

TDK RF Solutions Inc.

Software

Systems

Chambers

Products

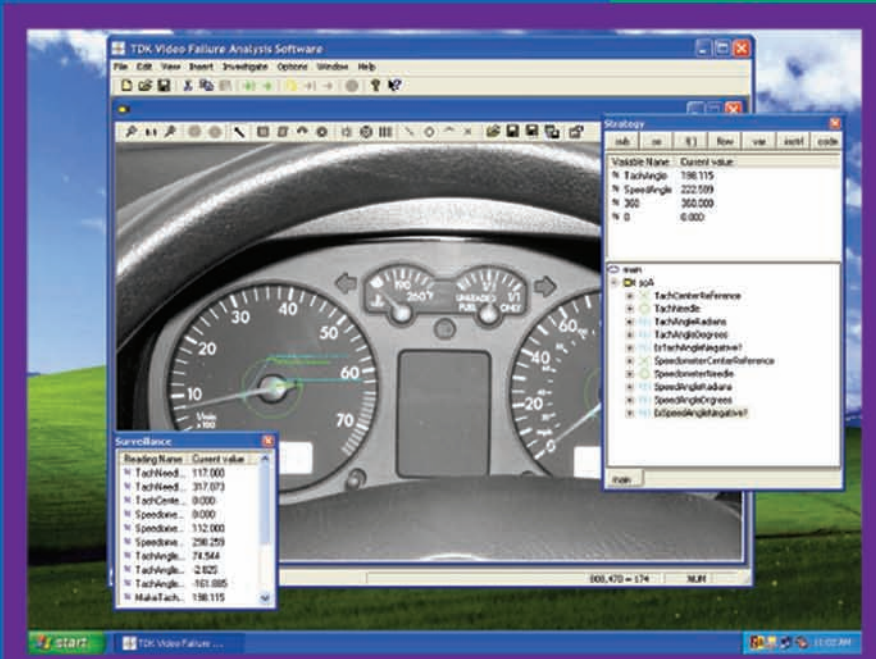
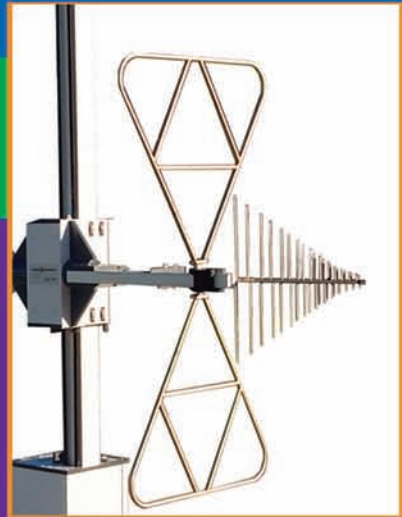
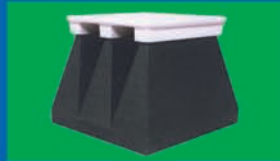


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TDK is a world leader in the design, development, and manufacture of technical solutions for the electromagnetic compatibility testing industry. We offer a complete range of solutions, including automated test systems, TDK anechoic chambers, software, antennas, a wide range of test products and electronic components. We call it Total System Technology[®], and it means TDK is your best choice of partner for proven solutions and services backed by internal technical expertise.

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Anechoic Chambers

TDK offers a line of standard turnkey 3 meter, 10 meter and compact anechoic chamber solutions based on top-performing TDK absorber technologies. We have developed and delivered innovative chamber designs for antenna measurements, automotive (CISPR 25), MIL-STD and other customized applications and sizes.

TDK chambers feature the original combination of polystyrene and ferrite tile absorber for excellent performance. We also offer unique polyethylene material for superb performance into the microwave range. Our solution is virtually maintenance-free with a proven long working life (30+ years).

Compact Anechoic Chambers

TDK Compact Anechoic Chambers are the ideal solution when EMS testing or pre-compliance scanning is only needed and a fully compliant 10-meter range or 3-meter range is not required. With dimensions of approximately 6m x 3m x 2.8m, the chamber can be located within most commercial and industrial buildings and can be conveniently located in a Q.C. laboratory, engineering department or production line.

