QUALITY ASSURANCE SYSTEM

1. Policy on the Quality

"Contributing to the prosperity of society with much pride through the creation of innovation and unique products for every sector", this is the goal we strive to fulfill. And "We, New Japan Radio Co., Ltd., continually creativity to improve our business and thus produce adaptable products and services of high quality that meet the satisfaction of our customers.", is our Quality policy.

To our customers we proffer the product which is high efficiency, high quality, high reliability, and we always consider earth environment. In the present circumstances, the electronic equipment has been upgraded with its performance and plays important role in any industry. Therefore default of the equipment might cause a serious problem on the system. Year after year, IC of our electronic equipment is requested the higher quality and the higher reliability.

We acquired ISO9001 in 1994 and acquired ISO14001 to satisfy those severe demands in 1997. In addition, we acquired ISO9001-2000.

And, I will do enough consideration concerning the environment not to mention the quality, and offer the product of the high quality and high reliability to be able to have use more than now at ease to the customer.

2. Quality Assurance System

Fig.1 shows NJRC's quality assurance system from the planning to shipping and customer services.

2.1 Production Planning

Before we make a plan for new products, we research into the customer needs and a trend of market extensively based on our business. Finally, we decide the planning for the new production at the New Products Development Meeting.

2.2 Design, Pre-production(Design Review)

2.2.1 Design

We design the product to meet the customer's requirement by close communications. The design makes by using the CAD system , and is based on the design rules justified reliability. For the quality of the design we check production technologies, development data and quality information by Design Review (DR).

2.2.2 Test Production

The test products are assessed the characteristic and the reliability.

The reliability evaluation method and condition shall be performed by EIAJ ED-4701(JEITA) specification.

The mass production is able to be started after consideration of process capability, yield result, reliability test result and customer's evaluation of ES(Engineering Sample).

2.3 Mass Production

2.3.1 Quality control of Raw Materials

We make effort to improve the quality of the raw material by quality approval of the materials, the purchasing specification, incoming inspection and close communication with the vendors.

2.3.2 Process Control

In addition to raw materials, process control effects importantly the quality. We make effort of avoid scattering products by the standardization and automatic system. We check the performance and the quality by the QC inspection. Fig.2 shows an example of process control.

2.3.3 Environment Control

The environment during IC production effect importantly the quality and reliability. We control properly the temperature, the humidity and the dust in fabrication. Especially for the high quality and high reliable production, we make the utmost effort to improve the cleanliness for the dust control is the most important factor.

2.3.4 Production equipment and facility control

Production equipment and facility control is very important to maintain the quality, characteristics and reliability. To keep our production, we prescribe the rule of maintenance and inspection for production equipment and facility. Therefore we can maintain a stable productivity.

2.3.5 Measuring instrument control

Measuring instrument control is the basis of quality assurance. Therefore the quality of products is greatly influenced by control of measuring instruments at the production line. We maintain a high precision at our measuring instruments in accordance with the rule of national standards. Periodically, we entrust the maintenance of our measurement instruments to the traders or public institution.

2.3.6 Change control and corrective action

Certainly, we change a condition of the design, the process, the material and facility in accordance with the change control system. We maintain this change control system to prevent occurrence of nonconformance. On this system, the changing of specification or characteristics is performed after customer's approval. Finally failure analysis data at the production process is notified to the related sections, and we can prevent a recurrence of an accident.

2.3.7 Sub-contractors control

The sub-contractor when we entrust the production, or the customer when we buy the parts and materials, we investigate the quality assurance system. Our investigation is carried out when we entrust the production for the first time. The investigation of quality assurance system is continued regularly or temporary. We hold a regularly meeting and process patrol, and we maintain the quality control system at the incoming products.

2.3.8 Education and training

Our educational policy is “We educate our employee for the individual growing, and for NJRC’s development” We educate to employee at the all sections, and all classes. Our educational course is consisted of three items, “On the job training, Off the job training and individual education”. The education according to our educational program is enough to satisfy a public circumstances.

