NoiseKen

Impulse Noise Simulator

INS-S220 / S420

IJ-AT450 (Automatic CDN for Impulse Noise Simulator)

NEW

Mercury free

www.noiseken.com

Impulse Noise Simulator (semi-conductor type)

INS-S220 / S420

to solve the real trouble in the market

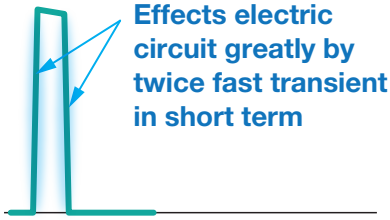
Noise simulator can simulate high frequency noise generated ON/OFF at contact point of switch or relay, arc caused by electric motor. It can evaluate the resistibility of electric devices.
Pulse contains high frequency and by energy volume is changable by adjusting pulse width. The high reproduction noise test of noise trouble in the market can be conducted.

- Button touch instead of coaxial cable replacing reduces pulse width setting time.
- Pulse waveform stability is improved, so high reproduction test is available.
- Cost is cut down because consuamable parts are reduced.
- Common mode/normal mode test is easily to switch by short plug.
- "Test time setting" new function simplifies test time setting.
- Wiring becomes easier because 50Ω resisitor is built in simulator.
- Repetition cycle becomes faster. Due to high repetition, mal-function occurrence rate is up and test time is to be shortened. (Only INS-S220)
- AC plug of EUT can be inserted directly by outlet panel.(option)
- Various tests are available by using different probes and coupling clamp.(option)
- EUT test with 3 phase is available by external CDN.(option)
- Dedicated software simplifies testing with various test conditions (Option. Applicable to INS-S420 only)

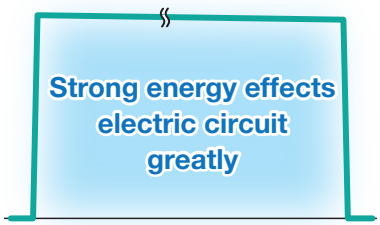
Feature

To solve the trouble in the markethigh frequency, energy volum of test pulse can be ajustable

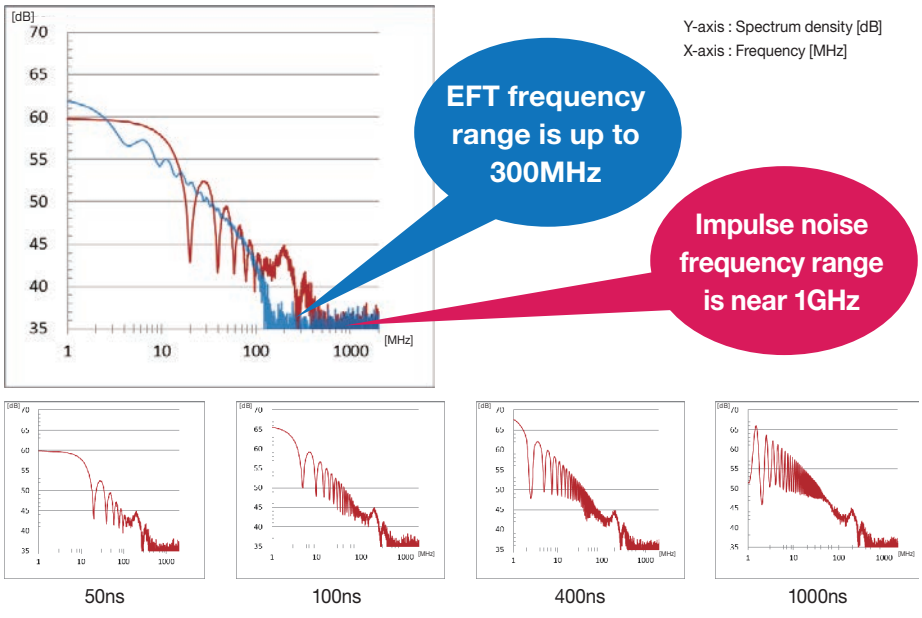
Even narrow pulse with 50ns-100ns width contains less energy, twice fast transient due to rise and fall and inducted coupling occurred by sharp electromagnetic field effect electric circuit greatly.
Wide pulse with 800ns-1000ns contains more energy, so voltage fluctuation is easily to effect circuit.
The rise time of impulse simulator is faster than IEC61000-4-4 fast transient/burst test, so spectrum is high. When it injects noise to EUT, noise is easier to invade electric circuit internally.
Spectrum and amplitude is different due to Impulse width, so it is recommended to test with different pulse width.



【 50ns pulse image 】



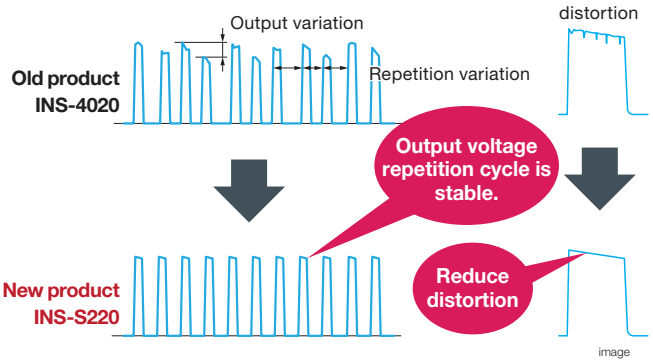
【 1000ns pulse image 】



INS-S220 / S420

Test reproduction is improved. More quantitative test is available.

