

# AMP 200N2

## LF SIGNAL & AMPLIFIER DC (0HZ) TO 500 KHZ WITH 1,000 W



### FOR TESTS ACCORDING TO ...

- › Chrysler CS-11809 (2009)
- › Chrysler CS-11979
- › Chrysler DC-11224 Rev.A
- › DaimlerChrysler DC-10614
- › DaimlerChrysler DC-10615
- › DaimlerChrysler DC-11224
- › Fiat 9.90110
- › Ford EMC-CS-2009.1
- › Ford ES-XW7T-1A278-AC
- › Ford FMC1278
- › GLloyd VI-7-2
- › GMW 3097 (2006)
- › GMW 3172
- › ISO 11452-10
- › ISO 11452-8
- › ISO 7637-4
- › Jaguar JLR-EMC-CS V1.0 Amd 4
- › LV 123
- › MAN 3285
- › MBN 10284-2

### AMP 200N2 - LOW-FREQUENCY SIGNAL / AMPLIFIER FOR SUPPLY SIMULATION AND MAGNETIC FIELD TESTING

The AMP 200N2 has been designed as a low-frequency signal source to generate sinusoidal signals used to simulate ripple noise and ground shift noise as required by a variety of standards in the avionics, military and automotive industry. The AMP 200N2 is controlled by the NetWave (for testing Electrical Vehicles, avionics, military and nautic standard requirements. e.g LV 123 and ISO 7637-4 Pulse C). The AutoWave is used for automotive testing such as e.g. Ford FMC1278. Additionally, the AMP 200N2 can be used to generate magnetic fields by means of a radiation loop or small Helmholtz coils as per various standards.

#### HIGHLIGHTS

- › Automatic Closed Loop test procedures
- › Built-in DDS sinus signal generator up to 500 kHz
- › Output voltage max. 160 V p-p, 50 V rms
- › Output current max. 18 A rms
- › Designed for EV's and much more
- › Supports magnetic field tests up to 1100 A/m
- › Short-circuit protected

#### APPLICATION AREAS

-  AUTOMOTIVE
-  MILITARY
-  AVIONICS

## TECHNICAL DETAILS

### BENEFITS

#### AMP 200N2 - SIGNAL GENERATOR/AMPLIFIER SOLUTION FOR RIPPLE NOISE AND MAGNETIC FIELD TESTING

The AMP 200N2 unifies a low-frequency signal generator and a powerful amplifier module giving a maximum amplitude of 160 V peak-to-peak as required e.g. by German Lloyd VI-7-2 or by Ford FMC1278. It generates both sinusoidal and transient signals.

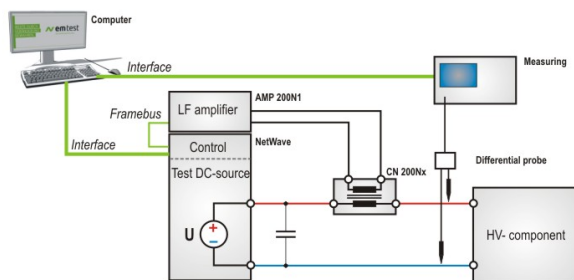
Equipped with a DDS it generates any sinusoidal signal with a frequency up to 500 kHz. The AMP 200N2 is controlled by the EM TEST AutoWave or the NetWave in order to generate any sinusoidal or non-sinusoidal/transient signals and is therefore fully supported by the autowave.control software with its exhaustive library of pre-programmed standards and its outstanding reporting and documentation capabilities.

The AMP 200N2 can also be used for magnetic field testing using a Radiation Loop and Loop Sensor. Extended by the optional measuring module the AMP 200N2 offers means for frequency-selective current measurement, voltage measurement and measurement of the magnetic field strength.

### ELECTRICAL VEHICLES TESTING

#### DESIGNED FOR ELECTRICAL VEHICLES

When used together with a NetWave, CN 200N series, the AMP 200N2 has the ability to couple voltage ripple onto HV battery lines from 10 Hz or lower up to 500 kHz. Our powerful net.control makes this a seamless test with no operator intervention required, and all test steps perfectly documented in one test report. Of course, tests like LV 123 and ISO 7637-4 are already programmed.



