ALPHA & OMEGA SEMICONDUCTOR

AOZ52183QI

High-Current, High-Performance Smart Power Stage for Notebook CPU Power

General Description

The AOZ52183QI is a general-purpose Smart Power Stage (SPS) consisting of two asymmetrical MOSFETs and an integrated driver for high current, high frequency DC-DC converters.

The AOZ52183QI provides an output current signal (IMON), which reports the real-time module current with a gain of 5 mV/A. The IMON signal can be directly used to replace inductor DCR sensing or resistor sensing in multiphase voltage regulator systems without the need for temperature compensation.

The AOZ52183QI also includes an accurate module temperature monitor (TMON). TMON is a voltage sourced signal with a gain of 8 mV/oC.

The MOSFETs are individually optimized for operation in the synchronous buck configuration. The High-Side MOSFET is optimized to achieve low capacitance and gate charge for fast switching with low duty cycle operation. The Low-Side MOSFET has ultra-low ON resistance to minimize conduction loss. The standard 5 mm x 4 mm QFN package is optimally designed to minimize parasitic inductance for minimal EMI signature.

Features

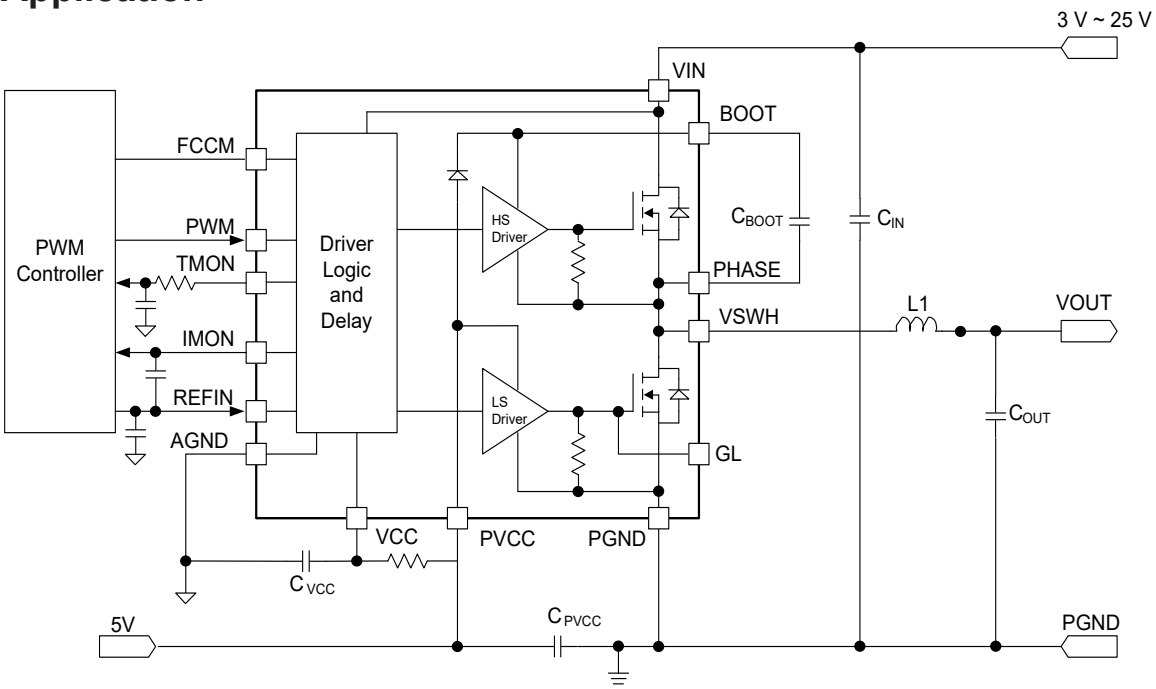
- 3 V to 25 V power supply range
- 45A continuous output current
  - Up to 65A for 20 ms instantaneous current @ 14 V VIN
  - Up to 60A for 20 ms instantaneous current @ 22 V VIN
  - Up to 80A for 10 us instantaneous current
- Optimized for switching frequency up to 1.5 MHz
- Integrated current monitor (5 mV/A) with typical 3% accuracy over temperature
- Integrated temperature monitor (8 mV/ oC) with 2% accuracy
- Fault Indicator
- Under-Voltage LockOut (UVLO) on VCC
- High Side MOSFET Over-Current Protection
- Zero Current Detect Function
- Over Temperature Protection
- Standard QFN5x4-24L package

