GRACE

SPECIFICATION

ROHS Compliant Parts

Customer : _____

Part Name : Wirewound Inductors

Part Number : KIWN-F

Dongguan GRACE electronic Technology Co., LTD

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Tel: 0769-22008861 Web: www.gracevn.com Email: grace@gracevn.com

Wirewound inductors —KIWN-F series

For Power inductors - Magnetic open

Features

- Operating temperature from -40 °C to 85°C
- Ultra-thin design
- Suitable for surface mounting

Applications

- Portable communication equipment, Notebook DC/DC conversion DC switching power supply circuit

Explanation of Part Numbers

KIWN	4532	F	1R0	M	S01	A	K000	T
①	②	③	④	⑤	⑥	⑦	⑧	⑨

①	Series
GRACE Wire-wound resin-coated SMD power inductors	

②	Outline dimension (L*H)mm
4532	4.5*3.2

③	Series code
F	Ultrathin

④	Nominal inductance(μH)
R47	0.47
1R0	1.0

⑤	Inductance tolerance
M	±20%
N	±30%

⑥	Design code
S01	

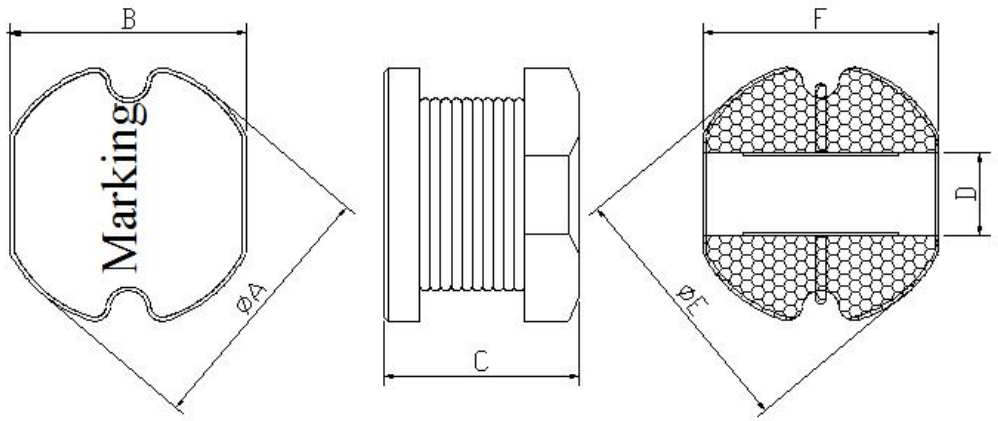
⑦	internal code
A	

⑧	Customer identification code
K000	

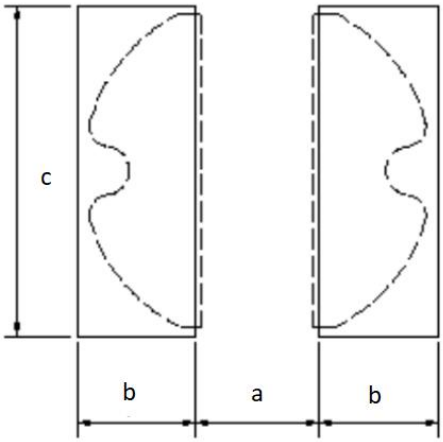
⑨	Packaging style
T	Tape
B	Bulk

Shape and Dimensions

1）Dimensions ：



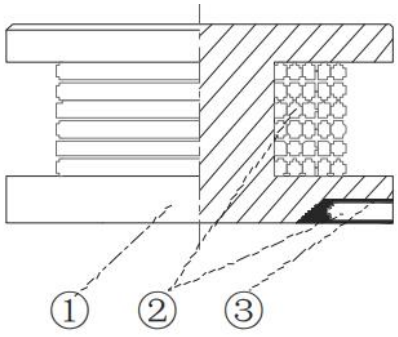
2）Recommended PCB pattern for reflow soldering:



Unit: mm

Size(JIS)	A	B	C	D	E	F	a	b	c
4532	4.5±0.3	4.0±0.3	3.2±0.3	1.6	4.5	4.0	1.5	1.75	4.5
5845	5.8±0.3	5.2±0.3	4.5±0.3	2.0	5.8	5.2	1.7	2.15	5.5
7850	7.8±0.3	7.0±0.3	5.0±0.3	2.5	7.8	7.0	2.0	3.0	7.5

Construction



No.	Name	Material
①	Core	Ni-Zn Ferrite
②	Winding	Enamelled wire H class
③	Electrodes	Bottom Layer—Ag Electroplated Coating—Ni Electroplated Coating—Sn Surface Layer—Sn/Cu

