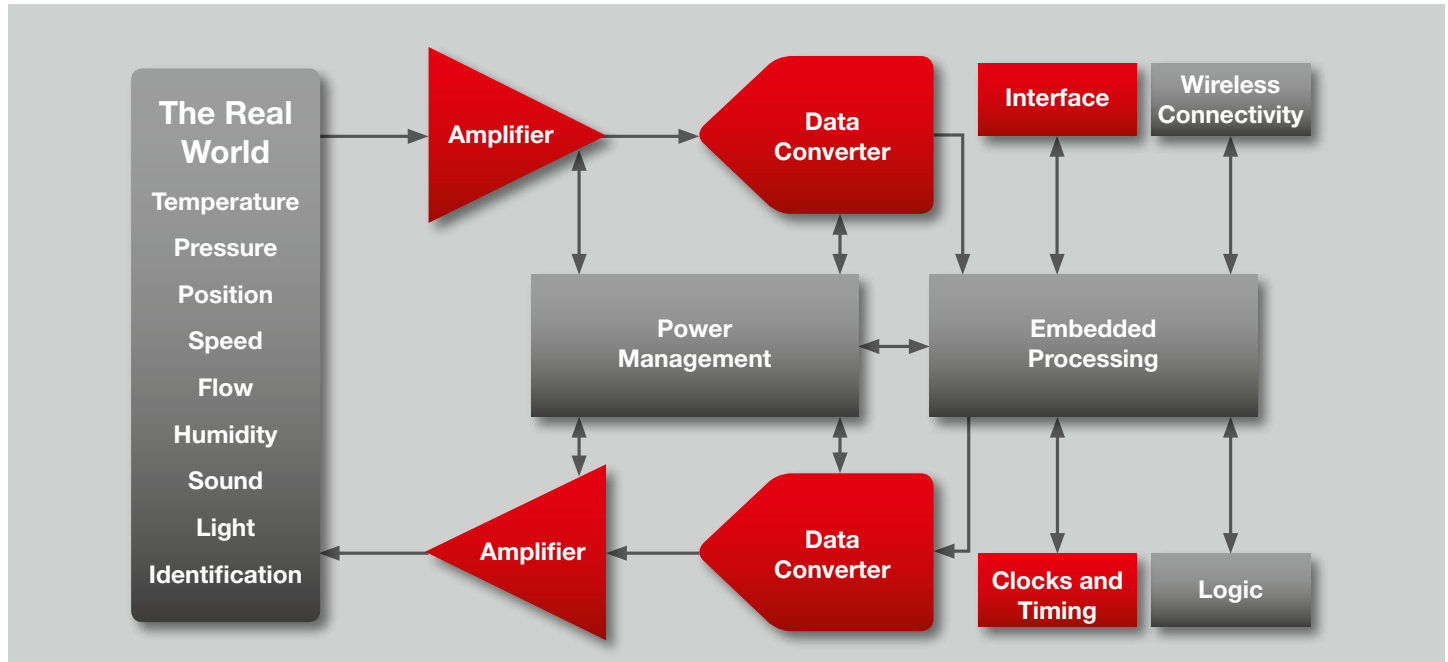


# Analog Signal Chain Portfolio Overview



# Analog Signal Chain Product Portfolio



**Space  
Qualification**



**DIE  
Services**



**High Temperature  
Qualification**



**Automotive  
Qualification**

 **TEXAS  
INSTRUMENTS**

# Data Converters Portfolio

| Product Highlights | Analog-to-Digital                                                                                                          |                                                                                                             |                                                                                      | Digital-to-Analog                                                                    | Audio                                                                                                                                                           | Embedded ADC                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
|                    | Delta-Sigma (oversampling)                                                                                                 | Successive Approximation (SAR)                                                                              | High Speed                                                                           | String, R2R Current Steering                                                         | ADC DAC Codec                                                                                                                                                   | Embedded Processing                                                                                                                   |
|                    | 12 to 31 bits up to 125 KSPS                                                                                               | 8 to 18 bits up to 4 MPS                                                                                    | 8 to 16 bits up to 4 GSPS                                                            | 8 to 18 bits up to 1.475 GSPS                                                        |                                                                                                                                                                 |                                                                                                                                       |
|                    | ADS1118<br>ADS1231<br>ADS1248<br>ADS1259<br>ADS1278<br>AMC1204<br>LMP90100<br>ADC161S626                                   | ADS8331<br>ADS8363<br>ADS8568<br>ADS8636<br>ADS8881                                                         | ADS4149<br>ADS5400<br>ADC12D1x00<br>ADS5294<br>ADS4249                               | DAC7678<br>DAC8562<br>DAC9881<br>DAC161P997<br>DAC34SH84                             | ADC<br>PCMxxxx<br>TLV320ADC3xxx<br>DAC<br>PCMxxxx<br>TLV320DAC3xxx<br>Codec<br>PCMxxxx<br>TLV320AIC3xxx                                                         | C5000™ DSP<br>Stellaris®<br>Cortex M3/M4F<br>C2000™ 32 bit floating point MCU<br>MSP430™ ULP<br>16 bit MCU<br>Hercules™<br>Cortex R4F |
