



# ADVANCED TEST SOLUTIONS FOR EMC

COMPANY PROFILE AND PRODUCT OVERVIEW



a TESEQ Company



a TESEQ Company



Advanced Test Solutions for EMC

**"WHATEVER WE DO, WE WANT TO DO IT BEST!"**

Johannes Schmid, President of Teseq®



## EDITORIAL



I am often asked what makes Teseq® special. What distinguishes us from our competitors. On the one hand, it is the unique positive Teseq® spirit of our employee-owned company. And then, there is the somewhat unusual setup of our company which combines the tradition and experience of a long-standing market leader with the enthusiasm and innovative spirit of a newcomer.

As an innovative EMC pioneer and test system developer, we have acquired comprehensive and invaluable expertise in our field. Our company, derived from Schaffner EMV AG, is young, fresh and hugely creative. We want to keep our finger on the pulse and stay ahead of the game. Our ideal size and flexibility enable us to react quickly to new developments. We are also passionate and committed when it comes to asserting our leading role on the international market, pushing forward technical development and setting ourselves new standards.

Since its Buy-Out the Teseq® Group has strongly grown organically as well as through acquisitions and has become one of the largest players in the EMC market. Our product range has continuously been expanded and today Teseq® is the only vendor who can offer products and solutions for Conducted as well as for Radiated EMC applications.

The aim of our ongoing research and development work is to offer you, our customer, the quickest possible market access through our cutting-edge technology, innovative and user-friendly measuring devices and testing systems. As such, your high-tech systems will set the standard in terms of safety and quality.

Johannes Schmid, President of Teseq®





**Q for Quality.** Teseq® is a leading international high-tech company for EMC test systems. We develop and manufacture test instruments, software and accessories for EMC emissions and immunity testing. Our product range is broad and unique. We secure a leading role for our customers in the international market through our innovative and compliant solutions and reliable test results.

Our clients work in testing and development laboratories, research institutes and centers of education. We do not compromise when it comes to quality control. As a rule, our hardware and software are thus manufactured under one roof, including the final assembly and test. We pay particular attention to product design and ease-of-use.

**We play a leading role in the following sectors:**

- Automotive industry
- Industrial electronics
- Consumer electronics
- Medical technology
- Telecommunications

**Short view of a long history**

- 1962 Schaffner Switzerland established by Dr. Hans Schaffner
- 1971 First EMC test instrument launched
- 1975– Global expansion to France, US,
- 1990 Singapore, Japan and China
- 1998 Acquisition of Chase EMC Ltd., Capel, UK
- 1999 Acquisition of MEB Messelektronik Berlin GmbH
- 2006 Management buy-out and establishment of the new brand Teseq®
- 2007 Support office Nagoya, Japan, established
- 2011 Teseq® Taiwan established
- 2012 Acquisition of Milmega Ltd., UK
- 2012 Sales offices in Shanghai and Shenzhen established
- 2012 Acquisition of instruments for industry Inc., USA

Even a worldwide leader such as Teseq® has to prove its excellence every day. We work hard to exceed our own demanding standards.

# SMART EQUIPMENT FOR A BRIGHT FUTURE

**At the top through creativity and conformity.** No progress without challenge, no development without feedback from our customers. We are renowned for our ability to think broader and develop further. Our engineers are creative perfectionists, who are constantly applying the latest technology, focusing on user-friendly design solutions and incorporating current information on the latest standards. Our participation in various international committees means that we are always up-to-date on the latest developments and thus able to stay at least one step ahead. Teseq®'s compliant solutions are used in a majority of accredited and certified laboratories.

## Product innovations

- Color touch screen for superior user-friendliness
- Modular system architecture for easy customization
- Flexible, user-configurable lab and test automation software with monitoring and reporting
- Automated robotic test solutions

**4 competence centers** for product management, development and manufacturing: Luterbach, Switzerland for conducted EMC; Berlin, Germany for RF equipment, software & accessories; Millmega in Ryde, UK for solid state microwave power amplifiers and IFI in Ronkonkoma, USA for TWT and RF power amplifiers. Development and production take place against a backdrop of the highest professional expertise and absolute reliability: The „Swiss Quality“ ethic is followed by all 4 sites.

**Local experience, international presence.** Teseq® maintains an international network of certified experts and operates 12 sales & support offices in Europe, Asia and the USA. Thanks to our international representatives, we are always close to our customers. We know their needs and we speak their language. Efficient communication is the keyword and tailor-made end-to-end applications are the result, thanks to our detailed knowledge of our customers and the market. Consultation, planning, training and implementation are, of course, carried out on-site. As with our calibration services, where our customers benefit from seven laboratories all around the world (six of which are accredited): We offer certified quality measuring devices at the very highest level.





**The simulation of electrostatic discharges is an important part of EMC tests for all types of electronic equipment. Many test standards require pulse voltages of a few kV to 15 kV while the automotive industry has even higher requirements.**

In this case, voltages of up to 30 kV must be applied to determine the immunity level. Not only do Teseq®'s ESD simulators meet all of today's requirements, they are also designed to comply with tomorrow's standards.

Teseq®'s ESD simulators are characterized by a compact and user-friendly design. Our product features large, easy to read LCD displays that show the user all necessary parameters during tests. They can be operated either from rechargeable batteries or from a mains power supply.

**Teseq® compliant-conducted immunity solutions use the latest touch screen technology and modular design. Technology you can count on.**

## ESD SIMULATORS



**NSG 435** ESD Simulator for industrial and commercial applications from 200 V to 16.5 kV.

- Battery powered
- Ergonomic and lightweight



**NSG 437** ESD Simulator for automotive testing from 200 V to 30 kV.

- Air and contact discharge up to 30 kV
- Touch panel display controls
- Counts only valid discharges
- Easy and fast network exchange



**NSG 438** ESD Simulator is an enhanced version of the NSG 437 for advanced automotive testing.

- All features of the NSG 437
- Built-in ISO self-test
- Supports a wide range of accessories
- Battery powered
- Freely adjustable discharge detection



**NSG 439** ESD Simulator in automated robotic applications.

- Ruggedized housing for robotic mounting
- Robotic air discharge adapter
- Built-in charge remover

# CONDUCTED EMC GENERATORS

**Small, smart and innovative.** Transient pulses superimposed on power and data cables, power interruptions and electromagnetic fields often cause malfunctions in electronic circuits and equipment. Immunity testing can ensure that components, instruments and systems function properly during routine operation in conformance with product standards. Teseq® offers an extensive range of pulsed immunity generators as well as coupling networks, antennas, variacs and accessories to ensure that interference phenomena can be safely and reliably reproduced. Teseq®'s Windows-based EMC Suite software simplifies testing procedures and test file processing, deliver flexible and adaptable test reports, and allow for remote operation.



**NSG 3040** The smart 4.4 kV solution for CE applications.

- Modular test system
- For Surge, Burst, dips & interrupts and magnetic field for AC and DC
- Easy-to-use 7" color touch screen
- Test sequences easily programmed from touch panel
- Wide range of optional test accessories



**NSG 3060** The modular solution for 6.6 kV applications.

- Modular, expandable system
- Surge, Ring wave, Burst, telecom, dips & interrupts and magnetic field
- IEC and ANSI coupling methods
- High accuracy switching technology meets ANSI coupling requirements







**CDN 3061 and CDN 3063 series** fully meet the ANSI and IEC specification and satisfies automated application needs for surge and/or burst pulses.

- 1-phase coupling network includes also PQT pulse
- 3-phase coupler rated for 32, 63 or 100 A
- 3-phase rotation indicator for safe EUT operation
- High accuracy switching technology
- Calibrated adaptor tools available for reproducible measurement results



**CDNs and accessories** Extensive expansion capabilities satisfy broad application needs.

- Portable 3-phase manual surge coupling up to 100 A EUT
- Efficient common mode burst CDN for 3-phase high current request
- Coupling networks for signal and data line applications
- Magnetic field options
- Single- or double variacs and step transformers
- CDN HSS-2 for surge testing on unshielded symmetrical high speed communication lines



**WIN 3000 remote control software** is based on the newest Windows platforms and fully utilizes their graphics features. It is a professional and attractively user interface.