Electrical Characteristics

4532 Type

Part Number	Inductance (μ H)	DC Resistance(Ω)	Rated DC Current IDC(A)	Test Freq
KIWN4532F1R0☐S01AK000T	1.0	0.045	3.5	100KHZ
KIWN4532F1R5☐S01AK000T	1.5	0.055	2.85	100KHZ
KIWN4532F2R2☐S01AK000T	2.2	0.070	2.40	100KHz
KIWN4532F2R7☐S01AK000T	2.7	0.075	2.30	100KHz
KIWN4532F3R3☐S01AK000T	3.3	0.085	2.25	100KHz
KIWN4532F3R9☐S01AK000T	3.9	0.090	1.70	100KHz
KIWN4532F4R7☐S01AK000T	4.7	0.105	1.65	100KHz
KIWN4532F5R6☐S01AK000T	5.6	0.120	1.60	100KHz
KIWN4532F6R8☐S01AK000T	6.8	0.130	1.40	100KHz
KIWN4532F8R2☐S01AK000T	8.2	0.145	1.30	100KHz
KIWN4532F100☐S01AK000T	10	0.180	1.10	100KHz
KIWN4532F120☐S01AK000T	12	0.210	1.00	100KHz
KIWN4532F150☐S01AK000T	15	0.235	0.85	100KHz
KIWN4532F180☐S01AK000T	18	0.330	0.80	100KHz
KIWN4532F220☐S01AK000T	22	0.360	0.70	100KHz
KIWN4532F270☐S01AK000T	27	0.520	0.65	100KHz
KIWN4532F330☐S01AK000T	33	0.540	0.60	100KHz
KIWN4532F390☐S01AK000T	39	0.580	0.55	100KHz
KIWN4532F470☐S01AK000T	47	0.840	0.48	100KHz
KIWN4532F560☐S01AK000T	56	0.930	0.46	100KHz
KIWN4532F680☐S01AK000T	68	1.110	0.44	100KHz
KIWN4532F820☐S01AK000T	82	1.250	0.42	100KHz
KIWN4532F101☐S01AK000T	100	1.400	0.40	1KHz
KIWN4532F121☐S01AK000T	120	1.500	0.38	1KHz
KIWN4532F151☐S01AK000T	150	2.000	0.35	1KHz
KIWN4532F181☐S01AK000T	180	2.120	0.30	1KHz
KIWN4532F221☐S01AK000T	220	2.460	0.27	1KHz

5845 Type

Part Number	Inductance (μ H)	DC Resistance(Ω)	Rated DC Current IDC(A)	Test Freq
KIWN5845FR47☐S01AK000T	0.47	0.012	4.80	100KHz
KIWN5845F1R0☐S01AK000T	1.0	0.025	3.50	100KHz

KIWN5845F1R5□S01AK000T	1.5	0.025	3.30	100KHz
KIWN5845F2R2□S01AK000T	2.2	0.028	3.20	100KHz
KIWN5845F2R7□S01AK000T	2.7	0.030	3.00	100KHz
KIWN5845F3R3□S01AK000T	3.3	0.035	2.50	100KHz
KIWN5845F3R9□S01AK000T	3.9	0.038	2.40	100KHz
KIWN5845F4R7□S01AK000T	4.7	0.040	2.30	100KHz
KIWN5845F5R6□S01AK000T	5.6	0.050	2.10	100KHz
KIWN5845F6R8□S01AK000T	6.8	0.055	2.00	100KHz
KIWN5845F7R2□S01AK000T	7.2	0.070	1.80	100KHz
KIWN5845F8R2□S01AK000T	8.2	0.090	1.70	100KHz
KIWN5845F100□S01AK000T	10	0.100	1.65	100KHz
KIWN5845F120□S01AK000T	12	0.120	1.55	100KHz
KIWN5845F150□S01AK000T	15	0.140	1.40	100KHz
KIWN5845F180□S01AK000T	18	0.150	1.25	100KHz
KIWN5845F220□S01AK000T	22	0.180	1.10	100KHz
KIWN5845F270□S01AK000T	27	0.200	0.95	100KHz
KIWN5845F330□S01AK000T	33	0.220	0.90	100KHz
KIWN5845F390□S01AK000T	39	0.300	0.80	100KHz
KIWN5845F470□S01AK000T	47	0.350	0.75	100KHz
KIWN5845F560□S01AK000T	56	0.400	0.70	100KHz
KIWN5845F680□S01AK000T	68	0.450	0.65	100KHz
KIWN5845F820□S01AK000T	82	0.600	0.60	100KHz
KIWN5845F101□S01AK000T	100	0.700	0.55	1KHz
KIWN5845F121□S01AK000T	120	0.850	0.45	1KHz
KIWN5845F151□S01AK000T	150	1.100	0.43	1KHz
KIWN5845F181□S01AK000T	180	1.350	0.40	1KHz
KIWN5845F221□S01AK000T	220	1.550	0.35	1KHz
KIWN5845F331□S01AK000T	330	1.760	0.30	1KHz
KIWN5845F391□S01AK000T	390	2.500	0.27	1KHz
KIWN5845F471□S01AK000T	470	2.500	0.25	1KHz
KIWN5845F561□S01AK000T	560	2.870	0.20	1KHz
KIWN5845F681□S01AK000T	680	3.500	0.18	1KHz
KIWN5845F821□S01AK000T	820	5.200	0.17	1KHz
KIWN5845F102□S01AK000T	1000	5.500	0.15	1KHz
KIWN5845F122□S01AK000T	1200	6.400	0.13	1KHz

