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DEKRA

ilac-MRA ENAC ENSAYOS Nº 51/LE147

Test report No:
NIE: 64461REM.002A1

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)

(*) Identification of item tested	PCB Controller for Solar Tracking and Data Acquisition
(*) Trademark	DEEPTRACK
(*) Model and /or type reference	DBOARD
Other identification of the product	HW Version: R3 SW Version: 3.1.26.4
(*) Features	LoRa/LoRaWAN EU868 and US915 communications, NFC tag, RS485
Manufacturer	DEEPTRACK S.L.U. Avda. de la transición española,32. Parque empresarial Omega, Edificio A. 28108. Alcobendas. Madrid. Spain.
Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager RAFAEL LÓPEZ MARTÍN 2020.11.04 12:08:12 +01'00'
Date of issue	2020-11-04
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report, FCC designation number ES0004.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification internal document PODT000.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is I = ± 4,9 dB for quasi-peak measurements, I = ± 4,6 dB for peak measurements (k= 2).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is I = ± 2,6 dB for peaks and average measurements (k = 2).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested).
2. The sample consists of a PCB Controller for Solar Tracking and Data acquisition, the device allows remote control of motor and data acquisition for solar trackers in Photovoltaic Industry.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples under test have been selected by: The client.

Sample S/01 is composed by the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
64461/009	PCB controller module	DBOARD	---	2020-06-23

Auxiliary elements used with the sample S/01:

Control Nº	Description	Model	Serial Nº	Date of reception
64461/003	Power supply cable	---	---	2020-06-23
64461/008	Inclinometer	---	---	2020-06-23

Test sample description

Ports…… :	Port name and description	Cable				
		Specified length [m]	Attached during test	Shielded		
	RS485		☒	☐		
	RS485		☒	☐		
	SPI		☐	☐		
	DIOS		☐	☐		
Supplymentary information to the ports…… :	Not provided data					
Rated power supply .....:	Voltage and Frequency	Reference poles				
		L1	L2	L3	N	PE
	☐ AC:	☐	☐	☐	☐	☐
	☐ AC:	☐	☐	☐	☐	☐
	☒ DC: 24Vdc.					
Rated Power .....:	0.75W					
Clock frequencies.....:	32MHz					
Other parameters .....:	Not provided data					
Software version .....:	3.1.26.4					
Hardware version .....:	R3					
Dimensions in cm (W x H x D) ....:	11.0x11.5x3.5					
Mounting position .....:	☐ Table top equipment					
	☐ Wall/Ceiling mounted equipment					
	☐ Floor standing equipment					
	☐ Hand-held equipment					
	☒ Other: Outdoor Field Environment					
Modules/parts.....:	Module/parts of test item	Type	Manufacturer			
	Not provided data					
Accessories (not part of the test item) .....:	Description	Type	Manufacturer			
	MODBUS Inclinometer		RION			
	LiFePO Battery		FBTECH			
Documents as provided by the applicant.....:	Description	File name	Issue date			
	Not provided data					

Identification of the client

DEEPTRACK S.L.U.
Avda. de la transición española,32.
Parque empresarial Omega, Edificio A.
28108. Alcobendas. Madrid. Spain.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-06-25
Date (finish)	2020-06-26

Document history

Report number	Date	Description
64461REM.002A1	2020-09-29	First release
64461REM.002A1	2020-11-04	Second release. It was added Operation mode #02 to complete the full behaviour of the equipment. This modification test report cancels and replaces the test report 64461REM.002

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2022-05-27
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	Frankonia	---
6121	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	---
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-17
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-20
6329	SHIELDED ROOM	---	FRANKONIA	---

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The test have been performed by the technical personnel: Antonio Ruiz.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

Emission Test		
Requirement – Test case	**Verdict**	**Remark**
Radiated emission. Electromagnetic field measure (30 MHz – 1000 MHz)	P	(3)
Radiated emission. Electromagnetic field measure (1 GHz – 12,75 GHz)	P	(3)
Radiated emission. Electromagnetic field measure (12,75 GHz – 26 GHz)	N/A	(1)
Continuous conducted emission (150 KHz – 30 MHz)	N/A	(2)

Supplymentary information and remarks:

(1) Range: f>12.75 GHz. Test required only if the 5th harmonics of the maximum internal work frequency EUT is higher than 12.75GHz.

