



# NSAI

## ECE TYPE-APPROVAL CERTIFICATE



Communication Concerning:<sup>2</sup>    Approval granted  
   ~~Approval extended~~  
   ~~Approval refused~~  
   ~~Approval withdrawn~~  
   ~~Production definitively discontinued~~

Of a type of ~~vehicle~~/component/~~separate technical unit~~<sup>2</sup> with regard to Regulation No. 10.  
Of a type of electrical/electronic sub-assembly<sup>2</sup> with regard to Regulation No.10.

Approval No: **E24\*10R06/02\*5258\*00**

Reason for extension:

**-N/A**

1.     Make (trade name of manufacturer):

***VEM Solutions, VEM Technology***

2.     Type and general commercial description:

***JSBT***

Variant(s):

***JSBT-1, JSBT-2, JSBT-3***

3.     Means of identification of type, if marked on the ~~vehicle~~/  
         component/separate technical unit<sup>2</sup>:

***Adhesive Label***

3.1   Location of that marking:

***On the bottom of plastic case***

4.     Category of vehicle:

***N/A***

5.     Name and address of manufacturer:

***VEM Solutions S.p.A.- via Aosta  
n.20/22/24, 10078 Venaria Reale (TO),  
Italy***


6.     In the case of components and separate technical units,  
         location and method of affixing of the approval mark:

***Adhesive Label***

7.     Address(es) of assembly plant(s):

***VEM SOLUTIONS S.p.A. ~ Via Aosta,  
20/22/24 ~ 10078 Venaria Reale (TO) ~  
Italy  
VEM TECHNOLOGY LTD. – 3, Kap. D.  
Spisarevski Blvd., fl. 6, 1592 Sofia,  
Bulgaria***

Approval No: E24\*10R06/02\*5258\*00

8. Additional information (where applicable): *See appendix below*
9. Technical service responsible for carrying out the tests: *IMQ S.p.A.  
via Quintiliano, 43,  
20138 Milan ITALY*
10. Date of test report: *21.12.2023*
11. Number of test report: *AR23-0097069-01*
12. Remarks (if any): *See Appendix below*
13. Place: *Dublin*
14. Date: *06<sup>th</sup> March, 2024*
15. Signature: 
16. The index to the information package lodged with the approval authority, which may be obtained on Request, is attached.



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1. Distinguishing number of the country which issued/extended/refused or withdrawn approval.  
(see Regulation, provisions on approval).
2. Strike out what does not apply.

## Appendix

To type-approval communication concerning the type approval of an electrical/electronic sub-assembly under Regulation No.10.

1. Additional information
  - 1.1. Electrical system rated voltage: **DC 12V & 24V, negative ground**
  - 1.2. This ESA can be used on any vehicle type with the following restrictions: **See manufacturer's specifications.**
    - 1.2.1 Installation conditions, if any: **See manufacturer's specifications.**
  - 1.3. This ESA can only be used on the following vehicle types: **N/A**
    - 1.3.1 Installation conditions, if any: **N/A**
  - 1.4. The specific test method(s) used and the frequency ranges covered to determine immunity were:
 

**Bulk Current Injection Method:**  
*Frequency: (20 – 200 MHz)*  
**Absorber Chamber Test:**  
*Frequency: (200 – 2000 MHz)*
  - 1.5. Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests: **IMQ S.p.A.**
2. Remarks: **N/A**

## Appendix to type-approval communication concerning the type approval of a vehicle under Regulation No.10.

1. Additional information
2. Electrical system rated voltage: **N/A**
3. Type of bodywork: **N/A**
4. List of electronic systems installed in the tested vehicle(s) not limited to the items in the information document: **N/A**
  - 4.1. Vehicle equipped with 24 GHz short-range radar equipment (yes/no/optional)<sup>2</sup>: **N/A**
5. Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests: **N/A**
6. Remarks: **N/A**



Approval No: E24\*10R06/02\*5258\*00

## **Index to the Information Package**

Date of issue:	<i>06<sup>th</sup> March, 2024</i>
Date of latest amendment:	<i>N/A</i>
Reason for extension/revision:	<i>N/A</i>
1. Additional conditions, and advisory notes on legal alternatives.	
2. Test report(s)	
- numbers(s):	<i>CS010-A0-2020-00905</i>
- date of issue:	<i>19.05.2020</i>
- date of latest amendment:	<i>N/A</i>
3. Information document	
- number(s):	<i>Annex 2B</i>
- date of issue:	<i>19.12.2023</i>
- date of latest amendment:	<i>N/A</i>
Documentation:	<i>81 pages</i>





Approval No: E24\*10R06/02\*5258\*00

## Appendix: **Additional conditions, and advisory notes on legal alternatives**

### A: Additional conditions:

1. The attached technical report, with any of its attachments, forms part of this Type Approval certificate.
2. Each device from series production shall be to the measurements specified in the attached drawings, and shall be manufactured only from the materials specified in the Approval documents.
3. Changes in the type are permitted only with the explicit permission of NSAI. Breaches of this requirement will lead to a withdrawal of the Type Approval, and in addition may be subject to criminal prosecution.
4. At regular intervals, any tests or associated checks prescribed by the applicable legislation to verify continued conformity with the approved type shall be carried out. The manufacturer shall demonstrate compliance with this by submitting to NSAI evidence of adequate arrangements and documented control plans for each type approved.
5. Any set of samples or test pieces showing evidence of non-conformity shall give rise to further sampling and testing and all steps shall be taken to restore conformity of production.
6. This Type Approval will expire when it is surrendered by the holder, or withdrawn by NSAI, or when the approved type no longer conforms to legal requirements. The recall of the Type Approval can be issued by NSAI when the conditions required for the issuing or continuation of the Type Approval are no longer current, or when the Approval holder is in breach of the duties attached to the Type Approval, or when it is established that the approved type no longer meets the requirements of traffic safety.
7. Changes in the company name, address or manufacturing site, as well as in any of the sales or other agents specified in the issuing of the approval must immediately be notified to NSAI.
8. The duties imposed by the issuing of this certificate are not transferable. The legal protection of third parties is not affected by this certificate.
9. When the manufacture or sale of the system, component or separate technical unit has not been started within one year of the date of issue of this certificate, then NSAI is to be informed. This requirement also applies when the manufacture or sale has been halted for more than one year, or when it ought to have been halted for more than one year. The initial commencement of manufacture or sale, or the resumption of manufacture or sale, shall then be notified to NSAI within one month of commencement or resumption.

### B: Legal Options:

Any objection to the requirements set out in this certificate shall be made within one month of the date of issue. The objection shall be made, in writing, to NSAI in Dublin.



# TEST REPORT

## No. AR23-0097069-01

performed in accordance with  
**UNECE Regulation No. 10 Revision 6 + Amendment 1:2020 + Amendment 2:2022**  
**(Supplement 2 to the 06 series of amendments)**  
**(Annex 7, 8, 9 and 10)**

<b>PRODUCT</b>	Black Box (GNSS/GSM Localizer and Emergency System)
<b>TYPE</b>	JSBT
<b>MODEL(s) TESTED</b>	JSBT-3
<b>TRADE MARK(s)</b>	VEM Solutions, VEM Technology

<b>APPLICANT</b>	VEM SOLUTIONS S.p.A. Via Aosta, 20/22/24 ~ 10078 Venaria Reale (TO) ~ Italy
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Tested by	Robertino Torri [Laboratory technician]	
Approved by	Roberto Colombo [Laboratory manager]	

### Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2023-1221	First edition Digital signed - AR23-0097069-01_TR_Accredia_R10 rev.6 - VEM SOLUTIONS - JSBT.doc

The results of tests and checks reported in this Test Report refer exclusively to the samples tested and described in the Report itself.  
This Report shall not be reproduced partially the written approval of IMQ S.p.A..  
The authenticity of this Test Report and its contents can be verified by contacting IMQ S.p.A., responsible for this Test Report.

**E24\*10R06/02\*5258\*00**

## 1. GENERAL DATA

SAMPLE		
Samples received on	2023-11-27	(Item(s) sampled and sent by applicant)
IMQ reference samples	BEM	115341
Samples tested No.	1	
Object under analysis recognition	Not carried out	
Date of acceptance of test item	2023-11-27	
TEST LOCATION		
Testing dates	2023-11-27 ÷ 2023-11-28	
Testing laboratory.	IMQ S.p.A. - Via Quintiliano, 43 – IT-20138 Milano	
Testing site	Viale Lombardia, 20 – IT-20021 Bollate (MI)	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	21 ÷ 23 °C	
Relative Humidity	35 ÷ 40 %	
Atmospheric Pressure	990 ÷ 1000 mbar	
The laboratory is monitored by a continuous environmental conditions measurements system. Temperature, humidity and pressure data are recorded on a weekly basis and stored in local archive.		
REMARKS		
<p>Throughout this report a point is used as the decimal separator.</p> <p>The ability or reliability of this product to perform its intended function in a particular application has not been investigated.</p> <p>The test results apply to the sample as received.</p> <p>All information relating to the details of the equipment under test at the § 3 of this document was provided by the applicant.</p> <p>IMQ declines any responsibility derived from missing or wrong information provided aside by the applicant.</p>		

## 2. REFERENCE DOCUMENT

DOCUMENT	DATE	TITLE
<input checked="" type="checkbox"/> UNECE Reg.10	Rev. 6 2019 + Amd. 1 2020 Amd. 2 2022 (*)	Electromagnetic compatibility
<input checked="" type="checkbox"/> CISPR 25	2 <sup>nd</sup> ed. 2002 Corr.1 2004	Radio disturbance characteristics for the protection of receivers used on board vehicles, boat and on device - Limits and methods measurement
<input checked="" type="checkbox"/> ISO 7637-2	2 <sup>nd</sup> ed. 2004	Road vehicles – Electrical disturbance from conduction and coupling – Part 2: Electrical transient conduction along supply lines only
<input checked="" type="checkbox"/> ISO 11452-2	2 <sup>nd</sup> ed. 2004	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 2: Absorber-lined shielded enclosure
<input checked="" type="checkbox"/> ISO 11452-4	4 <sup>th</sup> ed. 2011	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 4: Harness excitation methods

(\*) Supplement 2 to the 06 series of amendments.

### 3. Electrical/Electronic Sub-Assembly (ESA) DETAILS

TYPE	Description
JSBT	Black Box (GNSS/GSM Localizer and Emergency System) Localizer featuring GNSS receiver, GSM/GPRS module, Bluetooth LE interfaces, accelerometer and gyroscope.

MODEL(s) TESTED	Description
JSBT-3	Black Box (GNSS/GSM Localizer and Emergency System) with Molex terminals battery cable (drawing JSBB2__DM MOLEX)

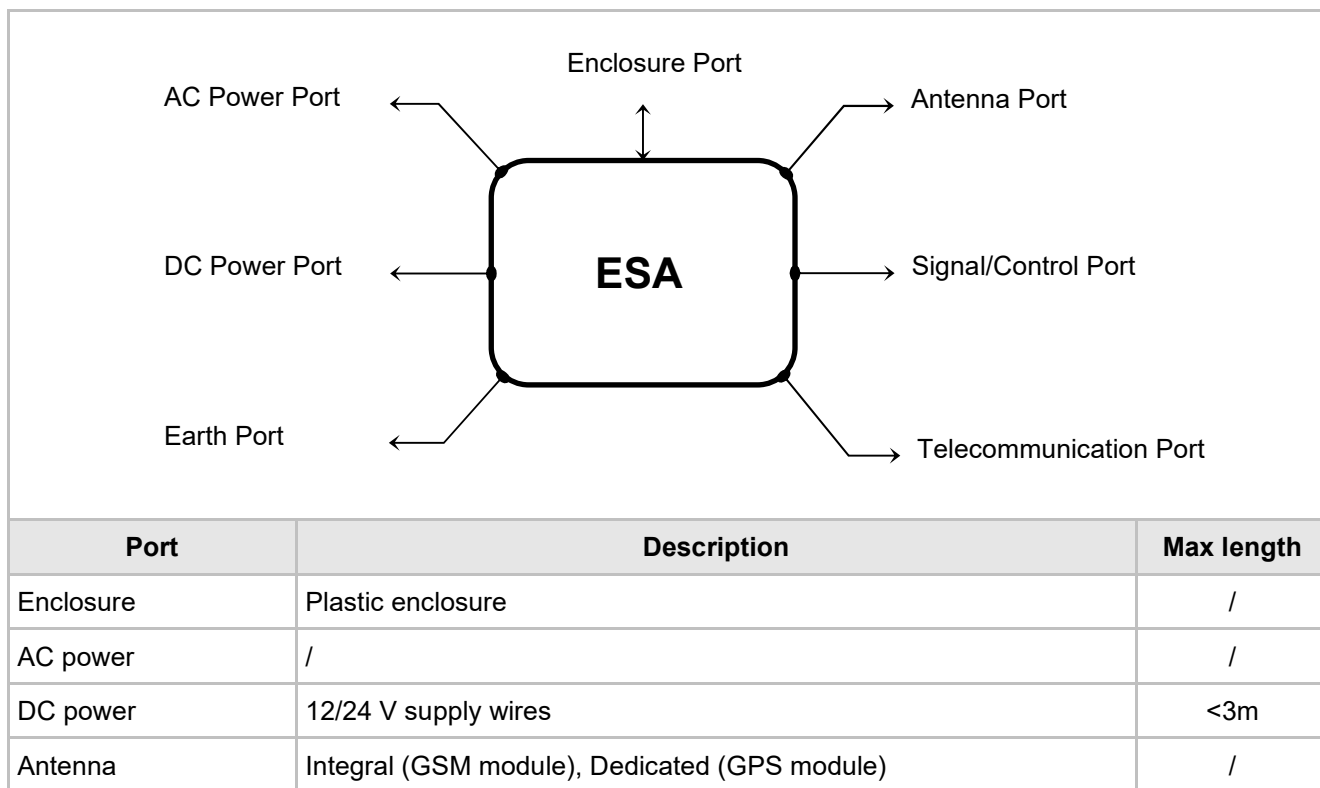
VARIANTS (*)	
MODEL DERIVED	Description
JSBT-1	Black Box (GNSS/GSM Localizer and Emergency System) with fork terminals battery cable (drawing JSBD6__DM)
JSBT-2	Black Box (GNSS/GSM Localizer and Emergency System) without fork terminals battery cable (drawing JSBB11__DM)

MANUFACTURER	VEM SOLUTIONS S.p.A. ~ Via Aosta, 20/22/24 ~ 10078 Venaria Reale (TO) ~ Italy
ASSEMBLY PLANT(s)	VEM SOLUTIONS S.p.A. ~ Via Aosta, 20/22/24 ~ 10078 Venaria Reale (TO) ~ Italy VEM TECHNOLOGY LTD. – 3, Kap. D. Spisarevski Blvd., fl. 6, 1592 Sofia, Bulgaria

ESA is composed by	Black Box
ESA foreseen use	Localizer and emergency system
ESA classification	<input checked="" type="checkbox"/> Component <input type="checkbox"/> Separate Technical Unit (STU)
ESA functional status	<input type="checkbox"/> Related to immunity-related functions <input checked="" type="checkbox"/> Not related to immunity-related functions
ESA single or system	<input checked="" type="checkbox"/> Single <input type="checkbox"/> System
ESA installation	Intended to be electrically bonded to a vehicle's metal bodywork: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
Supply voltage	<input checked="" type="checkbox"/> 12 V <input checked="" type="checkbox"/> 24 V
Ground connection	<input type="checkbox"/> Positive Ground <input checked="" type="checkbox"/> Negative Ground <input type="checkbox"/> Not applicable

(\*) Test not accredited by ACCREDIA

## ESA PORTS



## STATE OF THE ESA DURING TESTS

Ref.	Mode	Description
#1	Operating	ESA supplied at 12 V DC with the radio modules communication link
#2	Operating	ESA supplied at 24 V DC with the radio modules communication link

## SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the ESA, but not considered as tested:

Equipment	Manufacturer	Model
/	/	/

**ELECTROMAGNETICALLY RELEVANT COMPONENTS**

Component	No.	Manufacturer	Model
GSM/GPS module	1	QUECTEL	MC60ECB-04-BLE
Printed circuit board	1	VEM TECHNOLOGY	STBU_PCB1A2.80

**RFI SUPPRESSION DEVICES**

Component	No.	Manufacturer	Model
/	/	/	/

**EMI PROTECTION DEVICES**

Component	No.	Manufacturer	Model
/	/	/	/

**ESA TECHNICAL DOCUMENTATION**

Document	Reference

**ESA PERFORMANCE ASSESSMENT**

As declared by manufacturer

<b>Primary function</b>	Localizer and emergency system
<b>Representative parameter</b>	Continuous functioning
<b>Acceptable level of performance</b>	No degradation of normal function

## 4. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS	
Test object meets the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

## EMISSION TESTS

ENVIRONMENTAL PHENOMENON	PORT	RESULT
Radiated broadband electromagnetic emissions	Enclosure and Harness	PASS
Radiated narrowband electromagnetic emissions	Enclosure and Harness	PASS
Electrical voltage transient conducted emissions	Supply lines	PASS

## IMMUNITY TESTS

ENVIRONMENTAL PHENOMENON	PORT	RESULT
Immunity to electromagnetic radiation		
Absorber chamber method	Enclosure and Harness	PASS
Bulk current injection method	Harness	PASS
Immunity of transients	Supply lines	PASS



## 5. TEST RESULTS

### 5.1 RADIATED BROADBAND ELECTROMAGNETIC EMISSIONS

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 7
Test set-up	CISPR 25 § 6.4.2
Test procedure	CISPR 25 § 6.4.3
IMQ operational instruction	IO-81-P05
Limit	ECE ONU Regulation 10 § 6.5.2.1
Test specification	None
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-27

Port	Antenna polarization	Annex	Results
Enclosure and Harness	Horizontal and Vertical	A	PASS

#### REMARKS

The tested sample results within the specifications.

## 5.2 RADIATED NARROWBAND ELECTROMAGNETIC EMISSIONS

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 8
Test set-up	CISPR 25 § 6.4.2
Test procedure	CISPR 25 § 6.4.3
IMQ operational instruction	IO-81-P05
Limit	ECE ONU Regulation 10 § 6.6.2.1
Test specification	
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-27

Port	Antenna polarization	Annex	Results
Enclosure and Harness	Horizontal and Vertical	A	PASS

### REMARKS

The tested sample results within the specifications.

### 5.3 ELECTRICAL VOLTAGE TRANSIENT CONDUCTED EMISSIONS

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 10
Test set-up	ISO 7637-2 § 4.3
Test procedure	ISO 7637-2 § 4.3
IMQ operational instruction	IO-81-P09
Limit	ECE ONU Regulation 10 § 6.7 table 1
Test specification	None
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-27

Port under test	Supply voltage	Maximum allowed amplitude pulse	Maximum verified amplitude pulse	Result
Supply line	12 V	+75V	+16.5V	PASS
		-100V	0V	PASS
Supply line	24 V	+150V	+40.0V	PASS
		-450V	0V	PASS

## 5.4 RF IMMUNITY - ABSORBER-LINED SHIELDED ENCLOSURE METHOD

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 9
Test set-up	ISO 11452-2 § 7
Test procedure	ISO 11452-2 § 8.3
IMQ operational instruction	IO-81-P10 + IO-81-P11
Limit	ECE ONU Regulation 10 § 6.8.2.2
Test specification	None
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-27

Port under test	Frequency (MHz)	Test field strength V/m <sub>rms</sub> (unmodulated)	Modulation during the test	Performance criteria R10 § 6.8.2.2	Results
Enclosure and Harness	200 ÷ 800	30	AM, 80 %, 1 kHz sinewave	See note	PASS
	800 ÷ 2000	30	t <sub>on</sub> 577/4600 µs	See note	PASS

Frequency step: 1%  
Actuation time: 3 seconds

### Note

There are no degradation of performance of "immunity related functions".

