

# Specification

Drawing No.	TKY1W-H1-14042-00
Issued Date.	Dec.2014,15

To: Digi-Key

Note : In case of specification change, KYOCERA Part Number also will be changed.

Product Name	SAW Oscillator
Product Model	KC7050T Series
Frequency	212.500MHz
Customer Part Number	—
Customer Specification Number	—
KYOCERA Part Number	KC7050T212.500L3AEYF
Remarks: Pb-Free,RoHS Compliant., MSL=1	

## Customer Acceptance

Accept Signature	Accept Date	
	Department	
	Person in charge	

## KYOCERA Crystal Device Corporation

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## 1. Application

This specification delivers Digi-Key  
SAW Oscillator, KC7050T212.500L3AEYF applies to 212.500 MHz

## 2. Function

### 2-1. Absolute Maximum Rating

Item	Symbol	Rating	Unit
Power Supply Voltage	V <sub>DD</sub>	-0.5 to +5.0	V
Input Voltage	V <sub>IN</sub>	-0.5 to V <sub>CC</sub> +0.5	V
Storage Temperature Range	T <sub>STG</sub>	-55 to +125	°C

Note: If KC7050T is used beyond absolute maximum ratings, it may cause internal destruction.

KC7050T should be used under the recommended operating conditions. KC7050T reliability may be damaged if those conditions are exceeded.

### 2-2. Recommended Operating Condition

Item	Symbol	Min	Typ	Max	Unit	Remarks
Power Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Input Voltage	V <sub>IN</sub>	0	---	V <sub>CC</sub>	V	
Operating Temperature Range	T <sub>OPR</sub>	0	+25	+85	°C	

### 2-3. Electrical Characteristic Specifications

Item	Symbol	Min	Typ	Max	Unit	Remarks
Frequency Range	F <sub>OUT</sub>	---	212.500	---	MHz	
Frequency Stability	F <sub>SBY</sub>	-100	---	+100	ppm	*Over all conditions: Initial tolerance, operating temperature range, rated power supply voltage change, load change, aging (5year , 0~+70°C), shock and vibration
Current Consumption	I <sub>CC</sub>	---	---	70	mA	
Standby Current	I <sub>ST</sub>	---	---	30	μA	
Duty ratio (Symmetry)	SYM	45	50	55	%	100ohm, @ 50% V <sub>opp</sub>
Rise Time (20% to 80% Output Level)	Tr	---	0.4	0.6	nS	100ohm
Fall Time (20% to 80% Output Level)	Tf	---	0.4	0.6		
Output Voltage -"L"	V <sub>OL</sub>	0.9	1.1	---	V	DC characteristic.
Output Voltage -"H"	V <sub>OH</sub>	---	1.43	1.6		
Differential Output Voltage	V <sub>OD</sub>	247	330	454	mV	DC characteristic. dV <sub>OD</sub> =  V <sub>OD1</sub> - V <sub>OD2</sub>
Differential Output Voltage Error	dV <sub>OD</sub>	---	---	50		
Offset Voltage	V <sub>OS</sub>	1.125	1.25	1.375	V	
Offset Voltage Error	dV <sub>OS</sub>	---	---	50	mV	dV <sub>OS</sub> =  V <sub>OS1</sub> - V <sub>OS2</sub>
Output Load	---	---	100	---	ohm	LVDS Output
Input Voltage -"L"	V <sub>IL</sub>	---	---	30% V <sub>CC</sub>	V	OE termination
Input Voltage -"H"	V <sub>IH</sub>	70% V <sub>CC</sub>	---	---		
Output Disable Time	---	---	---	200	nS	
Output Enable Time	---	---	---	300	μS	
Start up time	ST	---	---	10	mS	@Minimum operating voltage to be 0sec
Deterministic Jitter*	DJ	---	0.2	2	pS	DJ pk-pk
1sigma Jitter*	1sigma	---	2	4		
Peak to Peak Jitter*	Pk-Pk	---	20	30		
Phase Jitter	Jphase	---	---	1		BW: 12kHz to 20MHz

Note: All Electrical characteristics define Maximum Loaded and operating temperature range.

