

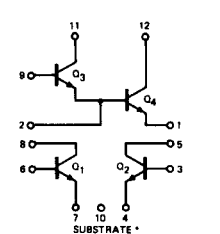
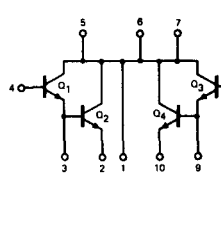
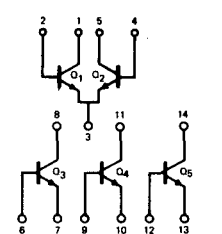
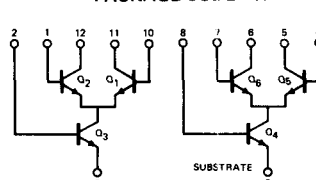
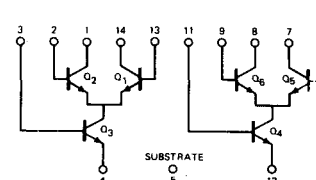
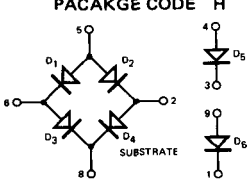
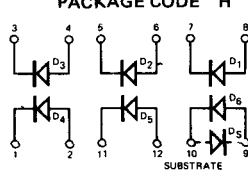
# μA3018 • μA3018A • μA3019 • μA3026 • μA3036 μA3039 • μA3045 • μA3046 • μA3054 • μA3086

## TRANSISTOR AND DIODE ARRAYS

FAIRCHILD LINEAR INTEGRATED CIRCUITS

**GENERAL DESCRIPTION** – Fairchild Transistor and Diode Arrays consist of general purpose integrated circuit devices constructed on a single substrate, using the Fairchild Planar\* epitaxial process. These arrays are arranged to offer maximum flexibility in circuit design for applications from dc to 120 MHz. Excellent transistor and diode matching and temperature tracking allow circuit techniques unavailable when using discrete devices. Multiple devices in one package permit a greater packing density and cost saving than with individually packaged transistors.

- PRECISION MONOLITHIC MATCHING
- DESIGN FLEXIBILITY
- CUSTOM APPLICATIONS

<p><b>PACKAGE OUTLINE 5D</b> PACKAGE CODE H</p>  <p><b>ORDER INFORMATION</b></p> <table border="0"> <thead> <tr> <th>TYPE</th> <th>PART NO.</th> </tr> </thead> <tbody> <tr> <td>μA3018</td> <td>μA3018</td> </tr> <tr> <td>μA3018A</td> <td>μA3018AHM</td> </tr> </tbody> </table>	TYPE	PART NO.	μA3018	μA3018	μA3018A	μA3018AHM	<p><b>PACKAGE OUTLINE 5Q</b> PACKAGE CODE H</p>  <p><b>ORDER INFORMATION</b></p> <table border="0"> <thead> <tr> <th>TYPE</th> <th>PART NO.</th> </tr> </thead> <tbody> <tr> <td>μA3036</td> <td>μA3036HM</td> </tr> </tbody> </table>	TYPE	PART NO.	μA3036	μA3036HM	<p><b>PACKAGE OUTLINE 6A</b> PACKAGE CODE D</p>  <p><b>ORDER INFORMATION</b></p> <table border="0"> <thead> <tr> <th>TYPE</th> <th>PART NO.</th> </tr> </thead> <tbody> <tr> <td>μA3045</td> <td>μA3045</td> </tr> <tr> <td>μA3046</td> <td>μA3046DC</td> </tr> <tr> <td>μA3086</td> <td>μA3086DM</td> </tr> </tbody> </table>	TYPE	PART NO.	μA3045	μA3045	μA3046	μA3046DC	μA3086	μA3086DM
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\*Planar is a patented Fairchild process.  
[www.DataSheet4U.com](http://www.DataSheet4U.com)

