

Technical Reference Manual

LP87334E Technical Reference Manual



ABSTRACT

This document provides the register bit values for the one-time programmable (OTP) bits of the orderable part number, LP87334ERHDR.

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1 Introduction

This technical reference manual can be used as a reference for the LP87334E default register bits after OTP memory download. This technical reference manual does not provide information about the electrical characteristics, external components, package, or the functionality of the device. For this information and the full register map, refer to the [LP8733xx Dual High-Current Buck Converter and Dual Linear Regulator data sheet](#).

2 OTP Memory Device Settings

This section lists all of the device settings that are downloaded from OTP memory.

[Table 2-1](#) lists the device settings for I²C and OTP revision ID values.

Table 2-1. Device Identification and I²C Settings

	Description	Bit Name	LP87334E
I ² C address			60h
DEVICE_ID	Device specific ID code	DEVICE_ID	02h
OTP_ID	Identification code for OTP version	OTP_ID	4Eh

[Table 2-2](#) lists the device settings for BUCK0 and BUCK1. The maximum allowed slew-rate for BUCKx depends on the output capacitance. Refer to the [LP8733xx Dual High-Current Buck Converter and Dual Linear Regulator data sheet](#) for output capacitance boundary conditions.

Table 2-2. BUCK0 and BUCK1 OTP Settings

	Description	Bit Name	LP87334E
	Buck phase configuration (2 single phase Bucks or combined 2 phase, denoted as 1+1 or 2-phase)		1+1
	Switching frequency		2 MHz
	Spread spectrum	EN_SPREAD_SPEC	Disabled

Table 2-2. BUCK0 and BUCK1 OTP Settings (continued)

	Description	Bit Name	LP87334E
BUCK0	Output voltage	BUCK0_VSET	0.850 V
	Enable, EN-pin or I ² C register	BUCK0_EN_PIN_CTRL	EN-pin
	Control for BUCK0	BUCK0_EN	High
	Force PWM mode or auto mode	BUCK0_FPWM	Yes
	Force Multiphase	BUCK0_FPWM_MP	No
	Peak current limit	BUCK0_ILIM	4 A
	Maximum load current limit	NA	3 A
	Slew rate	BUCK0_SLEW_RATE	7.5 mV/us
	Startup delay	BUCK0_STARTUP_DELAY	3 ms
	Shutdown delay	BUCK0_SHUTDOWN_DELAY	0.5 ms
BUCK1	Output voltage	BUCK1_VSET	1.100 V
	Enable, EN-pin or I ² C register	BUCK1_EN_PIN_CTRL	EN-pin
	Control for BUCK1	BUCK1_EN	High
	Force PWM mode or auto mode	BUCK1_FPWM	Yes
	Peak current limit	BUCK1_ILIM	4 A
	Maximum load current limit	NA	3 A
	Slew rate	BUCK1_SLEW_RATE	7.5 mV/us
	Startup delay	BUCK1_STARTUP_DELAY	3 ms
	Shutdown delay	BUCK1_SHUTDOWN_DELAY	0.5 ms

Table 2-3 lists the device settings for LDO0 and LDO1.

Table 2-3. LDO0 and LDO1 OTP Settings

	Description	Bit Name	LP87334E
LDO0	Output voltage	LDO0_VSET	0.800 V
	Enable, EN-pin or I ² C register	LDO0_EN_PIN_CTRL	EN-pin
	Control for LDO0	LDO0_EN	High
	Startup delay	LDO0_STARTUP_DELAY	1 ms
	Shutdown delay	LDO0_SHUTDOWN_DELAY	2.5 ms
LDO1	Output voltage	LDO1_VSET	1.800 V
	Enable, EN-pin or I ² C register	LDO1_EN_PIN_CTRL	EN-pin
	Control for LDO1	LDO1_EN	High
	Startup delay	LDO1_STARTUP_DELAY	0 ms
	Shutdown delay	LDO1_SHUTDOWN_DELAY	3 ms

Table 2-4 lists the device settings for GPIOs.

