



SENTON

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14 December 2009

Prüfbericht / Test Report

Nr. / No. 486475-00569-1 (Edition 1)

Auftraggeber <i>Applicant</i>	TÜV SÜD Automotive GmbH
Geräteart <i>Type of equipment</i>	Drive by wire cruise control and speed limiter
Typenbezeichnung <i>Type designation</i>	AP 900
Auftragsnummer / <i>Order No.</i>	725700569
Prüfgrundlage <i>Test standards</i>	Council Directive 72/245/EEC in the version 2009/19/EC ECE Regulation No. 10 Revision3:2008



Summary

Prüfergebnisse / Test Results		Auftragsnummer / Order No. 725700569				
Die Prüfungen wurden nach folgenden Vorschriften durchgeführt: <i>Tests were performed according to:</i> Council Directive 72/245/EEC in the version 2009/19/EC ECE Regulation No. 10 Revision3:2008						
Durchgeführte Prüfung <i>Test performed</i>	Prüfergebnis <i>Test result</i>					
	Erfüllt <i>Passed</i>	Nicht erfüllt <i>Not Passed</i>	Nicht zutreffend <i>Not applicable</i>	Nicht durchgeführt <i>Not performed</i>	Kriterium <i>Criterion</i>	
Gestrahlte Störgrößen / <i>Radiated disturbance</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Leitungsgeführte Störgrößen / <i>Emission of conducted disturbances</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Elektromagnetische HF-Felder / <i>RF-electromagnetic fields</i> <i>BCI</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Elektromagnetische HF-Felder / <i>RF-electromagnetic fields</i> <i>Stripline</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Elektromagnetische HF-Felder / <i>RF-electromagnetic fields</i> <i>Antenna/AM</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Elektromagnetische HF-Felder / <i>RF-electromagnetic fields</i> <i>Antenna/PM</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 1</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 2a</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 2b</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 3a</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 3b</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A	
Leitungsgeführte transiente Störungen / <i>Conducted transient disturbances</i> <i>Pulse 4</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	C	

Bemerkungen / Remarks:

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / <i>Date</i>	Geprüft von / <i>Tested by</i>	Freigabe durch / <i>Checked by</i>	Prüfergebnis / Test Result <input checked="" type="checkbox"/> Erfüllt / <i>Passed</i> <input type="checkbox"/> Nicht erfüllt / <i>Not passed</i>
14.12.2009	 Alexander Stübinger Responsible for testing	 Johann Roidt Laboratory manager	

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1 Administrative Data

Application details	
Applicant:	TÜV SÜD Automotive GmbH Ridlerstraße 57 80339 München Deutschland
Contact person:	Mr. Christian Pscheidl
Order number:	725700569 / July 03, 2009
Receipt of EUT:	July 06, 2009
Return of EUT:	---
Date(s) of test:	November 09, 2009
Note(s):	---
Responsible for testing:	Mr. Alexander Stübinger / Mr. Tobias Ettinger
Responsible for test report:	Mr. Alexander Stübinger / Mr. Tobias Ettinger
Test report checked by:	Mr. Johann Roidt

Report details	
Report number:	486475-00569-1
Edition:	1
Issue date:	14.12.2009

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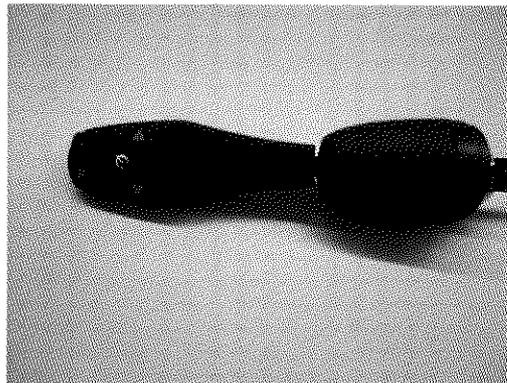
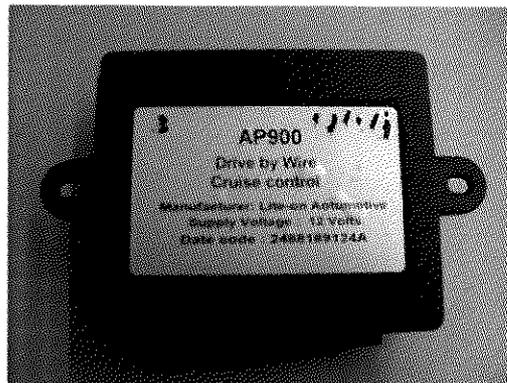


2 Details about the Test Laboratory

Details about the Test Laboratory	
Company name:	TÜV SÜD SENTON GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-PL-171/94-03 KBA-Registration Nr. KBA-P 00082-00
Contact:	Mr. Johann Roidt
	Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	AP 900
Parts of the system:	---
Options and accessories:	---
Type of equipment:	Drive by wire cruise control and speed limiter
Serial number:	2488189124A
Manufacturer:	Lite-on Automotive Corporation 37 Chung Yang Road NEPZ Kaohsiung 811, Taiwan
Power supply:	External DC supply Nominal: 12V Minimum: unknown Maximum: unknown Nominal frequency: ---
Version of EUT:	unknown



4 Operation Mode and Configuration of EUT

Operation Mode(s)	
-	dc supply 12 V
-	speed input 200 Hz square wave (12 V pulse)
-	cruise control active

List of ports and cables				
No.	Description	Classification ¹	Cable type	Cable length
D1	power-supply	dc power	Unshielded	0.2/0.5/1.7 m
S1	---	signal/control port	Unshielded	1.7 m

List of devices connected to EUT				
No.	Description	Type designation	Serial no. or ID	Manufacturer
1	Command Module	CM35	0209007458	Lite-on
2	Accelerator	---	VN198800-314	Toyota

List of support devices				
No.	Description	Type designation	Serial no. or ID	Manufacturer
no support devices				

¹ Ports shall be classified as ac power, dc power or signal/control port.

5 Performance Criteria and Methods of Observation

Definition of General Performance Criteria	
Referenced Standard:	ISO 7637-2:2004
Common Requirements:	The equipment shall not become dangerous or unsafe as a result of the application of the tests defined in this standard.
<i>Performance criterion</i>	<i>Specification</i>
A	All functions of a device/system perform as designed during and after exposure to disturbance
B	all functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.
C	one or more functions of a device/system do not perform as designed during exposure but returns automatically to normal operation after exposure is removed.
D	one or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple "operator/use" action.
E	one or more functions of a device/system do not perform as designed during and after exposure and cannot be returned to proper operation without repairing or replacing the device/system.

Methods of Observation			
<i>Function</i>	<i>Observed size</i>	<i>Permissible range</i>	<i>Observation method</i>
operation mode	voltage	---	Voltage measurement at outputs via voltmeter



6 Referenced Regulations

Council Directive 72/245/EEC in the version 2009/19/EC	COMMISSION DIRECTIVE 2009/19/EC of 12 March 2009 amending, for the purposes of their adaptation to technical progress, Council Directive 72/245/EEC of 20 June 1972 relating to the radio interference (electromagnetic compatibility) of vehicles and Council Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers
ECE Regulation No. 10 Revision 3:2008	Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions. Uniform provision concerning the approval of vehicles with regard to electromagnetic compatibility
CISPR 16-1-1 First edition (2003-11)	Specification for radio disturbance and immunity measuring apparatus and methods Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus
CISPR 25 Second edition (2002-08)	Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices Limits and methods of measurement
ISO 7637-1 Second edition (2002)	Road vehicles – Electrical disturbances from conduction and coupling Part 1: Definitions and general considerations
ISO 7637-2 Second edition (2004)	Road vehicles – Electrical disturbances from conduction and coupling Part 2: Electrical transient conduction along supply lines only
ISO 11452-1:2005 (Third Edition)	Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 1: General principles and terminology
ISO 11452-2:2004 (Second edition)	Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 2: Absorber-lined shielded enclosure
ISO 11452-4:2005 (Third Edition)	Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 4: Bulk current injection (BCI)
ISO 11452-5:2002 (Second edition)	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy Part 5: Stripline

7 Measurement Uncertainty Values

Radio Interference Emission Testing			
Test	k_p	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5μH NetznachbildungAMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH V-NetznachbildungAMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.8 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.8 dB	1
300 MHz to 1 GHz	2	± 4.6 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			
			4
Voltage Changes, Voltage Fluctuations and Flicker			
			4

Immunity Testing			
<i>Test</i>	<i>k_p</i>	<i>Expanded Uncertainty</i>	<i>Note</i>
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2.05	+21.9 / -18.0 %	3
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields	2	+30.3 / -23.2 %	2
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$, providing a level of confidence of $p = 95.45\%$

Note 4:

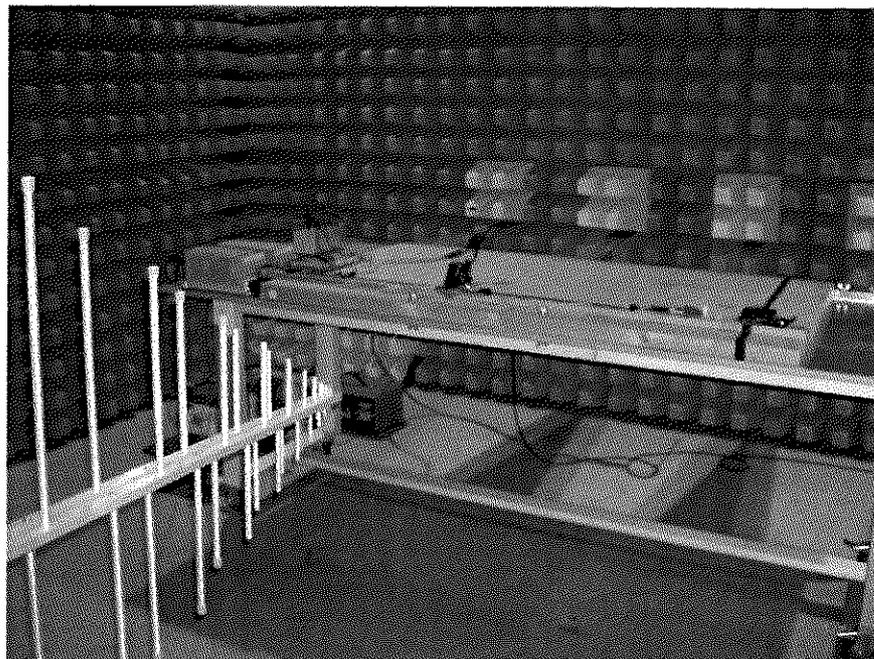
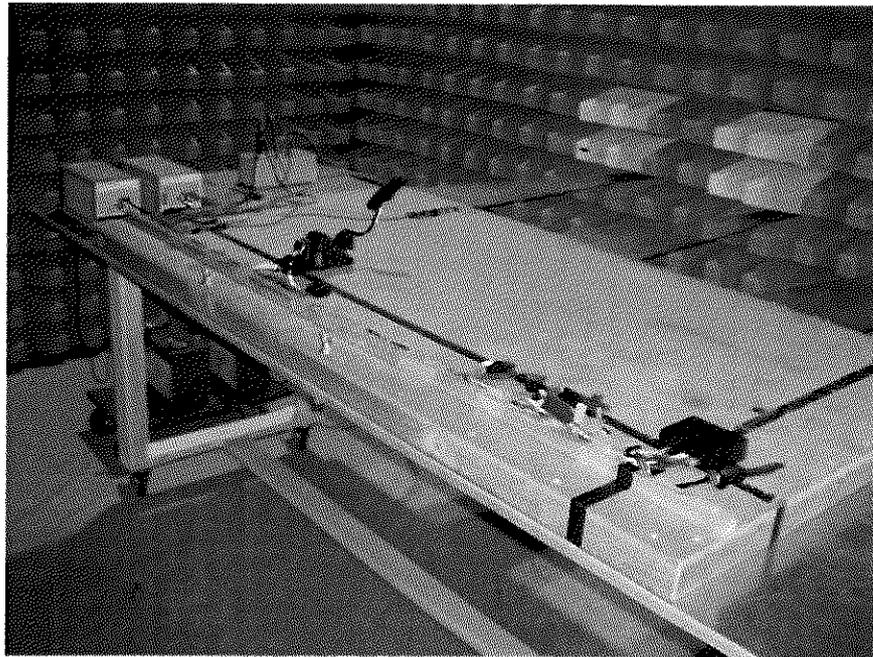
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence.

8 Test Results

Council Directive 72/245/EEC in the version 2009/19/EC / ECE Regulation No. 10 Revision3:2008			
<i>Test performed</i>		<i>Page</i>	<i>Test Result</i>
Radiated disturbance		13	Test passed
Emission of conducted disturbances		17	Test passed
RF-electromagnetic fields	BCI	23 / 26	Test passed
RF-electromagnetic fields	Antenna/AM	23 / 28	Test passed
RF-electromagnetic fields	Antenna/PM	23 / 30	Test passed
Conducted transient disturbances	Pulse 1	33 / 35	Test passed
Conducted transient disturbances	Pulse 2a	33 / 36	Test passed
Conducted transient disturbances	Pulse 2b	33 / 37	Test passed
Conducted transient disturbances	Pulse 3a	33 / 38	Test passed
Conducted transient disturbances	Pulse 3b	33 / 39	Test passed
Conducted transient disturbances	Pulse 4	33 / 40	Test passed

8.1 Radiated disturbance

8.1.1 Test Setup





8.1.2 Test Equipment List

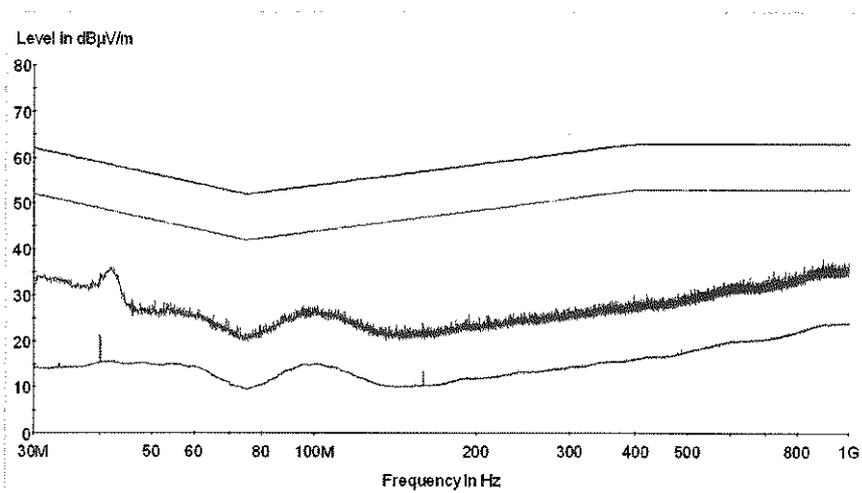
Typ		Bezeichnung	Inv.-Nr.	Seriennr. oder ID	Hersteller
<input type="checkbox"/>	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
<input type="checkbox"/>	EMI test receiver	ESPI7	1711	836914/0002	Rohde & Schwarz
<input type="checkbox"/>	EMI test receiver	Cabin no. 3 ESPI7	2010	101018	Rohde & Schwarz
<input checked="" type="checkbox"/>	EMI test receiver	ESCI3	1863	100008	Rohde & Schwarz
<input type="checkbox"/>	Test receiver	ESVP	1025	881120/024	Rohde & Schwarz
<input type="checkbox"/>	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
<input checked="" type="checkbox"/>	V-network	ESH 3-Z6	1220	830722/010	Rohde & Schwarz
<input checked="" type="checkbox"/>	V-network	ESH 3-Z6	1594	825993/027	Rohde & Schwarz
<input type="checkbox"/>	V-network	ESH 3-Z6	1793	100129	Rohde & Schwarz
<input type="checkbox"/>	V-network	ESH 3-Z6	1936	100328	Rohde & Schwarz
<input type="checkbox"/>	Preamplifier	Cabin no. 2 CPA9231A	1651	3393	Schaffner
<input type="checkbox"/>	Preamplifier	Cabin no. 2 AFS3-00100800-32-LN	1684	847743	Miteq
<input type="checkbox"/>	Preamplifier	Cabin no. 2 ACO/180-3530	1484	32641	CTT
<input type="checkbox"/>	Preamplifier	CPA9231A	1716	3557	Schaffner
<input type="checkbox"/>	Preamplifier	R14601	1142	13120026	Advantest
<input type="checkbox"/>	Preamplifier	AM-1309	1877	1112711	Miteq
<input type="checkbox"/>	Preamplifier	AMF-4D-005080-25-13P	1685	860149	Miteq
<input type="checkbox"/>	Magnetic Field Pickup Coil	HZ-10	1605	827129/013	Rohde & Schwarz
<input type="checkbox"/>	Loop antenna	HFH2-Z2	1016	882964/1	Rohde & Schwarz
<input type="checkbox"/>	Rod antenna	HFH2-Z6	1017	893053/001	Rohde & Schwarz
<input type="checkbox"/>	Trilog antenna	Cabin no. 2 VULB 9163	1722	9163-188	Schwarzbeck
<input type="checkbox"/>	Trilog antenna	Cabin no. 3 VULB 9163	1802	9163-214	Schwarzbeck
<input checked="" type="checkbox"/>	Trilog antenna	Cabin no. 6 VULB 9163	1824	9163-233	Schwarzbeck
<input type="checkbox"/>	Biconical antenna	Cabin no. 3 HK 116	1261	836239/02	Rohde & Schwarz
<input type="checkbox"/>	Log. per. antenna	Cabin no. 3 HL 223	1262	834408/12	Rohde & Schwarz
<input type="checkbox"/>	Horn antenna	3161-01	1009	1091	Emco
<input type="checkbox"/>	Horn antenna	3160-03	1010	9112-1003	Emco
<input type="checkbox"/>	Horn antenna	3160-04	1011	9112-1001	Emco
<input type="checkbox"/>	Biconical antenna	EG 1 HK 116	1518	842204/001	Rohde & Schwarz
<input type="checkbox"/>	Log. per. antenna	EG 1 HL 223	1519	841516/023	Rohde & Schwarz
<input type="checkbox"/>	Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/>	Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/>	Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/>	Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/>	Shielded room	No. 5	1537	5468	Ray Proof Division
<input checked="" type="checkbox"/>	Fully anechoic room	No. 6	1865	---	Albatross
<input type="checkbox"/>	Shielded room	No. 7	1866	---	Albatross
<input type="checkbox"/>	Open field test site	EG 1	1450	---	Senton

8.1.3 Test Results

Results for radiated disturbance are documented as listed below.