7850 Type

Part Number	Inductance (μ H)	DC Resistance(Ω)	Rated DC Current IDC(A)	Test Freq
KIWN7850F1R0☐S01AK000T	1.0	0.015	5.80	100KHz
KIWN7850F1R5☐S01AK000T	1.5	0.017	5.50	100KHz
KIWN7850F2R2☐S01AK000T	2.2	0.018	5.20	100KHz
KIWN7850F2R7☐S01AK000T	2.7	0.023	5.00	100KHz
KIWN7850F3R3☐S01AK000T	3.3	0.025	4.80	100KHz
KIWN7850F3R9☐S01AK000T	3.9	0.027	4.20	100KHz
KIWN7850F4R7☐S01AK000T	4.7	0.028	4.00	100KHz
KIWN7850F5R6☐S01AK000T	5.6	0.030	3.80	100KHz
KIWN7850F6R8☐S01AK000T	6.8	0.040	3.00	100KHz
KIWN7850F8R2☐S01AK000T	8.2	0.042	2.70	100KHz
KIWN7850F100☐S01AK000T	10	0.070	2.55	100KHz
KIWN7850F120☐S01AK000T	12	0.080	2.40	100KHz
KIWN7850F150☐S01AK000T	15	0.090	2.00	100KHz
KIWN7850F180☐S01AK000T	18	0.100	1.95	100KHz
KIWN7850F220☐S01AK000T	22	0.110	1.70	100KHz
KIWN7850F270☐S01AK000T	27	0.120	1.55	100KHz
KIWN7850F330☐S01AK000T	33	0.130	1.40	100KHz
KIWN7850F390☐S01AK000T	39	0.150	1.35	100KHz
KIWN7850F470☑S01AK000T	47	0.190	1.25	100KHz
KIWN7850F560☐S01AK000T	56	0.230	1.10	100KHz
KIWN7850F680☐S01AK000T	68	0.250	1.00	100KHz
KIWN7850F820☐S01AK000T	82	0.350	0.95	100KHz
KIWN7850F101☐S01AK000T	100	0.400	0.78	1KHz
KIWN7850F121☐S01AK000T	120	0.450	0.73	1KHz
KIWN7850F151☐S01AK000T	150	0.600	0.70	1KHz
KIWN7850F181☐S01AK000T	180	0.700	0.60	1KHz
KIWN7850F221☐S01AK000T	220	0.950	0.55	1KHz
KIWN7850F271☐S01AK000T	270	1.100	0.50	1KHz
KIWN7850F331☐S01AK000T	330	1.250	0.45	1KHz
KIWN7850F391☐S01AK000T	390	1.750	0.40	1KHz
KIWN7850F471☐S01AK000T	470	1.950	0.35	1KHz
KIWN7850F561☐S01AK000T	560	1.980	0.32	1KHz
KIWN7850F681☐S01AK000T	680	2.180	0.31	1KHz

KIWN7850F821☐S01AK000T	820	2.880	0.30	1KHz
KIWN7850F102☐S01AK000T	1000	3.850	0.20	1KHz
KIWN7850F152☐S01AK000T	1500	5.200	0.18	1KHz
KIWN7850F182☐S01AK000T	1800	7.000	0.16	1KHz
KIWN7850F202☐S01AK000T	2000	7.000	0.16	1KHz
KIWN7850F222☐S01AK000T	2200	8.300	0.15	1KHz

※ **Notes:**

1: The test voltage is 0.5V;

2: IDC:The DC current at which cause a 10% inductance reduction from the initial value or inductor surface temperature to rise by 40℃, whichever is smaller. (Reference ambient temperature 20℃).

