ASAHI KASEI MICRODEVICES
QUALITY ASSURANCE CENTER

HW-101A4T Quality Data

1. Packing Specification
2. Reliability Test Data
3. ESD Test Data
4. Country Origin
5. Soldering Methods and Handling Precautions
6. Package Cross Section
7. Failure Rate Estimation
8. Land Pattern for reference
9. Mounting Related Test Data

* The marking and dimensional drawings of our product described in this document (hereinafter referred to as the "Product") are shown in the datasheet of the Product. For any other information regarding Product not shown in this document, please make inquiries the sales office of us or authorized distributors.

Asahi Kasei Microdevices
Quality Assurance Center

梱包仕様書　Packing Specification

◆テーピング　Taping

HW-101A-4Ｔ型ホール素子は、テーピング包装（3,000個／リール）にて納入致します。
Hall Element HW-101A –4T is supplied in the reel tape, which contains 3,000pcs. per reel.

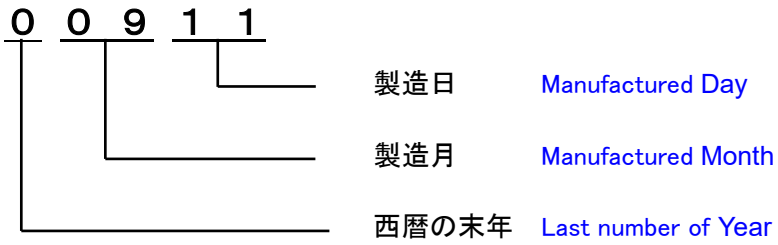
◆ラベル表示　Label

下記のようなラベルをリールに貼ります。
The following label is attached to every reel.

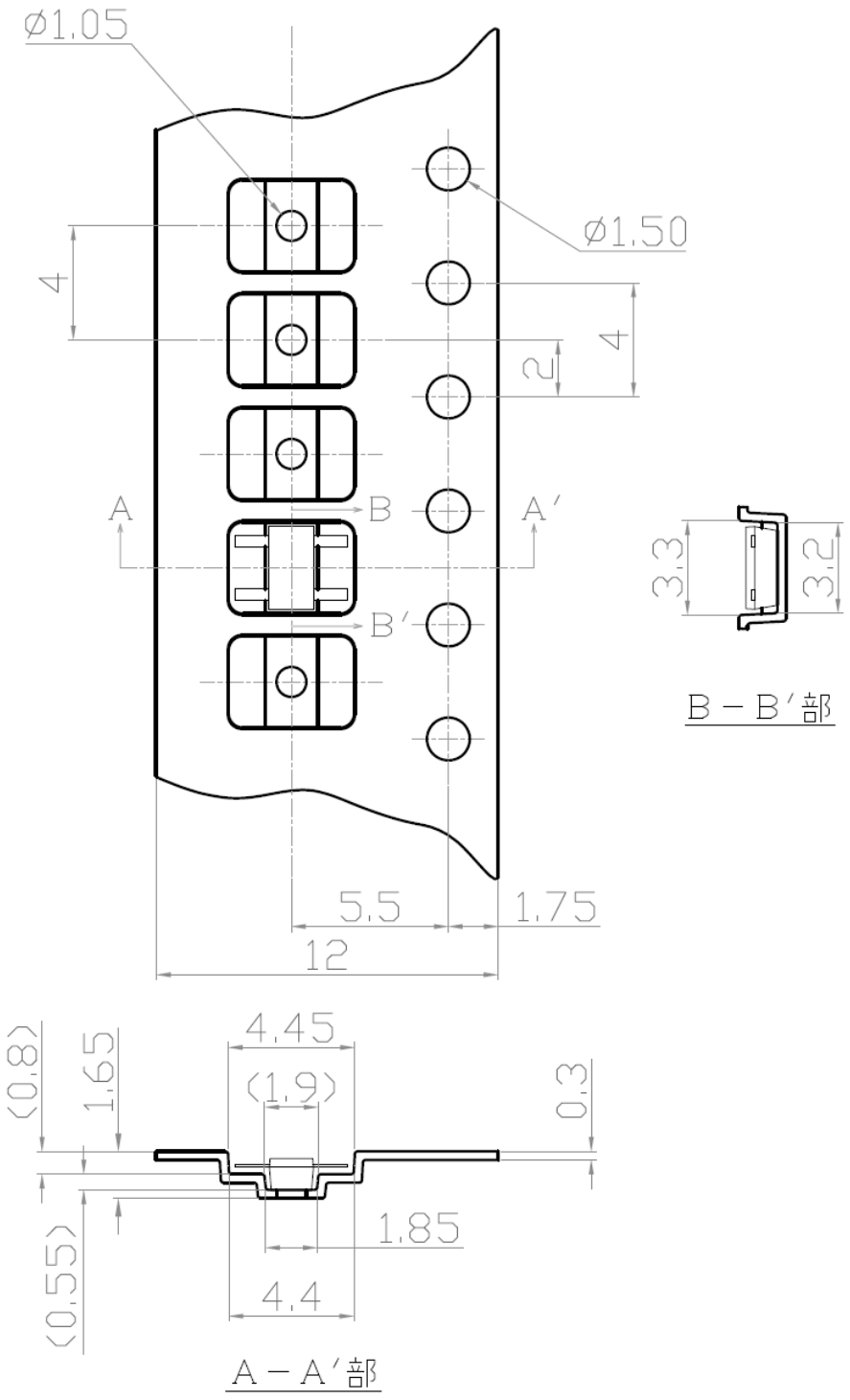
品　　名 *1	ＨＷ－１０１Ａ	感度 *2	Ｅ
ロットNo. *3	００９１１		
数　　量 *4	３０００	リード *5	４Ｔ

