



THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING APPROVAL GRANTED ⁽¹⁾ / ~~APPROVAL EXTENDED⁽⁴⁾ /
APPROVAL REFUSED⁽⁴⁾ / APPROVAL WITHDRAWN⁽⁴⁾ / PRODUCTION DEFINITELY
DISCONTINUED⁽⁴⁾~~ OF A TYPE OF ELECTRICAL / ~~ELECTRONIC SUB-ASSEMBLY⁽⁴⁾~~ WITH
REGARD TO REGULATION NO. 10.06



Approval No: E11*10R06/02*12928*00

1. Make (trade name of manufacturer): JUNCH
2. Type and general commercial description(s): PC12000B306
3. Means of identification of type, if marked on the ~~vehicle / component / separate technical unit⁽⁴⁾~~:
- 3.1. Location of that marking: On surface of the motor case
4. Category of vehicle: Not applicable
5. Name and address of manufacturer:

Shanghai Junch Industries Development Co., Ltd.
No.951, Qiangye Road
Songjiang District
Shanghai
People's Republic of China
6. In the case of components and separate technical units, location and method of affixing of the approval mark: Print on the motor surface
7. Address(es) of assembly plant(s): Same as item 5 above
8. Additional information (where applicable): See appendix below

9. Technical Service responsible for carrying out the tests: Vehicle Certification Agency
10. Date of test report: 24 June 2024
11. No. of test report: CSB628600
12. Remarks (if any): See appendix below
13. Place: BRISTOL
14. Date: 31 JULY 2024
15. Signature:



C McCABE
Chief Technical and Statutory Operations Officer

16. The index to the information package lodged with the Approval Authority, which may be obtained on request, is attached.
17. Reasons for extension: Not applicable

Appendix

to type-approval communication form No. E11*10R06/02*12928*00
concerning the type-approval of an electrical ~~electronic~~ sub-assembly under Regulation No. 10.06

1. Additional information:
 - 1.1. Electrical system rated voltage: 12V DC, only positive and negative, no ground
 - 1.2. This ESA can be used on any vehicle type with the following restrictions: Not applicable
 - 1.2.1. Installation conditions, if any: Not applicable
 - 1.3. This ESA can be used only on the following vehicle types: Not applicable
 - 1.3.1. Installation conditions, if any: Not applicable
 - 1.4. The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from Annex 9):

BCI: 20-400MHz
Free field: 200-2000MHz
 - 1.5. Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests:

Shanghai Motor Vehicle Inspection Certification & Tech Innovation Center Co., Ltd. (SMVIC)
2. Remarks: Variants: PC12000B377
 - (1) Strike out what does not apply.



Vehicle
Certification
Agency

THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

APPROVAL NUMBER: E11*10R06/02*12928*00

INFORMATION PACKAGE CONTENTS

INDEX REVISION NUMBER: 00

Conformity of Production (COP) Declaration	COP Confirmed
Assessment Method	COP Audit & Control Plans
Date of Initial Clearance	March 2024
Date of Last Clearance	March 2024

Total number of sheets: 9 (Nine)

Reasons for Revision: Not applicable

Revision Date
&
Office Stamp



INDEX OF DOCUMENTATION

<i>Page</i>	<i>Concept</i>	<i>Date</i>
2	GENERAL	Nov. 2023
3-6	DRAWING AND LOCATION OF THE ECE APPROVAL MARK	NOV. 2023
7	APPLICATION OF THE MOTOR	NOV. 2023
9	MOTOR SPECIFICATION AND MAIN COMPONENTS LIST	NOV. 2023

APPLICATION HISTORY

Extension No.	Extension Reasons	APPLICATION DATE
00	Not applicable(Base Approval)	NOV 2023



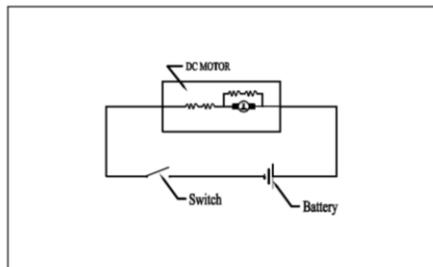
GENERAL

1. Make (trade name of manufacturer): **JUNCH**
2. Type: **PC12000B306**
3. Variants: **PC12000B377**
4. Commercial description(s): **DC MOTOR**
Function: FOR HYDRAULIC POWER UNIT.
5. Means of identification of type, if marked on the component/separate technical unit (a):
 - 5.1. Location of that marking: **On surface of the motor case.**
6. Name and address of manufacturer:
Shanghai Junch Industries Development Co., Ltd.
No.951, Qiangye Road, Songjiang District, Shanghai,China
7. Name and address of authorised representative, if any: **Not Applicable**
8. In the case of components and separate technical units, location and method of affixing of the EC approval mark: **Print on the motor surface.**
9. Address(es) of assembly plant(s):
Shanghai Junch Industries Development Co., Ltd.
No.951, Qiangye Road, Songjiang District, Shanghai,China
10. Any restrictions of use and conditions for fitting:
FOR HYDRAULIC POWER UNIT.
11. Electrical system rated voltage: V, positive/negative ground
14V DC, only positive and negative, no ground

**DRAWINGS OF THE MOTOR
MOTOR AND LOCATION OF THE ECE APPROVAL MARK
PC12000B306**

<p>SPLINE DATA SPLINE PITCH: 1.27/0.635(20/40DP) TEETH: 9 PRESSURE ANGLE: 30° PITCH DIAMETER: 11.43 MAJOR DIAMETER: 12.4^{+0.04}_{-0.10} MINOR DIAMETER: 9.7_{-0.15} TOLERANCE CLASS: 6</p>	<p>Model: PC12000B306 12V 1.5KW Rotation: CW DE See From Driving End Protection Class: IP54 Surface: Powder Coat, Grey RoHS & CE Requirement</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">12V 1.5KW</td> <td style="text-align: center;"><i>SPE</i></td> </tr> <tr> <td colspan="2" style="text-align: center;">直流电动机</td> <td style="text-align: center;">PC12000B306</td> </tr> <tr> <td style="font-size: small;">设计</td> <td style="font-size: small;">标准</td> <td style="font-size: small;">比例</td> </tr> <tr> <td style="font-size: small;">校核</td> <td style="font-size: small;">日期</td> <td style="font-size: small;">共 页 第 页</td> </tr> </table>	12V 1.5KW		<i>SPE</i>	直流电动机		PC12000B306	设计	标准	比例	校核	日期	共 页 第 页
12V 1.5KW		<i>SPE</i>												
直流电动机		PC12000B306												
设计	标准	比例												
校核	日期	共 页 第 页												

