Ultra High Frequency Transistor Arrays

The HFA3046, HFA3096, HFA3127 and the HFA3128 are Ultra High Frequency Transistor Arrays that are fabricated from Harris Semiconductor's complementary bipolar UHF-1 process. Each array consists of five dielectrically isolated transistors on a common monolithic substrate. The NPN transistors exhibit a f_T of 8GHz while the PNP transistors provide a f_T of 5.5GHz. Both types exhibit low noise (3.5dB), making them ideal for high frequency amplifier and mixer applications.

The HFA3046 and HFA3127 are all NPN arrays while the HFA3128 has all PNP transistors. The HFA3096 is an NPN-PNP combination. Access is provided to each of the terminals for the individual transistors for maximum application flexibility. Monolithic construction of these transistor arrays provides close electrical and thermal matching of the five transistors.

For PSPICE models, please request AnswerFAX document number 663046. Harris also provides an Application Note illustrating the use of these devices as RF amplifiers (request AnswerFAX document 99315).

Ordering Information

PART NUMBER	TEMP. RANGE (^oC)	PACKAGE	PKG. NO.
HFA3046B	-55 to 125	14 Ld SOIC	M14.15
HFA3096B	-55 to 125	16 Ld SOIC	M16.15
HFA3127B	-55 to 125	16 Ld SOIC	M16.15
HFA3128B	-55 to 125	16 Ld SOIC	M16.15

Features

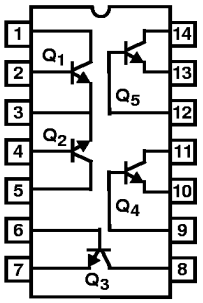
- NPN Transistor (f_T) 8GHz
- NPN Current Gain (h_{FE}) 130
- NPN Early Voltage (V_A) 50V
- PNP Transistor (f_T) 5.5GHz
- PNP Current Gain (h_{FE}) 60
- PNP Early Voltage (V_A) 20V
- Noise Figure (50Ω) at 1.0GHz 3.5dB
- Collector-to-Collector Leakage . . . . . <1pA
- Complete Isolation Between Transistors
- Pin Compatible with Industry Standard 3XXX Series Arrays

Applications

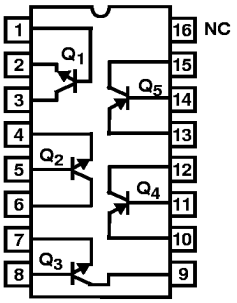
- VHF/UHF Amplifiers
- VHF/UHF Mixers
- IF Converters
- Synchronous Detectors

Pinouts

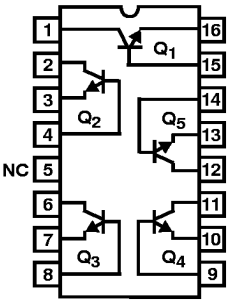
HFA3046
TOP VIEW



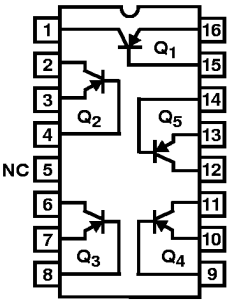
HFA3096
TOP VIEW



HFA3127
TOP VIEW



HFA3128
TOP VIEW



Absolute Maximum Ratings

Collector to Emitter Voltage (Open Base) 8V
Collector to Base Voltage (Open Emitter) 12V
Emitter to Base Voltage (Reverse Bias) 5.5V
Collector Current (100% Duty Cycle) . . . . . 18.5mA at $T_J = 150^oC$
34mA at $T_J = 125^oC$
37mA at $T_J = 110^oC$
Peak Collector Current (Any Condition) 65mA

Operating Information

Temperature Range . . . . . -55^oC to 125^oC

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} ($^oC/W$)
14 Ld SOIC Package	120
16 Ld SOIC Package	115

Maximum Power Dissipation (Any One Transistor) 0.15W
Maximum Junction Temperature (Die) . . . . . 175^oC
Maximum Junction Temperature (Plastic Package) . . . . . 150^oC
Maximum Storage Temperature Range . . . . . -65^oC to 150^oC
Maximum Lead Temperature (Soldering 10s) . . . . . 300^oC
(SOIC - Lead Tips Only)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications $T_A = 25^oC$

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
DC NPN CHARACTERISTICS								
Collector-to-Base Breakdown Voltage, $V_{(BR)CBO}$	$I_C = 100\mu A$, $I_E = 0$	12	18	-	12	18	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CEO}$	$I_C = 100\mu A$, $I_B = 0$	8	12	-	8	12	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CES}$	$I_C = 100\mu A$, Base Shorted to Emitter	10	20	-	10	20	-	V
Emitter-to-Base Breakdown Voltage, $V_{(BR)EBO}$	$I_E = 10\mu A$, $I_C = 0$	5.5	6	-	5.5	6	-	V
Collector-Cutoff-Current, I_{CEO}	$V_{CE} = 6V$, $I_B = 0$	-	2	100	-	2	100	nA
Collector-Cutoff-Current, I_{CBO}	$V_{CB} = 8V$, $I_E = 0$	-	0.1	10	-	0.1	10	nA
Collector-to-Emitter Saturation Voltage, $V_{CE(SAT)}$	$I_C = 10mA$, $I_B = 1mA$	-	0.3	0.5	-	0.3	0.5	V
Base-to-Emitter Voltage, V_{BE}	$I_C = 10mA$	-	0.85	0.95	-	0.85	0.95	V
DC Forward-Current Transfer Ratio, h_{FE}	$I_C = 10mA$ $V_{CE} = 2V$	40	130	-	40	130	-	
Early Voltage, V_A	$I_C = 1mA$, $V_{CE} = 3.5V$	20	50	-	20	50	-	V
Base-to-Emitter Voltage Drift	$I_C = 10mA$	-	-1.5	-	-	-1.5	-	$mV/^oC$
Collector-to-Collector Leakage		-	1	-	-	1	-	pA

