



# ISL6367

## Green Hybrid Digital Dual 6+1 Phase PWM Controller for VR12/IMVP7

### Applications With SMBus/PMBus/I<sup>2</sup>C and AUTO Phase

## Key Features

Intel VR12/IMVP7 Compliant

SerialVID with Programmable IMAX, TMAX, BOOT, ADDRESS OFFSET Registers

Intersil's Proprietary Green Hybrid Digital Enhanced Active Pulse Positioning (EAPP) Modulation Scheme (Patented)

SMBus/PMBus/I<sup>2</sup>C Interface with SVID Conflict Free

NVM and Firmware Free for Low Cost and Easy Use

Auto Phase Shedding Option for Green Environment with Boot-refresh Function Option

Variable Frequency Control During Load Transients to Reduce Beat Frequency Oscillation

Linear Control with Evenly Distributed PWM Pulses for Better Phase Current Balance During Load Transients

Voltage Feed-forward and Ramp Adjustable Options

High Frequency and PSI Compensation Options

Proprietary Active Phase Adding and Dropping with Diode Emulation Scheme For Enhanced Light Load Efficiency

Dual Outputs

Output 1 (VR0): 1 to 6-Phase for Core or Memory (Coupled Inductor and Phase Doubler, ISL6617/11A Compatible)

Output 2 (VR1): Single Phase for Graphics, System Agent, or Processor I/O

Differential Remote Voltage Sensing

±0.5% Closed-loop System Accuracy Over Load, Line and Temperature

Programmable 1 or 2-Phase Operation in PS11 Mode

Programmable Slew Rate of Fast Dynamic VID with Dynamic VID Compensation (DVC) for VR0

Dynamic VID Compensation (DVC) for VR1 at No Droop

Droop and Diode Emulation Options

Programmable Standard or Coupled-Inductor Operation

Precision Resistor or DCR Differential Current Sensing

Integrated Programmable Current Sense Resistors

Accurate Load-Line (Droop) Programming

Accurate Current Monitoring and Current Balancing

True Input Current Sensing For Catastrophic Failure Protection

Average Overcurrent Protection and Channel Current Limit With Internal Current Comparators

Precision Overcurrent Protection on IMON & IMONS Pins

Independent Oscillators, up to 2MHz Per Phase, for Cost, Efficiency, and Performance Optimization

Dual Thermal Monitoring and Integrated Compensation

Start-up Into Pre-Charged Load

Pb-Free (RoHS Compliant)

## Description

The ISL6367 is a Hybrid Digital dual PWM controller and is designed to be compliant to Intel VR12/IMVP7 specifications. Its 6-phase PWMs control the microprocessor core or memory voltage regulator, while its single-phase PWM controls the peripheral voltage regulator for graphics, system agent, or processor I/O. It includes programmable functions and telemetries for easy use, high system flexibility and overclocking applications using SMBus, PMBus, or I<sup>2</sup>C (Modified) interface, which is designed to be conflict free with CPU's SVID bus. This hybrid digital approach eliminates the need of NVM and Firmware often seen in a full digital solution and significantly reduces design complexity, inventory and manufacture cost.

The ISL6367 utilizes Intersil's proprietary Enhanced Active Pulse Positioning (EAPP) modulation scheme to achieve the extremely fast transient response with fewer output capacitors. The ISL6367 accurately monitors the load current via the IMON pin and reports this information via the IOOUT register to the microprocessor, which sends a PSI# signal to the controller at low power mode via SVID bus. The controller enters 1- or 2-phase operation in low power mode (PSI1); in the ultra low power mode (PSI2,3), it operates in single phase with diode emulation option. In low power modes, the magnetic core and switching losses are significantly reduced, yielding high efficiency at light load. After the PSI# signal is de-asserted, the dropped phase(s) are added back to sustain heavy load transient response and efficiency. In addition, the ISL6367 features auto-phase shedding to optimize the efficiency from light to full load for Green Environment without sacrificing the transient performance.

Today's microprocessors require a tightly regulated output voltage position versus load current (droop). The ISL6367 senses the output current continuously by measuring the voltage across a dedicated current sense resistor or the DCR of the output inductor. The sensed current flows out of the FB pin to develop the precision voltage drop across the feedback resistor for droop control. Current sensing circuits also provide the needed signals for channel-current balancing, average overcurrent protection and individual phase current limiting. The TM and TMS pins sense an NTC thermistor's temperature, which is internally digitized for thermal monitoring and for integrated thermal compensation of the current sense elements of the respective regulator.

The ISL6367 can sense input current to provide a true Catastrophic Failure Protection (CFP) output. It also features remote voltage sensing and completely eliminates any potential difference between remote and local grounds. This improves regulation and protection accuracy. The threshold-sensitive enable input is available to accurately coordinate the start-up of the ISL6367 with other voltage rails.