ALPHA & OMEGA SEMICONDUCTOR

AOZ52986QI

High-Switching Frequency, High-IMON Accuracy Smart Power Stage for Notebook CPU Power

General Description

The AOZ52986QI 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 AOZ52986QI provides an output voltage signal (IMON), which represents the real-time module current with a gain of 5µA/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 AOZ52986QI also includes an accurate module temperature monitor (TMON). TMON is a voltage sourced signal with a gain of 8mV/°C.

The MOSFETs are individually optimized for operation in the synchronous buck configuration. The High-Side (HS) MOSFET is optimized to achieve low capacitance and gate charge for fast switching with low duty cycle operation. The Low-Side (LS) MOSFET has ultra-low ON resistance to minimize conduction loss. The industry compatible 3mm x 4mm QFN package is optimally designed to minimize parasitic inductance for minimal EMI signature.

Features

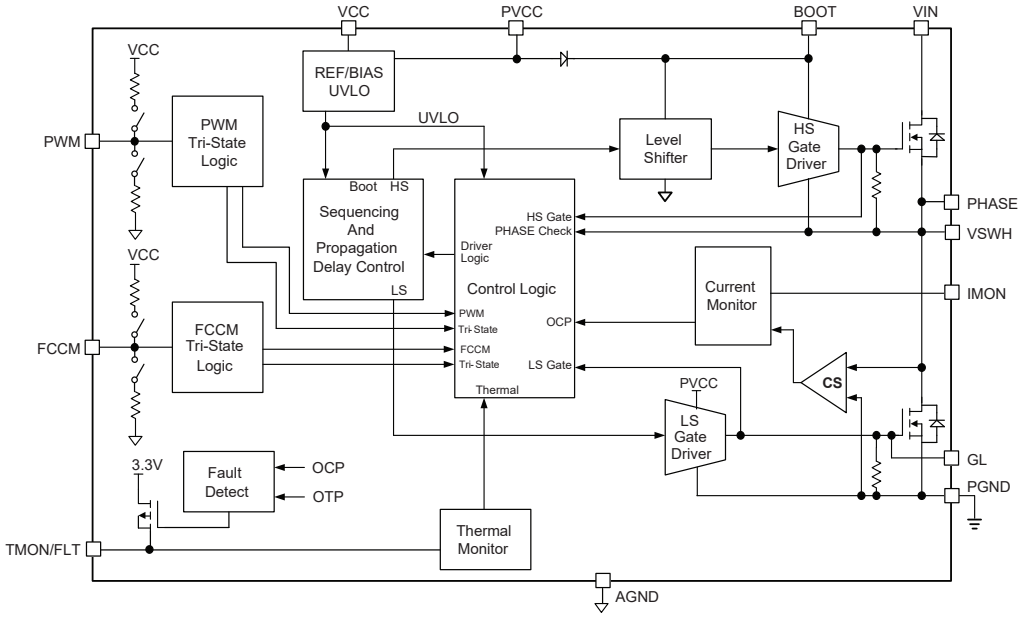
- 2.7V to 22V power supply range
- 30V HS MOSFET provides better system ruggedness
- 45A continuous output current
  - Up to 60A for 20ms on pulse @ 22V VIN
  - Up to 65A for 20ms on pulse @ 14V VIN
  - Up to 80A for 10µs on pulse @ 22V VIN
  - Up to 95A for 10µs on pulse @ 14V VIN
- Optimized for switching frequency up to 1.5MHz
- Integrated current monitor (5µA/A) with typical 3.5%accuracy over temperature
- Integrated temperature monitor (8mV/°C) with 2% accuracy
- Fault Indicator
- Under-Voltage Lock Out (UVLO) on VCC
- High-Side MOSFET Over-Current
- Zero Current Detect Function (ZCD)
- Over Temperature Protection (OTP)
- QFN3x4-26L package

