Automotive Infotainment Guide

Texas Instruments

Audio
Data Converters
Embedded Processors
Interface
Microcontrollers
Power Management
Wireless Connectivity

www.ti.com/automotive

2014

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Texas Instruments Commitment to Transportation

Texas Instruments (TI) is committed to providing innovative automotive technologies that make safer, greener and more enjoyable driving experiences. With deep understanding and expertise in analog and embedded processing, Texas Instruments provides a rich portfolio for the automotive/transportation space. TI is committed to providing superior cost-effective solutions to the transportation market along with benchmark service in terms of excellent product documentation, on-time delivery and conformance to specifications.

TI makes it possible to achieve the quality, reliability and cost goals needed to succeed in today's marketplace. TI enables customers to innovate and be safer, greener, more fun.

Automotive Qualified Products (Q1)

TI's automotive qualified products are indicated by the Q1 suffix. The Q1 indicates that a product has met TI's stringent automotive standards and includes:

- 180-day product change notification from final notice
- Extended temperature qualification
- Automotive documentation service
- Target zero defects

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Automotive Infotainment Guide
Introduction

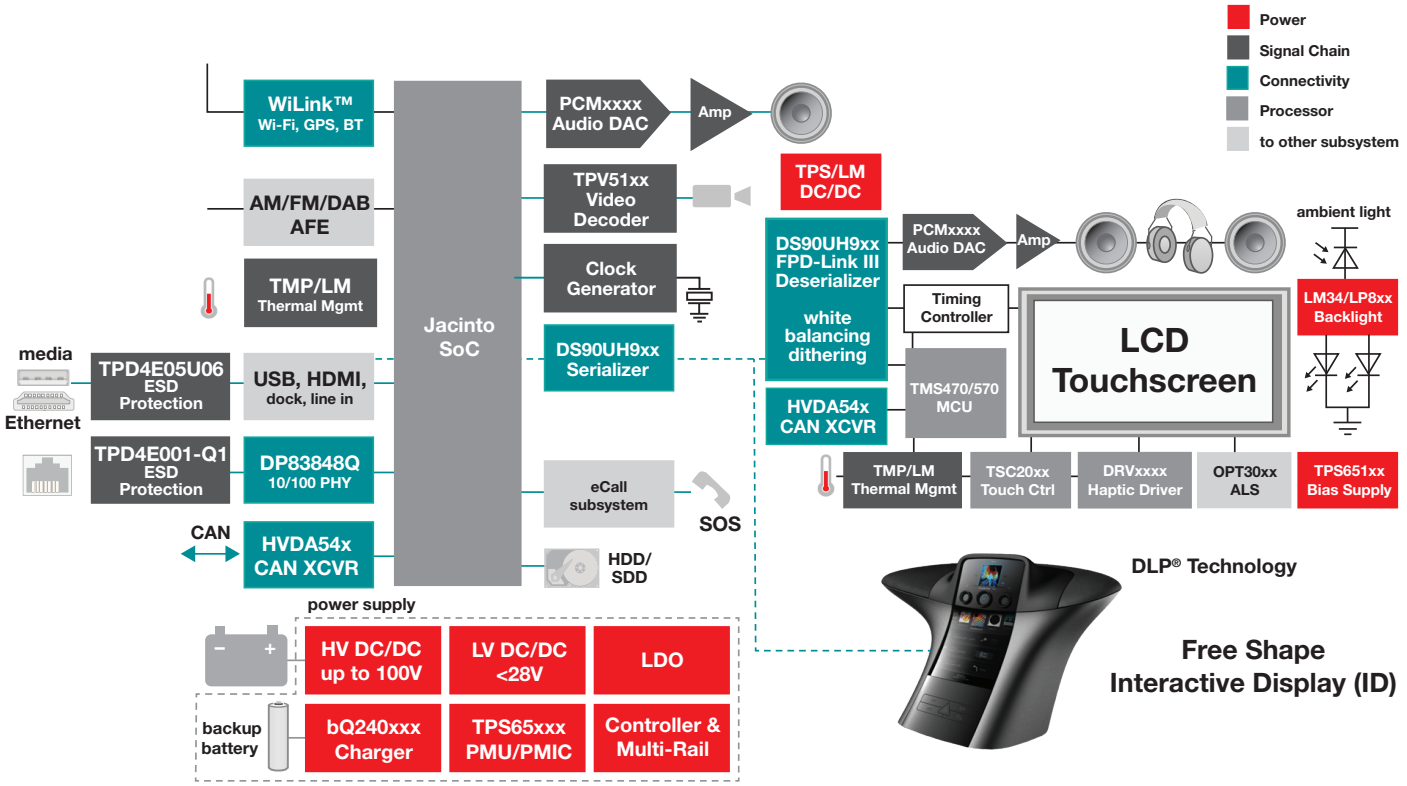
With the race to deliver the best features in new cars escalating, the infotainment system is now a key focus in the automotive design process. To support the growing importance of infotainment, Texas Instruments offers a strong portfolio and design support. TI's broad analog and digital embedded and applications processing portfolio provides improved audio quality and system speed, efficient power management and low power consumption for applications such as car audio, navigation systems, power supply, as well as in-car and personal entertainment.