Electrical Specifications $T_A = 25^oC$

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
DYNAMIC NPN CHARACTERISTICS								
Noise Figure	f = 1.0GHz, $V_{CE} = 5V$, $I_C = 5mA$, $Z_S = 50\Omega$	-	3.5	-	-	3.5	-	dB
f_T Current Gain-Bandwidth Product	$I_C = 1mA$, $V_{CE} = 5V$	-	5.5	-	-	5.5	-	GHz
	$I_C = 10mA$, $V_{CE} = 5V$	-	8	-	-	8	-	GHz
Power Gain-Bandwidth Product, f_{MAX}	$I_C = 10mA$, $V_{CE} = 5V$	-	6	-	-	2.5	-	GHz

Electrical Specifications $T_A = 25^oC$ (Continued)

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Base-to-Emitter Capacitance	V_{BE} = -3V	-	200	-	-	500	-	fF
Collector-to-Base Capacitance	V_{CB} = 3V	-	200	-	-	500	-	fF

Electrical Specifications $T_A = 25^oC$

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
DC PNP CHARACTERISTICS								
Collector-to-Base Breakdown Voltage, $V_{(BR)CBO}$	I_C = -100µA, I_E = 0	10	15	-	10	15	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CEO}$	I_C = -100µA, I_B = 0	8	15	-	8	15	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CES}$	I_C = -100µA, Base Shorted to Emitter	10	15	-	10	15	-	V
Emitter-to-Base Breakdown Voltage, $V_{(BR)EBO}$	I_E = -10µA, I_C = 0	4.5	5	-	4.5	5	-	V
Collector-Cutoff-Current, I_{CEO}	V_{CE} = -6V, I_B = 0	-	2	100	-	2	100	nA
Collector-Cutoff-Current, I_{CBO}	V_{CB} = -8V, I_E = 0	-	0.1	10	-	0.1	10	nA
Collector-to-Emitter Saturation Voltage, $V_{CE(SAT)}$	I_C = -10mA, I_B = -1mA	-	0.3	0.5	-	0.3	0.5	V
Base-to-Emitter Voltage, V_{BE}	I_C = -10mA	-	0.85	0.95	-	0.85	0.95	V
DC Forward-Current Transfer Ratio, h_{FE}	I_C = -10mA, V_{CE} = -2V	20	60	-	20	60	-	
Early Voltage, V_A	I_C = -1mA, V_{CE} = -3.5V	10	20	-	10	20	-	V
Base-to-Emitter Voltage Drift	I_C = -10mA	-	-1.5	-	-	-1.5	-	mV/^{o}C
Collector-to-Collector Leakage		-	1	-	-	1	-	pA

Electrical Specifications $T_A = 25^oC$

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
DYNAMIC PNP CHARACTERISTICS								
Noise Figure	f = 1.0GHz, V_{CE} = -5V, I_C = -5mA, Z_S = 50Ω	-	3.5	-	-	3.5	-	dB
f_T Current Gain-Bandwidth Product	I_C = -1mA, V_{CE} = -5V	-	2	-	-	2	-	GHz
	I_C = -10mA, V_{CE} = -5V	-	5.5	-	-	5.5	-	GHz
Power Gain-Bandwidth Product	I_C = -10mA, V_{CE} = -5V	-	3	-	-	2	-	GHz
Base-to-Emitter Capacitance	V_{BE} = 3V	-	200	-	-	500	-	fF
Collector-to-Base Capacitance	V_{CB} = -3V	-	300	-	-	600	-	fF

Electrical Specifications $T_A = 25^oC$

PARAMETER	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
DIFFERENTIAL PAIR MATCHING CHARACTERISTICS FOR THE HFA3046								
Input Offset Voltage	I_C = 10mA, V_{CE} = 5V	-	1.5	5.0	-	1.5	5.0	mV
Input Offset Current	I_C = 10mA, V_{CE} = 5V	-	5	25	-	5	25	µA
Input Offset Voltage TC	I_C = 10mA, V_{CE} = 5V	-	0.5	-	-	0.5	-	µV/^{o}C

S-Parameter and PSPICE model data is available from Harris Sales Offices, and Harris Semiconductor's web site.

