LOT ASSURANCE INSPECTION

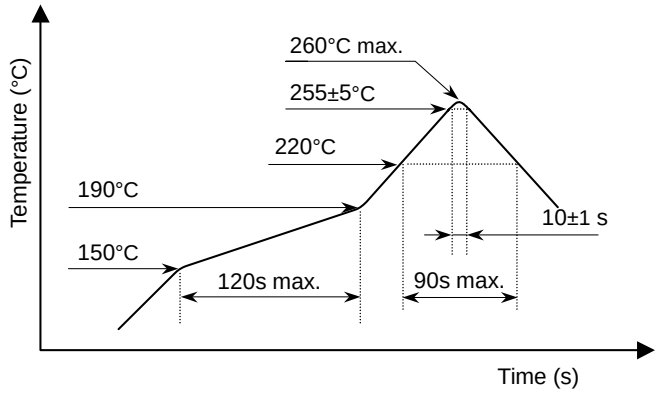
LOT ASSURANCE INSPECTION is performed to verify the quality every wafer process fabrication lot for quality assurance of initial reliability.

(For Power Management ICs)

№	TEST ITEMS		TEST CONDITION	SAMPLE SIZE	LTPD
1	High Temperature Operating Life Test		Ta=125℃ 40h	22	10%
2	Heat Treatment	Soldering Heat (TO-92 Package)	Ta=260℃ 10s Immersion in Solder Bath	22	10%
		IR Reflow (SMD Package)	Heating Profile (Fig-1) 3 times		
	USPCBT		Ta=125℃ RH=85% 16h		

< Test Period >
Basically, LOT ASSURANCE INSPECTION is performed every shipping lot. The test period will be change to the periodical monitoring when it is confirmed the good quality level.

Fig-1 HEATING TREATMENT CONDITIONOF INFRARED-RAY REFLOW



QUALITY ASSURANCE TEST INSPECTION

QUALITY ASSURANCE TEST is done for quality assurance of shipped products by using sampling inspection.

(For Power Management ICs)

№	DIVISION	TEST ITEMS	CRITERIA	AQL*2
1	Electrical	Heavy Defect	QAT Specification	0.065%*1
		Light Defect		0.15%
2	Appearance	Heavy Defect	Visual Inspection Criteria	0.25%
		Light Defect		0.65%

*1) Catastrophic Failures (short, open or functionally inoperative) AQL 0.065%
*2) AQL : ANSI/ASQC Z1.4-1993
Sampling Plans : Table Ⅱ-C-Single sampling plans for reduced inspection

PERIODICAL RELIABILITY MONITORING

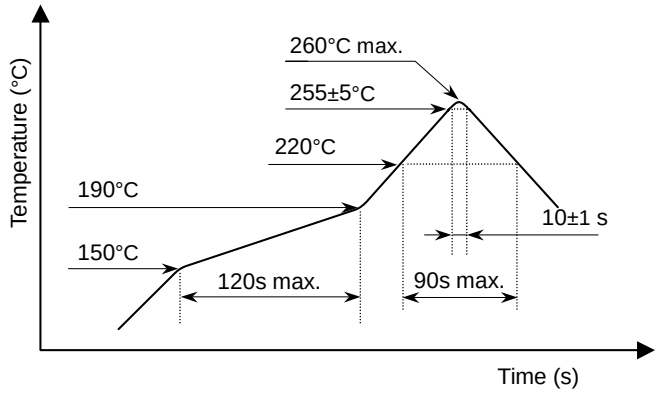
RERIODICAL RELIABILITY MONITORING is periodically performed to verify the products long-term reliability for process quality monitoring.

(For Power Management ICs)

№	TEST ITEMS	TEST CONDITION	Sample SIZE	Sampling	PERIOD
1	High Temperature Operating Life	Ta=125℃ DC 1000h	22	At least One item / process /package	Every month
2	High Temperature Storage	Ta=150℃ 1000h	22		
3	Temperature Cycle	Ta=-65～150℃ 100cycles	22		
4	Pressure Cooker Bias (USPCBT)	Ta=125℃ RH=85% DC 100h	22		

Pre-condition : 【SMD】 85℃ 85%RH 168h ＋ IR Reflow (Fig-1) 3times
【DIP】 85℃ 85%RH 168h ＋ Solder Dipping (260℃ 10s) Once

Fig-1 HEATING TREATMENT CONDITIONOF INFRARED-RAY REFLOW



№	TEST ITEMS	TEST CONDITION	Sample SIZE	Sampling	PERIOD
1	EM	Ta=200℃ AC	10	At least One item / process	Every month
2	TDDB	Ta=200℃ DC	30		
3	NBTI	Ta=125℃ VCC Max	5		

Note:
EM : Electro-migration
TDDB : Time Dependent Dielectric Breakdown
NBTI : Negative Bias Temperature Instability

HANDLING AND DESIGN GUIDELINES

1. Soldering

1-1 The surface temperature and exposure time should be kept as below.

