No. P-KVAN-E004/1
DATE 2025-11

PRODUCTS DATA SHEET

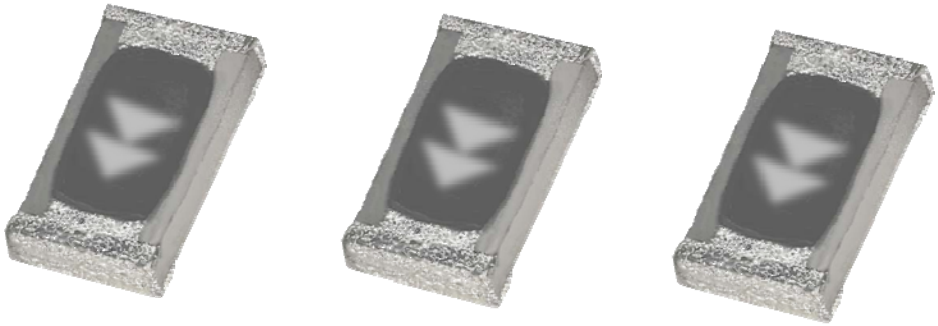
ESD protection

SURGE ABSORBER

Type KVA N Series

Size 1608

LEAD FREE



MATSUO ELECTRIC Co., LTD.

OUTLINE (TYPE　KVAN)

Surge Absorber KVA N Series is suitable for elimination of ESD on high-speed signal lines. It is qualified for AEC-Q200 that the standard is globally applied by automotive industry and meet ISO10605.
The ecology design of Type KVA N Series is environmentally friendly because of Lead-free and Halogen-free.

FEATURES

1. Usable on high-speed signal lines
2. Low capacitance (size 1608 : 0.08pF typ.)
3. Large ESD endurance and high insulation resistance
4. No polarity. Protection of circuit against ESD from both directions
5. Ultra-small size : 1608 (1.6 × 0.8 × 0.55 mm)
6. Suitable for automatic mounting by chip placer
7. Precise dimensions allows high-density mounting and symmetrical construction of terminal provide “Self-Alignment”.
8. Resistance to soldering heat : Reflow or flow soldering 10 seconds at 260℃
9. High accuracy carrier tape by using pressed pocket ensures excellent mounting.
10. Lead-free and RoHS Compliant

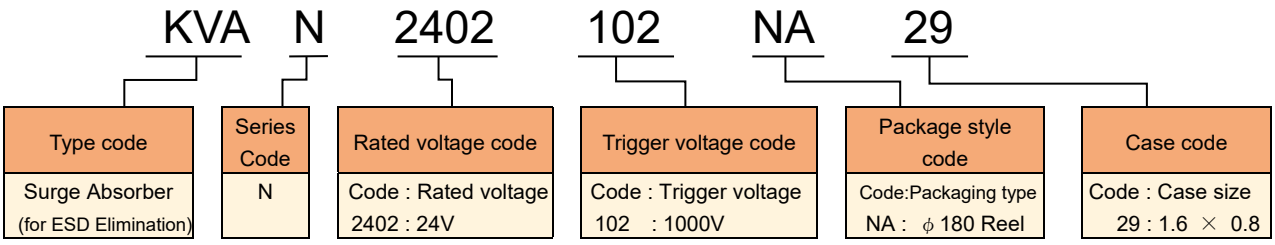
APPLICATION CLASSIFICATION BY USE

The application classification by use which divided the market and use into four is set up supposing our products being used for a broad use.
Please confirm the application classification by use of each product that you intend to use.
Moreover, please be sure to inform to our Sales Department in advance in examination of the use of those other than the indicated use.

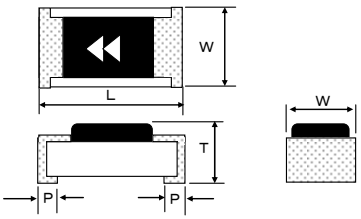
RATING

Item	Ratings
Category Temperature Range	– 40~+125° C
Rated Voltage	24 VDC
Trigger Voltage	1000V max. (650V typ.)
Clamp Voltage	200V max. (100V typ.)
Capacitance	0.2pF max. (0.08pF typ.)