\*The Time Interval Analyzer "Wavecrest DTS-2079" with VISI 6.3.1 shall measure jitter.

(Load=50ohm, @ 50% output swing)

Table 1

2-4. Measurement Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows:

- Ambient temperature : +15°C to +35 °C
- Relative Humidity : 25% to 85%
- Air pressure : 86kPa to 106kPa

If there is any doubt about the results, measurements shall be made within the following limits:

- Ambient temperature : +25°C
- Relative Humidity : 60% to 70%
- Air pressure : 86kPa to 106kPa

Unless otherwise specified for each item, it should be specified according to JIS (Japanese industrial Standard).

2-5. Measurement Circuit

The test circuit as shown in “Fig. 1” (\*Jitter Test Circuits “Fig. 4”) shall measure electric characteristics.

2-6. Clock Timing Chart

The clock timing chart as shown in “Fig. 2”, “Fig. 3”..

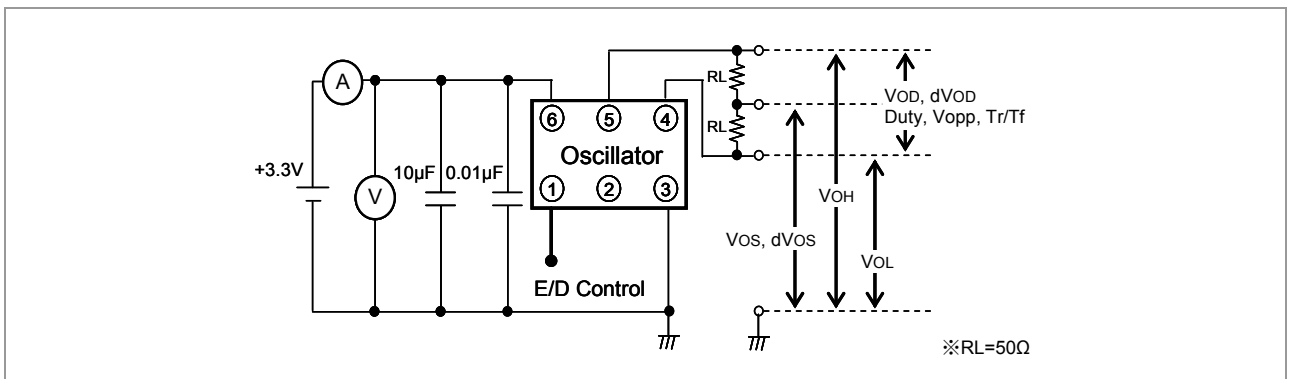


Fig.1 TestCircuit

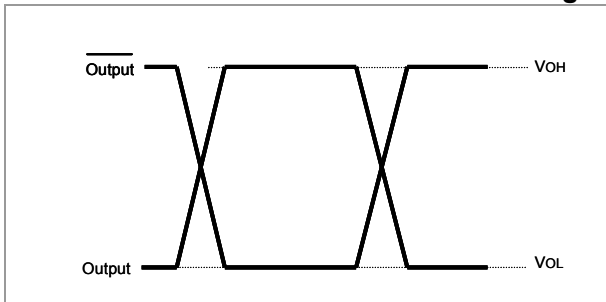


Fig.2 Clock Timing Chart 1

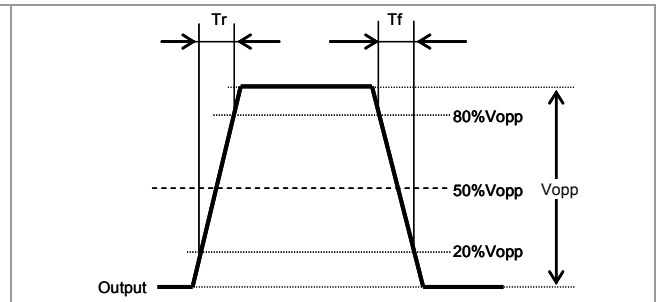


Fig.3 Clock Timing Chart 2

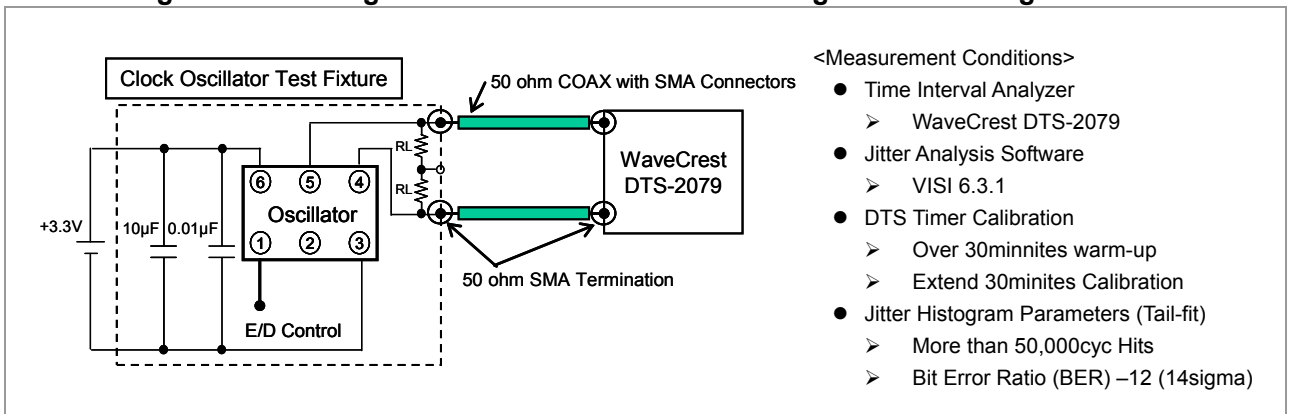
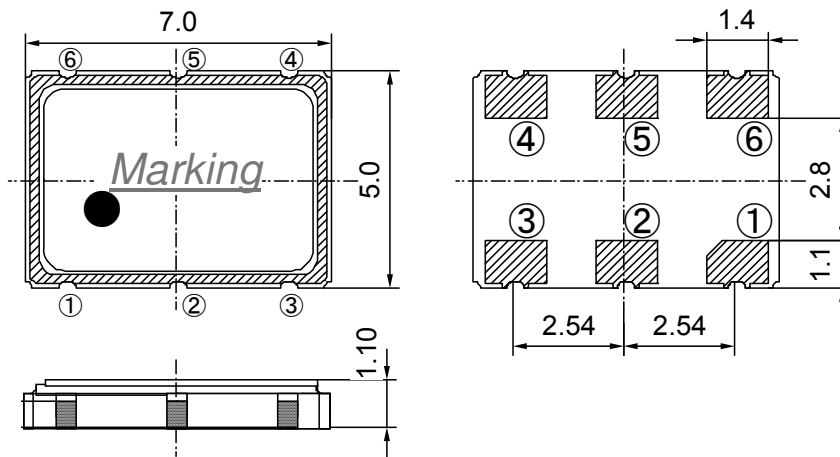


Fig.4 Jitter Test Circuits

<Measurement Conditions>

- Time Interval Analyzer
  - WaveCrest DTS-2079
- Jitter Analysis Software
  - VISI 6.3.1
- DTS Timer Calibration
  - Over 30minites warm-up
  - Extend 30minites Calibration
- Jitter Histogram Parameters (Tail-fit)
  - More than 50,000cyc Hits
  - Bit Error Ratio (BER) -12 (14sigma)

### 3. Dimensions and Marking



Tolerance; +/-0.2  
Unit; (mm)

