

Advanced Detection of Electronic Counterfeits (ADEC)

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The Counterfeit Problem

- Counterfeit electronics jeopardize the performance, reliability and safety of electronic systems
- Current screening capabilities are insufficient to detect counterfeit & maliciously modified parts***
- Insidious threat is being manufactured into systems***

Data from Round-Robin Results from Qualified Labs

| Lab | ID Counterfeit? | ID Authentic? |
|-----|----------------------|----------------------|
| A | ✓ | ✗ |
| B | ✓ | ✓ |
| C | ✓ | ✓ |
| D | ✓ | ✓ |
| E | ✗ | ✓ |
| F | ✓ | ✓ |
| G | No conclusion stated | No conclusion stated |
| H | ✓ | ✓ |
| I | ✓ | ✓ |
| J | ✓ | ✓ |
| K | ✓ | ✗ |

*

| | Current Industry Capabilities |
|-------------------------------|-------------------------------|
| Probability of Detection (Pd) | 82% [3] |
| False Alarm Rate (FAR) | 27% [3] |
| Time for Part Assessment | 1 week or more |

Senate Armed Services Committee (SASC) found “Suspect Counterfeit Parts” in the multiple DOD systems and concluded:

- *Report Conclusion 3: The DOD lacks knowledge of the scope and impact of counterfeit parts on critical defense systems.*
- *Report Conclusion 4: The use of counterfeit electronic parts in defense systems can compromise performance and reliability, risk national security and endanger the safety of military personnel.*
- *Report Conclusion 7: Weaknesses in the testing for electronic parts create vulnerabilities that are exploited by counterfeiters.*

Advanced Detection of Electronic Counterfeits (ADEC)

External Monitor
(Optional)

Touch Screen
& GUI

ADEC
Signature
Analyzer



Integrated
Antenna
Enclosure
(IAE)

Drawer for
Part Insertion

ADEC Screens for Three Classes of Counterfeits

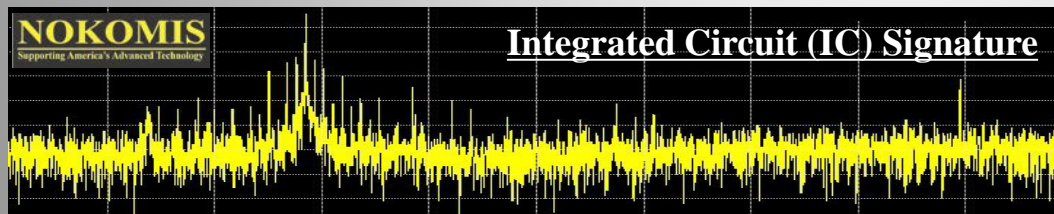
- 1) Recycled Parts - Aged / E-Waste Reclaimed
- 2) Upmarked / Mismarked Parts
- 3) Intentionally Modified Parts (*Hacking, Theft, and Espionage*)

Unintended Emissions

Application to Counterfeits

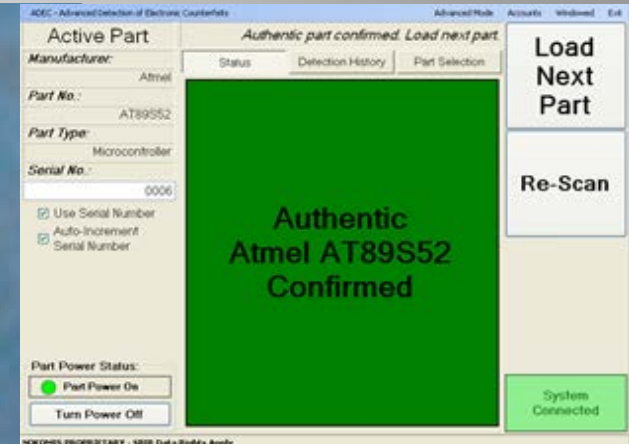
All electronics give off unintentional radiated emissions

- All electronics radiate electromagnetic energy that is characteristic of their function, design, and construction
- ICs can be characterized by emission signature analysis
- Anomalies within signatures indicate counterfeit devices
- Advanced Detection of Electronic Counterfeits (ADEC) program exploits these features



Recent Blind Pilot Testing

- Blind Pilot #1 (ADUM5241ARZ)
 - 7 parts supplied by third party
 - Accurately identified 2 parts as authentic and 5 parts as counterfeit
- Blind Pilot #2 (ATMEL AT89S52)
 - 5 parts supplied by third party
 - All 5 parts accurately identified by ADEC as counterfeit
 - 35 verified authentic parts procured from OCM accurately returned by ADEC system as authentic



| Criteria | Performance |
|-------------|-------------|
| Pd | 100% |
| FAR | 0% |
| Specificity | 100% |

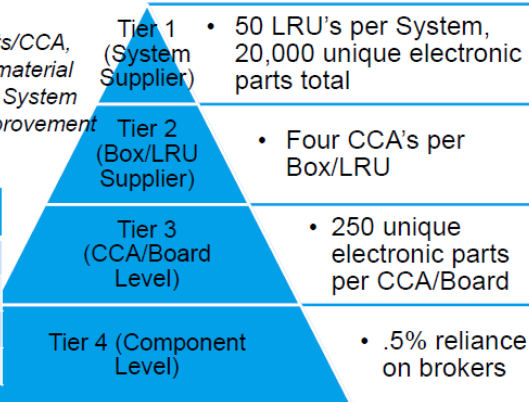


Cost Impact Assessments

Cost Impact Methodology - SAE International at December 2013 G19A Meeting

Assumptions: .5% reliance on Broker purchases to support CCA/Board Level, 250 components/CCA, 5% False Negatives, 10% broker material counterfeit, 60% common parts at System level, \$2.8M per incident, 50% improvement for proficient labs.

| Tier Level | # of Escapes | Cost to Mitigate | Cost Savings |
|-----------------------|--------------|------------------|---------------|
| 1 | .5 | \$1.4M | \$700K |
| 2 | .025 | \$70K | \$35K |
| 3 | .00625 | \$17.5K | 8.75K |
| Total Savings: | | \$1.48M | \$744K |



| Average # of Boards in a System | Average # of Broker Parts in a System | Average # of Escaped Parts in a System |
|---------------------------------|---------------------------------------|--|
| 200 | 100 | .5 |



Business Case for Third Party Assessment Program

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| K | ✓ | ✗ |

* Presented at the December 2013 SAE G-19A meeting by SAE International, Director, Washington Operations, Bruce Mahone in estimating cost savings for an approach that improves test efficiency by 50%.

ADEC Cost Savings for Typical Aircraft (assumes only 50% efficiency improvement):

- LRUs: 100 + , Spares: 300
- Estimated Cost to Mitigate anticipated counterfeits is $(\$1.4M/50)*400 = \underline{\$11.2M}$
- ADEC Cost Savings is $(\$1.4M/50)*400 * .5 = \underline{\$5.6M}$. (assumes 50% improved test efficiency))

ADEC approach provides better than 50% efficiency improvement

Conclusion

- ADEC system and approach to counterfeit detection provides robust counterfeit electronics screening capability
- Work continues to expand the scope of the application space
- Phenomenology is proven to provide unique counterfeit detection opportunities

