

## General Description

The AOZ71138QI is a high performance digital & analog hybrid multiphase buck controller designed in compliance with Intel IMVP8, 9, and 9.1/9.2 platform specifications. It provides three output rails (up to 4 + 2 + 1) and supports 4 separate SVID domains: Up to 4 phases for core voltage domain (IA), 2 phases for graphics voltage domain (GT) and 1 phase for Auxiliary domain (SA) as well as the PSYS domain's reporting functions, incorporated into a single SVID interface. AOS offers a novel AOS Advanced Transient Modulator (A<sup>2</sup>TM). It combines an advanced variable frequency hysteretic peak current mode control with proprietary phase current sensing scheme for fast transient response and low system cost. The control loop enhances light-load efficiency by seamlessly entering DCM mode of operation. Autonomous Phase Management also assures optimized efficiency and power loss during light load with single phase DCM mode.

The AOZ71138QI is equipped with SMBus digital Interface enabling register programming for tuning and configuration to minimize the system components and eliminate the need for manual solder rework on system board. Programmability can be done either by AOS GUI or customized ECS into the controller's built-in RAM or MTP. The controller provides MTP to store register settings once the configuration is finalized and the configuration can be updated more than ten times. In production stage, an external resistor can be used for pin strap to choose 1 out of 6 config settings pre-programmed into the parts to achieve easy BOM management and minimize the number of part number and SKU.

Combined with AOS high performance DrMOS and SPS, the AOZ71138QI provides a complete power solution for Intel IMVP9.2 Meteor Lake UH SKU applications. AOZ71138QI comes in a 6mm x 6mm 52-pin QFN package.

The AOZ71138QI controller features very low power consumption while still enabling digital interface control. This unique "Hybrid Digital" control scheme enables low quiescent power consumption in all power states as defined by the Intel IMVP9.2 platform to enable long system run times in battery life workloads.

The AOZ71138QI provides complete protection and warning functions including UVP, OVP, OCP and OTP. Fault protection behavior can be easily programmed through SMBus. AOZ71138QI also offers real time telemetry information via SMBus for VIN, VOUT, temperature, output currents, power states as well as PSYS / VSYS / IAUX pins reporting via SMBus.

## Features

- 2.5V to 24V VIN input supply voltage
- Triple output rails: 4/3/2/1 + 2/1 + 1 phase
- Meteor Lake UH Platform
- Support Discrete Inductor and 2 phase Coupled Inductor.
- Autonomous Phase Management including Phase shedding and auto DCM to optimize power loss
- Digital & analog hybrid controller with SMBus programmability and lowest power consumption
- SVID Interface to CPU compliant with IMVP8, 9, 9.1 and the latest 9.2 specifications
  - Support Fast V-Mode (FVM)
- Differential remote sensing to achieve 0.5% regulated VOUT accuracy
- Low quiescent current: 3.7mA at PS0 for 2+1+1 configuration
- Supports multi-sourced industry standard DrMOS or SPS power stages
- User friendly GUI for compensation and configurations with minimal external RC components.
- ECS programmability for configurations with Built-in MTP and RAM with more than 10 times configuration changes
- Pin Strap for easy configuration with 6 configuration setting with same PN to minimize number of SKU
- Proprietary, high performance AOS Advanced Transient Modulator (A<sup>2</sup>TM) control scheme:
  - Variable frequency hysteretic peak current mode control gives fast transient response
  - Dynamic phase current balance
  - Excellent load-line control and phase current sensing
  - Seamless CCM to DCM control to maximize efficiency
- System Input Power Monitoring (both PSYS and VSYS)
- 300kHz to 1.8MHz programmable switching frequency
- Acoustic Noise Suppression
- Output Under-Voltage Protection (UVP)
- Output Over-Voltage Protection (OVP)
- Over-Current Protection (OCP)
- Over-Temperature Protection (OTP)
- QFN6x6-52L package

