

# IBS ELECTRONICS GROUP

COMPONENT DIVISION



**WHITE HORSE**  
LABORATORIES

## Quality Control

Partnership with White Horse Laboratories



We Deliver On Time, Every Time!



# QUALITY CONTROL



ISO 9001 Certified



Incoming/Outgoing  
Inspection Teams



Approved  
Vendor List



Vendor Evaluation  
& Rating



Testing Facility



Documentation  
& Operational  
Procedures



Continuous  
Employee Training



Corrective &  
Preventive Quality  
Procedures



ESD Controlled  
Warehouse



Parts Traceability

## CERTIFICATE

**TUV USA Inc.**

hereby certifies that

**IBS Electronics**  
3506-D West Lake Center Drive  
Santa Ana, CA 92704 USA

has established and applies a quality system for

International procurement, warehousing, distribution  
and sale of electronic components, electromechanical  
equipment, computer peripherals, and electronic industry  
chemicals, and added value

Proof has been furnished that the requirements according to

**ISO 9001:2015**

are fulfilled.

Further clarifications regarding the scope of this certificate and the applicability of  
ISO 9001:2015 requirements may be obtained by consulting the organization.

Certificate Registration No.

56 100 18560081

Effective: December 03, 2018

Expires: December 02, 2021

Date of issue: September 05, 2018

*J. Ricard*

Quality Systems Division  
215 Main Street  
Salem, NH 03079 USA





# WHITE HORSE LABS INTRODUCTION

- **The IBS Electronics Group has Partnered with Whitehorse Laboratories to ensure Quality Control.**

Founded in 2004, White Horse Laboratories is the first company in China to specialize in counterfeit detection of electronic components. Our international reputation for technical expertise, transparency, and uncompromising report integrity has helped us become the pre-eminent lab in Asia and a consultant to IDEA-STD-1010B and the G-19 DAS6171.

We provide Product Verification, Electrical Testing, Failure Analysis, and Reliability Testing for electronic components, PCB, and PCBA in addition to Packaging, Logistics, and Factory Auditing and Inspection services.



# WHITE HORSE LABS



Main Lab Facility in Shenzhen. 1,200sqm with 40 FT employees including 7 Degreeed Engineers.



Hong Kong Labgistics & Packaging Centre. 600sqm with 6 FT Technicians.



Globally Approved at Jabil since 2015.



Laboratory Testing for Product Verification, Failure Analysis, Reliability Testing, and Factory Auditing.



The widest range of electrical test and inspection method capabilities.



# COMPANIES WHO TRUST WHL

**JABIL**

 Apothecary Products®

  
Member



**RAFAEL**   
ADVANCED DEFENSE SYSTEMS LTD.

**PLEXUS**®  
The Product Realization Company

 Westinghouse

**PHILIPS**  
Medical Systems

**HARRIS**

**Baxter**

**Honeywell**®



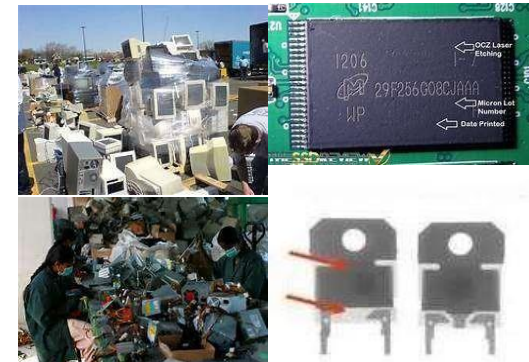
**THALES**

**SAE**  
INTERNATIONAL.



# SUBSTANDARD AND COUNTERFEIT

- How Counterfeit and Substandard Products Enter the Supply Chain
  - Clones
  - Old and Poorly Packaged
  - Remarked
  - Refurbished
  - Factory Reject
  - “Walking Wounded”
  - Poor Risk Management
- **20% of the Product we See is Substandard down from 80% in 2006**





# INTERNATIONAL STANDARDS AND CERTIFICATIONS

- ERAI
- [SAE G-19](#)
- IDEA
- AS5553
- AS6081
- AS6171
- AS9120
- [SC21](#)
- ANSI/ESD S20.20-201
- ISO 9001-2015
- ISO 17025
- MedAccred

## G-19 Members

Honeywell

### *Representation from Gov't, Aerospace, Military, & Commercial*

#### US Government Members ...

- DSCC
- GIDEP
- MDA
- NASA
- US AF / NRO (Aerospace Corp.)
- US Army - AMRDEC
- US Navy - NAVAIR
- US Navy - NSWC
- US Navy - NCIS
- US Customs and Border Protection

#### Industry Members ...

- Arrow Zeus Electronics
- BAE Systems
- Boeing
- General Dynamics
- Jabil Circuits
- Lockheed Martin
- Maxim Integrated Products
- Northrop Grumman
- Orbital Sciences
- QP Semiconductor
- Raytheon

#### Participating Industry Associations ...

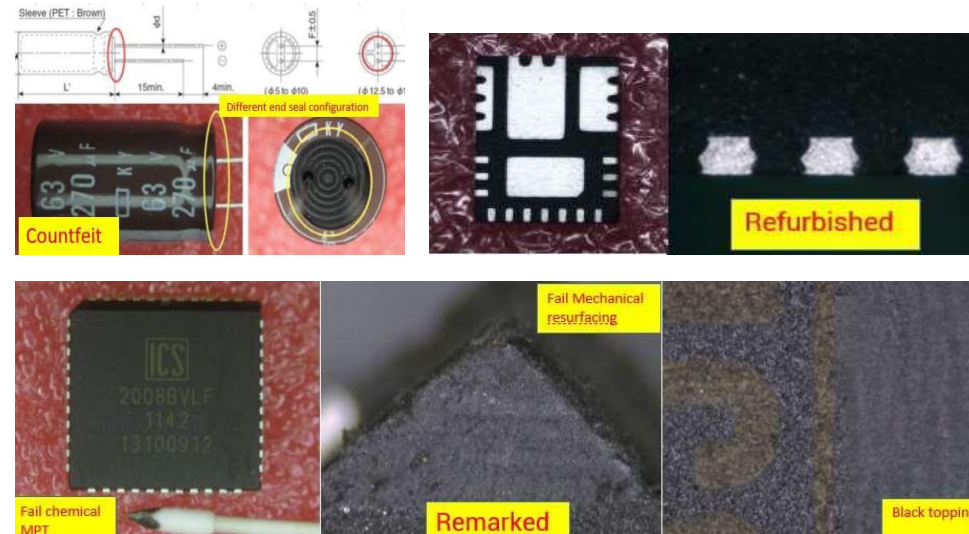
- Aerospace Industries Association (AIA)
- Best Manufacturing Practices Center of Excellence (BMPCOE)
- ERAI, Inc.
- Government Electronics & Information Technology Association (GEIA)
- Independent Distributors of Electronics Association (IDEA)





