



QP8817
**Advanced PMIC with 5 Bucks, 2 Buck-
Boost, and 10 LDO/LSWs**

QP8817 Datasheet Brief

For more information on the device and to request the full datasheet, please refer to the [QP8817 Product Page](#) in our [PMIC selection table](#)



BENEFITS and FEATURES

- **Wide Input Voltage Range**
 - $V_{in} = 2.7V$ to $5.5V$
- **Complete Integrated Power Solution**
 - SW 1, 2: Configurable Single/Dual Phase 6A Buck Switching Regulators
 - SW 3, 4, 5: 2A Buck Switching Regulators
 - SW 6, 7: 1.5A Buck-Boost Switching Regulators
 - LDO 1, 2: 200mA High PSRR LDOs
 - LDO/LSW 3, 4, 5: 400mA Generic LDOs, Configurable as a Load Switch
 - LDO/LSW 6: 400mA Generic LDO, Configurable as 1.5A Load Switch
 - LSW 7/8: 1.5A Load Switches
 - LDO 9, 10: Low Quiescent Current Always-on 30mA and 15mA LDOs
 - Proprietary ACOT Control for Buck and Buck-Boost Regulators
- **Space Savings**
 - Fully Integrated
 - All Buck Regulators Work with $0.22 \sim 0.47\mu H$ Inductors
- **Ultra-low Quiescent Current**
- **Excellent Efficiency at Very Light Load**
- **Easy System Level Design**
 - Configurable Power ON/OFF Sequencing
 - Seamless Sequencing of External Supplies
 - Configurable Sleep Modes
 - I²C Watch Dog timer.
 - UV, OV, OTS & OC Fault Monitoring.
 - Pin Configurable I²C Addresses.
 - 4 Levels of Thermal Warnings with Register bit Read Out.
- **12X GPIOs**
 - Autonomous LED Modes for 2X GPIOs.
 - Multiple Wake up Triggers with GPIOs
 - Low Power Mode Control.
 - Dynamic Voltage Scaling (DVS) Control.
 - Power Good, nRESET Output Signals.
 - Interrupt Request Output (nIRQ).
 - General Purpose Input / Output Control Pins.
 - Sync Input to Synchronize Sequencing with a Second PMIC (PWREN pin)
 - Autonomous LED Blink and Breathe
 - I²C Interface – up to 3.4MHz

APPLICATIONS

- Computer Vision
- Portable Audio / Video
- AI / AR / VR
- FPGA

GENERAL DESCRIPTION

The QP8817 PMIC is an integrated ActiveCiPS™ power management integrated circuit. It powers a wide range of processors, including video processors, FPGA's, peripherals, and microcontrollers. The QP8817 is highly flexible and can be reconfigured via I²C for multiple applications without the need for PCB changes. The low external component count and high configurability significantly speed time to market. Examples of configurable options include output voltage, startup time, slew rate, system-level sequencing, switching frequency, sleep modes, operating modes, etc. QP8817 is programmed at the factory with a default configuration. These settings can be optimized for a specific design through the I²C interface. The QP8817 is available in several default configurations. Contact the factory for specific default configurations.

The core of the device includes five DC/DC step-down and two DC/DC Buck-Boost regulators, all with integrated power FETs; two low noise, high PSRR low-dropout regulators (LDO), three configurable LDOs than can be configured as low switches; and three high current LSWs that can support up to 1.5A current, and two low quiescent current always-on LDOs that support 30mA and 15mA. All Bucks and Buck-Boosts regulators use an ACOT control architecture to optimize the load transient response with $0.22 \sim 0.47\mu H$ inductor and smaller output capacitors. Buck 1 and Buck 2 support dual-phase operation to support up to 10A typ. / 12A peak currents. The LDO/LSWs only require small ceramic capacitors. All outputs are highly configurable via the I²C interface.

In addition to the two I²C pins, the QP8817 has 12 configurable GPIOs. These GPIOs can be configured for multiple purposes, like enable signals for external regulators, interrupts, PWREN, DVS control, LED drive, push button, etc. For the LED driver, the QP8817 supports configurable single/double blink and breathe modes and LED drive current.

The QP8817 PMIC is available in a 3.77 x 4.17 mm 90-ball WLCSP package.