ORDERING INFORMATION



DIMENSIONS



Main body：Alumina ceramic
Terminal：Tin plating

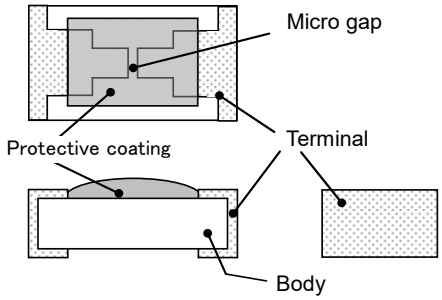
(mm)

Case size	Case code	L	W	T max	P
1608	29	$1.60^{\pm0.1}$	$0.80^{\pm0.1}$	0.55	$0.30^{\pm0.2}$

MARKING

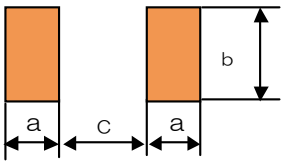
Code	Series	Rated voltage	Trigger voltage
⏪	N	24 VDC	1000 V max.

CONSTRUCTION



Name	Material
Micro gap	Nickel
Body	Alumina ceramic
Protective coat	Silicone resin
Terminal	Tin plating

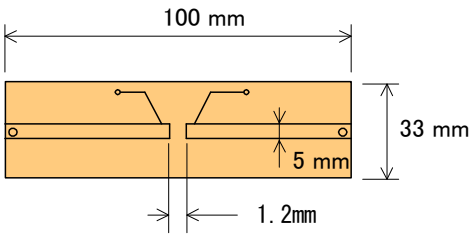
RECOMMENDED PAD DIMENSIONS



(mm)

	Size 1608
a	1.0
b	1.2
c	1.0

STANDARD TEST BOARD

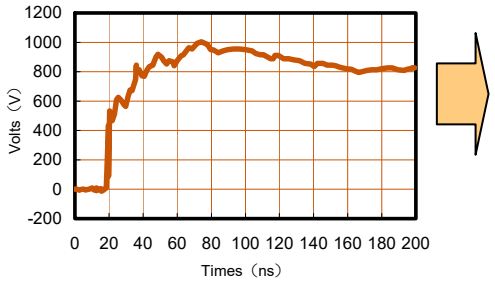


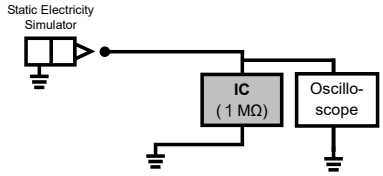
Glass epoxy on one side
Board thickness：1.6 mm
Copper layer：35μm

STATIC SUPPRESSION -Example of ESD Elimination-

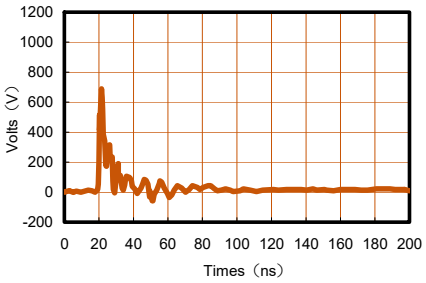
Surge Absorber absorbs and suppresses static electricity.

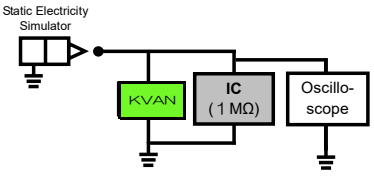
Original ESD waveform at 1 kV





Absorbed ESD waveform at 1KV when KVA N Series is used





When mounted in parallel with the elements to be protected, such as ICs, between the elements and GND, Type KVA N Series suppresses ESD applied to the elements and events malfunction and breaking.

