

General Purpose Transistor Array One Differentially Connected Pair and Three Isolated Transistor Arrays

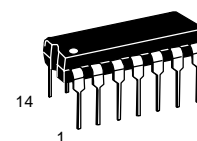
MC3346

GENERAL PURPOSE TRANSISTOR ARRAY

SEMICONDUCTOR TECHNICAL DATA

The MC3346 is designed for general purpose, low power applications for consumer and industrial designs.

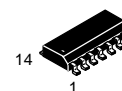
- Guaranteed Base–Emitter Voltage Matching
- Operating Current Range Specified: 10 μ A to 10 mA
- Five General Purpose Transistors in One Package



P SUFFIX
PLASTIC PACKAGE
CASE 646

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|-----------|-----------------|---------------------------|
| Collector–Emitter Voltage | V_{CEO} | 15 | Vdc |
| Collector–Base Voltage | V_{CBO} | 20 | Vdc |
| Emitter–Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector–Substrate Voltage | V_{CIO} | 20 | Vdc |
| Collector Current – Continuous | I_C | 50 | mAdc |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.2 10 | W mW/ $^\circ\text{C}$ |
| Operating Temperature Range | T_A | -40 to $+85$ | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -65 to $+150$ | $^\circ\text{C}$ |

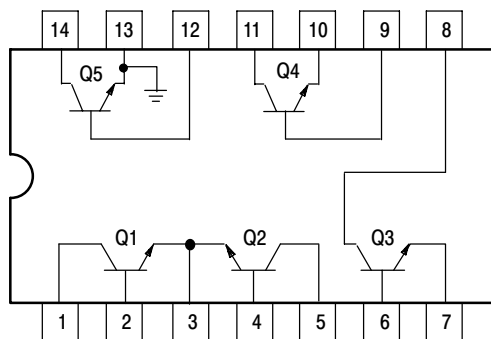


D SUFFIX
PLASTIC PACKAGE
CASE 751A
(SO-14)

ORDERING INFORMATION

| Device | Operating Temperature Range | Package |
|---------|--|-------------|
| MC3346D | $T_A = -40^\circ$ to $+85^\circ\text{C}$ | SO-14 |
| MC3356P | | Plastic DIP |

PIN CONNECTIONS



Pin 13 is connected to substrate and must remain at the lowest circuit potential.

MC3346

ELECTRICAL CHARACTERISTICS (T_A = +25°C, unless otherwise noted.)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|---|-------------------------------------|--------------|------------------|-------------|-------------------|
| STATIC CHARACTERISTICS | | | | | |
| Collector–Base Breakdown Voltage (I _C = 10 μAdc) | V _{(BR)CBO} | 20 | 60 | – | Vdc |
| Collector–Emitter Breakdown Voltage (I _C = 1.0 mAdc) | V _{(BR)CEO} | 15 | – | – | Vdc |
| Collector–Substrate Breakdown Voltage (I _C = 10 μA) | V _{(BR)CIO} | 20 | 60 | – | Vdc |
| Emitter–Base Breakdown Voltage (I _E = 10 μAdc) | V _{(BR)EBO} | 5.0 | 7.0 | – | Vdc |
| Collector–Base Cutoff Current (V _{CB} = 10 Vdc, I _E = 0) | I _{CBO} | – | – | 40 | nAdc |
| DC Current Gain (I _C = 10 mAdc, V _{CE} = 3.0 Vdc) (I _C = 1.0 mAdc, V _{CE} = 3.0 Vdc) (I _C = 10 μAdc, V _{CE} = 3.0 Vdc) | h _{FE} | – 40 – | 140 130 60 | – – – | – |
| Base–Emitter Voltage (V _{CE} = 3.0 Vdc, I _E = 1.0 mAdc) (V _{CE} = 3.0 Vdc, I _E = 10 mAdc) | V _{BE} | – – | 0.72 0.8 | – – | Vdc |
| Input Offset Current for Matched Pair Q1 and Q2 (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | I _{IO1} – I _{IO2} | – | 0.3 | 2.0 | μAdc |
| Magnitude of Input Offset Voltage (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | – | – | 0.5 | 5.0 | mVdc |
| Temperature Coefficient of Base–Emitter Voltage (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | $\frac{\Delta V_{BE}}{D_T}$ | – | –1.9 | – | mV/°C |
| Temperature Coefficient | $\frac{ \Delta V_{IO} }{D_T}$ | – | 1.0 | – | μV/°C |
| Collector–Emitter Cutoff Current (V _{CE} = 10 Vdc, I _B = 0) | I _{CEO} | – | – | 0.5 | μAdc |
| DYNAMIC CHARACTERISTICS | | | | | |
| Low Frequency Noise Figure (V _{CE} = 3.0 Vdc, I _C = 100 μAdc, R _S = 1.0 kΩ, f = 1.0 kHz) | NF | – | 3.25 | – | dB |
| Forward Current Transfer Ratio (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc, f = 1.0 kHz) | h _{FE} | – | 110 | – | – |
| Short Circuit Input Impedance (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | h _{ie} | – | 3.5 | – | kΩ |
| Open Circuit Output Impedance (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | h _{oe} | – | 15.6 | – | μmos |
| Reverse Voltage Transfer Ratio (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc) | h _{re} | – | 1.8 | – | x10 ^{–4} |
| Forward Transfer Admittance (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc, f = 1.0 MHz) | y _{fe} | – | 31–j1.5 | – | – |
| Input Admittance (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc, f = 1.0 MHz) | y _{ie} | – | 0.3 + j0.04 | – | – |
| Output Admittance (V _{CE} = 3.0 Vdc, I _C = 1.0 mAdc, f = 1.0 MHz) | y _{oe} | – | 0.001 + j0.03 | – | – |
| Current–Gain – Bandwidth Product (V _{CE} = 3.0 Vdc, I _C = 3.0 mAdc) | f _T | 300 | 550 | – | MHz |
| Emitter–Base Capacitance (V _{EB} = 3.0 Vdc, I _E = 0) | C _{eb} | – | 0.6 | – | pF |
| Collector–Base Capacitance (V _{CB} = 3.0 Vdc, I _C = 0) | C _{cb} | – | 0.58 | – | pF |
| Collector–Substrate Capacitance (V _{CS} = 3.0 Vdc, I _C = 0) | C _{Cl} | – | 2.8 | – | pF |