# FAIRCHILD LIC TRANSISTOR AND DIODE ARRAYS • $\mu$ A30XX SERIES

## $\mu$ A3018/3018A

- MATCHED MONOLITHIC GENERAL PURPOSE TRANSISTORS
- $h_{FE}$  MATCHED  $\pm 10\%$
- $V_{BE}$  MATCHED  $\pm 2$  mV 3018A ( $\pm 5$  mV 3018)
- OPERATION FROM DC TO 120 MHz
- WIDE OPERATING CURRENT RANGE
- 3018A PERFORMANCE CHARACTERISTICS CONTROLLED FROM  $10 \mu$ A TO 10 mA
- LOW NOISE FIGURE – 3.2 dB TYPICAL AT 1 kHz
- FULL MILITARY TEMPERATURE RANGE CAPABILITY ( $-55$  TO  $+125^\circ\text{C}$ )

### APPLICATIONS

- General Use in Signal Processing Systems in dc Through VHF Range
- Custom Design Differential Amplifiers
- Temperature Compensated Amplifiers

### ABSOLUTE MAXIMUM RATINGS

	$\mu$ A3018	$\mu$ A3018A
Power Dissipation (Note 1)		
Any One Transistor	300 mW	300 mW
Total Package	450 mW	450 mW
Temperature Range		
Operating Temperature	$-55^\circ\text{C}$ to $+125^\circ\text{C}$	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage Temperature	$-65^\circ\text{C}$ to $+200^\circ\text{C}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$
The following ratings apply for each transistor in the device:		
Collector-to-Emitter Voltage, $V_{CEO}$	15 V	15 V
Collector-to-Base Voltage, $V_{CBO}$	20 V	30 V
Collector-to-Substrate Voltage, $V_{CISO}$ (Note 2)	20 V	40 V
Emitter-to-Base Voltage, $V_{EBO}$	5 V	5 V
Collector Current, $I_C$	50 mA	50 mA

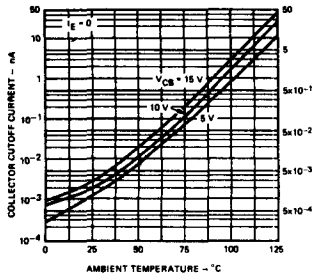
**FAIRCHILD LIC TRANSISTOR AND DIODE ARRAYS •  $\mu$ A30XX SERIES**