Pad arrangement	
①	Enable / Disable
②	NC
③	GND
④	Output
⑤	Complementary Output
⑥	V <sub>CC</sub>

Enable / Disable Function	
Pad1	Pad4 / Pad5
OPEN	Active
"H" Level	Active
"L" Level	No-Oscillation

Marking	
A	Frequency (3digits)
B	Frequency identification code
C	Output Waveform ex; 3[LVDS]
D	Supply Voltage ex; A[3.3V], B[2.5V]
E	Multiplying function ex; A[No multiplying], B[1/2]
F	Pin No.1 indication
G	Making Company Abbreviation
H	Lot code Manufacturing year and week are shown. The 1st digit shows year, 2nd to 3rd digit shows week.

(Example)

A	B	C	D	E
2	1	2	T	3
KSS401				

↑     ↑     ↑

F     G     H

Lot code	Year	Week
401	2014	1st week
402		2nd week
≈		≈
427		27th week

ex; 2014, The 1st week : 401

### 4. Parts Numbering Guide

**KC7050T 212.500 L 3 A E YF**

A	B	C	D	E	F	G
A: Series (6pad SMD SAW OSC)	B: Oscillating frequency	C: Output L [LVDS]	D: Supply voltage 3 [3.3V]	E: Frequency stability (*Over all condition) A [±100ppm]	F: Duty ratio and Enable/Disable function E [Duty 45% to 55% with standby function]	G: Customer special model suffix YF [Custom specification]

\*Over all conditions:  
Initial tolerance, operating temperature range, rated power supply voltage change, load change, aging(5year @0~+70°C), shock and vibration.

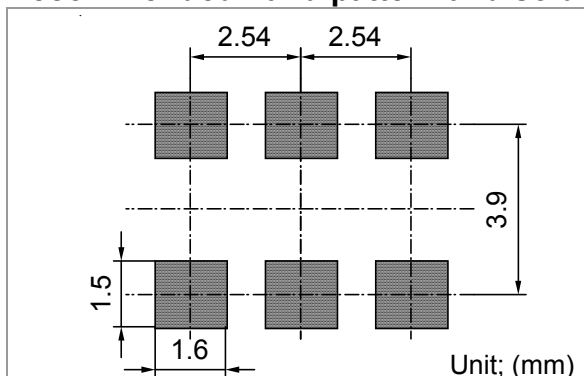
## 5. Environmental Characteristic

Items	Conditions	Criteria of Acceptance
5-1. Solderability	Soaking: +245±5°C, 5.0±0.5sec	Dipped potion: Minimum 95% coverage
5-2. Soldering Heat Resistance	Reflow Soldering: Peak+ 260°C max, 10sec, Twice max Soldering iron: +380±5°C, 3+1/-0sec, Twice as one time for four Pads	Without looseness or crack etc.
5-3. Temperature Cycle	10Cycles: -55°C to +125°C (30minuts each)/cycle	Clause 5-10 shall be satisfied.
5-4. Mechanical Shock (Pulse)	5 times 14750m/sec <sup>2</sup> (1500G), Duration of pulse 0.5msec (MIL-STD-883D-2002.3 Condition B)	
5-5. Vibration	4 times each axis X, Y, Z: 20 to 2000Hz and 2000Hz to 20Hz/cycle Peak acceleration 196m/sec <sup>2</sup> (20G) (MIL-STD-883D-2007.2 Condition A)	
5-6. High Temperature	1000 hours: Temperature:+ 85+5/-3°C	
5-7. Low Temperature	1000 hours: Temperature: -40+5/-3°C	
5-8. Humidity Cycle	10 cycles: Based on 1004 specifications (MIL-STD-883D-1004.7)	Clause 5-1 shall be satisfied.
5-9. Hermeticity 1 (Gross leak)	Soaking: +110±5°C, 5minutes	No bubbles appeared
5-10. Hermeticity 2 (Fine leak)	Measured by Helium Detector Device (MIL-STD-883D-1014.10 Condition A1)	5x10 <sup>-9</sup> Pa m <sup>3</sup> /sec max

