

MFS8416AMP5ES

Configuration report for FS8416 OTP program ID: P5

Rev 1.0 — 13 October 2020

Report

1 General description

The FS84 QFN48EP device family is developed in compliance with ASIL D process, FS84 QFN48EP is QM and ASIL B capable. All device options are pin to pin and software compatible.

The FS84 QFN48EP is an automotive functionally safe multi-output power supply integrated circuit, with focus on Radar, Vision, ADAS domain controller, Radio and Infotainment applications. It includes multiple switch mode and linear voltage regulators. It offers external frequency synchronization input and output, for optimized system EMC performance.

The FS84 QFN48EP includes enhanced safety features, with fail-safe output, becoming a full part of a safety-oriented system partitioning, covering ASIL B safety integrity level. It is developed in compliance with ISO 26262 standard and it is qualified in compliance with AEC-Q100 rev H (Grade 1, MSL3).

Several device versions are available, offering choice in safety target, number of output rails, output voltage setting, operating frequency and power up sequencing, to address multiple applications.

Note: All parametric information is maintained in FS84_QFN48EP datasheet

2 Features and benefits

- 40 V DC maximum input voltage for 12 V applications
- VPRES synchronous buck controller with external MOSFETs. Configurable output voltage, switching frequency, and current capability up to 10 A peak, **based on device options**
- Low voltage integrated synchronous BUCK1 converter, dedicated to MCU core supply with SVS capability. Configurable output voltage and current capability up to 4.5 A peak.
- **Based on device options:** low voltage integrated synchronous BUCK3 converter. Configurable output voltage and current capability up to 4.5 A peak.
- BOOST converter with integrated low-side switch. Configurable output voltage and max input current up to 1.5 A peak.
- EMC optimization techniques including SMPS frequency synchronization, spread spectrum, slew rate control, manual frequency tuning
- **Based on device options** up to 2 linear voltage regulators for MCU IOs and ADC supply, external physical layer. Configurable output voltage and current capability up to 400 mA DC.
- OFF mode (power down) with very low quiescent current (10 μ A typ)
- 2x input pins for wake-up detection and battery voltage sensing
- Device control via 32 bits SPI interface with CRC
- **Based on device options** Power synchronization pin to operate 2x FS84 devices or FS84 plus an external PMIC
- Scalable portfolio with independent monitoring circuitry, dedicated interface for MCU monitoring, simple watchdog function, power good, reset and interrupt, built-in self-test, fail-safe output
- Configuration by OTP programming. Prototype enablement to support custom setting during project development in engineering mode.