Infotainment systems combine entertainment, multi-media and driver information functions in one module. They offer AM/FM or satellite radio, DC/DVD player for music and video, navigation system, data and multi-media ports (USB, *Bluetooth*, line in, line out, video in) as well as general and vehicle status information.

Power management: The power supply is connected to the 12V or 24V board net and regulates down/up to voltages for DSP, uC, memory and ICs and functions in the infotainment system. In some cases there may be 10 or more different power rails, making the design of the power supply a critical task when trying to design for size, cost and efficiency.

Linear regulators with low quiescent current help reduce battery leakage current during standby operating modes (ignition off), are load dump voltage tolerant for direct battery devices, and need low drop-out and tracking for low battery crank operation.

Beyond providing increased conversion efficiencies, switching power supplies provide EMI improvement with slew rate control of the switching FET, frequency hopping, spread spectrum or triangulation method for attenuation of peak spectral energy, low Iq, soft start for power sequencing and in rush current limitation, phased switching for multiple SMPS's regulators to minimize input ripple current and lower input capacitance, higher switching frequency for smaller components (L and C's), and SVS functions for brown out indications



Automotive infotainment block diagram.

Automotive Infotainment Guide
Design Considerations

Bi-directional FPD-Link III embedded clock Ser/Des with ultra-low EMI signaling integrate data, clock, and real-time control over a single twisted wire pair.

Communication interfaces allow data exchange between independent electronic modules in the car, the remote sub modules of the infotainment system as well as external devices like USB memory or video sources.

High Speed CAN (up to 1Mbps, ISO 119898) is a two wire, fault tolerant differential bus. With a wide input common mode range and differential signal technology it serves as the main vehicle bus type for connecting the various electronic modules in the car with each other. LIN supports low speed (up to 20 kbps) single bus wire networks, primarily used to communicate with remote sub functions of the infotainment system. LVDS interfaces are used to transfer large amounts of data (e.g. HD video data) via a high speed serial connection to an external location like a video screen.

The Audio input front end and audio output is often combined into a single Codec. The Audio line level input from the source is converted into digital samples by the ADC and feed to the system's DSP. On the output side. ADCs convert the digital output an analog signal, which is amplified to the levels needed by the speakers or headphones used with the system. By using Class-D amplifiers the system's power efficiency can exceed 90% while maintaining low THD. This improved efficiency leads to significant size, weight and heat reductions. TI's class-D car audio solutions exhibit extremely low EMI levels and are being used in OEM systems with stringent EMC requirements.