Note:After above Test, it shall be subjected to standard atmospheric conditions for 2 hours, after which measurement shall be made. And result of the test shall satisfy **Table 1**

**Table2**

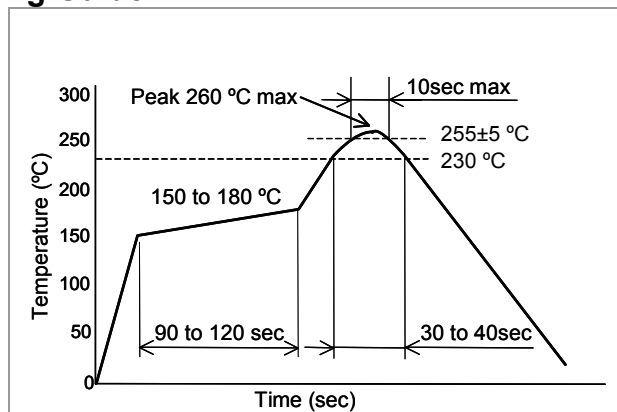
## 6. Recommended Land pattern and soldering Guide



Note:

Since KC7050T series has no Bypass Capacitor between V<sub>CC</sub> and GND, Please mount high frequency type capacitor 0.01μF and 10μF to the nearest position of oscillator.

**Fig.5 Land pattern**



Available Reflow times: Maximum twice

**Fig.6 Reflow profile (Lead Free Available)**

<Reflow Condition>

- Solder melting point +183°C

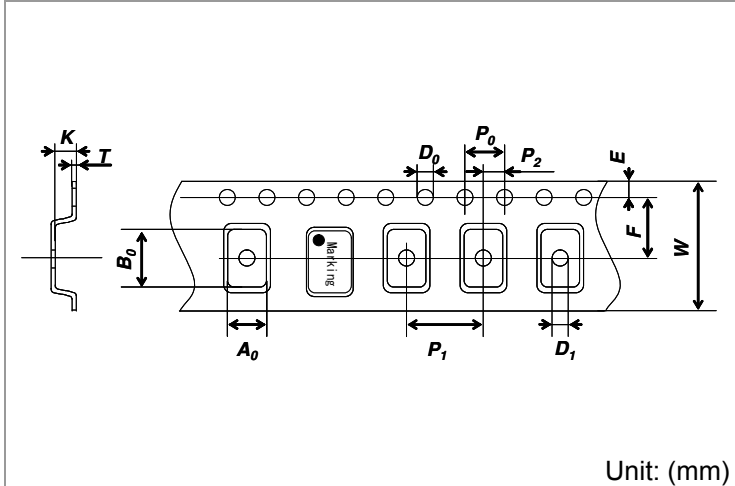
<Solder Heat Resistance>

- Maximum +260°C / Maximum 10sec or Maximum +230°C / Maximum 60sec.

## 7. Taping Specifications

### 7-1. Taping Quantities:

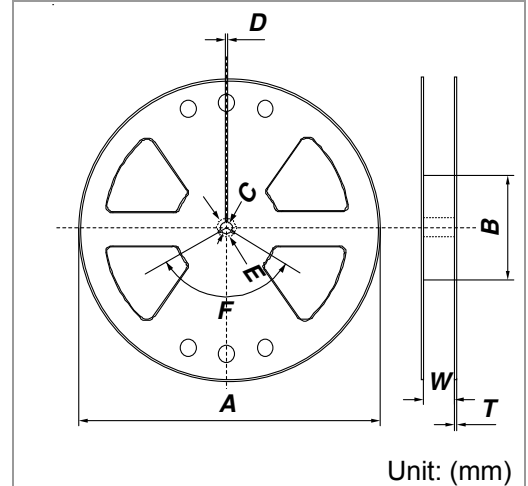
- The tape of one reel shall pack with maximum 1,000 pcs.
- KC7050T shall be contained continuously in pocket.



