emtest
the benchmark for emc

AMP 200N2

LF SIGNAL & AMPLIFIER DC (0HZ) TO 250 KHZ (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 250 kHz**
› **High frequency option 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**

APPLICATION AREAS

AUTOMOTIVE

MILITARY

AVIONICS

em test

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 250 kHz (500 kHz with HF option). 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.
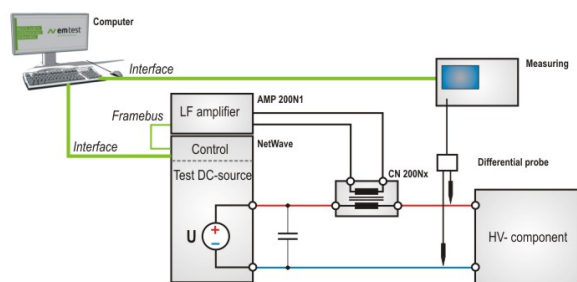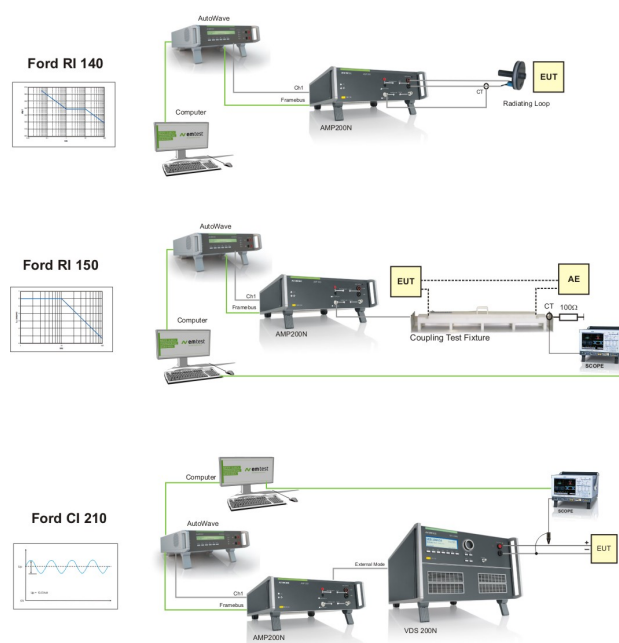

FORD FMC1278, RI 140, RI 150, CI 210

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

The AMP 200N2 is designed for immuntiy 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.


Ford RI 140

Ford RI 150

Ford CI 210

AMETEK®
COMPLIANCE TEST SOLUTIONS

∿ em test

the benchmark for emc

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.

Ford CI 250
Continuous Disturbance

Ford CI 250
Transient Disturbance
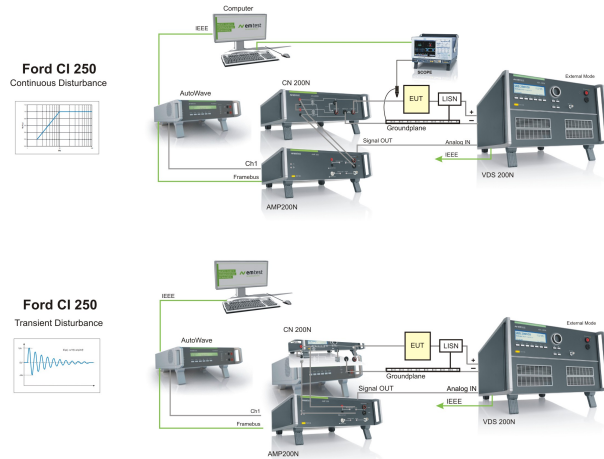
AUXILIARY DEVICES

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.

