HEWLETT PACKARD

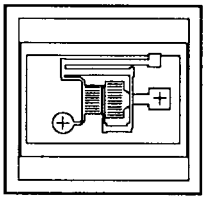
Silicon Bipolar Monolithic Amplifiers

Technical Data

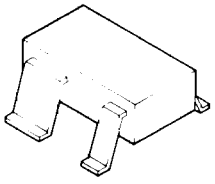
HPMA-0600
HPMA-0611
HPMA-0635
HPMA-0685
HPMA-0686

Features

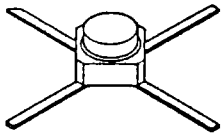
HPMA-0600
- 3 dB Bandwidth: DC to 1.0 GHz
- 19.9 dB Gain Typical at 0.5 GHz
- Low Noise Figure: 2.7 dB Typical at 0.5 GHz



HPMA-0611
- Gain - 100% RF Tested
- 3 dB Bandwidth: DC to 1.0 GHz
- 19 dB Gain Typical at 0.5 GHz
- Low Noise Figure: 3.0 dB Typical at 0.5 GHz
- Low Cost Surface Mount Package
- Tape and Reel Option Available

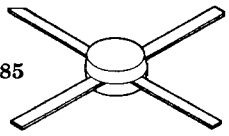


HPMA-0635
- Gain - 100% RF Tested
- 3 dB Bandwidth: DC to 1.0 GHz
- 19.8 dB Gain Typical at 0.5 GHz
- Low Noise Figure: 2.8 dB Typical at 0.5 GHz
- Metal/Ceramic Microstrip Package
- Tape and Reel Option Available

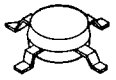


HPMA-0685/0686
- Gain - 100% RF Tested
- 3 dB Bandwidth: DC to 1.0 GHz
- 19 dB Typical Gain at 0.5 GHz
- Low Noise Figure: 3.0 dB Typical at 0.5 GHz
- Low Cost Plastic Package
- Low Cost Surface Mount Package (HPMA-0686)
- Tape and Reel Option Available (HPMA-0686)

HPMA-0685



HPMA-0686



Description

The HPMA-0600 is a silicon monolithic single-stage feedback amplifier chip. Series and shunt feedback are used to achieve high uniformity from amplifier to amplifier. The device is ideally suited as a 50 ohm gain block in narrow and broadband IF and RF amplifier applications. Use of an external limiting bias resistor allows for bias flexibility.

The device is manufactured using ion implantation and self-alignment techniques and has gold metallization and nitride passivation for high reliability.

The HPMA-0600 chip is also supplied as the HPMA-0611 in the low cost plastic surface mount SOT-143 package; the HPMA-0635 in the rugged metal/ceramic microstrip HPAC-100X package; the HPMA-0685 in the low cost plastic microstrip 85 package; and the HPMA-0686 in the low cost plastic microstrip package with leads formed for surface mount applications. Tape and reel options are also available for the HPMA-0611, HPMA-0635 and HPMA-0686.

Absolute Maximum Ratings*

(T_A = 25°C)

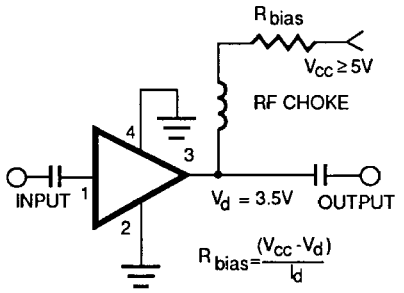
Symbol	Parameter	Units	Value				
			HPMA-0600	HPMA-0611 [1]	HPMA-0635 [1]	HPMA-0685 [1]	HPMA-0686 [1]
I_d	Device Current	mA	50	40	50	50	50
P_t	Total Device Dissipation	mW	200	125	200	200	200
P_{in}	RF Input Power	dBm	+20	+20	+20	+20	+20
T_j	Junction Temperature	°C	200	150	200	150	150
T_{stg}	Storage Temperature	°C	-65 to +200	-65 to +150	-65 to +200	-65 to 150	-65 to +150

*Operation in excess of any one of these conditions may result in permanent damage to this device.

θ_{jc}	Thermal Resistance Junction to Case	°C/W	65[4]	_ [2]	100	120[3]	125[3]

Notes:

1. Maximum soldering temperature is 260°C for 5 seconds.
2. A θ_{ja} of 500°C/W should be used for derating and junction temperature calculations: $T_j = (P_d \times \theta_{ja}) + T_A$.
3. A θ_{ja} of 320°C/W should be used for derating and junction temperature calculations: $T_j = (P_d \times \theta_{ja}) + T_A$.
4. For the HPMA-0600, θ_{jb} should be used for derating and junction temperature calculations: $T_j = (P_d \times \theta_{jb}) + T_A$.



NOTE: V_d = 3.3V FOR HPMA-0611

Typical Biasing Configuration

Electrical Specifications (T_A = 25°C)

Symbol	Parameters and Test Conditions I_d = 16 mA, Z_o= 50 Ω		Units	HPMA-0600 Min.	HPMA-0600 Typ.	HPMA-0600 Max.	HPMA-0611* Min.	HPMA-0611* Typ.	HPMA-0611* Max.	HPMA-0635* Min.	HPMA-0635* Typ.	HPMA-0635* Max.
$\|S_{21}\|^2$	Small Signal Gain	f=0.1 GHz f=0.5 GHz f=1.0 GHz	dB		20.5 19.9 18.2		 16.0	20.2 19.1 16.7		19.0	20.6 19.8 17.8	22.0
ΔG	Gain Flatness	f=0.1 to 0.5 GHz	dB		±0.3			±0.5			±0.4	±1.0
f_{3dB}	3 dB Bandwidth		GHz		1.0			1.0			1.0	
VSWR	Input VSWR	f=0.1 to 1.5 GHz			1.5:1			1.5:1			1.5:1	
	Output VSWR	f=0.1 to 1.5 GHz			1.1:1			1.0:1			1.1:1	
P_{1dB}	Output Power at 1 dB Compression	f=0.5 GHz	dBm		2.0			2.0			2.0	
NF	50 Ohm Noise Figure	f=0.5 GHz	dB		2.7			3.0			2.8	4.0
IP_3	Third Order Intercept Point	f=0.5 GHz	dBm		19			17			17	
t_D	Group Delay	f=0.5 GHz	psec.		175			216			217	
V_d	Device Voltage		Volts	3.1	3.5	3.9	2.6	3.3	4.0	3.1	3.5	3.9
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-8.0			-8.0			-8.0	

Symbol	Parameters and Test Conditions I_d = 16 mA, Z_o= 50 Ω		Units	HPMA-0685* Min.	HPMA-0685* Typ.	HPMA-0685* Max.	HPMA-0686* Min.	HPMA-0686* Typ.	HPMA-0686* Max.
$\|S_{21}\|^2$	Small Signal Gain	f=0.1 GHz f=0.5 GHz f=1.0 GHz	dB	 17.0	20.0 19.0 16.8		 16.5	20.0 19.0 16.8	
ΔG	Gain Flatness	f=0.1 to 0.5 GHz	dB		±0.5			±0.5	
f_{3dB}	3 dB Bandwidth		GHz		1.0			1.0	
VSWR	Input VSWR	f=0.1 to 1.5 GHz			1.5:1			1.5:1	
	Output VSWR	f=0.1 to 1.5 GHz			1.3:1			1.3:1	
P_{1dB}	Output Power at 1 dB Compression	f=0.5 GHz	dBm		2.0			2.0	
NF	50 Ohm Noise Figure	f=0.5 GHz	dB		3.0			3.0	
IP_3	Third Order Intercept Point	f=0.5 GHz	dBm		17			17	
t_D	Group Delay	f=0.5 GHz	psec.		194			207	
V_d	Device Voltage		Volts	2.8	3.5	4.2	2.8	3.5	4.2
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-8.0			-8.0	

Note: The recommended operating current range for these devices is 12 to 30 mA.