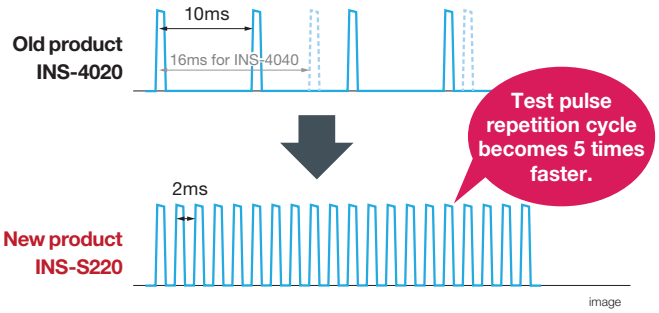
The usual mercury relay changes into semiconductor relay, so test pulse stability is improved. More quantitative and high reproduction test is available. Also, waveform distortion due to mercury relay's deterioration.



Mal-function rate is up. Test time is to be shortened.

The repetition of pulse in test is faster than the old product. Mal-function rate is up and test time is expected to be shortened.

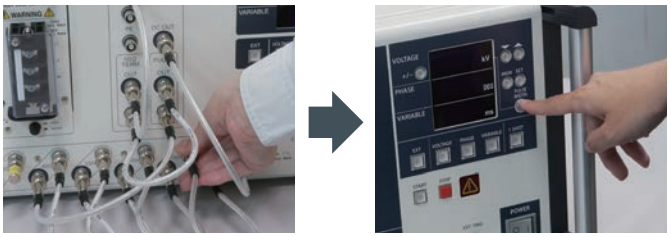
Example) In case that the repetitive cycle is 2ms



* There are restrictions on the pulse repetition period.

Setting is simplified. Setting time is shortened.

It is troubesome to change the special coxial cables manually in old way. Setting time and connection mistake can be reduced because setting can be operated by button.



Complicate cable connection setting becomes...

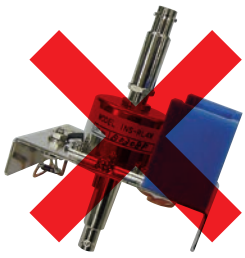
SIMPLE with button operations.

Connection is simplified. Connection time is shortened.

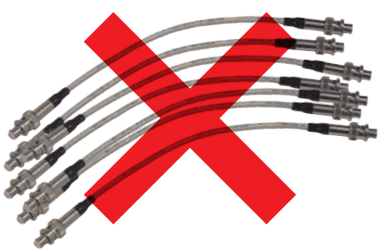
Outlet panel to which EUT is easyily to be connected is adopted.
EUT is easy to connect by using outlet panel (option) complying to each country's socket shape.

Cost is cut down. Consumable parts are reduced.

We adopt semiconductor type relay instead of the mercuray relay in old type.
Also, cost on consumable exchange is reduced because pulse width setting cable (consumable) is no longer needed.



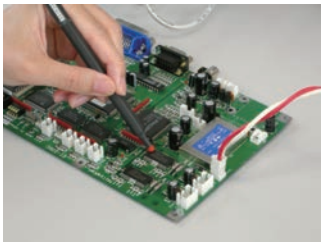
Mercury realy image



Coaxial cable image

Noise countermeasurement is easy. The malfunction generating position can be identified.

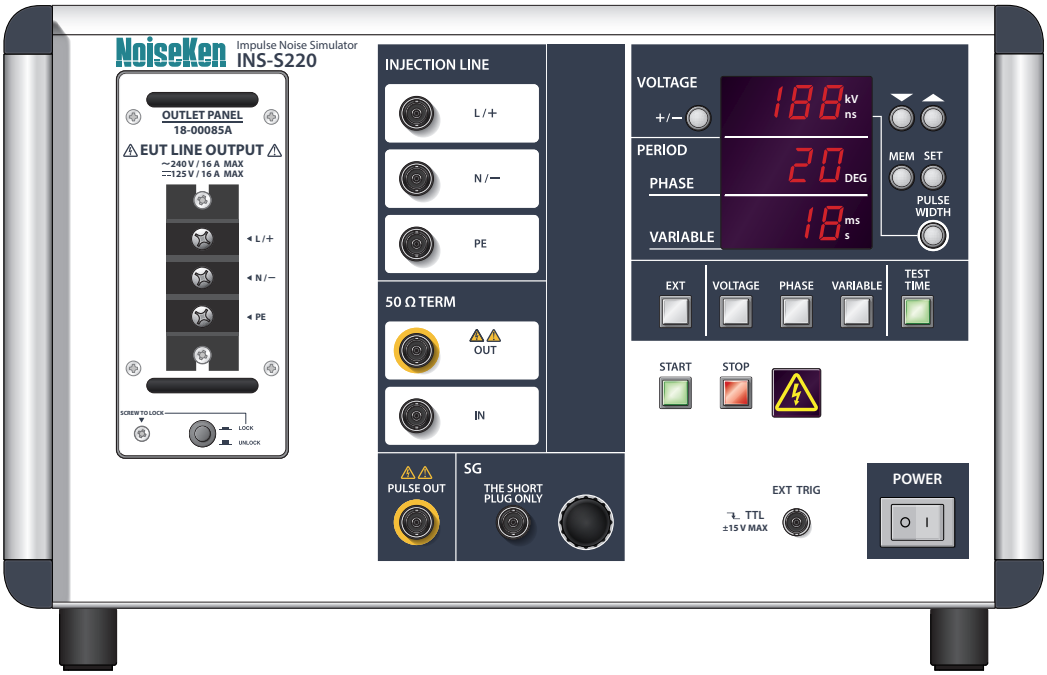
From power supply line, signal line, harness, enclosure to PCB, various noise injection options are ready. The malfunction generating position is easy to identify.