# COMPONENT CONDITION

- As defined within the AS6081, stemming originally from ERAI, the following definitions are used to categorize component condition.
- Suspect
- Fraudulent
- Counterfeit
- Refinished
- Refurbished
- Unused
- Uprated
- Upscreened
- Used (Refurbished or Pulled)







# DETECTION METHODS

- Documentation and Packaging Inspection
- General Inspection and Sampling
- External Visual Inspection
- Remarking and Resurfacing Tests
- Heated Chemical Testing
- X-Ray Inspection
- Delid/Decapsulation
- X-Ray Fluorescence (XRF)/EDX
- Scanning Electron Microscopy
- Scanning Acoustic Microscopy
- Electrical/Functional Testing
- Solderability Testing





# DOCUMENTATION & PACKAGING INSPECTION

- Check Packing Document
- Check Packaging Outer Condition
- Verify Quantity
- Document with Photograph

**Work Order** (Receipt, Inspection & Delivery)

Sales Order	106898	CS Rep.	JULY
Part Number	7A25000012		
Manufacturer	TSC	Engr Notes	
Engineer Name			
Order Quantity	400.000 PCS		
Lead Time	1.0 Days	Location	WH Lab
Package			
CS Notes	PO#3131479		

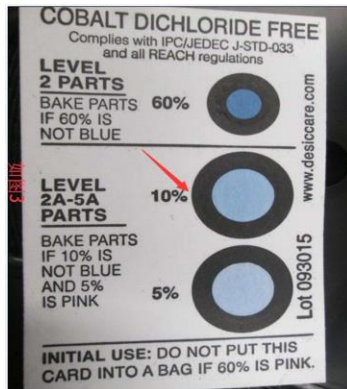
Contact: Think Phone: +6 (755) 839-884 (H: 819) Customer Name: Sembie Micro  
 Part Number: 7A25000012 Manufacturer: TSC Date Code: 10/18 Quantity: 400





# GENERAL INSPECTION & SAMPLING

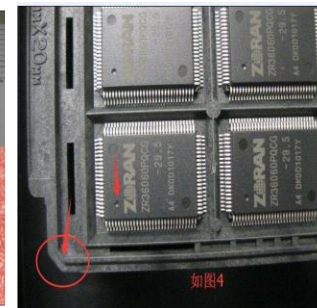
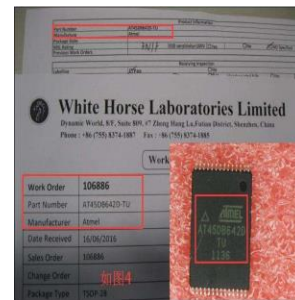
- Check Internal Packaging Condition
- Check the Marking and Orientation
- Verify Quantity
- Select Sample for EM



如图1



如图2



如图4



如图1





# EXTERNAL VISUAL INSPECTION

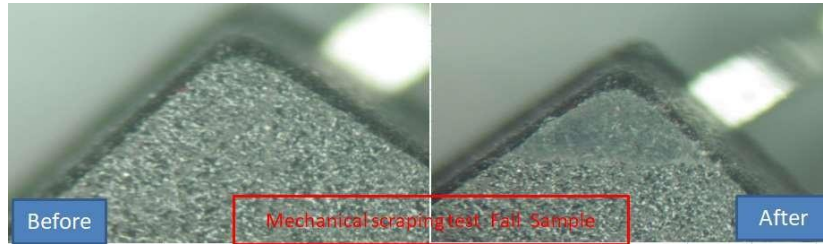
- Inspect Package Body
- Inspect Package Terminals
- Check the Marking
- Measure dimension and compare exterior configuration





# REMARKING AND RESURFACING TESTS

## 1. Mechanical scraping of the surface test

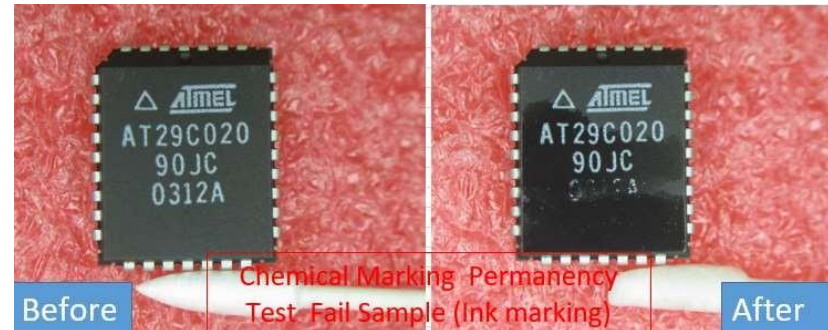


- Check if there is coating on body

## 2. Chemical Marking Permanency Test



For Laser marked device

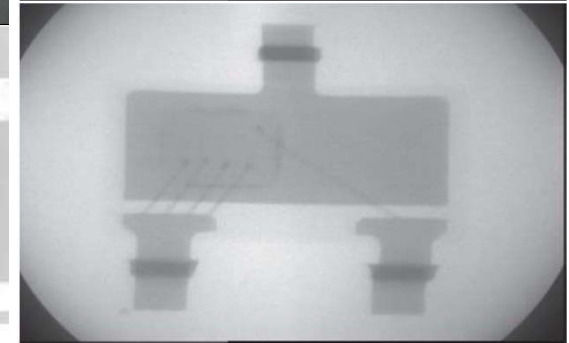
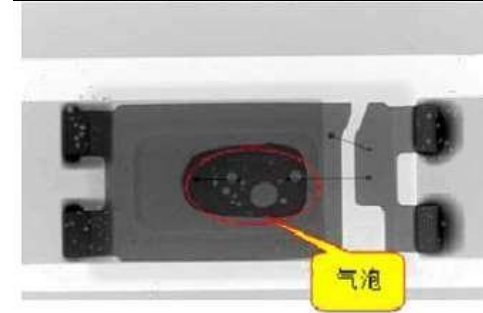
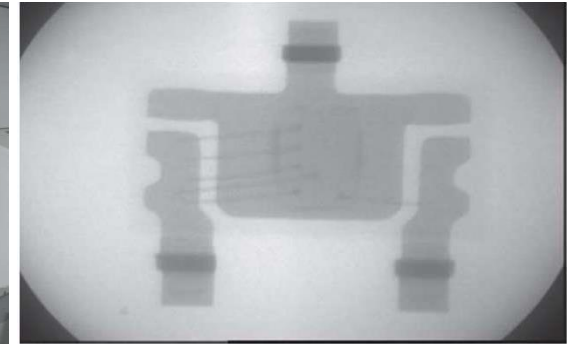


For ink marked device



# X-RAY INSPECTION (RADIOGRAPHY)

- Check the internal structure (lead frame, wire bond pattern, die position, etc.) and other anomalies such as voids.