- Clearly structured, all information visible at a glance
- Workspace can be customized and saved
- Test reports can be edited real-time in Microsoft Word
- Sequencing of different pulses, assisted by universal dialog features
- Large and powerful standard test library
- Freely programmable test with up to 500 test steps



**NSG 3025** A burst generator designed for portability.

- Compact, full-capability instrument for IEC/EN 61000-4-4 standard
- Preprogrammed tests and test sequences
- Built-in coupling network for AC and DC applications
- Designed for certification, development laboratories and on-site use



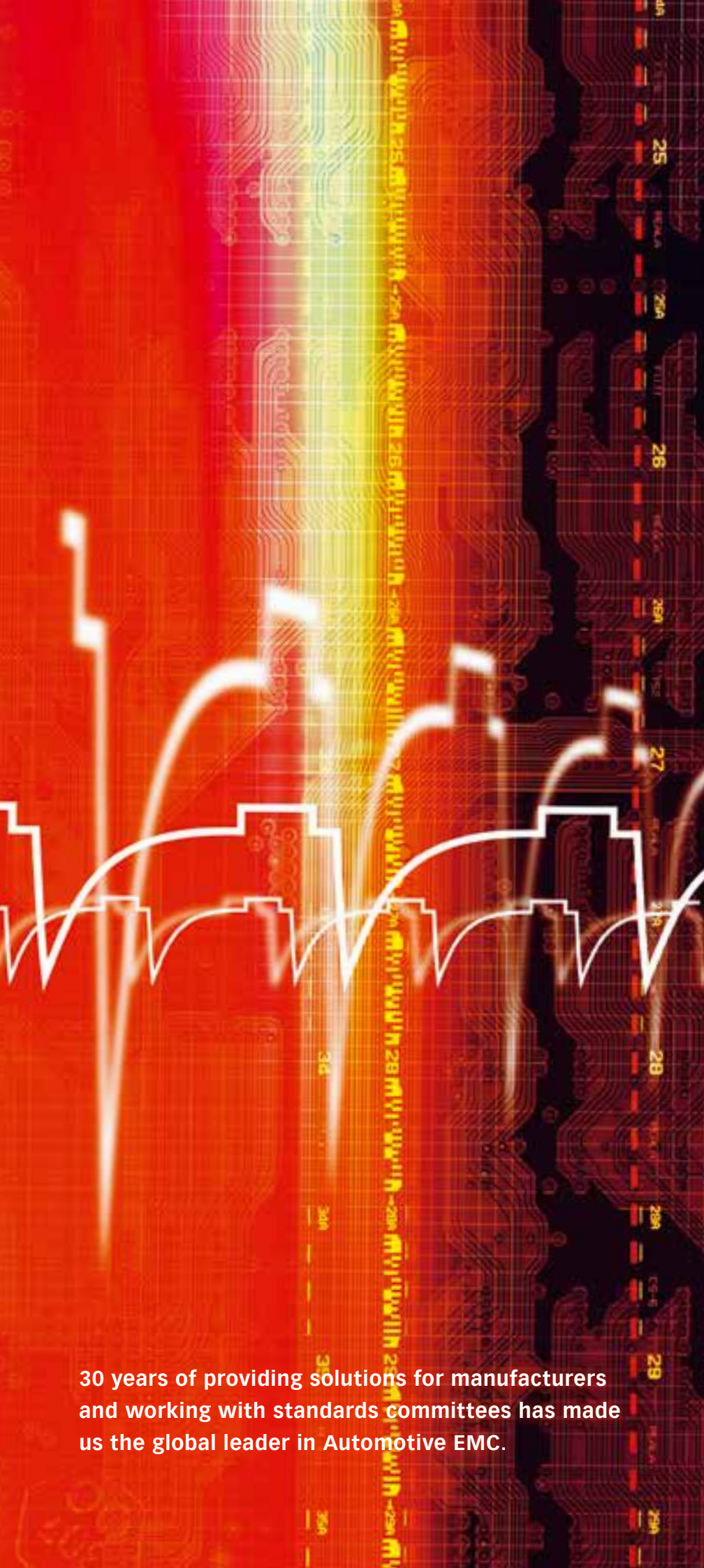
## HARMONICS AND FLICKER

**Teseq® is a pioneer in the field of harmonics and flicker EMC testing.** Manufacturers and test centers around the world trust Teseq® ProfLine 2100 systems. The ProfLine 2100 family's modular design enables Teseq®'s customers to configure customized testing systems. These systems also offer cost-effective solutions for a wide range of powers from 1.25 to 135 kVA per phase.



- Real time PC-based power analyzer
- 1 msample/s sampling rate ensure high fidelity, no gap data acquisition
- Programmable AC/DC voltage source
- Large power range 1.25 to 135 kVA
- Harmonic and interharmonic immunity testing in compliance with IEC/EN 61000-4-13
- Voltage drops and interruptions in compliance with IEC/EN 61000-4-11 and IEC/EN 61000-4-34 to 50 A per phase
- Windows software: WIN 2100 and WIN 2120 for simple testing procedures, remote control, test file processing and flexible test reports





Teseq® is the first company to provide compact, modular, standards-compliant systems, generators with automotive-specific functions and power amplifiers for battery simulation during EMC testing.

**Automotive competencies and solutions:**

- Emissions
- Immunity
- BCI
- ESD 30 kV
- Transients
- Reverberation
- RF Solutions
- GTEM

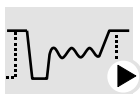
30 years of providing solutions for manufacturers and working with standards committees has made us the global leader in Automotive EMC.

# AUTOMOTIVE CONDUCTED IMMUNITY & EMISSIONS TEST SYSTEMS



**NSG 5500** Capacitive discharge pulse immunity generator. With its capacitive discharge circuits, the NSG 5500 takes Teseq's exclusive modular technology a step further with unique pulse generating functions, making it the only solution that meets all ISO 7637-2:2004 immunity requirements.

- Integrated battery switch/coupler 100 A (250 A peak)
- Modular system based on flexible technology that is easy to upgrade
- Uses a true "capacitive discharge into pulse shaping network"
- Modules for JASO and other Japanese manufacturers' requirements
- Pulse 3a/b generator with both 5/100 ns and 5/150 ns pulse width requirements
- Current and legacy pulses supported including pulse 6 and 7 for backward compatibility
- The only pulse 5 generator that meets all Load Dump requirements



**NSG 5600** The NSG 5600 is a voltage variation and noise simulator using a function generator and power amplifier. This provides vehicle voltage starting profiles, dips and drops, transformer-coupled sine wave noise and magnetic field immunity simulations.

- Flexible and powerful function generators are simple to program
- Modular and expandable up to 4 internal synchronized function generators
- Clone function for digital recording and duplication of oscilloscope wave forms or for importing from Math-CAD, Excel, etc.
- Single-click programming of sine, square, triangle and exponential functions, DC offsets and ramps
- Unique functions for transformer-coupled sine wave noise and magnetic field immunity tests



**PA 5840 & PA 5740** Power amplifier/battery simulator. The PA 5840 and PA 5740 are fast power amplifiers for battery simulation including features necessary for EMC users: capacitive stability mode, low impedance, high current, very high peak inrush currents, high bandwidth and stability in case of complex, variable loads in vehicle electrical systems.

