

dsPIC33 DSC ISELED Solution



A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



MCU16 Business Unit

CQ4' 21



SMART | CONNECTED | SECURE

Agenda

- **Market Insight**
- **Why dsPIC33 DSCs?**
- **Achieving Functional Safety**
- **ISELED Demo Board Introduction**
- **dsPIC33 Robust Design Roadmap**
- **Conclusion**

Trends - Yesterday vs. Today



Lighting Challenges

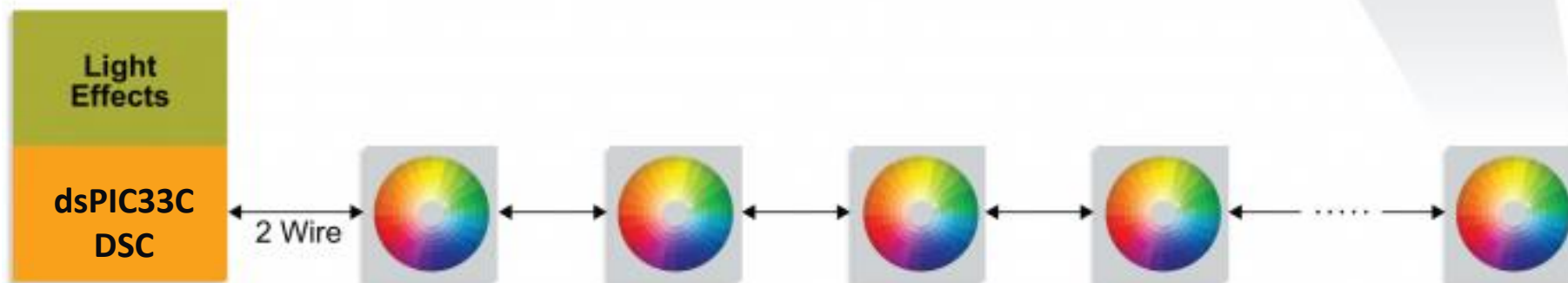
- **RGB Lighting is complex**
 - Calibration required for brightness & colour accuracy
 - Temperature degradation and aging
- **More LED light is increasing system cost**
- **Innovative Lighting concept in automotive is challenging**
 - EMI/EMC requirements
 - Diagnostic and monitoring



ISELED® and Microchip are solving the issue by bringing ease of manufacturing and innovation together

ISELED (Intelligent Smart Embedded LED)

- **ISELED is pre-calibrated for colour accuracy**
 - No binning required in manufacturing or calibration procedure in MCU
- **Low system cost**
- **Supports diagnostic features**
- **4079 LEDs in a string**
- **2Mbits/s Bus Speed**
- **Max 25 frames per second**