INS-S220 / S420

Specification

Parameter		INS-S220	INS-S420
Pulse setting-1		0.50kV ～ 0.99kV ±10%　0.01kV step	—
		100ns ～ 1000ns ±10%　50ns step	
		1ms ～ 999 ms ±10%　1ms step	
Pulse setting-2		1.00kV ～ 2.00 kV ±10%　0.01kV step	0.50kV ～ 4.00kV ±10%　0.01kV step
		50ns ～ 1000 ns ±10%　50ns step	50ns ±15%、100ns ～ 1000ns ±10%　50ns step
		10ms ～ 999 ms ±10%　1ms step	
Output voltage		0.5 ～ 2.00kV±10%　（10V step）	0.5 ～ 4.00kV±10%　（10V step）
Polarity		+ / —	
Rise time		＜3ns	
Output impedance		50Ω	
Terminal resistor		50Ω	
Pulse repetition mode	LINE PHASE	50Hz/60Hz coupling phase angle 0 ～ 360° ±10° synchronized with L-N of EUT supply or external CDN	
	VARIABLE	1ms ～ 999ms ±10 %（～ 1kV） 10ms ～ 999ms ±10 %（1kV ～ 2kV）	10ms ～ 999ms ±10 %
	EXT TRIG	Period：>10ms Input signal level：TTL/open collector negative logic Pulse width：>1ms Also functions for timing reference signals input from an external injection unit.	
	1 SHOT	Single pulse generation, each time the 1 SHOT button is pressed. Synchronized (phase angle set on the PHASE control) or asynchronized pulse period.	
Memory storage		5 tests	
Test time		1s ～ 999s ±10%　1s step	
Coulping switch		L(+), N(—), PE ／ PULSE OUT　※manual switch by coxial cable	
Coupling mode		common-mode / normal-mode　※manual switch by short plug	
EUT power capacity		Single phase AC240V / DC125V 16A　(L(+), N(—), PE)	
External control		—	RS-232C compliant optical communication
Power supply		AC100 ～ 240V 50Hz/60Hz	
Operatig temperature / Operatig humidity		15 ～ 35℃ / 25 ～ 75%	
Dimesion / weight		（W）430×（H）249×（D）540mm (projection excluded) / approximate 20kg	（W）430×（H）349×（D）540mm (projection excluded) / approximate 23kg
HV coxial cable		NMHV our customized type	
Accessory		coxial cable 30cm (02-00013A): 2pcs, SG short plug (02-00106A): 1pc, SG cable (05-00103A): 1pc, outlet panel: 1pc, AC cable: 1pc, manual instruction: 1 volum, accessory bag: 1pc	



Automatic CDN for impulse noise tester

IJ-AT450

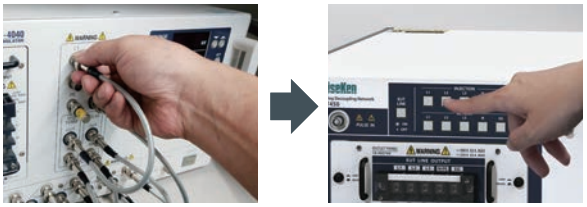
The Automated CDN (Model:IJ-AT450) for the impulse noise study is a superimposed unit that can be used to test three-phase AC lines and high-voltage DC lines in combination with the impulse noise tester. By performing remote control from Windows PC using dedicated software, the tester can automatically perform the test such as setting of voltages and applied phase, as well as sequence control.

- Tests can be performed on three-phase four-wire lines up to AC500V/50A.
- Testing to the DC-line up to DC250V/50A is also possible.
- EUT line switch allows the AC/DC line to be shut off.
- Emergency stop switch to stop the test in case of emergency.

Item	Specifications
Input pulse voltage	4kV terminating resistance 50 Ω is connected
EUT power capacity	AC: 3-phase, 4-wire (L1, L2, L3, N) 500V / 50A DC:250V / 50A
Input and output terminals	Input terminal: Terminal block Output terminal: Terminal block panel
High voltage coaxial connector	NMHV type *NoiseKen original
Superimposed phase switching	Switching by selection operation *Switching by the front switch of the main unit or remote software.
Zero Cross Detection	Detected from between L1-L2
Line protection circuit	Mounted with shut-off circuit device *Connectable/releasable input and output
Emergency stop	Built-in mushroom-type switch for push-lock and rotation-release
External control	Remote control from PC with optical I/F circuit
Power supply	AC100 ～ 240V 50Hz/60Hz
Operating temperature and humidity range	Temperature: 15 to 35° Humidity: 25 to 75%
Dimensions/weight	(W)430×(H)199×(D)540mm Not including protrusions/Approx. 23kg

Easy switching of application of phases Time required for setting can be reduced.

In the conventional model, setting the applied phase is troublesome. It was required to switch by using the dedicated coaxial cable and short-plug manually, but using IJ-AT450 simplifies switching and reduces setting times and reduces connection errors.



Applied phase switching with coaxial cable is troublesome..

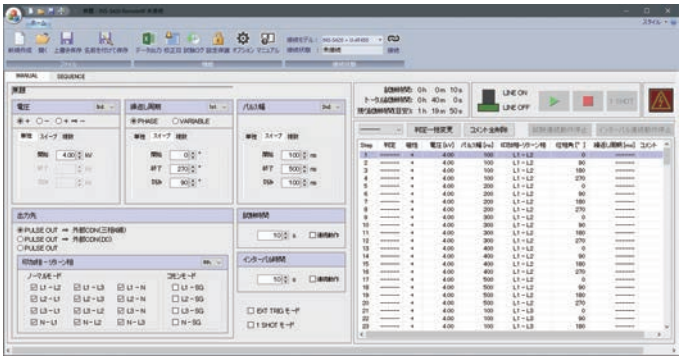
Button operation makes it easy!!