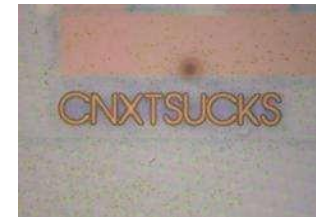
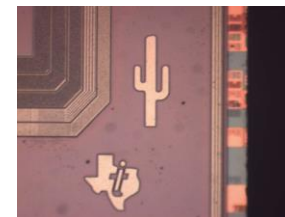
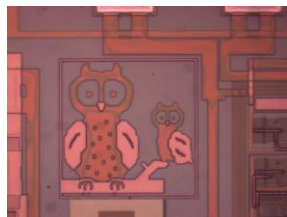






# DECAPSULATION

- Check the die marking if matches with manufacture name or logo and part number.
- Check die topography and die marking if consistent with reference sample or previous sample.
- Check if scratches or cracks on die surface.



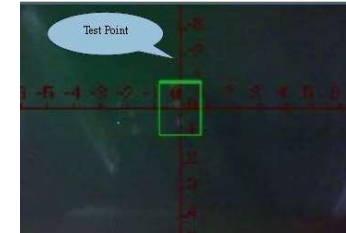
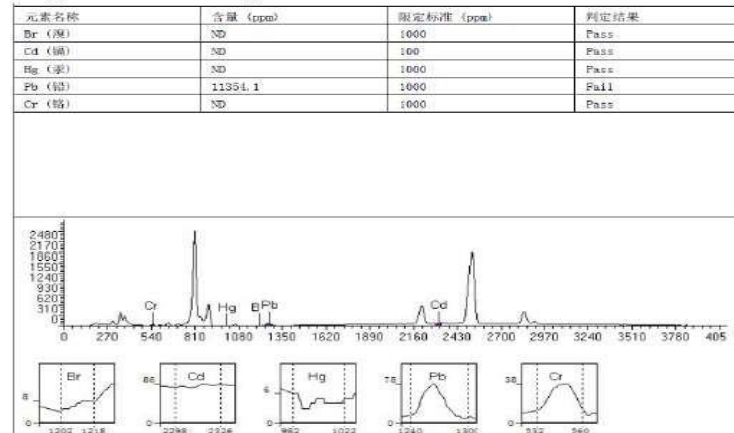


# X-RAY FLUORESCENCE

- This test will show the element PPM in test point.

## Test Data

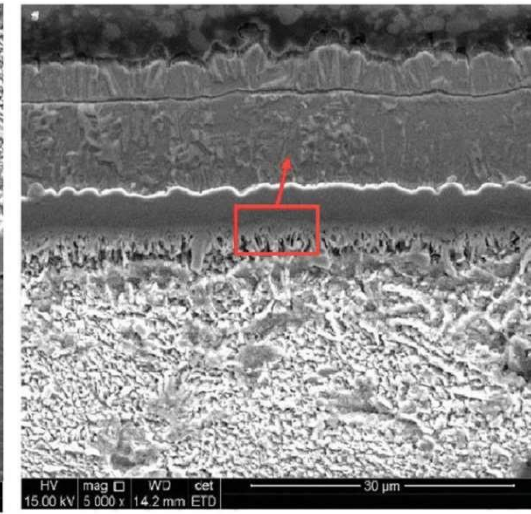
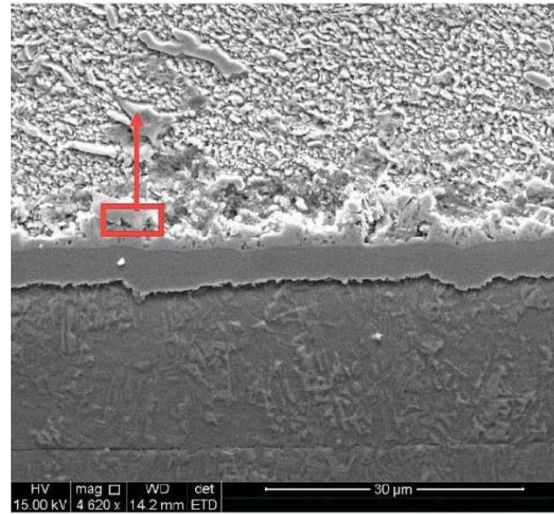
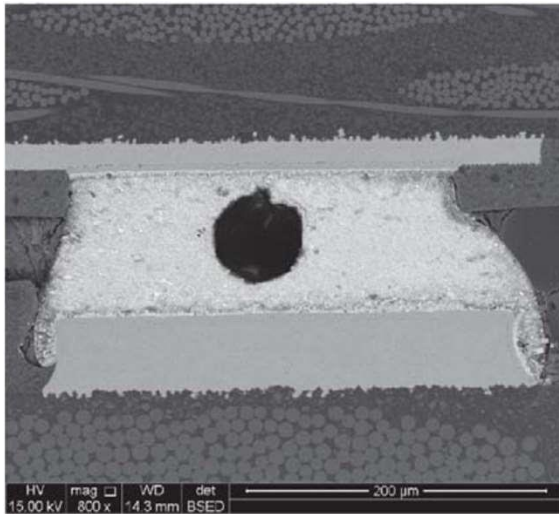
Sample	Material name	Cr	Cd	Pb	Hg	Br
Golden sample	Metal	N.D	N.D	11354.1	N.D	N.D
2	Metal	N.D	N.D	13463.2	N.D	N.D
3	Metal	N.D	N.D	102489.2	N.D	N.D
4	Metal	N.D	N.D	17551.3	N.D	N.D
5	Metal	N.D	N.D	5707.7	N.D	N.D





# SCANNING ELECTRON MICROSCOPY

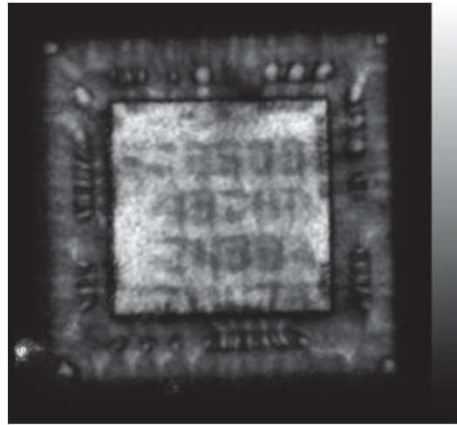
- Provide very high-resolution images of the sample surface.



