ALPHA & OMEGA SEMICONDUCTOR

AOZ53221QI

High-Performance DrMOS Power Module with Accurate High Over-Current Protection

General Description

The AOZ53221QI is a high efficiency synchronous buck power stage module consisting of two asymmetrical MOSFETs and an integrated driver. It features high accuracy temperature reporting to controller for thermal monitoring. 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 compact 5mm x 5mm QFN package is optimally chosen and designed to minimize parasitic inductance for minimal EMI signature.

The AOZ53221QI uses PWM and/or SMOD# input for accurate control of the power MOSFETs switching activities, is compatible with 3V and 5V logic and supports Tri-State PWM.

A number of features are provided making the AOZ53221QI a highly versatile power module. The bootstrap diode is integrated in the driver. The Low-Side MOSFET can be driven into diode emulation mode to provide asynchronous operation and improve light-load performance. It also features a continuous reporting to monitor signal the internal die temperature.

Features

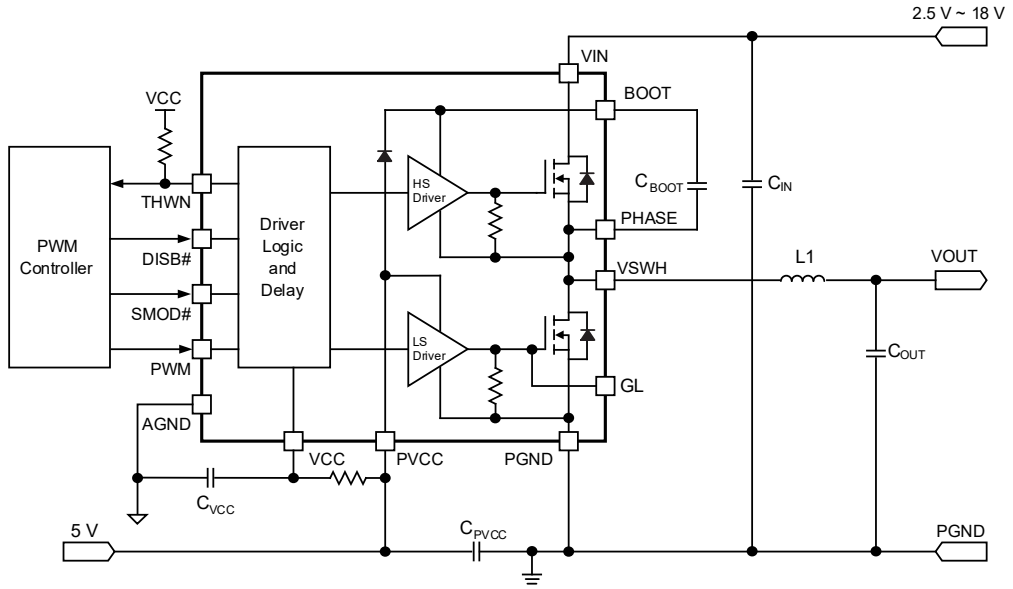
- 2.5V to 18V power supply range
- 4.5V to 5.5V driver supply range
- 60A continuous output current
  - Up to 80A with 10ms on pulse
  - Up to 120A with 10µs on pulse
- Over Current Protection
  - 100A Peak Current limit (+/-10%)
  - 50A Valley Current limit
- Up to 2MHz switching operation
- 3V/5V PWM and Tri-State input compatible
- Under-Voltage LockOut protection
- SMOD# pin control for Diode Emulation/CCM operation
- Standard QFN5x5-31L package

Applications

- Notebook computers
- Memory and graphic cards
- VRMs for motherboards
- Point of load DC/DC converter
- Video gaming console

GREEN Product

Typical Application



Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ53221QI	-40 °C to +125 °C	QFN5x5-31L	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