## 5.5 RF IMMUNITY - BULK CURRENT INJECTION (BCI) METHOD

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 9
Test set-up	ISO 11452-4 § 5
Test procedure	ISO 11452-4 § 6
IMQ operational instruction	IO-81-P03
Limit	ECE ONU Regulation 10 § 6.8.2.2
Test specification	None
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-28

Slim 70 R134a and Slim 90					
Port under test	Frequency (MHz)	Test level (mA) unmodulated	Modulation during the test	Performance criteria R10 § 6.8.2.2	Results
Harness	20 ÷ 200	60	AM, 80 %, 1 kHz sinewave	See note	PASS

Frequency step: 1 MHz  
Actuation time: 3 seconds

### Note

There is no degradation of performance of "immunity related functions".

## 5.6 TRANSIENT DISTURBANCE CONDUCTED IMMUNITY TEST

TEST REQUIREMENT	
Reference standard	UNECE Regulation No. 10 - Annex 10
Test set-up	ISO 7637-2 § 4.4
Test procedure	ISO 7637-2 § 4.4
IMQ operational instruction	IO-81-P12
Limit	ECE ONU Regulation 10 § 6.9 table 2
Test specification	None
Deviation to test procedure	None
EUT operating condition	#1, #2
Testing dates	2023-11-28

Supply voltage: 12 V		U <sub>a</sub> : 13.5 V - U <sub>b</sub> : 12 V				
Test pulse	Test Level U <sub>s</sub> (V)	No. of Pulses or Test time	Burst Cycle / Pulse repetition time	ESA functional status required for no immunity related functions	Observed Functional status	Results
1	- 75	5000 pulses	0.5 s	D	A	PASS
2a	+ 37	5000 pulses	0.5 s	D	A	PASS
2b	+ 10	10 pulses	0.5 s	D	A	PASS
3a	- 112	1 hour	90 ms	D	A	PASS
3b	+ 75	1 hour	90 ms	D	A	PASS
4	- 6	1 pulse	/	D	A	PASS

Supply voltage: 24 V		U <sub>a</sub> : 27 V - U <sub>b</sub> : 24 V				
Test pulse	Test Level U <sub>s</sub> (V)	No. of Pulses or Test time	Burst Cycle / Pulse repetition time	ESA functional status required for no immunity related functions	Observed Functional status	Results
1	- 450	5000 pulses	0.5 s	D	A	PASS
2a	+ 37	5000 pulses	0.2 s	D	A	PASS
2b	+ 20	10 pulses	0.5 s	D	A	PASS
3a	- 150	1 hour	90 ms	D	A	PASS
3b	+ 150	1 hour	90 ms	D	A	PASS
4	- 12	1 pulse	0.5 s	D	A	PASS

## 6. TESTS UNCERTAINTY

Unless otherwise stated the uncertainties for the tests and measurements are evaluated in according to IMQ Operational Instruction IO-LAB-001, IO-LAB-004 and IO-LAB-009.

The expanded uncertainty was calculated for all measurements and tests listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainty in EMC Measurements", with UKAS document LAB 34 and is documented in the quality system accordance to ISO/IEC 17025.

Internal Procedure PG-037 ensures that the requirements for traceability of calibrations, of all test equipment requiring calibration, and calibration intervals are met.

Test field strength Level			
Methods	Expanded Uncertainty	Unit	Confidence level
CISPR 25 (30 MHz – 1000 MHz)	3.8	dB	95 %
ISO 7637-2 Conducted emissions	3.7	%	95 %
ISO 11452-2 radiated immunity (200 MHz – 2000 MHz)	5.0	%	95 %
ISO 11452-4 Bulk current injection (20 MHz – 200 MHz)	4.8	mA	95 %

ISO 7637-2 Conducted immunity

Expanded uncertainty: Level of confidence = 95 %

Pulse type	Test level	Combinated uncertainty
1 (12v)	III	Amplitude: 1.0% Rise time: 34% Duration: 13%
1 (24v)	III	Amplitude: 1.8% Rise time: 18% Duration: 12%
2a(12v)	III	Amplitude: 1.6% Rise time: 10% Duration: 16%
2a (24v)	III	Amplitude: 1.6% Rise time: 10% Duration: 16%
2b(12v)	III	Amplitude: 4.8% Rise time: 4.6% Duration: 6.6%
2b (24v)	III	Amplitude: 2.3% Rise time: 5.6% Duration: 0.76%
3a (12v)	III	Amplitude: 9.1% Rise time: 4.8% Duration: 15%
3a (24v)	III	Amplitude: 9.1% Rise time: 4.8% Duration: 15%
3b (12v)	III	Amplitude: 6.8% Rise time: 20% Duration: 9.3%
3b (24v)	III	Amplitude: 6.8% Rise time: 20% Duration: 9.3%
4 (12v)	III	Amplitude: 2.1% Rise time: 4.7% Duration: 9.3%
4 (24v)	III	Amplitude: 2.1% Rise time: 4.7% Duration: 9.3%



## 7. MEASUREMENT EQUIPMENT AND INSTRUMENTATION

Radiated broadband electromagnetic emissions (§ 5.1) Radiated narrowband electromagnetic emissions (§ 5.2)					
Description	Manufacturer	Model	Identifier	Calibration date	
				Last	Due
Shielded anechoic chamber	ETS-LINGREN	FTF-305	P-04112	2023-08-01	2024-08-01
EMI receiver	ROHDE & SCHWARZ	FSW50	S-07990	2023-06-20	2024-06-20
LISN (+)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03579	2022-12-22	2023-12-22
LISN (-)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03580	2022-12-22	2023-12-22
TriLog antenna	SCHWARZBECK	VULB 9162	S-09211	2021-05-22	2024-05-22
Battery	BOSCH	MO6CN	S-05389	/	/
Battery	BOSCH	MO6CN	S-05390	/	/
Software	ROHDE & SCHWARZ	BAT-EMC V3.21.0.14	/	/	/
PC	/	/	/	/	/

Electrical voltage transient conducted emissions (§ 5.3)					
Instrument	Manufacturer	Model	IMQ Ref.	Calibration date	
				Last	Due
Electronic switch	EM TEST	BS 200	S-04504	2023-02-14	2024-02-14
LISN (+)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03579	2022-12-22	2023-12-22
LISN (-)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03580	2022-12-22	2023-12-22
Oscilloscope	YOKOGAWA	DL 7002	S-03745	2023-02-12	2024-02-12
Battery	BOSCH	MO6CN	S-05389	/	/
Battery	BOSCH	MO6CN	S-05390	/	/

RF immunity - Absorber-lined shielded enclosure method (§ 5.4)					
Instrument	Manufacturer	Model	IMQ Ref.	Calibration date	
				Last	Due
Shielded anechoic chamber	ETS-LINGREN	FTF-305	P-04112	2023-08-01	2024-08-01
RF Generator	ROHDE & SCHWARZ	SMB100B	S-09105	2022-12-05	2023-12-05
Log antenna	ARA	LPB-2513	S-02385	/	/
Horn antenna	SCHWARZBECK	BBHA 9120J	S-09110	/	/
RF amplifier	ROHDE & SCHWARZ	100W1000M1A	S-02389	2022-12-21	2023-12-21
RF amplifier	AMPLIFIER RESEARCH	60S1G3	S-04261	2022-12-21	2023-12-21
LISN (+)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03579	2022-12-22	2023-12-22
LISN (-)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03580	2022-12-22	2023-12-22
Battery	BOSCH	MO6CN	S-05389	/	/
Battery	BOSCH	MO6CN	S-05390	/	/
Software	ROHDE & SCHWARZ	BAT-EMC V3.21.0.14	/	/	/
PC	/	/	/	/	/

## RF immunity - Bulk current injection (BCI) method (§ 5.5)

Instrument	Manufacturer	Model	IMQ Ref.	Calibration date	
				Last	Due
RF current generator	EM TEST	CWS 500D	S-03484	2023-01-26	2024-01-26
Current injection probe	FISCHER CUSTOM	F-130A-1	S-03480	/	/
LISN (+)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03579	2022-12-22	2023-12-22
LISN (-)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03580	2022-12-22	2023-12-22
Attenuator 3dB	SPIN ELECTRONIC	SPIN ATT3-100	S-08897	/	/
Battery	BOSCH	MO6CN	S-05389	/	/
Battery	BOSCH	MO6CN	S-05390	/	/
Software	ROHDE & SCHWARZ	BAT-EMC V3.21.0.14	/	/	/
PC	/	/	/	/	/

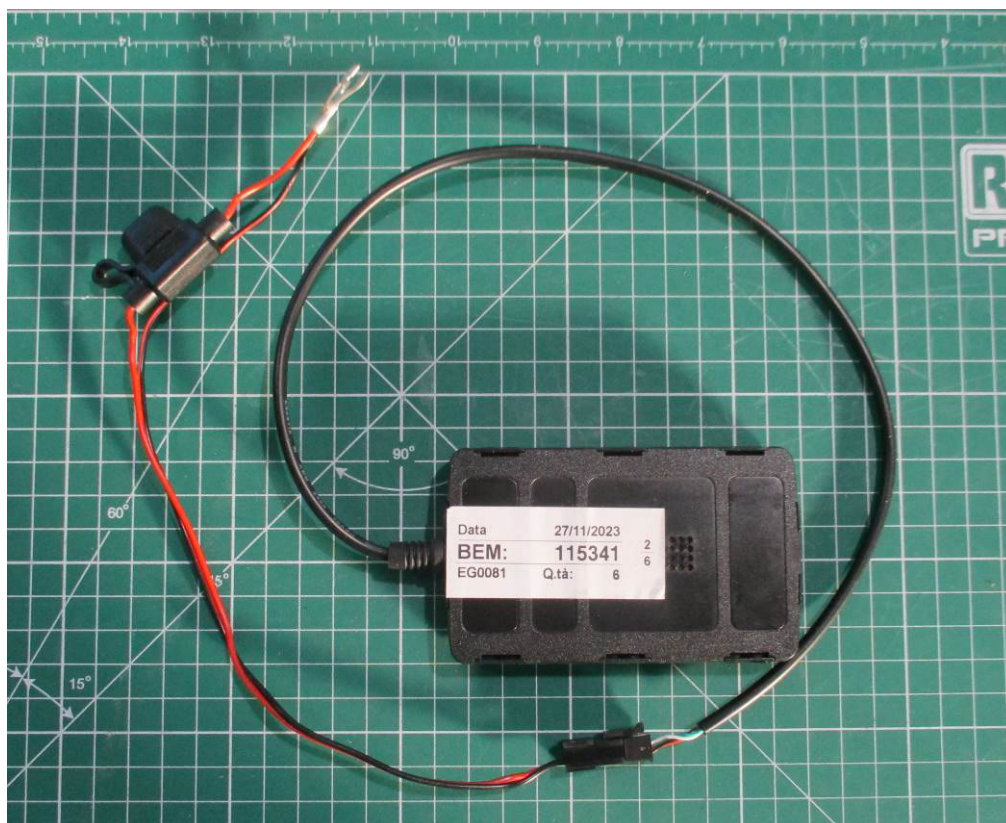
## Transient disturbance conducted immunity test (§ 5.6)

Instrument	Manufacturer	Model	IMQ Ref.	Calibration date	
				Last	Last
Transient generator	EM TEST	UCS 200M	S-03471	2023-02-10	2024-02-10
Battery simulator	EM TEST	VDS 200	S-03473	2023-02-14	2024-02-14
LISN (+)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03579	2022-12-22	2023-12-22
LISN (-)	SOLAR ELECTRONICS	7333-5-PJ-50-N	S-03580	2022-12-22	2023-12-22
Software	EM TEST	ISM ISO Vers. 5.0.6	W-00075	/	/
PC	/	/	H-00099	/	/

Measuring instruments are always used within the period of validity of the calibration.  
All the traceability informations are recorded in the Test Report or in Laboratory intranet system.

