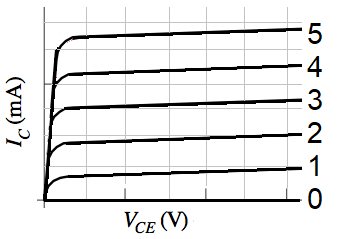
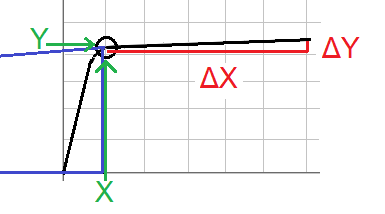
BJT Performance Card Name: Key

Device ID: 2N3904



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 | 15.6 |
| 8 | 15.2 |
| 7 | 13.3 |
| 6 | 11.4 |
| 5 | 9.3 |
| 4 | 7.4 |
| 3 | 5.5 |
| 2 | 3.6 |
| 1 | 1.5 |
| 0 | 0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ch1 Scale | 1 Volts/div |  | vce | Ch1 Scale \* 1 volts/volt | 1 Volts/div |
| Ch2 Scale | 0.2 Volts/div |  | ic | Ch2 Scale \* 4.55mA/volt | 0.9 mA/div |

Gain Calculation

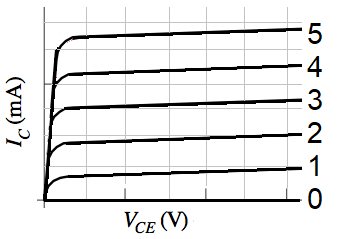
|  |  |  |  |
| --- | --- | --- | --- |
| Trace | #Divs | ic(mA) | ic/ib |
| 9 | 5.6 | 5.0 | 321 |
| 8 | 5.3 | 4.8 | 316 |
| 7 | 4.7 | 4.2 | 316 |
| 6 | 4.0 | 3.6 | 316 |
| 5 | 3.4 | 3.1 | 333 |
| 4 | 2.7 | 2.4 | 324 |
| 3 | 2.0 | 1.8 | 327 |
| 2 | 1.3 | 1.2 | 333 |
| 1 | 0.56 | 0.5 | 333 |
| 0 | 0 | 0mA | ------ |

Early Voltage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) | \* Ch1 Scale |
| 9 | 1 | 1.12 | 0.15 | 3.6 | -27V | ------------- |
| 8 | 1 | 1.05 | 0.13 | 3.6 | -29V | ------------- |
| 7 | 1 | 0.93 | 0.11 | 3.6 | -29V | ------------- |
| 6 | 1 | 0.81 | 0.092 | 3.6 | -31V | ------------- |

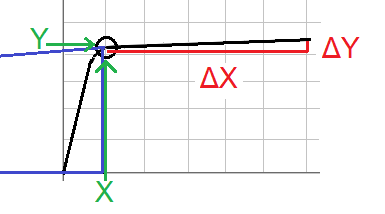
BJT Performance Card Name: Key

Device ID: 2N2222



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 | 15.6 |
| 8 | 15.2 |
| 7 | 13.3 |
| 6 | 11.4 |
| 5 | 9.3 |
| 4 | 7.4 |
| 3 | 5.5 |
| 2 | 3.6 |
| 1 | 1.5 |
| 0 | 0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ch1 Scale | 1 Volts/div |  | vce | Ch1 Scale \* 1 volts/volt | 1 Volts/div |
| Ch2 Scale | 0.1 Volts/div |  | ic | Ch2 Scale \* 4.55mA/volt | 0.46 mA/div |

Gain Calculation

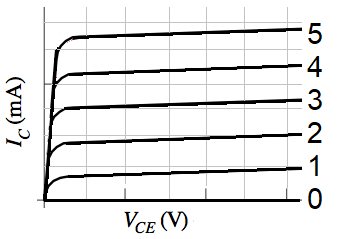
|  |  |  |  |
| --- | --- | --- | --- |
| Trace | #Divs | ic(mA) | ic/ib |
| 9 | 4.4 | 2.0 | 128 |
| 8 | 4.1 | 1.9 | 125 |
| 7 | 3.5 | 1.6 | 120 |
| 6 | 3.0 | 1.4 | 123 |
| 5 | 2.4 | 1.1 | 118 |
| 4 | 1.9 | 0.87 | 118 |
| 3 | 1.4 | 0.64 | 116 |
| 2 | 0.9 | 0.41 | 114 |
| 1 | 0.3 | 0.14 | 93 |
| 0 | 0 | 0mA | ------- |

