



Specification for Approval

- DEVICE NUMBER: BPC-10XX
- CUSTOMER:



**SAMPLES
ATTACHED AREA**

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| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| 2018/4/11 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | Initial Released |
| 2018/11/10 | 1.1 | | | | | | | | Add UL&VDE&CQC Certificate Number |
| | | | | | | | | | |
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FOR CUSTOMER'S APPROVAL STAMP OR SIGNATURE

| APPROVED | PURCHASE | MANUFACTURE | QUALITY | ENGINEERING |
|----------|----------|-------------|---------|-------------|
| | | | | |

佰鴻工業股份有限公司
 BRIGHT LED ELECTRONICS CORP.
 新北市板橋區和平路 19 號 3 樓
 3F., No.19, He Ping Road,
 Ban Qiao Dist., New Taipei City,
 Taiwan
 Tel: +886-2-29591090
 Fax: +886-2-29547006/29558809
www.brtled.com

| ISSUED | APPROVED | PREPARED |
|---|----------|---|
|  | |  |

● Features:

1. Current transfer ratio:
(CTR:50~600% at $I_F=5\text{mA}$, $V_{CE}=5\text{V}$)
2. High input-output isolation voltage
($V_{iso}=5,000\text{Vrms}$)
3. Creepage distance >8mm
4. Long Mini-flat package:2.3mm profile
5. UL/CUL approved:E236324
6. VDE approved:40007240
7. CQC approved:CQC18001204187
8. This product doesn't contain restriction substance, comply RoHS standard

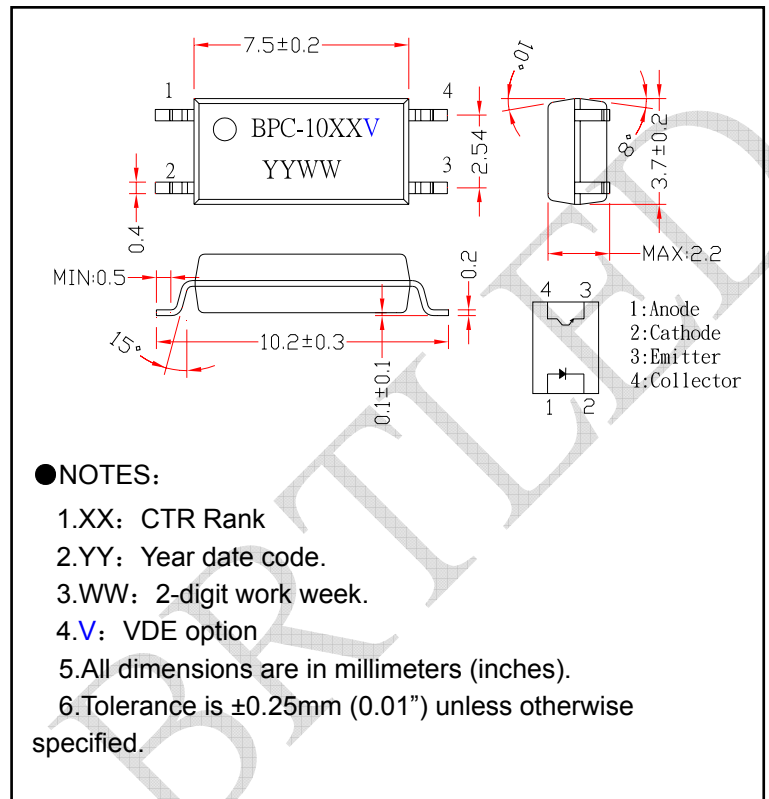
● Description

1. The BPC-10XX series are optically coupled isolators containing a infrared emitting diode and an NPN silicon phototransistor
2. The lead pitch is 2.54mm

● Applications:

1. Programmable controllers.
2. System appliances, measuring instruments.
3. Hybrid substrates that require high density mounting
4. Telecommunication equipments
5. Fast charger
6. Electric home appliances, such as fan heaters, etc.
7. Signal transmission between circuits of different potentials and impedances.