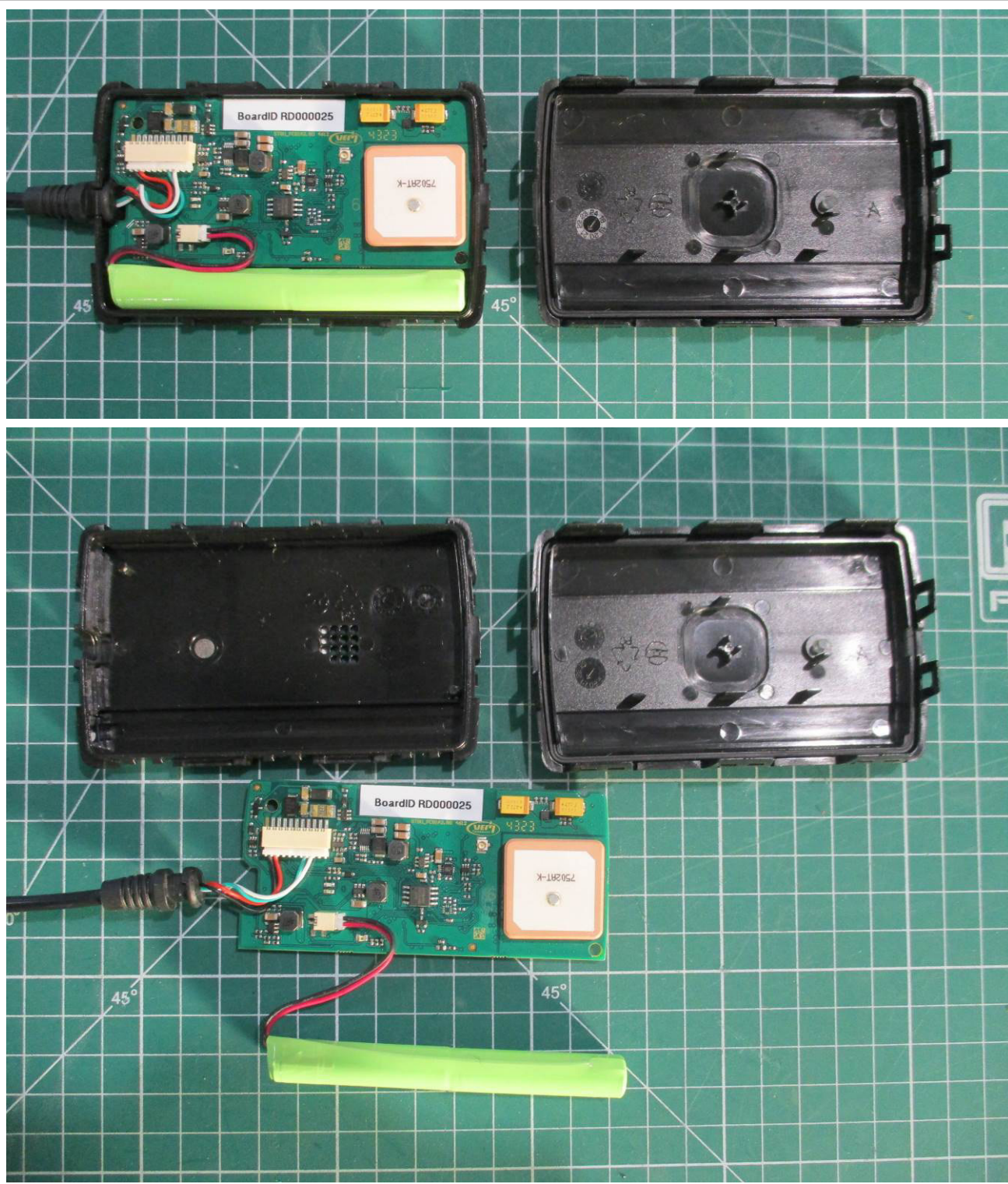
## 8. PHOTOGRAPHIC DOCUMENTATION

### ESA IDENTIFICATION – External views



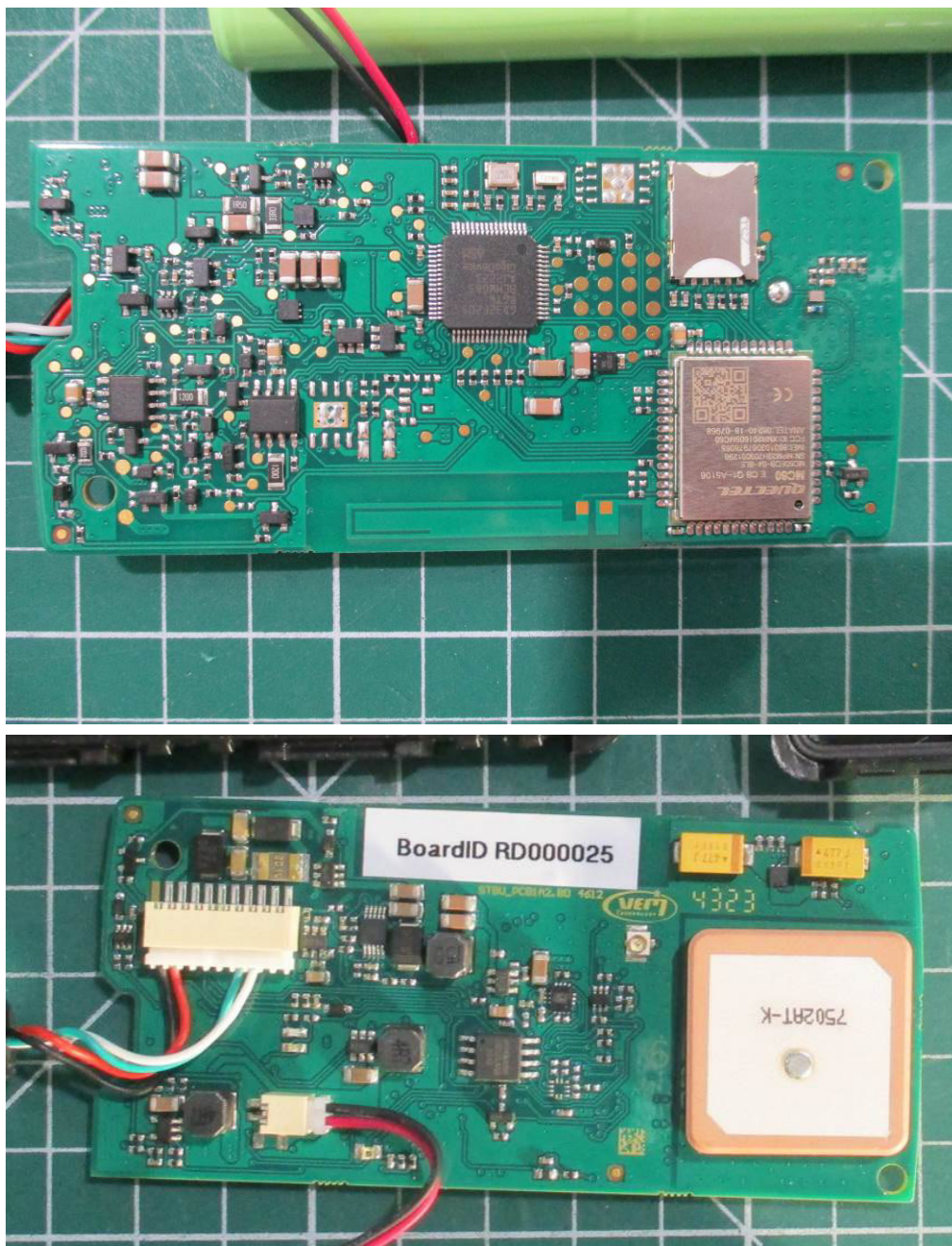


## ESA IDENTIFICATION – Internal views

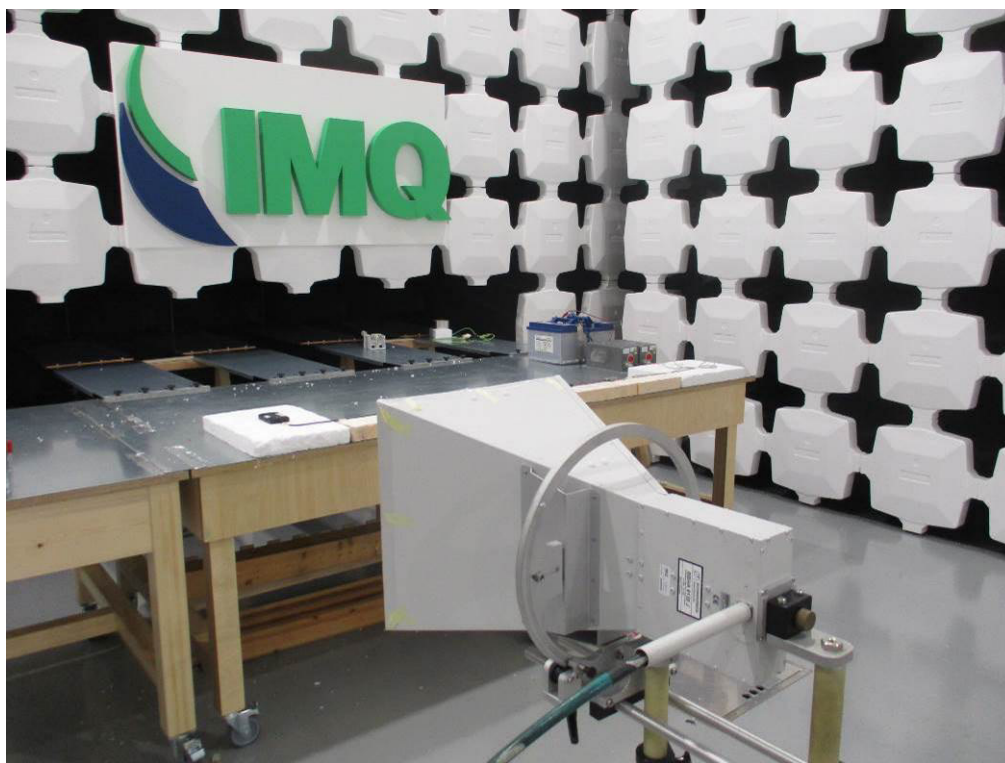




## ESA IDENTIFICATION – Internal views



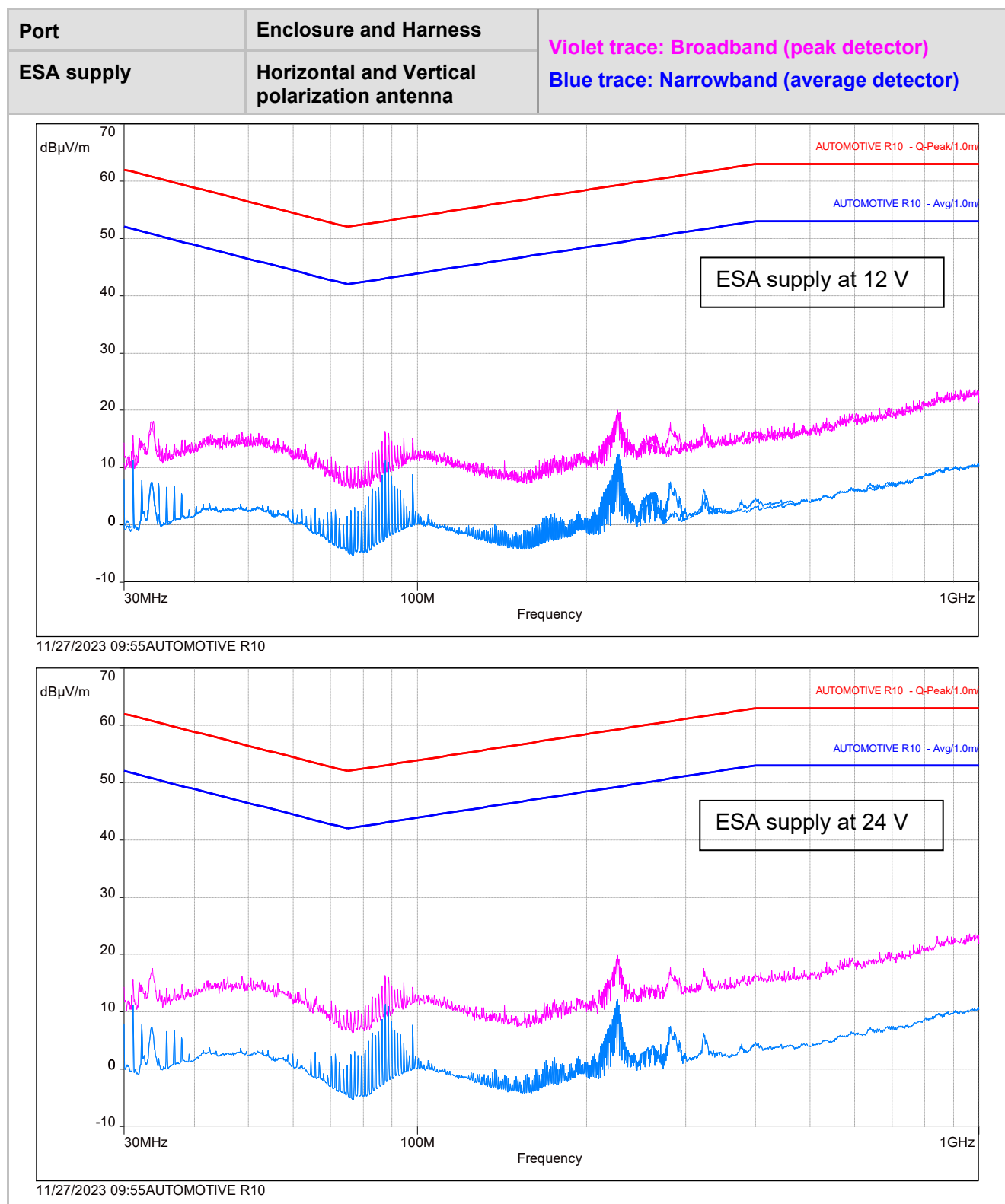
## RADIATED TEST SET-UP





## 9. DIAGRAMS

### ANNEX A – Radiated electromagnetic emissions



## 10. OPINIONS AND INTERPRETATIONS - NOT OBJECT TO ACCREDIA ACCREDITATION

Not Applicable

**END OF TEST REPORT**



## ANNEX 2B – UN ECE REGULATION 10 REV. 06

### INFORMATION DOCUMENT

#### FOR TYPE APPROVAL OF AN ELECTRIC/ELECTRONIC SUB-ASSEMBLY WITH RESPECT TO ELECTROMAGNETIC COMPATIBILITY

<b>1. MAKE (TRADE NAME OF MANUFACTURER)</b>
---

VEM Solutions

Other trade name:

VEM Technology

<b>2. TYPE</b>
----------------

JSBT

<b>2.1. VARIANTS</b>
----------------------

JSBT-1

JSBT-2

JSBT-3

<b>3. MEANS OF IDENTIFICATION OF TYPE, IF MARKED ON THE COMPONENT/SEPARATE TECHNICAL UNIT: <sup>1</sup></b>
---

Adhesive label (see annexes JSBT41\_ADE, JSBT42\_ADE, JSBT43\_ADE)

<b>3.1. LOCATION OF THAT MARKING</b>
--------------------------------------

On bottom of plastic case

<sup>1</sup> IF THE MEANS OF IDENTIFICATION OF TYPE CONTAINS CHARACTERS NOT RELEVANT TO DESCRIBE THE COMPONENT OR SEPARATE TECHNICAL UNIT TYPES COVERED BY THIS INFORMATION DOCUMENT, SUCH CHARACTERS SHALL BE REPRESENTED IN THE DOCUMENTATION BY THE SYMBOL "?" (E.G. ABC??123??).

--

<b>4. NAME AND ADDRESS OF MANUFACTURER</b>
<b>VEM Solutions S.p.A. – via Aosta n.20/22/24, 10078 Venaria Reale (TO), Italy</b>

<b>4.1. NAME AND ADDRESS OF AUTHORIZED REPRESENTATIVE, IF ANY</b>
<b>N/A</b>

<b>5. LOCATION AND METHOD OF AFFIXING OF THE APPROVAL MARK</b> <span style="border: 1px solid black; border-radius: 50%; padding: 2px 5px; float: right;">E</span>
<b>Adhesive label (see annexes JSBT41_ADE, JSBT42_ADE, JSBT43_ADE)</b>

<b>6. ADDRESS(ES) OF ASSEMBLY PLANT(S)</b>
<b>VEM Technology Ltd. – 3, Kap. D. Spisarevski Blvd., FL. 6, 1592 Sofia, Bulgaria</b> <b>VEM Solutions S.p.A. – via Aosta n.20/22/24, 10078 Venaria Reale (TO), Italy</b>

<b>7. THIS ESA SHALL BE APPROVED AS</b>
<input checked="" type="checkbox"/> <b>COMPONENT</b> (DEVICE INTENDED TO BE PART OF A VEHICLE, WHICH MAY BE TYPE APPROVED <u>INDEPENDENTLY</u> OF A VEHICLE)
<input type="checkbox"/> <b>SEPARATE TECHNICAL UNIT</b> (DEVICE INTENDED TO BE PART OF A VEHICLE, WHICH MAY BE TYPE APPROVED <u>SEPARATELY</u> BUT ONLY IN RELATION TO ONE OR MORE SPECIFIED TYPES OF VEHICLES)

<b>8. ANY RESTRICTIONS OF USE AND CONDITIONS FOR FITTING</b>

<b>9. ELECTRICAL SYSTEM RATED VOLTAGE</b>
<input checked="" type="checkbox"/> <b>12 V</b>
<input checked="" type="checkbox"/> <b>24 V</b>
<input type="checkbox"/> <b>POSITIVE GROUND</b>
<input checked="" type="checkbox"/> <b>NEGATIVE GROUND</b>

## APPENDIX 1:

### DESCRIPTION OF THE ESA CHOSEN TO REPRESENT THE TYPE (BASIC MODEL)

**Black Box (GNSS/GSM localizer and Emergency System)**

### DESCRIPTION OF THE DERIVED MODEL(S) AND RELATIVE DIFFERENCES FROM THE BASIC MODEL

All variants share the same electronic board. The main difference for each variant is the cable, so the device's interface.

**JSBT-1** → The cable is composed only by 2 wires for the power supply (K30, GND).

**JSBT-2** → The cable is composed by 2 wires for the power supply (K30, GND), plus 2 wires to interface a push button.

**JSBT-3** → The cable is composed by 2 wires for the power supply (K30, GND), plus 2 wires for serial interface (CAN\_L, CAN\_H).

### ENCLOSED

- ☒ WIRING DIAGRAM (SEE ANNEXES JSBT41\_ADE, JSBT42\_ADE, JSBT43\_ADE)
- ☒ CIRCUIT DIAGRAM (SEE ANNEX JSBT\_ADT)
- ☒ LIST OF MAIN COMPONENTS CONSTITUING THE ESA (SEE ANNEX JSBT\_ADT)
- ☒ INSTALLATION MANUAL (SEE ANNEXES JSBT41\_ADE, JSBT42\_ADE, JSBT43\_ADE)
- ☒ USER MANUAL (SEE ANNEXES JSBT41\_ADE, JSBT42\_ADE, JSBT43\_ADE)
- ☒ COP (SEE ANNEX COP AGREEMENT(Ed.2010))
- ☒ LABEL (SEE ANNEX JSBT\_ADT)

## APPENDIX 2:

### RELEVANT TEST REPORT(S) SUPPLIED BY THE MANUFACTURER FROM A TEST LABORATORY ACCREDITED TO ISO 17025 AND RECOGNIZED BY THE APPROVAL AUTHORITY FOR THE PURPOSE OF DRAWING UP THE TYPE APPROVAL CERTIFICATE.

- ☒ TEST REPORT BY IMQ LABORATORY ACCREDITED TO ISO 17025 AND RECOGNIZED BY NSAI ON 2006/01/26

ONLY APPLICABLE FOR CHARGING SYSTEMS: N.A.

<b>10. CHARGER</b>
<input type="checkbox"/> ON BOARD <input type="checkbox"/> EXTERNAL
<b>11. CHARGING CURRENT</b>
<input type="checkbox"/> DIRECT CURRENT <input type="checkbox"/> ALTERNATING CURRENT (NUMBER OF FASE <INSERIRE VALORE> FREQUENCY <INSERIRE VALORE> )
<b>12. MAXIMAL NOMINAL CURRENT (IN EACH MODE IF NECESSARY)</b>
<b>13. NOMINAL CHARGING VOLTAGE</b>
<b>14. BASIC ESA INTERFACE FUNCTIONS</b>
ESEMPIO DA CANCELLARE: L1/L2/L3/N/PE/CONTROL PILOT
<b>15. MINIMUM <math>R_{sce}</math> VALUE (SEE § 7.11 OF REGULATION)</b>

VEM Solutions S.p.A.

Domenico PETRONE

**VEM Solutions SpA**  
**Via Aosta n. 20-22-24**  
**10078 Venaria Reale (TO)**



<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

# Technical Dossier

## JSBT

### (SlimBox2.x)

	EDITOR	CHECK	APPROVAL
NAME	Ivaylo Raynov	Stefan Trifonov	F. Crua
DATE	04/12/2023	04/12/2023	05/12/2023
SIGNED			




<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
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## HYSTORY OF THE DOCUMENT


REV	PAGE	AMENDMENT
A	04/12/2023	Initial

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<b>6.</b>	<b><i>Compliance to 2014/53/UE directive .....</i></b>	<b><i>35</i></b>
<b>7.</b>	<b><i>Installation and user Manual .....</i></b>	<b><i>35</i></b>
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<b>9.</b>	<b><i>ISO 9001 Conformity certificate .....</i></b>	<b><i>35</i></b>

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## 1. Models

Reference to Annex 2B – UN ECE Regulation 10 Rev.06 Paragraph 2


<b>JSBT</b>	→	IDENTIFIER FOR PLATFORM
<b>JSBT-1</b>	→	VARIANT and the commercial product name is "SlimBox2.2"
<b>JSBT-2</b>	→	VARIANT and the commercial product name is "SlimBox2.4"
<b>JSBT-3</b>	→	VARIANT and the commercial product name is "SlimBox2.5"

## 2. Electronic control unit -Technical data

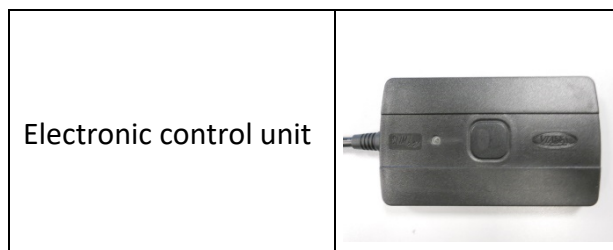


Microcontroller	GD32F205RGT6
GSM/BLE/GNSS Module	Quectel Quad Band GSM/GPRS/GNSS Module With BT4.0 - MC60ECB-04-BLE
GSM Antenna	PCB
GNSS antenna	JLTD1575-1602S25P4AT
Accelerometers	LSM6DSOTR and LIS2DH12TR
Data storage	Flash 128Mbit W25Q128JVS1Q
Backup battery	Rechargeable Ni-MH AAA 800mAh 2.4V
Diagnostic LEDs	Red and Green
Power supply	8.5 ÷ 32 Vdc, Max. 0.4A
Operating temperature range	-20 ÷ +60°C
Overall dimensions	100x62x13.5 mm



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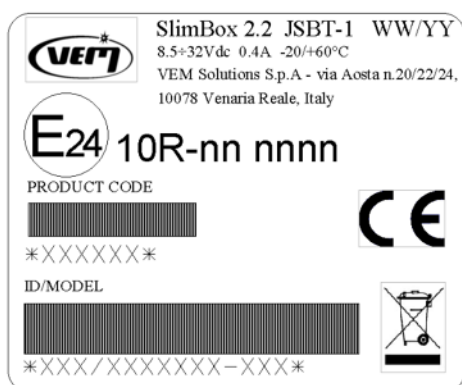
### 3. Main elements of the system



### 4. Homologation label placement

Reference to Annex 2B – UN ECE Regulation 10 Rev.06 - Paragraph 3

JSBT41\_ADE:




JSBT42\_ADE:



JSBT43\_ADE:



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	<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

## 5. Documents list

### Platform document list

Document type	Document number/file
Top side components layout	STBU_PCBA2G1.00-ASMPA.pdf
Bottom side components layout	STBU_PCBA2G1.00-ASMPA.pdf
Schematic diagram	STBU_PCBA2G1.00-SCHA.pdf
Bill of Materials	STBU_PCBA2G1.00-BOMA.pdf
Microcontroller datasheet	GD32F205xxDatasheet_Rev2.5.pdf
GSM/BLE/GNSS Module datasheet	Quectel_MC60E_GSM_Specification_V1.0.pdf
Accelerometer_1 datasheet	lsm6dso.pdf
Accelerometer_2 datasheet	lis2dh12.pdf
Battery cell datasheet	43AAA800-2-spec.pdf
Battery pack drawing	43AAA800-2-spec.pdf

### Specific document for the variant "JSBT-1"

Document type	Document number/file
Cable and accessories specification	JSBD6__DM
Label of electronic unit	JSBT41__DM
Label of packaging	JSBT41__DE, JSBT51__DE
Installation and User manual	JSBT61__MI