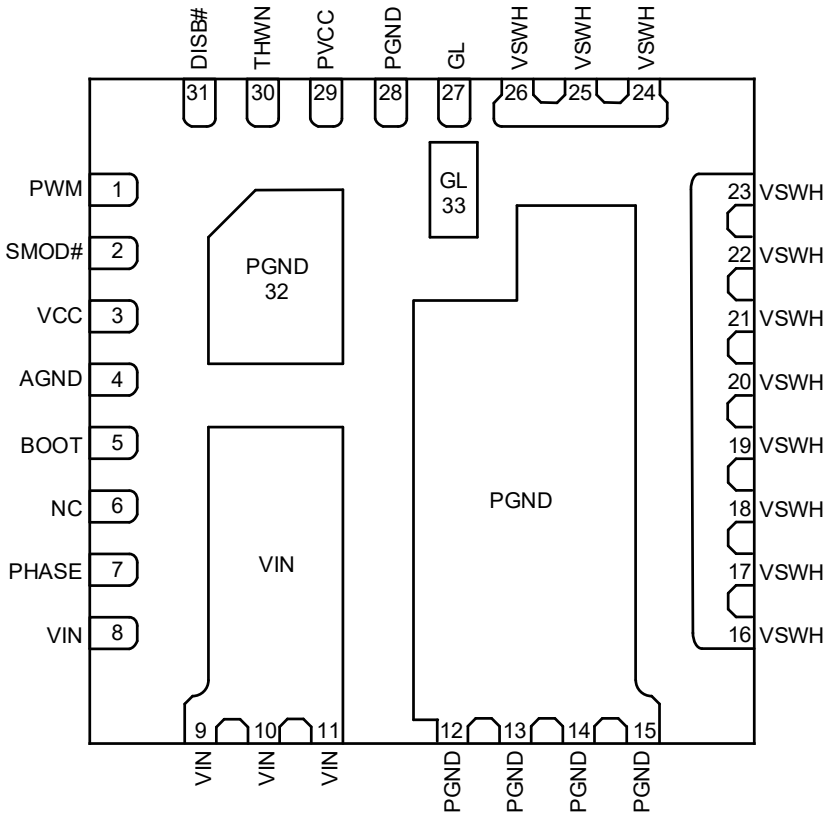
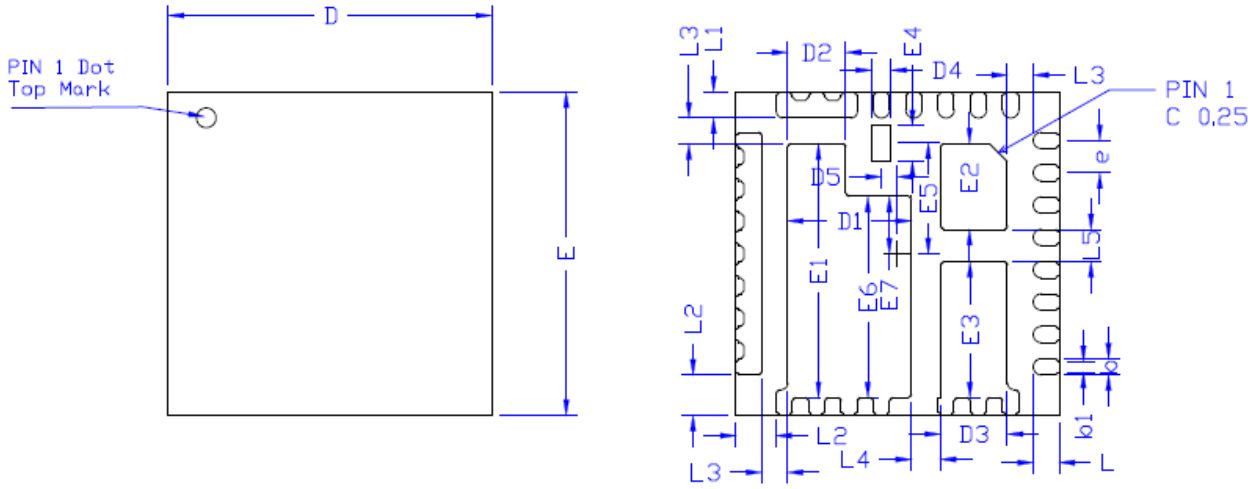


Figure 1. QFN5x5-31L
(Top View)

Pin Description

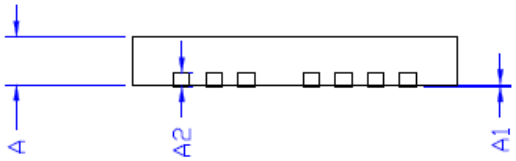
Pin Number	Pin Name	Pin Function
1	PWM	PWM input signal from the controller IC. This input is compatible with 3V/5 V and Tri-State logic level.
2	SMOD#	Pull low to enable Discontinuous Mode of Operation (DCM), Diode Emulation or Skip Mode. There is an internal pull-up resistor to VCC.
3	VCC	5V Bias for Internal Logic Blocks. Ensure to position a 1µF MLCC directly between VCC and AGND (Pin 4).
4	AGND	Signal Ground
5	BOOT	High-Side MOSFET Gate Driver supply rail. Connect a 100nF ceramic capacitor between BOOT and the PHASE (Pin 7).
6	NC	No Connect
7	PHASE	This pin is dedicated for bootstrap capacitor AC return path connection from BOOT (Pin 5).
8, 9, 10, 11	VIN	Power stage High Voltage Input (Drain connection of High-Side MOSFET).
12, 13, 14, 15	PGND	Power Ground pin for power stage (Source connection of Low-Side MOSFET).
16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	VSWH	Switching node connected to the Source of High-Side MOSFET and the Drain of Low-Side MOSFET. These pins are used for Zero Cross Detection and Anti-Overlap Control as well as main inductor terminal.
27	GL	Low-Side MOSFET Gate connection. This is for test purposes only.
28	PGND	Power Ground pin for High-Side and Low-Side MOSFET Gate Drivers. Ensure to connect 1µF directly between PGND and PVCC (Pin 29).
29	VCC	5V Power Rail for High-Side and Low-Side MOSFET Drivers. Ensure to position a 1µF MLCC directly between VCC and PGND (Pin 28).
30	THWN	Thermal warning indicator. This is an open−drain output. When the temperature at the driver IC die reaches the Over Temperature Threshold, this pin is pulled low.
31	DISB#	Output disable pin. When this pin is pulled to a logic low level, the IC is disabled. There is an internal pull−down resistor to AGND.

