

Etron Technology, Inc. Since 1991

Etron Company Profile and Automotive Introduction

by

Memory Marketing

2019

Safe Harbor Notice

This following presentation contains forward-looking statements, which involve known and unknown risks and are subject to uncertainties that could cause actual performance, financial results, or operation conditions to be materially different from those contained in the forward-looking statements.

Except as required by law, we undertake no obligation to update any forward-looking statement, whether as result of new information, future events, or otherwise.

Etron Technology, Inc.

(TPEX: 5351.TW)



- Fabless IC Design House since 1991
- IPO in Taiwan Stock Market, 1998
- Shareholder's Equity: **US\$117M** (As of Q1 2018)
- Assets: **US\$265M** (As of Q1 2018)
- Patents: **USA 200; Total 592** (As of Jun 2018)
- Number of Employees: **473** (As of Jun 2018)
- Headquarters: TWN Hsinchu Science Park
- Branch Offices & Liaison
 - USA : Santa Clara, CA
 - China : HK, Shanghai, Shenzhen
 - Asia : Japan
- World-Class Fabless IC design Company with Creativity and Innovative Products
- Pioneering Application-Driven Buffer Memory Business Model and Leader of Known-Good-Die Memory Products
- World's Leader in USB3.1 Type-C Switch Chip (10Gbps) and Power Delivery (PD2.0 up to 100W) Controller
- World's Best Cost/Performance 3D Depth-Map Object-Capture Chip and Platform

Etron Product Lines

■ Application Driven Buffer Memories

- Various DRAMs in Different Packages from 16Mb to 4Gb with SDR/DDR/DDR2/DDR3/LPDDR2 Protocols
- Known-Good-Die DRAMs from 8Mb to 2Gb Capacities

■ SPI Serial NAND Flash for Code Memories

■ USB3.x Host, Device and Power Delivery ICs

- USB 3.1 Type-C Switch and PD 2.1 Controller

■ 3D Vision: ISP (Image Signal Process) Controller/Platform

- Fish Lenses/Sensor Controllers: LyfieEye
- Synchronous 3D Stereoscopic: AR/VR HMD Positioning Camera
- 3D Depth-Map Controllers: ThingsCounting Camera, Object Capture Camera, 3D Scanner to Printing
- Virtualization Technology Using APP, Platform to ICs



Etron Memory Widely Used in 4C

■ Computer

- HDD, ODD, SSD
- Printer
- Industrial PC

■ Consumer

- DTV (Full HD, 3D, UHD)
- DSC, DPF
- DVD, MP3/4, Game Console

■ Communications

- xDSL, FTTx/PON, IAD, IP STB
- WiFi, Mobile Phone, IP CAM

■ Car Electronics

- Car Infotainment
- ADAS



Etron KGDM Pioneer in 3D-IC

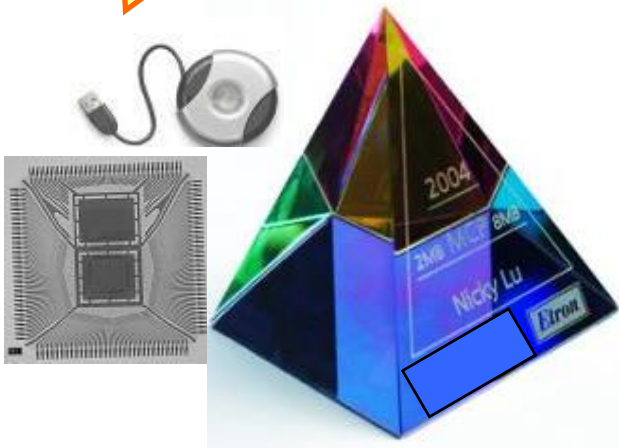
- Started Known-Good-Die-Memory Productions in 2000, Has Since Received the Intel Supplier Award and Many Other Accolades, and Shipped over 2 Billion Units
- Monthly KGD Shipments Exceed 10 Millions Units and Continue to Grow
- Applications Served by Etron's KGD Solutions:
 - Multimedia/baseband chip in Cellular Phones, Digital Cameras, GPS Devices, PDAs, MP3s, Mobile TVs
 - TVs/Displays, Projectors, Rearview Monitors, Surveillances
 - Printers, HDDs, ODDs, Blu-ray DVDs, Graphics
 - Flash Combos
 - Set Top Boxes
 - Automotive



KGDM Value Wins Top-Tier Customers' Recognition

**KGDM
Innovation**

**Quality
& Service**




THE WALL STREET JOURNAL.
TUESDAY, MARCH 23, 2004

Winners of the 2003 Preferred Quality Supplier Award

Of the thousands of suppliers who work with Intel, these 29 companies are being honored with Intel's 2003 Preferred Quality Supplier Award. This award recognizes their outstanding performance in exceeding Intel's supplier expectations. Congratulations!!

