To: DJI

Issue No. : E1705014
Date of Issue : May 17, 2017
Classification : [New] , Changed

PRODUCT SPECIFICATION FOR APPROVAL

Product Description : Conductive Polymer Tantalum Solid Capacitor

Customer Part Number :

Product Part Number : 16TQS33MED

Country of Origin : Japan, Indonesia

Applications :

※ If you approve this specification, please fill in and sign the below and return 1copy to us.

Approval No :

Approval Date :

Executed by :

(signature)

Title :

Dept. :

RoHS Compliant & Lead Free & Halogen* Free

* Halogen means Br and Cl.

Panasonic Industrial Devices Saga Co., Ltd.
Device Solutions Business Division
Automotive & Industrial Systems Company
Panasonic Corporation

217 Fukumo, Omachi-town,
Saga prefecture, 849-2102, Japan
Phone: +81-952-82-3281
Phone: +81-952-82-6219(Direct)

Prepared by : Engineering Planning Division

Contact Person
Signature
Name(Print) H.Morita
Title Engineer

Checked by
Signature
Name(Print) K.Murata
Title Supervisor

Y.Takeda
Manager

Authorized by
Signature
Name(Print) N.Honda
Title General Manager

Panasonic

Revision Record

Customer Part No.	Product Part No.	Note
	16TQS33MED	

No.	Pg	Revised Date	Enforce Date	Contents	Approval	Accepted No.
Initial Date May 17, 2017				New	N.Honda	
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1. Scope

These specifications specify 16TQS33MED of POSCAP that is a Conductive polymer solid capacitor. Test conditions and others that are not contained in these specifications should be pursuant to EIAJ RC-2378 and JIS C 5101-3.

2. Part number

Explanation of part number

16	TQS	33	M	ED
Rated voltage	Series name	Rated capacitance	Tolerance on rated capacitance	Special
2 figures	3 figures	2 figures	1 figure	2 figures

R.V.	Code
16	16

TQS series

R.C.	Code
33	33

Tolerance	Code
±20%	M

*This product has taping type only.

3. Rating

3-1. Category temperature range

-55deg.C to +105deg.C

3-2. Rated voltage, Rated temperature, Surge voltage, Category voltage

Rated voltage (V)	Rated temperature (deg. C)	Surge voltage (V)	Category voltage (V)
16	105	20	16

*The sum of DC voltage and the peak of ripple voltage must not exceed rated voltage.

3-3. Rated capacitance

(At 120Hz) See “Characteristics list “ in Item 13

3-4. Allowable ripple current

See “Characteristics list “ in Item 13

4. Dimensions

See “Dimensions” in Item 15

5. Electric, Mechanical, and weathering performance

* Standard conditions

Temperature : 15deg.C to 35deg.C (Base temperature : 20±2deg. C)
Relative humidity : less than 75%
Air pressure : 86kPa to 106kPa

5-1. Electric performance

5-1-1. Leakage current

(μA / 5 minutes) See "Characteristics list " in Item 13

In case Leakage current value exceeds the value shown in Item 13, those should be measured after treatment of the rated voltage for 120 minutes at 105deg.C.

Insert a protection resistor of about 1kohm for charge and discharge when measuring the leakage current.

5-1-2. Tolerance on rated capacitance

(At 120Hz) M: ±20%

5-1-3. Dissipation Factor (DF)

(At 120Hz) See "Characteristics list " in Item 13

5-1-4. Equivalent series resistance (E.S.R.)

(At 100kHz) See "Characteristics list " in Item 13

5-1-5. Characteristics at high temperature and low temperature

Step	Temperature (deg.C)	Characteristics
1	+20±2	Measurement: Capacitance DF Impedance (100kHz, Z 20deg.C)
2	-55 $^{+0}_{-2}$	Z / Z 20deg.C = 1.0 to 2.0
3	Keep at 15deg.C to 35deg.C for 15 minutes or more	
4	+105 $^{+2}_{-0}$	Z / Z 20deg.C = 0.6 to 1.0
5	+20±2	ΔC/C: Within ±5 % of step 1 DF: Less than a value on the item 5-1-3

Z / Z 20deg.C : Impedance ratio at 100kHz
ΔC/C 20deg.C : Capacitance change at 120Hz
DF : At 120Hz

5-1-6. Surge

Temperature : Room temperature (at 15deg.C to 35deg.C)
Surge voltage : See Item 3-2
Charging time : 30±5s.
Discharging time : 5 minutes 30s.
Period : 6 minutes ± 30s.
Operation : 1000 cycles
Protective resistor : R (kohm) = (100±50) / (C x n)
Discharging resistor : 1 kohm
Performance: The capacitors shall meet the following specifications when they leaved on a standard condition for 1 to 2 hours after the test.