| Functions/Features | \$0.50 to \$35                                                                                                             | \$0.50 to \$35                                                                                              | \$2.50 to \$2000                                                                     | \$0.50 to \$80                                                                       | \$0.95 to \$16.45                                                                                                                                               | \$0.25 to \$30                                                                                                                        |
|                    | PGA, current sources, references, MUX, modulator-only isolation                                                            | Simultaneous sampling, bipolar inputs, references, MUX                                                      | Digital processing for filtering, decimation 1/f noise reduction, interleaving ready | Voltage output, current output, multiplying references, bipolar output, multichannel | miniDSP, integrated amplifier, DirectPath HP amplifier, scalability, 2Vrms output, integrated PLL, 3rd party algorithms                                         | 10 – 12 bit SAR, 200K sps to 12.5 Msps, 2 – 24 channels, 16/24 bit sigma delta ADC, Up to 4ksps, 3 – 7 channels                       |
|                    | Low-frequency signals at high resolution, temperature, pressure, level seismic instrumentation, industrial process control | Industrial process control, motor control, three-phase power control, multi-axis positioning, power quality | Communication, imaging, defense, medical imaging, test and measurement               | Industrial, test and measurement, digitally controlled calibration, communication    | Consumer, prosumer, pro-audio, e.g. portable consumer electronics, low power applications, TV, STB, noise cancelling HP, iPod-docks, soundbars, mixing consoles | Measurement, motor control, security, audio, lighting, industrial, renewable energy, medical, safety                                  |
|                    | Applications                                                                                                               |                                                                                                             |                                                                                      |                                                                                      |                                                                                                                                                                 |                                                                                                                                       |

## Data Converter Nomenclature

### ADSxxxx

ADS1xxx = Delta-Sigma ADCs  
 ADS120x = Delta-Sigma Modulators  
 AMC120x = Isolated Delta-Sigma Modulators

ADS4xxx  
 ADS5xxx  
 ADS6xxx  
 ADS7xxx = SAR (Successive Approximation Register) ADCs  
 /8xxx

Speed Single-Ended Input:  
 02 = 50–200 KSPS  
 05 = 200–500 KSPS  
 10 = 500–1000 KSPS  
 Differential Input:  
 62 = 50–200 KSPS  
 65 = 200–500 KSPS  
 70 = 500–1000 KSPS

### ADC12 2 S 02 1

Resolution  
 14 = 14-bit  
 12 = 12-bit  
 10 = 10-bit  
 08 = 8-bit

Ref/Supply Options  
 Number of Supplies, Reference  
 1 = VA Reference, single supply  
 2 = VA Reference, dual supply  
 3 = Internal/External/VA Reference, signal supply  
 4 = Internal/External/VA Reference, dual supply  
 5 = External Reference, signal supply  
 6 = External Reference, dual supply