TYPICAL APPLICATION DIAGRAM

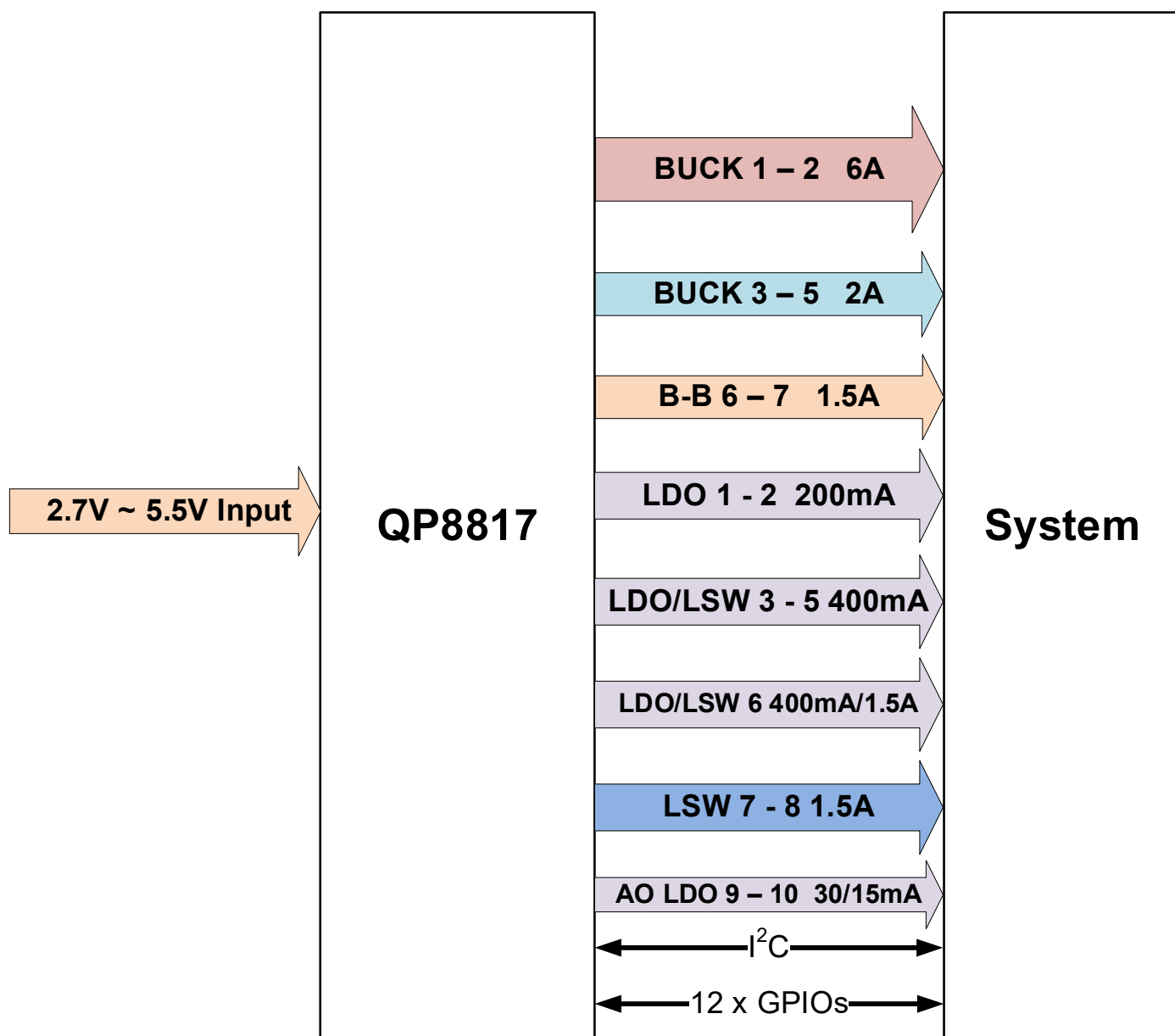


Figure 1: Typical Application Diagram

APPLICATION BLOCK DIAGRAM

