

## Small Signal Product

### TO-92 NPN Bipolar Transistor

#### FEATURES

- The transistor is subdivided into four groups according to its DC current gain: O, Y, GR, BL
- Pb free and RoHS compliant

#### MECHANICAL DATA

- Case: TO-92 small outline plastic package
- High temperature soldering guaranteed: 260°C/10s
- Weight: 195mg (approximately)

#### APPLICATION

- General purpose switching and AF amplifier application



1. Emitter
2. Collector
3. Base



#### TO-92

| MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted) |                                   |              |      |
|----------------------------------------------------------------------------------------------|-----------------------------------|--------------|------|
| PARAMETER                                                                                    | SYMBOL                            | VALUE        | UNIT |
| Collector Power Dissipation                                                                  | P <sub>C</sub>                    | 0.5          | W    |
| Collector-Base Voltage                                                                       | V <sub>CBO</sub>                  | 60           | V    |
| Collector-Emitter Voltage                                                                    | V <sub>CEO</sub>                  | 50           | V    |
| Emitter-Base Voltage                                                                         | V <sub>EBO</sub>                  | 5            | V    |
| Collector Current                                                                            | I <sub>C</sub>                    | 0.15         | A    |
| Thermal Resistance From Junction to Ambient                                                  | R <sub>θJA</sub>                  | 250          | °C/W |
| Junction and Storage Temperature Range                                                       | T <sub>J</sub> , T <sub>STG</sub> | -55 to + 150 | °C   |

| PARAMETER                                                                                                     | SYMBOL               | MIN | MAX  | UNIT |
|---------------------------------------------------------------------------------------------------------------|----------------------|-----|------|------|
| Collector Cut-off Current<br>V <sub>CB</sub> = 60V, I <sub>E</sub> = 0                                        | I <sub>CBO</sub>     | -   | 0.1  | μA   |
| Emitter Cut-off Current<br>V <sub>EB</sub> = 5V, I <sub>C</sub> = 0                                           | I <sub>EBO</sub>     | -   | 0.1  | μA   |
| DC Current Gain<br>V <sub>CE</sub> = 6V, I <sub>C</sub> = 2mA<br>V <sub>CE</sub> = 6V, I <sub>C</sub> = 150mA | h <sub>FE(1)</sub>   | 70  | 700  |      |
|                                                                                                               | h <sub>FE(2)</sub>   | 25  |      |      |
| Collector-Emitter Saturation Voltage<br>I <sub>C</sub> = 100mA, I <sub>B</sub> =10mA                          | V <sub>CE(sat)</sub> |     | 0.25 | V    |
| Base-Emitter Saturation Voltage<br>I <sub>C</sub> = 100mA, I <sub>B</sub> =10mA                               | V <sub>BE(sat)</sub> |     | 1    | V    |
| Transition Frequency<br>V <sub>CE</sub> = 10V, I <sub>C</sub> =1mA                                            | f <sub>T</sub>       | 80  |      | MHz  |
| Collector Output Capacitance<br>V <sub>CB</sub> = 10V, I <sub>E</sub> =0, f=1MHz                              | C <sub>ob</sub>      |     | 3.5  | pF   |

#### CLASSIFIATION OF h<sub>FE</sub>

| RANK  | O      | Y       | GR      | BL      |
|-------|--------|---------|---------|---------|
| RANGE | 70-140 | 120-240 | 200-400 | 300-700 |

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### RATINGS AND CHARACTERISTICS CURVES

( $T_A=25^\circ\text{C}$  unless otherwise noted)