Common Emitter S-Parameters of NPN 3µm x 50µm Transistor

FREQ. (Hz)	$\|S_{11}\|$	PHASE(S_{11})	$\|S_{21}\|$	PHASE(S_{21})	$\|S_{12}\|$	PHASE(S_{12})	$\|S_{22}\|$	PHASE(S_{22})
V_{CE} = 5V and I_C = 5mA								
1.0E+08	0.83	-11.78	11.07	168.57	1.41E-02	78.88	0.97	-11.05
2.0E+08	0.79	-22.82	10.51	157.89	2.69E-02	68.63	0.93	-21.35
3.0E+08	0.73	-32.64	9.75	148.44	3.75E-02	59.58	0.86	-30.44
4.0E+08	0.67	-41.08	8.91	140.36	4.57E-02	51.90	0.79	-38.16
5.0E+08	0.61	-48.23	8.10	133.56	5.19E-02	45.50	0.73	-44.59
6.0E+08	0.55	-54.27	7.35	127.88	5.65E-02	40.21	0.67	-49.93
7.0E+08	0.50	-59.41	6.69	123.10	6.00E-02	35.82	0.62	-54.37
8.0E+08	0.46	-63.81	6.11	119.04	6.27E-02	32.15	0.57	-58.10
9.0E+08	0.42	-67.63	5.61	115.57	6.47E-02	29.07	0.53	-61.25
1.0E+09	0.39	-70.98	5.17	112.55	6.63E-02	26.45	0.50	-63.96
1.1E+09	0.36	-73.95	4.79	109.91	6.75E-02	24.19	0.47	-66.31
1.2E+09	0.34	-76.62	4.45	107.57	6.85E-02	22.24	0.45	-68.37
1.3E+09	0.32	-79.04	4.15	105.47	6.93E-02	20.53	0.43	-70.19
1.4E+09	0.30	-81.25	3.89	103.57	7.00E-02	19.02	0.41	-71.83
1.5E+09	0.28	-83.28	3.66	101.84	7.05E-02	17.69	0.40	-73.31
1.6E+09	0.27	-85.17	3.45	100.26	7.10E-02	16.49	0.39	-74.66
1.7E+09	0.25	-86.92	3.27	98.79	7.13E-02	15.41	0.38	-75.90
1.8E+09	0.24	-88.57	3.10	97.43	7.17E-02	14.43	0.37	-77.05
1.9E+09	0.23	-90.12	2.94	96.15	7.19E-02	13.54	0.36	-78.12
2.0E+09	0.22	-91.59	2.80	94.95	7.21E-02	12.73	0.35	-79.13
2.1E+09	0.21	-92.98	2.68	93.81	7.23E-02	11.98	0.35	-80.09
2.2E+09	0.20	-94.30	2.56	92.73	7.25E-02	11.29	0.34	-80.99
2.3E+09	0.20	-95.57	2.45	91.70	7.27E-02	10.64	0.34	-81.85
2.4E+09	0.19	-96.78	2.35	90.72	7.28E-02	10.05	0.33	-82.68
2.5E+09	0.18	-97.93	2.26	89.78	7.29E-02	9.49	0.33	-83.47
2.6E+09	0.18	-99.05	2.18	88.87	7.30E-02	8.96	0.33	-84.23
2.7E+09	0.17	-100.12	2.10	88.00	7.31E-02	8.47	0.33	-84.97
2.8E+09	0.17	-101.15	2.02	87.15	7.31E-02	8.01	0.33	-85.68
2.9E+09	0.16	-102.15	1.96	86.33	7.32E-02	7.57	0.33	-86.37
3.0E+09	0.16	-103.11	1.89	85.54	7.32E-02	7.16	0.33	-87.05

Common Emitter S-Parameters of NPN 3μm x 50μm Transistor (Continued)

