

规格书 SPECIFICATION SHEET

| : | | |
|---|--------------------|---------------|
| : | RL | TYPE : RADIAL |
| : | 150uF/400V Φ 18*35 | |
| : | 2023-09-11 | |
| | : | : RL |

| | BERYL | | CUSTOMER | | | | |
|--------------|---------------------------|------|----------|---------|----------|--|--|
| P/N:RL400M15 | 51LO18*35TB-1E | 33Et | P/N: | | | | |
| PREPARED | PREPARED CHECKED APPROVAL | | PREPARED | CHECKED | APPROVAL | | |
| 董桂茹 | 廖梅君 | 张业维 | | | | | |

After approved, please sign back 1 Approval Sheet before order. If not, we will treat it as tacitly acknowledged and accepted our relative standard and technical index.

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Revise record

| NO. | Date | Revise reason | Revise content | Prepared |
|-----|------------|---------------|----------------|----------|
| 01 | 2023.09.11 | First issue | First issue | 董桂茹 |
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1, Application

This specification applies to Aluminum electrolytic capacitor (foil type) used in electronic equipment. Designed capacitor's quality meets IEC 60384.

2. Table of specification and characteristics

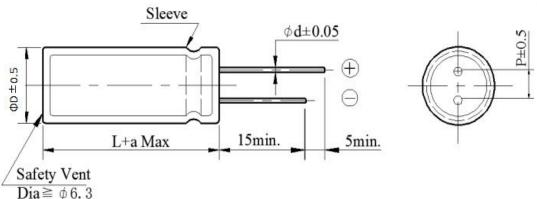
| Series | Cap(uF) | WV(V) | Size(mm) | | Temperature | Capacitance | Life(hours) |
|--------|------------|-------|----------|----|-------------|-------------|-------------|
| | 120Hz/20°C | | D | L | (°C) | Tolerance | @105(°C) |
| RL | 150 | 400 | 18 | 35 | -40~ +105 | ±20% | 3000 |

| DF (%)(MAX) | LC(μA)(MAX) | ESR(Ω)(MAX) | RC (mA rms) | Surge voltage(V) |
|-------------|-------------|-------------|------------------|------------------|
| 120Hz/20°C | 2 min/20°C | 100KHz/25°C | (MAX)105°C/120Hz | |
| ≤24 | ≤1210 | - | 540 | 440 |

Other: /

3. Product Dimensions

Type

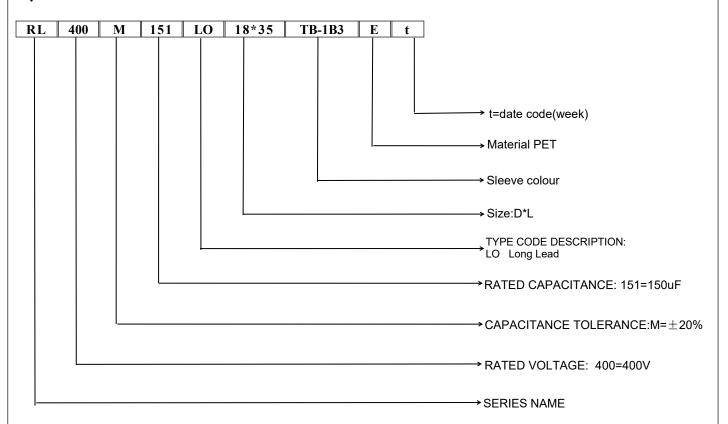


| ФD | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 |
|----|-----|-----|---------|-------|------|--------------|-----|-----|
| P | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 |
| Фd | 0.5 | 0.5 | 0.5/0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 |
| а | | | (L< 20) | ± 1.5 | (L≥2 | $0) \pm 2.0$ | | |

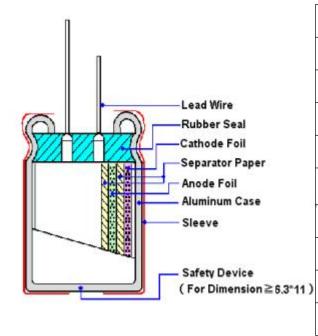
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4. Part Number