FIG.1 Static Characteristic

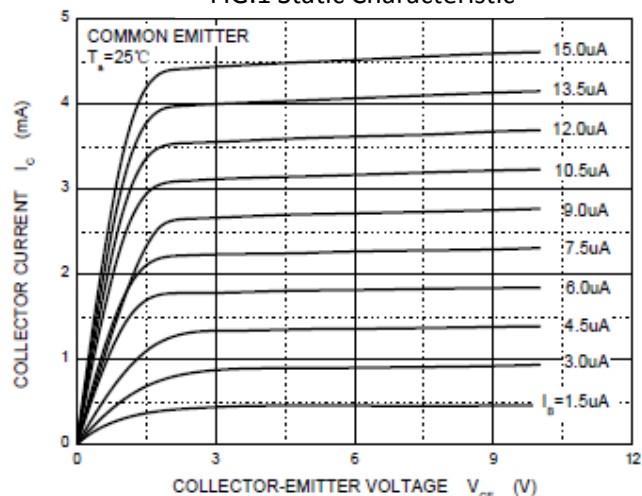


FIG.2  $h_{FE}$  vs.  $I_C$

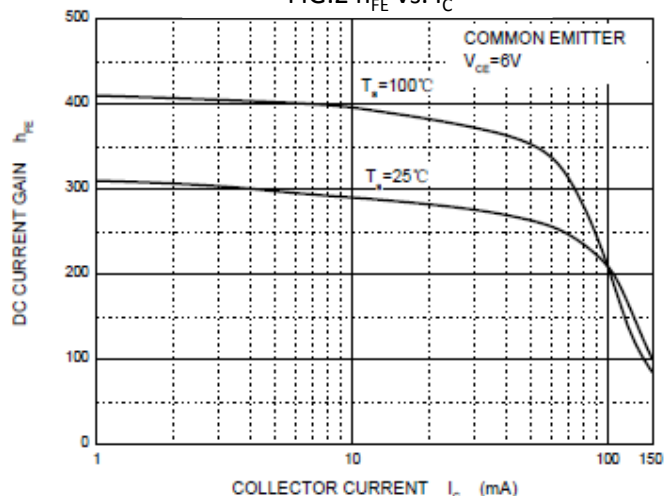


FIG.3  $V_{CE(sat)}$  vs.  $I_C$

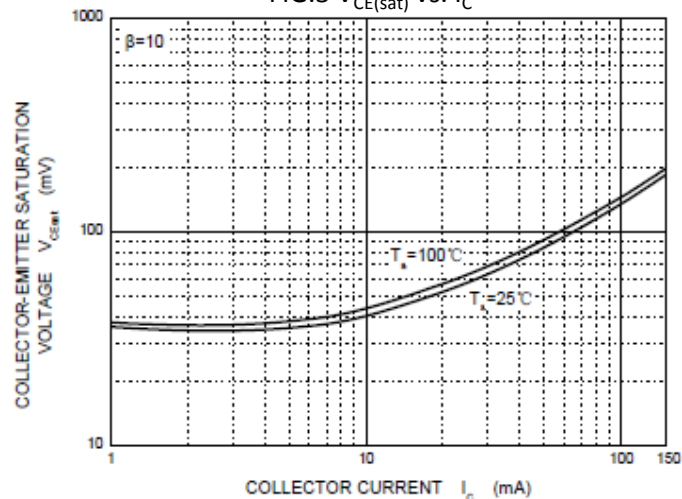


FIG.4  $V_{BE(sat)}$  vs.  $I_C$

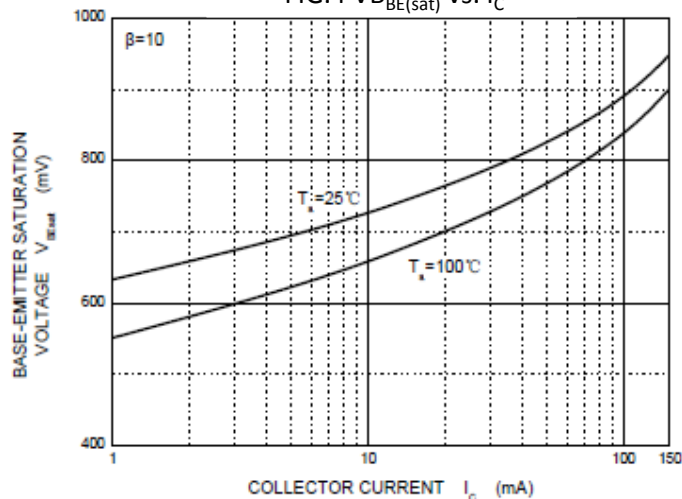


FIG.5  $C_{ob} / C_{ib}$  vs.  $V_{CB} / V_{Eb}$

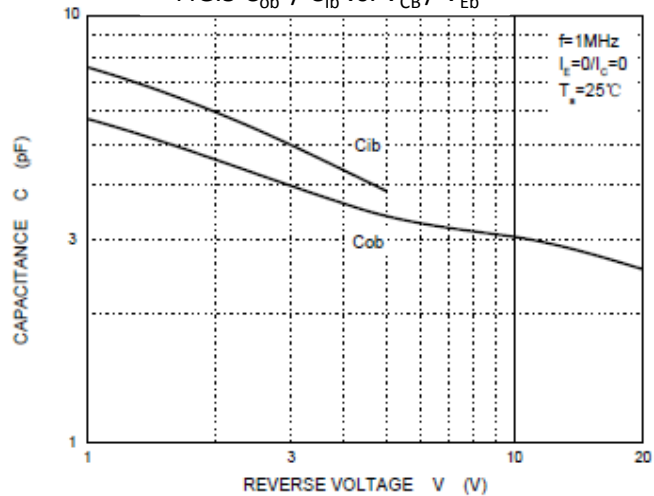
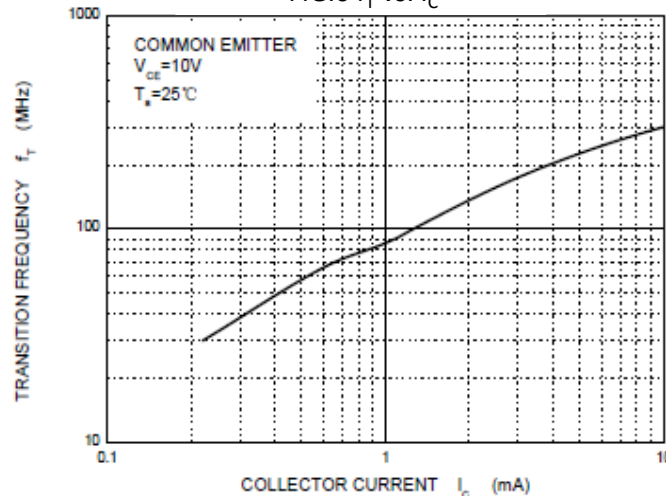


FIG.6  $f_T$  vs.  $I_C$



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| <b>ORDERING INFORMATION</b> |                         |                     |                            |                |                |                                 |
|-----------------------------|-------------------------|---------------------|----------------------------|----------------|----------------|---------------------------------|
| <b>PART NO.</b>             | <b>MANUFACTURE CODE</b> | <b>PACKING CODE</b> | <b>GREEN COMPOUND CODE</b> | <b>PACKAGE</b> | <b>PACKING</b> | <b>MARKING</b>                  |
| KTC3198-xx<br>(Note2)       | (Note1)                 | A1                  | G                          | TO-92          | 4K / Ammo      | KTC<br>3198<br>xx021<br>(Note3) |
|                             |                         | B1                  | G                          | TO-92          | 5K / Bulk      |                                 |
