ECSource Components Co.,Ltd

Quality Control (QC) System

Internal Training Manual For Buyers and QC
(2024 Revision)

Scientific Method +

Continuous Learning +

Love Industry

=ECSource Components

Let Electronics Make a Better Life!

1. Foreword

Every member of ECSource purchasing + QC must achieve the highest level of Market & Asian awareness,in order to become a true sense of everyone that quality is life, building a learning organization.

2. ECSource QC Introduction

ECSource owns two Quality Assurance Centers, separately in Shenzhen and HongKong, which provides professional tests on the physical and electrical parameters of an electronic component. Aiming to providing world-class quality assurance services to electronic clients. ECSource provides comprehensive services for companies and government agencies in the military/aerospace/OEM/Distributor sectors seeking advanced authenticity inspection.

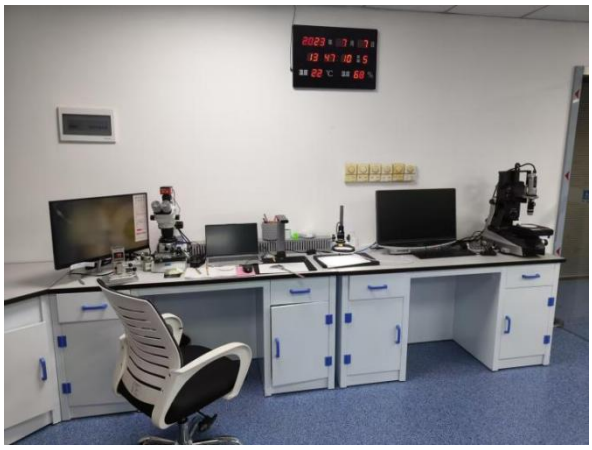
2.1 Organization Department

- Quality Department Inspector
- Purchasing Department

Quality Control Department is in-charge department to inspection the incoming material and maintaining the quality of components before hand over to store and production assembly.

Since most of incoming material is electronic components, QC Inspector shall have basic technical knowledge on:

- Electronic component Identification
- Electrical & mechanical specification
- Testing & measurement device
- Tolerance
- Verification Technique



2.2 Equipment

ECSource's Quality Control Centre is equipped with over 60 sophisticated professional testing equipment, including the German Leica Stereo Microscope, X-ray Non-Destructive Flaw Inspector, Dispersive X Fluorescence Analyser, and Precision LCR Testers which help our qualified engineers to identify the authenticity of the components and customise the testing requirements according to the customers' needs.

** Not limited to the above-mentioned equipment*

3. Six-Tier Quality Inspection Process

In order to detect quality defects in components, ECSource has implemented a comprehensive upgrade to the original three-tier quality inspection process, a Six-tier

quality inspection process in compliance with world-class inspection standards.

Level 1. Authenticity Inspection (AIV)

Level 2. DC Characteristic Parameter Test (DCCT)

Level 3. Key Function test (KFT)

Level 4. Full function and characteristic parameters test (FFCT)

Level 5. AC Parameter Testing and Analysis (ACCT)

Level 6. Special Environment Testing and Analysis (SEAT)

Test Deatails:

Testing Items	
Test Items	Quantity
Visual Inspection	< = 10Pcs
	>10Pcs
X-Ray Inspection	1～5 Pcs
	>5Pcs
De-capsulation	1 piece Decap (Normal or traditional package)
	1 piece (Pins>= 100 ）
	1 piece （(BGA/COB/PCB/LED)）
	1 piece (BGA for metal cover)
Marking Permanency Test	< =2Pcs
Scrape Test	< =2Pcs
Solderability Test	1 piece
	1 piece（Package is BGA）
DCCT (Electronic Test)	1-3 pieces
IV Curve	1 piece
Key Functional Test(FT)	1-5 pieces
Material Analysis	
Test Items	Quantity
XRF Inspection	1 piece
EDS Inspection	1 piece
ESD Test	1 Hour
SAT (C-SAM)	1 piece
Section	1 piece
Level Test	
Test Items	Spec
Level-I: Authenticity Inspection & Verification(AIV)	By case
Level-II: Direct Current Characteristics Test(DCCT)	By case

