Compact Immunity Test System CIT-10, 10kHz - 400MHz

acc. to IEC/EN 61000-4-6 / ISO 11452-4 / MIL-STD 461E

Description

The CIT-10 is a complete test system for conducted RF-immunity tests according to IEC/EN 61000-4-6, ISO 11452-4, MIL-STD 461E/F CS114, SAE-J1113-2, DC 10614 and similar standards. Its internal RF-generator and RF-power amplifier produce output signals with max. up to 150 W within a frequency range from 100 (10) kHz up to 400 MHz. Generated signals are measured via one of the max. 3 internal RF-Voltmeters. Furthermore via an optional, internal directional coupler forward and reflected power can be measured. The whole test system allows full automatic tests for the specified frequency range. As a "stand-alone" test system the CIT-10 is convincing by its easy and comfortable handling and the excellent cost-performance ratio. Add-ons like coupling/decoupling devices are available as well.

Special Features:

- Conducted RF immunity tests acc. to IEC/EN 61000-4-6 and BCI tests acc. to ISO 11452-4 and MIL-STD 461E
- Signalgenerator, RF-power amplifier, RF-power meter and directional coupler (optional) in one 19"-case
- Stand-alone operation possible with optional available netbook
- Control-software included
- Most important parameters are shown on an integrated display
- Automatic EUT-monitoring
- Operation via USB port of a PC or Notebook
- Complete range of CDNs available

Applications:

Immunity Testing:

Testing according to IEC/EN 61000-4-6, ISO 11452-4, MIL-STD 461E/F CS114, DC10614 can be performed automatically.

Generation, amplification and verification of RF-Signals:

The internal amplifier amplifies any signal from 100 (10) kHz up to 400 MHz. By using the internal generator a desired narrowband signal can be generated. Signals up to 30 dBm can be measured at the same time. If a directional coupler is installed, forward and reflected power are measured as well.

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Features:

Internal RF-Power Amplifier

Several amplifier modules are available. Highest output power can be 75 W over the specified frequency range. The amplifier input can be accessed via the back panel of the CIT-10, so that the amplifier can also be used with any external generator. 25 W and 75 W amplifiers are available as standard.

Internal RF-Voltmeter

Accurate measurements of RF signals from -40 dBm up to +30 dBm are done by the internal RF-voltmeter which can be accessed (for separate use) via a BNC connector. Two internal voltmeters measure the forward and reverse power on an optional available directional coupler. If no directional coupler is installed, the output voltage of the amplifier is measured.

Amplitude Modulation

Frequencies generated by the generator can also be modulated with a LF signal. Modulation frequencies may vary from 1 Hz up to 100 kHz, modulation levels are available from 0 % to 100 %.

Internal RF-Signal Generator

As the internal generator generates its output signal without any internal mixing components, low harmonics and spurious frequencies are assured.

BCI-Tests with additional RF-Power Meter

For BCI-Tests the CIT-10 can be equipped with up to 3 pieces of internal power meters.

User defined signals

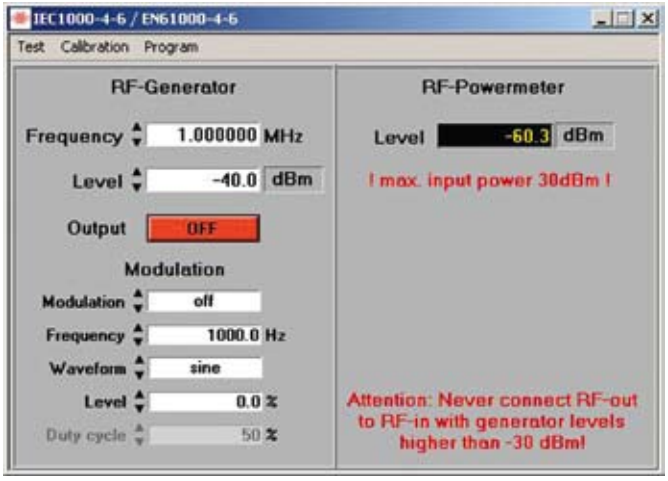
External signals (e.g. EUT-fail or external instruments) can be connected and monitored using the application software.

Setup

The CIT-10 is a PC-controlled test equipment. It can be operated by any commercial IBM compatible PC (Microsoft® Windows software) via USB port. All settings of the equipment, e.g. start frequency, stop frequency, step width, test voltage etc. are made by means of the control software which is also included in the delivery. The three functional units RF-signal generator, RF-power amplifier and RF-voltmeter are set automatically by the software, depending on the pre-set test parameters. Each component, however, may also be called and operated as separate measuring and testing equipment. This means: using the CIT-10 as testing system, you have three full, additional "single units" at your disposal, for which separate inputs and outputs are available as BNC connections. Due to the computer-aided control of the CIT-10, any modifications which may become necessary, for example, due to the revision of standards, may be performed without problems and without having to manipulate the hardware of the equipment.