### DACs

DAC8xxx (Precision DACs)  
 DAC7xxx

DAC3xxx (High-speed DACs)  
 DAC5xxx



# Amplifier Portfolio

|                    | Value Line                                                                                                                                                          | Precision                                                                                                                         | High Speed                                                                                                                                                    | Power Amplifiers                                                                                                                                                          | Audio/Video                                                                                                                                                  |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | Industry Standard                                                                                                                                                   | Offset Voltage<br>$V_{os} < 500 \mu V$<br>Low Temperature<br>Drift $< 1 \mu V/^{\circ}C$                                          | Gain Bandwidth<br>Product and<br>Equivalents<br>$> 50 \text{ MHz}$                                                                                            | $> 50 \text{ mA}$                                                                                                                                                         | Application-Specific<br>Solutions                                                                                                                            |
| Product Highlights | <b>OPA</b> x141<br><b>OPA</b> x171<br><b>OPA</b> x314<br><b>OPA</b> x322<br><b>OPA</b> x330<br><b>LPV</b> 521<br><b>LMV</b> 551<br><b>LMV</b> 651<br><b>LMV</b> 841 | <b>OPA</b> x140<br><b>OPA</b> x188<br><b>OPA</b> x209<br><b>OPA</b> x320<br><b>OPA</b> x320<br><b>LMP</b> 7721<br><b>LMP</b> 7731 | <b>OPA</b> 835/6<br><b>OPA</b> 2835/6<br><b>THS</b> 4509<br><b>THS</b> 4521/2/4<br><b>THS</b> 770006<br><b>LMH</b> 6521<br><b>LMH</b> 6554<br><b>LMH</b> 6629 | <b>OPA</b> 454<br><b>OPA</b> 464<br><b>OPA</b> 548<br><b>OPA</b> 552                                                                                                      | <b>OPA</b> 1632/ <b>OPA</b> 161x<br><b>OPA</b> 164x/ <b>OPA</b> 160x<br><b>OPA</b> 165x<br><b>OPA</b> 166x<br><b>LME</b> 49990                               |
|                    | \$0.50 to \$49                                                                                                                                                      | \$0.55 to \$12                                                                                                                    | \$1.35 to \$6.60                                                                                                                                              | \$1.75 to \$40                                                                                                                                                            | \$0.75 to \$3.30                                                                                                                                             |
| Functions/Features | Price/performance, high voltage, low voltage, ultra-small package                                                                                                   | Ultra-low offset, low input bias current, low noise, high/low voltage, zero-drift                                                 | Wide bandwidth $\geq 50 \text{ MHz}$ , increased dynamic range, low noise and low distortion, high-slew rate, low power, high voltage, digital variable gain  | High output current                                                                                                                                                       | FET/bipolar inputs, fully-differential architecture ( <b>OPA</b> 1632), low noise and distortion, low-power consumption, wide bandwidth, rail-to-rail output |
| Application        | Smoke detector, industrial, general purpose                                                                                                                         | Industrial process control, high-precision sensing, test and measurement, data acquisition                                        | Industrial process control, test and measurement, video, A/D buffering, data acquisition systems, high-speed communications, high-speed signal conditioning   | Test equipment, avalanche photodiode biasing, piezoelectric cells, transducer driver, servo driver, audio amplifier, high-voltage current sources, high-voltage regulator | Line drivers, line receiver, microphone/audio preamps, general purpose audio, volume control                                                                 |

|                 | Low Iq<br>(Iq in $\mu A$ )                                                                                | Low Noise<br>( $V_n$ in $nV/\sqrt{Hz}$ )                                                                          | Bandwidth<br>(GBW in MHz)                                                                                                         | Voltage Range<br>( $V_S$ in V)              |
|-----------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Value Line      | Down to 0.002 mA<br><b>OPA</b> 349                                                                        | Down to 7.5 $nV/\sqrt{Hz}$<br><b>OPA</b> 377                                                                      | Up to 20 MHz and<br>8.5 $nV/\sqrt{Hz}$ @1KHz<br><b>OPA</b> 322                                                                    | Up to 36 V<br><b>OPA</b> 171 (2.7 V-36 V)   |
| Precision       | Down to 400 nA<br><b>LPV</b> 521 (400 nA)                                                                 | Down to 1.1 $nV/\sqrt{Hz}$<br><b>OPA</b> 211 (1.1 $nV/\sqrt{Hz}$ )                                                | Up to 45 MHz<br><b>OPA</b> 211                                                                                                    | Up to 48 V<br><b>OPA</b> 209                |
| High Speed      | Down to 250 $\mu A/ch$<br>(250 $\mu A$ )<br><b>THS</b> 4521/2/4<br>(1.25 mA)<br><b>OPA</b> 2889 (0.46 mA) | Down to 0.69 $nV/\sqrt{Hz}$<br><b>OPA</b> 847 (0.85 $nV/\sqrt{Hz}$ )<br><b>LMH</b> 6629<br>(0.69 $nV/\sqrt{Hz}$ ) | Up to 2.8 GHz<br><b>OPA</b> 695 (1.4 GHz)<br><b>THS</b> 4509 (1.9 GHz)<br><b>LMH</b> 6654 (2.8 GHz)<br><b>THS</b> 77006 (2.4 GHz) | Up to $\pm 15 \text{ V}$<br><b>THS</b> 3095 |
| Power Amplifier | Down to 6 mA<br><b>OPA</b> 567                                                                            | Down to 12 $nV/\sqrt{Hz}$<br><b>OPA</b> 567                                                                       | Up to 17 MHz<br><b>OPA</b> 564                                                                                                    | Up to 60 V<br><b>OPA</b> 549                |

