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Nº 51/LE147

Informe de ensayo nº:
Test report No:

NIE: 46227REM.001A2

Test Report (Modification 2)

FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012)
&
ANSI C63.4-2009: American National standard for methods of measurements of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9kHz to 40GHz.

Identificación del objeto ensayado.....: Identification of item tested	KEYFOB & CENTRAL BODY CONTROLLER
Marca .....: Trade	Not provided data
Modelo y/o referencia tipo .....: Model and /or type reference	Keyfob: 1048598-01-D Central Body Controller: 1031503-01-D
Otra identificación del producto.....: Other identification of the product	FCC ID: 2AEIM-1048598 for Keyfob and 2AEIM-1031503 for Central Body Controller. IC: 20098-1048598 for Keyfob and 20098-1031503 for Central Body Controller.
Versión final del HW .....: Final HW version	Version 1
Versión final del SW .....: Final SW version	Version 1
Características .....: Features	Not provided data
Fabricante .....: Manufacturer	TESLA MOTORS, INC 3500 Deer Creek Rd, Palo Alto, CA 94304 USA
Método de ensayo solicitado, norma.....: Test method requested, standard	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) .....: Approved by (name / position & signature)	Rafael López EMC Lab Manager Firmado digitalmente por Rafael López Martín Fecha: 2015.10.21 12:37:05 +02'00'
Fecha de realización .....: Date of issue	2015-10-20
Formato de informe No. .....: Report template No	FDT11_17

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Competences and guarantees

AT4 wireless 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.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless 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 AT4 wireless at the time of performance of the test.

AT4 wireless 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.

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.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples under test have been selected by: the Client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial number	Reception date
46227/002	Car-Key (Radiated)	---	---	2015-07-13
46227/011	Module	---	---	2015-07-13

Auxiliary elements used with the sample S/01:

Control Nº	Description	Model	Serial number	Reception date
46227/004	Bluetooth antenna	---	---	2015-07-13
46227/005	Bluetooth antenna	---	---	2015-07-13
46227/006	Bluetooth antenna	---	---	2015-07-13
46227/007	Bluetooth antenna	---	---	2015-07-13
46227/008	Bluetooth antenna	---	---	2015-07-13
46227/009	Bluetooth antenna	---	---	2015-07-13

The Central Body Controller was connected to an EMC load box and to six Bluetooth antennas. The key Fob is near the system in idle mode.

Test sample description

The test sample consists of a Central body controller with Bluetooth Low Energy.

Identification of the client

TESLA MOTORS, INC
3500 Deer Creek Rd, Palo Alto, CA 94304 USA

Testing period

The performed test started on 2015-07-16 and finished on the same day.
The tests have been performed at AT4 wireless.

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. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

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

Temperature	Min. = 15 ºC Max. = 30 ºC
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Site VSWR	< ±6 dB at 3m distance between item under test and receiver antenna, (1 GHz to 18 GHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 18 GHz).

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

Temperature	Min. = 15 ºC Max. = 30 ºC
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 46277REM.001 related with the same samples, in the next clauses and sub-clauses:

It was replaced the original operation mode "Key Fob ON. Power supply: 3Vdc. Central Body Controller ON. Power supply: 12.5Vdc. Idle mode" by the new one "RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc"

By client requirement it was removed the B appendix with the sample and tests setup photographs from the test report.

This modification test report cancels and replaces the test report 46277REM.001.

Remarks and comments

The test has been performed by the technical personnel: José Manuel Márquez.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1 GHz is I = ± 4,57 dB for quasi-peak measurements, I = ± 4,48 dB for peak measurements (k = 2) and from 1 to 12,75 GHz is I = ± 3,43 dB for average and peak measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 12,75 GHz to 26 GHz is I = ± 4,09 dB for average and peak measurements.

Testing verdicts (Legend)

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

List of equipment used during the test					
CONTROL NUMBER	**DESCRIPTION**	**MANUFACTURER**	**MODEL**	**LAST CALIBRATION**	**NEXT CALIBRATION**
4523	EMI Receptor	ROHDE & SCHWARZ	ESU 26	2013-08-27	2015-08-27
1935	EMI Receptor	ROHDE & SCHWARZ	ESPI 3	2013-12-11	2015-12-11
2932	Bilog Hybrid Antenna	SUNOL	JB6	2014-05-11	2017-05-11
4656	Horn Antenna	SCHWARZBECK	BBHA 9170	2014-03-28	2017-03-28
1658	RF Amplifier	SCHAFFNER	CPA9231A	2013-06-11	2015-06-11
1975	RF Amplifier	MITEQ	JS4	2014-05-22	2016-05-22
3783	RF Amplifier	BONN ELEKTRONIK	BLMA 0118-3A	2015-05-15	2016-05-15
0258	Transient Limiter	HP	119471A	2014-10-02	2016-10-02
1650	Artificial Network	SCHWARZBECK	NNLK - 8121	2013-06-25	2015-06-25