5. Construction



| Material name | Composition | Supplier name | | |
|------------------|----------------------------------|--------------------------|--|--|
| Lead | Al and (Fe+Cu+Sn) | NM、RH、ZY | | |
| Rubber | IIR | LHX、TH | | |
| Case | Aluminum | OX、YJ、LY2、SH | | |
| Paper | Wood / Fibrous plant materials | KE, CY | | |
| Anode foil | $Al + Al_2O_3$ | HY1、HY2、HF、 HX1、GD、FC | | |
| Cathode foil | Aluminum | GY、FL、TL | | |
| Electrolyte | Glycol + Water +Ammonium salt | XZB、JZ2 | | |
| Sleeve | PET | YL、CY | | |
| Adhesive tape | propylene, butyl acrylate | RK、RB、CW | | |

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BERYL 绿宝石

ALUMINUM ELECTROLYTIC CAPACITORS

6. Product Marking

Marking Sample: Front BERYL 1 400V 2 150uF 3 7 Reverse RL(M) 6 E105°C 2312

Marking Details:

Capacitor shall be marked the following items:

- 1) Trademark (BERYL)
- 2) working voltage(400V)
- 3) Nominal capacitance(150uF)
- 4) Cathode marked
- 5) Series symbol & Nominal capacitance tolerance (M: -20% ~ +20%)
- 6) Sleeve material(E: PET)

Maximum operating temperature(105°C)

7) Date code (2312)

23: Manufactured year 2023

| Code | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | |
|------|------|------|------|------|------|------|------|------|--|
| Year | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | |

12: Manufactured week (01, 02, 03, 04......52, 53)

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7. Characteristics

Standard atmospheric conditions

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

Ambient temperature : 15°C to 35°C
Relative humidity : 45% to 85%
Air pressure : 86kPa to 106kPa

If there is any doubt about the results, measurement shall be made within the following conditions:

Ambient temperature : $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ Relative humidity : 60% to 70%Air pressure : 86kPa to 106kPa

Operating temperature range

The ambient temperature range at which the capacitor can be operated continuously at rated voltage is $(160\sim400\text{WV})$ -40°C to +105°C .(450WV) -25°C to +105°C .

Table

| | ITEM | PERFORMANCE |
|---|---------------------------------------|---|
| 1 | Nominal capacitance (Tolerance) | Condition> Measuring Frequency: 120Hz±12Hz Measuring circuit:Series equivalent circuit Measuring Voltage: Not more than 0.5Vrms +1.5~2.0V.DC Measuring Temperature: 20±2°C Criteria> Shall be within the specified capacitance tolerance. |
| 2 | Leakage current | Condition> Connecting the capacitor with a protective resistor (1kΩ±10Ω) in series for 2 minutes, and then, measure leakage current. Criteria> I: Leakage current (μA) I (μA) ≤0.02CV +10 (μA) which is greater, measurement circuit refer to right drawing. C: Capacitance (μF) V: Rated DC working voltage (V) |
| 3 | Dissipation factor | <condition> Nominal capacitance, for measuring frequency, voltage and temperature. <criteria> Must be within the parameters (See page 3)</criteria></condition> |

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| | ITEM | | | PERI | FORMAN | NCE | | | |
|---|--|---|--|---|--|---|--|--|-------------------------|
| 4 | Impedance | <condition> Measuring frequency:100kHz; Measuring temperature:20±2°C Measuring point: 2mm max. from the surface of a sealing rubber on the lead wire. <criteria> (20°C) Must be within the parameters (See page 3)</criteria></condition> | | | | | | | |
| 5 | Load life test | Condition> According to IEC603: Maximum operating to current for Rated life exceed the rated work recovering time at attempt of the characteristic shate and the characteristic shate and the characteristic shate and the characteristic shate and capacitance Change Dissipation Factor Appearance | emperature +48/0hours king voltage mospheric c Il meet the Not 1 Withi | ±2°C wi . (The sum of the condition of | th DC bia um of DC he produc s. The res | and ripp t should ult should nents. ified value. the speci | e plus the peak be tested meet the tested meet | e rated rip voltage sh d after 16 he follow | ple all not hours |
| 6 | Shelf life test | Condition> The capacitors are then stored with no voltage applied at a temperature of Maximum operate temperature±2°C for1000+48/0 hours. Following this period, the capacitors shall be remo from the test chamber and be allowed to stabilized at room temperature for16 hours. meast leakage current Criteria> The characteristic shall meet the following requirements. Leakage current Not more than 200% of the specified value. Capacitance Change Within ±20% of initial value. Dissipation Factor Not more than 200% of the specified value. Appearance There shall be no leakage of electrolyte. | | | | | | | |
| 7 | Maximum permissible (ripple current, temperature coefficient) | Condition> The maximum permiss applied at maximum of Table-3 The combined value of voltage and shall not referency Multipliers: Frequency Multipliers: Freq (Harris Cap. (μF) 150 Temperature Coefficien Temperature (** Factor* | D.C voltage verse volta z) 120 1.00 t: | nperature | | | 50k 1.50 | | |