## Applications

- Meteor Lake Notebook
- Memory and graphic cards
- Video game console



## Typical Application

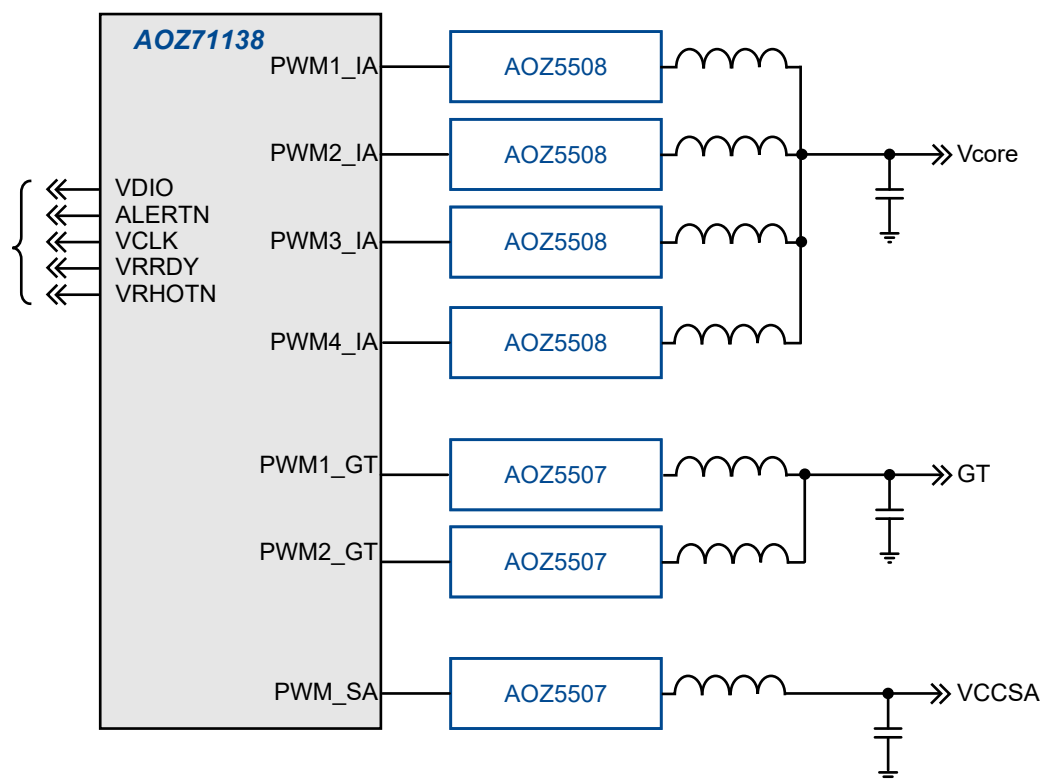


Figure 1. Typical Application

## Ordering Information

Part Number <sup>(1)</sup>	Junction Temperature Range	Package	Environmental
AOZ71138QI-xxx <sup>(2)</sup>	-40°C to +125°C	QFN6x6-52L	RoHS

### Notes:

- For each customer, the full PN already created for order is on the last page of this DS. Please refer to last page for more information.
- "xxx" is the configuration code identifier (also called sub-part number) for the register settings stored in the internal non-volatile memory (NVM). Each "x" can be a value between 0 and 9 and A-Z (except I, J, O, Q). Please work with an AOS Sales/FAE to create this unique number. Each project or board might need to use different sub-PN as the register setting might be different.