Level-III: Key Functional Test(KFT)	By case
Level-IV: Full Function & Characteristics Testing (FFCT)	By case
Level-V: Alternating Current Characteristics Test (ACCT)	By case
Level-VI: Special Environment Testing and Analysis (SEAT)	By case
Reliability Test	
Test Items	Spec
Baking:Temperature 25℃-50℃	Cubage
Hi-temp	< 20L
Low-temp	< 20L
Hi&LT	< 20L
Packing& Logistics	
Test Items	Spec
Re-tape	JEP130C Guidelines for Packing and Labeling
Vacuumize	JEP130C Guidelines for Packing and Labeling
Carton	JEP130C Guidelines for Packing and Labeling
Logistics	JEP130C Guidelines for Packing and Labeling
Service cost for freight	JEP130C Guidelines for Packing and Labeling

In addition, the warehouse should be kept at a constant temperature, and the humidity level "Moisture Sensitive Levels" (MSL) in the warehouse can be adjusted in real-time according to IPC guidelines & J-STD-020F Moisture sensitivity level.

- **MSL 1:**

Components with MSL 1 designation are considered the least sensitive to moisture. They have a long floor life and are less prone to moisture-related issues during assembly.

- **MSL 2-3:**

Components classified as MSL 2 or MSL 3 have moderate sensitivity to moisture. They may require additional precautions during storage and handling to prevent moisture absorption.

- **MSL 4-5:**

Components with MSL 4 or MSL 5 designations are highly sensitive to moisture. Strict guidelines, including vacuum-sealed packaging and rapid assembly, are necessary to minimize the risk of damage.

- **MSL 6:**

MSL 6 represents the highest level of moisture sensitivity. Components in this category are extremely susceptible to moisture, and special precautions, such as baking before use, are essential.

The definition of Moisture Sensitive Levels (MSL)

#	MSL	Floor Life

The definition of Moisture Sensitive Levels (MSL)

#	MSL	Floor Life
1	1	Unlimited (30℃ less than 85%RH)
2	2	1 year
3	2a	4 weeks
4	3	168 hours (7 days)
5	4	72 hours (3 days)
6	5	48 hours (2 days)
7	5a	24 hours (1 day)
8	6	Mandatory Bake before use

If moisture-sensitive components have been exposed to ambient air for longer than the specified time according to their MSL rating, or if the humidity indicator card indicates too much moisture after opening a Moisture Barrier Bag (MBB), then the components are required to be baked prior to the assembly process. To determine allowable maximum temperature, see the imprints/labels on the respective packing. Below is a table indicating recommended baking times.

Package Body	Level	Bake @ 125°C		Bake @ 90°C ≤5% RH		Bake @ 40°C ≤5% RH	
		Exceeding Floor Life by >72 h	Exceeding Floor Life by ≤72 h	Exceeding Floor Life by >72 h	Exceeding Floor Life by ≤72 h	Exceeding Floor Life by >72 h	Exceeding Floor Life by ≤72 h
Thickness ≤1.4 mm	2	5 hours	3 hours	17 hours	11 hours	8 days	5 days
	2a	7 hours	5 hours	23 hours	13 hours	9 days	7 days
	3	9 hours	7 hours	33 hours	23 hours	13 days	9 days
	4	11 hours	7 hours	37 hours	23 hours	15 days	9 days
	5	12 hours	7 hours	41 hours	24 hours	17 days	10 days
	5a	16 hours	10 hours	54 hours	24 hours	22 days	10 days
Thickness >1.4 mm ≤2.0 mm	2	18 hours	15 hours	63 hours	2 days	25days	20 days
	2a	21 hours	16 hours	3 days	2 days	29 days	22 days
	3	27 hours	17 hours	4 days	2 days	37 days	23 days
	4	34 hours	20 hours	5 days	3 days	47 days	28 days
	5	40 hours	25 hours	6 days	4 days	57 days	35 days
	5a	48 hours	40 hours	8 days	6 days	79 days	56 days
Thickness >2.0 mm ≤4.5 mm	2	48 hours	48 hours	10 days	7 days	79 days	67 days
	2a	48 hours	48 hours	10 days	7 days	79 days	67 days
	3	48 hours	48 hours	10 days	8 days	79 days	67 days
	4	48 hours	48 hours	10 days	10 days	79 days	67 days
	5	48 hours	48 hours	10 days	10 days	79 days	67 days
	5a	48 hours	48 hours	10 days	10 days	79 days	67 days
BGA package >17 mm x 17 mm or any stacked die package (See Note 2)	2-6	96 hours	As above per package thickness and moisture level	Not applicable	As above per package thickness and moisture level	Not applicable	As above per package thickness and moisture level

4. Pratice & Rreference Standards

4.1 Pratice Standards

ECSource staffs inspects and tests parts to the following standards.