PERFORMANCE

No.	Item	Performance	Test method
1	Trigger voltage	Shall not exceed 1000 V.	Contact discharging conforming to IEC61000-4-2 Tester capacity : 150 pF/Resistance : 330 Ω
2	Clamp voltage	Shall not exceed 200 V.	Contact discharging conforming to IEC61000-4-2 Tester capacity : 150 pF/Resistance : 330 Ω Test voltage : 8 kV (level 4)
3	Capacitance	size 1608 : Shall not exceed 0.2pF.	Measuring frequency : 1 MHz Measuring voltage : 1 V
4	Leakage current	Shall not exceed 1 nA.	Test voltage: 6V
5	Insulation resistance	Shall exceed 1 MΩ.	Resistance between terminals.
6	Electrode strength (Bending)	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Board supporting width : 90 mm Bending speed : Approx. 0.5 mm/sec. Duration : 60 sec. Bending : 3 mm
7	Shear test	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Applied force : 17.7N Duration : 60 sec. Tool : R0.5 Direction of the press : side face
8	Substrate bending test	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Supporting dimension : 0.8 mm Applied force : 10 N Tool : R0.5 Direction of the press : thickness direction of product.
9	Solderability (Solder Wetting time)	Solder Wetting time : within 3sec.	Solder : Sn–3Ag–0.5Cu Temperature : 245 ± 3℃ meniscograph method Solder : JISZ3282 H60A, H60S, H63A Temperature : 230 ± 2℃ meniscograph method
10	Solderability (new uniform coating of solder)	The dipping surface of the terminals shall be covered more than 95% with new solder.	Solder : Sn–3Ag–0.5Cu Temperature : 245 ± 3℃ Dipping : 3sec. Solder : JISZ3282 H60A, H60S, H63A Temperature : 230 ± 2℃ Dipping : 3sec.
11	Resistance to soldering heat	Marking shall be legible. No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Dipping (1 cycle) Preconditioning : 100 ~ 150℃, 60 sec. Temperature : 265 ± 3℃/6 ~ 7 sec. Reflow soldering (2 cycles) Preconditioning : 1 ~ 2 min, 180℃ or less Peak : 250 ± 5° C, 5 sec. Holding : 230 ~ 250℃, 30 ~ 40 sec. Cooling : more than 2 min. Manual soldering Temperature : 350 ± 10℃ Duration : 3 ~ 4 sec. Measure after 1 hour left under room temp. and humidity.
12	Solvent resistance	Marking shall be legible. No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Dipping rinse Solvent : Isopropyl alcohol Duration : 90 sec.

<table>
<tr><th>No.</th><th>Item</th><th>Performance</th><th>Test method</th></tr>
<tr><td>13</td><td>ESD endurance</td><td>No mechanical damage.
The resistance between terminals shall be 1 MΩ or more, and the trigger voltage shall be met.</td><td>Conforming to IEC61000-4-2
Tester capacity : 150pF / Resistance : 330 Ω
Test voltage :
<table><tr><th>Contact discharge</th><th>Air discharge</th></tr><tr><td>25kV</td><td>30kV</td></tr></table>1000 cycles.
Conforming to ISO10605
Tester capacity : 330pF / Resistance : 330Ω&2kΩ
Test voltage :
<table><tr><th>Contact discharge</th><th>Air discharge</th></tr><tr><td>20kV</td><td>25kV</td></tr></table>1000 cycles.</td></tr>
<tr><td>14</td><td>Vibration</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Peak value : 49N
Sweep time : 20min
Frequency range : 10~2000Hz
This cycle shall be performed 12 times in each of three mutually perpendicular directions(total of 36 times)</td></tr>
<tr><td>15</td><td>Shock</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance..</td><td>Peak value : 14700N
Duration : 0.5ms
Waveform : Half-sine
Velocity change : 4.7m/sec
Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (total of 18chocks).</td></tr>
<tr><td>16</td><td>Thermal shock</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>-55 ± 3° C : 30 min.
Room temperature : 2 ~ 3 min or less
125 ± 2° C : 30 min.
Room temperature : 2 ~ 3 min or less
Repeat above step for 1000 cycles.</td></tr>
<tr><td>17</td><td>Moisture resistance</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Temperature : 85 ± 3°C
Humidity : 85 ± 5% RH
Leaving
Duration : 1000 h</td></tr>
<tr><td>18</td><td>Load life</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Temperature : 85 ± 2°C
Applied : 24V (Rated voltage)
Duration : 1000 hours
Temperature : 125 ± 2°C
Applied : 24V (Rated voltage)
Duration : 1000 hours</td></tr>
<tr><td>19</td><td>Moisture load life</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Temperature : 85 ± 2℃
Humidity : 85 ± 5%RH
Applied : 24V(rated voltage)
Duration : 1000 hours</td></tr>
<tr><td>20</td><td>Stability</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Temperature : 125 ± 2℃
Leaving
Duration : 1000 hours</td></tr>
<tr><td>21</td><td>High and Low Temp</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance at each temperature.</td><td>Temperature :
20℃→-40℃→20℃→85℃→125℃→20℃</td></tr>
<tr><td>22</td><td>Sulfur resistance</td><td>No mechanical damage.
Shall meet specification of trigger voltage and the insulation resistance.</td><td>Hydrogen sulfide ges concentration : 3±1p.p.m.
Temperature : 40±1℃
Relative humidity : 90±5%RH
Duration : 240h</td></tr>
</table>

