Specification of Ultrasonic Transducer

Issued Date: 15th March, 2017

Version No.：V1.5

Product description: 300 KHz multi feed ultrasonic sensor

HTW Part No.：HT-300PLT/R10081

The product specification in this sheet is for reference only. The contents of this specification are subject to change.

You are requested to receive the latest specification and to return one copy of the specification to us with your receipt signature before going into mass production.

Division 2 of Sensor Department
Division 2 of Sales Department

Addr: C3, Moulding Tool Industry Park, West Hi-Tech Zone, Chengdu, China
Tel: 028-66348359   Fax: 028-87980486   Email: michael@htw-sensor.com
Web: en.htw-sensor.com   cdhto.en.alibaba.com   www.globalsources.com/htw.co

Specification of Ultrasonic Transducer

Type: HT-300PLT/R10081

1. Scope

This product specification is applied to ultrasonic transducer used for multiple sheet feed detection that is inserted between transducers. Please contact us when using this product for any other applications than described in the above.
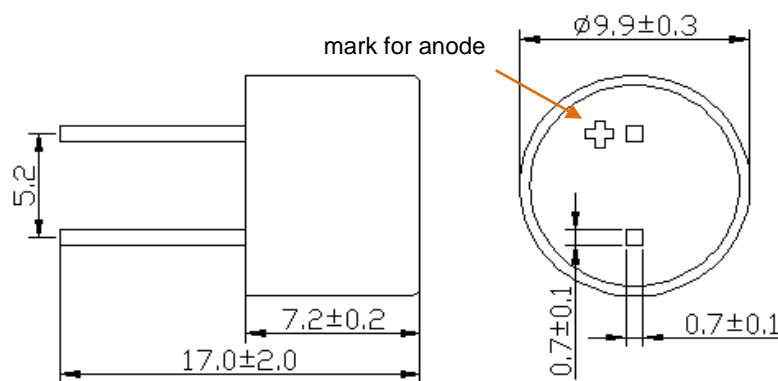
2. Part Number

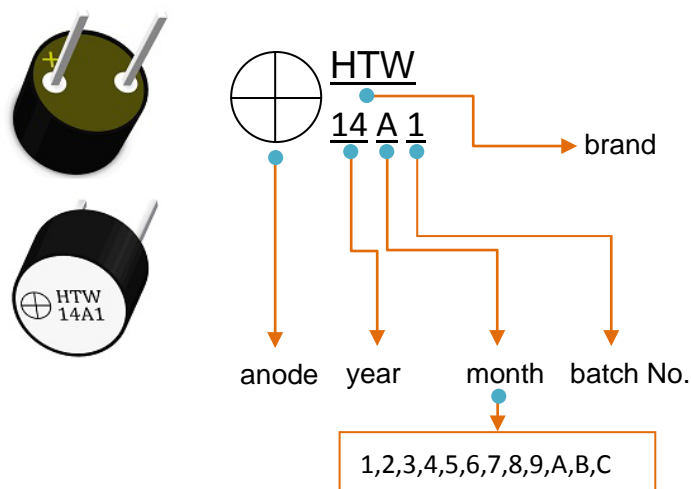   2-1   HTW part number: HT-300PLT/R10081
   2-2   Customer part number:
   2-3   Customer drawing number:

3. Dimension

(Fig. 1)

4. Marking

(Fig. 2)

5. Specifications

Item	Specification	Test condition
Operation frequency（kHz）	300±10%	Impedance Analyzer
Echo wave Voltage (V)	≥1.5V	HTW testing device
Distance to target plate（mm）	100	Stainless steel plate100mm×100mm
Directivity (deg)	Typ.7	Half power, -6dB
Cap. (pF)	1300±20%	Capacitance meter
Insulation Resistance (MΩ)	100	100VDC
Pulse interval（μs）	3.33	
Receiving circuit gain（dB）	60	
Housing	Black NYLON	
Weight (g)	1	
Operating temperature range（℃）	-20—+80	
Storage temperature range（℃）	-20—+80	
Operating humidity range（%RH）	≤90	
Storage humidity range（%RH）	≤90	

6. Test method of echo wave voltage/decay time

6-1 Equipments
a) Digital storage oscilloscope
b) Testing circuit board (HTW testing device)
c) DC regulated power source（12V）

