

S32K1 ISELED Solution for Automotive, Industrial & Consumer LED Lighting

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GC AMP AE

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Agenda

- Introduction to automotive ambient light current state
- ISELED Overview
- ISELED SMART LED Principle
- NXP ISELED Solution
- S32K1xx ISELED Driver
- ISELED Product Effect

Introduction to automotive ambient light current state



Current automotive interior lighting state

- Existent significant limitations in the LED control topologies:
 - Traditional standalone LS/HS LED driver
 - Not suited for chaining
 - Fiber optic:
 - Only one color per tube
 - Independent RGB LED drivers connected over LIN bus
 - Low speed communication
 - Increased cost and complexity for temperature compensation

Application example with BCR402W

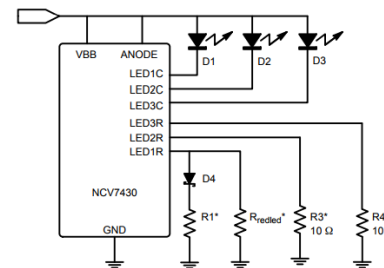
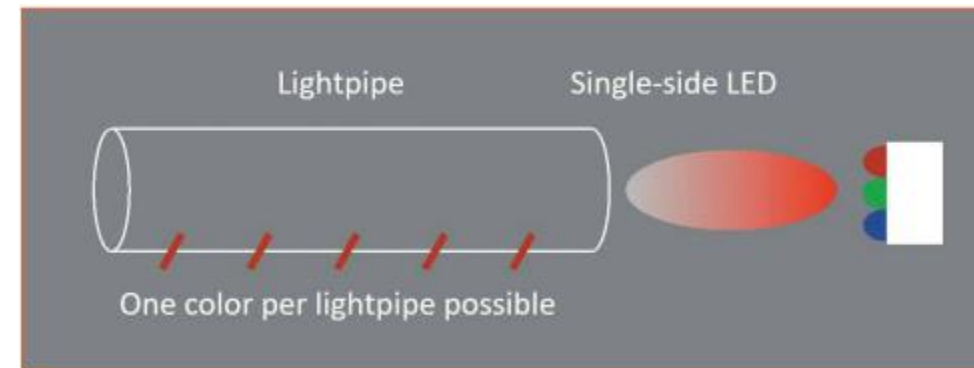
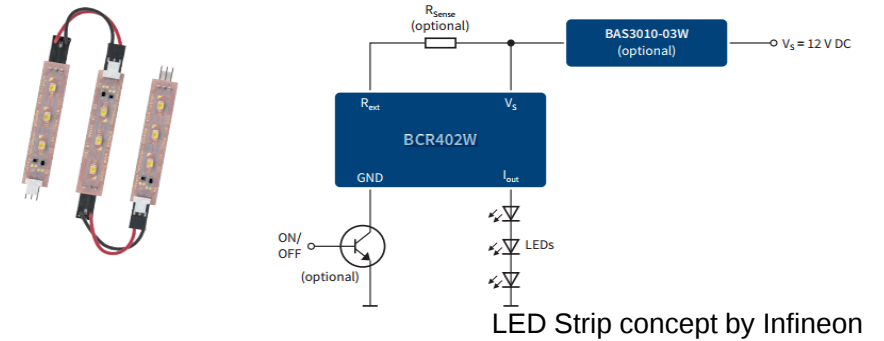
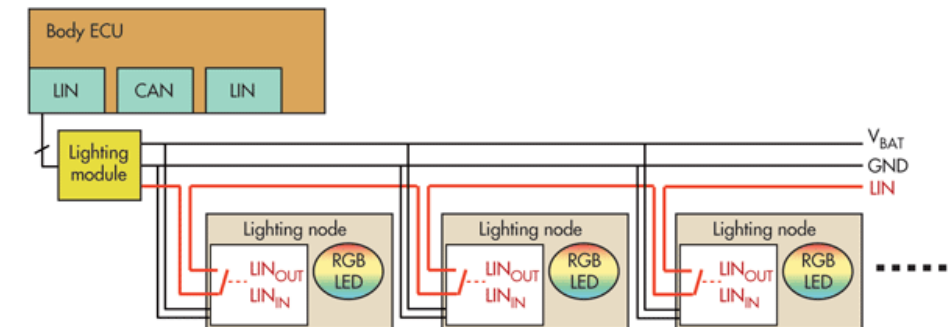


Figure 13. External Temperature Compensation

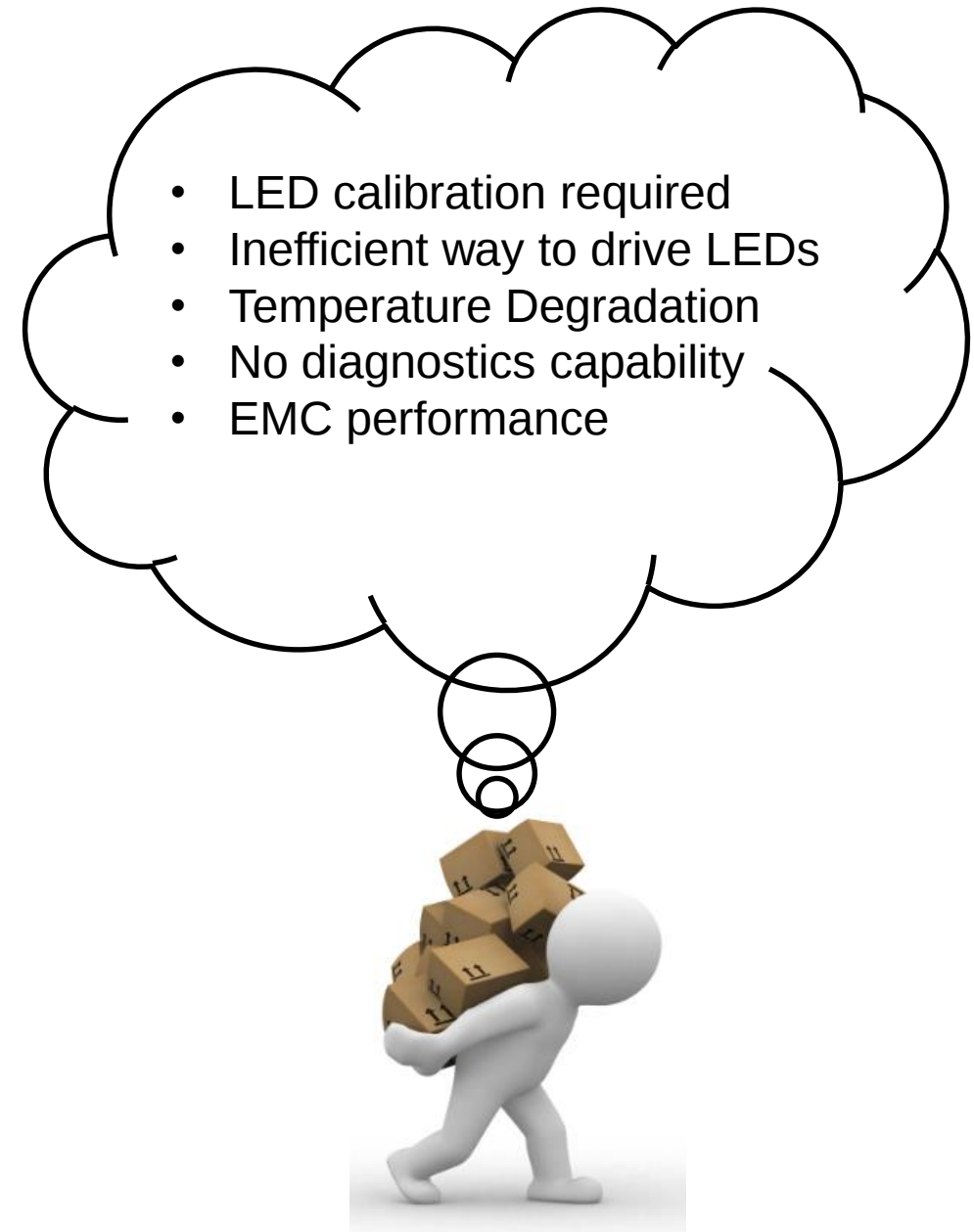
*R3, R4 = 10 Ω for 30 mA LED current.
R1, R2, R3, R4 values dependent on application.
R1, D4 set the LED current temperature coefficient.

OnSemi app. recommended
circuitry for Red LED curr. adj.



Challenges for Ambient Lighting

- Growing demand for **dynamic lighting effects** in the car
- Demand for **lower implementation effort & cost**
- Automotive requirements for **robust and low emitting bus system**



Requirements for Future Ambient Lighting

- Reduced complexity and cost
- Ability to compensate:
 - Temperature effects
 - Aging process (non-uniform)
- Diagnostics capabilities
- No LUT, calibration data stored inside LEDs' non-volatile memory
- On-board intelligence
 - Each LED lighting node has its own controller
 - Nodes can be replaced individually
 - Diminished spare-parts inventory
- LED control exclusively over communication interface
 - No additional peripheral required (high resolution timers, PWM, ADC for measuring LEDs V_f (forward voltage))

ISELED Overview



ISELED – Solution for Automotive, Industrial & Consumer LED Lighting

- ✓ LED based interior lighting
- ✓ Creating unique in-car lighting experience
- ✓ Creating emotional connection between the driver and the car



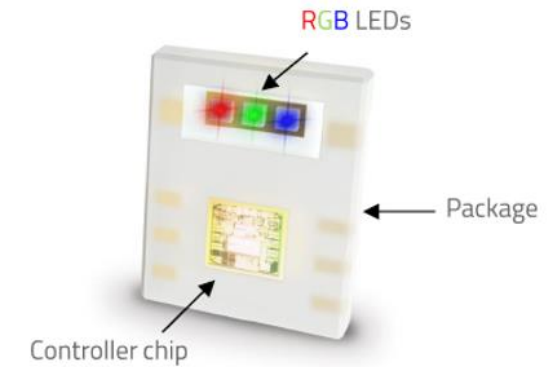
ISELED Alliance

Open Alliance to provide complete systems solution for smart LED, initially targeting automotive interior lighting



ISELED Concept

- ✓ Single package of LED and RGB ISELED driver chip*
 - High accuracy brightness and colour calibration performed by LED manufacture
 - No more LED binning classes
 - Integrated temperature sensor for compensation feature
- ✓ Proprietary protocol
 - Serial, differential communication
 - Up to 2Mbps data rate
 - Driving up to 4096 LEDs
 - Fast update rate of 52.5uS per LED (5.25ms)
 - Read access to all LEDs
 - Bus initialisation on start-up, auto detection of new or replaced LEDs

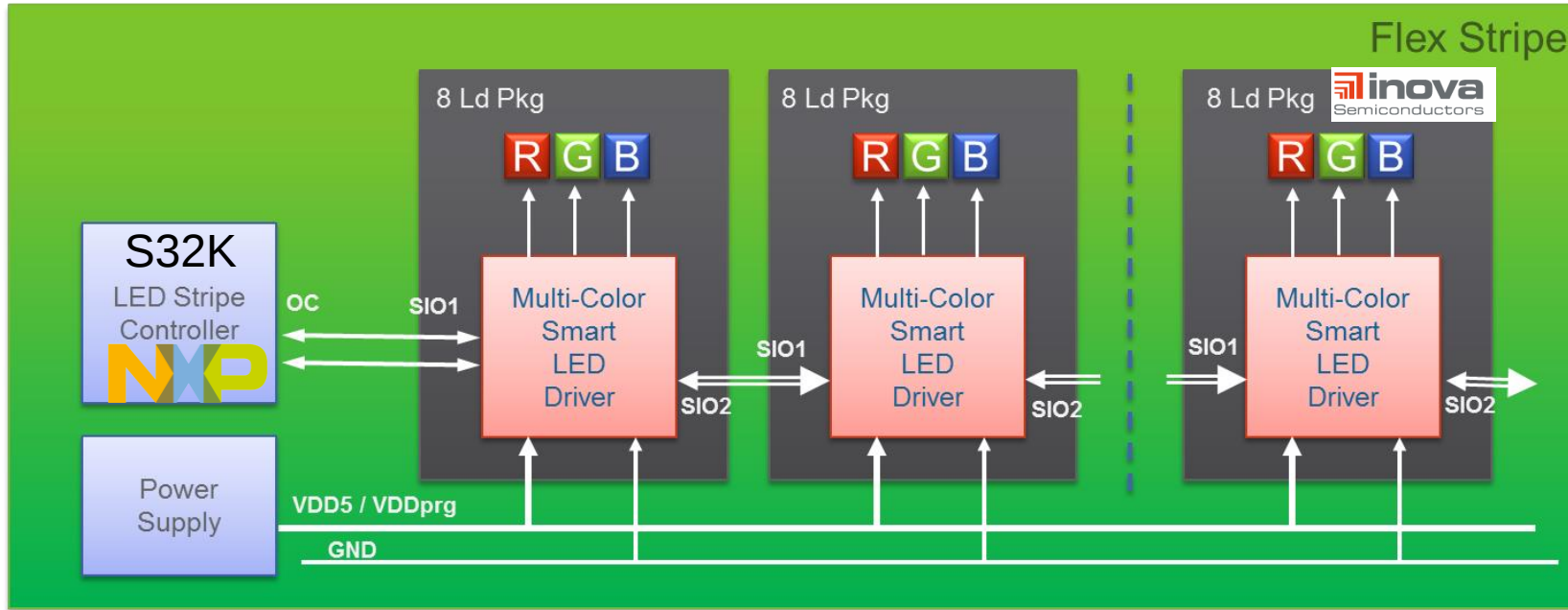


ISELED Target Applications

- Ambient Lighting
 - Automotive
 - Aerospace
 - Cruise Ships
- Functional Lighting
 - Steering wheel – HMI in ADAS systems
 - External display for autonomous taxi / buses
 - Dynamic Daytime Running Lights (DRL) applications for pedestrian communication
- Display Backlighting