*1 Product ID
*2 Sensitivity Rank
*3 Lot No.
*4 Quantity
*5 Lead type

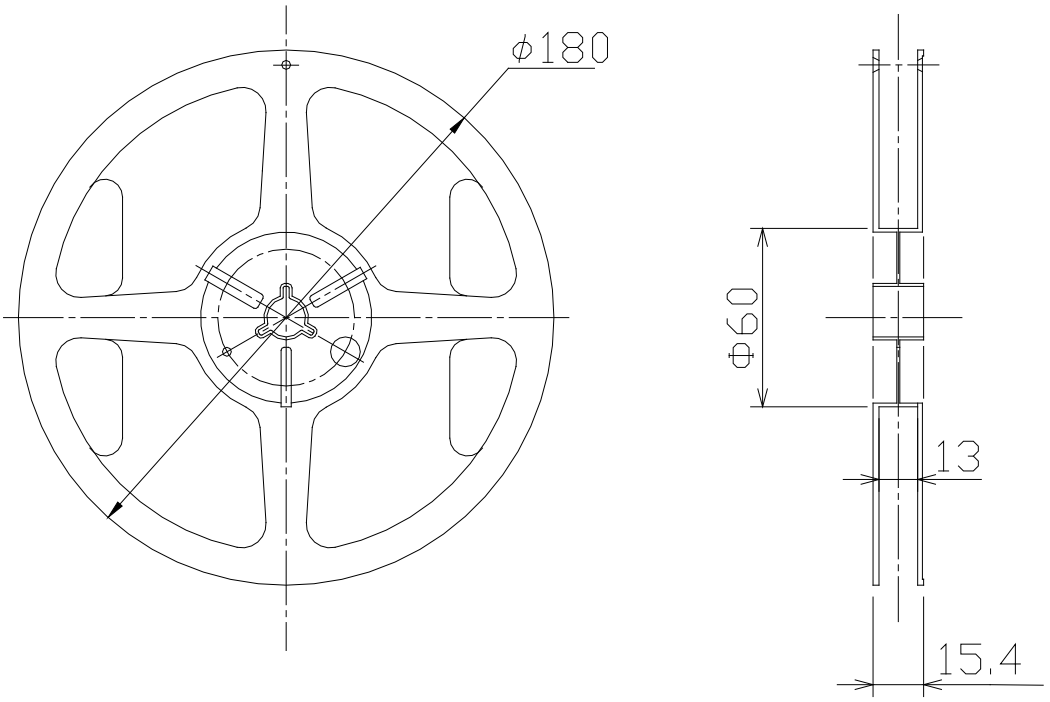
ロット番号の見方 Meaning of Lot No.

