A complete system solution for smart, dynamic LED lighting

S32K ISELED Solution for Automotive and Industrial LED Lighting

Smart LEDs + high-speed ISELED communication protocol + S32K Automotive Arm® Cortex®-based MCU with ISELED SDK software driver

OVERVIEW

ISELED is a new communication protocol for controlling static and dynamic LED arrays in automotive and industrial lighting applications. It addresses calibration and communication issues in today's LED systems by moving the costly external processes for ensuring stable light parameters (brightness and color stability), to embedded processing in the RGB LED. NXP's 32-bit Arm Cortex-M based, automotive-qualified S32K1 MCUs support the ISELED protocol with an ISELED software driver available for use with its production-grade SDK or in the AUTOSAR environment.

FEATURES

▸ Smart LED Module
  – Contains RGB LEDs + INLC100Q16 ISELED Driver IC (Inova Semiconductor) in single package. LED pre-calibrated during manufacture with data stored in driver IC – no speed-binning or look-up table in main S32K control MCU.
  – Color control using standard RGB value sent from S32K control MCU. Temperature sensor for auto-compensation.

▸ ISELED Communication Protocol
  – Address up to 4079 LEDs at video speed.

  – Half-duplex, bi-directional 2 Mbit/s communication with low latency.
  – Single-ended communication between main control MCU and first LED. Differential communication in LED chain. Diagnostic support and optional CRC.

▸ S32K1 Control MCU
  – Six automotive-qualified, Arm Cortex-M0+/M4F based MCU families.
  – Communication using FlexIO and LPSPI – fast, low CPU overhead.
  – Custom ISELED part numbers include production license for software driver.
  – Application Development Kit (ADK) - S32K EVB, power adaptor board and 16-LED bar.

S32K MCU ISELED APPLICATION DEVELOPMENT KIT (ADK)
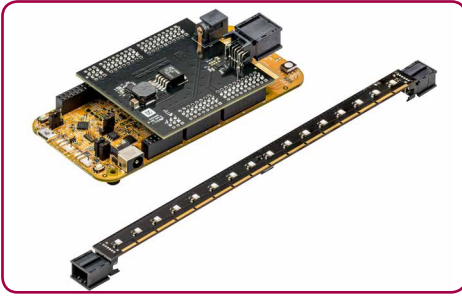
ISELED_ADK_D:

▸ S32K144EVB-Q100: Arm CM4F, 512 KB

▸ ISELED power adaptor board

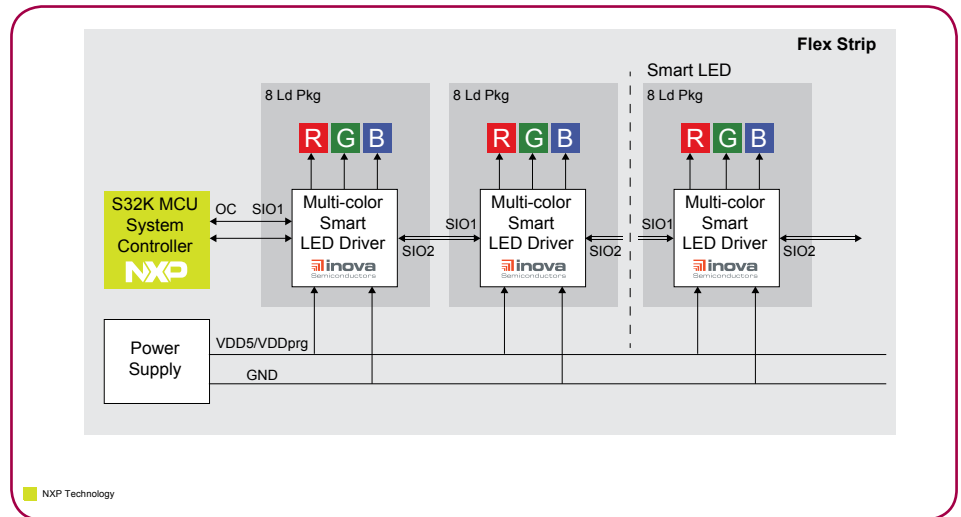▸ 16-LED bar with Dominant Opto LEDs (Osram LED version planned)

ISELED_ADK_EXT_D:

▸ Single 16-LED bar for daisy-chain

▸ Available only from Premier Farnell / Element14

S32K EVB compatibility with power adaptor board:

▸ K142/4/6 EVBs: 100%

▸ K116/8 EVBs: minor changes (see www. nxp.com/S32K-ISELED)

ISELED LED LIGHTING PROTOCOL

The ADK contains a standard S32K MCU sample which can only be used with the free-of-charge evaluation version of the ISELED software driver which re-initializes after 10,000 ISELED commands. For production, developers should order one of the S32K ISELED part numbers in the table below which include the full production license with unlimited driver functionality.

S32K MCU ISELED SOFTWARE

NXP provides the ISELED software driver that runs within the production-grade SDK included in the free-of-charge S32 Design Studio IDE. An application example is available via the FreeMASTER plug-in tool which provides real-time data visualisation and debugging.

S32K MCU ISELED PART NUMBERS

MCU Family	ISELED Part Number	Core	Flash/RAM	Package	Key Features	Ambient Temperature
S32K116	FS32K116LIT0VFMT	Arm CM0+	128 KB / 17 KB	32QFN	48 MHz + DMA + FlexIO + ISELED	-40 to 105°C
	FS32K116LIT0VLFT			48LQFP	48 MHz + DMA + FlexIO + ISELED	
S32K118	FS32K118LIT0VLFT		256 KB / 25 KB	48LQFP	48 MHz + DMA + FlexIO + ISELED	
S32K142	FS32K142UIT0VLHT	Arm CM4F	256 KB / 32 KB	64LQFP	112 MHz + DMA + FlexIO + ISELED	
S32K144	FS32K144UIT0VLHT		512 KB / 64 KB	64LQFP	112 MHz + DMA + FlexIO + ISELED	
	FS32K144ULT0VLHT				112 MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
	FS32K144ULT0VLLT			100LQFP	112 MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
S32K146	FS32K146UIT0VLLT		1 MB / 128 KB	100LQFP	112 MHz +DMA + FlexIO + ISELED	
	FS32K146ULT0VLLT				112 MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
S32K148	FS32K148UIT0VLQT		2 MB / 256 KB	144LQFP	112 MHz + DMA + FlexIO + ISELED	
	FS32K148UGT0VLQT				112 MHz + DMA + FlexIO + ISELED + CAN FD + CSEc + ENET	

www.nxp.com/S32K-ISELED