Item	Performance
Capacitance change	Within ±5% of an initial value
DF	Less than a value of the item 5-1-3
Leakage current	Less than 3.0 times of a value on the item 5-1-1
Outward appearance	No remarkable defect

5-2. Mechanical performance

5-2-1.Vibration

Frequency : 10Hz to 55Hz (1 minute interval / 10→55→10Hz)
Amplitude : 0.75 mm (Total excursion 1.5 mm)
Direction : X, Y, Z (3 axes)
Duration : 2 hours / axial (Total 6 hours)

The capacitors shall be mounted on a printed circuit board with soldering paste.
Soldering shall be carried out under the test conditions in Item 5-2-3 (Resistance to soldering heat).
Performance: Measured capacitance should be settled when it is within 30 minutes before the end of test.
Meanwhile, the rate of capacitance change is within ±5 % of the initial value after test.
In case the severe vibration more than above conditions is expected, the capacitor should be fixed with glue.

5-2-2. Solderability

Temperature : 245 ±5°C
Duration : 2 ± 0.5 seconds
Flux : Rosin (JIS K 5902) / Ethanol (JIS K 8101); About 25 wt.%
Performance : More than 95 % of dipped leads are covered with new solder.

5-2-3. Resistance to soldering heat

Test condition

A) Reflow soldering

The capacitors are mounted on a printed circuit board with soldering paste and soldered with recommended reflow soldering condition.

The capacitors shall meet the following specification after the capacitor's temperature is back to room temperature.

B) Soldering iron method

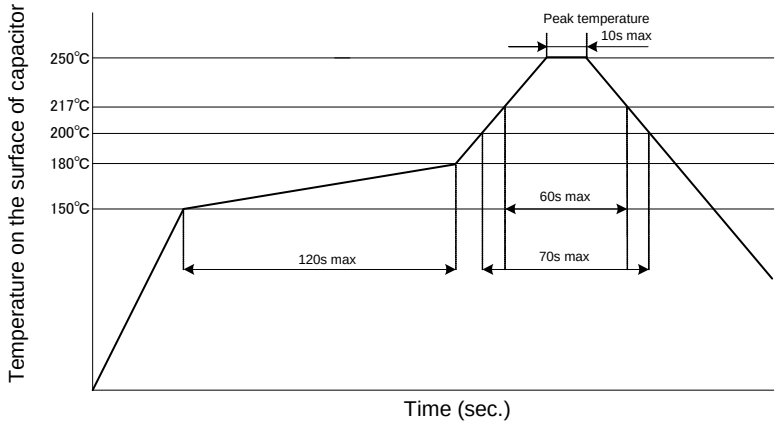
Temperature : 400 ±10°C
Duration : 5^{+1}_{-0} seconds

Performance: The capacitors shall meet the following specification after A or B test.

Item	Performance
Capacitance change	Within ±10% of an initial value
DF	Less than 2.0 times of a value on the item 5-1-3
Leakage current	Less than 3.0 times of a value on the item 5-1-1
Outward appearance	No remarkable defect

Recommended reflow condition

The cycles of reflow soldering: Twice (max)



Note: *Measurement position of temperature: The top of capacitor and terminal
*Heat stress to POSCAP will be influenced by the difference of reflow equipment, PCB material, size and number of parts. Please check reflow condition and confirm TQS's electric characteristic through a practical test mounting before reflow.

5-3. Weathering Performance

5-3-1. Damp heat (Steady state)

Temperature : 60 ±2deg.C
Relative humidity : 90% to 95%RH
Duration : 500^{+24}_{-0} hours

Performance: The capacitors shall meet the following specification after the test.