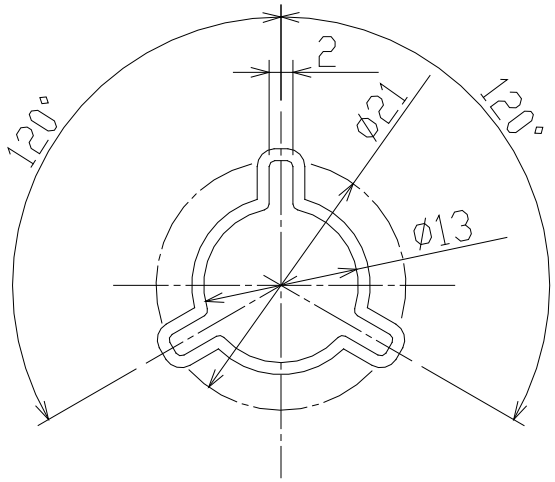


◆キャリアテープ寸法 Carrier Tape（Unit：mm）



◆キャリアテープ用リール寸法　Reel Dimensions　(Unit: mm)





軸芯部詳細

Detail of the hub

◆納入梱包形態　Packing

1．リールは内箱に収納します。内箱にはリールを最大４巻まで収納します。
内箱に収納するリールが３巻以下の場合は、隙間に帯電防止仕様の緩衝材を詰めリールを固定します。
Reels are put in an inner box. An inner box contains Max. 4 reels.
When an inner box contains less than 4 reels, antistatic cushions are put in inner box to fix reels.

●内箱サイズ一覧　Inner Box Size　(3,000pcs/reel)

内箱サイズ Box Size	寸法(mm) Dimensions	最大入り数 Max Quantity
Small	225×250×30	6,000pcs (2 reels)
Regular	180×180×60	12,000pcs (4 reels)

2．内箱は外箱に収納します。外箱は出荷量に応じて下表のいずれかのものを使用します。
Any of the outer boxes in the below table is used to contain inner boxes depending on the quantity.

●外箱サイズ一覧　Outer Box Size

外箱サイズ Box Size	寸法(mm) Dimensions	最大入り数(内箱) Max. Quantity (Inner Box)	最大入り数 Max Quantity
Small (Type F)	260×234×68	1	12,000pcs (　4 reels)
Small (Type D)	265×265×140	2	24,000pcs (　8 reels)
Regular (Type C)	265×265×235	5	60,000pcs (20 reels)
Regular (Type B-2)	368×268×190	8	96,000pcs (32 reels)
Regular (Type B-3)	364×330×185	10	120,000pcs (40 reels)
Large (Type A-1)	464×260×380	18	216,000pcs (72 reels)
Large (TypeA-3)	364×330×365	20	240,000pcs (80 reels)
Large (Type A-大)	540×270×416	24	288,000pcs (96 reels)

3．梱包部材一覧　Components for Packing

部材 Component	材料 Material	備考 Comment
内箱 Inner Box	段ボール Corrugated Cardboard	
外箱 Outer Box	段ボール Corrugated Cardboard	
緩衝材 Cushion	ポリエチレン Polyethylene	帯電防止 antistatic
包装用テープ Packing Tape	ポリプロピレン Polypropylene	

Asahi Kasei Microdevices
Quality Assurance Center

HW101A4T Reliability Test Data

PACKAGE TYPE : SC-59 4PIN

	TEST	CONDITION	S.S.	TEST RESULT MEASUREMENT TIME POINT / FAILURES	PASS-FAIL RESULT
1	HIGH TEMP. OPERATING LIFE	Ta=125°C DYNAMIC Vopr=Voprmax	22	500: 0 / 1000: 0 (h)	PASS
2	REFLOW	BAKE: 125°C/24h SOAK×1+REFLOW×3 SOAK: 85°C/85%RH/168h REFLOW: 260°C Max	66	ALL PASS	PASS
3	HIGH TEMP. STORAGE	(AFTER REFLOW TEST) Ta=150°C	22	500: 0 / 1000: 0 (h)	PASS
4	TEMP. CYCLING	(AFTER REFLOW TEST) Ta: -65~150°C SOAK: 30 min EACH	22	200: 0 / 500: 0 (CYCLE)	PASS
5	TEMP. HUMIDITY STORAGE	(AFTER REFLOW TEST) Ta=85, RH=85%	22	500: 0 / 1000: 0 (h)	PASS

Results by this product: No.1～No.5

Results by generic devices: -

Asahi Kasei Microdevices
Quality Assurance Center

ESD Test Data

１．Grade

ＨＷ－１０１Ａ

２．Test Condition（Reference standard ＥＩＡＪ ＥＤ－４７０１）

Ⅰ．Machine Model

Capacitor	:	２００〔ｐＦ〕
Resistance	:	０〔Ω〕
Switching Time	:	±１ time

Ⅱ．Human Body Model

Capacitor	:	１００〔ｐＦ〕
Resistance	:	１．５〔ｋΩ〕
Switching Time	:	±3 times

Ⅲ．Machine Model,Human Body Model

Test Pin	:	Discharge between terminal 1 and terminal 2
Ambient Temperature	:	２５〔℃〕
Interval	:	１〔sec〕

