MMIC AP409

Product Features

- 50 ~ 3500MHz
- InGaP HBT MMIC
- 33.5dBm Output IP3
- 15.5dB Gain
- 18.8dBm P1 dB
- On Chip Active bias
- Pb Free / RoHS Standard

Application

- CDMA, W-CDMA Medium Power Amplifier
- High Linearity Drive Amplifier



Package Type: SOT-89

Description

AP409 is a gain block amplifier designed with InGaP HBT MMIC in a low cost SOT-89 package.
This MMIC amplifier is designed for use as driver devices for infrastructure equipment in the 50~3500MHz Wireless technologies such as Cellular, GSM, PCS CDMA, W-CDMA.

Specifications

PARAMETER	Units	Min	Typ	Max	Typ	
Gain (S_{21})	dB	14	15.5		15.3	15.2
Input Return Loss (S_{11})	dB		-18		-22	-22
Output Return Loss (S_{22})	dB		-20		-19	-19
Output 3rd Order Intercept Point (OIP3)	dBm	+30	+33.5		+30	+27
Output 1dB compression Point (P_1dB)	dBm		+18.8		+18	+16.5
Noise Figure	dB		5		5.1	5.1
DC Operating Current	mA	55	70	85	65	52
Supply Voltage	Vdc		+5		+4.8	+4.5
Thermal Resistance (Rth)	℃/W			150		

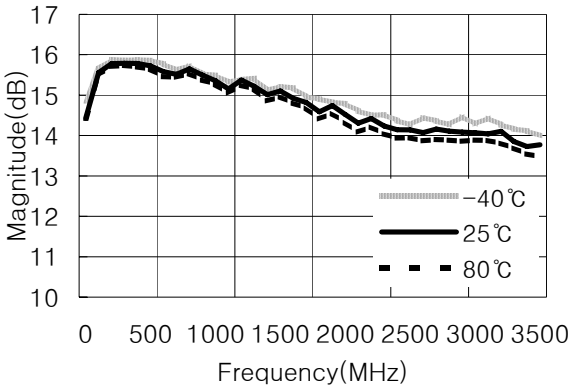
Test Condition
① 900MHz, Vdc=5V at 25℃
② OIP3 is measured with two tones, at an output power of +5dBm/tone separated by 1MHz.

Absolute Maximum Ratings

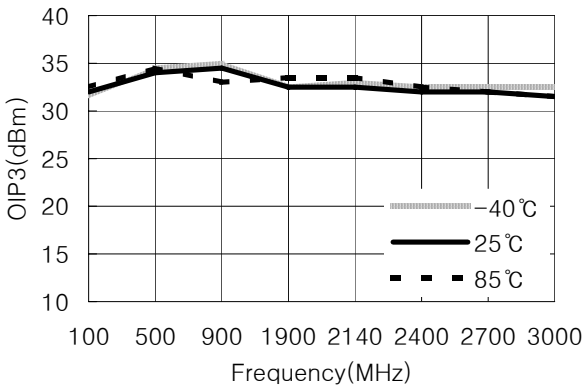
PARAMETER	Rating	Remark
Operating Case Temperature (℃)	-40 ~ +85	
Storage Temperature (℃)	-50 ~ +150	
Supply Voltage	+6	
Junction Temperature (℃)	+220	

Performance Charts (V_d=5V, I_d=70mA, T_c=25℃)

