



1. Customer's Spec. No. : ---
2. NDK Spec. No. : NSA3650A
3. Type : NH37M28LN
4. Rating

Parameters	Sym.	Spec.				Notes
		Min.	Typ.	Max.	Units	
4.1 Nominal Frequency	$f_{nom}$	10			MHz	2 digits
4.2 Supply Voltage	$V_{CC}$	+4.75	+5	+5.25	V	
4.3 Control Voltage	$V_{cont}$	0	+2.5	+5.0	V	
4.3 Load	$C_L$	14.25	15.0	15.75	pF	
4.4 Operating Temperature Range	$T_{opr}$	-40	-	+85	°C	
4.5 Storage Temperature Range	$T_{str}$	-40	-	+85	°C	

## 5. Electrical Specifications

Unless otherwise specified, meaning condition.

$T = +25\text{ °C}$ ,  $V_{CC} = +5.0\text{ V}$ ,  $V_{cont} = +2.5\text{ V}$ ,  $C_L = 15\text{ pF}$

Parameters	Sym.	Spec.				Conditions
		Min.	Typ.	Max.	Units	
5.1 Power Consumption						
5.1.1 During Warm-up	$P_{CC}$	-	3.0	3.5	W	$T = +25\text{ °C}$
5.1.2 Steady State	$P_{CC}$	-	-	1.6	W	
5.2 Frequency Stability						
5.2.1 Frequency Tolerance	$\Delta f/f_{nom}$	-25	-	+25	ppb	At the shipment. (*1)
5.2.2 Frequency/Temperature Characteristics	$\Delta f/f$	-0.5	-	+0.5	ppb	$T = -40 \sim +85\text{ °C}$ (*2)
5.2.3 Frequency/Voltage Coefficient	$\Delta f/f$	-0.2	-	+0.2	ppb	$V_{CC} = +3.3\text{ V} \pm 5\%$ (*2)
5.2.4 Long-term Frequency Stability	$\Delta f/f$	-0.2	-	+0.2	ppb	per day (*3)
		-50	-	+50	ppb	per year (*3)
5.2.5 Stabilization Time	-	-	-	5	min	(*4)
5.3 Frequency Control						
5.3.1 Change Polarity	-	Positive			-	
5.3.2 Control Range	$\Delta f/f$	-0.5	-	-0.3	ppm	$V_{cont} = 0\text{ V}$ (*2)
		+0.3	-	+0.5	ppm	$V_{cont} = +5.0\text{ V}$ (*2)
5.3.3 Linearity	-	-5	-	+5	%	
5.4 Output Characteristics						
5.4.1 Wave Form	-	Square wave			-	
5.4.2 Output Voltage						
High Level Output Voltage	$V_{OH}$	+2.4	-	-	V	$C_L = 15\text{ pF}$
Low Level Output Voltage	$V_{OL}$	-	-	+0.4	V	$C_L = 15\text{ pF}$
5.4.3 Symmetry	-	45	-	55	%	at $(V_{OH} + V_{OL})/2$

Parameters	Sym.	Spec.				Conditions
		Min.	Typ.	Max.	Units	
5.5 Phase Noise	L(f)	-	-83	-	dBc/Hz	1 Hz offset
		-	-110	-	dBc/Hz	10 Hz offset
		-	-135	-	dBc/Hz	100 Hz offset
		-	-152	-	dBc/Hz	1 kHz offset
		-	-157	-	dBc/Hz	10 kHz offset
		-	-160	-	dBc/Hz	100 kHz offset

(\*1)  $\Delta f/f_{\text{nom}}$  : Frequency shift from the nominal frequency ( $f_{\text{nom}}$ )

(\*2)  $\Delta f/f$  : Frequency shift from the reference frequency at  $T = +25^{\circ}\text{C}$ ,  $V_{\text{CC}} = +5.0\text{ V}$ ,  $V_{\text{cont}} = +2.5\text{ V}$ ,  $C_L = 15\text{ pF}$ .

(\*3)  $\Delta f/f$  : Frequency shift from the reference frequency.