Radiated Disturbance
 acc. to Directive 2009/19/EG / ECE Regulation No. 10 Revision3:2008

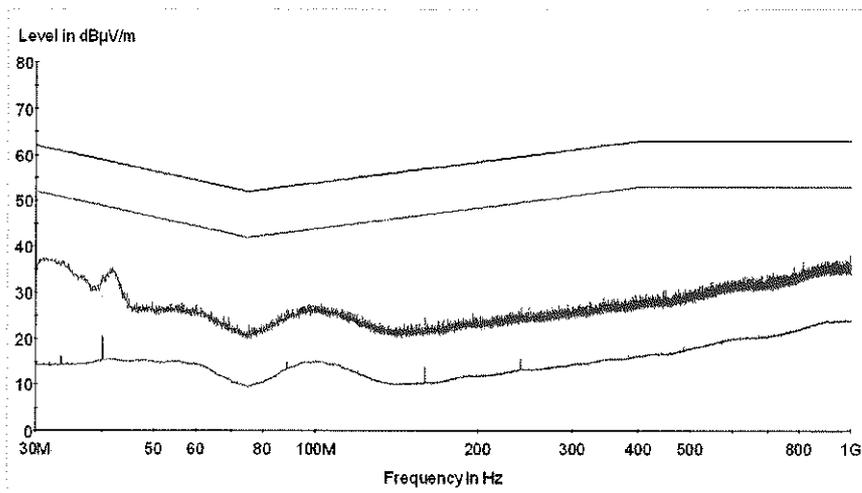
Model:	AP 900					
Applicant:	TÜV SÜD Automotive GmbH					
Antenna:	horizontal					
Mode of operation:	see chapter 4 / page 7					
Start-frequency	Stop-frequency	Stepwidth	Detector	Meastime	IF Bandwidth	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	Average MaxPeak	50.0 ms	120 kHz	VULB 9163 (1 m)



Test result:	Limit kept
Date of test:	09.11.2009
Tested by:	Alexander Stübinger/Tobias Ettinger

Radiated Disturbance
 acc. to Directive 2009/19/EG / ECE Regulation No. 10 Revision3:2008

Model:	AP 900					
Applicant:	TÜV SÜD Automotive GmbH					
Antenna:	vertical					
Mode of operation:	see chapter 4 / page 7					
Start-frequency	Stop-frequency	Stepwidth	Detector	Meastime	IF Bandwidth	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	Average MaxPeak	50.0 ms	120 kHz	VULB 9163 (1 m)



Level in dBµV/m

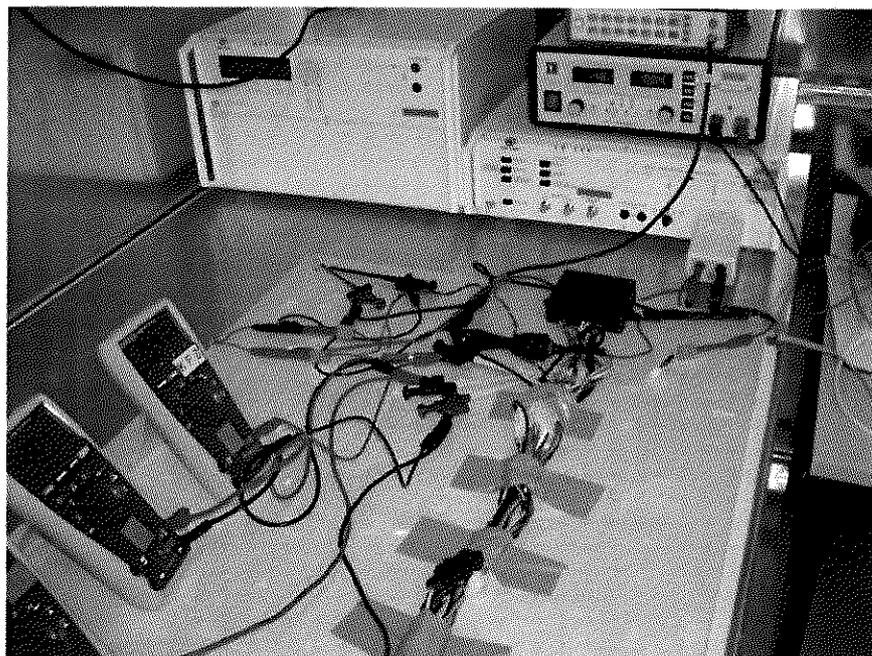
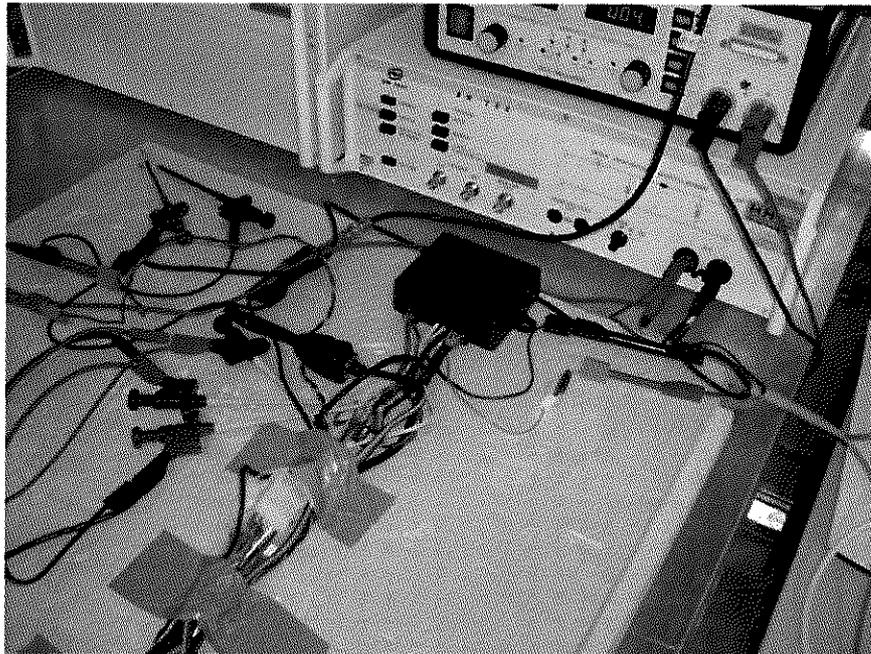
Frequency in Hz

— MaxPeak-ClearWrite
 Directive 72-245-EEC (2004-104-EC) BB
 Average-ClearWrite
 Directive 72-245-EEC (2004-104-EC) NB

Test result:	Limit kept
Date of test:	09.11.2009
Tested by:	Alexander Stübinger/Tobias Ettinger

8.2 Emission of conducted disturbances

8.2.1 Test Setup





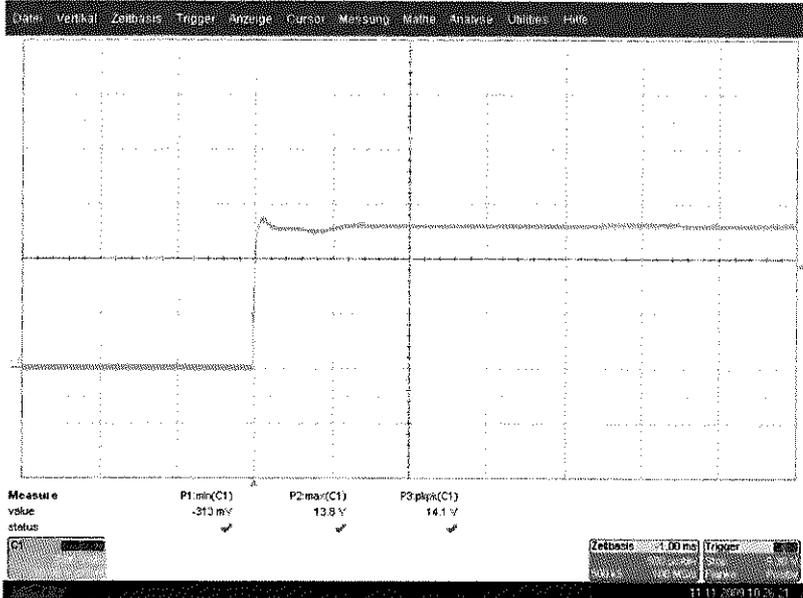
8.2.2 Test Equipment List

Typ	Bezeichnung	Inv.-Nr.	Seriennr. oder ID	Hersteller
<input checked="" type="checkbox"/> V-network / switch	AN200-S1	1919	V0613101304	EM Test
<input checked="" type="checkbox"/> Digital oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
<input type="checkbox"/> V-network	ESH 3-Z6	1220	830722/010	Rohde & Schwarz
<input type="checkbox"/> V-network	ESH 3-Z6	1594	825993/027	Rohde & Schwarz
<input type="checkbox"/> V-network	ESH 3-Z6	1793	100129	Rohde & Schwarz
<input type="checkbox"/> V-network	ESH 3-Z6	1936	100328	Rohde & Schwarz
<input type="checkbox"/> Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/> Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/> Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/> Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/> Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/> Fully anechoic room	No. 6	1865	---	Albatross
<input checked="" type="checkbox"/> Shielded room	No. 7	1866	---	Albatross
<input type="checkbox"/> Open field test site	EG 1	1450	---	Senton

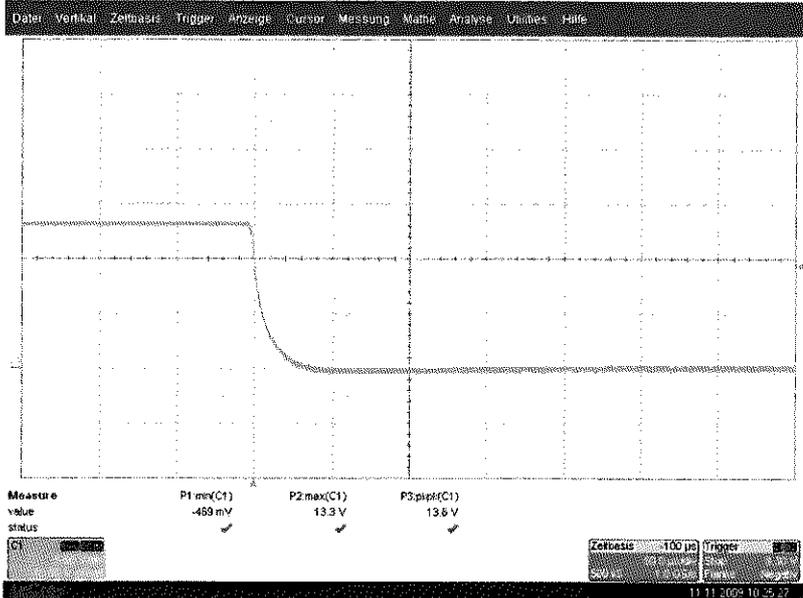
8.2.3 Test Results

Results for emission of conducted disturbances are documented as listed below.

