

Product Description

ATEK884P5 is a tunable band pass filter with low in band loss and high rejection. Filter is controlled by 10-bit GPIO control interface. 2 filter covering from 1 to 7.5 GHz frequency band, and additional 2 bypass states.

Filter is developed in highly repeatable MMIC manufacturing process, which results in minimal part to part variation.

Bias and control voltages of the filters are positive, which eliminates the need for negative voltage rails.

Filter is housed in compact 5x5 mm low cost SMD package. Input and output are matched to 50 ohms internally.

Evaluation Board, bare die, custom package, and module options are available upon request.

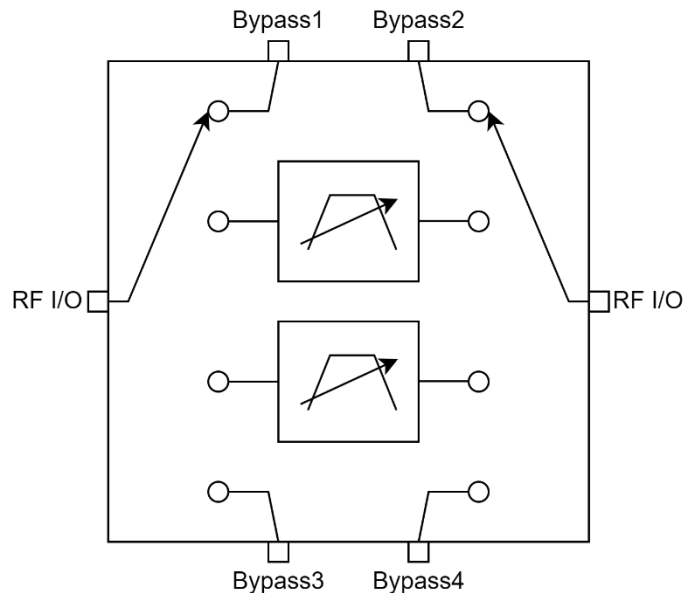
Product Features

- Frequency Range: 1 - 7.5 GHz
- Insertion Loss: 11 dB
- Positive Supply
- 5x5 mm compact size

Applications

- Wideband Receivers
- Telecommunication
- Test and Measurement
- SATCOM
- SDR

Functional Block Diagram



Electrical Specifications

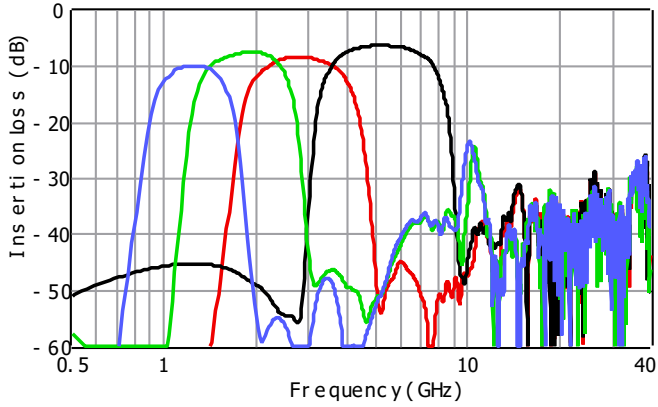
Conditions unless otherwise specified: $V_{DD} = 5V$, Typical, $T = 25\text{ C}$, CW.

Parameter		Min	Typ	Max	Units
Operational Frequency Range			1 - 7.5		GHz
Insertion Loss	1-3 GHz		11		dB
	3-7.5 GHz		9		
Input Return Loss			-12		dB
Output Return Loss			-12		dB
Input IP3			TBD		dBm
Input P1dB			TBD		dBm
Switching Speed 50% Vctrl to 90% of RF Output	On		260		ns
	Off		210		
0.1dB Settling Time			500		ns
DC Supply Voltage (Vdd)		3	5	5.5	V
DC Supply Current (Idd)			7		mA
Control Supply Current (Total Ictrl)			3		mA
Control Voltage (CTRL)	Low	-0.1		0.5	V
	High	3		5.5	
Operating Temperature		-40		85	°C

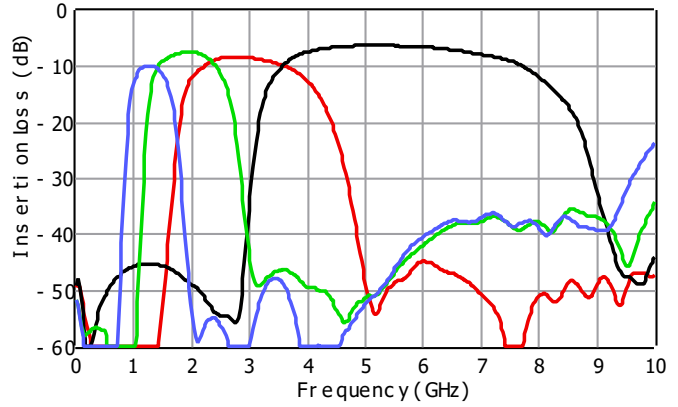
Typical Performance Plots

Conditions unless otherwise specified: $V_{DD} = 5V$, Typical, $T = 25\text{ C}$, CW.