Early Voltage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) | \* Ch1 Scale |
| 9 | 1 | 0.44 | 0.044 | 3.6 | -35V | ------------- |
| 8 | 1 | 0.41 | 0.040 | 3.6 | -36V | ------------- |
| 7 | 1 | 0.35 | 0.036 | 3.6 | -34V | ------------- |
| 6 | 1 | 0.30 | 0.030 | 3.6 | -35V | ------------- |

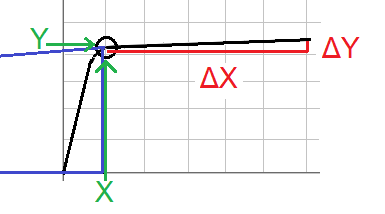
BJT Performance Card Name: Key

Device ID: BD139



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 | 15.6 |
| 8 | 15.2 |
| 7 | 13.3 |
| 6 | 11.4 |
| 5 | 9.3 |
| 4 | 7.4 |
| 3 | 5.5 |
| 2 | 3.6 |
| 1 | 1.5 |
| 0 | 0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ch1 Scale | 1 Volts/div |  | vce | Ch1 Scale \* 1 volts/volt | 1 Volts/div |
| Ch2 Scale | 0.2 Volts/div |  | ic | Ch2 Scale \* 4.55mA/volt | 0.9 mA/div |

Gain Calculation

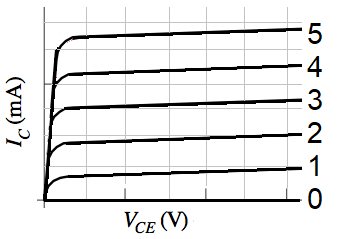
|  |  |  |  |
| --- | --- | --- | --- |
| Trace | #Divs | ic(mA) | ic/ib |
| 9 | 4.8 | 4.3 | 276 |
| 8 | 4.4 | 4.0 | 263 |
| 7 | 3.9 | 3.5 | 263 |
| 6 | 3.4 | 3.1 | 272 |
| 5 | 2.8 | 2.5 | 269 |
| 4 | 2.3 | 2.1 | 284 |
| 3 | 1.7 | 1.5 | 273 |
| 2 | 1.1 | 1.0 | 278 |
| 1 | 0.5 | 0.5 | 333 |
| 0 | 0 | 0mA | ------ |

Early Voltage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) | \* Ch1 Scale |
| 9 | 1 | 0.95 | 0.11 | 3.6 | -30V | ------------- |
| 8 | 1 | 0.89 | 0.10 | 3.6 | -31V | ------------- |
| 7 | 1 | 0.78 | 0.09 | 3.6 | -30V | ------------- |
| 6 | 1 | 0.75 | 0.076 | 3.6 | -35V | ------------- |

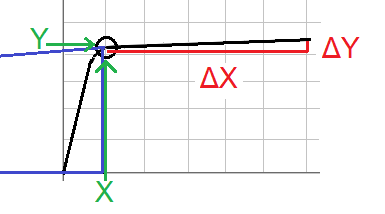
BJT Performance Card Name: Key

Device ID: TIP41C



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 | 15.6 |
| 8 | 15.2 |
| 7 | 13.3 |
| 6 | 11.4 |
| 5 | 9.3 |
| 4 | 7.4 |
| 3 | 5.5 |
| 2 | 3.6 |
| 1 | 1.5 |
| 0 | 0 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ch1 Scale | 1 Volts/div |  | vce | Ch1 Scale \* 1 volts/volt | 1 Volts/div |
| Ch2 Scale | 0.2Volts/div |  | ic | Ch2 Scale \* 4.55mA/volt | 0.9 mA/div |

