ALPHA & OMEGA SEMICONDUCTOR

AOZ52383QI

High-Current, High-Performance Smart Power Stage

General Description

The AOZ52383QI is a general-purpose Smart Power Stage (SPS) for computing notebook CPU power, consisting of two asymmetrical MOSFETs and an integrated driver for high current, high frequency, and DC-DC converter.

The AOZ52383QI provides an output current signal (IMON). The IMON signal can be directly used to replace inductor DCR sense or resistor sense in the multiphase voltage regulator system without any temperature compensation.

The AOZ52383QI also includes an accurate module thermal monitor (TMON). TMON is a voltage sourced PTAT signal with 8 mV/°C.

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 4 mm x 5 mm QFN package is optimally designed to minimize parasitic inductance for minimal EMI signature.

Features

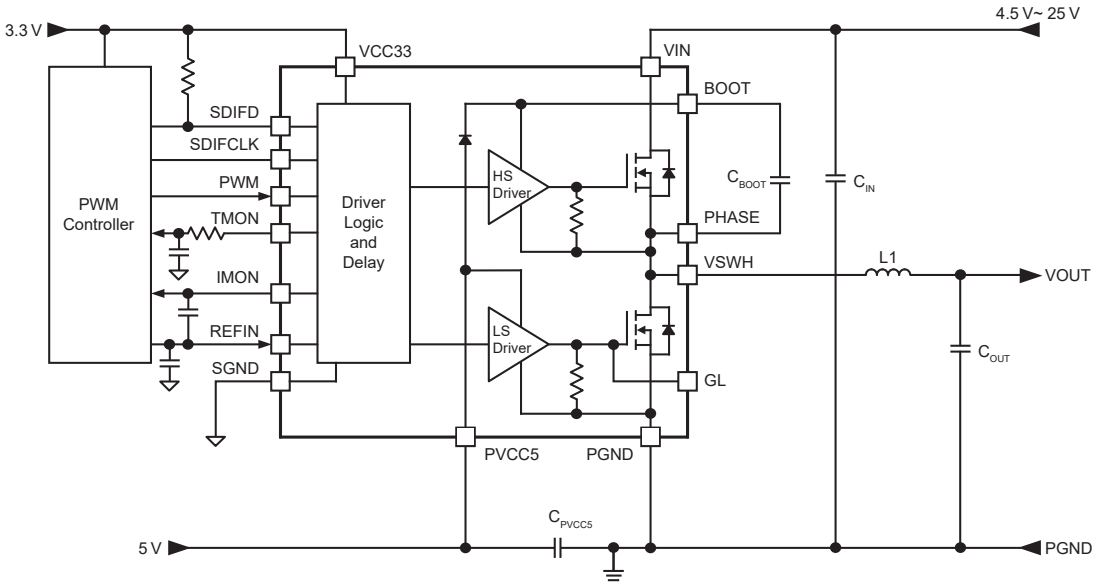
- 4.5 V to 25 V power supply range
- 45 A continuous output current
  - Up to 65 A for 20 ms instantaneous current @ 14 V VIN
  - Up to 60 A for 20 ms instantaneous current @ 22 V VIN
  - Up to 80 A for 10 µs instantaneous current
- Optimized for switching frequency up to 1 MHz
- Integrated current monitor output signal
- Integrated temperature monitor output signal
- Fault Indicator
- VCC33 and PVCC5 Under-Voltage LockOut (UVLO)
- Zero Current Detect Function
- Over Temperature Protection
- Standard QFN4x5-24L package

