

1 General description

The PF8150 is a power management integrated circuit (PMIC) designed for high performance i.MX 8 and S32V based applications. It features seven high efficiency buck converters and four linear regulators for powering the processor, memory and miscellaneous peripherals. It meets the stringent requirements of automotive applications and is fully AEC-Q100 grade 2 qualified.

Built-in one time programmable memory stores key startup configurations, drastically reducing external components typically used to set output voltage and sequence of external regulators. Regulator parameters are adjustable through high-speed I2C after start up offering flexibility for different system states.

Note: Electrical characteristics are maintained in the PF8150_PF8250 data sheet

2 Features and benefits

- Up to seven high efficiency buck converters
- Four linear regulators with load switch options
- RTC supply and coin cell charger
- Watchdog monitoring
- Independent OV/UV monitoring circuits
- One time programmable device configuration
- 3.4 MHz I2C communication interface
- 56-pin 8 x 8 QFN package
- AEC-Q100 grade 2 qualified

3 Applications

- Automotive Infotainment
- High-end consumer and industrial



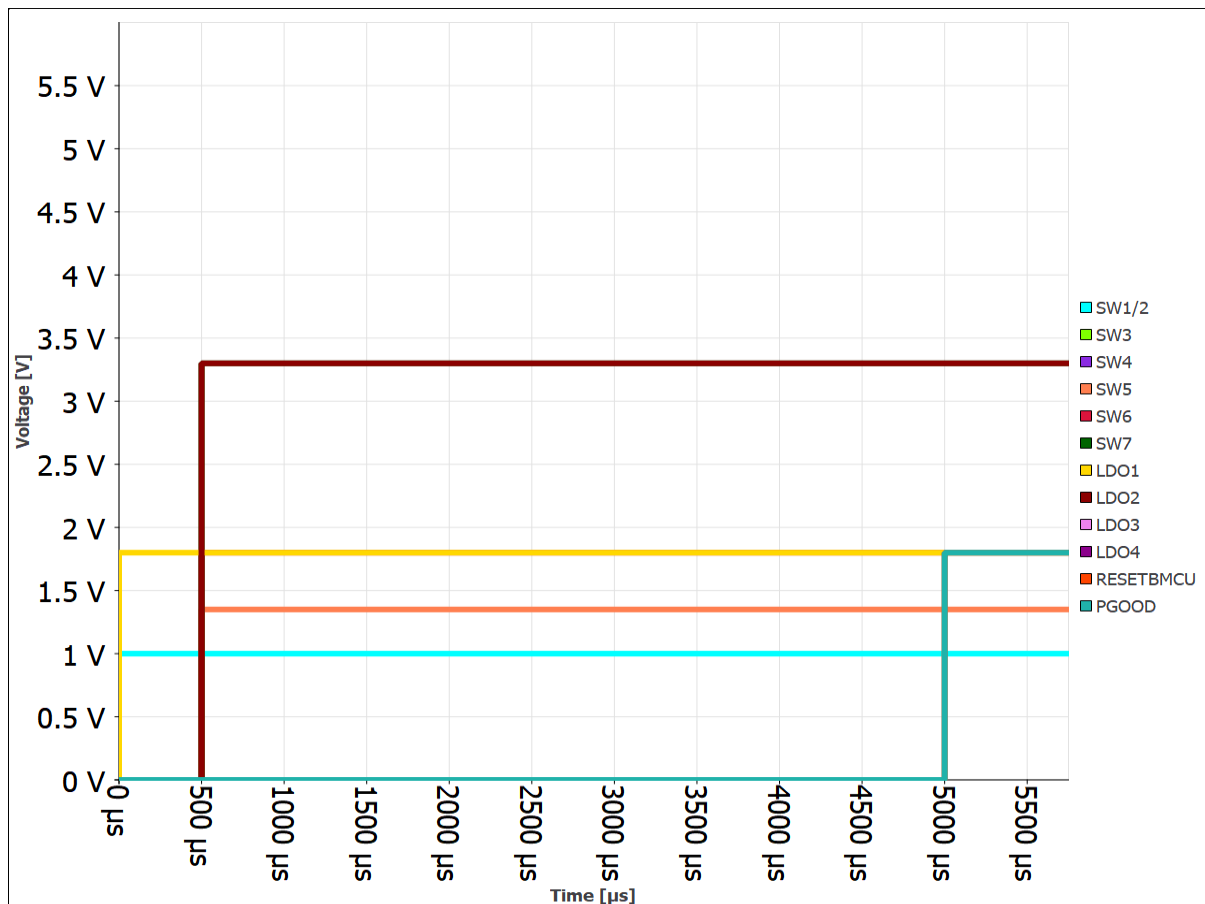
4 Ordering information

Table 1. Ordering information

| Type number ^[1] | Package | | |
|----------------------------|---------|--|--------------|
| | Name | Description | Version |
| MC33PF8150CFTS | HVQFN56 | HVQFN56, thermal enhanced very thin quad flat package, no leads, 56 terminals, 0.1 mm dimble wettable flank, 0.5 mm pitch, 8 mm x 8 mm x 0.9 mm body | SOT684-29(D) |

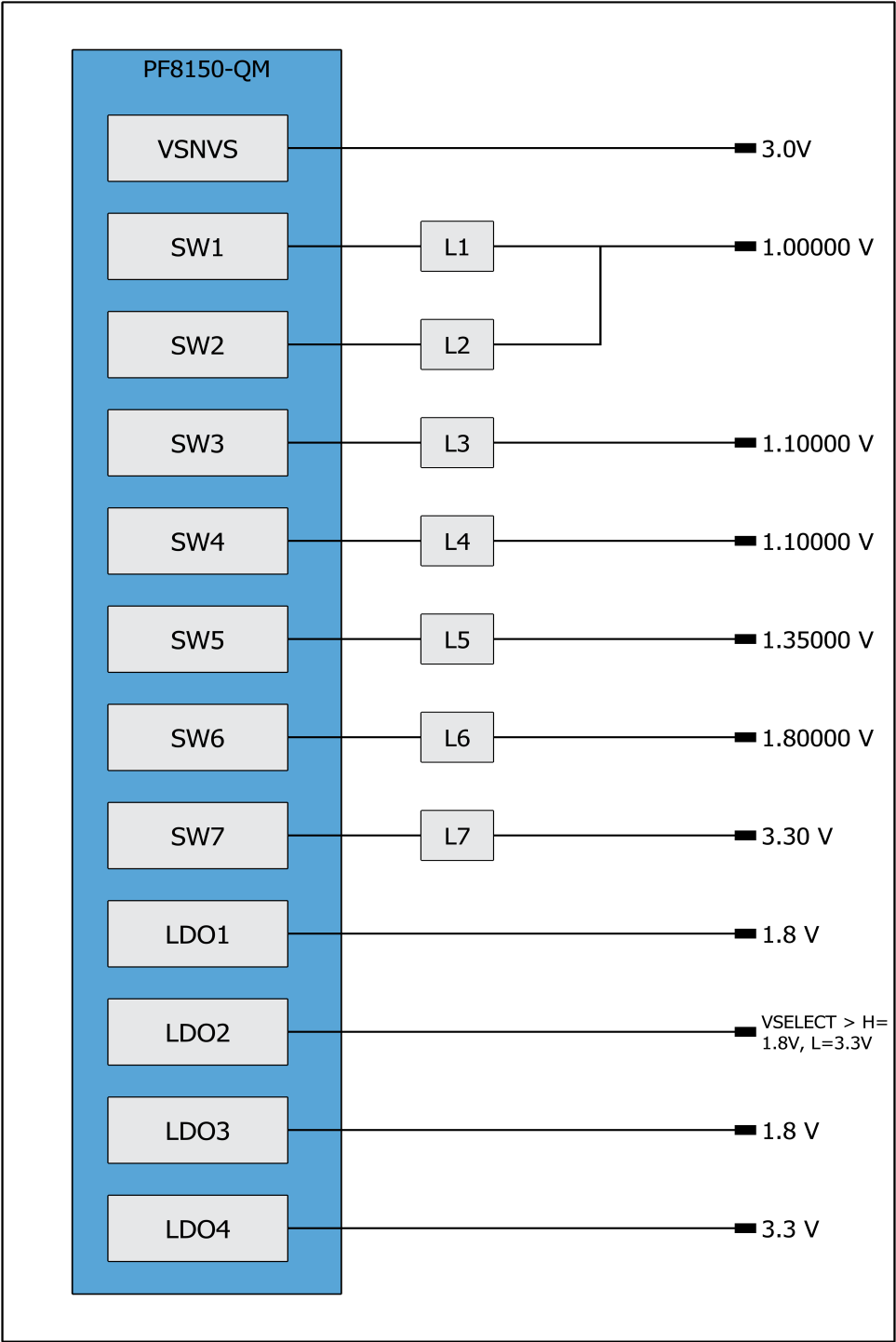
[1] To order parts in tape and reel, add the R2 suffix to the part number.