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| | ITEM | | | | PEF | FORM | ANCE | | | |
|----|-----------------------------|--|---|---|--|--|--|--|------------------------|------------------------------|
| 8 | Terminal | Condition> Tensile strength of terminals Fixed the capacitor, applied force to the terminal in lead out direction for 30+5-0 seconds. Bending strength of terminals. Fixed the capacitor, applied force to bent the terminal (1~4 mm from the rubber) for 90° wit 2~3 seconds, and then bent it for 90° to its original position within 2~3 seconds. Tensile force N Proceedings | | | | | | | | |
| 0 | strength | Diameter of lead wire | | | | kgf) | Bell | ding force | | |
| | | | 5mm and | | | (0.51) | | 2.5 (0.25 | | |
| | | | 0.6~0.8 m | ım | 10 | (1.02) | | 5 (0.51) |) | |
| | | <criteria> No notice</criteria> | able chang | ges shall | be found, n | o breaka | ge or loos | eness at th | e terminal | |
| | | <condition></condition> | | | | | | | | - |
| | | STEP | Testing | | ature (°C) | | | Time | | |
| | | 1 | | 20±2 | | | | ermal equ | | |
| | | 2 | | -40 -25 | ±3 | Time t | o reach th | each thermal equilibrium | | |
| | | 3 | | 20±2 | | Time t | o reach th | ermal equ | ilibrium | |
| | | 4 | | 105±2 | r | Time t | o reach th | ermal equ | ilibrium | |
| | | 5 | | 20±2 | | | | ermal equ | ilibrium | |
| 9 | Temperature characteristics | a. At +105 Dissipa The lead b. In step 5 Dissipa The lead | 5°C, capac tion factor kage curre 5, capacita tion factor kage curre | citance m r shall be ent measu ance mea r shall be ent shall | easured at + within the lared shall no sured at +20 within the la within the la not more tha atio shall no | 20°C shaimit of I of more to Shall imit of I on the sp | all be with tem 7.3 han 10 tin be within tem 7.3 ecified va | nin $\pm 25\%$ ones of its so $\pm 10\%$ of lue. | pecified vaits origina | alue. l value. |
| | | Voltage | (V) | 160 | 200 | 250 | 350 | 400 | 450 | |
| | | Z-40°C/Z | +20°C | 6 | 6 | 6 | 6 | 6 | 6 | |
| 10 | Surge | series for 30± 1000 times. T before measu CR: Nomin <criteria></criteria> | 5 seconds Then the carement al Capacit | s in every apacitors tance (μF | 5±0.5 minushall be lef | ites at 15 under n | 5~35°C.Pr iormal hui | ocedure sh midity for | nall be rep | Ω) resistor in eated |
| 10 | test | Leakage co | | | ot more tha | | | ue. | | |
| | | Capacitano Dissipation | | | Vithin $\pm 15\%$ ot more that | | | ue. | | |
| | | Appearance | | | here shall b | | | | | |
| | | Attention: | mulates o | over volta | | | | • | applicable | e to such over |

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| | ITEM | | PERFORMA | NCE | | | | | |
|----|-----------------------|--|---|---|---|--|--|--|--|
| | | <condition> Temperature cycle: According to IEC60384-4 N according as below:</condition> | o.4.7 methods, capacito | r shall be placed in an oven, the condition | n | | | | |
| | | | mperature | Time | | | | | |
| | | (1) +20°C | | 3 Minutes | | | | | |
| | Change of | (2) Rated low tempera | ture (-40°C) (-25°C) | 30±2 Minutes | | | | | |
| 11 | temperature test | (3) Rated high tempera | ature (+105°C) | 30±2 Minutes | | | | | |
| | | (1) to $(3) = 1$ cycle, total | al 5 cycle | | | | | | |
| | | Criteria> The characteristic shall meet Leakage current | the following requirem Not more than the | | | | | | |
| | | Dissipation Factor | Not more than the | specified value. | | | | | |
| | | Appearance | There shall be no le | eakage of electrolyte. | | | | | |
| 12 | Damp heat test | Humidity test: According to IEC60384-4 N be exposed for 500±8 hours | According to IEC60384-4 No.4.12 methods, capacitor shall be exposed for 500±8 hours in an atmosphere of 90~95%R H .at 40±2°C, the characteristic change shall meet the following requirement. **Criteria> Leakage current Not more than the specified value. Capacitance Change Within ±10% of initial value. Dissipation Factor Not more than 120% of the specified value. | | | | | | |
| 13 | Solderability test | Condition> The capacitor shall be tested Soldering temperature : 24 Dipping depth : 21 Dipping speed : 2 Dipping time : 3± Criteria> Soldering wetting time Coating quality | of the surface being | | | | | | |