* $|S_{21}|^2$ is 100% RF tested for packaged devices at frequencies where a minimum limit is specified.

HPMA-0600 Typical S-Parameters

Z_o = 50 Ohms, T_A = 25°C, I_d = 16 mA

Frequency (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.03	12	20.5	10.56	172	-23.0	0.071	3.6	0.06	-14
200	0.04	12	20.4	10.50	166	-22.9	0.071	8	0.04	-34
300	0.05	7	20.3	10.33	159	-22.7	0.073	12	0.05	-49
400	0.06	2	20.1	10.11	153	-22.5	0.075	15	0.05	-61
500	0.07	-5	19.9	9.84	146	-22.2	0.078	18	0.05	-69
600	0.08	-13	19.6	9.53	140	-21.8	0.081	21	0.04	-80
700	0.10	-21	19.3	9.22	134	-21.5	0.084	23	0.05	97
800	0.11	-32	18.9	8.88	128	-21.1	0.088	25	0.04	-100
900	0.13	-40	18.6	8.47	123	-20.7	0.092	27	0.04	-109
1000	0.14	-49	18.2	8.09	118	-20.5	0.095	28	0.04	-119
1500	0.21	-82	16.1	6.35	95	-18.9	0.114	31	0.01	-119
2000	0.22	-92	13.9	4.98	79	-17.7	0.130	32	0.11	-65
2500	0.21	-117	11.9	3.95	65	-17.0	0.142	32	0.13	-63
3000	0.25	-141	10.2	3.22	54	-16.6	0.148	32	0.20	-78
3500	0.27	-162	8.9	2.68	48	-16.3	0.154	36	0.24	-88
4000	0.30	-156	7.6	2.39	35	-14.9	0.180	38	0.28	-90
4500	0.37	180	5.8	1.94	27	-15.8	0.161	32	0.29	-95
5000	0.39	166	4.7	1.72	22	-15.4	0.170	32	0.31	-93
5500	0.43	155	3.7	1.54	17	-14.5	0.188	45	0.38	-99
6000	0.56	96	3.2	1.45	15	-12.7	0.231	53	0.31	-72

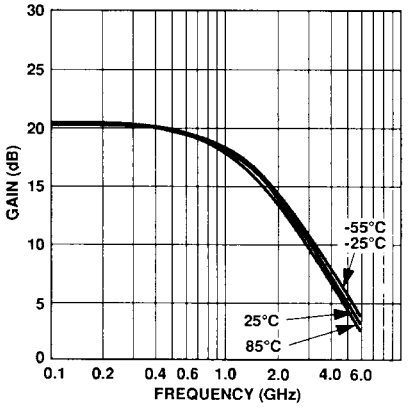


Figure 1. Typical Small Signal Gain vs. Frequency at Four Temperatures

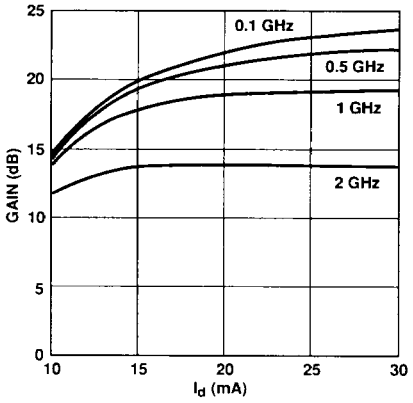


Figure 2. Typical Small Signal Gain vs. I_d at 25°C

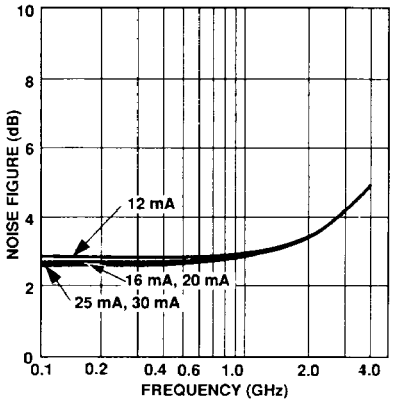


Figure 3. Typical Noise Figure vs. Frequency at 25°C

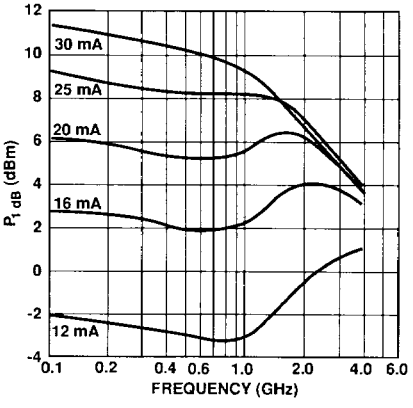


Figure 4. Typical $P_{1\ dB}$ vs. Frequency at 25°C

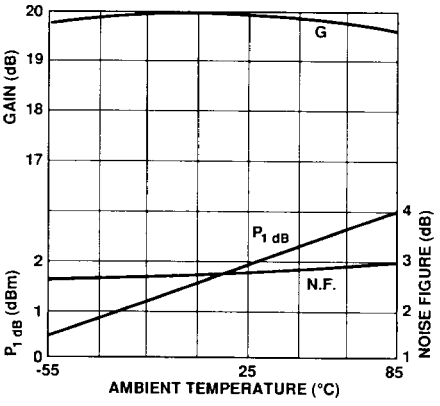


Figure 5. Small Signal Gain, Noise Figure and $P_{1\ dB}$ vs. Temperature at 0.5 GHz and I_d = 16 mA.

