

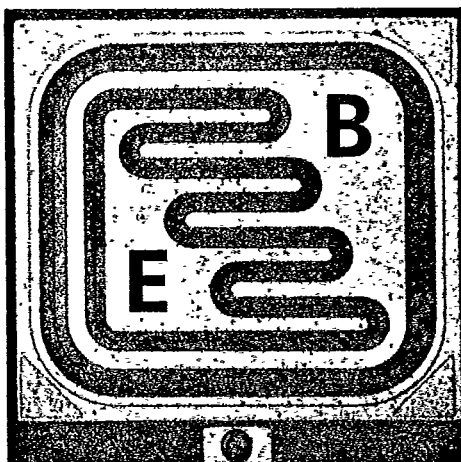
Product Specifications  
Small Signal Transistors

GB PNP

**Raytheon**

# Medium Current General Purpose Amplifiers and Switches

GB PNP

**Description**

General purpose medium power amplifier and switch, useful up to 500mA. The NPN complement is the CB.

**Dimensions**

Die Size: 21 x 21 mils

Bonding Pad Size:

Base — 4 mil diameter

Emitter — 4 mil diameter

**Popular Types**

2N2907A/JAN

2N2906A/JAN

2N2905A/JAN

2N2904A/JAN

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65-1006B 4/85

## GB PNP

## Medium Current General Purpose Amplifier &amp; Switch

## Electrical Characteristics (+25°C ambient temperature unless otherwise stated)

| Parameter     | Conditions   | 2N2904A/JAN<br>2N2906A/JAN |       |      | 2N2905A/JAN<br>2N2907A/JAN |       |      | Units         |
|---------------|--|----------------------------|-------|------|----------------------------|-------|------|---------------|
|               |  | Min                        | Typ   | Max  | Min                        | Typ   | Max  |               |
| $BV_{CEO}$    | $I_C = 10\text{mA}, I_B = 0$   | -60                        | -88   |      | -60                        | -82   |      | V             |
| $BV_{CBO}$    | $I_C = 10\mu\text{A}, I_E = 0$   | -60                        | -110  |      | -60                        | -105  |      | V             |
| $BV_{EBO}$    | $I_E = -10\mu\text{A}, I_C = 0$  | -5                         | -7.8  |      | -5                         | -7.8  |      | V             |
| $I_{CBO}$     | $I_E = 0, V_{CB} = -50\text{V}$  |                            | 0.01  | 50   |                            | 0.01  | 50   | nA            |
| $I_{CBO}$     | $I_E = 0, V_{CB} = -50\text{V}, T_A = 150^\circ\text{C}$               |                            | 0.03  | 10   |                            | 0.03  | 10   | $\mu\text{A}$ |
| $I_{EBO}$     | $I_C = 0, V_{EB} = -3.5\text{V}$                                       |                            | 0.01  | 50   |                            | 0.01  | 50   | nA            |
| $H_{FE}$      | $I_C = 100\mu\text{A}, V_{CE} = -10\text{V}$                           | 40                         | 80    |      | 75                         | 190   |      |               |
| $H_{FE}$      | $I_C = 1\text{mA}, V_{CE} = -10\text{V}$                               | 40                         | 90    | 75   | 100                        | 210   | 450  |               |
| $H_{FE}$      | $I_C = 1\text{mA}, V_{CE} = -10\text{V}, T_A = -55^\circ\text{C}$      | 20                         | 40    |      | 50                         | 100   |      |               |
| $H_{FE}$      | $I_C = 10\text{mA}, V_{CE} = -10\text{V}$                              | 40                         | 95    |      | 100                        | 220   |      |               |
| $H_{FE}$      | $I_C = 150\text{mA}, V_{CE} = -10\text{V}$                             | 40                         | 85    | 120  | 100                        | 195   | 300  |               |
| $H_{FE}$      | $I_C = 500\text{mA}, V_{CE} = -10\text{V}$                             | 40                         | 65    |      | 50                         | 100   |      |               |
| $h_{fe(ac)}$  | $I_C = 1\text{mA}, V_{CE} = -10\text{V}, \text{Freq} = 1\text{kHz}$    | 40                         | 100   |      | 100                        | 230   |      |               |
| $h_{fe}$      | $I_C = 50\text{mA}, V_{CE} = -20\text{V}, \text{Freq} = 100\text{MHz}$ | 2                          | 3.2   |      | 2                          | 3.4   |      |               |
| $V_{CE(SAT)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$                                |                            | -0.25 | -0.4 |                            | -0.2  | -0.4 | V             |
| $V_{CE(SAT)}$ | $I_C = 500\text{mA}, I_B = 50\text{mA}$                                |                            | -0.6  | -1.6 |                            | -0.54 | -1.6 | V             |
| $V_{BE(SAT)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$                                |                            | -0.88 | -1.3 |                            | -0.88 | -1.3 | V             |
| $V_{BE(SAT)}$ | $I_C = 500\text{mA}, I_B = 50\text{mA}$                                |                            | -1.0  | -2.6 |                            | -1.0  | -2.6 | V             |
| $C_{ob}$      | $V_{CB} = -10\text{V}, I_E = 0$  |                            | 6     | 8    |                            | 6     | 8    | pF            |
| $C_{ib}$      | $V_{EB} = -2\text{V}, I_C = 0$   |                            | 17    | 30   |                            | 17    | 30   | pF            |
| $t_{on}$      | $I_C = 150\text{mA}, I_{B1} = 15\text{mA}$ (see Fig. 1)                |                            | 18    | 45   |                            | 18    | 45   | nS            |
| $t_{off}$     | $I_C = 150\text{mA}, I_{B1} = I_{B2} = 15\text{mA}$ (see Fig. 2)       |                            | 135   | 300  |                            | 135   | 300  | nS            |