Table 2-4. EN, CLKIN, and GPIO Pin Settings

	Description	Bit Name	LP87334E
EN pin	EN pin pull-down resistor enable or disable	EN_PD	Enabled
CLKIN pin	CLKIN or GPO2 mode selection	CLKIN_PIN_SEL	GPO2
	CLKIN pin pull-down resistor enable or disable (applicable for both CLKIN and GPO2 modes.)	CLKIN_PD	Disabled
	Frequency of external clock when connected to CLKIN	EXT_CLK_FREQ	2 MHz
	Enable for the internal PLL. When PLL disabled, internal RC OSC is used	EN_PLL	Not Used
GPO	GPO output type (push-pull or open drain)	GPO_OD	PP
	Enable, EN-pin or I ² C register	GPO_EN_PIN_CTRL	EN-pin
	Control for GPO	GPO_EN	High
	Startup delay	GPO_STARTUP_DELAY	1 ms
	Shutdown delay	GPO_SHUTDOWN_DELAY	2.5 ms

Table 2-4. EN, CLKIN, and GPIO Pin Settings (continued)

	Description	Bit Name	LP87334E
GPO2	GPO2 output type (push-pull or open drain)	GPO2_OD	OD
	Enable, EN-pin or I ² C register	GPO2_EN_PIN_CTRL	EN-pin
	Control for GPO2	GPO2_EN	High
	Startup delay	GPO2_STARTUP_DELAY	11 ms
	Shutdown delay	GPO2_SHUTDOWN_DELAY	0 ms

Table 2-5 lists the device PGOOD settings.

Table 2-5. PGOOD OTP Settings

	Description	Bit Name	LP87334E
Signals monitored by PGOOD	BUCK0 output voltage	EN_PGOOD_BUCK0	Yes
	BUCK1 output voltage	EN_PGOOD_BUCK1	Yes
	LDO0 output voltage	EN_PGOOD_LDO0	Yes
	LDO1 output voltage	EN_PGOOD_LDO1	Yes
	Thermal warning	EN_PGOOD_TWARN	No
PGOOD mode selections	PGOOD thresholds for BUCK0, BUCK1 (Undervoltage and Window (undervoltage and overvoltage))	PGOOD_WINDOW_BUCK	Window
	PGOOD thresholds for LDO0, LDO1 (Undervoltage and Window (undervoltage and overvoltage))	PGOOD_WINDOW_LDO	Window
	PGOOD operating mode (detecting UNUSUAL situations or detecting UNVALID situations)	PGOOD_MODE	Detecting UNVALID situations
	PGOOD signal mode (status or latched until fault source read)	PG_FAULT_GATES_PGOOD	Status
	PGOOD output mode (push-pull or open drain)	PGOOD_OD	OD
	PGOOD polarity (active high or active low)	PGOOD_POL	Active High

Table 2-6 lists the device protection settings.

Table 2-6. Protections OTP Settings

	Description	Bit Name	LP87334E
Protections	Thermal warning level (125°C or 137°C)	TDIE_WARN_LEVEL	140°C
	Input overvoltage protection	NA	Enabled

Table 2-7 lists the device settings for interrupts. When an interrupt from an event is unmasked, an interrupt is generated on the nINT pin.

Table 2-7. Interrupt Mask Settings

	Interrupt event	Bit Name	LP87334E
General	PGOOD pin changing active to inactive	PGOOD_INT_MASK	Masked
	Sync clock appears or disappears	SYNC_CLK_MASK	Masked
	Thermal warning	TDIE_WARN_MASK	Masked
	Load measurement ready	I_MEAS_MASK	Masked
	Register reset	RESET_REG_MASK	Masked
BUCK0	Buck0 PGood active	BUCK0_PGR_MASK	Masked
	Buck0 PGood inactive	BUCK0_PGF_MASK	Masked
	Buck0 current limit	BUCK0_ILIM_MASK	Masked
BUCK1	Buck1 PGood active	BUCK1_PGR_MASK	Masked
	Buck1 PGood inactive	BUCK1_PGF_MASK	Masked
	Buck1 current limit	BUCK1_ILIM_MASK	Masked
LDO0	LDO0 PGood active	LDO0_PGR_MASK	Masked
	LDO0 PGood inactive	LDO0_PGF_MASK	Masked
	LDO0 current limit	LDO0_ILIM_MASK	Masked

Table 2-7. Interrupt Mask Settings (continued)

	Interrupt event	Bit Name	LP87334E
LDO1	LDO1 PGood active	LDO1_PGR_MASK	Masked
	LDO1 PGood inactive	LDO1_PGF_MASK	Masked
	LDO1 current limit	LDO1_ILIM_MASK	Masked

3 Power-up and Power Down Sequence

This section shows the power-up and power-down sequence for the device. The power-up and power-down delays for each rail are shown in [Figure 3-1](#).