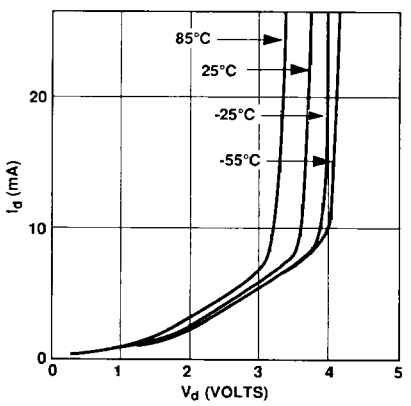


Figure 6. I_d vs. V_d at Four Temperatures

HPMA-0611 Typical S-Parameters

Z_o = 50 Ohms, T_A = 25°C, I_d = 16 mA

Frequency (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.04	157	20.2	10.22	171	-22.8	0.073	4	0.04	-20
200	0.03	143	20.1	10.06	162	-22.6	0.074	9	0.04	-36
300	0.02	116	19.8	9.73	153	-22.3	0.077	13	0.04	-52
400	0.01	68	19.5	9.39	146	-22.0	0.079	16	0.04	-66
500	0.02	-6	19.1	9.01	138	-21.6	0.083	19	0.04	-80
600	0.04	-29	18.7	8.58	130	-21.2	0.087	21	0.04	-91
700	0.06	-43	18.2	8.16	124	-20.8	0.092	23	0.03	-99
800	0.08	-52	17.7	7.71	117	-20.3	0.096	24	0.03	-105
900	0.10	-62	17.2	7.25	111	-19.9	0.101	26	0.02	-104
1000	0.12	-68	16.7	6.86	105	-19.5	0.106	26	0.02	-94
1500	0.19	-98	14.3	5.16	81	-17.9	0.128	26	0.04	-16
2000	0.22	-122	12.1	4.01	62	-16.9	0.144	24	0.10	-30
2500	0.22	-151	10.2	3.23	47	-16.2	0.156	21	0.14	-41
3000	0.23	179	8.7	2.71	33	-15.7	0.165	19	0.18	-54
3500	0.26	144	7.4	2.33	20	-15.2	0.173	17	0.20	-65
4000	0.32	117	6.0	1.99	7	-14.9	0.179	16	0.22	-77
4500	0.42	97	4.8	1.73	-5	-14.6	0.186	15	0.23	-89
5000	0.51	83	3.5	1.50	-15	-14.3	0.194	14	0.24	-103
5500	0.59	73	2.2	1.29	-25	-13.8	0.205	13	0.25	-117
6000	0.66	66	0.9	1.11	-34	-13.3	0.216	12	0.26	-132

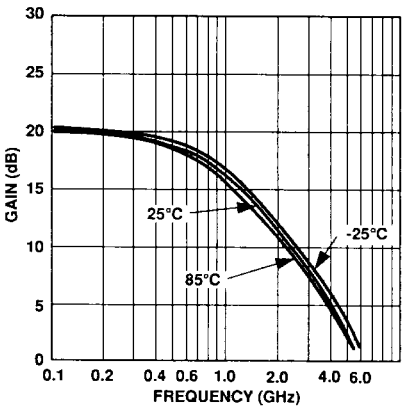


Figure 7. Typical Small Signal Gain vs. Frequency at Three Temperatures

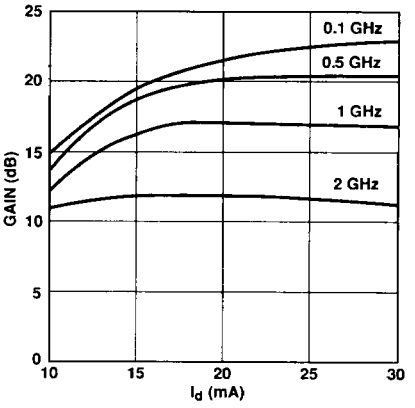


Figure 8. Typical Small Signal Gain vs. I_d at 25°C

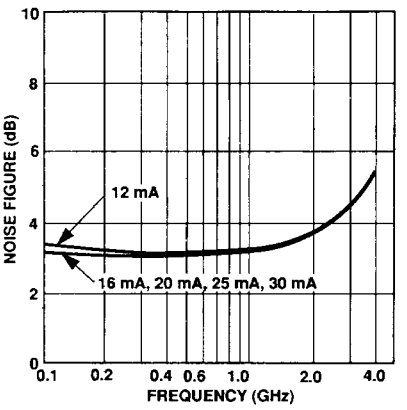


Figure 9. Typical Noise Figure vs. Frequency at 25°C

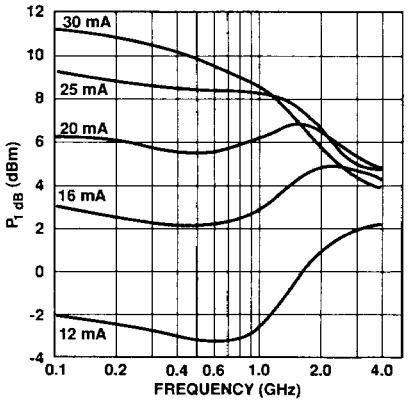


Figure 10. Typical $P_{1\ dB}$ vs. Frequency at 25°C

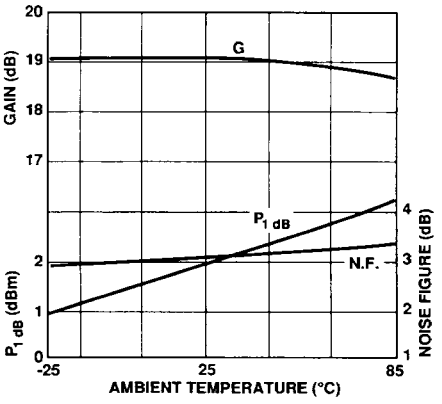


Figure 11. Small Signal Gain, Noise Figure and $P_{1\ dB}$ vs. Temperature at 0.5 GHz and I_d = 16 mA

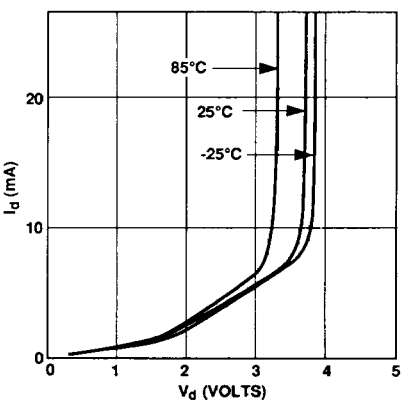


Figure 12. I_d vs. V_d at Three Temperatures

HPMA-0635 Typical S-Parameters

Z_0 = 50 Ohms, T_A = 25°C, I_d = 16 mA

Frequency (MHz)	S_{11} Mag.	S_{11} Ang.	S_{21} (dB)	S_{21} Mag.	S_{21} Ang.	S_{12} (dB)	S_{12} Mag.	S_{12} Ang.	S_{22} Mag.	S_{22} Ang.
100	0.04	165	20.6	10.66	172	-23.1	0.070	4	0.05	-17
200	0.03	152	20.5	10.58	164	-22.9	0.071	8	0.04	-32
300	0.02	135	20.3	10.32	156	-22.7	0.073	11	0.04	-46
400	0.02	85	20.1	10.05	149	-22.4	0.076	14	0.04	-63
500	0.01	32	19.8	9.73	141	-22.1	0.079	17	0.04	-82
600	0.03	-24	19.4	9.38	134	-21.7	0.082	19	0.04	-101
700	0.04	-50	19.1	8.97	128	-21.3	0.086	21	0.04	-122
800	0.05	-62	18.7	8.59	121	-20.9	0.090	22	0.04	-140
900	0.08	-76	18.3	8.19	115	-20.5	0.094	23	0.04	-158
1000	0.09	-83	17.8	7.79	109	-20.1	0.099	24	0.04	-179
1500	0.19	-119	15.6	6.03	84	-18.5	0.119	23	0.05	110
2000	0.26	-146	13.3	4.64	64	-17.6	0.132	20	0.06	63
2500	0.32	-166	11.4	3.72	48	-17.0	0.142	17	0.07	23
3000	0.36	176	9.5	3.00	34	-16.6	0.148	15	0.08	-8
3500	0.41	160	8.2	2.58	23	-16.3	0.153	13	0.09	-43
4000	0.45	147	6.9	2.21	11	-15.9	0.161	12	0.10	-73
4500	0.49	132	5.7	1.93	-1	-15.6	0.166	11	0.13	-101
5000	0.53	121	4.5	1.68	-11	-15.2	0.174	10	0.16	-123
5500	0.58	111	3.5	1.49	-20	-14.8	0.183	9	0.20	-142
6000	0.61	103	2.5	1.33	-30	-14.2	0.195	6	0.24	-157