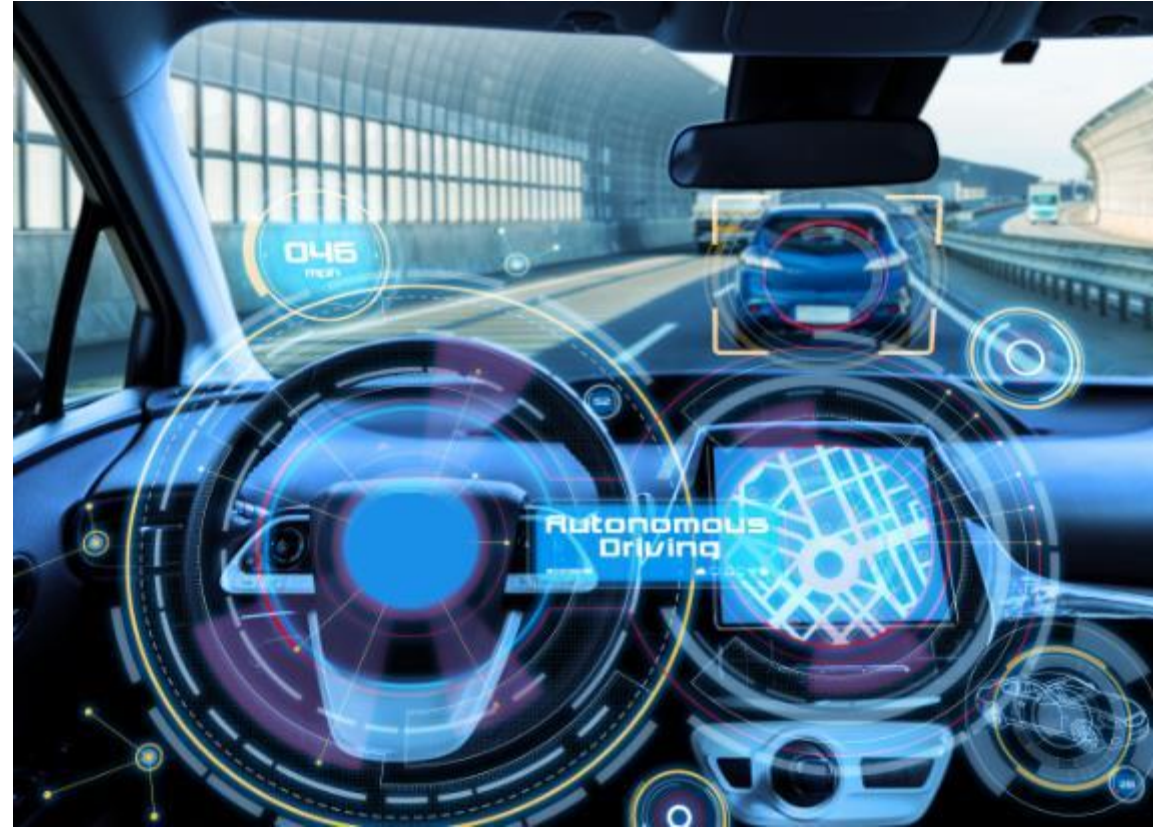
2 MBit/s Differential; No Clock

Tpd = 2 Clock Cycles
Data Nearly Simultaneously At All LEDs
LEDs Can Be Addressed Individually

ISELED Applications



Interior Lighting
Ex: Ambient Lighting



Dynamic Lighting
Ex: Instrument Cluster

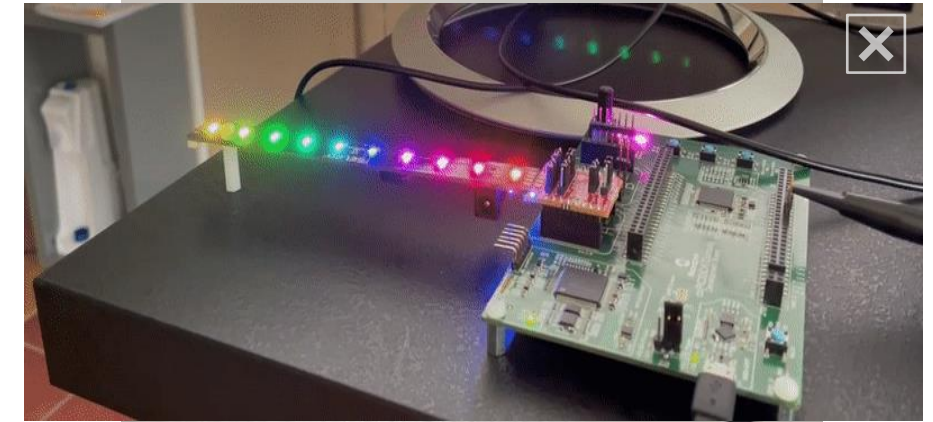
Why dsPIC33C DSCs for ISELED?