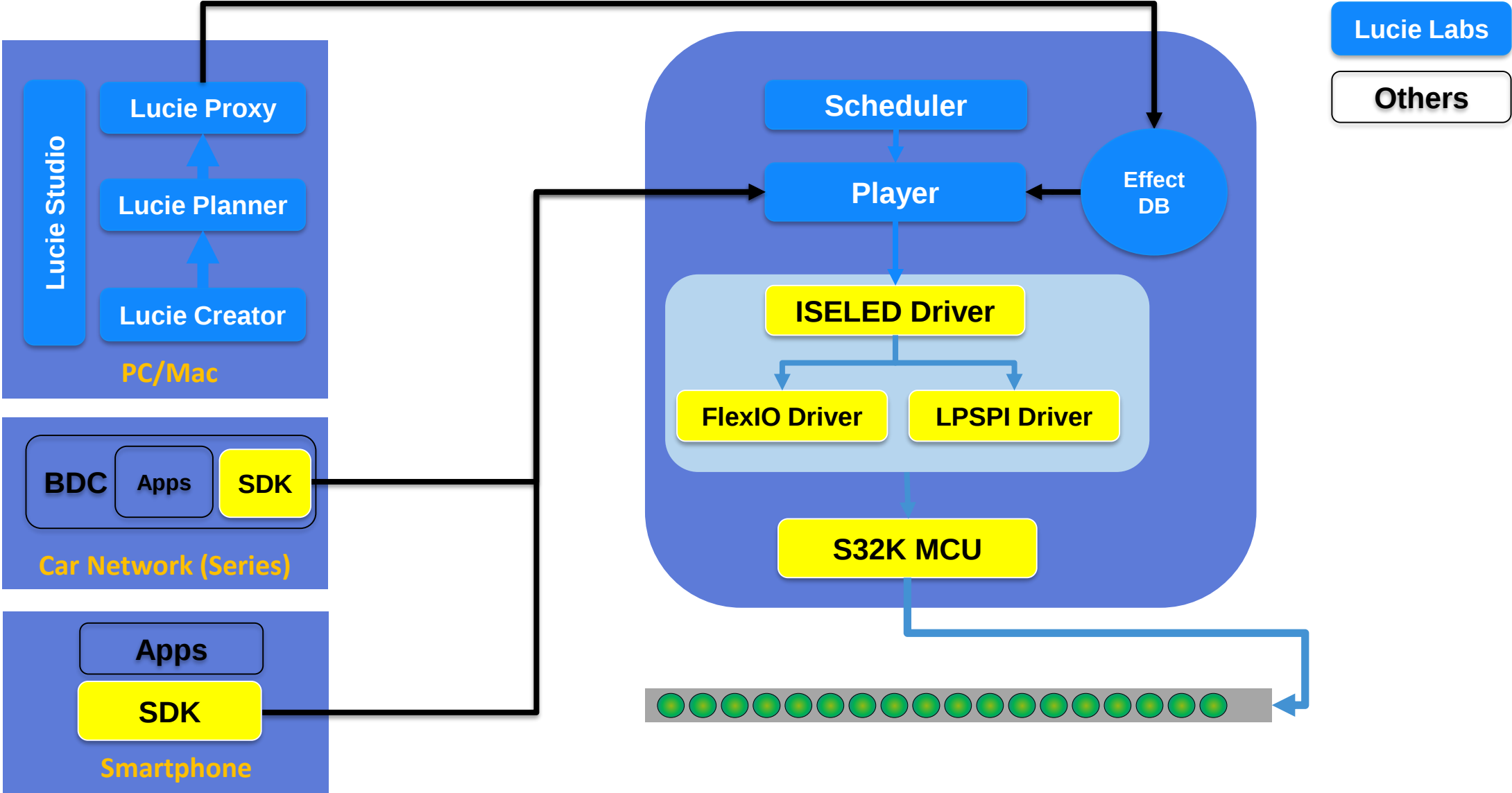


ISELED System Control MCU – S32K1xx



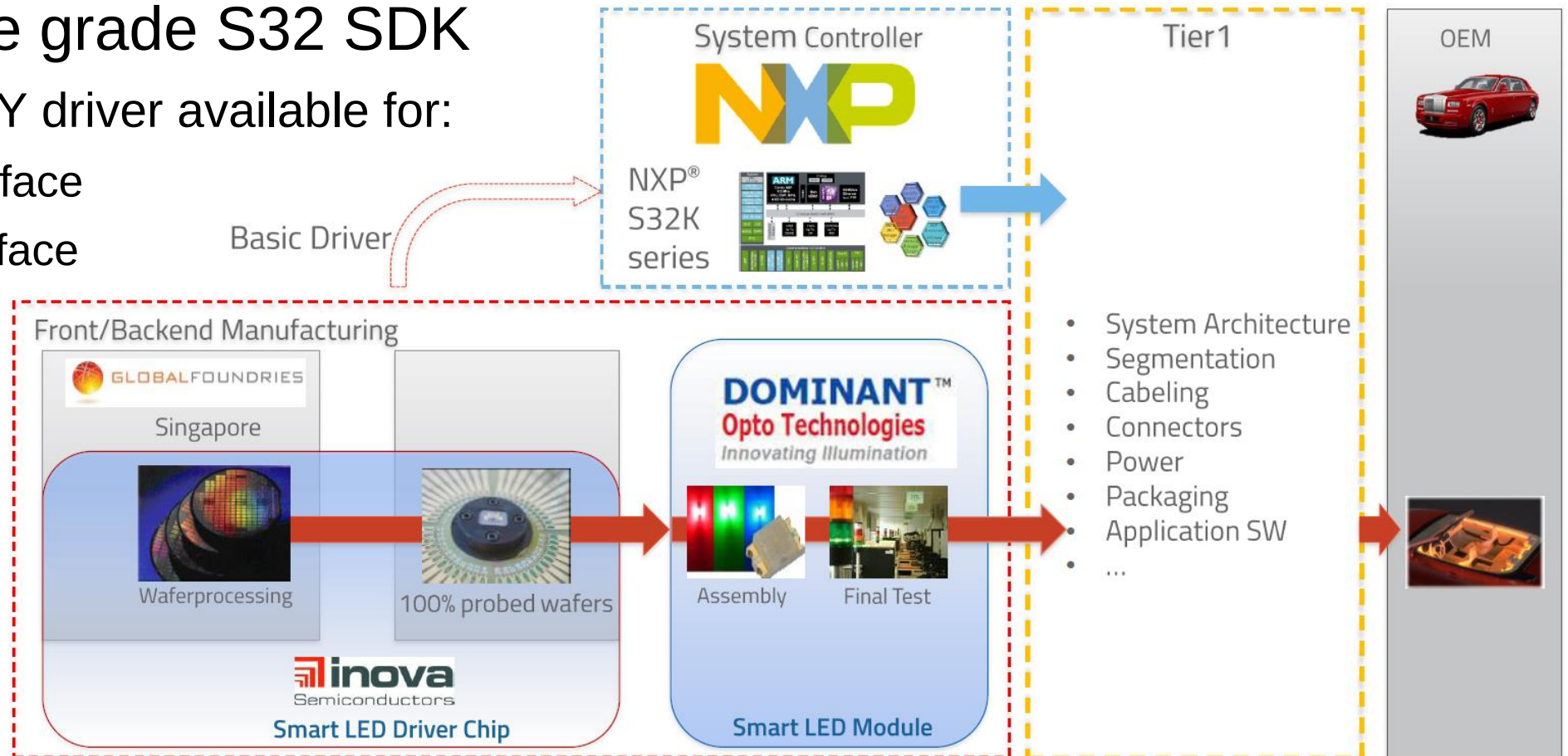
- ✓ Bi-directional communication between μ C and LED module
- ✓ EMI robust design based on 2 Mbit/s communication - no dedicated clock
- ✓ S32K1 FlexIO module – faster and more flexible
- ✓ LED temperature can be diagnosed individually by μ C
- ✓ Individual addressing of each LED -> efficient bandwidth usage

SW Architecture



ISELED Story

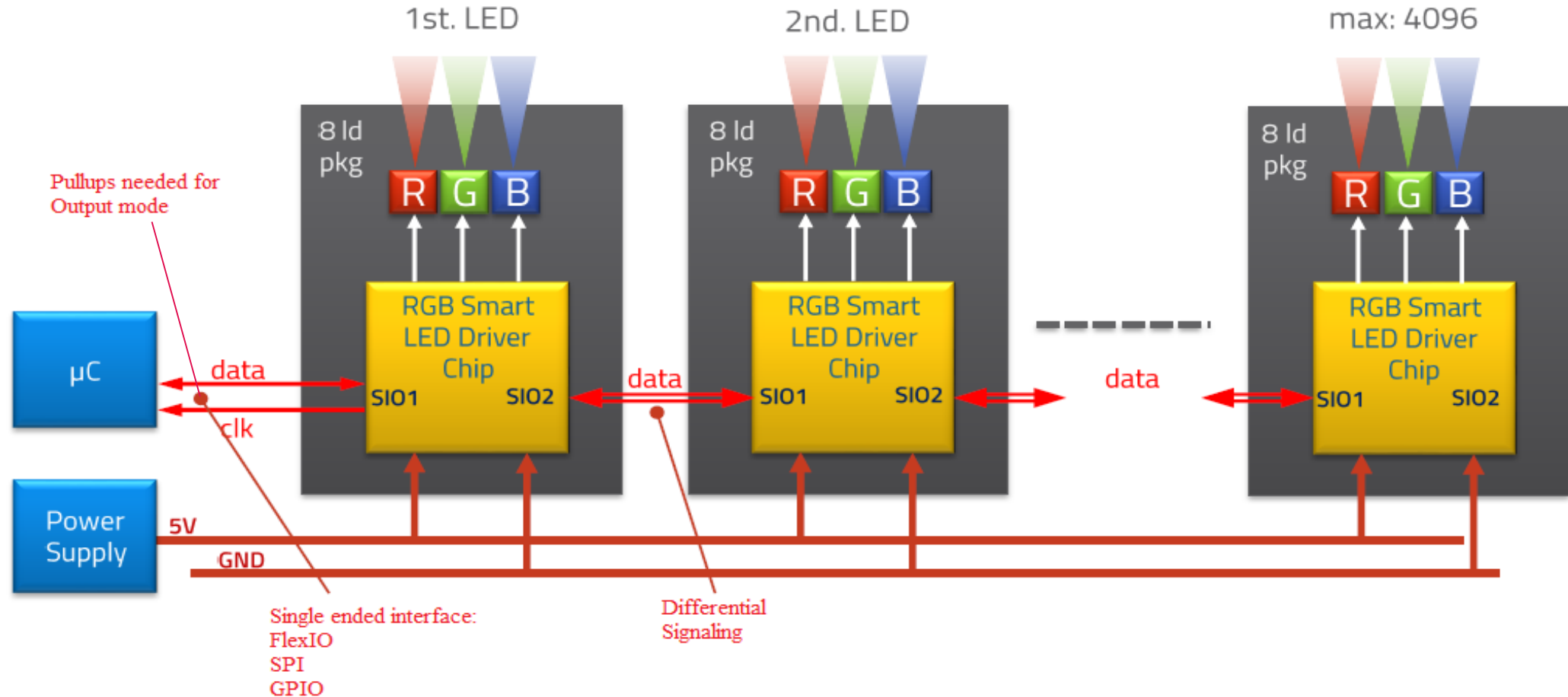
- Automotive grade S32K1 MCU family
- Automotive grade S32 SDK
 - ISELED PHY driver available for:
 - FlexIO interface
 - LPSPI interface
 - Demo SW



ISELED SMART LED Principle

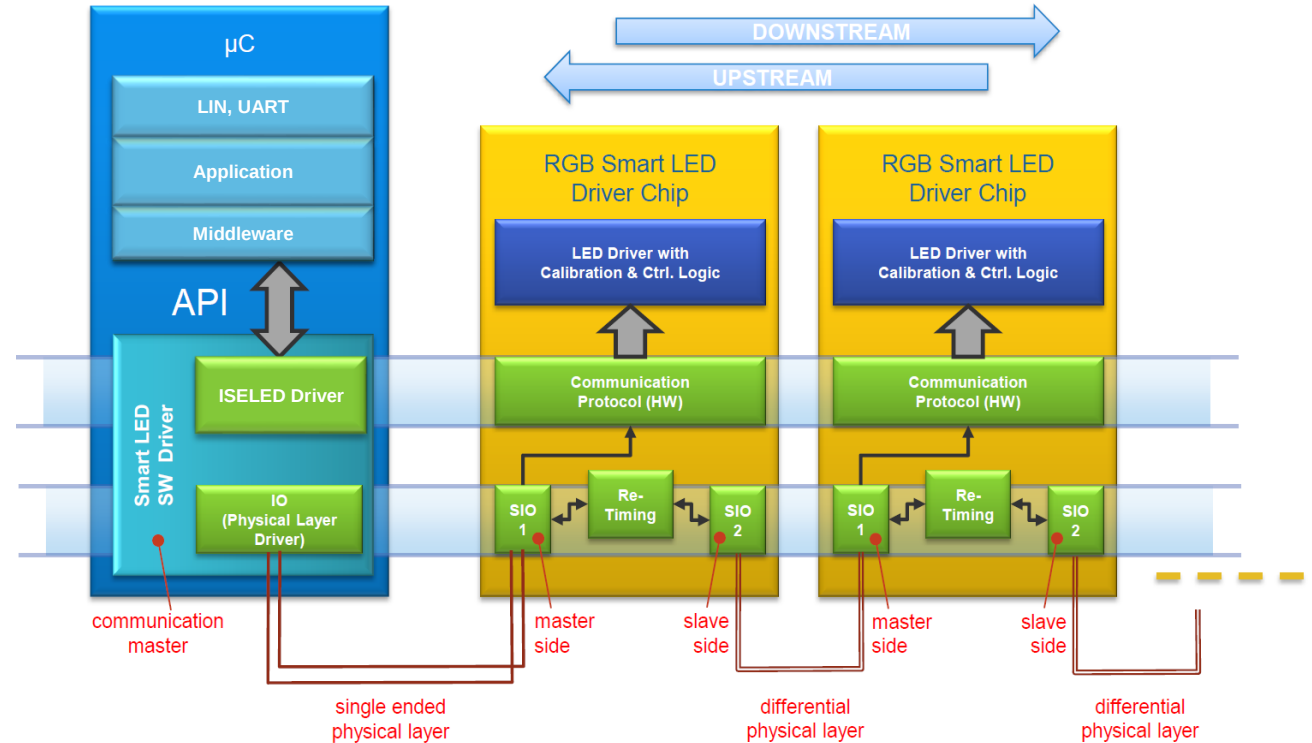


ISELED Application Setup

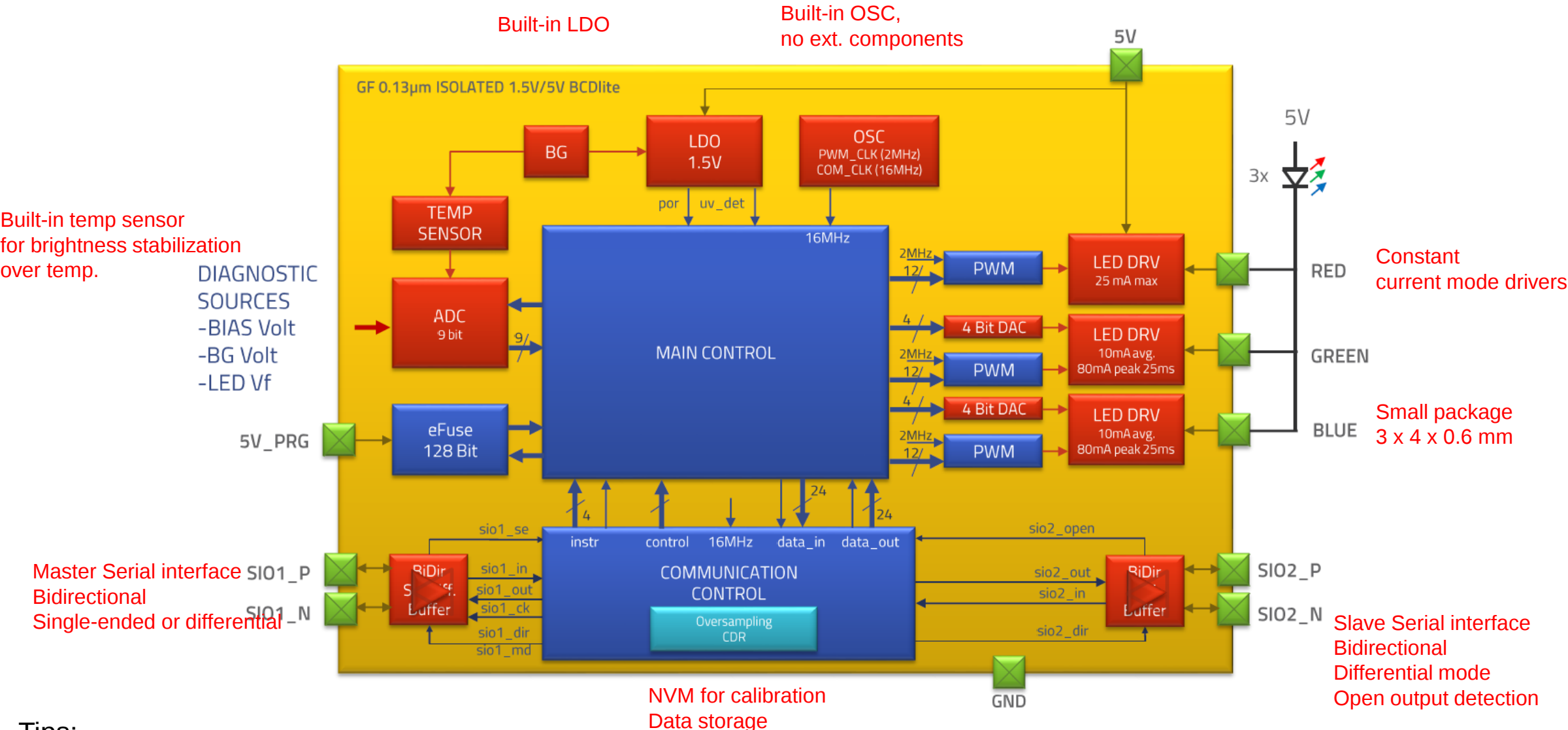


ISELED Communication Protocol

- Master-slave communication
- Half-duplex, high speed serial communication between a **LED Strip Controller Unit** and up to 4096 **Multi Color Smart LED Drivers**.
- MCU acts as comm. Master
 - Initiates all commands
 - Interfaces with the 1st LED in the chain through single-ended interface
 - Phy layer
 - FlexIO, SPI, GPIO
 - ISELED Driver
 - Middleware (Effect interpreter)