Applications

- Server systems
- High end CPU/GPU Power Stage
- Communications Infrastructure

GREEN Product

Typical Application



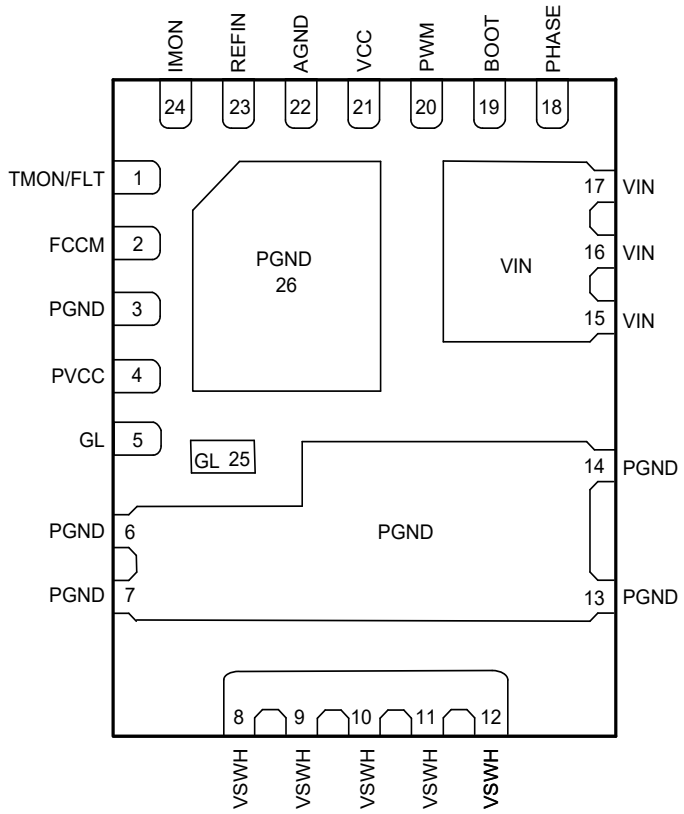
Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ52183QI	-40 °C to 125 °C	QFN5x4-24L	RoHS

Contact local sales office for full product datasheet.

AOS products are offered in packages with Pb-free plating and compliant to RoHS standards.
Please visit https://aosmd.com/sites/default/files/media/AOSGreenPolicy.pdf for additional information.

Pin Configuration

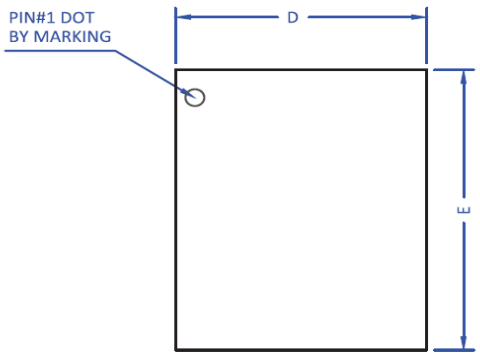


QFN5x4-24L
(Top Transparent View)

