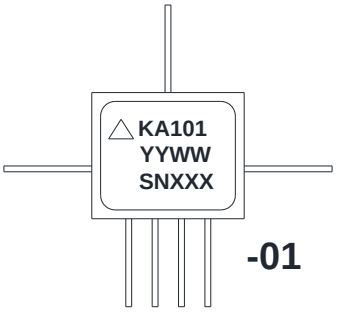
KA101-01, -10, -54

400-2700 MHz Medium Power Amplifier

KCB SOLUTIONS
RF DESIGN & MANUFACTURING

Description

The KA101 a high performance, ultra-wideband, medium power GaAs pHEMT amplifier with low noise, high linearity and high efficiency. The KA101 is supplied in a 7-lead hermetic microwave surface mount package with a copper tungsten base and in a space saving 3mm QFN package. The KA101 is ideal for high performance commercial and high-reliability applications.



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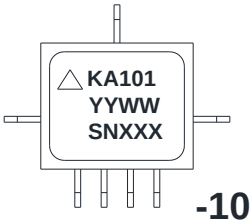
Features

- ❑ Tunable from 400 MHz to 2700 MHz
- ❑ Wide bandwidths
- ❑ 30 dBm output power
- ❑ High Gain
- ❑ MIL-PRF-38535 class B and S screening available
- ❑ Single supply operation with on-chip bias circuitry, 4.75V to 5.5V



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Electrical Characteristics (+25°C)

Parameter	Symbol	Test Conditions	Typical Performance 1000-1700 MHz Tuning		Typical Performance 1900-2400 MHz Tuning		Units
Frequency	f		1100	1600	2000	2300	MHz
Gain	|S21|	Small Signal	18.8	14.3	12.7	11.8	dB
Input Return loss	|S11|	Small Signal	18	18	18	18	dB
Output Return Loss	|S22|	Small Signal	16	18	15	15	dB
Reverse Transmission Loss	|S12|	Small Signal	29	26	27	27	dB
1 dB Compression	P1dB	CW	28.5	29.5	29.8	29.8	dBm
Noise Figure	NF		4	4	4	4	dB
Quiescent Current	Idq	No RF	188	188	188	188	mA
Operating current	Iop	At P1dB	400	400	470	440	mA

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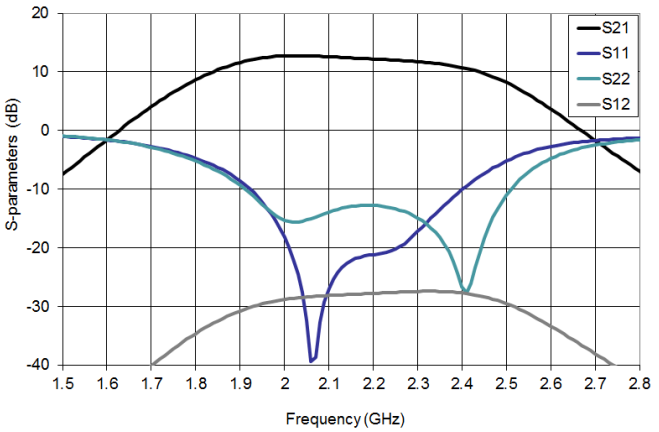
Rev(A), Date 08/28/2014

