



Dual-Rail $N+M \leq 8$ ($M \leq 4$) Controller with PMBus

1. General Description

The SA58258 is a dual-loop, 8-phase step-down controller designed for automotive ADAS applications. The controller supports two separate voltage rails and provides flexible phase assignment between them, allowing operation in any of the following configurations: 8+0, 7+1, 6+2, 5+3 or 4+4.

The parameters of the two loops are controlled through the PMBus interface, which supports a switching frequency from 400 kHz to 2 MHz, a load line from 0 mΩ to 0.62 mΩ, and a 50mV/step VID table.

The SA58258 utilizes ripple-based adaptive on-time control to deliver fast transient responses and offers programmable loop compensation. The controller also supports DrMOS power stages, which provide current sensing and temperature sensing information.

Protection features include a set of sophisticated over-voltage, under-voltage, over-temperature, and over-current protections. The SA58258 also detects and protects against open or short circuits on the remote sensing inputs. These attributes provide a comprehensive and advanced set of protection features for microprocessors and power systems.

The SA58258 is available in a space-saving, 48-lead 7mm × 7mm QFN package with a 0.5mm pin pitch.

2. Applications

- Automotive ADAS CPU power
- High Performance CPU/ASIC/FPGA Power

3. Features

- Supports up to 8 Phases
- Programmable Phase Assignment Between Two Voltage Rails; Support $N + M \leq 8$ ($M \leq 4$), with Configurations of 8+0, 7+1, 6+2, 5+3, up to 4+4
- Internal NVM to Store Custom Configurations, which can be Selected Using PMBus
- Configurable Autonomous Phase Add/Drop
- Output Voltage Regulation Range: 0.5V to 2.0V (50mV/step)
- PMBus Rev 1.3 Compliant Serial Interface
- Monitors Voltage, Current, and Temperature faults
- Maximum Supported Bus Speed: 1MHz
- Compliant with 1.8V and 3.3V Logic Levels
- Supports Start-Up into Pre-Biased Output Voltage
- Differential Output Voltage Sensing
- DrMOS Power Stage Current Sensing
- Adjustable Current Balancing with Programmable Offsets for Thermal Balancing
- Programmable Loop Compensation
- Programmable DC Load-Line Slope (droop) and Offset
- Input Voltage (+12V) Sensing
- External Fault Detection and Protection Capability
- IUUVLO, IOVP, OUV, OOV
- OOC (Total Current)
- Int. OTP/OTW and DrMOS OTP/OTW
- Open/Short Voltage Sense Line Detection
- Valley Phase Current Pulse Limit
- Negative Phase Current Pulse Limit
- Phase Configuration Fault Detection
- AUX Voltage OVP and AUX Voltage UVP
- Inductor Under-Current Warning
- AEC-Q100 Qualified
- ASIL-D System Ready
- Temperature Grade 1: -40°C to 125°C
- RoHS Compliant and Halogen Free 48-Lead 7mm x 7mm QFN (0.5mm Pin Pitch) Package