5 Power-up sequence summary



The signals depicted above are enable signals for each regulator. They don't represent the actual ramp voltage.

6 Hardware configuration diagram



7 OTP configuration

See PF8150_PF8250 data sheet for parametric details. The OTP configuration summary for CF (sequence ID) is provided in Tables below.

Table 2. Device OTP configuration

| Functional block | Feature | OTP selection |
|----------------------|------------------------|----------------------------------|
| System configuration | I2C Address | 0x08 |
| | I2C CRC | Disabled |
| | VIN OVLO Monitor | VIN_OVLO Enabled |
| | VIN OVLO Debounce | 100µs |
| | VIN OVLO Shutdown | VIN_OVLO Shutdown Disabled |
| | Maximum Fault Count | Disabled |
| | Fault Timer | DISABLED |
| Watchdog monitoring | WDI Mode | Hard WD Reset |
| | WDI Polarity | WD event detected on rising edge |
| | WDI In Standby | WDI event Disabled in Standby |
| | WD Counter | WD Timer Disabled |
| | WD Counter In Standby | WD Timer Disabled in Standby |
| | WD Clear Window | Clear within 100% of window |
| | Maximum Time Out Steps | 7 |
| | WD Duration | 1024 ms |
| | Maximum WD Event | 15 |
| Clock management | Switching Frequency | 2.5 MHz |
| | SYNCIN Range | 2000KHz to 3000KHz |
| | SYNCIN Operation | Disabled |
| | SYNCOUT Operation | Disabled |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|------------------|----------------------------|------------------------------------|
| | Frequency Spread Spectrum | Frequency Spread Spectrum Disabled |
| | FSS Range | FSS Range set to 5% |
| COINCELL Control | Coin Cell Charging Voltage | 3.0 V |

Table 3. I/Os configuration

| Functional block | Feature | OTP selection |
|-------------------|-------------------------|------------------------------------|
| I/O Configuration | PWRON Mode | Level Sensitive |
| | PWRON Debounce | 32 msec |
| | PWRON Reset Mode | Shut down >TRESET |
| | TRESET Delay | 2 sec |
| | STANDBY Polarity | STANDBY Active High |
| | PGOOD Pin Mode | PGOOD Indicator |
| | OV/UV Check On Power Up | PGOOD monitoring on PWRUP disabled |
| | EWARN Time | 5ms |
| | XFAILB Operation | XFAILB Operation Enabled |
| | FSOB Soft Fault Event | Event does not assert FSOB |
| | FSOB Hard Fault Event | Event does not assert FSOB |
| | FSOB WDI Event | Event does not assert FSOB |
| | FSOB WDC Event | Event does not assert FSOB |

Table 4. Sequencer configuration

| Functional block | Feature | OTP selection |
|-------------------|-------------------------|-----------------------------------|
| SW configurations | SW1 Multiphase Selector | SW1/2 Dual Phase |
| | SW4 Multiphase Selector | SW3/4 Single Phase |
| | SW5 Multiphase Selector | SW5/6 Single Phase |
| | Default SW Operation | SW Regulators Default in PWM mode |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|---------------------|--------------------------|----------------------------|
| | SW6 VTT Mode | VTT Mode Disabled |
| | Bandgap Monitor Reaction | BGMON shutdown Bypassed |
| | VTT Discharge Mode | VTT Output Disable in HI-Z |
| Power-up sequence | Sequencer Time Base | 250 μ s |
| | SW1 Sequence | Slot 0 |
| | SW2 Sequence | Slot 0 |
| | SW3 Sequence | OFF |
| | SW4 Sequence | OFF |
| | SW5 Sequence | Slot 2 |
| | SW6 Sequence | Slot 2 |
| | SW7 Sequence | Slot 2 |
| | LDO1 Sequence | Slot 0 |
| | LDO2 Sequence | Slot 2 |
| | LDO3 Sequence | OFF |
| | LDO4 Sequence | OFF |
| | RESETBMCU Sequence | Slot 20 |
| | PGOOD Sequence | Slot 20 |
| Power down sequence | Power Down Mode | Mirror power up sequence |
| | SW1 Power Down Group | Group 4 (1st) |
| | SW2 Power Down Group | Group 4 (1st) |
| | SW3 Power Down Group | Group 4 (1st) |
| | SW4 Power Down Group | Group 4 (1st) |
| | SW5 Power Down Group | Group 4 (1st) |
| | SW6 Power Down Group | Group 4 (1st) |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|-------------------|----------------------------|---------------|
| | SW7 Power Down Group | Group 4 (1st) |
| | LDO1 Power Down Group | Group 4 (1st) |
| | LDO2 Power Down Group | Group 4 (1st) |
| | LDO3 Power Down Group | Group 4 (1st) |
| | LDO4 Power Down Group | Group 4 (1st) |
| | RESETBMCU Power Down Group | Group 4 (1st) |
| | PGOOD Power Down Group | Group 4 (1st) |
| Power Down Delays | Group 1 Power Down Delay | 120 μ s |
| | Group 2 Power Down Delay | 120 μ s |
| | Group 3 Power Down Delay | 120 μ s |
| | Group 4 Power Down Delay | 120 μ s |
| | RESETBMCU Group Delay | 10 μ s |
| | Power Down Delay | 5 ms |