## Amplifier Nomenclature

| Channels                                                                                                                                                                                                                                                            | Amplifier class                                                                                                                                     | Amplifier class                                                                                                                                                                                                                                                                              | Amplifier class                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| No character = Single<br>2 = Dual<br>3 = Triple<br>4 = Quad                                                                                                                                                                                                         | TLV = Low supply voltage<br>TLC = 5-V CMOS<br>TLE = Wide supply voltage                                                                             | THS = High speed                                                                                                                                                                                                                                                                             | LMC = CMOS<br>LMV = Low voltage<br>LMP = Low power<br>LME = Audio<br>LMH = High speed<br>LPV = Ultra-low power |
| <b>OPA</b> x163                                                                                                                                                                                                                                                     | <b>TLV</b> 278x                                                                                                                                     | <b>THS</b> xy01                                                                                                                                                                                                                                                                              |                                                                                                                |
| Base model<br>100s = FET<br>200s = Bipolar<br>300s = CMOS (5.5 V)<br>400s = High voltage ( $>40 \text{ V}$ )<br>500s = High power ( $>200 \text{ mA}$ )<br>600s = High speed ( $>50 \text{ MHz}$ )<br>700s = CMOS (12 V)<br>800s = High speed ( $>50 \text{ MHz}$ ) | Channels and shutdown options<br>0 = Single with shutdown<br>1 = Single<br>2 = Dual<br>3 = Dual with shutdown<br>4 = Quad<br>5 = Quad with shutdown | Amplifier type<br>30 = Current feedback<br>31 = Current feedback<br>40 = Voltage feedback<br>41 = Fully differential<br>42 = Voltage feedback<br>43 = Fast voltage feedback<br>45 = Fully differential<br>46 = Transimpedance<br>60 = Line receiver<br>61 = Line driver<br>73 = Programmable |                                                                                                                |

# Interface Portfolio

|                    | RS-485                                                                                                                                                                                                                 | CAN                                                                             | Ethernet                                                                                                                                                         | USB                                                                                       | Digital isolation                                                                                                                                                                                             | UART                                                                                                    | SDI                                                                                                                                                                              | SERDES                                                                                                                                                                             |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product            | SN65HVD                                                                                                                                                                                                                | HVD10xx<br>HVD2xx                                                               | TLK1xx<br>DP83xx                                                                                                                                                 | TUSB                                                                                      | ISO                                                                                                                                                                                                           | TL16Cxxx                                                                                                | LMHxxx                                                                                                                                                                           | DS9xyy<br>TLKxxxx<br>SN65LVDS                                                                                                                                                      |
|                    | \$0.75 to \$5.10                                                                                                                                                                                                       | \$0.40 to \$1.50                                                                | \$1.20 to \$10                                                                                                                                                   | \$0.55 to \$4.75                                                                          | \$0.85 to \$3.30                                                                                                                                                                                              | \$1.30 to \$8.85                                                                                        | \$2 to \$26                                                                                                                                                                      | \$2 to \$45                                                                                                                                                                        |
| Functions/Features | 3.3-V and 5-V RS-485 half and full duplex<br>70-V bus protection 16-kV ESD protection<br>Non-isolated and isolated (560V/4kVpk) versions of 3.3 and 5V RS-485<br>High ESD protection versions with built in TVS diodes | 3.3-V and 5-V CAN transceiver<br>Bus fault protection -27 V/40 V and $\pm 36$ V | Robust industrial Ethernet PHY 10/100/1000 Mb<br>Timing parameters for real-time Ethernet<br>RMII/MII and single/dual options available<br>Industrial temp range | Complete USB portfolio<br>Host/OTG, peripheral, transceivers, hub<br>USB 2.0, 3.0 support | Capacitive digital couplers replacing opto-couplers<br>Superior lifetime reliability<br>Speed up to 150 Mbps<br>IEC 60747-5-2 Basic/<br>Insulation and UL1577<br>Integrated or stand alone transformer driver | UART expanders with and without FIFO<br>1 UART up to 4 UARTs<br>Support for down to 1.8V processor I/Os | Professional Broadcast Video Solutions for SD/HD/3G<br>Equalizers with 200m cable reach at 3bps and 155mW<br>First configurable I/O over BNC with integrated return loss network | Industrial and Automotive SERDES with I2C back channel up to 3Gbps<br>Communication SERDES for Gigabit and 10G Ethernet.<br>LVDS SERDES for Display drive up to 100MHz pixel clock |
| Standard           | ProfiBus<br>rs-485<br>rs-422                                                                                                                                                                                           | DeviceNet<br>CANopen                                                            | ProfiNET<br>EtherCAT<br>Sercos 3                                                                                                                                 | Super Speed<br>USB Certified                                                              | VDE<br>UL<br>TÜV<br>CSA                                                                                                                                                                                       |                                                                                                         | SMPTE                                                                                                                                                                            | CameraLink<br>Flatlink<br>1G and 10G Ethernet                                                                                                                                      |

