

SIGNAKEY e-SEAL

**Secure Supply Chain-of-Custody
For Obsolete Semiconductors**

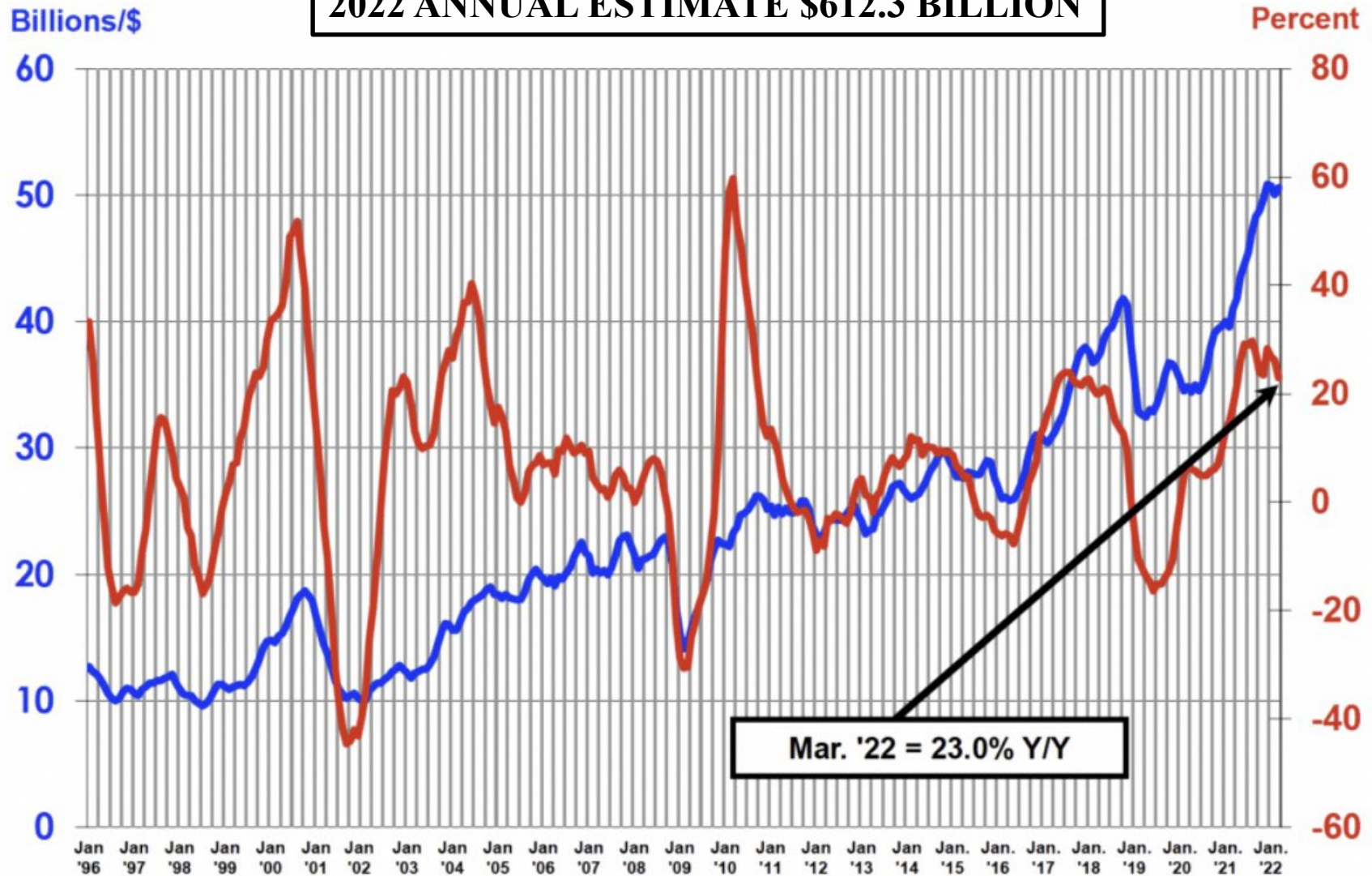


WHAT IS A SIGNAKEY?