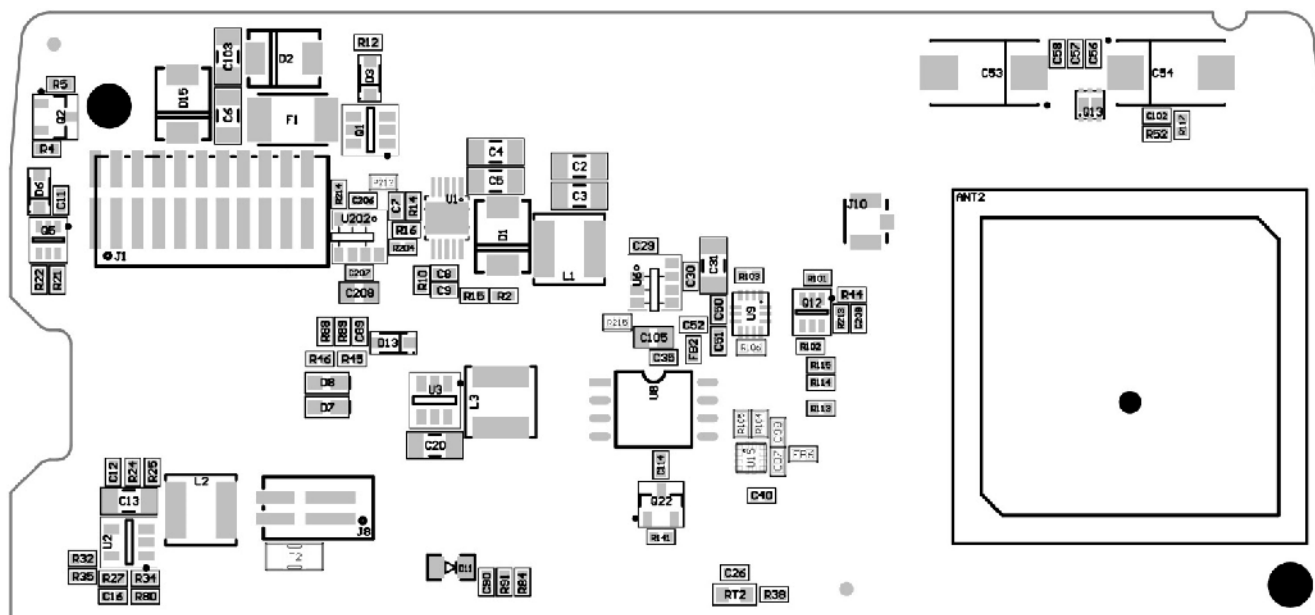
### Specific document for the variant "JSBT-2"

Document type	Document number/file
Cable and accessories specification	JSBB11__DM, KSTD1__DM
Label of electronic unit	JSBT42__DM
Label of packaging	JSBT42__DE, JSBT52__DE
Installation and User manual	JSBT62__MI

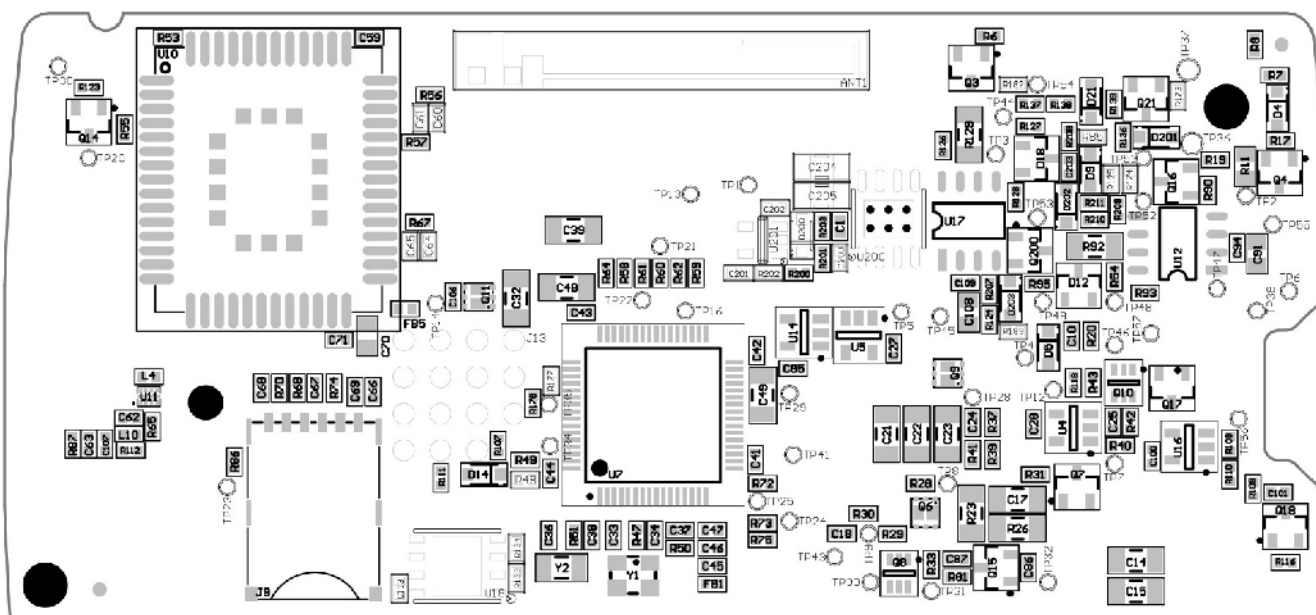
### Specific document for the variant "JSBT-3"

Document type	Document number/file
Cable and accessories specification	JSBB2__DM, JSBD3__DM, OBDA__DM
Label of electronic unit	JSBT43__DM
Label of packaging	JSBT43__DE, JSBT53__DE
Installation and User manual	JSBT63__MI

## 5.1 Top side

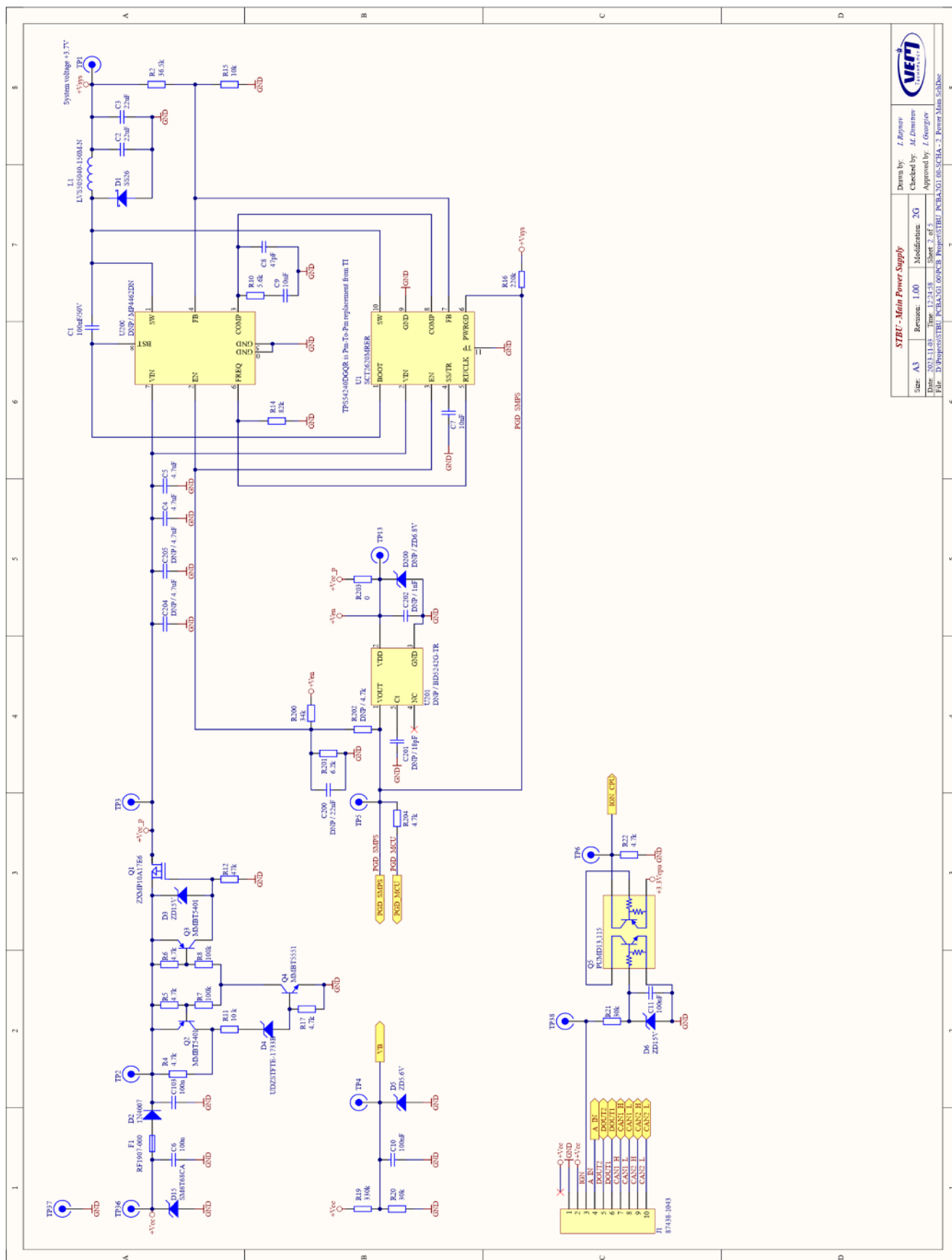


## 5.2 Bottom side

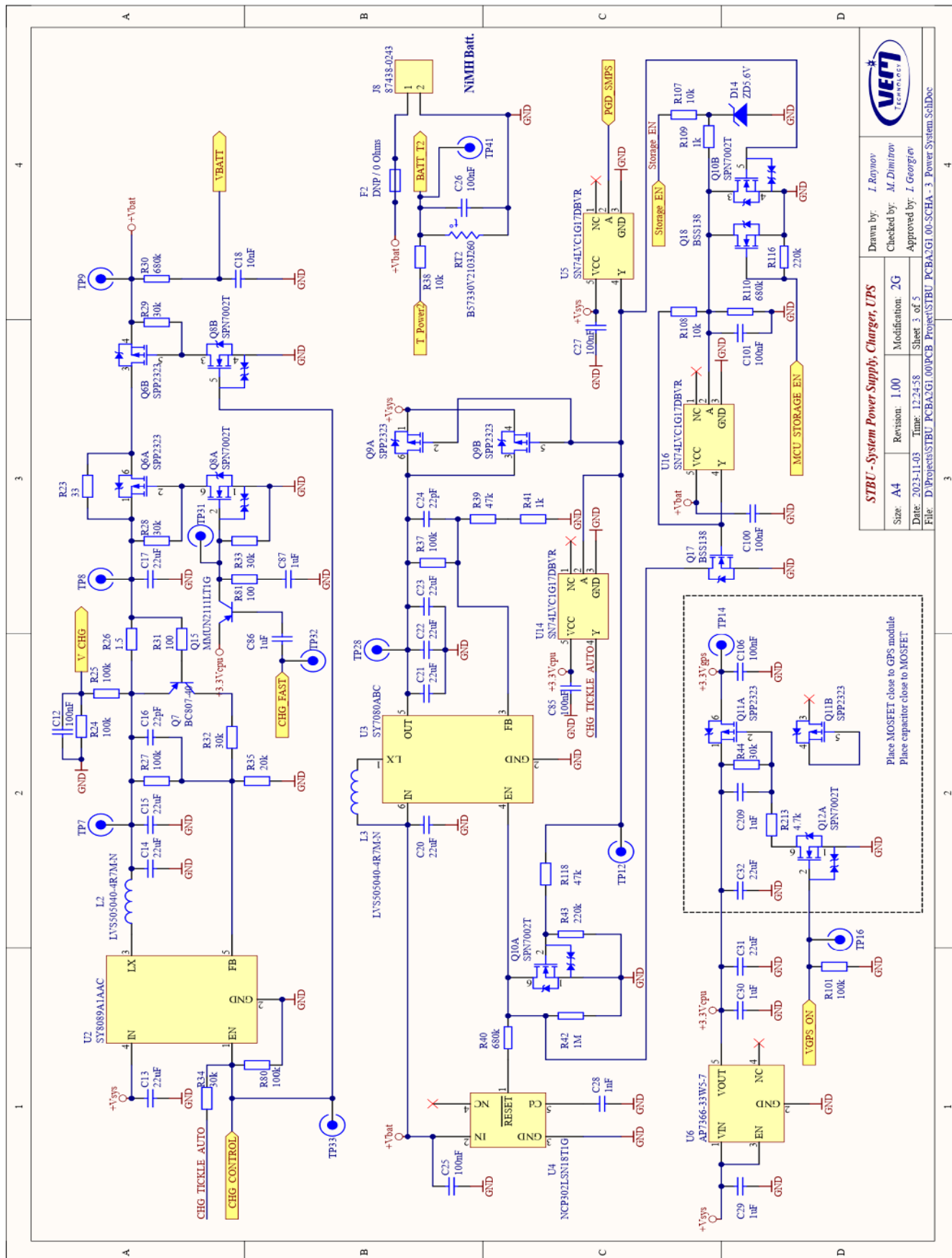


## 5.3 Schematic diagram

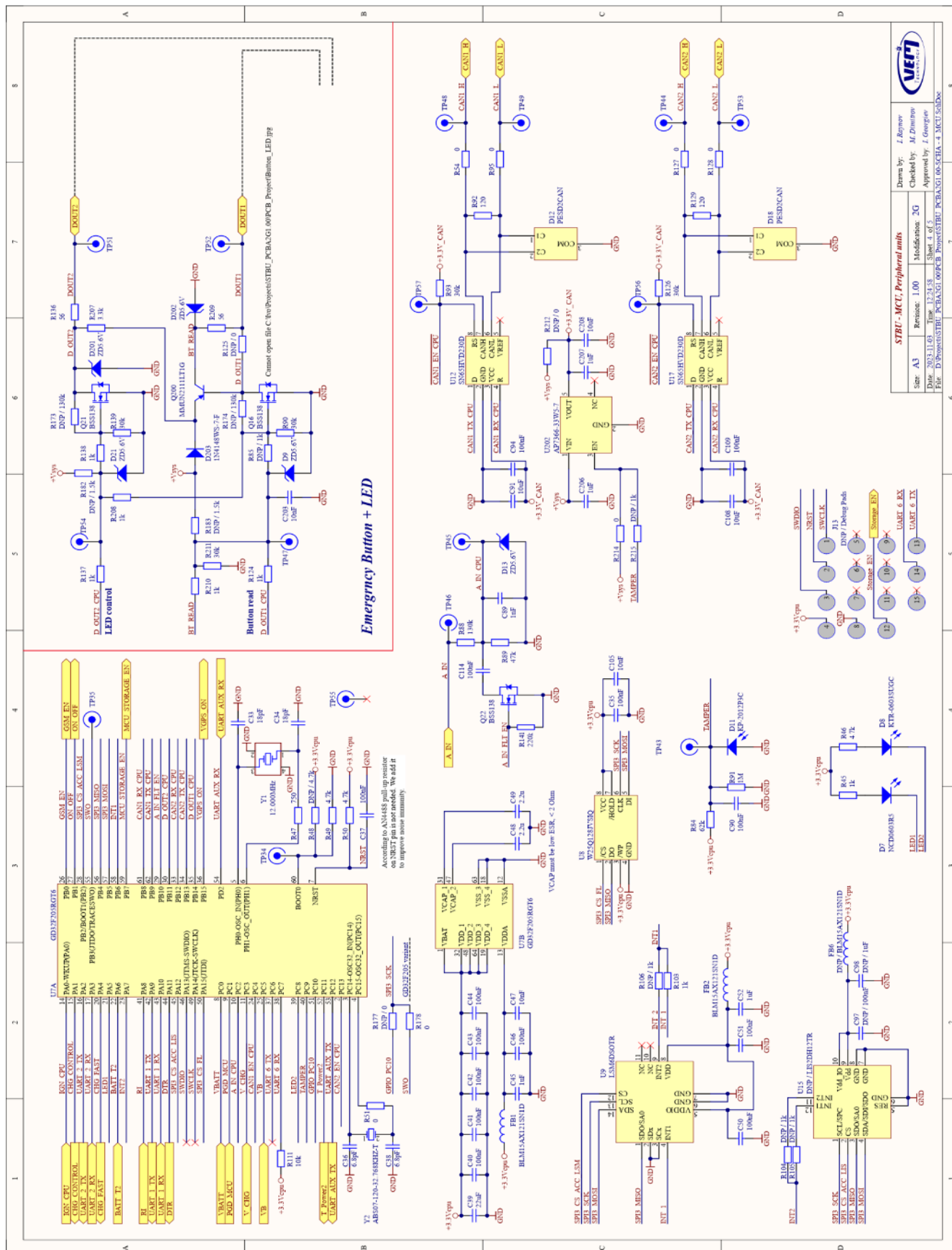









<b>STBU - System Power Supply, Charger, UPS</b>		<b>Drawn by:</b> I. Raynov <b>Checked by:</b> M. Diminov <b>Approved by:</b> I. Georgiev	
Size: A4	Revision: 1.00	Modification: 2G	
Date: 2023-11-03	Time: 12:24:58	Sheet: 3 of 5	
File: D:\Project\STBU_PCBA\G1_00\PCB_Project\STBU_PCBA\G1_00-SCHA - 3 Power System SchDoc			






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5.4 Bill of Materials

ERP Item code	Quantity	Comment	Designator	Description	Footprint	Distributor	Distributor PN	Manufacturer	Manufacturer PN
ANT-011201-0001	1	JLTD1575-1602S25P4AT	ANT2	GPS/GLONASS Dual-Band Patch Antenna - 25*25*4mm	ANT_Patch_25*25*4			Zhejiang JC Antenna Co., Ltd.	JLTD1575-1602S25P4AT
CAP-010101-0001	27	100nF	C10, C11, C12, C25, C26, C27, C35, C37, C40, C41, C42, C43, C44, C46, C50, C51, C56, C66, C71, C85, C90, C94, C100, C101, C106, C109, C114	Capacitor	0402_L	Comet	C0402 100nF 16V X7R SAMSUNG	Samsung Electro-Mechanics	CL05B104KO5NNNC
CAP-010101-0002	13	22uF	C2, C3, C13, C14, C15, C17, C20, C21, C22, C23, C31, C32, C39	Capacitor	1206_L	Comet	C1206 22uF 16V X5R SAMSUNG	Samsung Electro-Mechanics	CL31A226MOCLNNC
CAP-010101-0003	2	4.7uF	C4, C5	Capacitor	1206_L	Comet	C1206 4.7uF 50V X7R SAMSUNG	Samsung Electro-Mechanics	CL31B475KBHNNNE
CAP-010101-0004	2	100n	C6, C103	Capacitor	1206_L	Comet	C1206 100nF 100V X7R SAMSUNG	Samsung Electro-Mechanics	CL31B104KCFNNNE
CAP-010101-0005	5	10nF	C7, C9, C18, C47, C203	Capacitor	0402_L	Comet	C0402 10nF 50V X7R SAMSUNG	Samsung Electro-Mechanics	CL05B103KB5NNNC
CAP-010101-0006	1	47pF	C8	Capacitor	0402_L	Comet	C0402 47pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C470JB5NNNC
CAP-010101-0007	2	22pF	C16, C24	Capacitor	0402_L	Comet	C0402 22pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C220JB5NNNC
CAP-010101-0008	4	1nF	C28, C62, C63, C89	Capacitor	0402_L	Comet	C0402 1.0nF 50V X7R SAMSUNG	Samsung Electro-Mechanics	CL05B102KB5NNNC
CAP-010101-0009	10	1uF	C29, C30, C45, C52, C86, C87, C102, C206, C207, C209	Capacitor	0402_L	Comet	C0402 1.0uF 16V X5R SAMSUNG	Samsung Electro-Mechanics	CL05A105KO5NNNC
CAP-010101-0010	2	18pF	C33, C34	Capacitor	0402_L	Comet	C0402 18pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C180JB5NNNC
CAP-010101-0011	2	6.8pF	C36, C38	Capacitor	0402_L	Comet	C0402 6.8pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C6R8CB5NNNC
CAP-010101-0012	5	10uF	C70, C91, C105, C108, C208	Capacitor	0805_L	Comet	C0805 10uF 16V X5R SAMSUNG	Samsung Electro-Mechanics	CL21A106KOQNNNG
CAP-010101-0013	2	2.2u	C48, C49	Capacitor	1206_L	Farnell	9527753	Murata	GRM31MR71C225KA35L
CAP-010101-0014	4	33pF	C57, C67, C68, C69	Capacitor	0402_L	Comet	C0402 33pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C330JB5NNNC
CAP-010101-0015	1	10pF	C58	Capacitor	0402_L	Comet	C0402 10pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C100CB5NNNC
CAP-010101-0016	1	2.2uF	C59	Capacitor	0402_L	Comet	C0402 2.2uF 6.3V X5R SAMSUNG	Samsung Electro-Mechanics	CL05A225MQ5NNNC
CAP-010101-0017	1	1pF	C107	Capacitor	0402_L	Comet	C0402 1.0pF 50V C0G SAMSUNG	Samsung Electro-Mechanics	CL05C010BB5NNNC
CAP-010101-0087	1	100nF/50V	C1	Capacitor	0402_L	Comet	C0402 100nF 50V X5R	YAGEO	CC0402KRX5R9BB104
CAP-010105-0001	2	470uF/6.3V	C53, C54	Tantalum Capacitor	TANT D	Comet	TANT D SMD 470uF 6.3V	AVX	TAJD477K006RNJ
CON-010803-0002	1	87438-0243	J8	1.5mm Header, RA, SMT	CONN_87438-0243	Farnell	1711327	Molex	87438-0243
CON-010803-0024	1	87438-1043	J1	1.5mm Header, RA, SMT	CONN_87438-1043	Farnell	1711333	Molex	87438-1043
CON-010807-0001	1	UFL-JV-50-LF	J10	U.FL Male (Plug) - SMT PCB	U.FL-R-SMT	Comet	GSM UFL PCB CON	Morethanall	UFL-JV-50-LF
CON-010899-0001	1	693043020611	J9	NANO SIM - PUSH & PULL TYPE - 6 PINS	693043020611	Farnell	2470827	Wurth Elektronik	693043020611
DIO-010301-0001	1	1N4007	D2	Diode	DO-214AA	Comet	1N4007(M7) SMD	LGE	M7
DIO-010301-0002	1	1N4148WS-7-F	D203	Diode	SOD323	Comet	1N4148WS	Diodes	1N4148WS-7-F
DIO-010303-0001	1	SS26	D1	Schottky Diode	SMB	Comet	SK26 (SS26) SMD	LGE	SS26
DIO-010305-0001	2	ZD15V	D3, D6	Diode Zener	SOD323	Comet	ZD15V 0.2W ROHM SMD	Rohm	UDZSTE-1715B
DIO-010305-0002	1	UDZSTFTE-1733B	D4	Diode Zener	SOD323	Farnell	2528888	Rohm	UDZSTFTE-1733B