Based on frequency after 7 days operation, at  $T = +25^{\circ}\text{C}$ ,  $V_{\text{CC}} = +5.0\text{ V}$ ,  $V_{\text{cont}} = +2.5\text{ V}$ ,  $C_L = 15\text{ pF}$ .

(\*4) Within  $\pm 10\text{ ppb}$ , based on frequency after 60 minutes.  $T = +25^{\circ}\text{C}$ ,  $V_{\text{CC}} = +5.0\text{ V}$ ,  $V_{\text{cont}} = +2.5\text{ V}$ ,  $C_L = 15\text{ pF}$ .

(\*5) Typ. Value is for reference only.

## 7. Marking

7.1 NDK Spec. No.

7.2 Nominal Frequency

7.3 Serial Number

7.4 Manufacture Date

7.5 Manufacture's Symbol

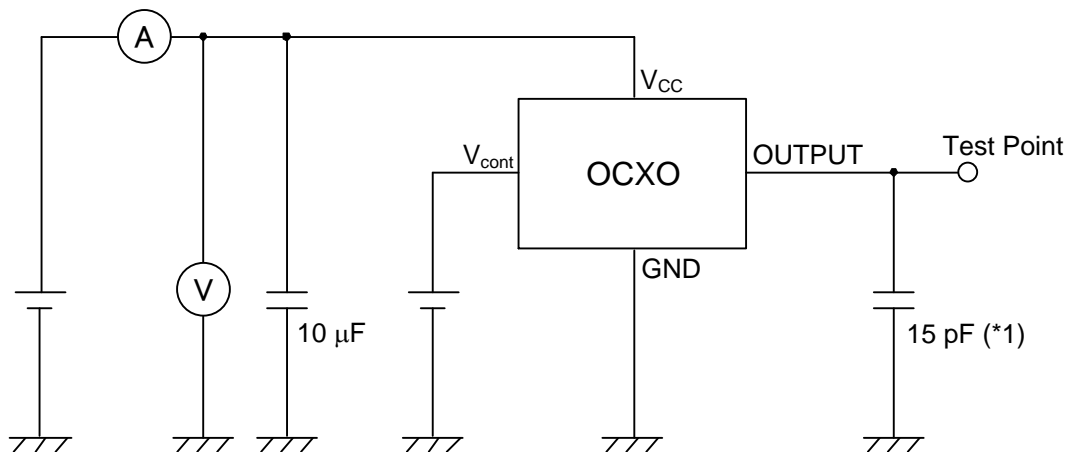
It might be printed NDK management code to the oscillator bottom by the laser trimming.

## 8. Drawing

8.1 External Dimension : ETD14B-01822

8.2 Packing : ETK17B-00393

## 9. Recommended Measurement Circuit



(\*1) Including capacitance of measurement jig and probe

## 10. Handling

- 10.1 Please do not add strong shock to the oscillator. In the time of transportation or installing the equipment, please do not drop or add shock to it. If strong shock is added, it may not operate normally. In that case, please use it after checking the characteristics.
- 10.2 Because of Oven Controlled Crystal Oscillator (OCXO), please do not place this product near heat sources, signal and noise sources that may affect the oscillator, and transmitter-receivers.
- 10.3 In OCXO, It is not recommended that some metal like a heat sink is placed on it directly, which is controlled by a specific high temperature, so that the characteristics cause unstable temperature control. Moreover, the ambient wind could affect characteristics by the same reason. The characteristic degradation by changing may occur according to ambient environment in the low temperature especially. Therefore, in the case of use of these products, please kindly do sufficient evaluation in advance on your side.
- 10.4 After soldering process, OCXO's characteristics may not be stable immediately because internal parts are influenced by the heat when soldering. For that reason, please avoid immediately using of these products after soldering and evaluate sufficiently in advance on your side.
- 10.5 If GND impedance of wiring pattern is high, OCXO's characteristics may not be stable because current consumption of OCXO greatly changes by the ambient temperature. In the case of use of these products, please kindly design GND impedance of wiring pattern to be sufficiently lower.

