51K Ω	1	R21
Resistor	560 Ω	10	R11, R15, R22, R35, R42, R55, R65, R69, R76, R83
Resistor	68K Ω	1	R89
Name	Model	QTY.	Remark
Transistor	2SA1162-SG	1	Q9

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Transistor	BC817-16	8	Q5, Q6, Q8, Q12, Q13, Q14, Q15, Q16
Transistor	2SC2712-LG	7	Q1, Q2, Q3, Q4, Q10, Q11, Q17
Crystal	7.68MHZ	1	XT1
zener Diode	5.1V/0.5W	1	D10
surge absorber condenser	470K	1	C4
Resistor	4.7 $\Omega$	1	Rr
Socket	VH-2AWS	8	SK2, SK3, SK5, SK7, SK8, SK9, SK11, SK12
Socket	VH-3AWS	1	SK10
Socket	CP-01404110	1	SK4
Socket	VH-6AWG	1	SK1
Variable Resistor	TG825M-104	2	VR1, VR2
Buzzer	Buzzer	1	
Display	Display	1	
Sensor	Sensor	8	

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