CIRCUIT DIAGRAM



LABEL

Type: DC MOTOR

Part no: PC12000B306

12V 1.5KW S3=10%

IP 54

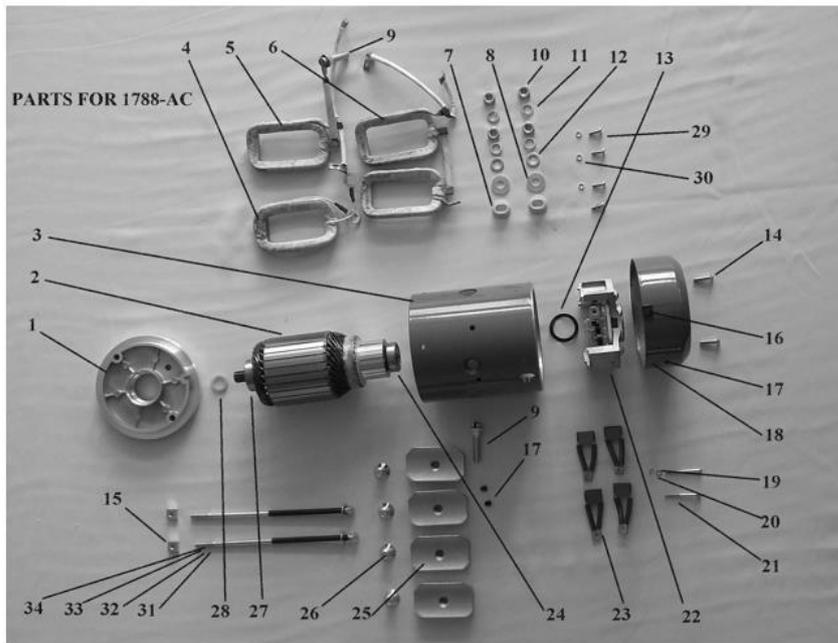
E11

R10-06 XXXX Date: XXXX



Bill of Material (BOM) for DC Motor PC12000B306				
No.	Part No.	Description	Material	Quantity
1	PC11000Z303401	Driving End Plate	Aluminum	1
2	PC12000Z306200	Armature	Copper, steel, insulation paper	1
3	PC12000B377101	Yoke	Steel	1
4	PC12000G319110	Coil	Glass tape, copper, insulation paper	1
5	PC12000G319120	Coil	Glass tape, copper, insulation paper	1
6	PC12000G377160	Coil	Glass tape, copper, insulation paper	1
7	PC11000Z303104	Isolator	Plastic	2
8	PC11000Z303158	Insulation Washer	Fibre glass plate	2
9	PC12000G377181	Terminal Bolt	Steel	2
10	PC11000Z303106	Nut	Steel	4
11	GB848	Washer Φ8	Steel	2
12	GB859	Spring Washer Φ8	Steel	4
13	PC11000Z303011	Wave Spring Washer	Steel	1
14	PC11000B325006	Screw	Steel	2
15	PC11000Z303007	Nut	Steel	2
16	PC22000B324012	Thermistor Grommet	Rubber	1
17	PC11000Z303005	Drain Hole Plug	Plastic	5
18	PC22000B324008	Cover	Steel	1
19	GB93	Spring Washer Φ3	Steel	2
20	GB97.1	Washer Φ3	Steel	2
21	PC12000G319005	Screw	Steel	2
22	PC12000G319300	Brush Holder ASSY	Steel, plastic, aluminum, Fibre glass plate	1
23	PC11000Z303003	Brush	Copper, carbon	4
24	GB/T 276	Bearing 6201	Steel, rubber, oil	1
25	PC11000Z303102	Pole	Steel	4
26	GB2673	Screw M10*16	Steel	4
27	GB/T 276	Bearing 6202	Steel, rubber, oil	1
28	PC12000B303202	Washer	Plastic	1
29	GB818	Screw M4*12	Steel	4
30	GB93	Spring Washer Φ4	Steel	4
31	LRS-1	Shrinking Tube Φ7	Plastic	2
32	PC11000Z303009	Long Bolt	Steel	2
33	PC11000Z303002	Washer	Steel	1
34	GB859	Spring Washer Φ6	Steel	2

Exploded View of PC12000B306



PC12000B377

PC12000B377

4-5.72^{+0.04}
Depth: 5.9^{+0.04}

2-5/16-24-2A
UNC

22.5° 22.5° 49°

54.8

90.4

2-1/4-20-2A
UNC

1.98^{+0.03}

11.3

6.5^{+0.36}

121.8

90

10

12.5^{+0.04}

5.640.3

10.8

7.134.78

180max

1*45°

5-DRAIN HOLE PLUG
HOLE 5-φ4.8^{+0.2}

Thermistor Grommet

① E11 R10-06 XXX

标准/零件号	
图号	
图状	
图版/图号	
图号	
签字	
日期	

SPLINE DATA

SPLINE PITCH	1.27/0.635 (20/40DP)
TEETH	9
PRESSURE ANGLE	30°
MAJOR DIAMETER	11.43
MINOR DIAMETER	12.4 ^{+0.04} 9.1 ^{+0.10}
TOLERANCE CLASS	6

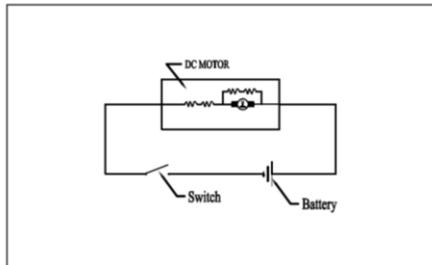
Note:

1. Performance:
Voltage: 11.7V
Torque: 3N.m
Current: 175max
Speed: 3400 rpm
Speed: 2675 rpm
Power out: 1.68KW
2. Rotation: CW DE See From Driving End
3. Protection Class: IP54
4. Surface: Powder Coat, Black
5. UL and RoHS Requirement

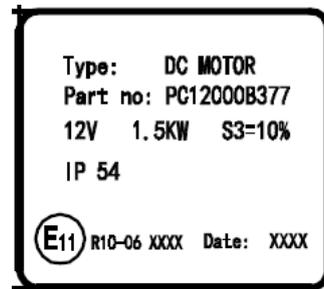
STANDARD		SQC	
DC MOTOR		PC12000B377	

设计	HENRY	标准化		图样标记		重量		比例	1:1
校对	JIM YAO	审定		S	A				
审核		日期	150303	共	张				

CIRCUIT DIAGRAM

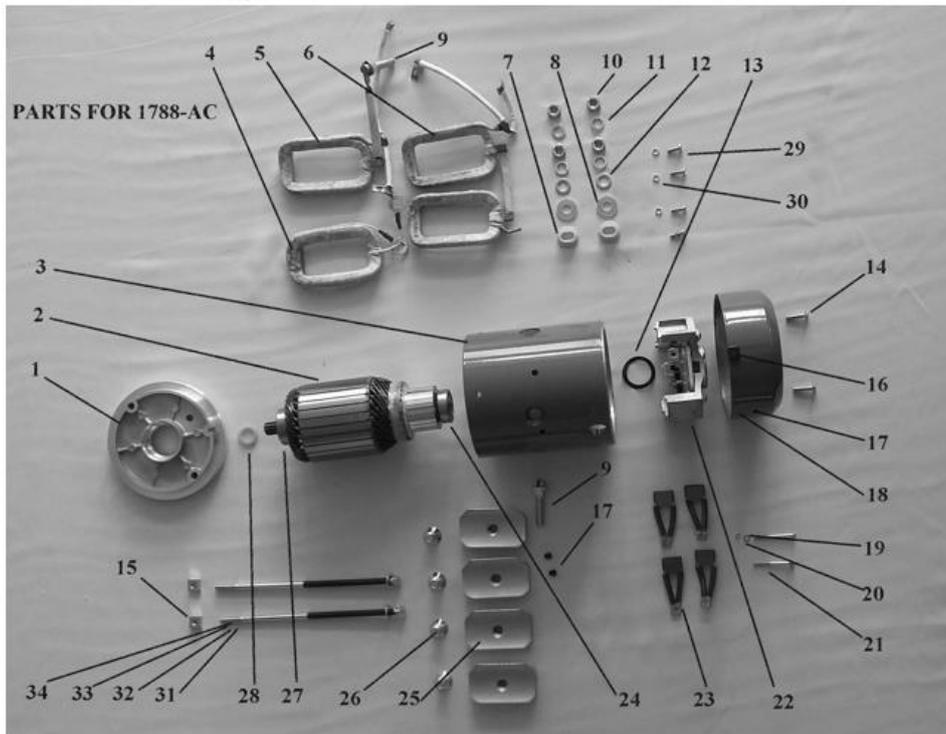


LABEL

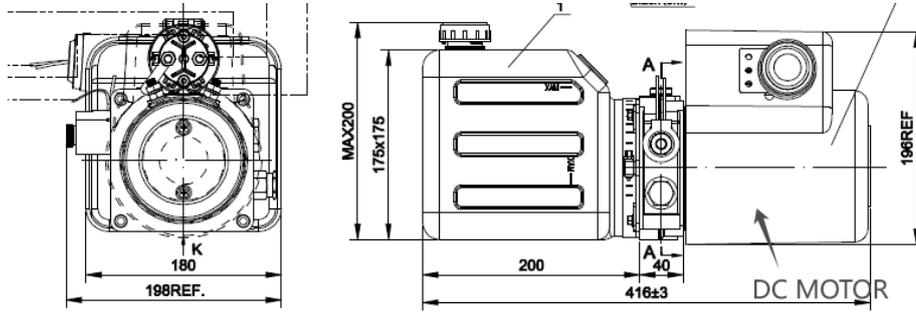


Bill of Material (BOM) for DC Motor PC12000B377				
No.	Part No.	Description	Material	Quantity
1	PC11000Z303401	Driving End Plate	Aluminum	1
2	PC12000Z306200	Armature	Copper, steel, insulation paper	1
3	PC12000B377101	Yoke	Steel	1
4	PC12000G319110	Coil	Glass tape, copper, insulation paper	1
5	PC12000G319120	Coil	Glass tape, copper, insulation paper	1
6	PC12000G377160	Coil	Glass tape, copper, insulation paper	1
7	PC11000Z303104	Isolator	Plastic	2
8	PC11000Z303153	Insulation Washer	Fibre glass plate	2
9	PC12000G377181	Terminal Bolt	Steel	2
10	PC11000Z303106	Nut	Steel	4
11	GB848	Washer Φ8	Steel	2
12	GB859	Spring Washer Φ8	Steel	4
13	PC11000Z303011	Wave Spring Washer	Steel	1
14	PC11000B325006	Screw	Steel	2
15	PC11000Z303007	Nut	Steel	2
16	PC22000B324012	Thermistor Grommet	Rubber	1
17	PC11000Z303005	Drain Hole Plug	Plastic	5
18	PC22000B324008	Cover	Steel	1
19	GB93	Spring Washer Φ3	Steel	2
20	GB97.1	Washer Φ3	Steel	2
21	PC12000G319005	Screw	Steel	2
22	PC12000G319300	Brush Holder ASSY	Steel, plastic, aluminum, Fibre glass plate	1
23	PC11000Z303003	Brush	Copper, carbon	4
24	GB/T 276	Bearing 6201	Steel, rubber, oil	1
25	PC11000Z303102	Pole	Steel	4
26	GB2673	Screw M10*16	Steel	4
27	GB/T 276	Bearing 6202	Steel, rubber, oil	1
28	PC22000B418202	Washer	Plastic	1
29	GB818	Screw M4*12	Steel	4
30	GB93	Spring Washer Φ4	Steel	4
31	LRS-1	Shrinking Tube Φ7	Plastic	2
32	PC11000Z303009	Long Bolt	Steel	2
33	PC11000Z303002	Washer	Steel	1
34	GB859	Spring Washer Φ6	Steel	2