Simplify ISELED implementation with more performance for application

dsPIC33C DSC's unique hardware architecture and Core Independent Peripherals (CIP) enable **Low Overhead ISELED protocol** implementation

- 5-bit hardware SPI mode and flexible hardware CRC simplify frame creation for ISELED and offload CPU bandwidth
- Increased ISELED throughput by using DMA to implement animations & light effects
- dsPIC33C DSC can directly interface to ISELED using its 5V tolerant Open Drain IOs – No glue logic or level shifters needed



ISELED Demo using dsPIC33CK Curiosity Development Board and ISELED Development Board ([DM330030](#) + [APG00112](#) + [APG00113](#))

Automotive DSCs

- AUTOSAR, OSEK and ASPICE L1 / ASIL B MCAL Drivers (H2'21)
- AEC Q100 Grade 0 (up to 150° C)
- Dual CAN FDs, SENT, LIN

ISO 26262 Functional Safety Ready

- ASIL-B Ready certified FMEDA and Safety Manual
- TÜV Rheinland certified diagnostic libraries for ASIL B/C design
- ISO 26262 Safety Packages

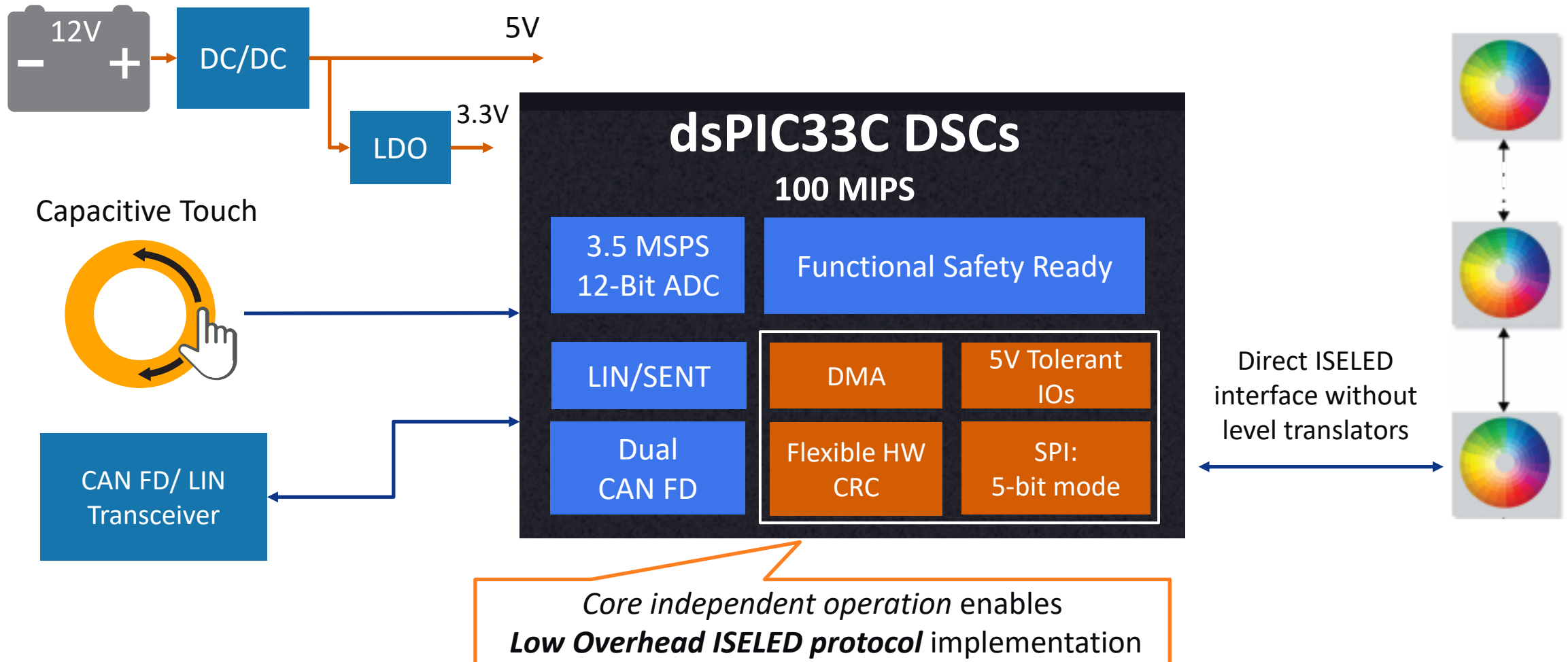
Robust Touch Solution

- High-performance devices with small memory and low pin counts
- Advanced analog