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	<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

DIO-010305-0003	7	ZD5.6V	D5, D9, D13, D14, D21, D201, D202	Diode Zener	SOD323	Comet	ZD5.6V 0.2W ROHM SMD	Rohm	UDZSTE-175.6B
DIO-010307-0001	1	SM6T68CA	D15	Transil	SMB	Farnell	9886028	ST	SM6T68CA
DIO-010307-0005	2	PESD2CAN	D12, D18	CAN bus ESD protection diode	SOT23_L	Comet	PESD2CAN	NXP	PESD2CAN
FBD-011501-0001	3	BLM15AX121SN1D	FB1, FB2, FB5	Ferrite Bead	0402_L	Farnell	2470352	Murata	BLM15AX121SN1D
FUS-011401-0001	1	RF1907-000	F1	PolySwitch Resettable Device - SMD Fuse	FUSE_miniSMDC030F	Digi-Key	MINISMDC030F-2CT-ND	Littelfuse	RF1907-000
ICR-010601-0012	1	GD32F205RGT6	U7	ARM Cortex-M3 32-bit MCU	STM-LQFP64_V			Gigadevice	GD32F205RGT6
ICR-010602-0001	1	W25Q128JVS1Q	U8	3V 128M-BIT SERIAL FLASH MEMORY	SOIC-8 (208)	Digi-Key	W25Q128JVS1Q-ND	Winbond Electronics	W25Q128JVS1Q
ICR-010603-0001	3	SN74LVC1G17DBVR	U5, U14, U16	Single Schmitt Trigger Buffer, Non-Inverting	SOT23-5_N	Comet	SN74LVC1G17DBVR	Texas Instruments	SN74LVC1G17DBVR
ICR-010605-0003	1	SY7080ABC	U3	0.9V min Vin, 4V max Vout Synchronous Boost Regulator	SOT23-6_N			Silergy	SY7080ABC
ICR-010605-0004	1	NCP302LSN18T1G	U4	Voltage Detector	SOT23-5_N	Mouser	863-NCP302LSN18T1G	ON Semiconductor	NCP302LSN18T1G
ICR-010605-0027	1	SCT2620MRER	U1	3.8V-60V Vin, 2.5A Step-down DCDC Converter	EMSOP-10			SCT	SCT2620MRER
ICR-010605-0028	1	SY8089A1AAC	U2	1.5MHz, 2A Synchronous Step Down Regulator	SOT23-5_N			Silergy	SY8089A1AAC
ICR-010605-0029	2	AP7366-33W5-7	U6, U202	600mA LOW DROPOUT LINEAR REGULATOR	SOT23-5_combined			Diodes	AP7366-33W5-7
ICR-010606-0015	1	MC60ECB-04-BLE	U10	GSM/GPRS/GNSS/BLE Module	GSM_GPS_MC60			Quectel	MC60ECB-04-BLE
ICR-010608-0001	2	SN65HVD230D	U12, U17	3.3V CAN Transceiver with Standby Mode	SO8	Comet	SN65HVD230D	Texas Instruments	SN65HVD230D
ICR-010699-0002	1	NJG1159PHH	U11	GNSS Front-End Module	HFFP10-HH_MOD1			New Japan Radio	NJG1159PHH
ICR-010699-0024	1	LSM6DSOTR	U9	3D accelerometer and 3D gyroscope	LGA-14L_M	Farnell	2980917	ST	LSM6DSOTR
IND-010401-0001	1	LVS505040-150M-N	L1	Inductor	LVS505040	Rutronik	IND15813	Chilisin Electronics	LVS505040-150M-N
IND-010401-0002	2	LVS505040-4R7M-N	L2, L3	Inductor	LVS505040	Rutronik		Chilisin Electronics	LVS505040-4R7M-N
IND-010401-0003	1	13nH	L4	Inductor	0402_L	Farnell	1748722	Würth Elektronik	744765113A
IND-010401-0004	1	22nH	L10	Inductor	0402_L	Farnell	1669580	TDK	MLG1005S22NJ
OPT-010901-0013	1	NCD0603R5	D7	Red LED	D0603			FOSHAN NATIONSTAR OPTOELECTRONICS CO., LTD	NCD0603R5
OPT-010901-0014	1	KTR-0603SUGC	D8	Green LED	D0603			KTRLIGHT - KETERINE	KTR-0603SUGC
OPT-010903-0001	1	KP-2012P3C	D11	Photosensitive Diode	0805_PT	Comet	KP-2012P3C	Kingbright	KP-2012P3C
QRZ-010701-0001	1	12.000MHz	Y1	Ceramic SMD Crystal	WTL3M21415			WTL	WTL3M21415
QRZ-010701-0002	1	ABS07-120-32.768KHZ-T	Y2	Crystal Oscillator	ABS07-120-32.768KHZ-T	Farnell	2467864	Abracon	ABS07-120-32.768KHZ-T
RES-010201-0001	10	0	R51, R54, R56, R67, R95, R127, R128, R178, R203, R214	Resistor	0402_L	Comet	R0402 0R 5%	Uni Ohm	
RES-010201-0002	1	36.5k	R2	Resistor	0402_L	Farnell	2302795	Panasonic	ERJ2RKF3652X
RES-010201-0003	1	34k	R200	Resistor	0402_L	Farnell	2302790	Panasonic	ERJ2RKF3402X
RES-010201-0004	10	4.7k	R4, R5, R6, R17, R22, R46, R49, R50, R204, R213	Resistor	0402_L	Comet	R0402 4.7K 1% YAG/ASJ	ASJ	
RES-010201-0005	6	47k	R12, R39, R52, R55, R89, R118	Resistor	0402_L	Comet	R0402 47K 1% YAG/ASJ	ASJ	
RES-010201-0006	6	5.6k	R10, R62, R64, R75, R114, R117	Resistor	0402_L	TME	SMD0402-5K6-1%	Royal Ohm	0402WGF5601TCE
RES-010201-0007	6	10k	R15, R38, R53, R107, R108, R111	Resistor	0402_L	Comet	R0402 10K 1% YAG/ASJ	ASJ	
RES-010201-0009	1	6.2k	R201	Resistor	0402_L	TME	SMD0402-6K2-1%	Royal Ohm	0402WGF6201TCE
RES-010201-0011	4	220k	R16, R43, R116, R141	Resistor	0402_L	Comet	R0402 220K 1% YAG/ASJ	ASJ	



	<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
	<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

RES-010201-0012	1	330k	R19	Resistor	0402_L	Comet	R0402 330K 1% YAG/ASJ	ASJ	
RES-010201-0013	13	30k	R20, R21, R28, R29, R32, R33, R34, R44, R90, R93, R126, R139, R211	Resistor	0402_L	TME	SMD0402-30K-1%	Royal Ohm	0402WGF3002TCE
RES-010201-0014	1	33	R23	Resistor	1206_L	Comet	R1206 33R 1% YAG/ASJ	Yageo	
RES-010201-0015	10	100k	R7, R8, R24, R25, R27, R37, R80, R101, R102, R123	Resistor	0402_L	Comet	R0402 100K 1% YAG/ASJ	ASJ	
RES-010201-0016	1	1.5	R26	Resistor	1206_L	Comet	R1206 1.5R 1% VISHAY	Vishay	CRCW12061R50FKTABC
RES-010201-0017	2	100	R31, R81	Resistor	0402_L	Comet	R0402 100R 1% YAG/ASJ	ASJ	
RES-010201-0018	1	20k	R35	Resistor	0402_L	Comet	R0402 20K 1% YAG/ASJ	ASJ	
RES-010201-0019	3	680k	R30, R40, R110	Resistor	0402_L	Comet	R0402 680K 1% YAG/ASJ	ASJ	
RES-010201-0020	19	1k	R41, R45, R58, R59, R60, R61, R65, R72, R73, R86, R103, R109, R113, R115, R124, R137, R138, R208, R210	Resistor	0402_L	Comet	R0402 1.0K 1% YAG/ASJ	ASJ	
RES-010201-0021	2	1M	R42, R91	Resistor	0402_L	Comet	R0402 1.0M 1% YAG/ASJ	ASJ	
RES-010201-0022	1	750	R47	Resistor	0402_L	Farnell	1458823	Yageo	RC0402FR-07750RL
RES-010201-0023	4	22	R57, R68, R70, R74	Resistor	0402_L	Comet	R0402 22R 1% YAG/ASJ	ASJ	
RES-010201-0024	1	1	R87	Resistor	0402_L	TME	RC0402JR-071RL	Yageo	RC0402JR-071RL
RES-010201-0025	1	12	R112	Resistor	0402_L	TME	SMD0402-12R-1%	Royal Ohm	0402WGF120JTCE
RES-010201-0029	1	10 k	R11	Resistor	0805_L	Comet	R0805 10K 1% YAG	Yageo	
RES-010201-0030	1	62k	R84	Resistor	0402_L	TME	SMD0402-62K-1%	Royal Ohm	0402WGF6202TCE
RES-010201-0031	1	130k	R88	Resistor	0402_L	Comet	R0402 130K 1% YAG/ASJ	ASJ	
RES-010201-0032	2	120	R92, R129	Resistor	1206_L	Comet	R1206 120R 1%	Uni Ohm	1206S4F0121T50
RES-010201-0151	1	82k	R14	Resistor	0402_L	Comet	R0402 82K 1% YAG/ASJ	ASJ	
RES-010201-0153	2	56	R136, R209	Resistor	0402_L	Comet	R0402 56R 1% YAG/ASJ	ASJ	
RES-010201-0154	1	3.3k	R207	Resistor	0402_L	Comet	R0402 3.3K 1% WAL/ASJ	ASJ	
RES-010299-0001	1	B57330V2103J260	RT2	Thermistor	0603_N	Farnell	2476062	Epcos	B57330V2103J260
TRN-010501-0001	1	MMBT5551	Q4	NPN Transistor	SOT23_L	Comet	MMBT5551 SMD	ON Semiconductor	MMBT5551LT1G
TRN-010503-0001	2	MMBT5401	Q2, Q3	PNP Transistor	SOT23_L	Comet	MMBT5401 SMD	ON Semiconductor	MMBT5401LT1G
TRN-010503-0002	1	BC807-40	Q7	PNP Transistor	SOT23_L	Comet	BC807-40 SMD	NXP	BC807-40
TRN-010505-0001	3	SPN7002T	Q8, Q10, Q12	Dual N-Channel Enhancement Mode MOSFET	SOT363_N			SYNC Power	SPN7002TS36RGB
TRN-010505-0002	6	BSS138	Q14, Q16, Q17, Q18, Q21, Q22	N-Channel MOSFET	SOT23_L	Comet	BSS138 SMD	Diodes	BSS138-7-F
TRN-010507-0001	1	ZXMP10A17E6	Q1	P-Channel MOSFET	SOT23-6_N	Comet	ZXMP10A17E6	Diodes	ZXMP10A17E6TA
TRN-010507-0011	4	SPP2323	Q6, Q9, Q11, Q13	Dual 20V P-Channel Enhancement Mode MOSFET	DFN2020-6L			Covason	SPP2323TDN6RGB
TRN-010510-0002	2	MMUN2111LT1G	Q15, Q200	PNP Transistor	SOT23_L	Comet	MMUN2111LT1G	ON Semiconductor	MMUN2111LT1G
TRN-010599-0001	1	PUMD13,115	Q5	NPN/PNP Resistor-equipped Transistor	SOT363_N	Farnell	2336827	NXP	PUMD13,115



Document code: JSBT41 ADE

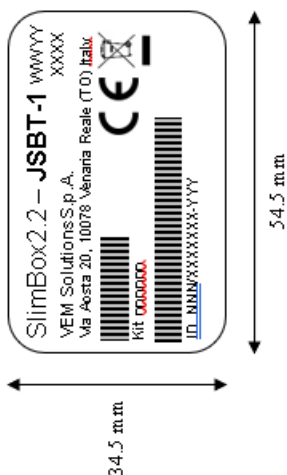
The information contained in this document are property of VEM Solutions SpA and can neither be disclosed nor reproduced.	<b>File NAME:</b> JSBT ADT - Technical Dossier SlimBox2.x.docx	Page 16 of 35
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<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

Document code: JSBT51\_ADE

Disegno n°	JSBT51_DE	Titolo	Disegno etichetta imballo Kit <b>SlimBox 2.2 -- JSBT-1</b>
Revisione	A	Vedere Tabella rev	
Data	17/11/2023	Scala	--
Codice etichetta	1900980	Materiale	Carta adesiva
Redazione	Ferrari	Controllo	Crua
Approvazione	Strocchi	Qualità	Marchesini



**Scritte intestazione etichetta:** 'SlimBox 2.2 -- JSBT-1' Arial 12 Grassetto;  
'VEM SOLUTIONS S.p.A.' Arial 8;  
'Via Aosta 20, 10078 Venaria Reale (TO) Italy' Arial 7;  
'WWYY' (settimana e anno) Arial 8;  
'XXXX' n°operatore Arial 8

**Barcode:**  
Code 128  
La lettera iniziale del 1° barcode prevede una **A** davanti al codice Kit  
La lettera iniziale del 2° barcode prevede una **X** davanti al codice ID apparato

**Scritte barcode:**  
Arial 7 Grassetto  
Codice KIT: **nnnnnn**  
per dati ID apparato (vedere Tabella di Configurazione Prodotti), dove:  
**NNN:** Eol Configurazione  
**XXXXXXX:** Range ID  
**YYY:** modello operativo (Mod)

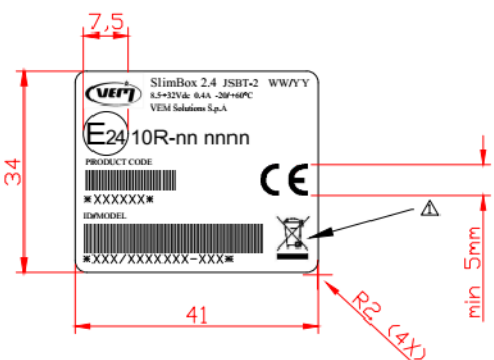
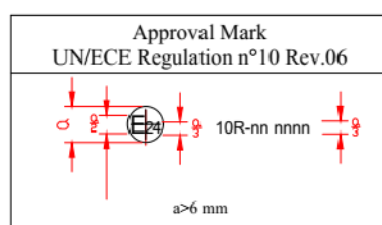



altezza minima 5mm **NON VARIARE LE PROPORZIONI DEL LOGO!**  
altezza minima 7mm **NON VARIARE LE PROPORZIONI DEL LOGO!**

Tabella revisioni		
REV	DE SCRIZIONE	DATA
A	Emissione	17/11/2023



## 5.6 Electronic unit identification label for JSBT-2

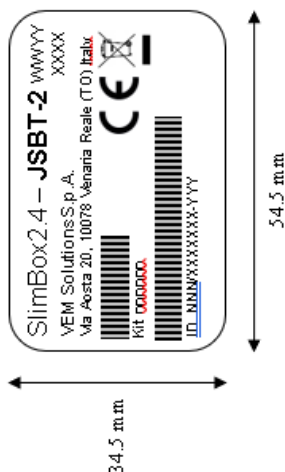
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<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

Document code: JSBT52\_ADE

Disegno n°	JSBT52_DE	Titolo	Disegno etichetta imballo Kit <b>SlimBox 2.4 – JSBT-2</b>
Revisione	A	Vedere Tabella rev.	
Data	17/11/2023	Scala	--
Codice etichetta	1900980	Materiale	Carta adesiva
Redazione	Ferrari	Controllo	Crua
Approvazione	Strocchi	Qualità	Marchesini



**Scritte intestazione etichetta:** 'SlimBox 2.4 – JSBT-2' Arial 12 Grassetto;  
'VEM SOLUTIONS S.p.A.' Arial 8;  
'Via Aosta 20, 10078 Venaria Reale (TO) Italy' Arial 7;  
'WWYY' (settimana e anno) Arial 8;  
'XXXX' n° operatore Arial 8

**Barcode:** Code 128  
La lettera iniziale del 1° barcode prevede una **A** davanti al codice Kit  
La lettera iniziale del 2° barcode prevede una **X** davanti al codice ID apparato

**Scritte barcode:** Arial 7 Grassetto  
Codice KIT: nnnnnn  
per dati ID apparato (vedere Tabella di Configurazione Prodotti), dove:  
**NNN:** Eq. Configurazione  
**XXXXXXX:** Range ID  
**YYY:** modello operativo (Mod)  
altezza minima 5mm **NON VARIARE LE PROPORZIONI DEL LOGO!**  
altezza minima 7mm **NON VARIARE LE PROPORZIONI DEL LOGO!**