- Developed specifically for automotive battery simulation during EMC testing
- Output range to  $\pm 60$  V
- Bandwidth up to 150 kHz (PA 5740, 180 kHz)
- Rise time  $< 10 \mu\text{s}$ , i.e. no additional switch required for voltage dips and drops for most dropout applications
- Versions from 10 to 100 A constant current
- Peak inrush currents up to three times nominal
- True four-quadrant operation



**AutoStar immunity test software** Teseq®'s leading software for automotive immunity applications, features a test management platform for controlling capacitive discharge transient simulations, voltage variations and other immunity tests.

- Optimized for automotive industry EMC testing
- More than 1000 preprogrammed standard tests for international and manufacturer-specific EMC standards
- New tests can be programmed by the user or downloaded from the Teseq® website





**AES 5501 Emissions System** Designed for emissions testing to ISO 7637-2, the AES 5500 is a system of electronic and mechanical switches, an artificial network and a unique control station. Having gone through meticulous development and intensive beta testing, the AES 5500 contains unique features and uncompromising quality and conformity found nowhere else. Consisting of a four-part solution, the user has complete control over where, when and how the switches can be placed and controlled, including the necessary drive voltages for the relays.

- The only complete and compliant solution for ISO 7637-2 emissions testing
- Clean, reliable 100 A operation with very low voltage drop
- Industry standard relay footprint for a wide selection of relays (one 100 A relay included)
- Separate control station with automatic, manual or external triggering of the switching behavior



**NSG 5071 Inductive Transient Generator** It is a convenient way of using the required components in the different configurations of EMC-CS-2009 which maximizes ease-of-use.

- Designed in exact accordance to Ford Standard EMC-CS-2009
- Transients disturbances CI 220 A and C pulses and CI 260 waveform F
- User replaceable relays and timer to track relay usage
- Up to 30 A DUT current



**Other accessories** A wide selection of couplers, suppressors, stand-alone generators, attenuators and verification accessories are also available.

- Capacitive coupling clamps
- External suppression networks
- Calibration and verification loads
- Probes, attenuators and adapters

## RF IMMUNITY TEST SYSTEMS



**NSG 4070** The NSG 4070 is a multifunctional EMC immunity test system. Its large frequency range from 9 kHz to 1 GHz and its modular setup using internal or external amplifiers enable a wide variety of applications including tests in accordance with IEC 61000-4-6, various BCI applications as well as signal generator and power meter for test systems as per IEC 61000-4-3, IEC 61000-4-20, IEC 61000-4-21 and many other applications.

- Integrated signal generator 9 kHz to 1 GHz
- 3 power meter inputs 9 kHz to 1 GHz
- Integrated class A power amplifier module for different applications
- Multiple EUT monitoring options
- Remote control software and report generator included



**ITS 6006** The ITS 6006 consists of an integrated RF signal generator, RF switches and EUT monitoring interfaces. The unit is designed for various radiated EMC applications in the 80 MHz to 6 GHz frequency range. The RF signal can be switched to one of four outputs, where up to four power amplifiers can be connected directly. Additional RF switches are available for combining two amplifier paths into a single antenna connection. Two of these relays are included for the four amplifier paths.

ITS 6006 interlock outputs ensure the activation of the power amplifier for only the selected signal path. The 3.5" color display shows the generator parameters. LEDs indicate the state of further functions.

- Integrated signal generator 80 MHz to 6 GHz
- Integrated RF switch network
- Multiple EUT monitoring options
- 3.5" TFT color display
- Safety interlock function
- Remote control via USB, RS232 or LAN





**Power meters** The power meter series has been specially designed for EMC testing requirements featuring a large dynamic range, fast measurements, rugged design and a frequency range that matches the application.

- PMR 6006 for 1 MHz to 6 GHz, -45 to +20 dBm and connection to ITS 6006
- PMU 6006 for 1 MHz to 6 GHz, -45 to +20 dBm, USB version
- PMU 6003 for 10 kHz to 3 GHz, USB version



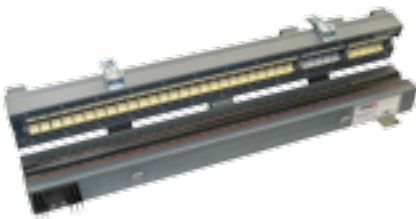
**WIN 6000** is a device control software for performing conducted and radiated susceptibility tests as defined by international standards. Both fully automatic testing and manual measurement are possible.

- Remote control via GPIB, LAN, USB and serial interfaces
- Graphical user interface
- Predefined equipment configurations with NSG 4070 and ITS 6006
- User editable equipment configurations
- User editable device drivers in clear text
- Driver support from Teseq®'s website
- Calibration files automatically correct frequency based parameters
- Wide range of EUT monitoring features
- Selection of different trigger behavior if limits exceed
- Automatic and manual EUT threshold search and single step operation
- Report generation with predefined and user editable templates (Global report function)
- Program update function



**CDNs** IEC/EN 61000-4-6 specifies the design and performance of a range of coupling/decoupling networks (CDNs). Each CDN is specific to the type of cable and the intended signal carried by the cable.

- CDN M Type for unscreened AC or DC power supply lines
- CDN AF Type for all unscreened, unbalanced lines
- CDN S Type for screened or coaxial cables
- CDN USB Type designed to test the universal serial bus
- CDN CAN BUS Type designed to test the unscreened CAN bus
- CDN T Type for telecommunication ports on ITE equipment
- CDN HDMI for high speed HDMI incl. HDCP, HEC (Ethernet), ARC and DSC



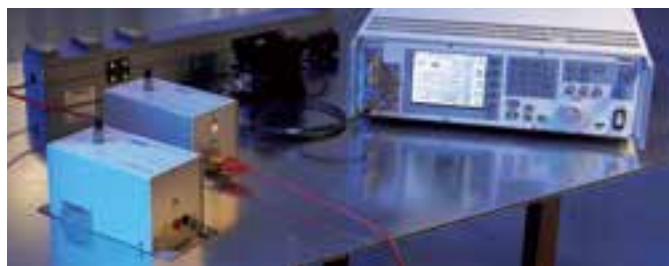
**EM clamp** The KEMZ 801A offers efficient inductive and capacitive coupling in the frequency range 10 kHz to 1000 MHz. The ferrite cores along the length of the clamp also improves the common mode impedance of the test set-up and the reproducibility of the test.

- Very efficient coupling
- Can be used almost any cable
- Ruggedly designed



**Current Injection Probe** The CIP 9136's unique non-ferrite core allows wide band performance from 10 kHz to 400 MHz. The core material is highly efficient and thermally rugged, thus allowing very high injected levels to be achieved with lower RF input powers.

- Meets ISO 11452-4, RTCA/DO-160 section 20, MIL-STD-461, UK Defence Standard 59-411 and IEC/EN 61000-4-6
- Ideal for automotive BCI testing
- High power handling (up to 1 kW)
- Calibration Jig PCJ 9201 available





**Monitoring Device** The MD 4070 can be used as an active or passive current sensor probe to measure the current in a conductor without connecting it directly. The MD 4070 allows fast and easy measurement as it can be quickly clamped around the current carrying conductor.