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

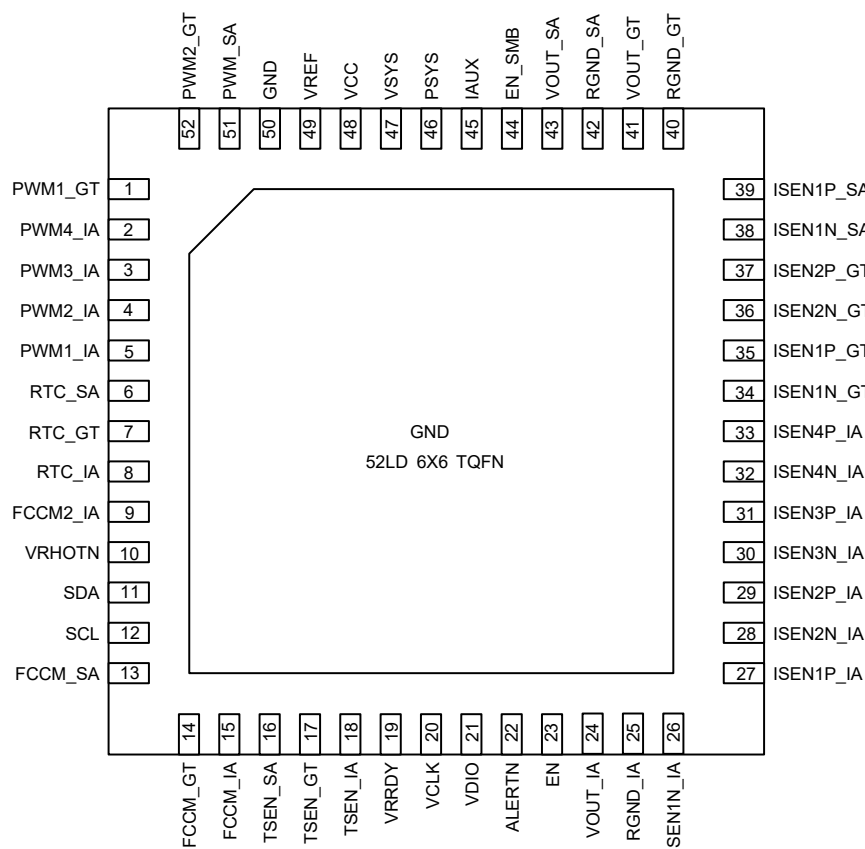
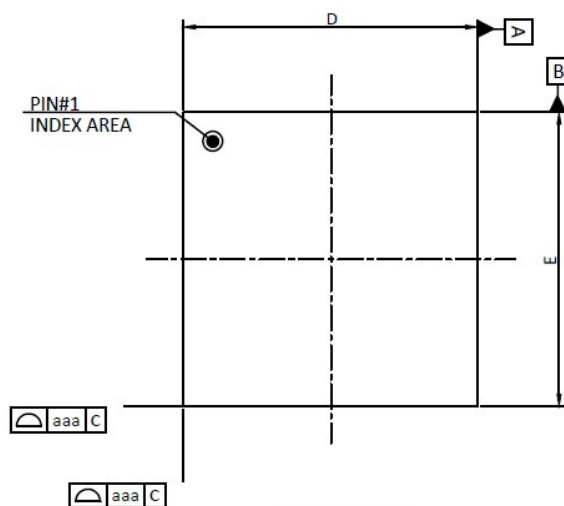
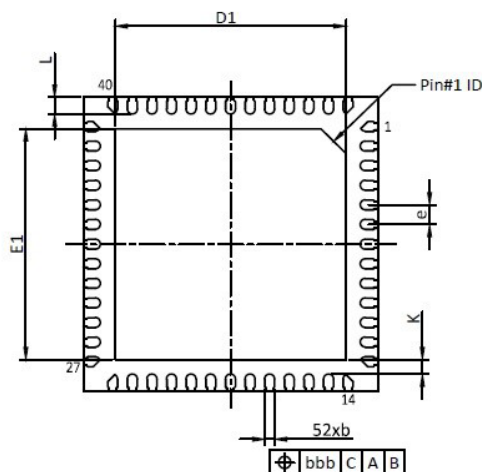


Figure 2. Pin Definition  
QFN6x6-52L  
(Top Transparent View)