Applications

- Notebook computer
- Graphics card
- Communications Infrastructure

Green Product

Typical Application



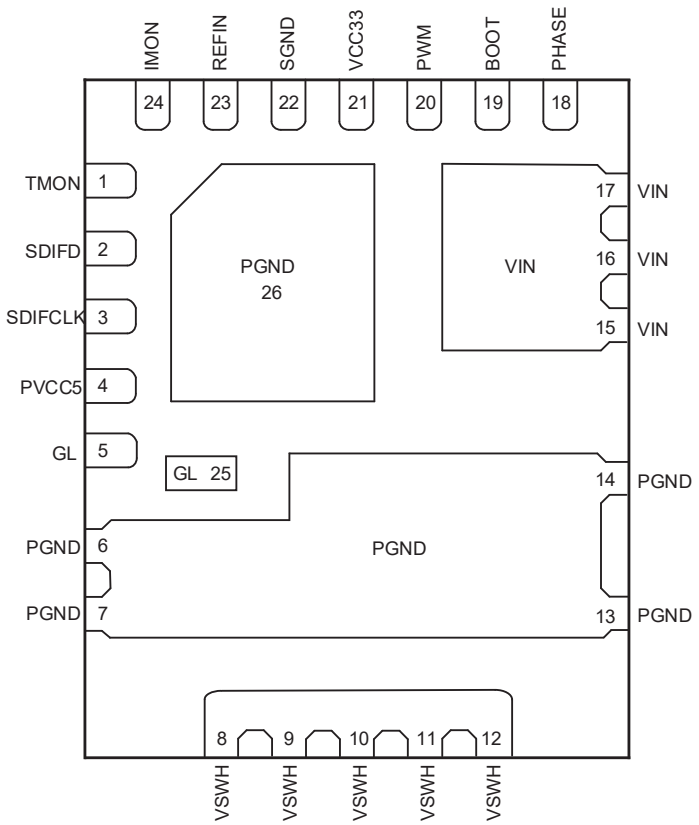
Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ52383QI	-40 °C to +125 °C	QFN4x5-24L	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 www.aosmd.com/media/AOSGreenPolicy.pdf for additional information.

Pin Configuration

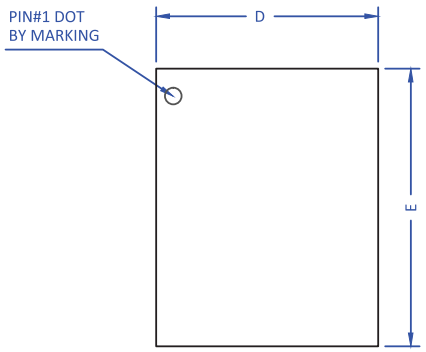


QFN4x5-24L
(Top Transparent View)

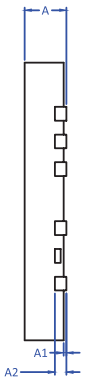
Pin Description

Pin Number	Pin Name	Pin Function
1	TMON	Temperature Monitor output signal. This pin is pulled high to VCC33 to indicate an over-temperature fault. For multiphase, the TMON pins can be connected together as a common bus. The highest voltage indicating highest temperature is sent to the controller. No more than 470 pF total capacitance can be directly connected across TMON and SGND (Pin 22). Higher capacitance is allowed with a series resistor, such as 1 kΩ for a 100 nF load.
2	SDIFD	Serial Digital Interface data input and output. Connect 1 kΩ to 3.3 V.
3	SDIFCLK	Serial Digital Interface clock input.
4	PVCC5	5 V Power Rail for High-Side and Low-Side MOSFET Place a high quality low ESR ceramic capacitor (~ 1 µF / X7R) directly between PVCC5 and PGND (Pin 6).
5, 25	GL	Low-Side MOSFET Gate connection. This is for test purposes only.
6, 7, 13, 14, 26	PGND	Power Ground for power stage (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 (Pin 19).
19	BOOT	High-Side MOSFET Gate Driver supply rail. Connect a 100 nF ceramic capacitor between BOOT and the PHASE (Pin 18).
20	PWM	PWM input signal from Controller IC. This input is compatible with 3.3 V Tri-State logic level.
21	VCC33	3.3V Bias for Internal Logic Blocks. Place a high quality low ESR ceramic capacitor (~ 1 µF / X7R) directly between VCC33 and SGND (Pin 22).
22	SGND	Signal Ground.
23	REFIN	Input for external reference voltage for IMON (Pin 24). This voltage should be between 0.8 V and 1.3 V. Connect this pin to the appropriate current sense input of the controller. Place a low ESR ceramic capacitor (~ 0.1 µF) from REFIN to SGND (Pin 22).
24	IMON	Current Monitor output signal referenced to REFIN (Pin 23). This pin is pulled high to VCC33 to indicate an over-temperature and/or PVCC5 UVLO fault. It is pulled to REFIN (Pin 23) to indicate VCC33 UVLO condition. Connect the IMON output to the appropriate current sense input of the controller. No more than 56 µF capacitance can be directly connected across the IMON and REFIN (Pin 23).