Package Dimensions, QFN5x5A-31L



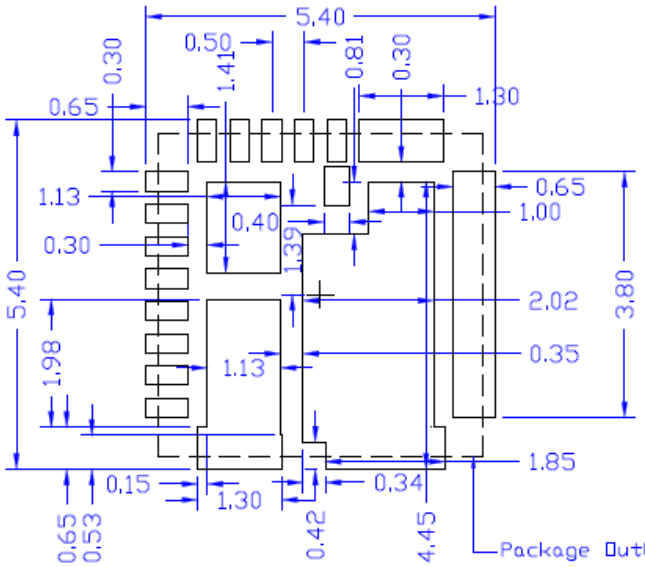
TOP VIEW

BOTTOM VIEW



SIDE VIEW

RECOMMENDED LAND PATTERN

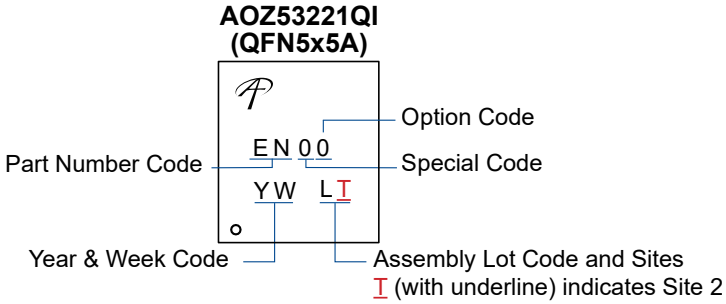


UNIT: mm

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	-	0.05	0.000	-	0.002
A2	0.20REF			0.008REF		
D	4.90	5.00	5.10	0.193	0.197	0.201
E	4.90	5.00	5.10	0.193	0.197	0.201
D1	1.87	1.92	1.97	0.074	0.076	0.078
D2	0.85	0.90	0.95	0.033	0.035	0.037
D3	0.99	1.04	1.09	0.039	0.041	0.043
D4	0.25	0.30	0.35	0.010	0.012	0.014
D5	0.20	0.25	0.30	0.008	0.010	0.012
E1	3.88	3.93	3.98	0.153	0.155	0.156
E2	1.27	1.32	1.37	0.050	0.052	0.054
E3	2.05	2.10	2.15	0.081	0.083	0.085
E4	0.50	0.55	0.60	0.020	0.022	0.024
E5	1.66	1.71	1.76	0.065	0.067	0.069
E6	3.06	3.11	3.16	0.121	0.122	0.124
E7	0.84	0.89	0.94	0.033	0.035	0.037
L	0.35	0.40	0.45	0.014	0.016	0.018
L1	0.35	0.40	0.45	0.014	0.016	0.018
L2	0.58	0.63	0.68	0.023	0.025	0.027
L3	0.35	0.40	0.45	0.014	0.016	0.018
L4	0.40	0.45	0.50	0.016	0.018	0.020
L5	0.45	0.50	0.55	0.018	0.020	0.022
b	0.20	0.25	0.30	0.008	0.010	0.012
b1	0.13	0.18	0.23	0.005	0.007	0.009
e	0.50BSC			0.020BSC		

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

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.