

# TI LED drivers – new product update

June 2021

# LED | Focus areas

## Automotive LED Drivers

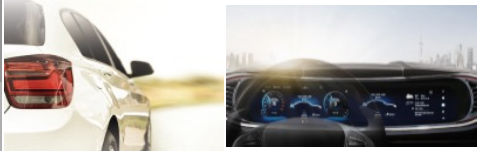
### Product Families

- Auto Backlight LED Drivers
- Auto Linear LED Drivers

### Focused EEs

#### **[Automotive]**

- Automotive Lighting
- Automotive HMI
- Automotive Display
- Instrument Cluster
- Head Unit



## LED Display Drivers

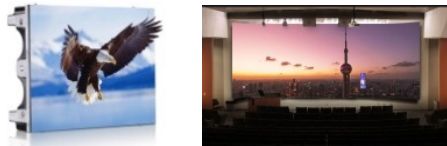
### Product Families

- Display Multi-Channel
- Display Matrix

### Focused EEs

#### **[Industrial]**

- LED Display Digital Signage



## RGB LED Drivers

### Product Families

- RGB Multi-Channel
- RGB Matrix

### Focused EEs

#### **[Industrial]**

- Appliance
- Medical
- Building Automation

#### **[Personal Electronics]**

- Speaker | STB | Portable

#### **[Communication | Enterprise]**

- Switches | Routers | MFP



## Backlight LED Drivers

### Product Families

- Max Vin  $\leq$  20V Backlight
- Max Vin  $>$  20V Backlight

### Focused EEs

#### **[Industrial]**

- Industrial LCD Display

#### **[Personal Electronics]**

- Notebook | Tablet | Mobile Phone
- TV | Monitor



## Illumination LED Drivers

### Product Families

- Max Vin  $\leq$  7V CCR
- Max Vin 7V  $\sim$  40V CCR
- Max Vin  $\geq$  40V CCR

### Focused EEs

#### **[Industrial]**

- Building Automation
- Factory Automation & Control
- Medical
- Appliance

#### **[Personal Electronics]**

- Camera Flash



# RGB LED DRIVERS

# RGB LED drivers

- *LED animation and indication that enhance the user experience*



*LED animation*



*LED indication*

Add animation or indication functionality to your polychromatic LED arrays with our [RGB LED drivers](#). Our versatile, multi-channel solutions are compatible for a variety of common interfaces.

# Delight your world

Smart Speaker



Gaming



Thermostat



Video Doorbell



Smart Bracelet



Switches



Small Home Appliance



Major Home Appliance



# RGB LED drivers

Production

Sampling

## Line Power



QFN



TSSOP



## Battery Power



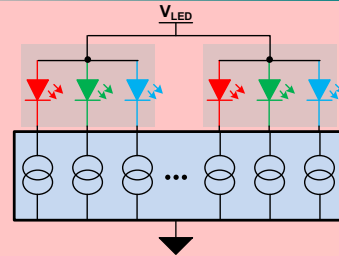
WCSP



QFN



## Multi-channel

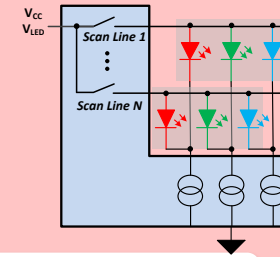


 **LP5009/12/18/24/30/36**

- ▶ 9/12/18/24/30/36-CH
- ▶ 35mA/CH, CA
- ▶ 12-bit PWM (29kHz)
- ▶ QFN & TSSOP (LP5009/LP5012)
- ▶ I<sup>2</sup>C interface

**LED# ≤ 50**

## Matrix



 **LP5860/8/6/4/2/1**

- ▶ 18-CH x N matrix, up to 198 LED dots
- ▶ 50mA/CH, CA
- ▶ 8/16-bit PWM (>20kHz), 3-bit MC, 8-bit DC
- ▶ QFN & TSSOP
- ▶ I<sup>2</sup>C & SPI interface

