Application Report
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LP8860-Q1 End-of-Line Programming Guide for EEPROM

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ABSTRACT

The LP8860-Q1 device is an automotive LED driver with boost converter to support infotainment display, automotive cluster, and lighting applications. In order to support wide range of application conditions for automotive application, LP8860-Q1 offers various settings with EEPROM registers. There are also various versions of EEPROM options of LP8860-Q1, which are pre-programmed for generic application conditions, however still not enough to support all different cases. This document provides detail information how to program EEPROM registers at the end of production lines of system, so EEPROM of LP8860-Q1 can be optimized for particular applications as needed. Information in this document is also available in LP8860-Q1 datasheet sections 8.5 and 8.6.

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1 EEPROM Structure

LP8860-Q1 has 2 different register fields. One is register field to control LED driver setting such as brightness, LED current, brightness slope. Another one is EEPROM register field to setup configurations of the device which default register values can be downloaded from EEPROM (default pre-programmed values).

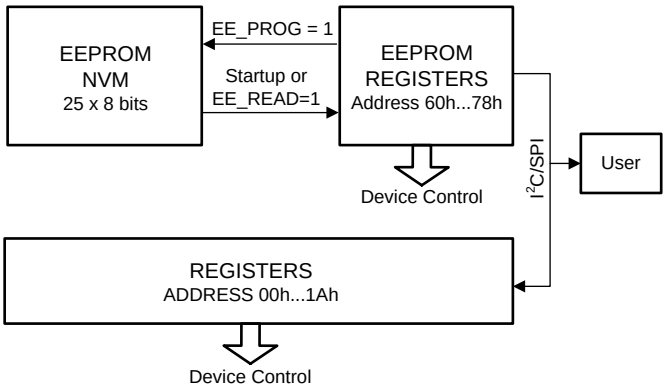

Figure 1. EEPROM and EEPROM Register Configuration

LP8860-Q1 supports both I^{2}C and SPI interfaces for register/EEPROM programming, and protocols are shown as figures below.

I^{2}C Slave address of LP8860-Q1 is 2Dh in 7 bit or 5Ah for write and 5Bh for read in 8-bit format.

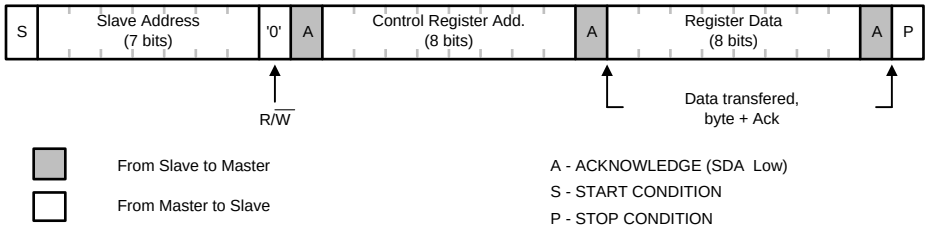

Figure 2. I^{2}C Register Write Format

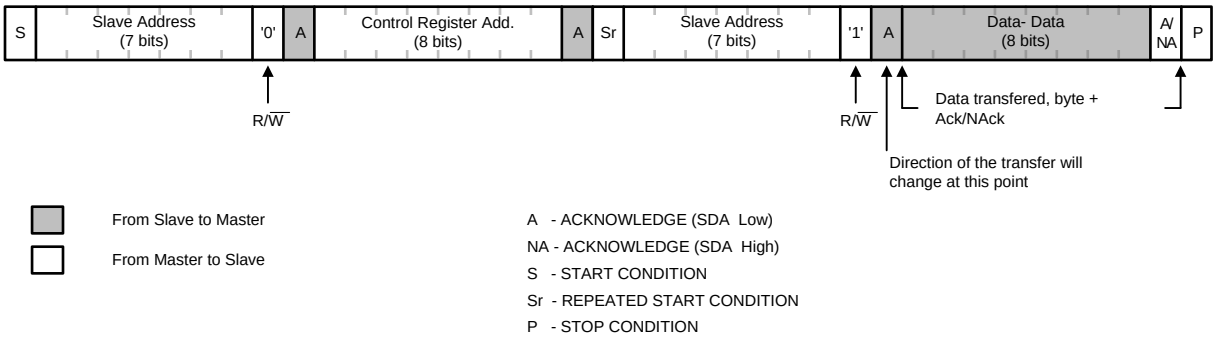

Figure 3. I^{2}C Register Read Format

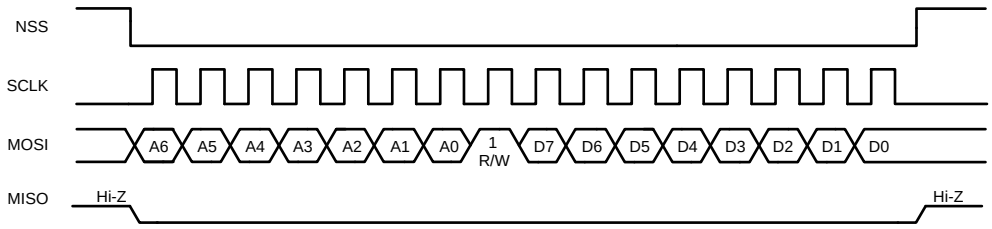

Figure 4. SPI Register Write Cycle

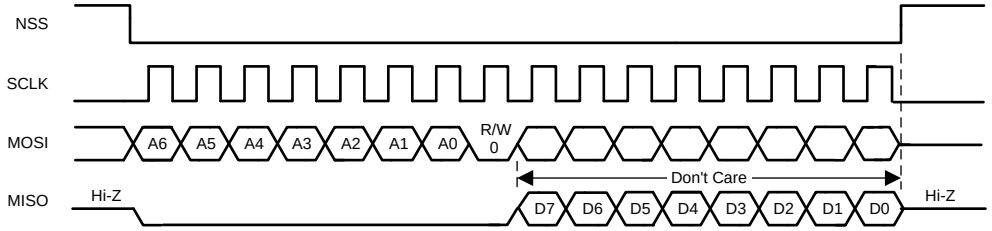

Figure 5. SPI Register Read Cycle

In order to support various configurations, EEPROM default values can be reprogrammed through these procedures.

	STEPS	ACTIONS	DESCRIPTIONS
1	Power rails up	VDD high	VIN (boost power) better be low not to make boost work during EEPROM register change. If separate control of VIN is not available, make brightness input 0% at least
2		VDD POR	VDD > 2.2V
3		EN/VDDIO high	Make sure VDD level is 2.5 V (minimum UVLO level) or higher before this step
4		Wait 500 µs at least	500 µs for internal state machine and EEPROM setup
5	Unlock EEPROM	Write unlock code to register address 0x1A	Write data 0x08, 0xBA, 0xEF starting from 0x08
6	Update EEPROM registers	Change EEPROM register values from address 0x60 to 0x78	To configure EEPROM registers for specific application conditions
7	Burn EEPROM	Write EEPROM programming code to register address 0x19	Write data 0x02
8		Wait 200 ms	Wait for re-write to EEPROM
9		Write EEPROM programming code to register address 0x19	Write data 0x00
10	Cycle power	EN/VDDIO or VDD	To apply updated EEPROM values for device control

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