Applications

- Notebook Core Voltage

GREEN Product

Typical Application



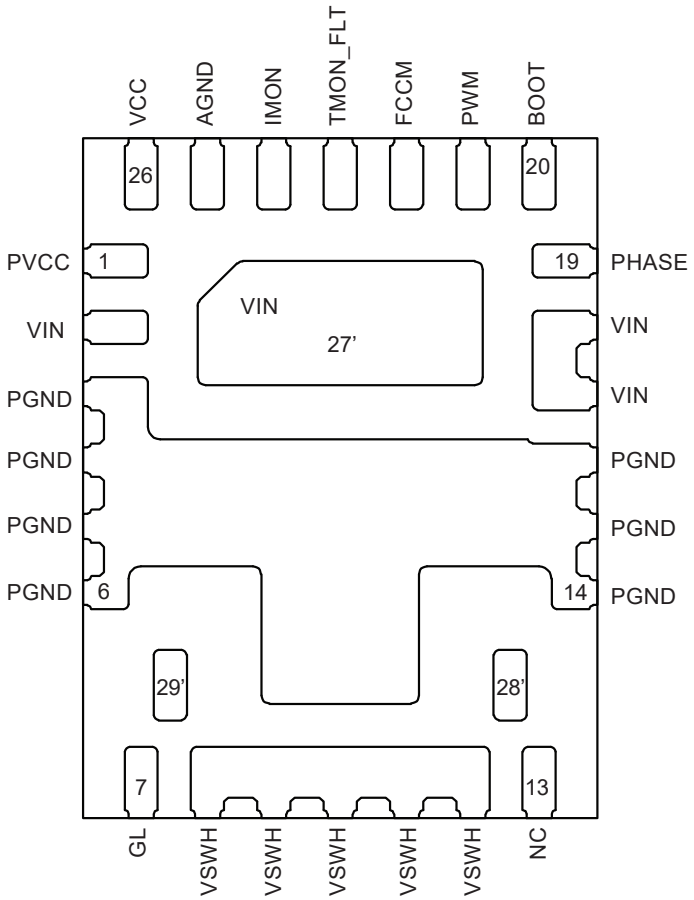
Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ52986QI	-40°C to +125°C	QFN3x4-26L	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

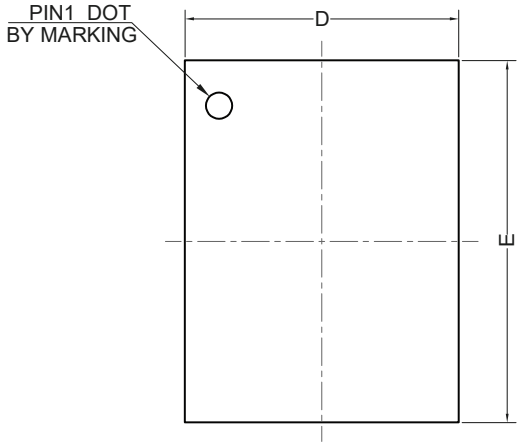


QFN3x4-26L
(Top View)

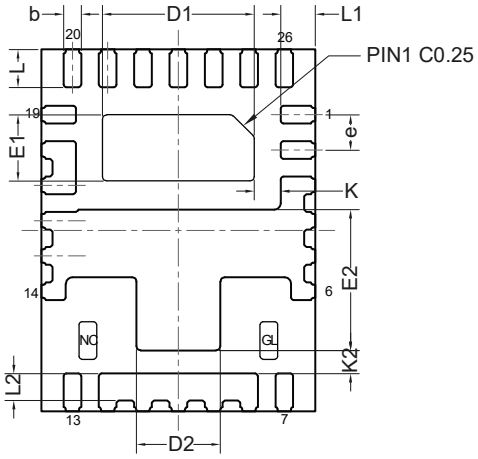
Pin Description

Pin Number	Pin Name	Pin Function
1	PVCC	Power Rail for High-Side and Low-Side MOSFET Drivers. Ensure to position a 1µF MLCC directly between VCC and AGND.
2, 17,18, 27	VIN	Power stage High Voltage Input (Drain connection of High-Side MOSFET).
3, 4, 5, 6, 14, 15, 16	PGND	Power Ground pin for power stage (Source connection of Low-Side MOSFET).
7, 29	GL	Gate for Lower-Side MOSFET as the testing purpose.
8,9,10,11,12	VSWH	Switching node connected to the Source of High-Side MOSFET and the Drain of Low-Side MOSFET.
13, 28	NC	Not Connected.
19	PHASE	This pin is dedicated for bootstrap capacitor AC return path connection from BOOT.
20	BOOT	High-Side MOSFET Gate Driver supply rail. Connect a 100nF ceramic capacitor between BOOT and the PHASE.
21	PWM	PWM input signal from controller IC. This input is compatible with 3.3V and 5V Tri-State logic levels.
22	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.
23	TMON/FLT	Temperature sense and fault reporting.
24	IMON	Current Monitor output signal. Connect the IMON output to the current sense input of the controller.
25	AGND	Analog ground. Connect AGND to the PGND plane at the VCC decoupling capacitor.
26	VCC	5V Bias for Internal Logic Blocks. Ensure to position a 1µF MLCC directly between VCC and AGND.