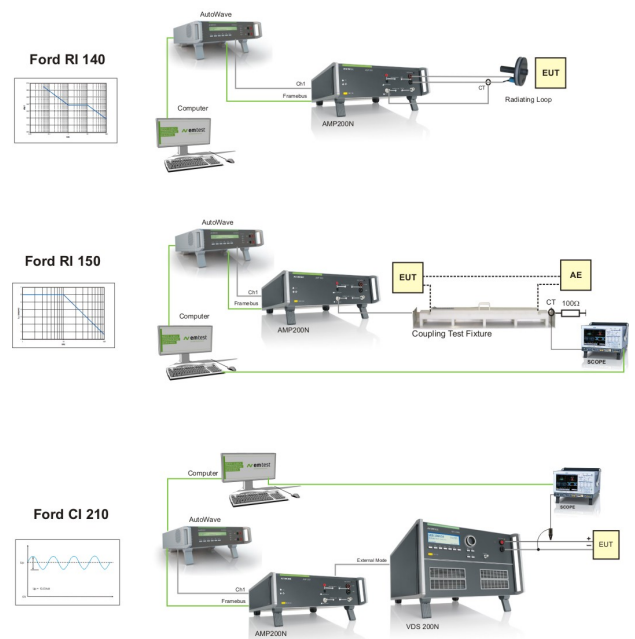
### FORD FMC1278, RI 140, RI 150, CI 210

#### MAGNETIC FIELD TESTING (RI 140), CONTINUOUS DISTURBANCE TESTING (RI 150) AND IMMUNITY FROM POWER LINE DISTURBANCES (CI 210)

The AMP 200N2 is designed for immunity testing and magnetic field testing as per Ford FMC1278. For RI 140 magnetic field testing a Radiation loop and current clamp to measure the induced current is required.

For RI 150 testing a test fixture is needed to represent the injection loop.

For CI 210 Immunity testing from continuous power line disturbances the AMP 200N2 generates the control signal to drive a programmable DC source, e.g. a VDS 200N or VDS 200Q.



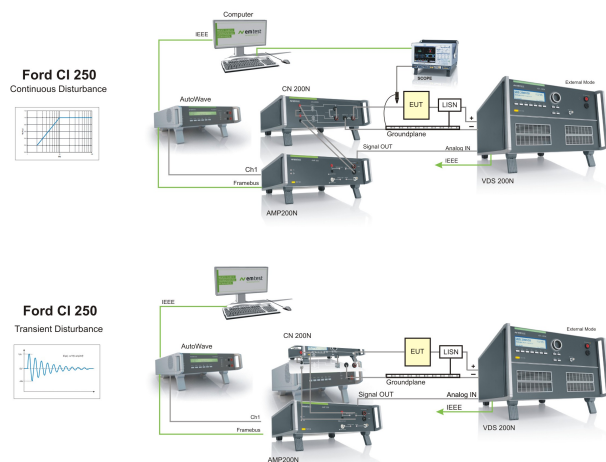
## TECHNICAL DETAILS

### FORD FMC1278, CI 250 TESTING

The AMP 200N2 can be used for testing the immunity to ground offset noise as per Ford FMC1278, CI 250.

Both the continuous as well as the transient signal are generated by means of the AMP 200N2, controlled by the AutoWave.

The CN 200N series is used to couple the test signals on to the line under test.



### AUXILIARY DEVICES

#### CN 200N SERIES - SINGLE-BOX TRANSFORMER ASSEMBLY FOR LF CONDUCTED IMMUNITY TESTING

The CN 200N series is an easy-to-use coupling device consisting of two audio transformers.

The CN 200N series is an easy-to-use coupling device, especially designed for EV applications, consisting of audio transformers. Available in 100, 200 and 300 A versions, and an voltage isolation of up to 1200 V, the CN 200N is designed to couple ripple onto HV battery voltage for tests such as ISO 7637-4 Pulse C and LV 123 voltage ripple.



## TECHNICAL DETAILS

## TECHNICAL DATA

## SIGNAL GENERATOR OUTPUT CHARACTERISTIC (BUILT-IN)

Frequency range	DC, 10 Hz - 500 kHz (sinusoidal)
Output voltage	+/-10 V, Programmable for control internal or external amplifiers

## AMPLIFIER OUTPUT CHARACTERISTICS

Frequency range	DC - 500 kHz
Signal power	1,000 W (nominal)
Output voltage	50 Vrms, 160 V(p-p), max. 100 kHz 30 Vrms, 100 kHz - 500 kHz
Output current	Low range: 25 V, Vpmax. 17 V, Vrms max. 18 A, Arms max.
	Mid range: 55 V, Vpmax. 37 V, Vrms max. 14 A, Arms max.
	High range: 80 V, Vpmax. 55 V, Vrms max. 10 A, Arms max.
DC current	25 A, (H-field)
Output Impedance	30 mOhm @ 1 kHz
Total Harmonic Distortion (THD)	< 0.1 % Load (< 4 ohm, < 100 kHz)
Protection	- Short circuit - Overtemperature