2.3.9 QC circle

The activity of QC circle is a trigger at the individual or mutual education. We are promoting the activity of this QC circle as a part of the TQM activity. Employee’s consciousness is essential power of our development. In accordance with their independent management, the employees use the QC skills to improve the quality of the products, the services and the working at the QC circle.

2.3.10 Internal quality audit

The internal quality audit is performed by the team consisted of the qualified auditors. At this internal audit, periodically, the auditors confirm whether the activity of quality assurance is conformed or not to the planning.

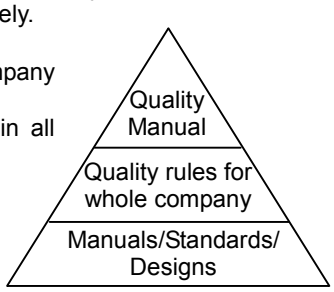
2.3.11 Quality Records Control

On our quality system, we provide the data obtain at the production, the process, the quality audit and the customer audit for quality records. We provides the rules to make use of quality records effectively.

2.3.12 Document System

The document system which composes the quality management system in our company is shown in a right picture.

The quality manual is made the top based on the demand with ISO9001, and in all sections which compose each system, various documents are made and operated.



QUALITY ASSURANCE SYSTEM

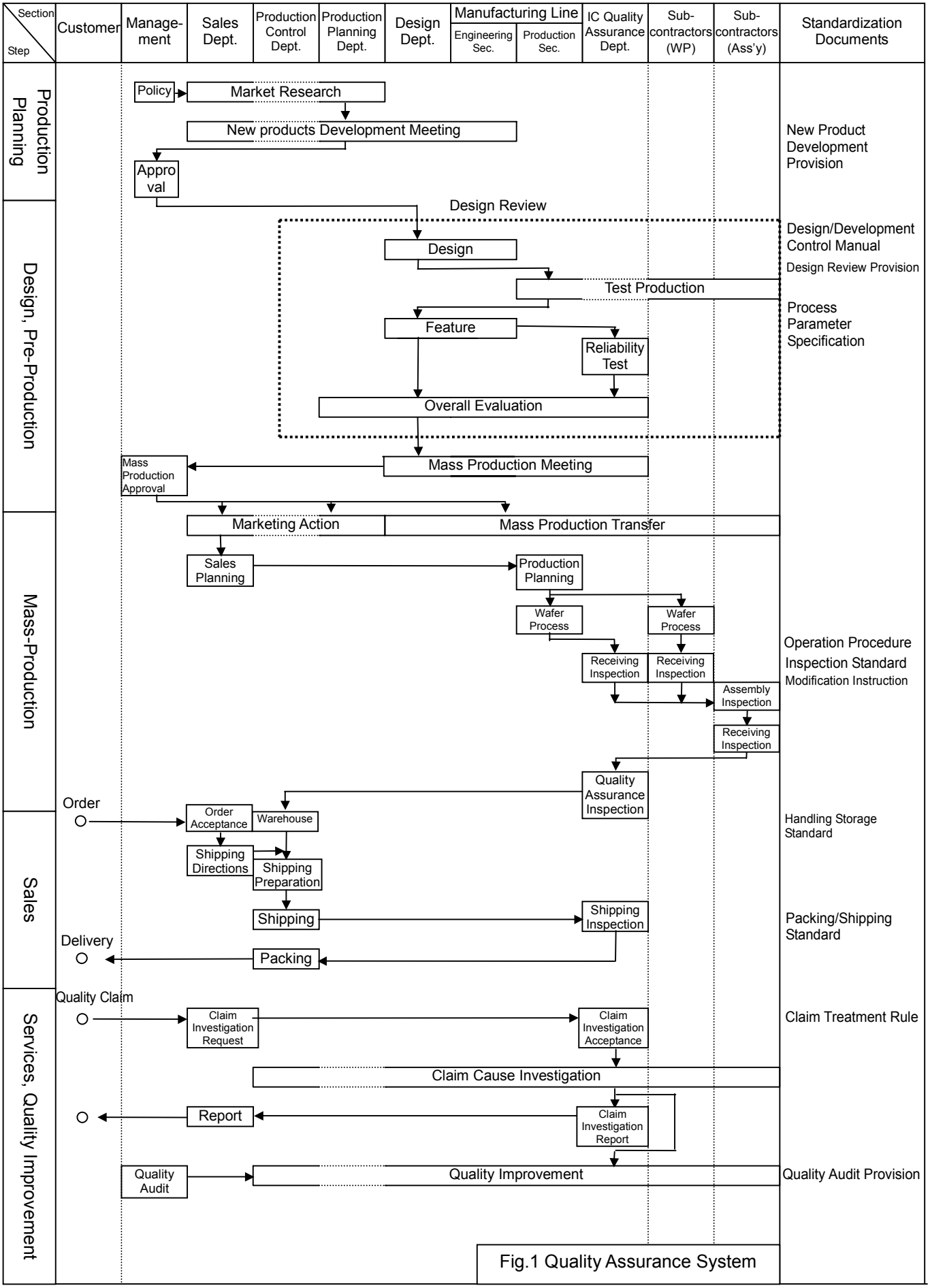
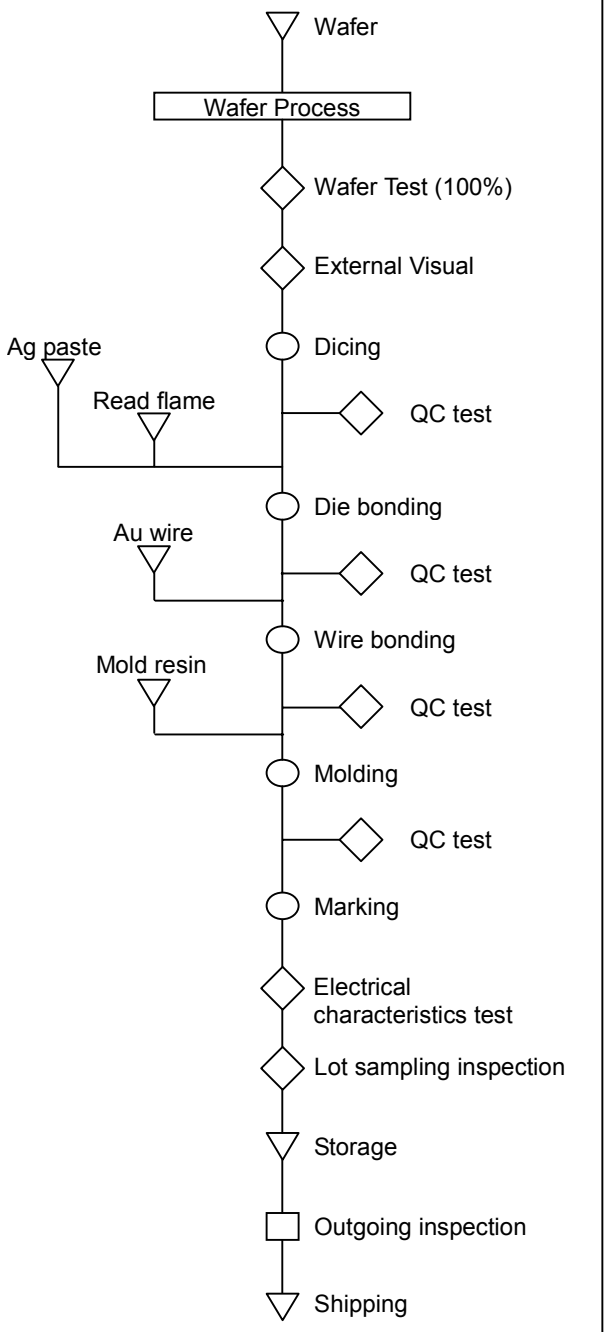


