

## FAQ - Automotive Transient Emissions and the All New AES 5501

Q: Why is the AES 5501 necessary?

A: Most importantly, is strictly required for **e** marking by 2004/104/EC. It is also required by many manufacturer (OEM) standards.

Q: But I made one myself already, can I use it?

A: If it is for compliant tests, probably not. It is a common misunderstanding is that you can use a relay in most cases (not true) and that CISPR and ISO 7637 artificial networks are the same (they're not).

Q: What is one actually testing with the AES 5501?

A: We're testing for transient emissions with the AES 5501. This means that we are checking for any switching spikes during power on and off. Realistically, though, we're measuring primarily inductive kickback of the DUT during power down.

Q: Is the AES 5501 fully compliant in every way?

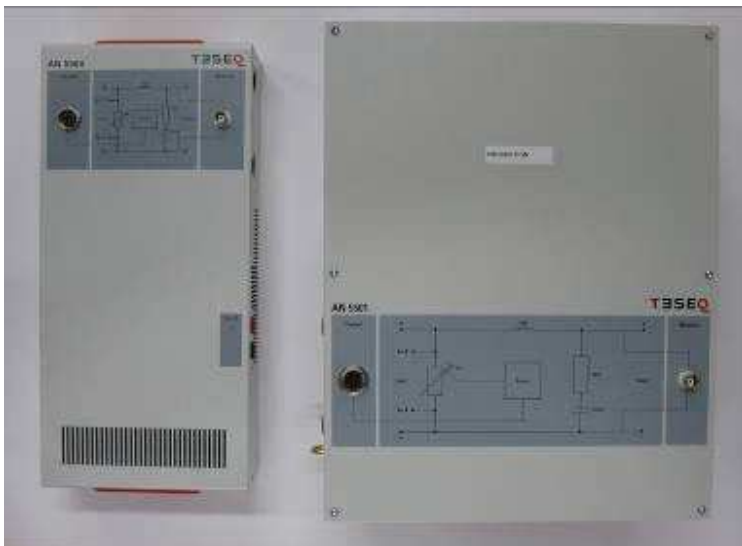
A: Yes.

Q: When did deliveries start?

A: The first fully compliant AES 5501 shipped November 3, 2009. An earlier pre-compliant unit was released to beta sites and select customers about a year prior.

Q: What is different between the AN 5501 and the pre-compliant version?

A: The AN 5501 has a better high-current coil that can be used at 100A indefinitely. Also, it features a fully-compliant impedance curve from ISO 7637-2. It is in a larger housing, has additional grounding features, and other details - all to improve its RF performance.



Q: And what is new in the MS 5501 and ES 5501?

A: Most importantly, the size of the housing. Interpretations of the standard differ, but the housing is more compact to fulfill the strictest interpretations on cable-length limitations. The MS 5501 also utilizes thumb screws for tool-less opening of the housing (for exchanging relays). The ES 5501 also has better overvoltage protection and cleaner switching.



Q: Can I mix parts of the AES 5501 older models?

A: No, this is really a significant redesign from the pre-compliant version. Even the wiring of the interconnect cables is different.

Q: Will the AN 5501 be available as a stand-alone device?

A: Maybe. There was an initial interest, but there have been no further requests since the launch. If you have customers with interest please let us know.

Q: How much does the AES 5501 system cost?

A: Approximately the same as the competitor's non-compliant system! Contact your authorized Teseq distributor or one of our eight worldwide sales and support offices for details.

Q: Is the ES 5501 available separately?

A: Sorry, no. You'll need a compliant AN anyway, and the CISPR AN is *NOT* the same. Also, because the system controller is required for use, the price would not be very attractive.

Q: Is the MS 5501 available separately?

A: Yes, because you may want to prepare enclosures with relays from several manufacturers.

Q: Why did you decide on a multi-part solution?

A: The AES 5501 is built in this way because the cable-lengths have to be carefully measured and laid out. Not every standard has the same cable-length requirement!