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| ITEM | | PERFORMANCE | | | | | |
|------|---|--|--|--|--|--|--|
| 14 | Vibration test | Condition> The following conditions shall be applied for 2 hours in each 3 mutually perpendicular directions. Vibration frequency range: 10Hz ~ 55Hz each to peak amplitude: 1.5mm Sweep rate: 10Hz ~ 55Hz ~ 10Hz in about 1 minute Mounting method: The capacitor with diameter greater than 12.5mm or longer than 25mm must be fixed in place with a bracket. Within 30° 4mm or less | | | | | |
| | | <criteria> To be soldered</criteria> | | | | | |
| | | After the test, the following items shall be tested: | | | | | |
| | | Inner construction No intermittent contacts, open or short circuiting. No damage of tab terminals or electrodes. | | | | | |
| | | Appearance No mechanical damage in terminal. No leakage of electrolyte or swelling of the case. The markings shall be legible. | | | | | |
| | Resistance to solder heat test | Condition> Terminals of the capacitor shall be immersed into solder bath at 260±5°Cfor10±1seconds or400±10°Cfor3 -0 seconds to 1.5~2.0 mm from the body of capacitor. Then the capacitor shall be left under the normal temperature and normal humidity for 1~2 hours before measurement. Criteria> | | | | | |
| 15 | | Leakage current Not more than the specified value. | | | | | |
| | | Capacitance Change Within ±5% of initial value. | | | | | |
| | | Dissipation Factor Not more than the specified value. | | | | | |
| | | Appearance There shall be no leakage of electrolyte. | | | | | |
| 16 | Vent | Condition> The following test only apply to those products with vent products at diameter ≥∅6.3 with vent. D.C. test The capacitor is connected with its polarity reversed to a DC power source. Then a current selected from Table 2 is applied. Table 2> | | | | | |
| 10 | test | Diameter (mm) DC Current (A) | | | | | |
| | | 22.4 or less 1 | | | | | |
| | | Criteria> The vent shall operate with no dangerous conditions such as flames or dispersion of pieces of the capacitor and/or case. | | | | | |

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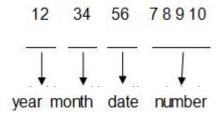


8. Packing Information

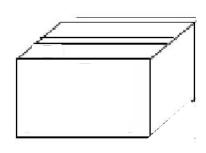
Packing Label Marked (the following items shall be marked on the label) (Inside box or bag)

(1)Clint order number (2)Client part number (3)Beryl part number (4)Capacitance (5)Voltage (6)Dimension (7)Packaging quantity (8)Capacitance tolerance (9) QC Marking (10) Lot number (11) Series

LOT Number:



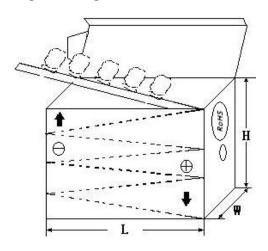
1) Bulk Packing:



3) Outer box



2) Taped Packing:



4) Outer box label:

| C.S.R: | | Ltd. | | |
|------------|-----|--------|---|---------|
| C.S.R P/O: | | | | ROHS HE |
| C.S.R P/N: | | | | |
| S.P.R P/N: | | | | QC |
| SPEC: | | | | |
| QTY: | PCS | TOL: | % | |
| L/N: | | S.P.R: | | 8 |

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9. Prohibition to Use Environment- related Substances

We are hereby to certify the followings:

Our company hereby warrants and guarantees that all or part of products, including, but not limited to, the peripherals, accessories or package, delivered to your company (including your subsidiaries and affiliated companies) directly or indirectly by our company are free from any of the substances listed below.