Fig.1 Quality Assurance System

QUALITY ASSURANCE SYSTEM

Process	Check Item
	

Wafer Test (100%)	Electrical characteristics
External Visual	External visual(wafer)
Dicing	Depth of dicing, Electrical Resistivity of pure water
QC test	External visual (chip)
Die bonding	Temperature
QC test	External visual, Adhesive strength (Die)
Wire bonding	Temperature, US power
QC test	External visual, Bonding strength (Wire)
Molding	Temperature, Pressure, Time
QC test	External visual
Electrical characteristics test	Electrical characteristics
Lot sampling inspection	Electrical characteristics, External visual
Outgoing inspection	Product's name, Quantity

Fig.2 Example of QC flow

3.Reliabirity Tests

We apply the reliability tests to new products, modified products (design, production equipment, process and materials) and reliability monitor test. Reliability tests verify that our products attain the reliability target. Table1 (BIPOLAR, C-MOS, GaAs), Table2 (Precondition BIPOLAR, C-MOS, GaAs), Table3 (OPTOELECTRONIC DEVICE) are in the following.

Table1.Example of reliability tests(BIPOLAR, C-MOS, GaAs)

Test Item	Test Method EIAJ ED-4701	Test Condition	
High Temperature Storage	201	Tstgmax, 1000h	
Low Temperature Storage	202	Tstgmin, 1000h	
Humidity	103	85℃, 85%, 1000h	
Steady State Life	101	Tj=Tstgmax, Voltage＝Maximum Rating, 1000h	
Temperature Humidity-Bias(THB)	102	85ºC, 85%, Voltage＝Maximum Rating, 1000h (Precondition 1)	
Pressure Cooker (PCT)	-	BIPOLAR, C-MOS	121ºC, 2.03 × 10^5Pa, 100%, 100h (Precondition 1)
		GaAs	121ºC, 2.03 × 10^5Pa, 100%, 40h (Precondition 1)
Soldering Heat	301	Reflow soldering：Peak Temperature 260ºC × 2 times (Precondition 2)	
Thermal Shock	307	0ºC 5min to 100ºC 5min 10 cycles (Precondition 1)	
Temperature Cycling	105	Tstgmin 30min to 25ºC 5min to Tstgmax 30ºC 5min, 100 cycles (Precondition 1)	
Solderability	-	Sn-37Pb : 230ºC, 5s(Non active Flux used) Sn-3Ag-0.5Cu : 245ºC, 5s(Non active Flux used) (Precondition 3)	
Electrostatic Discharge	-	BIPOLAR, C-MOS	C=100pF, R=1.5kΩ, V=±1000V
		GaAs	C=200pF, R=0Ω, V=±50V

Table2, Precondition (BIPOLAR,C-MOS, GaAs)

1	Baking	: 125ºC, 16h →
	Absorbent	: 85ºC, 85%, 168h →
	Reflow soldering	: Peak Temperature 260ºC × 2 times
2	Baking	: 125ºC, 16h →
	Absorbent	: 85ºC, 85%, 168h →
3	PCT	:105ºC 100% 4h

Table3.Example of reliability tests(OPTOELECTRONIC DEVICE)

Test Item	Test Condition
Steady State Life	Ta=25ºC, IF=Absolute Maximum Rating, VCE=Absolute Maximum Rating 1000h
High Temperature Storage	Ta=Tstg max 1000h
Humidity	60ºC, 90% 1000h
Soldering Heat	260ºC, 10s, The dipping depth should be up to 1.5mm from the body of the specimen.
Temperature Cycling	Tstg min(30min) to Tstg max(30min), Atmospheric Phase 20cycles
Solderability	230ºC, 5s, Flux used, The dipping depth should be up to 1.5mm from the body of the specimen.
Electrostatic Discharge	C=200pF, R=0Ω, V=1kv
Terminal Tensile Strength	5N, 10s at each lead

4.Customer Returning and Failure Analysis

In the case of device trouble on the customer's operation, we request that customers should send back it. With the troubled products, cause of troubles founded by our salesmen are returned to our factory. Generally, the quality assurance section is responsible for failure analysis. The design section or the engineer section is responsible for the application troubles. Failure analysis data are returned to our quality assurance section. After we totally reevaluate these failure analysis data, we report the failure analysis data to customer by way of salesman. These data returned to the design section, the engineer section and the manufacturing section, are useful for preventing of troubles and progressing in the product's quality.