Item	Performance
Capacitance change	Within -20% to +40% of an initial value
DF	Less than 1.5 times of a value on the item 5-1-3
Leakage current	Less than 3.0 times of a value on the item 5-1-1

5-3-2. Endurance

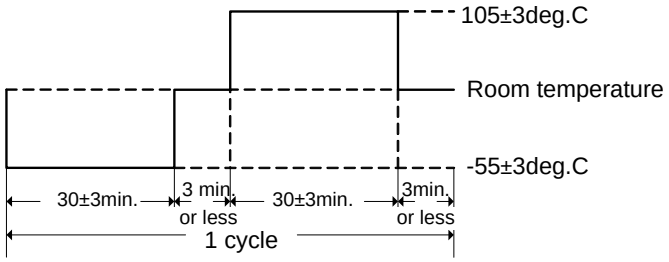
Temperature : 105 ±2 deg.C
Duration : 1000^{+72}_{-0} hours
Applied voltage: Rated voltage

Performance: The capacitors shall meet the following specification after the test.

Item	Performance
Capacitance change	Within ±20% of an initial value
DF	Less than 1.5 times of an value on the item 5-1-3
Leakage current	Less than a value of the item 5-1-1

5-3-3. Rapid change of temperature

Number of cycles : 5 cycles
Test diagram : Fig.1
Performance: The capacitors shall meet the following specification after 5 cycles.



(Fig.1)

Item	Performance
Capacitance change	Within ±10% of an initial value
DF	Less than 1.5 times of a value on the item 5-1-3
Leakage current	Less than 3.0 times of a value of the item 5-1-1

6. Failure rate level

0.5 % / 1000 hours (Confidence level: 60%)
Test conditions: 105deg.C, Rated voltage applied,

Failure criteria:

Item	Performance
Capacitance change	Within ±30% of an initial value
DF	Less than 3 times of a value on the item 5-1-3
Leakage current	Less than 30 times of a value on the item 5-1-1

7. Cleaning

Check the following items before washing the PCB with these detergents: high quality alcohol-based cleaning fluid such as Pine-αST-100S,Clean thru 750H, 750L,710M,750K, or Techno Care FRW14 through 17; or detergents including substitute freon as AK-225AES and IPA.

(a) Washing condition is immersion or ultrasonic waves. It is within 2 minutes in all to wash.
(b) The temperature of detergents should be less than 60deg.C.
(c) Watch the contamination of the detergent (conductivity, pH, specific gravity, water content, etc.).
(d) Do not store POSCAP in gases of detergents or in an airtight container after washing. Dry the PC board and POSCAP with hot air (less than the maximum category temperature).
The marking might be erased out according to several kind of cleaning fluid if rubbed.
(e) Please contact us for details about detergents, washing methods, and other detergents except for the above.

8. Manufacturer

Panasonic Industrial Devices Saga Co., Ltd.

SANYO JAYA COMPONENTS INDONESIA

9. Industrial property

Panasonic adjusts conflicts that concerned with industrial property about design POSCAP itself Panasonic deliver based on this specification.

10. Environmental consideration

10-1. RoHS Compliance

POSCAP do not use any of the following substances regulated by EU RoHS Directive,either the manufacturing process or raw materials (homogeneous materials),of POSCAP.

Restricted substances RoHS directive

- Lead (Pb) and it's compounds
- Cadmium (Cd) and it's compounds
- Mercury (Hg) and it's compounds
- Hexavalent chromium(Cr6+)
- Polybrominated biphenyls (PBBs)
- Polybromineted diphenyl ethers (PBDEs)

10-2. Lead-Free

All complete parts and homogenous materials of POSCAP are lead-free.

10-3. Halogen-free

Under this specification, the "halogen-free" means that homogeneous materials of compliant with the following conditions.

- Chlorine (Cl) concentration : ≦0.09wt% (900ppm)
- Bromine (Br) concentration : ≦0.09wt% (900ppm)
- Total concentration of chlorine(Cl)+bromine(Br) : ≦0.15wt% (1500ppm)

Our company restrictions on halogens apply only to chlorine, bromine, and their compounds. No otherhalogen (fluorine, iodine, astatine) is regulated.

Homogeneous material:

A homogeneous material has uniform composition throughout and cannot be mechanically disjointed into different materials.

- A ink layer, coating layer or coat of paint that is printed or coated on the surface of plastic materials.
- A metallic thin-film formed on the surface of plastic or metallic material.
- A material (plastic, adhesive material, metallic material, ink, glass, paper, alloy etc.) which is made up of a homogeneous substance.

*As for the packaging materials, they comply with EU94/62/EC Packaging and Waste Packaging Directive, which requires the total content of lead, cadmium, mercury and hexavalent chromium in the components of packaging materials to be 100 ppm or less.

