ICE Connector

NSPACK/ YSPACK/ HSPACK Technical Information

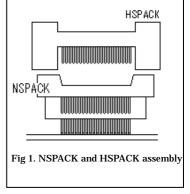December 21, 2005

I   Instruction for Use

(1) Mounting NSPACK on Target Board

1. Standard Type

Fig 1. NSPACK and HSPACK assembly

1-1   Put epoxy type glue lightly on the stand off at the bottom of NSPACK. Then place the NSPACK on a user board. Clean the surface of the user board with alcohol before soldering NSPACK. It will take more than 30 minutes to stiffen glue.
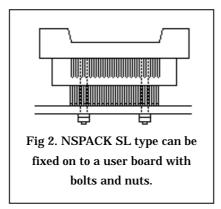
1-2   Solder NSPACK after HSPACK is assembled on NSPACK. This prevents leads of NSPACK from sticking flux or small tin lead dusts during soldering process.

1-3   LEAD FREE soldering Condition;   Reflow Soldering   : 260 ℃ for 10 seconds

Manual Soldering   : 350 ℃ for 5 seconds (1 pin)

Note: Do not insert leads into flux bathe. Do not clean leads with steam.

2. SL Type

As shown in Fig 2, SL type can be fixed onto a user board with bolts and nuts after soldered leads in order to increase mechanical strength. The bolts are provided at the bottom of NSPACK SL type.

Fig 2. NSPACK SL type can be fixed on to a user board with bolts and nuts.

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1

2-1 Drill holes at specified locations for the bolts. The screw size is M1.4. For details, refer to technical drawing. Soldering procedure is the same as that of standard type.
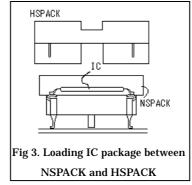
3. Important notes for designing a user board

3-1 The shape and sizes of NSPACK leads are the same as those of IC package. Therefore NSPACK can be soldered on the same soldering pads of IC package. Please see the recommended soldering foot pattern that can be accessed from TET home pages. In case PWB stuck on YSPACK is big, strong force will be applied to soldered portion of NSPACK. So please provide bigger soldering pads to increase mechanical strength. Refer to product catalog for the suitable IC packages.

3-2 When ICE tools are connected, the big force will be applied to the lead soldered portions. Therefore we recommend fixing NSPACK stand off with epoxy glue onto PWB. It will take more than 30 minutes to stiffen the glue. This helps to place NSPACK leads at the precise positions. To fix stand off with glue is also good for increasing mechanical strength after soldered NSPACK onto PWB.

Note: Nuts touching portions are the wiring prohibited areas. The area of M1.4 screw is 4mm in diameter.
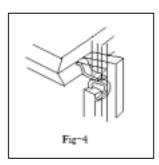
(2) Loading IC package

1. Loading Procedures

1-1   Refer to product catalog whether IC package is suitable for NSPACK. Please feel free to contact us if you have any questions. TET developed ICE connectors and sockets for emulation test purpose only; the product are not approved by any safety rules or EMI standards.

1-2   As shown in **Fig-3**, IC will be placed onto the NSPACK after NSPACK are soldered on Target board.

Fig 3. Loading IC package between NSPACK and HSPACK

1-3   Tighten NSPACK, IC Package, and HSPACK together with two screws (M-6, 6mm) attached to HSPACK. Screwdriver attached or a torque driver should be used for tightening screws. The tightening torque shall be around 0.054N m 0.55kgf cm . If the torque is higher, it may cause a poor contact. Screw driver attached to NSPACK can tighten the screws with in0.054N m 0.55kgf cm

IC leads are held with NSPACK and HSPACK contact pins. IC leads are isolated with the plastic grooves around NSPACK, therefore IC leads will never touch adjacent leads.

Fig-4

2. Notes on loading IC packages

2-1   When IC package is loading, visually check burrs at the corners of insulator, lead bent, other damage or defects.

2-2   When HSPACK is placing on NSPACK, visually check lead bent or damage.

2-3   NSPACK, IC package, and HSPACK assembly should be used for emulation test application only.
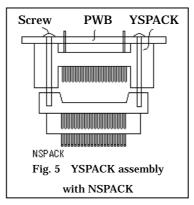
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(3) Instruction for use on YSPACK assembly

Mating height of NSPACK and YSPACK is 13.3mm. This is the distance between top surface of a user board and bottom of PWB on YSPACK.

1. Assembly procedure

1-1   Solder YSPACK onto PWB.

1-2   Visually check damage or bent on YSPACK leads. Place YSPACK on NSPACK. YSPACK and PWB tighten together with screws. Every time YSPACK is assembled on NSPACK, check damaged and/or bent leads visually.