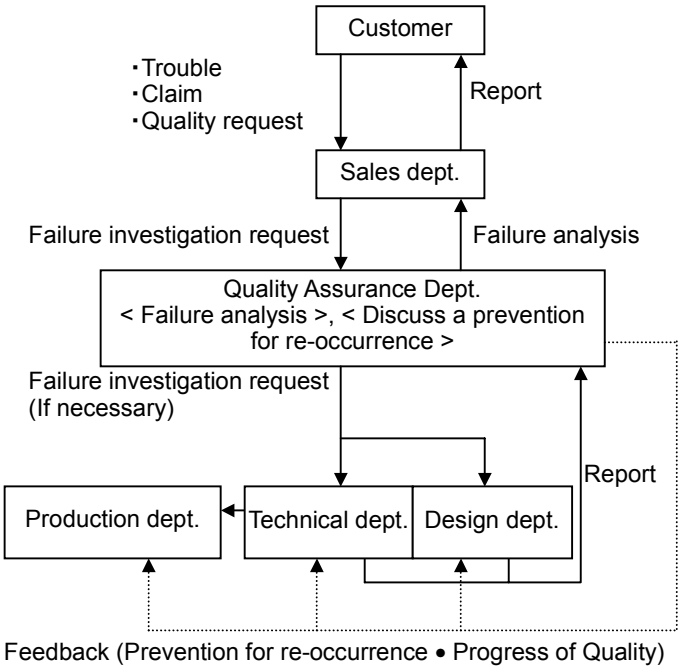


Fig.3 Customer Returning and Failure Analysis Route

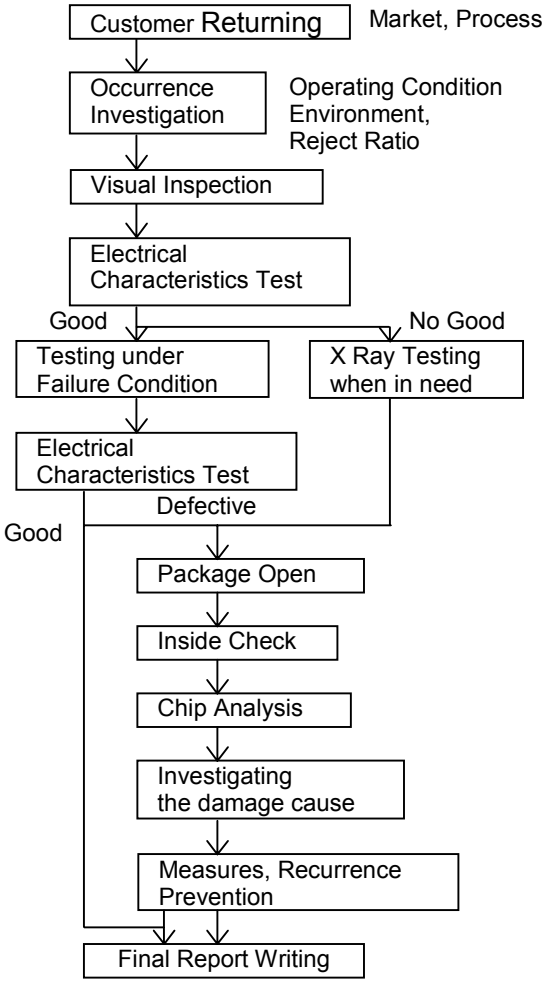


Fig.4 Failure Analysis Procedure