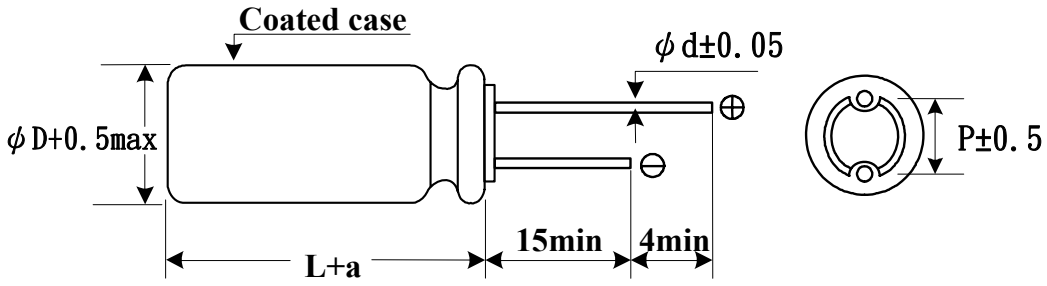
Ⅰ. Scope

This standard defines characteristics and dimensions for conductive polymer aluminum solid electrolytic capacitors named CG series for general purpose

Ⅱ. Construction & Dimensions (Unit = mm)



ψD	6.3	8	10
P	2.5	3.5	5
ψd	0.5	0.6	0.6
a (MAX)	1.0	1.0	1.0

Ⅲ. Characteristics

CG Type

-55 to +105° C Ultra low ESR of conductive polymer aluminum solid capacitors.

CG type capacitors have been developed for use in switching regulators, motherboard and other high frequency applications, which feature low equivalent series resistance, high ripple and inductance over wide temperature range.

1. Standard test conditions

Unless otherwise specified all tests shall be performed at, or referred to, an ambient temperature of 20℃ and a relative humidity not greater than 50%.

2. Electrical characteristics

2.1 Working voltage range : 2.5 to 16Vdc

2.2 Operating temp. range : -55 to 105 °C

2.3 Rate capacitance range : 180 to 1500uF

2.4 Capacitance tolerance : -20 to +20%

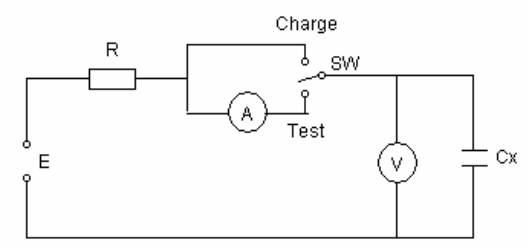
Capacitance tolerance should be within the range of ±20% which is measured at 120Hz/20℃

2.5 Leakage Current : 0.2 CV

C= Nominal Capacitance (μF) , V= Rated Voltage (V)

(Measurements shall be made after a 2 minute charge at rated working voltage)

Measurement circuit



2.6 Dissipation Factor: (tanδ)

Dissipation Factor at 120Hz/ 20℃ shall not exceed the values given in the table below.

WV (V)	2.5 ~10	16
tanδ (Max)	0.08	0.12

2.7 Low Temperature Characteristics

The ratio of impedance at -25℃/+20℃ and -55℃/+20℃ of the capacitor shall be less than the following value at 120Hz.

Working Voltage (WV)	2.5 ~ 16
Impedance Z-25°C / Z+20°C	≦ 1.15
Impedance Z-55°C / Z+20°C	≦ 1.25

3. Mechanical Characteristics

Lead Pull Test

Capacitors shall be with stand the pull test shown in the following table.

Lead diameter (mm)	Load (Kg)	Test time (sec)
d≦0.5	0.5	30 +5 -0
0.5<d≦0.8	1.0	30 +5 -0
0.8<d≦1.2	2.5	30 +5 -0

4. Endurance characteristics

4.1 Load Life

Rated voltage shall be applied to the capacitors for a period of 2000 hours with maximum ripple current at 105℃±2 . We will examine the electric characteristics after getting them cooled down to room temperature.

The values must not be over those on following table.

Capacitance Change	within 20% of initial value
Dissipation Factor	not exceed 150% of specified value
Equivalent Series Resistance	not exceed 150% of specified value
Leakage Current	not exceed the specified value

4.2 Shelf Life

The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 105±2℃ for 1000+12/-0 hours without voltage applied.