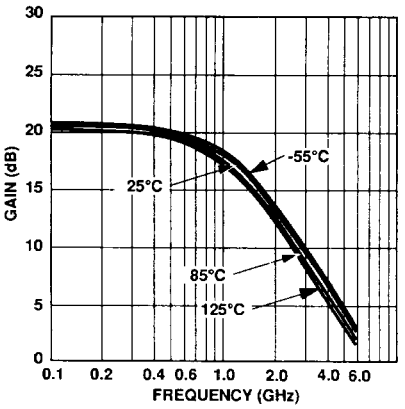


Figure 13. Typical Small Signal Gain vs. Frequency at Four Temperatures

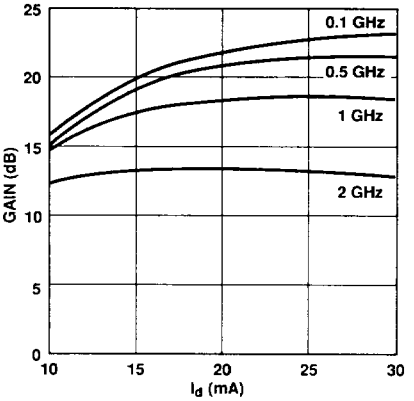


Figure 14. Typical Small Signal Gain vs. I_d at 25°C

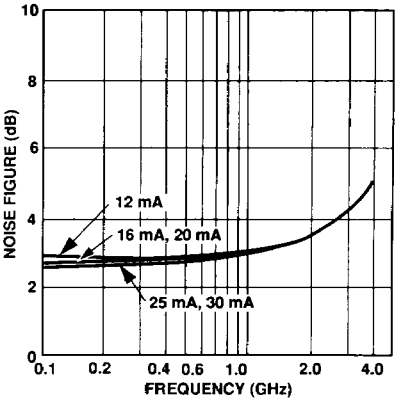


Figure 15. Typical Noise Figure vs. Frequency at 25°C

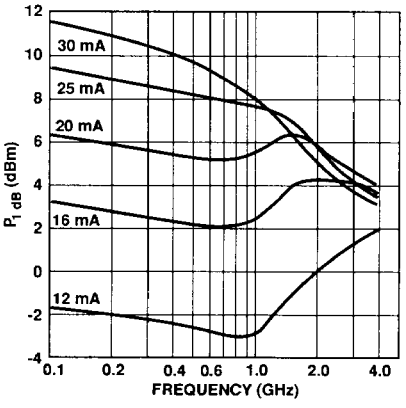


Figure 16. Typical $P_{1\ dB}$ vs. Frequency at 25°C

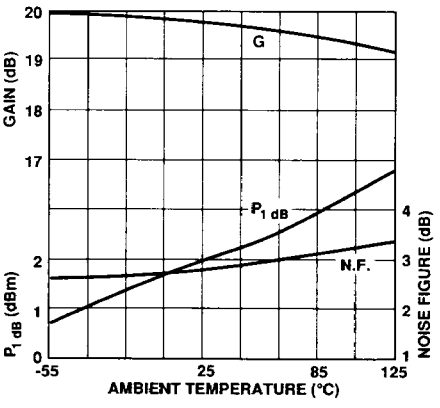


Figure 17. Small Signal Gain, Noise Figure and $P_{1\ dB}$ vs. Temperature at 0.5 GHz and I_d = 16 mA

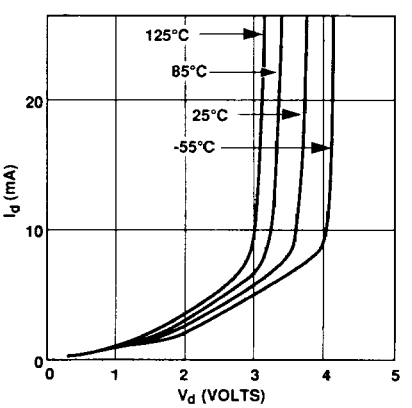


Figure 18. I_d vs. V_d at Four Temperatures

HPMA-0685 Typical S-Parameters

Z_o = 50 Ohms, T_A = 25°C, I_d = 16 mA

Frequency (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.01	178	19.9	9.93	171	-22.7	0.073	5	0.05	-26
200	0.01	-157	19.8	9.78	163	-22.5	0.075	9	0.06	-54
300	0.01	-88	19.5	9.48	155	-22.2	0.078	13	0.08	-71
400	0.01	-25	19.2	9.15	147	-21.8	0.081	17	0.10	-75
500	0.04	-56	18.9	8.80	140	-21.4	0.085	20	0.11	-85
600	0.06	-72	18.5	8.40	134	-21.0	0.089	23	0.12	-90
700	0.07	-77	18.1	8.00	127	-20.5	0.094	25	0.12	-103
800	0.09	-82	17.6	7.62	121	-20.1	0.099	27	0.12	-111
900	0.10	-92	17.2	7.21	115	-19.7	0.104	28	0.12	-119
1000	0.12	-97	16.7	6.83	110	-19.3	0.109	28	0.12	-126
1500	0.19	-120	14.3	5.21	87	-17.6	0.132	30	0.10	-152
2000	0.24	-138	12.3	4.10	70	-16.5	0.151	29	0.07	-157
2500	0.28	-157	10.4	3.30	54	-15.7	0.164	25	0.04	-135
3000	0.31	-170	8.9	2.79	42	-15.2	0.174	24	0.07	-88
3500	0.34	170	7.6	2.39	31	-14.8	0.183	24	0.10	-93
4000	0.39	154	6.3	2.07	21	-14.5	0.189	23	0.14	-100
4500	0.44	139	5.0	1.78	12	-14.2	0.195	23	0.16	-110
5000	0.49	128	4.0	1.58	3	-13.7	0.206	24	0.19	-124
5500	0.55	119	3.1	1.43	-6	-13.1	0.221	24	0.22	-138
6000	0.59	107	2.1	1.28	-16	-12.4	0.240	20	0.26	-154

