

Single Rail, 6 Phase Controller

1 General Description

The SQ51202 single rail 6 phase digital controller provides power for high performance SoCs. Silergy's unique ripple-based control with built-in flexible loop compensation provides fast transient response for high current applications. The controller supports integrated power stages that provide current and temperature sense. Additionally, SQ51202's programmable PWM driving configuration provides flexibility when used with DrMOS devices from multiple vendors.

The SQ51202 supports the PMBus® communication interface and it is compatible with 1.8V/3.3V interface levels. Complying with PMBus, SQ51202 supports the following features: dynamic voltage scaling (DVS), reporting telemetry information of voltage, current, temperature, fault/warning status to the host, configurable fault response and thresholds. All programmable parameters can be stored in a non-volatile memory.

2 Features

- Flexible Phase Assignment and Arbitrary Firing Sequence, $N \leq 6$
- Differential Remote Sense
- Output Voltage Regulation Range Covers:
 - 0.25~1.52V in 5mV Table
 - 0.5~2.0V in 10mV Table
 - 0.25~2V in Linear Mode (LSB=1.953mV)
- Programmable Soft-Start Slew Rate and Voltage Positioning Slew Rate
- Flexible Pin-Strap Settings Including:
 - Multiple(8) Customer Configurations
 - 5mV/10mV VID Table
 - 4 PMBus Addresses with Additional 5 Bit Programmable Offset
 - 8-Bit Boot Voltage
- PMBus 1.3.1 Compliant, 1.8/3.3V Signaling:
 - System Configuration
 - DVS using VOUT_COMMAND
 - Operation Control and Fault Handling
 - Status Reporting and Telemetry

- Flexible PWM Driver Design to Support SPS from Multiple Vendors
- Integrated Programmable Loop Compensation, Minimal External Components
- Adjustable Current Balancing with Optional Thermal Balancing Offsets
- Autonomous Phase Shedding with Enhanced Transient Performance
- Advanced Protection Scheme with Programmable Response and Thresholds
 - Fault Response: Latched Shutdown, Hiccup, Autonomous Recovery
 - IUVP, IOVP, OUV, OOV (Fix and Tracking)
 - OCP
 - OTP, DRV_FLT, DRV_NONRDY Protection
 - Driver UVLO and Limp Mode fault detection
 - SPS Current Sharing Protection
 - Pulse by Pulse Current Limit
 - Open/Short Voltage Sense Line Detection
 - Per-Phase Negative Current Limit
- Internal NVM to Store Up to 8 Customer Configurations
- Switching Frequency Range from 300kHz to 1.2MHz with Frequency Compensation
- Single +3.3V Supply Operation
- 48-Lead QFN7x7 0.5mm Pitch Package

3 Applications

- Application-Specific ASIC power
- Core Routers and Switches
- High Performance XPU/FPGA Power
- High Density Power Solutions

