

Product Description

ATEK888P5 is a tunable low pass filter with low in band loss and high rejection. Filter is controlled by 5-bit GPIO control interface. 32 filters covering from 20 to 530 MHz frequency band.

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.

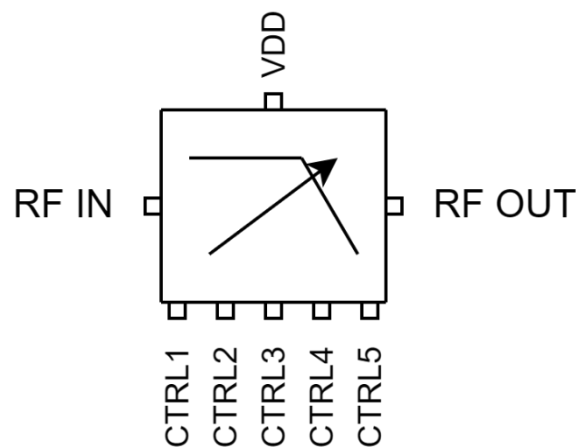
Product Features

- Frequency Range: 20 - 530 MHz
- Insertion Loss: 2 dB
- Input IP3: 44 dBm
- Positive Supply
- 5x5 mm compact size

Applications

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

Functional Block Diagram



Electrical Specifications

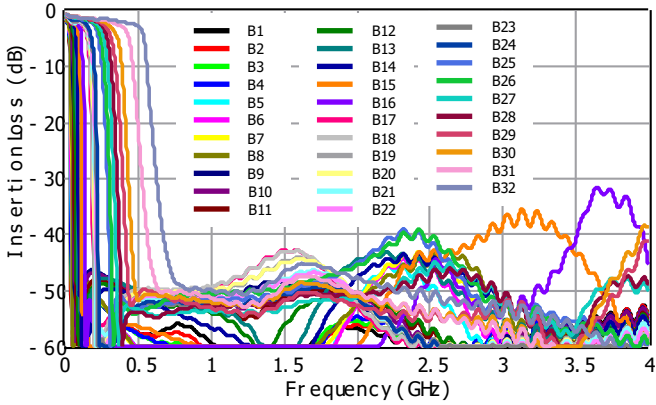
Conditions unless otherwise specified: $V_{DD} = 5\text{ V}$, Typical, $T = 25\text{ C}$, CW.

Parameter		Min	Typ	Max	Units
Operational Frequency Range		20	530		MHz
Insertion Loss			2		dB
Input Return Loss			-13		dB
Output Return Loss			-13		dB
Input IP3			44		dBm
Input P1dB			23		dBm
Switching Speed	On		240		ns
50% Vctrl to 90% of RF Output	Off		250		
0.1dB Settling Time			1.1		μs
DC Supply Voltage (Vdd)		3	5	5.5	V
DC Supply Current (Idd)			8		mA
DC Supply Current (Ictrl1+Ictrl2+Ictrl3+Ictrl4)			1.6		mA
DC Supply Current (Ictrl5)			1		mA
Control Voltage (CTRL)	Low	-0.1		0.5	V
	High	3		5.5	
Operating Temperature		-40		85	$^{\circ}\text{C}$