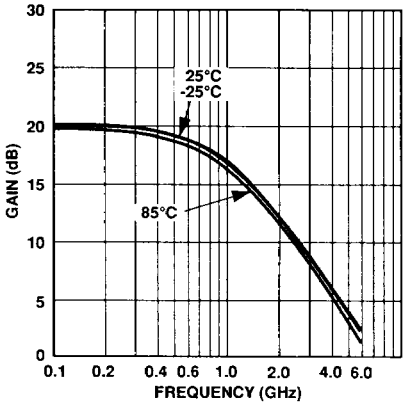


Figure 19. Typical Small Signal Gain vs. Frequency at Three Temperatures

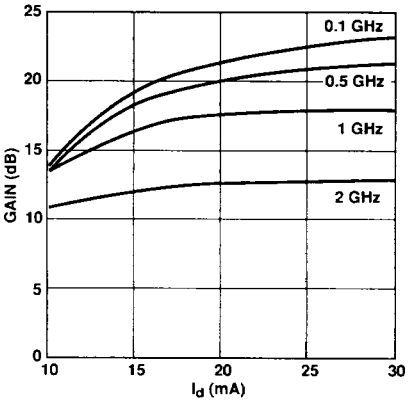


Figure 20. Typical Small Signal Gain vs. I_d at 25°C

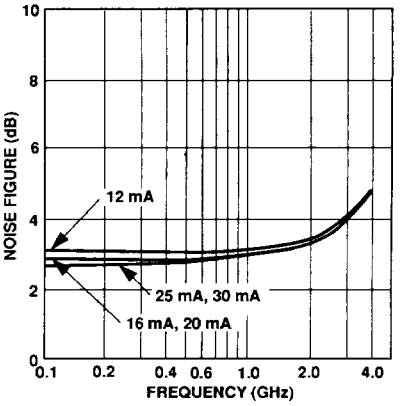


Figure 21. Typical Noise Figure vs. Frequency at 25°C

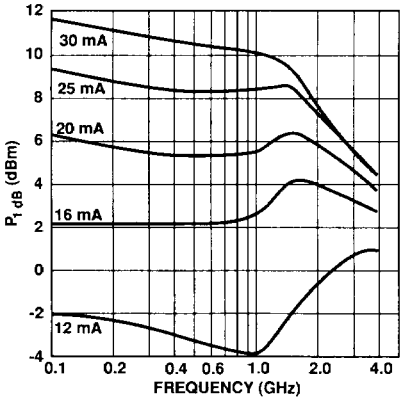


Figure 22. Typical $P_{1\ dB}$ vs. Frequency at 25°C

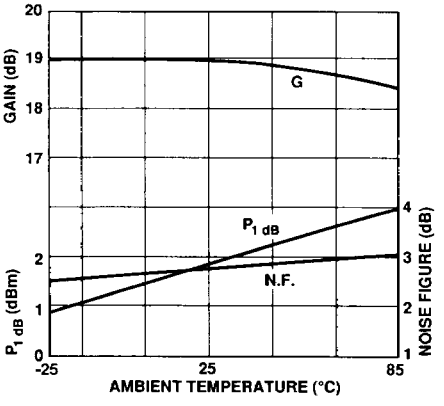


Figure 23. Small Signal Gain, Noise Figure and $P_{1\ dB}$ vs. Temperature at 0.5 GHz and I_d = 16 mA

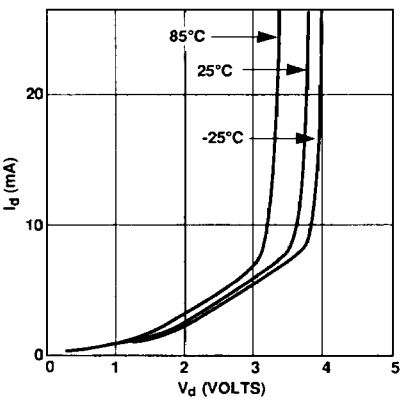


Figure 24. I_d vs. V_d at Three Temperatures

HPMA-0686 Typical S-Parameters

Z_o = 50 Ohms, T_A = 25°C, I_d = 16 mA

Frequency (MHz)	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag.	Ang.	(dB)	Mag.	Ang.	(dB)	Mag.	Ang.	Mag.	Ang.
100	0.02	168	20.1	10.06	171	-22.8	0.073	4	0.05	-24
200	0.01	171	20.0	9.94	163	-22.6	0.074	8	0.05	-52
300	0.01	-157	19.7	9.67	154	-22.3	0.077	12	0.06	-72
400	0.01	39	19.4	9.37	146	-21.9	0.080	15	0.08	-76
500	0.03	-44	19.1	9.04	139	-21.6	0.083	18	0.08	-90
600	0.04	-71	18.8	8.66	132	-21.1	0.088	20	0.08	-97
700	0.05	-80	18.4	8.27	124	-20.7	0.092	21	0.08	-116
800	0.06	-89	17.9	7.89	118	-20.2	0.097	23	0.08	-130
900	0.08	-102	17.5	7.48	112	-19.8	0.102	24	0.09	-144
1000	0.10	-110	17.0	7.09	106	-19.4	0.107	24	0.09	-156
1500	0.18	-142	14.6	5.40	80	-17.8	0.129	22	0.11	155
2000	0.25	-166	12.5	4.23	60	-16.7	0.146	19	0.12	124
2500	0.33	173	10.5	3.36	41	-16.1	0.157	13	0.11	101
3000	0.39	156	9.0	2.81	27	-15.7	0.164	9	0.09	84
3500	0.45	139	7.5	2.37	13	-15.5	0.168	6	0.07	93
4000	0.52	125	6.1	2.02	1	-15.4	0.171	4	0.06	119
4500	0.58	114	4.6	1.71	-10	-15.3	0.172	3	0.09	141
5000	0.64	104	3.4	1.47	-21	-15.0	0.177	2	0.15	147
5500	0.69	97	2.3	1.30	-31	-14.6	0.186	1	0.23	144
6000	0.73	86	1.1	1.13	-45	-14.1	0.197	-5	0.31	135

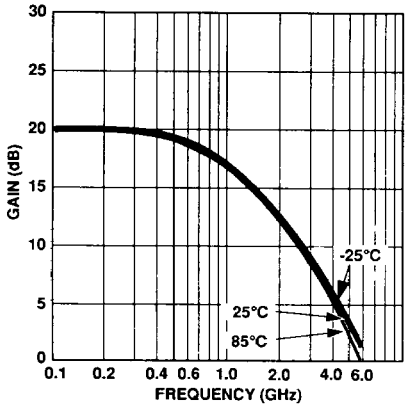


Figure 25. Typical Small Signal Gain vs. Frequency at Three Temperatures

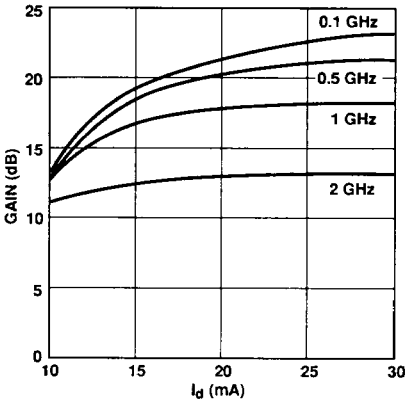


Figure 26. Typical Small Signal Gain vs. I_d at 25°C

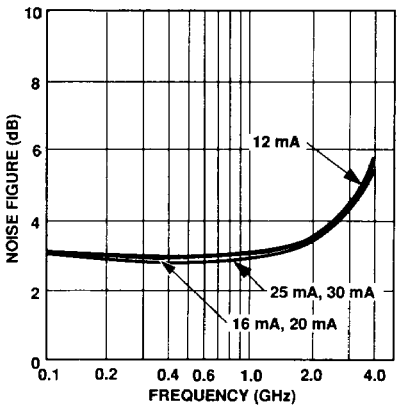


Figure 27. Typical Noise Figure vs. Frequency at 25°C

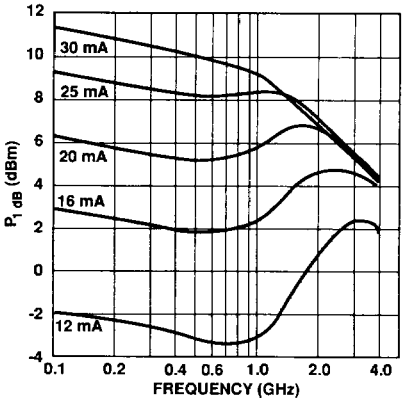


Figure 28. Typical $P_{1\ dB}$ vs. Frequency at 25°C

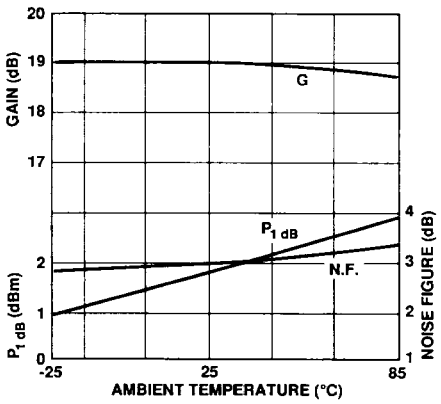


Figure 29. Small Signal Gain, Noise Figure and $P_{1\ dB}$ vs. Temperature at 0.5 GHz and I_d = 16 mA