The audio DSP performs I/Q demodulation and outputs digital audio and data. This includes functions like volume, treble, bass and sound effects, as well as more sophisticated features like mixing input channels and digitally process multiple channels, performing sound effects processing such as Dolby® Pro Logic® II, SRS® Circle Surround™ II, TruSound and other audio algorithms. The uC + DSP controls the user interface, bus interface, and network interface as well as GPS navigation and touch screen control. It is also used to process and output video data from multiple sources.

Wireless connectivity: For multimedia streaming, hands-free calling and A2DP stereo with easy pairing, a highly integrated combination chip that enables Wi-Fi®, Bluetooth®, and GPS/GLONASS is connected to the host processor.

Very Low-Power Stereo Audio CODEC with miniDSP and PowerTune™ Technology

TLV320AIC3254-Q1

The TLV320AIC3254-Q1 (also called the AIC3254- Q1) is a flexible, low-power, low-voltage stereo audio codec with programmable inputs and outputs, PowerTune capabilities, fully-programmable miniDSP, fixed predefined and customizable signal processing blocks, integrated PLL, integrated LDOs and flexible digital interfaces making it ideal for Automotive Applications such as Car Radio and Infotainment.

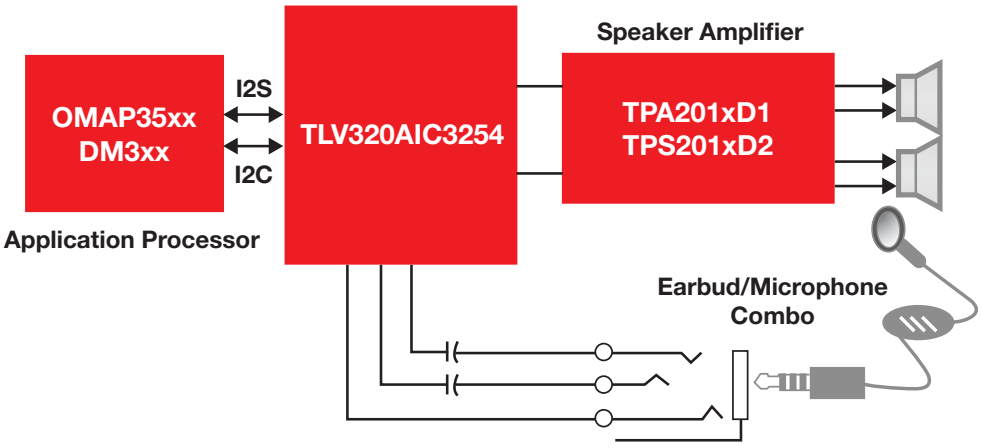
The TLV320AIC3254-Q1 features two fully-programmable miniDSP cores that support application-specific algorithms in the record and/or the playback path of the device. The miniDSP cores are fully software controlled. Target algorithms, like active noise cancellation, acoustic echo cancellation or advanced DSP filtering are loaded into the device after power-up. It also includes a digitally-controlled stereo microphone preamplifier and integrated microphone bias.

To ease system-level design, LDOs are integrated to generate the appropriate analog or digital supply from input voltages ranging from 1.8V to 3.6V. Digital IO voltages are supported in the range of 1.1V–3.6V.

The device is available in the 5-mm × 5-mm, 32-pin QFN package that is qualified per AEC-Q100 guidelines and supports Grade 3: –40°C to 85°C ambient operating temperature range.

Key Features

- Stereo audio DAC with 100 dB SNR
- 4.1 mW stereo 48 ksps DAC playback
- Stereo audio ADC with 93 dB SNR
- Extensive signal processing options
- Embedded miniDSP
- Six single-ended or three fully-differential analog Inputs
- Stereo analog and digital microphone inputs
- Stereo headphone outputs
- Stereo line outputs
- Very low-noise PGA
- Low power analog bypass mode
- Programmable microphone bias
- Programmable PLL
- Integrated LDO



Audio CODEC block diagram.