|                             |                         | A2                  | G                          | TO-92          | 2K / Ammo      |                                 |
|                             |                         | B2                  | G                          | TO-92          | 10K / Bulk     |                                 |
| KTC3198-xx<br>(Note2)       | B0                      | A1                  | G                          | TO-92          | 4K / Ammo      | KTC<br>3198<br>xx021<br>(Note3) |
| KTC3198-xx<br>(Note2)       | B0                      | B1                  | G                          | TO-92          | 5K / Bulk      |                                 |
| KTC3198-xx<br>(Note2)       | M0                      | A2                  | G                          | TO-92          | 2K / Ammo      |                                 |
| KTC3198-xx<br>(Note2)       | M0                      | B2                  | G                          | TO-92          | 10K / Bulk     |                                 |

Note1: Indicator of manufacturing site for manufacture special control, if empty means no special control requirement

Note2: "xx" means device code of "O", "Y", "GR", "BL"

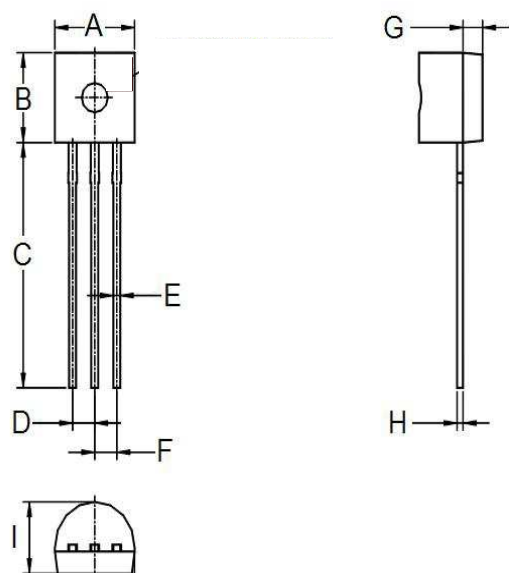
Note3: "MARKING" should follow the "PART NO.", for example, if "PART NO." is KTC3198-O, which