1-3   Drill two holes on PWB at specified location for mounting YSPACK. Regarding screw and hole details, refer to TABLE 1. As illustrated in Fig.5, tighten YSPACK soldered to PWB onto NSPACK with screws (M2, 10mm) attached. The thickness of PWB should be 1.0 to 2.0mm to fit the above screw. Screwdriver attached or a torque driver should be used for tightening screws. Tightening torque should be 0.55cN.m-maximum. If the screwing torque exceeds the limit, it may cause a poor contact.

1-4   Two screws of M2, 10mm are attached to YSPACK. See Fig. 5.

Fig. 5   YSPACK assembly with NSPACK

<u>*Note*</u>: IC package could not be loaded between NSPACK and YSPACK.

2. Board designing data on the fixing screw of NSPACK and YSPACK

Table-1: Board design data when a pan head screw is used.

[Unit: mm]

Flathead Screws	Guide hole diameter on PWB (4 places) (*1)	Runner restricted area in diameter	
		Underneath screw heads	Underneath washer(*2)
M2 x 10mm	ø2.4	Ø3.8	ø4.8

(*1) Please refer drawing of YSPACK for guide hole in details.

(*2) Bigger sizes of flat and spring washer are used as standard.
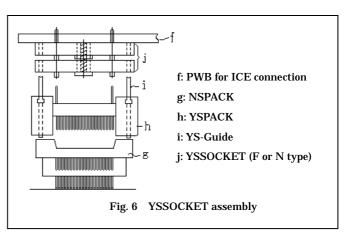
2. YSPACK Lead Ends Details on Soldering Portion

Table-2 [Unit: mm]

IC package lead Pitch	Pin cross section of YSPACK	Pin diagonal distance	Diameter of through hole on the PWB
0.5 1.0	0.25 x 0.3	0.38	ø0.50 or more

(4)   Stacking with YQSOCKET
(If the mating height should be 19.7 mm or higher)

1. As shown in **Fig-6**, NSPACK and YSPACK stacking on PWB is illustrated.

Distance between the top of user board and the bottom of PWB is 19.7 mm. The distance can be extended with additional YQSOCKET between PWB and YSPACK;
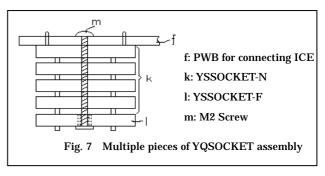
One YQSOCKET can extend the distance by 3.2 mm. After soldering NSPACK to a user board, YSPACK will be placed on NSPACK. NSPACK and YSPACK are stacked together with screws through YQ-Guide holes. The lower half of YQ-Guide provides threads for fixing NSPACK and YSPACK. The upper half helps blind mating to stack YQSOCKET onto YSPACK.   YQSOCKET mates to YSPACK by mean of YQ-Guide.

f: PWB for ICE connection
g: NSPACK
h: YSPACK
i: YS-Guide
j: YSSOCKET (F or N type)

Fig. 6   YSSOCKET assembly

2. Multiple YQSOCKET stacking

As shown in **Fig-7**, YQSOCKET-F type should be used at the bottom for stacking directly on YSPACK. YQSOCKET-N type should be used in between ICE PWB (f) and YQSOCKET-F. M2 screw firmly fixes together the total assembly.
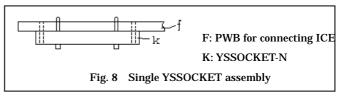

f: PWB for connecting ICE
k: YSSOCKET-N
l: YSSOCKET-F
m: M2 Screw

Fig. 7   Multiple pieces of YQSOCKET assembly

3. Two YQSOCKET stacking

As shown in **Fig-6**, two YQSOCKET-F2 types are fixed together with a hexagon socket set screw. Hole for the set screw is not necessary in ICE PWB. But if three or more YQSOCKET are stacked, there must be a hole in ICE PWB.