Anatomy of an ISELED SMART LED

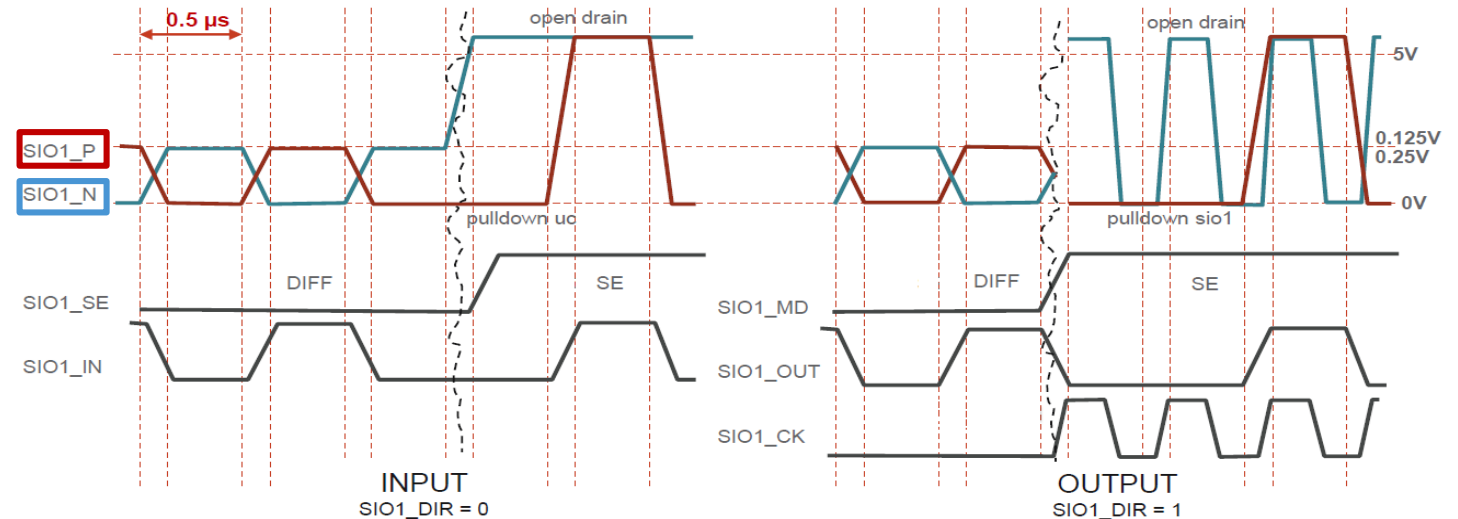
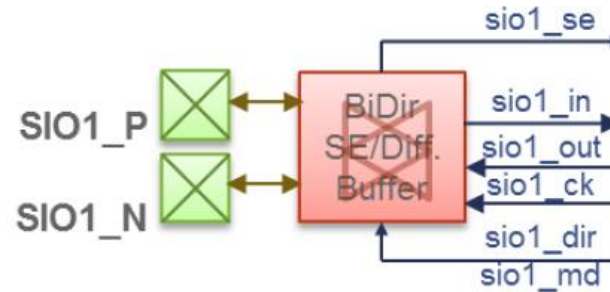


Tips:
More detail of ISELED please refer “preliminary Datasheet INLC100Q16 rev03_A3.pdf”



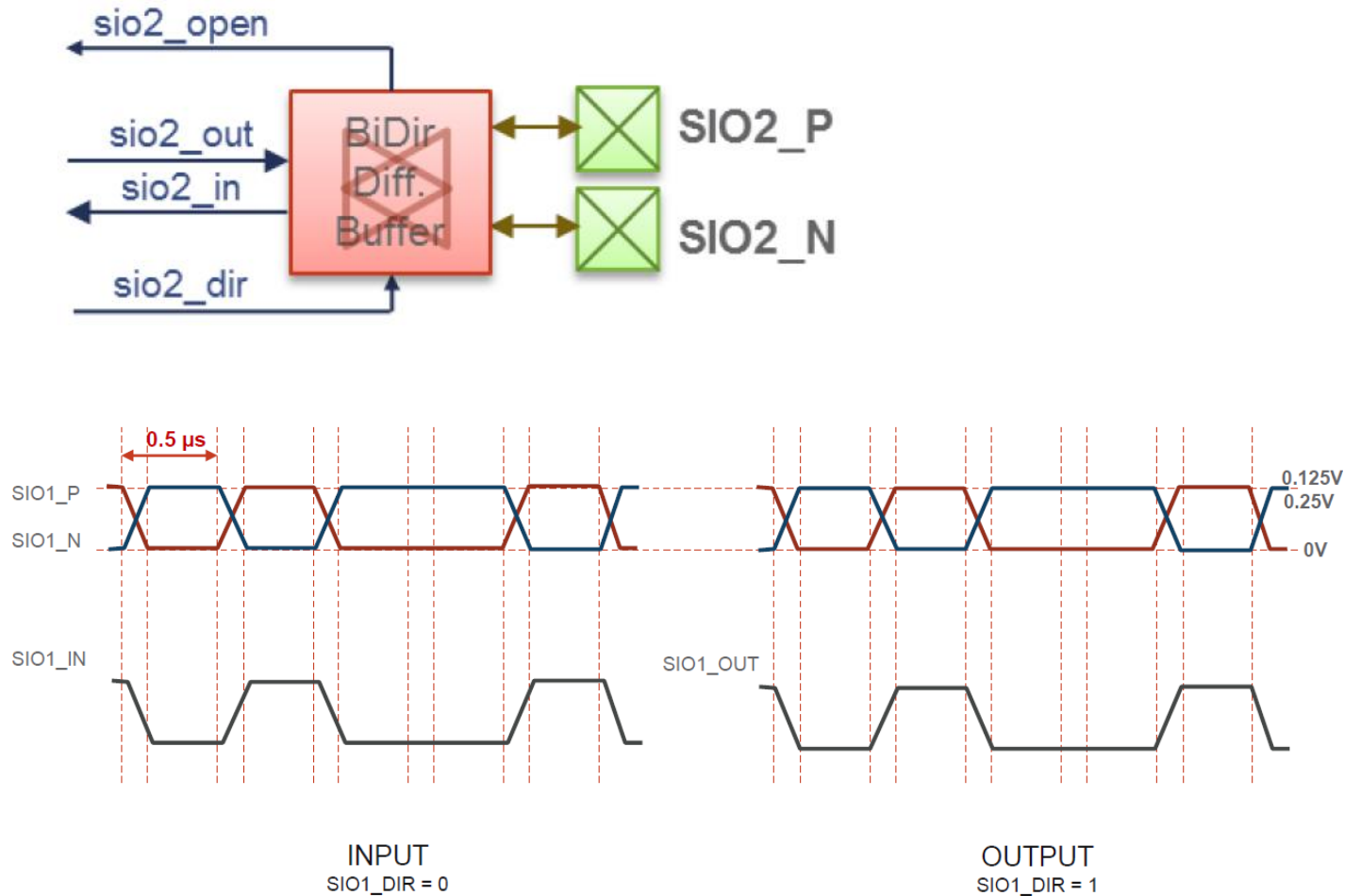
SMART LED Serial Interfaces – Master Side

- Bidirectional
- Dual mode:
 - Single ended for comm. with MCU
 - Differential for comm. with other LEDs in chain
- Single-ended mode provided
- Multilevel operational w/ level detect function
 - Sampling $SIO1_N \geq 1V$, interface switches to single-ended
- Differential mode selectable voltage swing (250/500mV)



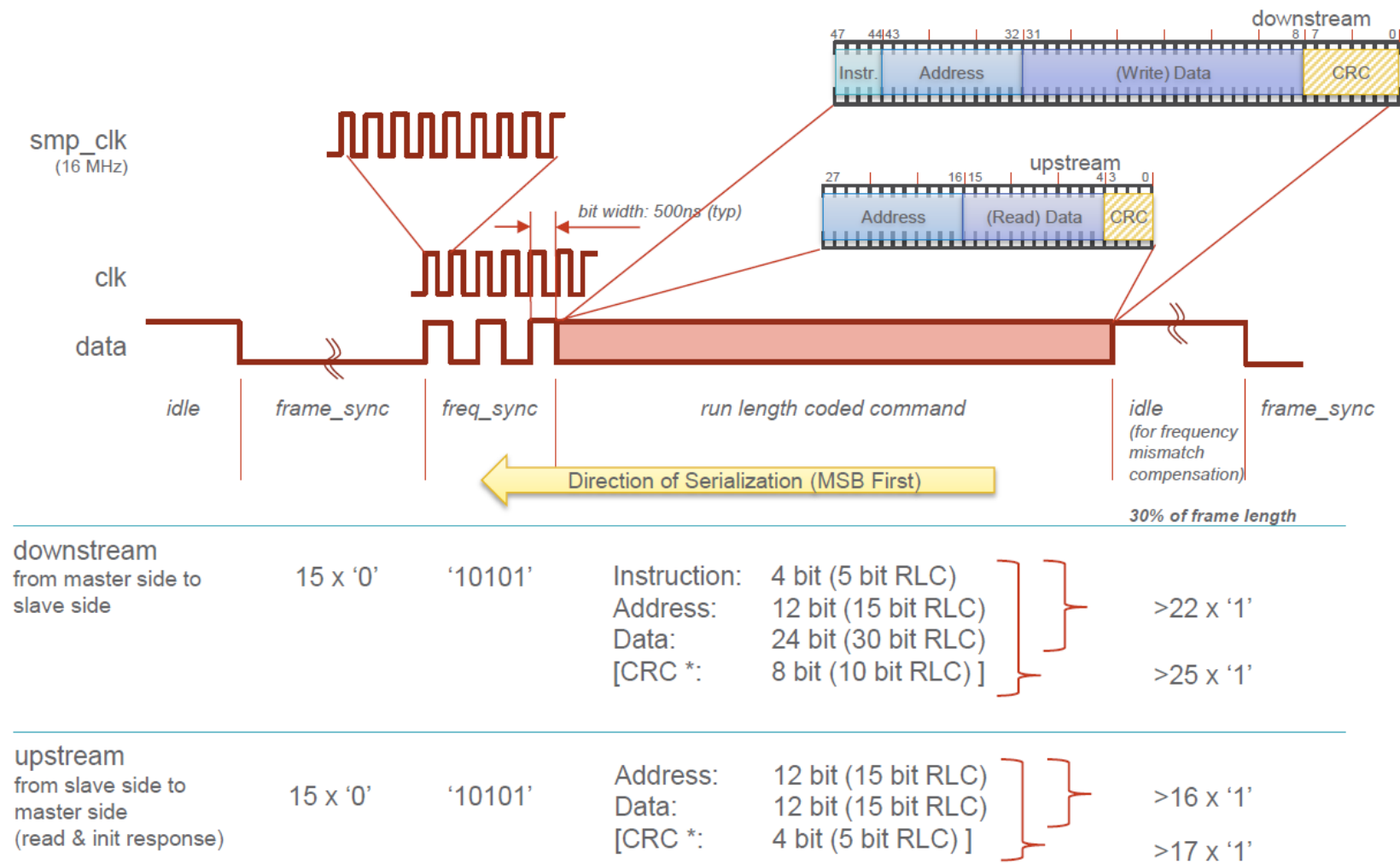
SMART LED Serial Interfaces – Slave Side

- Bidirectional
- Differential mode only
- Differential mode selectable voltage swing (250/500mV)
- Automatic termination detection (open output)



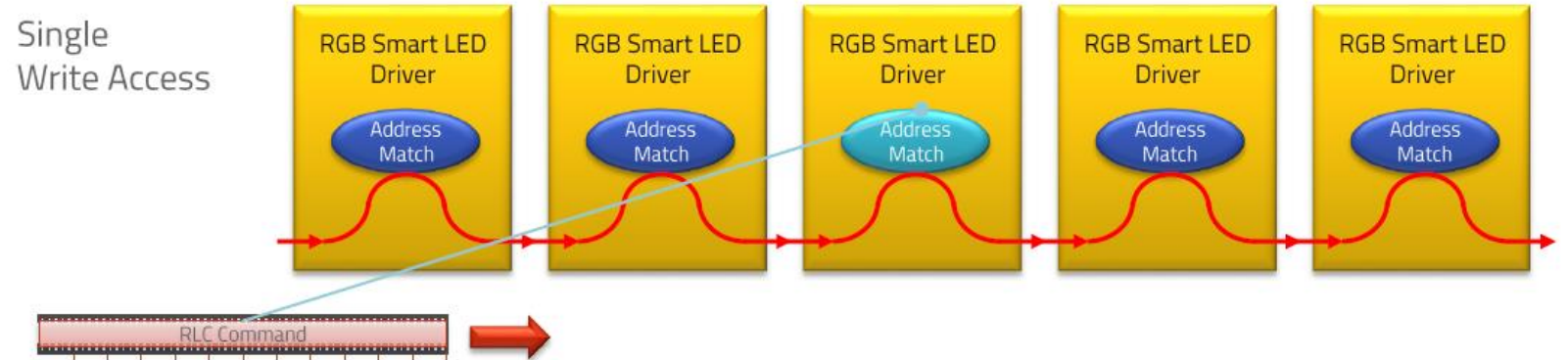
SMART LED Protocol Frame Structure

- Header
 - Frame sync
 - Freq sync.
- Payload
 - Instruction (downstream)
 - Address
 - Data
- Optional CRC field
 - CRC8 downstream
 - CRC4 upstream
- 4b/5b encoding

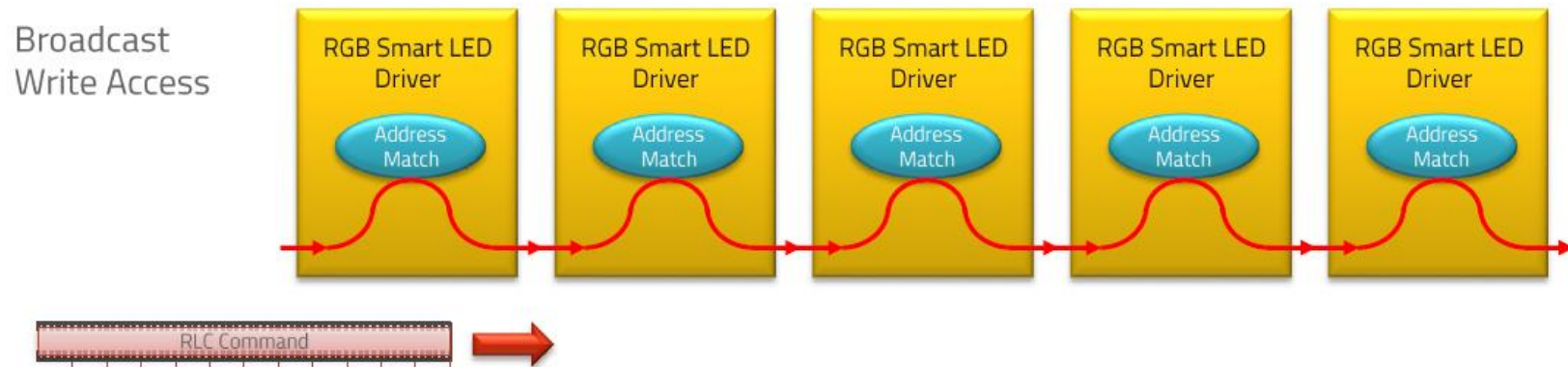


SMART LED Communication – Write Operation

- Individual addressing
 - Command is processed individually LED with matching address

