KSP
Photon Counting Integrated Circuit for Particulate Sensor & medical equipment
Product Specification

General Description

The KSP is a mixed-signal ASIC for a particulate sensor and medical equipment applications. It is a photon-counting type Readout Integrated Circuit (ROIC) for a continuous data acquisition from a SiPM photodiode.

The KSP is designed to detect and process small photoelectric currents ranging between 10 pico-amperes and 10 nano-amperes.

The KSP has an embedded peak detector that detects the absolute amplitude of photoelectric signals, and outputs the peak value with 1MHz bandwidth.

The KSP operates at a high frequency (wide bandwidth) for fast data acquisition, and it is suitable for applications that utilizes photoelectronic detection mechanism, such as particulate sensors, radioactive detectors, and bio-medical sensors. The KSP is optimized for PM1 – PM10 particulate detection when used for particulate detector, and also applicable to CT/PET radioactive diagnosis equipment. The chip can output data for digital analytic image reconstruction in real-time.

The KSP is one of the three different versions of Piera System's PCICs (Particle Counting IC).

Features

- Internal peak detector
- 3.3V single power supply
- External gain control
- High Sensitivity (10pA – 10nA)
- 1 digital and 1 analog output
- Threshold control (0~3.3V)
- High sampling rate ~1MHz
- Internal noise cancellation

Electrical Characteristics are identical to KSD

Applications

- Particulate sensor
- X-ray, γ-ray detector
- Bio-medical sensor
- Radioactive measurement devices

Pin Configuration
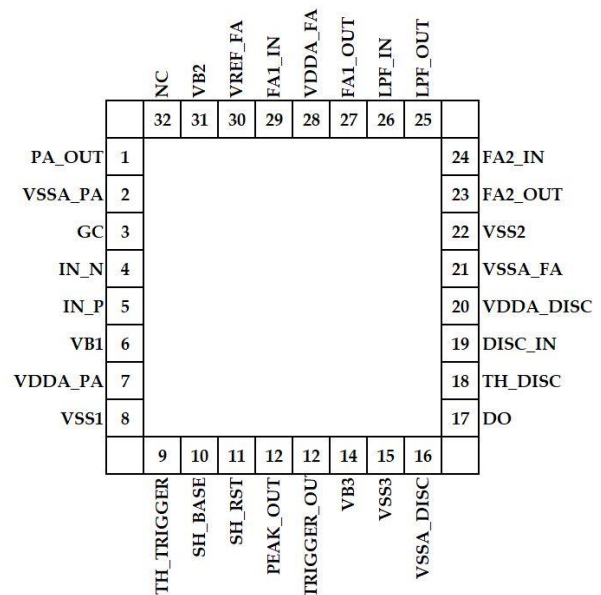
Recommended Operating Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Supply Voltage	VDDA_PA, VDDA_DISC , VDDA_FA	3.0	3.3	3.6	V
Operating Temperature	T_{OP}	0	-	85	℃
Storage Temperature	T_{STG}	-40	-	125	℃

Pin Description

Pad No.	Pad Name	Function	Min(V)	Typ.(V)	Max(V)
1	PA_OUT	Preamplifier output. Test Pin.	1		3
2	VSSA_PA	Ground pin for preamplifier. Must be connected to 0V.		0	
3	GC	Gain control input.	0	0	0.5
4	IN_N	Pre-amplifier Input. Connect to a cathode of a photodiode.		-	
5	IN_P	Preamplifier reference input voltage. External test voltage	0.8	1	1.2
6	VB1	Reference voltage.	0.8	1	1.2
7	VDDA_PA	Power supply input for preamplifier.		3.3	
8	VSS1	Ground pin. Must be connected to 0V.		0	
9	TH_TRIGGER	Peak detector threshold input voltage.	1		2
10	SH_BASE	S/H Base Voltage.	1	1.3	1.5
11	SH_RST	S/H Reset.	0		3.3
12	PEAK_OUT	Peak detector output.	1		2.5
13	TRIGGER_OUT	Trigger output.	0		3.3
14	VB3	Reference voltage.	0.8	1	1.2
15	VSS3	Ground pin. Must be connected to 0V.		0	
16	VSSA_DISC	Ground pin for discriminator. Must be connected to 0V.		0	
17	DO	Discriminator output (digital).	0		3.3
18	TH_DISC	Discriminator threshold input voltage.	0		3.3
19	DISC_IN	Discriminator input voltage.	0.2		3.3
20	VDDA_DISC	Power supply input for discriminator.		3.3	
21	VSSA_FA	Ground pin for amplifier. Must be connected to 0V.		0	
22	VSS2	Ground pin. Must be connected to 0V.		0	
23	FA2_OUT	2nd Filter & amplifier output. Test pin.	0.2		3.2
24	FA2_IN	2nd Filter & amplifier input. Can be used for testing.	0.5		2
25	LPF_OUT	Low pass filter output. Test Pin.	0.2		3
26	LPF_IN	Low pass filter external test input.	0.2		3
27	FA1_OUT	1st Filter & amplifier output. Test pin.	1		3
28	VDDA_FA	Power supply input for amplifier.		3.3	
29	FA1_IN	1st Filter & amplifier input. Can be used for testing.	1		3
30	VREF_FA	Filter & amplifier reference. External pin for testing.	1	1.3	1.5
31	VB2	Reference Voltage	0.8	1	1.2
32	NC	-	-	-	-

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