4. Single YQSOCKET stacking

As shown in **Fig-8**, single YQSOCKET is stacked on ICE PWB. There must be a hole for the set screw. We recommend diameter of the hole is 2.3 mm.
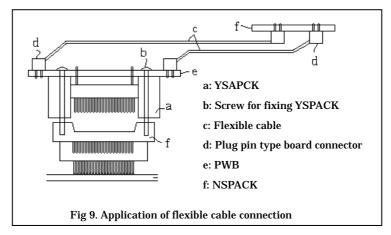

F: PWB for connecting ICE
K: YSSOCKET-N

Fig. 8   Single YSSOCKET assembly

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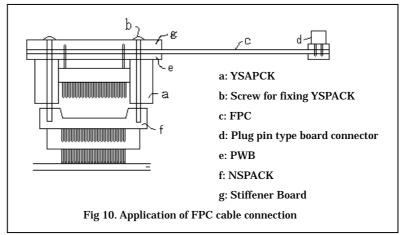### (5) Instruction for use on YS-Guide

1. YS-Guide should be used as shown in **Fig-6** on page 5, when you stack NSPACK, YSPACK, and YQSOCKET. YQ-Guide is sold separately. Its part number is YSGUIDE-S1 which includes two guidepins packed in a plastic bag.

Note: If mating and un-mating of YSPACK/YQSOCKET are done without YQ-Guide, it will cause bent pins of YSPACK.

II YSPACK Application

(1) PWB and Ribbon Cable Connection

a: YSAPCK

b: Screw for fixing YSPACK

c: Flexible cable

d: Plug pin type board connector

e: PWB

f: NSPACK

Fig 9. Application of flexible cable connection

(2) FPC Connection

a: YSAPCK

b: Screw for fixing YSPACK

c: FPC

d: Plug pin type board connector

e: PWB

f: NSPACK

g: Stiffener Board

Fig 10. Application of FPC cable connection

Note: PWB for YSPACK must have the screw holes for fixing NSPACK. Without the holes, NSPACK can not be fixed. Two (2) holes are required. For the further information, refer I· (3) ·1·1-3 at page 4.

Please contact us for consulting ICE tool design and manufacturing. We are developing and manufacturing ICE tool as well.

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12/21/2005

III Existing NSPACK and ICE Tool Connection

Basically, the existing ICE tools for TQPACK can be connected to NSPACK except a few exceptions. (There are some exceptions, call us for further information.)
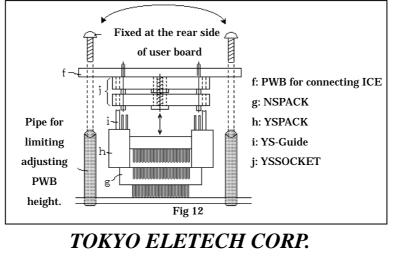
1. Connection Procedures

1-1 Solder NSPACK (g) to Target board.

1-2 Mount YSPACK (h) on NSPACK.

1-3 YSPACK and NSPACK are screwed together with the lower portion of YQ-Guide pin, which are threaded. Tighten four screws on the corners equally with precision torque screw driver (Phillips head tip #0 or 1). The setting of torques screw driver is 0.054N m 0.55kgf·cm .

1-4 Solder YQSOCKET-F2 (j) (two YQSOCKET stacked) on ICE PWB (f).

1-5 Mount YQSOCKET on YSPACK with upper portion of YQ-Guide.

1-6 When withdraw IC tools, remove them gradually from 4 corners of YQSOCKET with minus screwdriver. As illustrated in **Fig-12**, it will cause bent or loose pins on YSPACK to withdraw a tool by twisting YQSOCKET. Please hold NSPACK and YSPACK by fingers to prevent the soldered portions of a user board and YSPACK contact pins from stress, when withdraw a tool.
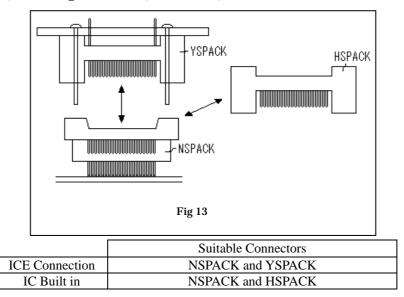
It will cause a bent pin on YSPACK to withdraw YQSOCKET with twisting force, during unmating process of YQSOCKET and YSPACK. PWB fixed with YQSOCKET is small, and it might be withdrawn with twisting force, please follow instruction as illustrated right (**Fig-12**).

Fig 11. Assembly procedure

f: PWB for connecting ICE
g: NSPACK
h: YSPACK
i: YS-Guide
j: YSSOCKET

Fixed at the rear side of user board

Pipe for limiting adjusting PWB height.

f: PWB for connecting ICE
g: NSPACK
h: YSPACK
i: YS-Guide
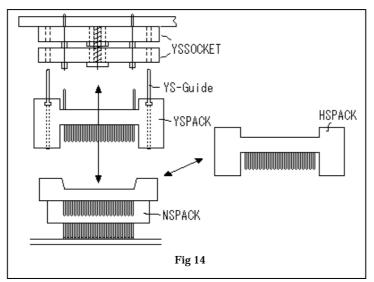j: YSSOCKET

Fig 12

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IV Connector Selection

You should choose ICE connectors that can mate with a connector fixed on a tool. Please confirm the details with tool manufactures.