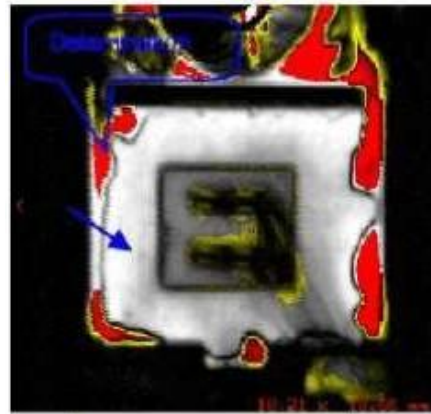


# SCANNING ACOUSTIC MICROSCOPY

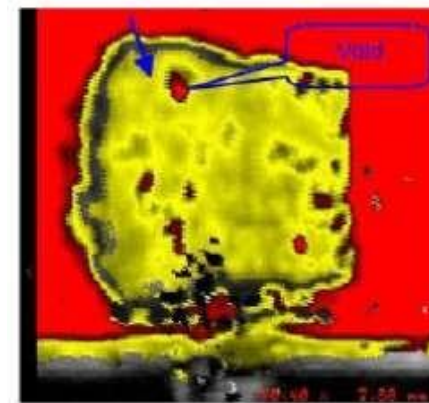
- SAM detects internal anomalies prior to destructive analysis such as delamination and voids.



No anomaly during SAM



Delamination

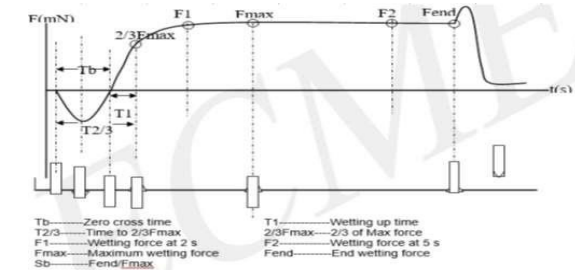
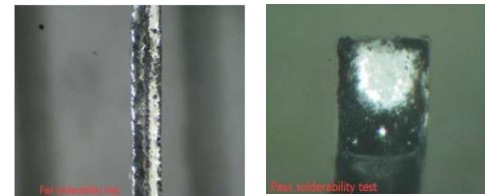
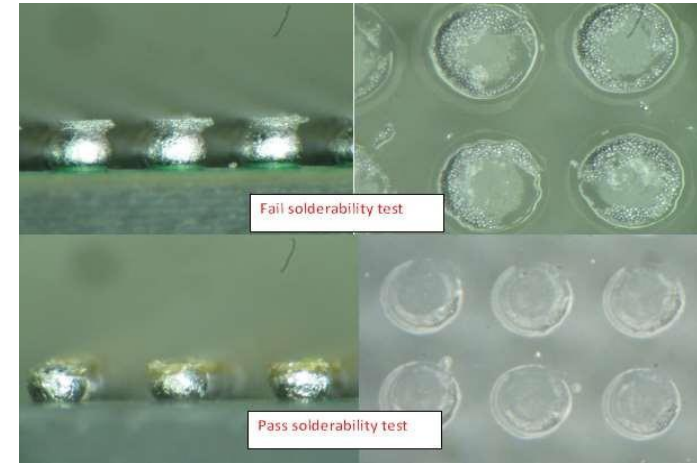


Voids



# SOLDERABILITY TEST

- This test is to determine the solderability of device intended to be jointed to another surface using solder for attachment.
- There are 3 methods:
  - Dip and look for non-BGA packages
  - Surface Mount Process Simulation for SMT devices
  - Wetting balance test - quantitative analysis method of solderability



**5.3 Judge Procedure** Wetting balance profile and judge procedure  
 $T_b < 0.50s$ ,  $T_{2/3} < 1.0s$ ;  
 (Reference:  $F_1 \geq 0.21mN$  at 2 sec and  $F_2 \geq 0.17mN$  at 5 sec.)



# COMPONENT CATEGORIZATION MATRIX AND TEST LEVELS

Component Category	Testing Profiles					
	PTPR/CVPD	Application Test	Functional Test	Parametric		
				Static	Dynamic	Timing
Capacitor-Ceramic	N	N	N	Y	Y	N
Capacitor-Tantalum	N	N	N	Y	Y	N
Capacitor-Electrolytic	N	N	N	Y	Y	N
Resistor	N	N	N	Y	N	N
Inductor	N	N	N	Y	Y	N
Oscillator, Resonator	N	Y	Y	N	Y	Y
Diode-Rectifier	Y	N	Y	Y	Y	N
Diode-Zener, TVS, ESD	Y	N	Y	Y	Y	N
Diode-LED	Y	N	Y	Y	Y	N
Diode-DIAC	Y	N	Y	Y	Y	Y
Transistor-BJT	Y	N	Y	Y	Y	Y
Transistor-MOSFET	N	N	Y	Y	Y	Y
Transistor-IGBT	N	N	Y	Y	Y	Y
Thyristor-SCR	N	N	Y	Y	Y	Y
Thyristor-Triac	N	Y	Y	Y	Y	N
Linear-Op-Amp	N	Y	Y	Y	Y	N
Linear-Amplifier-Audio, Instrumentation	YG	Y	Y	Y	Y	N
Linear-Comparator	N	Y	Y	Y	N	Y
Converter-Analog-to-Digital	YG	Y	Y	Y	Y	Y
Converter-Digital-to-Analog	YG	Y	Y	Y	Y	Y
Converter-Voltage-Frequency	YG	Y	Y	Y	Y	N
Regulator-Fixed, Reference	N	N	Y	Y	N	N
Regulator-Adjustable	N	Y	Y	Y	N	N
Regulator-Switching, DC/DC	YG	Y	Y	Y	N	Y
Analog Switch-Logic Relay	Y	Y	Y	Y	N	Y
Analog Switch-Optocoupler	N	N	Y	Y	N	Y
Analog Switch-Power Switch	Y	Y	Y	Y	N	Y
Analog Switch-Multiplexer	Y	Y	Y	Y	N	Y
Mixed Signal-LED/Motor Driver	Y	Y	Y	Y	N	Y
Logic-Gates, Transceiver, Registers, etc.	Y	Y	Y	Y	N	Y
Memory-Flash, OTP, EEPROM	Y	Y	Y	Y	Y	Y
Processors-MCU, DSP, CPU	Y	Y	Y	Y	Y	Y
Application Specific IC & System-on-chip IC	Y	Y	Y	Y	Y	Y





# COMPONENTS

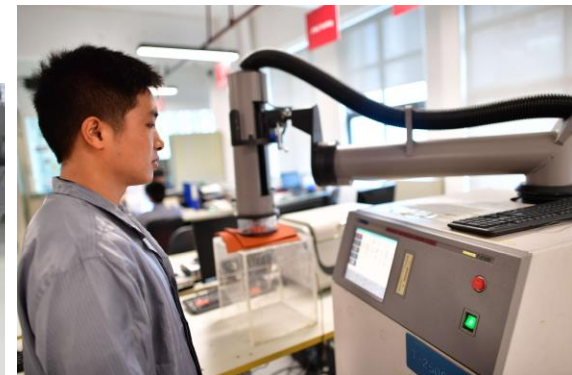
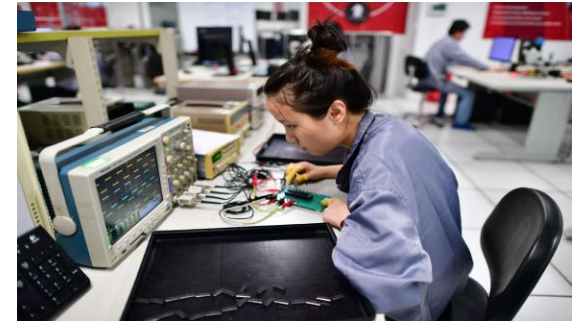
- **Passive components**
  - Resistor, Capacitor, Inductor
  - Transformer, Crystal
- **Active components**
  - Diodes, Transistors
  - Optoelectronic Devices
  - Integrated Circuits(IC)





