



## I<sup>2</sup>C Programmable 5A DVS Buck Converter

### Features

- Input Voltage Range: 2.5V~5.5V
- Programmable Output Voltage:
  - 0.600V to 1.230V in 10 mV Steps
- Maximum Output Current:
  - 5A Continuous, 8A Peak for 10ms
- V<sub>OUT</sub> Remote Sensing Capable for Point-of-Load Operation
- 2.4 MHz PWM with Seamless PWM/PFM Switching for Light-load Efficiency
- Dynamic Voltage Scaling (DVS) with Programmable Voltage Slew Rate
- Class-Leading Load and Line Transient
- Quiescent Current in PFM Tristate: 70μA
- I<sup>2</sup>C Interface with SM, FM, FM<sup>+</sup> and HS Modes
- Comprehensive Protection
  - Input Under-Voltage Lockout (UVLO)
  - Input Over-Voltage Protection (OVP)
  - Over Current and Short-Circuit Protection
  - Thermal Shut-down
- 4mm x 3mm 14-pin DFN Package
- AEC-Q100 qualified grade 3, automotive temperature range (-40°C to +85°C)

### Applications

- Application Processors
- Graphics Processors
- Memory, Hard Disk Drive and SSD
- Smart Phones
- Tablets
- Handheld Devices
- Automotive Infotainment System

### Order Information

Part Number	Default V <sub>OUT</sub> after POR		Default Mode after POR		Max Output Current rms	Max Pulse Current (10ms)	I <sup>2</sup> C Address	Package	Packing Method
	VSEL=0	VSEL=1	VSEL=0	VSEL=1					
HL7509FNQ00	0.870V	0.910V	FPWM	FPWM	5A	8A	1101000	DFN-14	Tape & Reel

For other default output voltage, mode and I<sup>2</sup>C address options, contact a Halo Micro sales representative.



## Typical Application Diagram

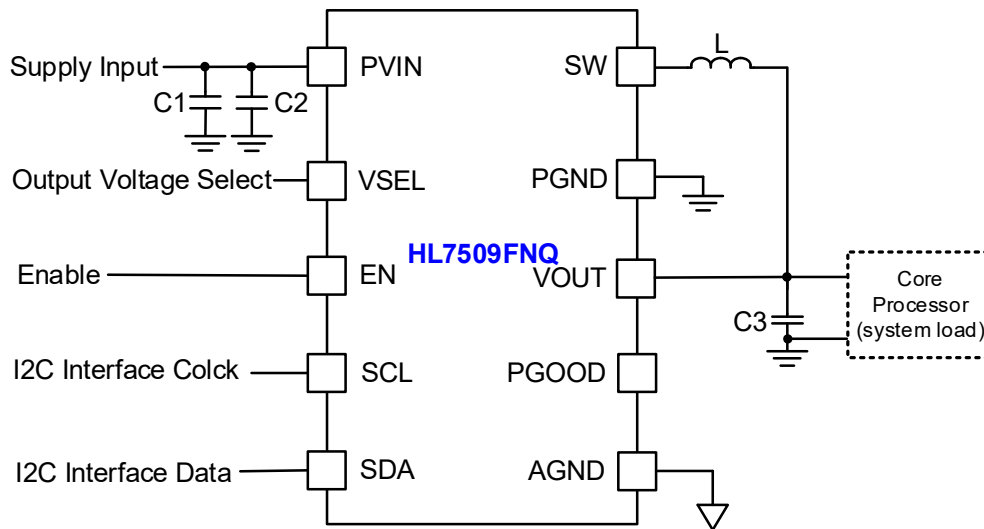


Figure 1 HL7509FNQ Typical Application Diagram

Component	Part Number	Value	Description	Vendor
L1	See Table2	220 to 470 nH	See Table2	See Table2
C1 (Optional)	TBD	47nF	25V, X7R, 0805	
C2	TBD	4.7 $\mu$ F	x2, 6.3V, X5R, 0805	
C3	TBD	47 $\mu$ F	x4, 6.3V, X5R, 0805	

Table 1 Recommended External Components

Manufacturer	Part Number	L	DCR	$I_{MAXDC}^{(1)}$	Component Dimensions		
					L	W	H
TBD	TBD	220nH	TBD	>5A			
TBD	TBD	330nH	TBD	>5A			
TBD	TBD	470nH	TBD	>5A			

Table 2 Recommended Inductors

### Notes:

- $I_{MAXDC}$  is the smaller current to produce 40°C temperature rising or 30% effective inductance reduction.



## Description

HL7509FNQ is a synchronous buck converter optimized to supply low-voltage applications. Its input voltage range is 2.5V to 5.5V. Its output voltage range is 0.6V to 1.23V programmed through an I<sup>2</sup>C interface. Its output voltage can be adjusted on the fly to provide Dynamic Voltage Scaling (DVS) function with a programmable slew rate.

HL7509FNQ maintains good efficiency for a wide range of load. It delivers a maximum 5A RMS load current, while spurious load up to 8A can be supported for 10ms duration. It operates at fixed frequency of 2.4MHz, which reduces the value of the external components. A wide range of output capacitors can be used to optimize V<sub>OUT</sub> excursion during load transients. Inductors from 0.22uH to 1.0uH may be used without affecting loop stability.

At moderate to light load, Pulse Frequency Modulation (PFM) is used to maintain conversion efficiency with a typical non-switching quiescent current of 60μA. Even with such a low quiescent current, HL7509FNQ

maintains excellent load and line transient responses. At higher loads, the system automatically switches to fixed-frequency Pulse Width Modulation (PWM) operation at for minimum V<sub>OUT</sub> ripple and optimal load transient response. In Shutdown Mode, the supply current drops below 1μA, reducing power consumption. PFM Mode can be disabled if needed through I<sup>2</sup>C registers.

HL7509FNQ supports V<sub>OUT</sub> remote sensing. Its feedback signal V<sub>OUT</sub> can be connected close to the power supply pin of the load for a true point-of-load operation without affecting control loop stability. See Detailed Description section for the maximum allowed trace resistance and bandwidth requirement.

HL7509FNQ is AEC Q100 Grade 3 certified to operate in automotive environment with ambient temperature range from -40°C to +85°C. It is available in a 4mm x 3 mm 14-pin DFN package.



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