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T-37-17

Low Level, General Purpose Amplifiers & Switches

GB PNP

**GB Single Transistors**

| Product Type  | Pkg.  | Electrical Parameters @ +25°C Ambient Temperature |                                    |                                    |  |   |      |        | f <sub>t</sub><br>MHz<br>Min | C <sub>ob</sub><br>pF<br>Max | t <sub>ON</sub><br>nS<br>Max | t <sub>OFF</sub><br>nS<br>Max |
|---------------|-------|---|------------------------------------|------------------------------------|--|---|------|--------|------------------------------|------------------------------|------------------------------|-------------------------------|
|               |       | BV <sub>CB0</sub><br>Min<br>@ 10μA                | BV <sub>CEO</sub><br>Min<br>@ 10mA | BV <sub>EB0</sub><br>Min<br>@ 10μA | H <sub>FE</sub> @ I <sub>C</sub> /V <sub>CE</sub><br>Min/<br>Max | V <sub>CE(SAT)</sub> @ I <sub>C</sub> /I <sub>B</sub><br>Volts<br>Max |      |        |                              |                              |                              |                               |
|               |       |   |                                    |                                    | mA/V   | mA/mA   |      |        |                              |                              |                              |                               |
| 2N721         | TO-18 | 50  | 35                                 | 5                                  | 20/45  | 150/10  | 1.5  | 150/15 | 50                           | 45                           |                              |                               |
| 2N722         | TO-18 | 50  | 35                                 | 5                                  | 30/90  | 150/10  | 1.5  | 150/15 | 60                           | 45                           |                              |                               |
| 2N722A        | TO-18 | 50  | 35                                 | 5                                  | 30/90  | 150/10  | 0.5  | 150/15 | 60                           | 40                           |                              |                               |
| 2N1131        | TO-5  | 50  | 35                                 | 5                                  | 20/45  | 150/10  | 1.5  | 150/15 | 50                           | 45                           |                              |                               |
| 2N1131J       | TO-5  | 50  | 40                                 | 5                                  | 20/45  | 150/10  | 1.5  | 150/15 | 50                           | 45                           |                              |                               |
| 2N1131A       | TO-5  | 60  | 40                                 | 5                                  | 20/45  | 150/10  | 1.5  | 150/15 | 50                           | 30                           | 45                           | 35                            |
| 2N1132        | TO-5  | 50  | 35                                 | 5                                  | 30/90  | 150/10  | 1.5  | 150/15 | 60                           | 45                           |                              |                               |
| 2N1132J       | TO-5  | 50  | 40                                 | 5                                  | 30/90  | 150/10  | 1.5  | 150/15 | 60                           | 45                           |                              |                               |
| 2N1132A       | TO-5  | 60  | 40                                 | 5                                  | 20/45  | 150/10  | 1.5  | 150/15 | 50                           | 30                           | 45                           | 35                            |
| 2N2904        | TO-5  | 60  | 40                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2904J,TX,V  | TO-5  | 60  | 40                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2904A       | TO-5  | 60  | 60                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2904AJ,TX,V | TO-5  | 60  | 60                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2905        | TO-5  | 60  | 40                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2905J,TX,V  | TO-5  | 60  | 40                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2905A       | TO-5  | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2905AJ,TX,V | TO-5  | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2906        | TO-18 | 60  | 40                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2906J,TX,V  | TO-18 | 60  | 40                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2906A       | TO-18 | 60  | 60                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2906AJ,TX,V | TO-18 | 60  | 60                                 | 5                                  | 40/120   | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2907        | TO-18 | 60  | 40                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2907J,TX,V  | TO-18 | 60  | 40                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2907A       | TO-18 | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N2907AJ,TX,V | TO-18 | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 45                           | 300                           |
| 2N3133        | TO-5  | 50  | 35                                 | 4                                  | 40/120   | 150/10  | 0.6  | 150/15 | 200                          | 10                           | 75                           | 150                           |
| 2N3134        | TO-5  | 50  | 35                                 | 4                                  | 100/300  | 150/10  | 0.6  | 150/15 | 200                          | 10                           | 75                           | 150                           |
| 2N3135        | TO-18 | 50  | 35                                 | 4                                  | 40/120   | 150/10  | 0.6  | 150/15 | 200                          | 10                           | 75                           | 150                           |
| 2N3136        | TO-18 | 50  | 35                                 | 4                                  | 100/300  | 150/10  | 0.6  | 150/15 | 200                          | 10                           | 75                           | 150                           |
| 2N3494        | TO-5  | 80  | 80                                 | 4.5                                | 40/—   | 50/10   | 0.3  | 10/1   | 200                          | 7                            | 300                          | 1000                          |
| 2N3502        | TO-5  | 45  | 45                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 40                           | 100                           |
| 2N3503        | TO-5  | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 40                           | 100                           |
| 2N3504        | TO-18 | 45  | 45                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 40                           | 100                           |
| 2N3505        | TO-18 | 60  | 60                                 | 5                                  | 100/300  | 150/10  | 0.4  | 150/15 | 200                          | 8                            | 40                           | 100                           |
| 2N4036        | TO-5  | 90  | 65                                 | 7                                  | 40/140   | 150/10  | 0.65 | 150/15 | 60                           | 30                           | 110                          | 700                           |
| 2N4037        | TO-5  | 60  | 4                                  | 7                                  | 50/250   | 150/10  | 1.4  | 150/15 | 60                           | 30                           |                              |                               |