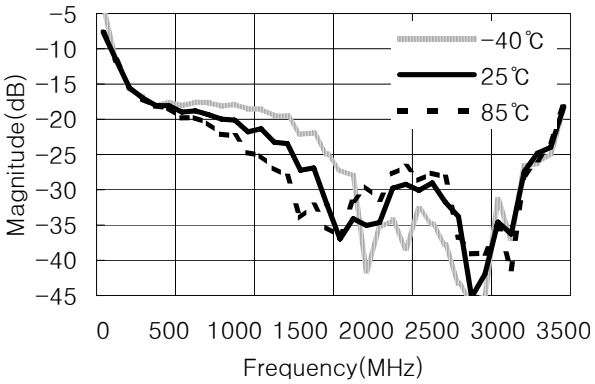
Gain vs. Frequency



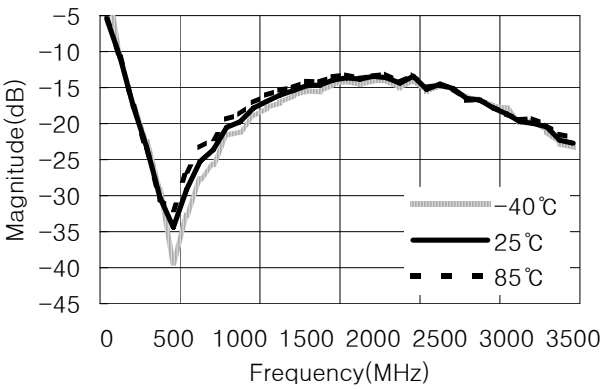
OIP3 vs. Frequency



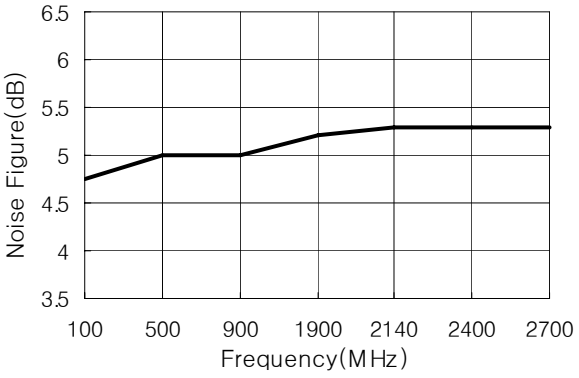
Input Return Loss vs. Frequency



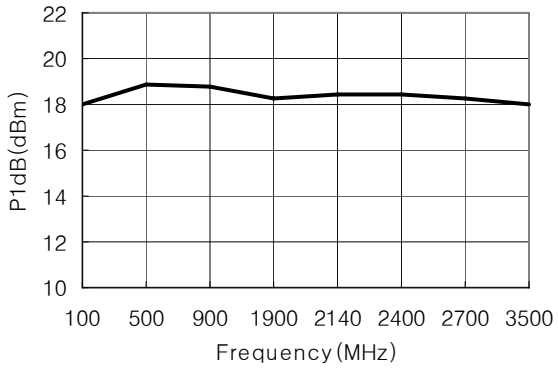
Output Return Loss vs. Frequency



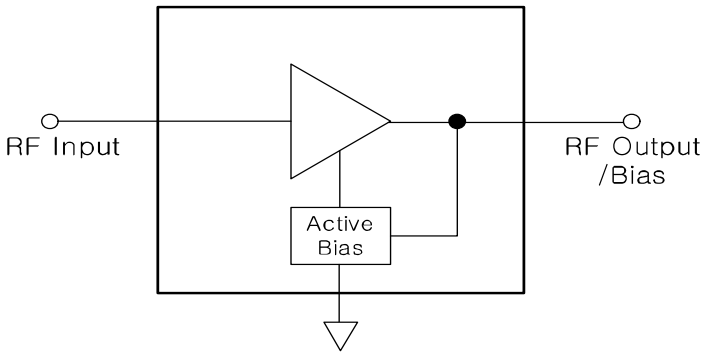
Noise Figure vs. Frequency



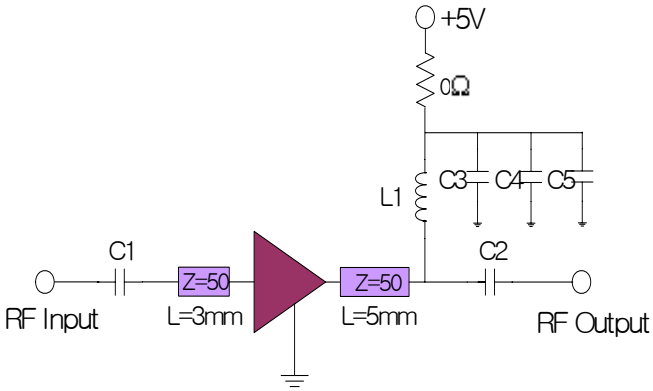
P1dB vs. Frequency

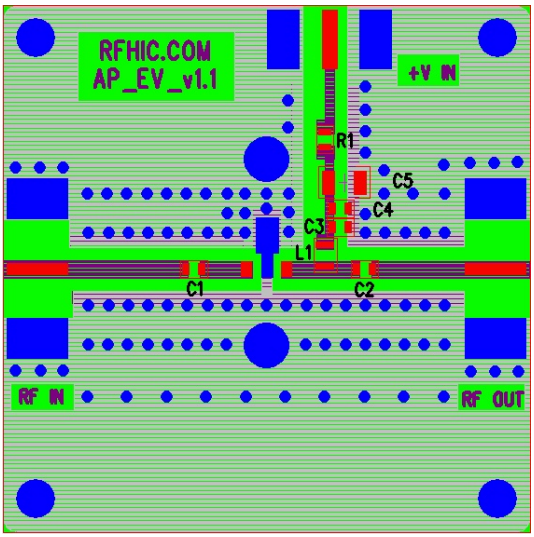


Block Diagram



Application Circuit





Recommended Component Values

	70MHz	500MHz-3000MHz
L1	560nH	100nH
C1,C2,C3	0.1uF	1000pF
C4	1000pF	0.1uF