## 11. Notes on use

- 11.1 Even if the appearance color etc. of the product differs by purchasing the component parts by more than two companies, there is no influence on the characteristics and reliability.
- 11.2 IN THE CASE OF THE FOLLOWING ITEMS, WE ARE NOT RESPONSIBLE FOR WARRANTY / COMPENSATION.
- (1) WHEN PRODUCTS OF THIS SPECIFICATION ARE USED FOR EQUIPMENT RELATED TO HUMAN LIFE OR PROPERTY, IT IS THE RESPONSIBILITY OF THE CUSTOMER TO CONFIRM THE INFLUENCE ON THIS PRODUCT AND EQUIPMENT TO BE USED BEFOREHAND, CONDUCT NECESSARY SAFETY DESIGN (INCLUDING REDUNDANT DESIGN, MALFUNCTION PREVENTION DESIGN, etc.), PLEASE USE IT AFTER SECURING SUFFICIENT SAFETY OF EQUIPMENT.
1. SAFETY-RELATED EQUIPMENT SUCH AS AUTOMOBILES, TRAINS, SHIPS, etc., OR EQUIPMENT DIRECTLY INVOLVED IN OPERATION
  2. AIRCRAFT EQUIPMENT
  3. SPACE EQUIPMENT
  4. MEDICAL EQUIPMENT
  5. MILITARY EQUIPMENT
  6. DISASTER PREVENTION / CRIME PREVENTION EQUIPMENT
  7. TRAFFIC LIGHT
  8. OTHER EQUIPMENT REQUIRING THE SAME PERFORMANCE AS THE ABOVE-MENTIONED EQUIPMENT
- (2) IN CASES WHERE IT IS NOT INDICATED IN THE REQUESTED STANDARD AND IS USED UNDER CONDITIONS OF USE (INCLUDING CIRCUIT MARGIN etc.) THAT CAN NOT BE PREDICTED AT THE PRODUCTION STAGE.
- (3) WHEN USING ULTRASONIC WELDING MACHINE. (THERE IS A POSSIBILITY THAT THE CHARACTERISTIC DEGRADATION IS CAUSED BY THE RESONANCE PHENOMENON OF THE PIEZOELECTRIC MATERIAL.  
(EXAMPLE; CRYSTAL PIECE)  
WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS.

SO, PLEASE SUFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE ULTRASONIC WELDING MACHINE.

(4) USING RESIN MOLD MAY AFFECT THE PRODUCT CHARACTERISTIC.

PLEASE MAKE SURE TO TELL OUR SALES CONTACT WHEN YOU USE RESIN MOLD. WE WILL PERFORM INDIVIDUAL CORRESPONDENCE ABOUT A DELIVERY SPECIFICATION AND AN EVALUATION METHOD.

IN ADDITION, IF YOU USE RESIN MOLD WITHOUT CONTACTING US, AND CAUSES DAMAGES AGAINST A CUSTOMER OR A THIRD PARTY, WE WILL NOT BE LIABLE FOR THE DAMAGES AND OTHER RESPONSIBILITIES BECAUSE WE CONSIDER IT IS UNDER SELF-RESPONSIBILITY USING RESIN MOLD.

WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS. PLEASE EFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE RESIN MOLD.

(5) WHEN PERFORMING IMPROPER HANDLING THAT EXCEEDS THE GUARANTEED RANGE.

11.3 This product can not be used for automotive applications.

12. Notes on storage

12.1 When storing the product in high temperature and high humidity condition for a long time, product characteristics (solderability etc.) and packaging condition may be deteriorated. Please store product at temperature +5 °C~+35 °C, humidity 85% RH or less. The product is an electronic component, so please do not storage under a dewing state.

12.2 The product storage deadline is 12 months after delivery in unopened state. Please use within storage deadline. If you exceed storage deadline, please check the product characteristics etc, please use.

13. Other Requests

13.1 Please use this specification only for confirmation of the specification of this product.

13.2 If there is a change request, please contact within three weeks from issue date. If there is no communication, we will deliver the product under the contents of this specification. In addition, if the product delivery date is within 3 weeks and there is a change request, we will consult the processing separately.