Appendix A – Test result

CONTENT

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DESCRIPTION OF THE OPERATION MODES

The operation modes used by the samples to which the present report refers, are shown in the following table:

OPERATION MODE	DESCRIPTION
OM#01	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc.

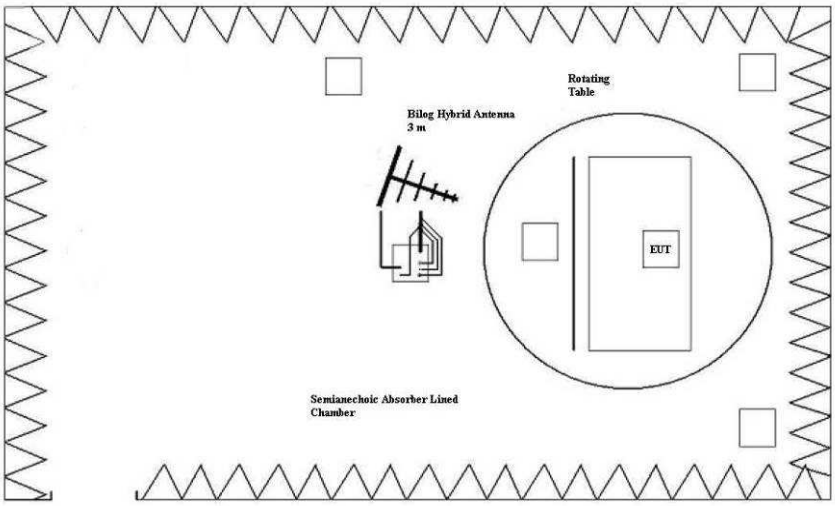
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

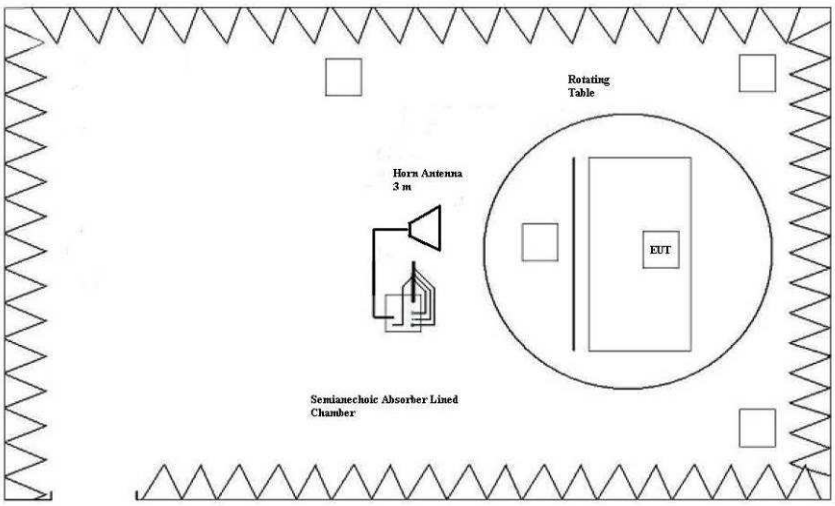
LIMITS:	Product standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009
	Test standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009

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 15.109, Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009 in the frequency range 30 MHz to 26 GHz, for Class B equipment, which is a transmitter in a band over 500 MHz, was:

Frequency range (MHz)	QP Limit for 3 m (µV/m)	QP Limit for 3 m (dBµV/m)
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98
Above 1000	Limit for 3m AVG	Limit for 3m PK
	53.98 dBµV/m	73.98 dBµV/m