Learn more at: **www.ti.com/tlv320aic3254-q1**

Data Converters/Audio
Component Recommendations

Audio ADCs

Device	Product Description	Key Specifications
ADS5204-Q1	Dual, 10-Bit, 40 MSPS Low-Power ADC with PGA	10-Bit, 40 MSPS,Pipeline, 275mW, 60.5-dB SNR, ENOB = 9.7, 2 Input Channels
PCM5100A-Q1	2VRMS DirectPath™, 112/106/100dB Audio Stereo DAC with 32-bit, 384kHz PCM Interface	Audio DAC + Support Circuitry in One Monolithic IC; Market-Leading Low Out-of-Band Noise; No DC Blocking Capacitors Required; Intelligent Muting System; Soft Up or Down Ramp and Analog Mute (AMUTE) for 120-dB Mute; Signal-To-Noise Ratio (SNR) with Popless Operation; Integrated High-Performance Audio Phased-Locked Loop (PLL); Supports 1.8-V Digital Input Interface
TLC2543-Q1	12-Bit ADC with Serial Control and 11 Analog Inputs	12-Bit, 66 kSPS, SAR, 5mW, 10-µs Conversion Time Over Operating Temperature, ±1 LSB (max)
TLV1548-Q1	Low-Voltage, 10-Bit ADC with Serial Control and 8 Analog Inputs	2.7-V to 5.5-V Supply, 10-Bit, 85 kSPS, SAR, Conversion Time ≤ 10 µs
TLV5535-Q1	8-Bit, 35-MSPS ADC, Single-Channel and Low Power	Meets AEC-Q100-011 C3A CDM Classification, 3.3-V Single Supply, 8-Bit, 35 MSPS

Class-D Audio Amplifiers

Device	Product Description	Key Specifications
TAS5414B-Q1	4-Channel Automotive Audio Amplifier with Single-Ended Inputs	8Four-Channel Digital Power Amplifier; Four Analog Inputs, Four BTL Power Outputs; Typical Output Power at 10% THD+N; 28 W/Ch Into 4 Ω at 14.4 V; 50 W/Ch Into 2 Ω at 14.4 V; THD+N < 0.02%, 1 kHz, 1 W Into 4 Ω; Patented Pop- and Click-Reduction Technology; Load Diagnostic Functions
TAS5424B-Q1	4-Channel Automotive Audio Amplifier with Differential Inputs	Four-Channel Digital Power Amplifier; Four Analog Inputs, Four BTL Power Outputs; Typical Output Power at 10% THD+N 28 W/Ch Into 4 Ω at 14.4 V; 50 W/Ch Into 2 Ω at 14.4 V; THD+N < 0.02%, 1 kHz, 1 W Into 4 Ω; Patented Pop- and Click-Reduction Technology; Load Diagnostic Functions
TAS5414C-Q1	4-Channel Automotive Audio Amplifier with Single-Ended Inputs	Four-Channel Digital Power Amplifier; Four Analog Inputs, Four BTL Power Outputs; Typical Output Power at 10% THD+N 28 W/Ch Into 4 Ω at 14.4 V; 50 W/Ch Into 2 Ω at 14.4 V; THD+N < 0.02%, 1 kHz, 1 W Into 4 Ω; Patented Pop- and Click-Reduction Technology; Load Diagnostic Functions
TAS5514B-Q1	4-Channel Automotive Digital Amplifier, Stand Alone Version	Four Channels at 23 W Continuously into 4 Ω at Less than 1% THD+N from a 14.4-V Supply; Channels Deliver 38 W into 2 Ω at 1% THD+N Each
TPA3112D1-Q1	Automotive Catalog, 25-W Filter-Free Mono Class-D Audio Amplifier with SpeakerGuard	20-W into an 4-Ω Load at 10% THD+N From a 12-V Supply; 94% Efficient Class-D Operation into 8-Ω Load eliminates Need for Heat Sinks; Wide Supply Voltage Range Allows Operation from 8 to 26 V; Differential Inputs