MAX. Temp.	MAX. Time.	Applicable part.
260	10s	Lead
350°C	5s	Lead (when hand-soldering is necessary)
380°C	3S	Lead (when hand-soldering is necessary)

1-2 Don't use halogenous solder flux.

1-3 Recommended heating profiles are shown in Fig-1 and Fig-2.

1-3-1 Reflow profile

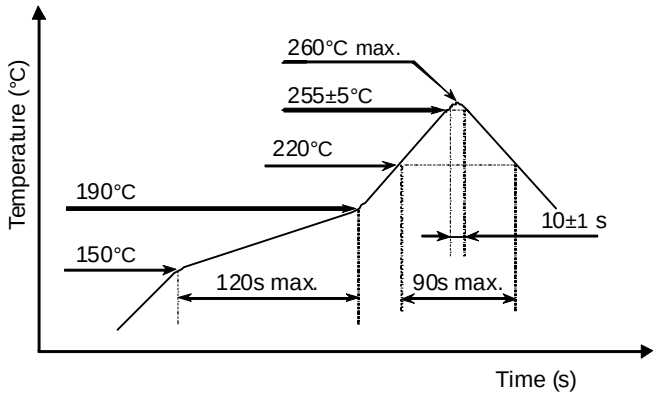


Fig-1 HEATING TREATMENT CONDITIONOF INFRARED-RAY REFLOW

1-3-2 Dip soldering

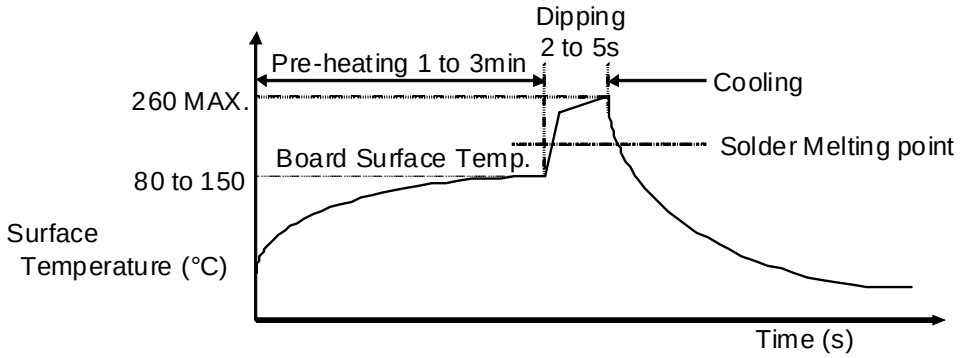


Fig-2: Dip Soldering

1-3-3 MSL (Moisture Sensitivity Levels)

The heating process is available three times. But it is recommended for less heat stress to devices that reflow times is minimized.

Humidification Conditions	Level		Storage time	Mainly Package
	JEDEC	JEITA		
85℃,85%,168h	1	A	Unlimited	SOT-23,SOT-89,SON,SC82/SC88,DFN
85℃,65%,168h	2	B	1year(*)	–
30℃,70%,672h	2a	C	4weeks(*)	SON-22(For RTC module)
30℃,70%,336h	-	D	2weeks(*)	–
30℃,70%,168h	3	E	168 Hours(*)	FBGA、QFP
30℃,70%, 96h	-	F	96 Hours(*)	–
30℃,70%, 72h	4	G	72 Hours(*)	–
30℃,70%, 48h	5	H	48 Hours(*)	–
30℃,70%, 24h	5a	I	24 Hours(*)	–
Specified individually	6	S	Time on Label(*)	–

(*) Baking: 125℃, 10h

1-4 The board cleaning conditions.

1-4-1 Alternative CFCs substitute for solvent is recommended.

Ex. ST-100s (Arakawa)

Don't use trichloroethylene, trichloroethane, etc.

1-4-2 Cleaning time should be less than 180s (including in solvent, in vapor and in ultrasonic bath).

1-4-3 Ultrasonic cleaning is usable

Frequency 28 to 40 kHz (resonant damage should be avoided)

Power 15W/liter (MAX.)

Time 60s (MAX.)

2. Storage

Please be sure to store devices in proper conditions to maintain device quality.

Ambient temperature	5 to 35°C
Humidity	less than 70% RH
Storage term	within six months

Please be sure to keep above conditions in order to minimize a V_{DET1} alteration through soldering process.

An outdoor storage should be prohibited because of a lot of change in temperature and humidity.

3. ESD handling precaution

The devices should be handled in the condition of greater than 40% relative humidity.