Table 5. Switching regulators

| Functional block | Feature | OTP selection |
|------------------|--------------------|---|
| SW1 | SW1 Output Voltage | 1.00000 V |
| | SW1 DVS Ramp | 7.813/5.208 mV/ μ s |
| | SW1 UV Threshold | 93% |
| | SW1 OV Threshold | 107% |
| | SW1 Current Limit | 4.5 A |
| | SW1 Inductor | 1 μ H |
| | SW1 Phase | 0° |
| | SW1 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW1 WD Bypass | Regulator reacts upon a Watchdog |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|-----|--------------------|---|
| | SW1 OV Bypass | OV Protect Enabled |
| | SW1 UV Bypass | UV Protect Enabled |
| | SW1 ILIM Bypass | ILIM Fault Bypassed |
| SW2 | SW2 Output Voltage | 1.00000 V |
| | SW2 DVS Ramp | 7.813/5.208 mV/μs |
| | SW2 UV Threshold | 93% |
| | SW2 OV Threshold | 107% |
| | SW2 Current Limit | 4.5 A |
| | SW2 Inductor | 1 μH |
| | SW2 Phase | 225° |
| | SW2 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW2 WD Bypass | Regulator reacts upon a Watchdog |
| | SW2 OV Bypass | OV Protect Enabled |
| | SW2 UV Bypass | UV Protect Enabled |
| | SW2 ILIM Bypass | ILIM Fault Bypassed |
| SW3 | SW3 Output Voltage | 1.10000 V |
| | SW3 DVS Ramp | 7.813/5.208 mV/μs |
| | SW3 UV Threshold | 93% |
| | SW3 OV Threshold | 107% |
| | SW3 Current Limit | 4.5 A |
| | SW3 Inductor | 1 μH |
| | SW3 Phase | 0° |
| | SW3 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW3 WD Bypass | Regulator reacts upon a Watchdog |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|-----|--------------------|---|
| | SW3 OV Bypass | OV Protect Enabled |
| | SW3 UV Bypass | UV Protect Enabled |
| | SW3 ILIM Bypass | ILIM Fault Bypassed |
| SW4 | SW4 Output Voltage | 1.10000 V |
| | SW4 DVS Ramp | 7.813/5.208 mV/μs |
| | SW4 UV Threshold | 93% |
| | SW4 OV Threshold | 107% |
| | SW4 Current Limit | 4.5 A |
| | SW4 Inductor | 1 μH |
| | SW4 Phase | 225° |
| | SW4 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW4 WD Bypass | Regulator reacts upon a Watchdog |
| | SW4 OV Bypass | OV Protect Enabled |
| | SW4 UV Bypass | UV Protect Enabled |
| | SW4 ILIM Bypass | ILIM Fault Bypassed |
| SW5 | SW5 Output Voltage | 1.35000 V |
| | SW5 DVS Ramp | 7.813/5.208 mV/μs |
| | SW5 UV Threshold | 93% |
| | SW5 OV Threshold | 107% |
| | SW5 Current Limit | 4.5 A |
| | SW5 Inductor | 1 μH |
| | SW5 Phase | 45° |
| | SW5 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW5 WD Bypass | Regulator reacts upon a Watchdog |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|-----|--------------------|---|
| | SW5 OV Bypass | OV Protect Enabled |
| | SW5 UV Bypass | UV Protect Enabled |
| | SW5 ILIM Bypass | ILIM Fault Bypassed |
| SW6 | SW6 Output Voltage | 1.80000 V |
| | SW6 DVS Ramp | 7.813/5.208 mV/μs |
| | SW6 UV Threshold | 93% |
| | SW6 OV Threshold | 107% |
| | SW6 Current Limit | 2.6 A |
| | SW6 Inductor | 1 μH |
| | SW6 Phase | 90° |
| | SW6 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW6 WD Bypass | Regulator reacts upon a Watchdog |
| | SW6 OV Bypass | OV Protect Enabled |
| | SW6 UV Bypass | UV Protect Enabled |
| | SW6 ILIM Bypass | ILIM Fault Bypassed |
| SW7 | SW7 Output Voltage | 3.30 V |
| | SW7 UV Threshold | 93% |
| | SW7 OV Threshold | 107% |
| | SW7 Current Limit | 2.6 A |
| | SW7 Inductor | 1 μH |
| | SW7 Phase | 270° |
| | SW7 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | SW7 WD Bypass | Regulator reacts upon a Watchdog |
| | SW7 OV Bypass | OV Protect Enabled |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|--|-----------------|---------------------|
| | SW7 UV Bypass | UV Protect Enabled |
| | SW7 ILIM Bypass | ILIM Fault Bypassed |