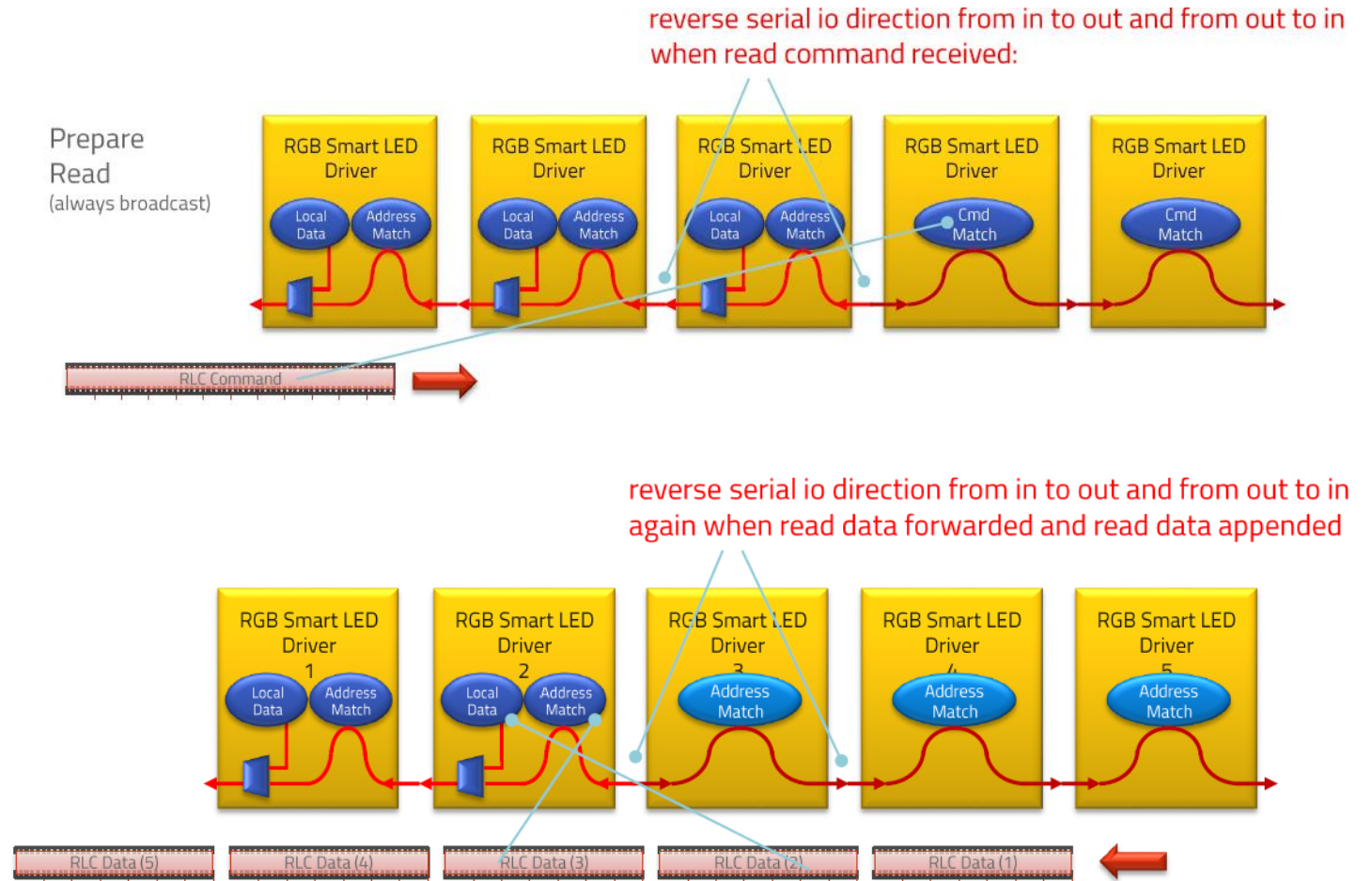


- Broadcast addressing
 - Command is processed by all LEDs in chain



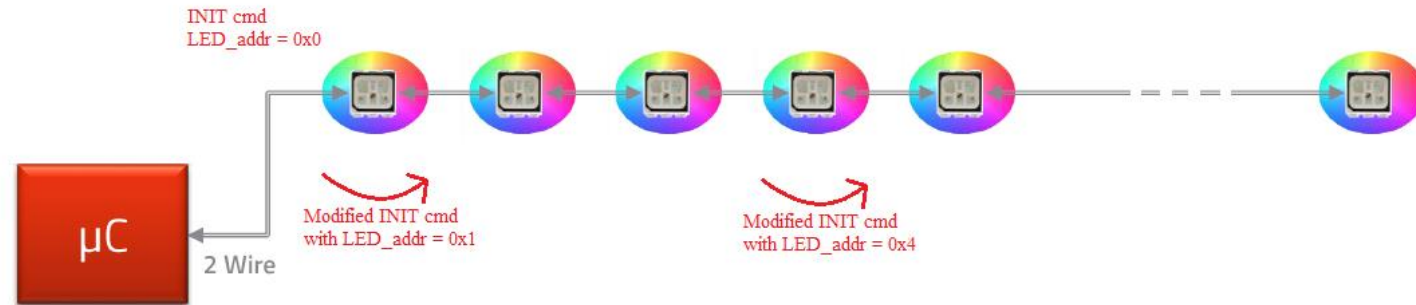
SMART LED Communication – Read Operation

- Broadcasting always used
- Default direction is downstream
- LEDs switch direction depending on the flow:
 - From downstream to upstream when decoding a READ cmd
 - From upstream to downstream again upon READ cmd response completion.



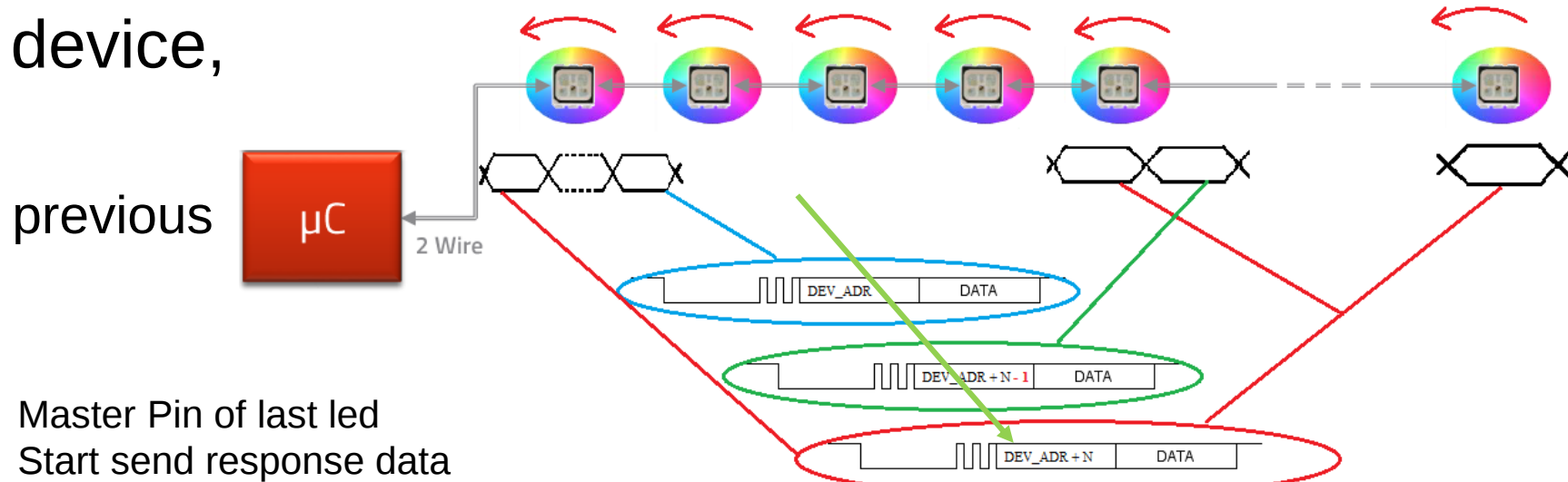
ISELED Initialization Process – Downstream Communication

- Initialization implements enumeration process
- During initialization, each LED, starting with first on strip:
 - Receives the INIT command
 - Evaluates it
 - Stores address field and increments it by 1
 - Creates a new complete INIT command, based on local clock
 - Send the new INIT command to the next LED



ISELED Initialization Process – Upstream Comm.

- Starting with the last device, each LED:
 - Forwards the frame from previous LED (except last LED)
 - Appends its own frame



ISELED Initialization Test based on Kit

2 line:

Master side pin of first led (SPI/Flexlo pin)

1 line:

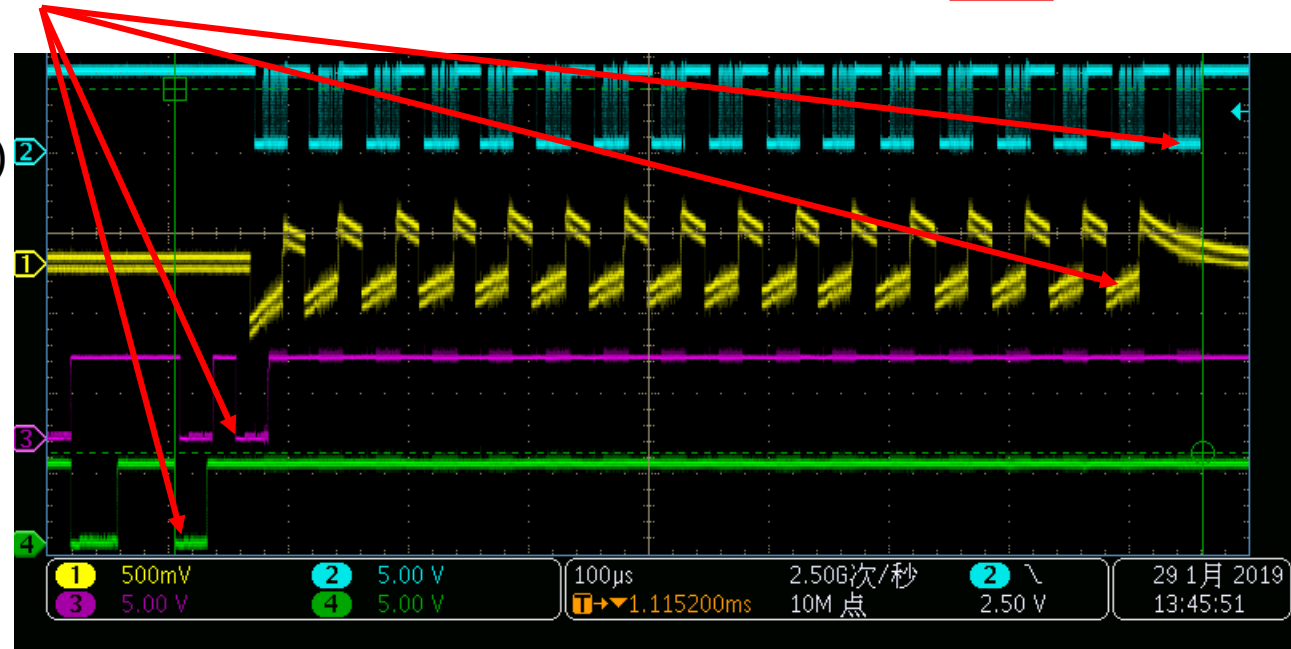
Master side pin of second led

3 line:

Master side pin of last led

4 line:

Master side pin of Second to last led



ISELED Benefits

	LIN	ISELED
<i>Lighting streaming</i>	Change of color and brightness (latency = no real time and no streaming)	Real time streaming Up to 25 frames per second, up to 4096 devices
<i>Bus speed</i>	19,6 Kbits/s	2 Mbits/s
<i>Number of supported devices</i>	Max = 15 devices	Max = 4096 devices
<i>Network</i>	Multiple sub network bus needed = cabling complexity	1 bus for the whole vehicle
<i>Command</i>	Unitary + broadcast	
<i>Protocol</i>	Master (gateway) + Slaves	
<i>Calibration (color + brightness)</i>	Assembly line calibration	Chip comes calibrated
<i>Package</i>	ASIC + RGB led	System in package with COB

NXP ISELED SOLUTION



What is NXP ISELED solution?

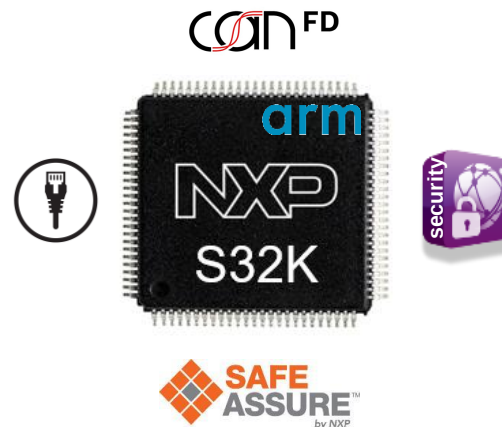
Software

- ✓ ISELED driver for:
 - NXP Auto SDK
 - NXP Autosar 4.0/4.2 (ASIL)
- ✓ S32 SDK free of charge
- ✓ Autosar MCAL + 3rd party



Hardware

- ✓ All S32K1xx MCUs
- ✓ ISELED part numbers include software license
- ✓ ISELED App Dev Kit



Market Launch June 2019

- ✓ ISELED “custom parts” released
- ✓ ISELED Driver
 - Beta release NOW
 - RTM in June 2019



S32K1 Family – Accelerating Automotive Software Design

Performance & Integration

Future proof designs

- ARM Cortex M4F and M0+ cores
- ISO CAN-FD, CSEc hardware security, ISO26262 ASIL-B functional safety
- Ultra low power



Automotive-grade SW

Minimized complexity

- S32 Design Studio IDE
- Automotive-grade Software Development Kit (SDK)
- Autosar MCAL & OS, 3rd party ecosystem



Broad Portfolio

Maximised reuse

- 128KB to 2MB, 32 to 176 pins
- H/w and S/w compatibility
- AEC Q100 grade 1 qualified (125°C), min. 15 year longevity

Flash	Pin Count								
	18/24	32	48	64	80	100 LQFP	100 BGA	144	176
2M						S32K148	S32K148	S32K148	S32K148
1M				S32K146		S32K146	S32K146	S32K146	
512K			S32K144 S32K144 M1	S32K144 S32K144 M1		S32K144	S32K144		
256K			S32K142 S32K142 M1 S32K118	S32K142 S32K142 M1 S32K118		S32K142			
128K		S32K116	S32K116	KEA128	KEA128				
64K		KEA104		KEA104 84	KEA104				
32K		KEA102		KEA102					
16K		KEA101		KEA101					
8K	KEA100								



S32K1xx Feature Overview

S32K11x

S32K116

S32K118

Arm Cortex-M0+ @ 48MHz

128KB Flash

256KB Flash

16KB SRAM

24KB SRAM

up to 42 I/Os

up to 58 I/Os

4 channel eDMA

1x FlexCAN with 1x FD

1x 13-ch 12-bit ADC

1x 16-ch 12-bit ADC

QFN-32

LQFP-64

LQFP-48

Common Features

AEC-Q100, 125°C, 5V

CSEc Security Module

Low Power Operating Modes & Peripherals

ASIL-B Capable: (ECC, MPU, CRC, W'DOGs)

LPUART, LPSPI, LPIIC, FlexIO

FlexTimers, LP Timers, Prog. Delay Block

8-40MHz Ext. Osc, 8/48MHz Osc., 128KHz LPO

*JTAG

S32DS IDE, SDK

Autosar MCAL / OS

Application SW

S32K142

S32K144

S32K146

S32K148

Arm Cortex-M4F @ up to 112MHz

256KB Flash

512KB Flash

1MB Flash

2MB Flash

32KB SRAM

64KB SRAM

128KB SRAM

256KB SRAM

up to 89 I/Os

up to 128 I/Os

up to 156 I/Os

16 channel eDMA

2x FlexCAN with 1x FD**

3x FlexCAN with 1x FD**

3x FlexCAN with 2x FD

3x FlexCAN with 3x FD

2x 16-ch 12-bit ADC

2x 24-ch 12-bit ADC

2x 32-ch 12-bit ADC

LQFP-64

LQFP-176

LQFP-48

LQFP-144

LQFP-100

LQFP-100

MAPBGA-100

IEEE 1588 ENET

Quad SPI

ETM Trace

2x SAI

S32K14x

*S32K14x only

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How to start with NXP ISELED solution?