FREQ. (Hz)	$\|S_{11}\|$	PHASE(S_{11})	$\|S_{21}\|$	PHASE(S_{21})	$\|S_{12}\|$	PHASE(S_{12})	$\|S_{22}\|$	PHASE(S_{22})
V_{CE} = 5V and I_C = 10mA								
1.0E+08	0.72	-16.43	15.12	165.22	1.27E-02	75.41	0.95	-14.26
2.0E+08	0.67	-31.26	13.90	152.04	2.34E-02	62.89	0.88	-26.95
3.0E+08	0.60	-43.76	12.39	141.18	3.13E-02	52.58	0.79	-37.31
4.0E+08	0.53	-54.00	10.92	132.57	3.68E-02	44.50	0.70	-45.45
5.0E+08	0.47	-62.38	9.62	125.78	4.05E-02	38.23	0.63	-51.77
6.0E+08	0.42	-69.35	8.53	120.37	4.31E-02	33.34	0.57	-56.72
7.0E+08	0.37	-75.26	7.62	116.00	4.49E-02	29.47	0.51	-60.65
8.0E+08	0.34	-80.36	6.86	112.39	4.63E-02	26.37	0.47	-63.85
9.0E+08	0.31	-84.84	6.22	109.36	4.72E-02	23.84	0.44	-66.49
1.0E+09	0.29	-88.83	5.69	106.77	4.80E-02	21.75	0.41	-68.71
1.1E+09	0.27	-92.44	5.23	104.51	4.86E-02	20.00	0.39	-70.62
1.2E+09	0.25	-95.73	4.83	102.53	4.90E-02	18.52	0.37	-72.28
1.3E+09	0.24	-98.75	4.49	100.75	4.94E-02	17.25	0.35	-73.76
1.4E+09	0.22	-101.55	4.19	99.16	4.97E-02	16.15	0.34	-75.08
1.5E+09	0.21	-104.15	3.93	97.70	4.99E-02	15.19	0.33	-76.28
1.6E+09	0.20	-106.57	3.70	96.36	5.01E-02	14.34	0.32	-77.38
1.7E+09	0.20	-108.85	3.49	95.12	5.03E-02	13.60	0.31	-78.41
1.8E+09	0.19	-110.98	3.30	93.96	5.05E-02	12.94	0.31	-79.37
1.9E+09	0.18	-113.00	3.13	92.87	5.06E-02	12.34	0.30	-80.27
2.0E+09	0.18	-114.90	2.98	91.85	5.07E-02	11.81	0.30	-81.13
2.1E+09	0.17	-116.69	2.84	90.87	5.08E-02	11.33	0.30	-81.95
2.2E+09	0.17	-118.39	2.72	89.94	5.09E-02	10.89	0.29	-82.74
2.3E+09	0.16	-120.01	2.60	89.06	5.10E-02	10.50	0.29	-83.50
2.4E+09	0.16	-121.54	2.49	88.21	5.11E-02	10.13	0.29	-84.24
2.5E+09	0.16	-122.99	2.39	87.39	5.12E-02	9.80	0.29	-84.95
2.6E+09	0.15	-124.37	2.30	86.60	5.12E-02	9.49	0.29	-85.64
2.7E+09	0.15	-125.69	2.22	85.83	5.13E-02	9.21	0.29	-86.32
2.8E+09	0.15	-126.94	2.14	85.09	5.13E-02	8.95	0.29	-86.98
2.9E+09	0.15	-128.14	2.06	84.36	5.14E-02	8.71	0.29	-87.62
3.0E+09	0.14	-129.27	1.99	83.66	5.15E-02	8.49	0.29	-88.25

Common Emitter S-Parameters of PNP 3μm x 50μm Transistor

FREQ. (Hz)	$\|S_{11}\|$	PHASE(S_{11})	$\|S_{21}\|$	PHASE(S_{21})	$\|S_{12}\|$	PHASE(S_{12})	$\|S_{22}\|$	PHASE(S_{22})
V_{CE} = -5V and I_C = -5mA								
1.0E+08	0.72	-16.65	10.11	166.77	1.66E-02	77.18	0.96	-10.76
2.0E+08	0.68	-32.12	9.44	154.69	3.10E-02	65.94	0.90	-20.38
3.0E+08	0.62	-45.73	8.57	144.40	4.23E-02	56.39	0.82	-28.25
4.0E+08	0.57	-57.39	7.68	135.95	5.05E-02	48.66	0.74	-34.31
5.0E+08	0.52	-67.32	6.86	129.11	5.64E-02	42.52	0.67	-38.81

Common Emitter S-Parameters of PNP 3μm x 50μm Transistor (Continued)