Audio Codecs

Device	Product Description	Key Specifications
TWL1103T-Q1	Voice-Band Audio Processor (VBAP)	2.7-V Operation, On-Chip I2C Bus, ESD Protection Exceeds 2 kV, Transmit and Receive Filtering for Voice-Band Communications Systems
TLV320AIC3104-Q1	Automotive Catalog Low-Power Stereo CODEC with 6 Inputs, 6 Outputs, HP Amp and Enhanced Digital Effects	2-ADC (92dB SNR), 2-DAC (102dB SNR), 6in, 6out, 96Khz Sampling, Low Power, Analog Bypass, Programmable PLL, I2C Digital Interface, Supports L, R, I2S, DSP, TDM Audio Formats
TLV320AIC3254-Q1	Automotive Catalog, Very Low-Power Stereo Audio CODEC with miniDSP and Power Tune™ Technology	Stereo Audio DAC with 100dB SNR; Stereo Audio ADC with 93dB SNR; Embedded miniDSP; Programmable PLL; Integrated LDO
PCM3168-Q1	24-Bit Multi-Channel Audio CODEC 6ch-in/8ch-out with 96/192kHz Sampling Rate	24-Bit, 6-ADC (107dB SNR), 8-DAC (112dB SNR), SPI or I2C Digital Interface, Supports R, L, I2S, TDM, DSP Audio Formats

Data Converters/Audio
Component Recommendations

Audio DACs

Device	Product Description	Key Specifications
PCM1681-Q1	105-dB, 8-Channel, TDM DAC	24-Bit, 192-kHz, 8-Channel Audio DAC, D-Range/SNR: 105 dB, 3-Way Control Interface (SPI/I2C/HW)
PCM1690-Q1	Automotive Catalog 113dB SNR 8-Channel Audio DAC with Differential Outputs	24-Bit, 192-kHz, 8-Channel Audio DAC, D-Range/SNR: 113 dB, L,R,I2S,TDM,DSP Audio Interfaces, Analog Mute
PCM5102-Q1	Automotive Catalog 112dB Stereo DAC with 2VRMS Output and Integrated Audio PLL	32-Bit, 384-kHz, 2-Channel Audio Delta Sigma DAC, 112 dB SNR, HW Control Interface, Integrated PLL, Under Voltage Protection, Intelligent Muting
PCM1753-Q1	Automotive Catalog 106dB SNR Stereo DAC (S/W Control)	24-Bit, 192-kHz, 2-Channel Audio Delta Sigma DAC, D-Range/SNR: 106 dB, Control Interface (SPI)
PCM1754-Q1	Automotive Catalog 106dB SNR Stereo DAC (H/W Control)	24-Bit, 192-kHz, 2-Channel Audio Delta Sigma DAC, D-Range/SNR: 106 dB, Control Interface (H/W)
TLV320DAC3100-Q1	Low-Power Stereo Audio DAC With Audio Processing	Stereo Audio DAC with 95-dB SNR; Supports 8-kHz to 192-kHz Sample Rates; Mono Class-D BTL Speaker Driver (2.5 W Into 4-Ω or 1.6 W Into 8-Ω); Stereo Headphone/Lineout and Mono Class-D; Microphone Bias

Sample Rate Converters

Device	Product Description	Key Specifications
SRC4190-Q1	Automotive Catalog 192kHz Stereo Asynchronous Sample Rate Converters	2-Channel, 212 kHz Sampling, 128 dB Dynamic Range, 3.3V Supply, Normal, I2S, TDM Audio Interface

Digital Audio Receivers

Device	Product Description	Key Specifications
DIR9001-Q1	96-kHz Digital Audio Interface Receiver	28-kHz to 108-kHz Sample Frequency, Low Clock Jitter: 50ps (typ), 100ps (max), 3.3-V, Single Supply, 5-V, Tolerant Digital Input