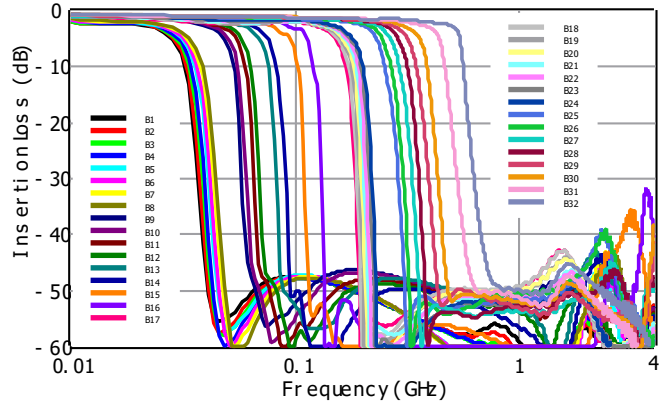
Typical Performance Plots

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

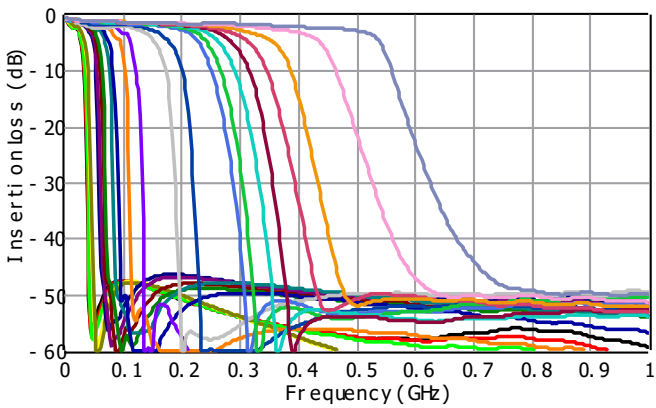
Insertion Loss



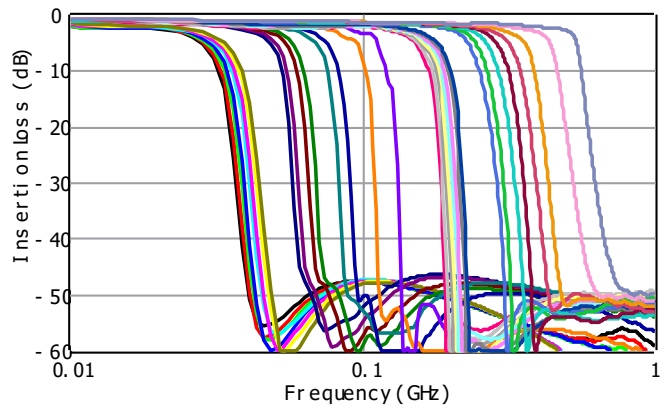
Insertion Loss, Log Scale



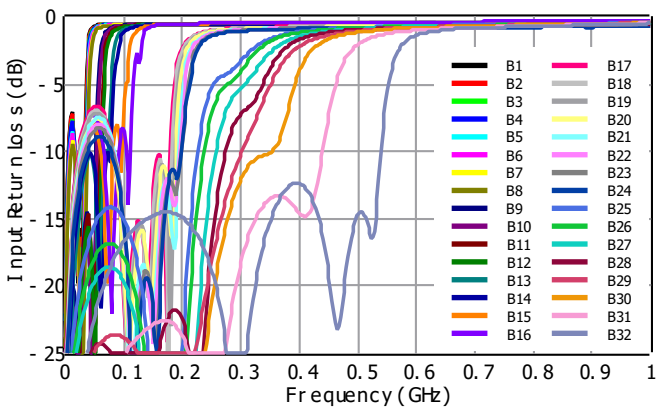
Insertion Loss



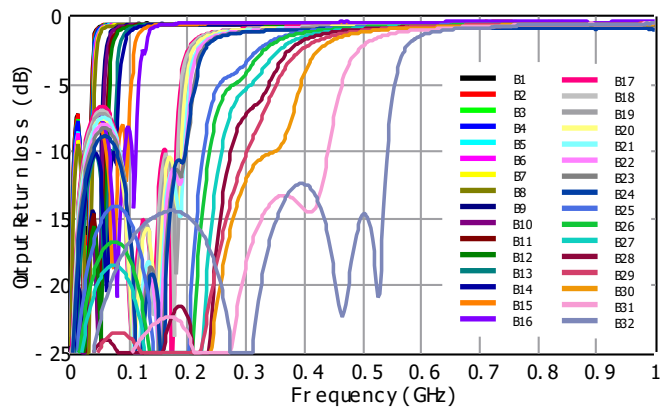
Insertion Loss, Log Scale



Input Return Loss



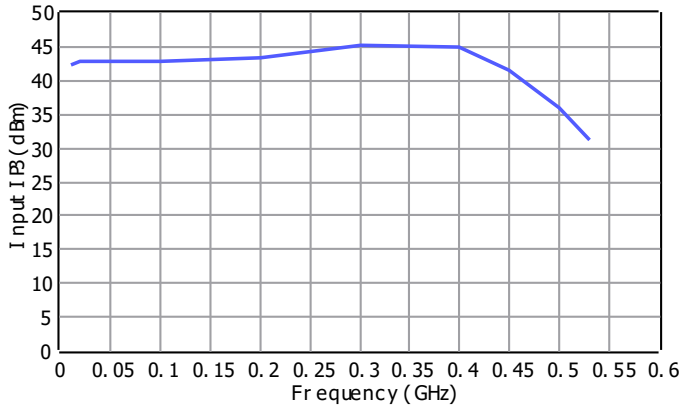
Output Return Loss



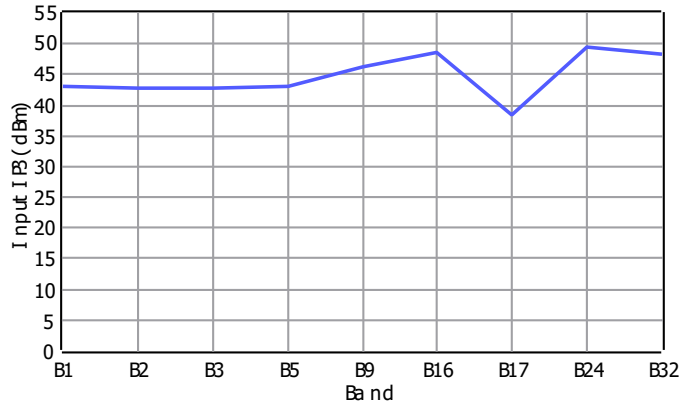
Typical Performance Plots