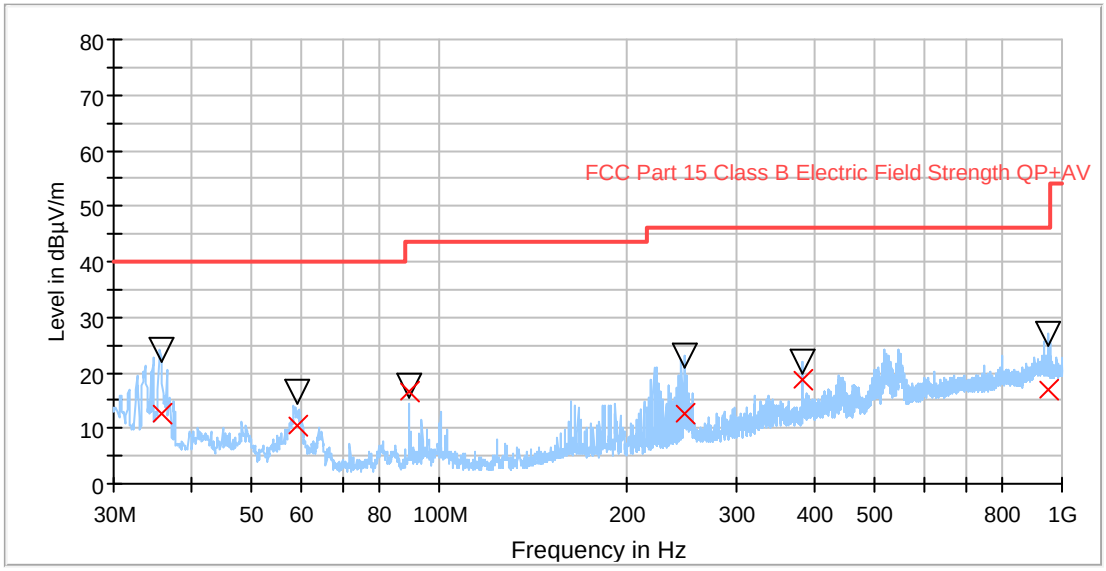
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS :	CRmmnn: CR, Condición de Radiación; mm: Sample number; nn: Operation mode.

CRmmnn	Description	Result
CR0101	Range: 30MHz o 1GHz.	P
CR0101_RA1_PH	Range: 1GHz o 18GHz. Horizontal polarization.	P
CR0101_RA1_PV	Range: 1GHz o 18GHz. Vertical polarization.	P
CR0101_RA2_PH	Range: 18GHz o 26GHz. Horizontal polarization.	P
CR0101_RA2_PV	Range: 18GHz o 26GHz. Vertical polarization.	P

Radiated Emission: CR0101

Project:	46227REM.001
Company:	TESLA MOTORS
Sample:	S/01
Operation mode:	OM#01
Description:	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc.

Full Spectrum



Preview Result 1-PK+
FCC Part 15 Class B Electric Field Strength QP+AV
MaxPeak
QuasiPeak

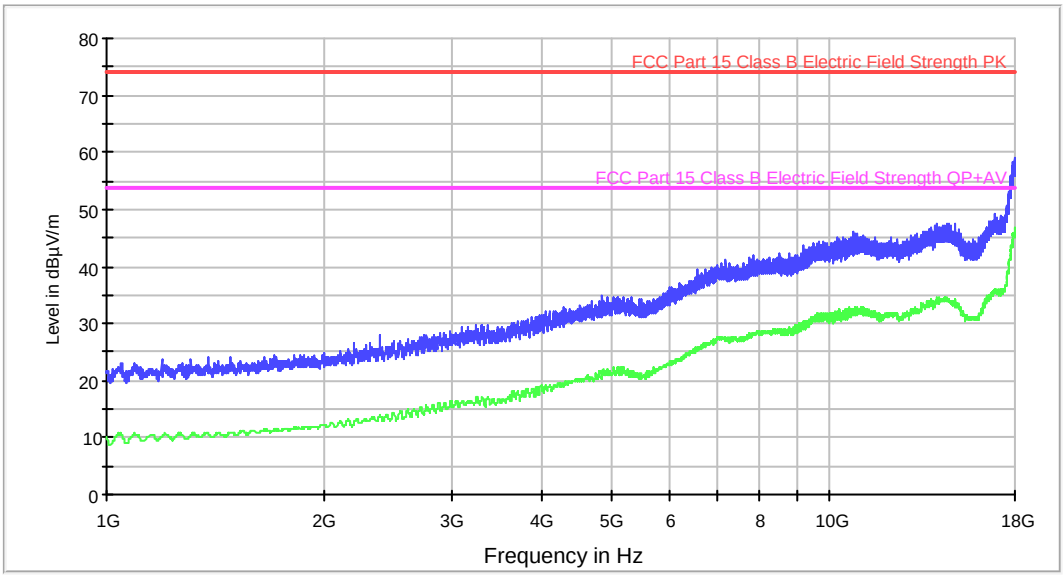
Maximizations

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
35.710390	23.98	12.5	98.0	V	1.0
58.980519	16.75	10.5	111.0	V	37.0
89.387013	17.73	16.6	124.0	V	143.0
247.071429	22.99	12.5	124.0	H	1.0
384.000000	21.90	18.7	125.0	V	350.0
951.270130	26.91	16.8	398.0	V	180.0

Radiated Emission: CR0101RA1_PH

Project:	46227REM.001
Company:	TESLA MOTORS
Sample:	S/01
Operation mode:	OM#01
Description:	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc. Horizontal polarization.