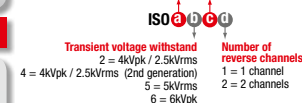
## Special functionality of the interface portfolio

- 1394
- LVDS/M-LVDS
- HDMI/Flatlink
- PCI/PCIe
- Crosspoint

## Interface Nomenclature

### Digital Isolators

- Integrated function**
- 1 = Integrated standard interfaces
  - 2 = Integrated standard interfaces
  - 5 = Isolated gate driver
  - 7 = Standalone digital isolator
- Total number of channels**
- 1 = 1 channel
  - 2 = 2 channels
  - 3 = 3 channels
  - 4 = 4 channels



### RS-485

- Operation temperature range**
- 5 = -55 to 125°C
  - 6 = -40 to 85°C
  - 7 = 0 to 70°C

### SN65HVD0xxx

- RS-485 Function**
- 08 = 3.3 to 5V RS-485
  - 1c = 3.3V Half-duplex
  - 2c = 5V Half-duplex
  - 3c = 3.3V Full-duplex
  - 17 = 70V Bus-pin protection
  - 30 = 5V economical and small package

### CAN

- Operation temperature range**
- 5 = -55 to 125°C
  - 6 = -40 to 85°C
  - 7 = 0 to 70°C

### SN65HVD0xx

- Function**
- 10 = Industry standard CAN
  - 23 = 3.3V CAN
  - 25 = 5V CAN

### USB

- Function**
- 1 = Discrete physical layer
  - 2 = Hub controller fullspeed
  - 3 = Peripheral fullspeed
  - 6 = Peripheral or host controller highspeed
  - 7 = Host controller
  - 8 = Hub controller superspeed
  - 9 = Peripheral superspeed

### TUSB0xxx

- Speed**
- 1 = USB 2.0 Full speed
  - 2 = USB 2.0 High speed
  - 3 = USB 3.0 Super speed

### UART

- FIFO**
- 4 = No FIFO
  - 5 = 16kB
  - 6 = 64kB

### TL16C05D

- Number of Channels**
- 0 = 1 channel
  - 1 = 1 channel
  - 2 = 2 channels
  - 4 = 4 channels