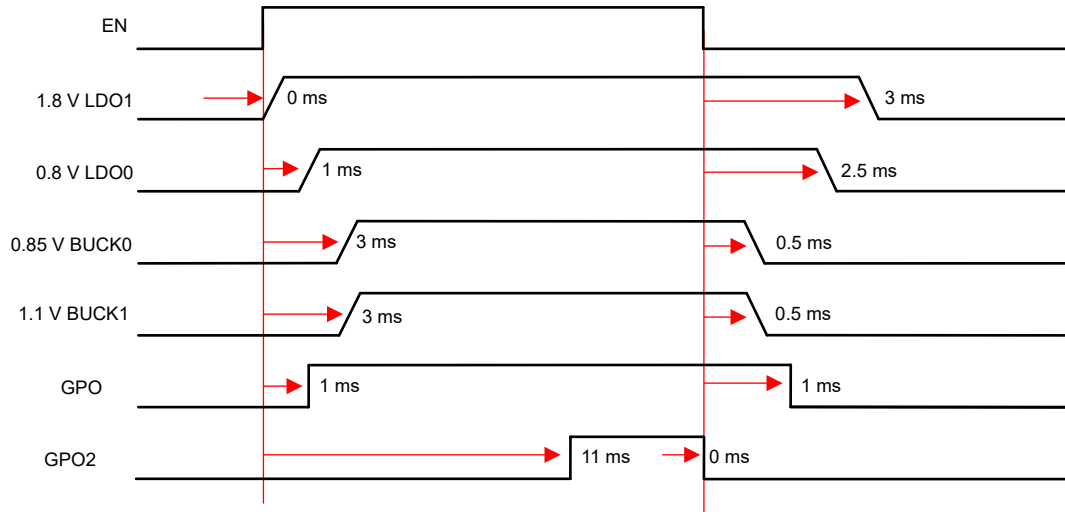


Figure 3-1. LP87334E Power-up and Power Down Sequence

4 Register Bits Loaded From OTP Memory

Table 4-1 lists the register bit values loaded from the OTP memory during device start-up.

Table 4-1. Summary of Control Registers

Address	Register Name	Bit	LP87334E Value
0x00	DEV_REV	DEVICE_ID[1:0]	02h
0x01	OTP_REV	OTP_ID[7:0]	4Eh
0x02	BUCK0_CTRL_1	BUCK0_FPWM_MP	00h
0x02	BUCK0_CTRL_1	BUCK0_FPWM	01h
0x02	BUCK0_CTRL_1	BUCK0_EN_PIN_CTRL	01h
0x02	BUCK0_CTRL_1	BUCK0_EN	01h
0x03	BUCK0_CTRL_2	BUCK0_ILIM[2:0]	05h
0x03	BUCK0_CTRL_2	BUCK0_SLEW_RATE[2:0]	03h
0x04	BUCK1_CTRL_1	BUCK1_FPWM	01h
0x04	BUCK1_CTRL_1	BUCK1_EN_PIN_CTRL	01h
0x04	BUCK1_CTRL_1	BUCK1_EN	01h
0x05	BUCK1_CTRL_2	BUCK1_ILIM[2:0]	05h
0x05	BUCK1_CTRL_2	BUCK1_SLEW_RATE[2:0]	03h
0x06	BUCK0_VOUT	BUCK0_VSET[7:0]	2Fh
0x07	BUCK1_VOUT	BUCK1_VSET[7:0]	61h
0x08	LDO0_CTRL	LDO0_EN_PIN_CTRL	01h
0x08	LDO0_CTRL	LDO0_EN	01h
0x09	LDO1_CTRL	LDO1_EN_PIN_CTRL	01h
0x09	LDO1_CTRL	LDO1_EN	01h
0x0A	LDO0_VOUT	LDO0_VSET[4:0]	00h
0x0B	LDO1_VOUT	LDO1_VSET[4:0]	0Ah
0x0C	BUCK0_DELAY	BUCK0_SHUTDOWN_DELAY[3:0]	01h
0x0C	BUCK0_DELAY	BUCK0_STARTUP_DELAY[3:0]	03h
0x0D	BUCK1_DELAY	BUCK1_SHUTDOWN_DELAY[3:0]	01h
0x0D	BUCK1_DELAY	BUCK1_STARTUP_DELAY[3:0]	03h
0x0E	LDO0_DELAY	LDO0_SHUTDOWN_DELAY[3:0]	05h
0x0E	LDO0_DELAY	LDO0_STARTUP_DELAY[3:0]	01h
0x0F	LDO1_DELAY	LDO1_SHUTDOWN_DELAY[3:0]	06h
0x0F	LDO1_DELAY	LDO1_STARTUP_DELAY[3:0]	00h
0x10	GPO_DELAY	GPO_SHUTDOWN_DELAY[3:0]	05h
0x10	GPO_DELAY	GPO_STARTUP_DELAY[3:0]	01h
0x11	GPO2_DELAY	GPO2_SHUTDOWN_DELAY[3:0]	00h
0x11	GPO2_DELAY	GPO2_STARTUP_DELAY[3:0]	0Bh
0x12	GPO_CTRL	GPO2_OD	01h
0x12	GPO_CTRL	GPO2_EN_PIN_CTRL	01h
0x12	GPO_CTRL	GPO2_EN	01h
0x12	GPO_CTRL	GPO_OD	00h
0x12	GPO_CTRL	GPO_EN_PIN_CTRL	01h
0x12	GPO_CTRL	GPO_EN	01h
0x13	CONFIG	STARTUP_DELAY_SEL	01h
0x13	CONFIG	SHUTDOWN_DELAY_SEL	00h
0x13	CONFIG	CLKIN_PIN_SEL	00h
0x13	CONFIG	CLKIN_PD	00h
0x13	CONFIG	EN_PD	01h
0x13	CONFIG	TDIE_WARN_LEVEL	01h
0x13	CONFIG	EN_SPREAD_SPEC	00h
0x14	PLL_CTRL	EN_PLL	00h
0x14	PLL_CTRL	EXT_CLK_FREQ[4:0]	01h