Compact chambers can be lined with a double-layer, ferrite-only absorber for operation up to 1GHz, or can be selectively treated with IP-045C in a "cascade" configuration to extend the upper limit to 18 GHz and above. The space saving characteristics are obtained by the use of a particular absorber installation technique which was invented and patented by TDK - the double layer technique. TDK X-131 ferrite tiles are mounted onto dielectric panels to cover the complete frequency range from 26 MHz to 1,000 MHz.



3-Meter Chamber

The TDK 3 meter and 10 Meter Chambers test range CISPR semi-anechoic chambers are designed to perform radiated emissions measurements at 3 meter distance in full compliance with ANSI C63.4, EN 50147-2 & CISPR 22 standards. By installing TDK ferrite tiles onto dielectric panels (double layer, TDK patent) to cover the frequency range from 30 MHz to 1,000 MHz, the chamber dimensions can be reduced to 9.0 m long x 6.0 m wide x 5.4 m high (29'-6" L x 19'-8" W x 17'-8" H). TDK guarantees NSA deviation of within ± 3.5 dB for a test volume of 2 m \varnothing , 2 m high.

TDK IP-045C wedge-shaped, fully matched resistive absorbers installed in selected areas of ceiling and walls extend the frequency range up to 18 GHz. White end caps complete the absorbers and greatly improve the illumination levels inside the chamber.

10-Meter Chamber

The TDK 10 meter test range semi-anechoic chamber is designed to perform radiated emissions measurements at 10 meter distance in full compliance with ANSI C63.4, EN 50147-2, and CISPR 22 standards. TDK hybrid technology absorber lining achieves exceptional electrical performance with dimensions of only 18.0 m long x 12.0 m wide x 8.4 m high (59' x 39'-4" x 27'-6").

The chamber is lined with TDK IB-015 ferrite tiles and IP-090BL hollow-taper, wedge-shaped, fully-matched absorbers to cover the frequency range from 30 MHz to 40 GHz. White end caps complete the absorbers and greatly improve the illumination levels inside the chamber. NSA deviation is guaranteed to be within ± 3.5 dB for a test volume of 4 m \varnothing , 2.5 m high. By positioning TDK ferrite tile floor plates and IP-045C absorbers between the transmit antenna and EUT (Equipment Under Test), the semi-anechoic chamber can be used to perform radiated immunity measurements in full compliance with IEC 1000-4-3 standard in the frequency range from 26 MHz to 18 GHz.



Absorber Materials

Absorber Materials

The TDK radio wave absorber material product line is a series of materials used in various combinations to provide a reflection attenuation of greater than 20dB over their intended frequency range. TDK resistive absorbers are made using closed-cell construction in either polystyrene or polyethylene foam. Our controlled molding process avoids uneven resistive material distribution problems that are frequently observed in competitor materials.

A key factor in absorbing unwanted electromagnetic energy efficiently is selecting the most appropriate materials for the application. This selection process must take into account the device or system being tested, its operating conditions, the ambient environment, and the applicable test requirements. With over 700 chambers installed worldwide, TDK has the expertise to design and install a chamber with the absorber product matched to your specific requirements.

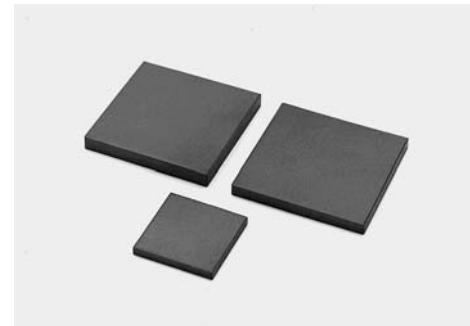
TDK materials are lightweight, yet rigid and will not perceptibly droop or change their physical or electrical characteristics. The materials are fire-resistant to meet international chamber safety specifications.

IB Series

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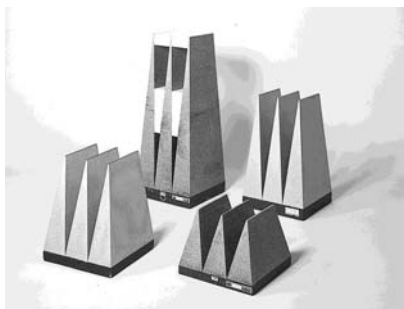
IB-017

The IB-017 ferrite tile is an absorbing material which utilizes the magnetic resonance loss of ferrite at high frequencies. The tile is precision ground to enhance performance, eliminating gaps between adjoining tiles and facilitating simple assembly. With a reflection attenuation of greater than 20dB, the IB-017 ferrite provides exceptional high absorption performance over the frequency range from 30 MHz to 1,200 MHz.



