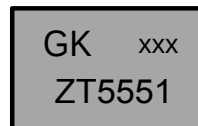


## Features

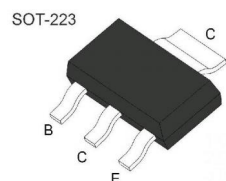
- High Collector-Emitter Voltage :  $BV_{CEO}=160V$
- High current gain

## Application

- Telephone Switching Circuit
- Amplifier



LOGO GK xxx CODE



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings ( $T_a=25^{\circ}C$ )

| Parameter                   | Symbol     | Value           | Unit        |
|-----------------------------|------------|-----------------|-------------|
| Collector-Base Voltage      | $BV_{CBO}$ | 180             | V           |
| Collector-Emitter Voltage   | $BV_{CEO}$ | 160             | V           |
| Emitter-Base Voltage        | $BV_{EBO}$ | 6               | V           |
| Collector Current           | $I_C$      | 600             | mA          |
| Collector Power Dissipation | $P_C$      | 2               | W           |
| Junction Temperature        | $T_j$      | 150             | $^{\circ}C$ |
| Storage Temperature         | $T_{stg}$  | $-55 \sim +150$ | $^{\circ}C$ |

## ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

| Parameter                            | Symbol        | Conditions                        | Value |     |     | Unit |
|--------------------------------------|---------------|-----------------------------------|-------|-----|-----|------|
|                                      |               |                                   | Min   | Typ | Max |      |
| Collector-base breakdown voltage     | $BV_{CBO}$    | $I_C = 100\mu A, I_E = 0$         | 180   |     |     | V    |
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | $I_C = 1mA, I_B = 0$              | 160   |     |     | V    |
| Emitter-base breakdown voltage       | $BV_{EBO}$    | $I_E = 100\mu A, I_C = 0$         | 6     |     |     | V    |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = 120V, I_E = 0$          |       |     | 50  | nA   |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = 4V, I_C = 0$            |       |     | 50  | nA   |
| DC current gain                      | $h_{FE}$      | $V_{CE} = 5V, I_C = 1mA$          | 80    |     |     |      |
|                                      |               | $V_{CE} = 5V, I_C = 10mA$         | 80    |     | 400 |      |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 50mA, I_B = 5mA$           |       |     | 0.2 | V    |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = 50mA, I_B = 5mA$           |       |     | 1.0 | V    |
| Transition frequency                 | $f_T$         | $V_{CE} = 10V, I_B = 10mA$        | 100   |     |     | MHz  |
| Output Capacitance                   | $C_{ob}$      | $V_{CB} = 10V, I_E = 0, f = 1MHz$ |       |     | 6   | pF   |

Note: Pulse test: P W < 300μs, Duty Cycle < 2%

### $h_{FE}$ Classification

| Classification | A      | B       | C       |
|----------------|--------|---------|---------|
| Range          | 80~170 | 150~240 | 200~400 |