**BEFORE REVIEWING THIS PRESENTATION,
THE VISTOR IS ENCOURAGED TO CLICK THE
RED BUTTON AT THE BOTTOM OF THE
“ABOUT US” SECTION OF THE HOME PAGE.**

Worldwide Semiconductor Revenues

2022 ANNUAL ESTIMATE \$612.3 BILLION



Mar. '22 = 23.0% Y/Y

Source: WSTS

Revenue Y/Y % Change

Realities of the 2022 Market

- Record growth over last 24-months..
- Global shortage drives massive equipment spending.
- US self-sufficiency will cost \$1.4 Trillion.
- \$50 Billion part of passed \$2.3 T infrastructure plan
- Biden 2022 military budget of \$779 Billion.
- China/US/Taiwan issue & Russia/Ukraine invasion
- Chinese manufactures sanction fear – stockpile chips.
- Lead times now into 2024 - no confirmed dates.
- Typical production of part design is only 23 months.

71% OF ALL BOM PARTS ARE OBSOLETE

Life Cycle Mis-Match



Aerospace

F-16 First in Sold 1978
Still in Production Block 72
4,675 Sold – 31 Countries



Transportation

Bombardier Railcar
Sold in 1999 to NYC
1,038 Build - 570 Running



Medical

1.5 Tesla MRI, First in 2004
29,000 Global - 12,500 US.
Est. 57% Still Working

Realities as of June 2022 Market

- 13 new 300 mm Wafer Fab plants 2021 & 10 in 2020
- Wafer capacity projected to grow 8.7% in 2022
- INTEL investing \$20 Billion – Ohio, 2 new Fab plants.
- Samsung \$151 Billion Capex – Non-Memory thru 2030
- Global capacity limit on Fab plant equipment.
- By 2024 Chip sales will rise to over \$700 Billion
- 3 nm MOSFET by TSMC 2022 – Intel 1.8 nm by 2024

**NONE OF THIS WILL MAKE OBSOLETE
PARTS EASIER TO FIND**

The OEM's Dilemma

- The OEM's (Lockheed Martin, Bombardier, GE etc.) want only to buy components from OCM's (Xilinx, Intel, Samsung etc.) or their Authorized Distributors (Arrow, Avnet, etc.).
- They see only **RISK** when buying from Independent Distributors (ID's), and include that in their policy statements.
- Butwhen they simply cannot get the obsolete components from anywhere but an ID . . they demand control of the source and the test procedures.

Dealing with ID's is Risky


FOR CUSTOMER ACCEPTANCE - ID SHOULD:

- Have an Effective 3rd Party Certified QMS .
- Buy only from their Known "Trusted" sources.
- Assume EVERY part is a potential counterfeit
- Work only to accredited test methods.
- All Inspector Technicians are Third Party Certified
- But, Good Parts may sell for 100 x Original Price

How does e-Seal Work

- Customer (OEM) Selects from Menu of AS6171 or AS6081, the tests that ID is contractually required to perform.
- These tests are specified in the Purchase Order to ID, who is required to perform **ALL** tests on **ALL** components.
- ID performs the tests and digitally attaches the results to the e-Seal Mark and applies the tamper evident seal.
- ID Delivers the package to OEM who can read the e-Seal and view the Test results – without removing the seal.
- When the Customer removes the Seal after reviewing the test results - they have accepted delivery and own the parts

Latest, Highest Standard

	AEROSPACE STANDARD	AS6171™	REV. A
		Issued 2016-10 Revised 2018-04	
		Superseding AS6171	
Test Methods Standard; General Requirements, Suspect/Counterfeit, Electrical, Electronic, and Electromechanical Parts			

- In US, **AS 6171:2018** is composed of a Main Document and multiple supporting “Slash Sheets”. These contain specific prescriptive test method requirements.
- Each Slash Sheet becomes an e-SEAL node for a digital copy of the actual test data.
- In Europe, **AS 6081** is considered the guiding document.