Step 1: Purchase ISELED Application Development Kit

- Orderable via Element14/Farnell website(<https://de.farnell.com/b/element14>)

Step 2: Download Documentation via <https://iseled.com/products.html>

- ISELED ADK User Manual
- NXP Installation Guide

Step 3: Download NXP ISELED SW

- Before June'19: Contact gpis.software@nxp.com for registration code
- After June'19: Download from www.nxp.com/S32K/ISELED

Step 4: Evaluation Phase

- When using ISELED development kit or non-ISELED K1 standard part number device:
 - License for evaluation only. Limited functionality: *Mandatory driver re-initialization after 150,000 ISELED commands.*

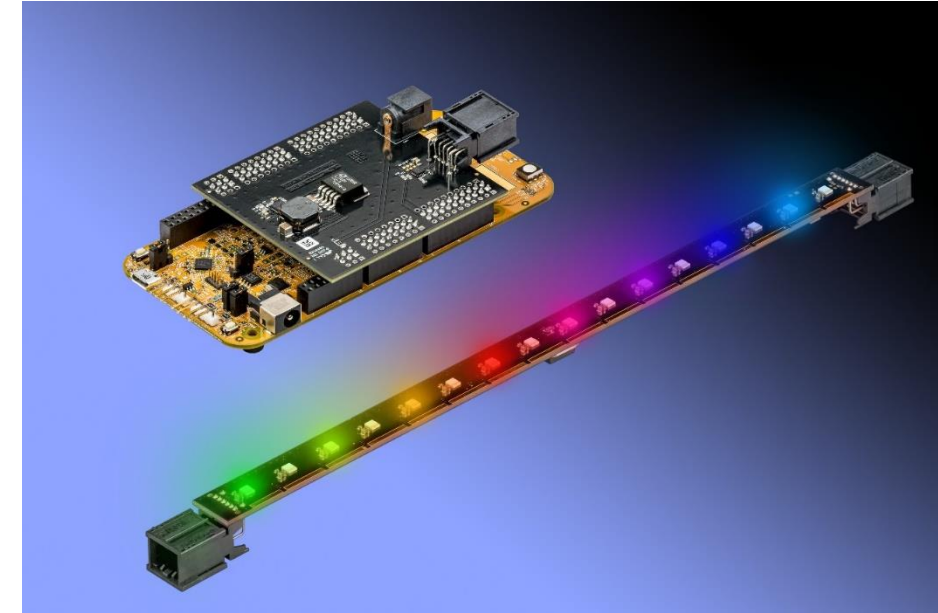
Step 5: Production Phase

- Purchase S32K1 custom ISELED MCU part number from www.nxp.com/S32K/ISELED
- License for evaluation and production included
- Full functionality available

How to start with NXP ISELED solution?

Step 1: Purchase ISELED Application Development Kit

- Orderable via Element14/Farnell website (<https://de.farnell.com/b/element14>)
- Note: ADK only orderable from Etailer [Element14/Farnell](#) as per ISELED Alliance Member's Distribution policy
- ADK Contents:
 - S32K144EVB-Q100 (NXP)
 - ISELED Power Adaptor 'Shield' (Inova Semi.)
 - 1 x 16-LED 'Bar' (Dominant Opto or OSRAM)
- Part numbers
 - **ISELED_ADK_D** //ADK + Dominant 16-LED bar
 - **ISELED_ADK_O** //ADK + OSRAM 16-LED bar
 - Additional LED bars orderable separately for daisy-chaining
 - **ISELED_ADK_EXT_D** //Dominant 16-LED bar
 - **ISELED_ADK_EXT_O** //OSRAM 16-LED bar



How to start with NXP ISELED solution?

Step 2: Download Documentation via <https://iseled.com/products.html>

- ISELED ADK User Manual
- NXP Installation Guide

Step 3: Download & Installation NXP ISELED SW

- Before June'19: Contact gpis.software@nxp.com for registration code
- After June'19: Download from www.nxp.com/S32K/ISELED

1. ISELED SW Installation Note

Please refer : “S32K SDK ISELED Driver installation guide.pdf”

Tips:

- ① If your S32DS does not install in disk “/C”, compiling will appear problem. So suggest S32DS install in disk “/C”.
- ② Before installing ISELED Driver, it must install the correct version of SDK. There is description about the version of SDK in “S32K1_ISELED_RTM_4.0.0_ReleaseNotes.pdf”

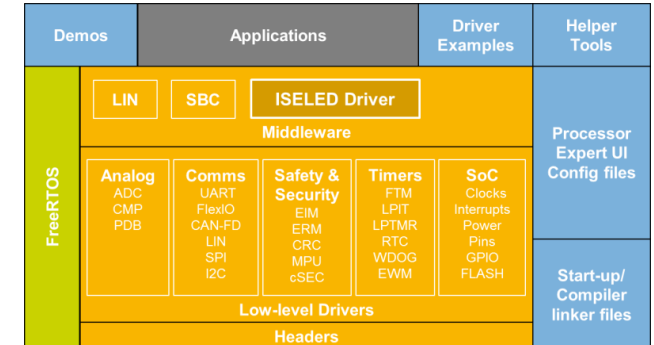
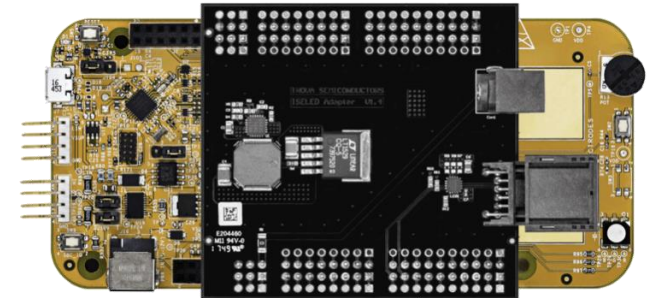
1. Description

This new library, built on top of the S32 SDK, is a new software solution designed to minimize the complexity and accelerate the time-to-market of applications designed to control ISELED devices using S32K1xx.

The package must be installed on top of the S32SDK for S32K1xx devices version 3.0.0 RTM and 3.0.1 RTM-SR.

This release has RTM quality status in terms of testing and quality documentation.

This SDK can be used standalone or it can be used with S32 Design Studio IDE (see Documentation).



How to install ISELED driver software?

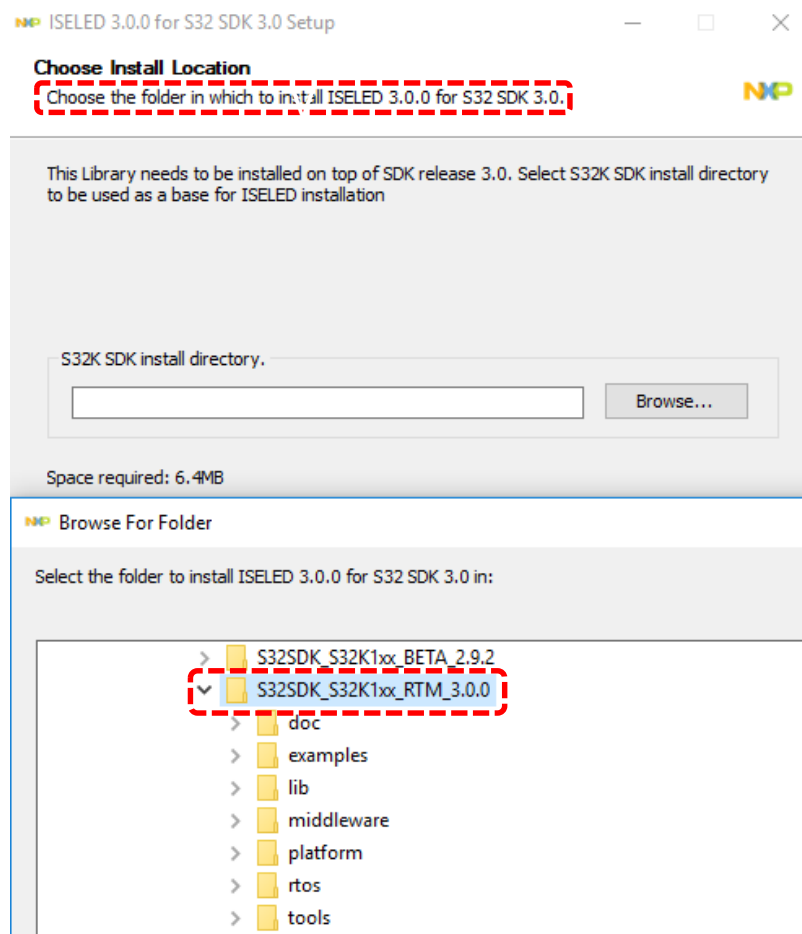
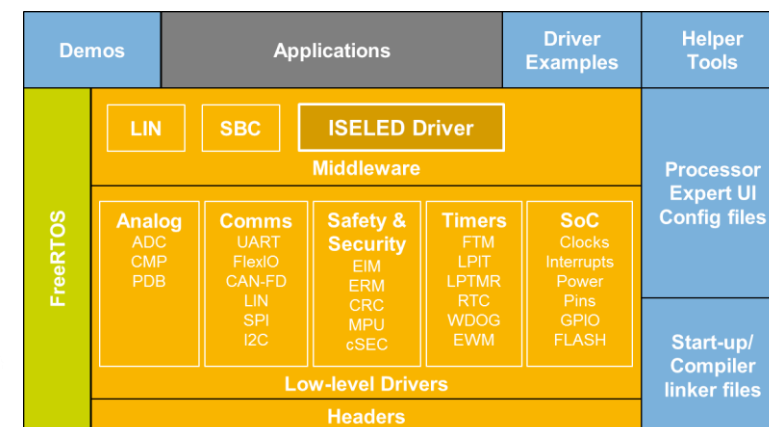
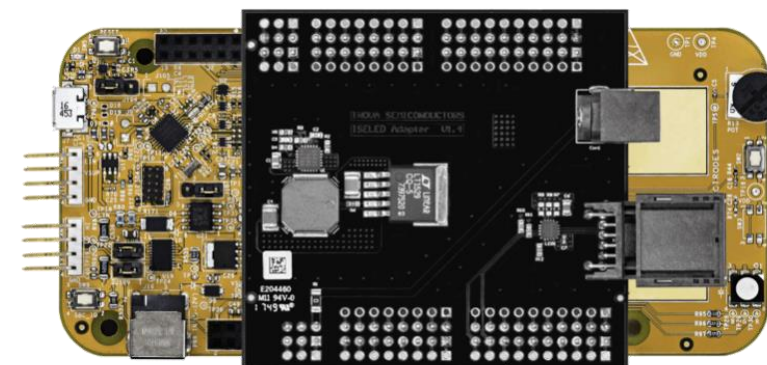
1. ISELED SW Installation Note

Tips:

③ Installing ISELED SDK 4.0.0 as be follow:

ISELED SDK 4.0.0 – S32K1x SDK3.0.0

The path must input correct path in installing ISELED driver.



How to install ISELED driver software?

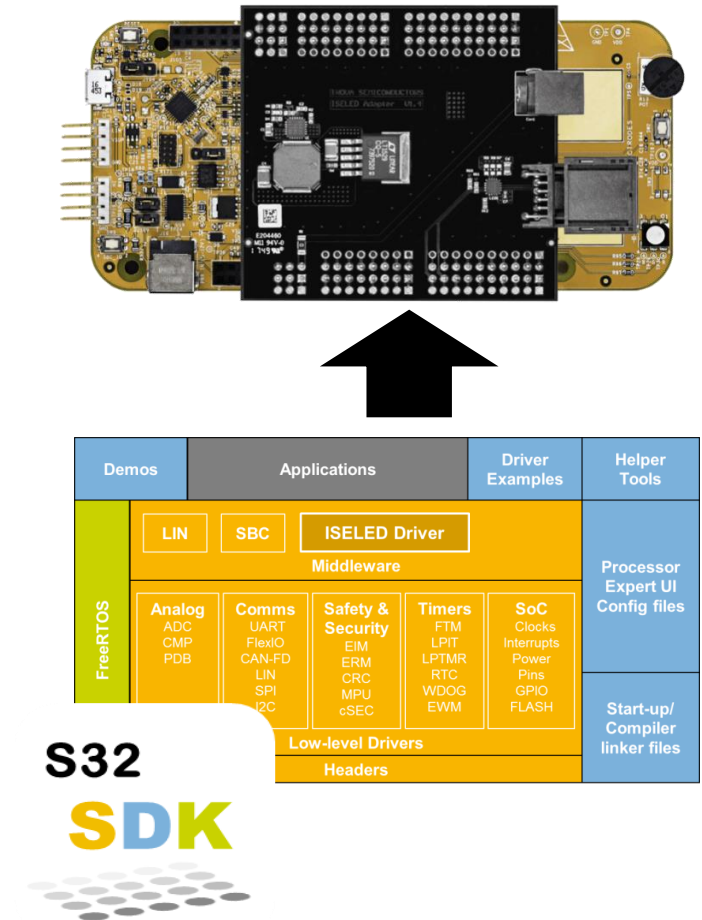
Step 3: Download & Installation NXP ISELED SW

2. Demo project code:

C:\NXP\S32DS_ARM_v2018.R1\S32DS\S32SDK_S32K14x_RTM_3.0.0\examples\S32K144\demo_apps\iseled_freemaster

3. User manual:

C:\NXP\S32DS_ARM_v2018.R1\S32DS\S32SDK_S32K14x_RTM_3.0.0\doc\ISELED\ISELED_S32K144_UserManual.pdf



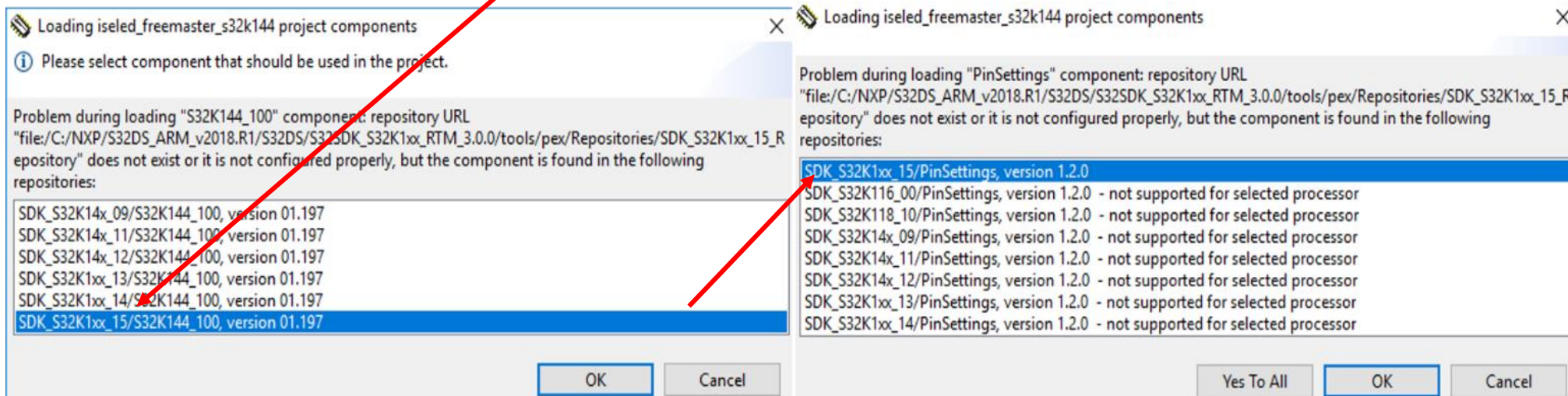
ISELED Application Development Kit Set up

- **Please refer:** “ISELED ADK User Manual.PDF”

Tips:

When new a iseled_freemaster example project, it is necessary to select the correct version of SDK. The version of SDK's relation is described as follow:

ISELED driver 3.0.0 -- S32K1xx SDK3.0.0 -- SDK_S32K14x_15



How to start with NXP ISELED solution?

Step 4: Evaluation Phase

- When using ISELED development kit or non-ISELED K1 standard part number device:
 - License for evaluation only. Limited functionality: *Mandatory driver re-initialization after 150,000 ISELED commands.*

Device	Evaluation Board Part Number	Compatibility to ISELED ADK	Modifications needed
S32K116	S32K116EVB-Q048	Modifications needed	- ISELED Adapter needs two wires (clock and data) routed from J5 to J4: J5-19 routed to J4-13 ; J5-17 routed to J4-09 - ISELED Adapter must be connected to EvalBoard so that all the pins from ISELED Adapter header J3 are connected to header J4 from EvalBoard - In case ISELED Adapter pins hit GND2 test point and don't allow the Adapter to be inserted completely in headers, GND2 must be bent (if Adapter pins are touching GND2 it's not a problem)
S32K118	S32K118EVB-Q064	Modifications needed	
S32K142	S32K142EVB-Q100	100% compatible	No
S32K144	S32K144EVB-Q100	100% compatible	No
S32K146	S32K146EVB-Q144	100% compatible	No
S32K148	S32K148EVB-Q176	Modifications needed	- ISELED Adapter needs two wires (clock and data) routed from ISELED Adapter header J5 to EvalBoard header J2: J5-19 routed to J2-25 ; J5-17 routed to J2-28 - ISELED Adapter must be connected to EvalBoard so that all the pins from ISELED Adapter header J5 are connected to header J5 from EvalBoard

How to start with NXP ISELED solution?