Simplifying the connection It can reduce the time required to connect

By adopting the outlet panel method, which simplifies the connection of the EUT, the EUT can be easily connected for testing.

Remote control Testing automation reduces testing time and man-hours

Using remote control software, in addition to test parameters such as pulse output voltage, pulse width, polarity, and repetition period, the application mode (common/normal) and applied phase can be set, and the test conditions can be controlled in sequence. This reduces the time and effort required to change the wiring during testing and contributes to shortening the testing time and reducing the number of man-hours.



Option

Attenuator for waveform check MODEL：00-00017A

Attenuator for measuring high voltage pulse.

Parameter	Specification
Attenuation rate	DC～2GHz：40dB（100：1）
Input pulse peak voltage	4000V MAX
Tolerable continuous pulse examples	Pulse peak voltage : Max. 4000V Pulse width : 50ns~1000ns Pulse width repetitive frequency : Max. 60Hz at 4000V output Max. 100Hz at 2000V
Input impedance	50Ω (50Ω±1% at DC)
Output impedance	50Ω (50Ω±1% at DC)
Interface connectors	INPUT：HN(F) OUTPUT：N(F)
Dimension/ Weight	(W)154.5mm×(D)105mm×(H)37mm / Approx 1350g

PULSE DIVIDER for INS MODEL：00-00021A

A voltage divider enables low voltage test with output by dividing high voltage pulses at a ratio of 4:1.

Parameter	Specification
Attenuation rate	DC～2GHz：12dB（4：1）
Input pulse peak voltage	2000V MAX
Tolerable continuous pulse examples	Pulse width : 10ns~1000ns Pulse width repetitive frequency :2000V output ≤ 62.5Hz (continuous output)
Input / Output impedance	50Ω (50Ω±1% at DC)
Interface connectors	HN(F)
Dimension/ Weight	(W)169mm×(D)119mm×(H)37mm / Approx 1490g

Attenuator MODEL：00-00011A

It is attenuator protecting measuring instrument.
It is recommend to use waveform checking attenuator (00-00017A) to protect measuring instrument.

Attenuating rate 20dB·N type connector

Outlet Panel MODEL：18-00059C/60B/84A

Outlet panel to be available for different types of connectors in line output of INS-S220 / S420.

Model	Specification
18-00059C	JP/USA Type AC125V 16A MAX
18-00060B	CEE Type AC240V 16A MAX
18-00084A	multi outlet type AC240V 16A MAX

● **For IJ-AT450**

Outlet Panel MODEL：18-00069A/71A

Outlet panel to be available for different types of connectors in line output of INS-S220 / S420.

Model	Specification
18-000069A	JP/USAType AC125V 16A MAX
18-00071A	multi outlet type

Coupling Clamp MODEL：15-00014A

Enable for testing characteristics against the noise only with clamping interconnection cable of electronic equipment in combination with INS series. The calibration fixture (15-00015A) for this clamp is also available.

○Enable to inject the noise without cutting signal, DC, AC, GND, etc.
○It can test noise tolerance of electric device separatly.
○Realize to test the noise resistibility effectively since the injection can be directly to lines.
○Enable to clamp bundle of lines whose maximum diameter is 20mm

Parameter	Specification
Input voltage	4000V Max
Input pulse width	50~1000ns
Coupling method	Capacitive coupling
Dimension / Mass	(W)350×(H)145×(D)140mm / Approx 3kg
Adequate cable dimension	maxium diameter 20mm
Terminal resistor	none
Coaxial connectors	NMHV(J) NoiseKen custom for the both of input and termination sides

Option

Coupling Adaptor **MODEL : CA-805B** (Capacitive coupling)

Enable for testing characteristics against the noise only with clamping interconnection cable of electronic equipment in combination with INS series.

- ○Enable to inject the noise without cutting signal, DC, AC, GND, etc.
- ○It can test noise tolerance of electric device separatly.
- ○Realize to test the noise resistibility effectively since the injection can be directly to lines.
- ○Enable to clamp bundle of lines whose maximum diameter is 26mm

Coupling Adaptor **MODEL : 15-00007A (CA-806 / Magnetic field coupling)**

Enable for testing characteristics against the noise only with clamping interconnection cable of electronic equipment in combination with INS series.

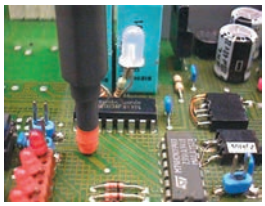
- ○Enable to inject the noise without cutting signal, DC, AC, GND, etc.
- ○It can test noise tolerance of electric device separatly.
- ○Termination resistance built-in.

Parameter	Specification
Structure	Magnetic field coupling noise injection clamp
Input voltage	2000V Max.
Input pulse width	50~1000ns
Coupling ratio	1/10±10% of input voltage
Termination resistance	54Ω system built-in
Max. diameter of ground cable	27mm
Dimension / Mass	(W)89×(H)64X(D)120mm / Approx 1000g
Coaxial connector	NMHV(J) NoiseKen custom

EMS Probe Kit **MODEL : H2-B**

Probes set to enable the noise injection onto PCB patterns, flat cables, etc. in the connection with the generator.
The probes can be selected per electric fields or magnetic fields and the irradiation in the near field can be performed.

