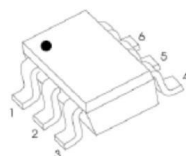


## Features

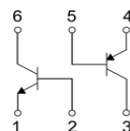
- Epitaxial Die Construction
- Two isolated NPN/PNP(BC847W+BC857W) Transistors in one package



SOT-363



Equivalent Circuit



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

**MAXIMUM RATINGS TR1 ( $T_a=25^{\circ}\text{C}$  unless otherwise noted)**

| Symbol    | Parameter                     | Value   | Units              |
|-----------|-------------------------------|---------|--------------------|
| $V_{CBO}$ | Collector-Base Voltage        | 50      | V                  |
| $V_{CEO}$ | Collector-Emitter Voltage     | 45      | V                  |
| $V_{EBO}$ | Emitter-Base Voltage          | 6       | V                  |
| $I_C$     | Collector Current –Continuous | 0.1     | A                  |
| $P_C$     | Collector Power Dissipation   | 200     | mW                 |
| $T_J$     | Junction Temperature          | 150     | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage Temperature           | -55-150 | $^{\circ}\text{C}$ |

## CHARACTERISTICS of TR1 (NPN Transistor) (Ta=25°C unless otherwise specified)

| Parameter                            | Symbol        | Test conditions                                                   | Min  | Typ | Max  | Unit |
|--------------------------------------|---------------|-------------------------------------------------------------------|------|-----|------|------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C=10\mu A, I_E=0$                                              | 50   |     |      | V    |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C=10mA, I_B=0$                                                 | 45   |     |      | V    |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E=1\mu A, I_C=0$                                               | 6    |     |      | V    |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB}=30V, I_E=0$                                               |      |     | 15   | nA   |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB}=5V, I_C=0$                                                |      |     | 15   | nA   |
| DC current gain                      | $h_{FE}$      | $V_{CE}=5V, I_C=2mA$                                              | 200  |     | 475  |      |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C=10mA, I_B=0.5mA$                                             |      |     | 0.25 | V    |
|                                      | $V_{CE(sat)}$ | $I_C=100mA, I_B=5mA$                                              |      |     | 0.6  | V    |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C=10mA, I_B=0.5mA$                                             |      | 0.7 |      | V    |
|                                      | $V_{BE(sat)}$ | $I_C=100mA, I_B=5mA$                                              |      | 0.9 |      | V    |
| Base-emitter voltage                 | $V_{BE(on)}$  | $V_{CE}=5V, I_C=2mA$                                              | 0.58 |     | 0.7  | V    |
|                                      | $V_{BE(on)}$  | $V_{CE}=5V, I_C=10mA$                                             |      |     | 0.72 | V    |
| Collector output capacitance         | $C_{ob}$      | $V_{CB}=10V, I_E=0, f=1MHz$                                       |      |     | 4.5  | pF   |
| Transition frequency                 | $f_T$         | $V_{CE}=5V, I_C=10mA, f=100MHz$                                   | 100  |     |      | MHz  |
| Noise figure                         | NF            | $V_{CE}=5V, I_C=0.2mA,$<br>$f=1kHz, R_g=2K\Omega, \Delta f=200Hz$ |      |     | 10   | dB   |