## GENERAL DATA

## INTERFACE

Serial interface	Framebus to AutoWave or NetWave
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## GENERAL DATA

Dimensions	19", 6 HU (500 mm x 449 mm x 286 mm)
Weight	Approx. 40 kg
Supply voltage	115 V +10/-02 %, 50/60 Hz or 230 V +10/-15 %, 50/60 Hz
Input power	Max. 1,900 VA
Fuses	16 AT (115 V) or 10 AT (230 V)
Cooling	Active cooling, air ventilation
Temperature	10 °C - 40 °C
Rel. humidity	Max. 85 %, non-condensing

## TECHNICAL DETAILS

## OPTIONS

## MEASUREMENTS (OPTIONAL)

MU-AMP 200N	Optional built-in measuring unit; Frequency-selective instrument for voltage, current and magnetic field
Frequency range	10 Hz - 250 kHz
Accuracy	Better than 5 %
Current measurement	External with current clamp: Range 100 mV/A: 1 mA - 30 A rms Range 10 mV/A: 10 mA - 300 A rms
Voltage measurement	17 mV - 70 Vrms

## ACCESSORIES

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Radiating Loop	120mm radiation loop for magnetic field testing as per Ford FMC1278, RI 140 1100 A/m up to 3 kHz > 30 A/m @ 100 kHz
Helmholtz coil	HHS 5204-12 450 A/m up to 800 Hz 10 A/m @ 100 kHz
Loop Sensor	To measure the magnetic field strength
CN 200N1	Transformer assembly with built-in 0.5ohm/250W resistive load as per Ford FMC1278, German Lloyd VI-7-2 and other standards

AVIONIC TESTS SUPPORTED WITH  
THE NETWAVE-SERIES

## STANDARD TESTS AS PER RCTA DO-160 E/F/G (SECT. 18)

Cat. R/K	AC (5 V - 170 V), 700 Hz - 32 kHz
Cat. R/B/Z	DC (14/28/270 V), 10 Hz - 150 kHz
Level control	Closed Loop
Frequency steps	As specified by the test plan

STANDARD TESTS AS PER ABD0100.1.2 G, CONDUCTED  
IMMUNITY

Cat. R/K	AC (5 V - 110 V), 700 Hz - 32 kHz
Cat. R/B/Z	DC (14/28/270 V), 10 Hz - 150 kHz
Level control	Closed Loop
Frequency steps	As specified by the test plan

STANDARD TESTS AS PER ABD0100.1.8 E, CHAPT. 16,  
RIPPLE VOLTAGE

Level control	Closed Loop
Frequency range	10 Hz - 150 kHz
Frequency steps	As specified by the test plan
Test levels	0.004 Vpp - 4.0 Vpp

STANDARD TESTS AS PER ABD0100.1.8.1, RIPPLE  
VOLTAGE

Level control	Closed Loop
Frequency range	10Hz - 150kHz
Frequency steps	As specified by the test plan
Test levels	0.6 Vpp - 4.0 Vpp

STANDARD TESTS AS PER ABD0100.1.8.1, VOLTAGE  
DISTORTION

Tests AC	SVF 107/303, SCF 107, SVFH 107
Tests DC	LDC 103
Level control	Closed loop
Frequency range	10 Hz - 150 kHz

## TECHNICAL DETAILS

## E-VEHICLE TESTS SUPPORTED WITH THE NETWAVE-SERIES

## ISO 7637-4

level control	Closed loop / Substitution method
Frequency range	15 kHz to 300 kHz*
Frequency steps	As specified by the test plan
Test levels	Up to 32 Vpp

## LV 123

level control	Closed loop / Substitution method
Frequency range	< 3 kHz to 20 kHz
Frequency range	As specified by the test plan
Test levels	Up to 32 Vpp

## STANDARD TESTS SUPPORTED WITH THE NETWAVE-SERIES

## STANDARD TESTS AS PER GERMAN LLOYD VI-7-2, CONDUCTED IMMUNITY

Frequency steps	As specified by the test plan
Test AC	Table 3.30 (up to 230 V), 100 Hz - 10 kHz
Test DC	Table 3.29, 50 Hz - 10 kHz
Level control	Closed Loop / Calculation method

