

# CAN FD LIGHT

AUGUST 2022

# CAN FD light Motivation



## CAN FD light ... extending the CAN FD success story to new low end application domains



01

### Cost optimized solution for single Commander (master) – multi-Responder (slave) networks

- ▶ Addressing bandwidth range of up to 1Mbit/s (e.g. supporting up to 4000 individual dynamic light sources)

02

### Leverage benefits of existing and automotive proven CAN FD technology

- ▶ Support for complex multi-point networks
- ▶ Attractive bandwidth/cost ratio
- ▶ Automotive grade safety
- ▶ Compliant with existing car networks
- ▶ Existing infrastructure and knowhow at car makers

03

### Re-use of existing controllers and components on Commander (master) side

04

### Lower cost Responder

- ▶ No external crystal needed
- ▶ Less complex IP needed, usable in mixed-signal ASIC

# CAN FD light Concept Overview

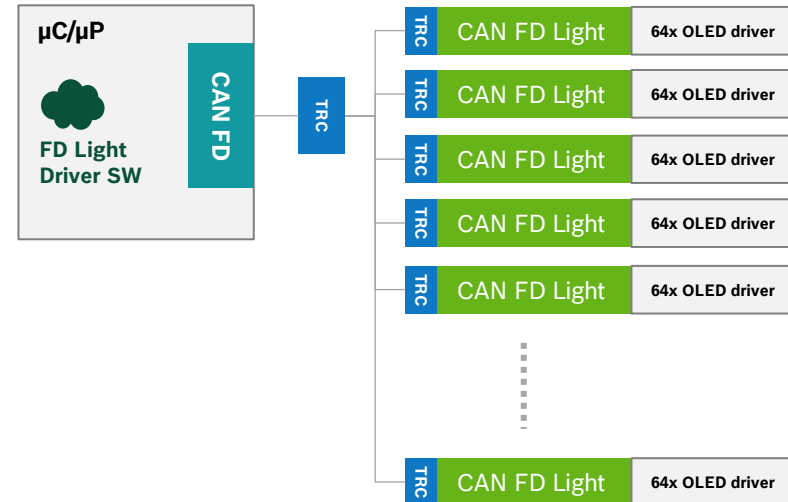
## Single master – multi slave networks

### COMMANDER (master)

- ▶ Standard CAN FD hardware controller [ISO11898-1:2015]
- ▶ Standard CAN/CAN FD Transceivers [ISO11898-2:2016]
- ▶ CAN FD light driver software

### RESPONDER (slave)

- ▶ Monolithic integration in sensor or actuator
- ▶ No ECU or software required
- ▶ Simplified CAN FD controller logic
- ▶ No costly crystal or ceramic resonator required



### Audi UseCase:

64 dynamic OLEDs per satellite



# CAN FD light

## Build on proven CAN FD protocol

### CAN FD LIGHT ... A CAN FD PROTOCOL COMPATIBLE COMMUNICATION

01

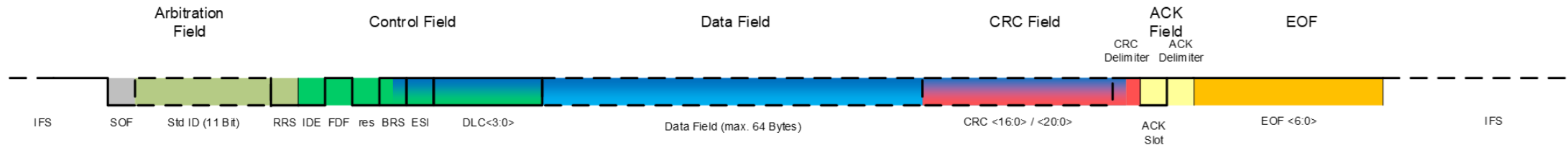
#### CAN FD light is a cost-optimized sub-set of CAN FD

- ▶ Base identifier (11 bit) only
- ▶ FD Frames only (no Classical CAN Frame formats supported)
- ▶ No error signaling (no Error Frames)

02

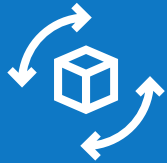
#### The CAN FD light protocol re-uses the CAN FD protocol frame format

- ▶ Data length code – defining up to 64 byte of payload
- ▶ CRC Field – frame integrity protection
- ▶ Acknowledgement



# CAN FD light

## Communication principles



### All communication initiated by master

- ▶ No arbitration or collision handling required
- ▶ High bandwidth utilization – no need to reserve bandwidth for high priority frames
- ▶ Addressing thru frame identifier (or first data field byte)



### Support for Broadcast frames to address multiple actuators synchronously

- ▶ Single frame providing shared or individual information for multiple slaves at the same time
- ▶ No response from slave except of acknowledging

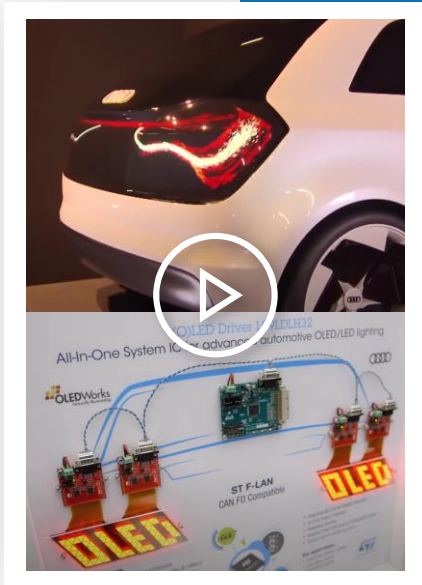


### Support for Unicast frames – with or w/o response frame from slave

- ▶ Addressing individual slaves with dedicated control information or request for status/diagnosis response
- ▶ Well defined response time

# CAN FD light

## Addressing new application domains



### USECASE EXAMPLE(S)

#### Automotive Lighting (dynamic high-resolution lighting e.g. in OLED driver ICs)

- ▶ CAN FD Light Commander: Standard CAN FD controller in zone or domain controller
- ▶ CAN FD Light Responder: Monolithic 32-channel high-side driver IC for digital OLED
  - ▶ Up to 4000 dynamic lights per CAN FD light bus with high refresh rate



#### Battery Management Network

- ▶ CAN FD Light Commander: Dedicated battery management controller or covered by zone or domain controller
- ▶ CAN FD Light Responder: Battery Cell Controller with battery monitoring and balancing function

# CAN FD light Specification & Standardization



## Specification at CiA

- ▶ CAN FD Light is specified in the **Special Interest Group (SIG) CAN FD Light** at CiA (CAN in Automation)
- ▶ CiA is an established standardization organization with CAN experts from all over the world
- ▶ **CiA 604-1: CAN FD Light Protocol for responder nodes**  
[Published as Draft Specification Version 1.0.0, March 2022]
- ▶ CiA 604-2: CAN FD Light Protocol Conformance Test Plan **in development**
- ▶ CiA 604-3: CAN FD Light System Implementation **in development**

**Special Interest Group CAN FD Light**  
“Development of a CAN FD based protocol for price-sensitive sensor and actuator networks including a conformance test plan. Application notes and network design recommendations are also in the scope of this SIG” (CiA)

## Standardization at ISO

- ▶ ISO11898-1 – CAN Protocol
  - ▶ Is currently (2022) under systematic review and update is in progress
  - ▶ CAN FD Light will be added to the Annex

**International  
Standardization  
Organization**