Unit: (mm)

Symbol	$A_0$	$B_0$	$W$	$F$	$E$
Dimensions	$5.6 \pm 0.1$	$7.8 \pm 0.1$	$16.0 \pm 0.3$	$7.5 \pm 0.1$	$1.75 \pm 0.1$
Symbol	$P_1$	$P_2$	$P_0$	$D_0$	$T$
Dimensions	$8.0 \pm 0.1$	$2.0 \pm 0.1$	$4.0 \pm 0.1$	$1.5 + 0.1/0$	$0.3 \pm 0.05$
Symbol	$K$	$D_1$			
Dimensions	$1.9 \pm 0.1$	$1.55 \pm 0.05$			

**Fig.7 Emboss Carrier**



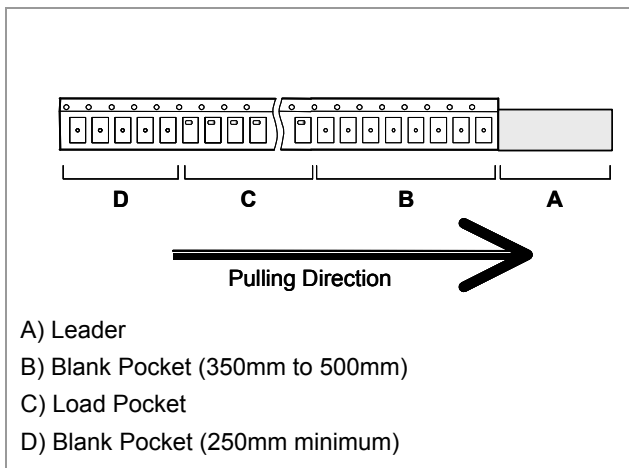
Unit: (mm)

Symbol	$A$	$B$	$C$
Dimensions	$\phi 330 \pm 2$	$\phi 100 \pm 1$	$\phi 13 \pm 0.2$
Symbol	$D$	$E$	$F$
Dimensions	$2.0 \pm 0.5$	$\phi 21 \pm 0.8$	$120^\circ$
Symbol	$W$	$T$	
Dimensions	$16.4 \pm 0.5$	$2 \pm 0.5$	

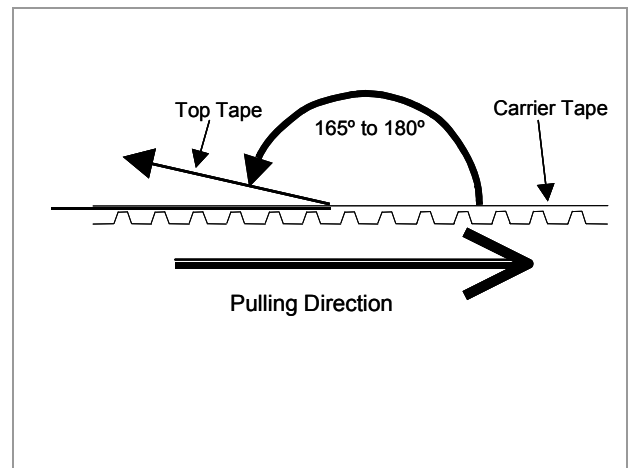
**Fig.8 Reel**

### 7-2. Leader and Blank Pocket

- Package shall consist of leader, blank pocket and loaded pocket as follows. "Fig.9"
- The power peeling top tape from carrier one shall be  $0.1N \{10gf\}$  to  $0.7N \{70gf\}$ . "Fig.10"