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

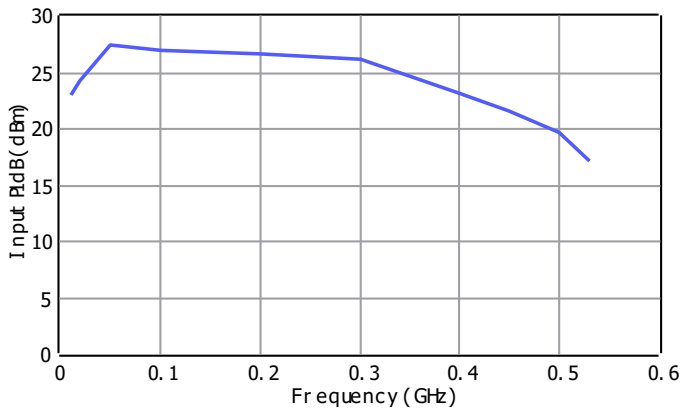
Input IP3 at Band32



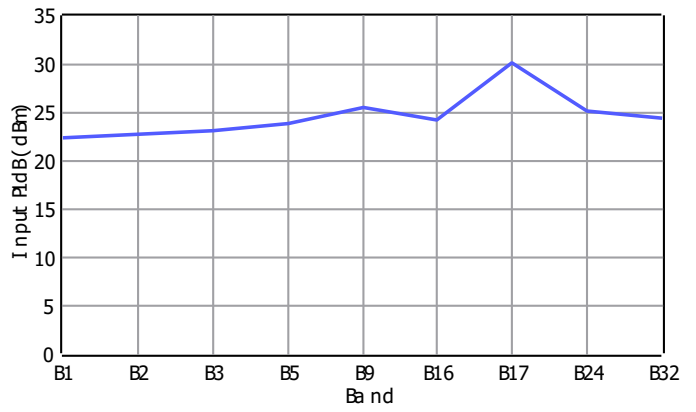
Input IP3 vs Bands at 20MHz



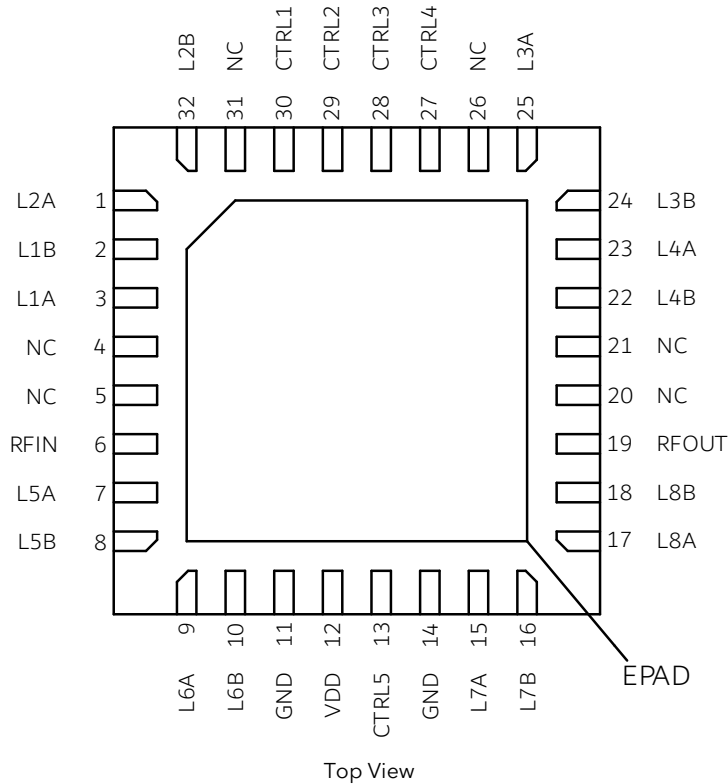
Input P1dB at Band32



Input P1dB vs Bands at 20MHz



Pin Description



Pin Number	Pin Name	Description
6	RF IN	RF input pin. Wideband external DC block capacitor is required.
19	RF OUT	RF output pin. Wideband external DC block capacitor is required.
12	VDD	Vdd bias pin.
30	CTRL1	Control pin.
29	CTRL2	Control pin.
28	CTRL3	Control pin.
27	CTRL4	Control pin.
13	CTRL5	Control pin.
3	L1A	External inductor connection.
2	L1B	External inductor connection.
1	L2A	External inductor connection.
32	L2B	External inductor connection.
25	L3A	External inductor connection.
24	L3B	External inductor connection.
23	L4A	External inductor connection.
22	L4B	External inductor connection.
7	L5A	External inductor connection.
8	L5B	External inductor connection.
9	L6A	External inductor connection.
10	L6B	External inductor connection.
15	L7A	External inductor connection.
16	L7B	External inductor connection.