C5	4.7uF/16V	4.7uF/16V

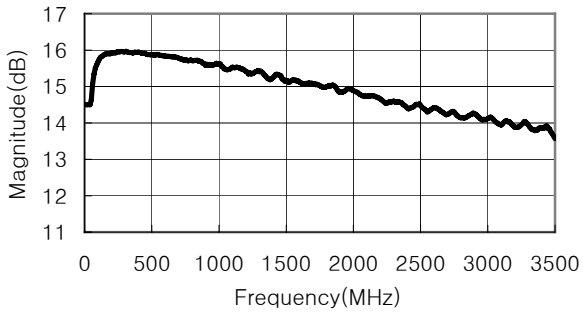
Recommended Bias Resistor Values

Vsupply	Rbias(5V)	Rbias(4.8V)	Rbias(4.5V)
6V	14	18	28
7V	28	33	48
8V	42	49	67
9V	57	64	86

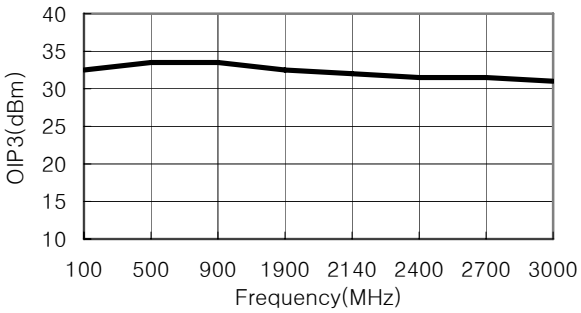
Performance Charts (V_d=5V, I_d=70mA, T_c=25℃)

Frequency	MHz	100	500	900	1900	2140	2400	2700	3500
Gain	dB	15.6	15.6	15.5	14.8	14.5	14.4	14.1	13.5
S11	dB	-11	-17	-18	-35	-33	-29	-26	-15
S22	dB	-10	-38	-20	-13	-13	-13	-14	-18
OIP3	dBm	32.5	33.5	33.5	32.5	32	31.5	31.5	
P1dB	dBm	18	18.9	18.8	18.3	18.4	18.4	18.3	18
Noise Figure	dB	4.75	5	5	5.2	5.3	5.3	5.3	