The latest version of <Substances Prohibited as per RoHS or <Sony-SS-00259>

| Accord with heavy metal Mercury and mercury compounds Hexavalent chromium compounds Polychlorinated biphenyls (PCB) Polychlorinated naphthalenes (PCN) Polychlorinated terphenyls (PCT) Chlorinated paraffins (CP) | | | | | |
|--|--|--|--|--|--|
| heavy metal Mercury and mercury compounds Hexavalent chromium compounds Polychlorinated biphenyls (PCB) Polychlorinated naphthalenes (PCN) Polychlorinated terphenyls (PCT) | | | | | |
| Hexavalent chromium compounds Polychlorinated biphenyls (PCB) Polychlorinated naphthalenes (PCN) Polychlorinated terphenyls (PCT) | | | | | |
| Organic chlorin compounds Polychlorinated biphenyls (PCB) Polychlorinated naphthalenes (PCN) Polychlorinated terphenyls (PCT) | | | | | |
| Organic chlorin compounds Polychlorinated naphthalenes (PCN) Polychlorinated terphenyls (PCT) | | | | | |
| Organic chlorin compounds Polychlorinated terphenyls (PCT) | | | | | |
| Polychlorinated terphenyls (PCT) | | | | | |
| Chlorinated paraffins (CP) | | | | | |
| | | | | | |
| Other chlorinated organic compounds | | | | | |
| Organic Polybrominated biphenyls (PBB) | | | | | |
| bromine Polybrominated diphenylethers (PBDE) | | | | | |
| compounds Other brominated organic compounds | | | | | |
| Tributyltin compounds | | | | | |
| Triphenyltin compounds | | | | | |
| Asbestos | | | | | |
| Specific azo compounds | | | | | |
| Formaldehyde | | | | | |
| Polyvinyl chloride (PVC) and PVC blends | | | | | |
| F、Cl、Br、I | | | | | |
| REACH | | | | | |

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Test Report

| Series | RL | Spec. | 150uF/400V | Size(mm) | 18*35 |
|------------------|------------|---------------------|------------|---------------------|-----------------------------|
| Cap tolerance | ±20% | Work temperature | 105°C | Color of Tube | Sapphire sleeve white front |
| Test date _ | 2023-09-02 | Test humidity | 62% | Test temperature | 25.4°C |

| Items | Cap (µF) | D.F (%) | L.C (μA) | ESR (Ω) | Appearance | |
|--|--------------------|----------------|-----------------|----------------|---------------------|--|
| SPEC NO. | 120~180 (120Hz) | ≤24 (120Hz) | ≤1210 (2min) | ≤/ (100KHz) | No abnormalities | |
| 1 | 129.9 | 3.75 | 49 | / | ОК | |
| 2 | 132.0 | 3.50 | 40 | / | ОК | |
| 3 | 130.7 | 3.86 | 47 | / | ОК | |
| 4 | 129.4 | 3.16 | 49 | / | ОК | |
| 5 | 131.5 | 3.91 | 49 | / | ОК | |
| 6 | 130.5 | 3.61 | 46 | / | ОК | |
| 7 | 129.9 | 3.49 | 41 | / | OK | |
| 8 | 128.2 | 3.26 | 48 | / | ОК | |
| 9 | 128.9 | 3.25 | 43 | / | OK | |
| 10 | 129.4 | 3.85 | 43 | / | ОК | |
| Opinion After 2 minutes application of rated voltage | | | | | | |
| Approve: | 廖梅君 | Audit: 董桂 | 茹 | Test: 赵凯群 | | |

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NEVH1.0M250AB NEVH3.3M250BB NEVH3.3M450CC KME50VB100M-8X11.5 SG220M1CSA-0407 ES5107M016AE1DA

ESMG160ETD102MJ16S ESX472M16B 227RZS050M 476CKH100MSA 477RZS050M B41793A9108Q1 UVX1V101KPA1FA

UVX1V222MHA1CA KME25VB100M-6.3X11 VTL100S10 VTL470S10 VTL470S16A 511D336M250EK5D 052687X ECE-A1CF471

NRE-S560M16V6.3X7TBSTF RGA221M1CTA-0611G ERZA630VHN182UP54N UPL1A331MPH NEV1000M6.3DE NEV100M16CB

NEV100M50DD-BULK NEV2200M16FF NEV220M50EE NEV2.2M50AA NEV330M63EF NEV4700M35HI NEV4.7M100BA

NEV47M16BA NEV47M50CB-BULK NEVH1.0M350AB