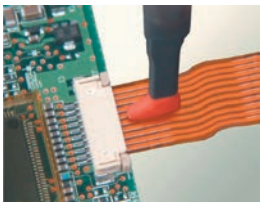
- ○Arbitrary noise injection to where it is desired on PCB or harness.
- ○Enable to detect point which the noise resistibility is weak per electric field and magnetic field with the probes differentiation.
- ○Each 3 pieces of different figure and size are contained for electric field and magnetic field.
- ○Enable to pinpoint where the noise resistibility is weak since the injection can be done in such small range several mm.
- ○Enable to detect point where the noise resistibility is weak in particular frequency in combination with a signal generator
- ○Suited for locating noise sensitive spots by using with the INS or FNS equipment



BS05DB

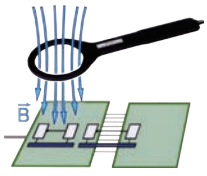
ES02

ES00

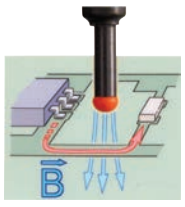


ES05D

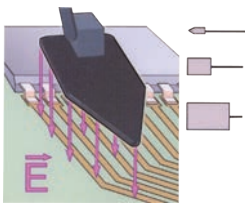
BS02



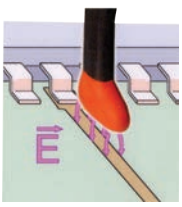
BS02



BS04DB
BS05DB



ES02
ES00



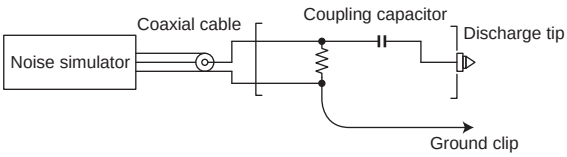
ES05D

Option

Noise Injection Probe MODEL : 01-00034A

○Enable to test the noise resistibility in a board level since the direct injection to LSI pin by pin is possible
○Possible for the noise injection up to 500V utilizing the INS or FNS simulator on hand.
○Possible to exchange the coupling capacitor (Option)
○50 ohm termination resistor built-in

[Option]
Coupling capacitors: 06-00039A : 220pF 06-00040A : 330pF 06-00041A : 3pF 06-00042A : 500pF
* 01-00034A. does not contain the coupling capacitors

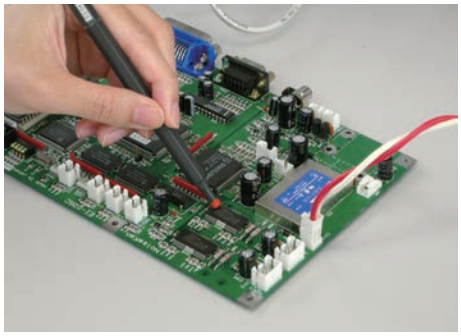


Radiation Probes MODEL : 01-00006A / 7A / 8A / 9A / 10A / 31A / 50A

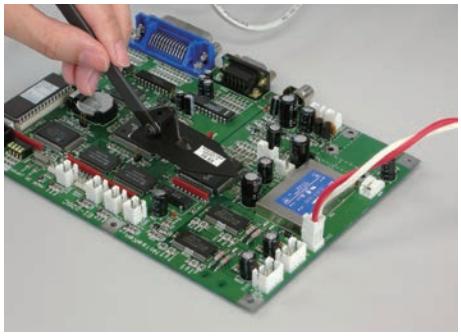
Probes to irradiate the radiation noise to wiring on PCB of electronic equipment so that point where the radiation noise resistibility is weak can be detected.

Parameter	Specification
Input voltage	4000V Max
Input pulse width	50~1000ns
Loop diameter	01-00006A : φ50mm, 01-00007A : φ75mm, 01-00008A : φ100mm, 01-00009A : φ150mm, 01-00010A : φ200mm, 01-00031A : 250mm, 01-00050A : 30mm
Cable length	Approx.2m
Mass Approx	180g~220g
Applicable connector	NMHV type

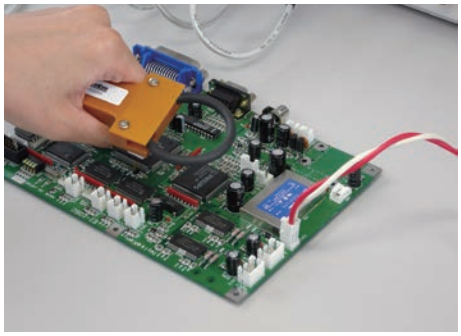
Application Example of Probes



H2-B

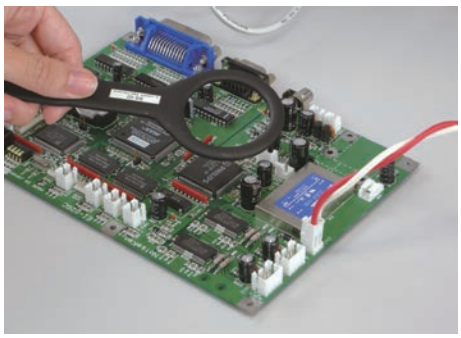


H2-B

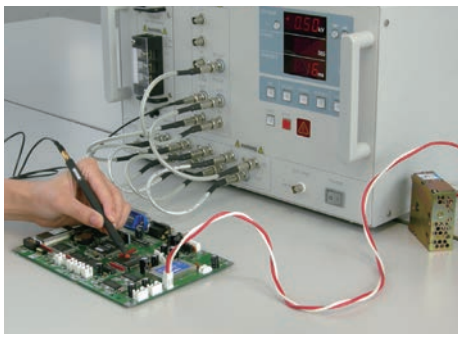


Radiation probe

Noise injection probe



H2-B



H2-B

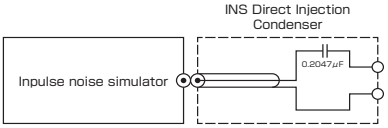
Option

Pulse Injection Cable MODEL：02-H1834

It is noise injection cable combed with noise impulse simulator.
***It can't be used to injected onto where current flows like power supply line.**

INS Direct Injection Condenser MODEL : 01-00047A

CDN and the same condenser for coupling are built in the box.
It is supposed to be used in the case that EUT capacity is 5V. Thepower doesn't turn on through CDN.