IP Series

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TDK IP-045C

The TDK IP-045C cascade absorber is a high performance, ultra wide band absorber with an operating frequency of 30 MHz to 40 GHz. Small in size and lightweight but with high mechanical strength, it is the perfect absorber solution for higher frequency measurement applications in compact type and 3 meter/5 meter fully compliant anechoic chambers.

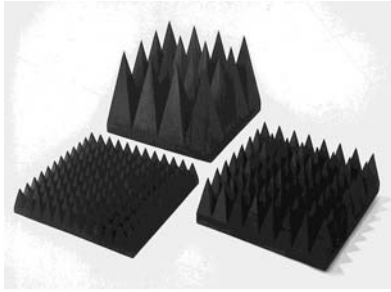
TDK IP-090BL & IP-130BL

The TDK IP-090BL & IP-130BL cascade absorbers are technically advanced ultra wide band absorbers. Their computer designed, lightweight structure offer superb mechanical strength combined with exceptional performance.

Absorber Materials

IS Series

Microwave Absorbers



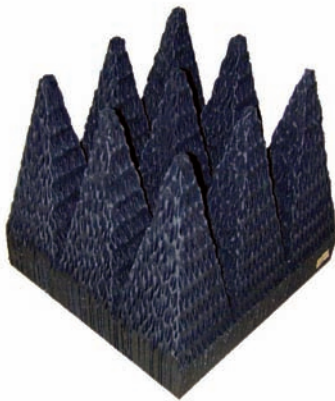
This electromagnetic absorber consists of a polyethylene foam base and utilizes the ohmic loss of carbon. Not only is the IS electromagnetic absorber capable of absorbing microwaves, it also delivers excellent electromagnetic absorption performance from as low as 300 MHz (depending on the size) through millimeter and submillimeter waves (through 1 THz).

The tips are designed to eliminate “droop” and deliver stable performance. The IS absorber is stable against chemicals and offers extremely long life. Available white end caps can be used to improve the indoor illumination. Sizes available from 5 cm (2”) to 100 cm (40”) pyramids.

In addition to the standard pyramidal IS material, TDK designs and develops specialized shapes and sizes of the polyethylene material (IS-S and IS-M materials), which is optimized for excellent performance for EM energy hitting at oblique angles.

ICT Series

High-Power Absorber



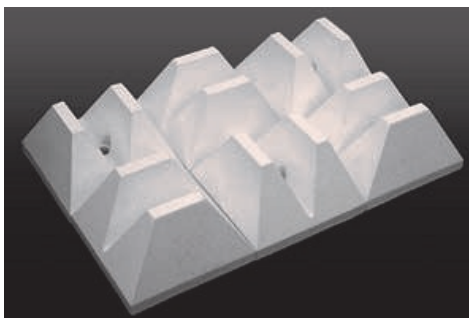
This “high power” absorber is a pyramidal electromagnetic absorber with a corrugated structure that consists of an inorganic base and utilizes the ohmic loss of carbon.

The corrugated structure is designed to radiate heat efficiently during power irradiations of 5 W/cm^2 ($> 32 \text{ W/in}^2$) or greater. The ICT absorber can provide excellent performance from as low as 300 MHz to 110 GHz. It is constructed of nonflammable materials to withstand the heat generated during high-power irradiation, and it is lightweight and strong. It comes in two sizes 30 cm (12”) and 12 cm (5”).

ICM Series

Ferrite Composite materials

This composite electromagnetic absorber utilizes the characteristics of the ICM electromagnetic absorber, which is a composite magnetic loss object made of an inorganic base and ferrite powder, and the IB electromagnetic absorber that utilizes the magnetic loss of ferrite.