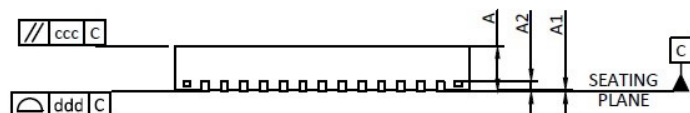
## Package Dimensions, QFN6x6-52L



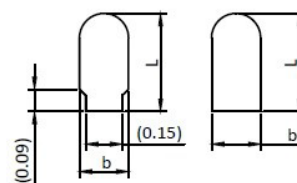
TOP VIEW



BOTTOM VIEW



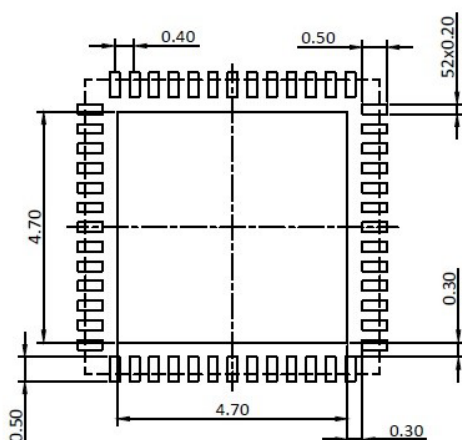
SIDE VIEW



Option 1 Option 2

Lead Option

## RECOMMENDED LAND PATTERN



UNIT: mm

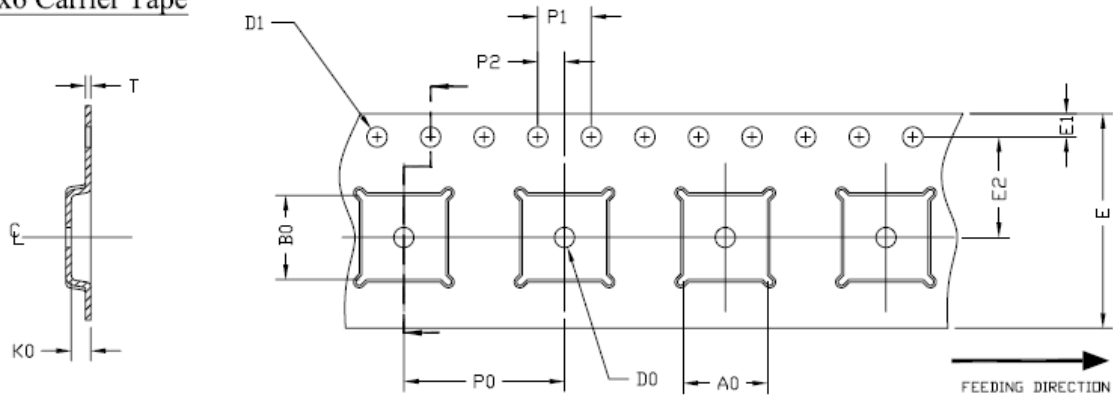
### NOTE:

1. CONTROLLING DIMENSION IS MILLIMETER.
2. CO-PLANARITY APPLIES TO THE EXPOSED PAD AND THE LEADS.

SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.031	0.035	0.039
A1	0.00	0.02	0.05	0.000	0.001	0.002
A2	0.15	0.20	0.25	0.006	0.008	0.010
b	0.15	0.20	0.25	0.006	0.008	0.010
D	5.90	6.00	6.10	0.232	0.236	0.240
D1	4.55	4.70	4.80	0.179	0.185	0.189
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	4.55	4.70	4.80	0.179	0.185	0.189
e	0.40 BSC			0.016 BSC		
K	0.20	0.30	0.40	0.008	0.012	0.016
L	0.25	0.35	0.45	0.010	0.014	0.018
aaa	0.10			0.004		
bbb	0.07			0.003		
ccc	0.10			0.004		
ddd	0.08			0.003		

