

DESCRIPTION

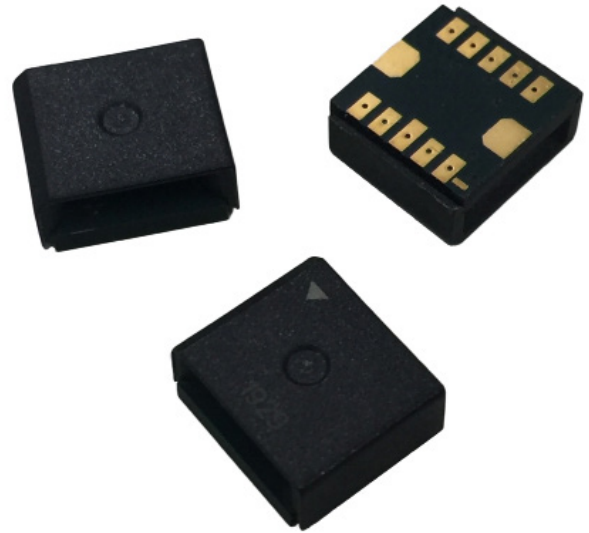
PAV3000 was designed as an economical high-performance air velocity sensor for thermal management in even the most space constrained locations such as data center server farms. Unlike thermistor based solutions, the Posifa MEMS sensor core is minimally affected by ambient temperature changes and provides instant real time feedback on proper air flow at the server blades.

PAV3000 features Posifa's third-generation thermal flow die, benefiting from the latest innovations in microfabrication. The sensor die uses a pair of thermopiles to detect changes in temperature gradient caused by mass flow, delivering excellent signal-to-noise and repeatability. The "solid state" thermal isolation structure on the sensor die eliminates the need for surface cavity or fragile membrane used in competing technologies, making the sensor resistant to clogging and pressure shock.

The PAV3000 series is surface mountable (SMD) and provides a digital I2C output.

APPLICATIONS

- Data Center Thermal Management
- HVAC VAV Damper Control
- HVAC Filter Monitoring



FEATURES

- Unsurpassed performance in a robust and cost effective package
- "Solid state" sensing core (no surface cavity or fragile membrane) resistant to clogging and pressure shock
- No moving parts
- Fast response times (125 ms typ)
- Excellent repeatability (1% FS)
- SMD packaging

MAXIMUM RATINGS

- Operating Temperature: -25 to 85 °C
- Storage Temperature: -40 to 90 °C
- Humidity: 0 to 100% RH, non-condensing

SPECIFICATIONS

Test Conditions: $V_{in}=3.3\pm0.01VDC$, $T_a=25^{\circ}C$. Relative Humidity: $40\%<RH<60\%$					
SPECIFICATIONS	MIN	TYP	MAX	UNIT	CONDITIONS
PAV3005D	0		7	m/sec	
PAV3015D	0		15	m/sec	
Output Count	409 to 4095			Count	
Null Voltage (V), $\pm 5\%$	0.5			VDC	
Null Output Count, $\pm 5\%$	409			Count	
Resolution		12		Bit	
Repeatability		1%		F.S.	
Accuracy		5%		F.S.	
Response Time		125		mSec	
Supply Voltage		3.3		VDC	
Supply Current		13		mA	

Output-code clarification

The 12-bit output-code limit is 4095. The page 3 values of 3965 and 3835 are nominal transfer-function outputs at 7 m/s and 15 m/s, respectively, not code-range limits.

OUTPUT DESCRIPTION

Air Speed (m/s)	Output (count)
y	x

$$y = a + b \cdot x + c \cdot x^2$$

	PAV3005D	PAV3015D
a	-3.18E-01	1.00E-01
b	8.47E-04	5.06E-05
c	2.52E-07	1.00E-06

PAV3005D

Output (count)	Airspeed (m/s)
409	0.00
1160	1.00
1785	2.00
2320	3.00
2785	4.00
3210	5.00
3600	6.00
3965	7.00

PAV3015D

Output (count)	Airspeed (m/s)
409	0.00
1355	2.00
1950	4.00
2404	6.00
2785	8.00
3121	10.00
3425	12.00
3703	14.00
3835	15.00