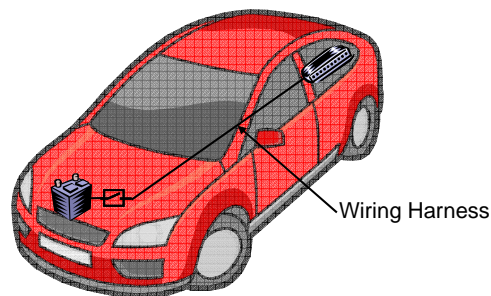
Many users participated in the beta test and answered survey preferred a unit in a single housing. However, because of the cable length and strict layout requirements, this is simply not possible - it wouldn't be compliant!

Q: Is there an advertisement for the AES 5501?

A: Yes! It is available from our corporate Marketing Team.

Q: When should I use the slow setup or fast setup?

A: The decision has to do with where most of the wiring harness impedance is. Remember that the AN is only to simulate wiring harness impedance. When the switch in the vehicle is closer to the DUT, use the fast setup. When the switch in the vehicle is closer to the battery, use the slow setup.



Slow Pulse Application

Q: When do I use a relay, and when do I use the electronic switch?

A: The electronic switch is fast, clean, repeatable and can be calibrated; a relay is none of these. Actually, the manufacturer standard will tell you which to use. Ford, for example, requires that you use the relay that is built into that exact production vehicle. ISO 7637-2 dictates electronic switches for voltage up to 400V and the relay over 400V.

Q: Does this expected transient have an equivalent pulse during immunity testing?

A: Yes, Pulse 1 is the simulation this event.

Q: What is new in the SC 5501 system controller?

A: The sliders are replaced with lockable dial indicators. Also, the time settings are  $T_{ON}$  and  $T_{OFF}$  instead of  $T_{ON}$  and  $T_{REP}$

Q: Why did you replace the sliders of the old unit?

A: Even though the timings are not fixed in the standard, most of the beta test users didn't like them and strongly requested multi-turn potentiometers with lockable dial indicators for more repeatable measurements.



Q: What are BNC measurement ports used for?

A: The BNC measurement ports are for measuring the transient returns. It is a convenience feature. Please note though, that the strictest interpretation of the standard actually requires measurement as close to the DUT as possible. It is also important to note that only the MS and ES have direct connection to the output terminals. The AN actually has a 5.6k output impedance - this was also necessary to improve the RF performance.



Q: What is the golden jumper on the AN?

A: This jumper connects the negative terminal to ground and is required by ISO 7637. Not all applications need it, therefore it is removable. It also improves the impedance curve during calibration.



Q: What is this metal fitting on the around the positive output connector on the AN 5501?

A: That is a fitting for the N-type adapter to the network analyzer for calibration.



Q: Do I need the calibration kit to perform calibration?

A: You would probably have a tough time getting compliant measurement results without one.



Q: What is the test load?

A: The switching time of the ES 5501 is with a test load defined in ISO 7637-2, *not* a resistor or open circuit. This is important because you don't get the fast 300 ns switching time measuring some other way.



Q: Why does the MS 5501 have a counter?

A: Some standards require that the relay be replaced after a certain usage.

Q: Why does the SC 5501 have power supplies inside?

A: These power supplies are for the relay, not the DUT power. The three power supplies are used to activate 12, 24 and 42V relays.

Q: What are comparable solutions to the AES 5501?

A: Strictly speaking, there aren't any. In our view, you need a compliant AN, electronic switch and mechanical switch that are movable to meet all the standard requirements, and some details that are often overlooked that are present in the AES 5501

Standard Requirement	Teseq AES 5501	The Competitors
Switch before and after AN	👍	👎
Control cable lengths	👍	👎
Unpainted metal surface for best ground	👍	👎
Very low voltage drop (<1V)	👍	👎
Mechanical Switch	👍	👎
Connector 50 mm above ground	👍	👎
Relay counter and exchangeable	👍	👎
100 A operation	👍	👎

Q: Can you describe the difference of the AN 5501 and AN 5500 Impedance Curves

A: The AN 5500 was compliant to just over 10 MHz. Above that, the hand-wired coil had irregular results. The graphic below shows a typical curve of the AN 5500 and actual calibration data of a randomly selected AN 5501.

Impedance Curve