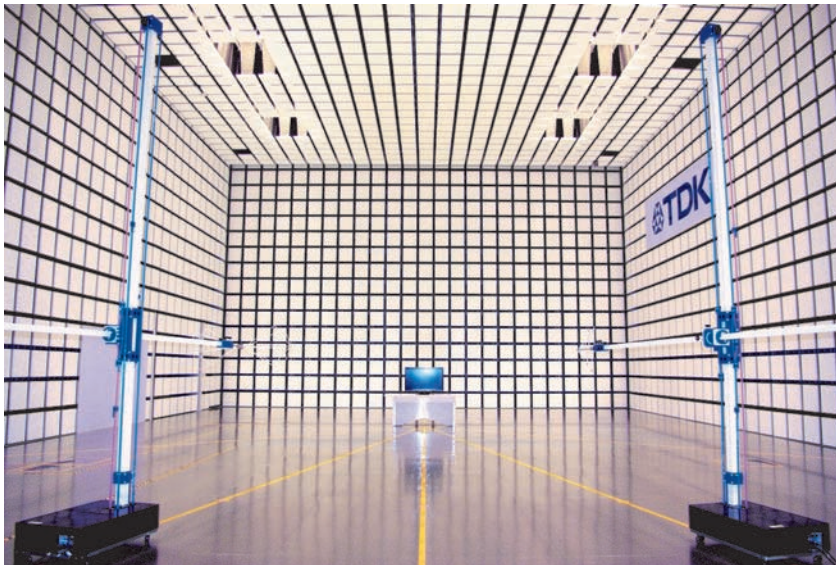
Our composite absorbers fully utilize the features of each loss material, and is designed to provide efficient electromagnetic absorption and deliver excellent electromagnetic absorption performance for frequencies as low as 30MHz.

Integrated Test Systems

Innovative Solutions

TDK provides innovative solutions for EMI and EMS test systems covering a wide range of specifications. Our technical expertise includes:

- **Radiated and Conducted Emissions:** Our Emissions Test System incorporates the latest technologies to efficiently test to the specifications applicable to your products.
- **Radiated and Conducted Immunity:** Our Immunity Test System integrates best-in-class test instrumentation, antennas, and software to provide automated testing for electromagnetic immunity according to U.S. and international test specifications.
- **EUT Monitoring:** Integrates monitoring instrumentation, video and audio equipment, and software to provide EUT signal monitoring, EUT stimulation, and monitoring for visual or audio interference during testing.
- **SAR Test Systems:** SAR System Components – robot with probe, twin phantom and integrated table, validation instrumentation in mini-rack, dipole antenna, and EUT mounting device.
- **Control Room, Shielded Room, and Chamber Design**
- **U.S. and International Test Standards**
- **System Integration and Control**



Total System Expertise™

Our expertise in EMC test systems engineering includes research, design, development, installation, and training. We can turn your vision into reality with a high-performance turnkey system optimized with the best selection of equipment and components, quality workmanship, and a seamless interface between the user, the system, and the environment.

Proven Solutions

Our test systems are based on proven commercial, telecommunications, automotive, and military system solutions already in place in Europe, North America, and Asia. As a result of our extensive experience and large installed base, our system designs are dynamic – we continually integrate the latest technologies into our solutions – which makes each installation more efficient and more manageable than those previously available.



Integrated Test Systems



Integrated System Design

TDK RF Solutions knows the key to making the most of your available resources and business demands is an integrated system that is both efficient and manageable. There are other companies that design test systems, but do just part of the job—focusing only on their area of specialization—and don't fully take into account the interrelationships between end users, instruments, software, test requirements, and test facilities. At TDK RF Solutions, our area of specialization is integrated system design. Whether you need a test system, a system upgrade, or an entire facility, we can turn your requirements into reality with a high-performance turnkey solution optimized with the best selection of equipment and components, quality workmanship, and a seamless interface between the user, the system, and the environment.

Test System Automation

TDK RF Solutions can help you maximize the productivity of limited personnel resources and accelerate your product's time to market by automating many testing procedures. Automation simplifies testing by eliminating repetitive tasks provides consistent and repeatable measurements, and reduces test times. Automation is also an integral part of a test facilities quality assurance strategy. We automate testing using a combination of our TDK TestLab™ software and hardware components to streamline the test setup process, perform measurements, and provide remote control of test instrumentation.

