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CASE STUDY:
MILITARY VEHICLE PASSES RE102 EMC TEST WITH HELP OF EESEAL®

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MILITARY VEHICLE PASSES RE102 EMC TEST WITH HELP OF EESEAL®

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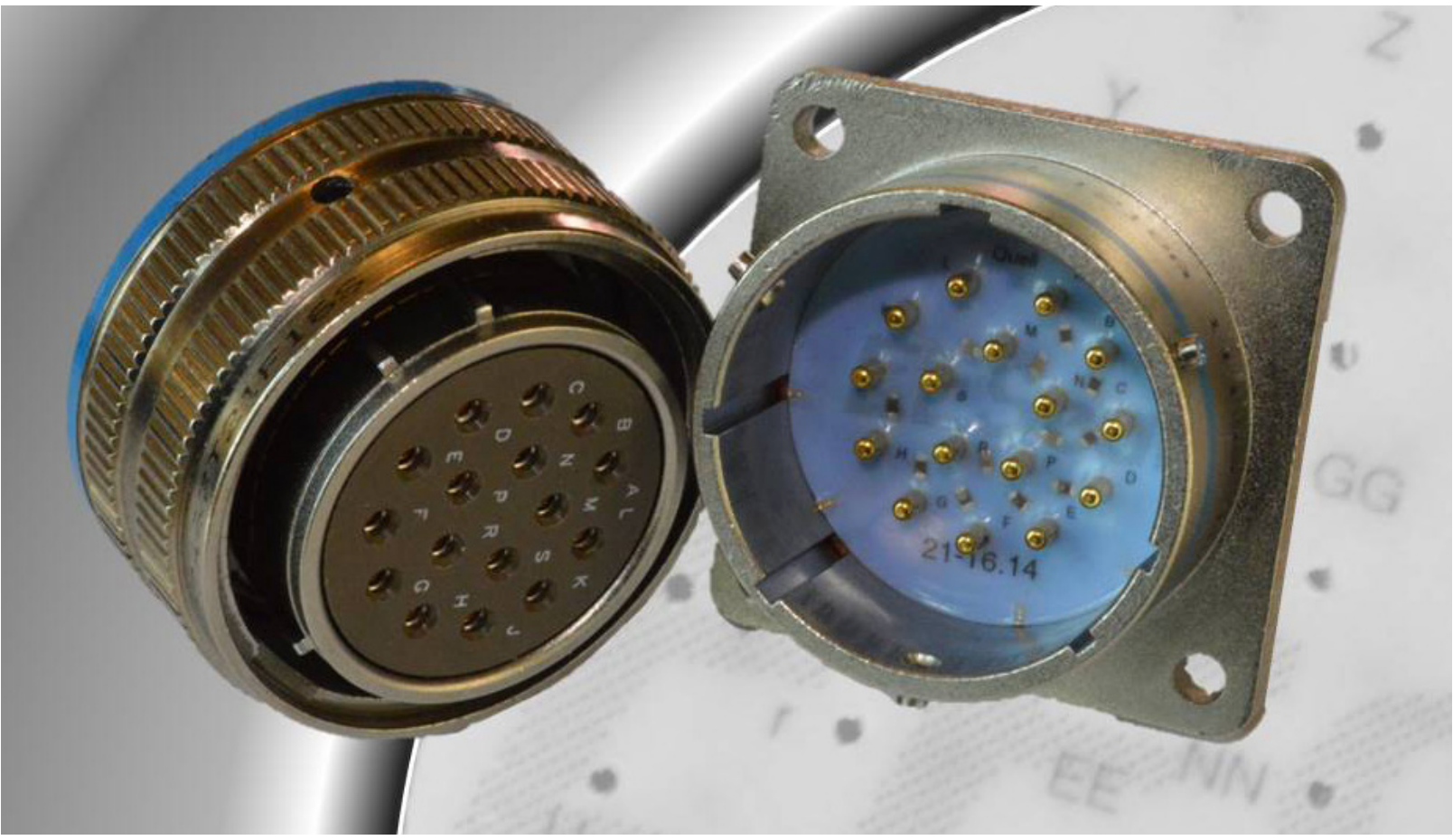
For an EMC/EMI Design and Test Engineer, one of the most frustrating and expensive problems is a unit failing EMC/EMI testing while at an EMC test facility. While following good EMI design practices on a new design can result in a pass the first time, legacy designs, commercial off-the-shelf (COTS), and competing design priorities can result in failures from time to time. When a unit is failing conducted or radiated emissions, there are not many hardware solutions that can be implemented for solving the problem in time to re-test before leaving the EMC test facility. However, EESeals® from Quell (Figure 1) can help solve these issues and are available in 24-48 hours after a design is finalized, most often free of charge.