Step 5: Production Phase

- After June'19: Purchase S32K1 custom ISELED MCU part number from www.nxp.com/S32K/ISELED
- License for evaluation and production included
- Full functionality available

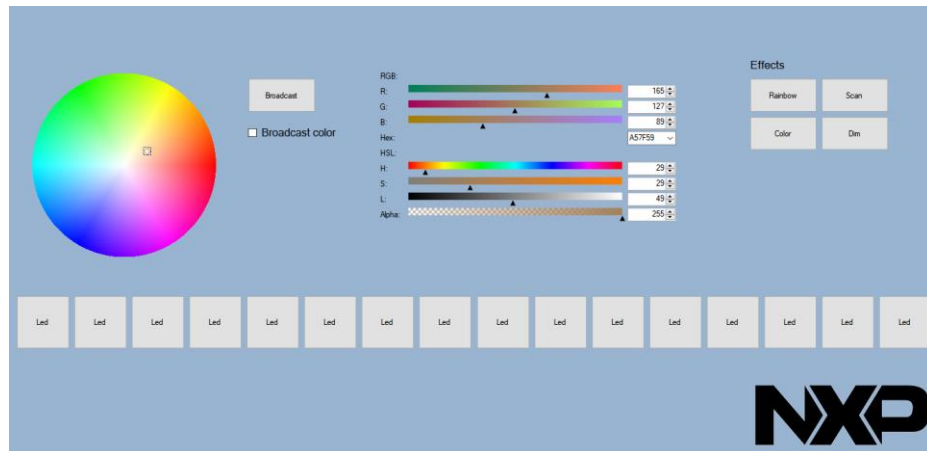
Product	ISELED Part Number	Flash	RAM	Package	Key Features	Ambient Temperature
K116	FS32K116LIT0VFMFT	128KB	17KB	32QFN	48MHz + DMA + FlexIO + ISELED	-40 to 105°C
	FS32K116LIT0VLFT			48LQFP	48MHz + DMA + FlexIO + ISELED	
K118	FS32K118LIT0VLFT	256KB	25KB	48LQFP	48MHz + DMA + FlexIO + ISELED	
K142	FS32K142UIT0VLHT	256KB	32KB	64LQFP	112MHz + DMA + FlexIO + ISELED	
K144	FS32K144UIT0VLHT	512KB	64KB	64LQFP	112MHz + DMA + FlexIO + ISELED	
	FS32K144ULT0VLHT				112MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
	FS32K144ULT0VLLT			100LQFP	112MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
K146	FS32K146UIT0VLLT	1MB	128KB	100LQFP	112MHz + DMA + FlexIO + ISELED	
	FS32K146ULT0VLLT				112MHz + DMA + FlexIO + ISELED + CAN FD + CSEc	
K148	FS32K148UIT0VLQT	2MB	256KB	144LQFP	112MHz + DMA + FlexIO + ISELED	
	FS32K148UGT0VLQT				112MHz + DMA + FlexIO + ISELED + ENET + CSEc + CAN FD	

NOTE: ISELED feature only available with above S32K1 part numbers, both Tray and Reel (16th PN character = T or R)

ISELED LED Effects Configuration Tools

NXP LED Effects Tool

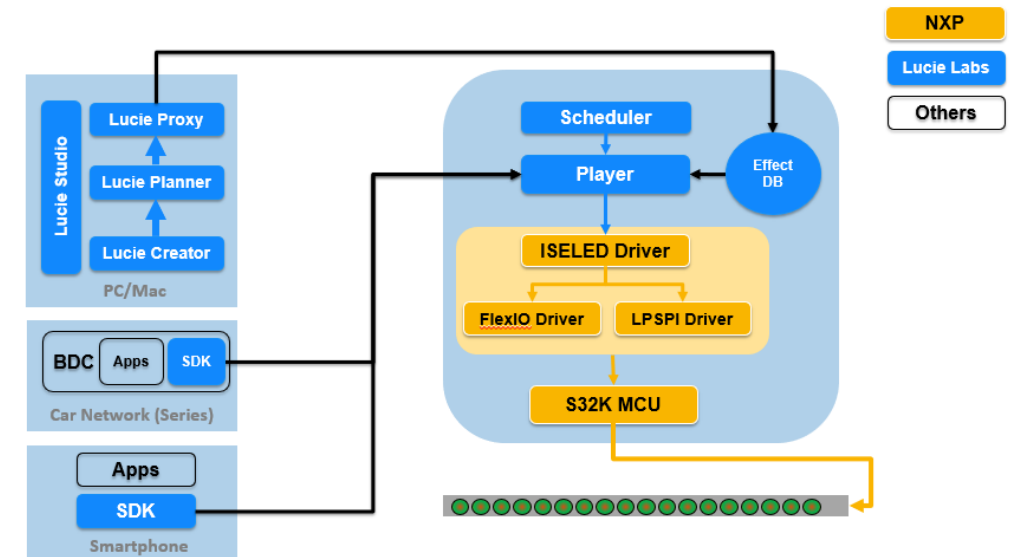
- Available from NXP
- Free of charge, Excel based
- For demo use only



Lucie Labs Lucy Studio



- Available from Lucie Labs, France
- Free 90-day evaluation version
- For production use



S32K1xx ISELED Driver

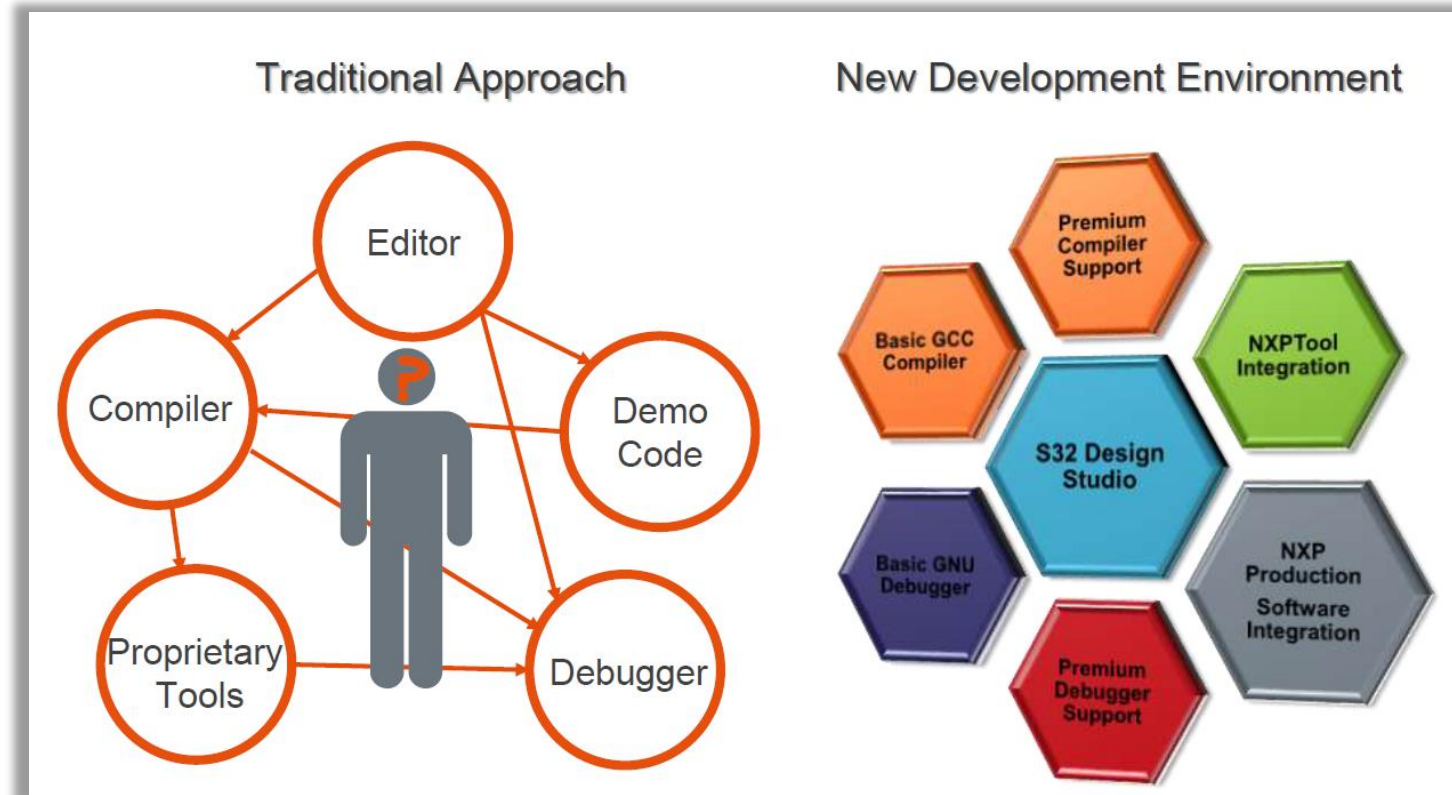


S32K1 ISELED Driver

- Delivered in binary format
- IP protection mechanism implemented
 - S32K1 ISELED custom parts have SDID register bit set to 1
 - ISELED s/w driver checks this which allows driver to run
- SDK Non-Autosar Solution
 - S32 Design Studio
 - S32 SDK RTM SR* 3.0.1
 - S32K1 ISELED SDK Driver RTM 4.0.0
 - Supported devices: S32K11x, K14x
- Autosar Solution
 - S32K1 Autosar MCAL 4.0 / 4.2 (QM / ISO 26262)
 - S32K1 ISELED MCAL (4.0/ 4.2) Driver RTM (ISO 26262)
 - Supported devices: S32K118, K14x

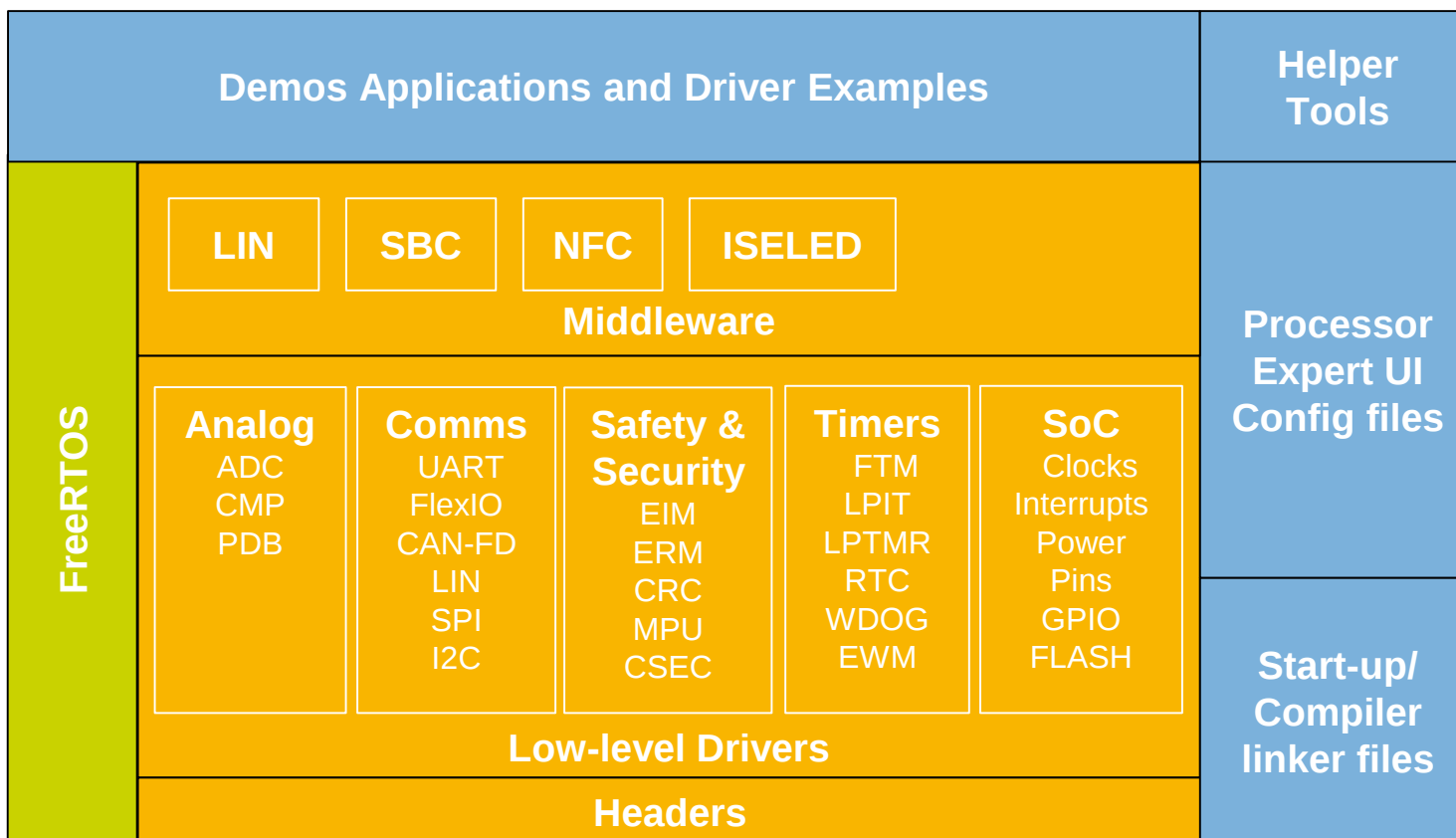
S32 Design Studio Environment

- Free of charge
- Unlimited code size
- Eclipse based environment
- GNU compiler & debugger integrated
- S32 SDK integrated (graphical configuration)
- Processor Expert integrated (automatic code generator)
- Can use with 3rd party compilers & debuggers (IAR) via Connection Utility
- Supports S32K and Power Architecture (MPC) products
- Not a replacement for NXP's CodeWarrior IDE
- Not intended to compete with premium 3rd party IDEs