# ELECTRICAL TESTING LEVELS

- **Continuity Testing**
  - Curve Tracer
  - PTPR/CVPD
- **Application Test**
- **Functional Test**
- **Static Parameter (DC)**
- **Dynamic Parameters (AC)**
- **Timing Characteristics**
- **Temperature Range**
- **Burn-In**





# LCR

- **L(Inductor)**
  - Inductance, Impedance, DCR
- **C(Capacitor)**
  - Capacitance, DF, ESR, IR
- **R(Resistor)**
  - Resistance

\*All LCR can be precondition (High Temperature or humidity)



MEAS DISPLAY				MEAS DISPLAY
FUNC	R-X	RANGE	AUTO	BIN DISPLAY
FREQ	1 kHz	BIAS	0 V	BIN No.
LEVEL	1 V	MEAS TIME	MED	BIN COUNT
<b>R 4.689186 kΩ</b>				LIST SWEEP
<b>X 69.92776 mΩ</b>				DISPLAY BLANK
VAC	979.079 mV	IAC	208.795 μA	
VDC	OFF	IDC	OFF	
CORR	0m, OPEN, SHORT	CH	SINGLE	
Use softkeys to select				

MEAS DISPLAY				MEAS DISPLAY
FUNC	Cp-D	RANGE	AUTO	BIN DISPLAY
FREQ	1 kHz	BIAS	0 V	BIN No.
LEVEL*	1 V	MEAS TIME	MED	BIN COUNT
<b>Cp 10.10658 μF</b>				LIST SWEEP
<b>D 0.049648</b>				DISPLAY BLANK
VAC	999.824 mV	IAC	63.5685 mA	
VDC	OFF	IDC	OFF	
CORR	0m, OPEN, SHORT	CH	SINGLE	
Warning, ALC unable to regulate				



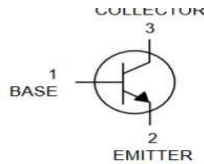
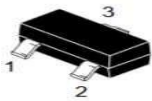


# DISCRETE DEVICES

- Diode
  - VF,IR



- Transistor
  - $I_{CEO}, BV_{CEO}$ ,
  - $I_{CBO}, V_{BE}, H_{FE}$

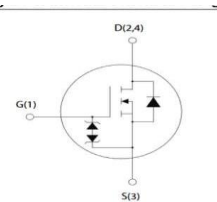


- MOSFET
  - $I_{DSS}, BV_{DSS}$ ,
  - $V_{GTH}, R_{DS(On)}$



SOT-223

TO-92 (Ammopak)



Test Program -- E:\PROGRAMS\PEG4010EL.T60

Step:Scan	Device	Limit	Bias 2	Bias 3	RBE/RGK	RL
01:00	DL AR DIODE	VF < 129.4mV	IF = 100.1uA			
02:00	DL AR DIODE	VF < 210.0mV	IF = 1.001mA			
03:00	DL AR DIODE	VF < 271.1mV	IF = 10.01mA			
04:00	DL AR DIODE	VF < 349.2mV	IF = 100.1mA			
05:00	DL AR DIODE	VF < 469.9mV	IF = 500.1mA			
06:00	DL AR DIODE	VF < 639.9mV	IF = 1.001 A			
07:00	DL AR/D DIODE	IR < 20.00uA	VR = 10.01 V			
08:00	DL AR/D DIODE	IR < 100.1uA	VR = 40.00 V			

Test Program -- E:\PROGRAMS\2SC2547.T60

Step:Scan	Device	Limit	Bias 2	Bias 3	RBE/RGK	RL
01:00	DL AR/D TRANSISTOR MPN	$I_{CEO} < 900.1mA$	$V_{CE} = 5.001 V$			Open
02:00	DL AR/D TRANSISTOR MPN	$I_{EBO} < 100.1mA$	$V_{EBO} = 1.001 V$			
03:00	DL AR TRANSISTOR MPN	$V_{CESAT} < 200.2mV$	$I_B = 100.1uA$	$I_C = 1.001mA$		Open
04:00	DL AR TRANSISTOR MPN	$BV_{CEO} > 120.1 V$	$I_C = 1.001mA$			Open
05:00	DL AR TRANSISTOR MPN	$BV_{CBO} > 120.1 V$	$I_C = 10.01uA$			
06:00	DL AR TRANSISTOR MPN	$BV_{EBO} > 5.001 V$	$I_E = 10.01uA$			
07:00	DL AR/D TRANSISTOR MPN	$I_{CBO} < 100.1mA$	$V_{CBO} = 50.01 V$			
08:00	DL AR/D TRANSISTOR MPN	$I_{EBO} < 100.1mA$	$V_{EBO} = 2.000 V$			
09:00	DL AR TRANSISTOR MPN	$H_{FE} > 249.8$	$I_C = 1.999mA$	$V_{CE} = 11.99 V$		Open
10:00	DL AR TRANSISTOR MPN	$H_{FE} > 400.1$	$I_C = 2.000mA$	$V_{CE} = 11.99 V$		Open
11:00	DL AR TRANSISTOR MPN	$H_{FE} > 799.8$	$I_C = 2.000mA$	$V_{CE} = 11.99 V$		Open
12:00	DL AR TRANSISTOR MPN	$V_{CESAT} < 200.2mV$	$I_B = 1.001mA$	$I_C = 10.01mA$		Open
13:00	DL AR TRANSISTOR MPN	$V_{BE} < 1.001 V$	$I_C = 2.000mA$	$V_{CE} = 11.99 V$		Open