Digital Audio Processors

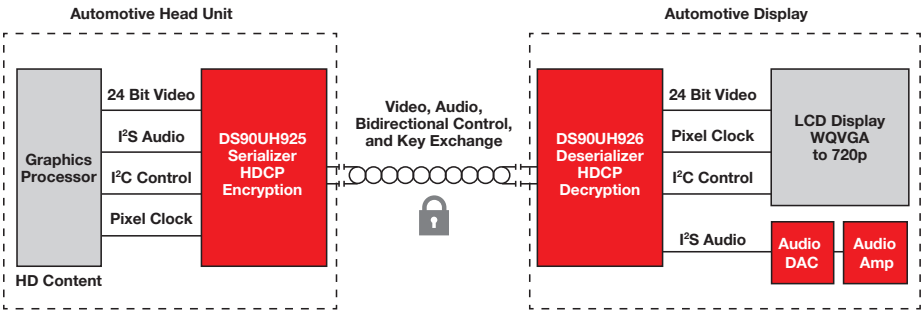
Device	Product Description	Key Specifications
DA710	DSPs for Multi-Channel, Multi-Zone Decode Applications	Fixed and Floating Point,, 256 BGA, up to 300MHz, SDRAM
DA70x	DSPs for Multi-Channel, Multi-Zone Decode Applications	Floating Point, 144 QFP, up to 250MHz, SDRAM
DA830	DSPs for Multi-Channel, Multi-Zone Decode Applications with Integrated ARM and Additional Connectivity	Fixed and Floating Point,, 250 BGA, up to 300MHz DSP + ARM, SDRAM
DA828	DSPs for Multi-Channel/Zone Decode Applications with Integrated ARM	Fixed and Floating Point,, 176 QFP, up to 400MHz DSP + ARM, SDRAM
DA810	DSPs for Multi-Channel/Zone Decode Applications with Additional Connectivity	Fixed and Floating Point,, 256 BGA, up to 400MHz, SDRAM
DA808	SPs for Multi-Channel, Multi-Zone Decode Applications with Additional Connectivity	Fixed and Floating Point,, 176 QFP, up to 400MHz, SDRAM
DA807	DSPs for Multi-Channel, Multi-Zone Decode Applications with Additional Connectivity	Fixed and Floating Point,, 176 QFP, up to 266MHz, SDRAM
DA805	DSPs for Multi-Channel, Multi-Zone Decode Applications with Additional Connectivity	Fixed and Floating Point,, 176 QFP, up to 266MHz
DA804/2	DSPs for Multi-Channel, Multi-Zone Decode Applications with Additional Connectivity	Fixed and Floating Point,, 80 QFP, up to 250 MHz

Touch Screen Controllers

Device	Product Description	Key Specifications
TSC2008-Q1	Automotive Catalog Nano-Power Touch Screen Controller with SPI	Single 1.2V to 3.6V Supply, Low Power: (12 bit), Enhanced IEC ESD Protection 25kV Air - 15kV Contact, On-Chip Temperature Measurement, Auxiliary Input, Touch Pressure Measurement
TSC2007-Q1	Automotive Catalog Nano-Power Touch Screen Controller with I2C	Single 1.2V to 3.6V Supply (No Separate I/O Supply), 22k/11kSPS Throughput in High-Speed Mode (3.4MHz), High-Speed I2C Serial Interface, 12- or 8-Bit Resolution Mode, On-Chip Temperature Measurement, Touch Pressure Measurement, Enhanced IEC ESD Protection 25kV Air - 15kV Contact

FPD-Link III Ser/Des
DS90UH925/6Q

The DS90UH925Q serializer, in conjunction with the DS90UH926Q deserializer, provides a solution for secure distribution of content-protected digital video within automotive entertainment systems. This chipset translates a parallel RGB Video Interface into a single pair high-speed serialized interface. The digital video data is protected using the industry standard high bandwidth digital content protection (HDCP) copy protection scheme, enabling playback of content-protected media. The serial bus scheme, FPD-Link III, supports video and audio data transmission and full duplex control including I2C communication over a single differential link. Consolidation of video data and control over a single differential pair reduces the interconnect size and weight, while also eliminating skew issues and simplifying system design.