３．Test Machine

Electrical Discharge Test Machine： Ｎｏｉｓｅｋｅｎ ＥＳＳ－６０６Ａ

４．Criteria

⊿Rin、⊿Rout and ⊿Vh are within ±20%、Vu is within ±12mV

５．Test Result

Ⅰ．Machine Model

Voltage[V]	150	200	250	300
NG Number/Test Number	0/5	0/5	2/5	2/5

Breakdown Voltage : 250[V]

Ⅱ．Human Body Model

Voltage[V]	2000	2200	2400	2600
NG Number/Test Number	0/5	1/5	1/5	2/5

Breakdown Voltage : 2200[V]

Asahi Kasei Microdevices
Quality Assurance Center

Country of origin of the HW-101A4T

Origin: Japan

Asahi Kasei Microdevices
Quality Assurance Center

Soldering Methods (Solder Paste: Pb Free) and Handling Precautions

When plastic surface-mount-device product (hereinafter, “product”) which is including excessive amount of moisture is put in the soldering furnace, package cracks may possibly occur in it.
AKM’s recommendations regarding soldering method are as below.

1. MSL

This product is worth MSL1. (JEDEC J-STD-020)

2. Storage Conditions

Store this product under the following conditions.
Shelf Life: 60 months from the bag seal date. (The seal date is indicated on the bar code label.)
Storage Conditions: 5~30°C, <85%RH (Recommended to use the product within 1 year after delivery.)
When the products are kept for a long term (more than 1 year after delivery) until soldering, they shall be put in a sealed container with desiccants to prevent the terminal-lead degradation.

3. Soldering Conditions

Please give your consideration on soldering conditions of the products. For reference, AKM presents soldering methods as below. And please check the results of solderability.

- Soldering Methods : IR or Air Reflow (Flow Soldering is not recommended)
- Reflow Times : up to 3 times
- Reflow Profile : Refer to Fig.1

Preheat/Soak	T_{smin}	150°C
	T_{smax}	200°C
	T_{smin} to T_{smax}	60~120s
Liquidous Temperature	T_L	217°C
	t_L	60~150s
Ramp-up Rate	T_L to T_p	3°C/s max.
Peak Package Body Temperature	T_p	260°C max.
	t_p	30s max.
Ramp-down Rate	T_p to T_L	6°C/s max.
Time 25°C to Peak Temperature	25°C to T_p	8min max.

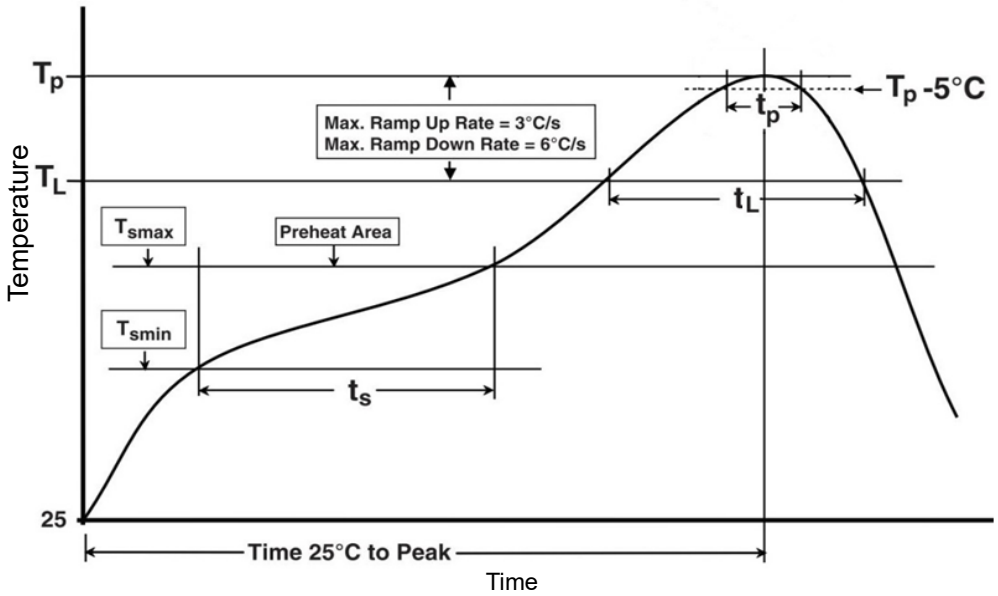


Fig.1 Temperature Profile (Pb Free Solder)

4. Handling Precautions

(1) Mounting and repair using a soldering iron

According to the general standard for the soldering heat resistance test of semiconductor devices, the temperature of the terminals should be 260°C for 10 seconds or 350°C for 3.5 seconds when heating the solder. If the soldering temperature is high and the time is long, the temperature of the device may rise excessively, which may cause deterioration or destruction.