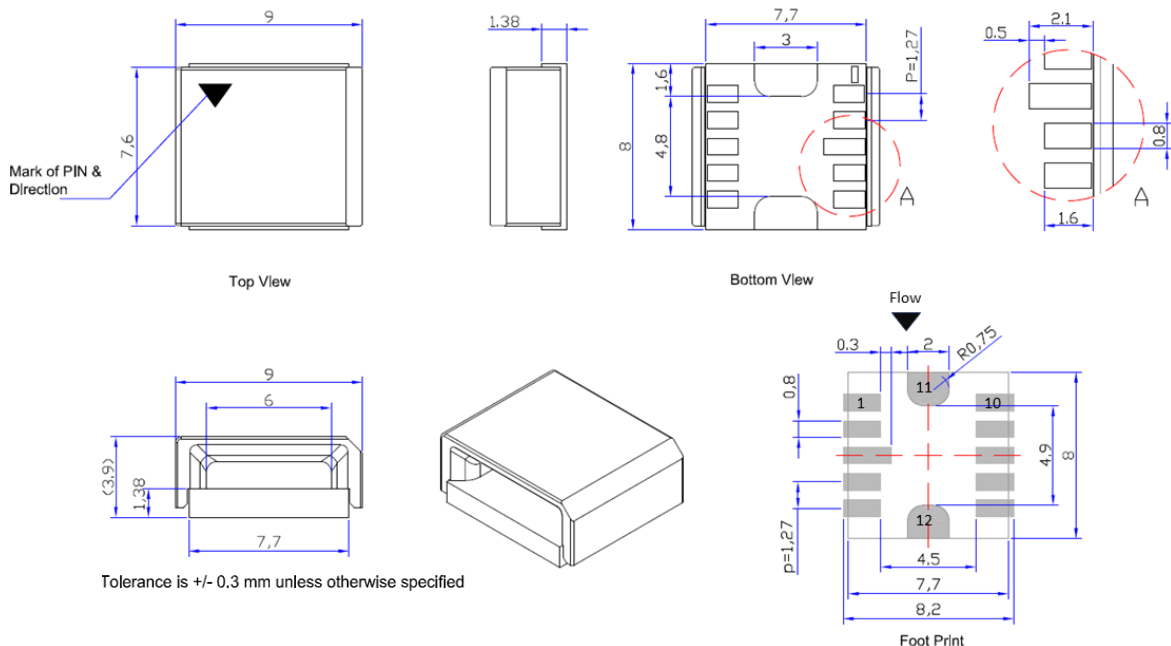
Transfer-table note

These are nominal curve values at the specified air speeds; they do not define the 12-bit electrical output-code limit. The D suffix is the correct designation for both digital parts.

PACKAGE DIMENSIONS

Pad	Description
1	V_{OREG}
2	V_{DD}
3	V_{SS}
4	N.C.
5	N.C.
6	SDA
7	SCL
8	AN1
9	AN0
10	V_{CM}
11	GND
12	GND

Note: N.C. pins must be left floating



MOISTURE SENSITIVITY AND HANDLING

PAV3005D and PAV3015D are moisture-sensitive SMD devices. Moisture absorbed by the package or PCB can rapidly expand and vaporize during reflow, creating internal stress and deformation that may damage the sensor or its interconnects. Follow the controls below through receiving, storage, kitting and SMT assembly.

CONTROL	REQUIREMENT
Moisture sensitivity	MSL 5
Factory preparation	Pre-bake at 100°C for 1 hour before packing.
Shipment packaging	Vacuum-sealed Moisture Barrier Bag (MBB) with desiccant and Humidity Indicator Card (HIC).
Floor life after MBB opening	48 hours at conditions not exceeding 30°C and 60% RH. Complete mounting and reflow within this period.

Receiving and storage

- Verify that the MBB is intact and vacuum-sealed and that desiccant and an HIC are present.
- Keep parts in the original sealed MBB until they are ready to be mounted.
- Record the date and time when the MBB is opened and control cumulative exposure against the 48-hour floor life.
- Reseal unused parts promptly in an MBB with effective desiccant and an HIC.

Do not reflow material when package integrity, exposure history or humidity status is unknown. If the MBB has been open longer than 48 hours, the HIC indicates excess moisture, or the bag was not properly sealed, hold the material and obtain an approved recovery instruction before use.

SMT ASSEMBLY AND REFLOW CONTROL

Use the Reflow Soldering Temperature Profile on page 7. The limits below apply to the total thermal exposure of the sensor during assembly and any permitted rework.

ITEM	LIMIT / INSTRUCTION
Recommended reflow count	One cycle whenever possible, to minimize cumulative thermal stress.
Maximum reflow count	Two cycles total.
Peak temperature	Follow the page 7 profile: TPmax 260/265°C and the associated time/ramp limits.
Rework	A second reflow is allowed only when necessary. Do not exceed two total cycles.

