TRUST IN LEADING TECHNOLOGY
GET INTO THE POLE POSITION

Real full compliance to the standards, versatile functionality, reliable test results and complete user convenience

The new EMC test system for automotive electronics by EM TEST

200 Series  |  Toyota Test System  |  RF Test System
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Never before has the automotive market seen such rapid developments as those experienced over the last couple of years. The force behind this is the demand from the market for greater technical features and passenger convenience for all classes of vehicle.

High-energy systems such as air conditioning and highly sophisticated mobile audio and communications require a complete new approach in design. As innovations are implemented, technology must anticipate the future. Innovation has driven EM TEST since its foundation. “Safety and reliability” is never compromised and all EM TEST EMC test systems are well prepared for future requirements. The test generators hardware is ready for increasing and changing demands based on the enlarged ranges on all test parameters and power ratings.

EM TEST offers an EMC test system that accommodates worldwide requirements today and tomorrow and makes investment safe for the future.
Despite a worldwide tendency to harmonise standards, the number of test requirements and procedures increase constantly. The reality today shows us an increasing number of national, international and most importantly, manufacturer specific requirements rather than just one common standard. Moreover, manufacturer specific requirements mostly exceed the common standards.

Individual test parameters set by the manufacturers are required to be strictly obeyed by both the manufacturer and his suppliers. These are the vital basis to secure the functionality of the vehicles. As a priority EM TEST fully supports this important task. Apart from covering national and international standards such as ISO, SAE, JASO, ETS and DIN using EM TEST EMC equipment for automotive assures your being best equipped to comply with most of the worldwide manufacturer specifications such as GM, Chrysler, Ford, Audi/Volkswagen, BMW, Renault/Nissan and Toyota to name only some of them.
THE EMC TEST SYSTEM FOR CONDUCTED IMMUNITY – AN OVERVIEW

THE POWERFUL THREE. And a new star.

**Voltage Drop Simulator** VDS 200B

1. For Pulses: 2b, 4, Sine wave sweep
   Battery Supply Variation
   Ramp function

2. Power Rating: 60 V/15 A to 60 V/200 A

**Power Fail Simulator** PFS 200B

1. For Pulses: Dips and Drops on the Battery Supply

2. Power Rating: 60 V/30 A to 60 V/200 A

**Ultra Compact Simulator** UCS 200M

double-exponential waveform generation

1. For Pulses: 1, 2a, 3a, 3b, Nissan, JASO D001, SAE J1455

2. Highlight: » 6 modules in 1 unit
   » FreeStyle mode

**Load Dump** LD 200B

double-exponential waveform generation

1. For Pulses: 5a, 5b (clipped), 7, Chrysler, Ford, MBN

2. Highlight: » Test voltage up to 200 V
   » built-in $R_i$: 0.5 to 10 $\Omega$
**HIGHLIGHT MANUAL OPERATION:**

**THE OPERATION CONCEPT OF THE SERIES 200**
The basis for versatile and multiple application

Curser keys and rotary knob allow most convenient operation of the simulator.

Parameters and complete test routines are selected via function keys. Comprehensive navigation makes operation as easy as possible. Service and self-check routines enable the user to verify the generator.

Every generator is equipped with both GPIB and RS232 interfaces for remote control. Fail1 and Fail2 input are implemented for DUT monitoring purposes.

Menus and parameters are comprehensively arranged in the LCD display for quick and accurate programming of tests.
3 DIFFERENT MODES OF USE

A CLOSER LOOK AT THE SYSTEM
Everything is there, everything is possible:

- **Standalone generators for single test applications and multitasking testing**

- **Multitasking testing and full documentation via EM TEST software**

- **The fully automated EMC test system for conducted immunity**
3 DIFFERENT MODES OF USE

SINGLE TEST APPLICATION OR MULTITASKING TESTING WITH STANDALONE UNITS

The easy way of testing

MANUAL OPERATION OF SINGLE UNITS
The easy operation (via cursor keys and rotary knob) as well as numerous pre-programmed test routines and the fast Test Mode (selection of test routines and parameters via function keys) allow tests to be performed most economically.

PORTABLE TESTING
Each generator includes a controller, a user interface (keyboard and display) and a coupling/decoupling network to work as an independent complete test facility. Take it anywhere, anytime and do your tests!

MULTITASKING TESTING
EM TEST’s EMC Test System is the one and only offering the capability to perform different tests with different test devices simultaneously. Long duration tests as specified by some manufacturer requirements can be done without any impact on other testing. This is what EM TEST calls efficient and economical use of valuable resources in EMC testing.

NO SOFTWARE REQUIRED
Designed to work standalone no software is required. Still operation is fast and easy using pre-programmed test routines.