<http://supplier.intel.com/quality>

AIR PRODUCTS AND CHEMICALS INC. Gases, Equipment, Chemicals and Service • ALPHASEN Die Sort and Die Attach Equipment • ANALOG DEVICES, INC. Analog Integrated Circuits • ARCH CHEMICALS, INC. Wafer Chemicals • ASAHI KASEI END CORPORATION Photodefinable Resists • CHUAN CHUNG TECHNOLOGY CORP.(C/C) Thermal Solutions • DAINIPPON SCREEN MANUFACTURING CO. LTD. Wafer Clean Stations, Scrub Systems, Single Water Cleaning Systems • DELTA DESIGN, INC. & COHU COMPANY Semiconductor Test Handling Equipment • DOWN CORNING CORPORATION Thermal Interface Materials • **ETRON TECHNOLOGY, INC. LPSRAM, PSRAM and LPSDRAM** • HENKEL TECHNOLOGIES Die Attach Adhesive and Underfill • HEWLETT-PACKARD COMPANY Computing Platforms, Enterprise Storage, and Services • HON HAIPOKCONN Motherboard Assembly, Connectors, Chassis, Cables, Thermal Solutions • JSR CORPORATION Photoresist and CMP Slurry • JSUI CHEMICALS, INC. Polishes and IC RDS Tops • MOSES LAKE INDUSTRIES (TINA CHEMICALS) High Purity Chemicals • MINTERS CORPORATION Fotor Concentrator and Thermal Oxidizer • MURATA MANUFACTURING CO., LTD. Ceramic Capacitors, Ferrite Beads, Inductors, and Other Passive Components • NGK SPARK PLUG CO., LTD. IGBT TECHNOLOGIES, INC. Substrate Packaging Materials • NICHICON CORPORATION Aluminum Capacitors • NIKON CORPORATION Lithography Exposure Equipment and Measuring Instruments • NPI TEST HOLDING CORPORATION IC Validation, Characterization and Manufacturing Test Products and Services • ON SEMICONDUCTOR CORPORATION Power Semiconductors • SECURITAS Security Services • SHAN-ETSU HANGDIAI GROUP Silicon Wafers and Services • TETRONIX, INC. Test and Measurement Equipment • UNITED VAN LINES, LLC Transportation Services • VWR INTERNATIONAL Distribution of Scientific Supplies • WESON TECHNOLOGIES CO., LTD. Systems and Connectors and Thermal



Etron Automotive Introduction

Etron Automotive Statement

- **TS16949 Certificated**
- **AEC-Q100 / PPAP Compliance**
- **Long-Term Product Life Supports**
- **Timely Support for Design-in and Failure Analysis**
- **Excellent Quality and Reliability**
- **Offer Broad Product Lineups**
- **Experienced in Supporting Major Japanese Customers**

Automotives Track Record

Car Electronics Parts Shipping to ...

- **Serving Automotive Customers Design-in Since 2005**
 - Focus on Infotainment System, Navigator, CD/DVD, HDD, DAB, HUD, Dash/Surrounding Cam



