



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
- IUVLO, IOVP, OUV, OOV
- OSCP (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

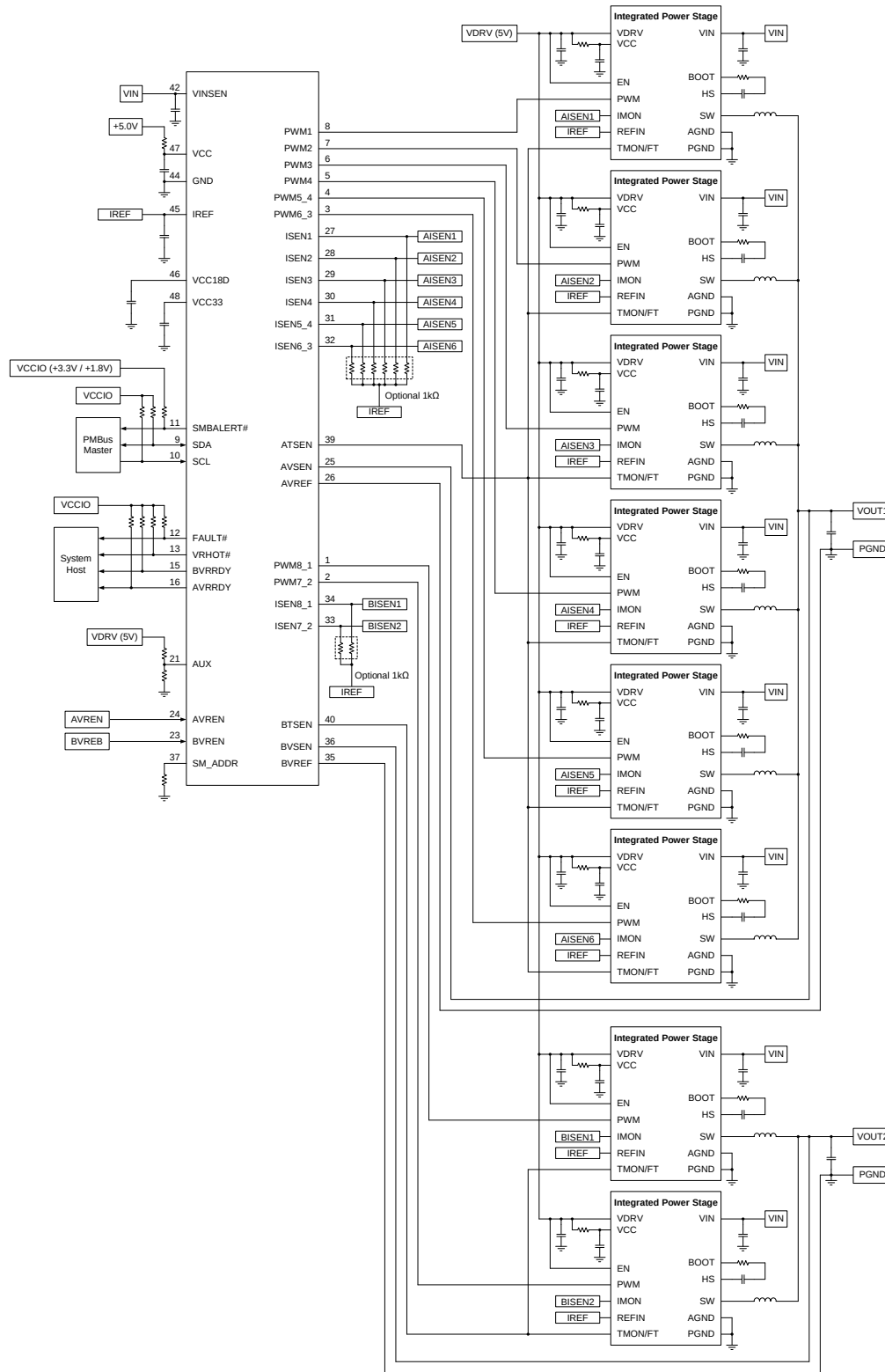


Figure 1. Schematic Diagram for Dual Rail using 6+2 Phase Configuration

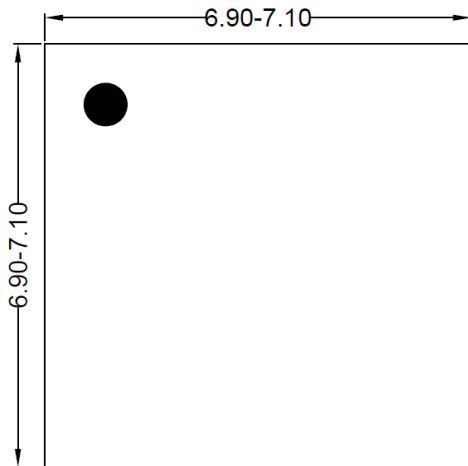
5. Ordering Information

Ordering Part Number	Package Type	Top Mark
SA58258QJQ	QFN7×7-48 RoHS Compliant and Halogen Free	FWPxyz