**LED# > 50**

 **LP5521/3** 

- ▶ 3/9-CH, 25.5 mA, CC
- ▶ Charge pump
- ▶ 8-bit PWM, 8-bit DC
- ▶ WCSP
- ▶ I<sup>2</sup>C interface

 **LP5562** 

- ▶ 4-CH, 25.5 mA, CA
- ▶ Current sink only
- ▶ 8-bit PWM, 8-bit DC
- ▶ WCSP
- ▶ I<sup>2</sup>C interface

 **LP5569** 

- ▶ 9-CH, 25.5mA, CA
- ▶ Charge pump
- ▶ 12-bit PWM, 8-bit DC
- ▶ QFN
- ▶ I<sup>2</sup>C interface

 **LP55281** 

- ▶ 12-CH, 40mA, CA
- ▶ Boost
- ▶ 6-bit PWM, 2-bit MC
- ▶ WCSP
- ▶ I<sup>2</sup>C & SPI interface



Low Iq



Auto Control

**CC:** Common Cathode

**DC:** Dot Correction

**CA:** Common Anode

**MC:** Maximum Current

## High $V_{LED}/I_{LED}$

### I<sup>2</sup>C Interface

**TLC59108/116(F)**

- ▶ 8/16-CH, 50/120 mA, CA
- ▶ 8-bit PWM
- ▶ 17V  $V_{LED}$
- ▶ QFN & TSSOP

### Single-wire Cascade

**TLC5973/TLC59731**

- ▶ 3-CH, 50mA, CA
- ▶ 12-bit PWM
- ▶ 21V  $V_{LED}$
- ▶ SOIC

### Two-wire Cascade

**TLC5971/TLC59711**

- ▶ 12-CH, 60mA, CA
- ▶ 16-bit PWM
- ▶ 17V  $V_{LED}$
- ▶ HTSSOP & QFN

# LP586x 18xN matrix LED driver

## Features

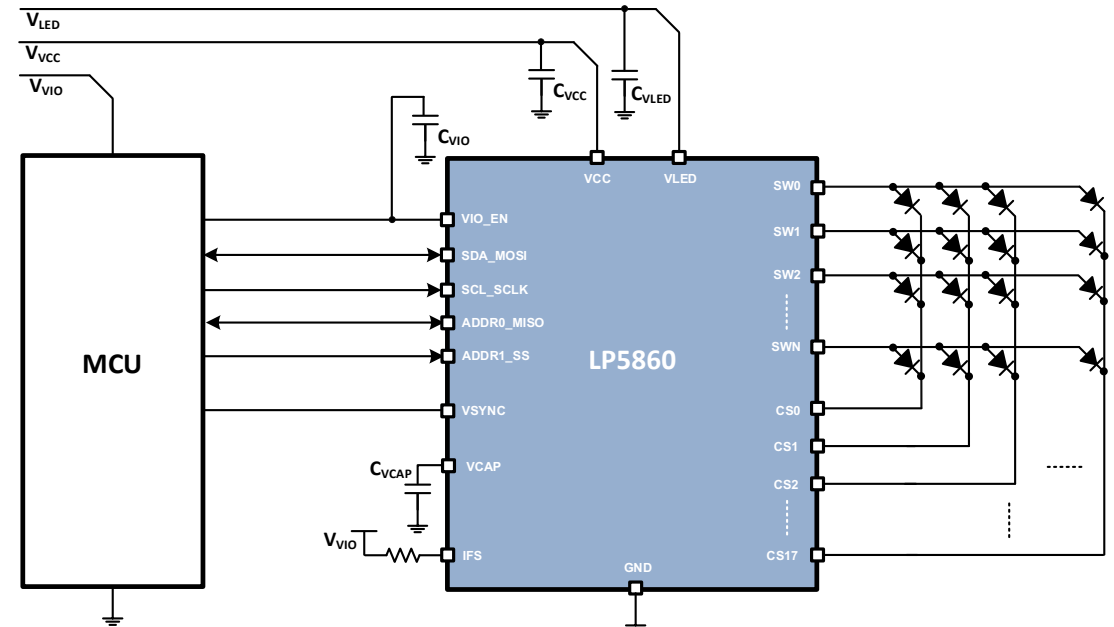
- **18 Constant Current Sink with N Switches**
  - LP5861: N=1: drive 18 LED dots or 6 RGB pixels.
  - LP5862: N=2: drive 36 LED dots or 12 RGB pixels.
  - LP5864: N=4: drive 72 LED dots or 24 RGB pixels.
  - LP5866: N=6: drive 108 LED dots or 36 RGB pixels.
  - LP5868: N=8: drive 144 LED dots or 48 RGB pixels.
  - LP5860: N=11: drive 198 LED dots or 66 RGB pixels.
- Operating Voltage Range:
  - VCC/VLED Range: 2.7V to 5.5V
  - VIO Range: 1.8V to 5V power rails
- Constant Current Sinks with High Precision:
  - **1-50 mA Maximum** per Channel when VCC ≥ 3.3V
  - Device-to-Device Error: ±5%; Channel-to-Channel Error: ±5%;
- **Flexible Dimming Options:**
  - **Individual ON/OFF Control for Each Channel**
  - **Analog Current Gain Control**
    - Global 3-bits Maximum Current(MC) Setting without Ext. Resistor
    - 3 Groups of 7-bits Color Current(CC) Setting
    - Individual 8-bits Dot Current(DC) Setting
  - **Audible Noise Free (>20KHz) PWM Control**
    - Global 8-bits PWM for Global Dimming
    - 3 Programmable Groups of 8-bits PWM Dimming
    - Individual 8-bits/16bits PWM for Each LED Dot
- **Full Addressable SRAM for Minimum Data Volume**
- Ultra low quiescent current
  - Shutdown Mode:
    - 2uA (max.) when EN Low.
    - 10uA (max.) when CHIP\_EN Low (data retained).
- Optional Interface: **Up to 1MHz I2C, Up to 12MHz SPI.**
- LED open/short detection
- **Deghosting, caterpillar removal, Low-brightness Compensation, low LED reverse voltage**
- Package:
  - **QFN-32, 4x4mm**(0.4mm pitch) --- LP5861, LP5862, LP5864
  - **QFN-40, 5x5mm**(0.4mm pitch) --- LP5866, LP5868, LP5860
  - **TSSOP-38, 9.7x4.4mm**(0.5mm pitch) --- LP5866, LP5862