ER EMI FCC 15 Class B AMP_4659 (1-18GHz)



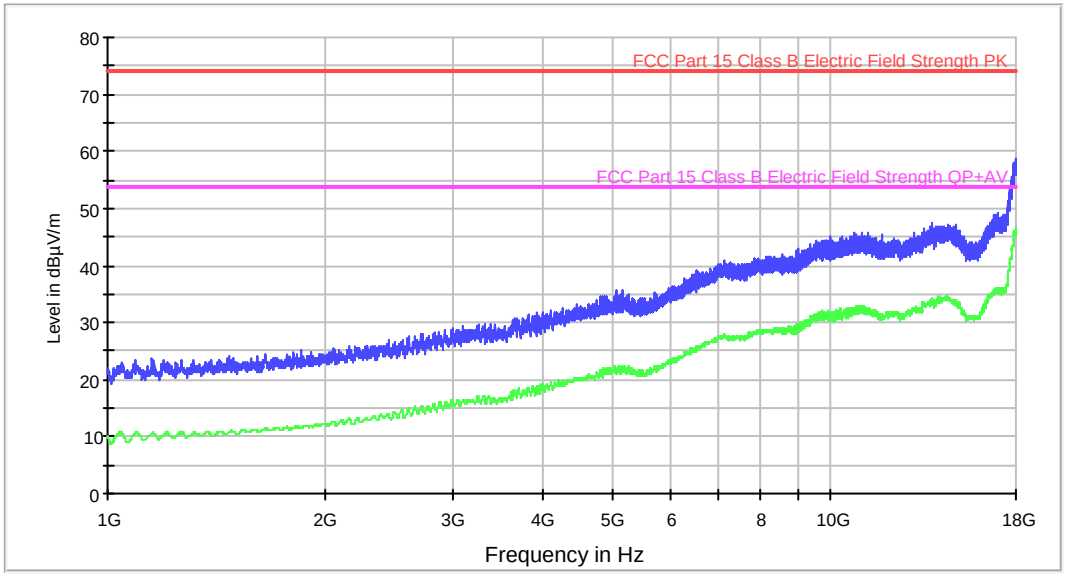
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1382.000000	24.2	10.7
2393.000000	27.9	13.7
4175.000000	32.2	19.0
6864.000000	39.7	26.8
10744.000000	46.0	32.5
17994.000000	59.0	46.7

Radiated Emission: CR0101RA1_PV

Project:	46227REM.001
Company:	TESLA MOTORS
Sample:	S/01
Operation mode:	OM#01
Description:	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc. Vertical polarization.

ER EMI FCC 15 Class B AMP_4659 (1-18GHz)



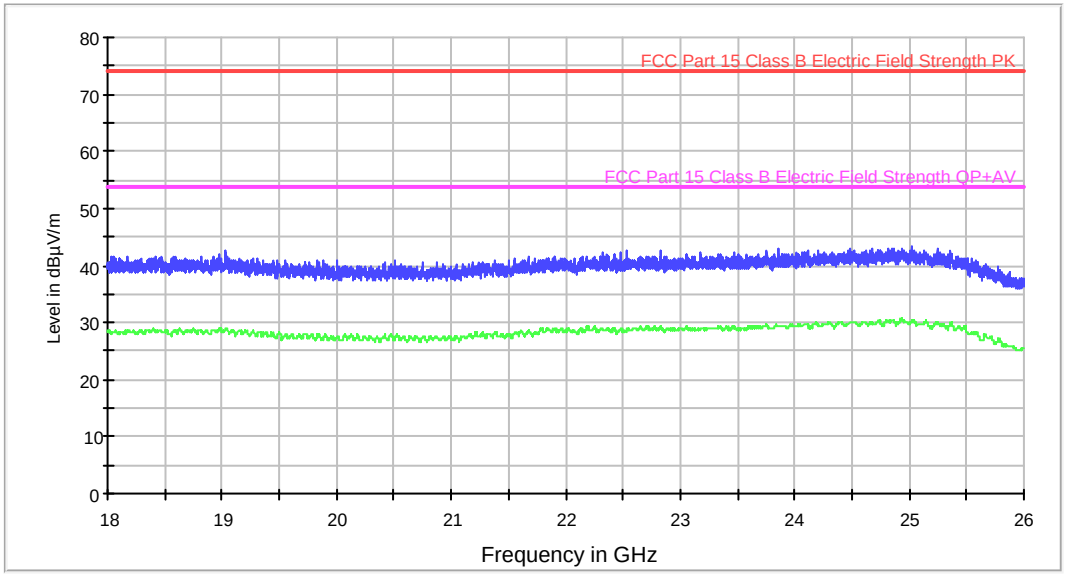
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1473.000000	24.1	10.9
2605.000000	27.5	14.9
4096.000000	32.2	19.4
6832.000000	39.4	26.7
11065.000000	45.7	32.7
17992.000000	58.7	46.6