GPIB AND RS232 INTERFACES, FAIL1 AND FAIL2
All interfaces are a common part of every generator.
- GPIB and RS232 for remote control
- Fail1 and Fail2 for DUT monitoring
3 DIFFERENT MODES OF USE

MULTITASKING TESTING AND FULL DOCUMENTATION VIA EM TEST SOFTWARE

Do your job 4 times faster

INTEGRATION OF AN EXTERNAL MEASURING DEVICE FOR DUT MONITORING

The EMC Test System provides the capability to integrate any GPIB controlled external measuring device for DUT monitoring.

INTEGRATION OF AN OSCILLOSCOPE FOR PULSE VERIFICATION

Either for functional checks prior to testing or for pulse verification as per ISO 7637-2:2004, Annex D, an oscilloscope is required which can be integrated into the EMC Test System.

REMOTE CONTROL: ISMISO

Manual operation or remote control — what’s better, what’s more appropriate? This is no question with the EMC Test System. The operator determines the mode of operation case by case depending on the test requirements.

IEEE GPIB AND RS232 INTERFACES, FAIL1 AND FAIL2

MULTITASKING TESTING

TEST REPORT GENERATION

ISMISO records test interruptions, registers DUT conditions (via external measuring device) and adds comments entered by the operator to the report along with the test parameters and other settings. Screenshots of the oscilloscope can be transferred and inserted into the test report as well to show the verification of the waveform. Test reports are directly converted into RTF file format and can be post-processed by any Windows program such as Word, Excel etc. Company logo and further information can be added manually.
3 DIFFERENT MODES OF USE

THE FULLY AUTOMATED EMC TEST SYSTEM FOR CONDUCTED IMMUNITY

The best you can get for fast results

FULLY AUTOMATED TESTING USING PRE-PROGRAMMED TEST ROUTINES
ISMISO software supports the generation of fully automated complete test sequences. Standard test routines, a Link File generator or even faster the Easy Link routine make your job easier.

INTEGRATION OF AN EXTERNAL MEASURING DEVICE FOR DUT MONITORING

INTEGRATION OF AN OSCILLOSCOPE FOR PULSE VERIFICATION

COMMON DUT CONNECTION PORT: COUPLING NETWORK OF THE UCS 200M
The Ultra Compact Simulator, type UCS 200M, includes a coupling/decoupling network serving as a common DUT connection port. All EM TEST generators such as LD 200Bx, VDS 200Bx and PFS200Bx can be interconnected with the UCS 200M and their pulses are made available at this common DUT output.

GPIB AND RS232 INTERFACES, FAIL1 AND FAIL2

FULL DOCUMENTATION

MANUAL OPERATION OF SINGLE UNITS

REMOTE CONTROL: ISMISO
EMC TEST SYSTEM FOR AUTOMOTIVE ELECTRONICS

THE STANDALONE GENERATORS OF THE 200 SERIES

VDS 200B Voltage Drop Simulator

---

GENERATION OF TEST PULSES ON THE BATTERY SUPPLY SYSTEM
CAN BE USED AS A STANDALONE DC VOLTAGE SOURCE
MANUAL OPERATION
QUICK START TEST MODE
STANDARD TEST ROUTINES AND USER TEST ROUTINES
GPIB AND RS232 INTERFACES
DUT MONITORING CAPABILITY

---

VDS 200B
60 V | 15 A

VDS 200B1
60 V | 30 A (70 A@500 ms)

VDS 200B2
60 V | 50 A (100 A@500 ms)

VDS 200B3
60 V | 100 A (150 A@500 ms)

VDS 200B4
60 V | 150 A

VDS 200B5
60 V | 200 A (optional 1,000 A@100 ms)

---

HIGHLIGHTS

GENERATED TEST PULSES

Pulse 2b
Ramp Down/Up
Jump High

Pulse 4
Ramp Up/Down
Jump Low

Pulse 4, sinus 2Hz
Ramp Down
Triangle High

Pulse 4, sinus 4-5Hz
Ramp Up
Triangle Low

JASO
Ramp Down/High
Overstress

Cranking
Ramp Low/Up

Sinus
Overvoltage

Sweep
Voltage Profile

Voltage Drop
Reversed Voltage

SUMMARY

The Voltage Drop Simulator VDS 200B generates disturbances appearing on the battery supply system occurring from switching and subsequent load changes. A wide range of pre-programmed test routines are available to simulate the various phenomena. For more sophisticated and more complex user specifications an arbitrary generator is available.
THE STANDALONE GENERATORS OF THE 200 SERIES

PFS 200B Power Fail Simulator

HIGHLIGHTS

GENERATION OF DIPS AND DROPS ON THE BATTERY SUPPLY SYSTEM
MANUAL OPERATION
QUICK START TEST MODE
STANDARD TEST ROUTINES AND USER TEST ROUTINES
GPIB AND RS232 INTERFACES
DUT MONITORING CAPABILITY