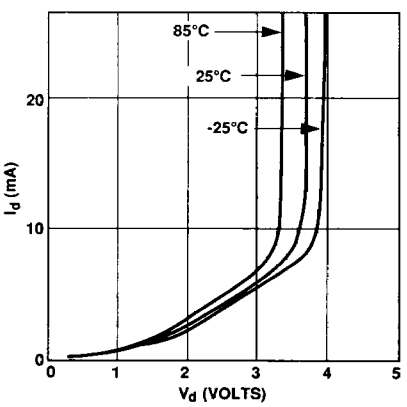


Figure 30. I_d vs. V_d at Three Temperatures

HPMA-0600 Typical Performance Parameters at T_A=25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Group Delay (ns)	Input VSWR	Output VSWR
100	-7.4	0.0	0.00	0.19	1.1	1.1
200	-5.6	-6.7	-0.05	0.19	1.1	1.1
300	-3.9	-13.2	-0.19	0.18	1.1	1.1
400	-2.4	-19.5	-0.38	0.18	1.1	1.1
500	-1.0	-25.8	-0.62	0.17	1.1	1.1
600	0.5	-32.1	-0.89	0.17	1.2	1.1
700	1.7	-38.2	-1.18	0.17	1.2	1.1
800	2.5	-43.8	-1.51	0.16	1.3	1.1
900	3.1	-49.3	-1.91	0.15	1.3	1.1
1000	3.3	-54.3	-2.31	0.14	1.3	1.1
1500	1.7	-76.9	-4.42	0.11	1.5	1.0
2000	-5.8	-93.6	-6.54	0.08	1.6	1.2
2500	-16.4	-107.2	-8.53	0.07	1.5	1.3
3000	-29.7	-118.2	-10.33	0.06	1.7	1.5
3500	-47.0	-125.0	-11.89	0.04	1.7	1.6
4000	-59.5	-136.8	-12.89	0.07	1.8	1.8
4500	-75.7	-144.8	-14.70	0.04	2.2	1.8
5000	-94.8	-149.9	-15.78	0.03	2.3	1.9
5500	-113.9	-155.0	-16.73	0.03	2.5	2.2
6000	-136.3	-156.8	-17.26	0.00	3.5	1.9

HPMA-0611 Typical Performance Parameters at T_A=25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Group Delay (ns)	Input VSWR	Output VSWR
100	-12.3	0.0	0.00	0.25	1.1	1.0
200	-8.6	-9.1	-0.14	0.25	1.1	1.0
300	-5.4	-17.8	-0.42	0.24	1.0	1.0
400	-3.0	-25.7	-0.73	0.22	1.0	1.0
500	-0.7	-33.4	-1.09	0.22	1.1	1.0
600	1.4	-41.0	-1.52	0.21	1.1	1.0
700	2.6	-47.6	-1.95	0.19	1.1	1.0
800	3.5	-54.0	-2.45	0.18	1.2	1.0
900	4.0	-60.0	-2.99	0.17	1.2	1.0
1000	4.7	-66.1	-3.47	0.17	1.3	1.0
1500	1.8	-90.5	-5.93	0.12	1.5	1.0
2000	-7.0	-109.1	-8.14	0.10	1.6	1.2
2500	-18.8	-124.5	-10.01	0.08	1.6	1.3
3000	-32.0	-138.6	-11.53	0.08	1.6	1.4
3500	-46.2	-151.6	-12.83	0.07	1.7	1.5
4000	-61.3	-164.0	-14.21	0.07	1.9	1.5
4500	-76.7	-175.8	-15.41	0.07	2.4	1.5
5000	-93.2	-186.6	-16.68	0.06	3.1	1.6
5500	-110.8	-196.2	-18.01	0.05	3.9	1.6
6000	-129.5	-205.0	-19.31	0.05	4.9	1.7

HPMA-0635 Typical Performance Parameters at T_A=25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Group Delay (ns)	Input VSWR	Output VSWR
100	-8.9	0.0	0.00	0.21	1.1	1.1
200	-6.7	-7.7	-0.07	0.21	1.1	1.1
300	-4.4	-15.5	-0.28	0.22	1.0	1.1
400	-2.7	-22.7	-0.51	0.20	1.0	1.1
500	-0.5	-30.5	-0.79	0.22	1.0	1.1
600	0.7	-37.1	-1.11	0.19	1.1	1.1
700	2.0	-43.9	-1.50	0.19	1.1	1.1
800	2.7	-50.2	-1.88	0.17	1.1	1.1
900	3.5	-56.5	-2.29	0.18	1.2	1.1
1000	3.8	-62.2	-2.72	0.16	1.2	1.1
1500	1.3	-87.3	-4.96	0.11	1.5	1.1
2000	-6.1	-107.5	-7.22	0.11	1.7	1.1
2500	-17.4	-123.8	-9.16	0.08	1.9	1.1
3000	-31.5	-137.2	-11.02	0.07	2.1	1.2
3500	-47.3	-148.9	-12.33	0.07	2.4	1.2
4000	-63.2	-160.6	-13.68	0.07	2.6	1.2
4500	-79.0	-172.4	-14.83	0.07	2.9	1.3
5000	-96.8	-182.1	-16.05	0.05	3.3	1.4
5500	-114.5	-191.9	-17.09	0.06	3.7	1.5
6000	-132.9	-201.1	-18.08	0.05	4.1	1.6