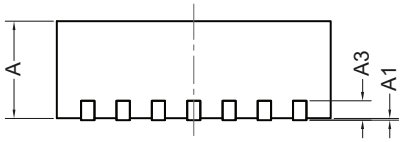
Package Dimensions, QFN3x4-26L



TOP VIEW

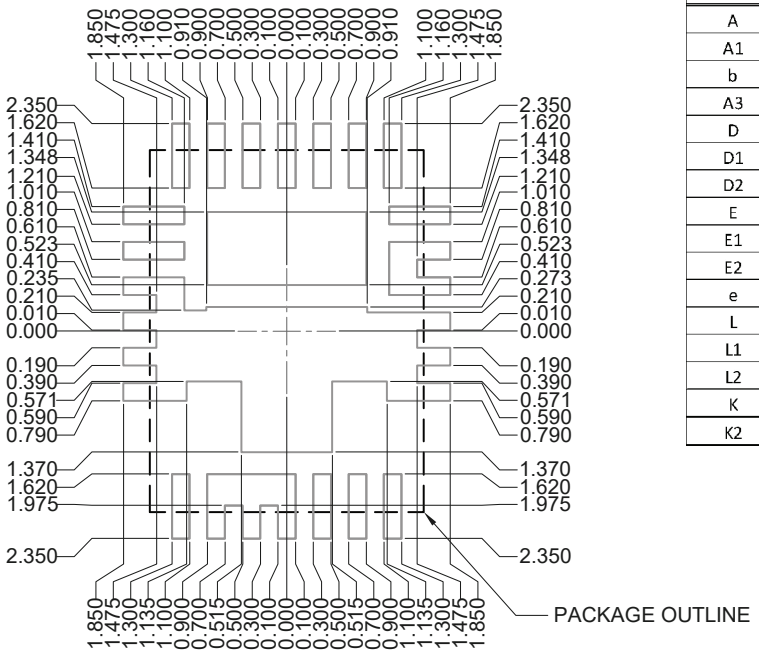


BOTTOM VIEW



SIDE VIEW

RECOMMENDED LAND PATTERN



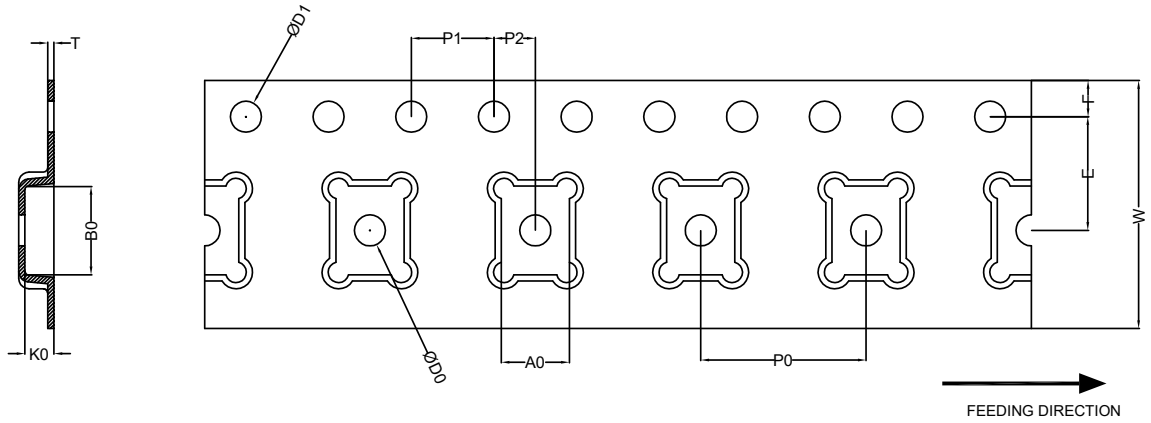
SYMBOLS	DIMENSION IN MILLIMETRES			DIMENSION IN INCHS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.050	1.100	1.150	0.041	0.043	0.045
A1	0.000	0.020	0.050	0.000	0.001	0.002
b	0.150	0.200	0.250	0.006	0.008	0.010
A3		0.203 REF.			0.008 REF.	
D	3.000	3.100	3.200	0.118	0.122	0.126
D1	1.620	1.720	1.820	0.064	0.068	0.072
D2	0.850	0.950	1.050	0.033	0.037	0.041
E	4.000	4.100	4.200	0.157	0.161	0.165
E1	0.650	0.750	0.850	0.026	0.030	0.033
E2	1.495	1.595	1.695	0.059	0.063	0.067
e		0.400 BSC			0.016 BSC	
L	0.330	0.430	0.530	0.013	0.017	0.021
L1	0.290	0.390	0.490	0.011	0.015	0.019
L2	0.205	0.305	0.405	0.008	0.012	0.016
K		0.300 REF.			0.0120 REF.	
K2		0.260 REF.			0.0102 REF.	