GENERATED TEST PULSES

Dips
Drop Out
Micro Drop
Drop High
Drop Low
Drop Single
Dip (Sag)
Switch Low
Switch High
Dips Single

STANDARD MODELS

PFS 200B1 60 V | 30 A (70 A@500 ms)
PFS 200B2 60 V | 50 A (100 A@500 ms)
PFS 200B3 60 V | 100 A (150 A@500 ms)
PFS 200B4 60 V | 150 A
PFS 200B5 60 V | 200 A (optional 1,000 A@100 ms)

SUMMARY

The Power Fail Simulator PFS 200B generates voltage interruptions (Drop out) and voltage dips occurring in the battery supply system. A wide range of pre-programmed test routines are available to easily simulate various kinds of Dips and Drop Outs.
THE STANDALONE GENERATORS OF THE 200 SERIES

UCS 200M Ultra Compact Simulator
Double-exponential waveform generation as per
ISO 7637-2:2004 annexes D & E

HIGHLIGHTS

DOUBLE-EXPONENTIAL WAVEFORM GENERATION BASED ON A RLC GENERATOR
TEST VOLTAGE UP TO 1,000 V ± 10%
MANUAL OPERATION
QUICK START TEST MODE
STANDARD TEST ROUTINES AND USER TEST ROUTINES
FREESTYLE-MODE
GPIB AND RS232 INTERFACES
DUT MONITORING CAPABILITY

GENERATED TEST PULSES

Pulse 1 (3/1,000) Pulse 2 (1/50) Inductive (SAE)
Pulse 1 (3/2,000) Pulse 2 (1/150) Mutual (SAE)
Pulse 1 (1/1,000) Pulse D2 (JASO) Freestyle-mode
Pulse 1 (1/2,000) Pulse B2 (Nissan)
Pulse 1 (1/6,000) Pulse C8 (Nissan)
Pulse 1 (3/1,000) Pulse C50 (Nissan)
Pulse A2 (JASO)
Pulse B2 (JASO)
Pulse D2 (JASO)

STANDARD COUPLER MODELS

| CN 30  | 60 V | 30 A (70 A@500 ms) |
| CN 50  | 60 V | 50 A (100 A@500 ms) |
| CN 100 | 60 V | 100 A (150 A@500 ms) |
| CN 150 | 60 V | 150 A |
| CN 200 | 60 V | 200 A (optional 1,000 A@100 ms) |

SUMMARY

The Ultra Compact Simulator UCS 200M generates pulses in the nanosecond (fast transients) and microsecond range (switching of inductive loads) as required for conducted immunity testing for automotive electronics. The FreeStyle mode allows the operator to define user specific test pulses with parameters being variable in a wide range. Naturally, programming is easy and does not require specific skills.
THE STANDALONE GENERATORS OF THE 200 SERIES

UCS 200M 6 modules in one box

Overview of highlights

» Compact and modular design
» Configurable according to customer’s requirements
» Upgrade and extension for new requirements possible any time

» Coupling networks available for different power ratings
» Coupler extension to integrate multiple Load Dump generator as per SAE, Nissan and JASO
» Best user convenience

» Pulse parameters can be varied over a wide range to create user specific test pulses. Easy to do, no special skills required.
» Single DUT connection port for complete test sequences including LD, VDS and PFS pulses.

<table>
<thead>
<tr>
<th>MODULE EFT</th>
<th>MODULE CN</th>
<th>MODULE MPG</th>
<th>MODULE JASO</th>
<th>MODULE NISSAN</th>
<th>MODULE SAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Standard)</td>
<td>(Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISO 7637-2/-3</td>
<td>Typ CNx</td>
<td>ISO 7637-2/-3</td>
<td>JASO D001</td>
<td>Nissan NDS</td>
<td>SAE J1455</td>
</tr>
<tr>
<td>Pulse 3a, 3b</td>
<td>Common DUT connection port</td>
<td>Pulse 1 (12 V/24 V)</td>
<td>Pulse A2, B2, D2</td>
<td>Pulse B2, C6, C50 and C300</td>
<td>Mutual Pulse Inductive Pulse</td>
</tr>
<tr>
<td></td>
<td>Coupling of all test pulses onto the DUT test supply lines</td>
<td>Pulse 2 (12 V/24 V)</td>
<td>JASO recommends the pulse circuit and its components</td>
<td>Nissan recommends the pulse circuit and its components</td>
<td></td>
</tr>
</tbody>
</table>
A simple menu structure and a clearly arranged display are the keys to easily find your way and access the function you need and to program your own test pulses quickly. Only a few steps and your Freestyle test pulse is created either in manual operation mode or via ISMISO software.