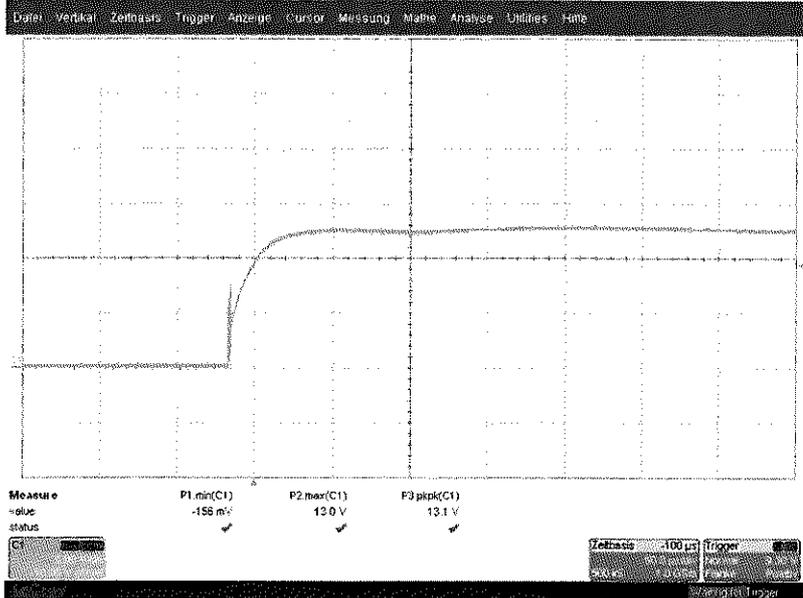
Test report Voltage transient emissions test

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Test carried out:	Measurement of transients (switch on battery-side) switching on		
Recorded impulse:			
Test result:	Polarity	impulse amplitude	
		measured value	limit
	positiv	13.8 V	+ 75 V
	negativ	-0.313 V	- 100 V
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

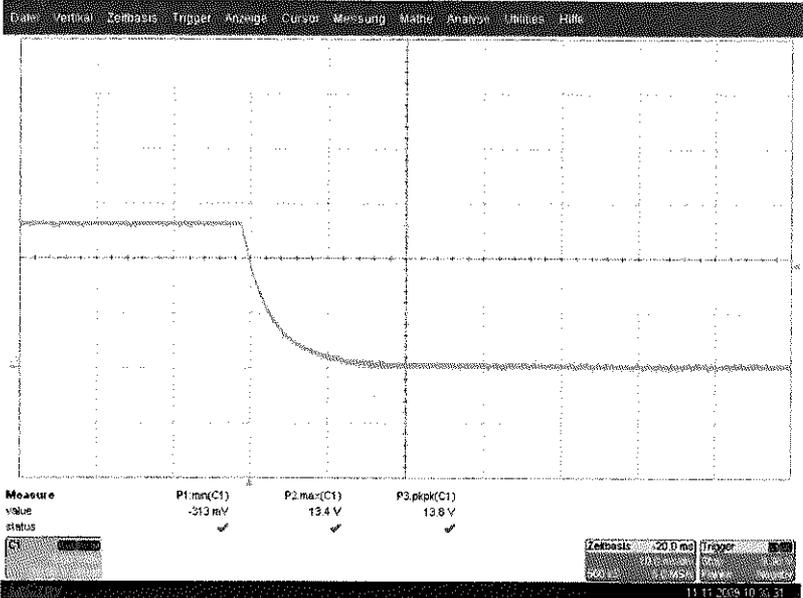
Test report Voltage transient emissions test

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Test carried out:	Measurement of transients (switch on battery-side) switching off		
Recorded impulse:			
			
Test result:	Polarity	impulse amplitude	
		measured value	limit
	positiv	13.3 V	+ 75 V
	negativ	-0.494 V	- 100 V
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

Test report Voltage transient emissions test

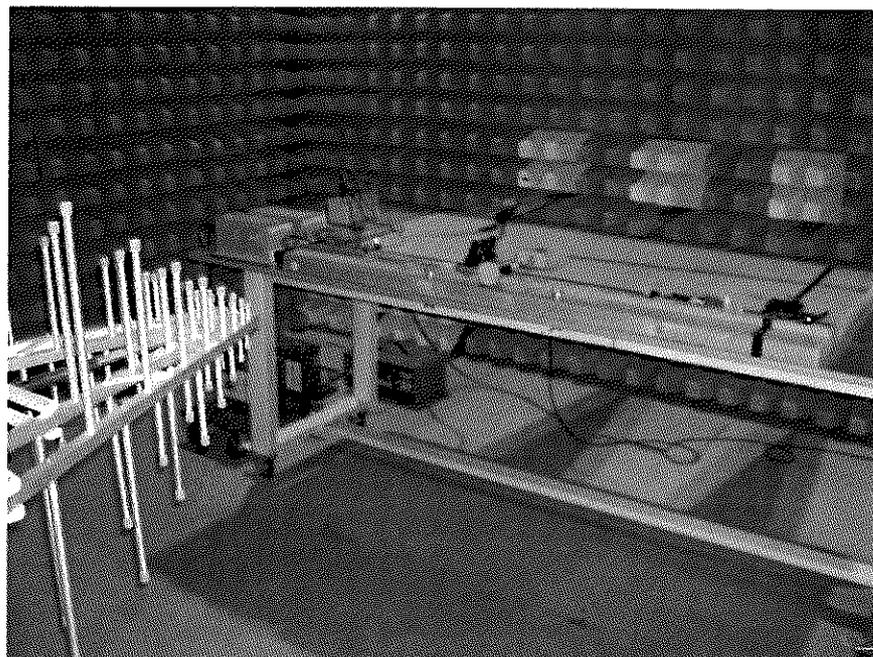
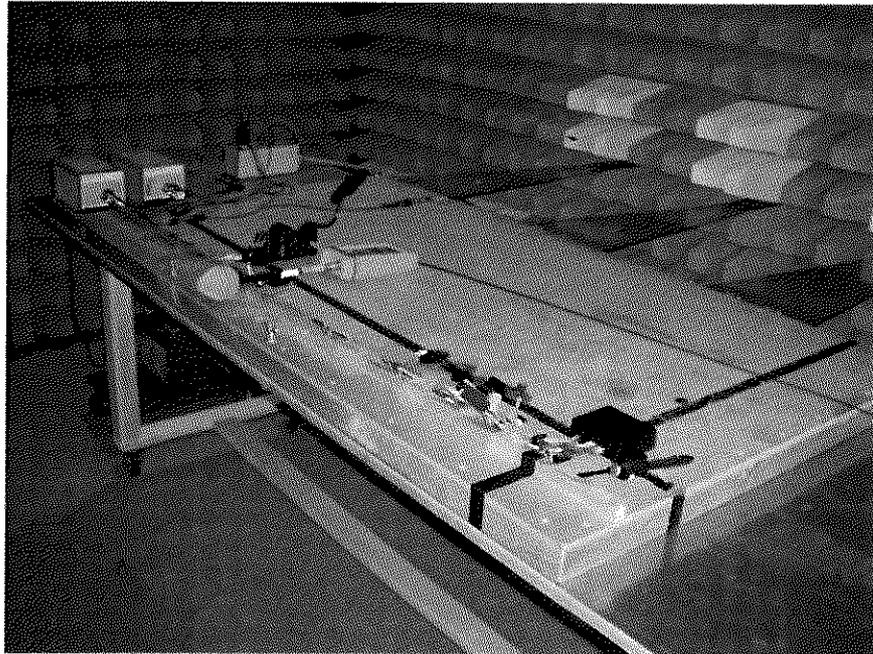
Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Test carried out:	Measurement of transients (switch on EUT-side) switching on		
Recorded impulse:			
Test result:	Polarity	impulse amplitude	
		measured value	limit
	positiv	13.0 V	+ 75 V
	negativ	-0.156 V	- 100 V
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

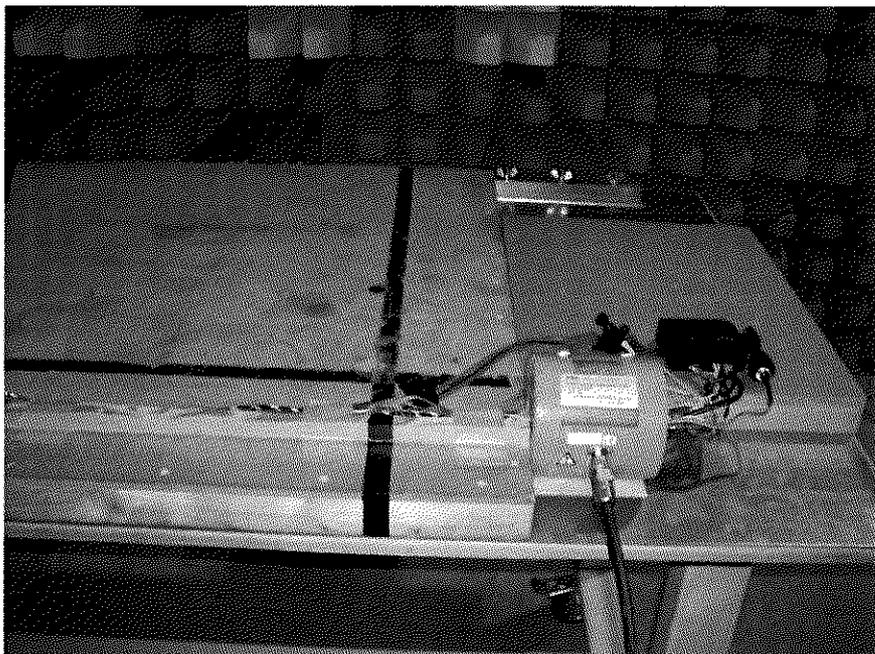
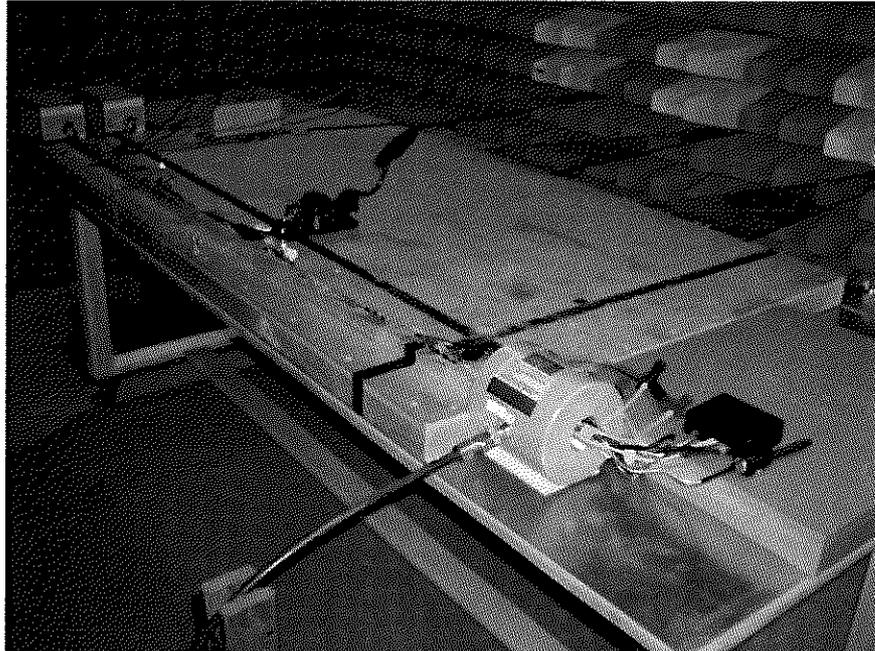
Test report Voltage transient emissions test