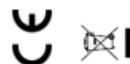
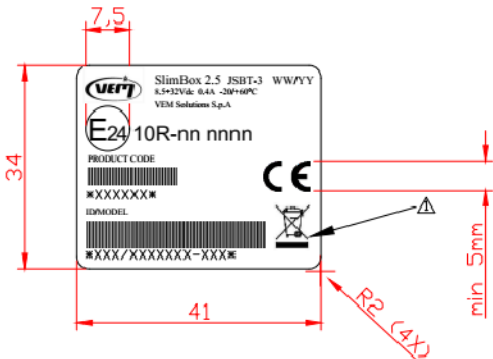
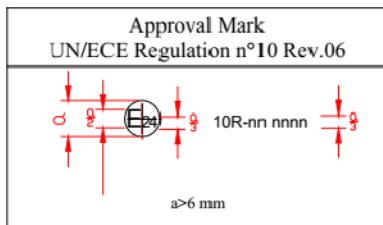





Tabella revisioni		
REV	DESCRIZIONE	DATA
A	Emissione	17/11/2023

## 5.7 Electronic unit identification label for JSBT-3

Document code: JSBT43\_ADE

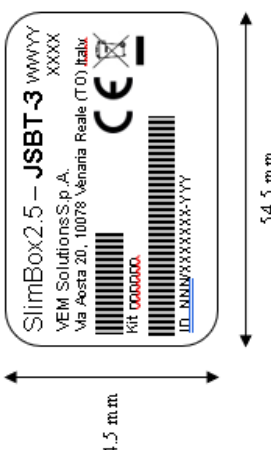
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<b>Document type:</b> Project Documentation	<b>Editor:</b> I. Raynov	<b>Document number:</b> JSBT__ADT
<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

Document code: JSBT53\_ADE

Disegno n°	JSBT53_DE	Titolo	Disegno etichetta imballo Kit <b>SlimBox 2.5 – JSBT-3</b>	
Revisione	A	Vedere Tabella rev.		
Data	17/11/2023	Scala	--	
Codice etichetta	1900980	Materiale	Carta adesiva	
Redazione	Ferriani	Controllo	Crua	
Approvazione	Strocchi	Qualità	Marchesini	



**Scritte intestazione etichetta:** 'SlimBox 2.5 – JSBT-3' Arial 12 Grassetto;  
 'VEM SOLUTIONS S.p.A.' Arial 8;  
 'Via Aosta 20, 10078 Venaria Reale (TO) Italy' Arial 7;  
 'WWW' (settimana e anno) Arial 8;  
 'XXXX' n°operatore Arial 8

**Barcode:**  
 Code 128  
 La lettera iniziale del 1° barcode prevede una **A** davanti al codice Kit  
 La lettera iniziale del 2° barcode prevede una **X** davanti al codice ID apparato

**Scritte barcode:**  
 Arial 7 Grassetto  
 Codice KIT: nnnnnn  
 per dati ID apparato (vedere Tabella di Configurazione Prodotti), dove:  
**NNN:** EqJ Configurazione  
**XXXXXXX:** Range ID  
**YYY:** modello operativo (Mod)  
 altezza minima 5mm NON VARIARE LE PROPORZIONI DEL LOGO  
 altezza minima 7mm NON VARIARE LE PROPORZIONI DEL LOGO




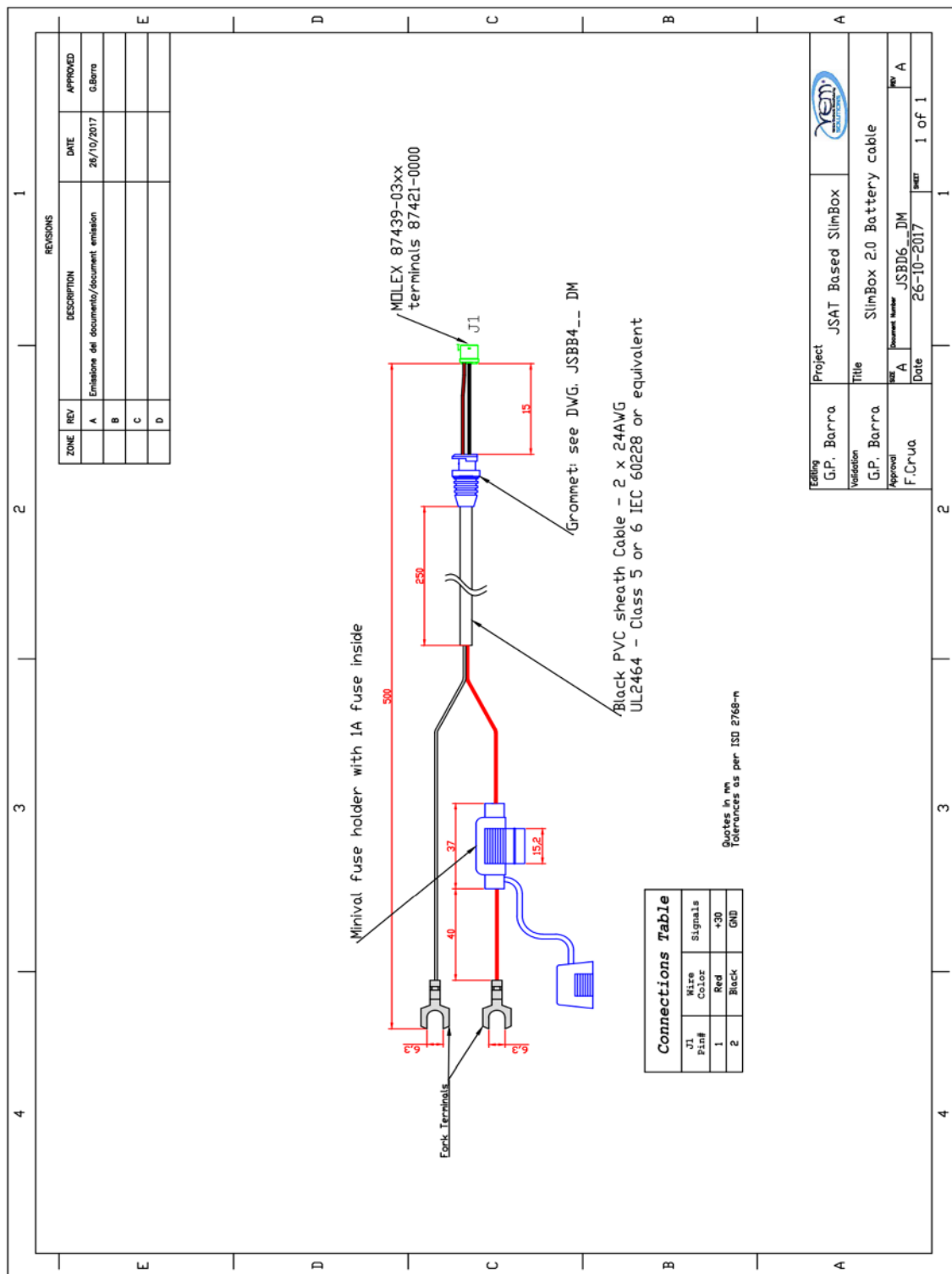
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REV	DESCRIZIONE	DATA
A	Emissione	17/11/2023





## 5.9 Cables / Accessories JSBT-1

Document code: JSBD6\_\_DM

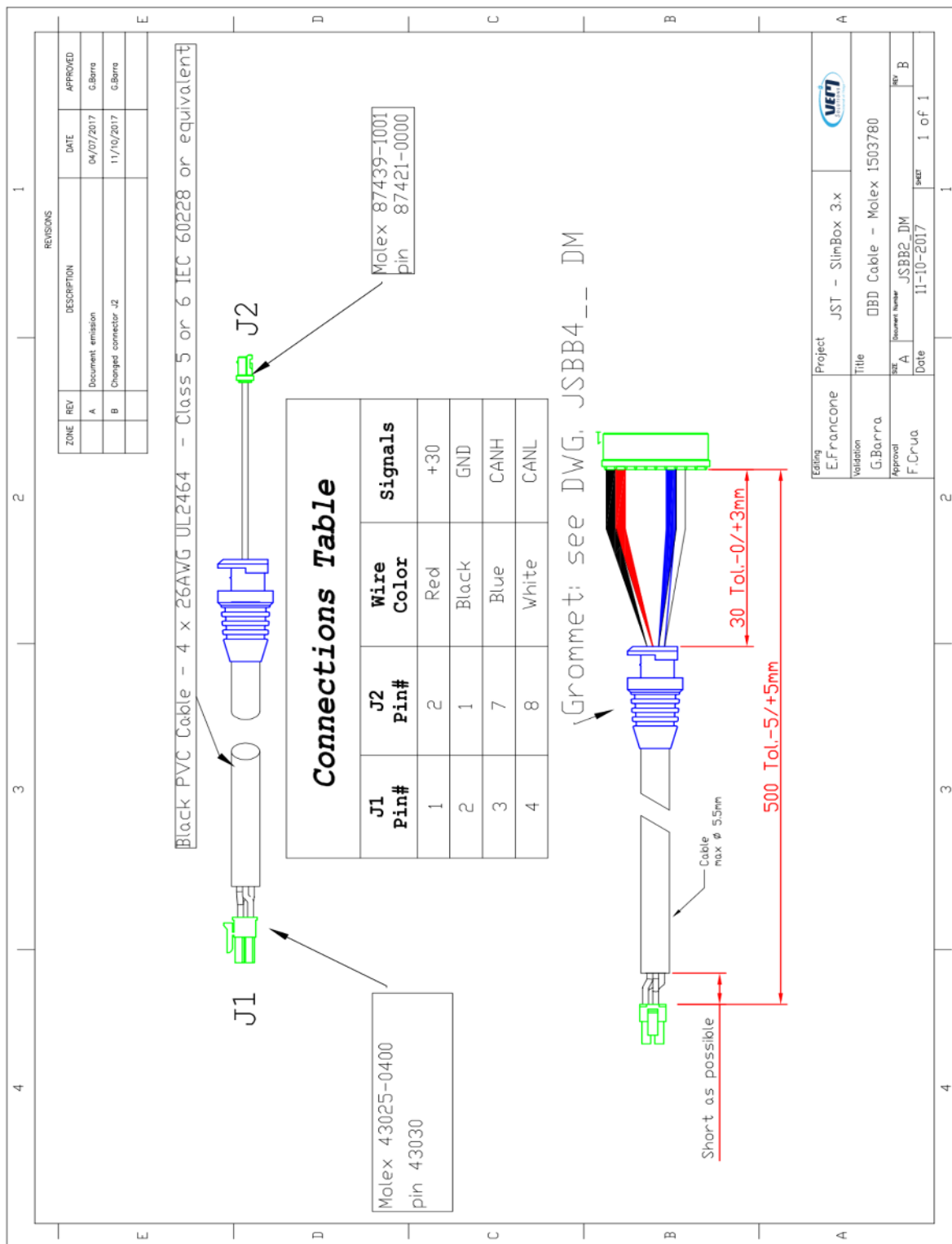




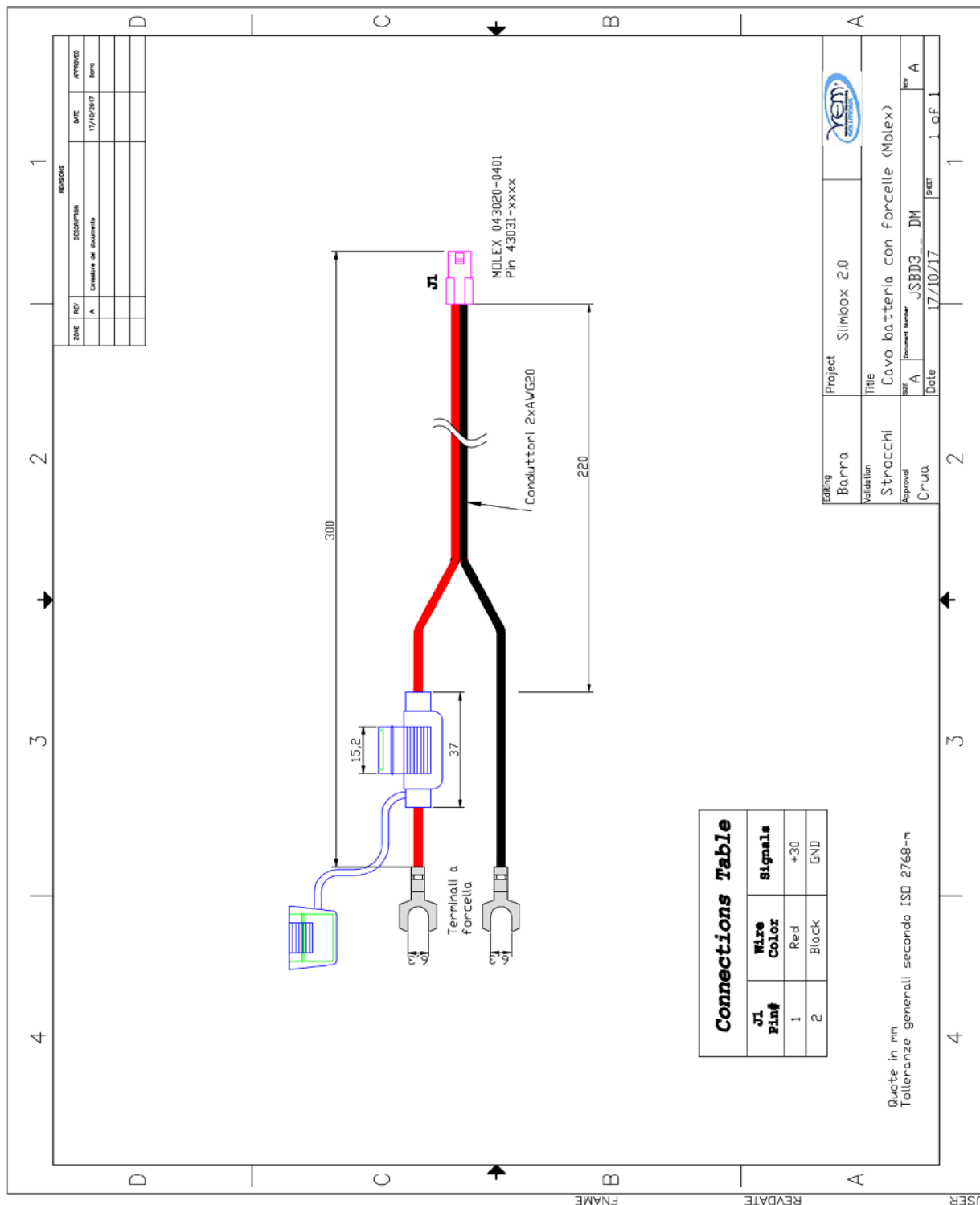


## 5.11 Cables / Accessories JSBT-3

Document code: JSBB2\_\_DM MOLEX



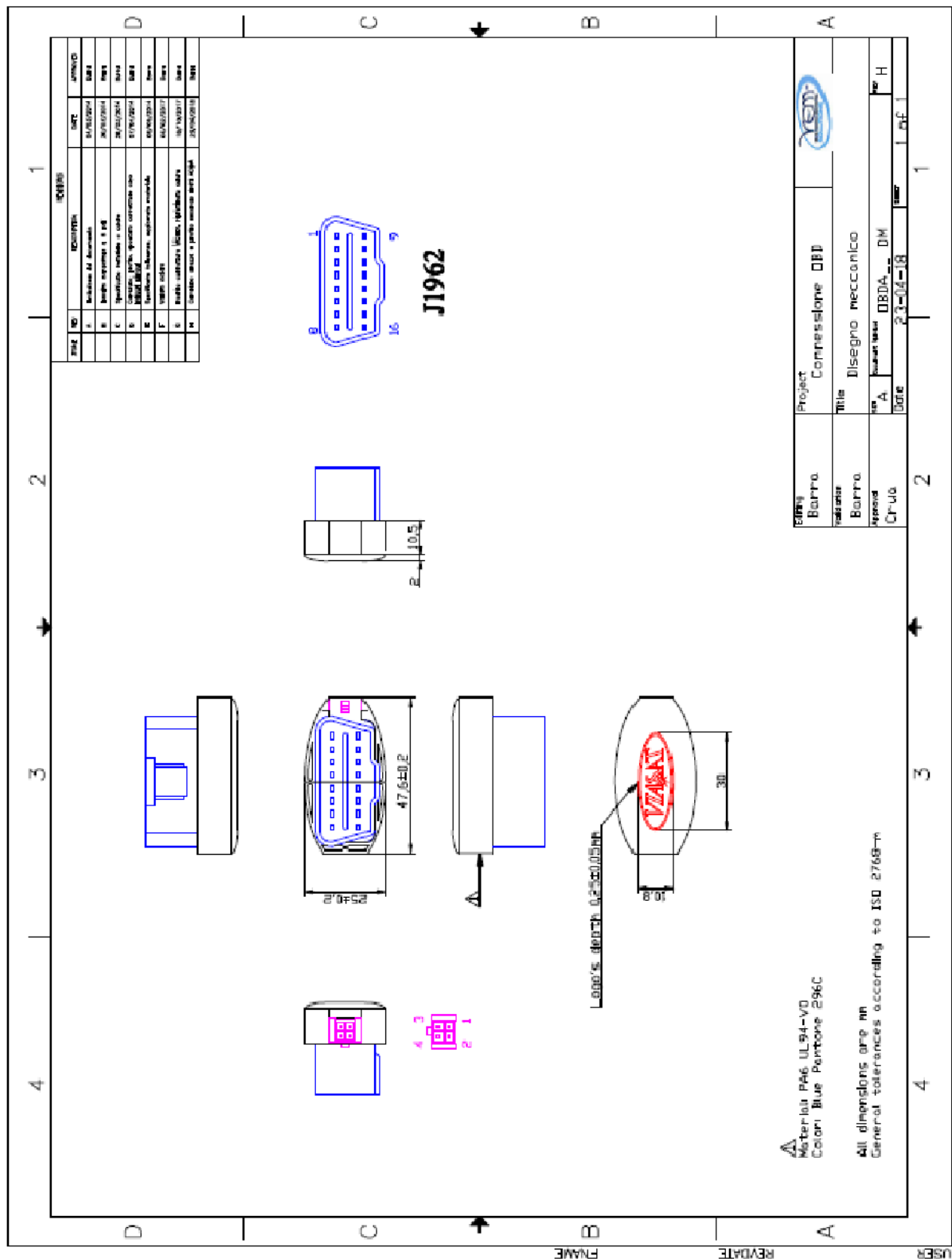
Document code: JSBD3\_\_DM





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Document code: OBDA\_\_DM



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<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

## 5.12 Datasheet

### 5.12.1 NiMH Battery pack 43AAA800mAh\*2

The respect customer: please read the following, our products will be delivered as a standard, if there is any discrepancy, please timely feedback.

#### Specification for Cylindrical Sealed Nickel Metal Hydride Batteries

**APPLICATION:** The applicable range: This specification is available only for the testing within one month since receipt of batteries. It's not a standard for stored goods.