### Step 1: Set the Desired Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rise Time</td>
<td>from 1 µs to 10 µs</td>
</tr>
<tr>
<td>Pulse Duration</td>
<td>from 50 µs to 10,000 µs</td>
</tr>
<tr>
<td>Peak Value</td>
<td>up to 600 V</td>
</tr>
<tr>
<td>Source Impedance</td>
<td>2 Ω, 4 Ω, 10 Ω to 100 Ω in steps of 5 Ω, 200 Ω, 400 Ω and 450 Ω</td>
</tr>
</tbody>
</table>

### Step 2: Your Own Test Pulse is Ready

For the standards of today and tomorrow
Technology in vehicles changes very fast. Time to market new models is faster than ever before. Test procedures and requirements change according to cope with new technologies.

Freestyle is the ultimate tool to program individual test pulses easily and quickly to keep pace with the rapid changes of requirements and to remain flexible and prepared for the future.

### Freestyle in Manual Operation Mode

Quick and easy handling
A simple menu structure and a clearly arranged display are the keys to easily find your way and access the function you need and to program your own test pulses quickly. Only a few steps and your Freestyle test pulse is created either in manual operation mode or via ISMISO software.
The Load Dump LD 200Bx generates pulses in the millisecond range as required by the EMC standard to test electronic components for vehicles. The pulses are of high energy originating from the sudden disconnection of the battery.

### HIGHLIGHTS
- **Double-exponential waveform generation based on a RLC generator**
- **Test pulses 5A, 5B as per ISO 7637-2:2004**
- **Test voltage up to 200 V ± 10%**
- **Built-in coupling network 60V / 30A**
- **Manual operation**
- **Quick start test mode**
- **Standard test routines and user test routines**
- **GPIB and RS232 interfaces**
- **DUT monitoring capability**

### STANDARD MODELS
- **LD 200B**: ISO 7637-2:2004
- **LD 200B1**: ISO, Chrysler, Ford
- **LD 200B1S2**: ISO, MBN 10284
- **LD 200S2**: ISO, SAE J1455
- **LD 200S3**: Nissan, Pulses A1, A2, B1
- **LD 200S16**: Jaso, Pulses A1, B1, D1

### GENERATED TEST PULSES
- Pulse 5a
- Pulse 5b Clipped
- Pulse 5 Chrysler Ramp
- Pulse 5 Chrysler
- Pulse 5 Chrysler Clipped
- Pulse 5 Ford AC
- Field-Decay

### SUMMARY
The Load Dump LD 200Bx generates pulses in the millisecond range as required by the EMC standard to test electronic components for vehicles. The pulses are of high energy originating from the sudden disconnection of the battery.
The relevant Toyota Engineering Standards specify Load Dump and Field Decay tests. These are applied as single pulses but also as a combination of DC overvoltage with superimposed transient pulses.

Field Decay is used to test the immunity of electronic components against transient disturbances. These occur when inductive loads are switched off. The test pulse is a combination of a DC overvoltage and a high-energy transient pulse. The same test is used for the so-called Floating Ground test as well.

The Load Dump tests represent phenomena such as rapid changes of the load on the alternator, sudden disconnection of the battery while being charged, and fast changes of loads in electronic circuits while the battery supply is interrupted. Toyota specifications specify a so-called Giant Pulse with a peak voltage of 110V, a high voltage pulse up to 80V peak with a very fast repetition as well as a high voltage pulse superimposed onto an increased DC supply voltage.
THE STANDALONE GENERATORS AS PER TOYOTA

TSC 7001 the Toyota Test System

HIGHLIGHTS

- TSC 3500G
  TEST METHOD FOR ANALOG READ OUT METER, 12 V
- TSC 3590G
  TEST METHOD FOR CLOCK, 12 V
- TSC 7001G
  BENCH TEST METHOD FOR ELECTRIC NOISE, 12 V/24 V
- TSC 7006G
  BENCH TEST METHOD FOR ELECTROMAGNETIC INTERFERENCE SUSCEPTIBILITY, 12 V/24 V
- TSC 7203G
  TEST METHODS FOR ABS-TRC COMPUTERS, 12 V/24 V

COMPLETE SYSTEMS CONSISTING OF

- RDS 200S1
  Remote controlled DC supply, 600 V/3 A
- LD 200S18
  Field Decay Test
- LD 200S19
  Load Dump Tests 1, 2 and 3

GENERATED TEST PULSES

- Field-Decay
- Load-Dump 1
- Load-Dump 2
- Load-Dump 3

SUMMARY

The Toyota Test System generates the test pulses as required by various Toyota specifications. The method of pulse generation and the pulse verification are strictly specified and form an integrated part of the standards. Depending on the application either a pulse amplifier or a RLC pulse forming network is used for pulse generation.
THE SOFTWARE
ISMISO SOFTWARE FOR AUTOMOTIVE
Comprehensive - Convenient - Fast