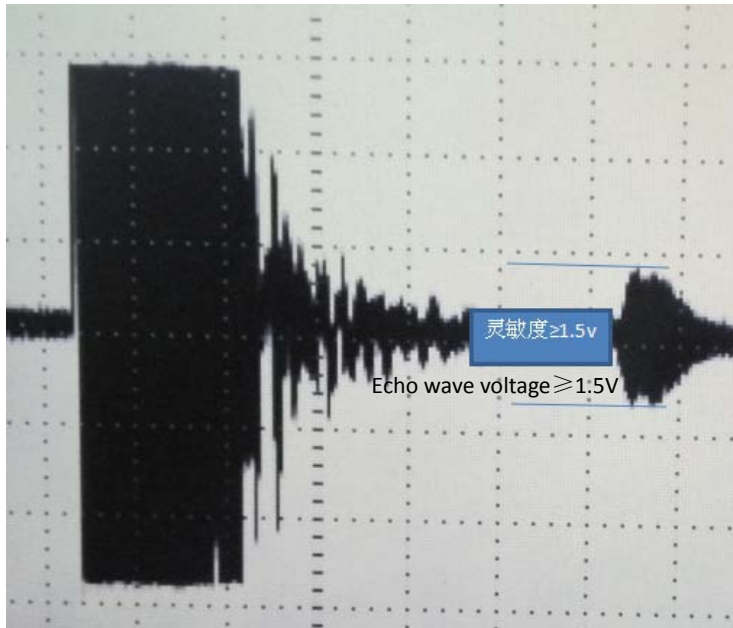6-2 Connecting ways of equipments：
a) Connect the DC 12V power source to the testing circuit board;
b) Connect the signal wire to oscilloscope;
c) Install the sensor as shows in Fig. 4

6-3 Digital storage oscilloscope setting
a) Set coupling of CH1 as DC, voltage as 1V/div；
b) Time axis = 250μs/div;
c) Set signal source as CH1, and slope descending。
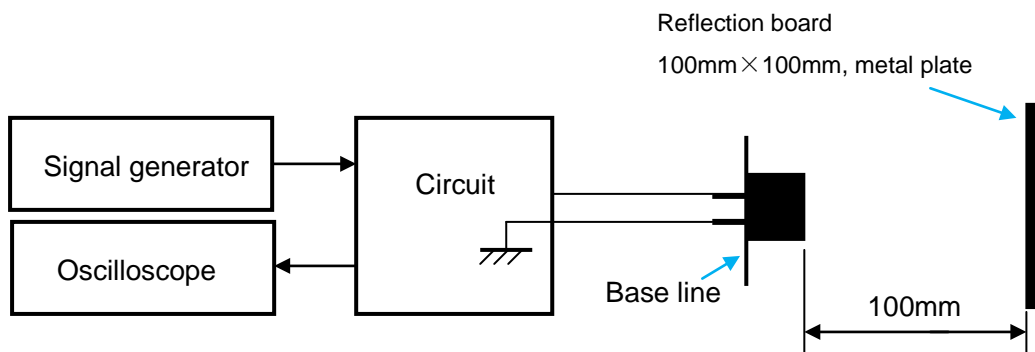
6-4 Oscillogram
Read the value of echo wave voltage