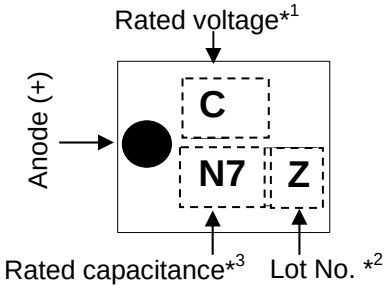
10-4. Substances destroying the ozone layer

Substances (class Ⅰ) destroying the ozone layer are not contained in POSCAP TQS series.
It is not used in manufacturing process too.

Substance (class Ⅰ) destroying the ozone layer

* Freon (CFC-11, 12, 13, 111, 112, 113, 114, 115, 211, 212, 213, 214, 215, 216, 217)
* Halon (halon-1211, 1301, 2402)
* Carbon tetrachloride
* 1,1,1-Trichloroethane (Methylchloroform)

11. Marking



*1 The rated voltage is as follows.

W.V	16V
Mark	C

*2 Lot. No. shows roughly manufacturing date.

*3 The rated capacitance is as follows.

C(uF)	33
Mark	N7

12. Operating precautions

Please take note of the following points in order to make the best use of the TQS series capacitors' performance. Please use the TQS series capacitors within the range of specified performance after confirming each capacitors' usage environment and circuit condition.

Please choose the TQS series capacitors that match the lifetime of the intended circuit design.

The performance of the capacitors varies with the temperature or frequency. Therefore, please consider these variations when designing the circuit.

Please buy the TQS series capacitors from our official distributors. Otherwise there is no us warranty.

12-1. Crucial precautions

12-1-1. Polarity

The TQS series capacitors have polarity.

Please confirm the polarity prior to use.

If they are used with the polarities reversed, it may result in an increase of leakage current, decrease of the life and a short circuit.

12-1-2. Prohibited circuits

Since problems can be expected, the TQS series capacitors cannot be used on the following circuits.

(1) High impedance voltage retention circuits

(2) Coupling circuits

(3) Time constant circuits

(4) Circuits greatly affected by leakage current

(5) The circuit in which two or more capacitors are connected in series so as to raises the endurance voltage.

12-1-3. Over voltage

Do not apply voltages exceeding the full rated voltage.

If such voltage is applied, it may cause short circuit even if it is for just a moment.

12-1-4. Rapid charge and discharge limitation

Rapid change and discharge are restricted (for maintenance of high-proof reliability).

A protective circuit is recommended for when a rapid charge or discharge causes excessive rush current since this is main cause of short circuit and large leakage current.

Use a protective circuit in case the rush current value exceeds 20A.

Be sure to insert a protection resistor of about 1kΩ for change and discharge when measuring the leakage current.

12-1-5. Soldering conditions

The soldering conditions are to be within the range prescribed in the specifications.

If the specifications are not followed, there is a possibility of the appearance becoming defective when soldering is conducted Under conditions that are harsher than those stipulated.

12-1-6. Using in industrial equipment

When the TQS series capacitors are used in industrial equipment, allow wider margin of capacitance, impedance and other characteristics.

12-1-7. Using in equipment regarding human's life

It must be contact us when the TQS series capacitors are designed in equipment regarding human's life, for example, Space equipment, Aeronautic equipment, Atomic equipment and Medical instrument, etc.

Do not use it without recognition document with us.

12-2. Cautions

12-2-1. Circuit designing cautions

(1) After checking the operation and installation environments, design the circuit so that it falls within the rated performance range stipulated in the specifications.

(2) Operating temperature and ripple current

(a) Set the operating temperature so that it falls within the range stipulated in the specifications.

(b) Do not supply current that exceeds the rated ripple current. When excessive ripple current is supplied, internal heat increases and reduces the TQS series capacitor's life span.

(3) Leakage current

Even when the soldering conditions fall within the range of the specifications, leakage current increases a little on occasion. It also increases a little during high temperature storage, high humidity storage and temperature cycling with no voltage applied. In cases such as these, leakage current will decrease by applying voltage under the condition of below the TQS series capacitors' maximum operating temperature. The speed at which the leakage current is restored is increased by applying voltage when the TQS series capacitors'temperature is close to the maximum operating temperature.