1. Example; Stacking connector, YSPACK, is fixed to a tool.

Fig 13

	Suitable Connectors
ICE Connection	NSPACK and YSPACK
IC Built in	NSPACK and HSPACK

2. Example; Stacking connector, YQSOCKET, is fixed to a tool.

Fig 14

	Suitable Connectors
ICE Connection	NSPACK, YSPACK, YQ-Guide, and YQSOCKET
IC Built in	NSPACK and HSPACK

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3. NSPACK, HSPACK, and YSPACK Attachments

NSPACK

One screw driver for tightening HSPACK or YSPACK onto NSPACK.

HSPACK

Two M2x6 mm screws for fixing HSPACK and NSPACK.

YSPACK

Tow M2x10 mm screws for fixing YSPACK and NSPACK soldered on a target board.

V   NSPACK Various Applications

Fig-15

f: PWB for connecting ICE
g: NSPACK
h: YSPACK
i: YS-Guide
j: YSSOCKET-F type
p: HSPACK
q: YSSOCKET-N type

When higher space is required between ICE and Target boards, the additional YQSOCKET will bridge the gap. The space of one YQSOCKET is 3.2mm in height.

YQSOCKET should be fixed to PWB with a screw as shown in **Fig-15 B:**.   YQSOCKET-F type should be used at the bottom. YQSOCKET-N type should be used in between PWB and YQSOCKET-F type.

Important Notes in Handling NSPACK/HSPACK/YSPACK

1. Check the IC sizes whether NSPACK is fit for the IC package, for details refer to catalog.

2. When NSPACK/HSPACK/YSPACK are taken out of a packing box, press the product lightly by fingers and remove the packing material first.

3. Packing boxes have been kept under ambient temperature of 50 °C for long time, and then the boxes might be deformed. The storage place should be free from sun light, and the room temperature should be 40 °C or lower.

4. Check mold burr around IC package by visual before place the package onto NSPACK. Please remove burr with a knife if you find it.

5. IC leads are easily bent during loading the package to NSPACK, as the leads are very fragile. Check bent lead, and repair it if any before loading.

6. Precision torque driver (number 0 or 1) is recommended for fixing the 4 holes on NSPACK/ HSPACK/ YSPACK. (Fix screw with 0.054N m   0.55kgf·cm   . When 4 screws are not tightening equally, then it may cause a poor contact.)

7. YSPACK lead pins may be bent during YSPACK/YQSOCKET withdrawal. Please withdraw without twisting force.

8. 4 holes, 2.3mm or 3.3mm in diameter, must be provided on PWB connected to YSPACK. Diameter of screw heads, 3.8mm or 4.3mm, should be runner restriction area.

9. HSPACK should be placed on NSPACK as a cover, which protects a flux splash during soldering process of NSPACK.

    Recommend soldering Temperature profile:

                  Reflow: 260 °C for 10 seconds or less

           Manual soldering: 350 °C for 5 seconds or less

          * Hot air soldering can not be recommended.

10. Do not clean NSPACK, HSPACK, and YSPACK with steam. Do not immerse NSPACK, YSPACK, HSPACK, and YSSOCKET into flux, which are lead free products.

11. Cleaning material will contaminate inside of connector.

12. NSPACK, HSPACK, and YSPACK should be used for test application only.

13. Stacking of NSPACK, IC package, and HSPACK and that of NSPACK and YSPACK are not being allowed for vibration and shock environments.

14. During test of IC package which is built in NSPACK and HSPACK, IC package might become mal-function from temperature rise. Please cool down the connectors by a fan.

15. NSPACK/YSPACK/HSPACK are developed for test application only. The connectors are not approved by safety rules or EMI regulations in any countries.

16. NSPACK, YSPACK, HSPACK and YQSOCKET are in compliance with RoHS.

VI Technical Data and Specifications of NSPACK series

* NSPACK/ YSPACK/ HSPACK Specifications

1. Materials

1-1 Contact:

Table-3

		NSPACK	YSPACK	HSPACK
Metal		Alloy (Be-Cu)	Alloy (Be-Cu)	Alloy (Be-Cu)
Under Coating	Base	Ni	Ni	Ni
Plating	Surface	Gold	Gold	Gold

1-2 Molds :

Liquid Crystal Polymer (Filled glass fiber : UL94V-0)

1-3 Sleeve(YSSOCKET) :

Ni under coating

Gold plating

2. Characteristic

2-1 Contact Resistance :