Item	Specification
Coxial connector	NMHV
Connector	Crimp terminal for M6
Dimension / weight	80×80×150 mm（projection excluded）／0.4 kg

Injection Unit MODEL : IJ-4050

Unit to enable the noise injection for power supply lines of EUT up to 3-phase 5 lines (L1, L2, L3, N. PE) in combination with main units of INS series. Setting for Normal mode and Common mode is simple and easy only with change of the connectors configurations
In case of the combination with INS-4020 / 4040 / S220, test synchronized with EUT lines can be conducted.

Parameter	Specification
Input impulse voltage	Max. 8kV without 50Ω termination　Max. 4kV with 50Ω termination
EUT power capacity	3-phase 5 lines (L1, L2, L3, N, PE)　AC415V 50A (Unavailable for DC) AC415V between L1-L2, L2-L3, L3-L1　AC240V between L1, L2, L3 – N
Change of injection line	With connectors configurations　L1, L2, L3, N, PE
Coupling mode	Normal / Common (Setting with short plug connection)
Line synchronization detection	Detects between L1 – L2 add put out the synchronizatoin signal from SYNC OUT terminal
EUT line protection circuit	Detects current in L1, L2 and L3 lines and breakes L1, L2, L3 and N lines
EUT line input terminal	Terminal block, screw connection
EUT line output terminal	Exclusive contact for φ6
Attenuation characteristics on coupling	≦-10db　10kHz~1GHz　without load
Residual voltage at input	≦450V　Residual voltage without load when 4000V impulse is injected with 50Ω termination
Termination resistance	Nothing (Termination resistance in the main unit is applied)
Power supply	AC100V~240V±10%　50 / 60Hz　20VA Max
Operating temperature / humidity range	15~35℃　25~75%
Dimension / Mass	(W)430×(H)199×(D)535mm (Projection excluded) / Approx 25kg

Injection Unit MODEL : IJ-5100Z

Unit to enable the noise injection to power supply lines of EUT up to AC480V / 100A 3 pjase 5 lines (L1, L2, L3, N, PE) in combination with main units of INS series. In case of the combination with INS-4020 / 4040 / S220, test synchronized with EUT lines can be conducte.

Parameter	Specification
Input impulse voltage	Max. 8kV without 50Ω termination　Max. 4kV with 50Ω termination
EUT Line	3-phase 5 lines (L1, L2, L3, N, PE) AC415V 50A (Unavailable for DC) AC415V between L1-L2, L2-L3, L3-L1　AC240V between L1, L2, L3 – N
Maxium voltage of EUT line	AC 480V
Maxium current of EUT line	100A
Line synchronlzation output	1/2 of EUT line input voltage
Through characteristic	within -10db under 10kHz~1GHz
CDN power supply	AC 100～240V ±10%50/60Hz
Dimension / Mass	(W)488×(H)520×(D)825mm (Projection excluded) / Approx 115kg

Circuit Breaker Box MODEL : 18-000072A (20A) / 18-00073A (50A)

Parameter (18-00072A)	Specification
Rated operating voltage	AC250V　50 / 60Hz　DC65V
Standard Arated current	20A
Switching life	≧10000 times　(Test conditions: rated switching 6000 times, switching without load 4000 times, switching frequency 6 times/min
Operating temperature / humidity range	15~35℃　25~75% (without dew)
Dimension / Mass	(W)180×(H)92×(D)100mm (Projection excluded) / Approx 0.75 kg

***Please contact your sales representatives for the 18-00073A (50A) specifications.**

Option

Isolation Transformer MODEL : TF-2302P

Model TF-2302P is a single-phase isolation transformer rated AC240V/30A and dielectric strength of 4kV. For safety reason, an isolation transformer is indispensable for AC powered testing for equipment.

Parameter	Specification
Maximum input voltage	Single phase AC240V Max (50/60Hz)
Maximum output current	30A Max
Dielectric strength	Primary winding to core AC4kV (1 minute) Secondary winding to core AC4kV (1 minute) Primary to secondary windings AC4kV (1 minute)
Insulation resistance	100MΩ or more at DC500V
Dimensions / Weight	(W)350×(H)475×(D)400mm (Except for eye bolt and handle) / Approx. 60kg

Isolation Transformer MODEL : TF-6503P, TF-6633P

Model TF-6503P is a three-phase isolation transformer rated AC 600 V / 50 A and dielectric strength of 4 kV. For safety reason, an isolation transformer is indispensable for AC powered testing for equipment.