Model:	AP 900														
Applicant:	TÜV SÜD Automotive GmbH														
Mode of operation	see chapter 4 / page 7														
Environmental conditions:	Bar. pressure:	975 hPa													
	Ambient temperature:	20 °C													
	Relative humidity:	40 %													
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004														
Test carried out:	Measurement of transients (switch on EUT-side) switching off														
Recorded impulse:	 <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>Measure</th> <th>P1.min(C1)</th> <th>P2.max(C1)</th> <th>P3.p1pk(C1)</th> </tr> </thead> <tbody> <tr> <td>value</td> <td>-0.313 mV</td> <td>13.4 V</td> <td>13.8 V</td> </tr> <tr> <td>status</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>			Measure	P1.min(C1)	P2.max(C1)	P3.p1pk(C1)	value	-0.313 mV	13.4 V	13.8 V	status	✓	✓	✓
Measure	P1.min(C1)	P2.max(C1)	P3.p1pk(C1)												
value	-0.313 mV	13.4 V	13.8 V												
status	✓	✓	✓												
Test result:	Polarity	impulse amplitude													
		measured value	limit												
	positiv	13.4 V	+ 75 V												
	negativ	-0.313 V	- 100 V												
Classification:	Test passed.														
Date of test:	09.11.2009														
Tested by:	Alexander Stübinger/Tobias Ettinger														

8.3 RF-electromagnetic fields

8.3.1 Test Setup







8.3.2 Test Equipment List

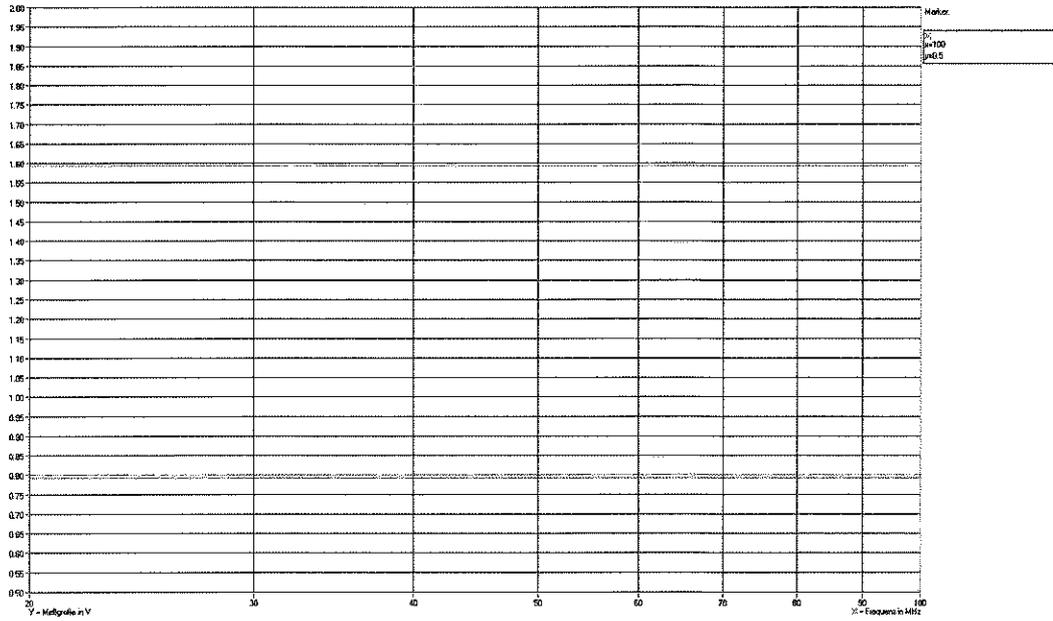
Typ		Bezeichnung	Inv.-Nr.	Seriennr. oder ID	Hersteller	
<input type="checkbox"/>	Signal generator	Cabin no. 3	SML 03	1729	101495	Rohde & Schwarz
<input checked="" type="checkbox"/>	Signal generator	Cabin no. 6	SML 03	1867	102131	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 6	HVV 250	1508	836956/004	Rohde & Schwarz
<input type="checkbox"/>	Power amplifier	Cabin no. 3	1000L	1704	8923	Amplifier Research
<input type="checkbox"/>	Power amplifier	Cabin no. 3	200W1000	1225	12904	Amplifier Research
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 6	1000W1000B	1827	307669	Amplifier Research
<input type="checkbox"/>	Power amplifier		25S1G4	1587	23171	Amplifier Research
<input checked="" type="checkbox"/>	Power amplifier	Cabin no. 6	TD81-250	1829	H040-0204	IFI
<input type="checkbox"/>	Power amplifier	Cabin no. 6	T188-20	1864	G119-0703	IFI
<input type="checkbox"/>	Power meter	Cabin no. 3	NRVD	1797	101092	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power meter	Cabin no. 6	NRP	1818	100006	Rohde & Schwarz
<input type="checkbox"/>	Power sensor		NRV-Z4	1034	863828/015	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 3	NRV-Z4	1798	100238	Rohde & Schwarz
<input type="checkbox"/>	Power sensor	Cabin no. 3	NRV-Z4	1799	100236	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power sensor	Cabin no. 6	NRP-Z91	1819	100064	Rohde & Schwarz
<input checked="" type="checkbox"/>	Power sensor	Cabin no. 6	NRP-Z91	1820	100065	Rohde & Schwarz
<input type="checkbox"/>	Directional coupler	Cabin no. 3	DC2000	1226	12502	Amplifier Research
<input type="checkbox"/>	Directional coupler	Cabin no. 3	DC6100	1227	12643	Amplifier Research
<input checked="" type="checkbox"/>	Directional coupler	Cabin no. 6	DC6280M6	1828	306877	Amplifier Research
<input checked="" type="checkbox"/>	Directional coupler	Cabin no. 6	DC7144M1	1808	310890	Amplifier Research
<input type="checkbox"/>	Trilog antenna		VULB 9163	1722	9163-188	Schwarzbeck
<input type="checkbox"/>	Hybrid log. periodic antenna		HLP-2603	1655	120500	EMC Automation
<input checked="" type="checkbox"/>	Stacked log. per. antenna		STLP 9128 E special	1854	019	Schwarzbeck
<input type="checkbox"/>	Horn antenna		3115	1516	9508-4553	Emco
<input type="checkbox"/>	Horn antenna		3160-03	1010	9112-1003	Emco
<input type="checkbox"/>	Horn antenna		3160-04	1011	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-05	1012	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-06	1013	9112-1001	Emco
<input type="checkbox"/>	Horn antenna		3160-07	1014	9112-1008	Emco
<input type="checkbox"/>	Horn antenna		3160-08	1015	9112-1002	Emco
<input type="checkbox"/>	Horn antenna		3161-01	1749	1091	Emco
<input type="checkbox"/>	Stripline		SL 150	1604	---	Senton
<input type="checkbox"/>	Stripline 90 Ohms (3.2 m)		SL 090	1811	---	Stimpff
<input checked="" type="checkbox"/>	Bulk Current Injection Probe		F-120-8	1869	83	FCC
<input type="checkbox"/>	Isotropic field probe		FP 2000	1228	12847	Amplifier Research
<input type="checkbox"/>	Isotropic field monitor		FM 2004	1229	12632	Amplifier Research
<input checked="" type="checkbox"/>	Electromagnetic radiation meter		EMR-200	1723	AT-0023	Narda
<input checked="" type="checkbox"/>	Electric field probe		Type 8.3	1724	AU-0008	Narda
<input type="checkbox"/>	Semi anechoic room		No. 3	1453	---	Siemens
<input checked="" type="checkbox"/>	Fully anechoic room		No. 6	1865	---	Albatross

8.3.3 Test Results

Results for RF-electromagnetic fields are documented as listed below.

