MOTOROLA Semiconductors

MC3346P
MC3386P

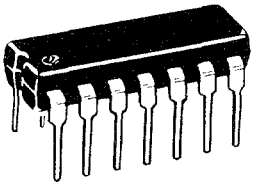
ONE DIFFERENTIALLY-CONNECTED PAIR AND THREE ISOLATED TRANSISTOR ARRAY

The MC3346P and MC3386P are designed for general-purpose, low power applications for consumer and industrial designs.

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

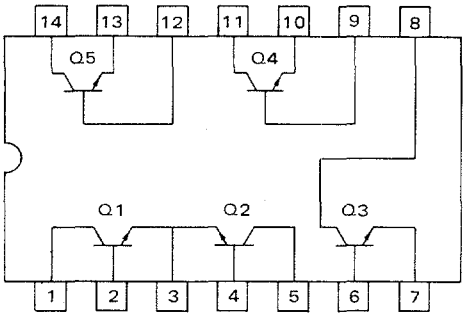
GENERAL-PURPOSE TRANSISTOR ARRAY

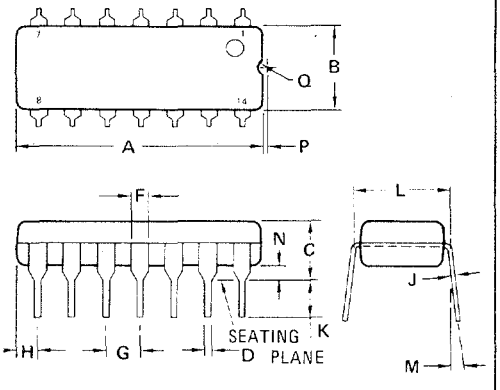
SILICON MONOLITHIC INTEGRATED CIRCUIT



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 @ $T_A = 25^oC$	P_D	1.2	Watts
Derate above 25^oC		10	$mW/^oC$
Derate Each Transistor @ 25^oC		300	$mW/^oC$
Operating Junction Temperature Range	T_A	0 to +85	^oC
Storage Temperature Range	T_{stg}	-65 to +150	^oC





NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.16	18.80	0.715	0.740
B	6.10	6.60	0.240	0.260
C	4.06	4.57	0.160	0.180
D	0.38	0.51	0.015	0.020
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.32	1.83	0.052	0.072
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.37	7.87	0.290	0.310
M	–	10^0	–	10^0
N	0.51	1.02	0.020	0.040
P	0.13	0.38	0.005	0.015
Q	0.51	0.76	0.020	0.030