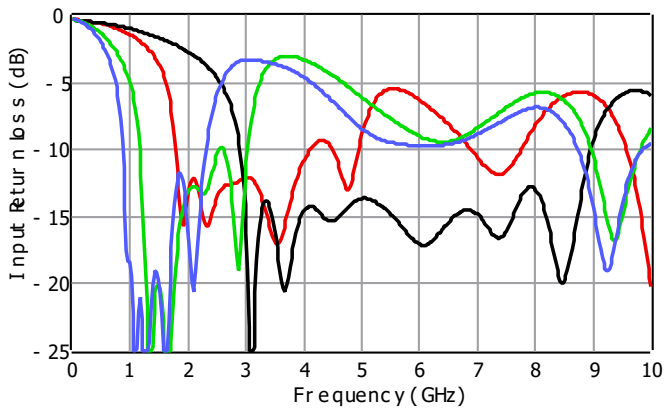
Insertion Loss, 1 to 7.5 GHz, Log Scale



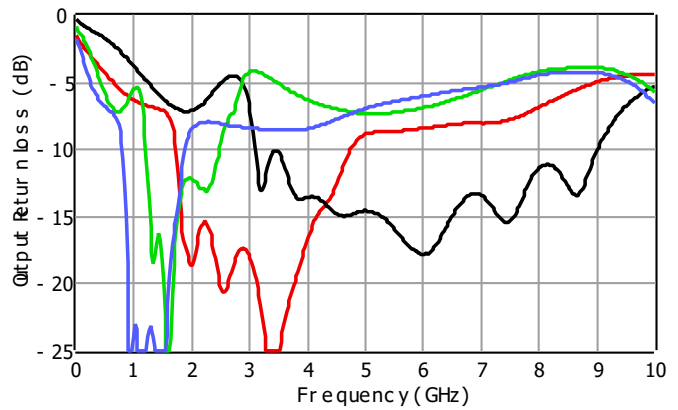
Insertion Loss, 1 to 7.5 GHz



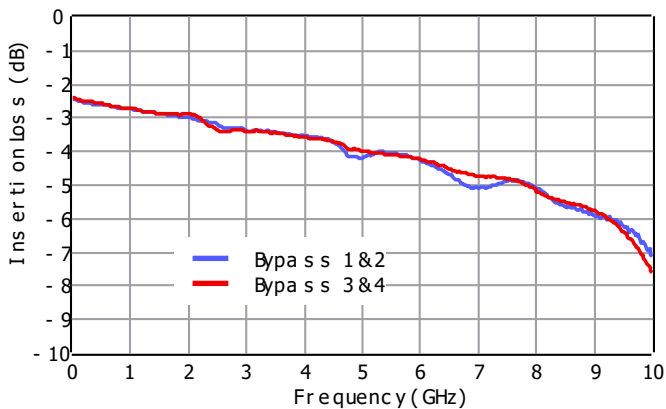
Input Return Loss, 1 to 7.5 GHz



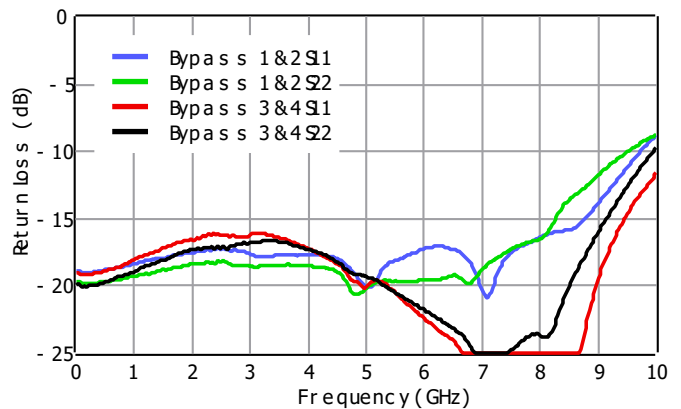
Output Return Loss, 1 to 7.5 GHz



Bypass Lines Insertion Loss



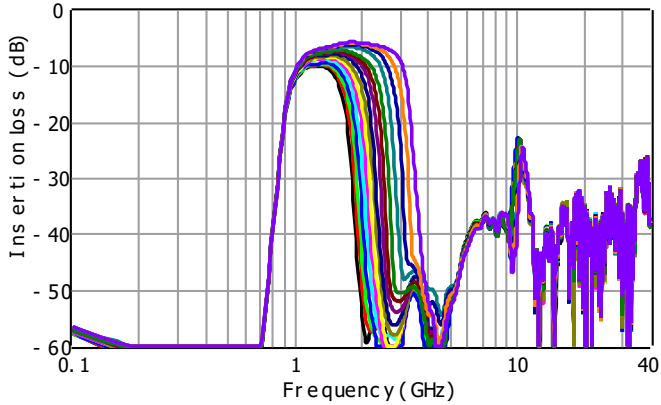
Bypass Lines Return Loss