## Benefits

- **High integration:** (18xN) matrix structure up to 198 LEDs
- **Highest dimming resolution:** market first 16 bits (>20KHz) PWM dimming, 8 bits per channel analog dimming
- **Ease of design:** 'True programmable group control', 'Minimum uC's loadings' and 'Free of Matrix issues'

## Applications

- Home Appliance
- Keyboards
- Small display



# LP586x device family

Part number	LED dot #	Package	Hardware Compatible	Software Compatible
LP5861RSMR	18*1= 18	QFN-32	Yes	Yes
LP5862RSMR	18*2= 36			
LP5864RSMR	18*4= 72			
LP5864MRSMR*	18*4= 72			
LP5866RKPR	18*6= 108	QFN-40	Yes	
LP5868RKPR	18*8= 144			
LP5860RKPR	18*11= 198			
LP5860MRKPR*	18*11= 198			
LP5862DBTR	18*2= 36	TSSOP-38	Yes	
LP5866DBTR	18*6= 108			
LP5866MDBTR*	18*6= 108			

\*: Extended Temperature devices, supporting -55°C ~ 125°C.

# LP586x value propositions

Benefits	Features
High Integration	<ul style="list-style-type: none"><li>▪ Drive 18/36/72/108/144/198 LEDs with single chip</li><li>▪ Small package /solution size</li></ul>
High Resolution Flexible Dimming	<ul style="list-style-type: none"><li>▪ 16 bits/&gt;20KHz PWM dimming</li><li>▪ 8 bits per channel analog dimming</li><li>▪ Programmable group control</li></ul>
Ease of design	<ul style="list-style-type: none"><li>▪ Free of LED Matrix parasitic issues (Ghosting, Non-uniformity, Open/Short Caterpillar, etc.)</li><li>▪ Full Addressable SRAM for Minimum Data Volume</li><li>▪ Various Protections and Diagnostics</li></ul>