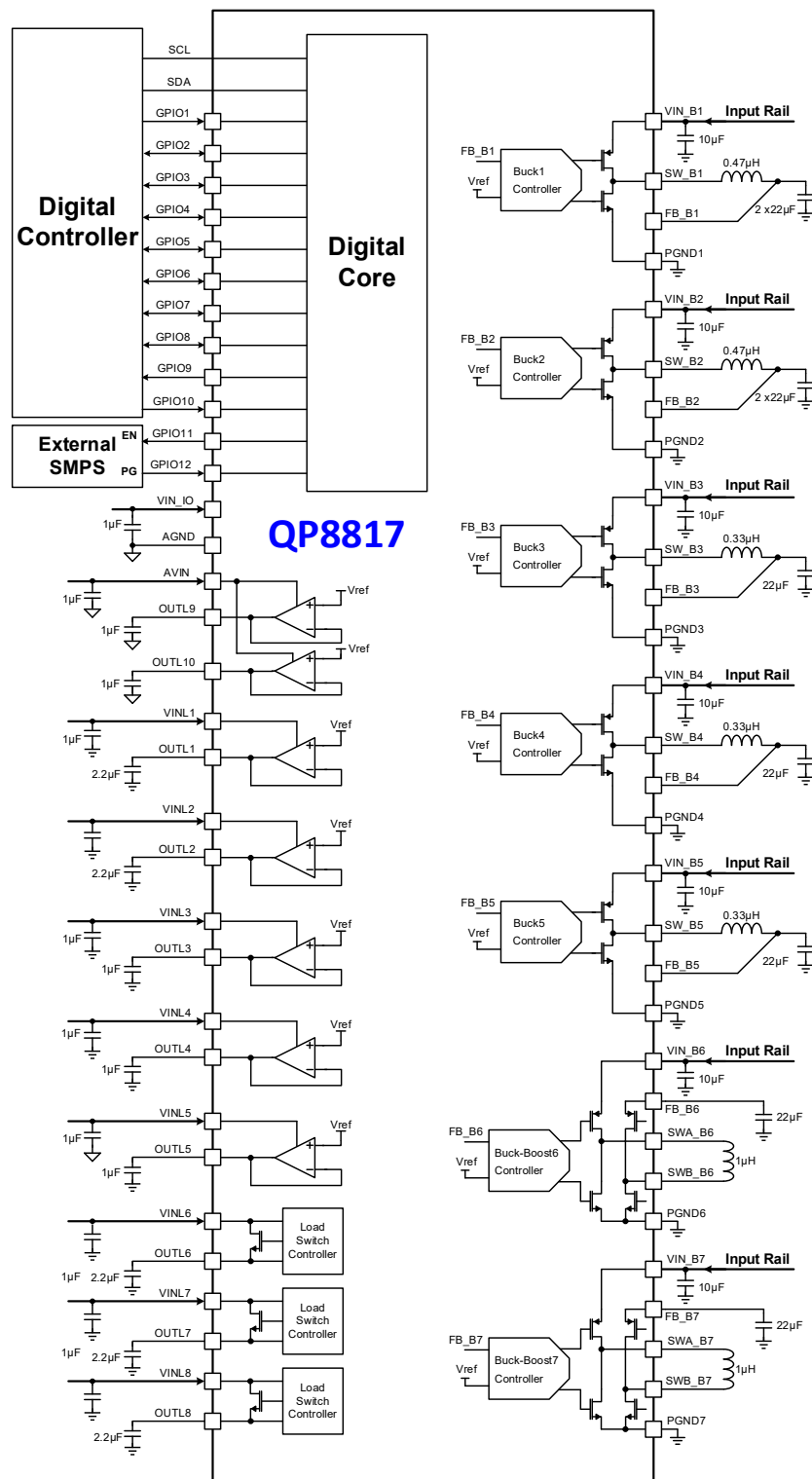


Figure 2: QP8817 Block Diagram & Application Schematic (Buck-Boost 6/7 in Buck-Boost Mode)