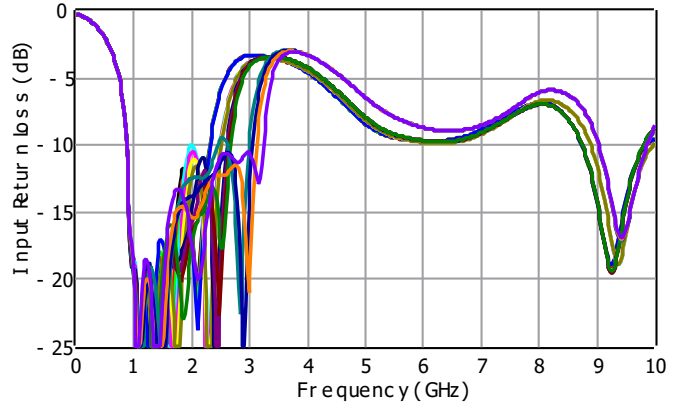
Typical Performance Plots

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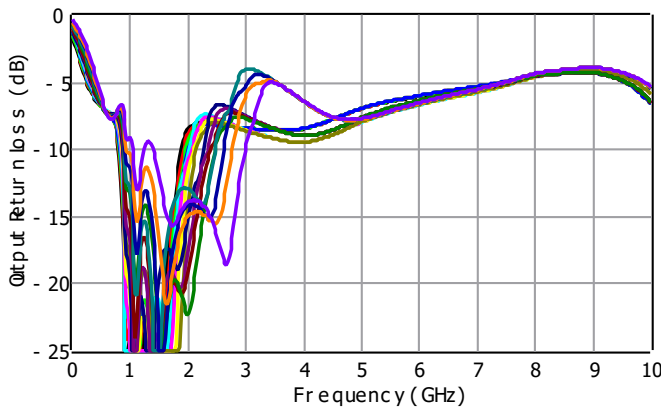
Insertion Loss, 1 to 3 GHz, Log Scale, Low Pass Tuning



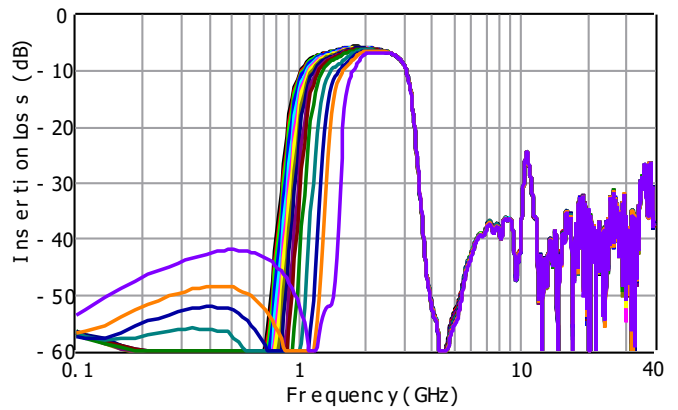
Input Return Loss, 1 to 3 GHz, Low Pass Tuning



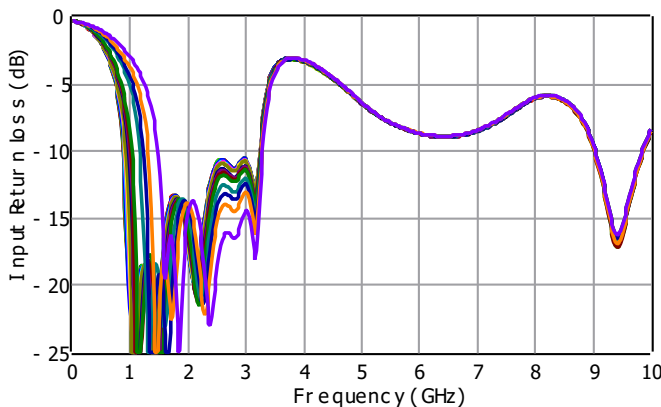
Output Return Loss, 1 to 3 GHz, Low Pass Tuning