13.3 NOTES THAT ARE DESCRIBED IN THIS DOCUMENT, IF YOU DID NOT COMPLY WITH THE PROHIBITIONS, AND OTHER PLEASE, INCLUDING THE FAILURE CORRESPONDENCE OR COMPENSATION OR DAMAGES, WE CAN NOT ASSUME THE RESPONSIBILITY, PLEASE UNDERSTAND.

14. Prohibited items

14.1 Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

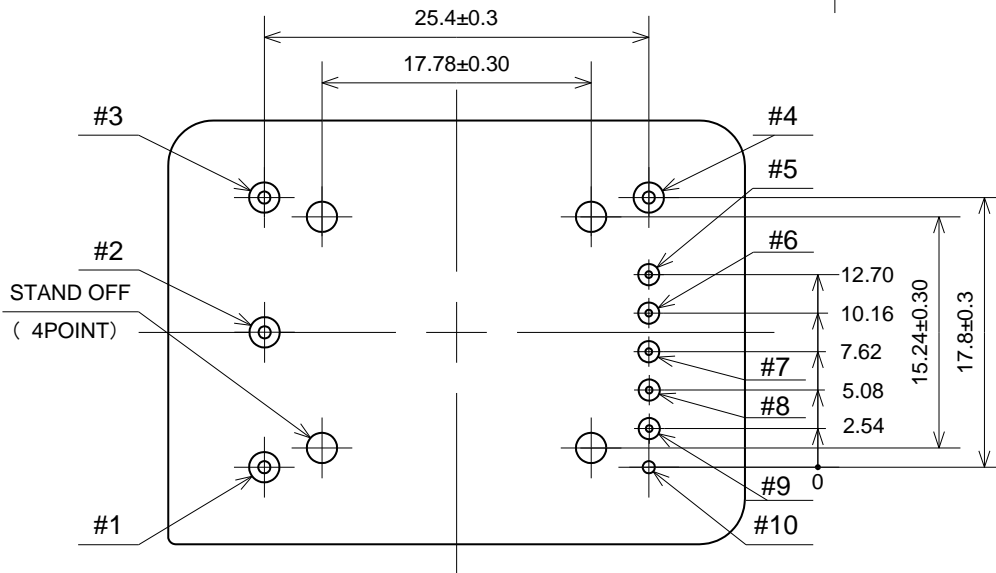
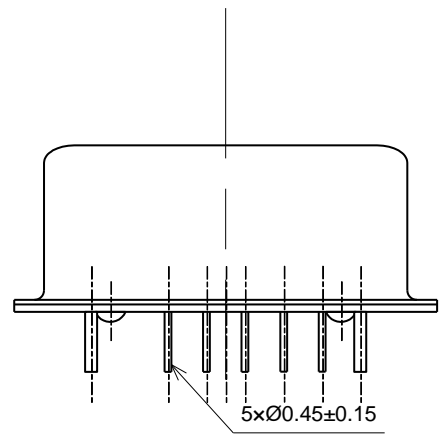
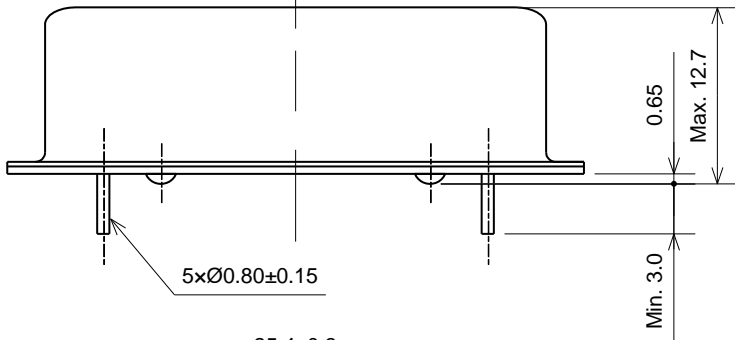
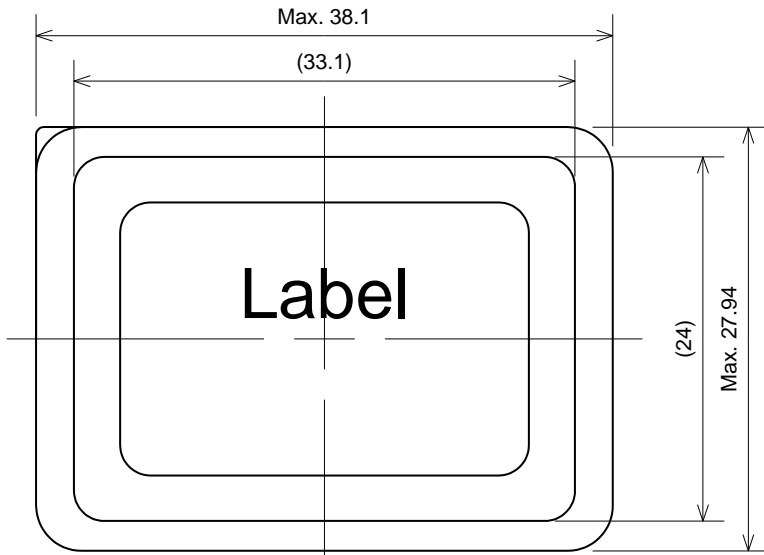
[Reflow soldering, Flow soldering heat resistance]