CASE 646

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	MC3346P			MC3386P			Unit
		Min	Typ	Max	Min	Typ	Max	
STATIC CHARACTERISTICS								
Collector-Base Breakdown Voltage (I_C = 10 μAdc)	BV_{CBO}	20	60	–	20	60	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc)	BV_{CEO}	15	–	–	15	–	–	Vdc
Collector-Substrate Breakdown Voltage (I_C = 10 μA)	BV_{CIO}	20	60	–	20	60	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc)	BV_{EBO}	5.0	7.0	–	5.0	7.0	–	Vdc
Collector-Base Cutoff Current (V_{CB} = 10 Vdc, I_E = 0)	I_{CBO}	–	–	40	–	–	100	nAdc
DC Current Gain	h_{FE}							–
(I_C = 10 mAdc, V_{CE} = 3.0 Vdc)		–	140	–	–	–	–	
(I_C = 1.0 mAdc, V_{CE} = 3.0 Vdc)		40	130	–	40	130	–	
(I_C = 10 μAdc, V_{CE} = 3.0 Vdc)		–	60	–	–	–	–	
Base-Emitter Voltage	V_{BE}							Vdc
(V_{CE} = 3.0 Vdc, I_E = 1.0 mAdc)		–	0.72	–	–	0.72	–	
(V_{CE} = 3.0 Vdc, I_E = 10 mAdc)		–	0.80	–	–	0.80	–	
Input Offset Current for Matched Pair Q1 and Q2 (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	$\lvert I_{IO1} - I_{IO2} \rvert$	–	0.3	2.0	–	0.3	–	μAdc
Magnitude of Input Offset Voltage (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	–	–	0.5	5.0	–	0.5	–	mVdc
Temperature Coefficient of Base-Emitter Voltage (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	$\frac{\Delta V_{BE}}{\Delta T}$	–	-1.9	–	–	-1.9	–	mV/°C
Temperature Coefficient	$\frac{\lvert \Delta V_{IO} \rvert}{\Delta T}$	–	1.0	–	–	1.0	–	μV/°C
Collector-Emitter Cutoff Current (V_{CB} = 10 Vdc, I_E = 0)	I_{CEO}	–	–	0.5	–	–	5.0	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	–	–	3.25	–	dB
Forward Current Transfer Ratio (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{FE}	–	110	–	–	110	–	–
Short-Circuit Input Impedance (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	h_{ie}	–	3.5	–	–	3.5	–	kΩ
Open-Circuit Output Impedance (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	h_{oe}	–	15.6	–	–	15.6	–	μmhos
Reverse Voltage Transfer Ratio (V_{CE} = 3.0 Vdc, I_C = 1.0 mAdc)	h_{re}	–	1.8	–	–	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	–	–	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	–	–	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	–	–	0.001+j0.03	–	–
Current-Gain — Bandwidth Product (V_{CE} = 3.0 Vdc, I_C = 3.0 mAdc)	f_T	300	550	–	–	550	–	MHz
Emitter-Base Capacitance (V_{EB} = 3.0 Vdc, I_E = 0)	C_{eb}	–	0.6	–	–	0.6	–	pF
Collector-Base Capacitance (V_{CB} = 3.0 Vdc, I_C = 0)	C_{cb}	–	0.58	–	–	0.58	–	pF
Collector-Substrate Capacitance (V_{CS} = 3.0 Vdc, I_C = 0)	C_{CI}	–	2.8	–	–	2.8	–	pF

TYPICAL CHARACTERISTICS

FIGURE 1 – COLLECTOR CUTOFF CURRENT versus TEMPERATURE (Each Transistor)

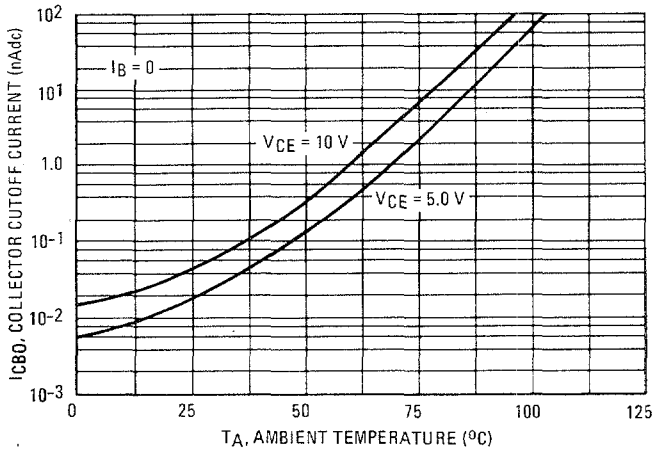


FIGURE 2 – COLLECTOR CUTOFF CURRENT versus TEMPERATURE (Each Transistor)