T-37-17

GB PNP

Medium Current General Purpose Amplifier & Switch

GB Dual Transistors

| Product Type | Pkg.  | Electrical Parameters @+25°C Ambient Temperature |                                       |                                       |   |        |                      |                       |   |   |   |   | f <sub>t</sub><br>MHz | C <sub>ob</sub><br>pF | NF<br>dB |
|--------------|-------|--|---------------------------------------|---------------------------------------|---|--------|----------------------|-----------------------|---|---|---|---|-----------------------|-----------------------|----------|
|              |       | BV <sub>CEO</sub><br>Min<br>@<br>10μA            | BV <sub>CEO</sub><br>Min<br>@<br>10mA | BV <sub>EBO</sub><br>Min<br>@<br>10μA | H <sub>FE</sub> @ I <sub>C</sub> /V <sub>CE</sub> |        | Matching             |                       | V <sub>CE(SAT)</sub> @ I <sub>C</sub> /I <sub>B</sub> |   | V <sub>BE(SAT)</sub> @ I <sub>C</sub> /I <sub>B</sub> |   |                       |                       |          |
|              |       |  |                                       |                                       | Min/<br>Max                                       | mA/V   | H <sub>FE</sub><br>% | V <sub>BE</sub><br>mV | Volts<br>Max  | I <sub>C</sub> /I <sub>B</sub><br>mA/mA | Volts<br>Max  | I <sub>C</sub> /I <sub>B</sub><br>mA/mA |                       |                       |          |
| 2N2802       | T0-78 | 25   | 20                                    | 5                                     | 20/200  | 1/5    | 10                   | 5                     | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N2803       | T0-78 | 25   | 20                                    | 5                                     | 20/200  | 1/5    | 20                   | 10                    | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N2804       | T0-78 | 25   | 20                                    | 5                                     | 20/200  | 1/5    |                      |                       | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N2805       | T0-78 | 25   | 20                                    | 5                                     | 40/200  | 1/5    | 10                   | 5                     | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N2806       | T0-78 | 25   | 20                                    | 5                                     | 40/200  | 1/5    | 20                   | 10                    | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N2807       | T0-78 | 25   | 20                                    | 5                                     | 40/200  | 1/5    |                      |                       | 0.5   | 10/1                                    | 0.9   | 10/1                                    | 60                    | 8                     | 4        |
| 2N3726       | T0-78 | 50   | 50                                    | 5                                     | 135/420   | 1/10   | 10                   | 5                     | 0.25  | 50/2.5                                  | 1.0   | 50/2.5                                  | 60                    | 8                     | 4        |
| 2N3727       | T0-78 | 50   | 50                                    | 5                                     | 135/420   | 1/10   | 10                   | 2.5                   | 0.25  | 50/2.5                                  | 1.0   | 50/2.5                                  | 60                    | 8                     | 4        |
| 2N5795       | T0-78 | 60   | 60                                    | 5                                     | 40/120  | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| 2N5796       | T0-78 | 60   | 60                                    | 5                                     | 100/200   | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2904F      | T0-89 | 60   | 40                                    | 5                                     | 40/120  | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2904AF     | T0-89 | 60   | 60                                    | 5                                     | 40/120  | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2905F      | T0-89 | 60   | 40                                    | 5                                     | 100/300   | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2905AF     | T0-89 | 60   | 60                                    | 5                                     | 100/300   | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2906F      | T0-89 | 60   | 40                                    | 5                                     | 40/120  | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2906AF     | T0-89 | 60   | 60                                    | 5                                     | 40/120  | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2907F      | T0-89 | 60   | 40                                    | 5                                     | 100/300   | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP2907AF     | T0-89 | 60   | 60                                    | 5                                     | 100/300   | 150/10 |                      |                       | 0.4   | 150/15                                  | 1.3   | 150/15                                  | 200                   | 8                     |          |
| SP3133F      | T0-89 | 50   | 35                                    | 4                                     | 40/120  | 150/10 |                      |                       | 0.6   | 150/15                                  | 1.5   | 150/15                                  | 200                   | 10                    |          |
| SP3134F      | T0-89 | 50   | 35                                    | 4                                     | 100/300   | 150/10 |                      |                       | 0.6   | 150/15                                  | 1.5   | 150/15                                  | 200                   | 10                    |          |
| SP3135F      | T0-89 | 50   | 35                                    | 4                                     | 40/120  | 150/10 |                      |                       | 0.6   | 150/15                                  | 1.5   | 150/15                                  | 200                   | 8                     |          |
| SP3136F      | T0-89 | 50   | 35                                    | 4                                     | 100/300   | 150/10 |                      |                       | 0.6   | 150/15                                  | 1.5   | 150/15                                  | 200                   | 8                     |          |

