

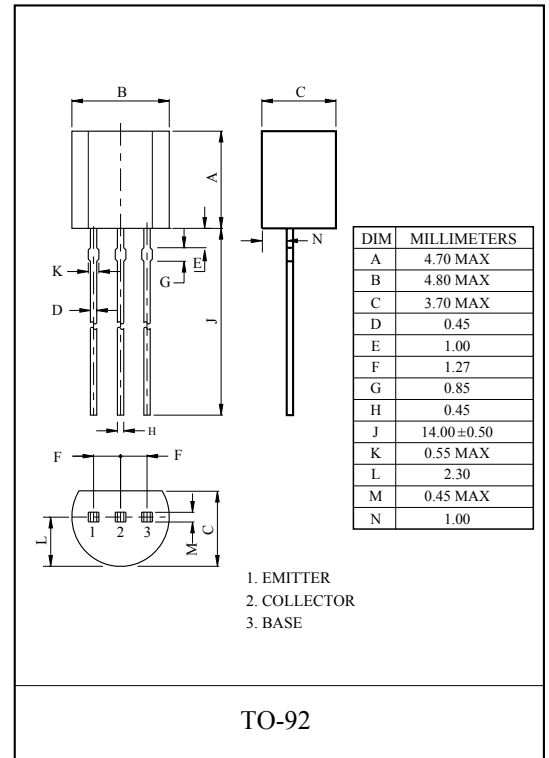
GENERAL PURPOSE APPLICATION.  
SWITCHING APPLICATION.

### FEATURES

- Low Leakage Current  
:  $I_{CEX}=50\text{nA}(\text{Max.}), I_{BL}=50\text{nA}(\text{Max.})$   
@  $V_{CE}=30\text{V}, V_{EB}=3\text{V}$ .
- Excellent DC Current Gain Linearity.
- Low Saturation Voltage  
:  $V_{CE(\text{sat})}=0.3\text{V}(\text{Max.})$  @  $I_C=50\text{mA}, I_B=5\text{mA}$ .
- Low Collector Output Capacitance  
:  $C_{ob}=4\text{pF}(\text{Max.})$  @  $V_{CB}=5\text{V}$ .
- Complementary to 2N3906C.

### MAXIMUM RATING ( $T_a=25^\circ\text{C}$ )

| CHARACTERISTIC                 |                        | SYMBOL           | RATING    | UNIT             |
|--------------------------------|------------------------|------------------|-----------|------------------|
| Collector-Base Voltage         |                        | $V_{CBO}$        | 60        | V                |
| Collector-Emitter Voltage      |                        | $V_{CEO}$        | 40        | V                |
| Emitter-Base Voltage           |                        | $V_{EBO}$        | 6         | V                |
| Collector Current              |                        | $I_C$            | 200       | mA               |
| Base Current                   |                        | $I_B$            | 50        | mA               |
| Collector Power<br>Dissipation | $T_a=25^\circ\text{C}$ | $P_C$            | 625       | mW               |
|                                | $T_c=25^\circ\text{C}$ |                  | 1.5       | W                |
| Junction Temperature           |                        | $T_j$            | 150       | $^\circ\text{C}$ |
| Storage Temperature Range      |                        | $T_{\text{stg}}$ | -55 ~ 150 | $^\circ\text{C}$ |



# 2N3904C

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

| CHARACTERISTIC                         |              | SYMBOL         | TEST CONDITION                   | MIN.  | TYP. | MAX. | UNIT             |
|--|--------------|----------------|----------------------------------|---|------|------|------------------|
| Collector Cut-off Current              |              | $I_{CEX}$      | $V_{CE}=30V, V_{EB}=3V$          | -   | -    | 50   | nA               |
| Base Cut-off Current                   |              | $I_{BL}$       | $V_{CE}=30V, V_{EB}=3V$          | -   | -    | 50   | nA               |
| Collector-Base Breakdown Voltage       |              | $V_{(BR)CBO}$  | $I_C=10\mu A, I_E=0$             | 60  | -    | -    | V                |
| Collector-Emitter Breakdown Voltage *  |              | $V_{(BR)CEO}$  | $I_C=1mA, I_B=0$                 | 40  | -    | -    | V                |
| Emitter-Base Breakdown Voltage         |              | $V_{(BR)EBO}$  | $I_E=10\mu A, I_C=0$             | 6.0   | -    | -    | V                |
| DC Current Gain                        | *            | $h_{FE(1)}$    | $V_{CE}=1V, I_C=0.1mA$           | 40  | -    | -    |                  |
|  |              | $h_{FE(2)}$    | $V_{CE}=1V, I_C=1mA$             | 70  | -    | -    |                  |
|  |              | $h_{FE(3)}$    | $V_{CE}=1V, I_C=10mA$            | 100   | -    | 300  |                  |
|  |              | $h_{FE(4)}$    | $V_{CE}=1V, I_C=50mA$            | 60  | -    | -    |                  |
|  |              | $h_{FE(5)}$    | $V_{CE}=1V, I_C=100mA$           | 30  | -    | -    |                  |
| Collector-Emitter Saturation Voltage * | *            | $V_{CE(sat)1}$ | $I_C=10mA, I_B=1mA$              | -   | -    | 0.2  | V                |
|  |              | $V_{CE(sat)2}$ | $I_C=50mA, I_B=5mA$              | -   | -    | 0.3  |                  |
| Base-Emitter Saturation Voltage *      | *            | $V_{BE(sat)1}$ | $I_C=10mA, I_B=1mA$              | 0.65  | -    | 0.85 | V                |
|  |              | $V_{BE(sat)2}$ | $I_C=50mA, I_B=5mA$              | -   | -    | 0.95 |                  |
| Transition Frequency                   |              | $f_T$          | $V_{CE}=20V, I_C=10mA, f=100MHz$ | 300   | -    | -    | MHz              |
| Collector Output Capacitance           |              | $C_{ob}$       | $V_{CB}=5V, I_E=0, f=1MHz$       | -   | -    | 4.0  | pF               |
| Input Capacitance                      |              | $C_{ib}$       | $V_{BE}=0.5V, I_C=0, f=1MHz$     | -   | -    | 8.0  | pF               |
| Input Impedance                        |              | $h_{ie}$       | $V_{CE}=10V, I_C=1mA, f=1kHz$    | 1.0   | -    | 10   | k $\Omega$       |
| Voltage Feedback Ratio                 |              | $h_{re}$       |                                  | 0.5   | -    | 8.0  | $\times 10^{-4}$ |
| Small-Signal Current Gain              |              | $h_{fe}$       |                                  | 100   | -    | 400  |                  |
| Collector Output Admittance            |              | $h_{oe}$       |                                  | 1.0   | -    | 40   | $\mu\bar{S}$     |
| Noise Figure                           |              | NF             |                                  | $V_{CE}=5V, I_C=0.1mA, R_g=1k\Omega, f=10Hz \sim 15.7kHz$ | -    | -    | 5.0              |
| Switching Time                         | Delay Time   | $t_d$          |                                  | -   | -    | 35   | nS               |
|  | Rise Time    | $t_r$          |                                  | -   | -    | 35   |                  |
|  | Storage Time | $t_{stg}$      |                                  | -   | -    | 200  |                  |
|  | Fall Time    | $t_f$          |                                  | -   | -    | 50   |                  |

\* Pulse Test : Pulse Width  $\leq 300\mu S$ , Duty Cycle  $\leq 2\%$ .