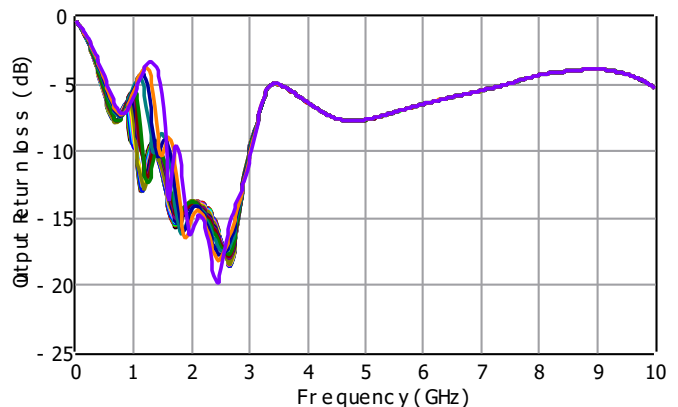
Insertion Loss, 1 to 3 GHz, Log Scale, High Pass Tuning



Input Return Loss, 1 to 3 GHz, High Pass Tuning



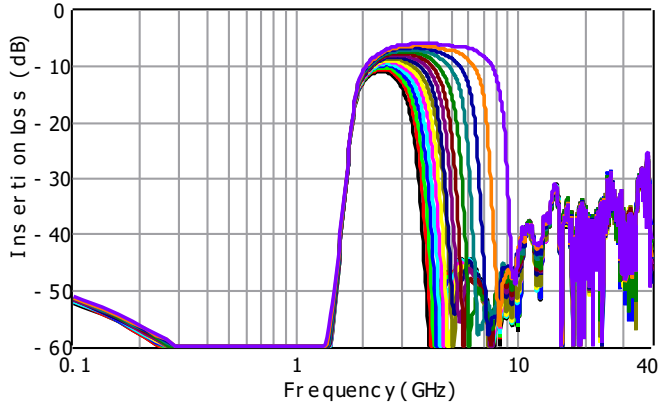
Output Return Loss, 1 to 3 GHz, High Pass Tuning



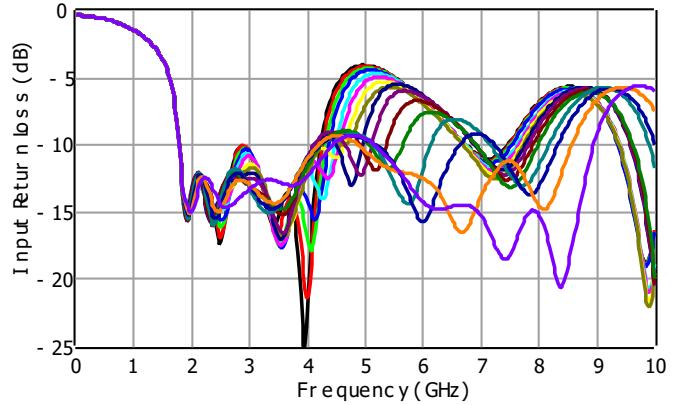
Typical Performance Plots

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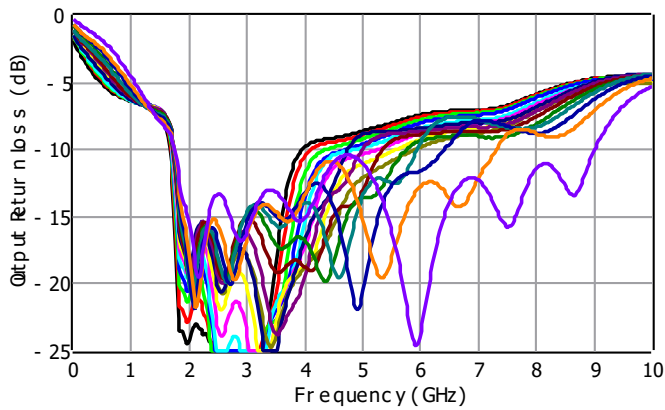
Insertion Loss, 2 to 7.5 GHz, Log Scale, Low Pass Tuning