Exploded View of PC12000B377



MOTOR APPLICATION ON THE HYDRAULIC POWER UNIT



SPECIFICATION OF THE MOTOR

No.	Item	Condition
1	Rate Voltage (V)	DC12
2	No load Speed (rpm)	≥9000
3	Load Current (Amp)	≅ 220@6Nm
4	Load Speed (rpm)	≥2950
5	IP	IP54
6	Working Rate	S2=2.0; S3=10%
7	Environment Tem (°C)	-10°C-- +40°C
8	Storage Temp (°C)	-10°C-- +40°C
9	Voltage limit	The motor must be run on 10-14V

APPEARANCE REQUEST

The motor surface must be clear, no damage, no wrinkle.

THE MOTOR DURABILITY

Minimum cycles is 40,000 @ 5scends on 25scends off a cycle.

Shanghai Junch Industries Development Co., Ltd.

2023/12/12





Inspection/Test Report: Electromagnetic Compatibility – ESA

Legislation

UNECE Regulation 10.06 to Supplement 2

Inspection/Test Details

Location of Inspection/Test: Shanghai Motor Vehicle Inspection Certification & Tech
Innovation Center Co., Ltd. (SMVIC)
Date(s) of Inspection/Test: 27 March 2024
VCA Representative(s): Beck Wang, Alfred Zhang
Inspectors Home Office Location: VCA China
Manufacturer's Representative(s): Jim Tao
Reason for Report: New Approval

Manufacturer Details

Name and Address: Shanghai Junch Industries Development Co., Ltd.
No.951, Qiangye Road, Songjiang District, Shanghai
People's Republic of China
Type: PC12000B306
Commercial Description: NA
Category: ESA

Conclusion

The above-mentioned vehicle / engine / component was tested in accordance with the above mentioned legislation and was found to comply in all respects listed in this report. This report relates only to the items tested.

Test Engineer
Signature:

Name: Beck Wang
Position: Type Approval Engineer
Date: 24 June 2024

Alfred Zhang
Type Approval Engineer
24 June 2024

List of Annexes

Annex	No of Pages	Subject
I	1	Test photos (<i>EC and ECE when needed</i>)
II	8	Test Result
III		
IV		





Issue Record

Issue 0 is original report

Note: Include reason for reissue, date of reissue, who has reissued.

Worst Case Rationale

New approval.

Note: Include information on variants and versions this report covers, as applicable. Supporting documents may be annexed to this report

Significant Interpretations, Alternative Test Methods, New Technologies

None

Inspection/Tests Required

	Yes, NA, See Report ... / Approval ... / Annex ...
ESA specification	Yes
Radiated Emissions:	Yes
Radiated Immunity	Yes
BCI Immunity:	Yes
Free Field Immunity:	Yes
150 mm Stripline Immunity:	NA
800 mm Stripline Immunity:	NA
Transient Testing:	Yes

Component Specification

Component Part Number: PC12000B306

Manufacturer's Documentation

Manufacturer's documentation is complete and reflects the agreed specification for the vehicle / engine / component tested and covers all variants and versions agreed in the worst case rationale. Yes

Information document uploaded to job folder and identified by job number. Yes

Facility and Equipment Checks

Facility Appraisal reference and date NA

Calibration certificates are traceable to national or international standards of measurement, where available: Yes

Calibration certificates checked and valid, recorded in the following table:





This test report shall not be reproduced except in full, without written approval of the technical service.

Equipment

Description	Make	Model	Serial number	Calibration due date
EMI Receiver	ROHDE&SCHWARZ	ESW8	574-916	05 July 2024
Biconical antenna	ROHDE&SCHWARZ	HK116	574-072-02	13 April 2024
Log-periodic antenna	ROHDE&SCHWARZ	HL223	574-072-03	13 April 2024
Artificial Network	ROHDE&SCHWARZ	ESH3-Z6	574-095	07 October 2024
Artificial Network	ROHDE&SCHWARZ	ESH3-Z6	574-090	07 October 2024
Signal Generator	ROHDE&SCHWARZ	SMB100A	574-351-02	07 October 2024
Power Amplifier	AmpLord	ALA-80M-1G-1200	574-945	30 July 2024
Power Meter/Power Sensor	ROHDE&SCHWARZ	NRP/NRP-Z91	574-124-02	20 December 2024
Power Meter/Power Sensor	ROHDE&SCHWARZ	NRP/NRP-Z91	574-124-03	20 December 2024
Directional Coupler	AR	DC2035M4	574-124-07	26 October 2024
Field Probe	AR	FM7004A/FL7006	574-601	27 March 2025
Power Amplifier	AR	120S1G3	574-124-08	26 October 2024
Signal Generator	KEYSIGHT	N5171B	574-388	07 October 2024
Power Meter/Power Sensor	KEYSIGHT	N1914/E9304A	574-389	07 October 2024
Load Dump Generator	EM TEST	LD 200N	574-1178	20 December 2024
Quadrant Voltage Drop Simulator - Battery simulator and DC voltage source	EM TEST	VDS 200Q50.2-400	574-1180	20 December 2024
Generates and records automotive waveforms	EM TEST	AutoWave	574-1181	20 December 2024
Absorber-lined Shielded Enclosure	Albatross	3m-SAC	574-191	24 December 2024

*Specify calibrated date + (interval) or calibration due date.

Software used in Testing

Description	Make	Version





Inspection/Test Requirements		Complies Yes / NA
ESA specification		
3.2.1.	ESA classification is applicable to Regulation 10.	Yes
3.2.2.	The application for ESA approval is submitted by the vehicle manufacturer or by the manufacturer of the ESA.	Yes
3.2.3.	The model of information document shown in Annex 2B is used.	Yes
3.2.3.	In addition, the information document stipulates location and method of affixing of the approval mark	Yes
3.2.3.	In addition, the information document stipulates approval marking size as the circle diameter to be = 6mm minimum and capitol "E" = 3mm minimum and remaining text = 2mm minimum <i>(If the above dimensions are not possible due to the size of the component, then the markings should be as large as possible)</i>	Yes
3.2.6	The sample of the ESA under test (EUT) is clearly and indelibly marked with the manufacturer's trade name or mark and the type designation.	Yes
3.2.7.	All restrictions on use are identified and are included in Annexes 2B and/or 3B, where applicable.	Yes
3.2.8.	ESA is brought to the market as spare part and is marked accordingly.	NA
3.2.9.	For components sold as aftermarket equipment, a declaration is issued by the manufacturer that the ESA fulfils the requirements of this Regulation and in particular the limits defined in paragraphs 6.5., 6.6., 6.7., 6.8. and 6.9. of this Regulation.	NA
3.2.10.	ESAs which are part of a light source have approval number specified to correct Regulations or a test report is provided stating that the ESA is not mechanically interchangeable with any light source.	NA



Radiated Emissions

CISPR25, 4.5. Measuring equipment complies with CISPR 16-1-4 (2010). Yes

Types and calibration date:

ESW 8, calibration date: 06 July 2023

Test Location

Ann 7, 3.1. Test performed in: Yes
Ann 7, 3.3. - A.L.S.E (Absorber-lined Shielded Enclosure)*
- ~~O.A.T.S (Open Area Test Site)*~~
**Strikethrough, as appropriate.*

Ann 7, 3.3. O.A.T.S level is a clear area, free from electromagnetic reflecting surfaces, within a circle of 15 m minimum radius. NA

Ann 7, 3.3. Measuring equipment is outside 15 m minimum radius circle. NS

Ann 7, 3.4. Ambient noise is at least 6 dB below reference limits, in either case. NS

Test Arrangements

CISPR25, 4.4.2. EUT and antenna are more than 2 m from the walls and ceiling, and 1 m from the nearest absorber material. Yes

CISPR25, 6.1.1. Ground plane is 900 ± 50 mm high and made from 0.5 mm thick copper, brass or galvanised steel. Yes

CISPR25, 6.1.1. Ground plane is at least 2,000 mm length x 1,000 mm width. Yes

CISPR25, 6.4.2.3. ESA and harness are supported at 50 ± 5 mm above the ground plane on low relative permittivity material. Yes

CISPR25, 6.4.2.3. Face of the ESA is within 200 ± 10 mm from the edge of the ground plane. Yes

CISPR25, 6.4.2.4. Length of test harness, parallel to the front of the ground plane, is $1,500 \pm 75$ mm and does not exceed 2,000 mm. Yes

CISPR25, 6.4.2.4. Long segment of test harness is located parallel to the edge of the ground plane, facing the antenna at a distance of 100 ± 10 mm from the edge. Yes

CISPR25, 6.1.2. Power supply is Artificial Network (AN) rated at $50 \Omega/50 \mu\text{H}$. Yes

CISPR25, 6.1.2. EUT is: Yes



31-Jul-24



This test report shall not be reproduced except in full, without written approval of the technical service.

- Remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line*
~~Locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required for the positive supply*~~
**Strikethrough, as appropriate.*

CISPR25, 6.1.2.

Case of the ESA is:

Yes

- Grounded, simulating actual vehicle configuration*
~~Not grounded, simulating actual vehicle configuration*~~
**Strikethrough, as appropriate.*

CISPR25, 6.1.2.

AN is electrically bonded to the ground plane.

Yes

Antenna

Types and calibration date:

HL223, HK116, calibration date: 14 April 2023

CISPR25, 6.4.2.6.

Height of the phase centre is 100 ± 10 mm above the ground plane.

Yes

CISPR25, 6.4.2.6.

No part of any antenna radiating element is closer than 250 mm to the floor.

Yes

CISPR25, 6.4.2.6.

Radiating elements of the measuring antenna are not closer than 1,000 mm to any absorber material, except that used on the floor, and are not closer than 2,000 mm to the walls or ceiling of the shielded enclosure.

Yes

CISPR25, 6.4.2.6.

Phase centre (for biconical) or tip (for log-periodic) is 1,000 ± 50 mm from the harness.

Yes

CISPR25, 6.4.2.6.

Antenna calibrated for this distance to correct measuring point (phase centre or tip).

Yes

CISPR25, 6.4.2.6.

Phase centre of the antenna is in line with the centre of the longitudinal part of the wiring harness.

Yes

Ann 7, Ann 8, 4.3.

Pre-test sweep supplied to show compliance throughout frequency range 30 to 1,000 MHz.

Yes

Ann 7, Ann 8, 4.3.

Test frequencies chosen from pre-test data.

Yes

Narrowband Test Results

Ann 8, 2.

Operational mode of ESA:

Normal operation

Ann 8, 2.

Detector used and bandwidth:





This test report shall not be reproduced except in full, without written approval of the technical service.

Average detector, 120KHz

6.6.2. ESA meets narrowband emissions limits, with both vertical and horizontal polarisations. Yes

Broadband Test Results

Ann 7, 2. Operational mode of ESA:
Normal operation

Ann 7, 2. Detector used and bandwidth:
Quasi-peak detector, 120kHz

6.5.2. ESA meets broadband emissions limits, with both vertical and horizontal polarisations. Yes

Radiated Immunity

Test Method(s) used and Frequency Range(s)

ISO11452-4 BCI frequency range between 20 and 400 MHz: 20-200 MHz Yes

ISO11452-2 Free field frequency range between 80 and 2,000 MHz: 200-2000 MHz Yes

ISO11452-3 TEM cell frequency range between 20 and 200 MHz: NA MHz NA

ISO11452-5 150 mm stripline frequency range between 20 and 400 MHz: NA MHz NA

ISO11452-5 800 mm stripline frequency range between 20 and 2,000 MHz: NA MHz NA

Maximum frequency step sizes do not exceed:

Frequency Band (MHz)	Linear Steps (MHz)	Log Steps (%)	Actual Steps Used
20 - 200	5	5	5%
200 - 400	10	5	5%
400 - 1000	20	2	2%
1000 - 2000	40	2	2%

Test Arrangements (General)

Ann 9, 2.2. Operational mode of ESA:
Normal operation





This test report shall not be reproduced except in full, without written approval of the technical service.

Ann 9, 2.3.	No extraneous equipment in place during calibration.	Yes
Ann 9, 2.4.	Test equipment used is the same as for calibration.	Yes
Ann 9, 2.5.	Loads and actuators are as realistic as possible.	Yes
Ann 9, 2.5.	Case of ESA is: - Grounded, simulating actual vehicle configuration* - Not grounded, simulating actual vehicle configuration* <i>*Strikethrough, as appropriate.</i>	Yes
Ann 9, 3.1.	Test frequency range is 20 to 2,000 MHz.	Yes
Ann 9, 3.1.	Test signal is R.F. sine wave amplitude, modulated by a 1 kHz sine wave at a modulation depth of 0.8 ± 0.04 , in the 20 - 800 MHz band and pulse modulation (time on 577 μ s, period 4,600 μ s) in the 800 - 2,000 MHz band.	Yes
6.8.2.1.	Pre-test sweep supplied to show compliance throughout frequency range 20 to 2,000 MHz.	Yes
Ann 9, 3.2.	Test frequencies chosen from pre-test data.	Yes
6.8.2.2.	No degradation of immunity related functions during the tests.	Yes

BCI Immunity

Calibration date:

25 December 2021, Valid for 3-5 years

ISO11452-4, 5.

Shielded area used:

Yes

Comments:

None

ISO11452-4, 8.3.2.1.

Forward power used to achieve specified current.

Yes

Installation of ESA under Test

Ann 9, 4.3.2.

Current probe located 150 ± 10 mm from ESA connectors or closed loop method used.

Yes

Ann 9, 4.3.2.

ESA installed:

~~- In a vehicle, as per ISO 11451-4*~~
- On a ground plane, as per ISO 11452-4*

**Strikethrough, as appropriate.*

Yes



31-Jul-24



This test report shall not be reproduced except in full, without written approval of the technical service.

ISO11452-4, 7.1.	Ground plane is made from at least 0.5 mm thick copper, brass or galvanised steel.	Yes
ISO11452-4, 7.1.	Minimum width of the ground plane is 1,000 mm and the minimum length is 1,500 mm, or length of the entire underneath of equipment plus 200 mm, whichever is greater.	Yes
ISO11452-4, 7.1.	Height of the ground plane is 900 ± 100 mm.	Yes
ISO11452-4, 7.1.	Ground plane is bonded to the shielded enclosure, with the straps at a distance no greater than 300 mm apart.	Yes
ISO11452-4, 7.2.	- ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)* - ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply* <i>*Strikethrough, as appropriate.</i>	
ISO11452-4, 7.2.	Power supply is Artificial Network (AN) rated at 50 Ω/5 µH.	Yes
ISO11452-4, 7.3.	ESA and harness supported 50 ± 5 mm above ground plane, on low relative permittivity material.	Yes
ISO11452-4, 7.3.	Face of the ESA at least 100 mm from the edge of the ground plane.	Yes
ISO11452-4, 7.3.	Distance of at least 500 mm between ESA and any metal parts, such as the walls of the shielded enclosure (exception is ground plane).	Yes
ISO11452-4, 7.4.	Length of test harness is 1,000 ± 100 mm, unless specified.	Yes
	Actual wiring harness length: <input type="text" value="1"/> m	Yes

BCI Test Results

6.8.2.1.	No malfunction at 60 mA or below. Comments: <input type="text" value='There is no degradation of performance of "immunity related functions".'/>	Yes
----------	--	-----

Free Field Immunity

	Calibration date: <input type="text" value="25 December 2021, Valid for 3-5 years"/>
ISO11452-2, 5.	Semi-anechoic chamber used: <input type="text" value="Yes"/>
ISO11452-2, 8.3.1.	Test field defined by:





This test report shall not be reproduced except in full, without written approval of the technical service.