Application Notes for Surge Absorber

1. Circuit Design

Type KVA Surge Absorber is a part for protection from static electricity and cannot be used for protection from lightning surge.
Before using Type KVA Surge Absorber, sufficiently examine its electrical characteristics and the circuit conditions to be mounted.
(1) Type KVA should always be operated below the rated voltage.
(2) Please use Type KVA under the condition of category temperature.

Type KVA should be selected by determining the operating conditions that will occur after final assembly, or estimating potential abnormalities through cycle testing.

2. Assembly and Mounting

During the entire assembly process, observe Type KVA body temperature and the heating time specified in the performance table. In addition, observe the following items :
(1) Mounting and adjusting with soldering irons are not recommended since temperature and time control is difficult.
In case of emergency for using soldering irons, be sure to observe the conditions specified in the performance table.
(2) Type KVA body should not contact a soldering iron directly.
(3) Once Type KVA mounted on the board, they should never be remounted on boards or substrates.
(4) During mounting, be careful not to apply any excessive mechanical stresses to the Type KVA.
(5) Should not rub the protective coat surface with a cotton swab or abrush, it might cause the lack for marking and protective coat.

3. Solvents

For cleaning of Type KVA, immersion in isopropyl alcohol for 90 seconds (at 20 ~ 30°C liquid temp.) will not be damaged.
If organic solvents will be used to Type KVA, be sure to preliminarily check that the solvent will not damage Type KVA .

4. Caution During Usage

Type KVA should never be touched in use.

5. Environmental Conditions

(1) Type KVA should not be stored or operated in the presence of acids, or alkalis, or corrosive atmosphere.
(2) Type KVA should not be vibrated, shocked, or pressed excessively.
(3) Type KVA should not be operated in a flammable or explosive atmosphere.
(4) Please do not use Type KVA in the environment where dew condensation occurs.
In case Type KVA has to be used under the dew condensation condition, please apply moisture-proof coating over Type KVA.
Covering Type KVA with moisture-proof coating may affect electrical characteristics, please evaluate the effects sufficiently before use.

6. Emergency

In case of fire, smoking, or offensive odor during operation, please cut off the power in the circuit or pull the plug out.

7. Storage

(1) Type KVA should not be stored in an environment with high temperature, low temperature, high humidity, condensation and dust and avoid direct sunlight or corrosive atmosphere such as H2S(hydrogen sulfide) or SO2(sulfur dioxide).
Direct sunlight may cause decolorization and deformation of the exterior and taping.
Also, solderability will be remarkably lower in high humidity.
(2) If the products are stored for an extended period of time, please contact Matsuo Sales Department for recommendation. The longer storage term causes packages and tapings to worsen. If the products will be stored for longer term, please contact us for advice.
(3) The products in taping, package, or box should not be given any kind of physical pressure. Deformation of taping or package may affect automatic mounting.
(4) The plastic reel (made of PS) used for packaging the product is intended for use in ambient temperatures (5-35℃). To prevent issues during automated insertion due to reel deformation or other factors, please keep the reel away from direct sunlight and heat sources, and ensure it does not reach high temperatures (above 60℃), including during transportation.