Carry out sufficient evaluation and use appropriate conditions.

(2) Flux types and cleaning methods

Rosin-based flux (RMA: Mildly Activated Rosin base) is recommended for use during soldering. The flux should be selected with due consideration for the environment and safety.

We recommend the use of general cleaning agents such as quasi-waterborne, hydrocarbon-based, or alcohol-based agents.

We also recommend the use of alcohol-based cleaning agents, which are environmentally and safely safe.

(3) Underfill

We do not recommend the use of underfill.

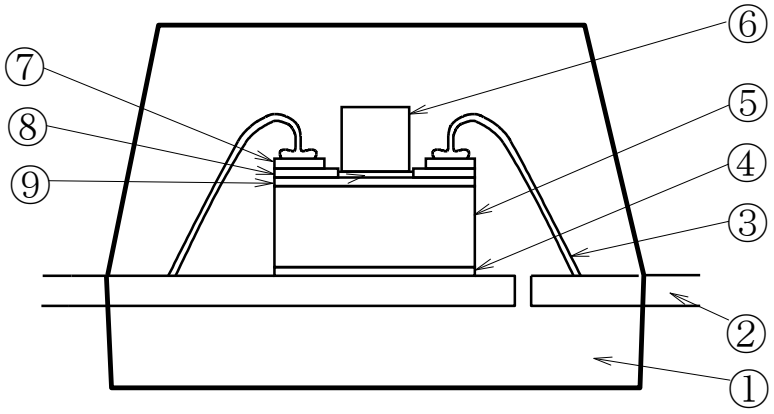
If underfill is to be used in BGA or WL-CSP packages, please evaluate it thoroughly by the customer.

(4) Static Electricity and Electrostatic Discharge

ESD (Electro-Static Discharge) destruction is different from EOS (Electrical Overstress) destruction that occurs during normal operation in that it can also occur before the device is mounted. For this reason, take care during the packing, storage and transportation of semiconductor devices.

Asahi Kasei Microdevices
Quality Assurance Center

HW-1xxA パッケージ断面図
Package Cross Section of HW-1xxA



No	名称 Component	材質 Material	備考 Comment
①	モールド樹脂 Mold Resin	エポキシ樹脂 Epoxy Resin	
②	リード Lead	銅合金 Cu alloy	
	端子めっき Lead Plating	スズ Sn (100%)	
③	ワイヤー Wire	金 Au	
④	ダイボンド樹脂 Die bonding resin	銀 Ag	
	ホール素子ペレット Hall element pellet		
⑤	基板 Substrate	フェライト Ferrite	
⑥	収束チップ Magnetic flux concentrator	フェライト Ferrite	
⑦	ボンディングパッド Bonding pad	金 Au	
⑧	銅電極 Cu electrode for ohmic contact to InSb	銅 Cu	
⑨	センサー膜 Sensor layer	インジィウムアンチモン InSb	
	マーク Mark		レーザ Laser

Asahi Kasei Microdevices
Quality Assurance Center

Failure Rate Estimation of Hall Element HW-Series

1. Basic Data for Estimating FIT and MTTF
   - Activation energy: E=1.52[eV]
   - Data from reliability test (High Temperature Bias Test):
     Ta=125[℃]、N=2300[pcs]、T=1,000[hr]
     Number of Failure=0[pcs]

On the basis of the above basic data, we estimated calculational failure rate as follows.

2. Estimated Internal Temperature and Accelerating Factor

If the conditions for actual use are Ta=60[degree] and Ic=10[mA]（Derating upper bound）, the internal temperature will be 72.6[degree].

On the other hand, when the conditions for High Temperature Bias Test are Ta=125[degree] and Ic=6[mA], the internal temperature will be 127[degree].