	<p>—Forward power* - Another parameter, directly related* <i>*Strikethrough, as appropriate.</i></p>	
ISO11452-2, 8.3.2.	Antenna is at a distance of 1,000 ± 10 mm from the reference point.	Yes
ISO11452-2, 8.3.2.	Reference point is 150 ± 10 mm above the ground plane.	Yes
ISO11452-2, 8.3.2.	Reference point is 100 ± 10mm from the edge of the ground plane.	Yes
ISO11452-2, 8.3.2.	For frequencies from 80 - 1,000 MHz, the reference point is in the centre of the harness.	Yes
ISO11452-2, 8.3.2.	For frequencies from 1,000 - 2,000 MHz, the reference point is in line with the ESA.	Yes
Test Arrangements		
ISO11452-2, 7.1.	Ground plane is made from at least 0.5 mm thick copper, brass or galvanised steel.	Yes
ISO11452-2, 7.1.	Minimum width of the ground plane is 1,000 mm and the minimum length is 2,000 mm.	Yes
ISO11452-2, 7.1.	Height of the ground plane is 900 ± 100 mm.	Yes
ISO11452-2, 7.1.	Bonding straps are at a distance no greater than 300 mm apart.	Yes
ISO11452-2, 7.2.	Power supply is Artificial Network (AN) rated at 50 Ω/5 μH.	Yes
ISO11452-2, 7.2.	<p>- ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)* —ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply* <i>*Strikethrough, as appropriate.</i></p>	
ISO11452-2, 7.3.	AN mounted directly on the ground plane and cases bonded to the ground plane.	Yes
ISO11452-2, 7.3.	ESA and harness supported 50 ± 5 mm above table, on low relative permittivity material.	Yes
ISO11452-2, 7.3.	Face of the ESA located 200 ± 10 mm from the edge of the ground plane.	Yes
ISO11452-2, 7.4.	Test harness parallel to the front edge of the ground plane.	Yes





This test report shall not be reproduced except in full, without written approval of the technical service.

ISO11452-2, 7.4.	Total length of harness does not exceed 2,000 mm.	Yes
ISO11452-2, 7.4.	Actual wiring harness length: <input type="text" value="NA"/> m	NA
ISO11452-2, 7.4.	or Length is 1,500 ± 75 mm between DUT and AN.	Yes
ISO11452-2, 7.4.	Harness is at a distance of 100 ± 10 mm from the edge of the ground plane.	Yes
ISO11452-2, Fig 1	Front face of ESA is at least 1.0 m from all other conductive structures.	Yes
ISO11452-2, Fig 1	ESA harness is at least 2.0 m forward from the chamber wall.	Yes

Antenna Type(s) and Frequency Range(s)

Ann 9, 4.1.2.	Antenna is vertically polarised.	Yes
ISO11452-2, 7.6.	Antenna is in the same position as the calibration.	Yes
ISO11452-2, 7.6.	Phase centre is 100 ± 10 mm above the ground plane.	Yes
ISO11452-2, 7.6.	Antenna elements are no closer than 250 mm to the floor of the facility, no closer than 0.5 m to any radio absorbent material, and no closer than 1.5 m to the wall of the facility.	Yes
ISO11452-2, 7.6.	Distance between wiring harness and antenna is 1,000 mm ± 10 mm, measured from the phase-centre of the biconical antenna, or the nearest part of the log-periodic and horn antennas.	Yes
Ann 9, 3.1.	Test signal modulation is: - AM, 1 kHz modulation, 80 % depth in 20 - 800 MHz frequency range; - PM, ton 577 µs, period 4,600 µs in 800 - 2,000 MHz frequency range.	Yes

Free Field Immunity Test Results

6.8.2.	No malfunction at 30 V/m over 90% of 20-2,000MHZ Frequency band and a minimum of 25 V/m over the whole band. Comments: <input type="text" value='There is no degradation of performance of "immunity related functions".'/>	Yes
--------	---	-----

150 mm Stripline Immunity

Calibration date:





This test report shall not be reproduced except in full, without written approval of the technical service.

ISO11452-5, 5.3.1. Stripline housed in a shielded room. NA

ISO11452-5, 6.2.2. Test field defined by: - Forward power* - Another parameter, directly related* *Strikethrough, as appropriate. NA

ISO11452-5, 6.2.3. Field probe in the centre of stripline. NA

Installation of ESA under Test

ISO11452-5, 5.3.1. ESA is 200 + 20 - 0 mm from the edge of the active conductor. NA

ISO11452-5, 5.3.1. Peripherals are a minimum of 200 mm from the edge of the active conductor. NA

ISO11452-5, 5.3.1. Harness supported 50 mm above the ground plane and is placed in the centre of the stripline. NA

ISO11452-5, 5.3.1. Actual wiring harness length: NA m or Minimum length under stripline is 1,000 mm. NA

ISO11452-5, 5.3.1. All wires in the harness are terminated or open, according to the vehicle application. NA

ISO11452-5, 5.3.1. Device and peripherals connected to the ground plane, as specified by the vehicle installation. NA

ISO11452-5, 5.3.1. Power supply is Artificial Network (AN) rated at 50 Ω/5 μH. NA

ISO11452-5, 5.3.1. - ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)* - ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply* *Strikethrough, as appropriate.

150 mm Stripline Test Results

6.8.2. No malfunction at 50 V/m or below. Comments: NA

800 mm Stripline Immunity

Calibration date:





This test report shall not be reproduced except in full, without written approval of the technical service.

NA

Ann 9, 4.5.2.1.	Stripline housed in a screened room.	NA
Ann 9, 4.5.2.1.	Stripline positioned a minimum of 2,000 mm from the walls or metallic enclosure.	NA
Ann 9, 4.5.2.1.	Stripline placed on non-conducting supports at least 400 mm above the floor.	NA
Ann 9, 4.5.2.2.	Field probe positioned within the central one-third of the longitudinal, vertical and transverse dimensions of the space between the parallel plates, with the system under test absent.	NA
Ann 9, 4.5.2.2.	Test field defined by: - Forward power* - Another parameter, directly related* <i>*Strikethrough, as appropriate.</i>	NA

Installation of ESA under Test

Ann 9, 4.5.2.3.	ESA is within the central one-third of the stripline.	NA
Ann 9, 4.5.2.3.	ESA is supported on non-conducting material.	NA
Ann 9, 4.5.2.4.	Wiring loom is arranged as per Appendix 1, Figure 3.	NA
Ann 9, 4.5.2.4.	Associated equipment is a minimum of 1,000 mm from stripline.	NA

800 mm Stripline Test Results

Frequency Suggested (MHz)	Frequency (MHz)	Forward Power		Output Level		Field Strength (V/m)
		Cal. (w)	Test (w)	Cal. (dBm)	Test (dBm)	

6.8.2.	No malfunction at 12.5 V/m or below. Comments: NA	NA
--------	---	----





Transient Testing

Case of ESA is:

- Grounded, simulating actual vehicle configuration*
 - ~~- Not grounded, simulating actual vehicle configuration*~~
- *Strikethrough, as appropriate.

Transient Immunity

- 6.9.1. Test set up according to ISO 7637-2 (second edition 2004) Yes
- Ann 10, 2. Supply lines and other lines, which may be connected to supply lines, are tested. Yes
- Test voltage and time parameters are within allowed envelopes. Yes
- Test pulses and duration according to the following: Yes

Test Pulse	Immunity Test Level	Functional Status for Systems		Test Duration	
		Related to Immunity-related Functions	Not Related to Immunity-related Functions		
1	III	C	D	5000 pulses	C
2a	III	B	D	5000 pulses	A
2b	III	C	D	10 pulses	C
3a	III	A	D	1 hour	A
3b	III	A	D	1 hour	A
4	III	B (for ESA, which must be operational during engine start, or C, for other ESA)		1 pulse	B

- ESA operational after the tests, according to the above classification. Yes

Emission of Conducted Disturbances

- 6.9.1. Test set up according to ISO 7637-2. Yes
- Ann 10, 3. Supply lines and other lines, which may be connected to supply lines, are tested. Yes

Comments:

None





This test report shall not be reproduced except in full, without written approval of the technical service.

Slow pulses and fast pulses tested on both powering up and powering down.

Yes

Polarity of Pulse Amplitude	Maximum Allowed Pulse Amplitude	
	Vehicles with 12 V systems	Vehicles with 24 V system
Positive	+ 75 V	+ 150 V
Negative	- 100 V	- 450 V

Notes

[Notes can be provided at the bottom if it is useful to provide additional information that is not covered by a compliance statement, for example glazing markings.]

Remarks

None

Note: no note needed.