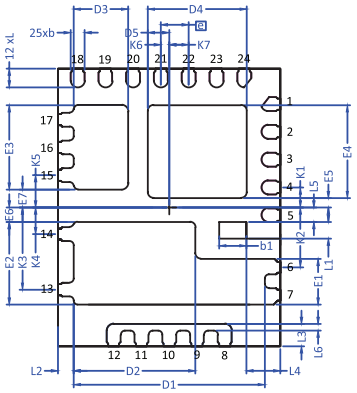
Package Dimensions, QFN4x5-24L



TOP VIEW

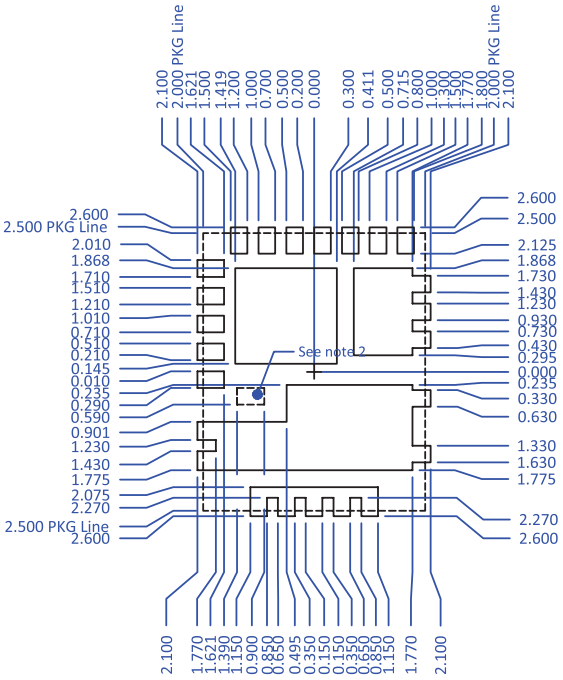


SIDE VIEW



BOTTOM VIEW

RECOMMENDED LAND PATTERN

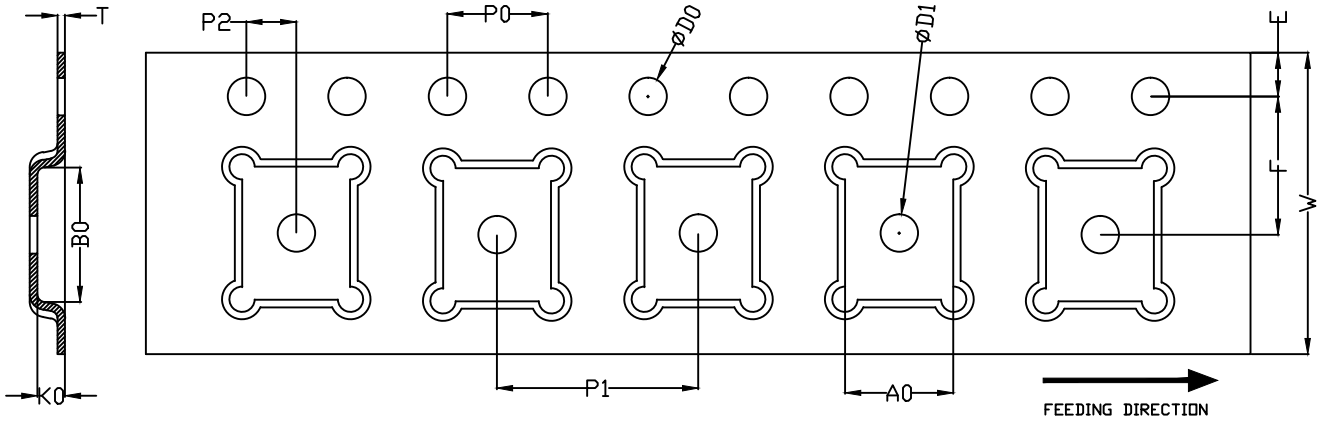


UNIT: mm

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:
1. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
2. DOTTED OUTLINE IS GUIDELINE TO BE COMPATIBLE WITH INDUSTRY COMMON LAYOUT BUT NOT RECOMMENDED BY AOS.