FREQ. (Hz)	$\|S_{11}\|$	PHASE(S_{11})	$\|S_{21}\|$	PHASE(S_{21})	$\|S_{12}\|$	PHASE(S_{12})	$\|S_{22}\|$	PHASE(S_{22})
6.0E+08	0.47	-75.83	6.14	123.55	6.07E-02	37.66	0.61	-42.10
7.0E+08	0.43	-83.18	5.53	118.98	6.37E-02	33.79	0.55	-44.47
8.0E+08	0.40	-89.60	5.01	115.17	6.60E-02	30.67	0.51	-46.15
9.0E+08	0.38	-95.26	4.56	111.94	6.77E-02	28.14	0.47	-47.33
1.0E+09	0.36	-100.29	4.18	109.17	6.91E-02	26.06	0.44	-48.15
1.1E+09	0.34	-104.80	3.86	106.76	7.01E-02	24.33	0.41	-48.69
1.2E+09	0.33	-108.86	3.58	104.63	7.09E-02	22.89	0.39	-49.05
1.3E+09	0.32	-112.53	3.33	102.72	7.16E-02	21.67	0.37	-49.26
1.4E+09	0.30	-115.86	3.12	101.01	7.22E-02	20.64	0.36	-49.38
1.5E+09	0.30	-118.90	2.92	99.44	7.27E-02	19.76	0.34	-49.43
1.6E+09	0.29	-121.69	2.75	98.01	7.32E-02	19.00	0.33	-49.44
1.7E+09	0.28	-124.24	2.60	96.68	7.35E-02	18.35	0.32	-49.43
1.8E+09	0.28	-126.59	2.47	95.44	7.39E-02	17.79	0.31	-49.40
1.9E+09	0.27	-128.76	2.34	94.29	7.42E-02	17.30	0.30	-49.38
2.0E+09	0.27	-130.77	2.23	93.19	7.45E-02	16.88	0.30	-49.36
2.1E+09	0.26	-132.63	2.13	92.16	7.47E-02	16.52	0.29	-49.35
2.2E+09	0.26	-134.35	2.04	91.18	7.50E-02	16.20	0.28	-49.35
2.3E+09	0.26	-135.96	1.95	90.24	7.52E-02	15.92	0.28	-49.38
2.4E+09	0.25	-137.46	1.87	89.34	7.55E-02	15.68	0.28	-49.42
2.5E+09	0.25	-138.86	1.80	88.48	7.57E-02	15.48	0.27	-49.49
2.6E+09	0.25	-140.17	1.73	87.65	7.59E-02	15.30	0.27	-49.56
2.7E+09	0.25	-141.39	1.67	86.85	7.61E-02	15.15	0.26	-49.67
2.8E+09	0.25	-142.54	1.61	86.07	7.63E-02	15.01	0.26	-49.81
2.9E+09	0.24	-143.62	1.56	85.31	7.65E-02	14.90	0.26	-49.96
3.0E+09	0.24	-144.64	1.51	84.58	7.67E-02	14.81	0.26	-50.13
V_{CE} = -5V, I_C = -10mA								
1.0E+08	0.58	-23.24	13.03	163.45	1.43E-02	73.38	0.93	-13.46
2.0E+08	0.53	-44.07	11.75	149.11	2.58E-02	60.43	0.85	-24.76
3.0E+08	0.48	-61.50	10.25	137.78	3.38E-02	50.16	0.74	-33.10
4.0E+08	0.43	-75.73	8.88	129.12	3.90E-02	42.49	0.65	-38.83
5.0E+08	0.40	-87.36	7.72	122.49	4.25E-02	36.81	0.58	-42.63
6.0E+08	0.37	-96.94	6.78	117.33	4.48E-02	32.59	0.51	-45.07
7.0E+08	0.35	-104.92	6.01	113.22	4.64E-02	29.39	0.47	-46.60
8.0E+08	0.33	-111.64	5.39	109.85	4.76E-02	26.94	0.43	-47.49
9.0E+08	0.32	-117.36	4.87	107.05	4.85E-02	25.04	0.40	-47.97
1.0E+09	0.31	-122.27	4.44	104.66	4.92E-02	23.55	0.37	-48.18
1.1E+09	0.30	-126.51	4.07	102.59	4.97E-02	22.37	0.35	-48.20
1.2E+09	0.30	-130.21	3.76	100.76	5.02E-02	21.44	0.33	-48.11

Common Emitter S-Parameters of PNP 3μm x 50μm Transistor (Continued)

FREQ. (Hz)	$\|S_{11}\|$	PHASE(S_{11})	$\|S_{21}\|$	PHASE(S_{21})	$\|S_{12}\|$	PHASE(S_{12})	$\|S_{22}\|$	PHASE(S_{22})
1.3E+09	0.29	-133.46	3.49	99.14	5.06E-02	20.70	0.32	-47.95
1.4E+09	0.29	-136.33	3.25	97.67	5.09E-02	20.11	0.31	-47.77
1.5E+09	0.28	-138.89	3.05	96.33	5.12E-02	19.65	0.30	-47.58
1.6E+09	0.28	-141.17	2.87	95.10	5.15E-02	19.29	0.29	-47.39
1.7E+09	0.28	-143.21	2.70	93.96	5.18E-02	19.01	0.28	-47.23
1.8E+09	0.28	-145.06	2.56	92.90	5.21E-02	18.80	0.27	-47.09
1.9E+09	0.27	-146.73	2.43	91.90	5.23E-02	18.65	0.27	-46.98
2.0E+09	0.27	-148.26	2.31	90.95	5.26E-02	18.55	0.26	-46.91
2.1E+09	0.27	-149.65	2.20	90.05	5.28E-02	18.49	0.26	-46.87
2.2E+09	0.27	-150.92	2.10	89.20	5.30E-02	18.46	0.25	-46.87
2.3E+09	0.27	-152.10	2.01	88.37	5.33E-02	18.47	0.25	-46.90
2.4E+09	0.27	-153.18	1.93	87.59	5.35E-02	18.50	0.25	-46.97
2.5E+09	0.27	-154.17	1.86	86.82	5.38E-02	18.55	0.24	-47.07
2.6E+09	0.26	-155.10	1.79	86.09	5.40E-02	18.62	0.24	-47.18
2.7E+09	0.26	-155.96	1.72	85.38	5.42E-02	18.71	0.24	-47.34
2.8E+09	0.26	-156.76	1.66	84.68	5.45E-02	18.80	0.24	-47.55
2.9E+09	0.26	-157.51	1.60	84.01	5.47E-02	18.91	0.24	-47.76
3.0E+09	0.26	-158.21	1.55	83.35	5.50E-02	19.03	0.23	-48.00