Annex I Test photos

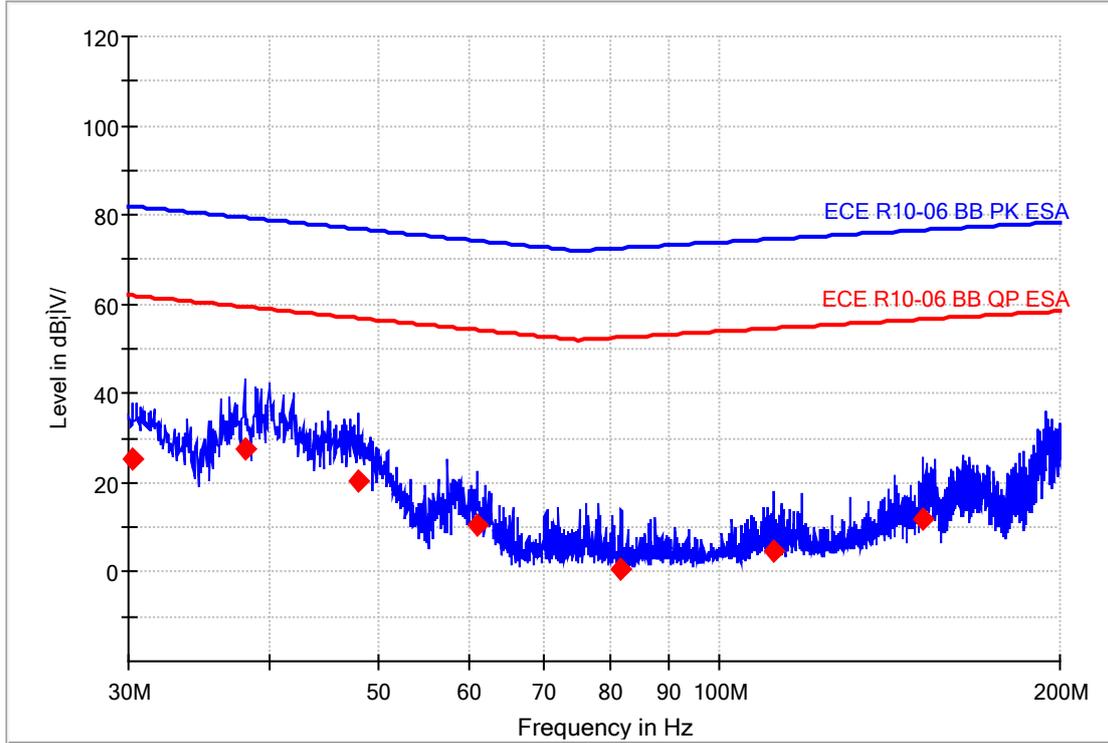




Annex II Test Result

BB 30M200M H

Full Spectrum



— Preview Result 1-PK+ — ECE R10-06 BB QP ESA
— ECE R10-06 BB PK ESA ◆ Final_Result QPK

Final_Result

Frequency (MHz)	QuasiPeak (dB _i V/m)	Limit (dB _i V/m)	Margin (dB)	Corr. (dB)
30.250000	25.17	61.91	36.74	-16.5
38.000000	27.66	59.42	31.76	-16.6
47.950000	20.52	56.88	36.36	-17.2
61.100000	10.33	54.24	43.91	-18.3
81.850000	0.74	52.57	51.84	-18.0
111.800000	4.51	54.62	50.11	-16.3
151.400000	12.02	56.62	44.60	-13.8

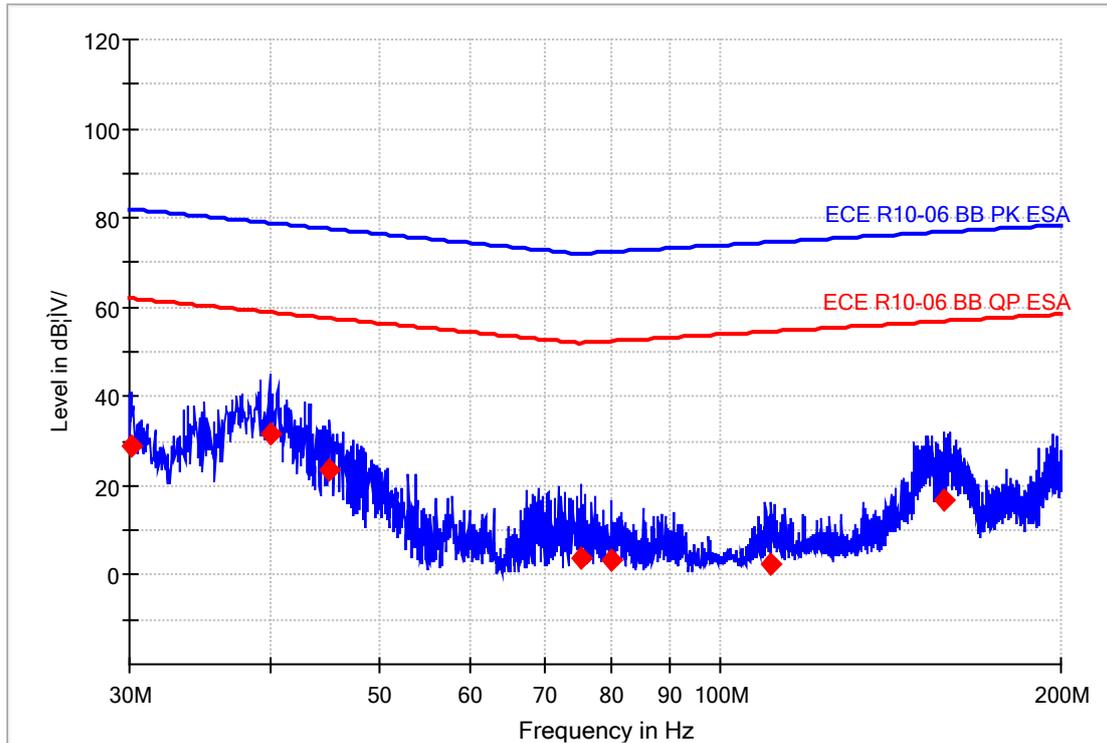




This test report shall not be reproduced except in full, without written approval of the technical service.

BB 30M200M V

Full Spectrum



— Preview Result 1-PK+ — ECE R10-06 BB QP ESA
— ECE R10-06 BB PK ESA ◆ Final_Result QPK

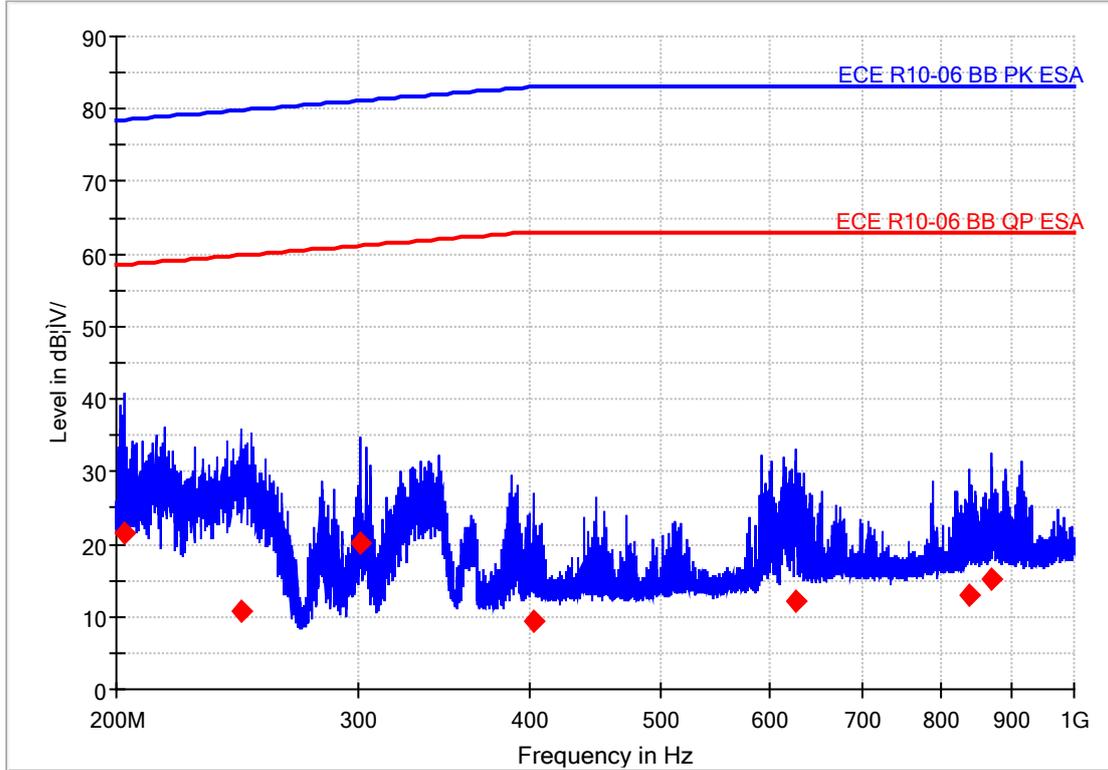
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Corr. (dB)
30.100000	28.84	61.96	33.12	-16.5
39.950000	31.77	58.87	27.10	-16.6
45.100000	23.35	57.55	34.20	-16.7
75.350000	3.56	52.03	48.47	-18.4
80.150000	3.36	52.44	49.07	-18.3
110.900000	2.42	54.57	52.15	-16.3
157.350000	16.77	56.87	40.10	-13.5



This test report shall not be reproduced except in full, without written approval of the technical service.

