HFA3046, HFA3096, HFA3127, HFA3128

July 1995

Ultra High Frequency Transistor Array

Features

- NPN Transistor (f_T) 8GHz
- NPN Current Gain (h_{FE}) 70
- NPN Early Voltage (V_A) 50V
- PNP Transistor (f_T) 5.5GHz
- PNP Current Gain (h_{FE}) 40
- PNP Early Voltage (V_A) 25V
- 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

Description

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 a 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.

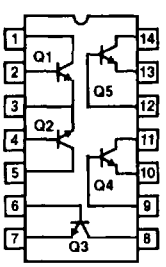
For PSPICE models, please request AnswerFAX document number 663046. Harris also provides an Application Note illustrating the use of these devices as RF amplifiers (request AnswerFAX document 99315).

Ordering Information

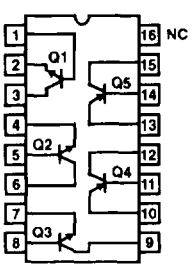
PART NUMBER	PACKAGE
HFA3046B	14 Lead Plastic SOIC (N)
HFA3096B, HFA3127B, HFA3128B	16 Lead Plastic SOIC (N)
HFA3046Y, HFA3096Y	Die
HFA3127Y, HFA3128Y	Die

Pinouts

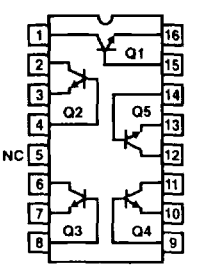
HFA3046
TOP VIEW



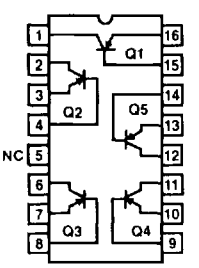
HFA3096
TOP VIEW



HFA3127
TOP VIEW



HFA3128
TOP VIEW



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper IC Handling Procedures.

File Number **3076.6**

Absolute Maximum Ratings

Collector to Emitter Voltage (Open Base) 8.0V
Collector to Base Voltage (Shorted Base) 12.0V
Emitter to Base Voltage (Reverse Bias) 5.5V
Collector Current 15.5mA
Storage Temperature Range . . . . . -65°C to +150°C
Operating Temperature Range . . . . . -55°C to +125°C
Junction Temperature (Die) . . . . . +175°C
Junction Temperature (Plastic Package) . . . . . +150°C
Lead Temperature (Soldering 10s) (Lead Tips Only) . . . . . +300°C

Thermal Information

Thermal Resistance	θ_{JA}
Plastic 14 Lead SOIC Package	120°C/W
Plastic 16 Lead SOIC Package	115°C/W
Maximum Package Power Dissipation at +75°C	
Plastic 14 Lead SOIC Package	0.63W
Plastic 16 Lead SOIC Package	0.66W
Any One Transistor	0.15W
Derating Factor Above +75°C	
Plastic 14 Lead SOIC Package	8.4mW/°C
Plastic 16 Lead SOIC Package	8.7mW/°C

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.

Static NPN Characteristics at $T_A = +25°C$

PARAMETERS	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
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	70	-	40	70	-	
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/°C
Collector-to-Collector Leakage		-	1	-	-	1	-	pA

Dynamic NPN Characteristics at $T_A = +25°C$

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

Static PNP Characteristics at $T_A = +25^oC$

PARAMETERS	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Collector-to-Base Breakdown Voltage, $V_{(BR)CBO}$	$I_C = -100\mu A$, $I_E = 0$	10	15	-	10	15	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CEO}$	$I_C = -100\mu A$, $I_B = 0$	8	15	-	8	15	-	V
Collector-to-Emitter Breakdown Voltage, $V_{(BR)CES}$	$I_C = -100\mu A$, Base Shorted to Emitter	10	15	-	10	15	-	V
Emitter-to-Base Breakdown Voltage, $V_{(BR)EBO}$	$I_E = -10\mu A$, $I_C = 0$	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}	$I_C = -10mA$, $V_{CE} = -2V$	25	40	-	25	40	-	
Early Voltage, V_A	$I_C = -1mA$, $V_{CE} = -3.5V$	10	25	-	10	25	-	V
Base-to-Emitter Voltage Drift	$I_C = -10mA$	-	-1.5	-	-	-1.5	-	$mV/^oC$
Collector-to-Collector Leakage		-	1	-	-	1	-	pA