4 Typical Application

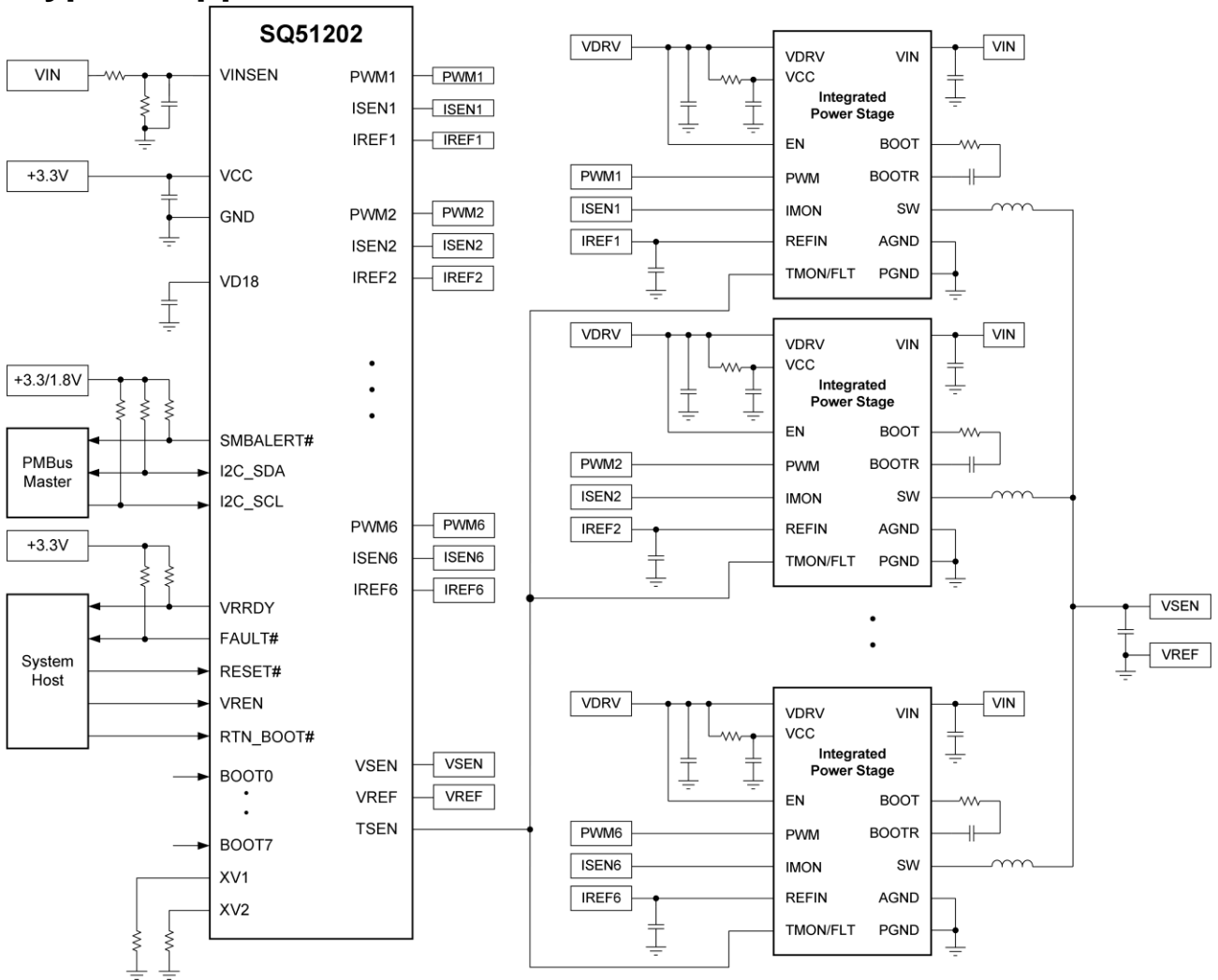


Figure1 Application Diagram -High Power rail using SQ51202 and 6 power stages



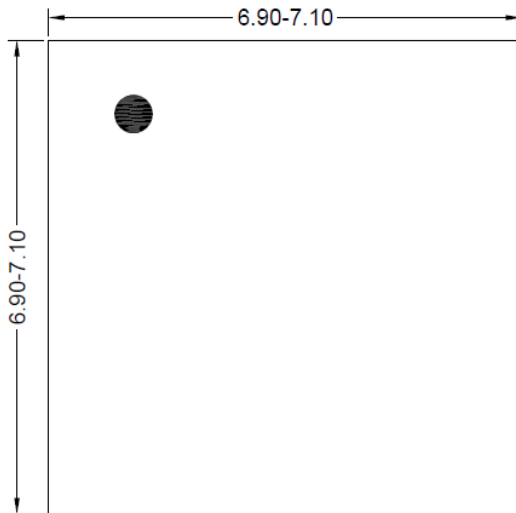
5 Ordering Information

Ordering Part Number	Package Type	Top Mark
SQ51202QJQ	QFN7x7-48 RoHS Compliant and Halogen Free	GMAxyz