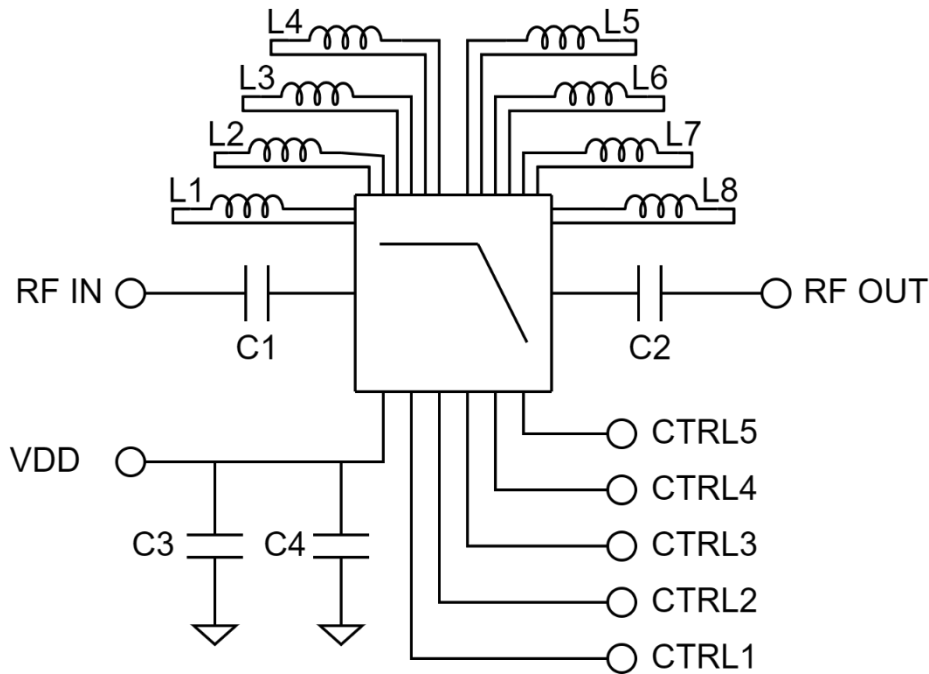
17	L8A	External inductor connection.
18	L8B	External inductor connection.
4, 5, 20, 21, 26, 31	NC	These pins are not internally connected. Can be grounded on the PCB.
11, 14	GND	Ground.
33	EPAD	Exposed Pad on the bottom of the package should be connected to ground with multiple number of vias to reduce the inductance to the GND.

Control Interface

CTRL1	CTRL2	CTRL3	CTRL4	CTRL5	Filter State	Typical 3dB Cutoff Frequency (MHz)
LOW	LOW	LOW	LOW	LOW	Band1	27
HIGH	LOW	LOW	LOW	LOW	Band2	28
LOW	HIGH	LOW	LOW	LOW	Band3	29
HIGH	HIGH	LOW	LOW	LOW	Band4	30
LOW	LOW	HIGH	LOW	LOW	Band5	31
HIGH	LOW	HIGH	LOW	LOW	Band6	32
LOW	HIGH	HIGH	LOW	LOW	Band7	33
HIGH	HIGH	HIGH	LOW	LOW	Band8	34
LOW	LOW	LOW	HIGH	LOW	Band9	48
HIGH	LOW	LOW	HIGH	LOW	Band10	51
LOW	HIGH	LOW	HIGH	LOW	Band11	55
HIGH	HIGH	LOW	HIGH	LOW	Band12	58
LOW	LOW	HIGH	HIGH	LOW	Band13	68
HIGH	LOW	HIGH	HIGH	LOW	Band14	75
LOW	HIGH	HIGH	HIGH	LOW	Band15	95
HIGH	HIGH	HIGH	HIGH	LOW	Band16	112
LOW	LOW	LOW	LOW	HIGH	Band17	150
HIGH	LOW	LOW	LOW	HIGH	Band18	155
LOW	HIGH	LOW	LOW	HIGH	Band19	160
HIGH	HIGH	LOW	LOW	HIGH	Band20	164
LOW	LOW	HIGH	LOW	HIGH	Band21	168
HIGH	LOW	HIGH	LOW	HIGH	Band22	172
LOW	HIGH	HIGH	LOW	HIGH	Band23	176
HIGH	HIGH	HIGH	LOW	HIGH	Band24	180
LOW	LOW	LOW	HIGH	HIGH	Band25	230
HIGH	LOW	LOW	HIGH	HIGH	Band26	245
LOW	HIGH	LOW	HIGH	HIGH	Band27	265
HIGH	HIGH	LOW	HIGH	HIGH	Band28	285
LOW	LOW	HIGH	HIGH	HIGH	Band29	310
HIGH	LOW	HIGH	HIGH	HIGH	Band30	350
LOW	HIGH	HIGH	HIGH	HIGH	Band31	425
HIGH	HIGH	HIGH	HIGH	HIGH	Band32	530

Applications Information

Signal entering from RF IN goes to RF OUT with low pass filtering.
Typical application schematic to operate the filter is given below.