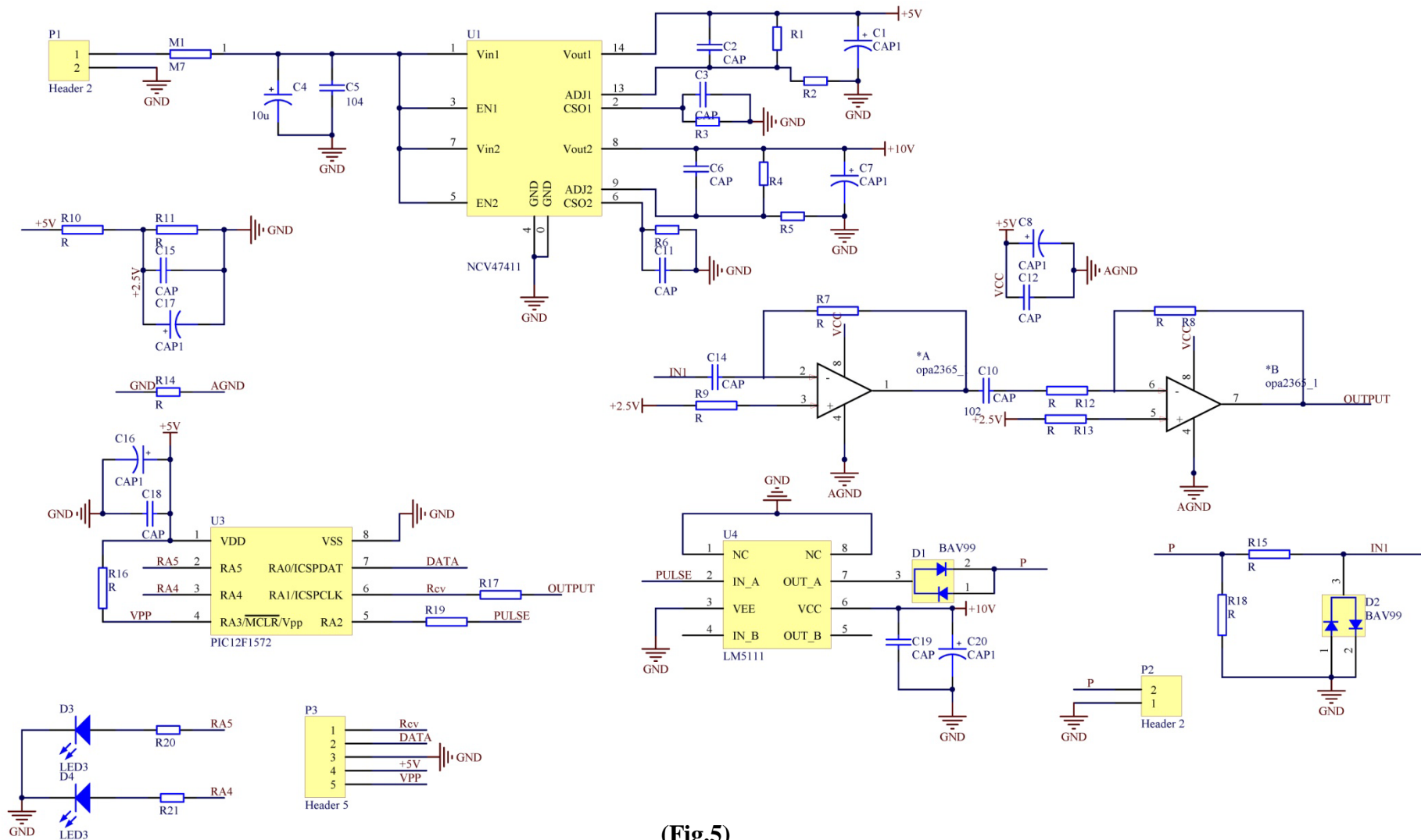Addr: C3, Moulding Tool Industry Park, West Hi-Tech Zone, Chengdu, China
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Web: en.htw-sensor.com   cdhto.en.alibaba.com   www.globalsources.com/htw.co

(Fig. 3)

6-5 Test system

6-5.1 Test system schematic

Reflection board

100mm×100mm, metal plate

Signal generator

Oscilloscope

Circuit

Base line

100mm

(Fig. 4)

6-5.2 Circuit diagram

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(Fig.5)

6-5.3 Driving signal

```
Frequency f=300kHz
 Rectangular wave
    Pulse n=5
```

10Vp-p
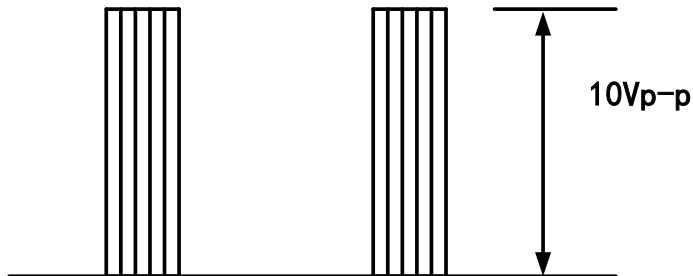
(Fig. 6)