Medium Current General Purpose Amplifier &amp; Switch GB PNP

T-37-17

## GB Quad Transistors

| Product Type | Pkg.   | Electrical Parameters @ +25°C Ambient Temperature |                          |                          |   |        |   |        | f <sub>t</sub><br>MHz<br>Min | C <sub>ob</sub><br>pF<br>Max |
|--------------|--------|---|--------------------------|--------------------------|---|--------|---|--------|------------------------------|------------------------------|
|              |        | BV <sub>CEO</sub><br>Min                          | BV <sub>CEO</sub><br>Min | BV <sub>EBO</sub><br>Min | H <sub>FE</sub> @ I <sub>C</sub> /V <sub>CE</sub> |        | V <sub>CE(SAT)</sub> @ I <sub>C</sub> /I <sub>B</sub> |        |                              |                              |
|              |        | @ 10μA  | @ 10mA                   | @ 10μA                   | Min/<br>Max                                       | mA/V   | Volts<br>Max  | mA/mA  |                              |                              |
| SP2904QD     | TO-116 | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2904QDB    | TO-116 | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2904QF     | TO-86  | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2904AQD    | TO-116 | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2904AQDB   | TO-116 | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2904AQF    | TO-86  | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905QD     | TO-116 | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905QDB    | TO-116 | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905QF     | TO-86  | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905AQD    | TO-116 | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905AQDB   | TO-116 | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2905AQF    | TO-86  | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906QD     | TO-116 | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906QDB    | TO-116 | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906QF     | TO-86  | 60  | 40                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906AQD    | TO-116 | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906AQDB   | TO-116 | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2906AQF    | TO-86  | 60  | 60                       | 5                        | 40/120  | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907QD     | TO-116 | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907QDB    | TO-116 | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907QF     | TO-86  | 60  | 40                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907AQD    | TO-116 | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907AQDB   | TO-116 | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |
| SP2907AQF    | TO-86  | 60  | 60                       | 5                        | 100/300   | 150/10 | 0.4   | 150/15 | 200                          | 8                            |

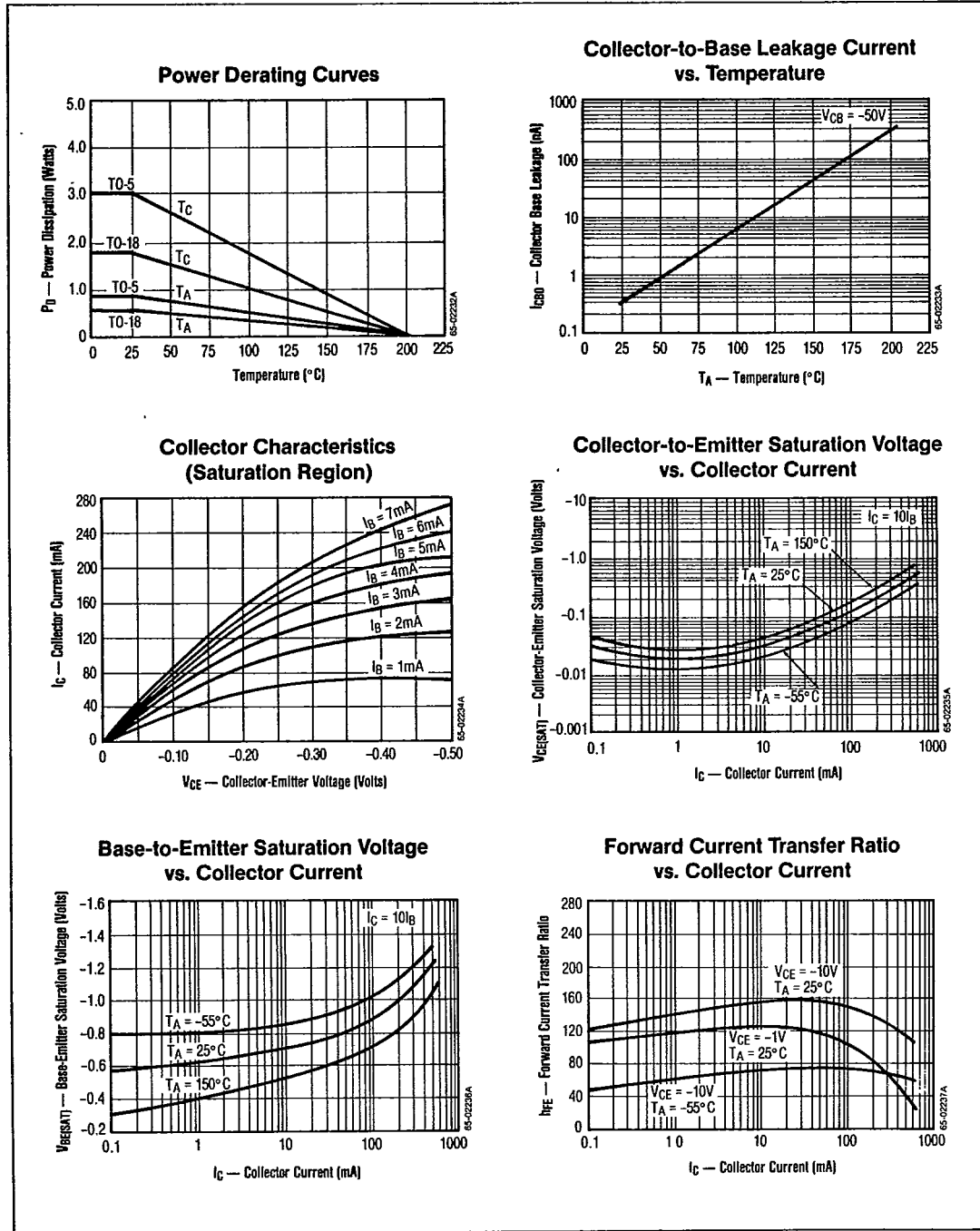
QD = Quad DIP (Ceramic); QDB = Quad DIP (Plastic); QF = Quad Flatpack