HIGHLIGHTS
STANDARDS LIBRARY: NATIONAL, INTERNATIONAL, WORLDWIDE
CAR AND TRUCK MANUFACTURERS
ADMINISTRATION OF USED ACCESSORIES
IMPLEMENTATION / SELECTION OF MEASURING DEVICES

EASY LINK
LINK FILE GENERATOR
TEST DOCUMENTATION

TEST PROCEDURE
01 Selection of standards
02 Selection of test pulses
03 Used accessories
04 Implementation / Selection of measuring devices
05 Easy Link
06 Test routine
07 Testing
08 Test documentation
THE SOFTWARE

ISMISO SOFTWARE FOR AUTOMOTIVE
The fast track to select your test standard

01 SELECTION OF STANDARDS

Stop searching extensive standards and manufacturer specifications to set up your test system. EM TEST having done this for you by creating a comprehensive library of standards.

NATIONAL/INTERNATIONAL: includes standards like ISO, DIN, ETS (mobile communication), JASO and SAE standards

MANUFACTURER SPECIFICATIONS: offers selection between European, American, Japanese and other Asian manufacturers specifications.

One click and the pulses of the corresponding standard automatically appear on desktop. Ready to test!

02 SELECTION OF TEST PULSES

All pulses available...

For individual requirements based on standard pulses or user defined pulses just a single switch to the device area is required. A list of all accessible test pulses for each test generator is shown. Select one of the predefined pulses, modify as desired and save it as your own test pulse that may be recalled from the test file administrator at any time.
THE SOFTWARE

ISMISO SOFTWARE FOR AUTOMOTIVE
Your test device administrator

03 USED ACCESSORIES

All test accessories listed
Nowadays electronics can easily become complex systems requiring various accessories and auxiliaries to stimulate and test their functionality. In order to assure reproducibility of test results such accessories and auxiliary parts have to be seen as a part of the test set-up and thus need to be referenced in the test documentation. Each accessory or auxiliary used in the test set-up can be added to the device library accessible from the desktop menu “Accessories”. Selected from this library the devices used for a certain test can be listed and referenced in the test documentation.

04 IMPLEMENTATION/ SELECTION OF MEASURING DEVICES

External measuring equipment – set-up and select
Either for functional checks prior to testing or for pulse verification as per ISO 7637-2:2004, Annex D, an oscilloscope is required which can be integrated into the EMC Test System. ISMISO offers an environment to easily set-up the drivers required in order to control any oscilloscope or other external measuring device (used for DUT monitoring purposes) being equipped with a GPIB bus interface. The driver library can manually be extended easily by any device not yet included. The built-in test function helps to verify the commands.
EMC TEST SYSTEM FOR AUTOMOTIVE ELECTRONICS

THE SOFTWARE

ISMISO SOFTWARE FOR AUTOMOTIVE

Easy and automatic — a conflict??

05 EASY LINK

06 TEST PROCEDURE

Easy as easy can be

For a fully automated test sequence composed from the various pulses required by a standard the serial test set-up is preferred. Fully automated test sequences are created by the software, type ISMISO. Easy Link hereby offers the ability to select the required test pulses (transients or battery supply simulation) from the library which should be included in the test routine and links them together in one test procedure. The selected pulses are sequentially applied as selected.

Fully automatic

The above diagram shows a fully automated test procedure. According to this the DUT will be exposed sequentially to all the test pulses included in this procedure. Such automated test routines are generated by means of the Link File generator. The Link File generator can link various types of test pulses, standard pulses or user defined pulses in any way using one or more test generator.
EMC TEST SYSTEM FOR AUTOMOTIVE ELECTRONICS

When starting a test the selected test pulse and all its parameters are shown on the screen. Functions like “Break” and “Stop” allow the operator to interrupt the test, enter comments or step to the next test pulse etc.

If an external measuring device is used for DUT monitoring this measuring device will automatically interrupt the test as preset.

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**The complete view**

When starting a test the selected test pulse and all its parameters are shown on the screen. Functions like “Break” and “Stop” allow the operator to interrupt the test, enter comments or step to the next test pulse etc.

If an external measuring device is used for DUT monitoring this measuring device will automatically interrupt the test as preset.

---

**The complete report**

ISMISO records test interruptions, registers DUT conditions (via external measuring device) and adds comments entered by the operator to the report along with the test parameters and other settings. Screenshots of the oscilloscope can be transferred and inserted into the test report as well as documenting and verifying the waveform.

Test reports are directly converted into RTF file format and can be post-processed by any Windows program such as Word, Excel etc. Company logo and further information can be added manually.