**ELECTRICAL CHARACTERISTICS FOR  $\mu$ A3018A ( $T_A = 25^\circ\text{C}$  unless otherwise specified)**

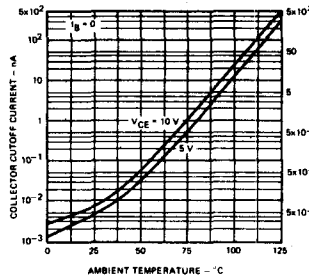
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 10\text{ V}, I_E = 0$		0.002	40	nA
$I_{CEO}$	Collector Cutoff Current	$V_{CE} = 10\text{ V}, I_B = 0$		See Curve	0.5	$\mu$ A
$I_{CEOD}$	Collector Cutoff Current Darlington Pair	$V_{CE} = 10\text{ V}, I_B = 0$			5.0	$\mu$ A
$V_{(BR)CEO}$	Collector-to-Emitter Breakdown Voltage	$I_C = 1\text{ mA}, I_B = 0$	15	24		V
$V_{(BR)CBO}$	Collector-to-Base Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}, I_E = 0$	30	60		V
$V_{(BR)EBO}$	Emitter-to-Base Breakdown Voltage	$I_E = 10\text{ }\mu\text{A}, I_C = 0$	5.0	7.0		V
$V_{(BR)CIO}$	Collector-to-Substrate Breakdown Voltage	$I_C = 10\text{ }\mu\text{A}, I_{C1} = 0$	40	60		V
$V_{CES}$	Collector-to-Emitter Saturation Voltage	$I_B = 1\text{ mA}, I_C = 10\text{ mA}$		0.23	0.5	V
$h_{FE}$	Static Forward Current Transfer Ratio	$V_{CE} = 3\text{ V}$ $\left\{ \begin{array}{l} I_C = 10\text{ mA} \\ I_C = 1\text{ mA} \\ I_C = 10\text{ }\mu\text{A} \end{array} \right.$	50 60 30	100 100 54		
	Magnitude of Static-Beta Ratio (Isolated Transistors $Q_1$ and $Q_2$ )	$V_{CE} = 3\text{ V}, I_{C1} = I_{C2} = 1\text{ mA}$	0.9	0.97		
$h_{FED}$	Static Forward Current Transfer Ratio Darlington Pair ( $Q_3$ & $Q_4$ )	$V_{CE} = 3\text{ V}$ $\left\{ \begin{array}{l} I_C = 1\text{ mA} \\ I_C = 100\text{ }\mu\text{A} \end{array} \right.$	2000 1000	5400 2800		
$V_{BE}$	Base-to-Emitter Voltage	$V_{CE} = 3\text{ V}$ $\left\{ \begin{array}{l} I_E = 1\text{ mA} \\ I_E = 10\text{ mA} \end{array} \right.$	0.600	0.715 0.800	0.800 0.900	V
$\left  \begin{array}{l} V_{BE1} \\ V_{BE2} \end{array} \right $	Input Offset Voltage	$V_{CE} = 3\text{ V}, I_E = 1\text{ mA}$		0.48	2.0	mV
$\frac{\Delta V_{BE}}{\Delta T}$	Temperature Coefficient: Base-to-Emitter Voltage $Q_1, Q_2$	$V_{CE} = 3\text{ V}, I_E = 1\text{ mA}$		-1.9		mV/ $^\circ\text{C}$
$V_{BED}$ ( $V_{9-1}$ )	Base ( $Q_3$ )-to-Emitter ( $Q_4$ ) Voltage-Darlington Pair	$V_{CE} = 3\text{ V}$ $\left\{ \begin{array}{l} I_E = 10\text{ mA} \\ I_E = 1\text{ mA} \end{array} \right.$	1.10	1.46 1.32	1.60 1.50	V
$\frac{\Delta V_{BED}}{\Delta T}$	Temperature Coefficient: Base-to-Emitter Voltage Darlington Pair- $Q_3, Q_4$	$V_{CE} = 3\text{ V}, I_E = 1\text{ mA}$		4.4		mV/ $^\circ\text{C}$
$\frac{V_{BE1} - V_{BE2}}{\Delta T}$	Temperature Coefficient: Magnitude of Input-Offset Voltage	$V_{CC} = +6\text{ V}, V_{EE} = -6\text{ V}$		10		$\mu\text{V}/^\circ\text{C}$
NF	Low Frequency Noise Figure	$f = 1\text{ kHz}, V_{CE} = 3\text{ V}, I_C = 100\text{ }\mu\text{A}$ Source resistance = 1 k $\Omega$		3.25		dB
$h_{fe}$ $h_{ie}$ $h_{oe}$ $h_{re}$	Low Frequency, Small-Signal Equivalent Circuit Characteristics: Forward Current-Transfer Ratio Short Circuit Input Resistance Open Circuit Output Conductance Open Circuit Reverse Voltage-Transfer Ratio	$f = 1\text{ kHz}, V_{CE} = 3\text{ V}, I_C = 1\text{ mA}$		110 3.5 15.6 $1.8 \times 10^{-4}$		k $\Omega$ $\mu\text{mho}$
$Y_{fe}$ $Y_{ie}$ $Y_{oe}$ $Y_{re}$	Admittance Characteristics: Forward Transfer Admittance Input Admittance Output Admittance Reverse Transfer Admittance	$f = 1\text{ MHz}, V_{CE} = 3\text{ V}, I_C = 1\text{ mA}$		31-j 1.5 0.3+j 0.04 0.001+j 0.03 See Curve		mmho mmho mmho mmho
$f_T$	Gain-Bandwidth Product	$V_{CE} = 3\text{ V}, I_C = 3\text{ mA}$		500		MHz
$C_{eb}$	Emitter-to-Base Capacitance	$V_{EB} = 3\text{ V}, I_E = 0$		0.6		pF
$C_{cb}$	Collector-to-Base Capacitance	$V_{CB} = 3\text{ V}, I_C = 0$		0.58		pF
$C_{Cl}$	Collector-to-Substrate Capacitance	$V_{Cl} = 3\text{ V}, I_C = 0$		2.8		pF