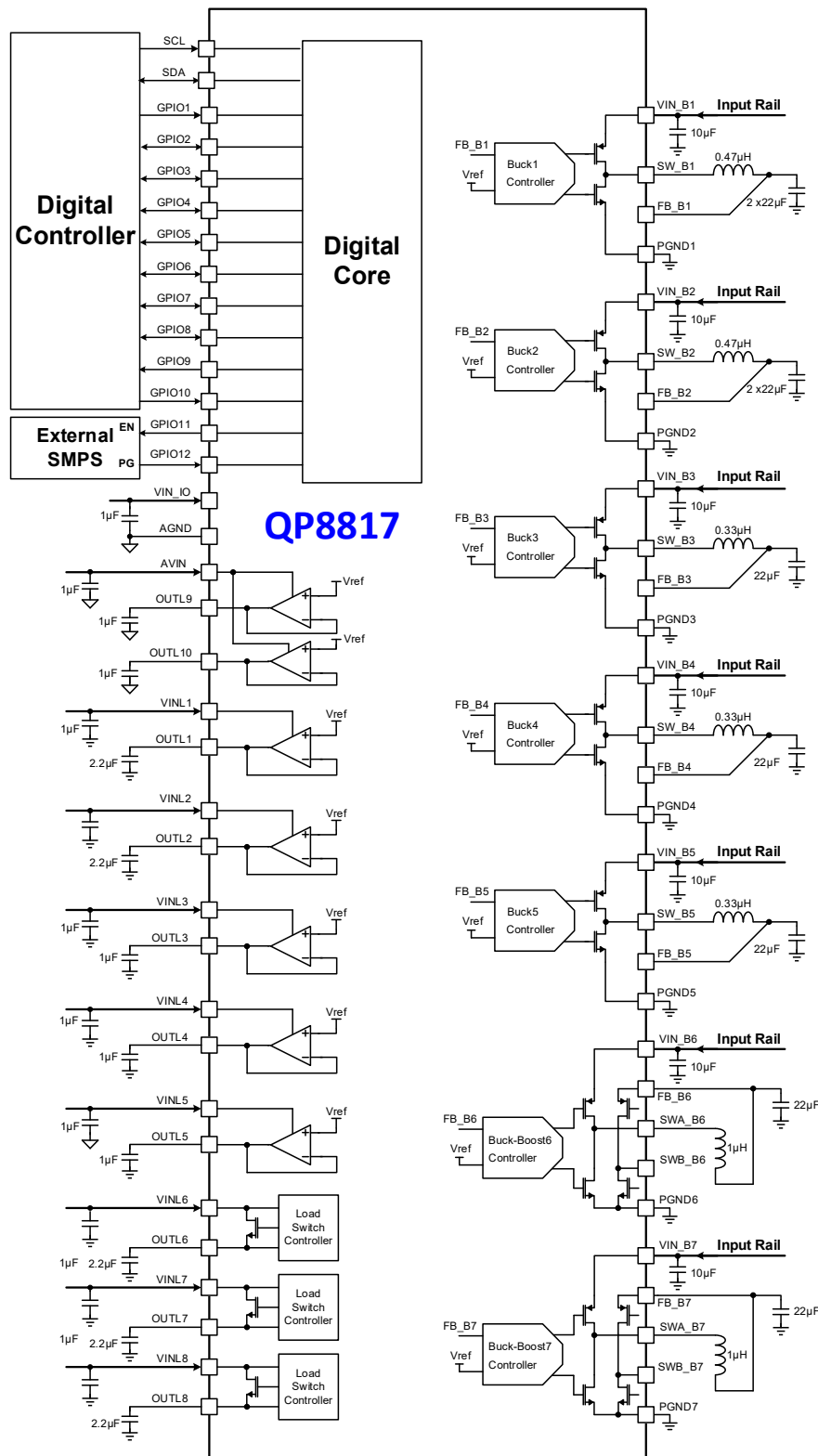
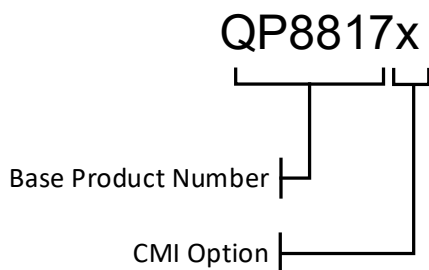


Figure 3: QP8817 Block Diagram & Application Schematic (Buck-Boost 6/7 in Buck Mode)

ORDERING INFORMATION

PART NUMBER	V _{OUT1}	V _{OUT2}	V _{OUT3}	V _{OUT4}	V _{OUT5}	V _{OUT6}	V _{OUT7}	V _{LDO1}	
QP8817A	0.725V	0.725V	1.8V	1.2V	0.725V	3.3V	3.3V	1.9V	
	V _{LDO2}	V _{LDO3}	V _{LDO4}	V _{LDO5}	V _{LDO6}	V _{LDO7}	V _{LDO8}	V _{LDO9}	V _{LDO10}
	1.8V	LSW	1.8V	1.05V	LSW	LSW	LSW	1.8V	3.3V



Note 1: Standard product options are identified in this table. Contact the factory for custom options. Minimum order quantity is required.