Integrated Test Systems

Commercial System Expertise

Commercial EMC testing involves controlling a wide range of instrumentation from a variety of vendors, performing detailed test procedures, and monitoring results. This becomes even more challenging as new technologies are adopted in the marketplace and testing becomes more complex. To meet these challenges, more and more companies rely on TDK RF Solutions to develop integrated system solutions that employ the latest technologies to bring commercial products into compliance.

TDK RF Solutions' test systems integrate test instrumentation, TDK TestLab™ software, system controls, positioning devices, and antennas to test specific products or subsystems for electromagnetic compatibility according to international, R&D, and manufacturer-specific standards. Our systems are designed to perform automated, semi-automated, and manual measurements in an anechoic chamber, shielded room, OATS, or test cell.

Each TDK RF Solutions system design is based on proven solutions already in place in Europe, North America, and Asia. As a result of our extensive experience and large installed base, our system designs are dynamic—we continually integrate the latest technologies and test standard developments into our solutions. This makes each installation better, more efficient, and more manageable.

Industry-Specific Testing Requirements

In addition to commercial test systems, TDK RF Solutions designs systems specific to requirements for Automotive, Telecommunications, Military and Aerospace testing.

Automotive Whole Vehicle and Vehicle Components

Telecommunications/Mobile Radio/Antenna

MIL Standards/Aerospace

Automotive Whole Vehicle and Vehicle Components

TDK RF Solutions designs solutions for testing whole vehicles, vehicle components, separate technical units (STU), and electronic sub assemblies (ESA).

Automotive installations include:

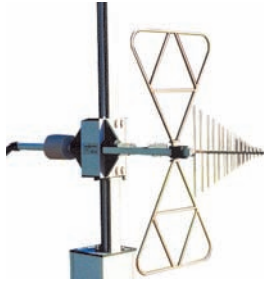
- Automotive EMC Directive
- North American and International Regulations
- Manufacturer Specific —Domestic and International
- EUT Monitoring



Antennas

Antennas

Hybrid Log Periodic Antennas



HLP-2006C

This extremely wideband antenna has excellent performance across the range of 20 MHz to 6 GHz. It is the best-balanced emissions antenna in the industry and especially suited for wideband testing of radiated emissions. Ideal for the medical or other commercial industries, the unique low frequency, hybrid elements enable an extremely compact antenna; ideal for compact chambers and smaller-sized compliant chambers.

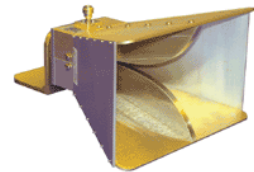
Additional Hybrid Log Periodic Antennas include:

- **HLP-2603:** Performance over the ultra wide frequency range of 26 MHz to 3 GHz for EMC immunity and emissions measurements.
- **HPBA-2510:** Provides extremely high field strengths over the operating frequency range of 25 MHz to 100 MHz.

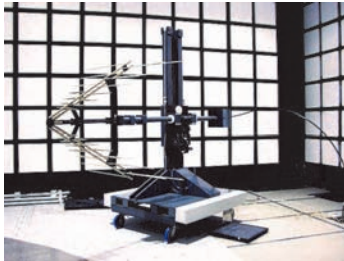
Horn Antenna

HRN-0118

A wide band, double-ridged horn used to transmit and receive microwave signals over the frequency range of 1 GHz to 18 GHz. The HRN-0118 generates high electric fields required for radiated immunity and emissions measurements, and features high gain, low VSWR, moderate power handling (300W), and a robust mechanical design.



Log Periodic Antennas



VLA-8001

This Vlog Periodic Antenna offers a wide frequency range (80 MHz to 1 GHz) with enhanced gain over standard log periodic dipole array antennas. Featuring an equalized E and H plane beamwidths, its unique, feed design (patent pending) provides superior performance for high-power, immunity applications.