Post-reflow verification

After reflow, allow the assembly to return to ambient conditions before functional verification. Confirm the following before release:

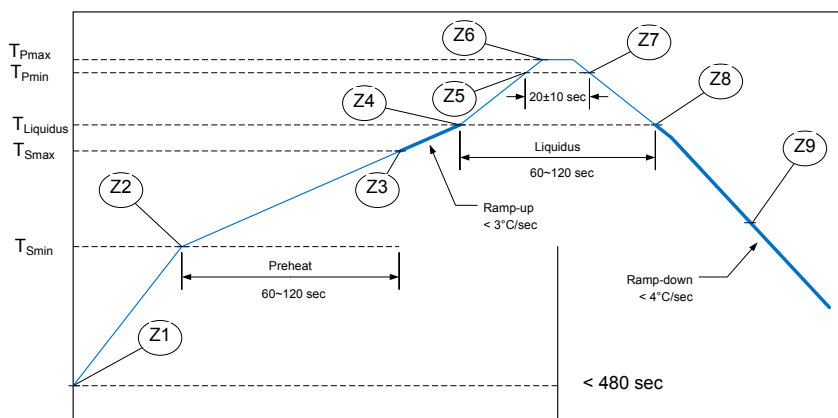
- I²C communication is stable and the device returns valid output counts.
- At zero air velocity, the null output is 409 counts ±5% (approximately 389 to 429 counts), consistent with the electrical specification on page 2.
- Output is stable and no abnormal shift is observed when compared with the incoming or pre-reflow baseline, when such a baseline is part of the manufacturing control plan.
- Devices that fail communication or show abnormal zero/output shift are segregated and investigated; do not subject them to additional reflow beyond the two-cycle maximum.

Process records

For lot traceability, retain the MBB opening time, temperature/humidity exposure, reflow profile record, number of reflow cycles and post-reflow verification results. These records support containment and root-cause analysis if a moisture-related issue is suspected.

The factory pre-bake and MSL controls are preventive measures. They do not replace the maximum ratings, electrical specifications or reflow profile elsewhere in this datasheet.

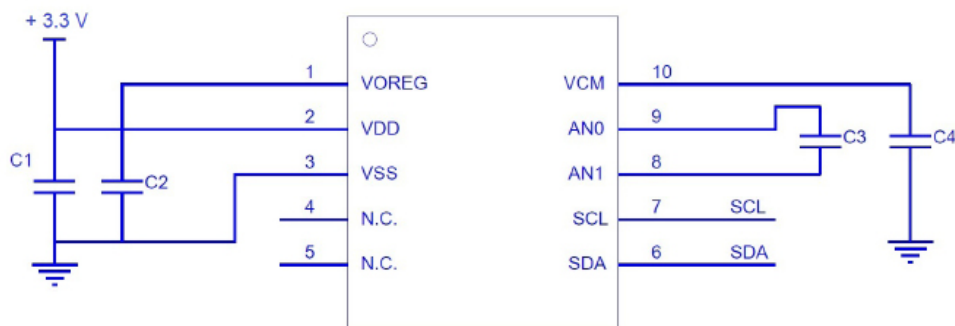
REFLOW SOLDERING TEMPERATURE PROFILE



Zone	Parameter	Limitation	
		Temp (°C)	Time (sec)
Z1	T_{room}	25	
Z2	T_{smin}	150	
Z3	T_{smax}	200	60~120 (Z2→Z3)
Z4	$T_{Liquidus}$	217	
Z5	T_{Pmin}	255/265	
Z6	T_{Pmax}	260/265	< 480 (Z1→Z6)
Z7	T_{Pmin}	255/260	10~30 (Z5→Z7)
Z8	$T_{Liquidus}$	217	60~120 (Z4→Z8)

12_2022_v1

APPLICATION CIRCUIT



Notes:

1. C1, C2 & C3 are 0.1uF, C4 is 1uF

ORDERING INFORMATION

PART NUMBER	SPECIFICATIONS
PAV3005D	7 m/sec, I ² C, non-linear, SMD
PAV3015D	15 m/sec, I ² C, non-linear, SMD

Please contact Posifa or your local distributor to place an order.

CUSTOMIZATION OPTIONS

If the standard product described in this datasheet does not completely meet your needs, please contact Posifa Technologies to discuss other options. Help us understand your application and sensor requirements and we can work together to find the best overall solution.