AMETEK®
COMPLIANCE TEST SOLUTIONS

em test

the benchmark for emc

TECHNICAL DETAILS

TECHNICAL DATA

SIGNAL GENERATOR OUTPUT CHARACTERISTIC (BUILT-IN)

Frequency range	DC, 10 Hz - 250 kHz (sinusoidal) DC, 10 Hz - 500 kHz HF Option
Output voltage	+/-10 V, Programmable for control internal or external amplifiers

AMPLIFIER OUTPUT CHARACTERISTICS

Frequency range	DC - 250 kHz
Signal power	1,000 W (nominal)
Output voltage	50 Vrms, 160 V(p-p), max. 100 kHz 30 Vrms, 100 kHz - 250 kHz
	Option, 30 Vrms, 250 kHz - 500 kHz
Output current	Low range: 25 V, Vpmax. 17 V, Vrms max. 18 A, Arms max.
	Midel 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
HF Option	BW extended to 500 kHz

GENERAL DATA

INTERFACE

Serial interface	Framebus to AutoWave or NetWave

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

AMETEK®
COMPLIANCE TEST SOLUTIONS

em test
the benchmark for emc

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

AMPLIFIER HIGH FREQUENCY OPTION	
	Option for extend to 500 kHz, Requires software option
AW-LIC AMP HF	AutoWave.control software: license option for AMP HF
LIC-1 NetAmpHigh	Net.control software 1-phase: license option for AMP HF
LIC-3 NetAmpHigh	Net.control software 3-phase: license option for AMP HF

ACCESSORIES

ACCESSORIES	
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
CN 200N series	CN 200N100, up to 100 A CN 200N200, up to 200 A CN 200N300, up to 300 A

AMETEK®
COMPLIANCE TEST SOLUTIONS

em test

the benchmark for emc

TECHNICAL DETAILS

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

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
	* High frequency option is required

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

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
Frequency steps	As specified by the test plan

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

AMETEK®
COMPLIANCE TEST SOLUTIONS

em test
the benchmark for emc

TECHNICAL DETAILS

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

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
Test levels	0.15 Vpp/0.5 Vpp/ 1.0 Vpp/ 3.0 Vpp

SAE J1113-22 - RADIATED MAGNETIC FIELD	
Level control	Substituition 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
Source impedance	less than 0.5 ohm

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
Frequency steps	As specified by the test plan

AMETEK®
COMPLIANCE TEST SOLUTIONS

em test
the benchmark for emc

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)
Chysler 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)
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)

MORE STANDARD TESTS...

ADDITIONAL AUTOMOTIVE STANDARDS	
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)