## RATING AND CHARACTERISTIC CURVES

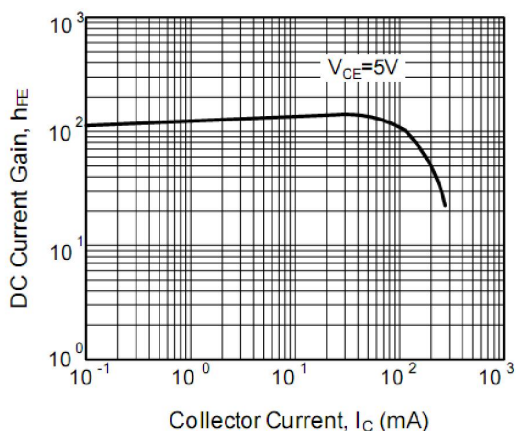


Figure 1. TDC Current Gain

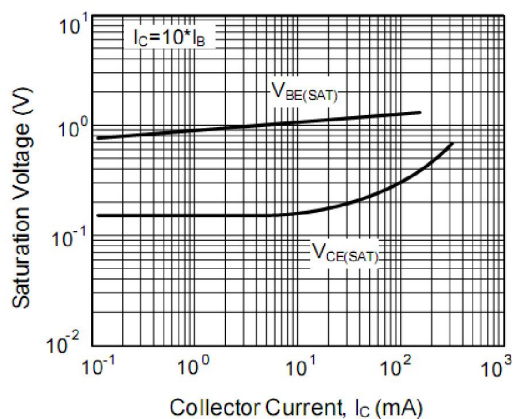


Figure 2. Saturation Voltage

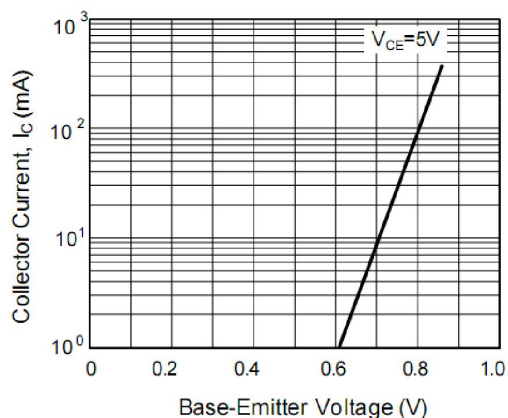


Figure 3. Base-Emitter on Voltage

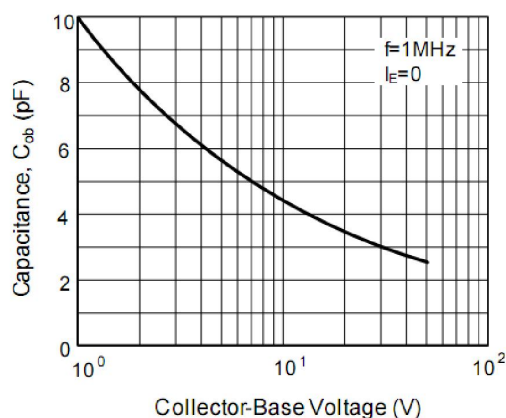


Figure 4. Collector Output Capacitance

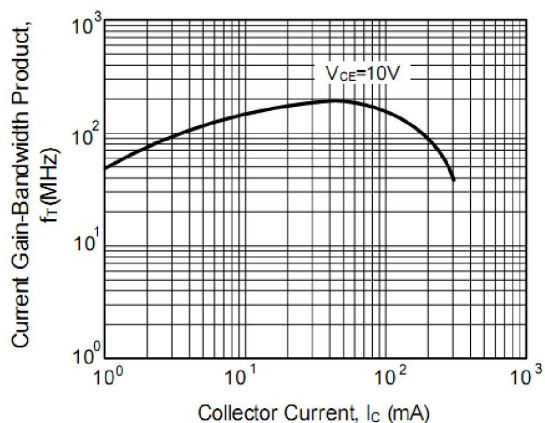
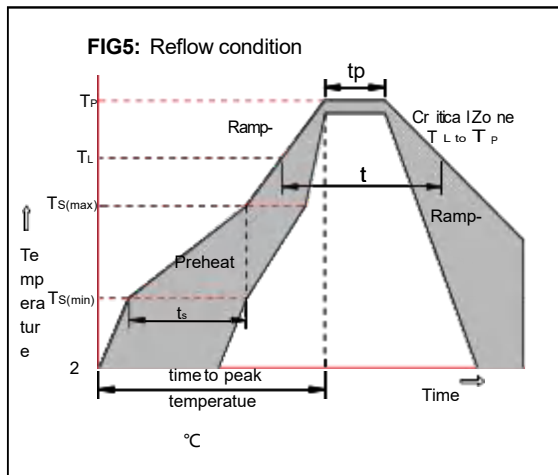


Figure 5. Current Gain-Bandwidth Product

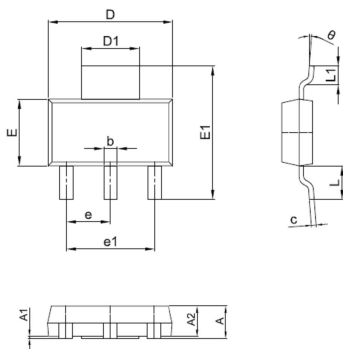
## Soldering parameters

| 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                             |