Additional Log Periodic Antennas:

- **HPA-8003:** H-Plane Array 800 MHz - 3 GHz
- **PLP-3003:** Precision Log Periodic 300 MHz - 3 GHz
- **LPDA-0801:** Log Periodic Dipole 80 MHz - 1 GHz
- **LPDA-8003:** Log Periodic Dipole 800 MHz - 3 GHz
- **VLA-2001:** V-Log Array 200 MHz - 1 GHz

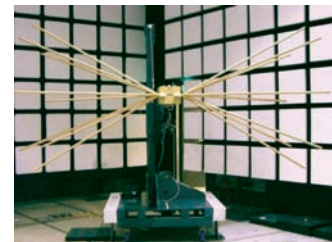
Biconical Antennas

HBA-2010

This High Power Biconical Antenna is a new generation biconical dipole that covers the operating frequency range of 10 MHz to 100 MHz. Its unprecedented combination of high power handling, balance and pattern control makes it an excellent choice for immunity measurements.

Additional Biconical Antennas:

- **PBA-2030:** Precision Biconical 20 MHz - 300 MHz
- **HBA-2030:** High Power Biconical 20 MHz - 300 MHz
- **MBA-2060:** Metrology Biconical 20 MHz - 600 MHz



Antennas

STL-03 Stripline Antenna

The TDK RF Solutions STL-03 Stripline is designed to produce high electric fields over a controlled bandwidth. It is used to perform EMC measurements according to automotive and aerospace standards in order to test the immunity of automotive and aircraft equipment to radiated electromagnetic fields.

The STL-03 uses a dual sided tapered adjustable feed design into a tunable transmission line.



Additional Stripline Antennas:

- **STL-01:** The TDK RF Solutions STL-01 and STL-01A Striplines are engineered to produce high electric fields used in radiated immunity testing for electrical and electronic equipment.
- **STL-02:** The TDK RF Solutions STL-02 Stripline is engineered to produce high electric fields used in immunity testing for electrical and electronic equipment.

Stripline Antennas



EFG-05 Large E/H-Field Generator

The TDK EFG-05 is a TEM wire device used to radiate large areas with a uniform field over the frequency range of 10 kHz to 30 MHz. It has retractable feedlines that allow it to adjust through a series of heights and feed impedances to tune the stripline to the anechoic chamber. The main use of the EFG-05 is to illuminate vehicles under test at the critical lower frequencies. It is especially suited for wideband high electric field generating capabilities.

Additional E-Field Generators:

- **EFG-02** E-Field Generator 10 kHz to 100 MHz; Capable of generating up to 500 V/m RSM using 2.5 kW amplifier and provides large uniform field area; Low VSWR
- **EFG-03** E-Field Generator 10 kHz to 100 MHz; Generates a minimum of 500 V/m between the elements; Low VSWR



E-Field Generators

DP-Series Dipole Antennas

TDK RF Solutions Precision Dipole Antennas are half-wave, fixed length precision dipoles designed to generate traceable calibrated fields or to measure electric fields at their respective frequency. The DP-series antennas offer low gain and essentially perfect cross-polarization rejection, and are typically used as a reference or standard gain antenna, or as a polarization standard.

- **Dipole Test Sets** The DP-Series Dipole Antennas are designed with operating frequencies matched the operating frequencies of common mobile radio devices, and are available in sets that correspond to communication systems used in Europe, North America, and Asia, including GSM, TDMA, PCS, Bluetooth, and others. Custom frequencies are available.



Other Antennas

Test Products

System Controls



SI-300 Multi-Purpose Solution

The TDK RF Solutions SI-300 controller is a multi-purpose system interface designed for manual or computer controlled EMC test systems. The SI-300 provides a user-

friendly method for controlling field sensors, turntables, masts, probe petitioners, and local and remote switch modules (depending on configuration chosen).

The SI-300 can be a rack mounted or stand alone unit. The SI-300 rear panel can be configured to contain up to 4 channels or up to 4 RF switches, depending on your application. Non-intrusive fiber optic links control the remote devices, eliminating the interference that may be associated with conventional control cabling.

Additional System Controls:

- Remote Switch Module (RSM-02)
- LISN Interface (LI-2000)
- Master Control Panel (MCP-01)

Monitoring Devices



VC-04 Color Video Camera

This camera is a high performance CCD specifically designed for remote monitoring of equipment under EMC testing. The camera is also ideal for wide angle anechoic chamber monitoring, shielded access control, and test action archiving.