- AS6171 Counterfeit Detection Testing Procedures
- AS6081 Counterfeit Avoidance Protocol
- DFARS Part 252.246-7007 Contractor Counterfeit Electronic Part Detection and Avoidance System
- CCAP-101 for Counterfeit Components
- IDEA-STD-1010 Visual Inspection Standard
- MIL-STD-750, Over 100 Test Methods
- MIL-STD-883, Over 50 Test Methods
- MIL-STD-202, 11 Test Methods
- IDEA-STD-1010B
- JESD22-B102-E(Solderability)
- J-STD-020F Moisture sensitivity level

4.2 Value-Added Services

- Baking
- Functional Testing
- Programming & Programm Testing
- Solderability Testing
- BGA Re-Balling
- C-SAM:Scanning Acoustic Microscopy
- Tape and Reel
- Wetting Balance Solder Testing

5. Test Categories And Items

5.1 Catalog by Function

5.1.1 Electrical Testing

- AC/DC Characteristics
- Functional
- Parametric
- Group A, B, C
- V-I Curve Trace
- Up Screening
- Burn-In
- Life Testing
- Failure Analysis
- At High/Low Temperatures: Ambient, Commercial, Industrial, Military

5.1.2 Authenticity Inspection & Testing

- Physical Dimension
- External Visual
- Component Surface
- Lead Condition Inspection
- Marking Permanency
- Blacktopping (resistance to solvents)
- Mechanical Scrape Test
- Internal Visual Die (DPA)
- X-Ray Die Bond/Frame Inspection
- Visual Testing via SEM
- IC Decapsulation/De-lidding
- HST Testing
- BGA Inspection
- Proprietary OCM Database Comparison

5.1.3 Inspections & Tests

- Physical Dimension
- External Visual
- Component Surface
- Lead Condition Inspection
- Marking Permanency
- Blacktopping (resistance to solvents)
- Internal Visual Die (DPA)
- XRF Material Analysis
- X-Ray Die Bond/Frame Inspection
- Visual Testing via SEM
- IC Decapsulation/De-lidding
- Heated Solvent Testing (HST)
- Mechanical Scrape Test
- BGA Inspection

- Electrical Curve Trace
- OCM Database Comparison

5.1.4 Material Analyses

- XRF Metal Composition
- RoHS Compliance
- MIL Lead Compliance
- Dye Penetration Inspection

5.1.5 Quality/Reliability Tests

- Fine/Gross Leak Testing
- Solderability Testing
- Temperature Cycling
- Coplanarity Inspection
- Die Shear Testing
- Bond Pull Testing

5.1.6 Other Engineering Services

5.2 Catalog by Material

Inspector will expose the clients on:

- Identify type of electronic component
  - Passive Component
  - Discrete semiconductor
  - IC Digital & IC Analog
- Electrical & mechanical component specification
- Application of Testing & measurement device
- Tolerance and reference value
- Verification Technique
  - Passive Component
  - Discrete semiconductor
  - IC Digital & IC Analog
- Inspection Checklist

5.2.1 Capacitor

- Component Datasheet
  - Number Code/ Color Code/SMT Code
  - Actual value / Tolerances
  - Electrical specification/ Dimension

- Tools & Equipment required
  - Vernier Clipper
  - LCR Meter – Test mode: Capacitance
- Inspection & Verification Point
  - Capacitance value
  - Equivalent Series Resistance (ESR)
  - Dimension / Appearance
  - Part status/ Reference value
- Checklist

5.2.2 Resistor

- Component Datasheet
  - Number code / Color Code /SMT Code
  - Actual value / Tolerances
  - Dimension
- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter- Test mode: Resistance
- Inspection & Verification Point
  - Resistance value / Electrical specification
  - Dimension / Appearance
  - Part status / Reference value
- Checklist