(4) Reduction of failure stress

The TQS series capacitors' failure has open circuit mode influenced by ambient temperature and contingency short mode due to over voltage or reverse voltage applied. In case of failures in short circuit mode, whose electrified current is comparatively small (within about 1A), capacitor itself heats a little, but no outward appearance problem even if it is electrified continuously.

However, as short circuit current is over the prescribed value and electrified continuously, inside temperature is getting high and it may cause the bulge of mold resin. The worst case, for example, smoke, disintegration, is expected, so pay enough attention when designing.

The time to reach the failure mode can be extended with reduced ambient temperature, ripple current and applied voltage.

(5) Operating environment restrictions

Do not use the TQS series capacitors in the following environments.

(a)Places where water, salt water or oil can directly fall on it and places where condensation may form.

(b) Places filled with noxious gas for capacitors (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc.).

(c) Places susceptible to ozone, ultraviolet rays and radiation.

(d) Places where vibration or shock exceeds the allowable value as specified in the catalog or in the specifications.

(e) Places exposed to direct sunlight.

(6) Land pattern

(a) Avoid locating heat-generating components around the capacitors and on the underside of the PCB.

(b)When the TQS series capacitors are mounted on the double-sided circuit board, avoid placing through holes under capacitors.

(c) Avoid having the printed wire under the capacitor. When mounting the TQS capacitors on PCB, match the capacitors' land pattern dimension.

(7) Parallel connection

Ripple current may be flowed to the capacitor that has lower impedance when different kinds of the TQS series capacitors are used in parallel. Please be careful of choosing models.

Please consider the balance of electric current when more than two capacitors are connected in parallel.

12-2-2. Storage

(1) It is necessary to set an environment to prevent a trouble at the time of soldering by the degradation of solder ability or moisture's getting into the molding resin when the TQS series capacitors are stored.
Store at a temperature between 15 deg. C to 35 deg. C, with humidity of 75%RH or less.

The storage period is 18 months or shorter after shipment, under the condition that is unopened the storage bag.

Please unseal the storage bag just before mounting and be conscious that the TQS series capacitors do not remain. When remainders unfortunately occur, return them to the storage bag once again, and please seal the unsealed part by adhesive tape, etc. with desiccants. Moreover, once opened the storage bag, use them up within a week (168hours) under the condition that is less than or equal to 30deg.C, 60%RH (MSL3).

(2) Do not store in damp conditions such as with water, salt water, or oil, and dew condensation.

(3) Do not store in places filled with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.)

(4) Do not store in places susceptible to ozone, ultraviolet rays and radiation.

Note:
In case of some problems concerning industrial possessive rights of third party by using this product, we do not take responsibility except for what to be directly conceded with structure processes of POSCAP. Please design with safety measures taking into consideration any social damage, such as personal or fire accident when using this product.
All rights reserved.

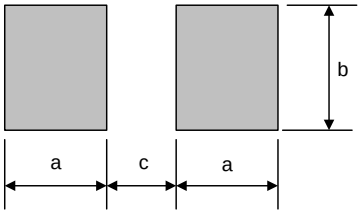
13. Characteristics list

Panasonic part number	Rated voltage [V DC]	Rated temp. [deg.C]	Category voltage [V DC]	Category temp. [deg.C]	Rated capacitance [uF] *1	Dissipation factor [% max] *1	Leakage current [uA max] *2	ESR [mOhm max] 100kHz *3	Maximum allowable ripple current [mArms] 100k
16TQS33MED	16	105	16	105	33	10.0	52.8	100	1000*4

*1: 120Hz, +20deg.C *2 : After 5minutes *3 : 100kHz, +20deg.C

*4: 100k to 1MHz, Maximum allowable ripple current (Spec) can be applied as long as the top of capacitor temperature does not exceed the category temperature.

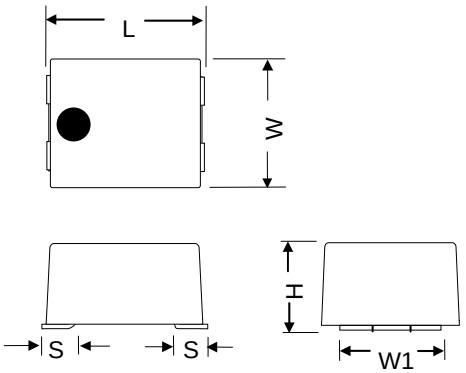
14. Recommended land pattern dimension



unit; mm

Size code	a	b	c
B1S	1.6	2.7	1.4

15. Dimensions



unit; mm

Size code	L (±0.2)	W (±0.2)	H (±0.1)	S (±0.3)	W1 (±0.1)
B1S	3.5	2.8	1.1	0.8	2.2

16. Packaging on Continuous Tapes

16-1. Dimensions of taping

See Item 16-5 (Embossed carrier tape)
See Item 16-6 (Top cover tape)
See Item 16-7 (Reel)