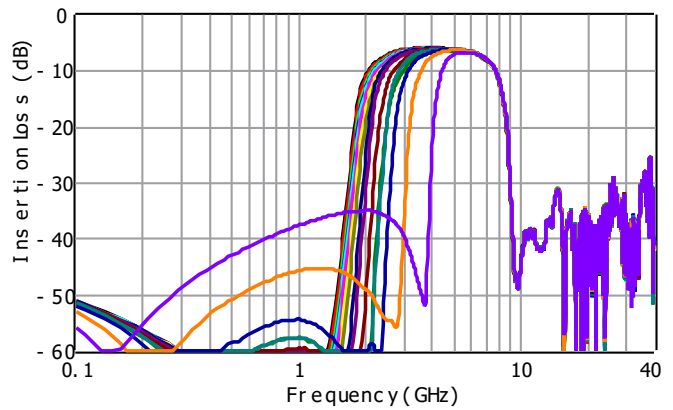
Input Return Loss, 2 to 7.5 GHz, Low Pass Tuning



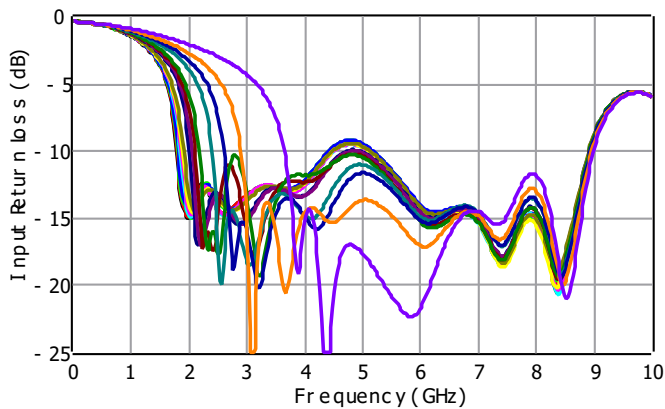
Output Return Loss, 2 to 7.5 GHz, Low Pass Tuning



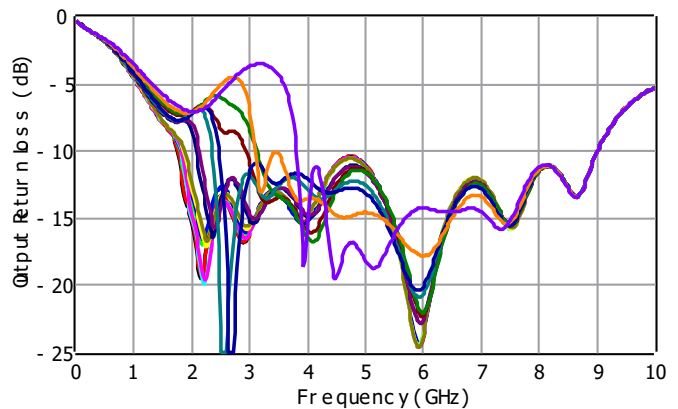
Insertion Loss, 2 to 7.5 GHz, Log Scale, High Pass Tuning



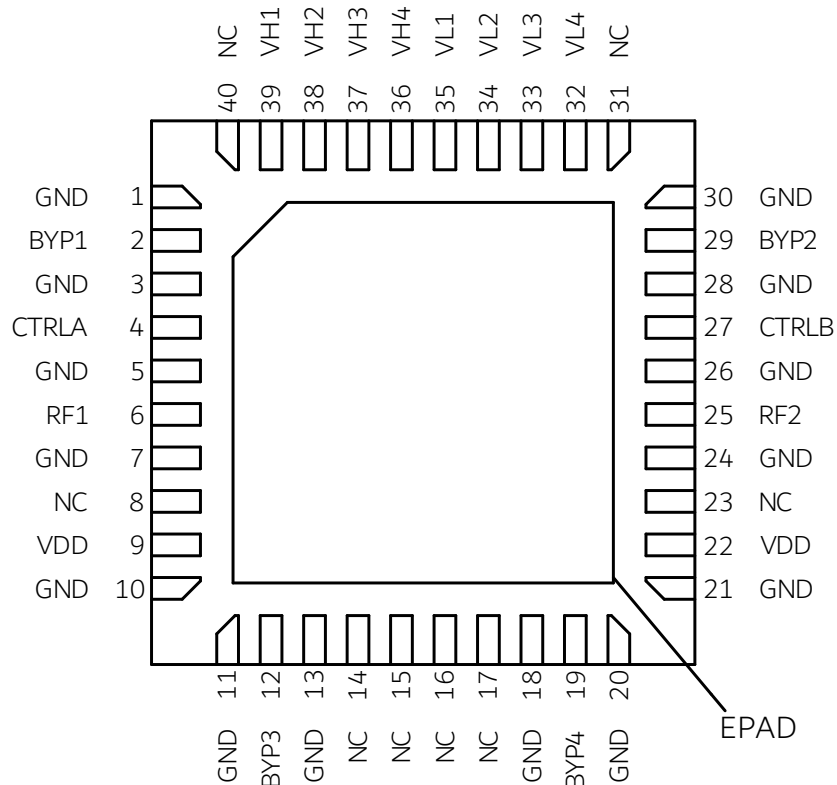
Input Return Loss, 2 to 7.5 GHz, High Pass Tuning