1. Model: 43AAA800mAh\*2

#### 2. RATINGS

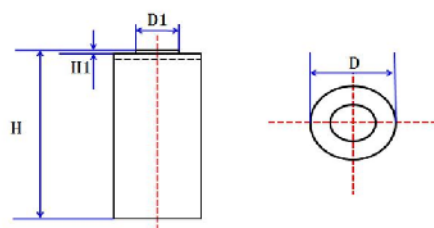
Nominal Voltage	2.4 V
Nominal	800 mAh
Minimum	760 mAh/0.2C
Standard charge rate	80 mA × 16h
Rapid charge rate	400 mA × 140min (-ΔV= 10mV)
Trickle charge current	20~40 mA
Value of dT/dt (for reference only)	1 to 2 °C/min
Operating temperature range	Humidity: +65%± 20%
Standard charge	0 to +45°C (32 to 113°F)
Rapid charge	+10 to +45°C (50 to 113°F)
Floating charge	-10 to +45°C (14 to 113°F)
Discharge	-20 to +65°C (-4 to 149°F)
Storage temperature range	Humidity : +65%±20%
Within 1 year	-20 to +35°C (-4 to 95°F)
Within 6 months	-20 to +45°C (-4 to 113°F)
Within 1 month	-20 to +55°C (-4 to 131°F)
Within 1 week	-20 to +65°C (-4 to 149°F)


Note :

- (1) All rapid charge methods should be discussed with our engineer
- (2) We stipulate to charge less than 50% fully power for delivery, if the charge is more than 50%, the battery has a certain latent risk. For the charge requirement is over 50% which caused quality problem, we do not undertake any responsibility.
- (3) Our battery guarantee time: 12 months
- (4) During storage period the batch battery is requested by the 50% electric charge, the battery storage surpasses 3 months, the recommendations 0.2C discharge to 2.0V and then add 50% of the electricity storage.

3. Measurement & Dimensions(cell)  
to see the drawing:

D	10.0~10.5mm
H	43.0~44.0mm
D1	4.65 ± 0.2mm
H1	0.4~1.0mm



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	<b>Document title:</b> Technical Dossier JSBT (SlimBox2.x)		<b>Date</b> 05/11/2023

## 5.12.2 Microcontroller (U7)



### GD32F205xx Datasheet

#### 1. General description

The GD32F205xx device belongs to the performance line of GD32 MCU Family. It is a new 32-bit general-purpose microcontroller based on the ARM® Cortex®-M3 RISC core with best cost-performance ratio in terms of processing capacity, reduced power consumption and peripheral set. The Cortex®-M3 is a next generation processor core which is tightly coupled with a Nested Vectored Interrupt Controller (NVIC), SysTick timer and advanced debug support.

The GD32F205xx device incorporates the ARM® Cortex®-M3 32-bit processor core operating at 120 MHz frequency with flash accesses zero wait states to obtain maximum efficiency. It provides up to 3072 KB on-chip flash memory and 256 KB SRAM memory. An extensive range of enhanced I/Os and peripherals connected to two APB buses. The devices offer up to three 12-bit 2 MSPS ADCs, two 12-bit DACs, up to ten 16-bit general timers, two 16-bit basic timers plus two 16-bit PWM advanced timers, as well as standard and advanced communication interfaces: up to three SPIs, three I2Cs, four USARTs and four UARTs, two I2Ss, two CANs, a SDIO, a USBFS. Additional peripherals as TFT-LCD Interface (TLI) and EXMC interface with SDRAM extension support are included.

The device operates from a 2.6 to 3.6V power supply and available in -40 to +85 °C temperature range. Several power saving modes provide the flexibility for maximum optimization of power consumption, an especially important consideration in low power applications.

The above features make GD32F205xx devices suitable for a wide range of interconnection and advanced applications, especially in areas such as industrial control, consumer and handheld equipment, embedded modules, human machine interface, security and alarm systems, automotive navigation and so on.



### 5.12.3 GSM/GNSS Module (U10)



Build a Smarter World

## Quectel MC60E

Ultra-small LCC Quad-band  
GSM/GPRS/GNSS Module  
With BT4.0 Function



MC60E is a quad-band full-featured GSM/GPRS/GNSS module using LCC castellation package. It is fully pin-to-pin compatible with Quectel MC60 module, and supports both BT4.0 and BT3.0 specifications. BT4.0 supports BLE (Bluetooth Low Energy) technology, which features ultra-low peak, average and idle mode power consumption, thus making MC60E especially ideal for applications requiring energy-efficient Bluetooth wireless connectivity. The module also supports Dual SIM Single Standby.

MC60E integrates both GPRS and GNSS engines in one compact and low profile SMT package. It supports EPO™ technology which provides predicted Extended Prediction Orbit to speed up TTFF without need of extra server. Based on EPO data, QuecFastFix Online function further reduces TTFF in cold start. EASY™ technology enables a very fast first fix when there is no enough satellite information. AlwaysLocate™ and GLP (GNSS Low Power) power saving modes ensure great positioning accuracy while with ultra-low power consumption. The built-in LNA provides the module with improved RF sensitivity and exceptional acquisition/tracking performances even in weak signal areas.

The compact form factor, great positioning performance, low power consumption and dual (U)SIM card interfaces make MC60E a best choice for a wide range of M2M applications, such as bicycle-sharing system, vehicle tracker, wearable device (smartwatch), pet tracker, asset tracker, driving recorder, etc.



#### Key Benefits

- ✓ Ultra compact size: 18.7mm × 16.0mm × 2.1mm
- ✓ Support Bluetooth 4.0 (GATT/PXP/FMP profiles) and Bluetooth 3.0 (SPP/HFP-AG profiles) specifications
- ✓ Easier soldering process with LCC package
- ✓ Low power consumption: 1.2mA @DRX=5
- ✓ Support voice, data, SMS and QuecFOTA™ functions
- ✓ Embedded abundant Internet service protocols
- ✓ Built-in LNA for higher sensitivity: -149dBm @Acquisition  
-167dBm @Tracking
- ✓ Multi-GNSS system: GPS, GLONASS, Galileo and QZSS
- ✓ GNSS receiver channels: 99 acquisition/33 tracking/210 PRN channels
- ✓ Support advanced technologies: EASY™/LOCUS™/EPO™/AlwaysLocate™/GLP/SDK/QuecFastFix Online
- ✓ Great anti-jamming performance due to multi-tone active interface canceller
- ✓ Support 1PPS function



Quad-band



GPRS Multi-slot  
Class 12



Extended Temperature  
Range: 40°C ~ +85°C



Highly Compact Size



LCC Package



Embedded Internet  
Services Protocols



Dual SIM  
Single Standby



Digital Audio



Bluetooth 4.0 &  
Bluetooth 3.0



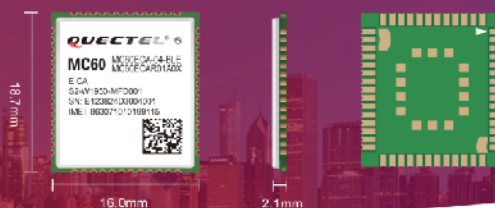
Multi-GNSS System

EMAIL US: [info@quectel.com](mailto:info@quectel.com)

VISIT US: [www.quectel.com](http://www.quectel.com)

# Quectel MC60E

Ultra-small LCC Quad-band  
GSM/GPRS/GNSS Module  
With BT4.0 Function



## Frequency Band

**Quad band:**  
850/900/1800/1900MHz

## Data

**GPRS Class 12:**  
Max 85.6kbps (Downlink)  
Max 85.6kbps (Uplink)  
**PBCCH**  
**Coding Schemes:**  
CS 1, 2, 3, 4  
**USSD**  
**Non-transparent Mode**

## SMS

Point to point MO and MT  
SMS Cell Broadcast  
Text and PDU Mode

## Voice

**Speech Codec Modes:**  
Half Rate (HR)  
Full Rate (FR)  
Enhanced Full Rate (EFR)  
Adaptive Multi-Rate (AMR)  
**Echo Arithmetic:**  
Echo Cancellation  
Echo Suppression  
Noise Reduction

## GNSS Features

**GPS L1 Band Receiver (1575.42MHz):**  
Channel: 33 (Tracking)/ 99 (Acquisition)/  
210 (PRN)  
**GLONASS L1 Band Receiver (1601.71MHz):**  
C/A Code  
SBAS: WAAS, EGNOS, MSAS, GAGAN  
**Horizontal Position Accuracy:**  
Autonomous: <2.5m CEP  
**Velocity Accuracy:**  
Without Aid: <0.1m/s  
**Acceleration Accuracy:**  
Without Aid: <0.1m/s<sup>2</sup>

## Advanced Technologies:

EASY™/LOCUS™/AlwaysLocate™/GLP/SDK/AIC/  
EPO™/QuecFastFix Online  
**Reacquisition Time:** <1s  
**TTFF @ 130dBm with QuecFastFix Online:**  
Cold Start: <4.5s  
**TTFF @ 130dBm with EASY™:**  
Cold Start: <15s  
Warm Start: <5s  
Hot Start: <1s  
**TTFF @ 130dBm without EASY™:**  
Cold Start: <35s  
Warm Start: <30s  
Hot Start: <1s  
**Sensitivity:**  
Acquisition: 149dBm  
Tracking: 167dBm  
Reacquisition: -161dBm  
**Dynamic Performance:**  
Maximum Altitude: 18000m  
Maximum Velocity: 515m/s  
Maximum Acceleration: 4G

## Interfaces

**(U)SIM Card Interface:** × 2 (3.0V/1.8V)  
**SD × 1**  
**UART:**  
× 3 (UART Port × 1, Debug Port × 1, GNSS UART  
Port × 1)  
**Analog Audio Channel:**  
2 Output Channels and 1 Input Channel  
**Bluetooth:**  
BT4.0 (BLE Profile: GATT/PXP/FMP)  
BT3.0 (Profile: SPP/HFP-AG)  
**ADC × 1**  
**GPIO × 1**  
**PCM × 1 (LGA Pad)**  
**RTC × 1**  
**Antenna Pad:**  
× 3 (GSM Antenna Pad × 1, GNSS Antenna Pad  
× 1, Bluetooth Antenna Pad × 1)

## Enhanced Features

eCall  
CMUX  
Dual UART  
DSSS  
STK  
Audio Play  
QuecLocator  
OpenCPU  
FOTA  
BT4.0 & BT3.0  
QuecFile  
(U)SIM Card Detection  
GNSS  
Jamming Detection  
Firmware Update

## Electrical Characteristics

**Output Power:**  
Class 4 (2W @850/900MHz)  
Class 1 (1W @1800/1900MHz)  
**Power Consumption:**  
1.2mA @DRX=5  
**Supply Voltage:**  
3.3V~4.6V, 4.0V Typ.

## Software Features

BT4.0 & BT3.0  
GNSS: GPS/GLONASS/Galileo/QZSS  
Protocols: TCP/UDP/FTP/HTTP/PPP/SSL

## General Features

GPRS Multi slot Class: Class 12  
GPRS Mobile Station: Class B  
Great Anti jamming Performance due to  
Multi-tone Active Interface Canceller  
Support 1PPS Function  
Built in LNA for Higher Sensitivity  
Extended Temperature: -40°C ~ +85°C  
Dimensions: 18.7mm × 16.0mm × 2.1mm  
LCC Package  
Approx. 1.3g  
GSM 07.07, 07.05 and other Enhanced  
AT Commands

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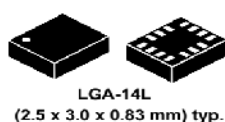
## 5.12.4 Accelerometer LSM6DSOTR (U9)



## LSM6DSO

### Datasheet

iNEMO inertial module: always-on 3D accelerometer and 3D gyroscope



### Features

- Power consumption: 0.55 mA in combo high-performance mode
- "Always-on" experience with low power consumption for both accelerometer and gyroscope
- Smart FIFO up to 9 kbyte
- Android compliant
- $\pm 2/\pm 4/\pm 8/\pm 16$  g full scale
- $\pm 125/\pm 250/\pm 500/\pm 1000/\pm 2000$  dps full scale
- Analog supply voltage: 1.71 V to 3.6 V
- Independent IO supply (1.62 V)
- Compact footprint: 2.5 mm x 3 mm x 0.83 mm
- SPI / I<sup>2</sup>C & MIPI I3C<sup>SM</sup> serial interface with main processor data synchronization
- Auxiliary SPI for OIS data output for gyroscope and accelerometer
- Advanced pedometer, step detector and step counter
- Significant Motion Detection, Tilt detection
- Standard interrupts: free-fall, wakeup, 6D/4D orientation, click and double-click
- Programmable Finite State Machine: accelerometer, gyroscope and external sensors
- Embedded temperature sensor
- ECOPACK<sup>®</sup>, RoHS and "Green" compliant

### Applications

- Motion tracking and gesture detection
- Sensor hub
- Indoor navigation
- IoT and connected devices
- Smart power saving for handheld devices
- EIS and OIS for camera applications
- Vibration monitoring and compensation

### Description

The **LSM6DSO** is a system-in-package featuring a 3D digital accelerometer and a 3D digital gyroscope boosting performance at 0.55 mA in high-performance mode and enabling always-on low-power features for an optimal motion experience for the consumer.

The LSM6DSO supports main OS requirements, offering real, virtual and batch sensors with 9 kbytes for dynamic data batching. ST's family of MEMS sensor modules leverages the robust and mature manufacturing processes already used for the production of micromachined accelerometers and gyroscopes. The various sensing elements are manufactured using specialized micromachining processes, while the IC interfaces are developed using CMOS technology that allows the design of a dedicated circuit which is trimmed to better match the characteristics of the sensing element.

Product status link		
<a href="#">LSM6DSO</a>		
Product summary		
Order code	LSM6DSO	LSM6DSOTR
Temperature range [°C]	-40 to +85	
Package	LGA-14L (2.5 x 3 x 0.83 mm)	
Packing	Tray	Tape & Reel
Product label		
		



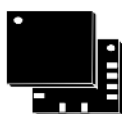
## 5.12.5 Accelerometer LIS2DH12TR (U15)



## LIS2DH12

**MEMS digital output motion sensor:  
ultra-low-power high-performance 3-axis "femto" accelerometer**

Datasheet - production data



LGA-12 (2.0x2.0x1 mm)

### Features

- Wide supply voltage, 1.71 V to 3.6 V
- Independent IO supply (1.8 V) and supply voltage compatible
- Ultra-low power consumption down to 2  $\mu$ A
- $\pm 2g/\pm 4g/\pm 8g/\pm 16g$  selectable full scales
- I<sup>2</sup>C/SPI digital output interface
- 2 independent programmable interrupt generators for free-fall and motion detection
- 6D/4D orientation detection
- "Sleep-to-wake" and "return-to-sleep" functions
- Free-fall detection
- Motion detection
- Embedded temperature sensor
- Embedded FIFO
- ECOPACK<sup>®</sup>, RoHS and "Green" compliant

### Applications

- Motion-activated functions
- Display orientation
- Shake control
- Pedometer
- Gaming and virtual reality input devices
- Impact recognition and logging

### Description

The LIS2DH12 is an ultra-low-power high-performance three-axis linear accelerometer belonging to the "femto" family with digital I<sup>2</sup>C/SPI serial interface standard output.

The LIS2DH12 has user-selectable full scales of  $\pm 2g/\pm 4g/\pm 8g/\pm 16g$  and is capable of measuring accelerations with output data rates from 1 Hz to 5.3 kHz.


The self-test capability allows the user to check the functionality of the sensor in the final application.

The device may be configured to generate interrupt signals by detecting two independent inertial wake-up/free-fall events as well as by the position of the device itself.

The LIS2DH12 is available in a small thin plastic land grid array package (LGA) and is guaranteed to operate over an extended temperature range from -40 °C to +85 °C.

**Table 1. Device summary**

Order code	Temp. range [°C]	Package	Packaging
LIS2DH12TR	-40 to +85	LGA-12	Tape and reel

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## 6. Compliance to 2014/53/UE directive

The software used by the device doesn't manage output power of the radio frequencies module(s).

## 7. Installation and user Manual

This document is provided separately and:

- the code of manual for JSBT-1 is JSBT61\_AMI.
- the code of manual for JSBT-2 is JSBT62\_AMI.
- the code of manual for JSBT-3 is JSBT63\_AMI.

## 8. Packaging artwork



## 9. ISO 9001 Conformity certificate

This document is provided separately.

# SLIMBOX 2.2

(JSBT-1)



## Instructions and warnings

## Declaration of conformity

**VEM Solutions S.p.A.**

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url: [www.vemsolutions.it](http://www.vemsolutions.it) – email: [contatti@vemsolutions.it](mailto:contatti@vemsolutions.it)  
Share capital euro 1.145.000 f.p. – VAT registration number 02245600016

**E24\*10R06/02\*5258\*00**

## 1 Foreword

SlimBox2.2 (JSBT-1) is a slim tracking device that embeds every advanced function and feature of a insurance's box. The device connection to the vehicle can be done by two-wires power harness. The installation methods are easy and fast. Please follow step by step the instructions below to obtain a good result.

**Attention:** It is important to read the entire contents of this guide prior to perform any maintenance and/or installation.

Failure to follow these instructions could cause a risk of electric shock.



## 2 Kit composition

---

N. 1 SlimBox2.2 (JSBT-1) device

---

N. 1 Instructions and warnings

---

N. 1 Kit adhesive pad

---

## 3 Functions and services

To know services and functions enabled on your system refer to your subscription and commercial documents on line or at the supply/installation Center.

Before installation **remember to pair correctly the device ID and the vehicle's plate number**; communicate this association to the Control Room. This action is mandatory to engage the final device activation.

The device uses a M2M SIM, **the pairing between the device ID and the phone number is automatic during the manufacturing process or it is communicated at contract's subscription.**

## 4 Installation procedure

The installation has to be done with **the engine turned off** and **a good level of GNSS signal**. Enclosed or underground spaces aren't recommended since GNSS signal could be not sufficient.

To obtain a good installation it's important to:

- Locate vehicle's battery position.
- Find the best place for the device, choosing a smooth surface to achieve a good adherence and ensure device stability. **Please don't fix the system at the chosen location yet.**
- Proceed with installation steps; pay attention to orient the system with the LED facing up to guarantee a good signal reception.
- Fix definitively the system on the vehicle's battery.
- **Don't discard the outer cardboard box:** it has to be used for shipping back the unit when removed.

**Attention:** a bad fixing could cause false crash alarms of and change the device orientation. This situation generates a request for system revision.

Read the whole instruction guide and keep it for future reference.



"Warning icons outline a notice about possible danger of electric shock."

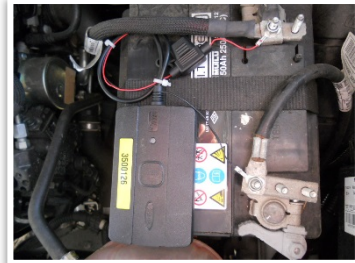
## 4.1 SlimBox with direct connection to vehicle's battery

### a) Installation stage

1. Locate the battery referring to vehicle's use & maintenance manual.  
Verify that the possibility to intervene on vehicle's battery is not limited to car manufacturer authorized personnel or that it doesn't require equipment and professional knowledge.
2. Disconnect the negative pole of the battery.  
**Attention: skipping this operation creates a real danger of electric shock.**
3. Connect the terminal of the two wires cable to the vehicle's battery, the red one to the positive pole and the black one to the negative, following what is written below:
  - a. Loose the positive side, insert the SlimBox2.2 (JSBT-1) cable fork (positive pole – red) and tighten the nut.
  - b. Insert the SlimBox2.2 (JSBT-1) cable fork (negative pole - black) together with the negative side of the battery, you have disconnected before, then lock the nut.



It is mandatory to execute the activity in the manner and order described above.