## Tape and Reel Dimensions, QFN6x6-52L

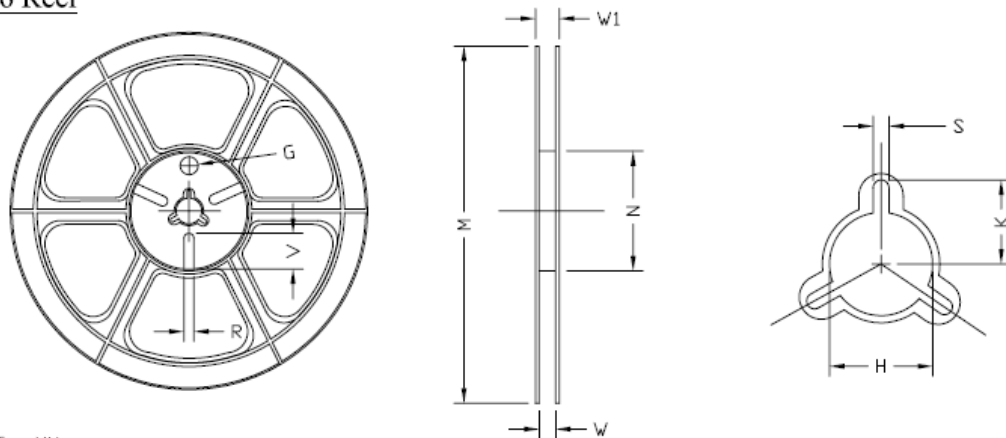
### QFN6x6 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
QFN6x6 (16 mm)	6.30 ±0.20	6.30 ±0.20	1.10 ±0.20	1.50 MIN.	1.50 +0.1 -0.0	16.0 ±0.3	1.75 ±0.10	7.5 ±0.1	12.00 ±0.20	4.00 ±0.20	2.00 ±0.10	0.30 ±0.05

### QFN6x6 Reel

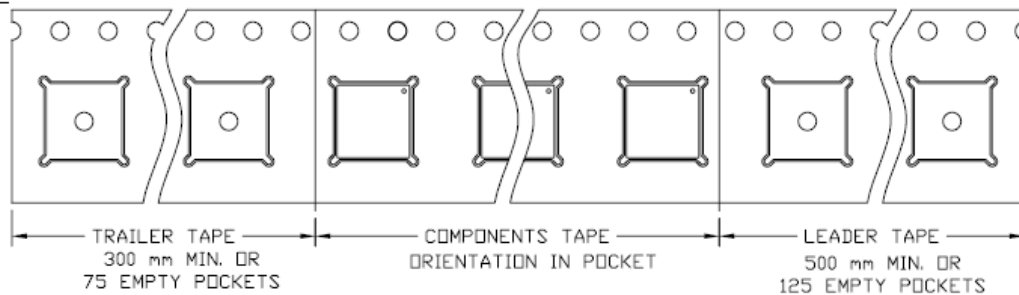


UNIT: MM

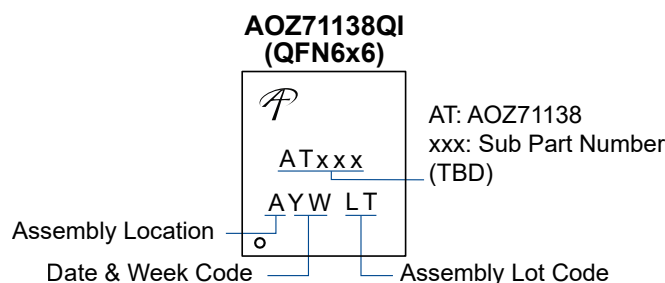
TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
16 mm	φ330	φ330 MAX.	φ100 MIN.	16.4 +2.0 -0.0	22.4 MAX.	φ13.0 +0.5 -0.2	10.1 MIN.	1.5 MIN.	---	---	---

### QFN6x6 Tape

Leader / Trailer  
& Orientation



## Part Marking



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