TYPICAL PERFORMANCE CURVES FOR  $\mu$ A3018/3018A

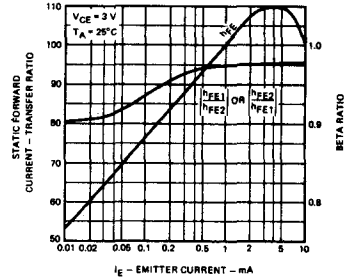
COLLECTOR-TO-BASE CUTOFF CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE FOR EACH TRANSISTOR



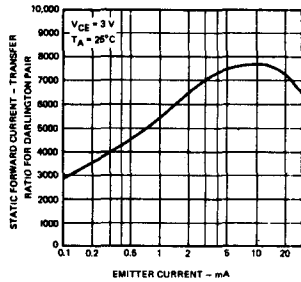
COLLECTOR-TO-EMITTER CUTOFF CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE FOR EACH TRANSISTOR



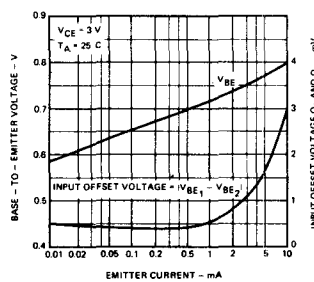
STATIC FORWARD CURRENT-TRANSFER AND BETA RATIO FOR TRANSISTORS Q1, Q2 AS A FUNCTION OF EMITTER CURRENT



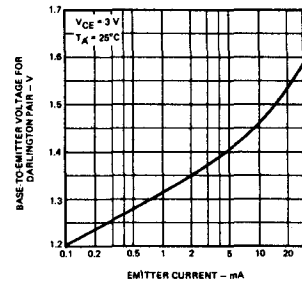
STATIC FORWARD CURRENT-TRANSFER RATIO FOR DARLINGTON CONNECTED TRANSISTORS Q3, Q4 AS A FUNCTION OF EMITTER CURRENT



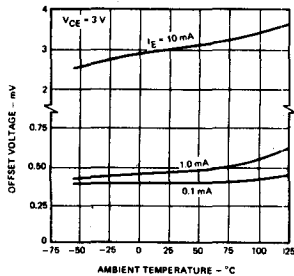
STATIC BASE-TO-EMITTER VOLTAGE AND INPUT OFFSET VOLTAGE FOR Q1, Q2 AS A FUNCTION OF EMITTER CURRENT



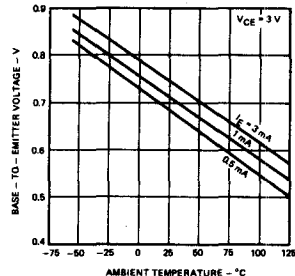
STATIC INPUT VOLTAGE FOR DARLINGTON PAIR Q3, Q4 AS A FUNCTION OF EMITTER CURRENT