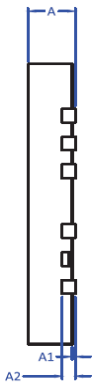
Pin Description

Pin Number	Pin Name	Pin Function
1	TMON/FLT	Temperature Monitor output signal. For multiphase, the TMON pins can be connected together as a common bus allowing the highest temperature to be sent to the controller. No more than 470 pF total capacitance can be directly connected across TMON and AGND pin. A higher capacitance load is allowed with a series resistor, such as 1 kΩ for 1 nF. This pin is pulled high to 3.3 V to indicate a fault conditions – see later description.
2	FCCM	Continuous conduction mode of operation is triggered when FCCM = High. Discontinuous mode is allowed and diode emulation mode is active when FCCM = Low. When FCCM is tri-stated, SPS enters a low power shutdown mode
3	PGND	Power Ground for High-Side and Low-Side MOSFET Gate Drivers. Ensure to connect 1 µF MLCC directly between PGND and PVCC.
4	PVCC	5 V Power Rail for High-Side and Low-Side MOSFET Drivers. Ensure to position a 1 µF MLCC directly between PVCC and PGND.
5, 25	GL	Low-Side MOSFET Gate connection. This is for test purposes only and should be left floating in the application
6, 7, 13, 14, 26	PGND	Power stage ground input (Source connection of Low-Side MOSFET)
8, 9, 10, 11, 12	VSWH	Switching node connected to the Source of High-Side MOSFET and the Drain of Low-Side MOSFET
15, 16, 17	VIN	Power stage High Voltage Input (Drain connection of High-Side MOSFET)
18	PHASE	This pin is dedicated for bootstrap capacitor AC return path connection from BOOT
19	BOOT	High-Side MOSFET Gate Driver supply rail. Connect a 100 nF ceramic capacitor between BOOT and the PHASE.
20	PWM	PWM input signal from the controller IC. Note that below UVLO, the internal resistor divider will be disconnected and this pin will be at high impedance.
21	VCC	5 V Bias for Internal Logic Blocks. Add a 1 µF MLCC directly between VCC and AGND.
22	AGND	Signal Ground.
23	REFIN	Input for external reference voltage for IMON signal. This voltage should be between 0.7 V and 2 V. Nominal is 1.2 V. Connect REFIN to the appropriate Current Sense input of the controller. Place a low ESR ceramic capacitor (~ 0.1 µF) in close proximity from this pin to GND.
24	IMON	Current Monitor output signal referenced to REFIN. Connect the IMON output to the appropriate Current Sense input of the controller. No more than 47 pF capacitance can be directly connected across IMON and REFIN pins. With a 100 Ω series resistor, up to 470 pF may be used