# Motor Drive Portfolio

| Product Highlights | Motor Drivers                                                                                              |                                                                                                                                                                            |                                                                                                   | Solenoid/Relay or unipolar Stepper Drivers                                |
|--------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                    | Brushed DC                                                                                                 | Stepper                                                                                                                                                                    | 3-Phase                                                                                           | Quad low-side switch                                                      |
|                    | 2.7V to 52.5V<br>up to 24A                                                                                 | 2.7V to 52.5V<br>up to 12A                                                                                                                                                 | 8V to 60V<br>Integrated FETs < 13A<br>Pre-Drivers support >60A                                    | 8.2 to 60V<br>up to 1.5A                                                  |
|                    | <b>DRV880x</b><br><b>DRV881x</b><br><b>DRV883x</b><br><b>DRV884x</b><br><b>DRV84x2</b>                     | <b>DRV881x</b><br><b>DRV882x</b><br><b>DRV883x</b><br><b>DRV884x</b><br><b>DRV84x2</b>                                                                                     | <b>DRV8301/2</b><br><b>DRV83x2</b>                                                                | <b>DRV8803</b><br><b>DRV8804</b><br><b>DRV8805</b>                        |
|                    | \$0.85 to \$5.50                                                                                           | \$0.95 to \$5.50                                                                                                                                                           | \$2.50 to \$4.70                                                                                  | \$1.40                                                                    |
| Functions/Features | Single, dual and quad H-bridge versions, inrush current limitation, slow, fast & mixed current decay modes | Single, dual and quad H-bridge versions, up to 32 u-steps indexer support, up to 256 u-steps and greater with external reference, slow, fast and mixed current decay modes | CBC inrush current protection, DRV8301/2 integrates DCDC converter and 2x current sense amplifier | Integrated free wheeling diodes, PWM or serial interface                  |
|                    | Office & POS printers, cash machines, gate and door controls, toys, valve actuators, textile machinery     | Office & POS printers, cash machines, camera control, door locks, textile machinery, toys, valve actuators, positioning systems                                            | E-bikes, power tools, pumps, industrial drives, medical drives                                    | Unipolar stepper motors, textile machinery, industrial automation systems |

## Motor Drive Nomenclature

DRV8xyz

Bridges  
 3 = Three half-bridges  
 4 = Four half-bridges  
 8 = One, two or four H-bridges

## Advantages of the integrated DRV8x Motor Drivers:

- Robust solution, thanks to the integrated protection features (over-current, over-temp, under-voltage, cross-conduction, etc).
- Reduced development time, efforts and costs.
- Reduced PCB space and BOM.
- Different interfaces and levels of control loop integration.

## Critical questions to choose the right DRV8x Motor Driver:

1. Which type of motor?
  - Brushed DC - Stepper - 3-Phase
2. Which voltage and current rating?
  - Motor Drivers with integrated MOSFETs go up to 60V and 24A.
  - Pre-Drivers for external MOSFETs can drive up to 60V and 60A.
3. What kind of interface / on-chip intelligence?
  - Generic PWM interface.
  - Easy to use Indexer, Serial or Phase/Enable interfaces with on-chip control intelligence.

## Software and Development Tools

- Combined DRV and MCU development kits:
  - DRV8301-HC-C2-kit
  - DRV8412-C2-kit
  - DRV8312-C2-kit
  - DRV88xx plus MSP430 EVMs
- Application notes
- Motor Driver forum in E2E™



# Clock Portfolio

|                    | Clock distribution                                                                   |                                                                                       | Clock generator                                              |                                                                         | Jitter-cleaners                                                                                  |                                                                                                   |                                            |
|--------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------|
|                    | Without output dividers                                                              | With output dividers                                                                  | Single-ended (LVCMOS)                                        | Differential (LVDS, LBPECL, CML)                                        | Intergrated VCO                                                                                  | External VCXO                                                                                     | Memory Clocks                              |
| Product Highlights | ↓                                                                                    | ↓                                                                                     | ↓                                                            | ↓                                                                       | ↓                                                                                                | ↓                                                                                                 | ↓                                          |
|                    | CDCLVC11x<br>CDCLVx12xx<br>CDCLVPxxx                                                 | CDCE18005<br>CDCL1810<br>LMK01xxx                                                     | CDCE9xx                                                      | CDCM6100x<br>CDC421Ax                                                   | CDCE6200x<br>LMK03xxx<br>LMK04xxx                                                                | CDCE72010<br>CDCM7005<br>LMK02xxx                                                                 | SN74SSQx<br>SN74SSTUx                      |
|                    | \$1.05 to \$8.20                                                                     | \$6.00 to \$7.20                                                                      | \$1.60 to \$2.35                                             | \$4.20 to \$6.50                                                        | \$6.60 to \$12.50                                                                                | \$7 to \$11                                                                                       | \$2.20 to \$6.20                           |
| Functions/Features | Fmax output <2 GHz<br>Universal output<br>RMS jitter 100 fs typ<br>Output skew 10 ps | Fmax output <1.6 GHz<br>Universal output<br>RMS jitter <10fs typ<br>Output skew 75 ps | Fmax <230 MHz<br>Spread-spectrum option<br>Output skew 60 ps | LVDS output <1.175 GHz<br>LVPECL output <1.175 GHz<br>Output skew 30 ps | Fmax <1.5 GHz<br>Up to 5 D/10 single-ended outputs<br>RMS jitter 112 ps typ<br>Output skew 75 ps | Fmax <1536 MHz<br>Up to 14 D/20 single-ended outputs<br>RMS jitter <200fs typ<br>Adjustable phase | -40° to +85°C options                      |
|                    | Single-ended and differential clock buffering                                        | Single-ended and differential clock divider                                           | DSP, FPGA, MPU clock XO replacement                          | PCIe, Gigabit Ethernet XO replacement                                   | ADC/DAC clocking, clock recovery                                                                 | High-speed ADC/DAC clocking                                                                       | DDR1, DDR2, DDR3 clocking                  |
| I/O                | Up to 16 different outputs<br>Input MUX                                              | Max 10 single-ended outputs<br>Built-in phase adjust                                  | Standard low-frequency XTAL input                            | Standard low-frequency XTAL input                                       | Three reference clock inputs<br>Built-in EEPROM                                                  | Up to three reference clock inputs<br>Built-in EEPROM                                             | Spread-spectrum option<br>Up to 60 outputs |