"MARKING" is   KTC  
                      3198  
                      O021

| <b>EXAMPLE</b>       |                 |                         |                     |                            |                    |
|----------------------|-----------------|-------------------------|---------------------|----------------------------|--------------------|
| <b>PREFERRED P/N</b> | <b>PART NO.</b> | <b>MANUFACTURE CODE</b> | <b>PACKING CODE</b> | <b>GREEN COMPOUND CODE</b> | <b>DESCRIPTION</b> |
| KTC3198-O A1G        | KTC3198-O       |                         | A1                  | G                          | Green compound     |
| KTC3198-O-B0 A1G     | KTC3198-O       | B0                      | A1                  | G                          | Green compound     |
| KTC3198-O-B0 B1G     | KTC3198-O       | B0                      | B1                  | G                          | Green compound     |
| KTC3198-O-M0 A2G     | KTC3198-O       | M0                      | A2                  | G                          | Green compound     |
| KTC3198-O-M0 B2G     | KTC3198-O       | M0                      | B2                  | G                          | Green compound     |

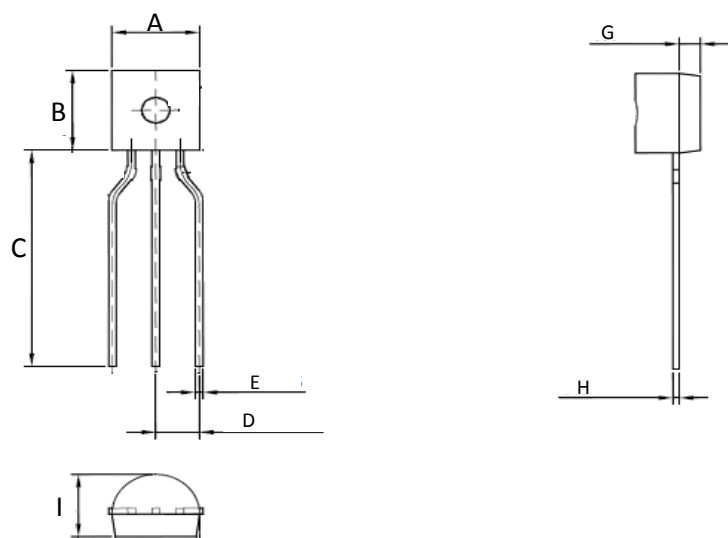
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**PACKAGE OUTLINE DIMENSIONS**  
**TO-92 Bulk**



| DIM. | Unit (mm) |       | Unit (inch) |       |
|------|-----------|-------|-------------|-------|
|      | Min       | Max   | Min         | Max   |
| A    | 4.30      | 4.70  | 0.169       | 0.185 |
| B    | 4.30      | 4.70  | 0.169       | 0.185 |
| C    | 12.50     | 14.50 | 0.492       | 0.571 |
| D    | 1.17      | 1.37  | 0.046       | 0.054 |
| E    | 0.35      | 0.55  | 0.014       | 0.022 |
| F    | 1.17      | 1.37  | 0.046       | 0.054 |
| G    | 0.59      | 1.20  | 0.023       | 0.047 |
| H    | 0.29      | 0.51  | 0.011       | 0.020 |
| I    | 3.30      | 3.70  | 0.130       | 0.146 |

**TO-92 Ammo**



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 4.30      | 4.70 | 0.169       | 0.185 |
| B    | 4.30      | 4.70 | 0.169       | 0.185 |
| C    | 12.50     | -    | 0.492       | -     |
| D    | 2.20      | 2.80 | 0.087       | 0.110 |
| E    | 0.35      | 0.55 | 0.014       | 0.022 |
| G    | 0.59      | 1.20 | 0.023       | 0.047 |
| H    | 0.29      | 0.51 | 0.011       | 0.020 |
| I    | 3.30      | 3.70 | 0.130       | 0.146 |

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