QUELL EMC FILTER APPLICATION EXAMPLE

Figure 1 - EESeals can be designed to fit in almost any connector interface: DSub, circulars, custom, etc.

A recent example is a military vehicle that was having issues in passing RE102 from 2MHz – 400MHz. Baseline scans came in with 5-10dB of attenuation needed across many problem frequencies (*Figure 2*). Asking the customer a few additional questions allowed for us to complete the design.

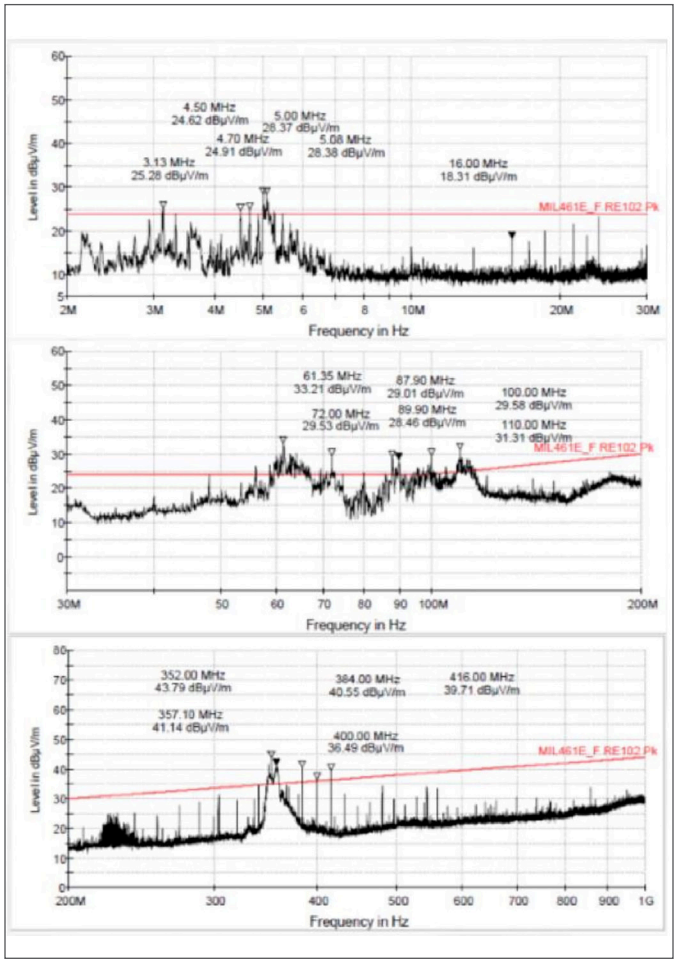


Figure 2 - Customer scans failing the RE102 EMC test.

Only four questions are usually needed before we begin the design.

- What is your complete connector part number?
- Where are your EMI issues (scans are helpful)?
- What are the voltages on each pin?
- What are the maximum data rates on each pin? (e.g., RS232, Ethernet, video, etc.)

Further, if there are any special requirements such as meeting lightning specifications, we ask for the lightning pulse requirement such as found in DO-160 section 22 or MIL-STD 461G, CS117.