Reliability Test

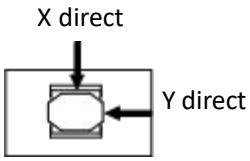
<table>
<tr><th>Items</th><th>Requirements</th><th>Test Methods and Remarks</th></tr>
<tr><td rowspan="2">Terminal Strength</td><td>No removal or split of the termination or other defects shall occur.</td><td rowspan="2">Solder the inductor to the testing jig (glass epoxy board shown in the following Fig. 1-1) using eutectic solder. Then apply a force in the direction of the arrow.
<table><tr><th>Size（JIS）</th><th>Force</th><th>Duration</th></tr><tr><td>All</td><td>10N</td><td>10±1s</td></tr></table></td></tr>
<tr><td> 

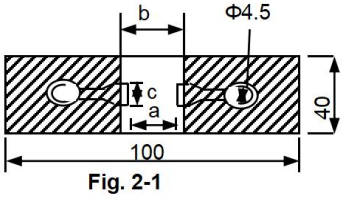
Fig.1-1</td></tr>
<tr><td rowspan="3">Resistance to Flexure</td><td>No visible mechanical damage.</td><td rowspan="3">Solder the chip to the test jig (glass epoxy board shown in Fig.2-1) using a eutectic solder. Then apply a force in the direction shown in Fig. 2-2.
<table><tr><th>Size（JIS）</th><th>Flexure</th><th>Pressurizing Speed</th><th>Duration</th></tr><tr><td>ALL</td><td>2mm</td><td>＜0.5mm/s</td><td>30±1s</td></tr></table></td></tr>
<tr><td>Unit: mm</td></tr>
<tr><td>Unit: mm
 

Fig. 2-1</td></tr>
</table>

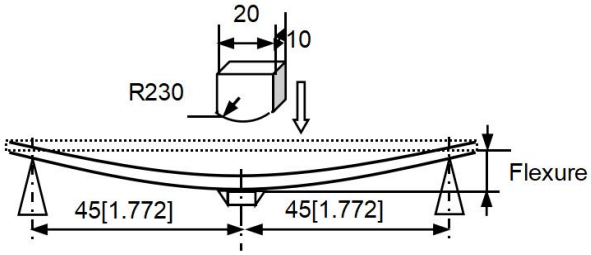
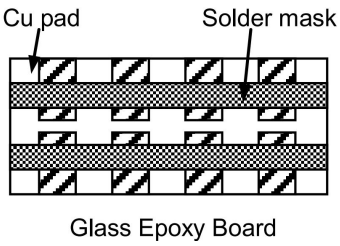
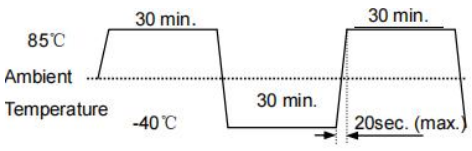