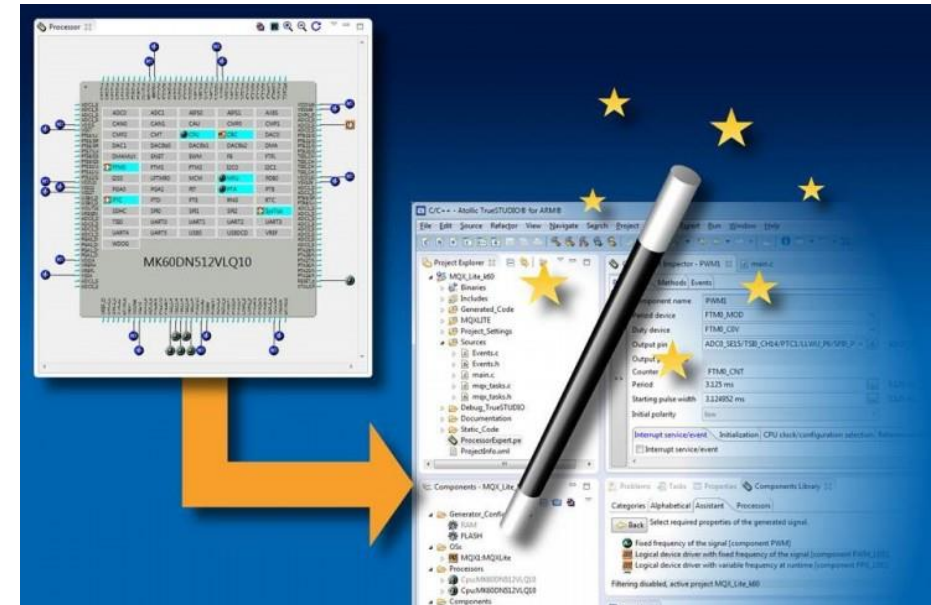
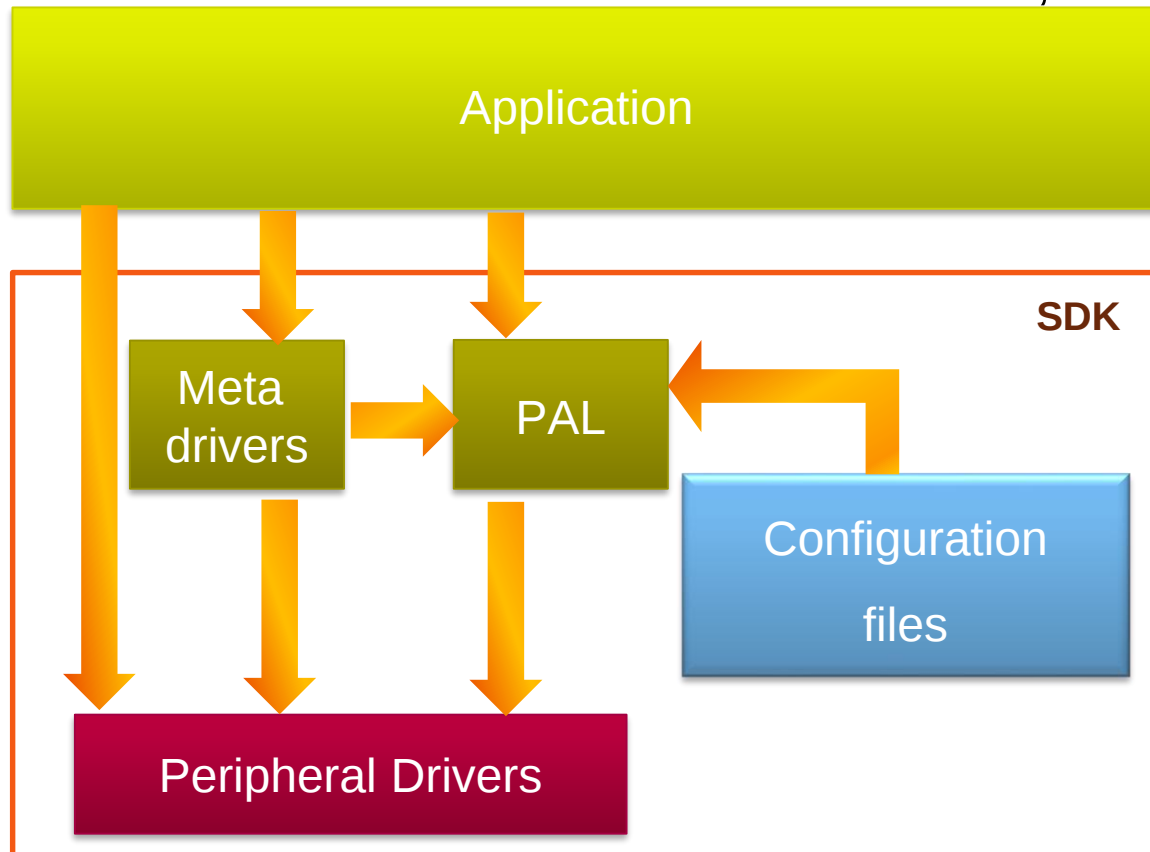
S32K SDK – Automotive Qualified SW Package

- Non-AUTOSAR Software package
- Graphical-based configuration
- Eclipse or other IDEs
- Covers all S32K MCUs Family
- Production quality: SPICE/CMMI compliant, MISRA 2012
- Multiple toolchains supported
- FreeRTOS integration



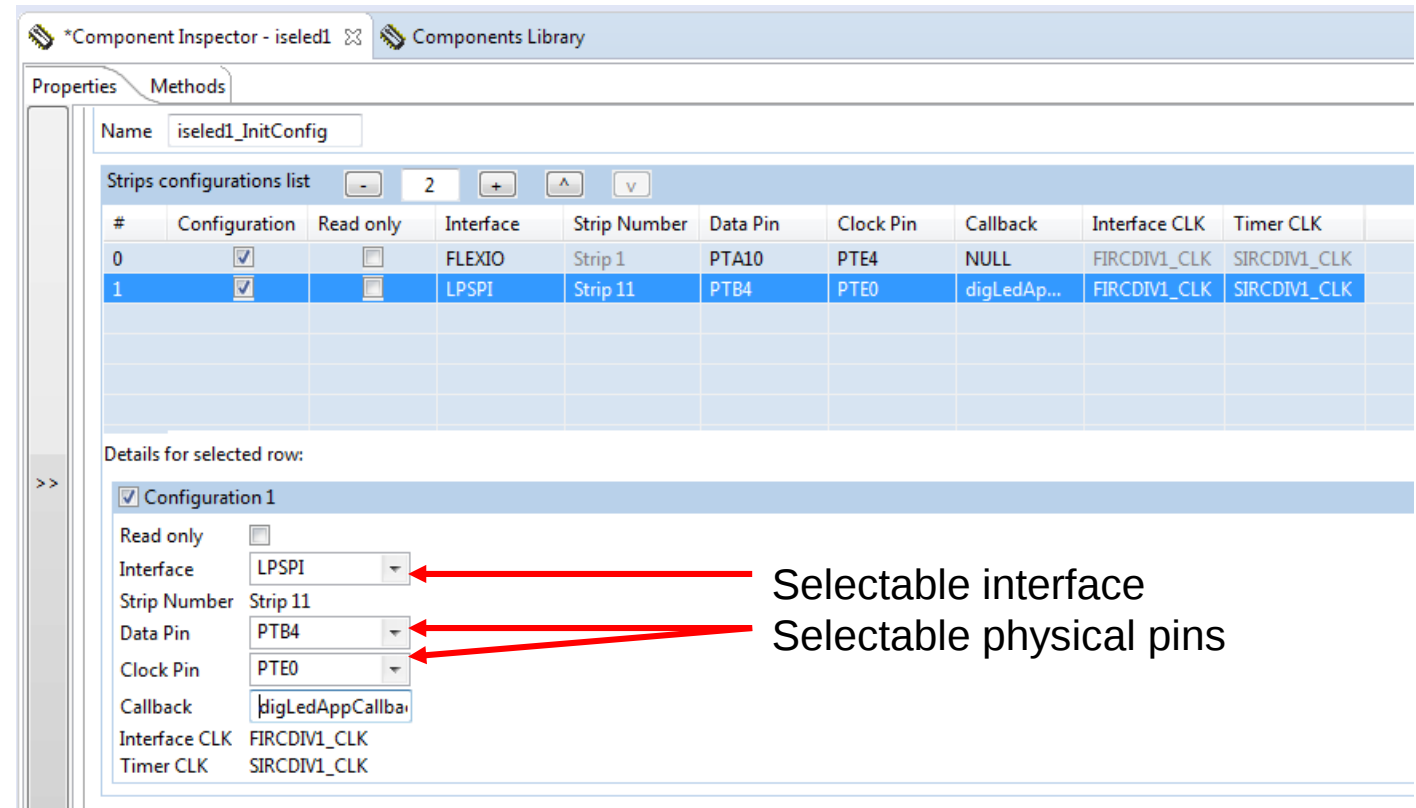
S32 SDK drivers

- Static drivers model
- Static drivers files, configurable through S32DS plugin (ProcessorExpert)
- Drivers files can be used as standalone, initialized through user-defined configuration



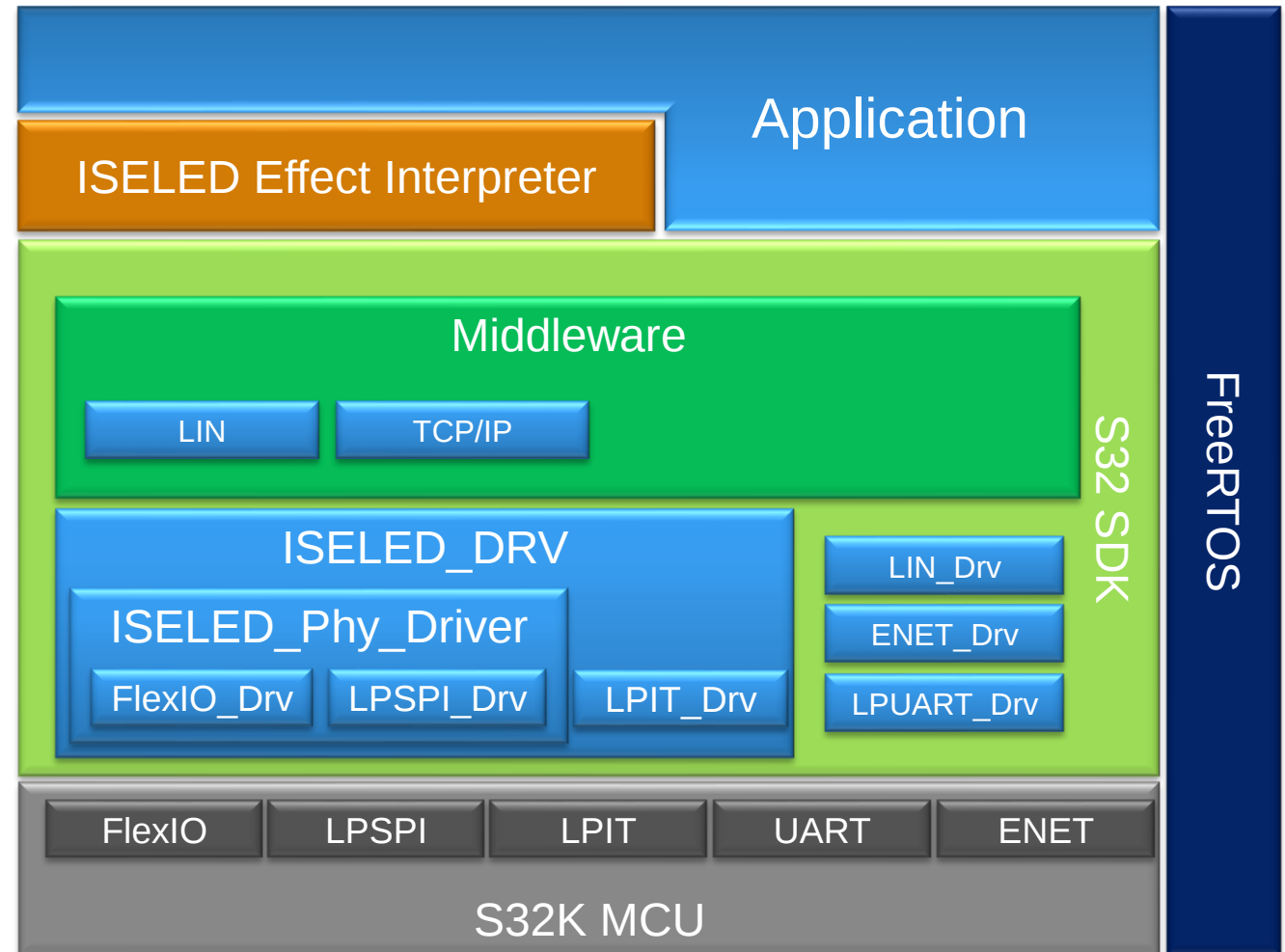
ISELED PEx configuration component

- Dual communication interface
 - FlexIO
 - LPSPI
- Multiple (up to 13) strips supported in parallel
- Callback based application notification
 - Tx/Rx completion
 - Comm. timeout detected
 - CRC error
 - Chanilength error

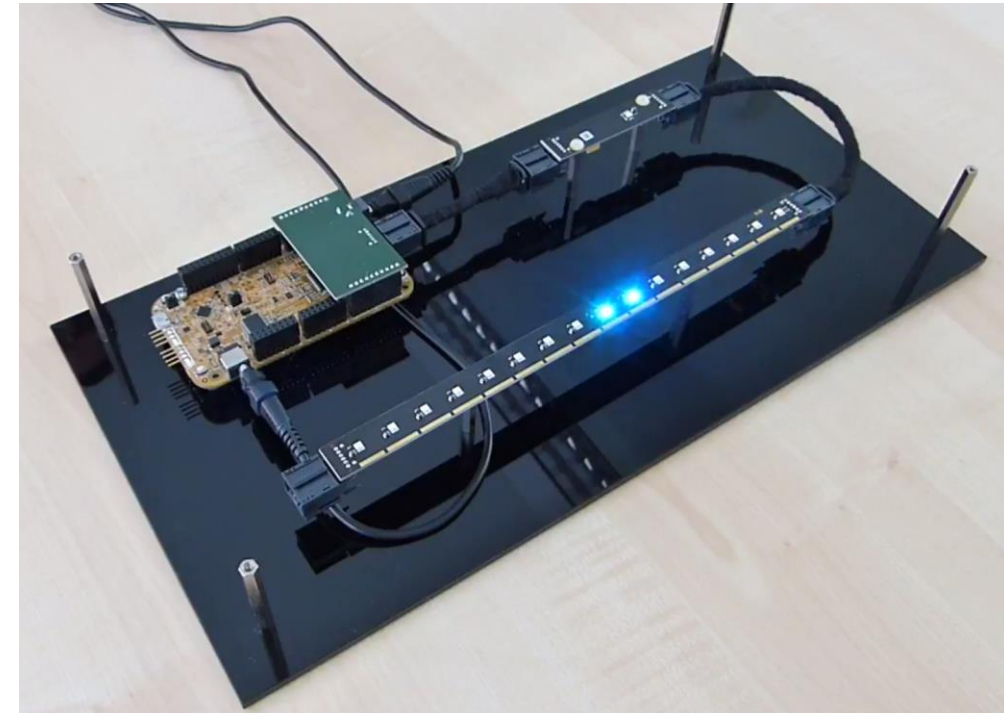
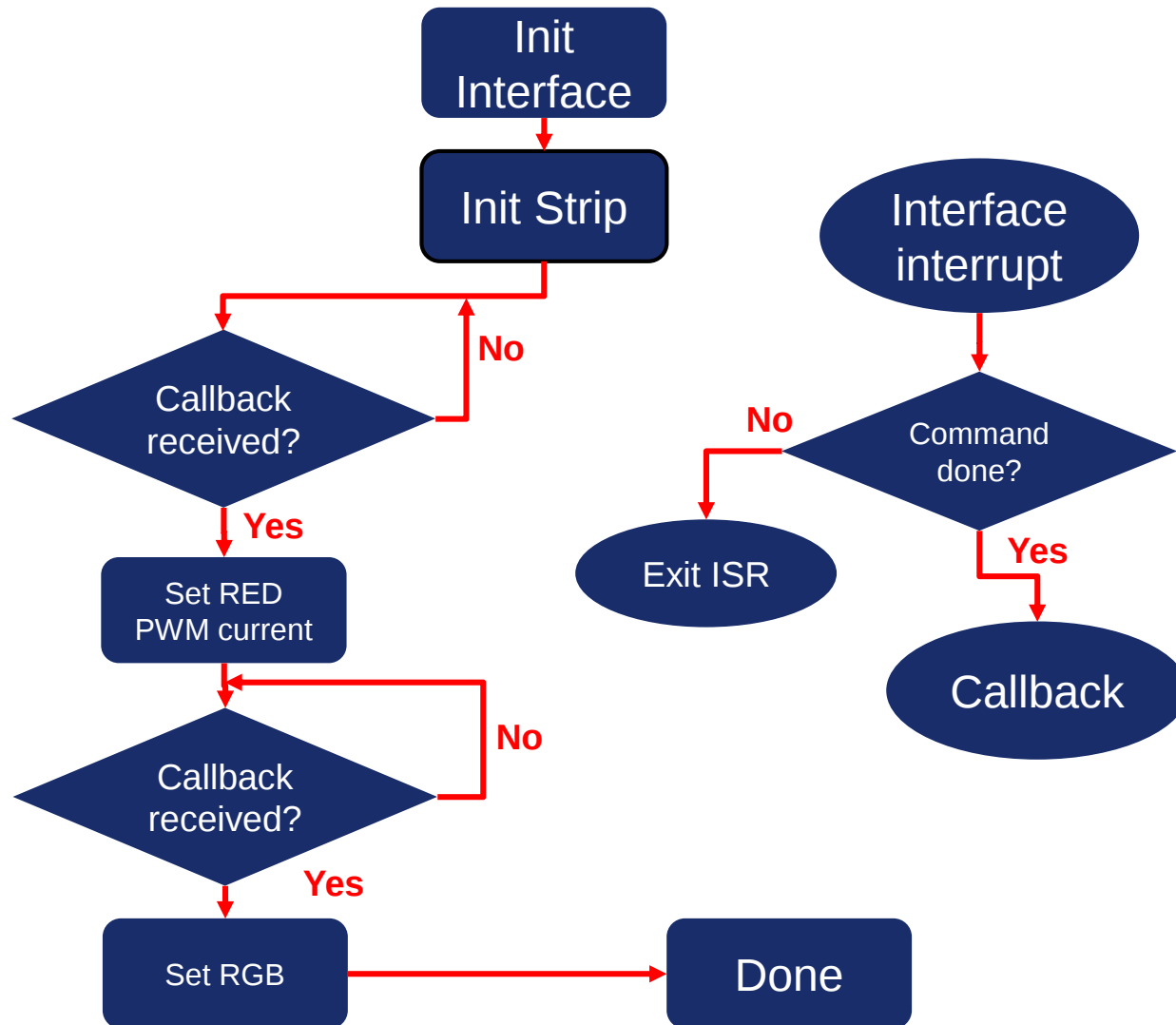