No application.

[Hand soldering heat resistance]

Press a soldering iron of 350 °C on terminal of the lead for five seconds (twice).

14.2 OCXO is designed to keep the performance by continuous operation. Therefore, please avoid use of OCXO which repeats ON-OFF of a power supply frequently.



Pin Connections

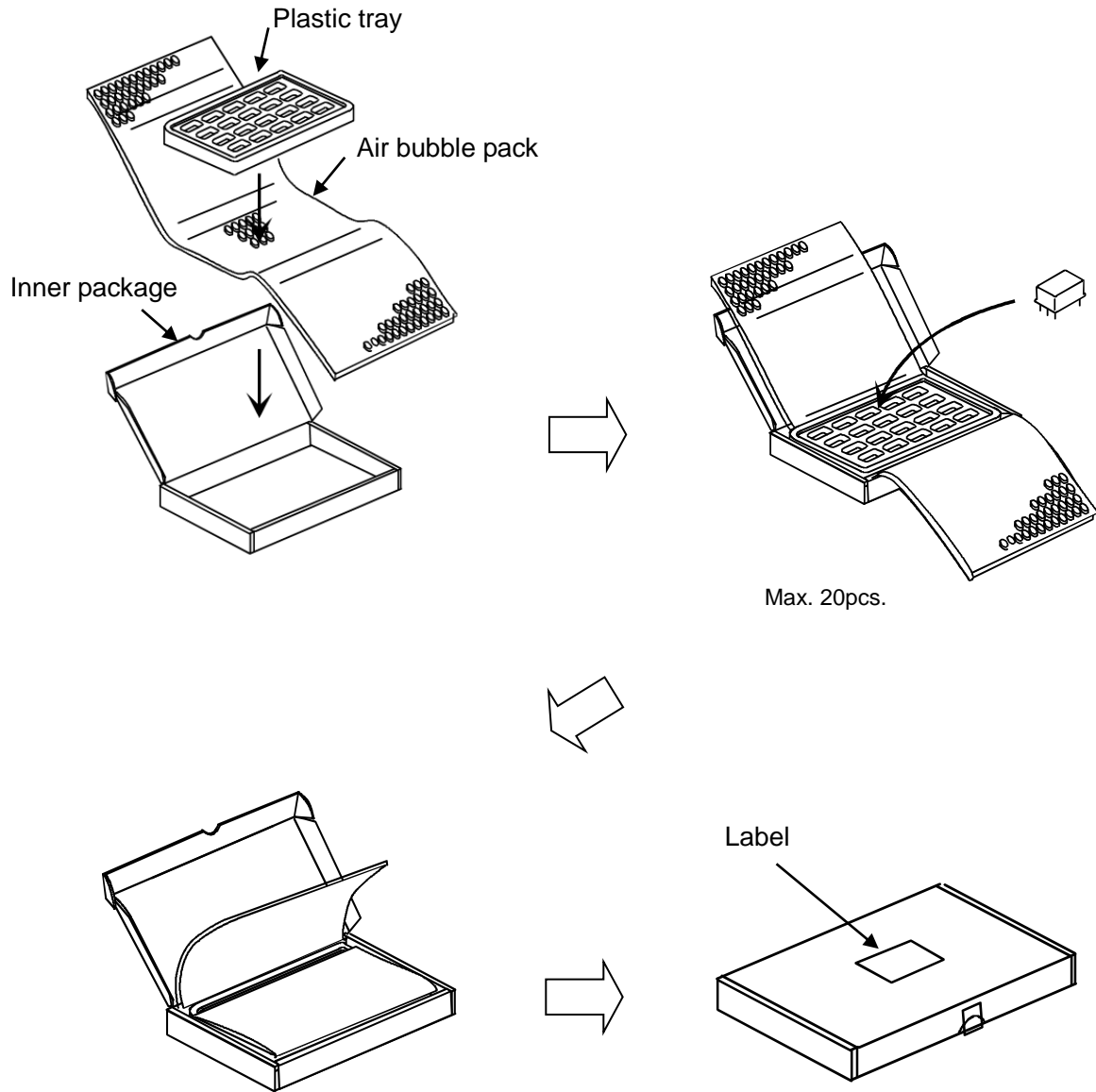
#1	V <sub>cont</sub>
#2	DNC (Don't connect)
#3	V <sub>CC</sub>
#4	OUTPUT
#5	DNC (Don't connect)
#6	DNC (Don't connect)
#7	DNC (Don't connect)
#8	DNC (Don't connect)
#9	DNC (Don't connect)
#10	GND