8. Disposal

When Type KVA are disposed of as waste or “scrap”, they should be treated as “industrial waste”. Type KVA contain various kinds of metals and resins.

9. Samples

Type KVA received as samples should not be used in any products or devices in the market. Samples are provided for a particular purpose such as configuration, confirmation of electrical characteristics, etc.

MATSUO ELECTRIC CO., LTD.

Please feel free to ask our Sales Department for more information on Surge Absorber.

Overseas Sales 5-3,3-Chome,Sennari-cho,Toyonaka-shi,Osaka 561-8558,Japan Tel:06-6332-0883 Fax:06-6332-0920
Head office 5-3,3-Chome,Sennari-cho,Toyonaka-shi,Osaka 561-8558,Japan Tel:06-6332-0871 Fax:06-6331-1386
URL https://www.ncc-matsuo.co.jp/

適用用途分類 / APPLICATION CLASSIFICATION BY USE

Rev.7 (2025.10.03)

市場	適用用途分類	用途		推奨品種	推奨品種
		概要	代表的なアプリケーション例	チップタンタルコンデンサ	回路保護素子
高信頼度機器	1	・高度な安全性や信頼性が要求される機器 ・製品の保守交換が不可能な機器、製品の故障が人命に直接かかわる、または、致命的なシステムダウンを引　き起こす可能性がある機器	・宇宙開発機器関連(衛星、ロケット、人工衛星) ・航空・防衛システム ・原子力・火力・水力発電システム	267型Pシリーズ	該当なし
車載・産業機器	2	・信頼性が重視される機器 ・製品の保守交換が極めて困難な機器や、製品の故障が人命に影響する、あるいは故障の範囲が広範囲である機器	・自動車および鉄道・船舶等の輸送機器の車両制御(エンジン制御,駆動制御,ブレーキ制御) ・新幹線・主要幹線の運行制御システム	267型Nシリーズ 271型Nシリーズ	JAG型Nシリーズ JAJ型Nシリーズ JAK型Nシリーズ JHC型Nシリーズ KAB型Nシリーズ KVA型Nシリーズ
	3-A	・車載用だが一般電装機器で車室内環境において使用される機器	・エアコン,カーナビ等の車室内搭載部品、　車載用通信機器		KAB型Mシリーズ
	3-B	・製品の保守交換が可能な機器や、製品の故障が人命に影響しないが故障によるシステムダウンの損失が大きく保全管理が要求される機器	・家庭用/ビル用等のセキュリティ管理システム ・工業用ロボットや工作機械等の制御機器	267型M,Eシリーズ 279型 281型M,Eシリーズ TCA型 TCD型	JHC型
汎用機器	4	・最先端技術を積極的に適用する小型・薄型品 ・製品の保守交換が可能な機器や、製品の故障によるシステムダウンが部分的な機器向けの市場で広く使用されることを想定した製品	・スマートフォン、携帯電話、モバイルPC(タブレット)、電子辞書 ・デスクトップPC、ノートPC、ホームネットワーク ・アミューズメント機器(パチンコ、ゲーム機)	251型Mシリーズ 267型Cシリーズ TCB型	JAE型、JAG型 JAJ型、JAK型 KAB型 KAB型Tシリーズ KVA型