## 5 Activation, test and fixing

### a) Activation and test stage

1. SlimBox2.2(JSBT-1) turns on just powered, the diagnostic LED blinks YELLOW and will remain active for 30 minutes since power on, then will go in standby mode. During this step SlimBox2.2 (JSBT-1) runs a self-diagnostic program, verifying the principal signals (K30, GSM e GNSS) autonomously.  
Note: the GSM signal lock is normally quick, but the search for GNSS signal might take few minutes, especially on the first time.
2. If signal level is ok, diagnostic LED changes from blinking YELLOW to blinking GREEN and the device sends a request of activation to the operative Center. The transition from step 5 to 6 is usually very quick, so blinking GREEN light could be undetected.
3. The Operation Center takes in charge the request and activates the system: the diagnostic LED becomes fix GREEN. From this moment onward it is recommended to avoid interrupting the electric connection. If the LED keeps blinking GREEN it is possible to proceed with Fixing Stage, the system will complete the Activation and Test procedure anyway.

### b) Fixing Stage

1. Focus on a smooth and rigid surface on battery, as suggested for SlimBox2.2 (JSBT-1) positioning, clean it carefully. Then fix the SlimBox2.2 (JSBT-1) using the adhesive pads. Fix the surplus cable with nylon ties, if necessary.

#### Activation failure

Diagnostic LED will be continue blinking YELLOW if signal levels aren't sufficient (item 4 of paragraph b"). The Client will therefore have to:

- move the vehicle it in a place with better GSM/GNSS coverage;
- Wait for signal GSM/GNSS reception (diagnostic LED GREEN or blinking GREEN).

In the case of further failure contact the **Customer Service**.

## 6 Diagnostic LED state summary

State	Diagnostic LED State	Meanings
Waiting for activation	YELLOW blinking	GSM or GNSS anomaly
	GREEN blinking	Activation request in progress (system self-diagnostic OK)
Operative	GREEN fix	The device is active, no anomalies

## 7 Warnings

- SlimBox2.2 (JSBT-1) should be installed in accordance with the manufacturer's instruction of this manual and in accordance with limits/recommendations of vehicle's manufacturer.
- It is important you read the entire contents of this guide prior to perform any maintenance and/or installation work. Failure to follow these instructions could cause a risk of electric shock. Vem Solutions S.p.A. has no responsibility for damage if User doesn't follow the instruction in this guide.
- The system includes a non-removable SIM, necessary to GSM communication with the call center.
- VEM Solutions S.p.A. declines any responsibility in case of malfunction due to:
  - installations not compliant to this manual
  - GSM/GPRS network
  - satellite network GNSS (Global Navigation Satellite System).
- Wiring different from specifications or not compliant may cause damage to the driver or to the vehicle.
- VEM Solutions S.p.A. reserves the right to make changes and improvements to the products and procedures described herein without notice.
- SlimBox2.2 (JSBT-1) must be protected from tampering, excessive heat, liquids (water, mud, oil, fuel), weather and direct sunlight. Do not wash it with water jets or water under pressure. The unit must be kept far from other electronic devices such as radios, CD/DVD players, power units, amplifiers, power harness and, in general, sources of electromagnetic interference.
- The device must be firmly fixed to the vehicle using adhesive pads. Please avoid to fix it on easily deformable parts, subject to vibration or that could modify the system orientation going on (round section rails, bundles of electric cables, not structural elements in the passenger compartment). Take care to not bend or damage the cables since this could cause intermittent and hardly detectable failures.
- System batteries is automatically recharged when the unit is connected to the power source. Maintenance state function is recommended every time it is disconnected by power source for necessary actions such as repair works, mechanical operations, car washing, navy crossings are carried out or for personal reasons. It's necessary to contact the operation center to enable this function on your device. When the system is in Maintenance mode it cannot send any alarm. During this time services are not guaranteed.
- Even if it is a low-power device it is active even when key are turned off to maintain connection with the Control Room and to send alarms. According to vehicle type and use in some case the vehicle battery may be discharged. If this is the case it would be useful to suggest to the end User a maintenance charging device or periodically recharge the vehicle's battery.

**The lack of this action will represent a real risk of electric shock.**





## 8 Declaration of conformity CE

The manufacturer VEM Solutions S.p.A. declares that the radio equipment SlimBox2.2 (JSBT-1) complies with the 2014/53/UE Directive to ensure safety of people by answering to every reliability criteria.

The equipment operates on four frequency bands (850/900/1800/1900MHz) and the maximum radiated power transmitted is:

- Class 4 (2W) for GSM850
- Class 4 (2W) for EGSM900
- Class 1 (1W) for GSM1800
- Class 1 (1W) for GSM1900

VEM Solutions declares that the product SlimBox2.2 (JSBT-1) complies with the essential requirements of Directive UN/ECE R10 and it is immune to voltage transients according to ISO. The system is warranted not to interfere with the normal vehicle operation if correctly installed. The system includes a class 3 GNSS receiver.

The full text of the EU declaration of conformity is available at the internet address:

<https://www.vemsolutions.it/certificazioni/>

### VEM Solutions S.p.A.

via Aosta n.20/22/24, 10078 Venaria Reale (TO), Italy

Phone: +39 011 4560201

url: [www.vemsolutions.it](http://www.vemsolutions.it) - email: [contatti@vemsolutions.it](mailto:contatti@vemsolutions.it)

Manual Code: 190xxxx (JSBT61\_AMI)

# SLIMBOX 2.4

(JSBT-2)



## Instructions and warnings

## Declaration of conformity

VEM Solutions S.p.A.

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url: [www.vemsolutions.it](http://www.vemsolutions.it) – email: [contatti@vemsolutions.it](mailto:contatti@vemsolutions.it)  
Share capital euro 1.145.000 f.p. – VAT registration number 02245600016

**E24\*10R06/02\*5258\*00**

## 1 Foreword

SlimBox2.4 (JSBT-2) is a slim tracking device that embeds every advanced function and feature of a insurance's box. The device connection to the vehicle can be done by OBD plug or two-wires power harness. Both installation methods are easy and fast. Please follow step by step the instructions below to obtain a good result.

**Attention:** It is important to read the entire contents of this guide prior to perform any maintenance and/or installation.

Failure to follow these instructions could cause a risk of electric shock.



## 2 Kit composition

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N. 1 SlimBox2.4 (JSBT-2) device

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N. 1 Instructions and warnings

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N. 1 Kit nylon ties

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N. 1 Push Button

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## 3 Functions and services

To know services and functions enabled on your system refer to your subscription and commercial documents on line or at the supply/installation Center.

Before installation **remember to pair correctly the device ID and the vehicle's plate number**; communicate this association to the Control Room. This action is mandatory to engage the final device activation.

The device uses a M2M SIM, **the pairing between the device ID and the phone number is automatic during the manufacturing process or it is communicated at contract's subscription.**

## 4 Installation procedure

The installation has to be done with **the engine turned off and a good level of GNSS signal**. Enclosed or underground spaces aren't recommended since GNSS signal could be not sufficient.

To obtain a good installation it's important to:

- Locate vehicle's OBD plug or battery position.
- Find the best place for the device, choosing a smooth surface to achieve a good adherence and ensure device stability. **Please don't fix the system at the chosen location yet.**
- Proceed with installation steps; pay attention to orient the system with the LED facing up to guarantee a good signal reception.
- Fix definitively the system near the OBD plug or on the vehicle's battery.
- **Don't discard the outer cardboard box:** it has to be used for shipping back the unit when removed.

**Attention:** a bad fixing could cause false crash alarms of and change the device orientation. This situation generates a request for system revision.

Read the whole instruction guide and keep it for future reference.



"Warning icons outline a notice about possible danger of electric shock."

## 4.1 SlimBox with direct connection to vehicle's battery

### a) Installation stage

1. Locate the best place under the dashboard. The device must be not interference in any case with the steering wheel or with the gas, break or clutch pedals.
2. Disconnect both poles of the battery.

**Attention: skipping this operation creates a real danger of electric shock.**

3. Connect the terminal of the two wires cable to the vehicle's power supply, the red one to the positive pole and the black one to the negative.
4. Locate the place for the push button and connect it with the device.



5. Reconnect both poles of the battery.

## 5 Activation, test and fixing

### a) Activation and test stage

1. SlimBox2.4(JSBT-2) turns on just powered, the diagnostic LED blinks YELLOW and will remain active for 30 minutes since power on, then will go in standby mode. During this step SlimBox2.4 (JSBT-2) runs a self-diagnostic program, verifying the principal signals (K30, GSM e GNSS) autonomously.

Note: the GSM signal lock is normally quick, but the search for GNSS signal might take few minutes, especially on the first time.

2. If signal level is ok, diagnostic LED changes from blinking YELLOW to blinking GREEN and the device sends a request of activation to the operative Center. The transition from step 5 to 6 is usually very quick, so blinking GREEN light could be undetected.
3. The Operation Center takes in charge the request and activates the system: the diagnostic LED becomes fix GREEN. From this moment onward it is recommended to avoid interrupting the electric connection. If the LED keeps blinking GREEN it is possible to proceed with Fixing Stage, the system will complete the Activation and Test procedure anyway.

### b) Fixing Stage

1. Focus on a smooth and rigid surface, as suggested for SlimBox2.4 (JSBT-2) positioning. Then fix the SlimBox2.4 (JSBT-2) using the ties. Fix the surplus cable with other nylon ties, if necessary.

### Activation failure

Diagnostic LED will be continue blinking YELLOW if signal levels aren't sufficient (item 4 of paragraph b"). The Client will therefore have to:

- move the vehicle it in a place with better GSM/GNSS coverage;
- Wait for signal GSM/GNSS reception (diagnostic LED GREEN or blinking GREEN).

In the case of further failure contact the **Customer Service**.

## 6 Diagnostic LED state summary

State	Diagnostic LED State	Meanings
Waiting for activation	YELLOW blinking	GSM or GNSS anomaly
	GREEN blinking	Activation request in progress (system self-diagnostic OK)
Operative	GREEN fix	The device is active, no anomalies

## 7 Warnings

- SlimBox2.4 (JSBT-2) should be installed in accordance with the manufacturer's instruction of this manual and in accordance with limits/recommendations of vehicle's manufacturer.
- It is important you read the entire contents of this guide prior to perform any maintenance and/or installation work. Failure to follow these instructions could cause a risk of electric shock. Vem Solutions S.p.A. has no responsibility for damage if User doesn't follow the instruction in this guide.
- The system includes a non-removable SIM, necessary to GSM communication with the call center.
- VEM Solutions S.p.A. declines any responsibility in case of malfunction due to:
  - installations not compliant to this manual,
  - GSM/GPRS network
  - satellite network GNSS (Global Navigation Satellite System).
- Wiring different from specifications or not compliant may cause damage to the driver or to the vehicle.
- VEM Solutions S.p.A. reserves the right to make changes and improvements to the products and procedures described herein without notice.
- SlimBox2.4 (JSBT-2) must be protected from tampering, excessive heat, liquids (water, mud, oil, fuel), weather and direct sunlight. Do not wash it with water jets or water under pressure. The unit must be kept far from other electronic devices such as radios, CD/DVD players, power units, amplifiers, power harness and, in general, sources of electromagnetic interference.
- The device must be firmly fixed to the vehicle using adhesive pads. Please avoid to fix it on easily deformable parts, subject to vibration or that could modify the system orientation going on (round section rails, bundles of electric cables, not structural elements in the passenger compartment). Take care to not bend or damage the cables since this could cause intermittent and hardly detectable failures.
- System batteries is automatically recharged when the unit is connected to the power source. Maintenance state function is recommended every time it is disconnected by power source for necessary actions such as repair works, mechanical operations, car washing, navy crossings are carried out or for personal reasons. It's necessary to contact the operation center to enable this function on your device. When the system is in Maintenance mode it cannot send any alarm. During this time services are not guaranteed.
- Even if it is a low-power device it is active even when key are turned off to maintain connection with the Control Room and to send alarms. According to vehicle type and use in some case the vehicle battery may be discharged. If this is the case it would be useful to suggest to the end User a maintenance charging device or periodically recharge the vehicle's battery.

**The lack of this action will represent a real risk of electric shock.**



## 8 Declaration of conformity CE

The manufacturer VEM Solutions S.p.A. declares that the radio equipment SlimBox2.4 (JSBT-2) complies with the 2014/53/UE Directive to ensure safety of people by answering to every reliability criteria.

The equipment operates on four frequency bands (850/900/1800/1900MHz) and the maximum radiated power transmitted is:

- Class 4 (2W) for GSM850
- Class 4 (2W) for EGSM900
- Class 1 (1W) for GSM1800
- Class 1 (1W) for GSM1900

VEM Solutions declares that the product SlimBox2.4 (JSBT-2) complies with the essential requirements of Directive UN/ECE R10 and it is immune to voltage transients according to ISO. The system is warranted not to interfere with the normal vehicle operation if correctly installed. The system includes a class 3 GNSS receiver.

The full text of the EU declaration of conformity is available at the internet address:

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Manual Code: 190xxxx (JSBT62\_AMI)



# SLIMBOX 2.5

(JSBT-3)



## Instructions and warnings

## Declaration of conformity

**VEM Solutions S.p.A.**

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Share capital euro 1.145.000 f.p. – VAT registration number 02245600016

**E24\*10R06/02\*5258\*00**

## 1 Foreword

SlimBox2.5 (JSBT-3) is a slim tracking device that embeds every advanced function and feature of a insurance's box. The device connection to the vehicle can be done by two-wires power harness. The installation methods are easy and fast. Please follow step by step the instructions below to obtain a good result.

**Attention:** It is important to read the entire contents of this guide prior to perform any maintenance and/or installation.

Failure to follow these instructions could cause a risk of electric shock.



## 2 Kit composition

N. 1 SlimBox2.5 (JSBT-3) device
N. 1 Instructions and warnings
N. 1 Kit adhesive pad
N. 1 cable power adapter
N. 1 OBD Plug

## 3 Functions and services

To know services and functions enabled on your system refer to your subscription and commercial documents on line or at the supply/installation Center.

Before installation **remember to pair correctly the device ID and the vehicle's plate number**; communicate this association to the Control Room. This action is mandatory to engage the final device activation.

The device uses a M2M SIM, **the pairing between the device ID and the phone number is automatic during the manufacturing process or it is communicated at contract's subscription.**

## 4 Installation procedure

The installation has to be done with **the engine turned off** and **a good level of GNSS signal**. Enclosed or underground spaces aren't recommended since GNSS signal could be not sufficient.

To obtain a good installation it's important to:

- Locate vehicle's battery position.
- Find the best place for the device, choosing a smooth surface to achieve a good adherence and ensure device stability. **Please don't fix the system at the chosen location yet.**
- Proceed with installation steps; pay attention to orient the system with the LED facing up to guarantee a good signal reception.
- Fix definitively the system with the nylon ties.
- **Don't discard the outer cardboard box:** it must be used for shipping back the unit when removed.

**Attention:** a bad fixing could cause false crash alarms of and change the device orientation. This situation generates a request for system revision.

Read the whole instruction guide and keep it for future reference.



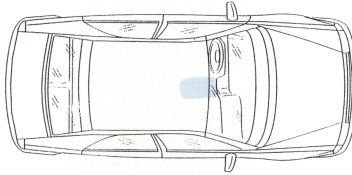
"Warning icons outline a notice about possible danger of electric shock."

#### 4.1 Slimbox with OBD plug connection

The device should be firmly fixed to the vehicle, avoiding unstable installations or floating parts that could trigger false crash alarms and erroneous performing data to the Service Platform.

The device can be placed:

- Inside the dashboard
- Near fuse-holder panel
- Along the central tunnel of passenger compartment



Installation areas

##### a) Installation stage

1. Locate the OBD plug into the passenger compartment, referring to user/maintenance vehicle's manual or looking for the explaining photos present on the following portals, according to brand and model:
  - <http://www.outilsobdfacile.com/location-plug-connector-obd.php>
  - <http://www.wikiobd.co.uk>
  - <https://www.carmd.com/wp/locating-the-obd-2-port-or-dlc-locator>
2. Insert the SlimBox2.5 (JSBT-3) power cable connector into the OBD plug taking care about polarization, it is unique.
3. Insert the plug into the OBD vehicle socket.



It's mandatory to execute the activity following the instructions and the order described above.

##### b) Fixing Stage

1. Clean carefully the area chosen for fixing, that should be smooth and rigid, far from airbag (leg's airbag) and it shouldn't be an obstacle for drive security and vehicle access. Fix the SlimBox2.5 (JSBT-3) using the adhesive pads placed on the back of the product. Fix the excess cable with nylon ties, if necessary.

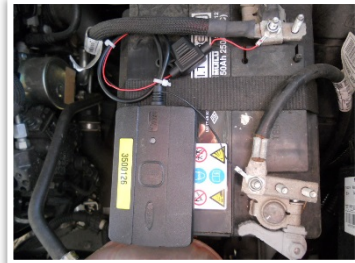
## 4.2 SlimBox with direct connection to vehicle's battery

### b) Installation stage

4. Locate the battery referring to vehicle's use & maintenance manual.  
Verify that the possibility to intervene on vehicle's battery is not limited to car manufacturer authorized personnel or that it doesn't require equipment and professional knowledge.
5. Disconnect the negative pole of the battery.  
**Attention: skipping this operation creates a real danger of electric shock.**
6. Connect the terminal of the adapter cable to the vehicle's battery, the red one to the positive pole and the black one to the negative, following what is written below:
  - a. Loose the positive side, insert the SlimBox2.5 (JSBT-3) cable fork (positive pole – red) and tighten the nut.
  - b. Insert the SlimBox2.5 (JSBT-3) cable fork (negative pole - black) together with the negative side of the battery, you have disconnected before, then lock the nut.



It is mandatory to execute the activity in the manner and order described above.



## 5 Activation, test and fixing

### a) Activation and test stage

1. SlimBox2.5(JSBT-3) turns on just powered, the diagnostic LED blinks YELLOW and will remain active for 30 minutes since power on, then will go in standby mode. During this step SlimBox2.5 (JSBT-3) runs a self-diagnostic program, verifying the principal signals (K30, GSM e GNSS) autonomously.  
Note: the GSM signal lock is normally quick, but the search for GNSS signal might take few minutes, especially on the first time.
2. If signal level is ok, diagnostic LED changes from blinking YELLOW to blinking GREEN and the device sends a request of activation to the operative Center. The transition from step 5 to 6 is usually very quick, so blinking GREEN light could be undetected.
3. The Operation Center takes in charge the request and activates the system: the diagnostic LED becomes fix GREEN. From this moment onward it is recommended to avoid interrupting the electric connection. If the LED keeps blinking GREEN it is possible to proceed with Fixing Stage, the system will complete the Activation and Test procedure anyway.

### b) Fixing Stage

1. Focus on a smooth and rigid surface on battery, as suggested for SlimBox2.5 (JSBT-3) positioning, clean it carefully. Then fix the SlimBox2.5 (JSBT-3) using the adhesive pads. Fix the surplus cable with nylon ties, if necessary.

#### Activation failure

Diagnostic LED will be continue blinking YELLOW if signal levels aren't sufficient (item 4 of paragraph b"). The Client will therefore have to:

- move the vehicle it in a place with better GSM/GNSS coverage;
- Wait for signal GSM/GNSS reception (diagnostic LED GREEN or blinking GREEN).

In the case of further failure contact the **Customer Service**.

## 6 Diagnostic LED state summary

State	Diagnostic LED State	Meanings
Waiting for activation	YELLOW blinking	GSM or GNSS anomaly
	GREEN blinking	Activation request in progress (system self-diagnostic OK)
Operative	GREEN fix	The device is active, no anomalies

## 7 Warnings

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