## MAXIMUM RATINGS TR2 (T<sub>a</sub>=25°C unless otherwise noted)

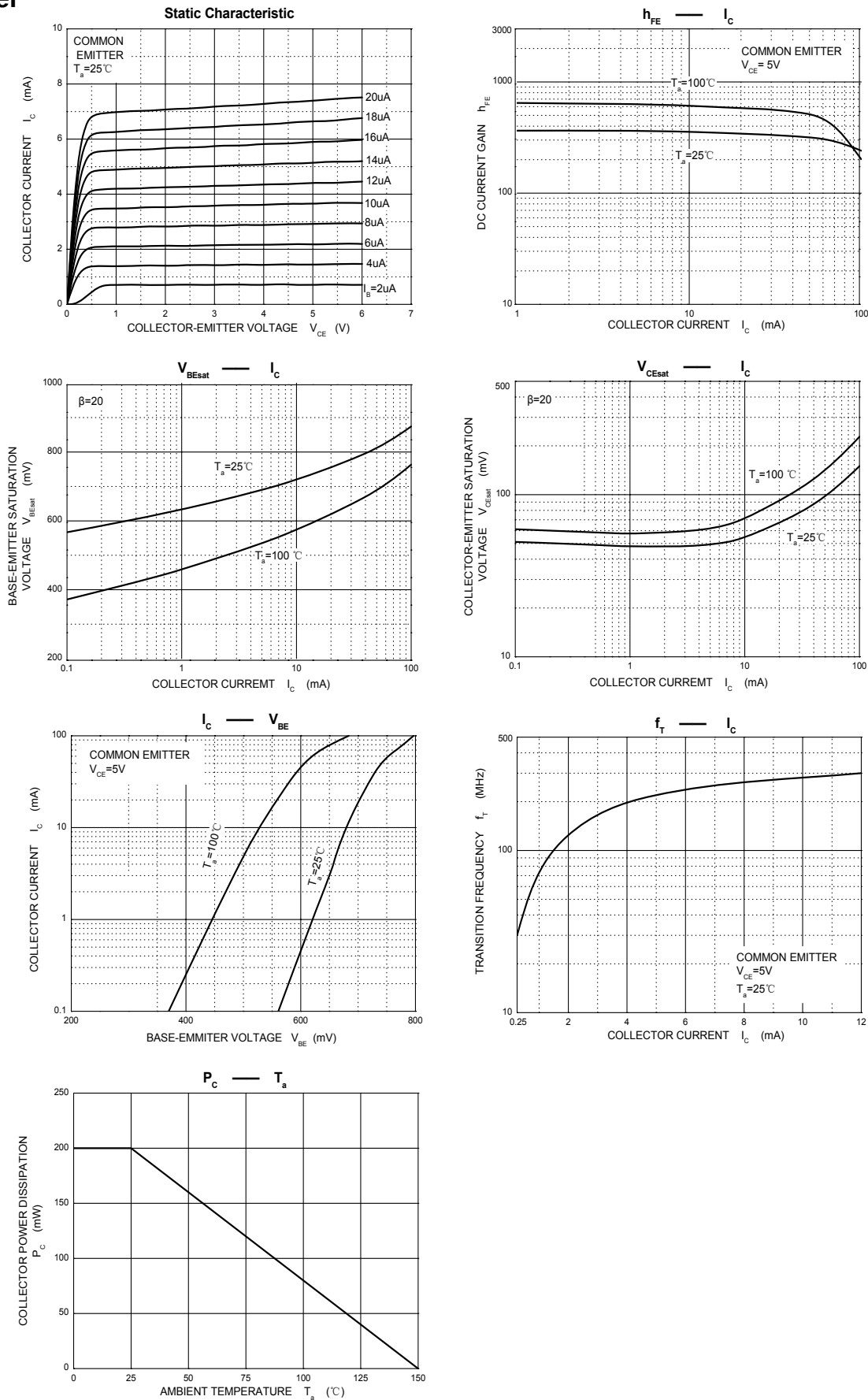
| Symbol    | Parameter                     | Value   | Units |
|-----------|-------------------------------|---------|-------|
| $V_{CBO}$ | Collector-Base Voltage        | -50     | V     |
| $V_{CEO}$ | Collector-Emitter Voltage     | -45     | V     |
| $V_{EBO}$ | Emitter-Base Voltage          | -5      | V     |
| $I_C$     | Collector Current –Continuous | -0.1    | A     |
| $P_C^*$   | Collector Power Dissipation   | 200     | mW    |
| $T_J$     | Junction Temperature          | 150     | °C    |
| $T_{stg}$ | Storage Temperature           | -55-150 | °C    |