■ Served Global Auto-Brands



Active Customer Maps



Quality Management System

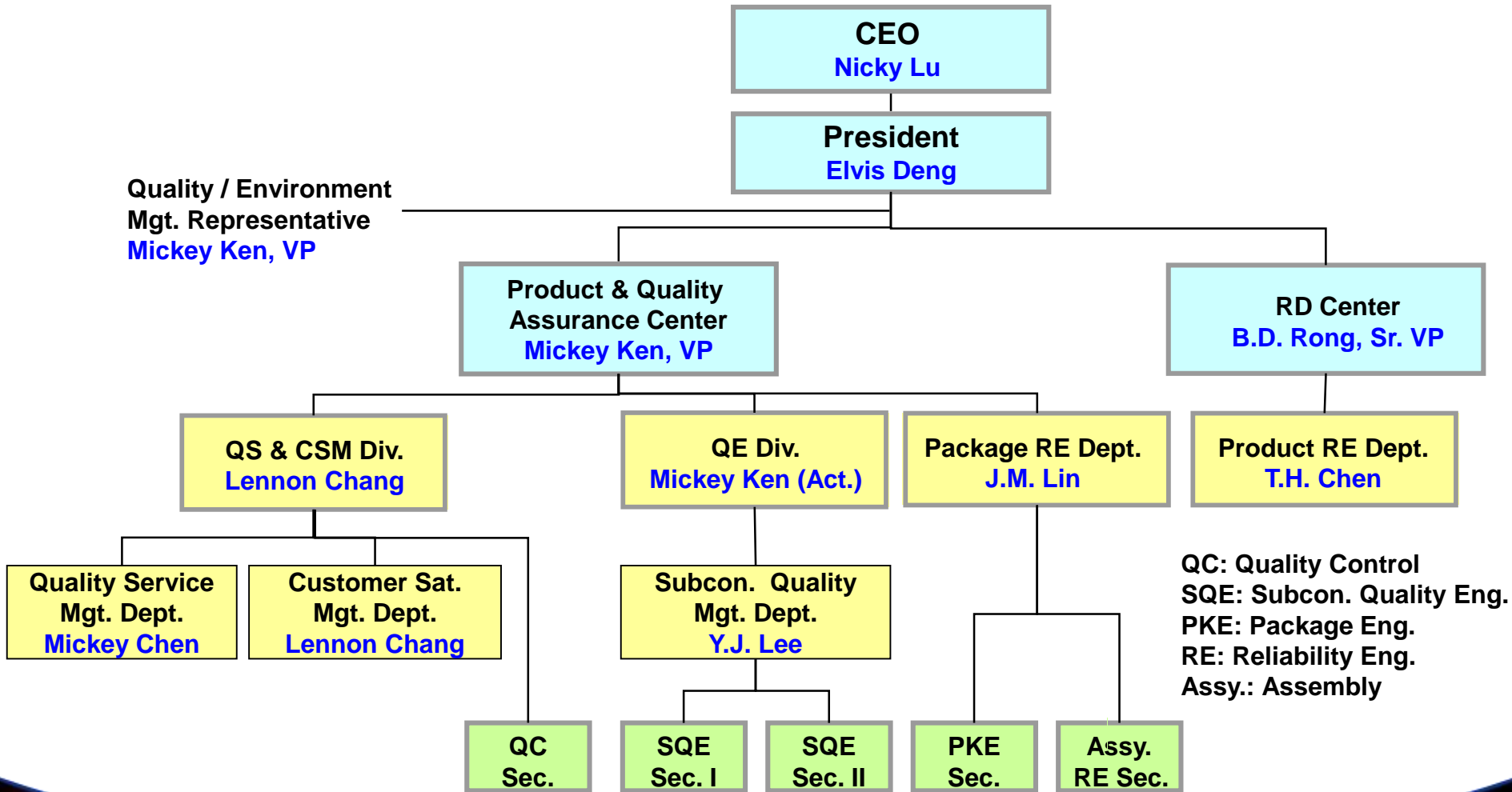
■ Quality Policy

- With a customer-oriented approach, all Etron employees strive to provide premium products and services on time, to continuously improve quality, and to achieve full customer satisfaction