- The VC-04 is designed to operate in the harsh environments required by EMC testing. The camera is housed in an EMI hardened protective case, and the control and video signals use fiber optics to prevent interference caused by high electromagnetic fields present during EMC testing.
- The high-resolution VC-04 is remotely focused, positioned, and zoomed using the TDK SI-300CC controller.
- The camera is available in both NTSC and PAL versions.

SI-300CC Camera Controller

This controller is capable of controlling up to four independent camera units. It allows precision manipulation of camera features such as pan, tilt, zoom, and focus with the use of two joysticks. In addition, the SI-300CC comes fully equipped with a graphical LCD, four function keys, four special keys, and twelve numerical keys for user-friendly control.



Test Products

Positioning Devices

Probe Positioner (PP-02)

The TDK RF Solutions PP-02 Field Probe Positioner is an x-y axis probe positioner designed for remote positioning applications. The positioner is controlled with the TDK RF Solutions SI-300 system interface, which reduces test interruptions by allowing test engineers to remotely position field probes during EMC/RF test procedures without opening the chamber door. With TDK TestLab™ software, the probe can also be positioned automatically.

- **IEC 1000-4-3 Compliant** The PP-02 can be used as part of an automated field leveling and uniformity scheme over a defined vertical plane, satisfying IEC 1000-4-3 field uniformity measurement requirements.

During field uniformity measurements, remote positioning of the probe eliminates 32 manual position changes (16 horizontal, 16 vertical) reducing test times up to 20%; for test facilities that use two antennas to cover the frequency, the PP-02 eliminates 64 manual position changes.

- **No E-Field Interference** The PP-02 is non-obtrusive to the test environment because of its DC battery supply, fiber optic transmission system, and non-conductive construction. This allows accurate measurements to be made without electric field interference from the positioner.



Dual Antenna Positioning System (DAPS)

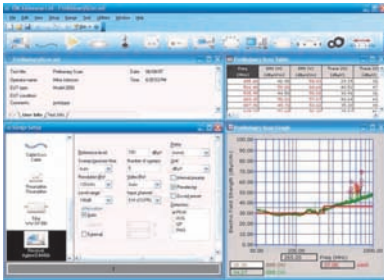
TDK RF Solutions' DAPS-01 Dual Antenna Positioning System consists of a dual antenna mast with integrated turntable and SI-300 system interface. The DAPS-01 is specifically designed for remote positioning of two antennas, both in the horizontal and vertical planes, during EMC testing. The DAPS-01 simplifies testing by allowing the user to test continuously across two antenna bandwidths without interruption.

- **Remote Control** The DAPS-01 is remotely controlled by the TDK RF Solutions' SI-300 system interface unit. A single independent control unit is used to handle the turn axis and the polarization sense.
- **Fiber Optic Link** Remote control of the positioning system is achieved by use of fiber optic links, eliminating a potential interference source and distance limitations.
- **Custom Dimensions** The dimensions of the positioning system mast and turntable are dependent on the customer's required illumination area. Dimensions are limited only by the maximum length of cable that is used.



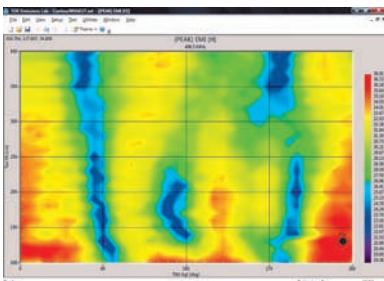
Test Software

The TDK TestLab suite of EMC testing software features an intuitive user interface that makes it easy to use without sacrificing flexibility or performance. TDK TestLab supports full automation for a variety of EMI and EMS tests specified in North American, European, and Asian regulations, including CISPR, EN, ETSI, FCC, IEC, ISO, MIL-STD-461/2, and RTCA DO-160, as well as various automotive test standards.

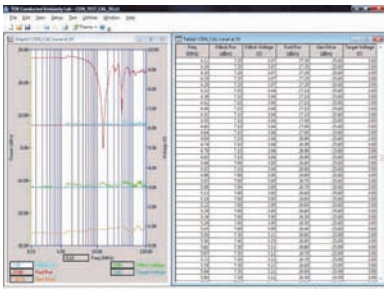


Emissions Lab (EMI-LAB)

TDK Emissions Lab makes it simple to perform radiated and conducted emissions measurements in a shielded room, in a chamber, or on an open area test site (OATS). It includes support for a wide variety of receivers, spectrum analyzers, turntables, antenna towers, and other equipment.