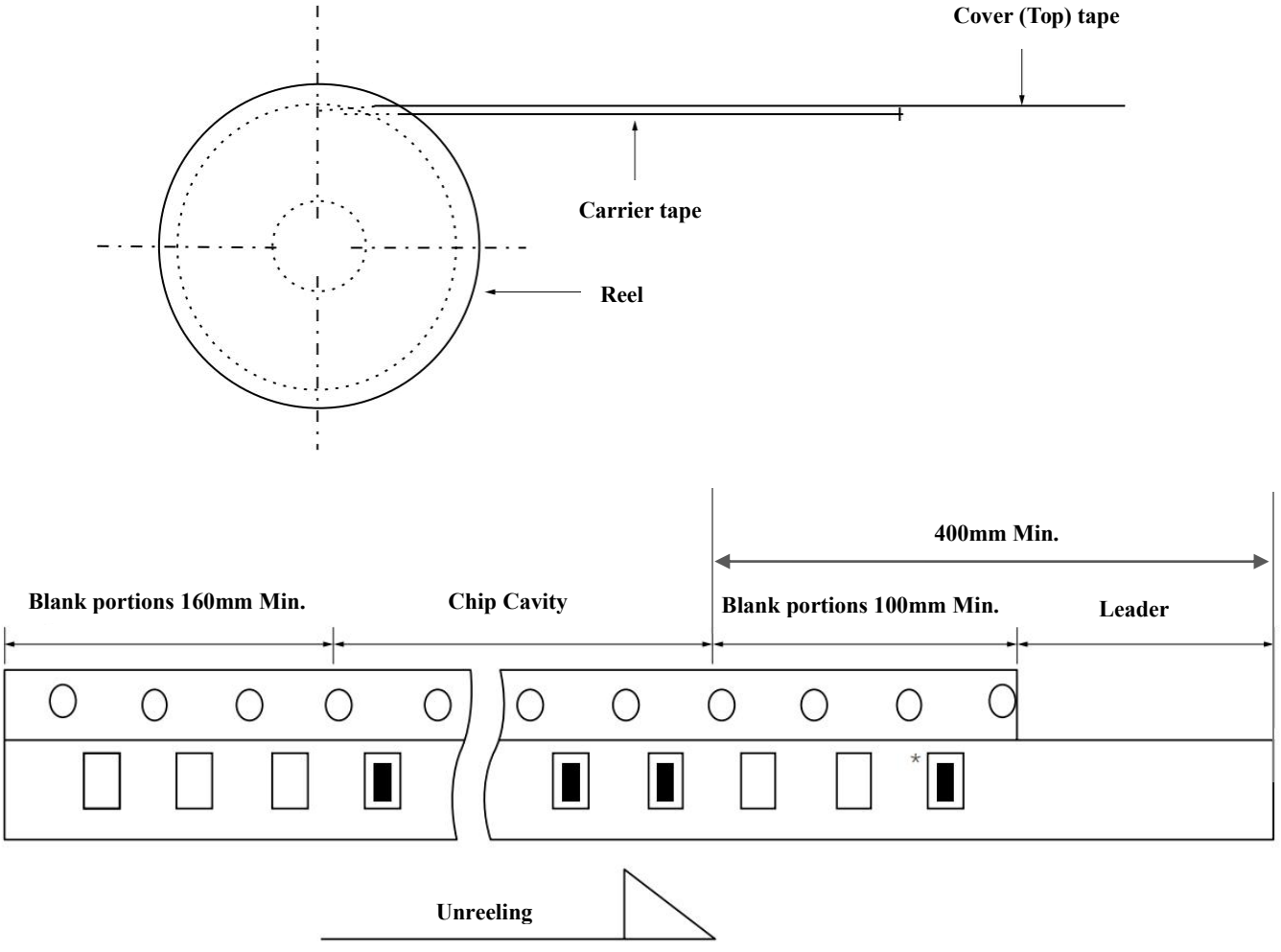
Fig.2-2

Vibration	❖ No visible mechanical damage. ❖ Inductance change: Within ±10%.  Fig. 3-1	❖ Solder the chip to the testing jig (glass epoxy board shown in Fig.3-1) using eutectic solder. ❖ The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ❖ The frequency ranging from 10 to 55 Hz and returning to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours).
Temperature Characteristic	❖ No visible mechanical damage. ❖ Inductance change: within ±20%	❖ Temperature range: -40℃ ~85℃. ❖ Reference temperature: +20℃
Solderability	❖ No visible mechanical damage. ❖ 95% or more of electrode area shall be coated by new solder.	❖ Solder temperature: 245±5℃. ❖ Duration: 5 sec. ❖ Solder: Sn/3.0Ag/0.5Cu. ❖ Flux: 25% Resin and 75% ethanol in weight.
Resistance to Soldering Heat	❖ No visible mechanical damage. ❖ Inductance change: within ±10%.	❖ Solder: Sn/3.0Ag/0.5Cu. ❖ Solder temperature: 260±5℃. ❖ Duration: 10 sec. ❖ The chip shall be stabilized at normal condition for 1~2hours before measuring.
Thermal Shock	❖ No visible mechanical damage. ❖ Inductance change: within ±10%.  	❖ Temperature, Time: -40℃ for 30±3 min→ 85℃ for 30±3min. ❖ Transforming interval: 2~3min. ❖ Tested cycle: 32 cycles. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Resistance to Low Temperature	❖ No visible mechanical damage. ❖ Inductance change: within ±10%.	❖ Temperature: -40±3℃ ❖ Duration: 1000±24 hours. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Resistance to High Temperature	❖ No visible mechanical damage. ❖ Inductance change: within ±20%. ❖ Q factor change: Within ±30%.	❖ Temperature: 85±2℃ ❖ Duration: 1000±24 hours. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Damp Heat (Steady States)	❖ No visible mechanical damage. ❖ Inductance change: within ±10%.	❖ Temperature:60±2℃ ❖ Humidity: 90% to 95% RH. ❖ Duration: 1000±24 hours. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Loading Under Damp Heat	❖ No visible mechanical damage. Inductance change: within ±10%.	❖ Temperature:85±2℃ ❖ Duration: 1000+24 hours. ❖ Applied current: Max. Permissive Operating Current. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
Loading at High Temperature (Life Test)	❖ No visible mechanical damage. ❖ Inductance change: within ±10%.	❖ Temperature: 85±2℃ ❖ Duration: 1000+24 hours. ❖ Applied current: Max. Permissive Operating Current. ❖ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