NSPACK-IC (Mated with HSPACK) ; 70mΩ/pin or less

NSPACK-YSPACK　　　　　　　; 70 mΩ/pin or less

YSPACK-YQSOCKET　　　　　; 70 mΩ/pin or less

2-2 Withstand Voltage :

100V AC for one minute

2-3 Insulation Resistance :

500MΩ Min at 100V DC

2-4 Rating Current :

0.5 A /pin or less

2-5 Operating Temperature :

-25°C to +85°C

3. Insertion and Withdrawal Force

3-1   Withdrawal Force between YSPACK-YQSOCKET ; 60 g/pin or less
        Insertion Force between YSPACK-YQSOCKET   ; 10 g /pin or more

3-2   Contact Life :
        150 times

4. Soldering

4-1   Soldering Temperature:
        Reflow: 260 °C for 10 seconds or less
        Manual soldering: 350 °C for 5 seconds or less
               * Hot air soldering can not be recommended.

5. Solvent resistance

5-1   With stand Freon cleaning for 2 minutes max under normal temperature.

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* NSPACK Characteristics

1. NSPACK contacts and leads (reliability against heat and humidity)

Table-4   [Unit: mΩ]

Test hours	Temperature							
	150°C				60°C, 90 %Rh			
	$\overline{X}$	σ	X Max.	X Min.	$\overline{X}$	σ	X Max.	X Min.
Initial	16.36	3.46	21	11	16.79	3.45	22	11
240 Hours	16.74	3.29	21	13	16.83	3.47	22	11
360 Hours	16.98	3.30	20	13	16.86	3.48	21	11

Measurement Method: The contact resistance between the pins of NSPACK120SE-IClead-HSPACK120SE is measured under normal room temperature.

Test Points: n = 28(lines) x 3(connectors)

Measurement Equipment: HP 4338A milli-ohm meter

o：PWB
p：Test Pin
q：HQPACK120SE
r：HQPACK120SE Pin
s：NQPACK120SE
t：NQPACK120SE Contact Pin

Fig-16

2. NSPACK –YSPACK Durability

Table-5   [Unit: mΩ]

Life Test Cycle	Test Data			
	Contact Resistance			
	$\overline{X}$	σn	X Max.	X Min.
Initial	18.69	3.35	23	13
5	22.30	2.31	25	18
10	23.86	2.38	27	19
50	25.09	2.54	29	21
100	26.12	3.10	30	21
150	27.09	3.35	32	21
200	27.93	2.29	32	23
300	29.63	2.56	34	25
400	31.83	2.75	38	24
500	33.18	3.52	42	27

Fig-17

o：PWB
p：Test Pin
s：NQPACK120SE
t：NQPACK120SE Contact Pin
u：YQPACK120SE
v：YQPACK120SE Contact Pin

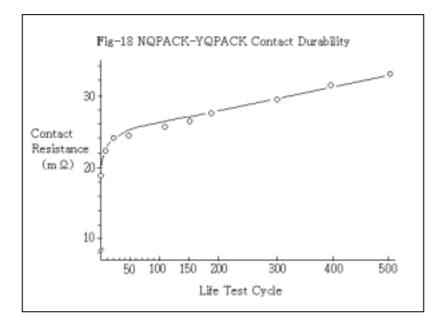**Measurement Condition:** Test was made under normal room temperature.

Contact resistance(X) is calculated by formula shown under;

X= (Resistance between PWB/NSPACK120SE/YSPACK120SE) – (YSPACK Pin Resistance, 43.6 mΩ)

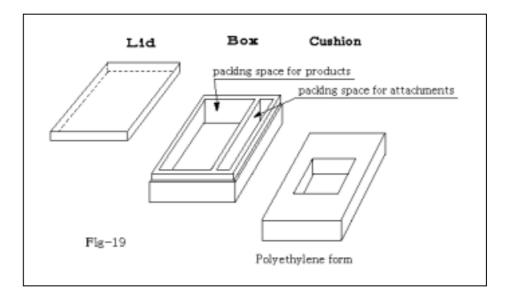**Measurement Location:** n = 32(lines) x 3(connectors)

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12/21/2005

Measurement Equipment: HP 4338A milli-ohm meter

Fig-18 NQPACK-YQPACK Contact Durability

VII NSPACK/HSPACK/YSPACK Individual Packing Box

Fig-19

*Box Dimensions
External (55 x 60 x 22 mm)
Internal (42 x 56 x20 mm)
Material (Polystyrene)

<u>*Note:*</u> Box is made of the biodegradable plastic. Please stock them under sun light free room.

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