Typical Performance Curves

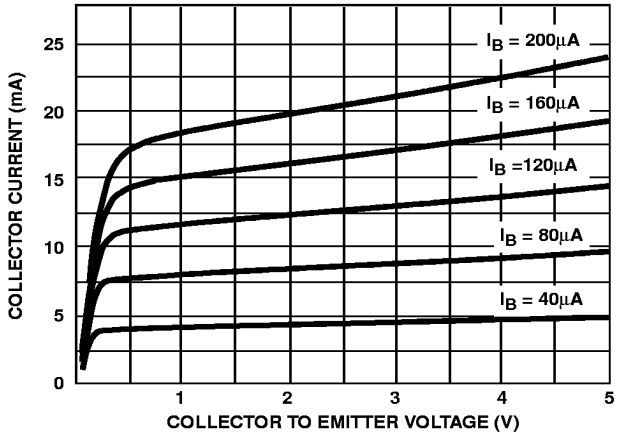


FIGURE 1. NPN COLLECTOR CURRENT vs COLLECTOR TO EMITTER VOLTAGE

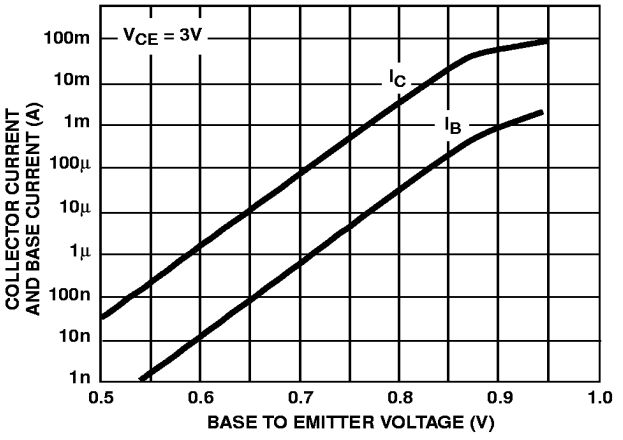


FIGURE 2. NPN COLLECTOR CURRENT AND BASE CURRENT vs BASE TO EMITTER VOLTAGE

Typical Performance Curves (Continued)

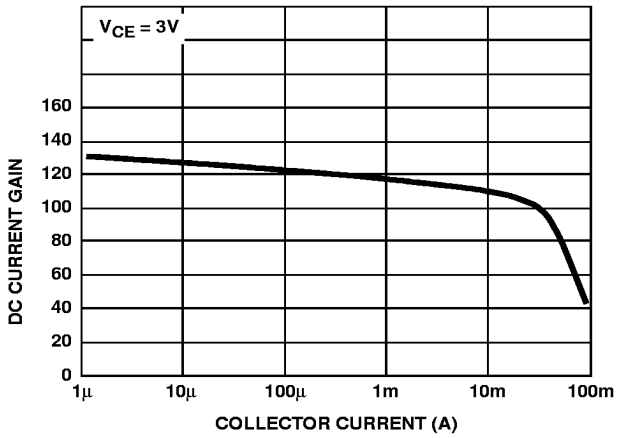


FIGURE 3. NPN DC CURRENT GAIN vs COLLECTOR CURRENT

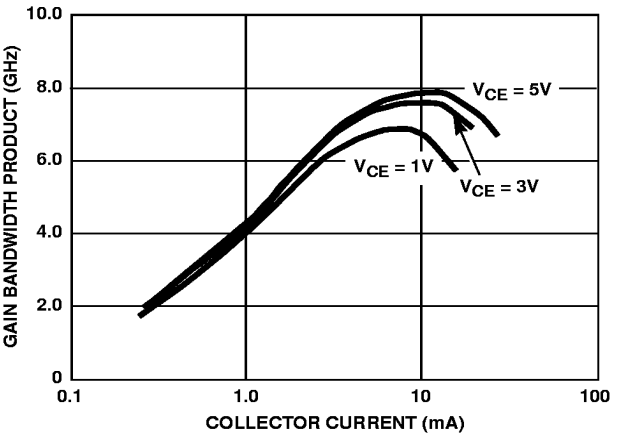


FIGURE 4. NPN GAIN BANDWIDTH PRODUCT vs COLLECTOR CURRENT (UHF 3 x 50 WITH BOND PADS)