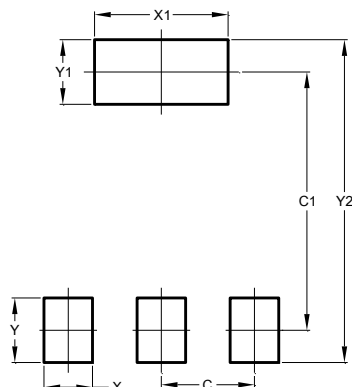


## Package Dimensions & Suggested Pad Layout

### SOT-223

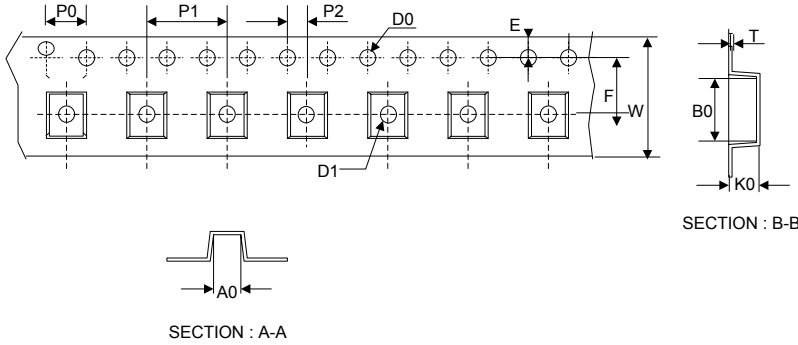
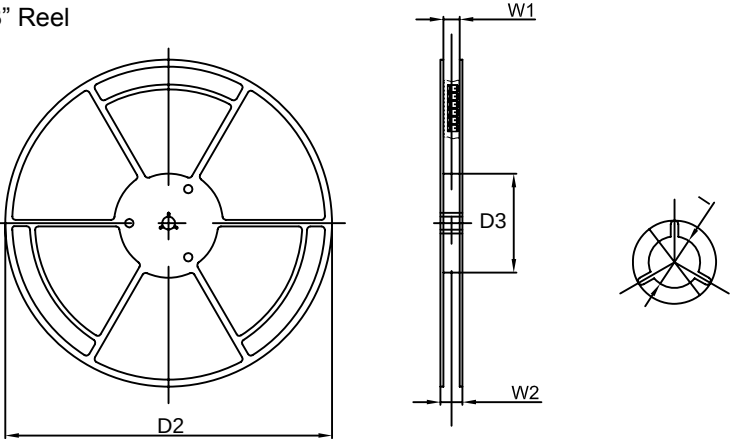


| Symbol | Millimeter |      | Inches |       |
|--------|------------|------|--------|-------|
|        | Min.       | Max. | Min.   | Max.  |
| A      | 1.50       | 1.80 | 0.059  | 0.071 |
| A1     | 0.00       | 0.10 | 0.000  | 0.004 |
| A2     | 1.50       | 1.70 | 0.059  | 0.067 |
| b      | 0.65       | 0.75 | 0.026  | 0.030 |
| c      | 0.20       | 0.30 | 0.008  | 0.012 |
| D      | 6.40       | 6.60 | 0.252  | 0.260 |
| D1     | 2.90       | 3.10 | 0.114  | 0.122 |
| E      | 3.30       | 3.70 | 0.130  | 0.146 |
| E1     | 6.85       | 7.15 | 0.270  | 0.281 |
| e      | 2.20       | 2.40 | 0.087  | 0.094 |
| e1     | 4.40       | 4.80 | 0.173  | 0.189 |
| L      | 1.65       | 1.85 | 0.065  | 0.073 |
| L1     | 0.90       | 1.15 | 0.035  | 0.045 |



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.30          |
| C1         | 6.00          |
| X          | 1.20          |
| X1         | 3.60          |
| Y          | 1.70          |
| Y1         | 1.70          |
| Y2         | 7.70          |

## Tape & reel specification

| Tape                                                                               |  | Symbol            | Dimension (mm) |
|------------------------------------------------------------------------------------|--|-------------------|----------------|
|  |  | P0                | 4.00±0.20      |
|                                                                                    |  | P1                | 8.00±0.20      |
|                                                                                    |  | P2                | 2.00±0.20      |
|                                                                                    |  | D0                | 1.55±0.20      |
|                                                                                    |  | D1                | 1.55±0.20      |
|                                                                                    |  | E                 | 1.75±0.20      |
|                                                                                    |  | F                 | 5.50±0.20      |
|                                                                                    |  | W                 | 12.00±0.20     |
|                                                                                    |  | A0                | 7.40±0.20      |
|                                                                                    |  | B0                | 7.50±0.20      |
|                                                                                    |  | K0                | 2.10±0.20      |
|                                                                                    |  | T                 | 0.20±0.20      |
|                                                                                    |  | D2                | 330.0±5.0      |
|                                                                                    |  | D3                | 100.0±4.0      |
| 13" Reel                                                                           |  | W1                | W2             |
|  |  | D2                | 330.0±5.0      |
|                                                                                    |  | D3                | 100.0±4.0      |
|                                                                                    |  | W1                | 18.0±5.0       |
|                                                                                    |  | W2                | 22.0±5.0       |
|                                                                                    |  | I                 | 13.0±2.0       |
|                                                                                    |  | Quantity: 2500PCS |                |