● Outline Dimensions



● Absolute Maximum Ratings (Ta=25°C)

| Parameter | | Symbol | Rating | Unit |
|--------------------------|-----------------------------|-----------|--------------|------|
| INPUT | Forward Current | I_F | 60 | mA |
| | Reverse Voltage | V_R | 6 | V |
| | Power Dissipation | P | 100 | mW |
| OUTPUT | Collector-Emitter Voltage | V_{CEO} | 80 | V |
| | Emitter- Collector Voltage | V_{ECO} | 7 | |
| | Collector Current | I_C | 50 | mA |
| | Collector Power Dissipation | P_C | 150 | mW |
| Total Power Dissipation | | P_{tot} | 250 | mW |
| *1 Isolation Voltage | | V_{iso} | 5,000 | Vrms |
| Operating Temperature | | T_{opr} | -30 to + 110 | °C |
| Storage Temperature | | T_{stg} | -55 to + 125 | |
| *2 Soldering Temperature | | T_{sol} | 260 | |

*1. AC For minute, R.H. =40~60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

*2. For 10 Seconds



● Electro-Optical Characteristics (Ta=25°C)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--------------------------|--------------------------------------|---------------|---------------------------------------|--------------------|--------------------|------|---------------|
| INPUT | Forward Voltage | V_F | $I_F=50\text{mA}$ | --- | 1.25 | 1.5 | V |
| | Reverse Current | I_R | $V_R=6\text{V}$ | --- | --- | 10 | μA |
| | Terminal Capacitance | C_t | $V=0, f=1\text{KHz}$ | --- | 50 | --- | pF |
| OUTPUT | Collector Dark Current | I_{CEO} | $V_{CE}=20\text{V}, I_F=0$ | --- | --- | 100 | nA |
| | Collector-Emitter Breakdown Voltage | BV_{CEO} | $I_C=0.1\text{mA}$ $I_F=0$ | 80 | --- | --- | V |
| | Emitter-Collector Breakdown Voltage | BV_{ECO} | $I_E=100\mu\text{A}$ $I_F=0$ | 7 | --- | --- | V |
| TRANSFER CHARACTERISTICS | Collector Current | I_C | $I_F=5\text{mA}$ | 2.5 | --- | 30 | mA |
| | *1 Current Transfer Ratio | CTR | $V_{CE}=5\text{V}$ | 50 | --- | 600 | % |
| | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F=10\text{mA}$ $I_C=1\text{mA}$ | --- | --- | 0.3 | V |
| | Isolation Resistance | R_{iso} | DC500V 40~60%R.H. | 5×10^{10} | 1×10^{11} | --- | Ω |
| | Floating Capacitance | C_f | $V=0, f=1\text{MHz}$ | --- | 0.6 | 1 | pF |
| | Response Time(Rise) | t_r | $V_{CE}=2\text{V}, I_C=2\text{mA}$ | --- | --- | 18 | μs |
| | Response Time(Fall) | t_f | $R_L=100\Omega$ | --- | --- | 18 | μs |

*1 CTR= $I_C / I_F \times 100\%$

● RANK TABLE OF CURRENT TRANSFER RATIO(CTR)

| CTR Rank | Min | Typ | Max | Unit | Condition |
|----------|-----|-----|-----|------|-------------------------------------|
| BPC-1000 | 50 | - | 600 | % | $I_F=5\text{mA}, V_{CE}=5\text{V}$ |
| BPC-1007 | 80 | - | 160 | | |
| BPC-1008 | 130 | - | 260 | | |
| BPC-1009 | 200 | - | 400 | | |
| BPC-1002 | 22 | - | - | % | $I_F=1\text{mA}, V_{CE}=5\text{V}$ |
| BPC-1003 | 34 | - | - | | |
| BPC-1014 | 56 | - | - | | |
| BPC-1002 | 63 | - | 125 | % | $I_F=10\text{mA}, V_{CE}=5\text{V}$ |
| BPC-1003 | 100 | - | 200 | | |
| BPC-1014 | 160 | - | 320 | | |