- Core independent peripherals (ADC, DMA, DAC, CLC, PTG, PPS)
- Enable fast and sensitive touch

* Certification is in progress

dsPIC33C DSCs – Integrated Solution for ISELED

ISELED + Capacitive Touch + Robust Communication



Functional Safety Readiness – ISO 26262



- “**Functional Safety Ready**” dsPIC33C DSCs offer the following:
 - AEC-Q100-qualified silicon with *hardware safety features*
 - *SGS-TÜV Saar-certified Failure Modes, Effects, and Diagnostic Analysis (FMEDA) report* to quantify the device’s fault modes via Failure-In-Time (FIT) rate distribution
 - *SGS-TÜV Saar-certified Functional Safety Manual* that provides recommendations on how the device should be used for the safest operation
 - *TÜV SÜD-certified MPLAB® XC16 compiler* and a fully qualified and complete development environment
- In addition, select product families also offer/support:
 - *TÜV-Rheinland-certified Diagnostic software libraries* for design targeting up to ASIL C* that are useful for achieving fault coverage



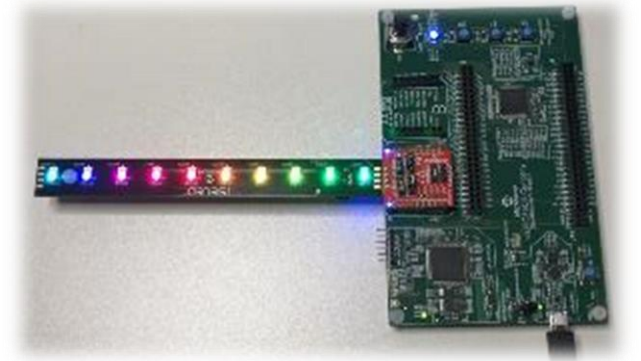
**When Safety is Critical,
Reliability Means Everything**