---

**TEST PROCEDURE**

07 TESTING

08 TEST DOCUMENTATION
RF disturbances are everywhere!!

The phenomenon is well known nowadays: Transmitters and radio receivers, radars and many other sources emitting radio frequency signals cause RF signals to be induced onto other kinds of lines. As induced disturbances these signals affect all kind of electronic devices and systems causing them to fail.

With an increasing number of potential RF sources worldwide, immunity testing (following corresponding mandatory national and international requirements) becomes an ever more important aspect to achieve and secure the performance and quality of a product for the global market.

The traditional solution

- COMPLICATED OPERATION
- TIME-CONSUMING CABLEING
- TIME-CONSUMING PREPARATION FOR TESTING
- THE COMPLEX TEST SET-UP NEEDS WELL SKILLED OPERATING PERSONNEL AND REPRESENTS A HIGH POTENTIAL FOR FAILURES
**NEW**

**CWS 500D: THE ALL-IN-ONE SOLUTION**

The unique 5 plus 1 EM TEST approach

**MODULE 1**

**THE CONTROLLER**
- Standards library, RS232&GPIB (IEEE488) interfaces, driver for external measuring devices, test report generator

**MODULE 2**

**THE SIGNAL-GENERATOR**
- 10kHz – 1GHz; for CW, AM & PM

**MODULE 3**

**THE BI-DIRECTIONAL COUPLER**
- 10kHz – 1GHz; 200W; with taps to measure forward and reverse power

**MODULE 4**

**THE 3-CHANNEL MEASURING DEVICE**
- Configurable; e.g. to measure forward and reverse power and the induced RF current

**MODULE 5**

**THE RF-SWITCH**
- Automatic switch; switches between internal and external amplifiers (up to two)

**MODULE 6 (OPTIONAL)**

**100W / 150W AMPLIFIER**
- Built-in amplifier modules; 100W, 10kHz to 400MHz or 150W, 100kHz to 400MHz

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**OVERVIEW OF APPLICATIONS**

The TEM Cell is a rectangular coaxial conductor with a characteristic impedance (e.g. 50 Ω). The DUT is exposed to the homogenous field. The CWS500D offers specific test routines for an automated calibration using a field probe.

The test signal is induced in the wiring harness by means of an RF injection probe. The applied power is automatically controlled during test. Two methods are used; Substitution method and Closed-Loop method depending on the test specification.

Using a Stripline, 1 meter of the wiring harness is laid under the Septum (homogenous field underneath the active conductor).
03 THE CONTINUOUS WAVE SYSTEM FOR RF IMMUNITY TESTING

CWS 500D: THE ALL-IN-ONE SOLUTION

THERE IS NO COMPARISON!

HIGHLIGHTS

- No time-consuming cabling necessary; no failure possible
- Most compact design in modular technology
- Increased reproducibility of test results
- Easy and comprehensive operation
- Pre-programmed calibration routines saving time
- RF switch to select built-in or external amplifier
- Pre-programmed test routines as per most used standards and requirements
- Implementation of up to 4 devices for measurement, control and DUT monitoring
- Integration into other software systems (via RS232): set-up, control and DUT monitoring

STANDARD MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWS500D-MF</td>
<td>Mainframe incl. Modules 1-5</td>
</tr>
<tr>
<td>AMP1</td>
<td>Optional built-in amplifier 100W / 10kHz – 400MHz</td>
</tr>
<tr>
<td>AMP2</td>
<td>Optional built-in amplifier 150W / 100kHz – 400MHz</td>
</tr>
<tr>
<td>Ext. AMP max.</td>
<td>200W / max. 1GHz</td>
</tr>
<tr>
<td>Stripline</td>
<td>90 Ω; 3.2m or 2.7m</td>
</tr>
</tbody>
</table>

GENERATED TEST SIGNALS

- Continuous wave signal (unmodulated signal)
- Amplitude modulated signal (car manufacturer requirements): Frequency 50Hz, 80% AM
- Amplitude modulated signal (medical requirements): Frequency 2Hz, 80% AM
- Amplitude modulated signal (Telecom applications): Frequency 400Hz, 80% AM
- Amplitude modulated signal (IEC 61000-4-6): Frequency 1kHz, 80% AM
- Amplitude modulated signal (car manufacturer requirements): Frequency 1kHz, 95% AM
- Pulse modulated signals (alarm systems as per EN 50130-4): Frequency 1kHz, 50% duty cycle
- Pulse modulated signals (MIL STD 461 and car manufacturer requirements): Frequency 1kHz, 50% duty cycle

SAVE YOUR TIME

The intelligent levelling algorithms as well as the compact design and the very limited number of cables necessary for the test set-up make it possible to test in 50% of the time required, when using traditional systems.
SOFTWARE FOR CWS 500D