3 Applications

- Radar
- Vision
- ADAS domain controller
- Radio
- V2x
- Infotainment

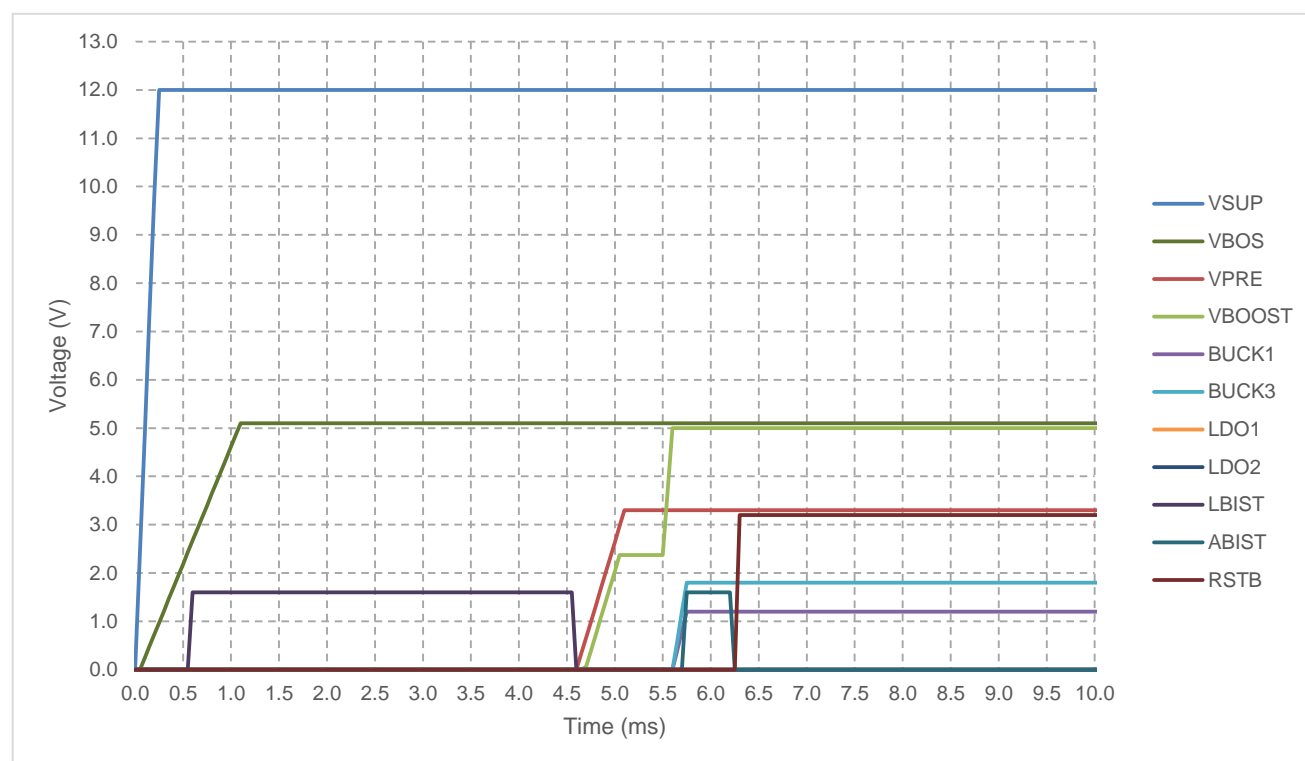
4 Ordering information

Table 1. Ordering Information

Type number ^[1]	Package		
	Name	Description	Version
MFS8416AMP5ES	QFN48EP	FS84 QFN48EP package is a QFN (sawn), thermally enhanced wettable flanks, 7 x 7 x 0.85 mm, 0.5 mm pitch, 48 pins.	SOT619-27(D)

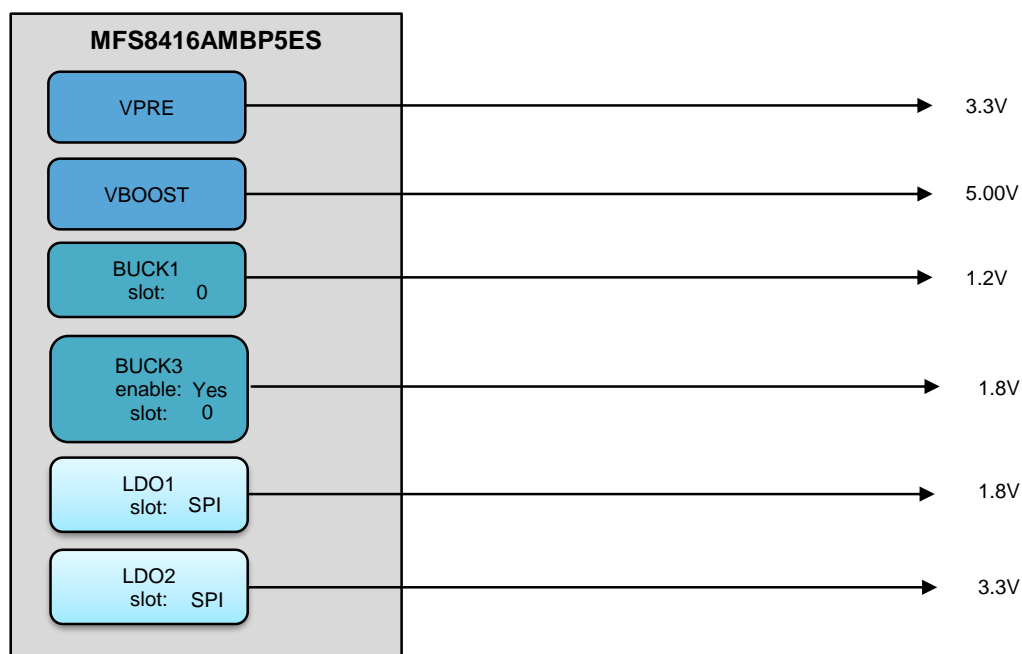
[1] To order parts in tape and reel, add the R2 suffix to the part number.