(2) DC powered device.

(3) It was measured on the worst case configuration (operation mode #01)

Appendix A: Test results

Appendix A Content

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DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. The operation modes used by the samples to which the present report refers, are shown in the following table:

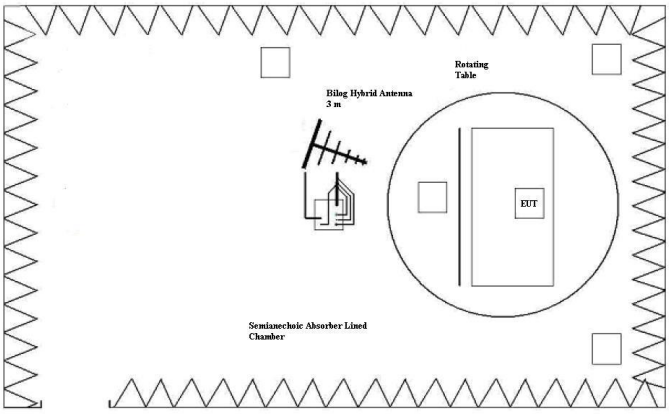
OPERATION MODE	DESCRIPTION
OM#01	EUT ON. LORA in IDLE mode. NFC waiting for signal (worst case). Power supply: 24Vdc.
OM#02	EUT ON. LORA in RX mode. NFC waiting for signal. Power supply: 24Vdc.

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

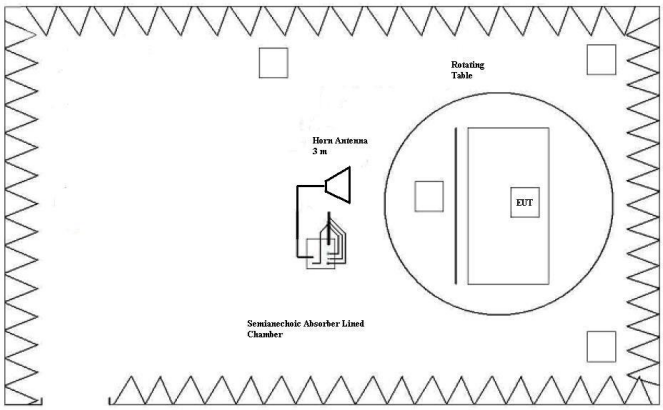
LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)

Limits of interference Class B
The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2019)

Frequency of emission (MHz)	Field strength (microvolt/meter)
30-88	100
88-216	150
21-960	200
Above 960	500



Setup for measurements < 1GHz.



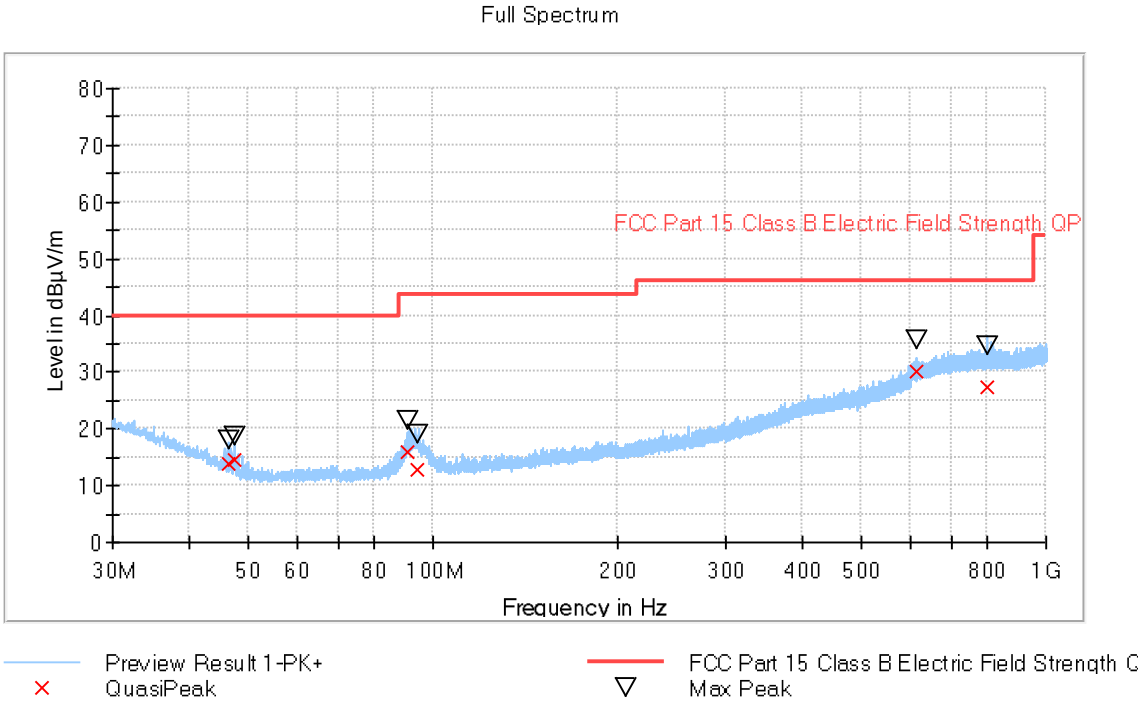
Setup for measurements > 1GHz.

TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR_PH	Range: 1 GHz – 12,75 GHz. Horizontal polarization.	P
CR0101HR_PV	Range: 1 GHz – 12,75 GHz. Vertical polarization.	P

Radiated Emission. CR0101LR

Project:	64461REM.002
Company:	DEEPTRACK SL
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. LORA in IDLE mode.NFC waiting for signal. (worst case) Power supply: 24Vdc.

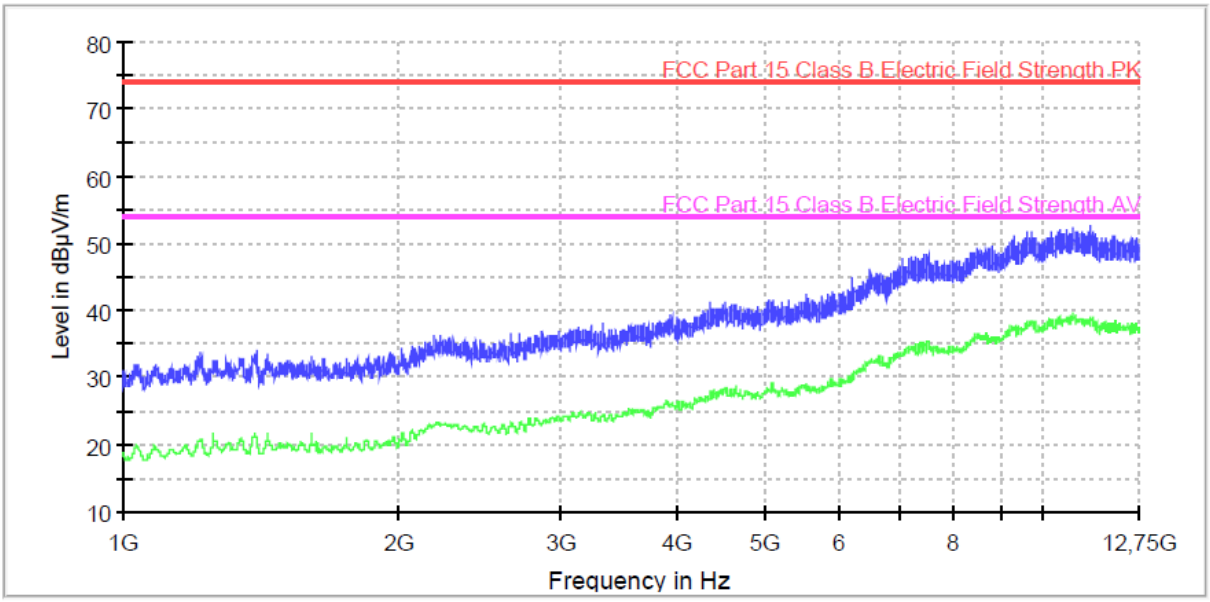


Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
46.221000	13.81	18.14	40.00	26.19	V	133.0
47.524000	14.47	18.55	40.00	25.53	V	-60.0
90.563000	15.94	21.52	43.52	27.58	V	-41.0
94.506000	12.75	19.09	43.52	30.77	V	15.0
614.712000	30.17	35.83	46.00	15.83	H	157.0
801.455000	27.46	34.49	46.00	18.54	V	54.0

Radiated Emission. CR0101HR_PH

Project:	64461REM.002
Company:	DEEPTRACK SL
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. LORA in IDLE mode. NFC waiting for signal (worst case) Power supply: 24Vdc. Horizontal Polarization.