This ensures the appropriate capacitors are designed into the EESeal to meet lightning requirements. The silicone rubber packaging technology used makes it possible to use the connector interface space to add electronic components to the connector (*Figure 3*). The EESeal saves time, money, takes no additional space and adds very little weight (<1gram). The EESeal is totally customizable, so that different component values can be assigned pin by pin, placed in parallel, or simply connected pin to shell as long as there is space within the connector. Pins can also be shorted (often used to ground coax shields) or left open. This allows us to provide a filter with optimized attenuation to mitigate the frequency problems in the application while not interfering with the pins with data signals.

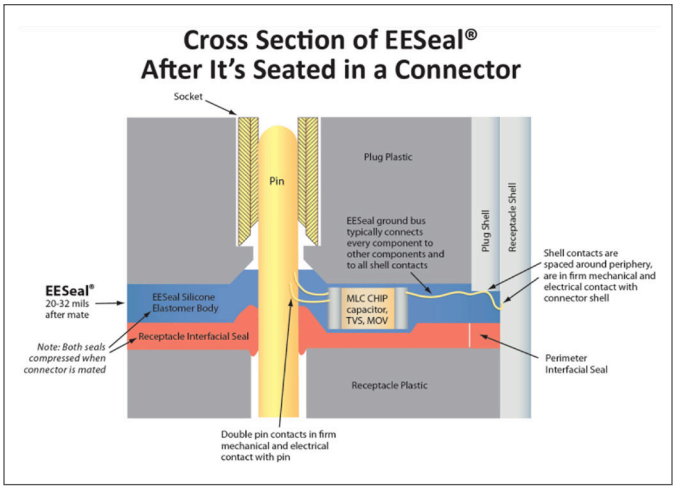


Figure 3 - Illustration showing pin contact capacitor and connector shell connections.

The packaging technique of the EESeal is a unique silicone rubber technology which creates an elastomeric body and adaptive interconnect system that suspends, isolates and protects discrete electrical components such as; Resistors, capacitors, TVS diodes, MOVs from pin to pin or shell to pin (even shorts or opens). Every pin can be treated as needed within the same connector. The entire assembly can change shape and size in response to external forces. Individual components and interconnections move as the EESeal changes shape while maintaining electrical and mechanical integrity. The package acts as conformal coat and electrical isolation for suspended

components. The natural compressive forces are exploited to create re-usable electrical contacts that can withstand extreme abuse. The filter inserts into any connector in seconds and requires no soldering or tools.