Note 2: "xxx" represents the CMI (Code Matrix Index) option. The CMI identifies the IC's default register settings.

PIN CONFIGURATION - WLCSP

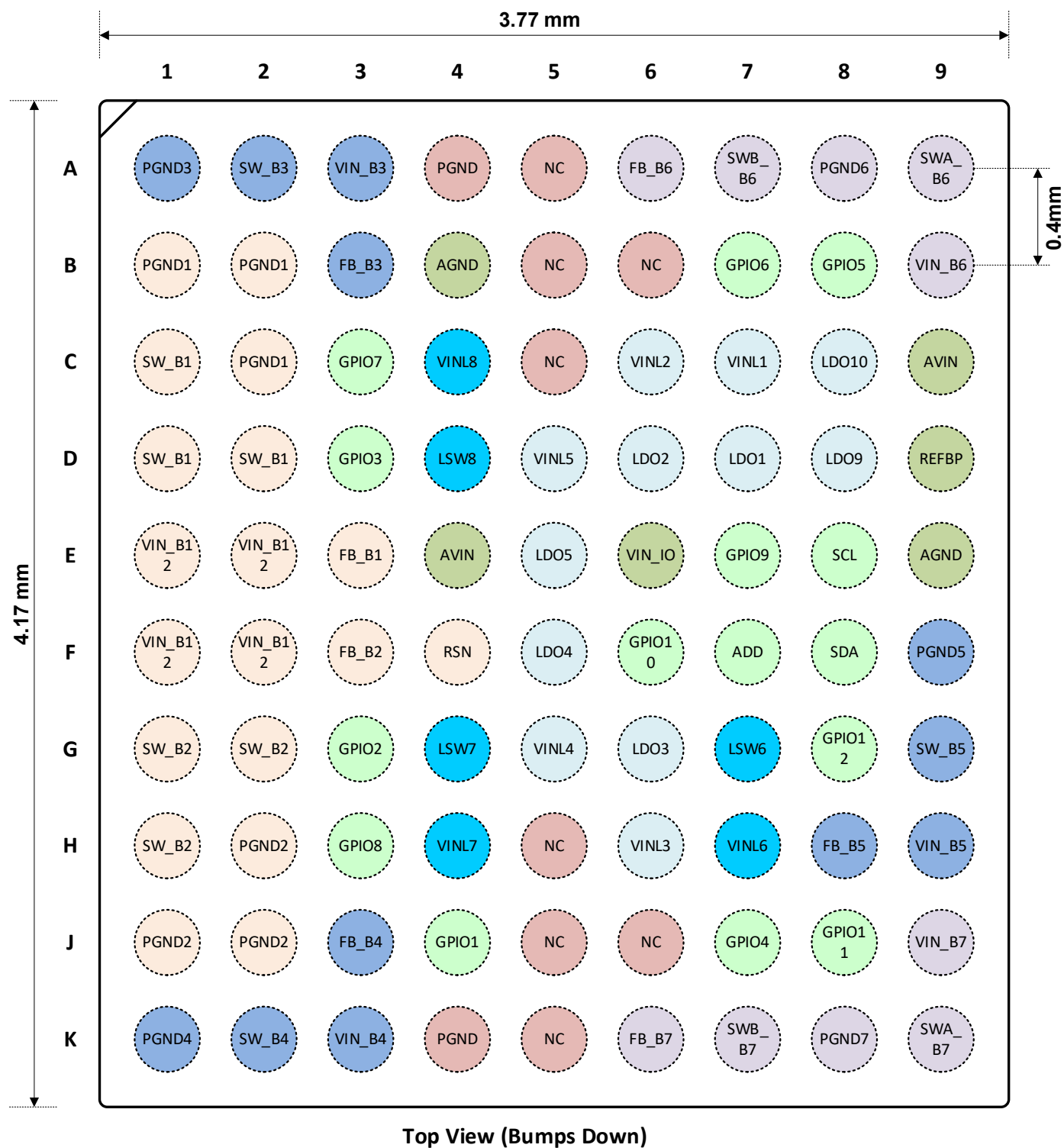


Figure 4: QP8817 Pin Configuration – Top View (bumps down) – WLCSP- 90

PIN DESCRIPTIONS

Ball (CSP)	NAME	DESCRIPTION
E1, E2	VIN_B1	Buck1 Input. Connect a bypass capacitor between this pin and PGND.
C1, D1, D2	SW_B1	Buck1 switch node
B1, B2, C2	PGND1	Buck1 power ground
E3	FB_B1	Buck1 feedback
F4	RSN	Buck1 remote sense, it is also the remote sense pin for Buck 1/2 dual-phase operation. Can be used with FB_B1 as a differential pair for remote voltage sensing.
F1, F2	VIN_B2	Buck2 Input. Connect a bypass capacitor between this pin and PGND.
G1, G2, H1	SW_B2	Buck2 switch node
H2, J1, J2	PGND2	Buck2 power ground
F3	FB_B2	Buck2 feedback
A3	VIN_B3	Buck3 Input. Connect a bypass capacitor between this pin and PGND.
A2	SW_B3	Buck1 switch node
A1	PGND3	Buck3 power ground
B3	FB_B3	Buck3 feedback
K3	VIN_B4	Buck4 Input. Connect a bypass capacitor between this pin and PGND.
K2	SW_B4	Buck4 switch node
K1	PGND4	Buck4 power ground
J3	FB_B4	Buck4 feedback
H9	VIN_B5	Buck5 Input. Connect a bypass capacitor between this pin and PGND.
G9	SW_B5	Buck5 switch node
F9	PGND5	Buck5 power ground
H8	FB_B5	Buck5 feedback
B9	VIN_B6	Buck-Boost6 Input. Connect a bypass capacitor between this pin and PGND.
A9	SWA_B6	Buck-Boost6 Buck side switch node
A7	SWB_B6	Buck-Boost6 Buck side switch node