Output Return Loss, 2 to 7.5 GHz, High Pass Tuning



Pin Description



Top View

Pin Number	Pin Name	Description
6	RF1	RF input/output pin. Wideband external DC block capacitor is required.
25	RF2	RF input/output pin. Wideband external DC block capacitor is required.
2	BYP1	RF bypass input/output pin. Wideband external DC block capacitor is required.
29	BYP2	RF bypass input/output pin. Wideband external DC block capacitor is required.
12	BYP3	RF bypass input/output pin. Wideband external DC block capacitor is required.
19	BYP4	RF bypass input/output pin. Wideband external DC block capacitor is required.
9, 22	VDD	Vdd supply pin.
4	CTRLA	Control A pin
27	CTRLB	Control B pin
39	VH1	High Pass Control Pin1
38	VH2	High Pass Control Pin2
37	VH3	High Pass Control Pin3
36	VH4	High Pass Control Pin4
35	VL1	Low Pass Control Pin1
34	VL2	Low Pass Control Pin2
33	VL3	Low Pass Control Pin3
32	VL4	Low Pass Control Pin4

8, 14-17, 23, 31, 40	NC	These pins are not internally connected. Can be grounded on the PCB.
1, 3, 5, 7, 10, 11, 13, 18, 20, 21, 24, 26, 28, 30	GND	Ground.
41	EPAD	Exposed Pad on the bottom of the package should be connected to ground with multiple number of vias to reduce the inductance to the GND.

Control Interface

CTRLA	CTRLB	Filter Bank State
LOW	LOW	Bypass 1&2
LOW	HIGH	1 to 3 GHz Band Pass Filter
HIGH	LOW	2 to 7.5 GHz Band Pass Filter
HIGH	HIGH	Bypass 3&4