ICD SOFTWARE
Brilliant and simple – simply ingenious

HIGHLIGHTS

BEST USER CONVENIENCE AND USER GUIDANCE

PRE-PROGRAMMED CALIBRATION ROUTINES

SUPPORTS SUBSTITUTION AND CLOSED-LOOP TEST METHOD

STANDARDS LIBRARY FOR NATIONAL AND INTERNATIONAL STANDARDS

STANDARDS LIBRARY INCLUDING MOST MANUFACTURER’S STANDARDS WORLDWIDE

IMPLEMENTATION OF DEVICES FOR MEASUREMENT, CONTROL AND DUT MONITORING

GRAPHICS AND TABLES SHOWING MEASURING RESULTS AND IMPEDANCE CHARACTERISTICS

FULL TEST DOCUMENTATION WITH LISTING OF ALL RESULTS, INDIVIDUAL HEADER INFORMATION AND COMPANY LOGO

IMPLEMENTATION OF ALL DIAGRAMS, IMPEDANCE CHARACTERISTIC AND AUXILIARY EQUIPMENT USED FOR THE TEST

IMPLEMENTATION OF EXCEL SHEETS FOR VERSATILE APPLICATIONS

ANALYSIS TOOL WITH USER GUIDANCE

FUNCTION FOR AUTOMATIC DETECTION OF SUSCEPTIBILITY LEVELS

LINK FILE GENERATOR WITH NEW EASY LINK FUNCTION

EXPERT MODE FOR INDIVIDUALLY GENERATED TEST ROUTINES AS PER SPECIAL REQUIREMENTS

VECTOR MODE TO CREATE NEW TEST ROUTINES

CONSOLE MODE FOR MANUAL OPERATION AND ANALYSIS OF THE DUT

ANALYSIS TOOL WITH USER GUIDANCE ACCESSIBLE FROM EACH USER MODE

MODE OF MODULATION AND MODULATION DEPTH ARE FULLY ADJUSTABLE
The up-to-date standards library offers you quick access to the various test routines and necessary calibration functions. Moreover, this standards library is an extraordinary source of information about standards, test setups, test modes etc.

The configuration tool helps to easily set up all the measuring devices used for calibration or DUT monitoring. Parameters like trigger conditions, measuring windows, limiters and fail conditions can be inserted and activated.

The operator can individually configure the conditions under which a measuring device detects a DUT failure: Reduction of power and successive detection of the susceptibility level, starting the analysis tool and continuation of the test.

Each time a test routine is opened, the operator can select one of the calibration files listed or configure a new calibration file for BCI, TEM Cell or Stripline. Thereby the test setup and all characteristic parameters are shown on the screen. No need to seek such information in the relevant documents (standards etc.).
SOFTWARE FOR CWS500D

ICD SOFTWARE
Routines to attain the goal

05 CALIBRATION ROUTINE, E.G. AS PER ISO 11452-4

Levelling procedure
All measuring devices are set-up as required for the test and are configured accordingly. The CWS500D will then automatically acquire the susceptibility level of the DUT, show the result in the corresponding measuring windows and record the results.

06 IMPLEMENTATION OF MEASURING DEVICES

The measuring device administrator
While the calibration is in progress the test level is determined for each spot frequency and stored in the database. This ensures that the test is conducted at a constant level.

07 VECTOR TEST ROUTINE

Individually configured test routine
Tests can be configured with various vectors. The operator defines the start and stop point of each vector (frequency and amplitude), specifies the mode and depth of the modulation, frequency step and dwell time etc. Specific test points can also be determined via Excel file, if more convenient.

08 TEST ROUTINE AS PER ISO 11452-4

The test procedure
The operator can follow the progress of the test by means of the constantly updated measuring windows and graphics. Apart from the applied power, the graphics show forward and reverse power and the induced current. The impedance characteristic is determined from the measured values and shown as a graphic. The operator is given very detailed information to determine the DUT’s behaviour during test.
SOFTWARE FOR CWS500D

ICD SOFTWARE
Everything’s under control

09 TEST ROUTINE AS PER ISO 11452-4 – CLOSED LOOP

Closed Loop-mode
In Closed Loop-mode the output power is constantly controlled. If the applied calibrated power is not sufficient to achieve the required test level, the applied power has to be increased until either the power limit or the required test level is reached. As soon as the test level is achieved the dwell time is started.

The monitor
The DUT monitor is shown in a separate window. The operator can follow the progress of the measuring results during the test.

11 SUBSTITUTION MODE TEST ROUTINE

Open Loop-mode
In this test mode the power having been calibrated prior to the test is applied at each test frequency. There is no adjustment of the applied power.

This represents the preferred method for BCI as well as for TEM Cell and Stripline applications.