Dynamic PNP Characteristics at $T_A = +25^oC$

PARAMETERS	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
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	$I_C = -1mA$, $V_{CE} = -5V$	-	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

Differential Pair Matching Characteristics for the HFA3046

PARAMETERS	TEST CONDITIONS	DIE			SOIC			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
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	-	$\mu V/^oC$

S-Parameter and PSPICE model data is available from Harris Sales Offices.

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

FREQ. (Hz)	IS11I	PHASE(S11)	IS12I	PHASE(S12)	IS21I	PHASE(S21)	IS22I	PHASE(S22)
V_{CE} = 5V and I_C = 5mA								
1.0E+08	0.83	-11.78	1.41E-02	78.88	11.07	168.57	0.97	-11.05
2.0E+08	0.79	-22.82	2.69E-02	68.63	10.51	157.89	0.93	-21.35
3.0E+08	0.73	-32.64	3.75E-02	59.58	9.75	148.44	0.86	-30.44
4.0E+08	0.67	-41.08	4.57E-02	51.90	8.91	140.36	0.79	-38.16
5.0E+08	0.61	-48.23	5.19E-02	45.50	8.10	133.56	0.73	-44.59
6.0E+08	0.55	-54.27	5.65E-02	40.21	7.35	127.88	0.67	-49.93
7.0E+08	0.50	-59.41	6.00E-02	35.82	6.69	123.10	0.62	-54.37
8.0E+08	0.46	-63.81	6.27E-02	32.15	6.11	119.04	0.57	-58.10
9.0E+08	0.42	-67.63	6.47E-02	29.07	5.61	115.57	0.53	-61.25
1.0E+09	0.39	-70.98	6.63E-02	26.45	5.17	112.55	0.50	-63.96
1.1E+09	0.36	-73.95	6.75E-02	24.19	4.79	109.91	0.47	-66.31
1.2E+09	0.34	-76.62	6.85E-02	22.24	4.45	107.57	0.45	-68.37
1.3E+09	0.32	-79.04	6.93E-02	20.53	4.15	105.47	0.43	-70.19
1.4E+09	0.30	-81.25	7.00E-02	19.02	3.89	103.57	0.41	-71.83
1.5E+09	0.28	-83.28	7.05E-02	17.69	3.66	101.84	0.40	-73.31
1.6E+09	0.27	-85.17	7.10E-02	16.49	3.45	100.26	0.39	-74.66
1.7E+09	0.25	-86.92	7.13E-02	15.41	3.27	98.79	0.38	-75.90
1.8E+09	0.24	-88.57	7.17E-02	14.43	3.10	97.43	0.37	-77.05
1.9E+09	0.23	-90.12	7.19E-02	13.54	2.94	96.15	0.36	-78.12
2.0E+09	0.22	-91.59	7.21E-02	12.73	2.80	94.95	0.35	-79.13
2.1E+09	0.21	-92.98	7.23E-02	11.98	2.68	93.81	0.35	-80.09
2.2E+09	0.20	-94.30	7.25E-02	11.29	2.56	92.73	0.34	-80.99
2.3E+09	0.20	-95.57	7.27E-02	10.64	2.45	91.70	0.34	-81.85
2.4E+09	0.19	-96.78	7.28E-02	10.05	2.35	90.72	0.33	-82.68
2.5E+09	0.18	-97.93	7.29E-02	9.49	2.26	89.78	0.33	-83.47
2.6E+09	0.18	-99.05	7.30E-02	8.96	2.18	88.87	0.33	-84.23
2.7E+09	0.17	-100.12	7.31E-02	8.47	2.10	88.00	0.33	-84.97
2.8E+09	0.17	-101.15	7.31E-02	8.01	2.02	87.15	0.33	-85.68
2.9E+09	0.16	-102.15	7.32E-02	7.57	1.96	86.33	0.33	-86.37
3.0E+09	0.16	-103.11	7.32E-02	7.16	1.89	85.54	0.33	-87.05