T-37-17

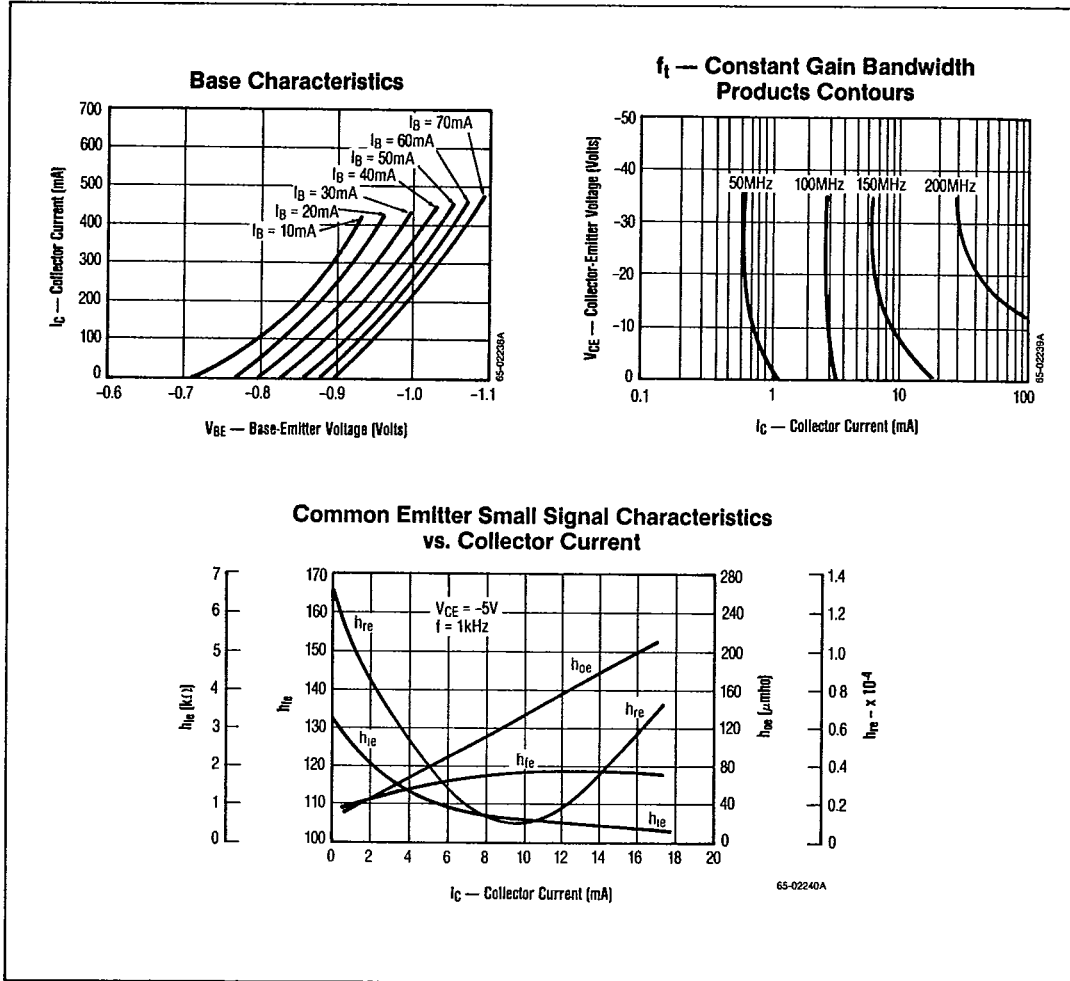
GB PNP

Medium Current General Purpose Amplifier & Switch

Typical Performance Characteristics



Typical Performance Characteristics (Continued)