## MIL TESTS SUPPORTED WITH THE NETWAVE-SERIES

## STANDARD TESTS AS PER MIL STD 461 E/F/G

CS 101	Voltage ripple AC/DC, 30 Hz - 150 kHz
CS 109	Structure current, 60 Hz - 100 kHz
RS 101	H-Field (Army, Navy), 30 Hz - 100 kHz
Level control	Closed Loop / Calculation method

## STANDARD TESTS AS PER MIL-STD-704 A/B/C/D/E/F

Tests AC	SAC 106, SVF 106, SXF 106
Tests DC	LDC 103/104, HDC 103/104
Level control	Substitution method
Frequency range	10 Hz - 150 kHz

## TECHNICAL DETAILS

## STANDARD TESTS WITH AUTOWAVE

## SAE J1113-2 - CONDUCTED IMMUNITY

Injected current	Limited to max. 1A during test
Level control	Closed Loop / Substitution method
Frequency range	15 Hz - 80 kHz (250 kHz)
Frequency steps	As specified by the test plan

## SAE J1113-22 - RADIATED MAGNETIC FIELD

Level control	Substitution method
Frequency range	15Hz - 30kHz
Frequency steps	As specified by the test plan
Test levels	10 uT - 100 uT

## ISO 11452-8 - MAGNETIC FIELD

Level control	Calculation method; verified by Loop sensor
Frequency range	15 Hz - 150 kHz
Frequency steps	As specified by the test plan
Test levels	0.3 A/m - 1,000 A/m

## STANDARD TESTS WITH AUTOWAVE

## ISO 11452-10 - CONDUCTED IMMUNITY

Level control	Closed Loop / Substitution method
Frequency range	15 Hz - 250 kHz
Frequency steps	As specified by the test plan
Test levels	0.15 Vpp/ 0.5 Vpp/ 1.0 Vpp/ 3.0 Vpp

## STANDARD TESTS AS PER FORD FMC1278

RI 140	Magnetic field Immunity, 10 Hz - 100 kHz
RI 150	Coupled Immunity, 1 kHz - 100 kHz
CI 210	Immunity to Continuous Power Line Disturbances, 10 Hz - 100 kHz
CI 250	Immunity to Ground Voltage Offset Continuous, 2 kHz - 100 kHz Immunity to Ground Voltage Offset Transient, Sequence 1 - 4
Level control	Closed Loop / Calculation method