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

FREQ. (Hz)	|S11|	PHASE(S11)	|S12|	PHASE(S12)	|S21|	PHASE(S21)	|S22|	PHASE(S22)
V_{CE} = 5V and I_C = 10mA								
1.0E+08	0.72	-16.43	1.27E-02	75.41	15.12	165.22	0.95	-14.26
2.0E+08	0.67	-31.26	2.34E-02	62.89	13.90	152.04	0.88	-26.95
3.0E+08	0.60	-43.76	3.13E-02	52.58	12.39	141.18	0.79	-37.31
4.0E+08	0.53	-54.00	3.68E-02	44.50	10.92	132.57	0.70	-45.45
5.0E+08	0.47	-62.38	4.05E-02	38.23	9.62	125.78	0.63	-51.77
6.0E+08	0.42	-69.35	4.31E-02	33.34	8.53	120.37	0.57	-56.72
7.0E+08	0.37	-75.26	4.49E-02	29.47	7.62	116.00	0.51	-60.65
8.0E+08	0.34	-80.36	4.63E-02	26.37	6.86	112.39	0.47	-63.85
9.0E+08	0.31	-84.84	4.72E-02	23.84	6.22	109.36	0.44	-66.49
1.0E+09	0.29	-88.83	4.80E-02	21.75	5.69	106.77	0.41	-68.71
1.1E+09	0.27	-92.44	4.86E-02	20.00	5.23	104.51	0.39	-70.62
1.2E+09	0.25	-95.73	4.90E-02	18.52	4.83	102.53	0.37	-72.28
1.3E+09	0.24	-98.75	4.94E-02	17.25	4.49	100.75	0.35	-73.76
1.4E+09	0.22	-101.55	4.97E-02	16.15	4.19	99.16	0.34	-75.08
1.5E+09	0.21	-104.15	4.99E-02	15.19	3.93	97.70	0.33	-76.28
1.6E+09	0.20	-106.57	5.01E-02	14.34	3.70	96.36	0.32	-77.38
1.7E+09	0.20	-108.85	5.03E-02	13.60	3.49	95.12	0.31	-78.41
1.8E+09	0.19	-110.98	5.05E-02	12.94	3.30	93.96	0.31	-79.37
1.9E+09	0.18	-113.00	5.06E-02	12.34	3.13	92.87	0.30	-80.27
2.0E+09	0.18	-114.90	5.07E-02	11.81	2.98	91.85	0.30	-81.13
2.1E+09	0.17	-116.69	5.08E-02	11.33	2.84	90.87	0.30	-81.95
2.2E+09	0.17	-118.39	5.09E-02	10.89	2.72	89.94	0.29	-82.74
2.3E+09	0.16	-120.01	5.10E-02	10.50	2.60	89.06	0.29	-83.50
2.4E+09	0.16	-121.54	5.11E-02	10.13	2.49	88.21	0.29	-84.24
2.5E+09	0.16	-122.99	5.12E-02	9.80	2.39	87.39	0.29	-84.95
2.6E+09	0.15	-124.37	5.12E-02	9.49	2.30	86.60	0.29	-85.64
2.7E+09	0.15	-125.69	5.13E-02	9.21	2.22	85.83	0.29	-86.32
2.8E+09	0.15	-126.94	5.13E-02	8.95	2.14	85.09	0.29	-86.98
2.9E+09	0.15	-128.14	5.14E-02	8.71	2.06	84.36	0.29	-87.62
3.0E+09	0.14	-129.27	5.15E-02	8.49	1.99	83.66	0.29	-88.25

Common Emitter S-Parameters of PNP 3mm^2 x 50mm^2 Transistor

FREQ. (Hz)	|S11|	PHASE(S11)	|S21|	PHASE(S21)	|S12|	PHASE(S12)	|S22|	PHASE(S22)
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
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