Packaging

(1) **Figure**

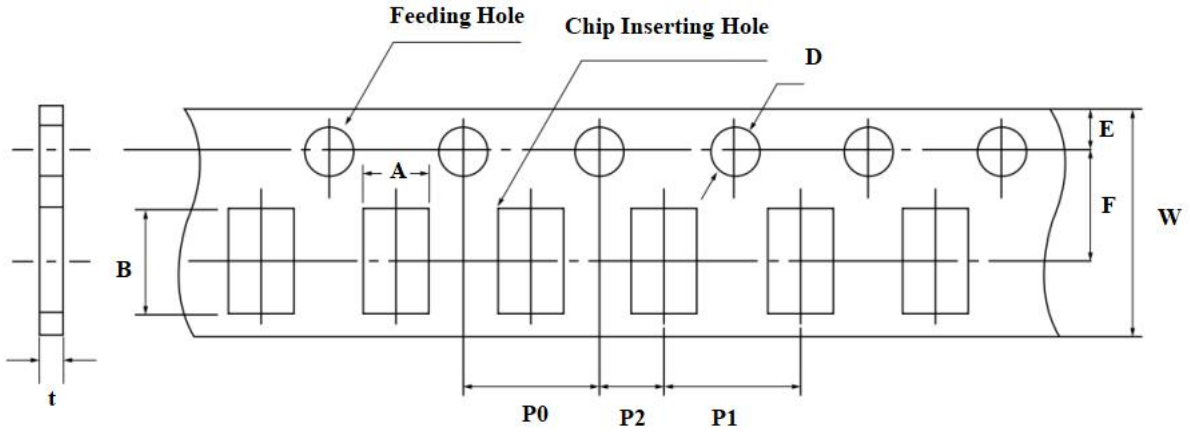


(2) Quantity

Size(JIS)	Taping Type	Reel	Inner Bo	Outer Box
4532	Paper	2K	2K×10=20K	20K×6=120K
5845	Paper	1.5K	1.5K×10=15K	15K×6=90K
7850	Paper	1K	1K×10=10K	10K×6=60K

(3) Tape Size

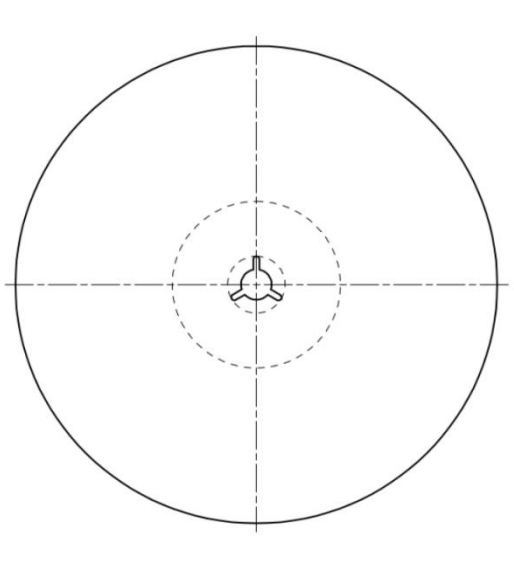
❖ **Cardboard(Paper) tape**

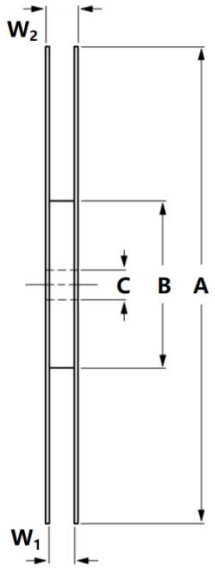


Unit: mm

Size (EIA)	A	B	W	F	E	P1	P2	P0	D	t
4532	4.3±0.3	4.8±0.3	12±0.5	5.5±0.3	1.75 ±0.3	8±0.3	2.00 ±0.3	4.00 ±0.3	Φ1.50 ±0.3	4.0±0.1
5845	5.5±0.3	6.7±0.3	16±0.5	7.5±0.3	1.75 ±0.3	8±0.3	2.00	4.00	Φ1.50	5.5±0.1
7850	7.3±0.3	8.1±0.3	16±0.5	7.5±0.3	1.75 ±0.3	12±0.3	±0.3	±0.3	±0.3	6±0.1