7. Directivity (Reference only)

Typ.7°

15°   15°

30°   30°

45°   45°

60°   60°

75°   75°

90°   90°

-6dB   -24dB   -36dB   -42dB   -30dB   -18dB
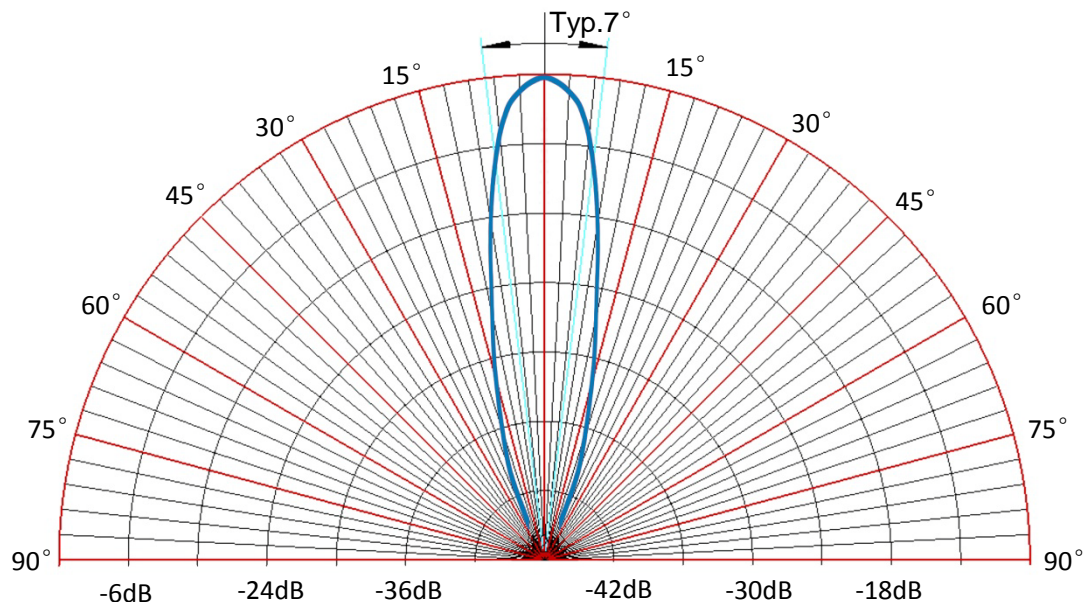
(Fig. 7)

8. Notice in test

a) Sensor face should be clear away from greasy dirt, dust, or other impurity..

b) The sensor is applicable only in air or neutral gas.

c) Only alcohol cotton ball is allowed to clean up sensor face.

d) Standard test condition: temperature 24±4℃, humidity 45%~75%，

9. Environmental tests

9-1 Working in normal condition
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

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Working frequency: 300 KHz
Pulse interval: 30ms
Peak voltage: 120Vp-p
Time: 240 hours

9-2 Vibration Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Vibration at sweeping frequency: from 20Hz to 200Hz for 96 hour
Sweep period: 15 min
Acceleration: 43.12 m/s^2 (4.4G)

9-3 Drop Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Height: 1±0.01 meter onto concrete floor
Times: 3 times

9-4 High Temperature Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Temperature: +80 ± 2℃
Time: 240 hours

9-5 Low Temperature Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Temperature : -40 ± 2℃
Time: 240 hours

9-6 Humidity Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Temperature: +60 ± 5℃
Humidity: 90 to 95 % R.H.
Time: 240 hours

9-7 High temperature & high humidity Test
After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.
Temperature: +75 ± 2℃
Humidity: 85%R.H.
Input voltage: 120Vp-p
Pulse interval: 30ms
Frequency: 300KHz
Time: 240 hours

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9-8 Heat Cycle Test

After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature: +80 ± 2℃, 30 minute

　　　　　　 -40 ± 3℃, 30 minute

Cycles: 100 cycles

9-9 Endurance Test

After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

a) Temperature: +70 ± 3℃

　　Input voltage: 120Vp-p

　　Frequency: 300 KHz

　　Pulse interval: 30ms

　　Time: 500 hours

b) Temperature: -40 ± 2℃

　　Input voltage: ≤120Vp-p

　　Frequency: 300 kHz

　　Pulse interval: 30ms

　　Time: 240 hours

9-10 Characteristics in high and low temperature

After following test, tested products are exposed at nominal condition room for 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Exposed in -40 ± 2℃ for 2 hours and get the test result, then heat up to +80 ± 2℃ for 2 hours and get the test result

Table 1

Item	Judgment
Overall sensitivity	Within ±3 dB compared with Initial sensitivity

10. Caution

10-1 Limitation of Applications

Please don't use for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

1) Aircraft equipment
2) Aerospace equipment
3) Undersea equipment
4) Power plant control equipment
5) Medical equipment
6) Transportation equipment (vehicles, trains, ships, etc.)
7) Traffic signal equipment
8) Disaster prevention / crime prevention equipment