4. Typical Application

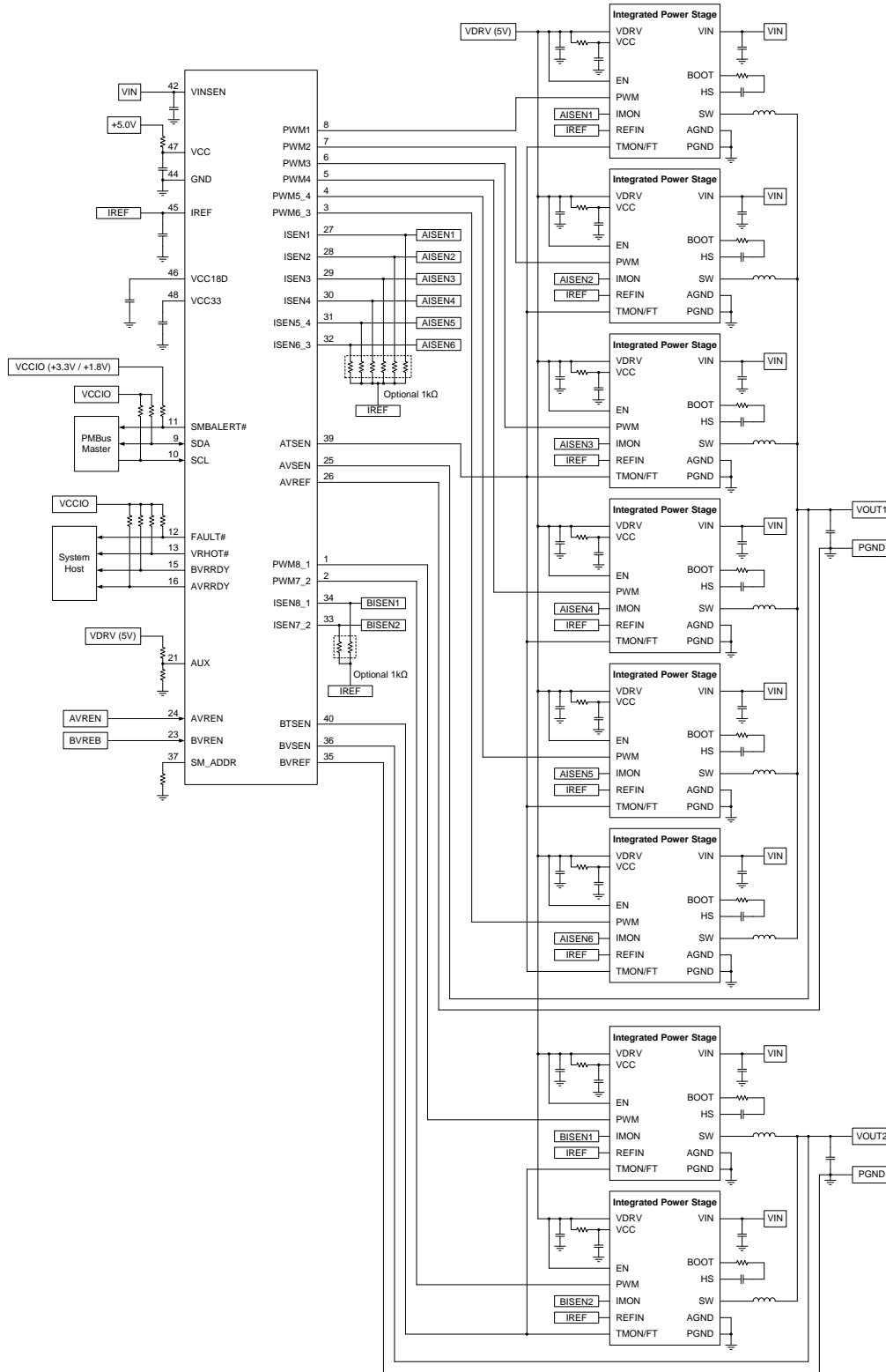


Figure 1. Schematic Diagram for Dual Rail using 6+2 Phase Configuration

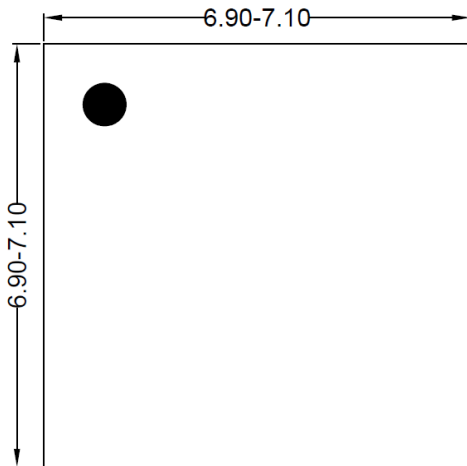
5. Ordering Information

Ordering Part Number	Package Type	Top Mark
SA58258QJQ	QFN7x7-48 RoHS Compliant and Halogen Free	FWPxyz