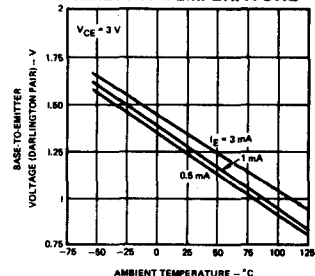
OFFSET VOLTAGE CHARACTERISTIC AS A FUNCTION OF AMBIENT TEMPERATURE



BASE-TO-EMITTER VOLTAGE CHARACTERISTIC FOR EACH TRANSISTOR AS A FUNCTION OF AMBIENT TEMPERATURE

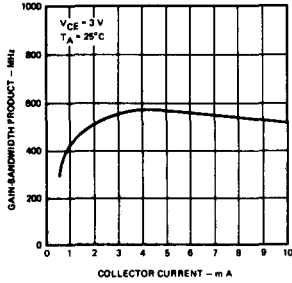


STATIC INPUT VOLTAGE FOR DARLINGTON PAIR (Q3, Q4) AS A FUNCTION OF AMBIENT TEMPERATURE

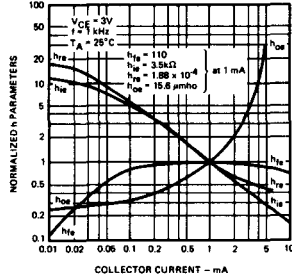


TYPICAL AC CHARACTERISTICS FOR EACH TRANSISTOR

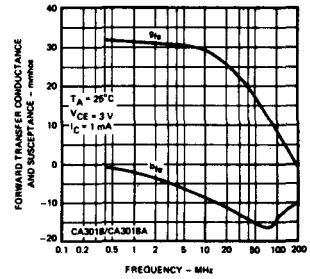
**GAIN-BANDWIDTH PRODUCT ( $f_T$ ) AS A FUNCTION OF COLLECTOR CURRENT**



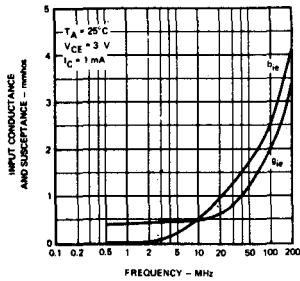
**NORMALIZED h PARAMETERS AS A FUNCTION OF COLLECTOR CURRENT**



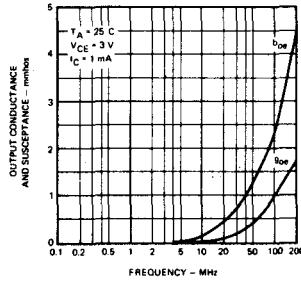
**FORWARD TRANSFER ADMITTANCE ( $Y_{fe}$ ) AS A FUNCTION OF FREQUENCY**



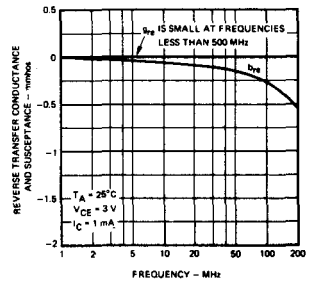
**INPUT ADMITTANCE ( $Y_{ie}$ ) AS A FUNCTION OF FREQUENCY**



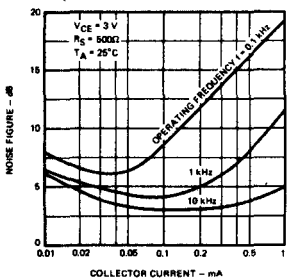
**OUTPUT ADMITTANCE ( $Y_{oe}$ ) AS A FUNCTION OF FREQUENCY**



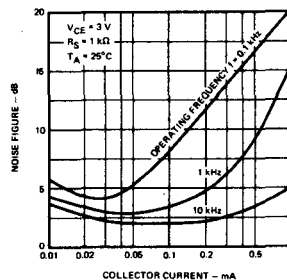
**REVERSE TRANSFER ADMITTANCE ( $Y_{re}$ ) AS A FUNCTION OF FREQUENCY**



**NOISE FIGURE AS A FUNCTION OF COLLECTOR CURRENT**



**NOISE FIGURE AS A FUNCTION OF COLLECTOR CURRENT**



**NOISE FIGURE AS A FUNCTION OF COLLECTOR CURRENT**