● Characteristics Curves

Figure1. P_{tot} vs TA

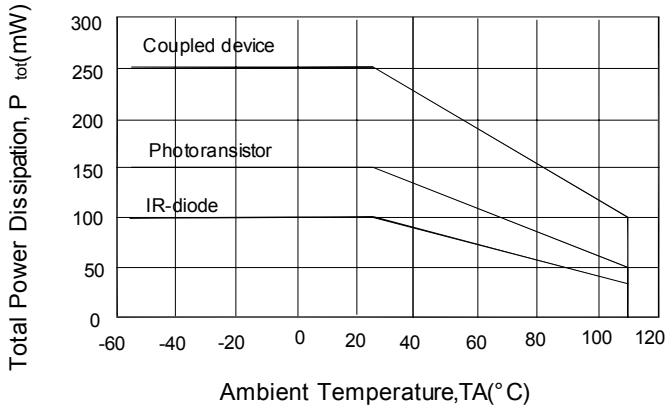


Figure2. I_F vs V_F

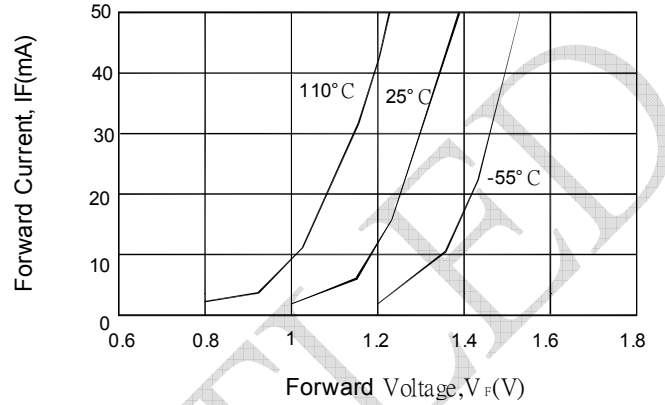


Figure3. Saturated Normalized CTR vs. TA

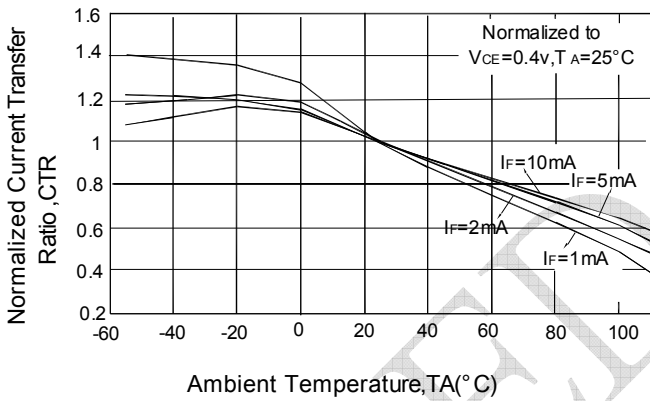


Figure4. Normalized I_c vs. I_F

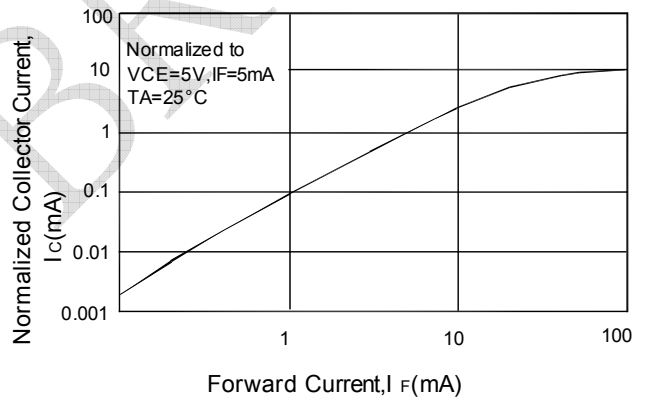


Figure5. Non-Saturated Normalized CTR vs. TA

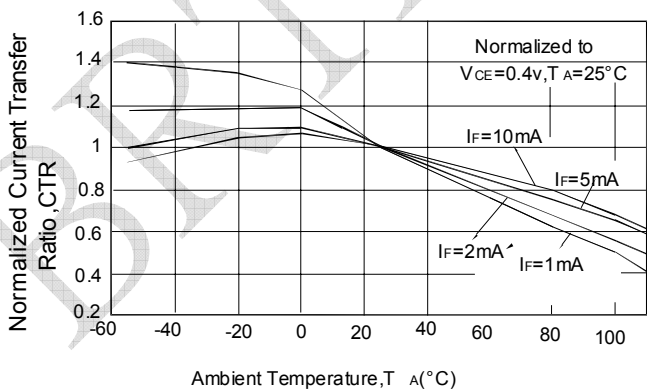


Figure6. Normalized I_c vs. I_F