(4) Reel Size



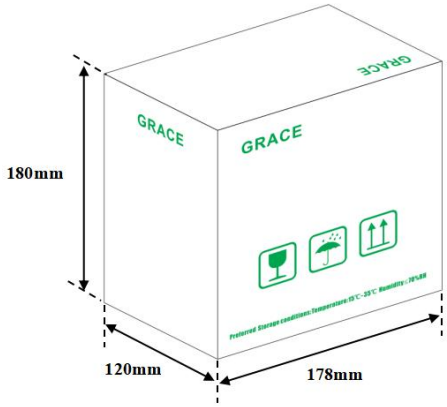


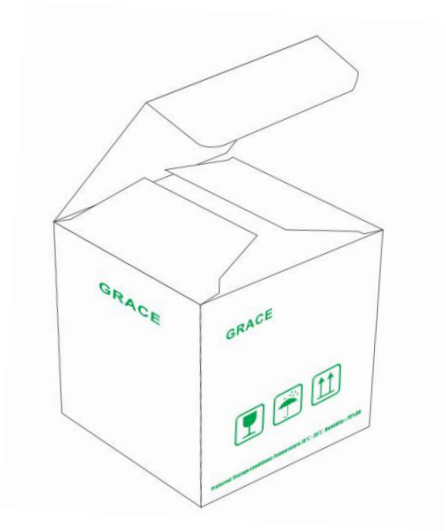
Type	Symbol	Dimensions(mm)
All	A	330±2
	B	100±2
	C	13±0.2
	W1	≤16.4
	W2	13±0.5

(5) BOX package

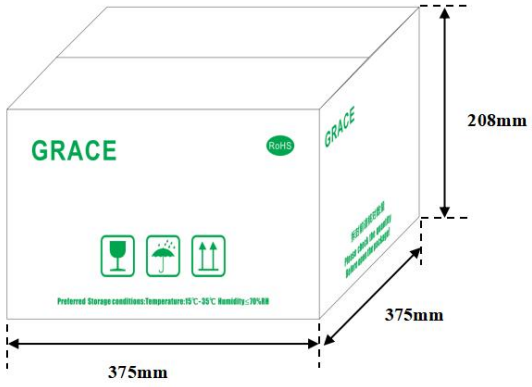
Double packaging with the paper type of inner box and outer box.

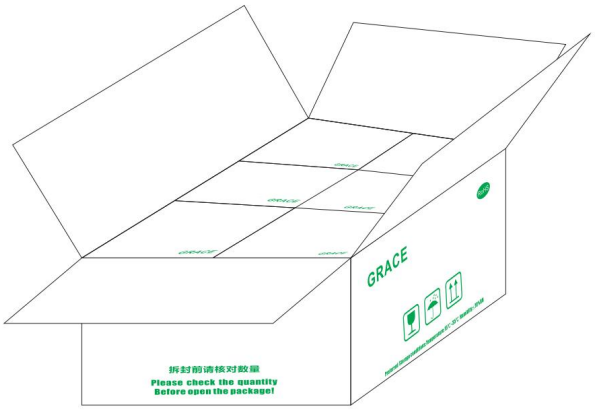
❖ **Inner Box ：**





❖ **Outer Box ：**





※ Box size specifications for reference.

Storage environment

(1) Recommendation for temperature/humidity

❖ **Even taping and packaging materials are designed to endure a long-term storage, they should be stored with a temperature of -10~40℃and an RH of 0~70% otherwise, too high temperatures or humidity may deteriorate the quality of the chip rapidly.**

❖ **Packaging material may be deform-ed if package are stored where they are exposed to heat of direct sunlight.**

❖ **As oxidization is accelerated when relative humidity is above 70%RH, the lower the humidity is, the better the solderability is.**

❖ **As the temperature difference may cause dew condensation during the storage of the chip, it is a must to maintain a temperature control environment.**

(2) Shelf Life

- **An allowable storage period should be within 12 months from the outgoing date of delivery in consideration of solderability.**
- **As for chips in storage over 12 months, please check solderability before use.**

(3) Caution for corrosive environment

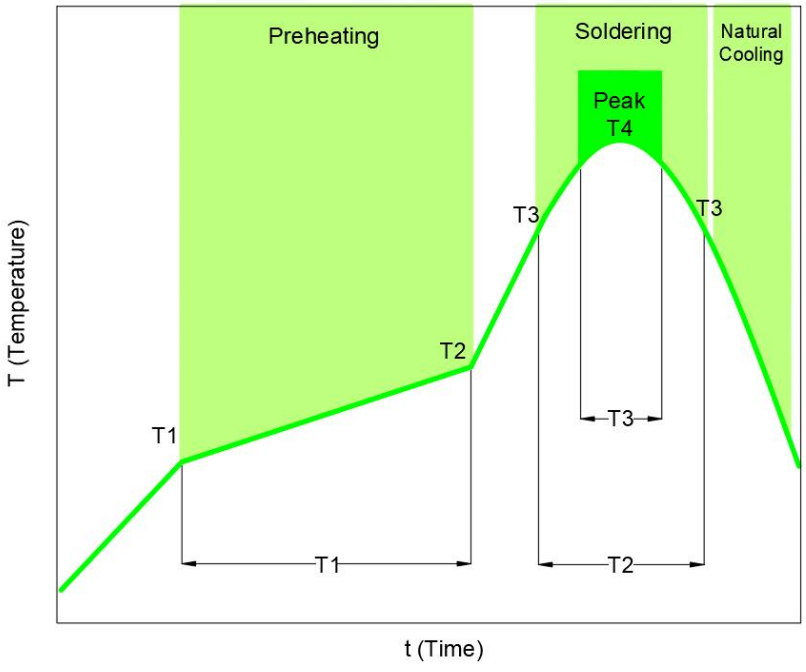
As corrosive gases may deteriorate the solderability of chip outer termination, it is a must to store chip in an environment without gases. chip that is exposed to corrosive gases may cause its quality issues due to the corrosion of plating layers and the penetration of moisture.