# LP5860 for smart speaker

## Key Requirement

- Drive large number of LEDs (50 – 200) for animation
- Best-in-class dimming performance
- Easy design for both software and hardware

## LP5860's Benefits

- **High integration:**
  - Drives up to 198 LEDs with one single chip, saves >80% solution size compared to LP50xx and other direct drive solution
- **Ease-of-use:**
  - True programmable global control, grouping control and individual control.
- **Free of 'matrix issues':**
  - Implementing features such as de-ghosting, caterpillar removal, low-brightness compensation and low LED reverse voltage.



# LP5860 for ethernet switch

## Key Requirement

- Drive large number of LEDs (50 – 200) for indication
- Easy design for both software and hardware

## LP5860's Benefits

- **High integration:**
  - Drives up to 198 LEDs with one single chip, saves >80% solution size compared to LP50xx and other direct drive solution
- **Ease-of-use:**
  - True programmable global control, grouping control and individual control.



# LP5860 for appliances

## Key Requirement

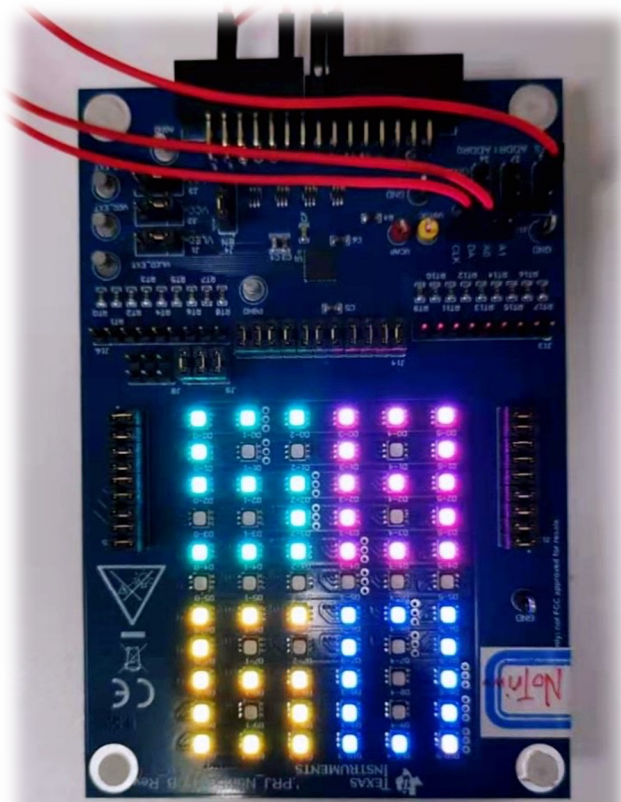
- Drive large number of LED segments (50 – 200) for indication on the panel.
- In Asia there are more and more dot matrix arrays to display Chinese characters or other symbols.

## LP5860's Benefits

- **High integration:**
  - Drives up to 198 LEDs with one single chip, saves >80% solution size compared to LP50xx and discrete solution.
- **Ease-of-use:**
  - True programmable global control, grouping control and individual control.
- **Free of 'matrix issues':**
  - Implementing features such as de-ghosting, caterpillar removal, low-brightness compensation and low LED reverse voltage.



# LP5860EVM and GUI – build the matrix!



LP586x

FileOptionsToolsHelp

⌂

⌕

≡

✎

# LP586x

The LP586x device is a 18xN Matrix LED Driver with Individual 16-bits PWM and 8-bits Analog Dimming.