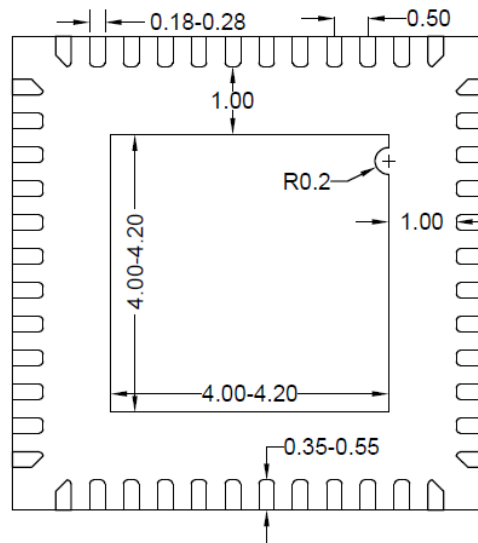
Device code: GMA

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

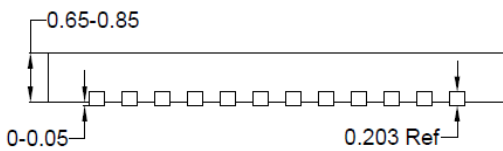
6 Package Outline Drawing



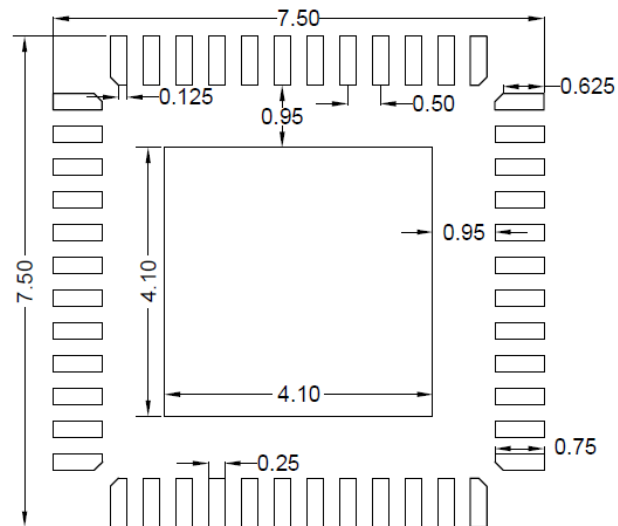
Top View



Side view



Bottom View



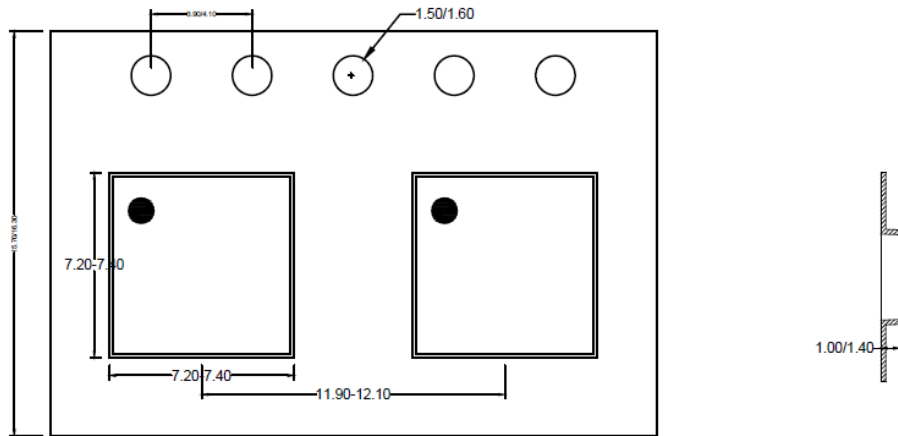
Recommended PCB Layout
Only for reference

Notes: All dimension in millimeter and exclude mold flash & metal burr.

7 Tape and Reel information

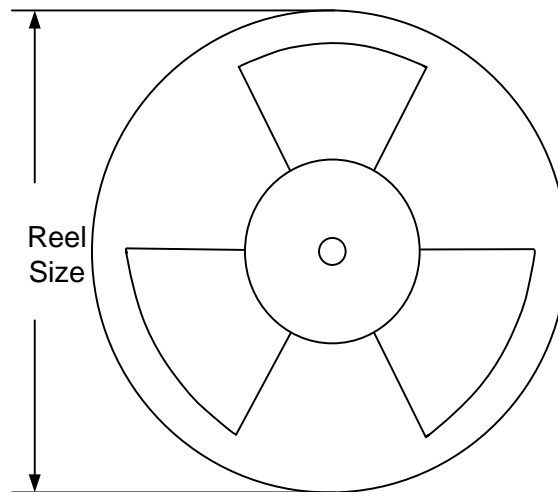
1. Tape Dimensions and Pin 1 Orientation

QFN7x7



Feeding direction →

2. Reel Dimensions



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
QFN7x7	16	12	13"	400	400	3000

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