C1 and C2 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.

C3 and C4 are used to filter out the ripples and unwanted signals coming from the Vdd supply. Using additional capacitors in parallel to C3 and C4 will improve this filtering. If this filtering is of no concern, then filters can be operated without C3 and C4.

L1, L2, L3, L4, L5, L6, L7 and L8 inductors are high Q RF inductors.

Small signal data is generated with connectorized evaluation PCB measurements. Large signal data is generated with connectorized evaluation PCB measurements. Then the input loss of the PCB is de-embedded from measurement data across frequency, to generate data shown in this document.

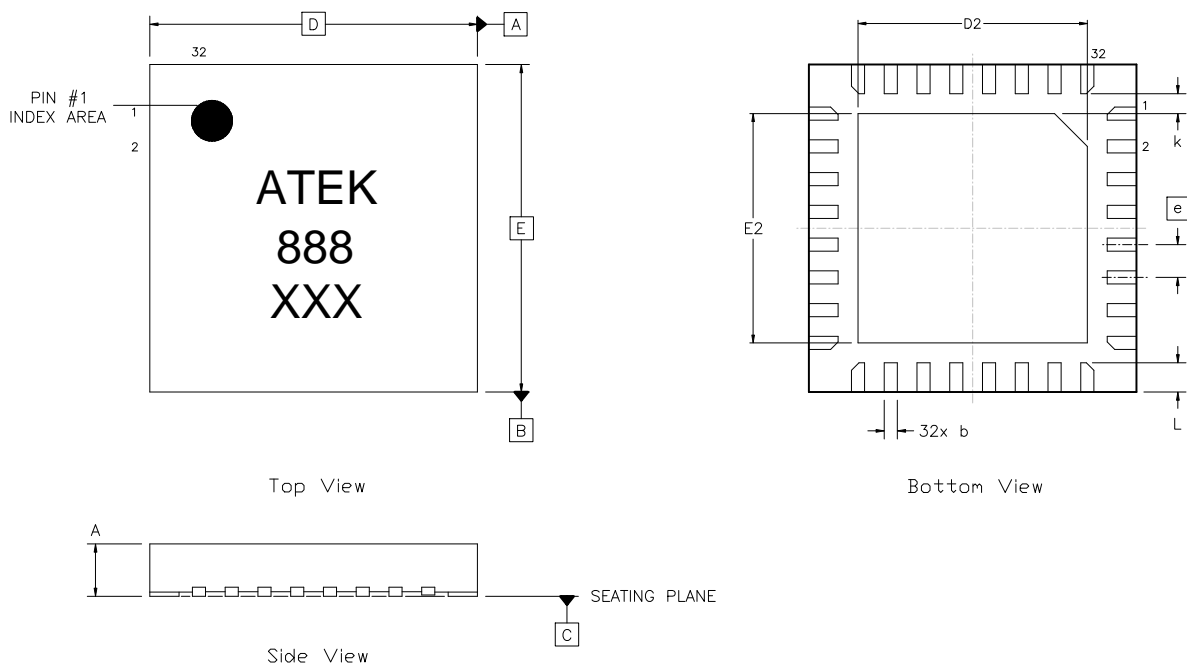
The NC pins of the filter are connected to the GND on the PCBs used to generate the plots shown in this document.

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	0.18	0.30	e	0.50	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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Revisions

Revision No	Revision Date	Revision Reason	Section / Page No
1.0	27.11.2024	Initial Release	
1.1	28.11.2024	Format and Content Fixed	
1.2	20.12.2024	Large Signal Data Added	
1.3	09.01.2025	Format and Content Fixed	
1.4	14.01.2025	Control Interface Table Updated	
1.5	03.02.2025	Switching Speed Data Added	
1.6	29.04.2025	Settling Time Data Added	