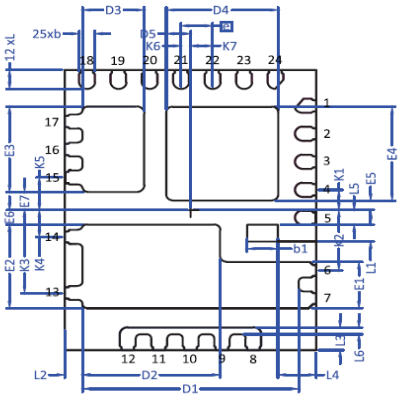
Package Dimensions, QFN5x4-24L



TOP VIEW

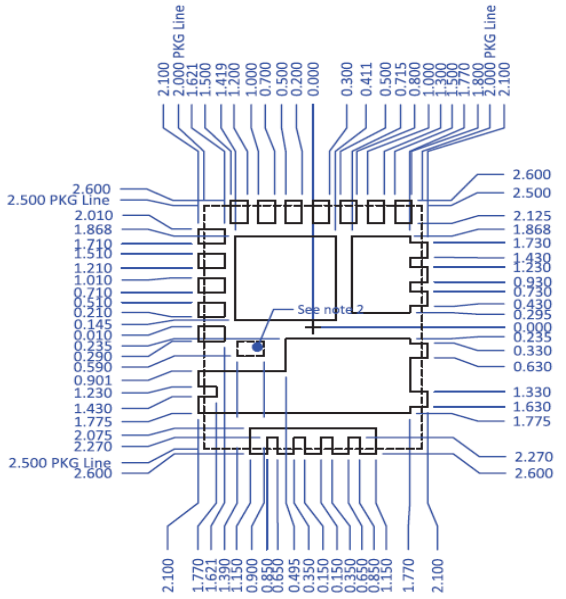


SIDE VIEW



BOTTOM VIEW

RECOMMENDED LAND PATTERN



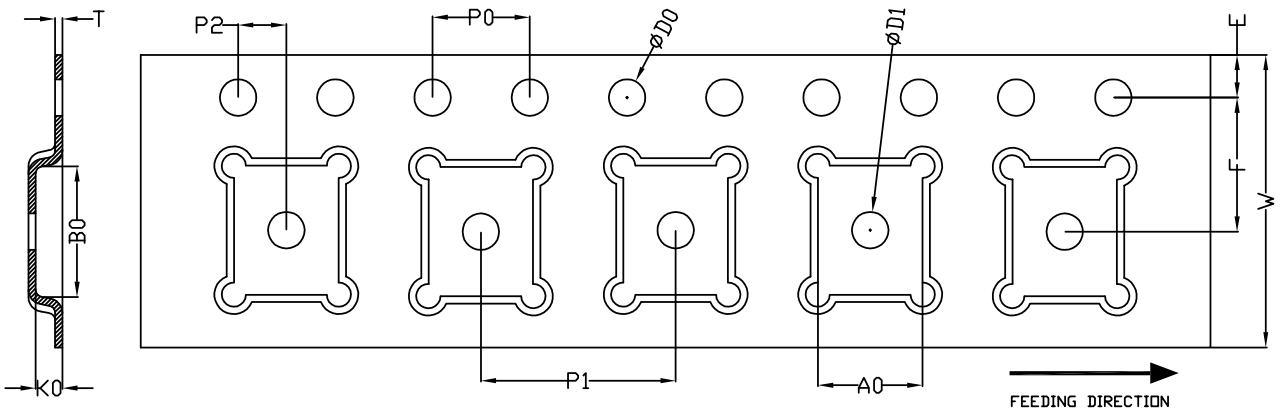
UNIT: mm

SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.025	0.05	0.000	0.001	0.002
A3	0.15	0.20	0.25	0.006	0.008	0.010
b	0.20	0.25	0.30	0.008	0.010	0.012
b1	0.44	0.49	0.54	0.017	0.019	0.021
D	3.90	4.00	4.10	0.154	0.157	0.161
D1	3.34	3.44	3.54	0.131	0.135	0.139
D2	2.09	2.19	2.29	0.082	0.086	0.090
D3	0.88	0.98	1.08	0.035	0.039	0.043
D4	1.68	1.78	1.88	0.066	0.070	0.074
D5	0.34	0.39	0.44	0.013	0.015	0.017
E	4.90	5.00	5.10	0.193	0.197	0.201
E1	0.72	0.82	0.92	0.028	0.032	0.036
E2	1.39	1.49	1.59	0.055	0.059	0.063
E3	1.42	1.52	1.62	0.056	0.060	0.064
E4	1.57	1.67	1.77	0.062	0.066	0.070
E5	0.12	0.17	0.22	0.005	0.007	0.009
E6	0.21	0.26	0.31	0.008	0.010	0.012
E7	0.27	0.32	0.37	0.011	0.013	0.015
e	0.50BSC			0.020BSC		
K1	0.36ref.			0.014ref.		
K2	1.08ref.			0.043ref.		
K3	1.48ref.			0.058ef.		
K4	0.48ref.			0.019ref.		
K5	0.58ref.			0.023ref.		
K6	0.15ref.			0.006ref.		
K7	0.35ref.			0.014ref.		
L	0.29	0.34	0.39	0.011	0.013	0.015
L1	0.25	0.30	0.35	0.010	0.012	0.014
L2	0.23	0.28	0.33	0.009	0.011	0.013
L3	0.35	0.40	0.45	0.014	0.016	0.018
L4	0.56	0.61	0.66	0.022	0.024	0.026
L5	0.21	0.26	0.31	0.008	0.010	0.012
L6	0.07	0.12	0.17	0.003	0.005	0.007