Gain Calculation

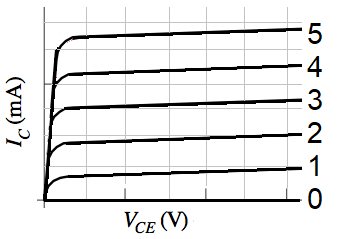
|  |  |  |  |
| --- | --- | --- | --- |
| Trace | #Divs | ic(mA) | ic/ib |
| 9 | 3.3 | 3 | 192 |
| 8 | 3.1 | 2.8 | 184 |
| 7 | 2.8 | 2.5 | 188 |
| 6 | 2.4 | 2.2 | 193 |
| 5 | 2.0 | 1.8 | 194 |
| 4 | 1.7 | 1.5 | 203 |
| 3 | 1.3 | 1.2 | 219 |
| 2 | 0.9 | 0.8 | 222 |
| 1 | 0.5 | 0.5 | 333 |
| 0 | 0 | 0mA | ------- |

Early Voltage

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) | \* Ch1 Scale |
| 9 | 0.7 | 0.7 | 0.048 | 3.92 | -56V | ------------- |
| 8 | 0.7 | 0.66 | 0.040 | 3.92 | -64V | ------------- |
| 7 | 0.7 | 0.56 | 0.028 | 3.92 | -78V | ------------- |
| 6 | 0.7 | 0.48 | 0.020 | 3.92 | -93V | ------------- |

BJT Performance Card Name: Key

Device ID: 2N3904 = Old board



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 | 15.6 |
| 8 | 15.2 |
| 7 | 13.3 |
| 6 | 11.4 |
| 5 | 9.3 |
| 4 | 7.4 |
| 3 | 5.5 |
| 2 | 3.6 |
| 1 | 1.5 |
| 0 | 0 |

Ic = Vic \* 4.55mA/volt

Gain Calculation

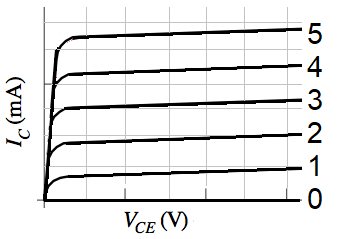
|  |  |  |  |
| --- | --- | --- | --- |
| Trace | Vic | ic(mA) | ic/ib |
| 9 | 0.768 | 3.55 | 228 |
| 8 | 0.744 | 3.39 | 3390/15.2 = 223 |
| 7 | 0.65 | 3 | 225 |
| 6 | 0.56 | 2.5 | 224 |
| 5 | 0.468 | 2.13 | 230 |
| 4 | 0.368 | 1.67 | 226 |
| 3 | 0.272 | 1.24 | 225 |
| 2 | 0.176 | 0.80 | 222 |
| 1 | 0.072 | 0.328 | 218 |
| 0 |  |  |  |

Early Voltage

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) |
| 9 | 1 |  |  | 3 |  |
| 8 | 1 | 0.744 | 0.08 | 3 | -27 |
| 7 | 1 | 0.65 | 0.068 | 3 | -28 |
| 6 | 1 | 0.56 | 0.056 | 3 | -29 |

BJT Performance Card Name: Key

Device ID: 2N3904 = New board



|  |  |
| --- | --- |
| Trace | ib (uA) |
| 9 |  |
| 8 | 53.8 |
| 7 | 46.6 |
| 6 | 39 |
| 5 | 31.4 |
| 4 | 24.2 |
| 3 | 16.6 |
| 2 | 9 |
| 1 | 1 |
| 0 | 0 |

Ic = Vic \* 10mA/volt

Gain Calculation

|  |  |  |  |
| --- | --- | --- | --- |
| Trace | Vic | ic(mA) | ic/ib |
| 9 |  |  |  |
| 8 | 1.54 | 15.4 | 286 |
| 7 | 1.40 | 14 | 300 |
| 6 | 1.21 | 12.1 | 310 |
| 5 | 1.01 | 10.1 | 321 |
| 4 | 0.80 | 8.0 | 331 |
| 3 | 0.58 | 5.8 | 349 |
| 2 | 0.34 | 3.4 | 3400/9 = 377 |
| 1 | 0.09 | 0.9 |  |
| 0 |  |  |  |

Early Voltage

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trace | X | Y | ΔY | ΔX | X- Y (ΔX/ ΔY) |
| 9 | 1 |  |  | 3 |  |
| 8 | 1 | 1.54 | 0.16 | 3 |  |
| 7 | 1 | 1.40 | 0.12 | 3 |  |
| 6 | 1 | 1.21 | 0.090 | 3 |  |