Table 6. LDO regulators

| Functional block | Feature | OTP selection |
|------------------|--------------------------|---|
| LDO1 | LDO1 Output Voltage | 1.8 V |
| | LDO1 UV Threshold | 93% |
| | LDO1 OV Threshold | 107% |
| | LDO1 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | LDO1 WD Bypass | Regulator reacts upon a Watchdog |
| | LDO1 Mode | Normal Mode |
| | LDO1 OV Bypass | OV Protect Enabled |
| | LDO1 UV Bypass | UV Protect Enabled |
| | LDO1 ILIM Bypass | ILIM Fault Bypassed |
| LDO2 | LDO2 Output Voltage | 3.3 V |
| | LDO2 UV Threshold | 93% |
| | LDO2 OV Threshold | 107% |
| | LDO2 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | LDO2 WD Bypass | Regulator reacts upon a Watchdog |
| | LDO2 Mode | Normal Mode |
| | LDO2EN Hardware Control | I2C Control Only |
| | VSELECT Hardware Control | LDO2 set by VSELECT. Low=3.3V / High=1.8V |
| | LDO2 OV Bypass | OV Protect Enabled |
| | LDO2 UV Bypass | UV Protect Enabled |
| | LDO2 ILIM Bypass | ILIM Fault Bypassed |

Configuration report for PF8150-QM OTP program ID: CF rev A

| | | |
|-------|----------------------|---|
| LDO3 | LDO3 Output Voltage | 1.8 V |
| | LDO3 UV Threshold | 93% |
| | LDO3 OV Threshold | 107% |
| | LDO3 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | LDO3 WD Bypass | Regulator reacts upon a Watchdog |
| | LDO3 Mode | Normal Mode |
| | LDO3 OV Bypass | OV Protect Enabled |
| | LDO3 UV Bypass | UV Protect Enabled |
| | LDO3 ILIM Bypass | ILIM Fault Bypassed |
| LDO4 | LDO4 Output Voltage | 3.3 V |
| | LDO4 UV Threshold | 93% |
| | LDO4 OV Threshold | 107% |
| | LDO4 PGOOD Control | Reg. is part of AND function to control PGOOD |
| | LDO4 WD Bypass | Regulator reacts upon a Watchdog |
| | LDO4 Mode | Normal Mode |
| | LDO4 OV Bypass | OV Protect Enabled |
| | LDO4 UV Bypass | UV Protect Enabled |
| | LDO4 ILIM Bypass | ILIM Fault Bypassed |
| VSNVS | VSNVS Output Voltage | 3.0V |

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Contents

1 General description 1

2 Features and benefits 1

3 Applications 1

4 Ordering information 2

5 Power up sequence summary 2

6 Hardware configuration diagram 3

7 OTP configuration 4

8 Legal information 13

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.