## Choose a Device Variant

LP5860

11 Switching FET 198 Channels

LP5860

TEXAS INSTRUMENTS

LP5868

8 Switching FET 144 Channels

LP5868

TEXAS INSTRUMENTS

LP5866

6 Switching FET 108 Channels

LP5866

TEXAS INSTRUMENTS

LP5864

4 Switching FET 72 Channels

LP5864

TEXAS INSTRUMENTS

LP5862

2 Switching FET 36 Channels

LP5862

TEXAS INSTRUMENTS

LP5861

1 Switching FET 18 Channels

LP5861

TEXAS INSTRUMENTS

LP5860

The LP5860 device is a 18x11 Matrix LED driver. It Integrates 18 constant current sinks plus 11 switching FETs

EXPLORE

Keyboard

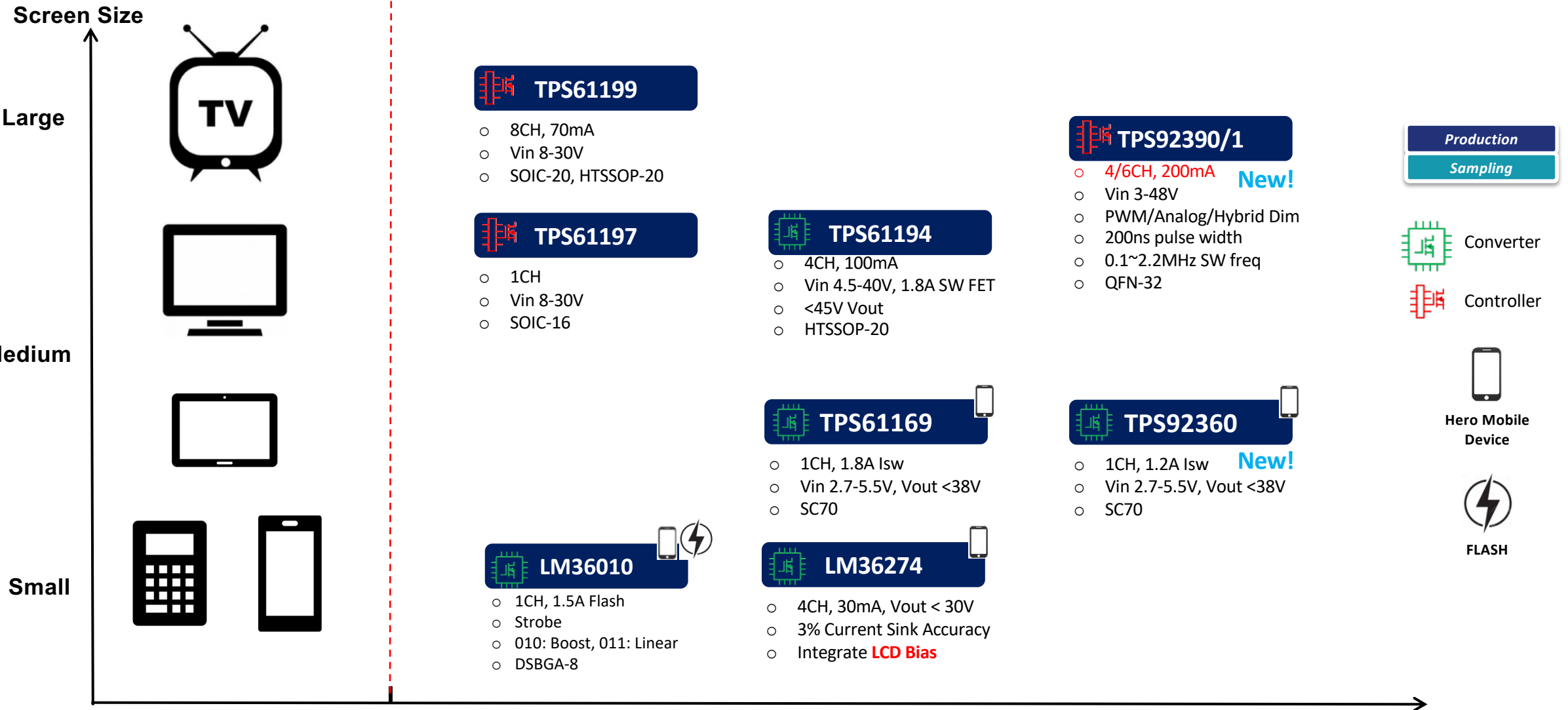