BB 200M1000M H



— Preview Result 1-PK+ — ECE R10-06 BB QP ESA
— ECE R10-06 BB PK ESA ◆ Final_Result QPK

Final_Result

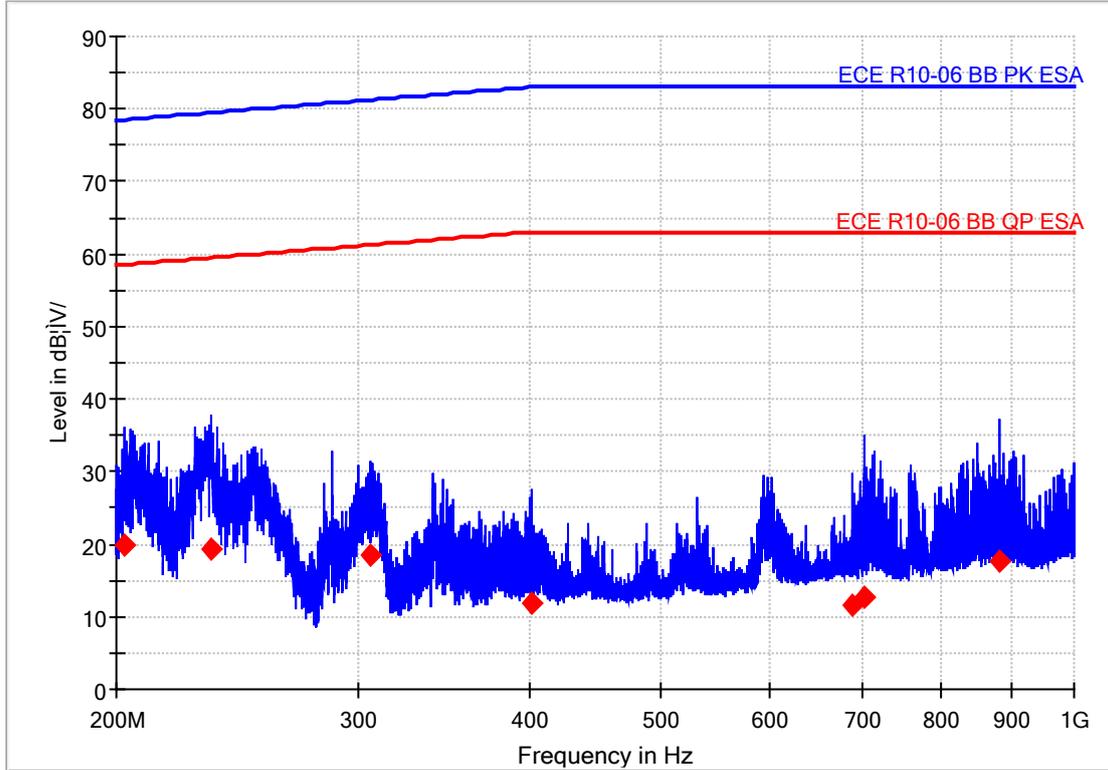
Frequency (MHz)	QuasiPeak (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
202.800000	21.42	58.54	37.12	-13.4
246.350000	10.64	59.82	49.17	-12.3
301.550000	20.14	61.14	41.00	-11.3
403.350000	9.47	63.00	53.53	-8.4
625.700000	12.25	63.00	50.75	-5.9
837.650000	12.97	63.00	50.03	-3.9
870.800000	15.29	63.00	47.71	-3.4





This test report shall not be reproduced except in full, without written approval of the technical service.

BB 200M1000M V



— Preview Result 1-PK+ — ECE R10-06 BB QP ESA
— ECE R10-06 BB PK ESA ◆ Final_Result QPK

Final_Result

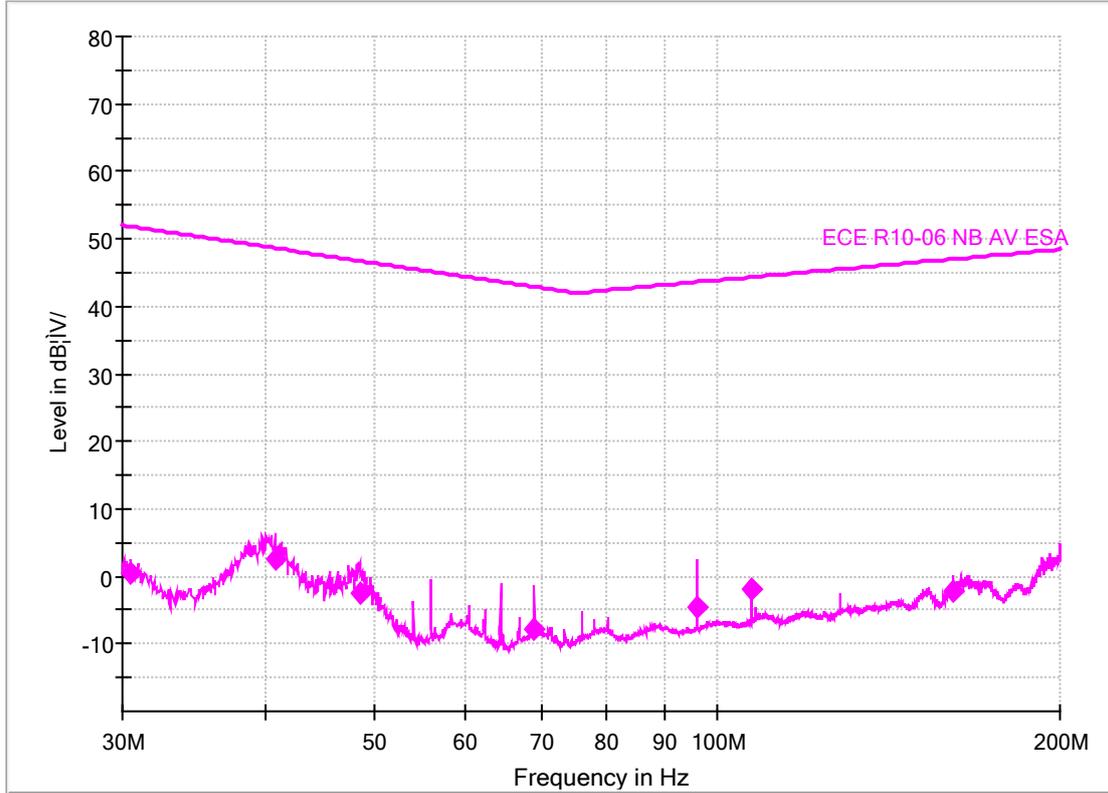
Frequency (MHz)	QuasiPeak (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
202.450000	19.84	58.53	38.69	-13.3
234.700000	19.44	59.50	40.06	-12.9
306.850000	18.53	61.26	42.73	-11.1
401.600000	11.80	63.00	51.20	-8.5
688.200000	11.53	63.00	51.47	-5.4
703.350000	12.77	63.00	50.23	-5.6
881.750000	17.79	63.00	45.21	-3.7





This test report shall not be reproduced except in full, without written approval of the technical service.

NB 30M200M H



Preview Result 1-AVG ECE R10-06 NB AV ESA Final_Result AVG

Final_Result

Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
30.550000	0.38	51.80	51.42	-16.5
40.850000	2.47	48.63	46.16	-16.5
48.500000	-2.37	46.76	49.13	-17.2
69.050000	-7.95	42.90	50.85	-18.7
96.050000	-4.55	43.63	48.18	-17.3
107.100000	-1.85	44.34	46.19	-16.4
161.250000	-2.08	47.03	49.11	-13.3

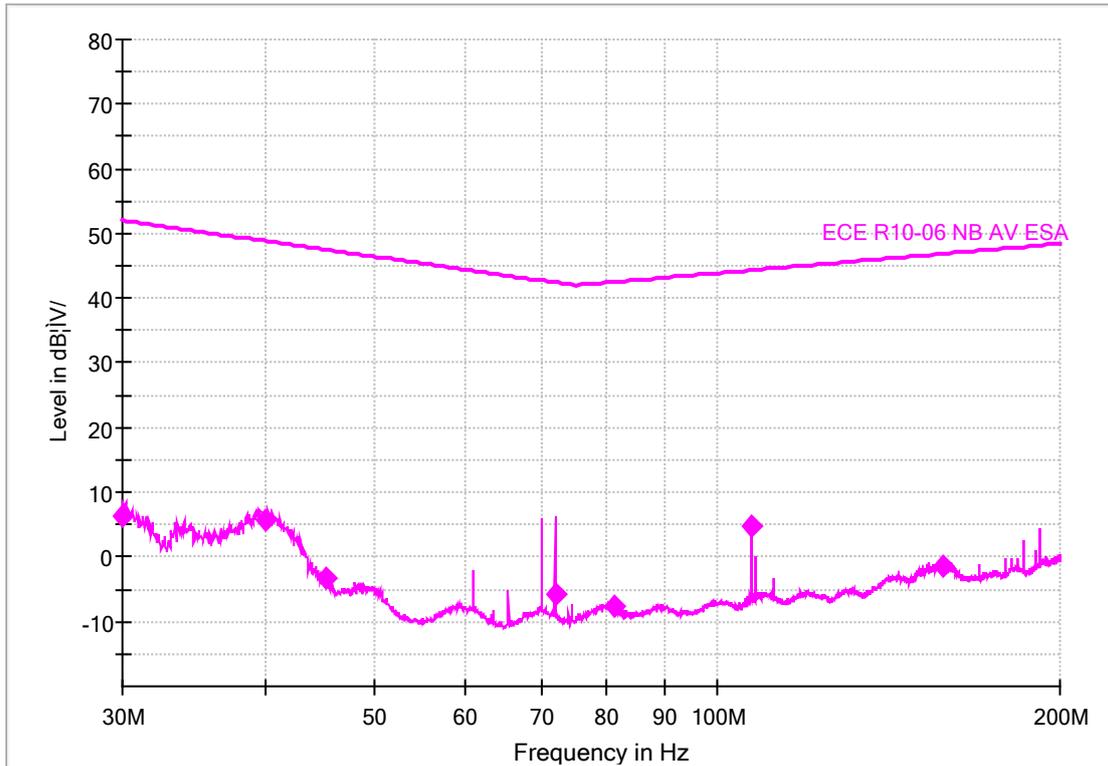




This test report shall not be reproduced except in full, without written approval of the technical service.