Terminal number is not printed

	Date of Revise	Charge	Approved	Reason
	Date	Name	Third Angle Projection	Tolerance
Drawn	25.Mar.2015	K.Hongu	Dimension:mm	±0.2
Designed	25.Mar.2015	K.Hongu	Title	Drawing No.
Checked	25.Mar.2015	Y.Ishii	<b>External Dimension</b>	<b>ETD14B-01822</b>
Approved	25.Mar.2015	M.Ito		

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# Inner Package

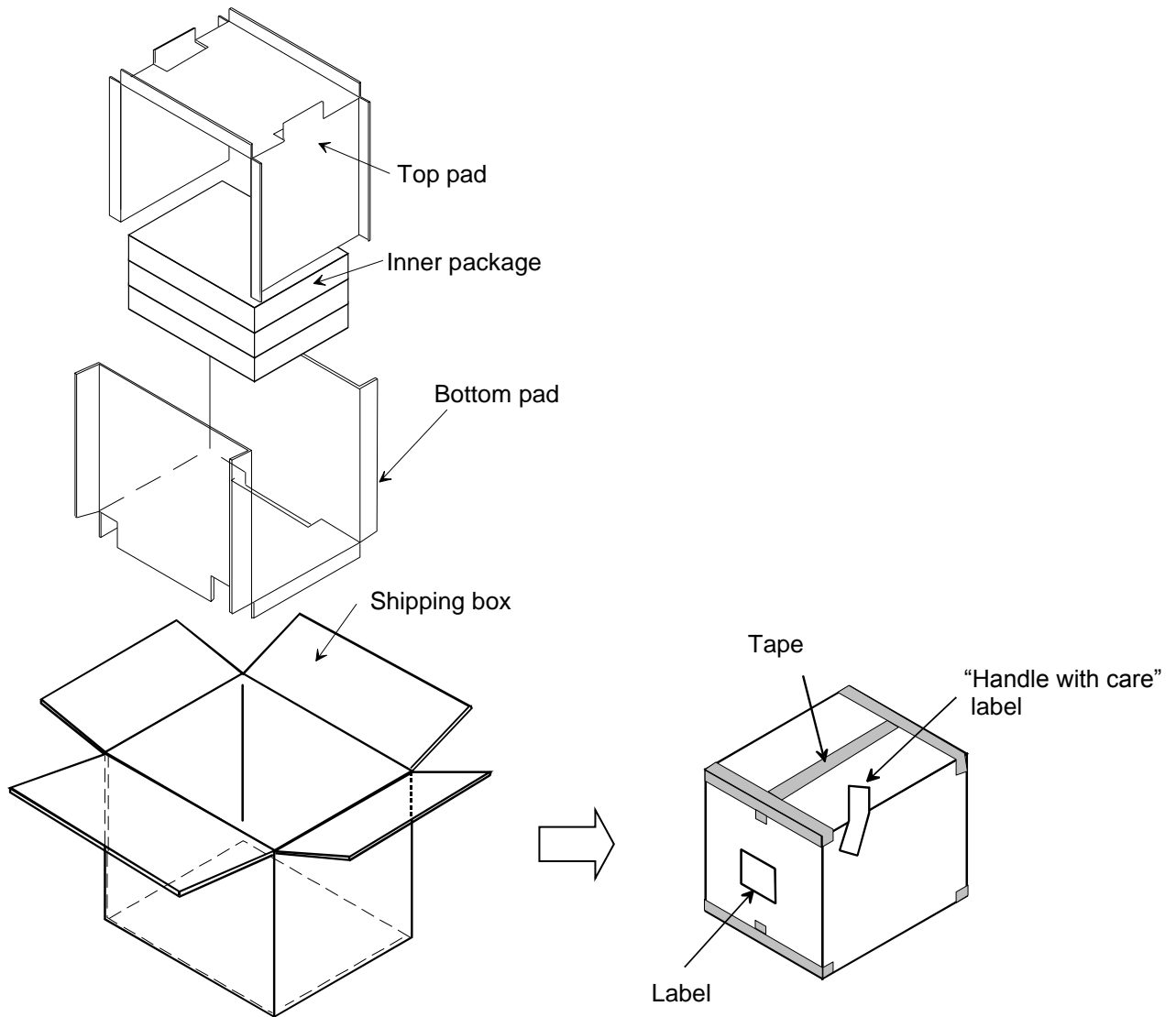


	Date of Revise	Charge	Approved	Reason	
A	17.Jul.2014	K.Hongu	M.Ito	Add. the English ver.	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	13.Dec.2013	K. Irie	Dimension:mm	-----	-----
Designed	13.Dec.2013	K. Irie	Title <b>Packing</b>	Drawing No. <b>ETK17B-00393(1/2)</b>	Rev.