## TECHNICAL DETAILS

## MORE STANDARD TESTS...

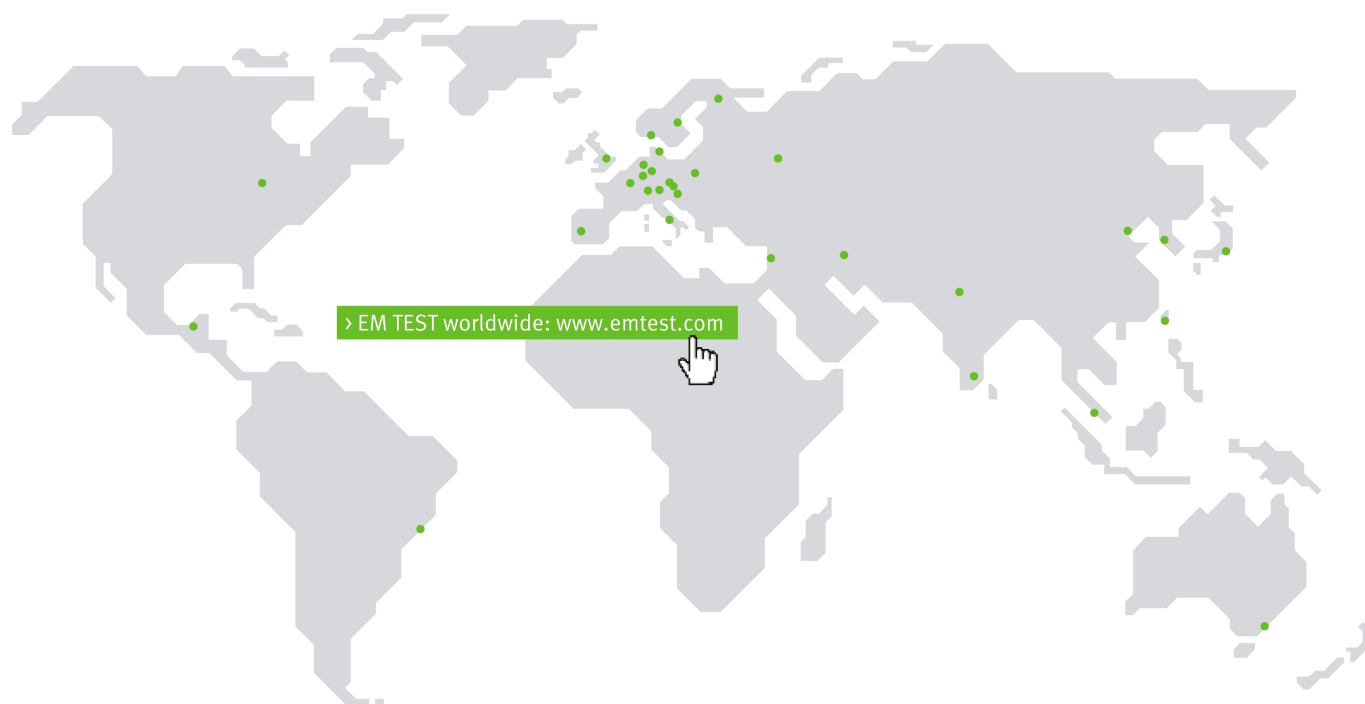
ADDITIONAL AUTOMOTIVE STANDARDS	
BMW	GS 95002-2 (2013-07) GS 95025-1 (2012-05)
Case New Holland	ENS0310 (2009-03) ENS0310 (2010-01)
Chrysler LLC	DC-10615 (Rev. E, 2007-12) DC-11224 (Rev. A, Add., 2008-04) CS-11809 (2009-05) CS-11979 (Change A, 2010-04)
DaimlerChrysler	DC-10614 (Rev. A, 2004-01) DC-10615 (Rev. B, 2004-08) DC-10615 (Rev. C, 2006-04) DC-10615 (Rev. D, 2007-05) DC-11224 (Rev. A, 2007-05)
FIAT	9.90110 (Rev. 11, 2003-07) 9.90110 (Rev. 12, 2006-02) 9.90110 (Rev. 13, 2007-03) 9.90111 (Rev. 1, 2010-05)
Ford	ES-XW7T-1A278-AC (2003-10) Ford EMC-CS-2009.1 Ford FMC1278
General Motors	GMW 3097 (Rev. 4, 2004-02) GMW 3097 (Rev. 5, 2006-07) GMW 3097 (Rev. 5, 2012-04)
IVECO	16-2119 (2008-11) 16-2119 (2010-05)
Jaguar/LandRover	EMC-CS-2010JLR (2010-06) EMC-CS-2010JLR V.1.1 (2011-01) JLR-EMC-CS (2013-11)
Mazda	MES PW 67602 (207-03)
Mitsubishi	ES-X82114 (Rev. C, 2007-04) ES-X82114 (Rev. D, 2009-03) ES-X82115 (Rev. C, 2007-04) ES-X82115 (Rev. D, 2009-03) ES-X82115 (Rev. E, 2010-10)

## MORE STANDARD TESTS...

ADDITIONAL AUTOMOTIVE STANDARDS	
Mercedes-Benz	MBN 10 284-2 (2008-03) MBN 10 284-2 (2011-04) MBN 10 284-4 (2011-04)
Nissan	28 401 NDS02 [2] (2003-10) 28 401 NDS02 [3] (2006-03) 28 401 NDS02 [4] (2008-08) 28 401 NDS02 [5] (2010-12)
Paccar	CPP0016 (2011-10)
PSA	B21 7110 (Rev. A, 2004-07) B21 7110 (Rev. B, 2005-05) B21 7110 (Rev. C, 2008-03) B21 7110 (Add. Rev. C, 2010-05) B21 7110 (Rev. D, 2012-07)
Renault	36.00.808/--G (2004-02) 36.00.808/--H (2007-06) 36.00.808/--J (2008-04) 36.00.808/--K (2009-03) 36.00.808/--L (2010-12) 36.00.808/--M (2012-07)
Tata Motors	TST/TS/WI/257 (2008-07)
Volkswagen	VW TL 825 66 (2006-02) VW TL 825 66 (2011-05)
Volvo	STD 515-0003 (Rev. 3, 2008-03) STD 515-0003 (Rev. 4, 2009-10)



# COMPETENCE WHEREVER YOU ARE



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Information about scope of delivery, visual design and technical data correspond with the state of development at time of release. Subject to change without further notice.