Test Program -- SQJ500AEP\_M.T60

Step:Scan	Device	Limit	Bias 2	Bias 3	RBE/RGK	RL
01:00	DL AR/D MOSFET N-CHANNEL	$I_{DSS} < 500.1mA$	$V_{DS} = 5.001 V$			
02:00	DL AR/D MOSFET N-CHANNEL	$I_{GSSF} < 500.1mA$	$V_{GSF} = 5.001 V$			
03:00	DL AR MOSFET N-CHANNEL	$V_{GS0N} < 2.300 V$	$V_{DS} = 4.000 V$			
04:00	DL AR MOSFET N-CHANNEL	$BV_{DSS} > 40.00 V$	$I_D = 250.1uA$	$I_D = 100.1uA$		
05:00	DL AR/D MOSFET N-CHANNEL	$I_{DSS} < 1.001uA$	$V_{DS} = 40.00 V$			
06:00	DL AR/D MOSFET N-CHANNEL	$I_{GSSF} < 100.1mA$	$V_{GSF} = 20.00 V$			
07:00	DL AR/D MOSFET N-CHANNEL	$I_{GSSR} < 100.1mA$	$V_{GSR} = 20.00 V$			
08:00	DL AR MOSFET N-CHANNEL	$V_{GTH} < 2.300 V$	$I_D = 250.1uA$			
09:00	DL AR MOSFET N-CHANNEL	$V_{GTH} > 1.299 V$	$I_D = 250.1uA$			
10:00	DL AR MOSFET N-CHANNEL	$V_{SD} < 1.199 V$	$I_S = 6.501 A$			



# DIGITAL PROGRAM TESTING

- E(E)PROM/FRAM/NVRAM
- B/PROM
- DRAM/SRAM
- PLD
- MCU/MPU

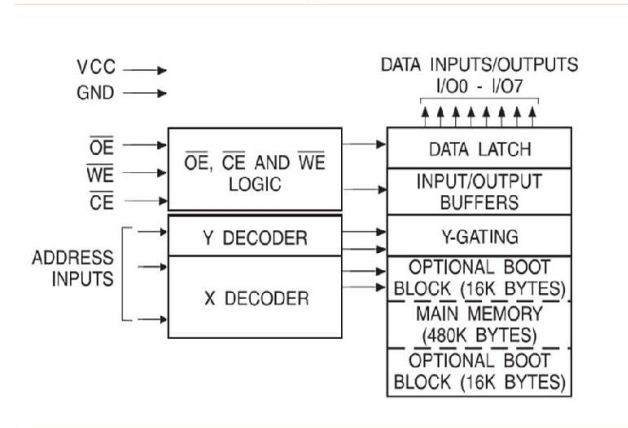
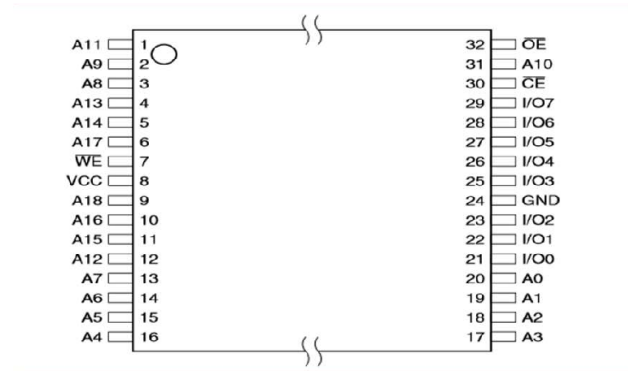
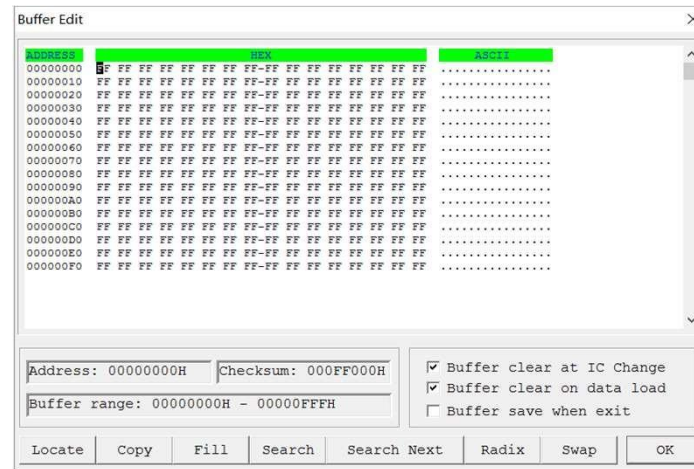






# ELECTRICAL TESTING

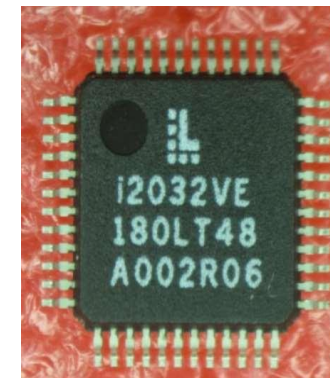
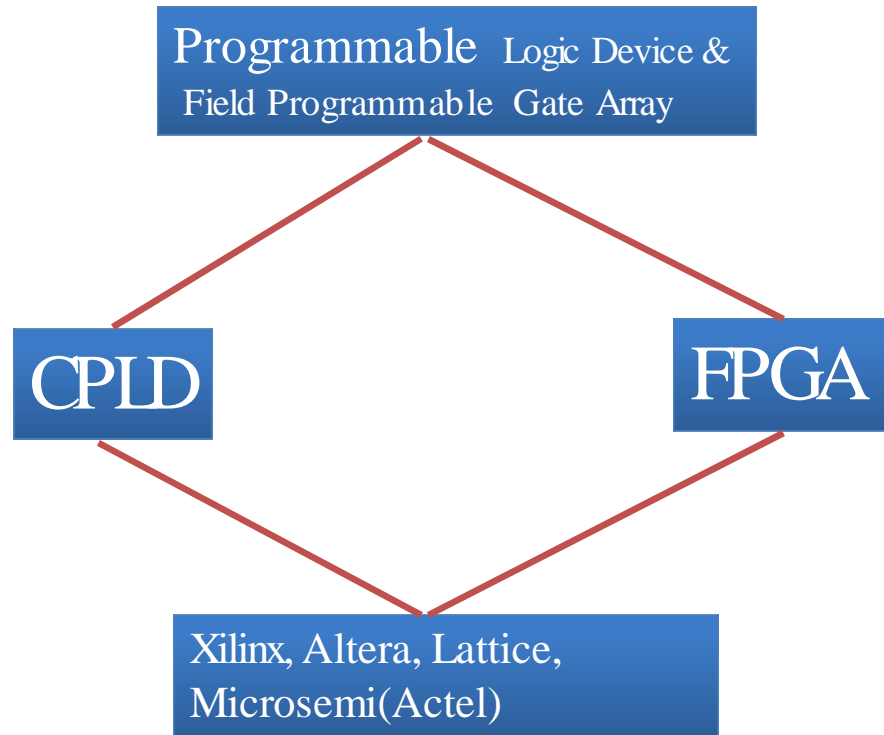
- Pin continuity test
- ID check
- Blank-check
- Program & verify
- Read & verify
- Erase