5.2.3 Inductor

- Component Datasheet
  - Number code / Color Code /SMT Code
  - Actual value / Tolerances
  - Electrical specification
  - Dimension
- Tools & Equipment required
  - Vernier Clipper
  - LCR Meter – Test mode : Inductance / Resistance
- Inspection & Verification Point
  - Inductance value
  - DC Resistance
  - Q Factor
  - Dimension / Appearance
  - Part status / Reference value

- Checklist

5.2.4 Transformer

- Component Datasheet
  - Number code / SMT Code/ Part No
  - Actual value / Tolerances
  - Electrical specification
  - Dimension / Pin Layout
- Tools & Equipment required
  - Vernier Clipper
  - LCR Meter — Test mode : inductance / Resistance
- Inspection & Verification Point
  - Inductance value (Primary winding /Secondary Winding)
  - DC Resistance (Primary winding /Secondary Winding)
  - Q Factors (Primary winding /Secondary Winding)
  - Dimension / Appearance
  - Part Status / Reference value
- Checklist

5.2.5 Diode

- Component Datasheet
  - Part No/SMT Code
  - Diode Type / Voltage Bias / Tolerances
  - Electrical specification
  - Dimension
- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode : Diode
- Inspection & Verification Point
  - Forward Bias (Anode –cathode)
  - Reverse Bias(Anode –cathode)
  - Dimension / Appearance
  - Part Status/ Reference value
- Checklist

5.2.6 Zener Diode

- Component Datasheet
  - Part No /SMT Code
  - Diode Type / Voltage Bias/ Tolerances
  - Electrical specification

- Dimension

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: Diode

- Inspection & Verification Point
  - Forward Bias (Anode –cathode)
  - Reverse Bias (Anode –cathode)
  - Dimension / Appearance
  - Part Status / Reference value

- Checklist

5.2.7 Bridge Diode

- Component Datasheet
  - Part No /SMT Code
  - Diode Type / Voltage Bias / Tolerances
  - Electrical specification
  - Dimension / Pin layout

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode : Diode

- Inspection & Verification Point
  - Forward Bias (Diode 1 to Diode 4)
  - Reverse Bias (Diode 1 to Diode 4)
  - Dimension / Appearance
  - Part Status/ Reference value

- Checklist

5.2.8 Transistor

- Component Datasheet
  - Part No/SMT Code
  - Transistor Type
  - Electrical specification
  - Dimension

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: Diode

- Inspection & Verification Point
  - Forward Bias (Base – Collector / Base –Emitter)
  - Reverse Bias (Base – Collector / Base –Emitter)

- Dimension / Appearance
- Part Status/ Reference value

- Checklist

5.2.9 Silicon Control Rectifier (SCR)

- Component Datasheet
  - Part No/SMT Code
  - Pin Layout
  - Electrical specification
  - Dimension
- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: continuity
- Inspection & Verification Point
  - Short-Open Test (MT1 –MT2)
  - Dimension / Appearance
  - Part Status/ Reference value
- Checklist

5.2.10 Triac

- Component Datasheet
  - Part No/SMT Code
  - Pin Layout
  - Electrical specification
  - Dimension
- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode : continuity
- Inspection & Verification Point
  - Short-Open Test (Anode –Cathode)
  - Dimension / Appearance
  - Part Status/ Reference value
- Checklist

5.2.11 Mosfet

- Component Datasheet
  - Part No /SMT Code
  - Pin Layout

- Electrical specification
- Dimension

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: continuity

- Inspection & Verification Point
  - Short-Open Test (Drain –Source)
  - Dimension / Appearance
  - Part Status/ Reference value

- Checklist

5.2.12 IC Digital

- Component Datasheet
  - Part No /SMT Code
  - Pin Layout
  - Electrical specification
  - Dimension

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: Diode / Continuity

- Inspection & Verification Point
  - Voltage Bias Test (VCC –Gnd)
  - Short –Open Test (Gnd- all pins)
  - Pin Broken / shorted each other
  - Dimension / Appearance
  - Part Status/ Reference value

- Checklist

5.2.13 IC Analog

- Component Datasheet
  - Part No / SMT Code
  - Pin Layout
  - Electrical specification
  - Dimension

- Tools & Equipment required
  - Vernier Clipper
  - Digital Multimeter – Test mode: Diode / Continuity

- Inspection & Verification Point
  - Voltage Bias Test (VCC –Gnd)

- Short –Open Test (Gnd- all pins)
- Pin Broken / shorted each other
- Dimension / Appearance
- Part Status/ Reference value

- Checklist

By implementation of this inspection and verification technique for electronic components by QC department, it will ensure quality of electronic components received and hand over to clients.