1 - 3 GHz Band Pass Filter Control Interface

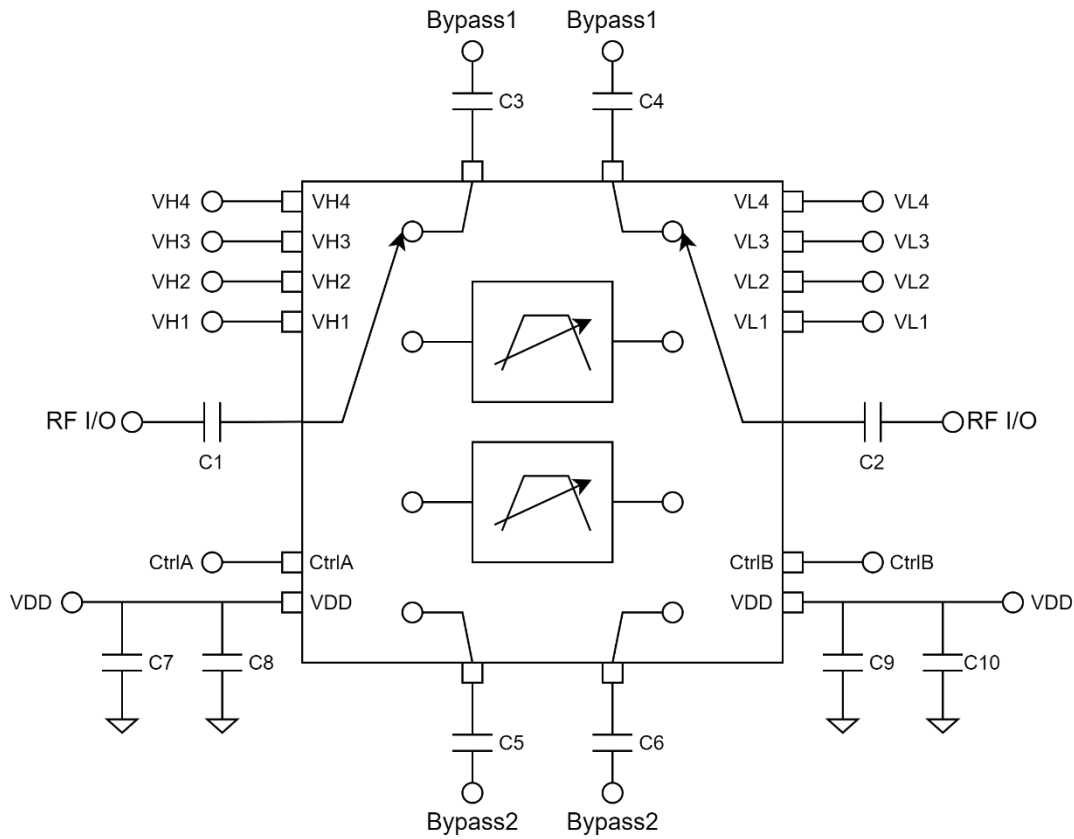
H4	H3	H2	H1	CTRLA	CTRLB	Typical High Pass 3dB Cutoff Frequency (MHz)	L4	L3	L2	L1	CTRLA	CTRLB	Typical Low Pass 3dB Cutoff Frequency (MHz)
LOW	LOW	LOW	LOW	LOW	HIGH	1070	LOW	LOW	LOW	LOW	LOW	HIGH	1570
LOW	LOW	LOW	HIGH	LOW	HIGH	1080	LOW	LOW	LOW	HIGH	LOW	HIGH	1610
LOW	LOW	HIGH	LOW	LOW	HIGH	1085	LOW	LOW	HIGH	LOW	LOW	HIGH	1630
LOW	LOW	HIGH	HIGH	LOW	HIGH	1100	LOW	LOW	HIGH	HIGH	LOW	HIGH	1680
LOW	HIGH	LOW	LOW	LOW	HIGH	1130	LOW	HIGH	LOW	LOW	LOW	HIGH	1720
LOW	HIGH	LOW	HIGH	LOW	HIGH	1150	LOW	HIGH	LOW	HIGH	LOW	HIGH	1770
LOW	HIGH	HIGH	LOW	LOW	HIGH	1160	LOW	HIGH	HIGH	LOW	LOW	HIGH	1820
LOW	HIGH	HIGH	HIGH	LOW	HIGH	1190	LOW	HIGH	HIGH	HIGH	LOW	HIGH	1880
HIGH	LOW	LOW	LOW	LOW	HIGH	1200	HIGH	LOW	LOW	LOW	LOW	HIGH	1960
HIGH	LOW	LOW	HIGH	LOW	HIGH	1250	HIGH	LOW	LOW	HIGH	LOW	HIGH	2080
HIGH	LOW	HIGH	LOW	LOW	HIGH	1270	HIGH	LOW	HIGH	LOW	LOW	HIGH	2110
HIGH	LOW	HIGH	HIGH	LOW	HIGH	1320	HIGH	LOW	HIGH	HIGH	LOW	HIGH	2210
HIGH	HIGH	LOW	LOW	LOW	HIGH	1460	HIGH	HIGH	LOW	LOW	LOW	HIGH	2380
HIGH	HIGH	LOW	HIGH	LOW	HIGH	1560	HIGH	HIGH	LOW	HIGH	LOW	HIGH	2550
HIGH	HIGH	HIGH	LOW	LOW	HIGH	1620	HIGH	HIGH	HIGH	LOW	LOW	HIGH	2710
HIGH	HIGH	HIGH	HIGH	LOW	HIGH	1770	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	2950

2 - 7.5 GHz Band Pass Filter Control Interface

H4	H3	H2	H1	CTRLA	CTRLB	Typical High Pass 3dB Cutoff Frequency (MHz)	L4	L3	L2	L1	CTRLA	CTRLB	Typical Low Pass 3dB Cutoff Frequency (MHz)
LOW	LOW	LOW	LOW	HIGH	LOW	2170	LOW	LOW	LOW	LOW	HIGH	LOW	3010
LOW	LOW	LOW	HIGH	HIGH	LOW	2200	LOW	LOW	LOW	HIGH	HIGH	LOW	3080
LOW	LOW	HIGH	LOW	HIGH	LOW	2280	LOW	LOW	HIGH	LOW	HIGH	LOW	3140
LOW	LOW	HIGH	HIGH	HIGH	LOW	2300	LOW	LOW	HIGH	HIGH	HIGH	LOW	3210
LOW	HIGH	LOW	LOW	HIGH	LOW	2310	LOW	HIGH	LOW	LOW	HIGH	LOW	3350
LOW	HIGH	LOW	HIGH	HIGH	LOW	2360	LOW	HIGH	LOW	HIGH	HIGH	LOW	3440
LOW	HIGH	HIGH	LOW	HIGH	LOW	2430	LOW	HIGH	HIGH	LOW	HIGH	LOW	3560
LOW	HIGH	HIGH	HIGH	HIGH	LOW	2500	LOW	HIGH	HIGH	HIGH	HIGH	LOW	3680
HIGH	LOW	LOW	LOW	HIGH	LOW	2480	HIGH	LOW	LOW	LOW	HIGH	LOW	3850
HIGH	LOW	LOW	HIGH	HIGH	LOW	2570	HIGH	LOW	LOW	HIGH	HIGH	LOW	4050
HIGH	LOW	HIGH	LOW	HIGH	LOW	2810	HIGH	LOW	HIGH	LOW	HIGH	LOW	4250
HIGH	LOW	HIGH	HIGH	HIGH	LOW	2910	HIGH	LOW	HIGH	HIGH	HIGH	LOW	4500
HIGH	HIGH	LOW	LOW	HIGH	LOW	3040	HIGH	HIGH	LOW	LOW	HIGH	LOW	4900
HIGH	HIGH	LOW	HIGH	HIGH	LOW	3200	HIGH	HIGH	LOW	HIGH	HIGH	LOW	5400
HIGH	HIGH	HIGH	LOW	HIGH	LOW	3640	HIGH	HIGH	HIGH	LOW	HIGH	LOW	6150
HIGH	HIGH	HIGH	HIGH	HIGH	LOW	4440	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	7500