CHARACTERISTICS of TR2 (PNP Transistor) (Ta=25°C unless otherwise specified)

| Parameter                            | Symbol        | Test conditions                                                               | MIN  | TYP  | MAX   | UNIT |
|--------------------------------------|---------------|-------------------------------------------------------------------------------|------|------|-------|------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C = -10\mu A, I_E = 0$                                                     | -50  |      |       | V    |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C = -10mA, I_B = 0$                                                        | -45  |      |       | V    |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E = -1\mu A, I_C = 0$                                                      | -5   |      |       | V    |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = -30V, I_E = 0$                                                      |      |      | -15   | nA   |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = -5V, I_C = 0$                                                       |      |      | -15   | nA   |
| DC current gain                      | $h_{FE1}$     | $V_{CE} = -5V, I_C = -2mA$                                                    | 200  |      | 475   |      |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -10mA, I_B = -0.5mA$                                                   |      |      | -0.3  | V    |
|                                      | $V_{CE(sat)}$ | $I_C = -100mA, I_B = -5mA$                                                    |      |      | -0.65 | V    |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = -10mA, I_B = -0.5mA$                                                   |      | -0.7 |       | V    |
|                                      | $V_{BE(sat)}$ | $I_C = -100mA, I_B = -5mA$                                                    |      |      | -0.95 | V    |
| Base-emitter voltage                 | $V_{BE(on)}$  | $V_{CE} = -5V, I_C = -2mA$                                                    | -0.6 |      | -0.75 | V    |
|                                      | $V_{BE(on)}$  | $V_{CE} = -5V, I_C = -10mA$                                                   |      |      | -0.82 | V    |
| Collector output capacitance         | $C_{ob}$      | $V_{CB} = -10V, I_E = 0, f = 1MHz$                                            |      |      | 4.5   | pF   |
| Transition frequency                 | $f_T$         | $V_{CE} = -5V, I_C = -10mA, f = 100MHz$                                       | 100  |      |       | MHz  |
| Noise figure                         | NF            | $V_{CE} = -5V, I_C = -0.2mA,$<br>$f = 1kHz, R_g = 2K\Omega, \Delta f = 200Hz$ |      |      | 10    | dB   |