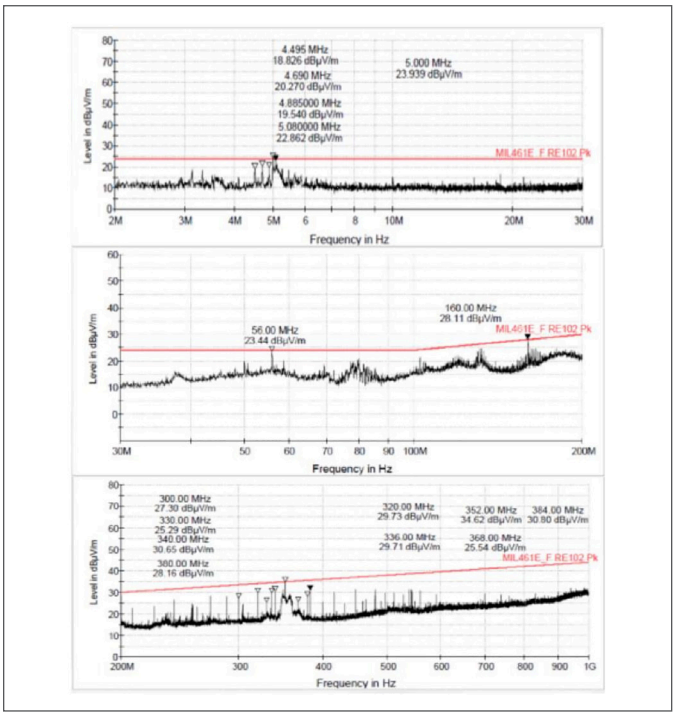


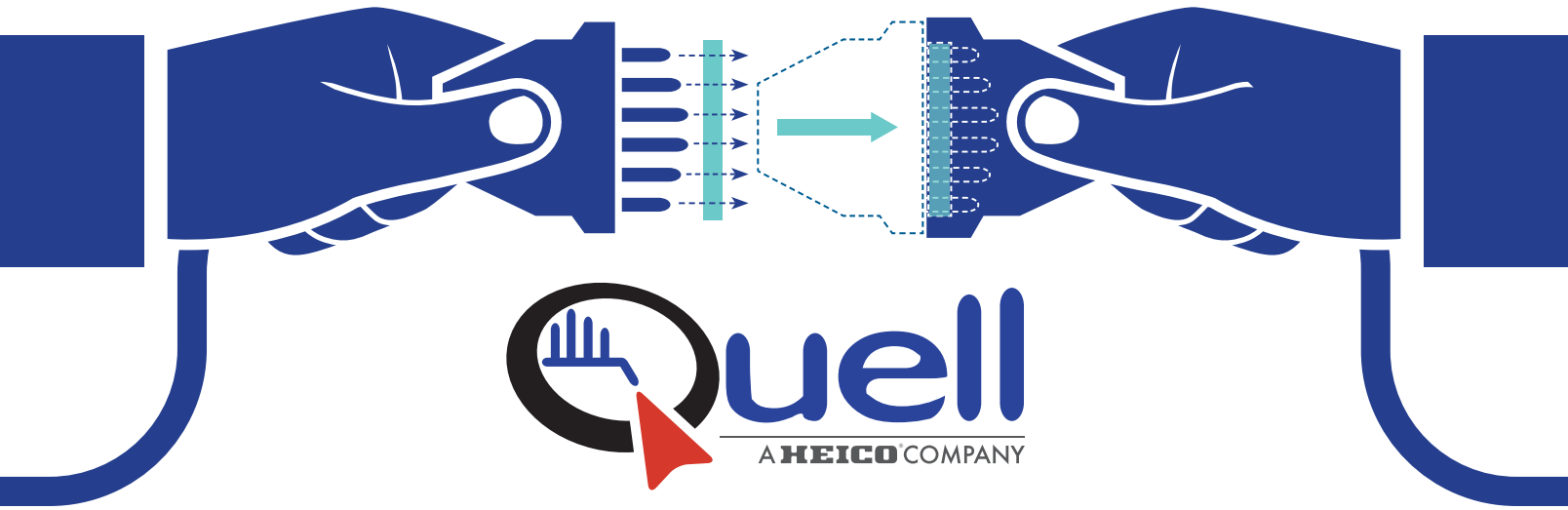
Figure 4 - Customer final EMI scans

As this military vehicle application needed broad frequency mitigation, Quell engineers put several capacitors in parallel on each pin ranging from 47pF up to 2uF. This allowed the customer to remain in the test chamber and pass their RE102 test (*Figure 4*) and head straight to production.

Testing is costly and can run in the hundreds of thousands of dollars especially when you add up all of the engineers, technicians and EMC folks that are involved (not to mention travel expenses). When a unit is failing EMC test, the EESeal can not only help troubleshoot, but permanently solve the problem before leaving the EMC test facility, saving time and the cost on re-testing.

EESeal's have passed the test of time with 20+ years of history. It has no trouble passing the harsh environmental testing our customers demand for their applications and can be found on military vehicles, aircraft, radios, missiles, commercial aircraft, medical equipment, and more.

For more information, visit the Quell website at www.eeseal.com.
To request your free EESeal sample in as little as 24 hours, visit www.eeseal.com/item



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