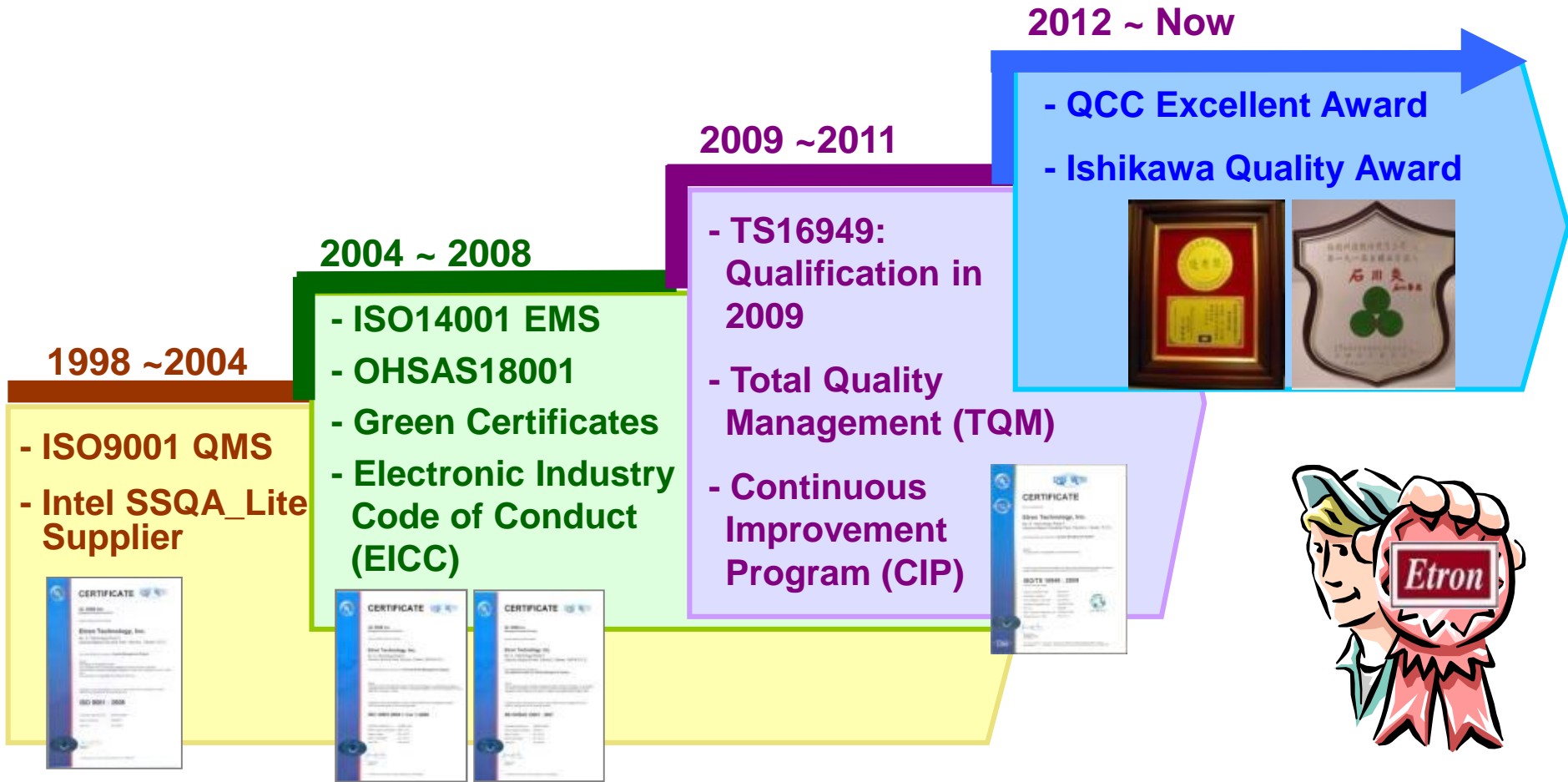
■ Objectives / Plan

- Define and deploy quantitative yearly KPI / PI goals with quarterly management review for continuous improvement

Quality / Reliability Organization



Quality Systems: Searching for Excellence



SSQA: Standardized Supplier Quality Assessment
 TS16949: Quality management system for Automotive



AEC-Q100 Compliance Grade-2/3

■ Coverage on All Products: A Series of Tests Standardized In AEC-Q100 and JEDEC Are Performed

– Assure better Quality & Reliability to meet the automotive requirements and standards

■ Etron Can Support Automotive Grade-2 & Grade-3 Products

No	Check Item	Test Method	JEDEC Sample Size	AEC-Q100 Sample Size	Commercial Level	Industrial Level	Automotive Grade 3/Grade 2
1	EFR	JESD22-A108 JESD47	1000 ea	800 X 3 Lots	0°C&70°C	-40°C&85°C	-40°C&85°C/-40°C&105°C
2	HTOL	JESD22-A108 JESD47	77 X 3 Lots	77 X 3 Lots	0°C&70°C	-40°C&85°C	-40°C&85°C/-40°C&105°C
3	HTST	JESD22-A103 JESD47	75 ea	45 X 1 Lot	25°C	25°C&85°C	25°C&85°C/25°C&105°C
4	Pre-Con	JESD22-A113 JESD47	300 ea	231 X 3 Lots	25°C	25°C&85°C	25°C&85°C/25°C&105°C
5	TCT	JESD22-A104 JESD47	75 ea	77 x 3 Lots	25°C	25°C&85°C	25°C&85°C/25°C&105°C
6	PCT	JESD22-A102 JESD47	75 ea	77 x 3 Lots	25°C	25°C&85°C	25°C&85°C/25°C&105°C
7	HAST	JESD22-A110 JESD47	75 ea	77 x 3 Lots	25°C	25°C&85°C	25°C&85°C/25°C&105°C
8	TH	JESD22-A101 JESD47	75 ea	-	25°C	25°C&85°C	-
9	Latch-up	JESD78 JESD47	6 ea	6 x 1 Lot	25°C	25°C&85°C	25°C&85°C/25°C&105°C
10	ESD (HBM)	JESD22-A114 JESD47	3 ea	3 x 1 Lot	25°C	25°C&85°C	25°C&85°C/25°C&105°C
	ESD (MM)	JESD22-A115 JESD47	3 ea	3 x 1 Lot	25°C	25°C&85°C	25°C&85°C/25°C&105°C
	ESD (CDM)	JESD22-C101 JESD47	3 ea	3 x 1 Lot	25°C	25°C&85°C	25°C&85°C/25°C&105°C