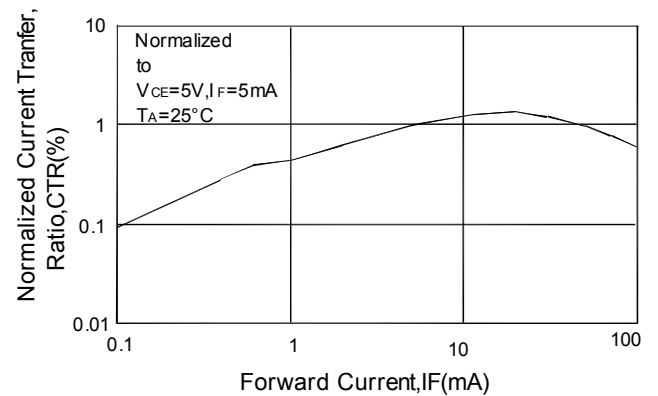


Figure7. I_{CEO} vs. T_A

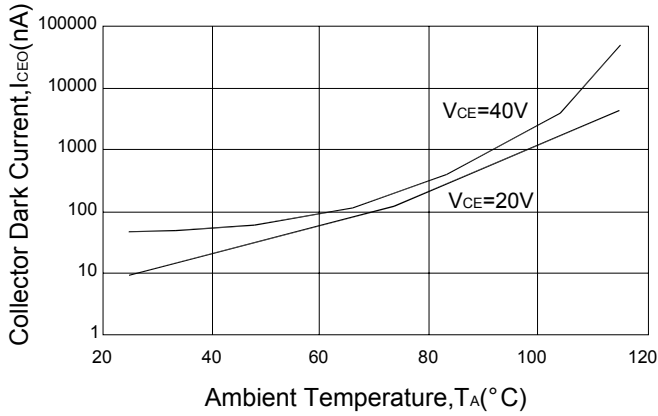


Figure8. T_{ON}/T_{OFF} vs. I_F

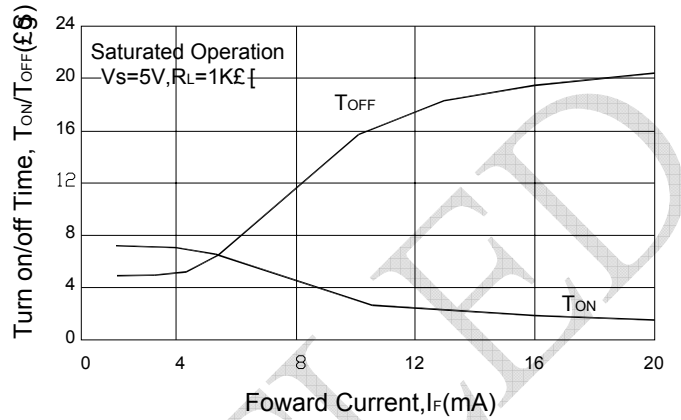


Figure9. I_C vs. V_{CE}

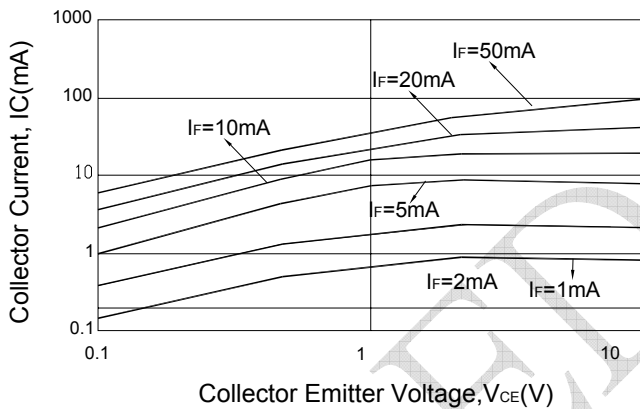


Figure10. Frequency Response

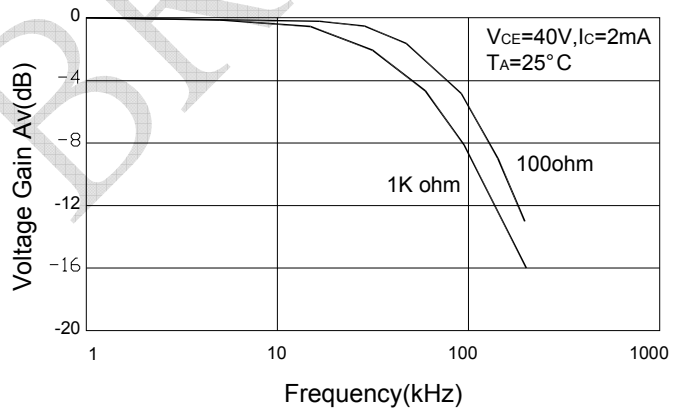
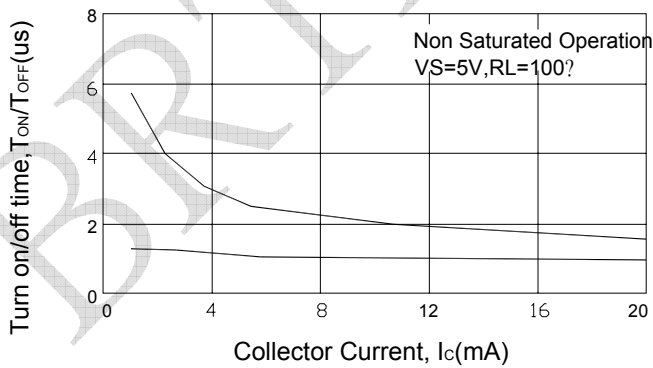
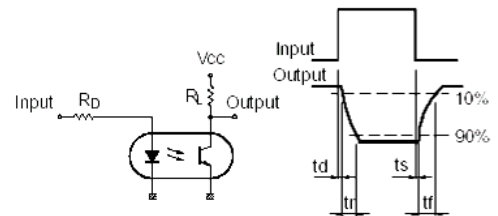