Smart home appliances

Audio mixer

Smart Speaker

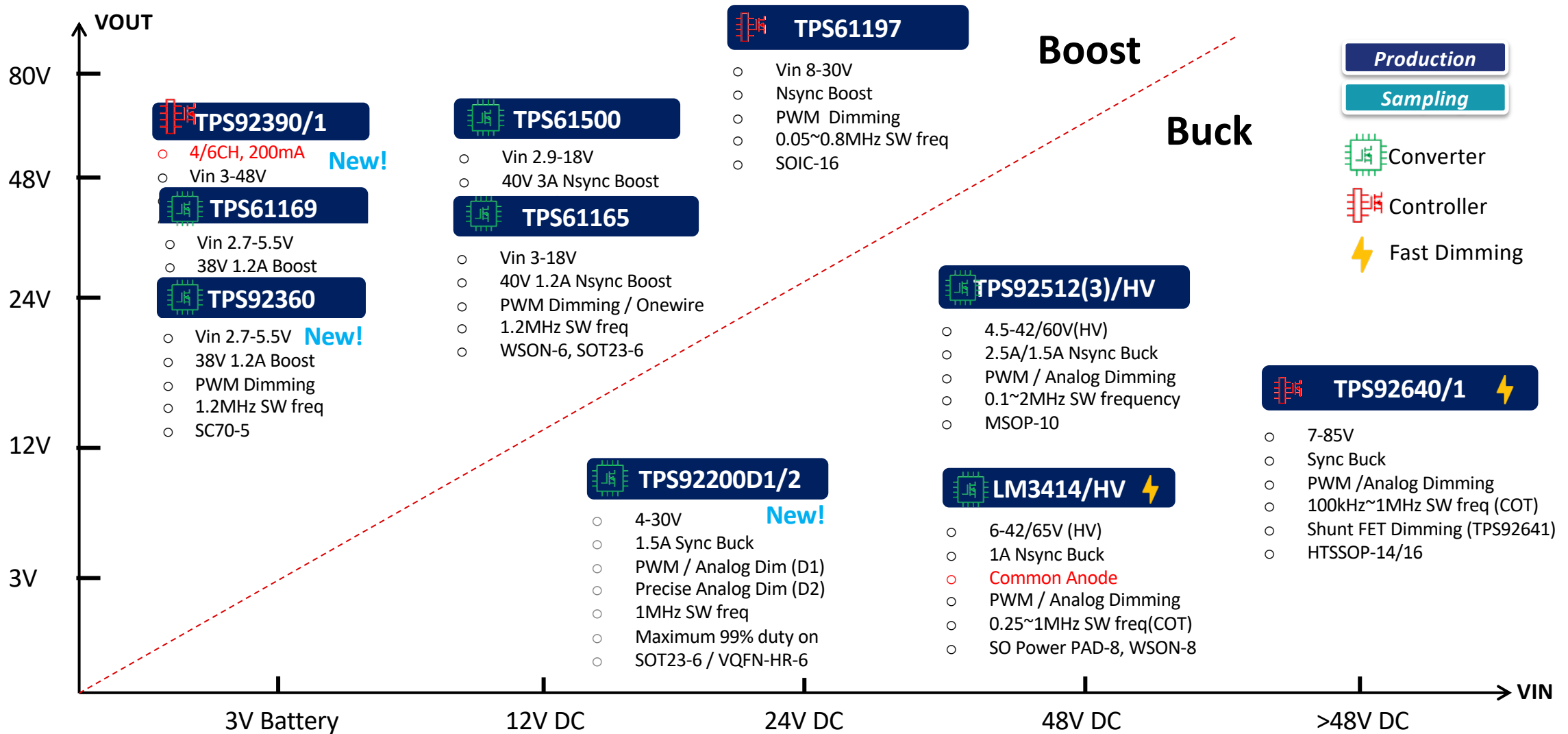
# BACKLIGHT LED DRIVERS

# Backlight LED drivers



# ILLUMINATION LED DRIVERS

# Illumination LED drivers



The background of the slide is a detailed, light gray circuit board pattern. It features a complex network of lines, pads, and components, including what appear to be integrated circuits, capacitors, and connectors, all rendered in a monochromatic, technical style.

# Thanks!

<https://www.ti.com/led>

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