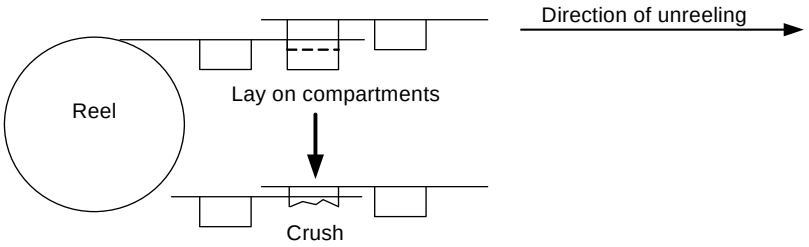
16-2. Scope

16-2-1. Number of missing components

The number of missing components shall not exceed 1 piece except for splice compartments. Then, the total number of components on one reel shall meet the standard.

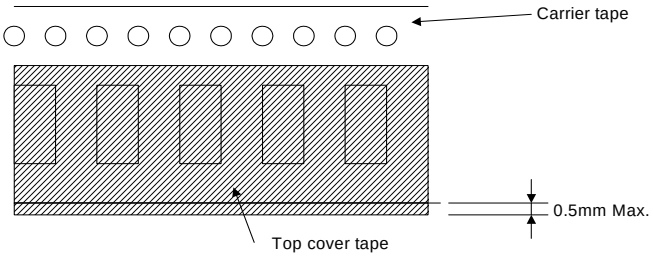
16-2-2. Splices

One empty component-compartments of the unreeling direction side tape should be laid on the reel side compartments and then they should be crushed to be joined together.

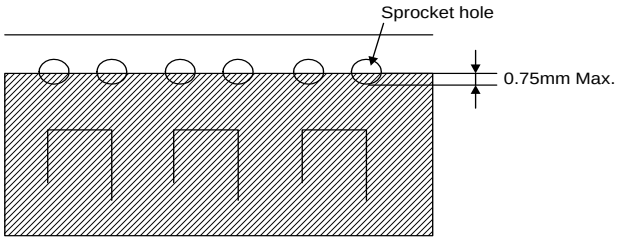


16-2-3. Deviations of top cover tape

(1) In case the top cover tape extends beyond the edge of carrier tape, the distance shall not exceed 0.5mm.



(2) In case the top cover tape covers a part of sprocket hole, the distance shall not exceed 0.75mm.



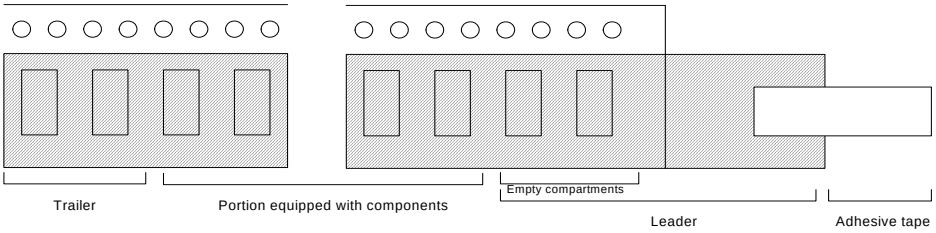
16-3. Leader tape and trailer tape

16-3-1. The trailer tape at the hub of reel shall be at least 40mm in length.

16-3-2. The length of leader tape at empty compartments shall be at least 40mm.

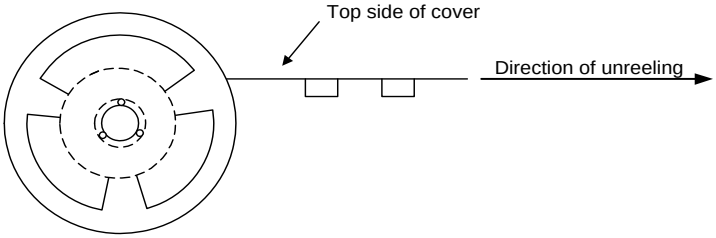
16-3-3. The length of leader tape shall be at least 400mm.