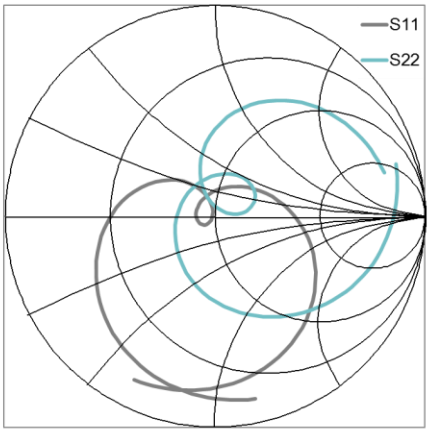
Typical Performance Characteristics

KA101-10, Tc =25° C, V_{cc} = 5 V, 1.9 GHz to 2.4 GHz tuning

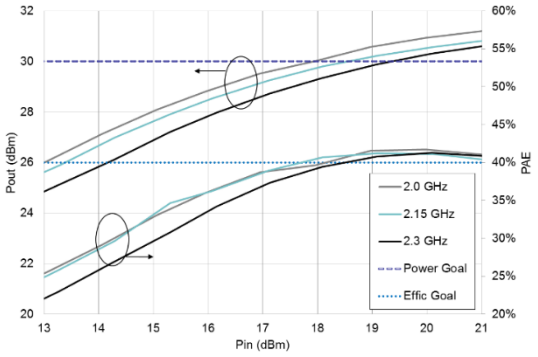
S-parameters (dB) vs. Frequency



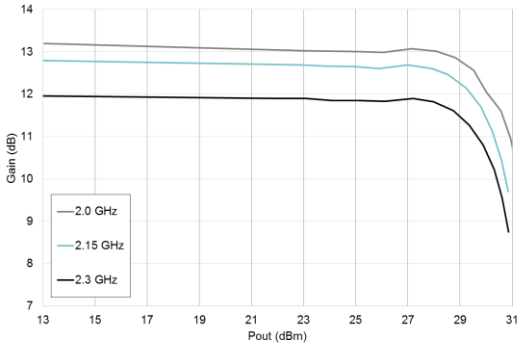
Reflection Coefficients
(1.5 GHz to 2.8 GHz)



Pout and PAE vs Pin

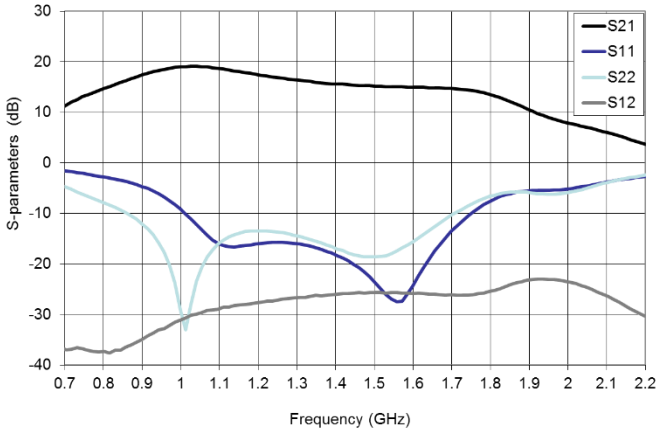


Gain vs Pout

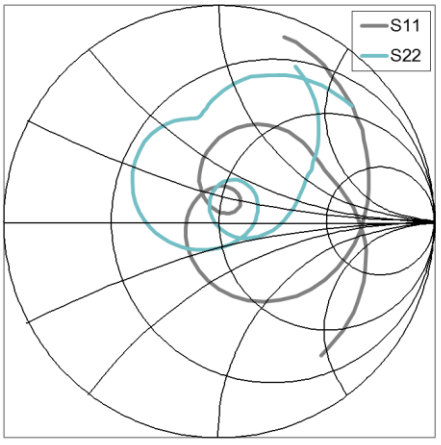


KA101-54, Tc =25° C, V_{cc} = 5 V, 1.0 GHz to 1.7 GHz tuning

S-parameters (dB) versus Frequency



Input and output reflection coefficients



KA101-01/KA101-10 S-parameters

T_a= 25 C, Z_0 =50 Ω, V_{cc} = 5 V, I =188 mA

Freq.	S11		S21		S12		S22	
MHz	dB	Ang	dB	Ang	dB	Ang	dB	Ang
200	-3.55	-167.85	20.45	-168.93	-48.02	81.95	-1.99	155.88
300	-1.73	-174.19	21.67	133.88	-42.11	76.00	-6.49	170.68
400	-1.46	176.64	20.12	100.12	-40.13	55.35	-2.90	-177.19
500	-1.55	170.98	18.18	87.92	-39.65	46.74	-1.88	174.91
600	-1.64	166.50	16.45	79.52	-39.16	42.73	-1.64	169.12
700	-1.71	162.69	15.06	72.34	-38.57	39.85	-1.57	164.64
800	-1.82	159.55	13.81	66.23	-38.07	38.25	-1.62	161.02
900	-1.83	157.15	12.83	60.92	-37.41	36.94	-1.61	158.27
1000	-1.80	154.42	11.99	55.35	-36.73	34.98	-1.55	155.33
1100	-1.79	151.76	11.22	49.95	-36.12	32.99	-1.53	152.18
1200	-1.80	149.19	10.53	44.77	-35.50	30.97	-1.54	149.34
1300	-1.82	146.67	9.90	39.68	-34.94	28.65	-1.55	146.57
1400	-1.85	144.23	9.36	34.76	-34.35	26.57	-1.58	143.89
1500	-1.89	141.69	8.87	29.87	-33.79	24.09	-1.61	141.22
1600	-1.93	139.22	8.44	24.87	-33.25	21.70	-1.64	138.52
1700	-1.98	136.74	8.06	19.85	-32.68	19.06	-1.68	135.76
1800	-2.03	134.00	7.71	14.64	-32.14	16.03	-1.73	132.85
1900	-2.10	131.20	7.38	9.47	-31.62	13.31	-1.78	129.88
2000	-2.18	128.46	7.09	4.21	-31.04	10.29	-1.83	126.73
2100	-2.28	125.22	6.83	-1.22	-30.49	6.84	-1.90	123.47
2200	-2.38	121.89	6.58	-6.78	-29.96	3.10	-1.96	119.75
2300	-2.49	118.33	6.36	-12.47	-29.44	-0.75	-2.05	115.72
2400	-2.59	114.53	6.15	-18.36	-28.94	-4.96	-2.13	111.29
2500	-2.71	110.23	5.93	-24.50	-28.47	-9.43	-2.24	106.45
2600	-2.81	105.77	5.72	-30.74	-28.03	-14.00	-2.35	101.20
2700	-2.90	101.01	5.50	-37.16	-27.61	-18.87	-2.47	95.46
2800	-2.97	96.02	5.27	-43.76	-27.24	-24.01	-2.59	89.18
2900	-3.04	90.64	4.99	-50.58	-26.92	-29.22	-2.70	82.35
3000	-3.05	85.28	4.71	-57.42	-26.63	-34.74	-2.79	74.93