Capacitance Change	within 20% of initial value
Dissipation Factor	not exceed 150% of specified value
Equivalent Series Resistance	not exceed 150% of specified value
Leakage Current	not exceed the specified value

4.3 Surge Voltage

The surge DC rating is the maximum voltage to which the capacitor should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage.

4.3.1 Capacitors, connected in series with 1000 ohm resistors, shall withstand the surge test voltage applied at the rated of 1/2 minute on, 5 1/2 minutes off, for 1000 successive test cycles at normal temperature.(see the following table)

Rated Voltage: 2.5 ~ 16

Surge Voltage: (Rated Voltage) x 1.15

4.3.2 After the test, the capacitors shall meet the requirement specified in the following table.

Appearance	No significant damage
Capacitance Change	Within±20% of the initial value
Dissipation Factor	Not more than 150% of the initial specified value
Equivalent Series Resistance	Not more than 150% of the initial specified value
Leakage Current	Not more than the initial specified value

4.4 Humidity Test

The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃,90 to 95%RH for 1000 hours. The values must not be over those on following table.

Appearance	No significant damage
Capacitance Change	Within±20% of the initial value
Dissipation Factor	Not more than 150% of the initial specified value
Equivalent Series Resistance	Not more than 150% of the initial specified value
Leakage Current	Not more than the initial specified value

4.5 Solderability Test

The following specifications shall be satisfied when the lead wires are tested in solder bath at 235±5^{0}C for 2±0.5 seconds, more than 95% of the terminal surface shall be covered with new solder.

4.6 Solder Heat Resistance Test

4.6.1 Soldering bath method at 260 ±5^{0}C for 10±1 seconds.

4.6.2 Soldering iron method at 400 ±10^{0}C for 3 –0/+1 seconds.

Capacitance Change	≦±5% of the initial value
Dissipation factor	Not more than 150% of the initial specified value
Leakage Current	Not more than the initial specified value

Ⅳ. Guide To Application

1. Maximum Ripple Current

1.1 Maximum rms. ripple current at 105°C,100K Hz is given in the table 1.

1.2 When capacitors are operated at frequency other than 100K Hz, the maximum rms. ripple currents must be multiplied by the factors shown in below table.

COMPENSATION FACTOR OF RIPPLE CURRENT VERSUS FREQUENCY

Frequency (Hz)	120≦f＜1K	1K≦f＜10K	10K≦f＜100K	100K≦f≦500K
Coefficient	0.05	0.3	0.7	1

2.Applying voltage

Do not apply an over voltage exceeding the full rated operating voltage of the capacitors. The over voltage may cause increasing the leakage current and giving short circuit.

3. Ripple voltage

Ripple voltage must not exceed the following:

The sum of the DC voltage plus the AC ripple voltage must not exceed the rated DC voltage. The DC voltage plus the peak AC voltage must not cause a voltage reversal more than 1.5 volts.

4.Circuit Design

Verify the following before designing the circuit：

4.1 The electrical characteristics of the capacitor will vary depending on differences in temperature and frequency. Perform circuit design after verifying the scope of these factors.

4.2When connecting two or more capacitors in parallel, ensure that the design takes current balancing into account.

4.3 When two or more capacitors are connected in series, variability in applied voltage may cause over-voltage conditions, Contact Teapo before using capacitors connected in series.

5. Failures and Service Life

5.1 Failure Modes

The main causes of failure are thermal stresses caused by the thermal use environment, along with electrical stresses and mechanical stresses. The most common capacitor failure mode is the short circuit mode, where the following phenomenon may occur after shorting：

5.1.1 If the pass-through current when the product is shorted is 1A or less, then the product becomes heated, but no effects are visible, even when the current is continuously carried. However, larger currents may cause substantial internal heating that causes the rubber seal to separate from the case, causing the release of an odorous gas.

5.1.2 Some flammable materials are used in the capacitor. If an extremely large electric current flows through the capacitor after shorting, the shorted part may spark, and in a worst-case scenario, may ignite. Consequently, ensure safety by fully considering the design issues described below when using this capacitor in equipment where safety is a priority.

- Increase safety by using in conjunction with a protective circuit or protective equipment.
- Install measures such as redundant circuits so that the failure of a part of equipment will not cause unstable operation.

5.2 Service Life

This series uses rubber as the sealing material, so the service life depends on the thermal deterioration of the rubber. Consequently, it is recommended to use the capacitor at a lower temperature than the maximum temperature for the capacitor category as much as possible.