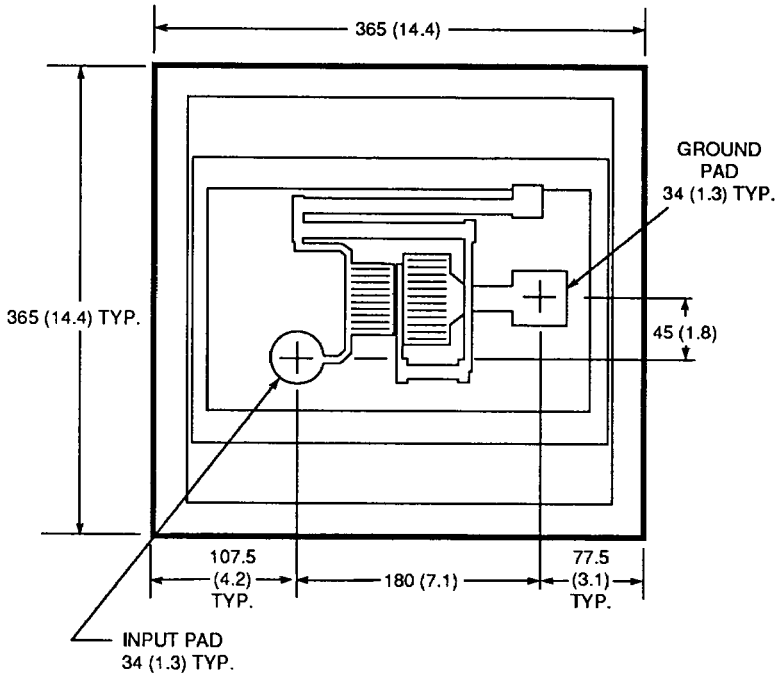
HPMA-0685 Typical Performance Parameters at T_A=25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Group Delay (ns)	Input VSWR	Output VSWR
100	-11.3	0.0	0.00	0.23	1.0	1.1
200	-8.0	-8.4	-0.13	0.23	1.0	1.1
300	-5.0	-16.5	-0.40	0.22	1.0	1.2
400	-2.5	-24.1	-0.70	0.21	1.0	1.2
500	-0.6	-31.0	-1.05	0.19	1.1	1.2
600	1.1	-37.8	-1.46	0.19	1.1	1.3
700	2.5	-44.4	-1.88	0.18	1.2	1.3
800	3.5	-50.5	-2.30	0.17	1.2	1.3
900	3.9	-56.0	-2.78	0.15	1.2	1.3
1000	4.1	-61.2	-3.24	0.15	1.3	1.3
1500	1.6	-84.1	-5.60	0.11	1.5	1.2
2000	-6.8	-101.1	-7.67	0.08	1.6	1.1
2500	-15.7	-117.7	-9.56	0.12	1.8	1.1
3000	-29.3	-129.6	-11.03	0.07	1.9	1.1
3500	-43.6	-140.7	-12.37	0.06	2.0	1.2
4000	-59.3	-150.5	-13.63	0.05	2.3	1.3
4500	-75.7	-159.5	-14.91	0.05	2.6	1.4
5000	-92.3	-168.3	-15.94	0.05	3.0	1.5
5500	-109.2	-176.9	-16.82	0.05	3.4	1.6
6000	-123.7	-187.7	-17.80	0.06	3.8	1.7

HPMA-0686 Typical Performance Parameters at T_A=25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Group Delay (ns)	Input VSWR	Output VSWR
100	-10.7	0.0	0.00	0.24	1.0	1.1
200	-7.7	-8.6	-0.10	0.24	1.0	1.1
300	-4.9	-17.0	-0.34	0.23	1.0	1.1
400	-2.6	-25.0	-0.61	0.22	1.0	1.2
500	-0.8	-32.4	-0.92	0.21	1.1	1.2
600	1.0	-39.8	-1.30	0.20	1.1	1.2
700	2.4	-46.8	-1.70	0.20	1.1	1.2
800	3.4	-53.5	-2.10	0.19	1.1	1.2
900	3.8	-59.6	-2.57	0.17	1.2	1.2
1000	4.0	-65.4	-3.03	0.16	1.2	1.2
1500	1.6	-91.2	-5.41	0.13	1.4	1.2
2000	-6.8	-110.9	-7.53	0.09	1.7	1.3
2500	-15.9	-130.0	-9.51	0.14	2.0	1.3
3000	-29.4	-144.7	-11.08	0.08	2.3	1.2
3500	-44.0	-158.2	-12.55	0.08	2.6	1.1
4000	-60.1	-170.3	-13.95	0.07	3.1	1.1
4500	-77.5	-181.1	-15.41	0.06	3.8	1.2
5000	-94.7	-192.1	-16.68	0.06	4.5	1.4
5500	-112.2	-202.7	-17.74	0.06	5.5	1.6
6000	-127.1	-216.0	-18.97	0.07	6.5	1.9

Package Dimensions



DIMENSIONS IN MICROMETERS (MILS) ± 25 (1.0)

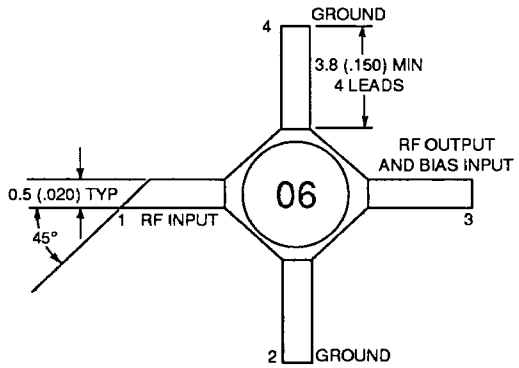
Chip Outline HPMA-0600

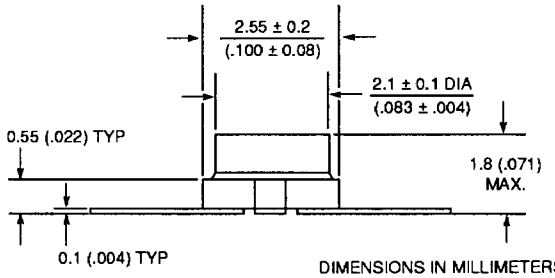
Recommended Die Attach and Bonding Procedures

Eutectic Die Attach at a stage temperature of 410 ± 10°C under an N_2 ambient. Chip should be lightly scrubbed using a tweezer or collet and eutectic should flow within five seconds.

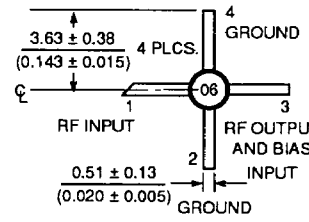
Thermocompression Wire Bond at a stage temperature of 310 ±10°C, using a tip force of 30 ± 5 grams with 0.7 or 1.0 mil gold wire. A one mil minimum wire clearance at the passivation edge is recommended (Ultrasonic wire bonding is not recommended).

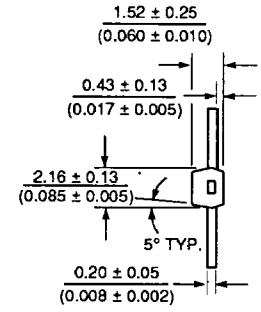
Package Dimensions (cont'd)



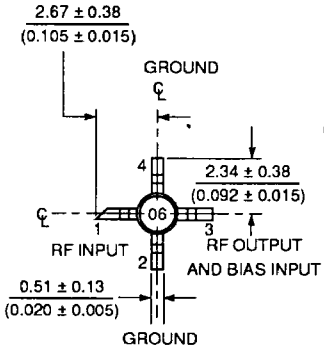


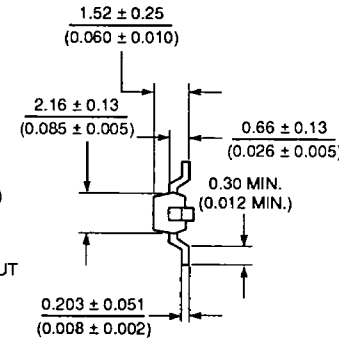
HPAC-100X





HPAC-85

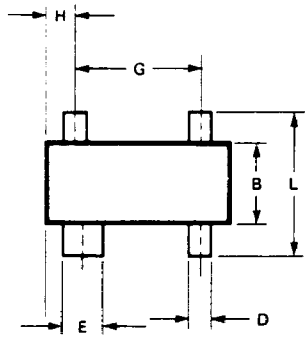




HPAC-86

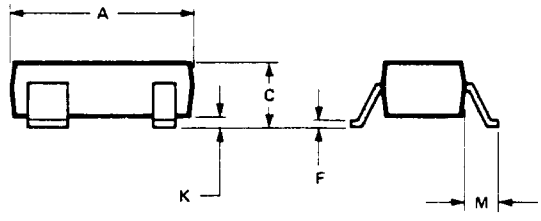
DIMENSIONS ARE IN MILLIMETERS (INCHES)