Table 4-1. Summary of Control Registers (continued)

Address	Register Name	Bit	LP87334E Value
0x15	PGOOD_CTRL_1	PGOOD_POL	00h
0x15	PGOOD_CTRL_1	PGOOD_OD	01h
0x15	PGOOD_CTRL_1	PGOOD_WINDOW_LDO	01h
0x15	PGOOD_CTRL_1	PGOOD_WINDOW_BUCK	01h
0x15	PGOOD_CTRL_1	EN_PGOOD_LDO1	01h
0x15	PGOOD_CTRL_1	EN_PGOOD_LDO0	01h
0x15	PGOOD_CTRL_1	EN_PGOOD_BUCK1	01h
0x15	PGOOD_CTRL_1	EN_PGOOD_BUCK0	01h
0x16	PGOOD_CTRL_2	EN_PGOOD_TWARN	00h
0x16	PGOOD_CTRL_2	PG_FAULT_GATES_PGOOD	00h
0x16	PGOOD_CTRL_2	PGOOD_MODE	01h
0x20	TOP_MASK_1	PGOOD_INT_MASK	01h
0x20	TOP_MASK_1	SYNC_CLK_MASK	01h
0x20	TOP_MASK_1	TDIE_WARN_MASK	01h
0x20	TOP_MASK_1	I_MEAS_MASK	01h
0x21	TOP_MASK_2	RESET_REG_MASK	01h
0x22	BUCK_MASK	BUCK1_PGF_MASK	01h
0x22	BUCK_MASK	BUCK1_PGR_MASK	01h
0x22	BUCK_MASK	BUCK1_ILIM_MASK	01h
0x22	BUCK_MASK	BUCK0_PGF_MASK	01h
0x22	BUCK_MASK	BUCK0_PGR_MASK	01h
0x22	BUCK_MASK	BUCK0_ILIM_MASK	01h
0x23	LDO_MASK	LDO1_PGF_MASK	01h
0x23	LDO_MASK	LDO1_PGR_MASK	01h
0x23	LDO_MASK	LDO1_ILIM_MASK	01h
0x23	LDO_MASK	LDO0_PGF_MASK	01h
0x23	LDO_MASK	LDO0_PGR_MASK	01h
0x23	LDO_MASK	LDO0_ILIM_MASK	01h

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
June 2023	*	Initial Release

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