12 TEST ROUTINE AS PER PSA STANDARD

Powerful device
In order to test level 4 as per PSA standard, a 150W amplifier is needed to apply the required power for the entire frequency range up to 400MHz. For this application the CWS500D can be equipped either with a built-in 150W amplifier or an amplifier can be connected externally.
Once a test is completed all measuring data is displayed on the screen. Depending on the settings and configuration markers will be set to show what limits of applied power or induced current have been reached. The software automatically generates a complete test report in RTF file format including the details given for the DUT, the header information with the integrated company logo and the specific operator entries. The report contains all test parameters like applied standard, calibration data, the test curve, diagrams of induced current, forward and reverse power, the DUT's impedance characteristic and all measured values, a table showing all the test points as well as a table of events with all comments entered by the operator and finally the test result.

**13 ANALYSIS TOOL WITH USER GUIDANCE**

**Easy test evaluation**

In each test mode the operator can open the analysis tool. Based on its configuration it will open automatically when an ongoing test is interrupted. The operator can then insert any comment, reduce or increase the test signal, change the modulation or frequency etc. to carefully evaluate the DUT's behaviour. The test can be continued both manually or automatically or the test can be stopped.

**14 TEST COMPLETED!**

**Test results**

Once a test is completed all measuring data is displayed on the screen. Depending on the settings and configuration markers will be set to show what limits of applied power or induced current have been reached. The software automatically generates a complete test report in RTF file format including the details given for the DUT, the header information with the integrated company logo and the specific operator entries. The report contains all test parameters like applied standard, calibration data, the test curve, diagrams of induced current, forward and reverse power, the DUT's impedance characteristic and all measured values, a table showing all the test points as well as a table of events with all comments entered by the operator and finally the test result.

**15 MANUAL TEST – CONSOLE MODE**

**Manual operation**

This mode is used for special test requirements. For detailed analysis and individual evaluation of the susceptibility level or in case of failure analysis, the console mode allows the operator to select and set all test parameters individually. The format of the parameters can be selected and changed according to the requirements.
ACCESSORIES
EVERYTHING YOU NEED FOR YOUR TEST SET-UP

Surplus requirements
EMC tests consist of complex test procedures and are conducted on various DUT’s with different battery supply conditions. Different lines require different coupling and decoupling devices. Generated test signals and induced currents need to be verified with high accuracy. Appropriate measuring and control devices, DUT monitoring and signal recording devices are needed in a test set-up for these purposes. This means: an extensive range of accessories is required and represents an important part of the test set-up and test procedure.
ACCESSORIES

OUR SUPPORT TO MAKE YOUR LIFE EASY

RDS 200

RDS 200 is a remote controlled DC voltage source with a built-in current sink and is used to generate battery supply variations. It is controlled via the 0-10V DC analog signal by the PFS 200B for voltage dips or by an arbitrary generator to generate signals e.g. as required by Ford’s CI 230 specification.

FORD ES-XW7T CI 230...

RDS 200S1

RDS 200S1 is a remote controlled DC voltage source with a nominal output of 600V / 3A. It is used along with the LD 200S18 for the Field Decay test and generates the −600V rectangular pulse. It is controlled via the 0-10V DC analog signal by the LD 200S18 and thus enables fully automatic testing.

AN 200

AN 200 includes a battery switch to perform reproducible disconnection of inductive loads from the battery supply. The transient voltage occurring due to switching, can be measured on various load impedances and must comply with the limits indicated in the corresponding standards. AN 200 incorporates a semiconductor switch, the artificial network required, the measuring output, internal selectable loads and allows for connecting additional external loads.

TSC 7001G

FIELD DECAY AND SPARK TEST

ISO 7637-2:2004

ISO 7637-3:1995

The capacitive coupling clamp, type ACC, is used to induce nanosecond transients and microsecond pulses onto signal and data lines.

ACC CAPACITIVE COUPLING CLAMP
ACCESSORIES

OUR SUPPORT TO MAKE YOUR LIFE EASY

BCI CLAMPS

INDUCTIVE PULSE COUPLING AS PER ISO 7637-3 (DRAFT)
COUPLING DEVICES FOR I/O LINES
CURRENT MONITORING CLAMPS
FOR BCI APPLICATIONS AS PER ISO 11452-4 AND MANUFACTURER REQUIREMENTS

KW 50/KW 1000

BUILT-IN ATTENUATOR 1:100 (KW 50) AND 1:500 (KW 1000).

ISO RACK

ALL BUILT-IN GENERATORS ARE THUS CONNECTED TO THIS GROUND REFERENCE PLANE.
IT ALSO INCORPORATES THE WIRING AND CONTROL OF THE EMERGENCY SWITCH-OFF CAPABILITY.