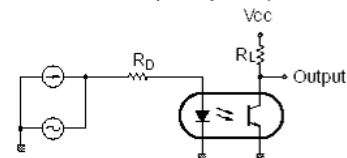
Figure11. T_{ON}/T_{OFF} vs. I_C



Test Circuit for Response Time



Test Circuit for Frequency Response



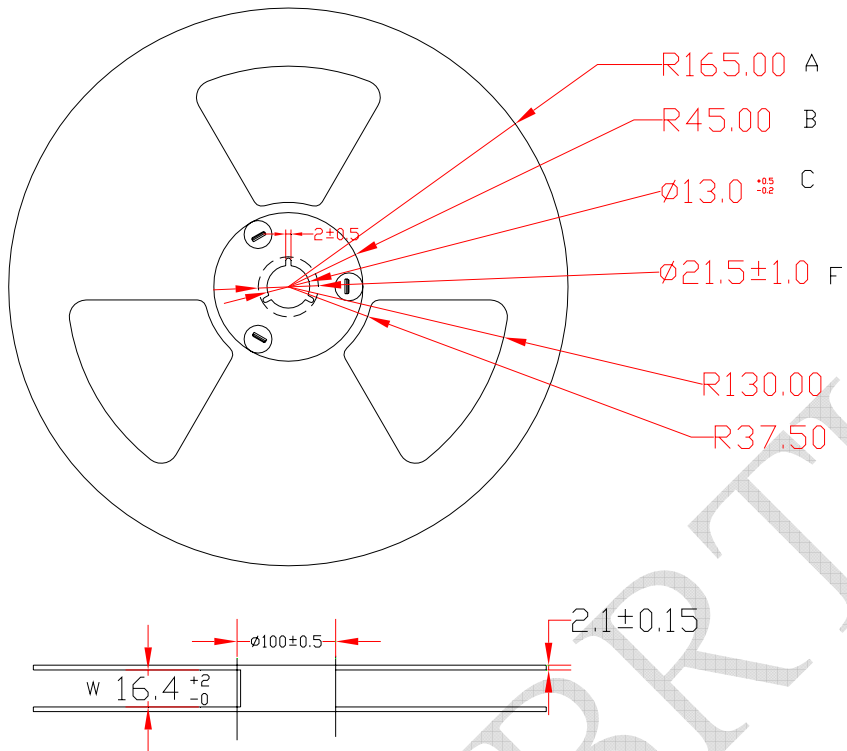
● Reliability Test

| Classification | Test Item | Reference Standard | Test Conditions | Result |
|--------------------|--|---|--|--------|
| Endurance Test | Operation Life | MIL-STD-750:1026 MIL-STD-883:1005 JIS C 7021 :B-1 | Connect with a power $I_f=50\text{mA}$ T_a =Under room temperature Test time=1,000hrs | 0/20 |
| | High Temperature High Humidity Reverse Bias (H3TRB) | JIS C 7021 :B-11 | $T_a=+85^\circ\text{C}\pm 5^\circ\text{C}$, RH=85% PTR= V_{CE} absolute max rating*80% Test time=1000hrs | 0/20 |
| | High Temperature Reverse Bias (HTRB) | JIS C 7021 :B- 8 | $T_a=+105^\circ\text{C}\pm 5^\circ\text{C}$ PTR= V_{CE} absolute max rating Test time=1000hrs | 0/20 |
| | High Temperature Storage | MIL-STD-883:1008 JIS C 7021 :B-10 | High $T_a=+125^\circ\text{C}\pm 5^\circ\text{C}$ Test time=1,000hrs | 0/20 |