Applications Information

Signal entering from RF input goes to RF output with band pass filtering. Typical application schematic to operate the filter is given below.



C1, C2, C3, C4, C5 and C6 are DC block capacitors. It is recommended to use wideband low loss DC block capacitors to achieve the best performance. Using low profile capacitors is also possible, which will result in additional loss.

C7, C8, C9 and C10 are used to filter out the ripples and unwanted signals coming from the Vdd supply. Using additional capacitors in parallel to C7, C8, C9 and C10 will improve this filtering. If this filtering is of no concern, then filters can be operated without C7, C8, C9 and C10.

Small signal data is generated with connectorized evaluation PCB measurements. Then the PCB trace and connector transition losses are de-embedded, to generate insertion loss data plots shown in this document.

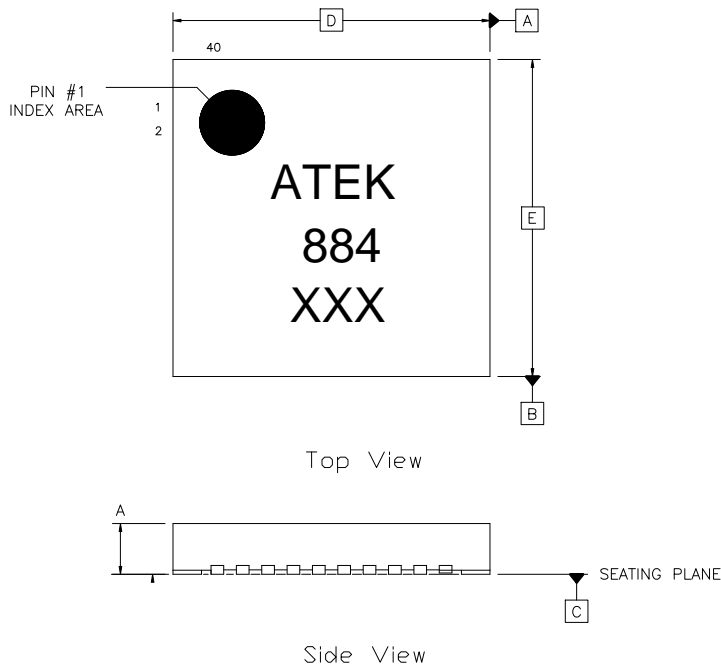
The NC pins of the filter are connected to the GND on the PCBs used to generate the plots shown in this document.

Absolute Maximum Ratings

Parameter	Value/Range
Supply Voltage (Vdd)	TBD
RF Input Power	TBD
Storage Temperature	-55 to +125°C

Operation of this device outside the parameter ranges given above may cause damage. These conditions should not be applied simultaneously.

Mechanical and Marking Information



NOTES:
1) ALL DIMENSIONS IN MM

SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A, V	0.80	1.00	E2	3.40	3.60
b	0.15	0.25	e	0.40	BSC
D	5.00	BSC	k	0.20	-
D2	3.40	3.60	L	0.40	0.50
E	5.00	BSC			

Handling Precautions



Caution!
ESD-Sensitive Device
Handle Accordingly

Contact Information

For the latest specifications, additional product information, support, and sales.

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Email: support@atekmidas.com

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Revisions

Revision No	Revision Date	Revision Reason	Section / Page No
1.0	11.01.2025	Initial Release	
1.1	16.01.2025	Plots Revised, Control Interface Updated, Application Information Revised	
1.2	03.02.2025	Switching Speed Data Added	
1.3	29.04.2025	Settling Time Data Added	