Market	Application classification by use	Use		Recommendation Type	Recommendation Type
		Outline	Typical example of application	Chip Tantalum Capacitors	Circuit Protection Components
High reliability apparatus	1	- Apparatus in which advanced safety and reliability are demanded. - Whether failure of the apparatus which cannot maintenance exchange products, and a product is direct for a human life, apparatus which changes or may cause a fatal system failure.	- Space development apparatus relation (Satellite, Rocket, Artificial Satellite) - Aviation and a defensive system - Atomic power, fire power, and a water-power generation system	Type 267 P Sereis	With no relevance
In-vehicle - Industrial apparatus	2	- Apparatus in which reliability is important. - The apparatus in which maintenance exchange of a product is very difficult, and failure of a product influence a human life, or the range of failure is wide range.	- Vehicles control of transport machines, such as a car, and a railroad, a vessel (Engine control, drive control, brake control) - The operation control system of the Shinkansen and a main artery	Type 267 N Sereis Type 271 N Sereis	Type JAG N series Type JAJ N series Type JAK N series Type JHC N series Type KAB N series Type KVA N series
	3-A	- General electrical equipment designed for use in vehicles but used in the interior environment	- Vehicle indoor loading parts, such as an air-conditioner and car navigation, and in-vehicle communication facility		Type KAB M series
	3-B	-Apparatus which can maintenance exchange products, and apparatus in which the loss of the system failure is large although failure of a product does not influence a human life, and maintenance engineering is demanded	- Security management system for home/buildings etc. - Control apparatus, such as Industrial use robots and a machine tool etc.	Type 267 M,E Sereis Type 279 Type 281 M,E Sereis Type TCA Type TCD	Type JHC
Apparatus in general	4	- The small size and the thin article which applies leading-edge technology positively - The product supposing being used widely in the market for the apparatus which can maintenance exchange products, and apparatus with a partial system failure by failure of product.	-Smart phone, Mobile phone, Mobile PC (tablet), Electronic dictionary - Desktop PC, Notebook PC, Home network - Amusement apparatus (Pachinko,Game machine)	Type 251 M Series Type 267 C Series Type TCB	Type JAE, Type JAG Type JAJ, Type JAK Type KAB Type KAB T series Type KVA

テーピング数量・リール寸法
Taping Quantity And Carrier Tape Dimensions

チップタンタルコンデンサ
Chip Tantalum Capacitors

定格：251型Mシリーズ, TCB型
Type：251 M Series, TCB

ケース記号 Case Code	ケースサイズ Case size	W (mm)	F (mm)	E (mm)	P_1 (mm)	P_2 (mm)	P_0 (mm)	ϕD_0 (mm)	包装数/リール(個) Quantity/Reel (pcs)
									ϕ180
U	1.0×0.5	8.0±0.3	3.5±0.05	1.75±0.1	2.0±0.05	2.0±0.05	4.0±0.1	1.55±0.03	10,000
M	1.6×0.8				4.0±0.1			$1.5^{+0.1}_{0}$	3,000
S	2.0×1.25								
A	3.2×1.6								

定格：267型Mシリーズ, 267型Eシリーズ, 267型Pシリーズ, 271Nシリーズ
279型Mシリーズ, 281型Mシリーズ, 281型Eシリーズ
Type：267 M Series, 267 E Series, 267 P Series, 271 N Series
279 M Series, 281 M Series, 281 E Series

ケース記号 Case Code	ケースサイズ Case size	W (mm)	F (mm)	E (mm)	P_1 (mm)	P_2 (mm)	P_0 (mm)	D_0 (mm)	包装数/リール(個) Quantity/Reel (pcs)	
									ϕ180	ϕ330
A	3.2×1.6	8.0±0.3	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	$\phi 1.5^{+0.1}_{0}$	2,000	9,000
B	3.5×2.8									8,000
C3	6.0×3.2	12.0±0.3	5.5±0.05		8.0±0.1				500	3,000
D3	7.3×4.4		5.7±0.05	1.5±0.1						2,500
H	7.3×4.4		5.7±0.1							1,500
E	7.3×5.8		5.5±0.05	1.75±0.05						2,000

定格：267型Nシリーズ、TCA型
Type：267 N Series, TCA

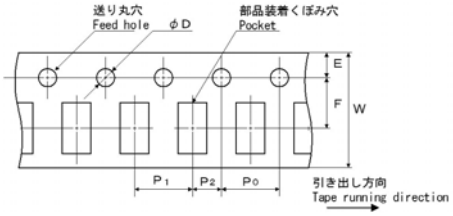
ケース記号 Case Code	ケースサイズ Case size	W (mm)	F (mm)	E (mm)	P_1 (mm)	P_2 (mm)	P_0 (mm)	D_0 (mm)	包装数/リール(個) Quantity/Reel (pcs)	
									ϕ180	ϕ330
A	3.2×1.6	8.0±0.3	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	$\phi 1.5^{+0.1}_{0}$	2,000	9,000
B	3.5×2.8									8,000
C	6.0×3.2	12.0±0.3	5.5±0.05		8.0±0.1				500	3,000
D	7.3×4.4		5.7±0.05	1.5±0.1						2,500