Grade 3: -40°C to 85°C; Grade 2: -40°C to 105°C

Comparison of Commercial/Automotive Grades

	Commercial	Automotive	Remarks
Application	TV, DVD, STB, Printer, Panel, etc.	Car Electronics	With different product part number
Ta temperature	0~70 degree C	-40~85 degree C (Grade 3) -40~105 degree C (Grade 2)	With different production flow, wafer selection, enhanced burn-in, and testing
PPM	Target < 200 ppm	Target < 10 ppm	
Reliability Standard & Specification	JEDEC	JEDEC AEC-Q100 Spec Customization	
Product Life	2~5 years	7~10 years	
FA Priority	Normal priority	24 hrs initial response Top priority	Discussable by case

AEC-Q100: Quality test procedure developed by the AIAG (Automotive Industry Action Group) for IC

Product Level Qualification

- Complete full product qualification before releasing for mass production, by following AEC-Q100 and JEDEC standards

檢驗項目 Inspection Item	檢驗條件 Inspection Conditions	數量 Quantity	批量 Lot	接受/退回 Accept/Reject	參考標準 Reference Standard
EFR	$>1.2 \cdot V_{int}$, $T_a=125^\circ\text{C}$	800	3	Predict 0.5~1year	AECQ100-008
				1000DPM	
OLT	$>1.1 \cdot V_{int}$, $T_a=125^\circ\text{C}$	77	3	1000H	JESD22-A108
				50FIT	
ESD	$\geq \pm 2\text{KV}$ (HBM) $R=1.5\text{K-ohm}$, $C=100\text{pF}$	3	1	0/1	AECQ100-002
	$\geq \pm 200\text{V}$ (MM) $R=0\text{K-ohm}$, $C=200\text{pF}$	3	1	0/1	AECQ100-003
	$\geq \pm 500\text{V}$ (CDM)	3	1	0/1	AECQ100-011
Latch-up	$V_{tr(+)} \geq 1.5 \cdot V_{cc}$ $V_{tr(-)} \leq -0.5 \cdot V_{cc}$ $I_{tr(+)} \geq 100\text{mA}$ $I_{tr(-)} \leq -100\text{mA}$	6	1	0/1	AECQ100-004

Package Level Qualification

- Complete full package qualification before releasing for mass production, by following AEC-Q100 and JEDEC standards

檢驗項目 Inspection Item	檢驗條件 Inspection Conditions	數量 Quantity	批量 Lot	接受/退回 Accept/Reject	參考標準 Reference Standard
HTST	Ta=150°C, 1000hrs	45	1	0/1	JESD22-A103
Pre-condition	Level III	Sum of HAST, PCT and TCT	3	0/1	JESD22-A113
HAST	V=Vmax, Ta=130°C, 85%R.H., 2.3atm, 96Hrs	77	3	0/1	JESD22-A110
PCT	Ta=121°C, 100%R.H., 2.0atm, 168Hrs	77	3	0/1	JESD22-A102
TCT	-65°C ~ +150°C, 500Cycles (air to air)	77	3	0/1	JESD22-A104

Note: PCT duration is 96H for BGA type product

Quarterly Product Reliability Monitor

- Product routine test after releasing for mass production, by following AEC-Q100 and JEDEC standards

檢驗項目 Inspection Item	檢驗條件 Inspection Conditions	數量 Quantity	批量 Lot	接受/退回 Accept/Reject	參考標準 Reference Standard
EFR	>1.2*Vint, Ta=125°C	800	3	Predict 0.5~1year 1000DPM	AECQ100-008
OLT	>1.1*Vint, Ta=125°C	77	3	1000H 50FIT	JESD22-A108
HTST	Ta=150°C, 1000hrs	45	1	0/1	JESD22-A103
Pre-condition	Level III	Sum of HAST, PCT and TCT	3	0/1	JESD22-A113
HAST	V=Vmax, Ta=130°C, 85% R.H., 2.3atm, 96Hrs	77	3	0/1	JESD22-A110
PCT	Ta=121°C, 100% R.H., 2.0atm, 168Hrs	77	3	0/1	JESD22-A102
TCT	-65°C ~ +150°C, 500Cycles (air to air)	77	3	0/1	JESD22-A104

Note: PCT duration is 96H for BGA type product
Routine monitor starts from the product shipment >150Kpcs/qtr

Through Semiconductor IC,
We Connect People to



Realize the Dream!



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