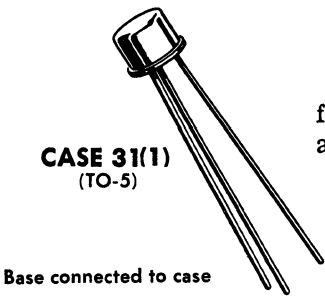


2N1413 thru 2N1415 (GERMANIUM)  
2N1175



PNP germanium transistors for general-purpose low-frequency amplifier and switching applications. Characteristic curves similar to 2N524-2N527 series.

MAXIMUM RATINGS

| Rating                            | Symbol            | Value       | Unit |
|-----------------------------------|-------------------|-------------|------|
| Collector-Base Voltage            | $V_{CB}$          | 35          | Vdc  |
| Collector-Emitter Voltage         | $V_{CEO}$         | 25          | Vdc  |
| Emitter-Base Voltage              | $V_{EB}$          | 10          | Vdc  |
| Collector Current                 | $I_C$             | 500         | mAdc |
| Junction and Storage Temperature  | $T_j$ & $T_{stg}$ | -65 to +100 | °C   |
| Power Dissipation at 25°C Ambient | $P_D$             | 225         | mW   |

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

| Characteristics                                                              | Symbol     | Min | Max | Unit            |
|------------------------------------------------------------------------------|------------|-----|-----|-----------------|
| Collector Cutoff Current<br>$V_{CB} = 30 \text{ Vdc}, I_E = 0$               | $I_{CBO}$  | —   | 12  | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>$V_{EB} = 10 \text{ Vdc}, I_C = 0$                 | $I_{EBO}$  | —   | 10  | $\mu\text{Adc}$ |
| Collector-Emitter Voltage<br>$I_C = 0.6 \text{ mAdc}, R_{BE} = 10 \text{ K}$ | $BV_{CER}$ | 25  | —   | Vdc             |
| Punch-Thru Voltage                                                           | $V_{pt}$   | 25  | —   | Vdc             |
| DC Current Gain<br>$I_C = 20 \text{ mAdc}, V_{CE} = 1 \text{ Vdc}$           | $h_{FE}$   |     |     |                 |
|                                                                              |            | 25  | 42  | —               |
|                                                                              |            | 34  | 65  |                 |
|                                                                              |            | 53  | 90  |                 |
|                                                                              |            | 70  | 140 |                 |

**2N1413 thru 2N1415, 2N1175 (continued)**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Characteristics                                                                                                                                                              | Symbol         | Min                          | Max                      | Unit             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------|--------------------------|------------------|
| DC Current Gain<br>$I_C = 100 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175                                                               | $h_{FE}$       | 23<br>30<br>47<br>62         | —<br>—<br>—<br>—         | —                |
| Base Input Voltage<br>$V_{CE} = 1 \text{ Vdc}$ , $I_C = 20 \text{ mAdc}$<br>2N1175                                                                                           | $V_{BE}$       | —                            | 260                      | mVdc             |
| Output Capacitance; Input AC Open Circuit<br>$V_{CB} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$ , $f = 1 \text{ MHz}$                                                         | $C_{ob}$       | —                            | 40                       | pF               |
| Frequency Cutoff<br>$V_{CE} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175                                                                | $f_{\alpha b}$ | 0.8<br>1.0<br>1.3<br>1.5     | —<br>—<br>—<br>—         | MHz              |
| Small-Signal Short-Circuit Forward-Transfer Current Ratio<br>$V_{CE} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$ , $f = 1 \text{ kHz}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175 | $h_{fe}$       | 20<br>30<br>44<br>60         | 41<br>64<br>88<br>120    | —                |
| Small-Signal Open Circuit Output Admittance<br>$V_{CB} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$ , $f = 1 \text{ kHz}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175               | $h_{ob}$       | 0.10<br>0.10<br>0.10<br>0.10 | 1.3<br>1.2<br>1.0<br>0.9 | $\mu\text{mh}$   |
| Small-Signal Open-Circuit Reverse-Transfer Voltage Ratio<br>$V_{CB} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$ , $f = 1 \text{ kHz}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175  | $h_{rb}$       | 1.0<br>1.0<br>1.0<br>1.0     | 10<br>11<br>12<br>14     | $\times 10^{-4}$ |
| Small-Signal Short-Circuit Input Impedance<br>$V_{CB} = 5 \text{ Vdc}$ , $I_E = 1 \text{ mAdc}$ , $f = 1 \text{ kHz}$<br>2N1413<br>2N1414<br>2N1415<br>2N1175                | $h_{ib}$       | 26<br>26<br>26<br>26         | 36<br>35<br>33<br>31     | $\mu\text{mhos}$ |

**2N1420**

For Specifications, See 2N718 Data.

**2N1494, A, 2N1495, 2N1496**

For Specifications, See 2N1204 Data.