ISELED Integration in S32 SDK

- ISELED driver stacked on two types of peripherals:
 - Comm. interface: FlexIO, LPSPI
 - Timing: LPIT
- Effect Interpreter library developed by LucieLabs ISELED consortium member
- LIN stack available for node connectivity

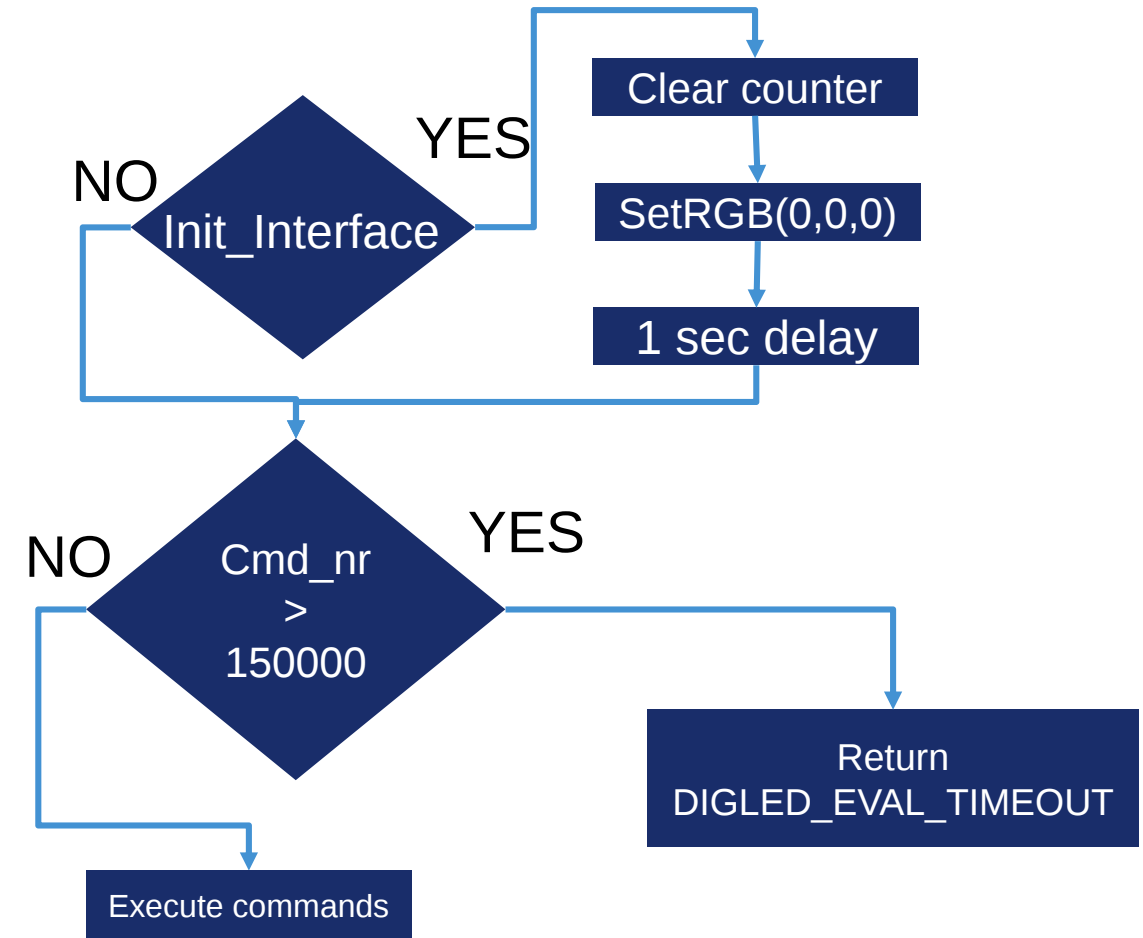


ISELED Driver – How to set a red color



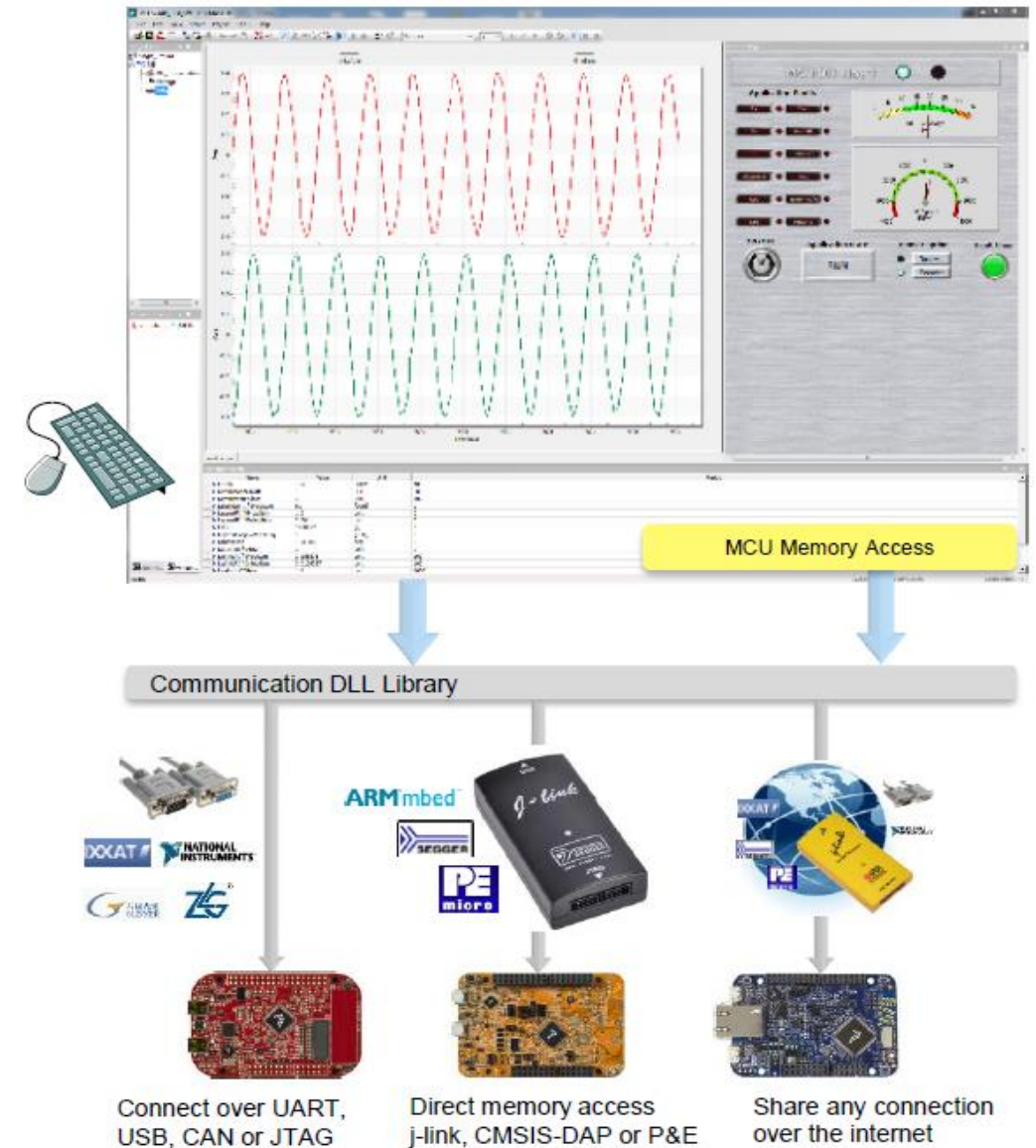
ISELED evaluation mode on unauthorized parts

- Idea: limit the number of commands sent to LEDs
- Clearly state the evaluation condition:
 - After a predefined number of commands, a reinitialization of the strip is required
- LEDs are turned off for 1 second during initialization sequence (actual evaluation mode limitation)
- The turn-off sequence from init is there to prevent against user resetting the board and avoid turn-off sequence
- Counter limit reset @ initialization



FreeMASTER Overview

- **What is FreeMASTER?**
 - Runtime configuration & tuning tool for embedded software applications
 - Graphical Control Panel
 - Data Capture tool, interface to custom processing in Matlab, Excel etc.
- **What do we do with FreeMASTER?**
 - **Connect:** to target MCU over UART, CAN, BDM, JTAG
 - **Monitor:** Read & show variables in run-time
 - **Control:** Set variables, send commands
 - **Share:** Enable Excel, Matlab or a script engine to add hardware to the control loop





UART/SCI



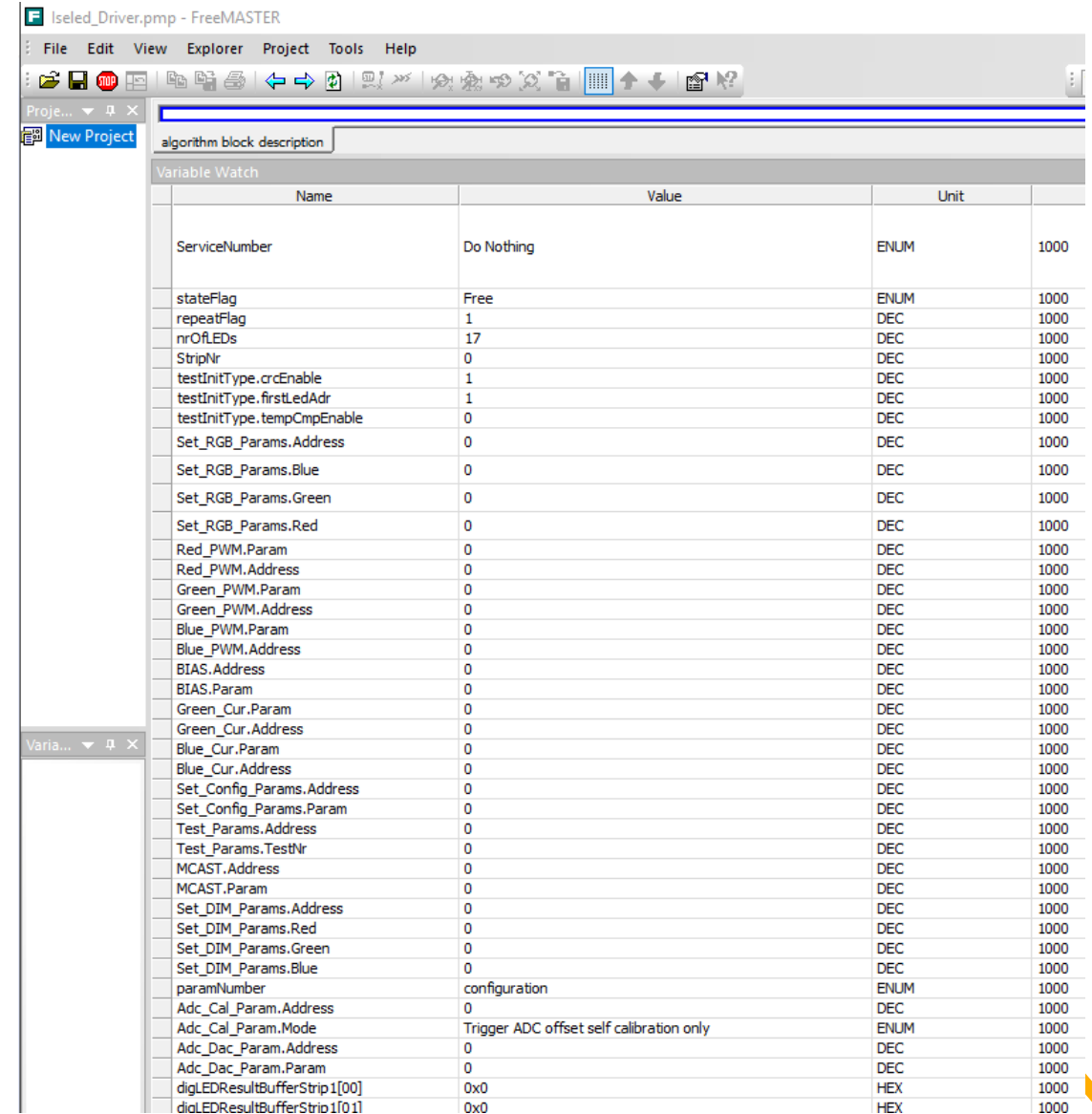
UART/SCI

[illegible]

- 

ISELED SDK Driver Demo – FreeMASTER template

- Connection over Debugger
- Control and Monitor variables
- Request through Service Number variable



The screenshot displays the FreeMASTER application window for the project 'Iseled_Driver.pmp'. The 'Variable Watch' tab is active, showing a table of monitored variables. The table has four columns: Name, Value, Unit, and a numerical value (likely a scale or address). The variables include ServiceNumber, stateFlag, repeatFlag, nrOfLEDs, StripNr, and various initialization and parameter variables for RGB, PWM, BIAS, DIM, and ADC.

Name	Value	Unit	
ServiceNumber	Do Nothing	ENUM	1000
stateFlag	Free	ENUM	1000
repeatFlag	1	DEC	1000
nrOfLEDs	17	DEC	1000
StripNr	0	DEC	1000
testInitType.crcEnable	1	DEC	1000
testInitType.firstLedAdr	1	DEC	1000
testInitType.tempCmpEnable	0	DEC	1000
Set_RGB_Params.Address	0	DEC	1000
Set_RGB_Params.Blue	0	DEC	1000
Set_RGB_Params.Green	0	DEC	1000
Set_RGB_Params.Red	0	DEC	1000
Red_PWM.Param	0	DEC	1000
Red_PWM.Address	0	DEC	1000
Green_PWM.Param	0	DEC	1000
Green_PWM.Address	0	DEC	1000
Blue_PWM.Param	0	DEC	1000
Blue_PWM.Address	0	DEC	1000
BIAS.Address	0	DEC	1000
BIAS.Param	0	DEC	1000
Green_Cur.Param	0	DEC	1000
Green_Cur.Address	0	DEC	1000
Blue_Cur.Param	0	DEC	1000
Blue_Cur.Address	0	DEC	1000
Set_Config_Params.Address	0	DEC	1000
Set_Config_Params.Param	0	DEC	1000
Test_Params.Address	0	DEC	1000
Test_Params.TestNr	0	DEC	1000
MCAST.Address	0	DEC	1000
MCAST.Param	0	DEC	1000
Set_DIM_Params.Address	0	DEC	1000
Set_DIM_Params.Red	0	DEC	1000
Set_DIM_Params.Green	0	DEC	1000
Set_DIM_Params.Blue	0	DEC	1000
paramNumber	configuration	ENUM	1000
Adc_Cal_Param.Address	0	DEC	1000
Adc_Cal_Param.Mode	Trigger ADC offset self calibration only	ENUM	1000
Adc_Dac_Param.Address	0	DEC	1000
Adc_Dac_Param.Param	0	DEC	1000
digLEDResultBufferStrip1[00]	0x0	HEX	1000
digLEDResultBufferStrip1[01]	0x0	HEX	1000

ISELED – Useful Links

- ISELED Alliance <https://iseled.com/products.html>
- Inova Semiconductor <https://inova-semiconductors.de/iseled.html>
- NXP S32K ISELED Solution (active mid June 19) www.nxp.com/S32K/ISELED

Product Effect



Hella interior lighting



Video Link:

1. <https://www.youtube.com/watch?v=2lcMepfMTzo>
[ISELED - Digital LED Technology.mp4](#)
2. <https://www.youtube.com/watch?v=dq14TpKfBk4>
[Electronica 2018 - ISELED Matrix.mp4](#)



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