A8	PGND6	Buck-Boost6 power ground
A6	FB_B6	Buck-Boost6 feedback
J9	VIN_B7	Buck-Boost7 Input. Connect a bypass capacitor between this pin and PGND.
K9	SWA_B7	Buck-Boost7 Buck side switch node
K7	SWB_B7	Buck-Boost7 Buck side switch node
K8	PGND7	Buck-Boost7 power ground

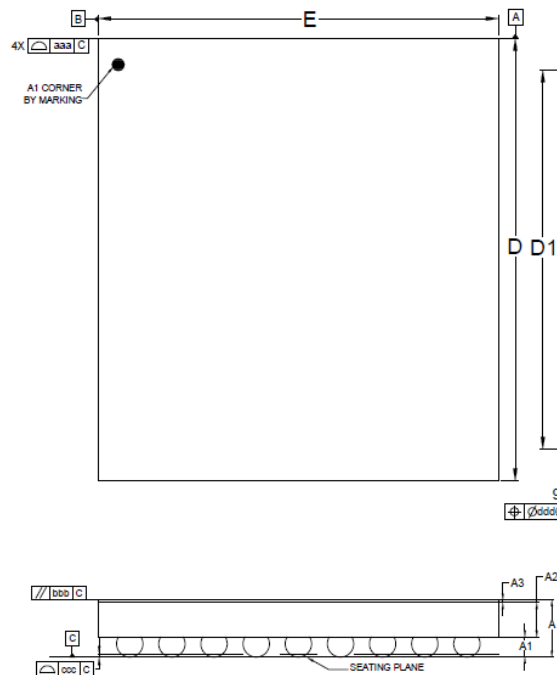
K6	FB_B7	Buck-Boost7 feedback
C7	VINL1	LDO1 input. Connect a bypass capacitor between this pin and AGND.
D7	LDO1	LDO1 output
C6	VINL2	LDO2 input. Connect a bypass capacitor between this pin and AGND.
D6	LDO2	LDO2 output
H6	VINL3	LDO3 input. Connect a bypass capacitor between this pin and AGND.
G6	LDO3	LDO3 output
G5	VINL4	LDO4 input. Connect a bypass capacitor between this pin and AGND.
F5	LDO4	LDO4 output
D5	VINL5	LDO5 input. Connect a bypass capacitor between this pin and AGND.
E5	LDO5	LDO5output
H7	VINL6	Load switch 6 input. Connect a bypass capacitor between this pin and AGND.
G7	LSW6	Load switch 6 output
H4	VINL7	Load switch 7 input. Connect a bypass capacitor between this pin and AGND.
G4	LSW7	Load switch 7 output
C4	VINL8	Load switch 8 input. Connect a bypass capacitor between this pin and AGND.
D4	LSW8	Load switch 8 output
D8	LDO9	Low quiescent current LDO9 output
C8	LDO10	Low quiescent current LDO10 output
J4	GPIO1	GPIO
G3	GPIO2	GPIO
D3	GPIO3	GPIO
J7	GPIO4	GPIO
B8	GPIO5	GPIO
B7	GPIO6	GPIO
C3	GPIO7	GPIO
H3	GPIO8	GPIO
E7	GPIO9	GPIO
F6	GPIO10	GPIO
J8	GPIO11	GPIO
G8	GPIO12	GPIO
F8	SDA	I2C Data