6. The Operation of Devices

6.1 Do not touch the capacitor terminals directly.

6.2 Do not short-circuit the terminal of a capacitor by letting it come into contact

7. Storage Condition

We recommend the following condition for storage.

(a) Store capacitors in a cool , dry place. Store at a temperature between 5 and 35℃ , with a humidity of 75% or less.

(b) Store the capacitor in a location free from direct contact with water, salt water, and oil.

(c) Store in a location where the capacitor is not exposed to toxic gas, such as hydrogen sulfide, sulfurous acid, nittrous acid, chlorine or chlorine compounds, bromine or other halogen gases, methyl bromide or other halogen compounds, ammonia, or similar.

(d) Store in a location where the capacitor is not exposed to ozone, ultraviolet radiation, or other radiation.

(e) It is recommended to store capacitor in their original packaging wherever possible.

(f) To keep good solderability, store radial lead type packed in bags for not more than one year (after delivery),and radial lead types with taping for not more than six months (after delivery) before opening.

(Refer to the following table)

	Before unseal	After unseal
Radial lead type (Bag Packing product)	Within 1 year after delivery (Unopened condition)	Within 7 days from opening (1 week)
Radial lead type (Taping product)	Within 6 months after delivery (Unopened condition)	Within 7 days from opening (1 week)

8. High Altitude

These capacitors are capable of withstanding in transit conditions where storage temperature may range from -55ºC to +105ºC and the altitude may reach 200,000 feet.

9. Cleaning agents

Halogenated hydrocarbon cleaning solvents are not recommended for use in cleaning capacitors supplied with exposed end seals. Where cleaning with a halogenated solvent is desired ,capacitors should be ordered with a Epoxy-coated end seal.

10.Others

(1) All TEAPO capacitors comply to RoHS(Restriction of Hazardous Substances) requirements where Chromium Ⅵ(Cr+6),Cadmium(Cd) , Mercury(Hg), Lead(pb), Polybrominated biphenyls(PBBs)and

Polybrominated biphenyl/diphenyl ethers (PBBEs/PBDEs) have not been detected [lower than MDL (Method Detection Limit)] per SGS certification test report..

(2)Satisfied characteristic JIS C 5101

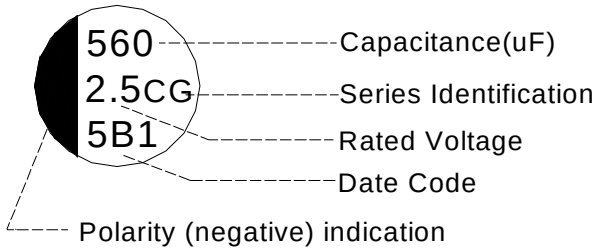
(3)Aluminum Electrolytic Capacitors may b e damaged by corrosion which is caused by any halogenated hydrocarbon solvents.

Please let us know in advance the solvent name and conditions for your PCB cleaning