Accessing Digital Results

AS 6171 Nodes

/1 EVAL

/2 VISUAL

/3 X-RAY

/4 DECAP

/5 RADIOL.

/6 ACOUST

/7 ELECTR

/8 RAMAN

/9 FTIR

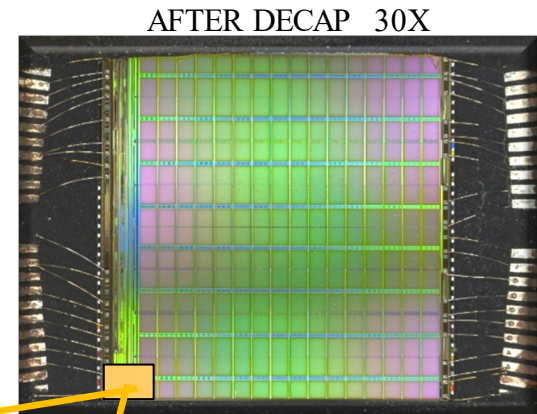
/10 TGA

/11 DRT

Step 1: Customer Specified Test Results Buttons Green

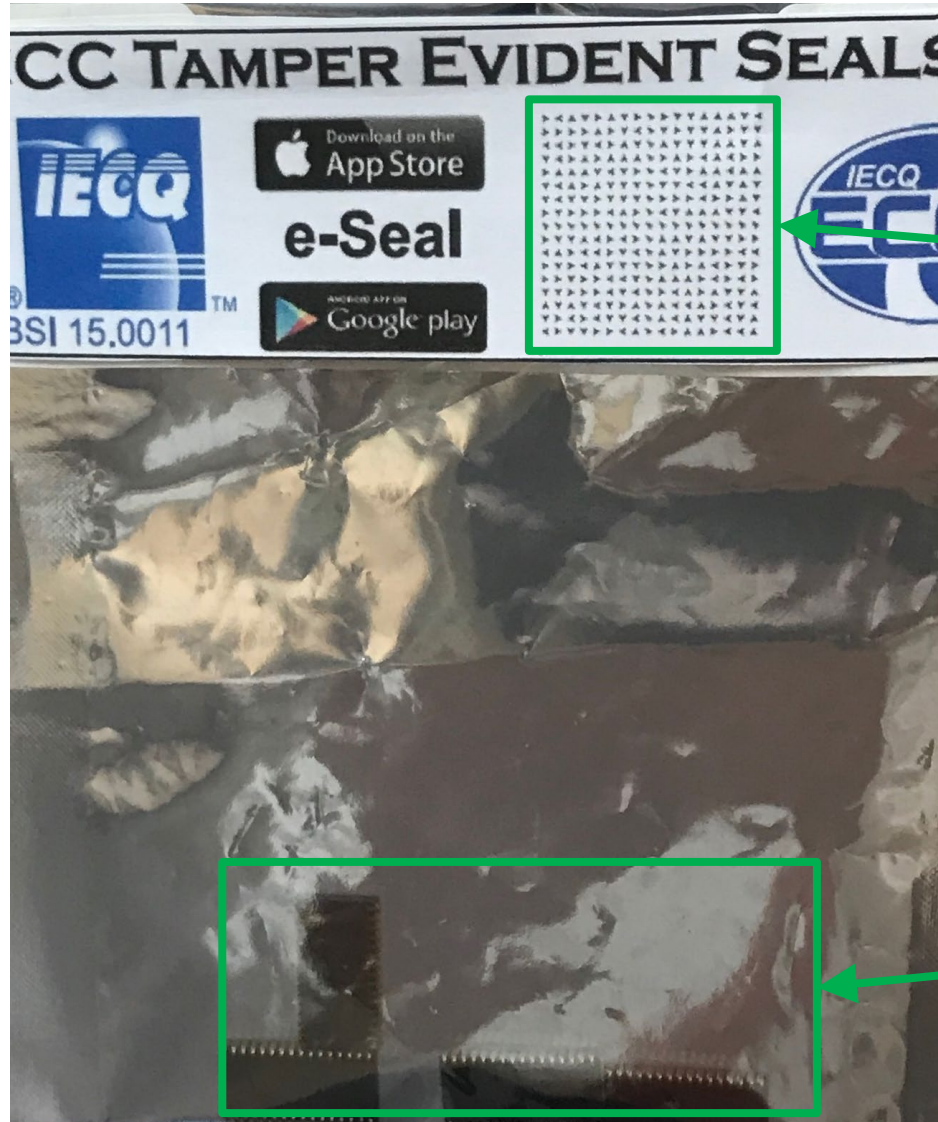
Step 2: Select Button

Step 3: View Actual Digital Results



DIE MARKINGS 500X

“Good” Components in Sealed ESD Pouch



**FOCUS CAMERA ON
THE e-SEAL MARK TO
GET TEST RESULTS**

**ESD = ELECTROSTATIC
DISCHARGE** – Designed to
protect “Charge” sensitive
devices

**GOOD COMPONENTS
SEALED IN POUCH**

Removed e-Seal – Tamper Evidence



e-Seal Secure Chain-of-Custody

A Counterfeit Avoidance Program for tracking Authenticated Open Market components, down the Supply Chain, with Full Chain-of- Custody History

STRONG PROTECTION LAYERS

1. Tamper Evident e-Seal on ESD Pouch
2. with digitally attached, cybersecure results,
3. from Customer Specified tests.
4. performed by IECQ Trained & Certified inspectors
5. using only Customer approved procedures.

Test Results Upload Page

Test Level A1



Test Level B



Test Level A2



Test Level C



Test Level A3



Test Level D



Test Level A4



Test Level E



Test Level A5



Test Level F



Test Level A6



Test Level G



TABLE 1 - LOT SAMPLING PLAN

Test/Inspection	Minimum Sample Size		Level
	Lot Size 200 or greater Devices	Lot Size 1-199 Devices (See NOTE 1)	
Minimum Required Tests			Level A
Documentation and Packaging			A1
Documentation and Packaging Inspection (4.2.6.4.1) (non-destructive)	All devices	All devices	
External Visual Inspection			A2
a. General (4.2.6.4.2.1) (non-destructive)	All devices	All devices	