Package Characteristics	HPAC-100X	HPAC-85/86
Lead Material	Alloy 42	Copper
Lead Finish	Tin, 100%	Tin-Lead



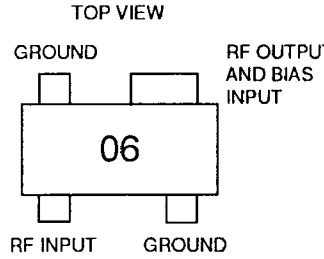
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.06	0.110	0.120
B	1.20	1.40	0.047	0.055
C*	0.85	1.20	0.033	0.047
D	0.37	0.54	0.015	0.021
E	0.78	0.92	0.031	0.036
F	0.09	0.15	0.003	0.006
G	1.78	2.04	0.070	0.080
H	0.45	0.60	0.018	0.024
K*	0.10	0.25	0.004	0.010
L	2.10	2.65	0.083	0.104
M	0.45	0.69	0.018	0.027

*LOW PROFILE also available,
with C min./max of 0.89/1.04 millimeters, 0.035/0.041 inches;
with K min./max of 0.013/0.10 millimeters, 0.0005/0.004 inches.



HPMA-0611 Outline 143

Package Lead Code Identification



MARKING: WHITE – STANDARD PROFILE
LOW PROFILE (SUFFIX L)

Package Characteristics	HPMA-0611
Lead Material	Alloy 42
Lead Finish	Tin-Lead
Min. Lead Strength	2 pounds pull
Typical Package Inductance	2 nH
Typical Package Capacitance	0.08 pF (opposite leads)

Ordering Information For HPMA-0611 only

Standard Profile

Option T30 = Bulk
Option T31 = Tape and Reel, See Figure 31.
Option T32 = Tape and Reel, See Figure 32.

Low Profile

Option L30 = Bulk
Option L31 = Tape and Reel, See Figure 31.
Option L32 = Tape and Reel, See Figure 32.

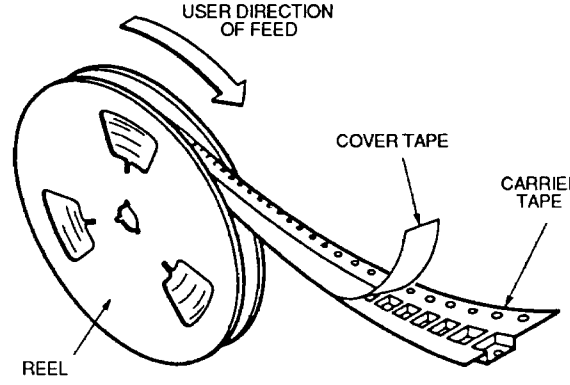
Conforms to Electronic Industries Standard RS-481, "Taping of Surface Mounted Components for Automated Placement." Standard Quantity is 3,000 Devices/Reel.

Specify Part Number followed by Option Number

Example:

HPMA-0611 Option X XX

- XX: Bulk or Tape and Reel Option
- X: Profile: Standard = T; or Low = L
- 0611: Part Number
- HPMA: Monolithic Amplifier
- HP



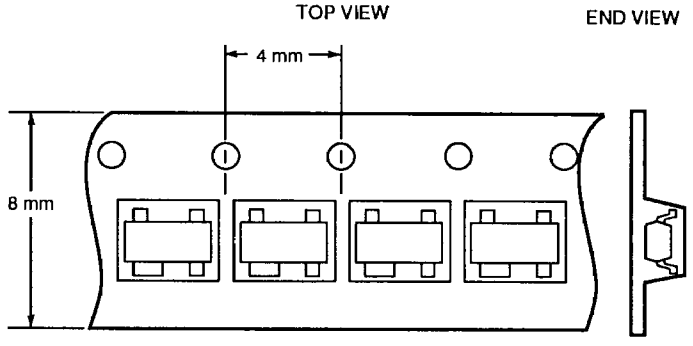


Figure 31. Options T31, L31

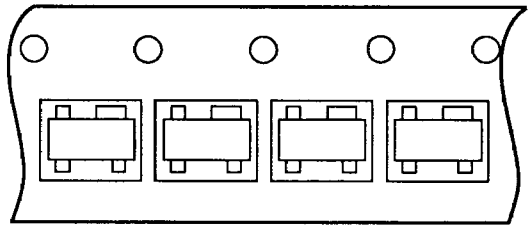


Figure 32. Options T32, L32

HEWLETT PACKARD

Ordering Information For HPMA-0686 only

Option T00 = Bulk
Option T15 = Tape and Reel, See Figure 33.

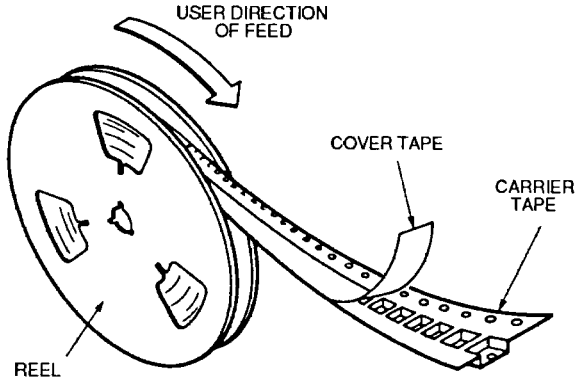
Conforms to Electronic Industries Standard RS-481, "Taping of Surface Mounted Components for Automated Placement." Standard Quantity is 1,500 Devices/Reel.

Specify Part Number followed by Option Number

Example:

HPMA-0686 TXX

- Bulk or Tape and Reel Option
- Part Number
- Monolithic Amplifier
- HP



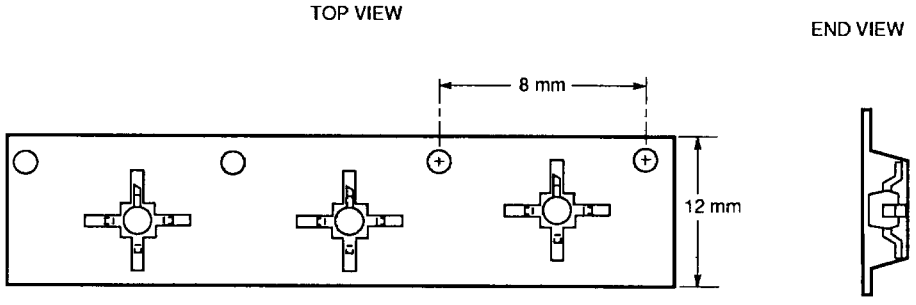


Figure 33. Option T15

For more information call:
United States: 1-800-752-0900*
Or write:
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Building 49 AV
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Cupertino, California 95014
Canada: (416) 678-9430*
Europe: (49) 7031/14-0*
Far East/Australia: (65) 271-9444*
Japan: (81) 03-331-6111*
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Printed in U.S.A. 5091-1546E (4/91)