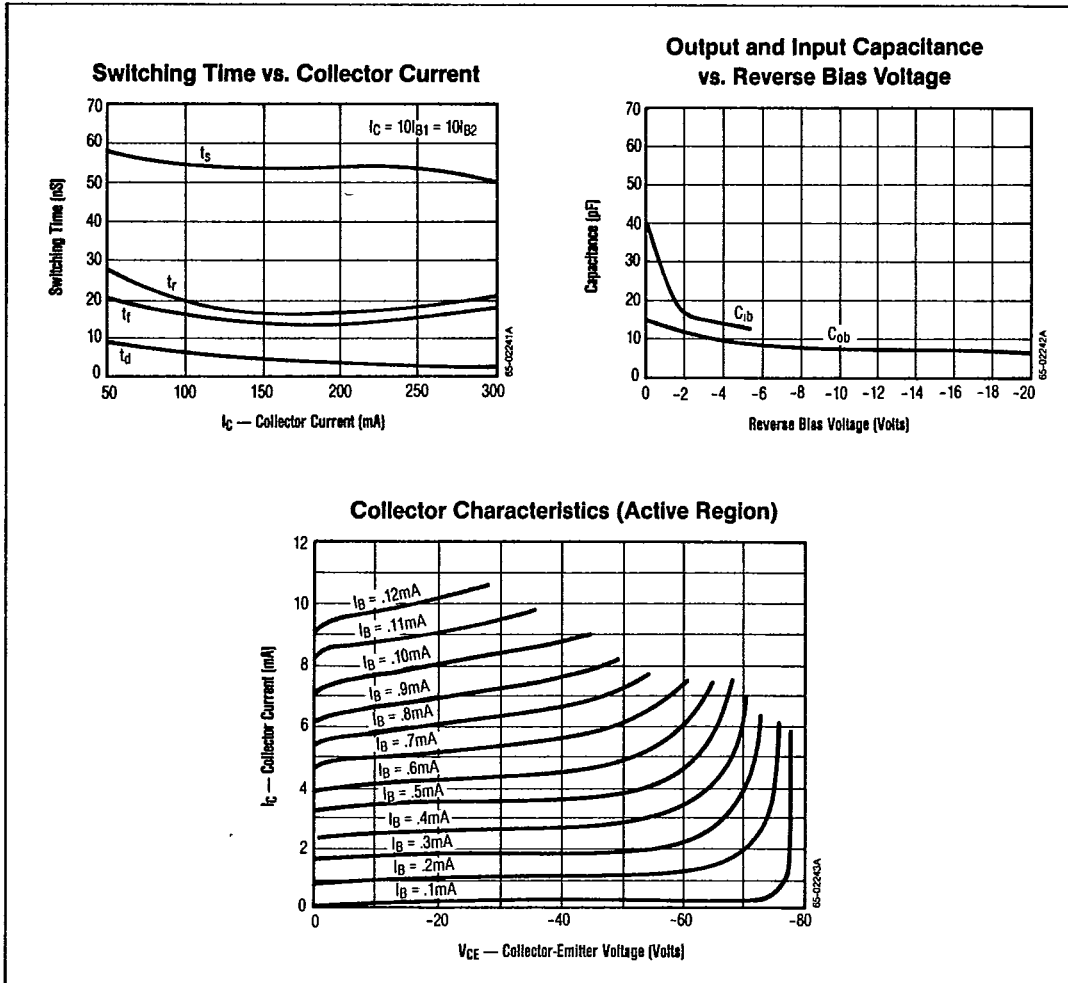


T-37-17

GB PNP

Medium Current General Purpose Amplifier & Switch

Typical Performance Characteristics (Continued)





Switching Measurement Circuits

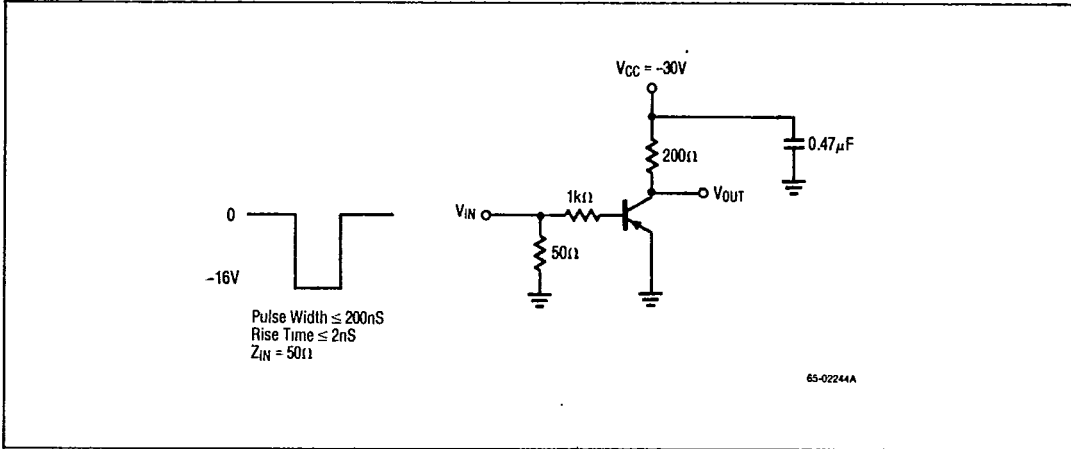


Figure 1.  $t_{ON}$  Switching

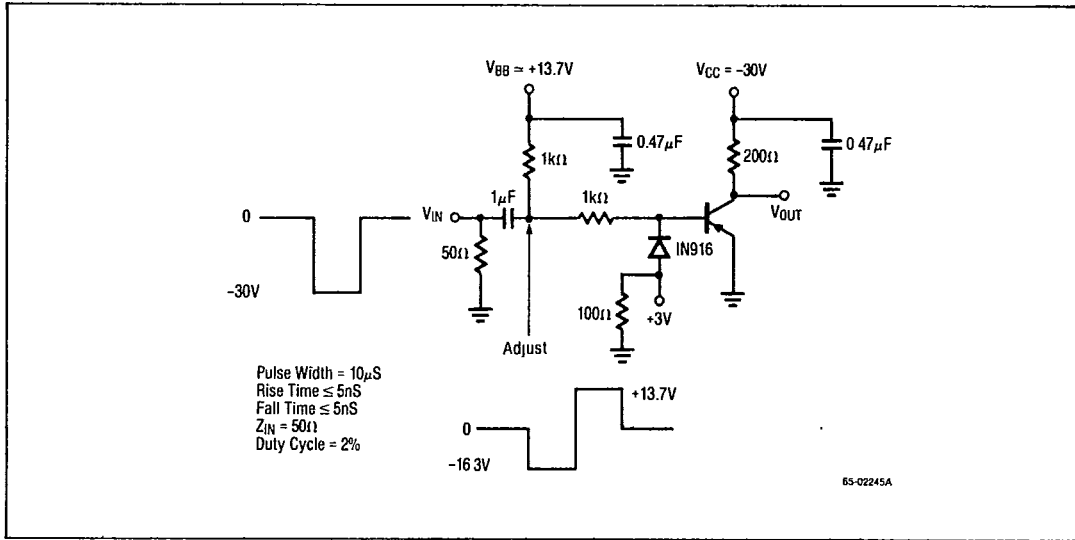


Figure 2.  $t_{OFF}$  Switching

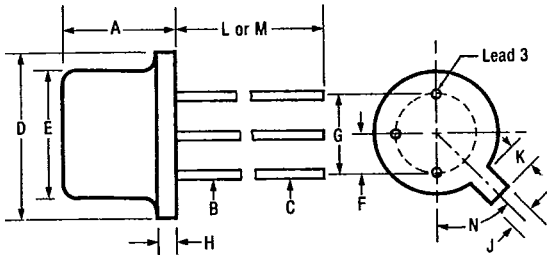
T-37-17

GB PNP

Medium Current General Purpose Amplifier & Switch

Packaging Information

In Accordance With JEDEC (TO-5) Outline  
(15 mil Kovar Header)