| | Low Temperature Storage | JIS-C-7021 :B-12 | Low $T_a=-55^\circ\text{C}\pm 5^\circ\text{C}$ Test time=1,000hrs | 0/20 |
| | Autoclave | JESD 22-A102-B | P=15PSIG, $T_a=121^\circ\text{C}$ Humi. =100%RH, 48hrs | 0/20 |
| Environmental Test | Temperature Cycling | MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1010 JIS C 7021 :A-4 | $125^\circ\text{C} \sim 25^\circ\text{C} \sim -55^\circ\text{C} \sim 25^\circ\text{C}$ 30min 5min 30min 5min Test Time=20cycle | 0/20 |
| | Thermal Shock | MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1011 | $125^\circ\text{C} \sim -55^\circ\text{C}$ 20min 20min Test Time=20cycle | 0/20 |
| | Solder Resistance | MIL-STD-202:201A MIL-STD-750:2031 JIS C 7021 :A-1 | Operation heating : 260°C , within 10 ± 1 seconds. | 0/20 |
| | Solder Ability | MIL-S-883:2003 JIS C 7021 :A-2 | Operation heating : 235°C , within 5 ± 1 seconds. | 0/20 |

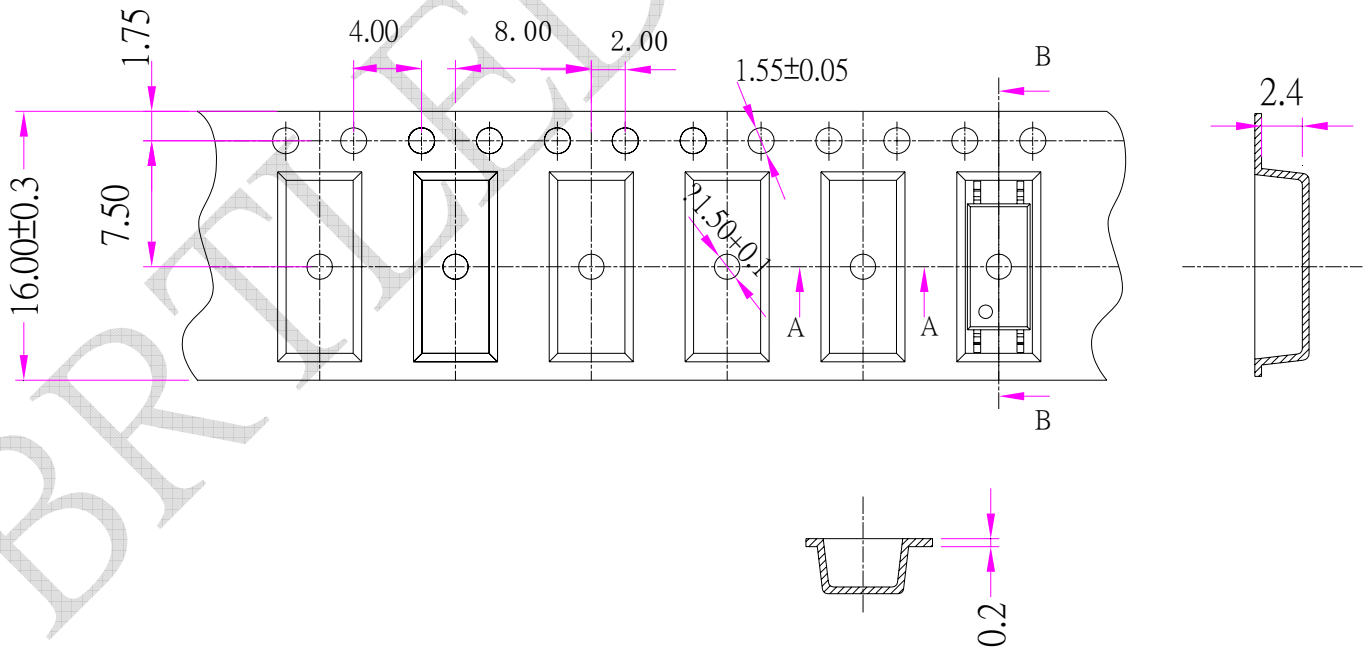
● Judgment Criteria Of Failure For The Reliability