回路保護素子
Circuit Protection Components

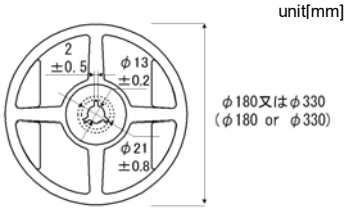
定格：JAE型、JAG型、JAG型Nシリーズ、JAJ型、JAJ型Nシリーズ、JAK型、JAK型Nシリーズ、JHC型、JHC型Nシリーズ
KAB型、KAB型Nシリーズ、KAB型Mシリーズ、KAB型Tシリーズ、KVA型、KVA型Nシリーズ
Type：JAE, JAG, JAG N Series, JAJ, JAJ N Series, JAK, JAK N Series, JHC, JHC N Series
KAB, KAB N Series, KAB M Series, KAB T Series, KVA, KVA N Series

ケース記号 Case Code	ケースサイズ Case size	W (mm)	F (mm)	E (mm)	P_1 (mm)	P_2 (mm)	P_0 (mm)	D_0 (mm)	包装数/リール(個) Quantity/Reel (pcs)	
									ϕ180	ϕ330
29	1.6×0.8	8.0±0.3	3.5±0.05	1.75±0.05	4.0±0.1	2.0±0.05	4.0±0.1	ϕ1.55±0.03	5,000	-
31	2.0×1.25									-
52	3.2×1.6			1.75±0.1				ϕ1.5±0.1	2,000	-
44E	7.3×5.8	12±0.3	5.5±005		8.0±0.1			$\phi 1.5^{+0.1}_{0}$	500	1,500
59F	11.0×7.3	24±0.3	11.5±005		12.0±0.1				-	500

テーピング寸法/Tape dimensions



リール寸法/Reel dimensions　単位[mm]
unit[mm]



チップタンタルコンデンサ テーピング形状記号
Chip Tantalum Capacitors Tape code

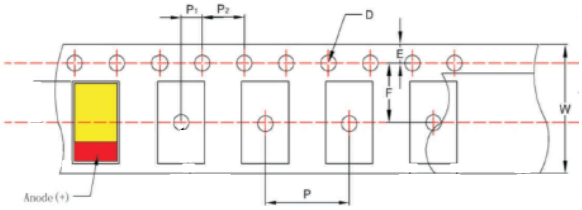
φ180リール φ180Reel	φ330リール φ330Reel	極性 Anode notation
L	P	送り穴側 ＋ Feed hole ＋
R	N	送り穴側 － Feed hole －

チップタンタルコンデンサ
Chip Tantalum Capacitors

定格：TCD型
Type：TCD

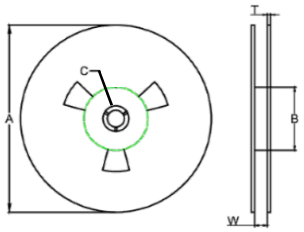
ケース記号 Case Code	ケースサイズ Case size	W (mm)	F (mm)	E (mm)	P (mm)	P_1 (mm)	P_2 (mm)	φD (mm)	包装数/リール(個) Quantity/Reel (pcs)
									φ180
D	7.3×4.3×2.8	12±0.30	5.5±0.05	1.75±0.10	4±0.10	8±0.10	2±0.10	1.55±0.20	500

テーピング寸法/Tape dimensions



単位[mm]
unit[mm]

リール寸法/Reel dimensions



リール Reel	テープ幅 Tape width	A	B	C	W	T
φ180	12	178±2.00	50 min	13.0±0.50	12.4+1.5/-0	1.50±0.50