Test report
Immunity to radiated RF electromagnetic fields (BCI, AM)

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 11452-1 / -4		
Requirements:	20 - 100 MHz	BCI	60 mA
Interfering signal:	Modulation	AM (80 % / 1 kHz)	
	Step size:	5 MHz	
	Position:	150 mm	
	Dwell time:	3 s	
Performance criteria:	Criterion A according to ISO 11452-1		
Test result:	No effects detected.		
Classification:	Test passed		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		



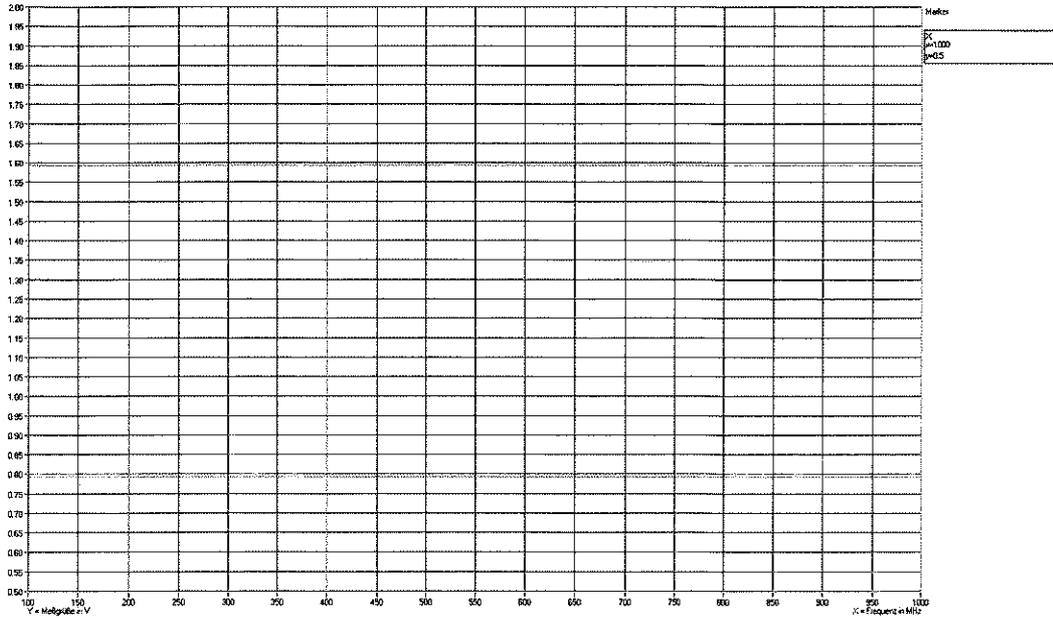
TÜV 725700569 AP900 20M-100M 150mm BCI 01



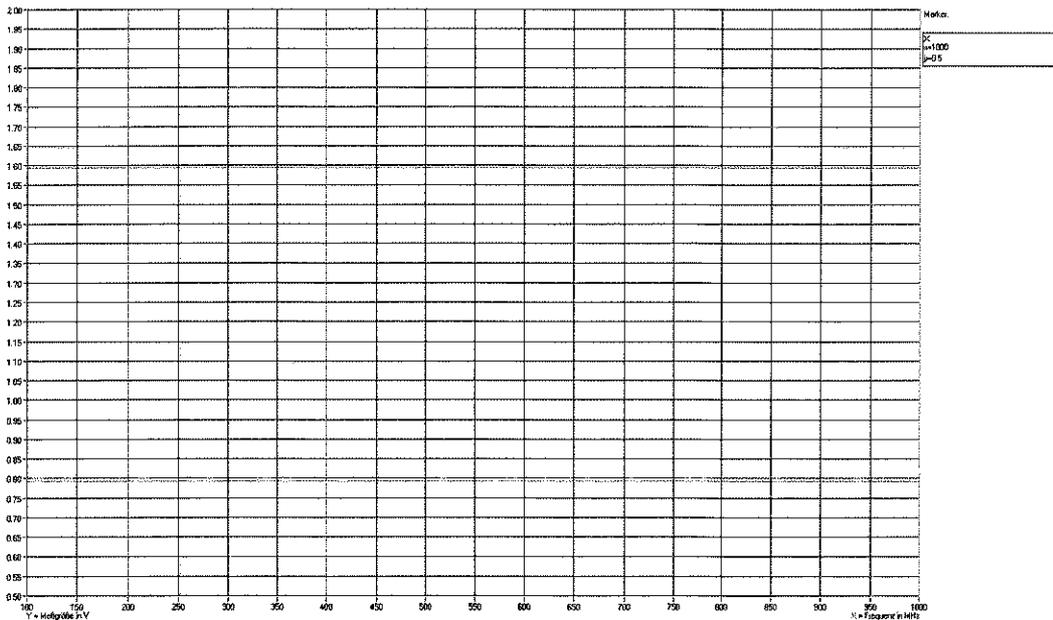
Test report

Immunity to radiated RF electromagnetic fields (Antenna, AM)

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 11452-1 / -2		
Requirements:	100 MHz - 1 GHz	Antenna	30 V/m
Interfering signal:	Modulation	AM (80 % / 1 kHz)	
	Step size:	100 MHz - 200 MHz	5 MHz
		200 MHz - 400 MHz	10 MHz
		400 MHz - 1 GHz	20 MHz
	Polarisation:	vertical / horizontal	
	Dwell time:	3 s	
Performance criteria:	Criterion A according to ISO 11452-1		
Test result:	No effects detected.		
Classification:	Test passed		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		



TÜV 725700569 AP900 100M-1G ver AM 01



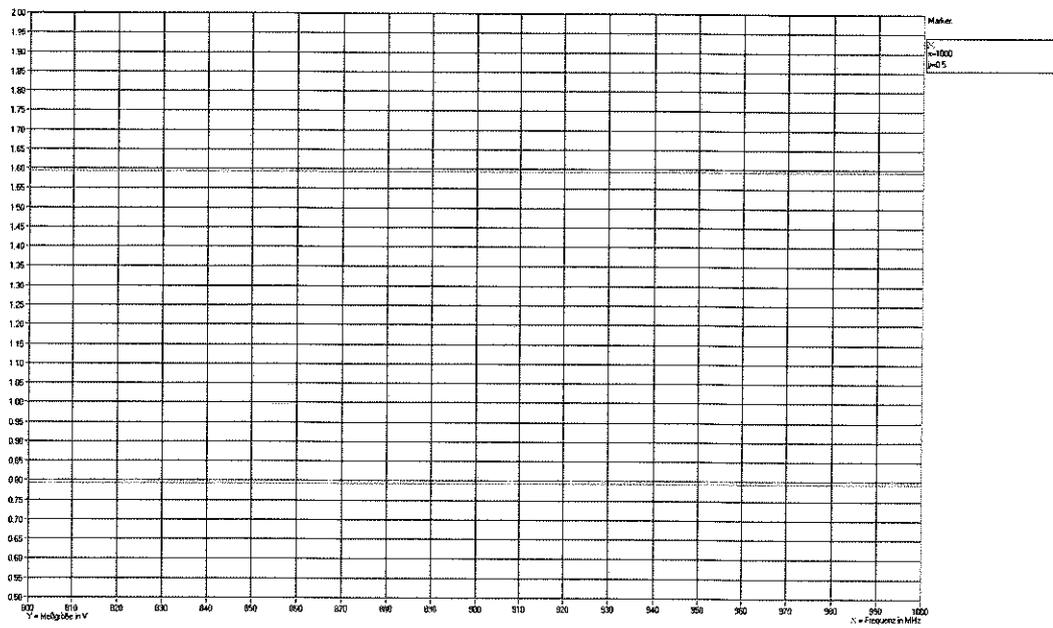
TÜV 725700569 AP900 100M-1G hor AM 01



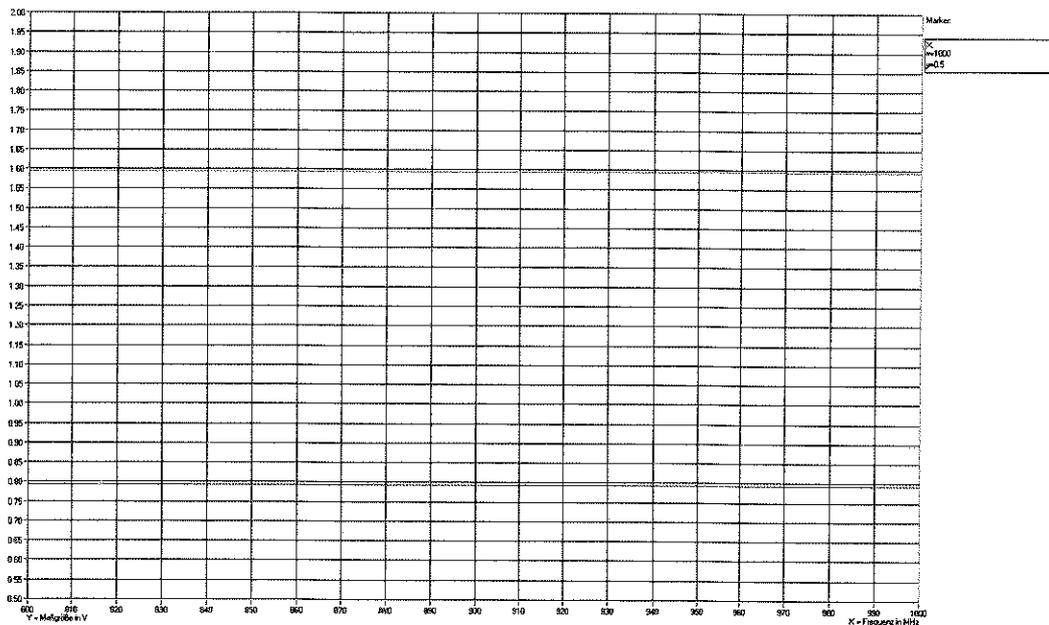
Test report

Immunity to radiated RF electromagnetic fields (Antenna, PM)