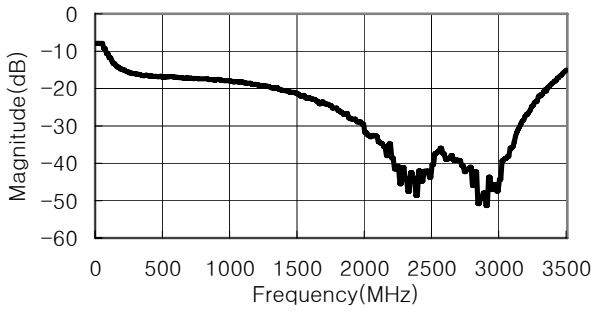
Gain vs. Frequency



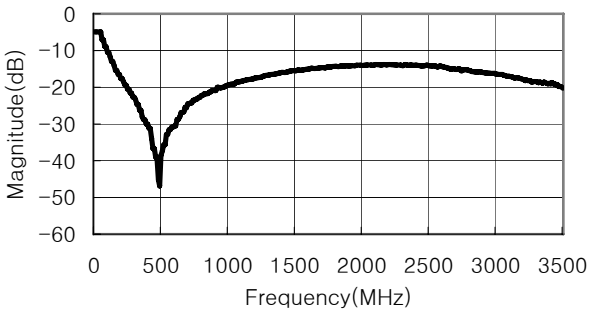
OIP3 vs. Frequency



Input Return Loss vs. Frequency

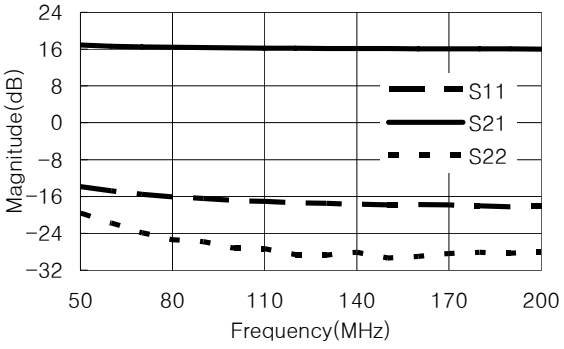


Output Return Loss vs. Frequency



70MHz Performance

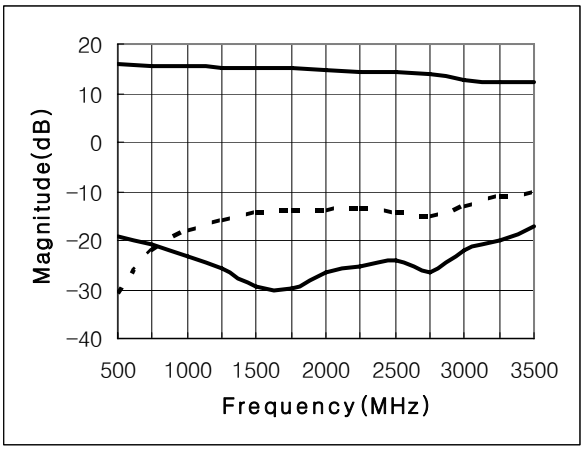
Typical Specifications	
Frequency	50~200MHz
Gain(S21)	16dB
Return Loss(S11)	-15dB
Return Loss(S22)	-23dB
OIP3	32.5dBm
Noise Figure	4.7dB
P1dB	19dBm



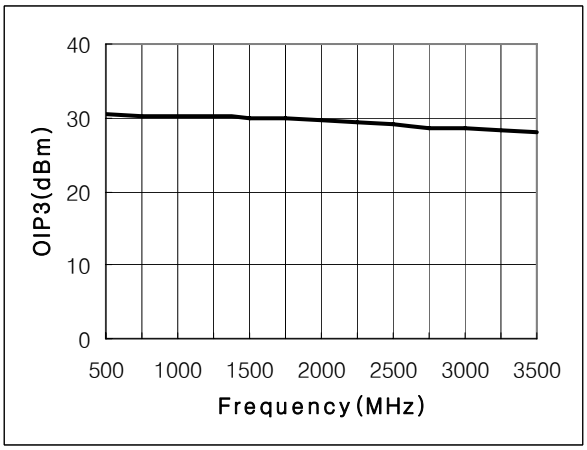
Performance Charts (V_d=4.8V, I_d=65mA, T_c=25℃)

Frequency	MHz	500	880	960	1860	2140	2700	3500
Gain	dB	15.5	15.3	15.3	14.6	14.3	12.6	12.2
S11	dB	-19	-22	-23	-27	-26	-26	-17
S22	dB	-31	-19	-17	-13	-14	-15	-10
OIP3	dBm	30.5	30	30	30	29	28.5	28
P1dB	dBm	18.1	18	18	17.5	17.1	16.5	16
Noise Figure	dB	5.1	5.1	5.1	5.2	5.2	5.3	5.3