Automotive infotainment block diagram.

Key Features

- Integrated HDCP cipher engine with on-chip key storage
- Bidirectional control interface channel interface with I2C compatible serial control bus
- Supports high definition 720 pixels digital video format
- RGB888 + VS, HS, DE and synchronized I2S audio supported
- 5 to 85-MHz PCLK supports high definition resolutions, dual-view displays and 24-bit color depth
- Single 3.3-V operation with 1.8-V or 3.3-V compatible LVCMOS I/O interface
- AC-coupled STP interconnect up to 10 meters
- Parallel LVCMOS video inputs
- I2C compatible serial control bus for configuration (DS90UH926Q)
- DC-balanced & scrambled data with embedded clock simplifies interconnects and reduces the number of cables and connectors
- Adaptive cable equalization (DS90UH926Q)
- HDCP content protected
- Supports HDCP repeater application
- @ SPEED link BIST mode and LOCK status pin (DS90UH926Q)
- EMI minimization (SSCG and EPTO) (DS90UH926Q)
- Image Enhancement (white balance and dithering) and internal pattern generation
- Low power modes minimize power dissipation
- Automotive grade product: AEC-Q100 grade two qualified
- >8-kV HBM and ISO 10605 ESD rating
- Backward compatible modes

Learn more at: **www.ti.com/ds90uh925-6q**

Interface
Component Recommendations

FPD-Link II & III Ser/Des

Device	Application(s)	Parallel Data	Pixel Clock	Equalization	Spread Spectrum	Other Features	ESD
FPD-Link III with Embedded Bidirectional Control Bus							
DS90UH925/6	Display	24 (27) CMOS	5 to 85 MHz	Adaptive	Y	HDCP, Repeater, I2S Audio, White Balance, Dithering	8 kV HBM, ISO 10605
DS90UB925/6	Display	25 (27) CMOS	6 to 85 MHz	Adaptive	Y	Repeater, I2S Audio, White Balance, Dithering	8 kV HBM, ISO 10605
DS90UB913/4	Camera	10 or 12 CMOS	10 to 100 MHz	Adaptive	Y	2:1 Input Mux	8 kV HBM, ISO 10605
DS90UB903/4	Display	18 (21) CMOS	10 to 43 MHz	Y	Y	—	8 kV HBM, ISO 10605
DS90UB901/2	Camera	14 (16) CMOS	10 to 43 MHz	Y	Y	—	8 kV HBM, ISO 10605
FPD-Link II							
DS90UR910	Display, Camera	CSI-2	10 to 65 MHz	Y	–	—	8 kV HBM, ISO 10605
DS90UR907/8	Display	4 LVDS	5 to 65 MHz	Y	Y	—	8 kV HBM, ISO 10605
DS90UR905/6/16	Display	24 (27) CMOS	6 to 65 MHz	Y	Y	White Balance, Dithering	8 kV HBM, ISO 10605
DS90UR903/4	Display	18 (21) CMOS	10 to 43 MHz	Y	Y	—	8 kV HBM, ISO 10605
DS99R421/124	Display	3 LVDS	5 to 43 MHz	Y	Y	—	8 kV HBM, ISO 10605
DS90UR241/124	Display, Camera	24 CMOS	5 to 43 MHz	—	—	—	8 kV HBM, ISO 10605
DS90C241/124	Display, Camera	24 CMOS	5 to 35 MHz	—	—	—	8 kV HBM, ISO 10605