- Frequency range 10 kHz to 400 (600) MHz
- As required in IEC/EN 61000-4-6
- Suitable for BCI testing per ISO 11452-4, RTCA/DO-160 section 20, MIL-STD-461 and various automotive standards
- Active/passive operation for wide dynamic range



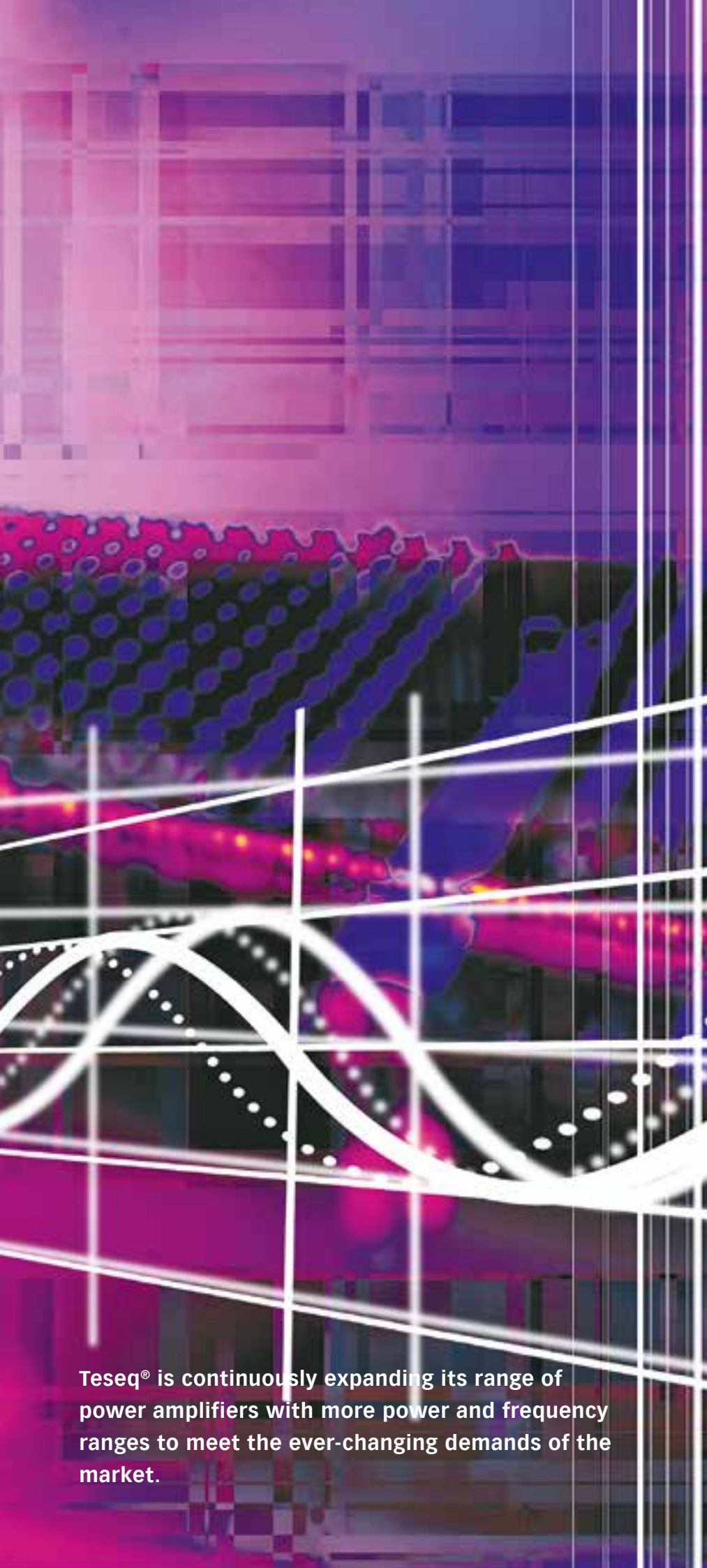
**Complete systems** can be offered by Teseq® meeting all types of RF electromagnetic susceptibility tests.

#### **BCI Automotive**

- Frequency range 10 kHz to 400 MHz (1000 MHz)
- Power up to 1000 Watts
- Signal generator, power meter, EUT monitoring: NSG 4070
- Power amplifier: CBA series
- Current injection probe: CIP 9136

#### **RF Radiated immunity**

- Frequency range 9 kHz to 6 GHz
- Power up to 1100 Watts
- Range 9 kHz to 1 GHz: Signal generator, power meter, EUT monitoring: NSG 4070
- Range 80 MHz to 6 GHz: Signal generator, RF switches, EUT monitoring: ITS 6006
- Power amplifier: CBA series, Milmega, IFI
- Antennas: CBL series, BHA series
- GTEM



#### **Why buy from Teseq®?**

- Decades of market experience
- Industry experts active in establishing global standards
- Best-of-breed products
- Modular architecture
- Excellent price-to-performance ratio
- User-friendly software solutions
- Widest range of local services around the globe
- Shared language and culture with our customers

**Teseq® is continuously expanding its range of power amplifiers with more power and frequency ranges to meet the ever-changing demands of the market.**

# RF IMMUNITY POWER AMPLIFIERS

Three strong brands joined forces in 2012 under the Teseq® umbrella to offer the industry's widest product range: Teseq®, IFI and Milmega!

Our product portfolio includes Milmega's famous solid state microwave amplifiers, Teseq's rugged Class A power amplifiers and IFI's high power RF solid state and Tetrode tube amplifiers, as well as their well-known TWT amplifiers up to 40 GHz. Teseq® now covers any application in the EMC, telecommunications and defense industries.

Our strong global service network with local accredited calibration labs ensures fast turn-around for calibration and repair. We back our commitment to quality and reliability with a warranty up to 5 years.

Teseq® – IFI – Milmega, the new power amplifier team to remember!

What we offer:

- Amplifiers for EMC, ISM, telecom and defense
- Solid-state class A and class AB models
- CW, pulsed and combined TWT amplifiers
- Tetrode tube amplifiers

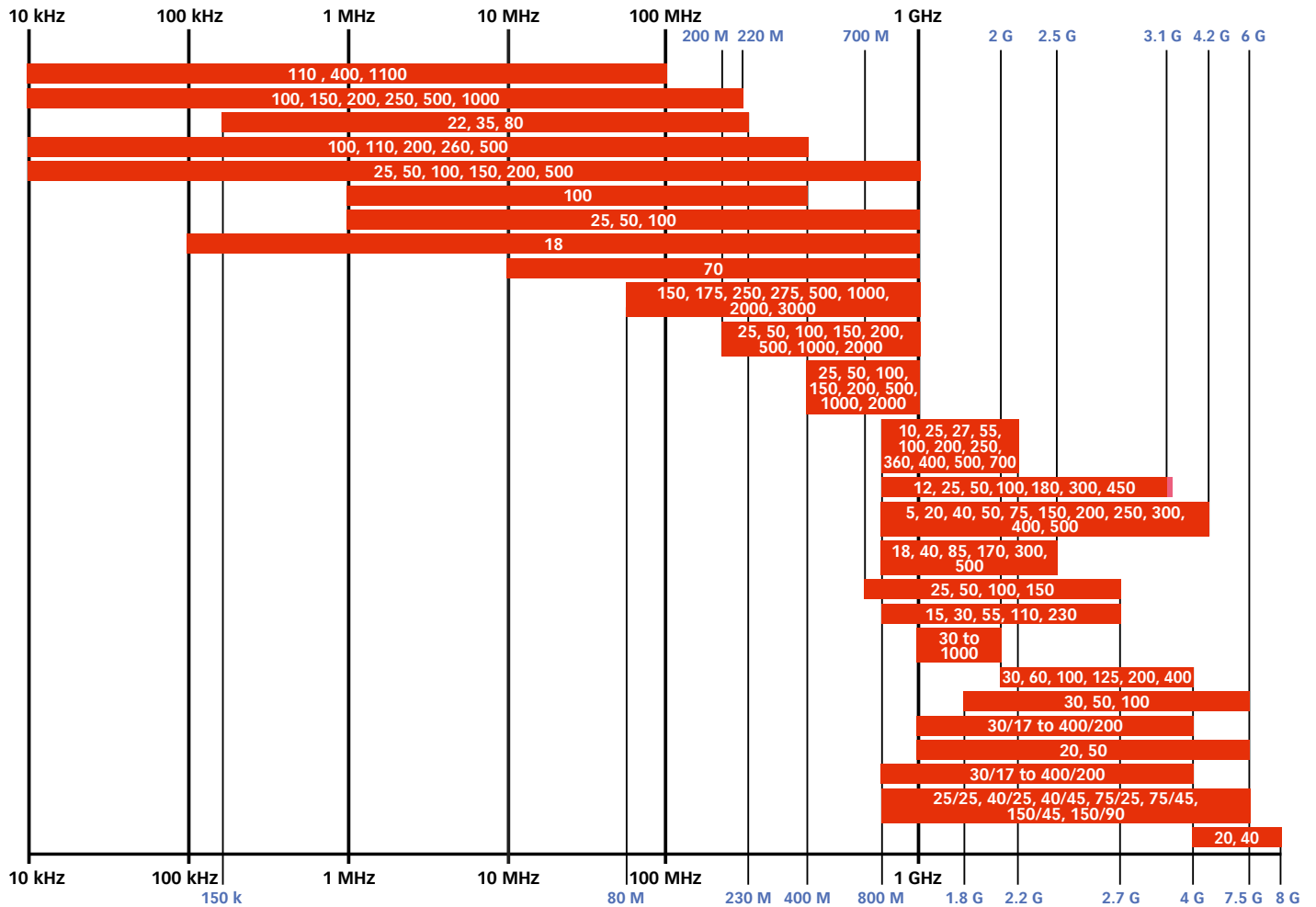
What makes us unique:

- Rugged, reliable design for EMC testing with any load
- Higher power at lower frequency to compensate for antenna gain
- Compact design with modular architecture
- Up to 5 years warranty
- Local service through Teseq®'s own service organizations

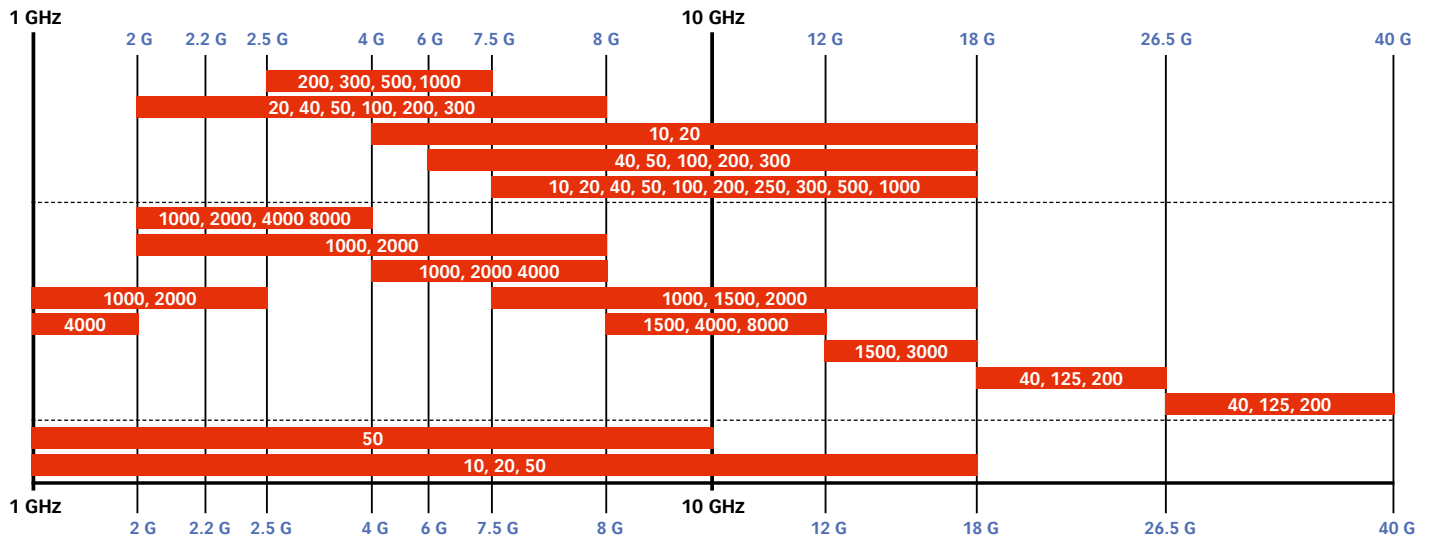


# TESEQ/MILMEGA/IFI AMPLIFIER SELECTION CHART

## Solid State



## TWT, Pulse TWT, SS & TWT



# RF, MICROWAVE & TWT EXPERTS AMPLIFIERS 10 KHZ – 40 GHZ UP TO 10 KW



## TESEQ®

The CBA series is a complete range of solid-state class-A power amplifiers designed with frequency and power ratings specifically for EMC immunity test applications. These robust and dependable power amplifiers ensure complete reliability at low operating costs.

- Reliable Class A
- Tested and matched to EMC applications
- Safe operation into open-circuit and short-circuit
- For a wide range of radiated RF immunity/susceptibility testing
- Ideal for military and Automotive susceptibility testing



## MILMEGA

Designers and manufacturers of High Power Microwave and RF Amplifiers, specialized on modular and compact class A and class AB microwave amplifiers.

- Superior price / power ratio
- Upgradeable modular philosophy
- Simple modules swap out for minimum down time
- Front panel indicators show operational status
- IEEE, USB, Ethernet and RS 232 interfaces
- Directional coupler included (some models only)



## IFI – Instruments For Industry

Designers and manufacturers of High Power Microwave and RF Amplifiers (Tetrode Tubes, Solid State and TWT), specialized on TWT amplifiers and class AB RF amplifiers.

- Instantaneous Broadband Frequency range
- Rugged Construction & High Reliability
- Backlit LCD Display
- Integrated Force Air Cooling
- Self-diagnostic circuitry
- IEEE-488 interface, RS232
- Solid State Power Supply

## RF IMMUNITY & EMISSIONS GTEM / TEM CELLS AND STRIP LINES



**GTEM Cells** The GTEM cell is a frequency extended variant of the traditional TEM (Transverse Electro-Magnetic) cell. The GTEM cell is, in principle, a tapered coaxial line (offset septum plate), which is terminated by a combination of discrete resistors and RF absorbers to achieve a broadband match. Designed for EMC applications, calibration of antennas/field probes, test and measuring of mobile phones and screening measuring of material.

- Septum height from 250 to 2000 mm
- Wide range for filter, media panels and customized solutions
- Meets IEC/EN 61000-4-20
- Frequency range DC to 18 GHz



**GTEM 250A SAE** The standards SAE J1752/3 and IEC 61967-2 define a method for measuring the electromagnetic radiation from an integrated circuit (IC). The IC itself is mounted on a test board that is clamped to a special window in the top of the TEM cell. The connected spectrum analyzer or receiver measures the RF emissions emanating from the integrated circuit and impressed onto the septum of the cell.

- Test cell with special opening to test integrated circuits on approx. 45 mm septum height
- Meets IEC/EN 61000-4-20, SAE J1752/3, IEC 62132-2 and IEC 61967-2
- 100 Watts input power
- Excellent VSWR up to 18 GHz



**Strip Lines** are made for the generation of homogeneous electromagnetic fields and specified in ISO 11452-5 and EU guidelines 95/94. The strip lines can be used for testing of electrical/electronic submodules (EUB) and their associated cables.

- EMC tests for vehicle components immunity to RF fields
- Conform with ISO 11452-5 and EU guidelines 95/94
- Efficient power conversion provides high fields with minimum power





## RF IMMUNITY & EMISSIONS REVERBERATION CHAMBERS



**Reverberation Chambers** (RCs) are modern EMC test environments in addition to the established methods like semi- or full anechoic rooms, open area test sites or GTEM cells. They can be used for emissions and immunity testing.