# JTAG TESTING





# JTAG TESTING

- Read the IDcode and verify
- Loading the program
- Running on ApplicationBoard

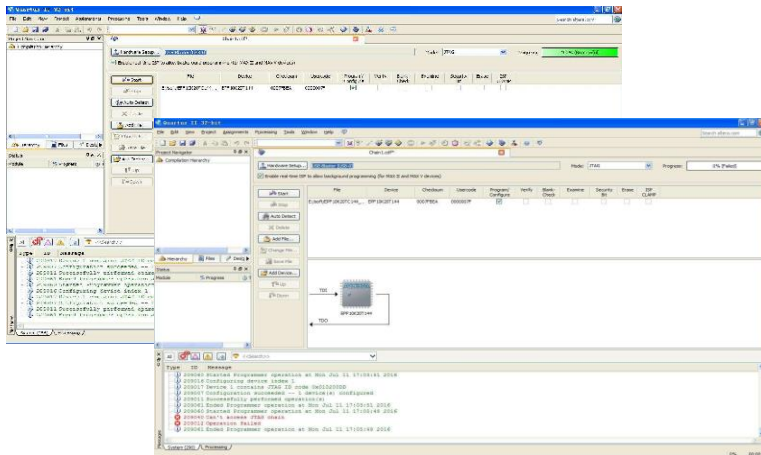


Table 11. 32-Bit MAX 7000 Device IDCODE *Note (1)*

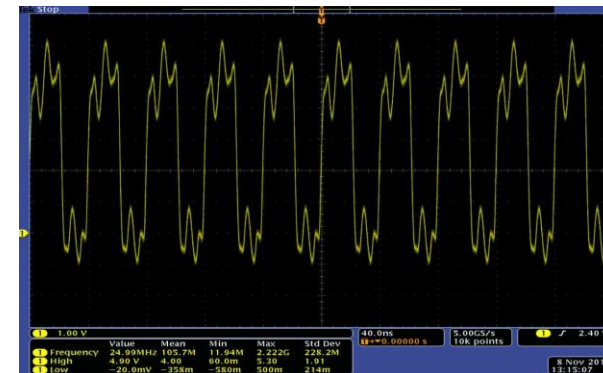
Device	IDCODE (32 Bits)			
	Version (4 Bits)	Part Number (16 Bits)	Manufacturer's Identity (11 Bits)	1 (1 Bit) (2)
EPM7032S	0000	0111 0000 0011 0010	00001101110	1
EPM7064S	0000	0111 0000 0110 0100	00001101110	1
EPM7128S	0000	0111 0001 0010 1000	00001101110	1
EPM7160S	0000	0111 0001 0110 0000	00001101110	1
EPM7192S	0000	0111 0001 1001 0010	00001101110	1
EPM7256S	0000	0111 0010 0101 0110	00001101110	1



# SPEED AND TEMPERATURE TESTING

- Set the Temperature
- Commercial is -40C to +85C
- Industrial is -40C to +100C
- Measure the output frequency to compare the Golden Sample.

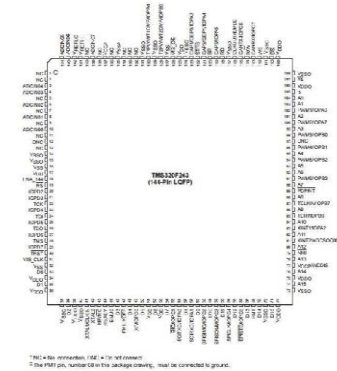
SEQ #	Set Point °C	Ramp Rate °C/Min	Soak Time Secs	Start ATE Y/N	Min/Max Air °C	Cold Boos Y/N
1	-40.0	0	180	N	-90.0	N
2	25.0	0	30	N	175.0	N
3	85.0	0	180	N	175.0	N