6. EMS & PCBA Quality Assurance

Quality assurance of electronic components is essential as it ensures reliability and safety in safety-critical applications. It extends product life, reduces costs through reduced scrap, and builds customer confidence. It ensures compliance with norms and standards, and feedback from quality assurance allows products and processes to be continuously improved. Overall, quality assurance contributes significantly to the success and competitiveness of electronics companies.

Challenges of materials testing for electronics

Materials testing of electronics components is a complex process that presents several challenges due to the continuous miniaturization of electronics and associated materials.

- Miniaturization
- Variety of materials
- Complex material composition
- Non-destructive testing
- Hidden defects
- Temperature and environmental conditions:
- Cost and time

EMS & PCBA Typical defect patterns of electronic components

Solder defects	X-ray inspection can identify solder defects such as incomplete solder joints, solder bridges, solder offsets, or air pockets that can occur during the soldering process.
Contaminants	X-ray inspection can detect foreign particles, contaminants, or residues on or in components that may have resulted from improper cleaning or processing.
Delamination	Delamination is a separation or detachment of layers within a component. X-ray inspection can detect such internal structural problems.
Tilting of chip components	X-ray inspection can determine if chip components are properly positioned and aligned on the PC
Incorrect placement	X-ray inspection can ensure that the correct components are placed in the appropriate mounting positions.
Cracks and breaks	X-ray inspection can look for cracks, breaks or structural defects caused by mechanical stress or material fatigue.
Pores in solder joints	X-ray testing can detect inclusions or air pockets in solder joints that can compromise electrical or mechanical integrity.
Faulty or damaged conductive traces	X-ray inspection can detect faulty traces or damage to traces that could affect component functionality.
Internal structure inspection	X-ray inspection allows examination of the internal structure of components such as integrated circuits (ICs) or transistors to ensure they meet specified design requirements.

7. Staff Training

Every member of ECSource purchasing + QC must achieve the highest level of Market & Asian awareness, in order to become a true sense of everyone QC, quality is life, build learning organization.The Quality Assurance Centre has established a training system combining internal and external training programs.

Foxconn Testing Innovation Centre regularly provides professional testing and knowledge training for ECSource's quality inspection engineers, sharing advanced testing theories and methodology.
At the same time, ECSource also actively organizes laboratory-related trainings, such as ISO17025, CCAP-101, ANSI/ESD S20.20, AS6081, etc, conducted by professional certification bodies.

ECSource also offers continuous training and make full use of available resources to

empower the quality inspection engineers, such as, basic training on testing knowledge, IPC-anti-counterfeiting, and anti-static (ESD) training, IDEA-reducing counterfeiting products and inspection training, and original factory's data analysis and interpretation.

With regular and continuous training and learning, quality inspection engineers will be equipped with professional skills that enable them to fulfill various inspection tasks in a standardised and adept manner.

8. ECSource Summary

ECSource Components Summary	
Corporate Name:	ESCOURCE COMPONENTS (A Growtech Company)
Location:	Hongkong,Shenzhen,Shanghai,Dongguan,Chongqing,Beijing
Registered Capital:	USD$7.85M
Revenue：	USD $112.67M
Franchise Agent：	TE, Zeus (USA), Mobileye(Israel), Heraeussensor(Germany), Omron(Japan)
Members:	100+
Development History:	2002.11 Found
	2007.01 Focus on Automotive Industry
	2016.03 Listed National Equities Exchange and Quotations
	2018.09 Gintelink fonded Own wiring harness factory set up
	2022.09 Global Supply Bom & Sourcing & Obsolete & Shortage
	2022.09 Third Party Test Lab Service
Business Content:	FPGA,RF,DSP,MOMERY,CONECTORS,Electronic Component