em test
the benchmark for emc

COMPETENCE WHEREVER YOU ARE

› EM TEST worldwide: www.emtest.com
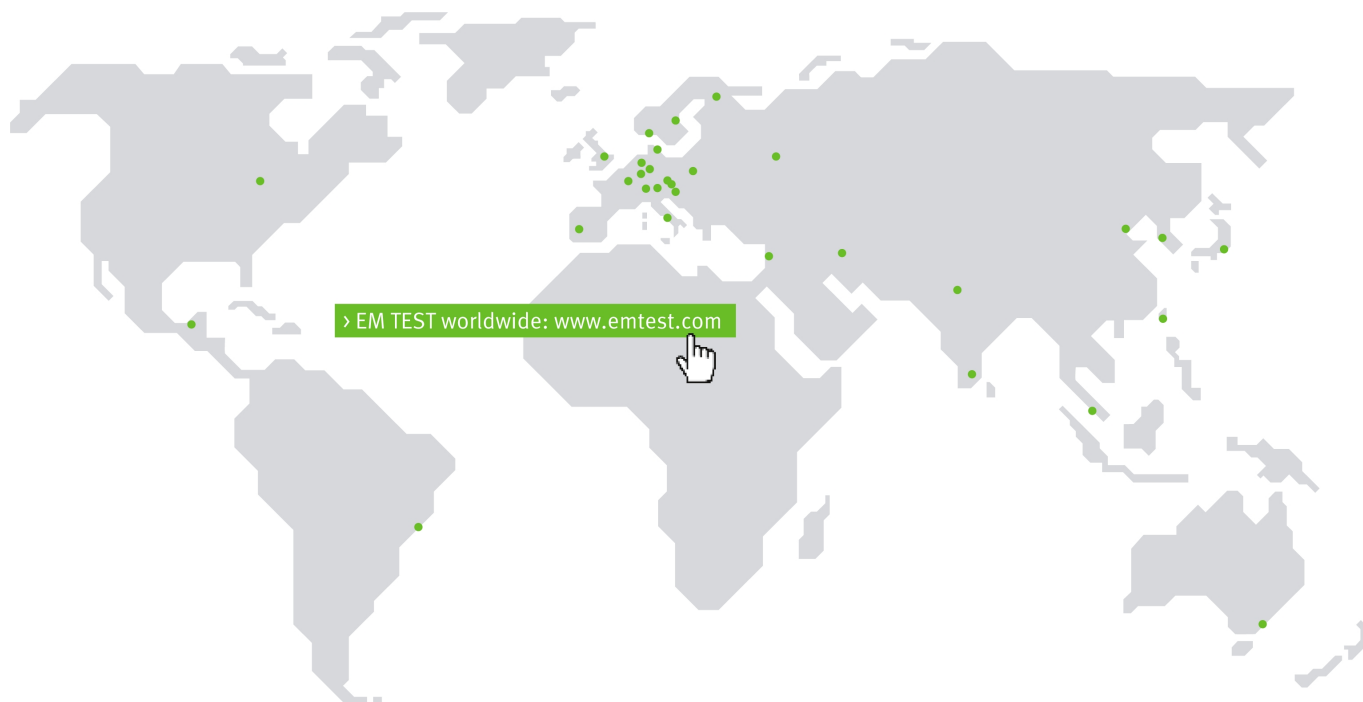
CONTACT EM TEST DIRECTLY

Switzerland
EM TEST (Switzerland) GmbH › Sternenhofstraße 15 › 4153 Reinach › Switzerland
Phone +41 (0)61/7179191 › Fax +41 (0)61/7179199
Internet: www.emtest.ch › E-mail: sales.emtest@ametek.com

Germany
AMETEK CTS Germany GmbH › Lünener Straße 211 › 59174 Kamen › Deutschland
Phone +49 (0)2307/26070-0 › Fax +49 (0)2307/17050
Internet: www.emtest.com › E-mail: info.cts@ametek.de

France
EM TEST FRANCE › Le Trident - Parc des Collines › Immeuble B1 - Etage 3 › 36, rue Paul Cézanne › 68200 Mulhouse › France
Phone +33 (0)389 31 23 50 › Fax +33 (0)389 31 23 55
Internet: www.emtest.fr › E-mail: info@emtest.fr

Poland
EM TEST Polska › ul. Ogrodowa 31/35, 00-893 Warszawa › Polska
Phone +48 (0)518 64 35 12
Internet: www.emtest.com/pl › E-mail: infopolska.emtest@ametek.com

USA / Canada
AMETEK Compliance Test Solutions › 52 Mayfield Ave. › Edison › NJ 08837
Phone +1 (732) 417-0501
Internet: www.emtest.com › E-mail: sales.emtest@ametek.com

P.R. China
E & S Test Technology Limited › Rm 913, Leftbank ›
No. 68 Bei Si Huan Xi Lu › Haidian District › Beijing 100080 › P.R. China
Phone +86 (0)10 82 67 60 27 › Fax +86 (0)10 82 67 62 38
Internet: www.emtest.com › E-mail: info@emtest.com.cn

Republic of Korea
EM TEST Korea Limited › #405 › WooYeon Plaza › #986-8 › YoungDeok-dong › Giheung-gu › Yongin-si › Gyeonggi-do › Korea
Phone +82 (31) 216 8616 › Fax +82 (31) 216 8616
Internet: www.emtest.co.kr › E-mail: sales@emtest.co.kr

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.