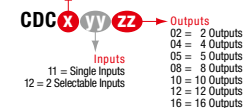
## Clock Nomenclature

### Clock distribution devices

LVC = with LVTTL or LVCMOS outputs (single-ended)  
 LVP = with LVPECL outputs (differential)  
 LVD = with LVDS outputs (differential)

### Clock Generation or Jitter Cleaners

E = with EPROM  
 L = Current Mode Logic  
 M = without EPROM



### LMK0xyyy

1 = 1<sup>st</sup> Generation  
 2 = 2<sup>nd</sup> Generation  
 3 = 3<sup>rd</sup> Generation  
 4 = 4<sup>th</sup> Generation

# Audio and Imaging Portfolio

| Audio                        |                                                                                                                                    |                                                                                                                                                          |                                                                                                 |                                                                                                       |                                                                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Battery Powered Applications |                                                                                                                                    |                                                                                                                                                          | Line Powered Applications                                                                       |                                                                                                       |                                                                                                                                                |
| Low Power Speaker Amps       |                                                                                                                                    | Low Power Converters (ADC/CODEC/DAC)                                                                                                                     | Headphone Amps and Line Drivers                                                                 | High Performance Converters                                                                           | Medium-High Power Amps and PWM Modulators                                                                                                      |
| Product Highlights           | TPA2015D1<br>TPA2025D1<br>LM49155<br>LM48411<br>TPA2011D1<br>LM48901                                                               | TLV320AIC3256<br>TLV320ADC3101<br>TLV320DAC3120<br>LM49350<br>LM49321<br>LMV1051                                                                         | TPA6140<br>TPA6132<br>LM48824<br>LM4808<br>DRV632<br>DRV602                                     | PCM3070<br>PCM5100<br>PCM1792A<br>PCM4220                                                             | TAS5727<br>TAS5630<br>TPA3116<br>LM4781                                                                                                        |
|                              | \$0.35 to \$2.10                                                                                                                   | \$1.35 to \$8.65                                                                                                                                         | \$0.31 to \$2.45                                                                                | \$0.95 to \$16.45                                                                                     | \$0.75 to \$7.95                                                                                                                               |
|                              | Class-AB/D up to 3W, boosted Class-D, battery tracking features, subsystems with high level of integration, spread-spectrum output | miniDSP with 3rd party algorithms, integrated Class-D amplifier, DirectPath HP amplifier, scalability (pin-to-pin options), 2Vrms output, integrated PLL | Class-AB, power savings through Class-G, 2Vrms outputs from single supply, high output power HP | miniDSP with 3rd party algorithms, integrated HP amplifier, 2Vrms output, integrated PLL, USB options | Up to 2x300W output power, closed/open loop architectures, analog, PWM or I2S inputs, audio processing capabilities, 8 channels PWM modulators |
|                              | Mobile phones, portable consumer electronics, home audio (e.g. docks)                                                              | Smart/mobile phones, portable consumer electronics, video conferencing systems                                                                           | Mobile phones, televisions, set top boxes, docks                                                | Video conferencing systems, audio Docks/HTIB/AVR systems, soundbars, pro-audio applications STB       | Audio docks/HTIB/AVR systems, soundbars, televisions, STB                                                                                      |
|                              | Applications                                                                                                                       |                                                                                                                                                          |                                                                                                 |                                                                                                       |                                                                                                                                                |