Common Emitter S-Parameters of PNP 3mm^2 x 50mm^2 Transistor (Continued)

FREQ. (Hz)	IS11I	PHASE(S11)	IS21I	PHASE(S21)	IS12I	PHASE(S12)	IS22I	PHASE(S22)
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
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

Die Characteristics

PROCESS:
UHF-1

DIE DIMENSIONS:
53 x 52 x 19 ± 1mils
1340µm x 1320µm ± 25.4µm

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

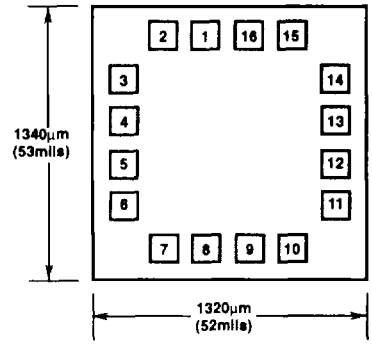
GLASSIVATION:
Type: Nitride
Thickness: 4kÅ ± 0.5kÅ

DIE ATTACH:
Material: Epoxy

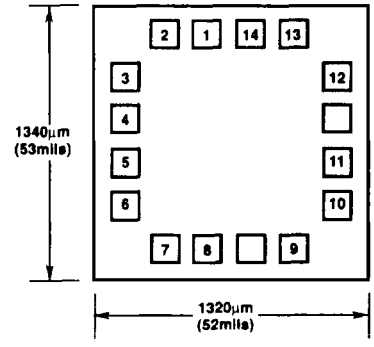
WORST CASE CURRENT DENSITY:
1.39×10^5 A/cm^2

Metallization Mask Layout

HFA3096, HFA3127, HFA3128



HFA3046



Pad numbers correspond to package part pin out.