# PIN CONTINUITY TESTING

- Pin-to-Pin Resistance Clampdown Voltage of Protective Diodes
- Curve Trace



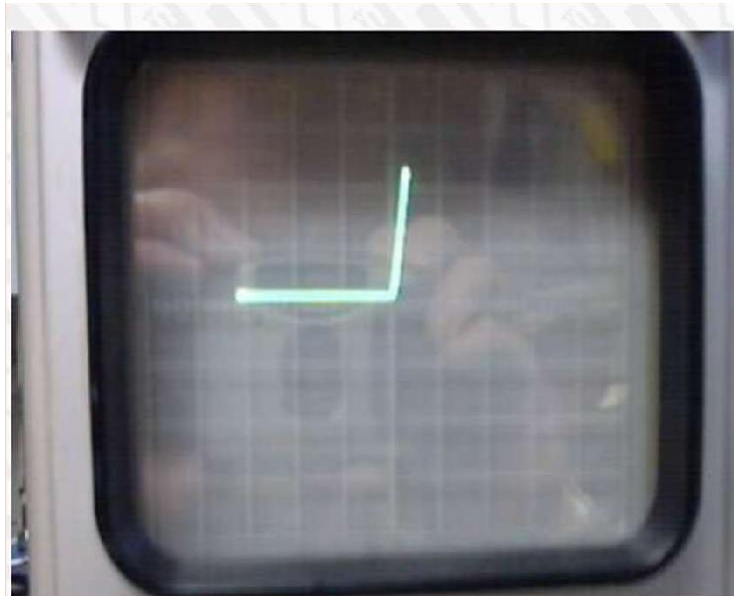




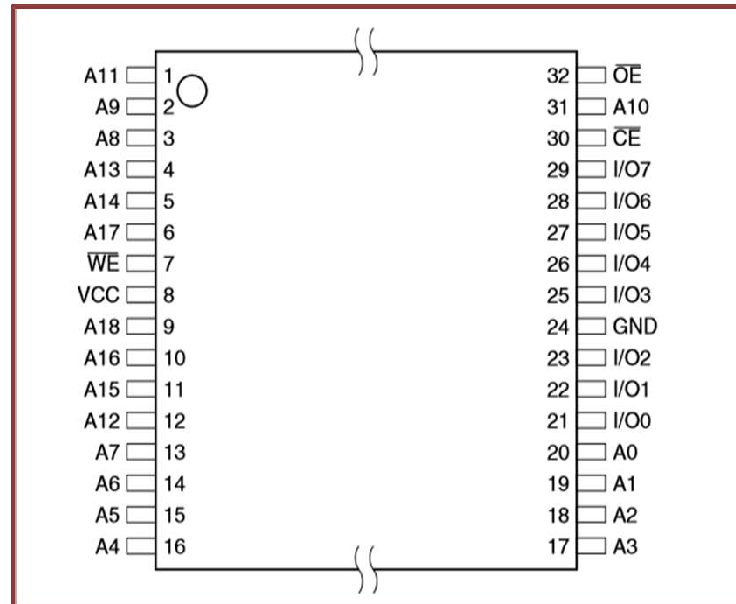


# CURVE TRACE

The tracer is for one pin



IC Pin-out

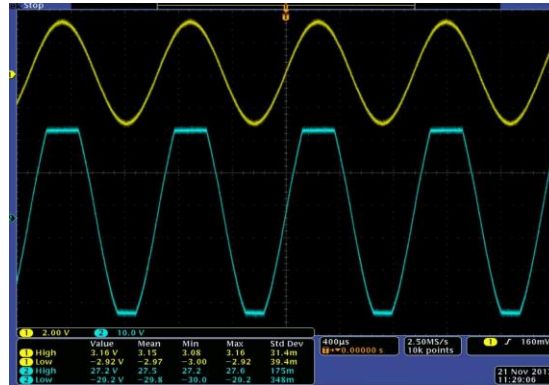
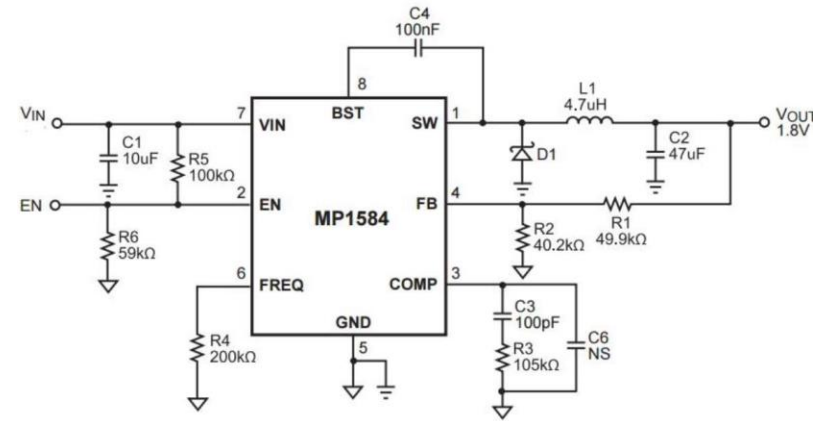






# BENCH TESTING

- Voltage
- Current
- Frequency





# RECOMMENDATIONS BY PRODUCT TYPE

## - Protocol Cheat Sheet:

Component Category	Inspection Processes				
	Visual Inspection	Decapsulation	X-Ray	Solderability	Lead-free
Capacitor-Ceramic	Y	N	YG	Y	Y
Capacitor-Tantalum	Y	N	YG	Y	Y
Capacitor-Electrolytic	Y	N	YG	Y	Y
Resistor	Y	N	N	Y	Y
Inductor	Y	N	YG	Y	Y
Oscillator, Resonator	Y	N	N	Y	Y
Diode-Rectifier	Y	N	YG	Y	Y
Diode-Zener, TVS, ESD	Y	N	YG	Y	Y
Diode-LED	Y	N	N	Y	Y
Diode-DIAC	Y	N	YG	Y	Y
Transistor-BJT	Y	N	YG	Y	Y
Transistor-MOSFET	Y	N	YG	Y	Y
Transistor-IGBT	Y	N	YG	Y	Y
Thyristor-SCR	Y	N	YG	Y	Y
Thyristor-Triac	Y	N	YG	Y	Y
Linear-Op-Amp	Y	Y	Y	Y	Y
Linear-Amplifier-Audio, Instrumentation	Y	Y	Y	Y	Y
Linear-Comparator	Y	Y	Y	Y	Y
Converter-Analog-to-Digital	Y	Y	Y	Y	Y
Converter-Digital-to-Analog	Y	Y	Y	Y	Y
Converter-Voltage-Frequency	Y	Y	Y	Y	Y
Regulator-Fixed, Reference	Y	Y	YG	Y	Y
Regulator-Adjustable	Y	Y	YG	Y	Y
Regulator-Switching, DC/DC	Y	Y	Y	Y	Y
Analog Switch-Logic Relay	Y	Y	Y	Y	Y
Analog Switch-Optocoupler	Y	Y	Y	Y	Y
Analog Switch-Power Switch	Y	Y	Y	Y	Y
Analog Switch-Multiplexer	Y	Y	Y	Y	Y
Mixed Signal-LED/Motor Driver	Y	Y	Y	Y	Y
Logic-Gates, Transceiver, Registers, etc.	Y	Y	Y	Y	Y
Memory-Flash, OTP, EEPROM	Y	Y	Y	Y	Y
Processors-MCU, DSP, CPU	Y	Y	Y	Y	Y
Application Specific IC & System-on-chip IC	Y	Y	Y	Y	Y



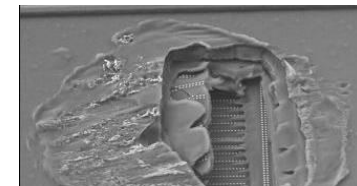
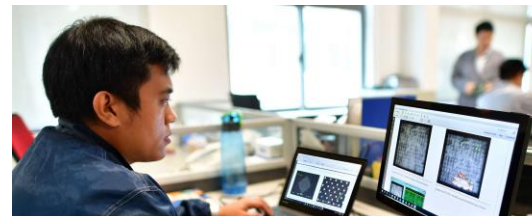
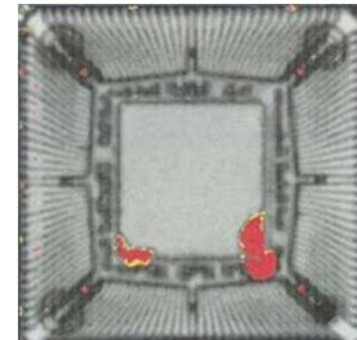
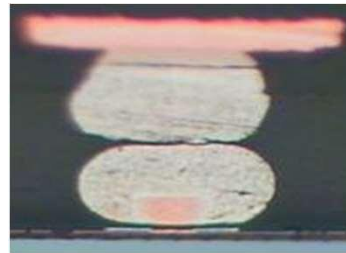
# REPORT EXAMPLES

- Inspections combined report
- Visual inspection (Remarked & Refurbished)
- Parametric test – Resistor (temperature range)
- Functional test – JTAG
- Failure Analysis



# COMPONENT, PCB, & PCBA FAILURE ANALYSIS & RELIABILITY TESTING

- Component and Board-level Failure Analysis to verify the reported failure mode and the cause of it. OEM and EMS require this information to make decisions about the reliability of the products they are providing to their customers.
- White Horse provides faster more reliable answers than OCM or supplier direct who have a vested interest in protection themselves.
- Curve Trace Testing
- Failure Mode Verification
- Scanning Acoustic Microscopy
- Cross Sectioning
- Scanning Electron Microscopy
- Liquid Crystal (Hotspot) Testing
- Layered Demetalization





# PRODUCT PACKAGING AND PROGRAMMING

- Poor packaging can lead to lead oxidation, delamination, and “popcorning” and we frequently see good quality product delivered in poor packaging.
- Wide range of carriers and material in stock for most component package types
- ESD-certified facility
- Baking MSL-sensitive parts
- Tape and Reel packaging service
- Dry-Pack (vacuum seal with desiccant and HIC)
- Re-boxing and labeling
- Documentation and bookings







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