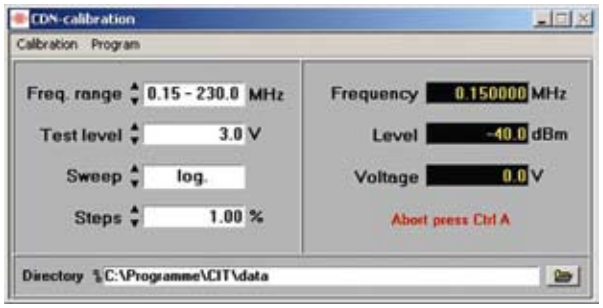
Functioning

The equipment is ready for operation immediately after connection with the USB port and installation of the drivers and the control software. After starting the control software, the main menu offers the manual control of <RF-Generator> and <RF-Power Meter>. Further options in the menu are <Calibration> (<CDN-Calibration>, <Self-Calibration>) and <Test> (<Complete Test>, <Selective Test>).



CDN-Calibration

The CDNs (Coupling/Decoupling Networks) serve to inject the test voltage into the lines to be tested and/or to decouple any connected peripheral equipment from the EUT. The characteristics of the CDNs as well as of the power amplifier are not absolutely linear over the whole frequency range, i.e. the amount of power required to generate a constant test voltage over the whole frequency range varies slightly, depending on the frequency. In the calibration run, the frequency-dependent output level of the signal generator, which is necessary for a constant test voltage, will be determined and stored in the software, together with the defined frequency range and the desired test voltage. The data records thus created may then be stored and recalled for tests.



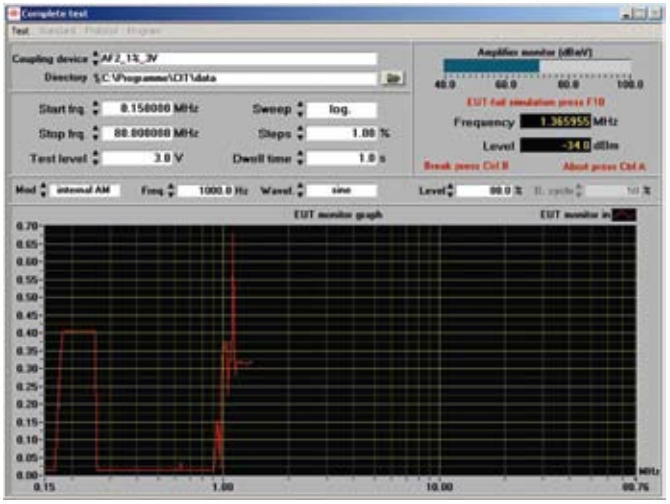
Self-Calibration

When selecting this menu option, the test equipment will perform a self-calibration. In this case, the output of the signal generator must be connected to the input of the voltmeter.

Test

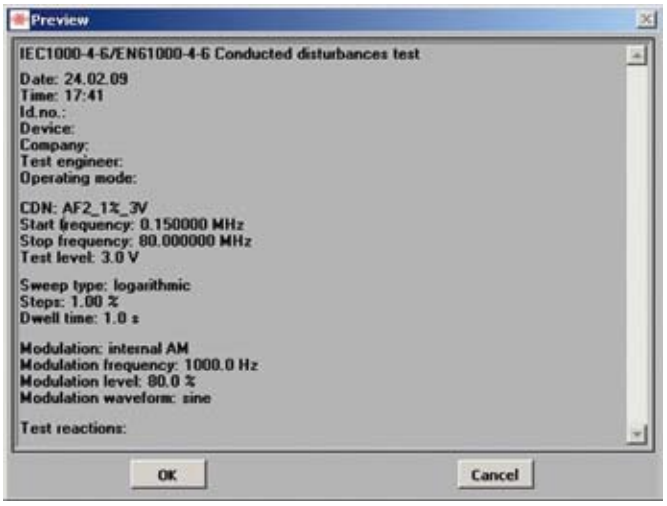
The menu option <Test> offers the selection possibilities <Complete Test>, <Selective Test> and <Protocol>. The settings for a test, e.g. start and stop frequency, step width and test voltage are made automatically via the calibration file of the selected coupling unit. It is now possible to decide whether the test is to be performed exactly according to these pre-settings, i.e. exactly as in the calibration, or whether modifications of the pre-settings shall be admissible. If the calibration run was performed, for example, for a test voltage of 10 V, and the test is to be performed now with 3 V without having to perform a new calibration run for this purpose, this can be done by selecting menu item <Extrapolation>.

