

HL7781

3A Buck-Boost Converter with I²C Interface

Overview

The HL7781 is a highly integrated and high efficiency buck-boost converter that takes input voltage from 2.2V to 5.5V and delivers output voltage from 1.8V to 5.2V, delivering output current up to 3.0A continuous. It can operate in buck converter, boost converter, and buck-boost converter mode automatically. Transition between these three operation modes depends on the pre-defined difference between the input and output voltages. The control scheme is based on COT architecture for both buck and boost converter operation modes. For buck-boost converter operation, it is based on a novel fixed frequency constant on-time and variable off-time architecture that provides the best efficiency and fast load transient responses. To achieve high efficiency at light load, the HL7781 enters PFM mode when output load current is below the PWM/PFM threshold.

The HL7781 provides I²C interface with 100kHz, 400kHz, and 1MHz clock frequencies. The output voltage can be adjusted over I²C. The HL7781 also offers two logic interfaces (EN and VSEL) that can control the output ON and OFF as well as toggle the output voltage between two preset voltages with logic signals. Output active discharge is provided to pull the output voltage to zero when the output is disabled by either EN or ENABLE bit function. If the input voltage is above the ULVO threshold, the I²C interface becomes active, and the control registers are accessible even though the output is disabled by EN function. The HL7781 offers robust operation safety by providing many protections, such as input OVP, output OVP, output OCP, cycle-by-cycle peak current limit, output short circuit protection (either shutdown or hiccup mode), as well as die-over-temperature protection.

The HL7781 is available in 15-bump (3x5) WLCSP package with 1.344mm x 2.255mm size.

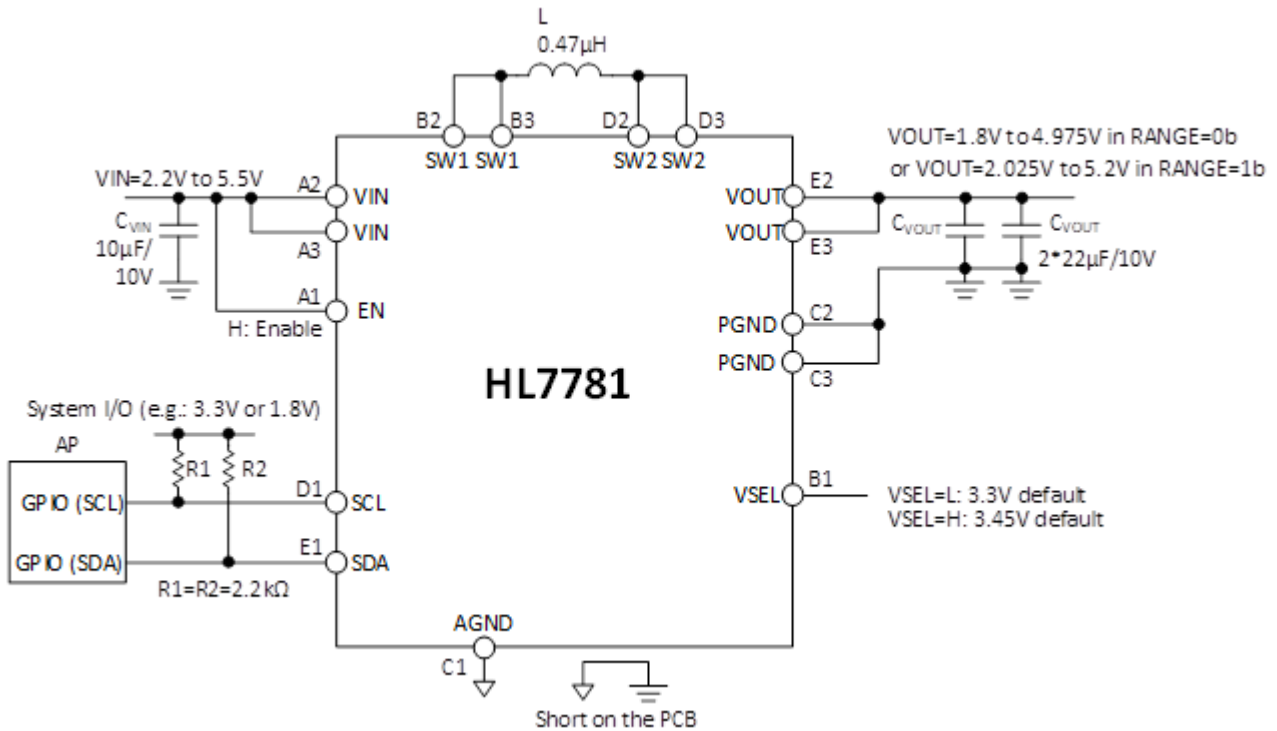
Features

- Input voltage range: 2.2V to 5.5V
- Output voltage range: 1.8V to 5.2V in 25mV steps
 - I²C configuration during operation and shutdown
 - VSEL pin to toggle between two output voltage presets
- Output current
 - Up to 3A for VIN ≥ 3.0V, VOUT=3.3V
 - Up to 2.5A for VIN ≥ 2.5V, VOUT=3.3V
 - Up to 2.5A for VIN ≥ 3.5V, VOUT=3.3V to 5.2V
- High efficiency over entire load range
 - Up to 95% peak efficiency
 - Low 20μA operating quiescent current
 - Automatic power save mode and forced PWM mode (I²C configurable)
- Safety and robust operation features
 - Integrated soft start
 - Over-temperature and over-voltage protections
 - True load disconnected during shutdown
 - Forward and backward current limit
 - Output active discharge
- Pre-programmed output voltages (3.3V, 3.45V)
- Solution size of < 20mm² with only four external components
- Protections
 - VIN OVP ≥ 5.6V (typ.)
 - Output over-voltage protection (OVP)
 - Output over-current protection (OCP)
 - Cycle by cycle peak current protection
 - 150°C thermal shutdown protection
 - Power good
 - True-shutdown mode
- 1.344mm x 2.255mm 15-bump WLCSP

Applications

- System Pre-Regulator for TWS Earphones, Smartphones, Tablets, and Medical Hearing Aids
- Point-of-Load Regulation (Time-of-Flight Camera Sensors, Port/Cable Adapter and Dongle)
- Thermoelectric Device Supply (TEC, Optical Modules)
- Broadband Network Radio or SoC Supply (IoT, Home Automation, EPOS)
- Smartphones
- Tablets
- Notebooks

Typical Application Diagram



Ordering Information

Part Number	Output Start-Up State	Output Voltage ^(NOTE)	Package
HL7781	Enabled	VOUT=3.3 in VSEL=Low VSEL=HIGH: 3.45V (OTP)	WLCSP-15

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