NB 30M200M V

Full Spectrum



— Preview Result 1-AVG — ECE R10-06 NB AV ESA ◆ Final_Result AVG

Final_Result

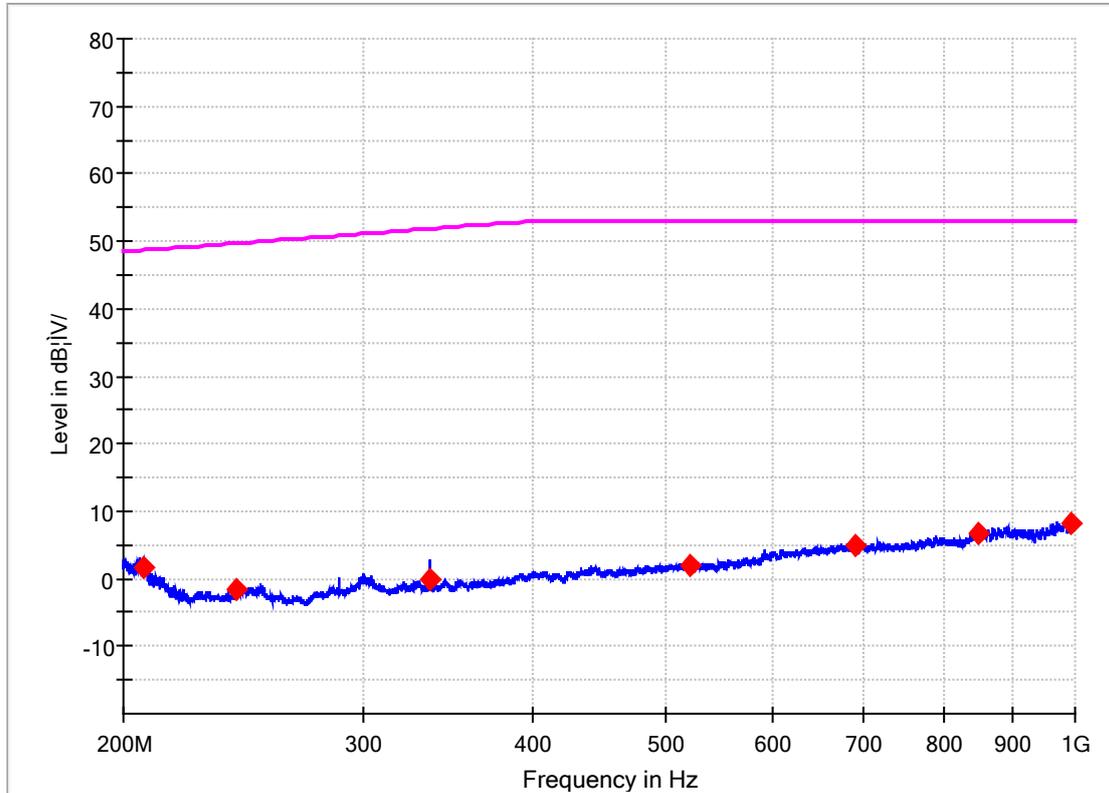
Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
30.550000	0.38	51.80	51.42	-16.5
40.850000	2.47	48.63	46.16	-16.5
48.500000	-2.37	46.76	49.13	-17.2
69.050000	-7.95	42.90	50.85	-18.7
96.050000	-4.55	43.63	48.18	-17.3
107.100000	-1.85	44.34	46.19	-16.4
161.250000	-2.08	47.03	49.11	-13.3





This test report shall not be reproduced except in full, without written approval of the technical service.

NB 200M1000M H



— Preview Result 1-AVG — ECE R10-06 NB AV ESA ◆ Final_Result AVG

Final_Result

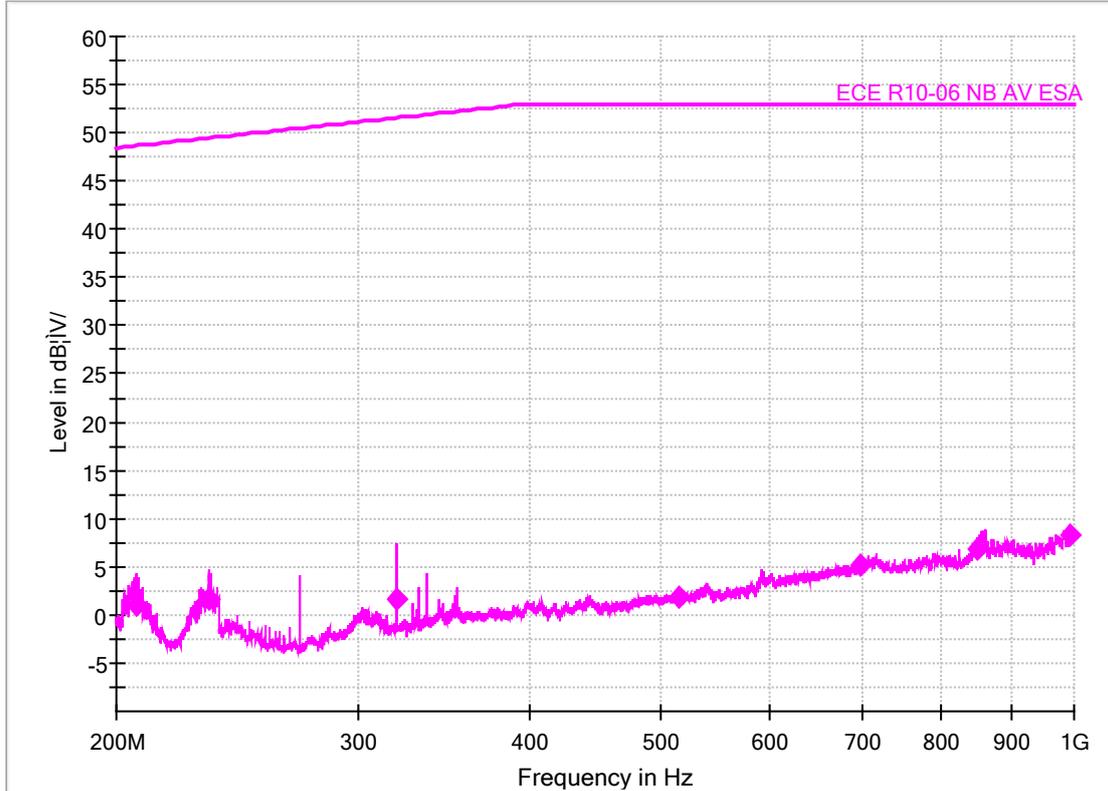
Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
206.850000	1.72	48.67	46.95	-13.6
241.900000	-1.68	49.70	51.38	-12.5
336.050000	-0.25	51.86	52.10	-10.5
521.250000	1.97	53.00	51.03	-7.2
689.550000	4.79	53.00	48.21	-5.4
848.650000	6.59	53.00	46.41	-3.3
992.050000	8.21	53.00	44.79	-4.4





This test report shall not be reproduced except in full, without written approval of the technical service.

NB 200M1000M V



Preview Result 1-AVG ECE R10-06 NB AV ESA Final_Result AVG

Final_Result

Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Corr. (dB)
206.550000	1.10	48.66	47.56	-13.5
233.600000	1.71	49.47	47.76	-13.0
319.950000	1.56	51.53	49.97	-10.9
514.300000	1.86	53.00	51.14	-7.3
699.400000	5.15	53.00	47.85	-5.5
849.450000	6.82	53.00	46.18	-3.3
992.750000	8.37	53.00	44.63	-4.4