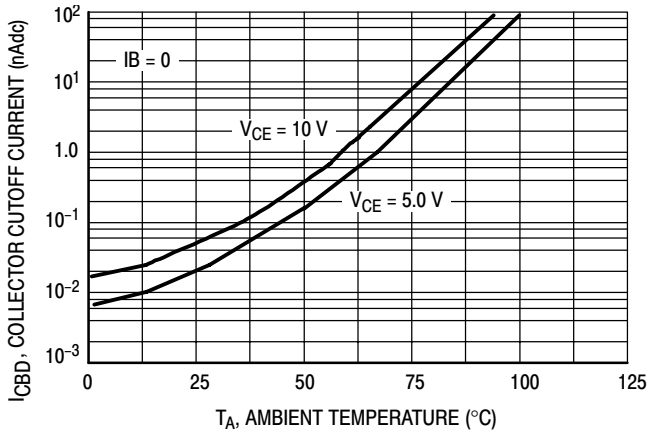


Figure 1. Collector Cutoff Current versus Temperature (Each Transistor)

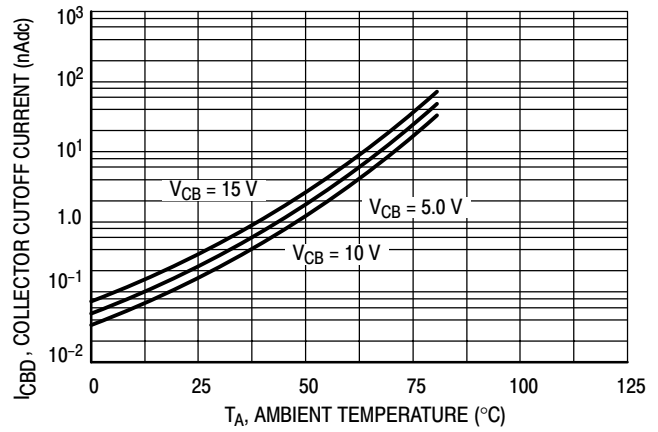


Figure 2. Collector Cutoff Current versus Temperature (Each Transistor)