Process of Mounting and Soldering

(1) Reflow soldering

The reflow soldering temperature conditions are composed of temperature curves of Preheating, Temp. rise, Heating, Peak and Gradual cooling. Large temperature difference inside the chip caused by rapid heat application to the chip may lead to excessive thermal stresses, contributing to the thermal cracks. The Preheating temperature requires controlling with great care so that tombstone phenomenon may be prevented.

Follow the recommended soldering conditions to avoid degradation of performance .



Item	Specification	
	For eutectic mixture solder	For lead-free solder
Preheating temperature	160 ～ 180 ℃	150 ～ 180 ℃
Solder melting temperature	200 ℃	230 ℃
Maximum temperature	240° C max.	260 ℃ max.
Preheating time	100s max.	120s max.

Time to reach higher than the solder melting temperature	30s max.	40s max.
number of possible reflow cycles	2 max.	2 max.

※ Pre-heating is necessary for all constituents including the PCB to prevent the mechanical damages on the chip . The temperature difference between the PCB and the component surface must be kept to the minimum.

a. Allowable temperature difference △T≦ 150 °C

b. Use non-activated flux. (Max. Cl content less than 0.1%)

(2) Soldering Iron

Manual soldering can pose a great risk on creating thermal cracks in the chip. The high temperature soldering iron tip may come into a direct contact with the ceramic body of the chip due to the carelessness of an operator. Therefore, the soldering iron must be handled carefully, and close attention must be paid to the selection of the soldering iron tip and to temperature control of the tip.

Iron soldering power	Soldering time	Soldering Temp.	Number of times	Pre-heating
20W max.	3s max.	300±10℃ max.	Within each terminal once(Within total of twice)	① ΔT≤130 ② ⩾60S

※ Keep the contact time between the outer termination of the chip and the soldering iron as short as possible. Long soldering time may cause problems such as adhesion deterioration by the leaching phenomenon of the outer termination.

a. Control Δ T in the solder iron and preheating temperature;

b. Caution - Iron tip should not contact with ceramic body directly;

c. Do not cool down the chip and PCB rapidly after soldering;

d. Lead-free solder: Sn-3.0Ag-0.5CU.

(3) Cleaning

❖ In general, cleaning is unnecessary if rosin flux is used.

When acidic flux is used strongly, chlorine in the flux may dissolve into some types of cleaning fluids, thereby affecting the performance of the chip.

This means that the cleansing solution must be carefully selected and should always be new.

❖ Cautions for cleaning

a. Soldering flux residue may remain on the PC board if cleaned with an inappropriate solvent.This may deteriorate the performance of Varistors, especially insulation resistance.

b. The chip or solder joint may be cracked with the vibration of PCB, if ultrasonic vibration is too strong during cleaning. Therefore，test should be done for the cleaning equipment and its process before the cleaning in order to avoid damages on the chip，you can refer to the following conditions for cleaning

Ultrasound output	Ultrasound frequency	Cleaning time
20W/liter or less	40kHz or less	5minutes or less

⚠ Limitation

Please contact us with usage environment information such as voltage, current, temperature, or other special conditions before using our products for the applications listed below. The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below.

If you have any questions regarding this 'Limitation'，you should first contact our sales personnel or application engineers.

- **Aerospace/Aviation equipment1wheeler, 2wheeler and 3wheeler vehicle**
- **Automotive of Transportation equipment**
- **Military equipment**
- **Atomic energy-related equipment**
- **Undersea equipment**
- **Medical equipment**
- **Disaster prevention/crime prevention equipment**
- **Power plant control equipment**
- **Traffic signal equipment**
- **Data-processing equipment**
- **Electric heating apparatus，burning equipment**
- **Safety equipment**
- **Any other applications with the same as or similar complexity or reliability to the applications**