## Audio Nomenclature

### Audio Amplifier

TPA2... = Analog Input Low Power Amplifiers (<3.5W/ch)

TPA2100... = Analog Input, Low Power Amplifiers with Piezo speaker support

TPA3... = Analog Input Medium Power Amplifiers (6-50W/ch)

TPA6... = Analog Input HP Amps 24 bit

TAS2... = I2S Input Low Power Amplifiers (<3.5W/ch)

TAS50.../55... = PWM Modulators

TAS51.../53... = PWM Input, Open Loop High Power Amplifiers (15-200W/ch)

TAS56... = Analog/PWM Input, Closed Loop High Power Amplifiers (15-300W/ch)

TAS57... = 16 bit-18 bit, up to 10 MPS

LM4... = Analog Input Low Power Amplifiers (<3.5W/ch)

LM48.../49... = Analog Input, Low Power Amplifiers with Piezo speaker support

LM47.../38... = Analog Input Medium Power Amplifiers

### Audio Converter

PCM... = High Performance Converters

TLV320ADC... = Low Power ADCs

TLV320AIC... = Low Power Codecs

TLV320DAC... = Low Power DACs

LM49... = Audio subsystem with integrated converters

# Audio and Imaging Portfolio

| Audio, Imaging and Sensing Solutions |                                                                               |                                                                                                             |                                                                                               |                                                                                                                                                                                                           |                                                                                                                         |
|--------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Product Highlights                   | Audio                                                                         | Sensing                                                                                                     |                                                                                               | Touch Solutions                                                                                                                                                                                           | Imaging                                                                                                                 |
|                                      | Audio Interfaces                                                              | Current Sense                                                                                               | Temperature Sense                                                                             | Touch Screen & Haptics Controllers                                                                                                                                                                        | Imaging AFE                                                                                                             |
|                                      | SRC4192<br>SRC4392<br>DIR9001<br>DIX9211<br>PGA2500                           | INA216<br>INA226<br>INA282<br>TMP512<br>LMP8480<br>LMP8646                                                  | TMP006<br>TMP103<br>TMP112<br>TMP512<br>LM57<br>LM94022                                       | TSC2014<br>TSC2020<br>TSC3060<br>DRV8601<br>DRV8662                                                                                                                                                       | VSP7500<br>VSP8133<br>VSP8244<br>VSP5610<br>LM98620                                                                     |
|                                      | \$0.70 to \$11.45                                                             | \$0.35 to \$7.15                                                                                            | \$0.20 to \$3.95                                                                              | \$1.25 to \$5.60                                                                                                                                                                                          | \$3.55 to \$27                                                                                                          |
| Functions/Features                   | Sample rate converters, digital audio transceivers, microphone pre-amplifiers | Highest accuracy, zero drift architecture, low gain error, small size, wide-dynamic range, high integration | Low power high accuracy, IR sensor, small size, true beta correction, fan control/ HW monitor | Resistive/multi-touch resistive/capacitive touch, small size, low power, superior analog frontend, fast speed, high level of integration (Audio/Haptics), haptics drivers with integrated boost converter | High integration (timing generator, vertical drivers) low power, 12-16 bit, multichannel support, up to 65 MHz sampling |
|                                      | Pro-Audio, soundbar, AVR, HTiB, audio dock                                    | Current/voltage/power monitoring, consumer electronics, white goods, industrial                             | Consumer electronics, white goods, industrial                                                 | Consumer electronics, medical applications, white goods HMI, industrial HMI                                                                                                                               | Security cameras, machine surveillance, IPTV cams, digital cameras, consumer electronics                                |

## Audio, Sensing and Imaging Nomenclature

### Current Sense

INA ...

### Temperature Sense

TMP ...

LMxy

### Touchscreen Controller

TSC ...

LM8300/8500

### Haptics Driver

DRV86 .../DRV26 ...

LM48580, LM4570

### Imaging AFE

VSP ...

LM98 ...

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|                               |                                                                                          |
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