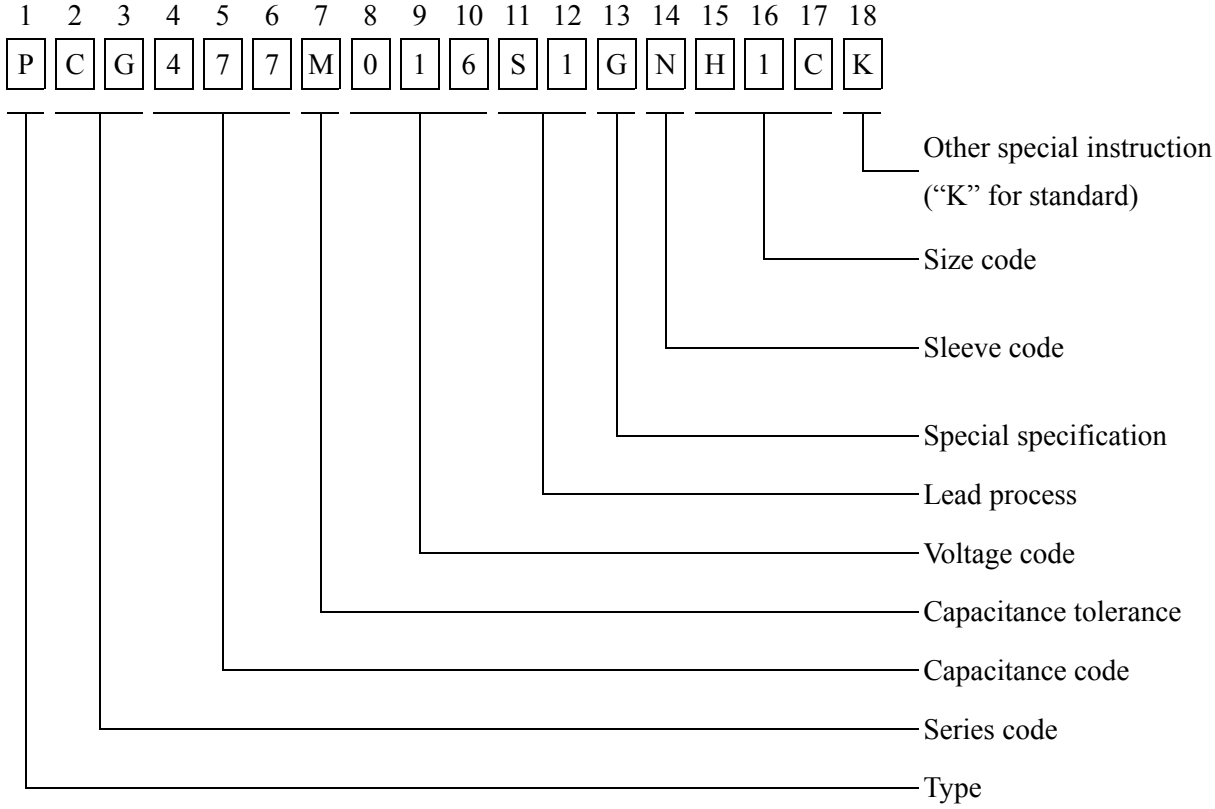
Ⅵ. Marking

Capacitors shall be marked with rated capacitance ; rated DC working voltage range. and the date code of manufacture.

The cathode lead will be identified with minus signs (red color) on the top of the case.



Ⅶ. Catalog numbering



Type code:

Code	Model Type
D	Standard Dip Type (PVC sleeve)
K	Standard Dip Type (PET sleeve)
V	SMD (V-chip) Type (Nylon coating)
L	Snap-in Type (PVC sleeve)
S	Snap-in Type (PET sleeve)
P	Conductive Polymer Solid Capacitor (Nylon coating)

Capacitance code:

Capacitance	0.47	4.7	47	470	4700
Code	474	475	476	477	478

Capacitance tolerance:

M = ±20% , K = ±10% ,V = +20 －10%

Voltage Code:

Voltage	2.5	4	6.3	10	16
Code	2R5	004	6R3	010	016

Code 13 Special specification:

A : Standard D : Impedance
B : DF (tanδ) E : Ripple current
C : ESR F : Leakage current
G : Convex rubber

Code 14 Sleeve code:

N : SMD standard pack & solid capacitor

Code 15~17 Size Code:

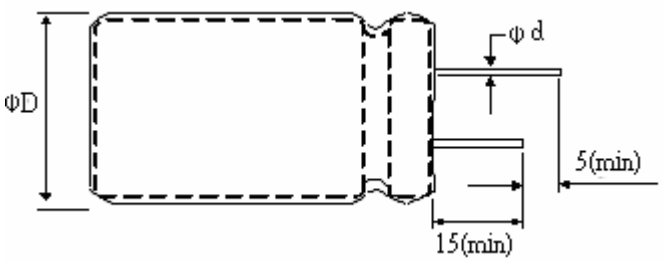
ψDxL	6.3x10.5	8X8	8X11.5	10X12.5
Size Code	E1A	G08	G1B	H1C

Code 18

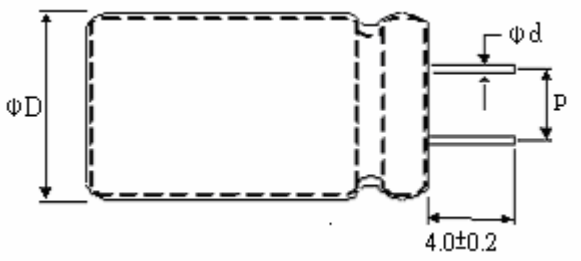
Other special instructions (“ K ” for standard)

Code 11~12 Lead Process :