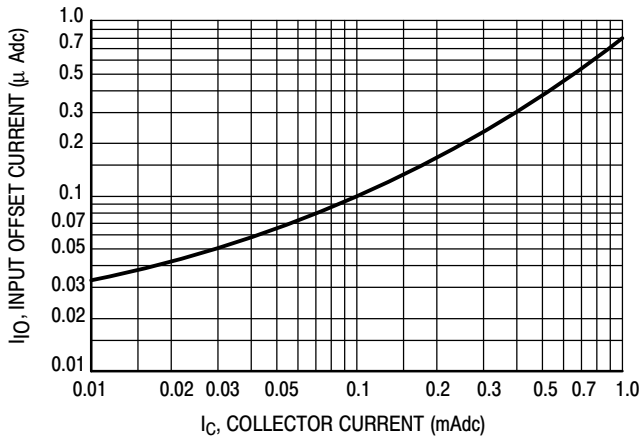


Figure 3. Input Offset Characteristics for Q1 and Q2

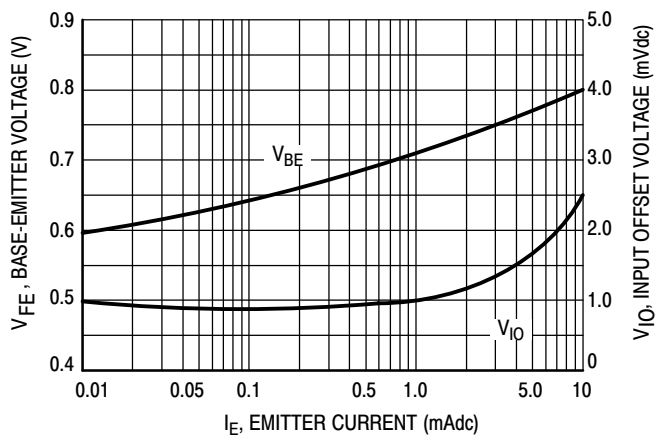


Figure 4. Base-Emitter and Input Offset Voltage Characteristics

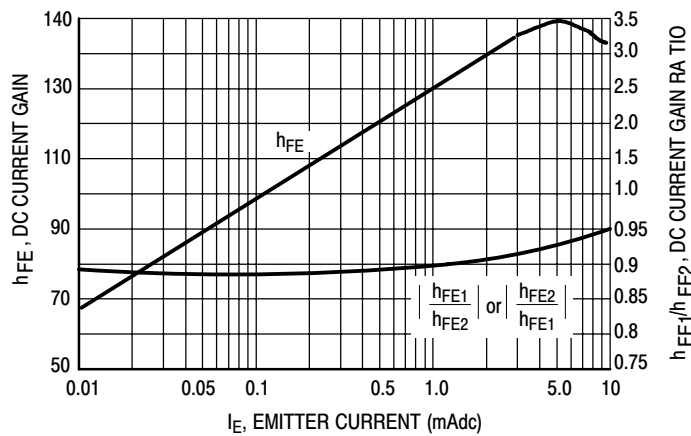
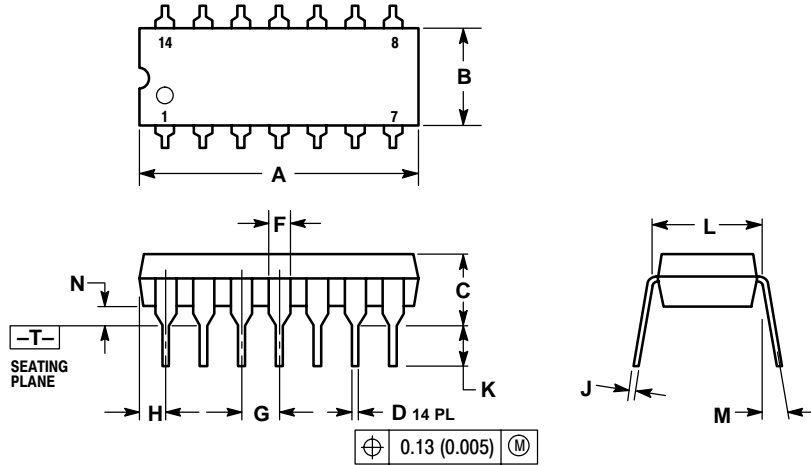


Figure 5. DC Current Gain

MC3346

PACKAGE DIMENSIONS

P SUFFIX
 PLASTIC PACKAGE
 CASE 646-06
 ISSUE M



NOTES:

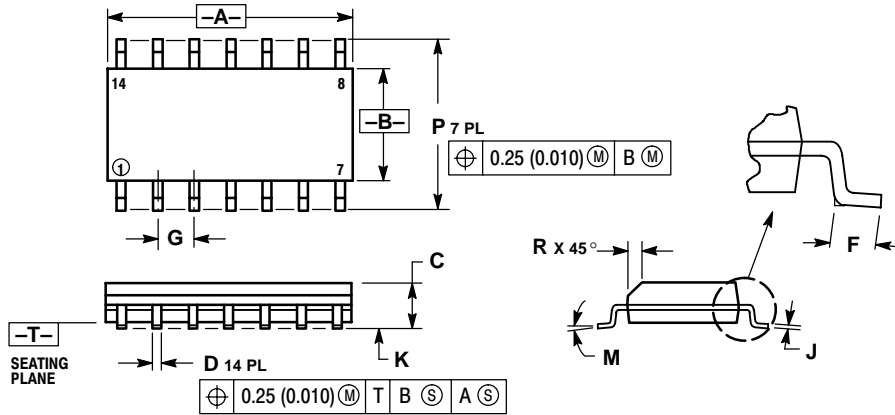
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.715 | 0.770 | 18.16 | 18.80 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.145 | 0.185 | 3.69 | 4.69 |
| D | 0.015 | 0.021 | 0.38 | 0.53 |
| F | 0.040 | 0.070 | 1.02 | 1.78 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.052 | 0.095 | 1.32 | 2.41 |
| J | 0.008 | 0.015 | 0.20 | 0.38 |
| K | 0.115 | 0.135 | 2.92 | 3.43 |
| L | 0.290 | 0.310 | 7.37 | 7.87 |
| M | --- | 10° | --- | 10° |
| N | 0.015 | 0.039 | 0.38 | 1.01 |

MC3346

PACKAGE DIMENSIONS

D SUFFIX
 PLASTIC PACKAGE
 CASE 751A-03
 (SO-8)
 ISSUE F




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 8.55 | 8.75 | 0.337 | 0.344 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.228 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

Notes

Notes

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