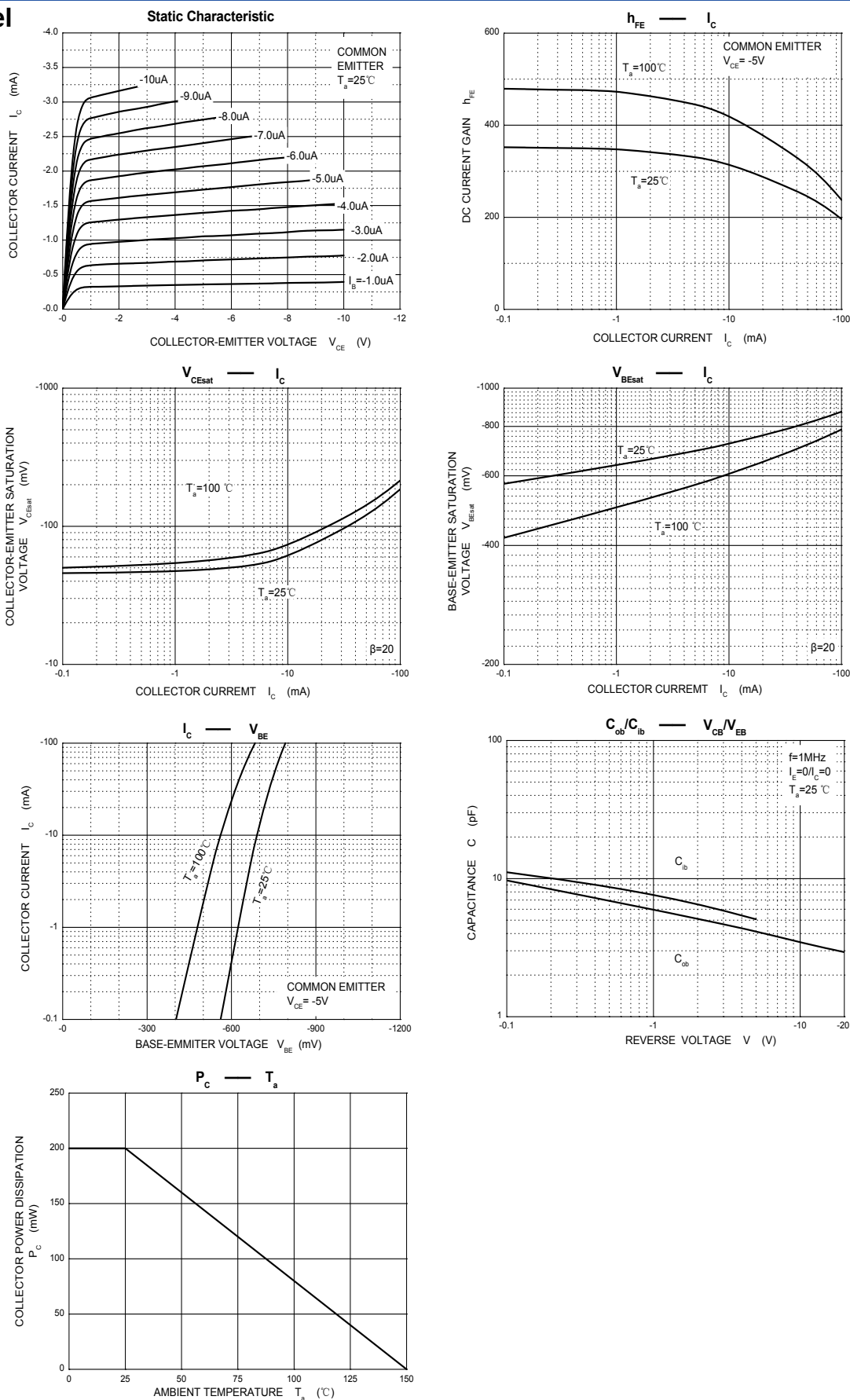
## RATING AND CHARACTERISTIC CURVES

### N-Channel



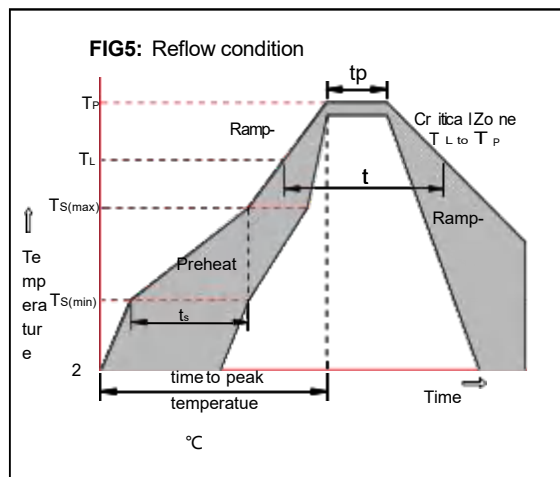
## RATING AND CHARACTERISTIC CURVES

### P-Channel



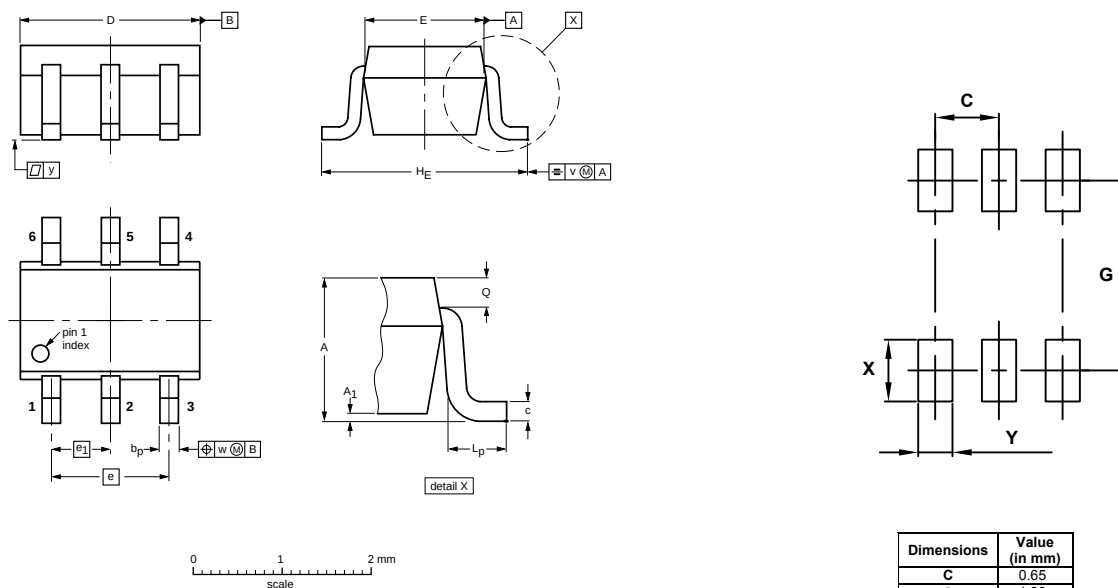
## Soldering parameters

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(see as below) |
|---------------------------------------------------------|-----------------------------------|------------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ ) | +150 °C                            |
|                                                         | -Temperature Max( $T_{s(max)}$ )  | +200 °C                            |
|                                                         | -Time (Min to Max) (ts)           | 60-180 secs.                       |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3 °C/sec. Max                      |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3 °C/sec. Max                      |
| Reflow                                                  | -Temperature( $T_L$ )(Liquid us)  | +217 °C                            |
|                                                         | -Temperature( $t_L$ )             | 60-150 secs.                       |
| Peak Temp ( $T_P$ )                                     |                                   | +260(+0/-5) °C                     |
| Time within 5 °C of actual Peak Temp ( $t_P$ )          |                                   | 30 secs. Max                       |
| Ramp-down Rate                                          |                                   | 6 °C/sec. Max                      |
| Time 25 °C to Peak Temp ( $T_P$ )                       |                                   | 8 min. Max                         |