NOTE:
CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

Tape and Reel Dimensions, QFN5x4-24L

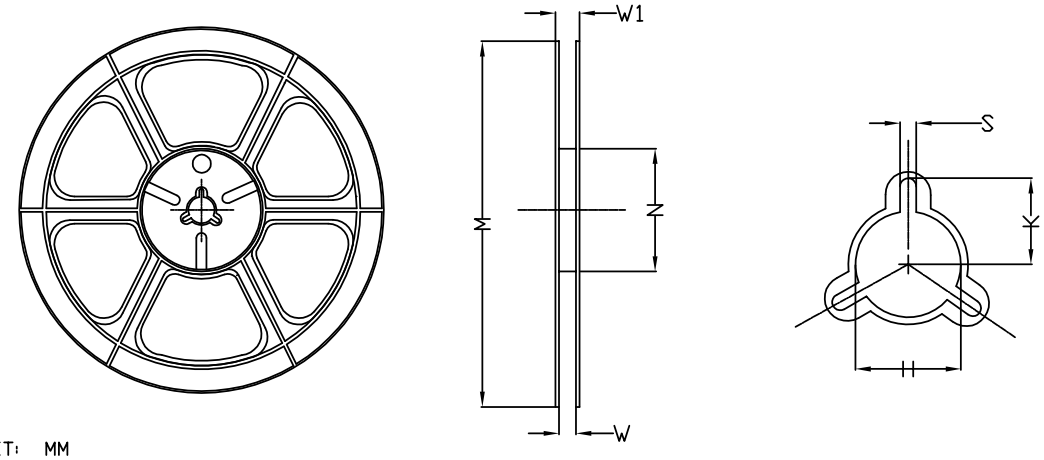
QFN5x4_24L_EP3_S/QFN5x4_28L_EP1_S Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	W	E	F	P0	P1	P2	T
QFN5x4 −0.75	4.30 ±0.10	5.30 ±0.10	1.10 ±0.10	Ø1.50 +0.10 −0.00	Ø1.50 ±0.10	12.00 ±0.3	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	8.00 ±0.10	2.00 ±0.05	0.30 ±0.05

QFN5x4_24L_EP3_S/QFN5x4_28L_EP1_S Reel



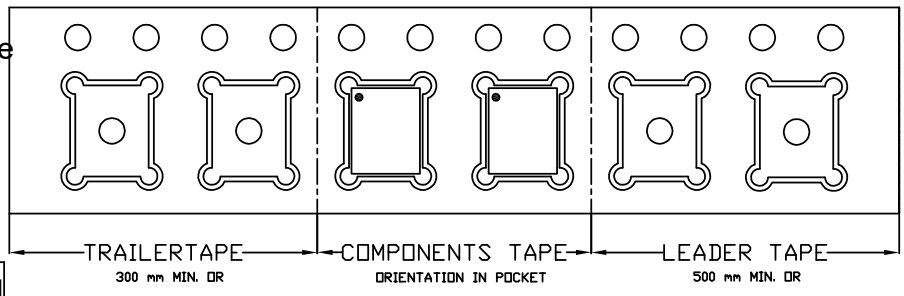
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S			
12 mm	Ø330	Ø330 ±0.50	Ø97.00 ±0.10	13.0 ±0.30	17.40 ±1.00	Ø13.0 +0.5 −0.2	10.6	2.00 ±0.50			

QFN5x4_24L_EP3_S
QFN5x4_28L_EP1_STape

Leader / Trailer
& Orientation

Unit Per Reel:
3000pcs



All Dimensions Comply with EAI-481

Part Marking