5 Power up sequence summary



Note: VBOS is set at 5.1 V and RSTB at 3.2 V or 4.9 V to differentiate from regulators on the graph

6 Hardware configuration diagram



7 OTP configuration

Table 2. Main OTP configuration

Functional block	Feature	OTP selection
VPRE	Output voltage	3.3V
	Slope compensation	60mV/μs
	Current limitation	120mV
	High Side slew rate	PU/PD/130mA
	Low Side slew rate	PU/PD/900mA
	Switching frequency	455KHz
	Phase shifting	delay 0
	Turn OFF delay	250μs
	VPRE mode	Force PWM

Table 2. Main OTP configuration (continued)

Functional block	Feature	OTP selection
VBOOST	Enabled	Yes
	Output voltage	5.00V
	Slope compensation	160mV/μs
	Slew rate	500V/μs
	Compensation resistor	750kohms
	Compensation capacitor	125pF
	Switching frequency	2.22MHz
	Phase shifting	delay 3
	Behavior in case of TSD	BOOST Shutdown
BUCK1	Output voltage	1.2V
	Inductor	1μH
	Current limitation	2.6A
	Compensation network	65 GM
	Switching frequency	2.22MHz
	Phase shifting	delay 2
	Behavior in case of TSD	BUCK1 Shutdown
	Power sequencing slot	Regulator Start and Stop in Slot 0
	Soft start ramp	7.81mV/μs
BUCK3	Enabled	Yes
	Output voltage	1.8V
	Inductor	1μH
	Current limitation	2.6A
	Compensation resistor	Default
	Gain control	Default
	Switching frequency	2.22MHz
	Phase shifting	delay 4
	Behavior in case of TSD	BUCK3 Shutdown
	Power sequencing slot	Regulator Start and Stop in Slot 0
	Soft start ramp	10.41mV/μs

Table 2. Main OTP configuration (continued)

Functional block	Feature	OTP selection
LDO1	Output voltage	1.8V
	Current limitation	400mA
	Behavior in case of TSD	LDO1 Shutdown
	Power sequencing slot	Regulator does not Start (Enabled by SPI)
LDO2	Output voltage	3.3V
	Current limitation	400mA
	Behavior in case of TSD	LDO2 Shutdown
	Power sequencing slot	Regulator does not Start (Enabled by SPI)
Miscellaneous	Power up/down slot duration	250µs
	PSYNC	Disabled
	PLL enabled	Yes
	Deep Fail Safe (autoretry)	x15
	VSUP power-up threshold	4.9V for Vpre < 4.5V
	Regulator assigned to VDDIO	VPRE
	Device ID	00000001

Table 3. Fail-safe OTP configuration

Functional block	Feature	OTP selection
VCOREMON	Monitoring Voltage	1.2V
	OVTH	110%
	UVTH	95%
	OV_DGLT	25µs
	UV_DGLT	15µs
	SVS_CLAMP	No SVS
VDDIOMON	Monitoring Voltage	3.3V
	OVTH	106.5%
	UVTH	95%
	OV_DGLT	25µs
	UV_DGLT	15µs
VMON1	OVTH	109%
	UVTH	95.5%
	OV_DGLT	25µs
	UV_DGLT	15µs

Table 3. Fail-safe OTP configuration (continued)

Functional block	Feature	OTP selection
VMON2	OVTH	110%
	UVTH	90%
	OV_DGLT	25µs
	UV_DGLT	15µs
VMON3	OVTH	112%
	UVTH	88%
	OV_DGLT	25µs
	UV_DGLT	15µs
VMON4	OVTH	112%
	UVTH	88%
	OV_DGLT	25µs
	UV_DGLT	15µs
PGOOD	VCOREMON	Yes
	VDDIOMON	Yes
	VMON1	Yes
	VMON2	Yes
	VMON3	No
	VMON4	No
	RSTB	No
ABIST1	VCOREMON	Yes
	VDDIOMON	Yes
	VMON1	Yes
	VMON2	Yes
	VMON3	No
	VMON4	No
Safety enable	VMON1	Yes
	VMON2	Yes
	VMON3	No
	VMON4	No
	FCCU	No
	WATCHDOG	Simple WD
	FLT_RECOVERY	No

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