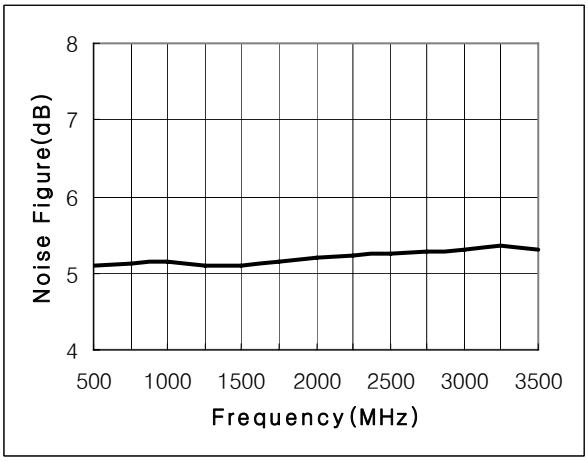
S-Parameter vs. Frequency



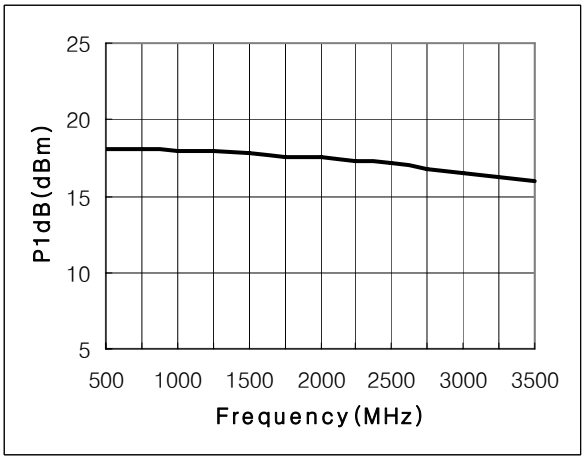
OIP3 vs. Frequency



Noise Figure vs. Frequency



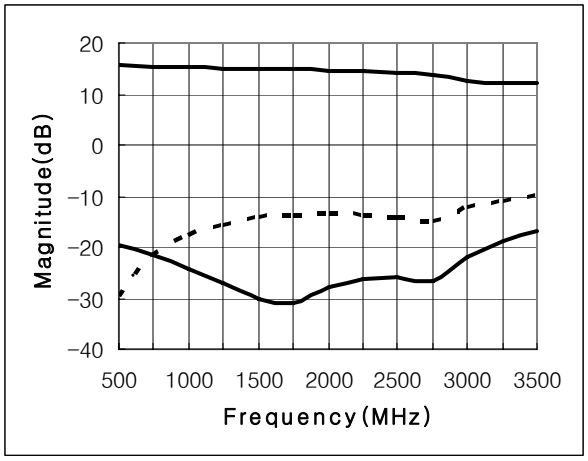
P1dB vs. Frequency



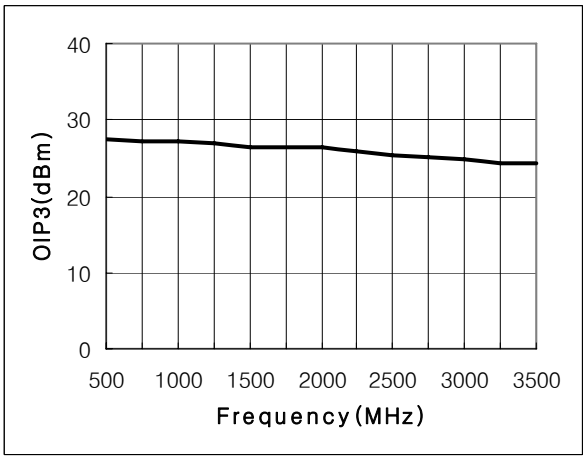
Performance Charts (V_d=4.5V, I_d=52mA, T_c=25℃)

Frequency	MHz	500	880	960	1860	2140	2700	3500
Gain	dB	15.5	15.2	15.2	14.5	14.1	12.4	12
S11	dB	-19	-22	-23	-27	-26	-26	-17
S22	dB	-30	-19	-17	-13	-14	-15	-10
OIP3	dBm	27.5	27	27	26	25	24	24
P1dB	dBm	16.7	16.5	16.4	15.6	15.2	14.9	14.1
Noise Figure	dB	5.1	5.1	5.1	5.2	5.25	5.27	5.3