- Wide frequency range 100 MHz to >18 GHz
- Excellent field homogeneity (<3 dB)
- Full and precompliance testing
- Radiated emissions and immunity measurements
- Stirrer optimized by numerical analysis
- Calibrated per IEC/EN 61000-4-21 or other standards (e.g. RTCA D0160 D/E, MIL 461 E, GMW 3097...)
- Consulting, calibration and services



**Software** One of the most important factors for the implementation of calibration, and final use of a reverberation chamber is the calibration, control and valuation software. Using Teseq®'s powerful system software (C++ based) Compliance 5, these procedures are solved in a comfortable and time-effective way:

- Individual equipment configuration for RVC systems
- Complex EUT test sequences
- Results displayed simultaneously in graphical and tabular form
- Powerful test report generator and data export capability





## RF IMMUNITY & EMISSIONS EMC TEST SOFTWARE

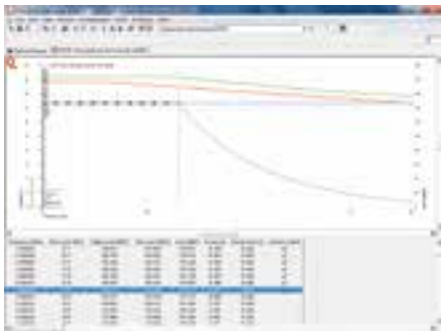


**Compliance 5** is sophisticated EMC laboratory control software designed to make RF Susceptibility/Immunity testing fast, efficient, compliant, accurate and simple. A major feature in Compliance 5 is the availability of 'Installable Applications'. These optional applications are dedicated to specific industry test standards and methodology such as commercial, Military, Aerospace and Automotive.

Using these applications means that only a few simple selections and settings need to be made in order to run a test in accordance with a particular standard.

Limit lines, profiles and test levels are pre-installed ready for selection by the user. Even reporting is automatically controlled and reports can be available at the end of the test using either the preloaded or custom report templates.



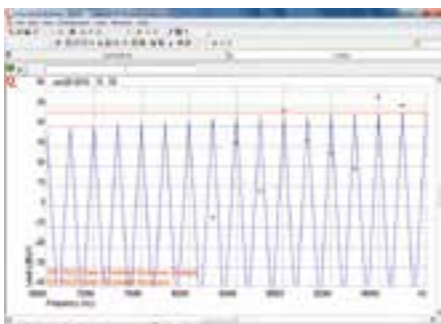


Test results produced by military susceptibility test application.

### Compliance 5 Immunity

Fully featured RF conducted and radiated immunity/susceptibility test software package.

- Optional test application for testing to commercial RF immunity standards
- Optional test application for testing to military RF susceptibility standards (MIL-STD)
- Optional test application for testing to Aerospace RF susceptibility standards (RTCA DO160)
- Optional test application for testing to automotive RF immunity standards for components
- Tools for creation of user defined test procedures
- Continuous development of additional applications
- Large selection of drivers for commonly used hardware



### EmiPak 5

Pre-compliance commercial conducted and radiated emission testing.

- Easy-to-operate user interface
- Pre-configured
- Pre-compliance RF conducted and radiated emissions testing
- Results presented simply and clearly
- Can be upgraded to Compliance 5 Emissions



### GTEM 5 Immunity

Simple radiated immunity testing in a GTEM.

- Easy-to-operate user interface
- Preconfigured
- Supports conducted and radiated testing
- Results presented simply and clearly
- Can be upgraded to full Compliance 5 versions

Teseq® has an extensive offering of EMC antennas. The well-known BiLog® antenna was the original ultrawide band EMC emissions measurement antenna introduced to the market. It represented an important milestone in the development of EMC measuring techniques.

The BiLog® was, at the time, a unique combination of a sophisticated matching network and innovative design that provided significant advantages over conventional EMC antennas. The ability to perform measurements in one pass without changing the antenna, resulted in a test time savings of up to 30%. Consequently measurements are more reliable, faster and easier to conduct.

With its X-Wing® antennas, Teseq® has applied the advancements of the BiLog® antenna to immunity testing. Teseq® also offers loop antennas, biconical antennas and broadband horn antennas.

The ability to run a complete emissions test with a single antenna provides significant time savings.



## RF IMMUNITY & EMISSIONS ANTENNAS



### BiLog®

- CBL 6111  
30 MHz to 1 GHz
- CBL 6112  
30 MHz to 2 GHz



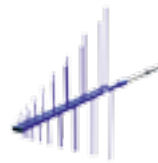
### Compact X-wing BiLog®

- CBL 6141  
30 MHz to 2 GHz
- CBL 6143  
30 MHz to 3 GHz



### X-wing BiLog®

- CBL 6144  
25 MHz to 3 GHz



### Log periodic

- UPA 6108  
300 MHz to 1 GHz
- UPA 6109  
200 MHz to 1 GHz



### Biconical

- DPA 3000  
800 MHz to 2.8 GHz
- DPA 4000  
200 MHz to 1 GHz
- VBA 6106  
30 MHz to 300 MHz



### Broadband horn

- BHA 9118  
1 GHz to 18 GHz
- BHA 9220  
200 MHz to 2 GHz



### Loop

- HLA 6120  
9 kHz to 30 MHz

# RF EMISSIONS TESTING



**ISNs** Impedance Stabilization Networks (ISNs), or with CISPR 16-1-2 called Asymmetric Artificial Networks (AANs), are used for emissions measuring on telecommunication lines. Teseq® offers a wide range of ISNs for CISPR 22/ EN 55022 and CISPR 32/ EN 55032.

- ISN T2A for one unscreened balanced pair
- ISN T4A for up to two unscreened balanced pairs
- ISN T8 for up to four unscreened balanced pairs
- ISN T8-CAT6 for up to four unscreened balanced pairs and Cat 6
- ISN ST08 for screened balanced pairs with RJ45
- ISN S501 for screened coaxial lines with BNC



**LISNs** Line Impedance Stabilization Network (LISN), or with CISPR 16-1-2 called Artificial Mains Network (AMN), such as the DC-LISN-M2-25 and DC-LISN-M2-100 are designed for measuring disturbances of a photovoltaic inverter's DC port.

- Frequency range 150 kHz to 30 MHz
- 150  $\Omega$  DC-LISN for photovoltaic inverters
- Switch for selecting the LISN type: V, Y, Delta
- Current up to 150 A





**LISNs** Line Impedance Stabilization Network (LISN), or with CISPR 16-1-2 called Artificial Mains Network (AMN), such as the NNB 51 and NNB 52 are used to measure distortion signals on the power cord of an electrical Equipment Under Test (EUT).

- NNB 51 Dual-line-V-LISN, NNB 52 Four-line-V-LISN
- Compliant to CISPR 16-1-2
- Current up to 16/32 Amps
- Frequency range 9 kHz to 30 MHz
- Massive grounding bars



**Capacitive Voltage Probe** The CVP 2200A is used for measuring on telecommunication ports for lines with more than four balanced pairs or for unbalanced lines.

- Active probe
- Switchable amplification 1:1/10/100
- Compliant to CISPR 16-1-2, CISPR 22 and CISPR 32
- Frequency range 150 kHz to 30 MHz



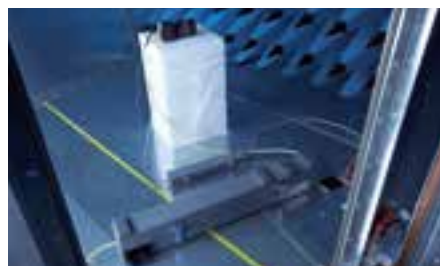
**Absorbing Clamps** The AMZ 41A is used for measuring interference signals on power supply cables according to CISPR 14. Decoupling clamps are available for a variety of different EMC applications.

- AMZ 41A absorbing clamp for CISPR 13, 14-1 and 16-1-3
- CMAD 20A common mode absorbing device (CMAD) according CISPR 16-1-4 and CISPR 16-2-3
- KEMA 801 RF attenuation clamp as recommended for IEC/EN 61000-4-6 testing



**Reference Sources** Teseq® has a wide range of products for reference measurements between test sites, calibration and verification of test equipment.