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E8	SCL	I2C Clock
C9, E4	AVIN	Analog input
B4, E9	AGND	Analog output
E6	VIN_IO	IO Voltage Pin
D9	REFBP	Internal reference bypass pin. Connect a capacitor between this pin and AGND.
F7	ADD	I2C address program pin. Connect a resistor between this pin and AGND to set the I2C address.
A4, K4	PGND	Power ground
A5, B5, B6, C5, H5, J5, J6, K5	NC	No connect. This pin must be left floating.

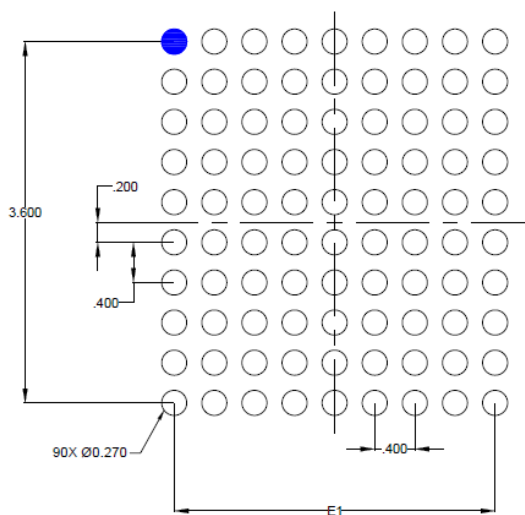
PACKAGE OUTLINE AND DIMENSIONS



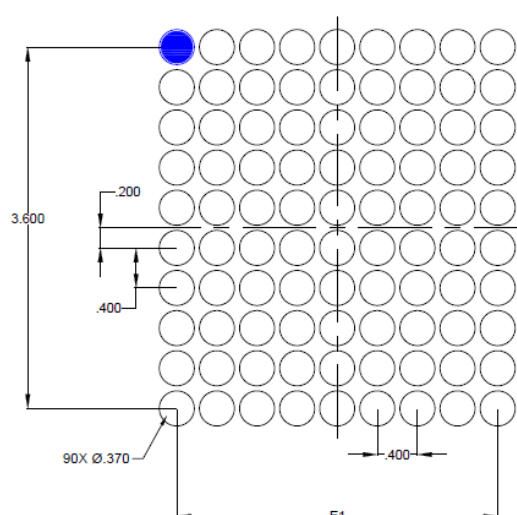
Dimensional Ref.			
REF.	Min.	Nom.	Max.
A	0.490	0.540	0.590
A1	0.145	0.165	0.185
A2	0.325	0.350	0.375
A3	0.022	0.025	0.028
D	4.155	4.170	4.185
E	3.755	3.770	3.785
D1	3.550	3.600	3.650
E1	3.150	3.200	3.250
b	0.210	0.240	0.270
d	0.400 BSC		
e	0.400 BSC		
SD	0.200 BSC		
SE	0.000 BSC		
Tol. of Form&Position			
aaa	0.10		
bbb	0.10		
ccc	0.05		
ddd	0.05		

Notes

1. ALL DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1994.



RECOMMENDED
PCB METAL TOP
VIEW



RECOMMENDED SOLDERMASK TOP VIEW

Notes:

1. Shaded area represents Pin 1 location.

Product Compliance

This part complies with RoHS directive 2011/65/EU as amended by (EU) 2015/863.

This part also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- PFOS Free
- SVHC Free



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

For technical questions and application information:

Email: appsupport@qorvo.com

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