Typical Performance Curves

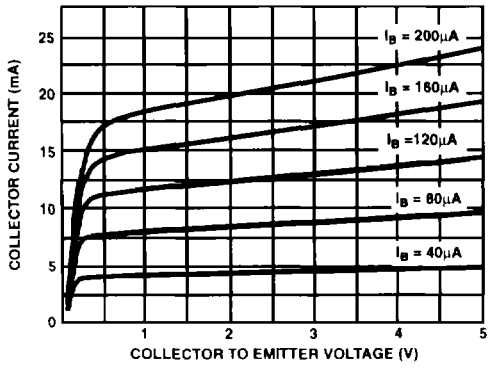


FIGURE 1. NPN COLLECTOR CURRENT vs COLLECTOR TO EMITTER VOLTAGE

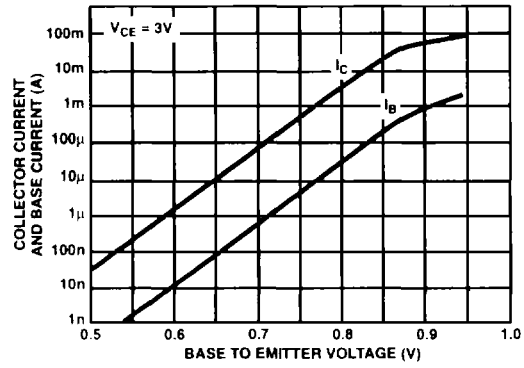


FIGURE 2. NPN COLLECTOR CURRENT AND BASE CURRENT TO EMITTER VOLTAGE

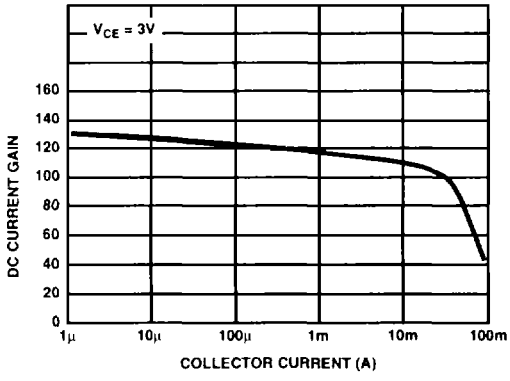


FIGURE 3. NPN DC CURRENT GAIN vs COLLECTOR CURRENT

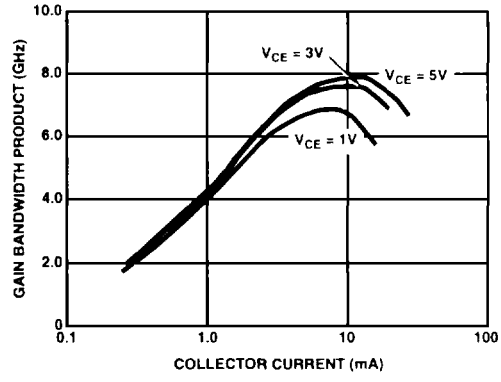


FIGURE 4. NPN GAIN BANDWIDTH PRODUCT vs COLLECTOR CURRENT (UHF 3 x 50 WITH BOND PADS)

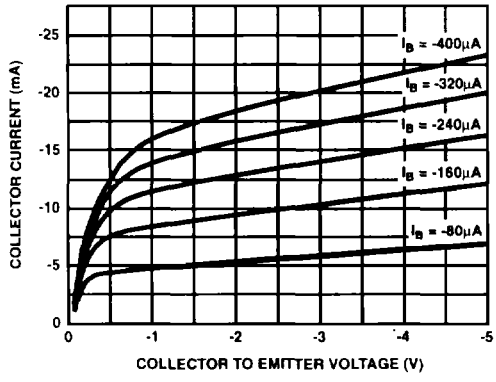


FIGURE 5. PNP COLLECTOR CURRENT vs COLLECTOR TO EMITTER VOLTAGE

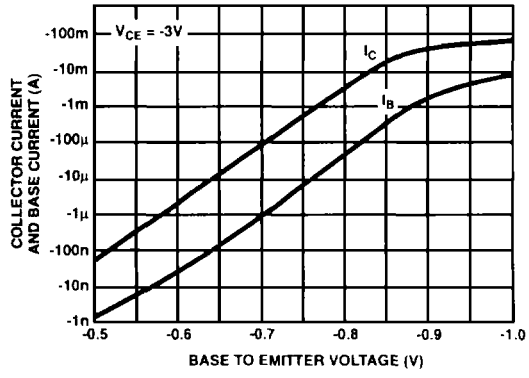


FIGURE 6. PNP COLLECTOR CURRENT AND BASE CURRENT TO EMITTER VOLTAGE

Typical Performance Curves (Continued)

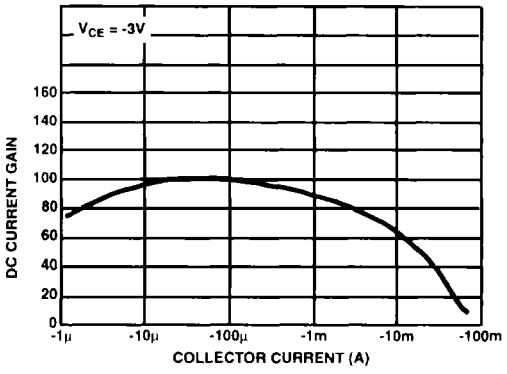


FIGURE 7. PNP DC CURRENT GAIN vs COLLECTOR CURRENT

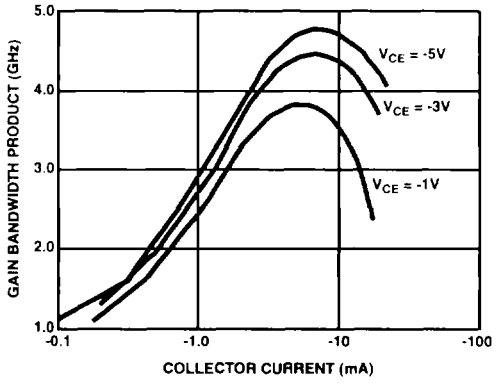


FIGURE 8. PNP GAIN BANDWIDTH PRODUCT vs COLLECTOR CURRENT (UHF 3 x 50 WITH BOND PADS)