- KSQ 1000/1001 spherical radiation source 30 MHz to 1 GHz
- VSQ 1000/3000/2000 radiation source up to 1/3/18 GHz
- RSG 1000/3000/2000 radiation source up to 1/6/18 GHz







## EMC CONSULTING AND SYSTEM INTEGRATION



**Reliability in every phase.** Meeting today's EMC compliance requirements is an extensive and complex task. There are numerous standards and requirements which vary in accordance with the product, application and region. Most manufacturers and test laboratories do not have the resources to define a complex EMC test system to meet their needs. This leads to considerable risk when selecting and constructing an EMC test laboratory.

Teseq® offers a complete solution for EMC test facilities and guarantees full service over the entire product life – from site surveys and hardware/software configuration to start-up, final acceptance, training and calibration. Teseq®'s extensive knowledge of EMC systems can be seen around the world with hundreds of systems installed in application fields such as automotive, telecommunications, commercial, military and medical.

- Complete integration of Teseq®, Schaffner and third-party EMC equipment
- Global experience, purchasing, logistics, consultancy and support
- Expertise in automotive, medical, military, telecommunications and many more applications
- Hundreds of systems installed worldwide
- Dedicated EMC specialists to evaluate current and future requirements
- Local support from Teseq® offices

Consultation and quotation

System design and implementation

Installation, maintenance and support





**Accreditation gives confidence in the competence of a calibration laboratory.**

Accreditation provides confidence in uncertainties, certificates and reports by implementing widely accepted criteria set by the European (CEN) or international (ISO) standardization bodies. The standards address issues such as impartiality, competence and reliability; leading to confidence in the compatibility of certificates and reports across national borders.

All our calibration laboratories worldwide are accredited to EN ISO/IEC 17025, which is the latest international standard specifically addressing the performance of calibration laboratories as well as staff. The laboratories are based in Switzerland, Germany, UK, USA, Singapore, Japan and China.

**AMETEK CHINA**



**AMETEK JAPAN**



**AMETEK SINGAPORE**



**TESEQ GERMANY**



**TESEQ SWITZERLAND**



**TESEQ UNITED KINGDOM**



**TESEQ USA**



From consultation to implementation: Teseq® offers its competence for your confidence.

## CALIBRATION AND CUSTOMER SERVICES

**Worldwide, fast and cost-effective.** For fast-turnaround calibration and repair of all your commonly used EMC test equipment, choose Teseq®'s calibration and customer services. As the most extensive, single-source service for the calibration of RF and conducted EMI test equipment in the world, Teseq® provides test laboratories with fast, reliable, high quality services. Teseq®'s extensive worldwide EMC calibration and repair capability is built on our own high quality standards and longstanding engineering experience. We operate our own laboratories, most of them accredited to national and international standards, and offer both accredited and traceable calibration services. All have full test and repair facilities for our EMC equipment. We test and calibrate other manufacturers' equipment as well. Teseq® guarantees 10 years of calibration and repair service from the date of purchase and minimal downtime for the customer. Our experts are also available for customer-specific consulting and training.

**The accredited calibration service is designed for accredited test laboratories.** It is based on calibration equipment, procedures, measurement uncertainties and personnel, all of which are assessed by a national accreditation authority to ensure accuracy of measurement.

**The traceable calibration service is ideal for all types of commercial and in-house test laboratories.** It uses similar traceable measurement equipment, and almost the same processes. Both accredited and traceable calibration services are in-line with the recommendations of EN ISO/IEC 17025.

Teseq® also offers the following services around the globe:

- On-site calibration
- Repair
- Training
- Consulting
- Equipment rental



# PRODUCT STANDARDS AND TESEQ® SOLUTIONS



Commercial & Industrial		Scope	Area of use
EN 61000-6-1	IEC 61000-6-1	Generic immunity standard	Residential, commercial and light industrial environment
EN 61000-6-2	IEC 61000-6-2	Generic immunity standard	Industrial environment
EN 61000-6-3	IEC 61000-6-3	Generic emissions standard	Residential, commercial and light industrial environment
EN 61000-6-4	IEC 61000-6-4	Generic emissions standard	Industrial environment
EN 61000-3-2	IEC 61000-3-2	Basic emissions standard	Harmonic currents
EN 61000-3-3	IEC 61000-3-3	Basic emissions standard	Voltage fluctuations and flicker
EN 61000-3-11	IEC 61000-3-11	Basic emissions standard	Voltage fluctuations and flicker
EN 61000-3-12	IEC 61000-3-12	Basic emissions standard	Harmonic currents
EN 61000-4-2	IEC 61000-4-2	Basic immunity standard	Electrostatic discharge
EN 61000-4-3	IEC 61000-4-3	Basic immunity standard	Radiated RF field
EN 61000-4-4	IEC 61000-4-4	Basic immunity standard	Electrical fast burst transients
EN 61000-4-5	IEC 61000-4-5	Basic immunity standard	Surge
EN 61000-4-6	IEC 61000-4-6	Basic immunity standard	Conducted RF
EN 61000-4-8	IEC 61000-4-8	Basic immunity standard	Power frequency magnetic field
EN 61000-4-9	IEC 61000-4-9	Basic immunity standard	Pulse magnetic field
EN 61000-4-11	IEC 61000-4-11	Basic immunity standard	AC voltage dips, interruptions and variations <16 A per phase
EN 61000-4-12	IEC 61000-4-12	Basic immunity standard	Ring waves and oscillatory waves
EN 61000-4-13	IEC 61000-4-13	Basic immunity standard	Harmonics and interharmonics
EN 61000-4-14	IEC 61000-4-14	Basic immunity standard	Voltage fluctuations
EN 61000-4-20	IEC 61000-4-20	Basic immunity and emissions standard	Transverse electromagnetic (TEM) waveguides
EN 61000-4-21	IEC 61000-4-21	Basic immunity and emissions standard	Reverberation chamber test methods
EN 61000-4-27	IEC 61000-4-27	Basic immunity standard	Voltage unbalance
EN 61000-4-28	IEC 61000-4-28	Basic immunity standard	Variation of power frequency
EN 61000-4-29	IEC 61000-4-29	Basic immunity standard	DC voltage dips, interruptions and variations
EN 61000-4-34	IEC 61000-4-34	Basic immunity standard	AC voltage dips, interruptions and variations >16 A per phase
EN 55011	CISPR 11	Product family emissions standard	Industrial, scientific and medical radio frequency equipment
EN 55013	CISPR 13	Product family emissions standard	Broadcast receivers and associated equipment
EN 55014-1	CISPR 14-1	Product family emissions standard	Household appliances, electric tools and similar
EN 55014-2	CISPR 14-2	Product family immunity standard	Household appliances, electric tools and similar
EN 55015	CISPR 15	Product family emissions standard	General lighting equipment
EN 55020	CISPR 20	Product family immunity standard	Broadcast receivers and associated equipment
EN 55022	CISPR 22	Product family emissions standard	Information technology equipment
EN 55024	CISPR 24	Product family immunity standard	Information technology equipment
ANSI IEEE C62.41		Recommended practice in low voltage AC power circuits	

## Automotive

EN 55025	CISPR 25	Vehicle and component RF emissions tests
ISO 11451		Vehicle RF immunity tests
ISO 11452		Component RF immunity tests
SAE J1113		Component emissions and immunity tests
ISO 7637		Component-conducted emissions and immunity tests
ISO 10605		Electrostatic voltage immunity in road vehicles
ISO 16750-2		Stress testing of electronic systems and components
2004/104/EC		EC type-approval – “e” marking for components

## Telecommunications

Bellcore		EMC and electrical safety – generic criteria for network telecom equipment
FCC		Connection of terminal equipment to the telephone network
ETSI		EMC for telecom equipment
ITU – K series		Immunity of telecom equipment