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9) Data-processing equipment
10) Application of similar complexity and/or reliability requirement to the applications listed in the above

10-2 Fail-safe

Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

11. Caution in use

11-1 Notice in design and usage

1) Please do not apply D.C. voltage to the transducer to avoid depolarization, or silver migration of electrode on piezoelectric ceramic.
2) The transducer may generate surge voltage by mechanical or thermal shock. Care should be taken to protect from it in designing your application circuit.
3) Please do not use the transducer in liquid as like water, organic solvent, etc. It will cause of malfunction.
4) It is not recommended to drive transducer with 6 drive pulses or more. It will make transducer unstable excitation and unstable sensitivity.
5) Please do not apply excessive mechanical shock to transducer to avoid piezoelectric ceramic breakage. When you drop it, please don't use and discard it.
6) Please do not apply excessive force on the rear of transducer to avoid damage to sensor housing case, lead wire, piezoelectric element, and other sensor components.
7) Avoid sudden changes in temperature. It may cause of depolarization of piezoelectric element.
8) Avoid sudden changes in humidity. It may cause of poor solder ability.
9) To reduce noise signal come from another device and circuit pattern, please connect (+) indicated terminal to the signal line, and connect other terminal to GND.
10) Care should be taken when select the material to hold, or cover backside of transducer. If it contains sulfur or sulfide, electrode on piezo-electric element may corroded and because of malfunction.
11) The transducer described in this specification is not water-proof type. Please don't expose to water, organic solvent, chemical liquid and corrosive gases.
12) The decay time of transducer is not guaranteed. Please don't use for distance measuring apparatus, and/or equipments measure the sound traveling time.

11-2 Notice in storage

1) The products should not be used or stored in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. Store the products in the room where is normal temperature and humidity, and avoid the sunlight, sudden changes in temperature and humidity. It may cause of failure or malfunction in such condition.

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2) Store the products where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade, and 30 to 80% RH. Use the products within 6 months after receiving.
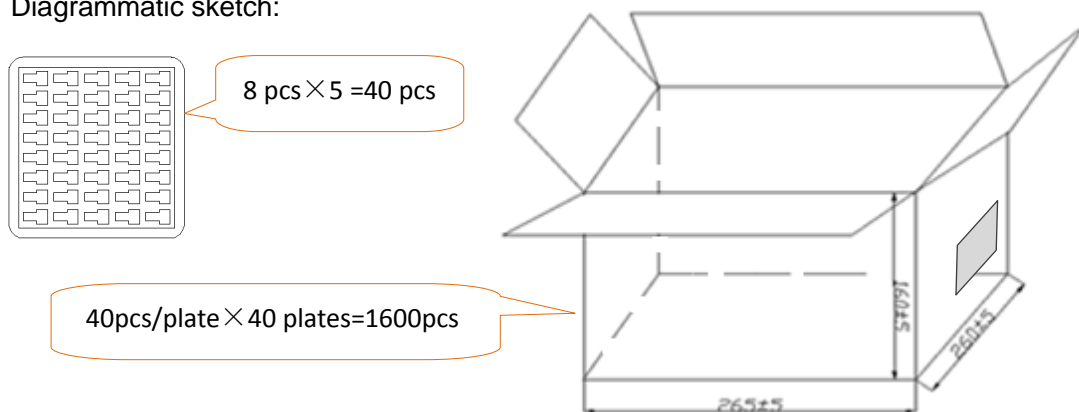
11-3 Notice in soldering and mounting

1) Please hold the transducer with soft materials to avoid vibration leakage.

2) Please do not clean with water or organic solvent. Liquid penetration will make malfunction.

3) Please do not apply excessive force to terminals when soldering. It will make damage to sensor housing case, lead wire, piezoelectric element, and other sensor components.

4) Please use soldering iron when you mount sensor on the circuit board. Please don't apply excess soldering temperature over 360℃ within 3 sec. Flow, and re-flow soldering process is not recommended.

12. Note

1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

2) You are requested not to use our product deviating from the agreed specifications.

3) We consider it not to appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

13. Package

Diagrammatic sketch:

8 pcs×5 =40 pcs

40pcs/plate×40 plates=1600pcs

(Fig. 8)