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Reliability Tests Report

Product Name: TK42A12N1
Package Name: TO-220SIS

1. Thermal tests

Test Item	Test Condition	Failure Size / Sample Size
Heat resistance (Flow)	Peak : 260 deg.C Immersion time : 10 s (Up to 1.5mm from the Root shall be immersed) Once	0 / 32
Heat resistance (Iron)	Temperature of the iron tip : 400 deg.C Time : 3 s Once	0 / 32
Temperature cycling	- 55 deg.C(30 min) to 150 deg.C(30 min) 100 cycles	0 / 50
-	-	-

2. Mechanical tests

Test Item	Test Condition	Failure Size / Sample Size
Solderability	Solder bath : Sn-Ag-Cu 245 deg.C , 5 s ,once (using Flux) Solder bath : Sn-Pb 230 deg.C , 5 s ,once (using Flux)	0 / 11
Lead integrity	Weight 10 N 0 deg. to 90 deg. to 0 deg. Bend , 3times	0 / 11
-	-	-
-	-	-
-	-	-

3. Life tests

Test Item	Test Condition	Failure Size / Sample Size
Steady state operation	Ta = 25 deg.C, PD = 2.0W ,1000 h	0 / 30
High temp. reverse bias	Ta = 150 deg.C, VGS = 20V ,1000 h	0 / 30
High temp. storage	Ta = 150 deg.C ,1000 h	0 / 30
High temp. high humidity storage	Ta = 85 deg.C, RH = 85% ,1000 h	0 / 30
Pressure cooker test	Ta = 121 deg.C(203kPa)(Unsaturated) ,96 h	0 / 20
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Estimated Failure Rate

Product Name	Estimated failure rate
TK42A12N1	0.14 Fit or less

Above estimated value is determined with the standard operation under the general environment:*

*The general environment here means the conditions of Tj = 55 degree C and no application of surge and so on.

The Estimated Failure Rate contained herein represents the result of our internal product reliability tests, and is provided for your reference only.
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Heat-resistant Mounting Conditions

Product Name: TK42A12N1
Package Name: TO-220SIS

1.Flow

Number: Only once
Solder temperature : 260 deg.C maximum
Soldering time : Within 10 seconds
Preheat : 150 deg.C , 60 to 120 seconds
NOTE: Apply up to stopper part or point 1.5 mm or more far from the body of device.

If the double-wave method is used, keep the total dwell time for a first bath and a second bath within 10 seconds.

Preheating conditions are based on the surface temperature of the PWB by the solder mounting side.
(When the PWB surface by the device side is preheated, its condition should not exceed the maximum storage temperature of a device.)

2.Others

We urge you to verify well before mounting to assure enough solder joint strength.

The information above is just the heat-resistance mounting conditions set.
It does not provide a warranty for possibility of mounting.

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Moisture Absorption Control Level (Moisture Sensitivity Level)

Product Name : **TK42A12N1**
Package Name : **TO-220SIS**

The concept of the moisture sensitivity level does not apply because this is a through-hole mount device.

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Electrostatic Discharge Test

1.Type of product TK42A12N1

2.Test condition

C=100pF, R=1.5kohm, application times:3
[Referred standard: JEITA ED-4701]

3.Test result

Sample Quantity	Failure	
	+/-1900V	+/-2000V
10 pcs	0 / 10	4 / 10

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Protective Measures for Static Electricity

1.Storage

(1) The storage area temperature should be kept within a temperature range of 5 to 35 degrees, and relative humidity should be maintained between 45 and 75%

(2) Use anti-static containers, and do not allow external forces or loads to be applied to devices while they are in storage.

2.Transportation

(1) When transportation of plastic package devices, avoid friction between the devices and other polymeric compounds.

(2) Use anti-static containers for transportation.

3.Handling

(1) Floors, workbenches, conveyors, and floor mats must be grounded to earth to prevent accumulation of static electricity. Especially, workbenches which are in direct contact with devices and conductive floor mats must be always grounded to earth.

(2) Measurement instruments, jigs, must also be grounded to earth.

(3) Operators must wear anti-static work clothes and conductive shoes, as well as a wrist strap to have their bodies grounded to earth.
(This wrist strap must be grounded through a resistor of about 0.5 to 1M ohms for human body protection purposes.)

(4) Pack devices in anti-static containers.
Use carrying boxes made of conductive materials.

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Latch-up test

1 Type of product

TK42A12N1

2 Latch-up test

This product cannot occur latch-up phenomenon, therefore latch-up test is not performed.

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General Storage

1) Avoid storage locations where semiconductor products may be exposed to water (wet, rain, dew condensation, etc.) or direct sunlight.

2) Follow the precautions printed on the packing label for transportation and storage.

3) Keep the storage location at temperature and relative humidity within a range of 5°C to 35°C and 45% to 75%, respectively.

4) Do not store the products in locations with poisonous gases (especially corrosive gases) and/or in dusty conditions.

5) Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause dew condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of leads.

6) When restoring semiconductor products after removal from their packing, use anti-static containers.

7) Do not allow loads to be applied directly to semiconductor products while they are in storage.

Always store the Product in accordance with the General Storage conditions forth above.
In the event the Product is stored otherwise, the applicable product warranty, if any, is void.

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CAUTIONS IN BOARD CLEANING PROCEDURE

The Cleaning of general semiconductor products should be taken for flux removal after soldering process with giving attention as followings :

1. Flux cleaning should be completed free of residual reactive ion such as Na, Cl, etc.

   Some organic solvents react with water to generate hydrogen chloride and other corrosive gases which can result in semiconductor-product deterioration.
   Also, if the cleaning solution contains any contaminants (flux-derived halogen, etc.) that were dissolved during cleaning, can result in semiconductor-product deterioration.

2. HANDLING

   Effective solvent seriously affects mark ink and resin. Operators should be careful so as not to scrub the indication mark surface with a brush or their hands when cleaning and cleaning solvent is on semiconductor products. The indication mark is erased, as the case may be.

   Washing should be performed at your own discretion, utilizing information from detergent manufacturers.

3. ULTRASONIC CLEANING

   Ultrasonic cleaning, that provides effective cleaning for short time, much affects on the semiconductor product.
   Avoid use of ultrasonic cleaning with semiconductor products in hermetically sealed ceramic packages, since resonation phenomenon to shorten the life time and catastrophic destruction occurs by some complicated factors such as the cleaning bath size, output of ultrasonic transducer, setting condition on the printed circuit board, etc.
   Even if a Non-hermetic seal type (plastic package), keep the duration of ultrasonic cleaning in a brief time. Long hours of ultrasonic cleaning may deteriorate the adhesion between the mold resin and frame material.

   RECOMMENDED CONDITION OF STANDARD ULTRASONIC CLEANING

Frequency	:	27 to 29 KHz
Ultrasonic output	:	0.15W / cm2 or less
Cleaning duration time	:	30 seconds or less

   Suspend the printed circuit board in the solvent bath to ensure that the circuit board and semiconductor products do not come in direct contact with the ultrasonic vibrator.

The cleaning condition contained in CAUTIONS IN BOARD CLEANING PROCEDURE is provided for your reference only.

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