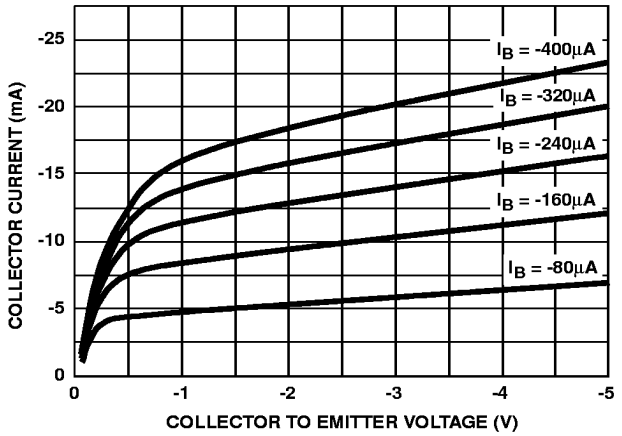


FIGURE 5. PNP COLLECTOR CURRENT vs COLLECTOR TO EMITTER VOLTAGE

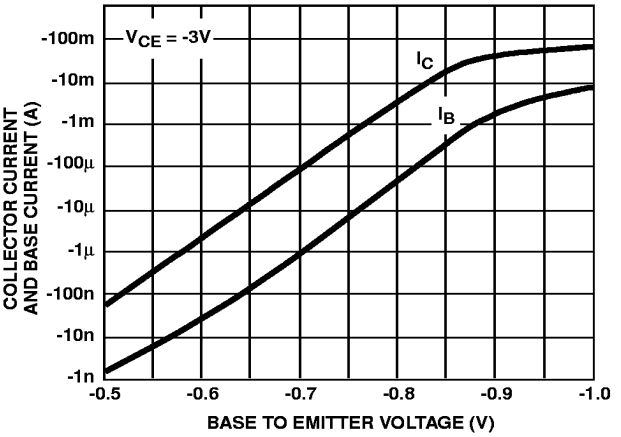


FIGURE 6. PNP COLLECTOR CURRENT AND BASE CURRENT vs BASE TO EMITTER VOLTAGE

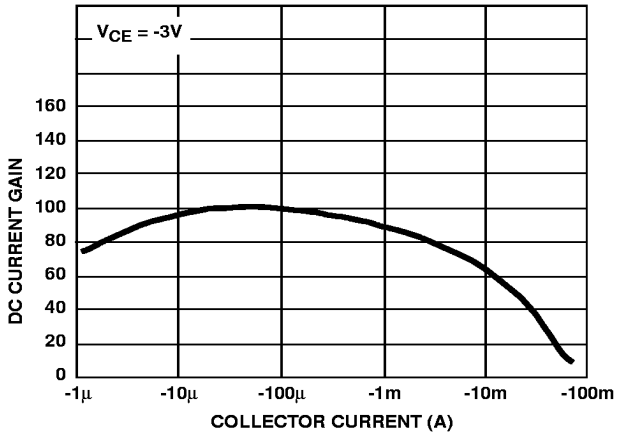


FIGURE 7. PNP DC CURRENT GAIN vs COLLECTOR CURRENT

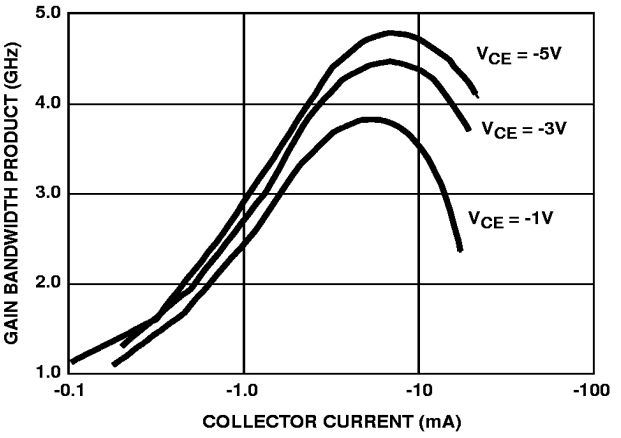


FIGURE 8. PNP GAIN BANDWIDTH PRODUCT vs COLLECTOR CURRENT (UHF 3 x 50 WITH BOND PADS)

Die Characteristics

DIE DIMENSIONS:

53 mils x 52 mils x 19 mils
1340µm x 1320µm x 483µm

METALLIZATION:

Type: Metal 1: AlCu(2%)/TiW
Thickness: Metal 1: 8kÅ ±0.4kÅ
Type: Metal 2: AlCu(2%)
Thickness: Metal 2: 16kÅ 0.8kÅ

PASSIVATION:

Type: Nitride
Thickness: 4kÅ ±0.5kÅ

PROCESS:

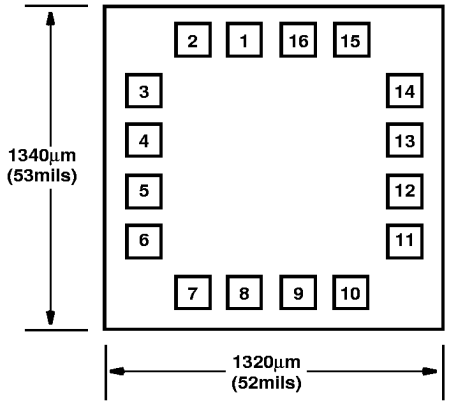
UHF-1

SUBSTRATE POTENTIAL: (POWERED UP)