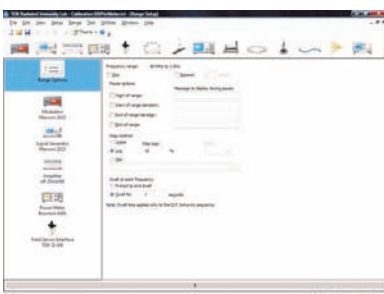


- **Test Data Output** TDK Emissions Lab allows you to view test data in a table as well as in many different types of graphs: x-y plot of amplitude vs. frequency, colored contour plot of amplitude vs. antenna height and turntable position, polar plot of amplitude vs. turntable position, and x-y plot of amplitude vs. antenna height.



Conducted Immunity Lab (CON-LAB)

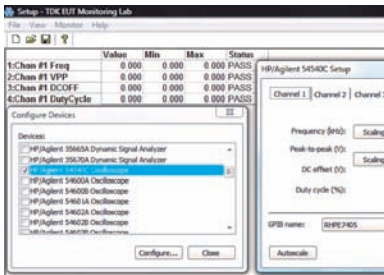
TDK Conducted Immunity Lab supports various types of conducted immunity tests, including CDN-type and BCI (bulk current injection). Equipment supported includes various signal generators, amplifiers, power meters, spectrum analyzers, and voltmeters.



Radiated Immunity Lab (RAD-LAB)

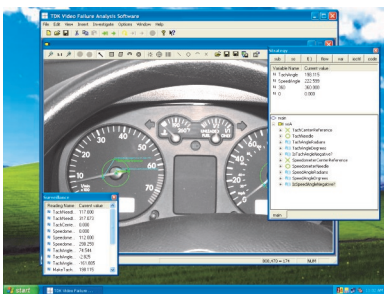
TDK Radiated Immunity Lab is designed for radiated immunity testing in a chamber, GTEM, or TEM cell, or using a stripline. It supports many different signal generators, amplifiers, power meters, electric field sensors, spectrum analyzers, and other types of equipment.

Test Software

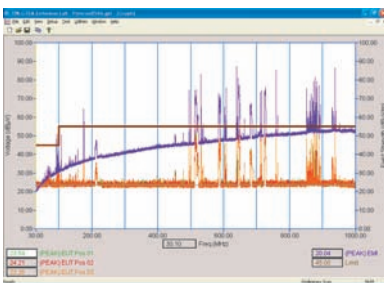


EUT Monitoring Lab (EUT-LAB)

TDK EUT Monitoring Lab allows you to acquire data from an EUT during an immunity test via instruments such as oscilloscopes, receivers, spectrum analyzers, voltmeters, dynamic signal analyzers, etc. It can determine the pass/fail status of the EUT by comparing the acquired data against pass/fail thresholds.

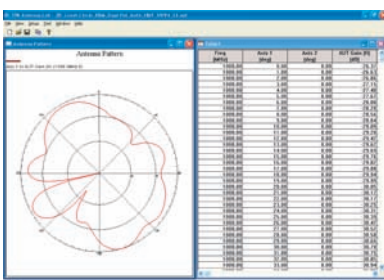


- **Video Capture** The Video Capture option in TDK EUT Monitoring Lab allows you to use a camera to detect EUT events during an immunity test, as well as to record video of the entire test for later playback and observation of EUT events. It offers great flexibility in the definition of the types of changes in the video image that constitute an EUT event.



GTEM Emissions Lab (EMI-GTEM-LAB)

TDK GTEM Emissions Lab automates radiated emissions tests in a GTEM and performs the GTEM-to-OATS correlation on the test data. In addition to including support for receivers and spectrum analyzers, it can also control the optional EUT manipulator in the GTEM.



Antenna Lab

TDK Antenna Lab performs 2-D and 3-D antenna pattern measurements, using a vector network analyzer in conjunction with positioning devices such as a turntable and/or a 3-D manipulator.

TDK RF Solutions Inc.

TDK offers a single vendor solution for all of your EMC needs.

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