**Fig.9 Taping**



**Fig.10 Peeling Strength**

## 8. Package

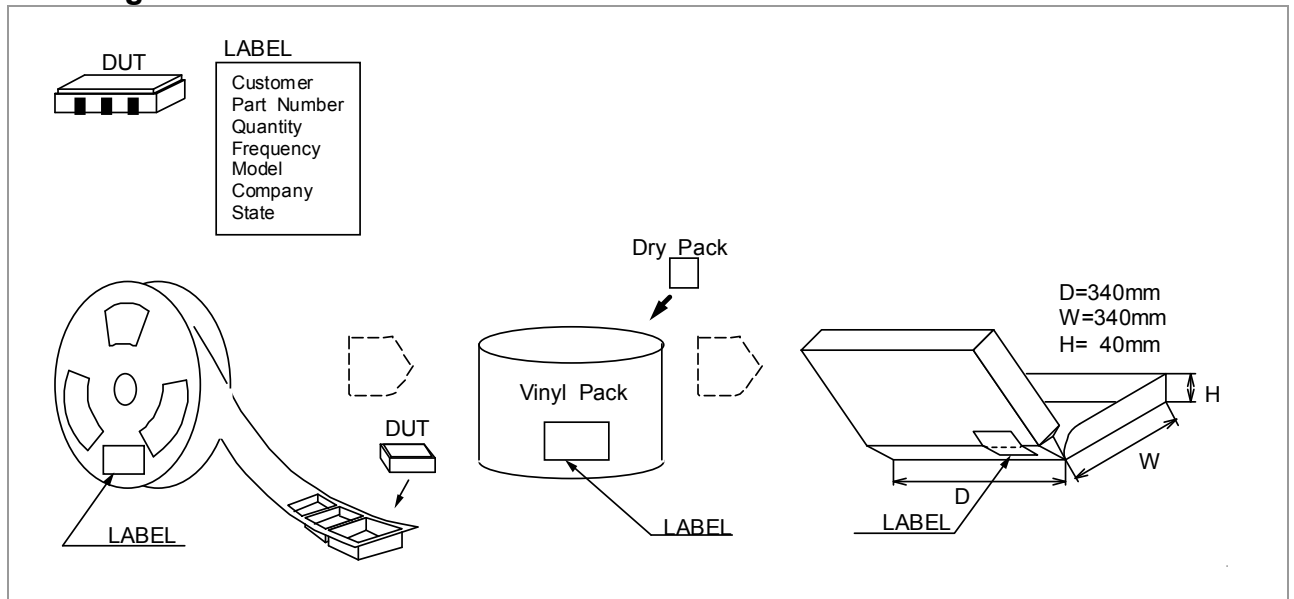


Fig.11 Package

## 9. The agreement of this specifications

If you find further points in this specifications, contact us within 45 days after the date of issue.

## 10. Remarks on Usage

### 10-1. Storage Condition

Parts should be stored in temperature range of  $-5$  to  $+40^{\circ}\text{C}$ , humidity 40 to 60% RH, and avoid direct sunlight. Then use within 6 months.

### 10-2. Handling Condition

Although KC7050T has protection circuit against static electricity, when excess static electricity is applied, the inside IC may get damaged.

When mounting on PCB, please make sure the direction of KC7050T is correct, otherwise KC7050T will increase in temperature and may damaged.

Please do not use KC7050T under unfavorable condition such as beyond specified range in catalogue or specification sheet.

When using an auto-mounting machine, select the one which give silent impulse as little as possible to the relevant components and operate it with much attentive confirmation so that it may not cause damaged.

After making the KC7050T mounted on a printed circuit board, if it is required to divide the printed circuit board into another one, use it with attentive confirmation so that a warp caused by this division might not affect any damage. When designing a printed circuit board as well as handling the mounting location, the printed circuit board has to be being stress free area as much as possible.

Please do not use KC7050T under condition in the water or salt water will drop on KC7050T and under environment of dew or harmful gas.

### 10-3. Soldering

Please use KC7050T under condition " IR or Vapor phase Reflow " only.

### 10-4. Washing Condition

If KC7050T is applied ultrasonic, it may be inferior and destroy.

Please don't use ultrasonic cleaner.

In case of using KC7050T without above precaution, Kyocera is unable to guarantee the specified characteristics.