b. Detailed (4.2.6.4.2.2) (non-destructive)	122 devices	122 or all devices, whichever is less	
Remarking & Resurfacing (destructive)	See NOTE 2	See NOTE 2	A3
Solvent Test for Remarking (4.2.6.4.3 A) (destructive)	3 devices	3 devices	
Solvent Test for Resurfacing (4.2.6.4.3 B) (destructive)	3 devices	3 devices	
Radiological (X-Ray) Inspection			A4
X-Ray Inspection (4.2.6.4.4) (non-destructive)	45 devices	45 devices or all devices, whichever is less	
Lead Finish Evaluation (XRF or EDS/EDX)	See NOTE 3	See NOTE 3	A5
XRF (non-destructive) or EDS/EDX (destructive) (4.2.6.4.5) (Appendix C.1)	3 devices	3 devices	
Delid/Decapsulation Internal Analysis (destructive)	See NOTE 4	See NOTE 4	A6
Delid/Decapsulation (4.2.6.4.6) (destructive)	3 devices	3 devices	
Additional Tests (as agreed between Customer and Organization)			
Remarking & Resurfacing (destructive)	See NOTE 2	See NOTE 2	A3 Option
Scanning Electron Microscope (4.2.6.4.3 C) (destructive)	3 devices	3 devices	
Quantitative Surface Analysis (4.2.6.4.3 D) (non-destructive)	5 devices	5 devices	
Thermal Testing			Level B
Thermal Cycling Test (Appendix C.2)	All devices	All devices	
Electrical Testing			Level C
Electrical Testing (Appendix C.3)	116 devices	All devices	
Burn-In			Level D
Burn-In (Pre & Post) (Appendix C.4)	45 Devices	45 devices or all devices, whichever is less	
Hermeticity Verification (Fine and Gross Leak)			Level E
Hermeticity Verification (Fine and Gross Leak) (Appendix C.5)	All devices	All devices	
Scanning Acoustic Microscopy (SAM)			Level F
Scanning Acoustic Microscopy (SAM) (Appendix C.6)	As specified	As specified	
Other			Level G
Other test/inspections	As specified	As specified	