| Do not exceed                                           |                                   | +260 °C                            |



## Package Dimensions & Suggested Pad Layout

### SOT-363



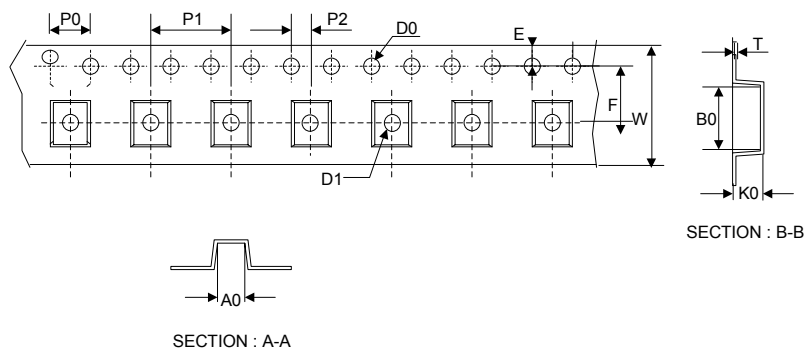
| Dimensions | Value<br>(in mm) |
|------------|------------------|
| C          | 0.65             |
| G          | 1.90             |
| X          | 0.85             |
| Y          | 0.40             |

DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A1<br>max | b <sub>p</sub> | c            | D          | E            | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   | y   |
|------|------------|-----------|----------------|--------------|------------|--------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm   | 1.1<br>0.8 | 0.1       | 0.30<br>0.20   | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65           | 2.2<br>2.0     | 0.45<br>0.15   | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

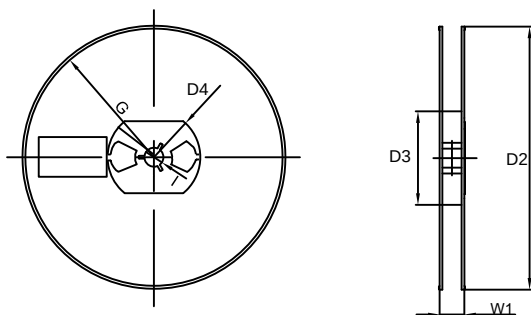
## Tape & reel specification

### Tape



| Symbol | Dimension (mm) |
|--------|----------------|
| P0     | 4.00±0.20      |
| P1     | 4.00±0.20      |
| P2     | 2.00±0.20      |
| D0     | 1.55±0.20      |
| D1     | 1.00±0.20      |
| E      | 1.55±0.25      |
| F      | 3.60±0.20      |
| W      | 8.00±0.20      |
| A0     | 3.00±0.20      |
| B0     | 3.00±0.20      |
| K0     | 1.30±0.20      |
| T      | 0.20±0.20      |
| D2     | 177.0±5.0      |
| D3     | 55Min.         |
| D4     | R24.6±2.0      |
| G      | R82.0±2.0      |
| I      | 13.0±2.0       |
| W1     | 10.20±3.0      |

### 7" Reel



Quantity: 3000PCS