Is a suitable measuring instrument connected to the specified serial port of the CIT-10, EUT can be monitored automatically. Data are shown graphically. During all test routines the amplifier output is monitored in a bar display. This guarantees correct tests.
In the case of <Complete Test>, a test is performed over the complete selected frequency range; in this case the test frequency is increased by the control software according to the selected step width and the entered dwell time. If there is a malfunction of the EUT, the test may be stopped at any time. It is then possible to either increase or reduce the frequency by any number of steps, as well as to switch on and off the modulation and test voltage. Besides, a description of the malfunction occurred may be entered in a comment line which is included in the test record.



<Selective Test> offers the possibility of testing the EUT at discrete frequencies. This can be done either with a fixed test voltage or, optionally, with a ramp function. In case of the ramp function, the start and stop voltage, the step width by which the test voltage is to be increased, as well as the dwell time between the individual steps may be preset by the tester.

The standard <Protocol> consists of the head of the protocol and a diagram which shows the test results. In the head of the protocol the date and time are taken over from the computer; in addition, details like temperature, air humidity, tester, as well as testing set-up and EUT, may be registered. The protocol may be printed directly. It is also possible to edit the protocol individually.



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Technical specifications	
RF Voltmeter (external in-/output)	
Frequency range	10 kHz to 400 MHz
Measuring range	+30 dBm to -40 dBm
Accuracy	±0.5 dB
VSWR	< 1.1 : 1
Input	BNC, 50 Ω
RF-Signal Generator	
Output	BNC, 50 Ω
Frequency range	10 kHz to 400 MHz
Frequency resolution	1 Hz
Output level range	0 to - 60 dBm
Output level resolution	0.1 dB
Output level accuracy	±0.5 dB (± 1 dB max)
Accuracy (frequency)	±5 ppm (TCXO)
Harmonics	< -30 dBc
Non harmonics	< -45 dBc
Amplitude modulation (internal)	0 to 100 %; resolution 0.5 % (internal AF-Generator)
Amplitude modulation (external)	BNC jack 1 Hz to 100 kHz, 0 to 100 % Input impedance > 100 kΩ
Pulse modulation	variable duty cycle 10 - 90 %; resolution 1 % (internal AF Generator)
VSWR	< 1.5:1
AF-Generator	
Output jack	BNC
Frequency range	1 Hz to 100 kHz
Frequency resolution	0.1 Hz
Output voltage	0 to 1 V amplitude; resolution 5 mV
Accuracy (frequency)	±50 ppm
Signal	Sine wave / square wave / triangular
RF-Voltmeter (internal, 2 pcs.)	
Frequency range	10 kHz to 400 MHz
Measuring range	+53 dBm to - 0 dBm
Accuracy	±0.5 dB
Directional coupler (optional)	
Frequency range	10 kHz to 400 MHz
Power	200 W CW
Insertion loss	0.5 dB max
VSWR	1.25 : 1 max
Directivity	20 dB min

Technical specifications	
RF-Power Amplifier	
Frequency range	100 kHz to 400 MHz (75 W) 100 kHz to 250 MHz (25 W)
Gain	51 dB ± 1.5 dB
Output power	75 W 20 W (100 kHz to 230 MHz)
Distortion	<20 dBc at 75 W
Input impedance	50 Ω, VSWR < 1.5:1
Output impedance	50 Ω nom.
EUT-fail input	
Input resistance	2.2 kΩ
Level	TTL/CMOS compatible, optical decoupled
EUT-Monitor input	
Input voltage	0-10 V
Input impedance	100 kΩ
Amplifier monitor	
Output	BNC, 50 Ω
Level	- 40 dB (amplifier output), ±3 dB
Interfaces	
USB-A	Multimeter (for EUT control)
USB-A	Relay switching unit
USB-B	Connection to computer
General data	
Temperature range	0 to 40 °C
Warm-up time	15 min.
Housing	19"-Subrack or desktop case
Dimension (W x H x D)	449 mm x 133 mm x 435.5 mm
AC input	100 - 240 VAC; 50/60 Hz
Volume of delivery	CIT-10 (basic equipment), cabling, system software
Part Number	CIT-10/25 with integrated 25 W RF-power amplifier
	CIT-10/75 with integrated 75 W RF-power amplifier
	CIT-10/W without internal RF-power amplifier