

56A, 16-phase, DC-DC Step-Down Power Converter Chiplet

Features

- Single Output
- 16 phase buck converter with fully integrated power switches and inductors
- Efficiency >91%
- Wide Loop Bandwidth: 20MHz
- True Point-of-Load (PoL) Sensing
- Gang Operation
- Automatic Phase Shedding
- Input Voltage, Output Voltage, Output Current and Temperature Telemetry
- UVLO, OVP, OCP, and OTP Fault Response
- 1MHz PMBus-Compliant Serial Interface
- 50MHz AVSBus-Compliant Serial Interface enabling Dynamic Voltage Scaling (DVS)
- μ LGA with gold plated pads

Applications

- High performance multi-core systems-on-chip
- GPUs, TPUs, ASICs and FPGAs
- Data center processors
- Embedded industrial systems

General Description

The Fe1736 is a single output, 16-phase interleaved buck converter with a fully integrated powertrain, including power inductors. The Fe1736's digital interface provides complete power management and monitoring with fast and precise voltage control, fast transient response times, and high bandwidth regulation. Its high switching frequency powertrain includes high performance FETs and capacitors that drive the industry's most advanced power inductors, all in a single device. Its tiny size delivers the best in class current density; reducing board area, layout complexity, and component count.

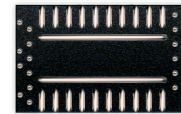


Figure 1: 5.64 x 3.54mm Package Footprint.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VIN Voltage Range	V_{IN}	$AVDD18 \geq V_{IN}$	1.6	1.8	2.0	V
Output Voltage Range	V_{OUT}	$V_{IN} \geq 1.8V$	0.25		1.5	V
Output Voltage Resolution	$V_{OUT,RES}$			1.7		mV
Steady State Output Current	I_{OUT}				56	A
Number of Powertrain Phases	N_{PHASES}		2		16	Phases
Width	W			3.54		mm
Length	L			5.64		mm
Area	A			20.0		mm ²
Adjustable Thickness	T		0.53	0.60	1.0	mm
Current Density	j_{max}				2.8	$\frac{A}{mm^2}$
DC Line Regulation	$\left(\frac{\Delta V_{OUT}}{V_{OUT}}\right)_{Line}$	$V_{IN}=[1.6,2.0]V$		± 0.5		%
DC Load Regulation	$\left(\frac{\Delta V_{OUT}}{V_{OUT}}\right)_{Load}$	$I_{OUT}=[0,56]A$		± 0.5		%
Output Voltage Ripple	ΔV_{RIPPLE}	$C_{LOAD} \geq 600nF$		1		mV
Switching Frequency	f_{SW}		60	75	100	MHz

28A, Quad Output, DC-DC Step-Down Power Converter Chiplet

Features

- Four Independent Outputs
- 8 phase buck converter with integrated power switches and power inductors
- Efficiency >91%
- Wide Loop Bandwidth: 20MHz
- True Point-of-Load (PoL) Sensing
- Gang Operation
- Automatic Phase Shedding
- Input Voltage, Output Voltage, Output Current and Temperature Telemetry
- UVLO, OVP, OCP, and OTP Fault Response
- 1MHz PMBus-Compliant Serial Interface
- 50MHz AVSBus-Compliant Serial Interface
- μ LGA with gold plated pads

Applications

- High performance multi-core systems-on-chip
- GPUs, TPUs, ASICs and FPGAs
- Data center processors
- Embedded industrial systems

General Description

The Fe1728 is a quad output power convert chiplet. Each of the 4 outputs are able to act completely independently to a maximum of 7A each, or they may be combined to allow for higher currents. The Fe1728 is a 8-phase interleaved buck converter with a fully integrated powertrain, including power inductors. The Fe1728 integrates digital interface, power management, voltage control and powertrain circuitry (including power FETs, inductors and capacitors) all in a single device. The Fe1728 delivers precise voltage, fast transient response, and high bandwidth regulation. A high switching frequency powertrain drives Ferric's magnetic composite integrated inductor technology; delivering high efficiency, high-quality power in a small footprint and volume to reduce board area, layout complexity, and component count.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VIN Voltage Range	V_{IN}	$AVDD18 \geq V_{IN}$	1.6	1.8	2.0	V
Output Voltage Range	V_{OUT}	$V_{IN} \geq 1.8V$	0.25		1.5	V
Output Voltage Resolution	$V_{OUT,RES}$			1.7		mV
Total Steady State Output Current	$I_{OUT,TOT}$				28	A
Number of Output Domains	$N_{DOMAINS}$		1		4	Domains
Total Powertrain Phases	N_{PHASES}				8	Phases
Width	W			2.94		mm
Length	L			5.01		mm
Area	A			14.7		mm ²
Adjustable Thickness	T		0.53	0.6	1.0	mm
Current Density	j_{max}				1.90	$\frac{A}{mm^2}$
DC Line Regulation	$\left(\frac{\Delta V_{OUT}}{V_{OUT}}\right)_{Line}$	$V_{IN}=[1.6,2.0]V$		± 0.5		%
DC Load Regulation	$\left(\frac{\Delta V_{OUT}}{V_{OUT}}\right)_{Load}$	$I_{OUT}=[0,28]A$		± 0.5		%
Output Voltage Ripple	ΔV_{RIPPLE}	$C_{LOAD} \geq 600nF$		1		mV
Switching Frequency	f_{SW}		60	75	100	MHz