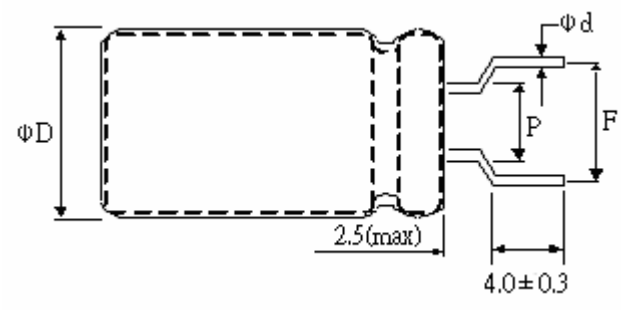
Code S1: Standard Type



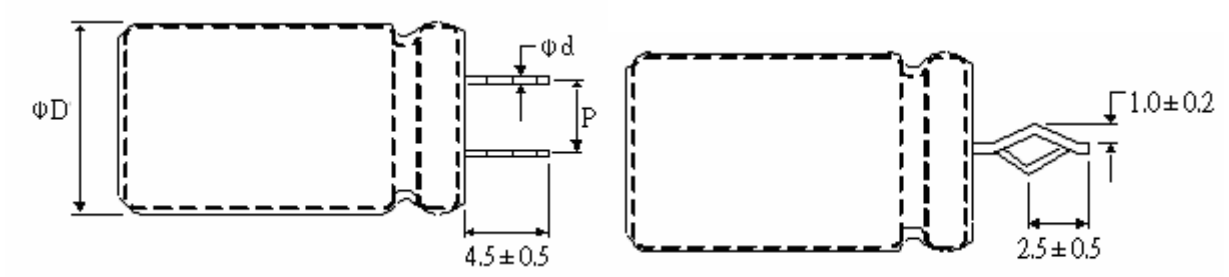
Code C5: Straight Cut



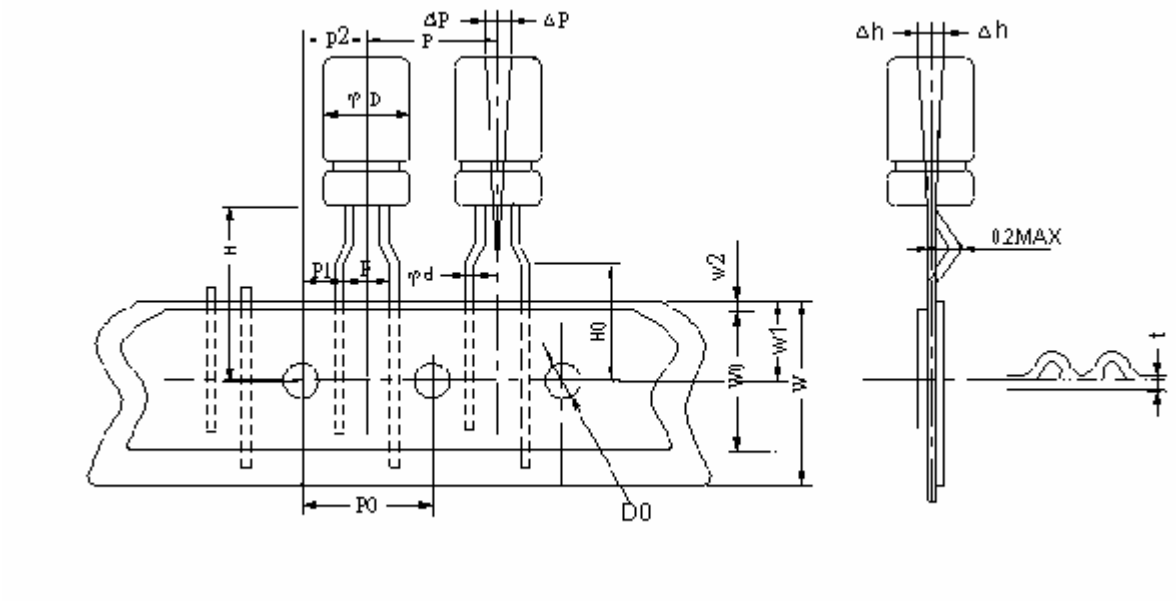
Code F6: Forming Cut(ϕ4~ ϕ8)±



Code K2: Kink cut, & Crimping

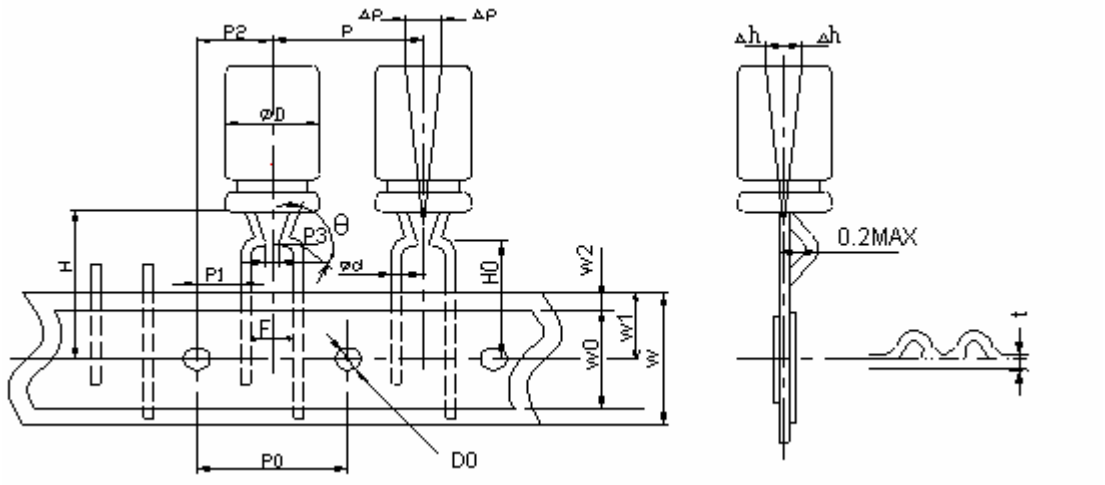


Code T1/R1：Ammo / Reel Tape (ϕ 6.3)