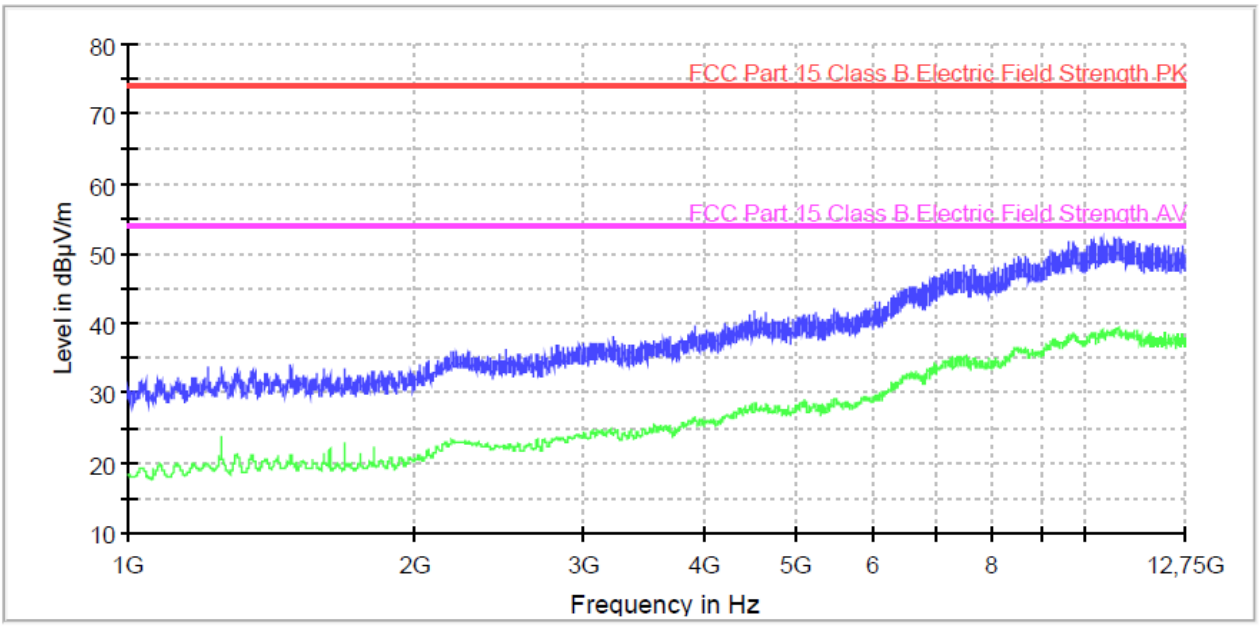
Average Scan
FCC Part 15 Class B Electric Field Strength PK
Peak Scan
FCC Part 15 Class B Electric Field Strength AV

Maximizations

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
2128.800000	35.6	22.1
3330.000000	38.3	24.5
4354.800000	41.2	27.7
5526.800000	42.6	28.9
6488.400000	46.1	32.4
7494.000000	48.4	34.9
9224.800000	50.0	37.7
10262.800000	51.7	38.7
11286.800000	52.6	39.1
12016.400000	51.3	38.1

Radiated Emission. CR0101HR_PV

Project:	64461REM.002
Company:	DEEPTRACK SL
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. LORA in IDLE mode. NFC waiting for signal (worst case). Power supply: 24Vdc. Vertical Polarization.



Average Scan
FCC Part 15 Class B Electric Field Strength PK
Peak Scan
FCC Part 15 Class B Electric Field Strength AV

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
2174.400000	35.5	22.7
3224.800000	38.2	24.4
4477.200000	41.3	28.3
5491.600000	42.3	29.3
6772.000000	45.8	32.1
7498.000000	48.3	35.5
9223.200000	50.7	37.7
10169.200000	52.0	38.5
10904.400000	52.5	38.7
11798.800000	51.6	38.0