

56A, 18-phase, DC-DC Step-Down Power Converter Chiplet

Features

- Single Output
- 18 phase buck converter with fully integrated power switches and inductors
- Peak efficiency of 90% for 1.8V to 0.9V conversion with 56A output current
- Wide Loop Bandwidth: 10MHz
- Differential Point-of-Load (PoL) Sensing
- Gang Operation: up to 32 devices in parallel
- Automatic Phase Shedding
- Input Voltage, Output Voltage, Output Current and Temperature Telemetry
- UVLO, UVP, OVP, OCP, and OTP Faults
- 1MHz PMBus 1.3 Compliant Serial Interface
- 50MHz AVSBus 1.4 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

General Description

The Fe1736 is a single output, 18-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.

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		18	Phases
Width	W		3.540	3.580	3.620	mm
Length	L		5.637	5.687	5.737	mm
Area	A			20.4		mm ²
Thickness	T		0.705	0.725	0.745	mm
Current Density (TDC)	$j_{max,TDC}$				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		%
Switching Frequency	f_{SW}		25	31	100	MHz
Junction Temperature	T_J		-40		125	°C
Thermal Resistance Junction to Top	$\Theta_{JC,TOP}$			0.1		$\frac{^{\circ}C}{W}$
Thermal Resistance Junction to Bottom	$\Theta_{JC,BOT}$			3.7		$\frac{^{\circ}C}{W}$