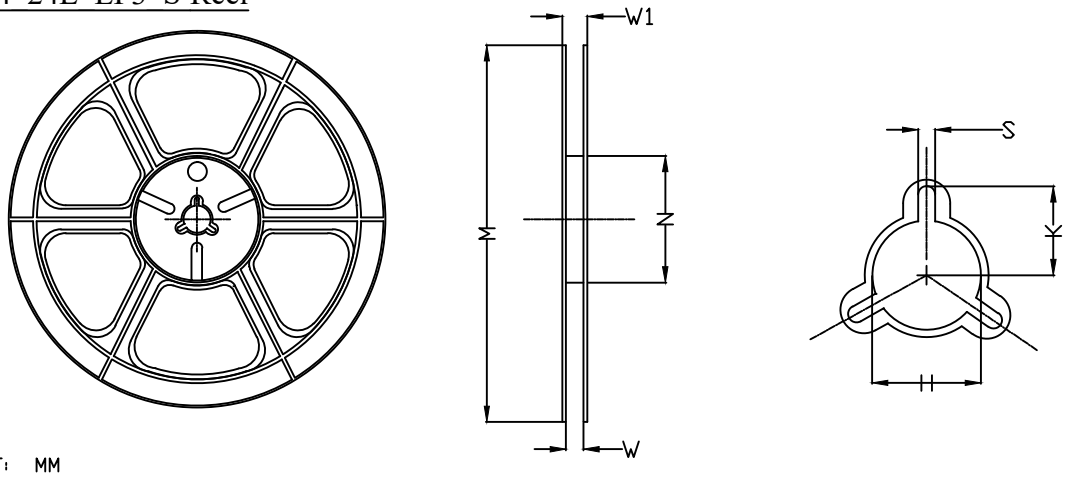
Tape and Reel Dimensions, QFN4x5-24L



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 Reel



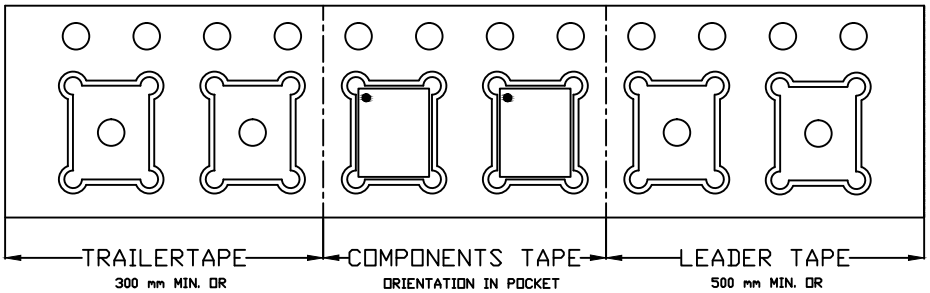
UNIT: MM

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			

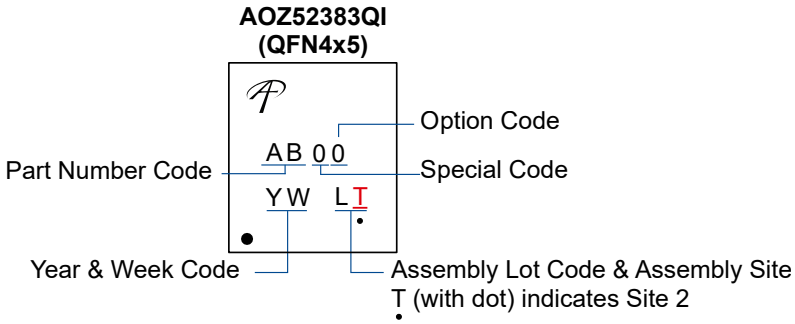
QFN5x4_24L_EP3_S Tape

Leader / Trailer & Orientation

Unit Per Reel: 3000pcs



Part Marking



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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.