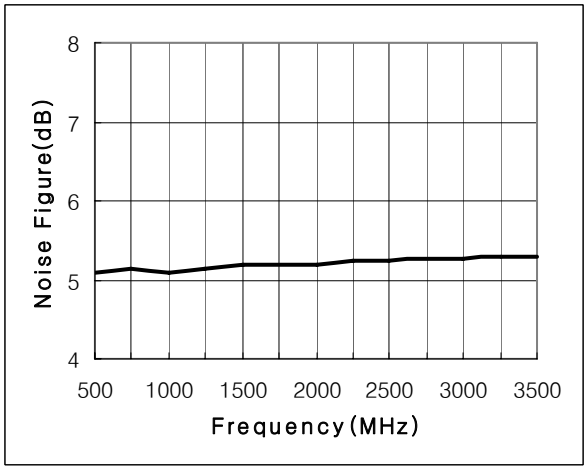
S-Parameter vs. Frequency



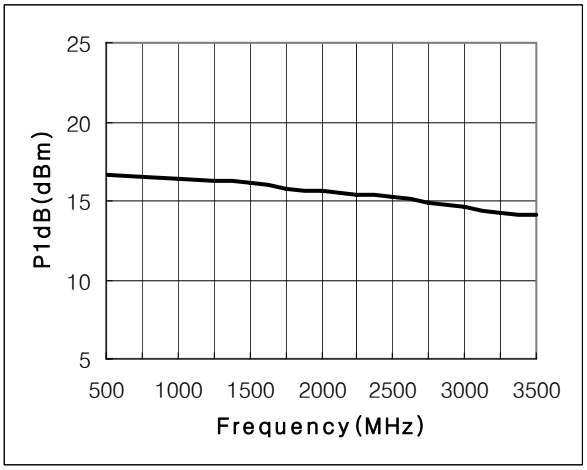
OIP3 vs. Frequency



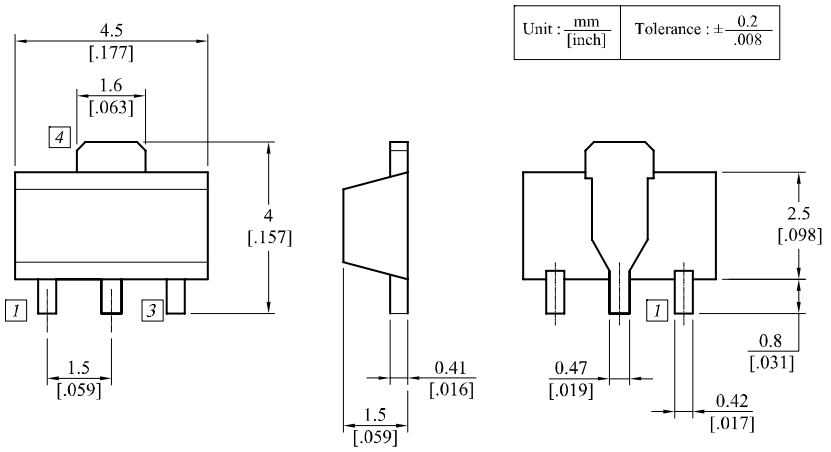
Noise Figure vs. Frequency



P1dB vs. Frequency



Package Dimensions (Type: SOT-89)

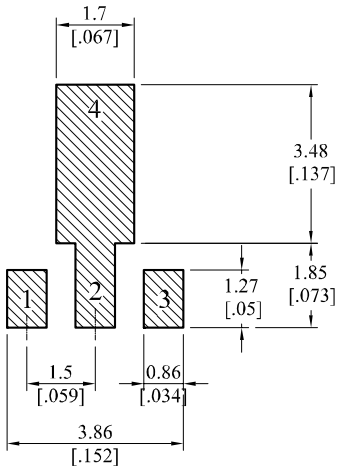


Pin No	Function
1	Input
2	Ground
3	Output/Bias
4	Ground

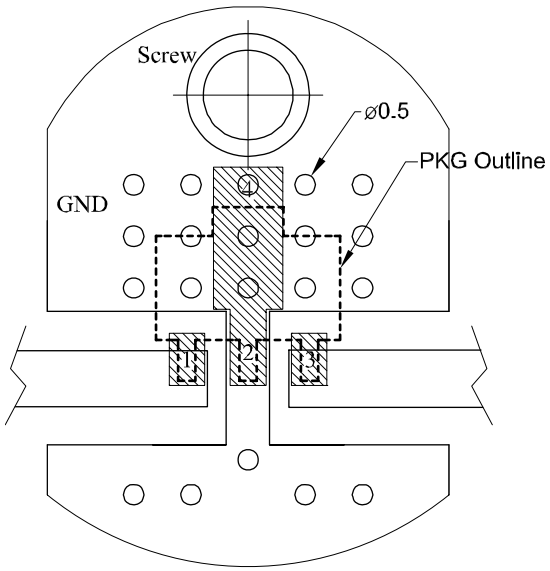
! ESD sensitive

Observe precautions for handling, testing and packaging.

Recommended Pattern



Recommended Mounting Configuration



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