SYMBOL	SIZE	TOLERANCE
φ d	0.5	±0.05
P	12.7	±1.0
P0	12.7	±0.3
P1	3.85	±0.5
P2	6.35	±1.0
F	5.0	+0.6 / –0.2
W	18.0	±0.5
W0	12.0 min	-
W1	9.0	±0.5
W2	2.0 max	-
H	18.5	±0.75
H0	16.0	±0.5
D0	4.0	±0.3
△P	0.2 max	-
△h	0.2 max	-
t	0.6	±0.3

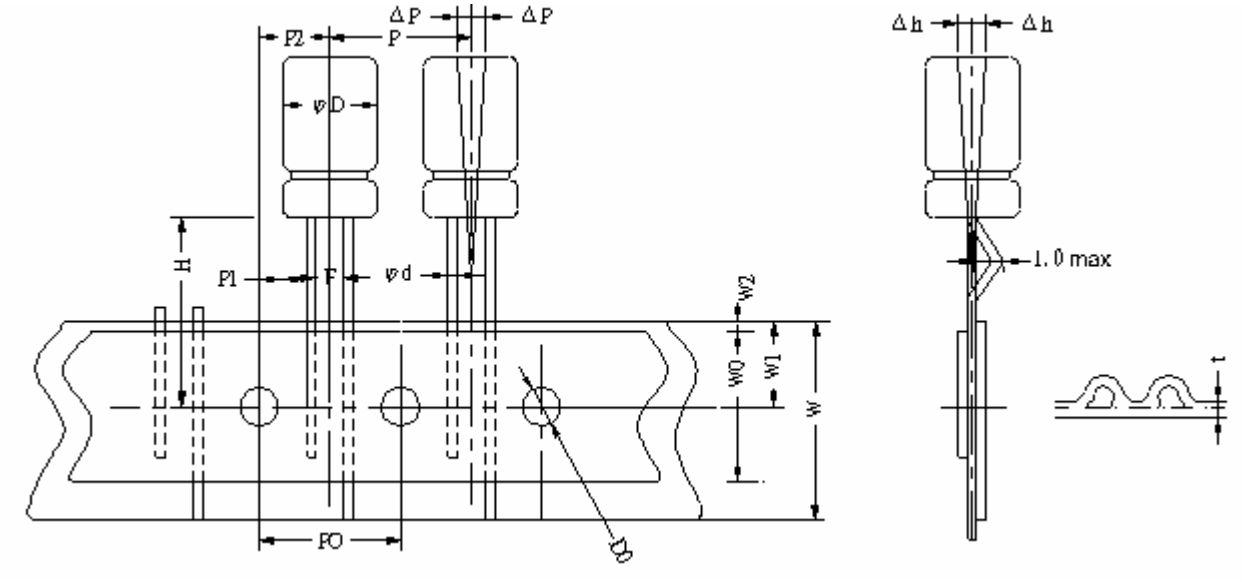
Code T1/R1 : Ammo / Reel Tape (ϕ 8)