16-3-4. The length of adhesive tape fixed leader tape shall be about 100mm.

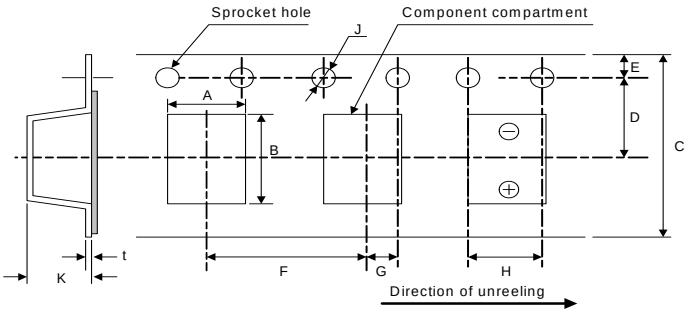


16-4. Reel

Carrier tape shall be reeled with it is bottom side being oriented towards the center of reel.
The trailer shall be put into a slit at the hub.



16-5. Taping of embossed carrier



unit; mm

Size Code	A ±0.1	B ±0.1	C ±0.3	D ±0.1	E ±0.1	F ±0.1	G ±0.1	H ±0.1	J -0/+0.1	K ±0.2	t ±0.1
B1S	3.25	3.9	8.0	3.5	1.75	4.0	2.0	4.0	ϕ1.5	1.7	0.25

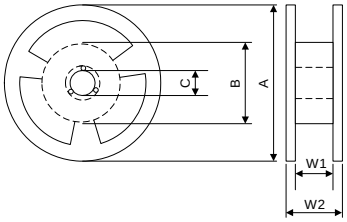
* Dimension A and B are the measure of compartment's inside bottom.
* The anode of parts is placed opposite to sprocket hole.

16-6. Dimension of top cover tape

Width of top cover tape : 5.5±0.2mm

16-7. Style and dimension of reel

According to EIAJ ETX-7001



Unit; mm

Size code	A	B	C	W1	W2
B1S	ϕ180+0/-2	ϕ60±2	ϕ13±0.2	9.5±0.5	11.4±1.0

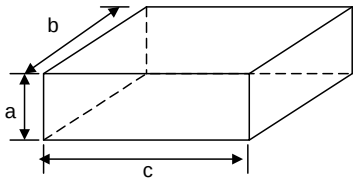
16-8. Packing quantities

Size code	Reel	Pieces / reel
B1S	ϕ180	2,500

*To place an order, please specify with integral multiple of above quantities.

16-9. Dimension of packing box

Each reel is boxed after putting it in a bag with silica gel.



unit; mm

Size code	Box size	a	b	c
B1S	Box A (ϕ180)	90	240	240

Maximum stacking quantity of box A is 10 boxes.

16-10. Maximum packing quantities in packing box

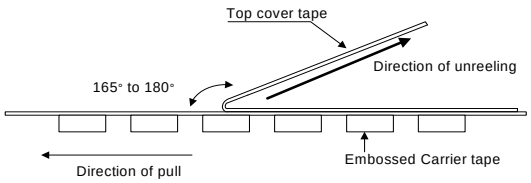
unit: Pieces

Size code	Box A (ϕ180)
B1S	12,500

16-11. Peel force of top cover tape

According to JIS C 0806

The Peel force of top cover tap shall be 0.1N to 0.7N when the top cover tape is pulled at a speed of 300mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 as illustrated below.



Unikeyic Electronics

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Panasonic:

ERJ2RKF12R0X ERJ8ENF2701V EEUEB1E221SB ERJ-3GEYJ3R0V ERJ-P08F2000V ERJ-UP3J750V ERJB1AF100U 16SVPC100M ERJ-6ENF7501V ERJD1CFR030U AXT340124 ERJ-8ENF39R0V ERJ-P6WF1500V ERJU0XJ105Y ETQP3M1R5KVN ERA6AEB124V ERJ-P08J1R0V ERJ1TYJ330U ERJ-XGNJ3R0Y ERJPB3B1001V AXK5F16547YG ERA-3AEB912V ERJB1CFR018U ECQE2273KB ERJ-B1AF511U ERJB1CFR01U ERJD1CJR022U EEE-FK1E221GP EEEFK1A102AP ERJ1TYJ1R0U