This means that the accelerating factor at 127[degree] calculated from 73[degree] will be as follows:

$$K=\mathrm{Exp}\{(1/(273+73)-1/(273+127))\times E/k\}$$
$$=1071.4(\text{times})$$

k[eV/K]: Boltzmann constant ($8.62*10^{-5}$)

3. Estimation of FIT and MTTF

Calculated from the above data, FIT of HW-Series, under the conditions of Ta=60[degree], Ic=10[mA], and reliability standard of 60%, would be as below.

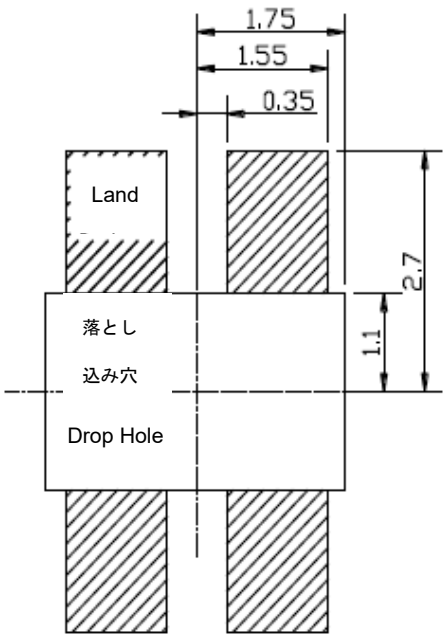
Fit: $0.917/(2300\times1000\times1071.4)=0.37\times10^{-9}$

MTTF: $(2300\times1000\times1071.4)/0.917=2.69\times10^{9}$ (h)

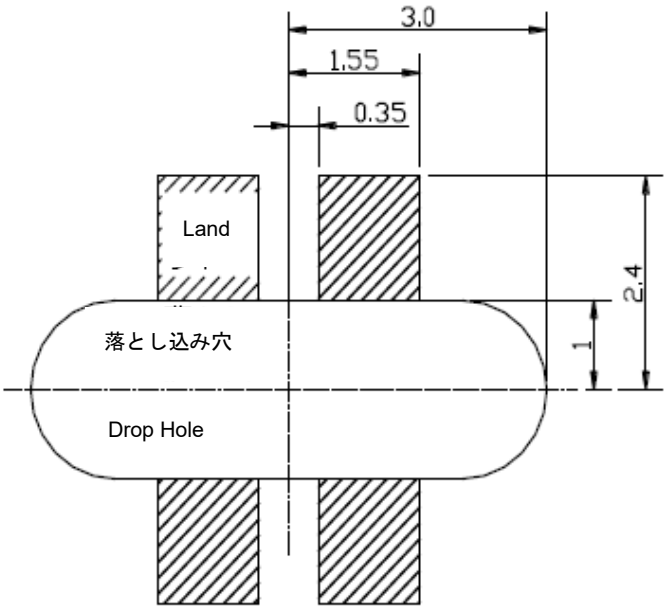
Ambient Temp（degree）	80	60	40
Accelerating Factor	92.7	1071.4	13995.1
Fit (Fit)	4.3	0.37	0.03
MTTF（h）	2.32×10^{8}	2.69×10^{9}	3.51×10^{10}

◆ 参考ランドパターン図　Land Pattern for reference (Units: mm)

HW-101A（4T/FU）



基板厚み　Board Thickness　1.6　[mm]



基板厚み　Board Thickness　1.6　[mm]

HW-101A4T Mounting Related Test Data

LEAD PLATING : Sn100%
PACKAGE TYPE : SOP 4PIN

TEST	CONDITION	S.S.	RESULTS / FAILURES
SOLDERABILITY	Before solderability test: 105℃／100%RH／4h Pb free Solder : Sn-3.0Ag-0.5Cu Solder Temp Ts=240°C Test condition : Solder wetting time test by wetting balance method with solder paste (EIAJ ET-7404) Criteria : Solder wetting time should be 3 seconds or less.	5	Pass Wetting Area: Over 95% Zero Cross Time: Within 3s
WHISKER	Temperature humidity storage 85℃,85%, 3000hrs storage Criteria : Plated surface condition before and after the tests can be observed under a microscope (500x magnification)	22	PASS (Whiskers are not observed)
	Room Temp Storage Room Temperature, six months storage Criteria : Plated surface condition before and after the tests can be observed under a microscope (500x magnification)	22	
	Temperature cycle -50℃／150℃, 3000cycles Criteria : Plated surface condition before and after the tests can be observed under a microscope (500x magnification)	22	

The data above is based on the test results of generic devices of HW-1xx.