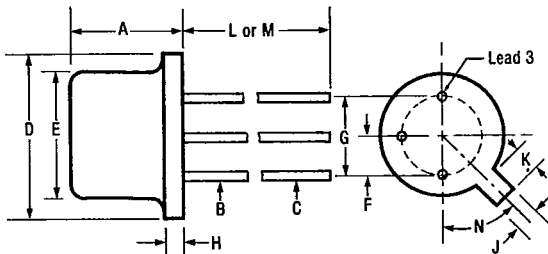


Notes: Lead No. 3 internally connected to case.  
Can material is nickel.

| Dimension | Inches  |      | Millimeters |      |
|-----------|---------|------|-------------|------|
|           | Min.    | Max. | Min.        | Max. |
| A         | .240    | .260 | 6.09        | 6.60 |
| B         | .016    | .019 | .41         | .48  |
| C         | .016    | .021 | .41         | .53  |
| D         | .335    | .370 | 8.51        | 9.40 |
| E         | .305    | .335 | 7.75        | 8.51 |
| F         | .100BSC |      | 2.54BSC     |      |
| G         | .200BSC |      | 5.08BSC     |      |
| H         | .009    | .125 | .22         | 3.17 |
| J         | .028    | .034 | .71         | .86  |
| K         | .029    | .045 | .73         | 1.14 |
| L         | .500    |      | 12.70       |      |
| M         | 1.500   |      | 38.10       |      |
| N         | 45°BSC  |      | 45°BSC      |      |

65-01178B

In Accordance With JEDEC (TO-5) Outline  
(60 mil Kovar or Steel Header)

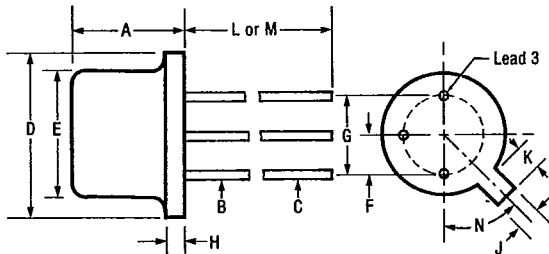


Notes: Lead No. 3 internally connected to case.  
Can material is nickel.

| Dimension | Inches  |      | Millimeters |      |
|-----------|---------|------|-------------|------|
|           | Min.    | Max. | Min.        | Max. |
| A         | .240    | .260 | 6.09        | 6.60 |
| B         | .016    | .019 | .41         | .48  |
| C         | .016    | .021 | .41         | .53  |
| D         | .335    | .370 | 8.51        | 9.40 |
| E         | .305    | .335 | 7.75        | 8.51 |
| F         | .100BSC |      | 2.54BSC     |      |
| G         | .200BSC |      | 5.08BSC     |      |
| H         | .009    | .125 | .22         | 3.17 |
| J         | .028    | .034 | .71         | .86  |
| K         | .029    | .045 | .73         | 1.14 |
| L         | .500    |      | 12.70       |      |
| M         | 1.500   |      | 38.10       |      |
| N         | 45°BSC  |      | 45°BSC      |      |

65-01180B

In Accordance With JEDEC (TO-18) Outline  
(8 mil Kovar Header)



Notes: Lead No. 3 internally connected to case.  
Can material is nickel.

| Dimension | Inches  |      | Millimeters |      |
|-----------|---------|------|-------------|------|
|           | Min.    | Max. | Min.        | Max. |
| A         | .170    | .210 | 4.31        | 5.33 |
| B         | .016    | .019 | .41         | .48  |
| C         | .016    | .021 | .41         | .53  |
| D         | .209    | .230 | 5.30        | 5.84 |
| E         | .178    | .195 | 4.52        | 4.95 |
| F         | .050BSC |      | 1.27BSC     |      |
| G         | .100BSC |      | 2.54BSC     |      |
| H         | .030    |      | .76         |      |
| J         | .036    | .046 | .91         | 1.16 |
| K         | .028    | .048 | .71         | 1.21 |
| L         | .500    |      | 12.70       |      |
| M         | 1.500   |      | 38.10       |      |
| N         | 45°BSC  |      | 45°BSC      |      |

65-01181B

Medium Current General Purpose Amplifier & Switch GB PNP

Packaging Information (Continued)

**In Accordance With JEDEC (TO-78) Outline  
(15 mil Kovar Header)  
Adjacent Two Island Package**

Reference Plane  
Base and Seating Plane

Lead No. 1 internally connected to one island.  
Lead No. 7 internally connected to other island.

Note: Can material is nickel.

| Dimension | Inches   |       | Millimeters |       |
|-----------|----------|-------|-------------|-------|
|           | Min.     | Max.  | Min.        | Max.  |
| A         | 0.165    | 0.185 | 4.19        | 4.70  |
| B         | 0.016    | 0.019 | 0.41        | 0.48  |
| C         | 0.016    | 0.021 | 0.41        | 0.53  |
| D         | 0.335    | 0.370 | 8.51        | 9.40  |
| E         | 0.305    | 0.335 | 7.75        | 8.51  |
| F         | 0.120    | 0.160 | 3.05        | 4.06  |
| G         | 0.200BSC |       | 5.08BSC     |       |
| H         | 0.100BSC |       | 2.54BSC     |       |
| J         | 0.009    | 0.041 | 0.23        | 1.04  |
| K         | 0.028    | 0.034 | 0.71        | 0.86  |
| L         | 0.029    | 0.045 | 0.74        | 1.14  |
| M         | 0.500    | 0.750 | 12.70       | 19.05 |
| N         |          | 0.050 |             | 1.27  |
| P         | 0.250    |       | 6.35        |       |
| R         | 0.010    | 0.045 | 0.25        | 1.14  |
| S         | 45°BSC   |       | 45°BSC      |       |