Checked	13.Dec.2013	K. Kasahara			A
Approved	13.Dec.2013	H. Kanno			

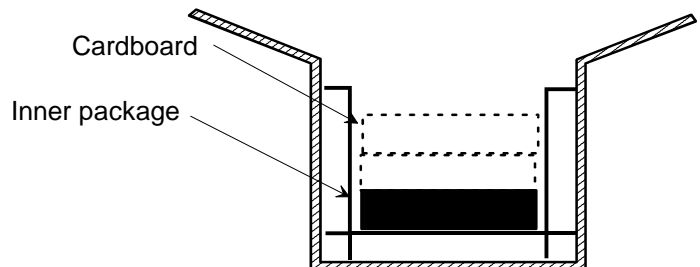
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# Shipping Package

QTY. 1 ~ 60 pcs



\*If the inner package is less than 3pcs, the buffer material (cardboard) will be inserted.



	Date of Revise	Charge	Approved	Reason	
A	17.Jul.2014	K.Hongu	M.Ito	Add. the English ver.	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	13.Dec.2013	K. Irie	Dimension:mm	-----	-----
Designed	13.Dec.2013	K. Irie	Title	Drawing No.	Rev.
Checked	13.Dec.2013	K. Kasahara			
Approved	13.Dec.2013	H. Kanno			
			<b>Packing</b>	<b>ETK17B-00393(2/2)</b>	<b>A</b>

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