KA101-54 S-parameters

T_a= 25 C, Z_0 =50 Ω, V_{cc} = 5 V, I =188 mA

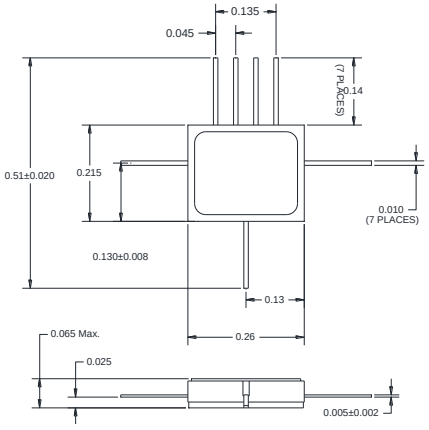
Freq.	S11		S21		S12		S22	
MHz	dB	Ang	dB	Ang	dB	Ang	dB	Ang
200	-3.50	-164.72	21.75	-167.32	-48.04	85.37	-2.67	153.93
300	-2.03	-165.64	22.22	147.70	-42.39	87.08	-9.45	177.11
400	-1.59	-172.11	20.81	114.52	-39.96	70.70	-4.12	-158.18
500	-1.64	-174.95	18.94	104.30	-39.28	64.70	-2.73	-164.41
600	-1.73	-176.73	17.39	98.42	-38.73	63.37	-2.44	-167.62
700	-1.81	-177.88	16.20	94.15	-38.08	63.73	-2.37	-169.05
800	-1.89	-178.72	15.07	90.32	-37.41	64.59	-2.38	-169.67
900	-1.96	-179.33	14.24	87.18	-36.73	65.84	-2.42	-169.83
1000	-2.04	179.94	13.45	84.13	-36.06	66.74	-2.45	-169.84
1100	-2.12	179.26	12.81	81.33	-35.36	68.05	-2.51	-169.76
1200	-2.20	178.57	12.21	78.57	-34.67	68.86	-2.57	-169.59
1300	-2.30	177.66	11.65	75.76	-34.02	69.48	-2.64	-169.42
1400	-2.40	176.68	11.18	72.97	-33.35	70.15	-2.72	-169.34
1500	-2.51	175.50	10.76	70.08	-32.67	70.25	-2.80	-169.37
1600	-2.63	174.08	10.37	67.14	-32.02	70.15	-2.88	-169.48
1700	-2.77	172.46	10.00	64.09	-31.42	69.91	-2.96	-169.71
1800	-2.89	170.50	9.68	60.95	-30.79	69.40	-3.05	-170.17
1900	-3.04	168.25	9.37	57.55	-30.21	68.56	-3.14	-170.84
2000	-3.17	165.56	9.07	53.85	-29.65	67.36	-3.23	-171.64
2100	-3.30	162.49	8.73	50.29	-29.14	66.41	-3.28	-172.72
2200	-3.41	158.88	8.47	46.53	-28.58	64.83	-3.35	-174.44
2300	-3.52	154.90	8.17	42.38	-28.09	62.96	-3.43	-176.46
2400	-3.59	150.54	7.86	38.01	-27.63	60.62	-3.49	-178.80
2500	-3.62	145.94	7.51	33.56	-27.25	58.23	-3.54	178.64
2600	-3.59	141.03	7.14	29.01	-26.90	55.71	-3.55	175.61
2700	-3.53	136.08	6.75	24.43	-26.59	53.20	-3.55	172.08
2800	-3.42	131.12	6.32	19.68	-26.31	50.21	-3.54	168.24
2900	-3.27	126.35	5.83	14.93	-26.13	47.15	-3.50	164.16
3000	-3.09	121.92	5.32	10.18	-25.99	44.18	-3.43	159.71