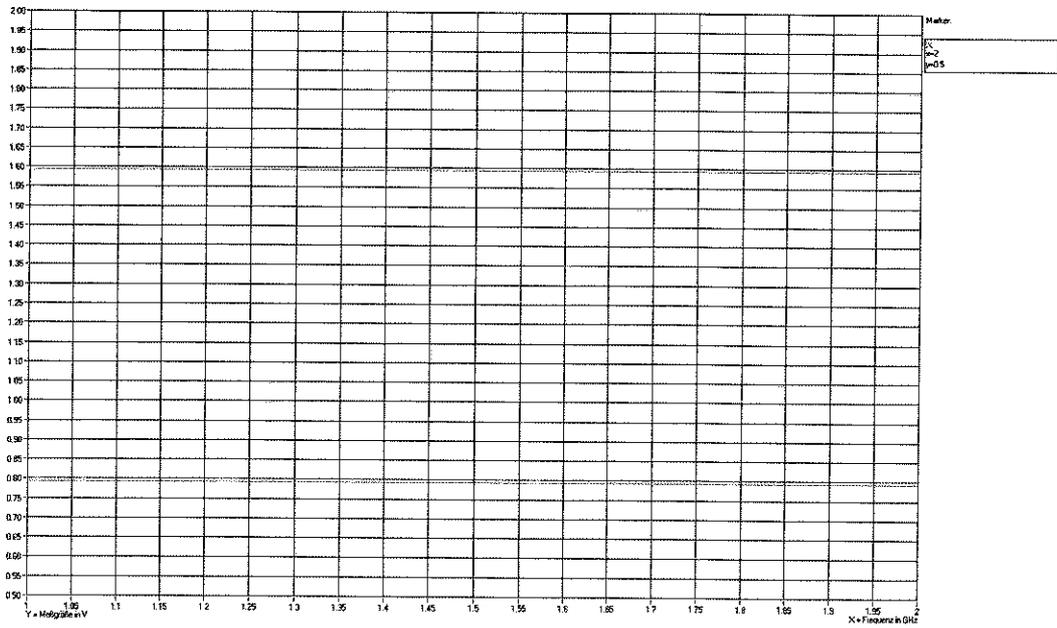
Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 11452-1 / -2		
Requirements:	800 MHz - 2 GHz	Antenna	30 V/m
Interfering signal:	Modulation	PM (577 µs / 4023 µs)	
	Step size:	800 MHz - 1 GHz	20 MHz
		1 GHz - 2 GHz	40 MHz
	Polarisation:	vertical / horizontal	
	Dwell time:	3 s	
Performance criteria:	Criterion A according to ISO 11452-1		
Test result:	No effects detected.		
Classification:	Test passed		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		



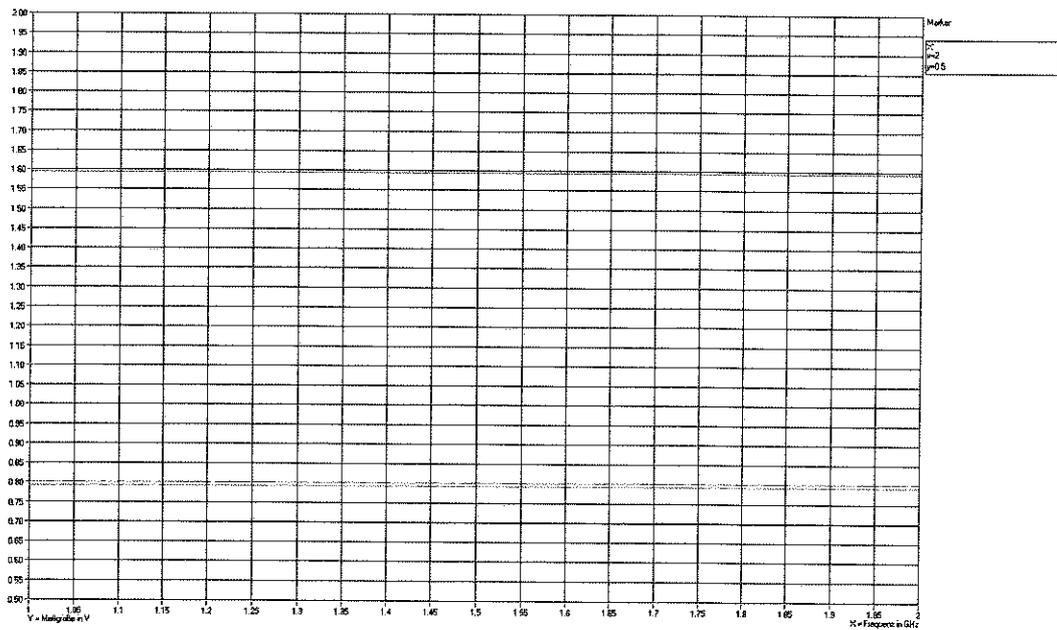
TÜV 725700569 AP900 800M-1G hor PM 01



TÜV 725700569 AP900 800M-1G ver PM 01



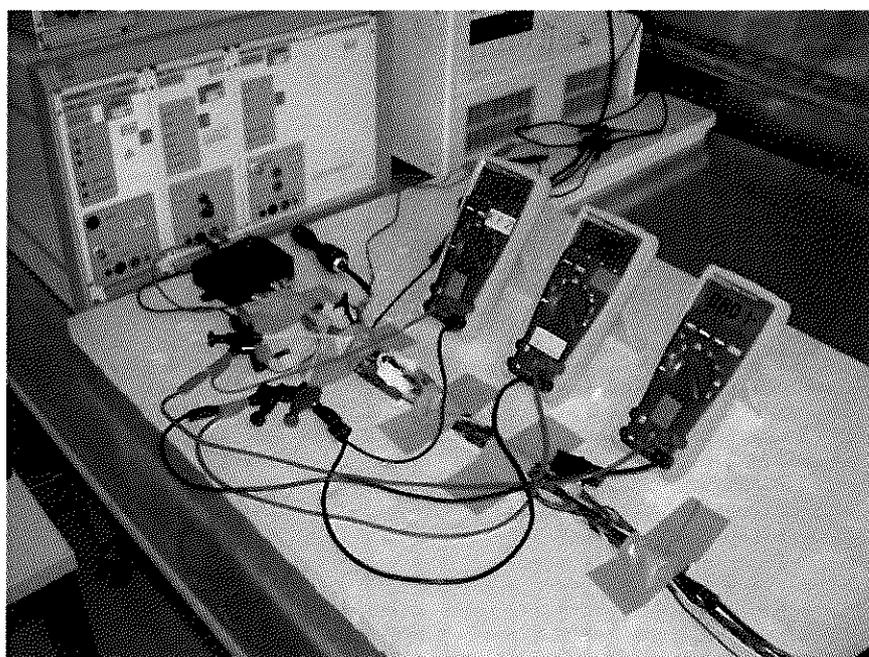
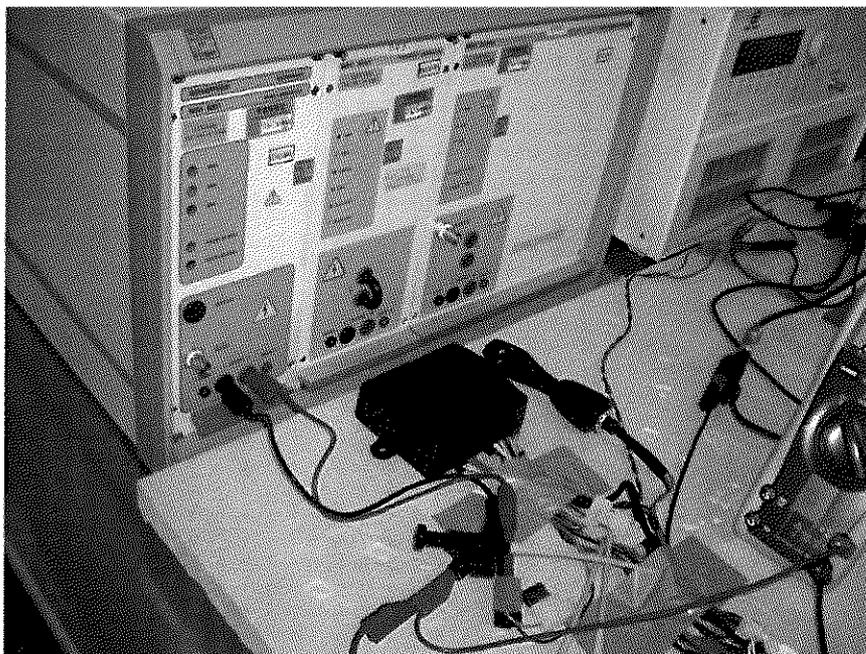
TÜV 725700569 AP900 1G-2G hor PM 01



TÜV 725700569 AP900 1G-2G ver PM 01

8.4 Conducted transient disturbance

8.4.1 Test Setup





8.4.2 Test Equipment List

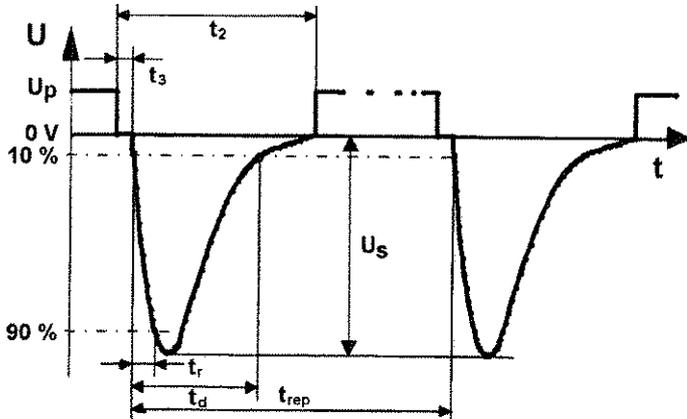
Typ	Bezeichnung	Inv.-Nr.	Seriennr. oder ID	Hersteller	
<input checked="" type="checkbox"/>	Main frame	NSG 5000	1596	199905-210EK	Schaffner
<input checked="" type="checkbox"/>	Test pulse generator	NSG 5003	1598	199811-089AR	Schaffner
<input type="checkbox"/>	Test pulse generator	NSG 5001A	1814	200227-161AR	Schaffner
<input checked="" type="checkbox"/>	Test pulse generator	NSG 5041	1597	003	Schaffner
<input type="checkbox"/>	Test pulse generator	NSG 5005A	1600	199840-093AR	Schaffner
<input checked="" type="checkbox"/>	Battery switch	INA 5020	1596	199838-631AR	Schaffner
<input type="checkbox"/>	Coupling clamp	CDN 500	1601	293	Schaffner
<input type="checkbox"/>	Current clamp	F-120-9B	1514	15	FCC
<input checked="" type="checkbox"/>	Digital Oscilloscope	Wave Surfer 452	1796	LCRY0301J11938	LeCroy
<input type="checkbox"/>	Arbitrary Wave Form Generator	Pragmatic 2714A	1649	02100477	EM Test
<input checked="" type="checkbox"/>	Voltage Drop Generator	VDS 200 PF	1648	0500-07	EM Test
<input type="checkbox"/>	Shielded room	No. 1	1451	---	Albatross
<input type="checkbox"/>	Fully anechoic room	No. 2	1452	---	Albatross
<input type="checkbox"/>	Semi anechoic room	No. 3	1453	---	Siemens
<input type="checkbox"/>	Shielded room	No. 4	1454	3FD 100 544	Euroshield
<input type="checkbox"/>	Shielded room	No. 5	1537	5468	Ray Proof Division
<input type="checkbox"/>	Fully anechoic room	No. 6	1865	---	Albatross
<input checked="" type="checkbox"/>	Shielded room	No. 7	1866	---	Albatross
<input type="checkbox"/>	Open field test site	EG 1	1450	---	Senton

8.4.3 Test Results

Results for conducted transient disturbances are documented as listed below.