UNIT: mm

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

Tape and Reel Dimensions, QFN3x4-26L

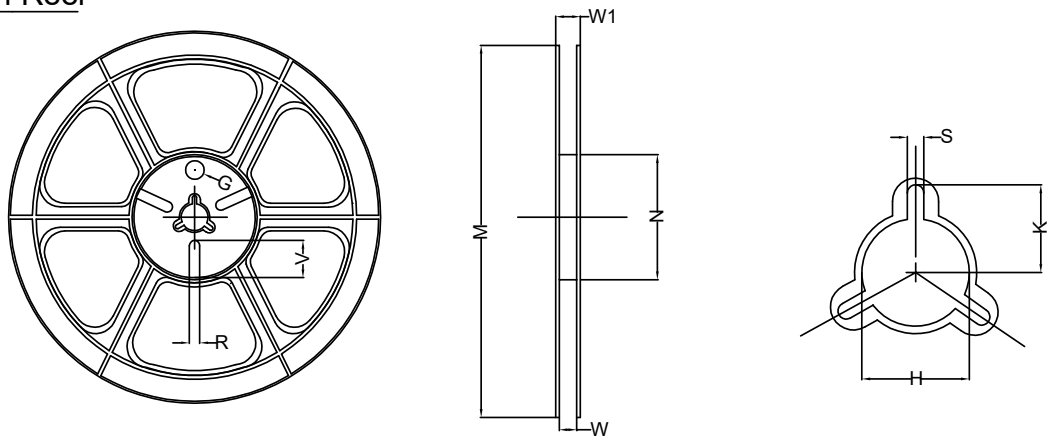
QFN3x4 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	W	F	E	P0	P1	P2	T
QFN3x4 (12 mm)	3.30 ±0.05	4.30 ±0.05	1.40 +0.10 -0.05	1.50 MIN.	1.50 +0.1 -0.0	12.0 +0.30 -0.10	1.75 ±0.10	5.50 ±0.05	8.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.30 ±0.05

QFN3x4 Reel



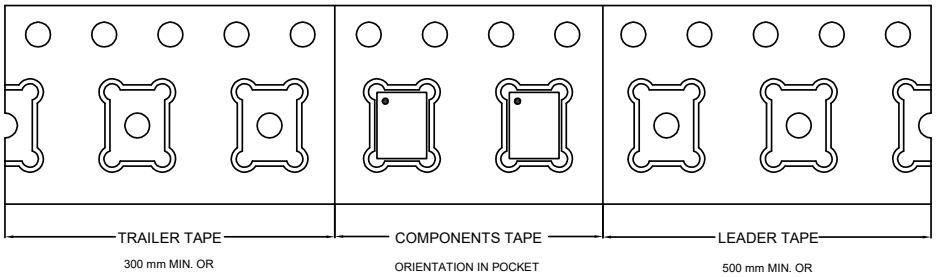
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S
12 mm	Ø330	Ø330.0 ±2.0	Ø101.6 ±2.0	12.4 +2.0 -0.0	17.0 +2.6 -1.2	Ø13.2 +0.3 -0.2	10.5 ±0.2	2.0 +0.6 -0.3

QFN3x4 Tape

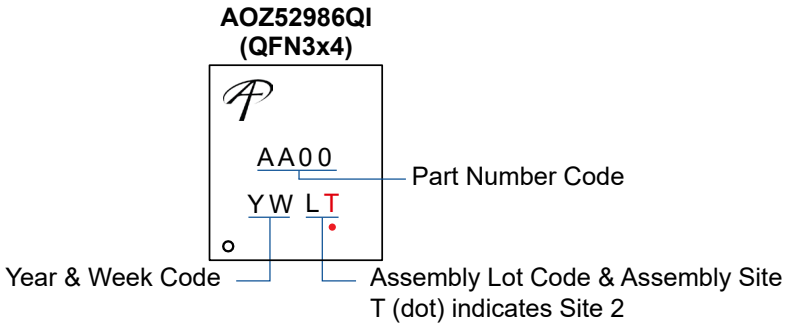
Leader / Trailer & Orientation

Unit Per Reel: 5000pcs



All Dimensions Comply with EAI-481

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.