* Certification is in progress

ISELED® Development Made Easy

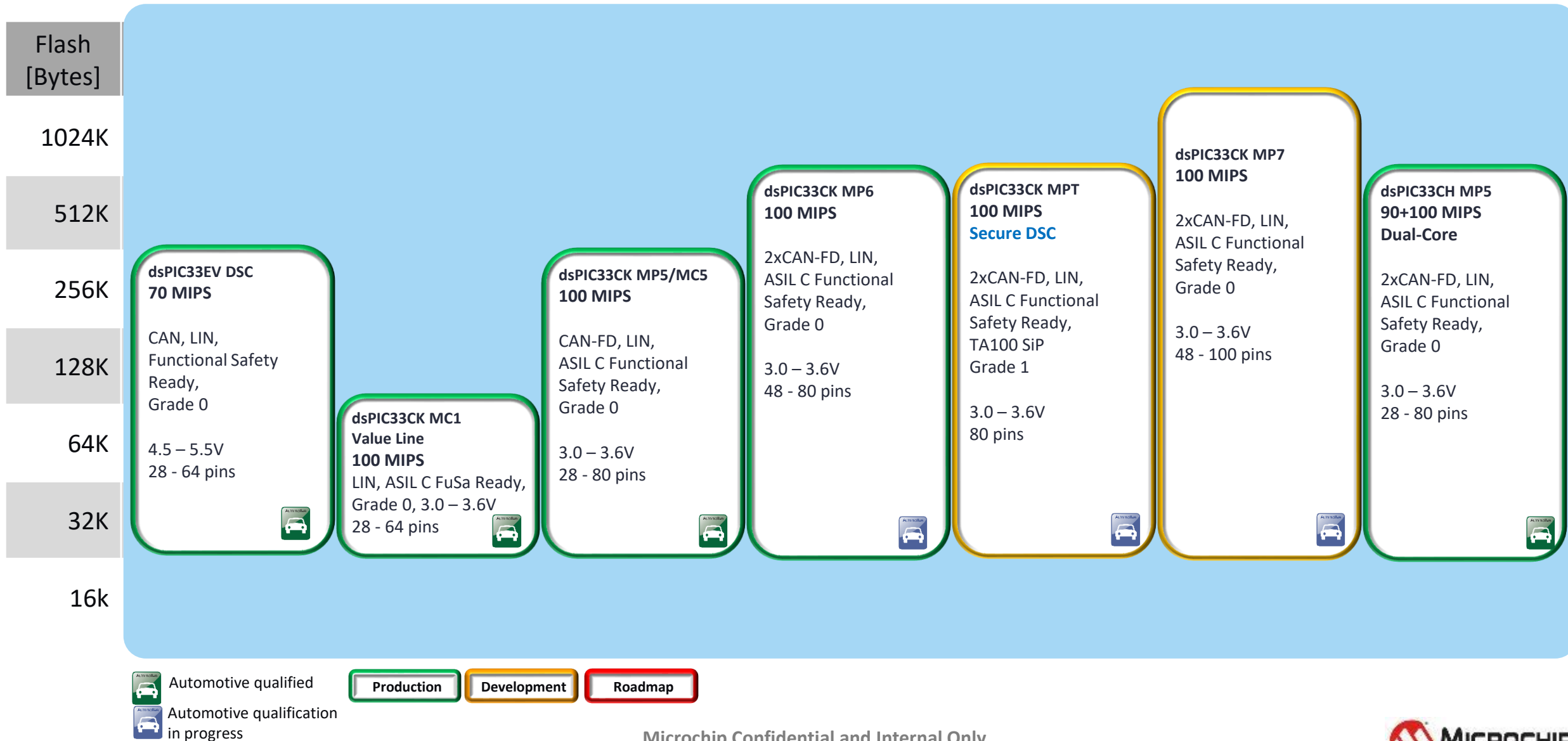
- **Development using dsPIC33C Curiosity Ecosystem**
 - dsPIC33C Curiosity Development Board ([DM330030](#))
 - ISELED® Interface Board ([APG00112](#))
 - ISELED® Development Board (Osram) ([APGT00113](#))
 - ISELED® Development Board (Dominant) ([APG00114](#))
- **MPLAB Code Configurator – ISELED CIP**
- **Extend and customize your development board using mikroBUS™ interface**
- **Comprehensive Documentation**
 - AN3766 - ISELED Microchip Driver Communication Protocol - Control Commands
 - ISELED® Development Platform User's Guide ([DS50003043](#))



ISELED Library & Licensing

- **Microchip provides both Evaluation and Production ISELED Library**
- **Evaluation ISELED Library**
 - Limitations on functionality
 - Free of charge license is provided after signing the Evaluation Licensing Agreement
 - Limited to 3 months – extension requires resigning Licensing Agreement
- **Production ISELED Library**
 - Full functionality
 - NSCAR/NDA needed, but no additional agreement to sign

dsPIC® DSCs for ISELED and Capacitive Touch



Summary

- **dsPIC33 DSCs offer**

- Highly integrated peripherals to simplify ISELED
- High performance core enable maximum ISELED throughput for animation and light effects

- **Single chip Solution for**

- ISELED, Functional Safety, Touch

- **Low risk, low cost, fast time to market**

Thank You!

dsPIC33 DSC Robust Designs