AS6081

Assign Signakey

Process This Lot



When Signakey is assigned, an e-mail is sent to customer with hyperlink that allows for viewing of all test results.

Linking the Data to the e-Seal

Firefox File Edit View History Bookmarks Tools Window Help

Search Control Shipping Order - ECC Corp e-Seal.us

https://www.e-seal.us/Custom/MyAccount/ShipOrderEdit.advx?Hash=D41D8CD98F00B204E9800998ECF84

Test Level A1 Test Level A2 Test Level A3 Test Level A4 Test Level A5 Test Level A6

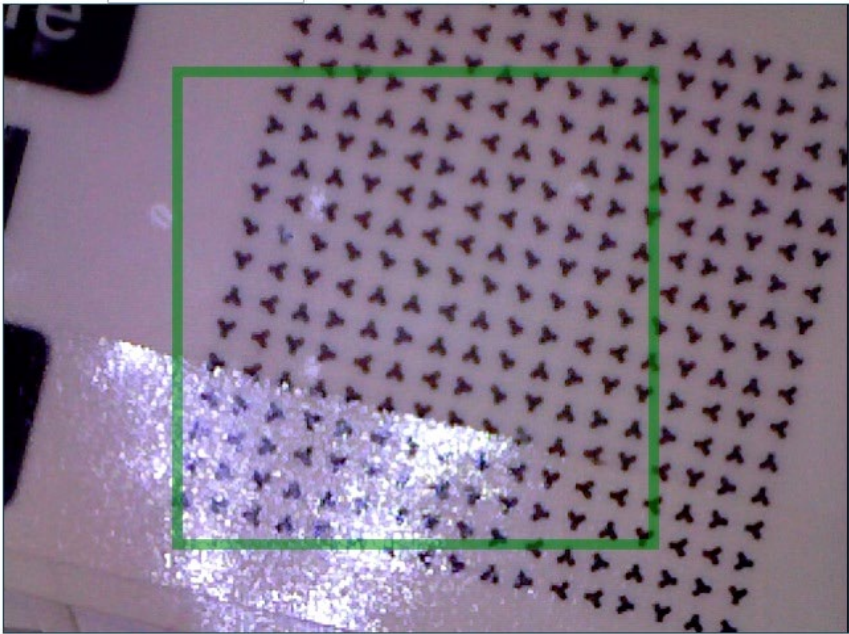
Assign Key

640 x 480 USB 2760 Camera

Camera granted

Camera Off

Capture



Position your SignaKey more or less in the green square.

Capture and Assign Key

Shipmen

Quantity Sh

Ship Via

add new lot

6081

Current Status

- e-Seal Website/Database currently under Beta Test at multiple sites in both Europe and US.
- Beta test Database currently at Version 12. Three more months scheduled.
- Participants already testing with small “best” customers on light version.
- By September, participating ID’s should begin trials with major OEM’s and DLA – who are fully aware of the effort.
- Interested? **rmcd@signakey.com**

e-Seal



PROVIDES THE FINAL

e-Chain of Custody