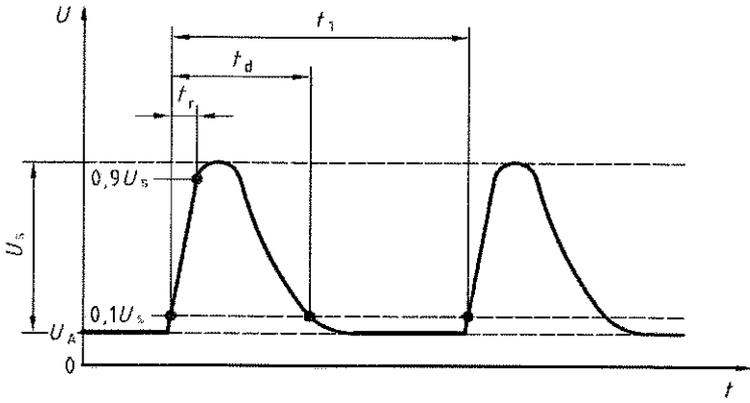
Test report

Immunity to conducted disturbances - Pulse 1

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 1:			
			
Pulse voltage U_s :	-75 V	t_r :	1 μ s
Impedance R_i :	10 Ohms	t_d :	2 ms
Pulse count:	5000	t_{rep} :	0.5 s
		t_2 :	200 ms
Supply voltage U_p :	13.5 V	t_3 :	< 100 μ s
Performance criteria:	Criterion C according to ISO 7637-2		
Test result:	During the pulses the AP900 inactiv, normal operation after test (Criterion C).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

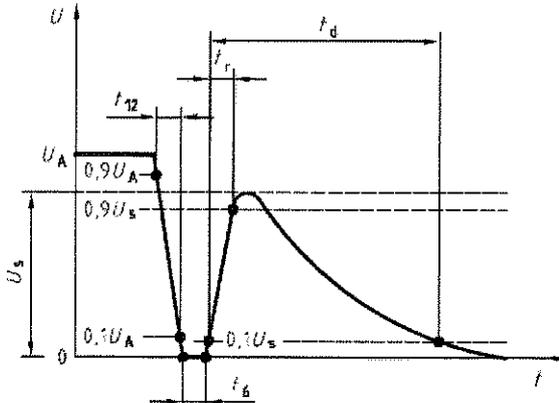
Test report

Immunity to conducted disturbances - Pulse 2a

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 2a:			
			
Pulse voltage U_s :	+37 V	t_r :	10 μ s
Impedance R_i :	2 Ohm	t_f :	50 μ s
Pulse count:	5000	t_{rep} :	0.2 s
Supply voltage U_p :	13.5 V		
Performance criteria:	Criterion B according to ISO 7637-2		
Test result:	No effects detected (Criterion A).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

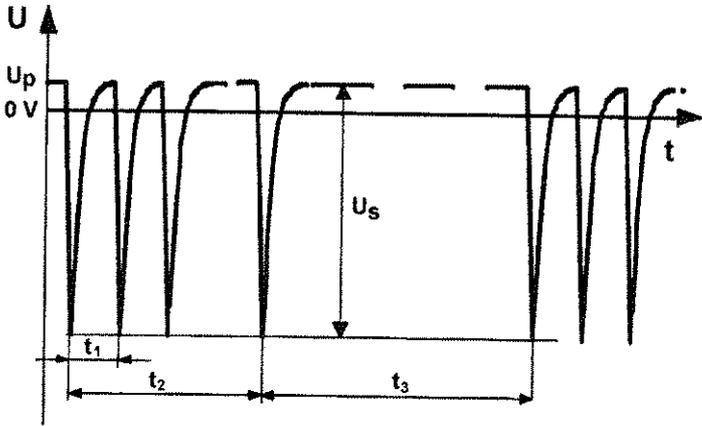
Test report

Immunity to conducted disturbances - Pulse 2b

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 2b:			
			
Pulse voltage U_s :	+10 V	t_r :	1 ms
Impedance R_i :	0.05 Ohm	t_d :	0.2 s
Pulse count:	10	t_6 :	1 ms
		t_{12} :	1 ms
Supply voltage U_p :	13.5 V		
Performance criteria:	Criterion C according to ISO 7637-2		
Test result:	During the pulses the AP900 inactiv, normal operation after test (Criterion C).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

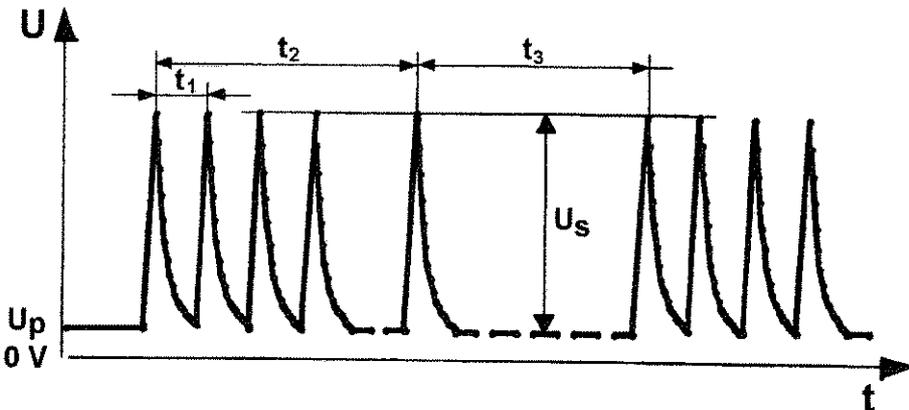
Test report

Immunity to conducted disturbances - Pulse 3a

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 3a:			
			
Pulse voltage U_s :	-112 V	t_r :	5 ns
Impedance R_i :	50 Ohm	t_d :	0.1 μ s
Test duration:	1 h	t_{rep} :	100 ms
		t_1 :	100 μ s
		t_2 :	10 ms
		t_3 :	90 ms
Supply voltage U_p :	13.5 V		
Performance criteria:	Criterion A according to ISO 7637-2		
Test result:	No effects detected (Criterion A).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

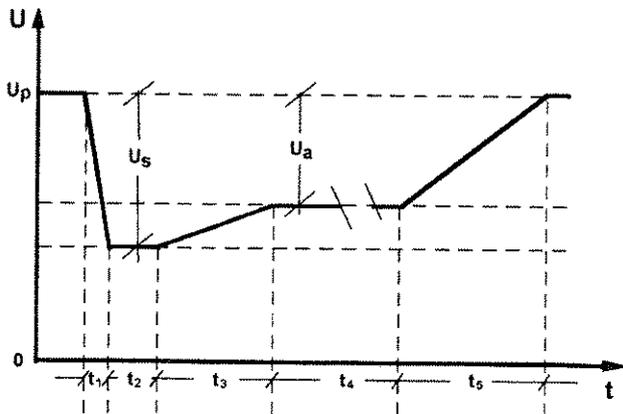
Test report

Immunity to conducted disturbances - Pulse 3b

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 3b:			
			
Pulse voltage U_s :	+75 V	t_r :	5 ns
Impedance R_i :	50 Ohm	t_d :	0.1 μ s
Test duration:	1 h	t_{rep} :	100 ms
		t_1 :	100 μ s
		t_2 :	10 ms
		t_3 :	90 ms
Supply voltage U_p :	13.5 V		
Performance criteria:	Criterion A according to ISO 7637-2		
Test result:	No effects detected (Criterion A).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		

Test report

Immunity to conducted disturbances - Pulse 4

Model:	AP 900		
Applicant:	TÜV SÜD Automotive GmbH		
Mode of operation	see chapter 4 / page 7		
Environmental conditions:	Bar. pressure:	975 hPa	
	Ambient temperature:	20 °C	
	Relative humidity:	40 %	
Regulation(s):	Directive 2009/19/EG ECE Regulation No. 10 Revision3:2008 ISO 7637-2:2004		
Coupling mode:	Coupling onto DC supply lines		
Specifications for Pulse 4:			
			
Supply voltage U_p :	12 V	t_1 :	≤ 5 ms
Voltage U_s :	-6 V	t_2 :	15 ms
Voltage U_a :	-2.5 V	t_3 :	50 ms
		t_4 :	2000 ms
Pulse count:	1	t_5 :	5 ms
Performance criteria:	Criterion C according to ISO 7637-2		
Test result:	During the pulse the AP900 inactiv, normal operation after test (Criterion C).		
Classification:	Test passed.		
Date of test:	09.11.2009		
Tested by:	Alexander Stübinger/Tobias Ettinger		



9 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	02.12.2009	A. Stübinger (rm)/ T. Ettinger	First Edition