Radiated Emission: CR0101RA2_PH

Project:	46227REM.001
Company:	TESLA MOTORS
Sample:	S/01
Operation mode:	OM#01
Description:	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc. Horizontal polarization.

ER EMI FCC 15 Class B AMP_4729 (18-26GHz)



MaxPeak-ClearWrite-PK+
FCC Part 15 Class B Electric Field Strength PK
Average-ClearWrite-AVG
FCC Part 15 Class B Electric Field Strength QP+AV

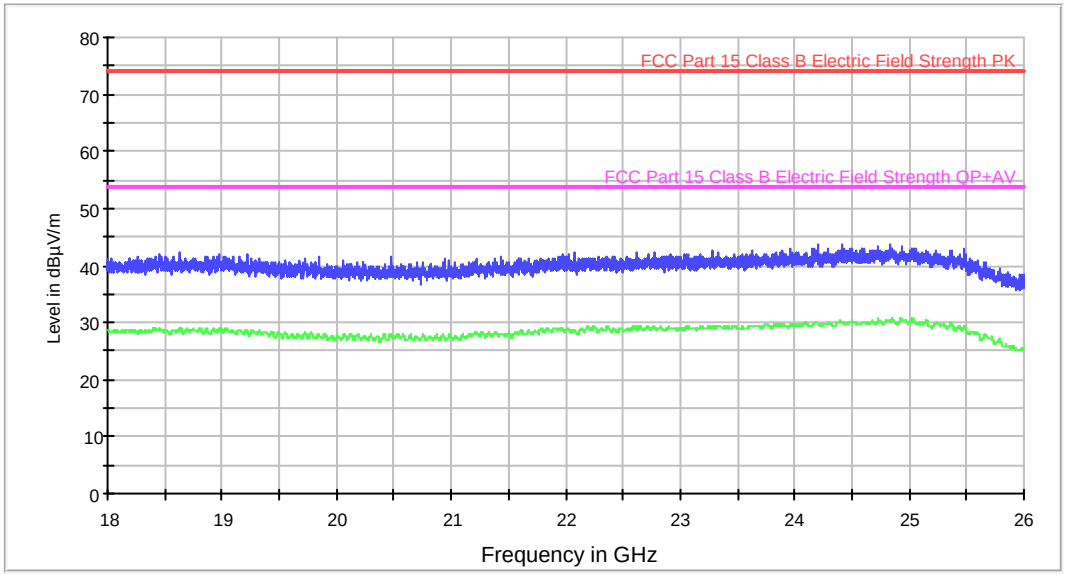
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
19036.000000	42.7	29.0
19142.000000	41.4	28.5
21555.000000	41.3	28.0
22828.000000	42.5	29.2
23862.000000	42.8	29.3
25021.000000	43.3	30.2

Radiated Emission: CR0101RA2_PV

Project:	46227REM.001
Company:	TESLA MOTORS
Sample:	S/01
Operation mode:	OM#01
Description:	RX mode for Bluetooth Low Energy & UHF 315 MHz and Idle mode for 22 kHz Low Frequency. Power supply: 12.5Vdc. Vertical polarization.

ER EMI FCC 15 Class B AMP_4729 (18-26GHz)



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
18625.000000	42.2	28.8
19220.000000	41.8	28.2
20470.000000	41.5	27.9
22616.000000	42.2	29.2
24204.000000	43.8	29.7
24838.000000	43.5	30.4