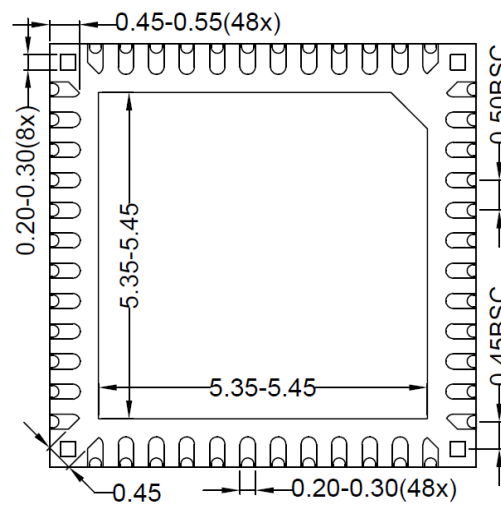
Device code: FWP

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

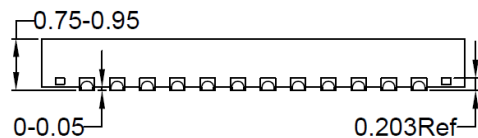
6. Package Outline Drawing



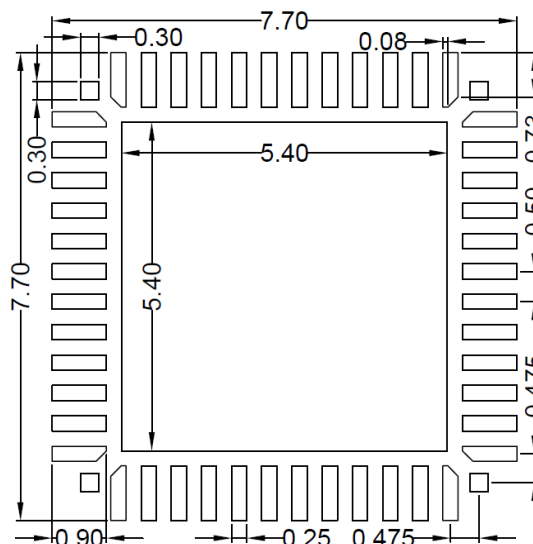
Top View



Bottom View



Front View

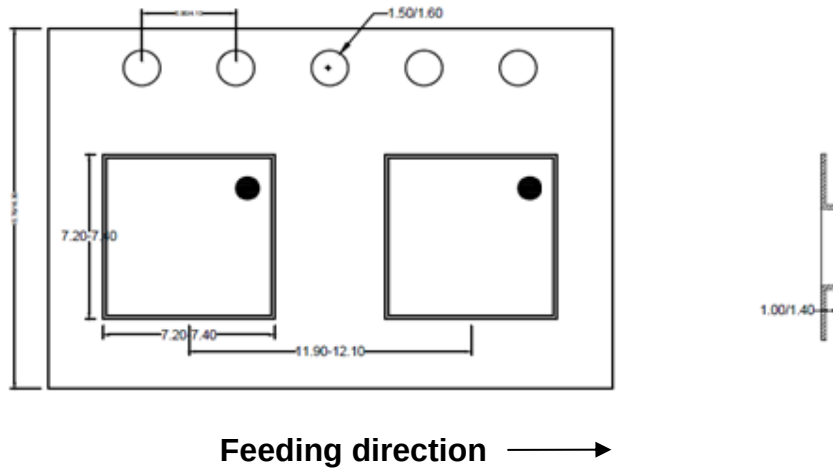


Recommended PCB Layout
(Reference Only)

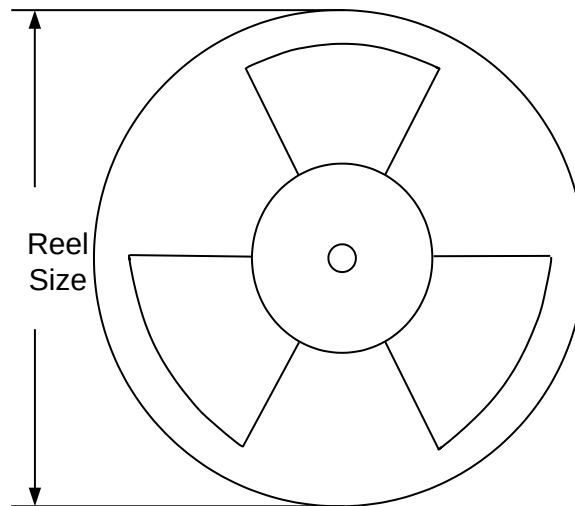
Notes: All dimensions in millimeters and exclude mold flash & metal burr.

7. Tape and Reel Information

QFN7×7-48 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

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