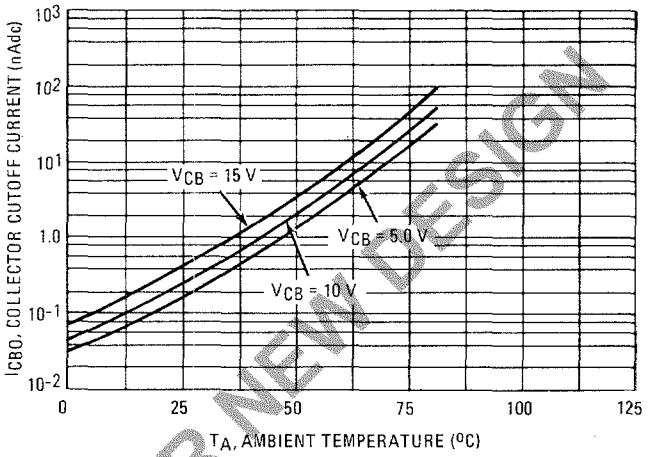


FIGURE 3 – INPUT OFFSET CHARACTERISTICS FOR Q1 and Q2

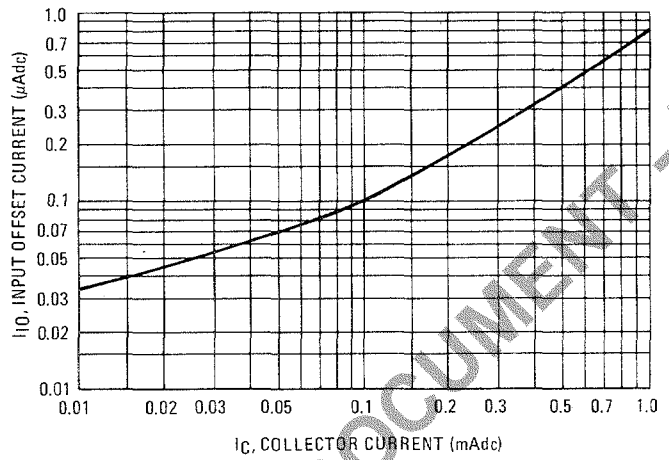


FIGURE 4 – BASE-EMITTER AND INPUT OFFSET VOLTAGE CHARACTERISTICS

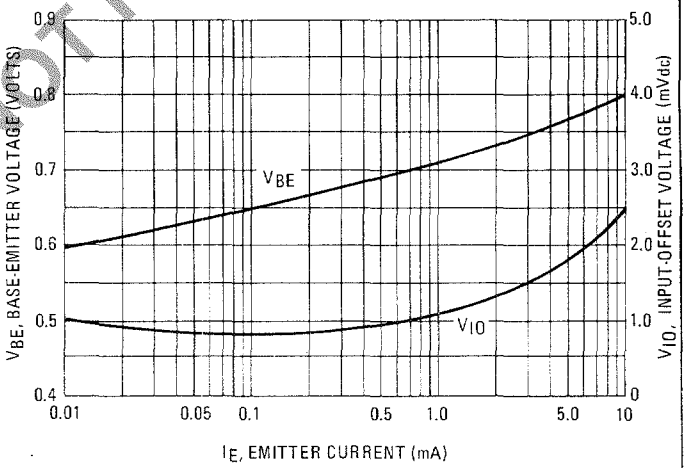
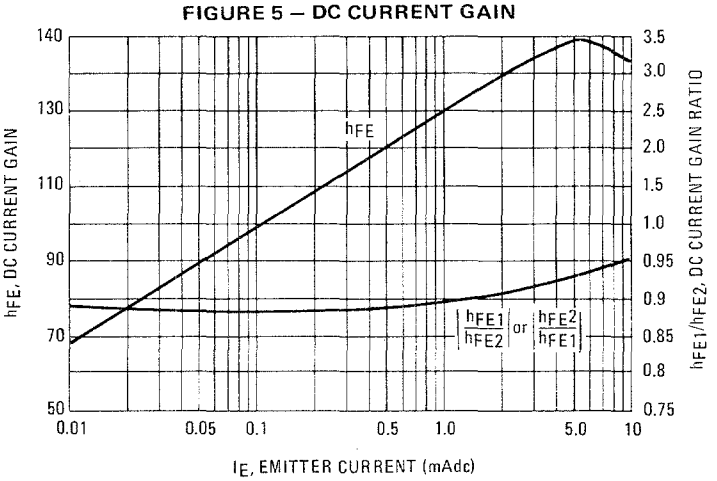


FIGURE 5 – DC CURRENT GAIN



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