| Symbol | Measuring conditions | Judgment criteria for failure |
|-------------------------|---------------------------------------|-------------------------------|
| V_F (V) | $I_F=20\text{mA}$ | Over $U_x1.0$ |
| I_r (μA) | $V_r=6\text{V}$ | Over $U_x1.0$ |
| CTR(%) | $I_F=5\text{mA}$, $V_{CE}=5\text{V}$ | Shift>1.2 |
| $V_{CE(\text{sat})}$ | $I_F=20\text{mA}$, $I_C= 1\text{mA}$ | Over $U_x1.0$ |
| BV_{CEO} | $I_C=0.1\text{mA}$, $I_F=0$ | Over $L_x1.0$ |
| BV_{ECO} | $I_E=10\mu\text{A}$, $I_F=0$ | Over $L_x1.0$ |

● Packaging Box Dimensions (Units: mm)

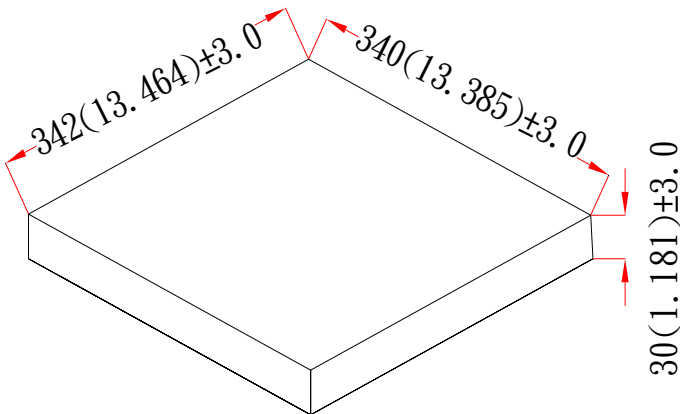


● Packaging Tube Dimensions

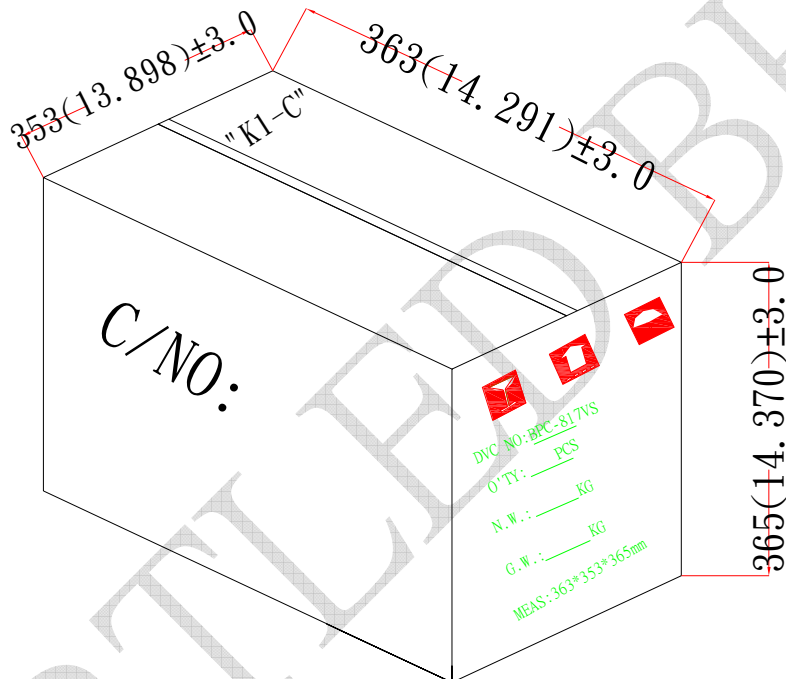




● Inner box



● Carton



Notes:

1. 3000 PCS per reel, 10reels per Carton.
2. All dimensions are in millimeters (inches).
3. Tolerance is $\pm 0.10\text{mm}$ (0.004") unless otherwise specified.
4. Specifications are subject to change without notice.

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