Parameter	TF-6503P Specification	TF-6633P Specification
Maximum input voltage	Single / Three phase AC 600 V Max (50/60 Hz)	
Transformer wiring method	Star wiring	
Maximum output current	50 A Max	63 A Max
Dielectric strength	Primary winding to core AC 4 kV (1 minute) Secondary winding to core AC 4 kV (1 minute) Primary to secondary windings AC 4 kV (1 minute)	
Insulation resistance	100 MΩ or more at DC 500 V	
Dimensions / Weight	(W)500×(H)640×(D)700mm (Eye bolts and handles excluded) / approx. 300 kg	

Noise Canceller Transformer NCT series

It has superb attenuation characteristics against impulse noises. It can be used for insulate in the impulse noise test.
***Connection cable is needed to be modified when it is connected with the transformer. Please inquire us for details.**

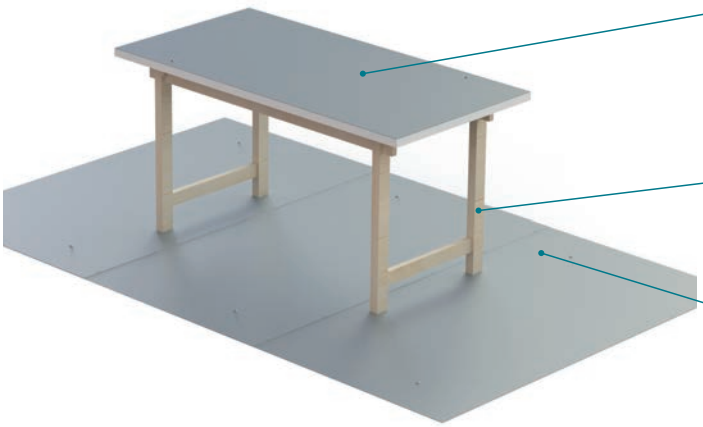
MODEL	Primary Voltage / Secondary Voltage	Rated current	Frequency
NCT-160	120V	5A	50/60Hz
NCT-1240		20A	
NCT-2240	240V	10A	

Line input cable MODEL：05-00160A Line output cable MODEL：05-00161A

The connection cable between noise impulse simulator and noise canceller transformer on primary winding. Pleas inquiry us for details.

Description	MODEL	Description
Line input cable	05-00160A	Single phase 20A 3m Cabtyre cable. "Ring terminal end" - "Stripped end" (termination at customers)
Line output cable	05-00161A	Single phase 20A 2m Cabtyre cable. "Ring terminal end" - "Ring terminal end"

Option



Horizontal Coupling Plate (HCP) MODEL : 03-00020A

Metal plate placed on the table for the testing of tabletop EUT.
(W)1600 ×(D)800 × (t)1.5 mm × 1 sheet (Made of Aluminum)
* Used as a horizontal coupling plate in ESD testing and also can be used as a ground plane

Test Table MODEL : 03-00039A

Wooden table to be used for the test to devices under test (DUT).
(W)1600 × (H)800 × (D)800 mm

Ground Reference Plane (GRP) MODEL : 03-00007A

Ground plane to be placed just under the wooden table.
(W)1800 × (D)1000 × (t)1.5 mm × 3 pcs. in 1 set (Made of aluminum)

Insulating Block MODEL : 03-00054A

Blocks to float (isolate) wirings of DUT from GRP.
(W)300 × (D)300 × (H)50mm, 5 pcs. in 1 set

Insulating support MODEL : 03-00024A

When doing the electrostatic discharge test to floor-standing equipment, to be used for floating the equipment 10cm higher than the ground reference plane.

Size : (W)1200 × (D)1200 × (H)100mm
Material : Wooden
Withstanding loads : 500kg

Cubic Insulating Block100 MODEL : 03-00029A

Used for floating EUT 10cm upper than the ground plane in case of testing to floor-standing EUT

Size : (W)100 × (D)100 × (H)100mm
Material : Wood
Withstanding loads: 500kg

SG Cable MODEL : 05-00103A

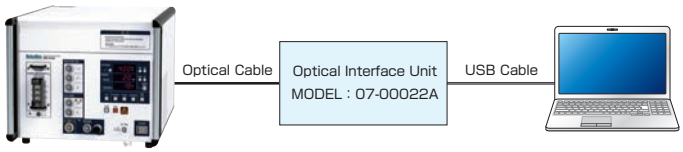
Braided wire cable to connect between SG terminal of the main unit and the ground reference plane.
Length : 0.1m

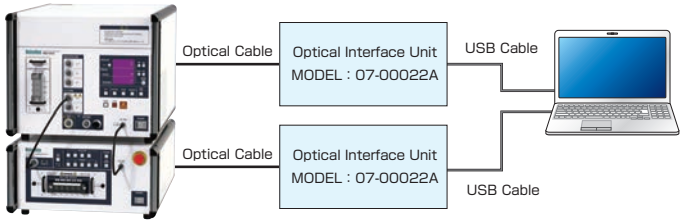
SG Connection Plate MODEL : 03-00112A

It is metal plate connecting simulator's SG and ground plane.
There is no need to screw on ground plane, so the simulator becomes easy to move.

Optical USB module MODEL : 07-00022A

Adapter for PC remote control.
Equipped with USB-Optical conversion fiber optic cable (5m)

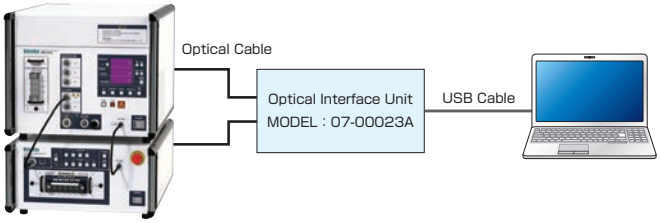




【PC control image of INS-S420 only.】
Applicable to control voltage, polarity, repetition period, etc. except for phase angle and return phase switching.