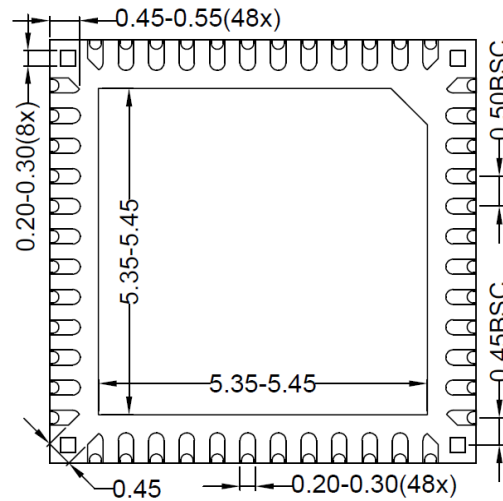
Device code: FWP

x=year code, y=week code, z= lot number code

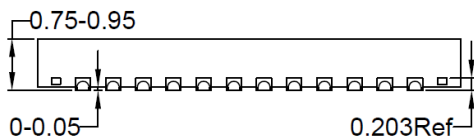
6. Package Outline Drawing



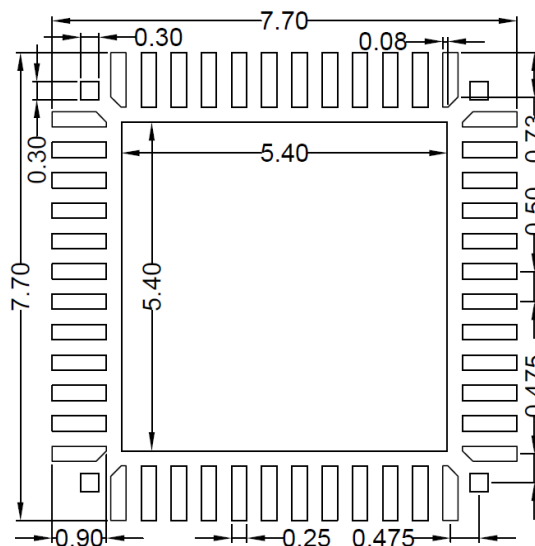
Top View



Bottom View



Front View

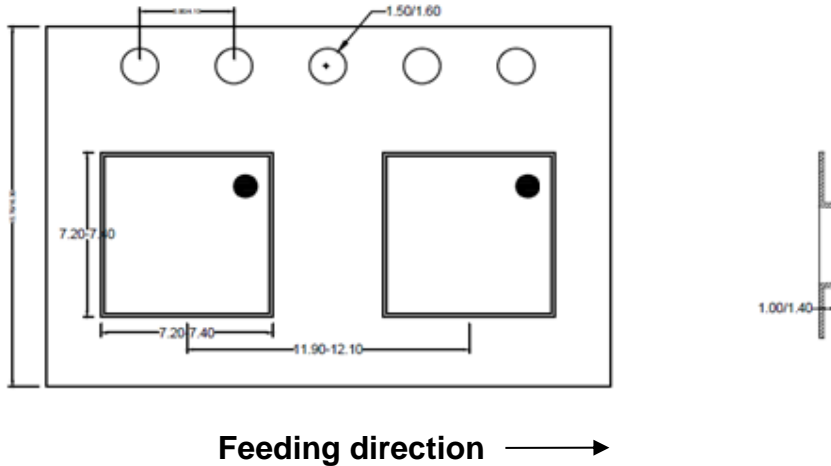


Recommended PCB Layout
(Reference Only)

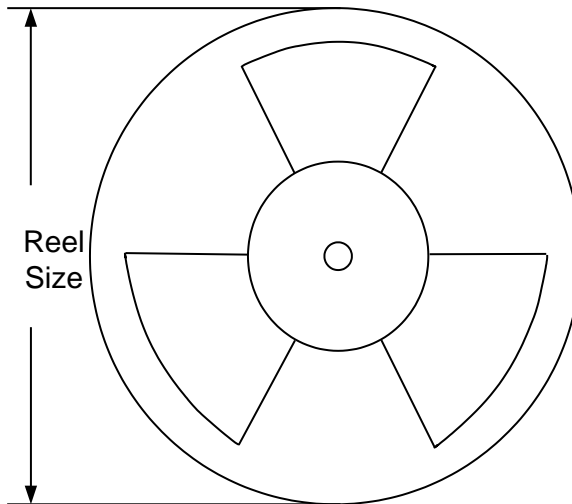
Notes: All dimensions in millimeters and exclude mold flash & metal burr.

7. Tape and Reel Information

QFN7x7-48 Tape Dimensions and Pin1 Orientation



Reel Dimensions



Package Types	Tape Width (mm)	Pocket Pitch(mm)	Reel Size (inch)	Trailer Length(mm)	Leader Length (mm)	Qty Per Reel
QFN7x7-48	16	12	13"	400	400	3000

IMPORTANT NOTICE

- 1. Right to make changes.** Silergy and its subsidiaries (hereafter Silergy) reserve the right to change any information published in this document, including but not limited to circuitry, specification and/or product design, manufacturing or descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to Silergy's standard terms and conditions of sale.
- 2. Applications.** Application examples that are described herein for any of these products are for illustrative purposes only. Silergy makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Buyers are responsible for the design and operation of their applications and products using Silergy products. Silergy or its subsidiaries assume no liability for any application assistance or designs of customer products. It is customer's sole responsibility to determine whether the Silergy product is suitable and fit for the customer's applications and products planned. To minimize the risks associated with customer's products and applications, customer should provide adequate design and operating safeguards. Customer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Silergy assumes no liability related to any default, damage, costs or problem in the customer's applications or products, or the application or use by customer's third-party buyers. Customer will fully indemnify Silergy, its subsidiaries, and their representatives against any damages arising out of the use of any Silergy components in safety-critical applications. It is also buyers' sole responsibility to warrant and guarantee that any intellectual property rights of a third party are not infringed upon when integrating Silergy products into any application. Silergy assumes no responsibility for any said applications or for any use of any circuitry other than circuitry entirely embodied in a Silergy product.
- 3. Limited warranty and liability.** Information furnished by Silergy in this document is believed to be accurate and reliable. However, Silergy makes no representation or warranty, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. In no event shall Silergy be liable for any indirect, incidental, punitive, special or consequential damages, including but not limited to lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges, whether or not such damages are based on tort or negligence, warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, Silergy' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Standard Terms and Conditions of Sale of Silergy.
- 4. Suitability for use.** Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of Silergy components in its applications, notwithstanding any applications-related information or support that may be provided by Silergy. Silergy products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of a Silergy product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Silergy assumes no liability for inclusion and/or use of Silergy products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.
- 5. Terms and conditions of commercial sale.** Silergy products are sold subject to the standard terms and conditions of commercial sale, as published at <http://www.silergy.com/stdterms>, unless otherwise agreed in a valid written individual agreement specifically agreed to in writing by an authorized officer of Silergy. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Silergy hereby expressly objects to and denies the application of any customer's general terms and conditions with regard to the purchase of Silergy products by the customer.
- 6. No offer to sell or license.** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights. Silergy makes no representation or warranty that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right. Information published by Silergy regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from Silergy under the patents or other intellectual property of Silergy.

For more information, please visit: www.silergy.com

©2025 Silergy Corp.

All Rights Reserved.