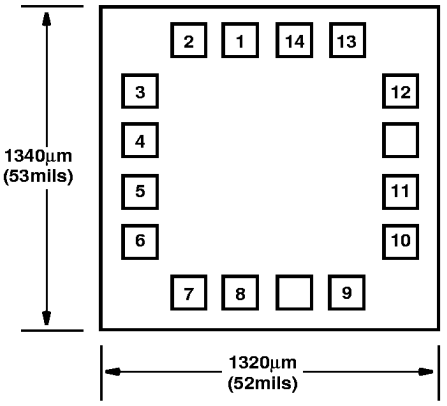
Unbiased

Metallization Mask Layout

HFA3096, HFA3127, HFA3128

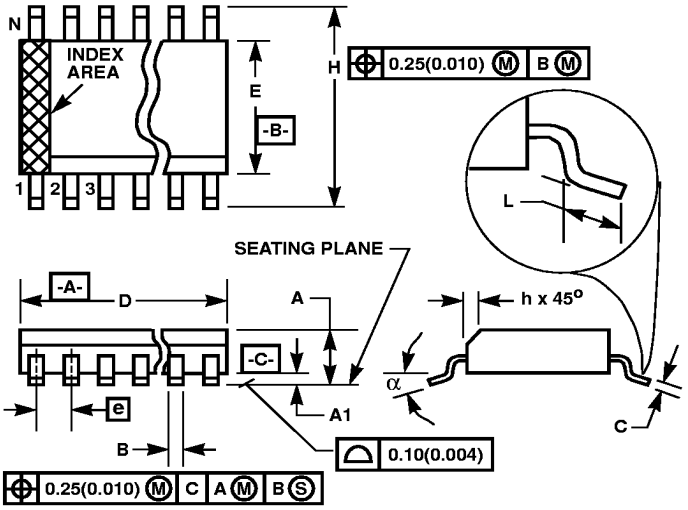


HFA3046



Pad numbers correspond to SOIC pinout.

Small Outline Plastic Packages (SOIC)



NOTES:

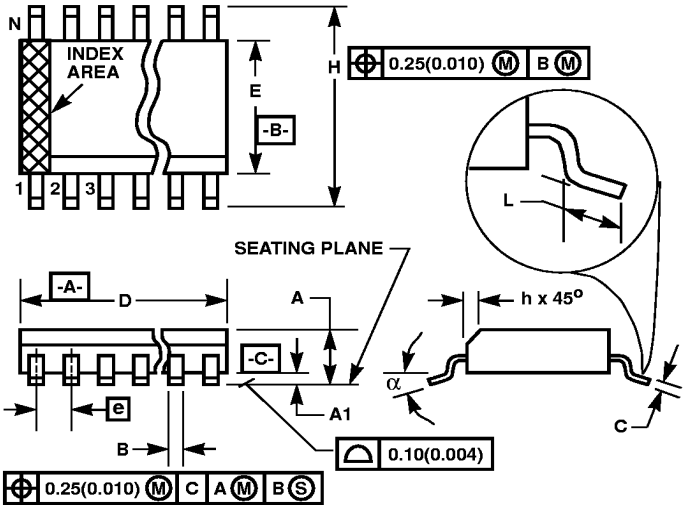
1. Symbols are defined in the "MO Series Symbol List" in Section 2.2 of Publication Number 95.
2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
3. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion and gate burrs shall not exceed 0.15mm (0.006 inch) per side.
4. Dimension "E" does not include interlead flash or protrusions. Interlead flash and protrusions shall not exceed 0.25mm (0.010 inch) per side.
5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
6. "L" is the length of terminal for soldering to a substrate.
7. "N" is the number of terminal positions.
8. Terminal numbers are shown for reference only.
9. The lead width "B", as measured 0.36mm (0.014 inch) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.024 inch).
10. Controlling dimension: MILLIMETER. Converted inch dimensions are not necessarily exact.

M14.15 (JEDEC MS-012-AB ISSUE C)
14 LEAD NARROW BODY SMALL OUTLINE PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.0532	0.0688	1.35	1.75	-
A1	0.0040	0.0098	0.10	0.25	-
B	0.013	0.020	0.33	0.51	9
C	0.0075	0.0098	0.19	0.25	-
D	0.3367	0.3444	8.55	8.75	3
E	0.1497	0.1574	3.80	4.00	4
e	0.050 BSC		1.27 BSC		-
H	0.2284	0.2440	5.80	6.20	-
h	0.0099	0.0196	0.25	0.50	5
L	0.016	0.050	0.40	1.27	6
N	14		14		7
α	0^o	8^o	0^o	8^o	-

Rev. 0 12/93

Small Outline Plastic Packages (SOIC)



M16.15 (JEDEC MS-012-AC ISSUE C)
16 LEAD NARROW BODY SMALL OUTLINE PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.0532	0.0688	1.35	1.75	-
A1	0.0040	0.0098	0.10	0.25	-
B	0.013	0.020	0.33	0.51	9
C	0.0075	0.0098	0.19	0.25	-
D	0.3859	0.3937	9.80	10.00	3
E	0.1497	0.1574	3.80	4.00	4
e	0.050 BSC		1.27 BSC		-
H	0.2284	0.2440	5.80	6.20	-
h	0.0099	0.0196	0.25	0.50	5
L	0.016	0.050	0.40	1.27	6
N	16		16		7
α	0^o	8^o	0^o	8^o	-

Rev. 0 12/93

NOTES:

1. Symbols are defined in the "MO Series Symbol List" in Section 2.2 of Publication Number 95.
2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
3. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion and gate burrs shall not exceed 0.15mm (0.006 inch) per side.
4. Dimension "E" does not include interlead flash or protrusions. Interlead flash and protrusions shall not exceed 0.25mm (0.010 inch) per side.
5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
6. "L" is the length of terminal for soldering to a substrate.
7. "N" is the number of terminal positions.
8. Terminal numbers are shown for reference only.
9. The lead width "B", as measured 0.36mm (0.014 inch) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.024 inch).
10. Controlling dimension: MILLIMETER. Converted inch dimensions are not necessarily exact.

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