65-01188B

**In Accordance With JEDEC (TO-86) Outline  
14-Lead Flatpack**

| Dimension | Inches   |       | Millimeters |      |
|-----------|----------|-------|-------------|------|
|           | Min.     | Max.  | Min.        | Max. |
| A         | 0.030    | 0.070 | 0.76        | 1.77 |
| B         | 0.010    | 0.019 | 0.25        | 0.48 |
| C         | 0.003    | 0.006 | 0.08        | 0.15 |
| D         | 0.240    | 0.275 | 6.10        | 6.99 |
| E         | 0.240    | 0.260 | 6.10        | 6.60 |
| F         |          | 0.290 |             | 7.37 |
| G         | 0.050BSC |       | 1.27BSC     |      |
| H         | 0.008    | 0.015 | 0.20        | 0.38 |
| J         | 0.070    |       | 1.78        |      |
| K         | 0.005    | 0.035 | 0.13        | 0.89 |
| L         | 0.005    |       | 0.13        |      |
| M         | 0.004    |       | 0.10        |      |

65-01191B

**In Accordance With JEDEC (TO-89) Outline  
6-Lead Flatpack**

| Dimension | Inches   |       | Millimeters |       |
|-----------|----------|-------|-------------|-------|
|           | Min.     | Max.  | Min.        | Max.  |
| A         | 0.240    | 0.290 | 6.10        | 7.36  |
| B         | 0.115    | 0.160 | 2.92        | 3.81  |
| C         | 0.030    | 0.080 | 0.76        | 2.03  |
| D         | 0.003    | 0.006 | 0.08        | 0.15  |
| E         | 0.005    | 0.035 | 0.13        | 0.89  |
| F         | 0.010    | 0.019 | 0.25        | 0.48  |
| G         | 0.100BSC |       | 2.54BSC     |       |
| H         | 0.050BSC |       | 1.27BSC     |       |
| J         | 0.070    | 0.250 | 1.78        | 6.35  |
| K         | 0.260    | 0.650 | 6.60        | 16.51 |

65-01184B

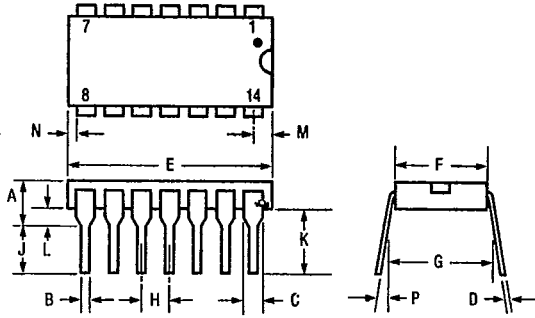
T-37-17

GB PNP

Medium Current General Purpose Amplifier & Switch

Packaging Information (Continued)

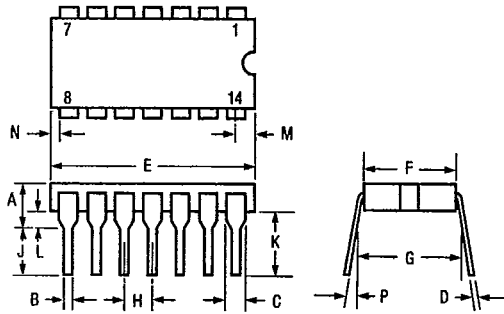
TO-116 Outline  
14-Lead Plastic Dual In-Line Package



| Dimension | Inches   |       | Millimeters |       |
|-----------|----------|-------|-------------|-------|
|           | Min.     | Max.  | Min.        | Max.  |
| A         |          | 0.200 |             | 5.08  |
| B         | 0.015    | 0.023 | 0.381       | 0.584 |
| C         | 0.030    | 0.070 | 0.77        | 1.77  |
| D         | 0.008    | 0.015 | 0.204       | 0.381 |
| E         | 0.660    | 0.785 | 16.76       | 19.94 |
| F         | 0.220    | 0.280 | 5.59        | 7.11  |
| G         | 0.290    | 0.310 | 7.37        | 7.87  |
| H         | 0.100BSC |       | 2.54BSC     |       |
| J         | 0.100    |       | 2.54        |       |
| K         | 0.120    |       | 3.05        |       |
| L         | 0.020    |       | 0.51        |       |
| M         | 0.020    | 0.102 | 0.51        | 2.59  |
| N         | 0.002    | 0.087 | 0.051       | 2.21  |
| P         | 0°       | 15°   | 0°          | 15°   |

65-01196B

Similar to JEDEC (TO-116) Outline  
14-Lead Ceramic Dual In-Line Package



| Dimension | Inches  |      | Millimeters |       |
|-----------|---------|------|-------------|-------|
|           | Min.    | Max. | Min.        | Max.  |
| A         |         | .200 |             | 5.08  |
| B         | .014    | .023 | 0.36        | 0.58  |
| C         | .030    | .070 | 0.76        | 1.78  |
| D         | .008    | .015 | 0.20        | 0.38  |
| E         |         | .785 |             | 19.94 |
| F         | .220    | .310 | 5.59        | 7.87  |
| G         | .290    | .320 | 7.37        | 8.13  |
| H         | .100BSC |      | 2.54BSC     |       |
| J         | .125    | .200 | 3.18        | 5.08  |
| K         | .150    |      | 3.81        |       |
| L         | .015    | .060 | 0.38        | 1.52  |
| M         |         | .098 |             | 2.49  |
| N         | .005    |      | 0.13        |       |
| P         | 0°      | 15°  | 0°          | 15°   |

65-01206B

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