Commercial & Industrial		ESD generators	Conducted EMC generators	Automotive conducted immunity test systems	Harmonics and flicker	RF conducted immunity test generator	RF power amplifiers	Antennas	EMI measuring receivers	Discontinuous interference analyzer	GTEM/TEM cells	Reverberation chambers	EMC RF test software
EN 61000-6-1	IEC 61000-6-1	■	■			■	■	■			■		■
EN 61000-6-2	IEC 61000-6-2	■	■			■	■	■			■		■
EN 61000-6-3	IEC 61000-6-3				■			■	■		■		■
EN 61000-6-4	IEC 61000-6-4				■	■		■	■		■		■
EN 61000-3-2	IEC 61000-3-2				■								
EN 61000-3-3	IEC 61000-3-3				■								
EN 61000-3-11	IEC 61000-3-11				■								
EN 61000-3-12	IEC 61000-3-12				■								
EN 61000-4-2	IEC 61000-4-2	■											
EN 61000-4-3	IEC 61000-4-3					■	■	■					■
EN 61000-4-4	IEC 61000-4-4		■										
EN 61000-4-5	IEC 61000-4-5		■										
EN 61000-4-6	IEC 61000-4-6					■	■						■
EN 61000-4-8	IEC 61000-4-8		■		■								
EN 61000-4-9	IEC 61000-4-9		■										
EN 61000-4-11	IEC 61000-4-11		■		■								
EN 61000-4-12	IEC 61000-4-12		■										
EN 61000-4-13	IEC 61000-4-13				■								
EN 61000-4-14	IEC 61000-4-14				■								
EN 61000-4-20	IEC 61000-4-20					■	■		■		■		■
EN 61000-4-21	IEC 61000-4-21					■	■	■	■			■	■
EN 61000-4-27	IEC 61000-4-27				■								
EN 61000-4-28	IEC 61000-4-28				■								
EN 61000-4-29	IEC 61000-4-29		■		■								
EN 61000-4-34	IEC 61000-4-34		■		■								
EN 55011	CISPR 11							■	■				■
EN 55013	CISPR 13							■	■				■
EN 55014-1	CISPR 14-1							■	■	■	■		■
EN 55014-2	CISPR 14-2	■	■			■	■	■	■				■
EN 55015	CISPR 15							■	■				■
EN 55020	CISPR 20	■	■			■	■	■	■		■		■
EN 55022	CISPR 22							■	■				■
EN 55024	CISPR 24	■	■			■	■	■	■				■
ANSI IEEE C62.41			■										

#### Automotive

EN 55025	CISPR 25							■	■		■		■
ISO 11451						■	■	■	■		■	■	■
ISO 11452				■		■	■	■	■		■	■	■
SAE J1113		■		■		■	■	■	■		■	■	■
ISO 7637				■			■						■
ISO 10605		■											
ISO 16750-2				■									
2004/104/EC				■		■	■	■	■		■		■

#### Telecommunications

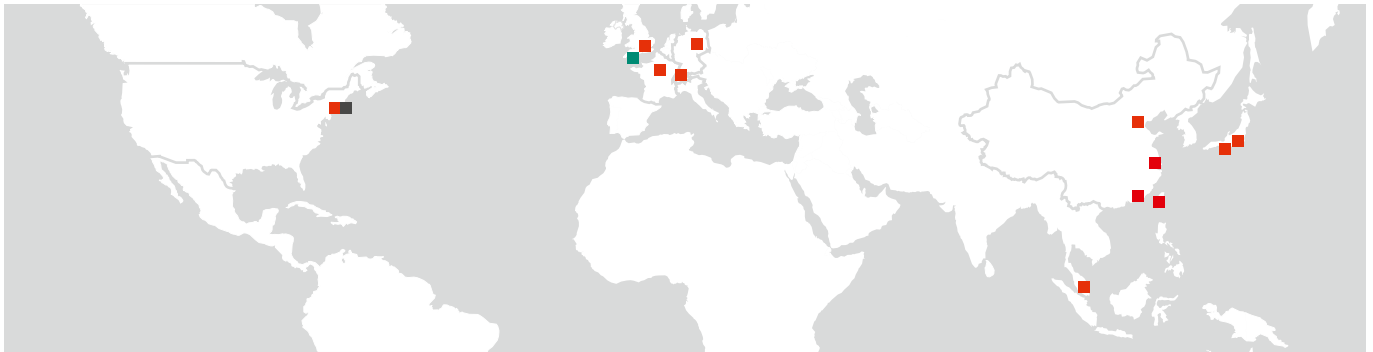
Bellcore						■	■	■	■		■		■
FCC			■			■	■	■	■		■		■
ETSI		■	■	■	■	■	■	■	■		■		■
ITU – K series			■				■						■



## EMC INSTRUMENTATION AND SYSTEMS FOR ANY BUDGET

**Teseq® offers the world's most comprehensive range of EMC systems for immunity and emissions testing.** We take great pride in our world-class research and development program, backed by state-of-the-art global manufacturing. Our membership in the relevant international committees demonstrates our commitment to the industry. Our network of direct sales offices, representatives and distributors offers market leading EMC expertise tailored to local needs in more than 30 different countries.

Our unique "modular" approach to EMC is focused on our customers' business needs. By breaking down the barriers between traditionally separate test functions we can optimize the test process to help you bring products to market more quickly.



### Headquarters

**Teseq AG**  
4542 Luterbach  
Switzerland  
T +41 32 681 40 40  
F +41 32 681 40 48  
sales@teseq.com  
[www.teseq.com](http://www.teseq.com)

### MILMEGA Ltd.

Park Road, Ryde,  
Isle of Wight,  
PO33 2BE, UK  
T +44 (0) 1983 618004  
F +44 (0) 1983 811521  
sales@milmega.co.uk  
[www.milmega.co.uk](http://www.milmega.co.uk)

### IFI Inc.

903 South Second Street  
Ronkonkoma, NY 11779  
T +1 631 467 8400  
F +1 631 467 8558  
sales@ifi.com  
[www.ifi.com](http://www.ifi.com)

### China

**Teseq Company Limited**  
T +86 10 8460 8080  
F +86 10 8460 8078  
chinasales@teseq.com

### Singapore

**Teseq Pte Ltd.**  
T +65 6846 2488  
F +65 6841 4282  
singaporesales@teseq.com

### USA

**Teseq Inc.**  
T +1 732 417 0501  
F +1 732 417 0511  
Toll free +1 888 417 0501  
usasales@teseq.com

691-200D May 2013

© 2013 Teseq®  
Specifications subject to change without notice.

### France

**Teseq Sarl**  
T +33 1 39 47 42 21  
F +33 1 39 47 40 92  
francesales@teseq.com

### Switzerland

**Teseq AG**  
T +41 32 681 40 50  
F +41 32 681 40 48  
sales@teseq.com

### Germany

**Teseq GmbH**  
T +49 30 5659 8835  
F +49 30 5659 8834  
desales@teseq.com

### Taiwan

**Teseq (Taiwan) Ltd.**  
T +886 2 2917 8080  
F +886 2 2917 2626  
taiwansales@teseq.com

### Japan

**Teseq K.K.**  
T +81 3 5774 5771  
F +81 3 5774 5772  
japansales@teseq.com

### UK

**Teseq Ltd.**  
T +44 845 074 0660  
F +44 845 074 0656  
uksales@teseq.com



To find your local partner within Teseq's global network, please go to [www.teseq.com](http://www.teseq.com)

Teseq® is an ISO-registered company. Its products are designed and manufactured under the strict quality and environmental requirements of the ISO 9001.

This document has been carefully checked. However, Teseq® does not assume any liability for errors, inaccuracies or changes due to technical developments.





a TESEQ Company



a TESEQ Company



Advanced Test Solutions for EMC