Unit: mm

SYMBOL	SIZE	TOLERANCE
φ d	0.6	±0.05
P	12.7	±1.0
P0	12.7	±0.3
P1	3.85	±0.7
P2	6.35	±1.0
P3	2.5	+0.2 / –0.5
θ	110°	±15°
F	5.0	+0.6 / –0.2
W	18.0	±0.5
W0	12.0 min	-
W1	9.0	±0.5
W2	2.0 max	-
H	18.5	±0.75
H0	16.0	±0.5
D0	4.0	±0.3
△P	0.2 max	-
△h	0.2 max	-
t	0.6	±0.3

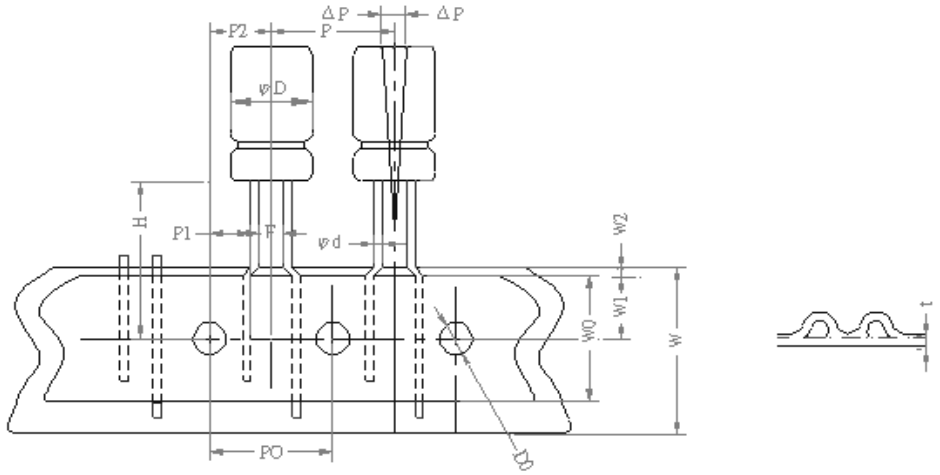
Code T1/R1 : Ammo / Reel Tape (ϕ 10)



Unit: mm

SYMBOL	SIZE	TOLERANCE
φ d	0.6	±0.05
P	12.7	±1.0
P0	12.7	±0.3
P1	3.85	±0.5
P2	6.35	±1.0
F	5.0	+0.6 / –0.2
W	18.0	±0.5
W0	12.0 min	-
W1	9.0	±0.5
W2	2.0 max	-
H	18.5	±0.75
D0	4.0	±0.3
△P	0.2 max	-
△h	0.2 max	-
t	0.7	±0.2

Code T2/R2 : Ammo / Reel Tape with straight lead (ϕ 6.3~8)



Unit : mm

SYMBOL	CASE SIZE		TOLERANCE
	ϕ 6.3	ϕ 8	
φ d	0.5	0.6	±0.05
F	2.5	3.5	+0.6 / –0.2
P1	5.1	4.6	±0.5
P0	12.7		±0.3
P	12.7		±1.0
P2	6.35		±1.0
W	18.0		±0.5
W0	12.0 min		-
W1	9.0		±0.5
W2	3.0 max		-
H	18.5		±0.75
D0	4.0		±0.3
△p	0.2 max		-
t	0.6		±0.2

Table 1-1 CG Type , Standard Rating And Catalog Number

Load Life : 2000hurs at 105℃

NO.	料號 Part No	靜電容量 CAP(u F) 120Hz 20℃	工作電壓 W V (VDC)	損失角 DF(%) (MAX) 120Hz 20℃	泄漏電流 LC(u A) (MAX) 20℃	等效串聯電阻 ESR(mΩ) 100KHz (MAX) 20℃	濾波電流 R C (mArms) (MAX) 100KHz 105℃	尺寸 Dimensions(mm)		
								ΦD	L	P
1	**PCG477M016S1GNH1CK**	**470**	**16**	**8**	**1504**	**9**	**5000**	**10**	**12.5**	**5.0**