

GEN3 AutoCAF Testing to Reduce Conductive Anodic Filament Failure in Hi-Rel Boards

Interview with GEN3's AutoCAF2 Engineers [Craig Chadband](#) and [Bob Smith](#) (L to R)

GEN3 has been testing and measuring electronics for over 40 years. In this interview, we talk



with two of the people who work with the AutoCAF2, a conductive anodic filament monitoring system that measures resistance changes derived through Electrochemical Migration (ECM).

Conductive anodic filament (CAF) failure

is copper corrosion within a printed board. It is electro-migration of the copper from anode to cathode between two conductors of different potential. A combination of bias voltage and high humidity enhances CAF failures. When a filament grows between electrically isolated nets, electrical failure results.

To ensure high performance for high-reliability boards, the GEN3 AutoCAF2 is built to measure, record and track the influences of sub-surface electro-chemical reactions.

Craig, as an electronic development engineer, please share with us a little about what you do.

Craig: I'm involved along with my colleague in consistently developing predominantly the AutoCAF program, including continuous hardware changes to improve the overall design and production, and ensure quality in what it does. I also assist the software engineer with what we would like to see in the future, and to find bugs and make improvements in what can be done.

Would you tell us about the functionality and set-up of the AutoCAF2?

Craig: The [AutoCAF](#) is a cathodic analytic filament tester, and also measures surface insulation resistance. The box reads current and we're looking for failures of the test within the environmental chamber.





The box comes with 64, 128 or 256 channels, and you have 16 channels per measurement board. The measurement boards are connected to a test environment by fully shielded cables.

What would you say is the most challenging part of your job?

Craig: I would say that keeping up with continuous product development in terms of what's available in the market for us to use, since things in the electronics industry are constantly changing.

Bob Smith is GEN3's Chief Engineer. Bob, would you explain how the AutoCAF2 process works?

Bob: The system is designed to read very low current, just a few pico amps. In a normal setup, you would have a laboratory and an environmental chamber, and you would hook up to a rack in a chamber and you would go through the actual steps, measuring in terms of humidity, in terms of temperature over time. The current readings would be registered. You must use deionized chamber that has to be very, very clean. Obviously, the cleanliness inside the chamber is important, too. There's no room for contamination.

Could you tell us about the function of the CLR1250 and why that's important?

Bob: We can currently test up to 1250 volts. Obviously due to the complexity now with ECM vehicles and the circuitry, that's a necessary function. You need to be able to test at a very high voltage.

The [CLR1250](#) was developed to bridge that high voltage. Its function is to take the load, shorten the coupon, and you drop the voltage potential across the resistors in the CLR box.



With the CLR box, on every single channel you have a load, from 2 to 1250, and the load across it is dropped. It's a safety feature and it's very simple to connect.

Normally we rely on the customer to supply their own high-voltage power supply with the specifications we give them. There is also specific interlocking circuitry with the chamber, in case there's any kind of leakage.

Very often customers ask us to design our own rack, and we wire the rack to the correct bias. The customers generally do their own connections to the coupons.

Craig, we understand you work with some large customers. Has this collaboration generated any new innovations or features?

Craig: Changes that I'm working with involve global customers with household names, which is great. Customer demands are constantly changing for the better, which is good, because of course we want to improve the product as best we can.

One of the main new features we have now is what's called [Multiple Bias](#), which allows multiple voltages to be tested at once. Traditionally, you could only apply one voltage to your measurement across all 16 ports. We've changed that. Now, you can have up three different bias options split across 16 ports.

Another feature we've got is the ability to change the set bias after a certain number of samples. For example, if you have done 200 measurements, you can now dictate to the software that after 100 measurements, you want your measurement bias to change from say, 100 to 50.

We heard that the AutoCAF2 software is also innovative. How is it different from other software?

Craig: It's a much more modern user interface, and you now get live *and* recorded data on the same screen.

We've also made the ability to view your results a lot better, when the test is finished. you get a DocGEN3 file, which can be reloaded as the software was. You can go back through all your data from start to finish.

Another feature is that we have software available in six different languages because we do export to many countries. As a global company, it's important for us to have these features available for our customers.

The [GEN3 AutoCAF2](#) features high voltage capability, new software user interface, new low noise measurement capability, and the ability to run multiple voltage tests simultaneously. For three generations, GEN3 have designed, engineered, manufactured, and distributed our test and measurement equipment into the electronics industry to shield your circuits from failure in the field. In the high-reliability arena, there is too much at stake to allow room for error. Testing must be finite and flawless. At GEN3, we understand your need for precision.



Technical Specifications

Number of Channels	64 or 128 or 256
Measurable range of insulation resistance	10 ⁶ to 10 ¹⁴ Ω
Internal Bias Voltage	AutoCAF2+ has Built-in Bias Power Supply equipped with: 0V; 3.3V; 5V; 10V; 12.5V; 15V; ± 50V & ± 100V
External Bias Voltage	1V to 100V Free selection External 1V to 1250V
Measurement Method	Continuous on all selected channels
Measurement Test Intervals	Fully selectable from minimum of 30 seconds
Measurement Time	<15ms/channel
Maximum Test Duration	Unlimited
Current measuring cable	Fully shielded
Alarms	Low resistance Test Running Bias Voltage Out of Range/Failure Temperature and humidity
Data collection	Sampling Time, Elapsed Time, Resistance, Current, Applied Voltage, Temperature, Humidity
Applicable OS	Windows® 7 onwards
Power Source	110V/230V Switchable mains single phase
Dimensions & Weight	[A] 515mm (20 1/2") [B] 170mm (6 1/2") [C] 390mm (15") 10.5 kgs (371 lbs)

Get closer to perfection by minimising your risk. GEN3 - precision as standard.

<https://www.GEN3systems.com/GEN3-systems>.

You can watch this video interview of Craig and Bob discussing our technology benefits here:

<https://youtu.be/O9jnYrxLfb0>

About GEN3

GEN3. Testing and measuring the electronics industry for over 40 years. For three generations, Gen3 have designed, engineered, manufactured, and distributed their test and measurement equipment into the electronics industry to shield their clients from failure in the field.

Their reputation for excellence has grown to a global scale. The team is made up of industry experts who work to set the standards around circuit testing, measurement, and compliance. They collaborate with key industry associations, offering our unique experience and expertise to educate all on what it takes to succeed. For product protection the preferred way is GEN3, where precision comes as standard, acting as a mentor and your front-line defender.

In the high-reliability arena, there is too much at stake to allow room for error. Testing must be finite and flawless. GEN3 understand the need for precision. Get closer to perfection by minimising your risk.



GEN3. Precision as Standard.

For more information, please visit our various platforms;

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