Optical USB module MODEL : 07-00023A

Adapter for PC remote control.
Equipped with USB-Optical conversion fiber cables 5m x 4 (ch)



【PC control image together of INS-S420 and IJ-AT450.】
Enable PC control of voltage, polarity, repetition period as well as common mode/normal mode and return phase switching.

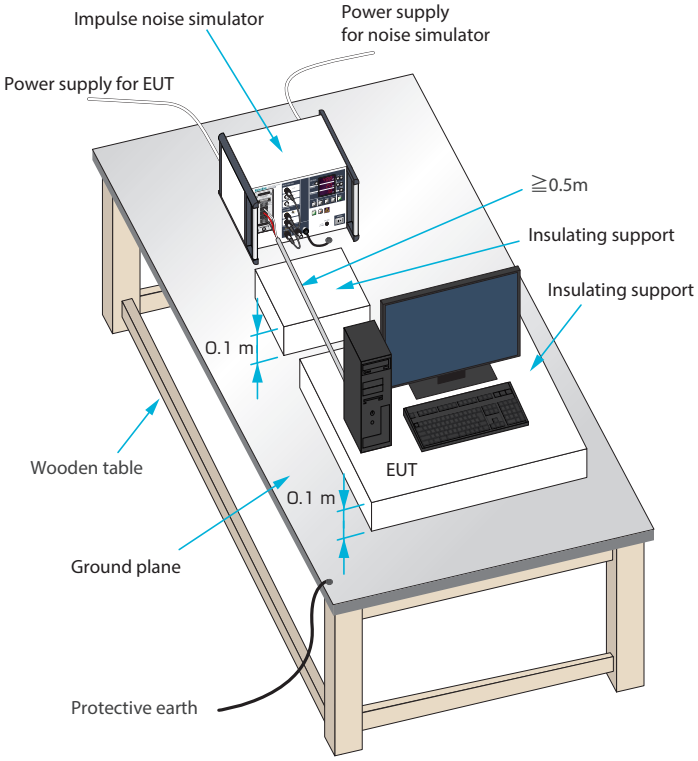
NoiseKen NOISE LABORATORY

INS Test Setup Summary

INS Test Method

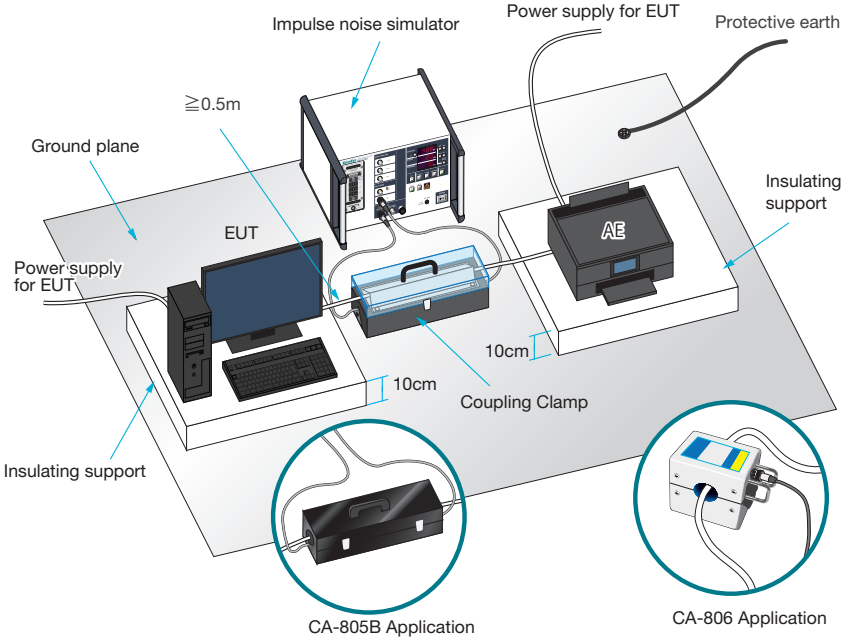
Method or test to power supply lines

①Connect power supply line for EUT to EUT LINE INPUT on the simulator main unit (hereafter called as main unit) through an isolation transformer
②Lay a ground plane and insulation sheet under main unit and EUT, and ground the ground plane for safety
③Connect power supply cable of EUT to main unit (Fold and bind the cable so it can be short in case the length is long)
④Connect SG short plug to SG terminal. Connect SG terminal of main unit and FG terminal (In case it is there) of EUT to ground plane with low impedance braided wire shortly and securely
⑤Connect 50Ω TERM OUT connector to connector of phase (L1 or L2, PE if necessary) the noise is intended to be injected with coaxial cable



Method or test to interconnection lines

①Lay a ground plane and insulation sheet under main unit and EUT, and ground the ground plane for safety
②Open coupling adaptor 15-00014A (Option) and clamp interface cable with the adaptor. Connect connector of the adaptor to PULSE OUT of main unit. Connect the one another connector of the adaptor to 50Ω TERM IN of main unit.
③Connect power supply cable of EUT to any power source since no high voltage pulse is injected in this test
④Connect SG terminal and FG terminal of EUT to ground plane



NoiseKen NOISE LABORATORY CO.,LTD.
http://www.noiseken.com

Intrernational Sales & Marketing Section
1-4-4 Chiyoda, Chuo-ku, Sagamihara City, Kanagawa Pref. 252-0237 Japan
TEL: +81-(0)42-712-2051 FAX: +81-(0)42-712-2050
E-Mail:salse@noiseken.com