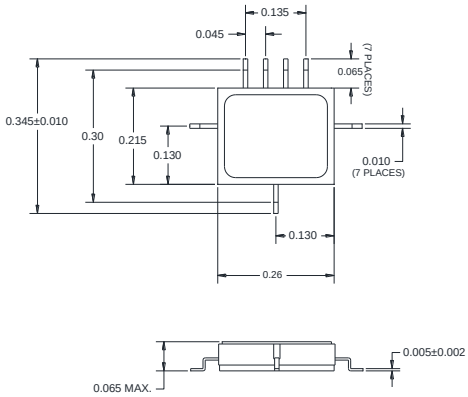
Absolute Maximum Ratings

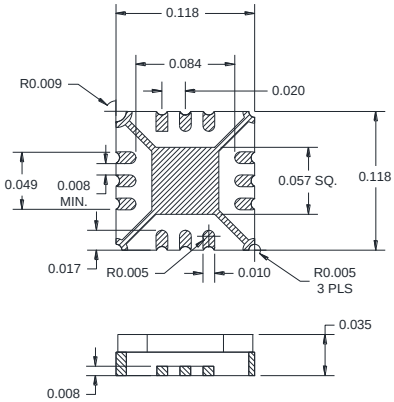
Characteristic	Min Value	Max Value	Units
Supply Voltage (Vdd)		6	Volts
RF Input Power		TBD	dBm
Supply Current		TBD	mA
Storage Temperature	-55	+150	° C
Operating Case Temp	-55	+125	° C
Junction Temperature		+150	° C

Note: Thermal Resistance Θ_{-JC} TBD, all values TBR
Exceeding any of the limits listed here may result in permanent damage to the device.

Outline Drawings

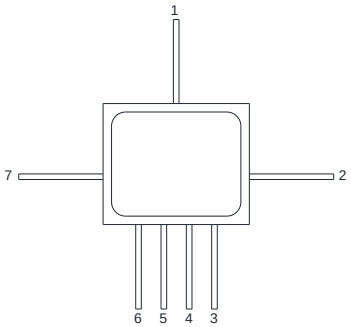




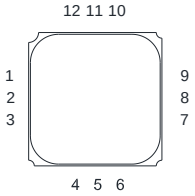


KA101-01 **KA101-10** **KA101-54**

Pin Outs



0 (backside)	GND
1	GND
2	RF out
3	GND
4	GND
5	GND
6	GND
7	RF in



0 (backside)	GND
1	NC
2	RF IN
3	NC
4	NC
5	NC
6	NC
7	NC
8	RF out
9	GND
10	GND
11	GND
12	GND

Screening Flow

Test Inspection	MIL – STD -883		Requirement	
	Method	Condition	Class B	Class S
Wafer Lot Acceptance	5007		N/A	Per Wafer Lot
Non-Destructive Bond Pull	2023		Process under Statistical Control	100%
Internal Visual	2010	A= Class S B = Class B	100%	100%
Temperature Cycle	1010	C	100%	100%
Acceleration	2001	E (Y1 only)	100%	100%
PIND	2020	A (5 Cycles)	N/A	100%
Serialization	Per Product Specification		100%	100%
Radiographic	2012		N/A	100%
Electrical Test	Per Product Specification	+25^{O}C	100%	100%
Burn In	1015	A	100% 160 Hours @ 125^{O}C	100% 320 Hours @ 125 ^{O}C
Final Electrical	Per Product Specification	+25^{O}C	100%	100%
Group A Electrical	Per Product Specification	-55^{O}C + 125^{O}C	45/0	45/0
Seal Fine Leak Gross Leak	1014	 A C	100%	100%
External Visual	2009		100%	100%

Ordering Information

KCB Solutions Part Number	Screening Level
KA101-01C(straight leads) KA101-10C (gullwing) KA101-54C (3 mm QFN)	Unscreened
KA101-_ _B	Class B Screening
KA101-_ _S	Class S Screening