LVDS

Device	Product Description	Key Specifications
SN65LVDS051-Q1	Dual, High-Speed LVDS Transmitter/Receiver	Single 3.3-V Supply, Meets ANSI TIA/EIA-644-1995 Standard, Signaling Rates up to 400 Mbps
SN65LVDM050-Q1	Dual, High-Speed LVDS Transmitter/Receiver	Single 3.3-V Supply, Signaling Rates up to 500 Mbps
SN65LVDM051-Q1	Dual, High-Speed LVDS Transmitter/Receiver	Single 3.3-V Supply, Signaling Rates up to 500 Mbps, TIA/EIA-644 Standard Compliant Devices
SN65LVDS84A-Q1	FlatLink™ Transmitter	3.3-V Supply Voltage, 197-Mbps Data Rate, Very Low EMI, 21 Data Channels Plus Clock-In Low-Voltage TTL Inputs and 3 Data Channels Plus Clock-Out Low-Voltage Differential Signaling (LVDS) Outputs
SN65LVDS86A-Q1	FlatLink™ Receiver	21 inputs, 163 MBs

CAN Transceivers

Device	Product Description	Key Specifications
SN65HVDA1040A-Q1	5 V High Speed CAN Transceiver	Low-Power Standby Mode with Wake, Common Mode Bus Stabilization Output
SN65HVDA1050A-Q1	5 V High Speed CAN Transceiver	Silent Mode, Common Mode Bus Stabilization Output
SN65HVDA54x-Q1 Family	5 V High Speed CAN Transceivers (HVDA540, HVDA541, HVDA542)	I/O Level Shifting (All), Low-Power Standby Mode (540), Low-Power Standby Mode with Wake (541), and Silent Mode (542)
SN65HVDA54x5-Q1 Family	5 V High Speed CAN Transceivers (HVDA540-5, HVDA541-5, HVDA542-5)	Low-Power Standby Mode (540-5), Low-Power Standby Mode with Wake (541-5), and Silent Mode (542-5)
SN65HVDA55x Family	5 V High Speed CAN Transceivers (HVDA551, HVDA553)	Enhanced ESD and Transient Protection, Low-Power Standby Mode with Wake, I/O Level Shifting (551), Common Mode Bus Stabilization Output (553)

LIN Transceivers

Device	Product Description	Key Specifications
TPIC1021A-Q1	LIN Transceiver	LIN Specifiation 2.0 Compliant, 5V or 3.3V I/O Support, up to 20kbps, Low Current Consumption
SN65HVDA100-Q1	LIN Transceiver	LIN Specifiation 2.0 Compliant, Extended Operation with Supply from 5V to 27V DC, External Wakeup Pin

Analog Switches

Device	Product Description	Key Specifications
CD74HC4051-Q1	High-Speed, CMOS Logic, Analog Multiplexers/Demultiplexers	2-V to 6-V Supply Voltage, High-Noise Immunity NIL = 30%, NIH = 30% of VCC, VCC = 5V
CD74HCT4067-Q1	High Speed CMOS 16-Channel Analog Multiplexer/Demultiplexer with TTL Inputs	4.5-5.5V Supply, Low Power Consumption, Low 70Ω On Resistance
SN74HC4851-Q1	8-Channel, Analog Multiplexer/Demultiplexer with Injection-Current Effect Control	2-V to 6-V VCC Supply, 2 to 6 Node Voltage, Low Crosstalk Between Switches
SN74HC4852-Q1	Dual, 4-to-1 Channel, Analog Multiplexer/Demultiplexer with Injection-Current Effect Control	2-V to 6-V VCC Supply, Injection-Current Cross Coupling<1 mV/mA, ICC 10 µA

Interface
Component Recommendations

ESD Protection

Device	Product Description	Key Specifications
TPD4E001-Q1	Ideal for Automotive Infotainment: Dual USB2.0, Ethernet, and LVDS	4-Channel, 1.5pF, ESD Protection, 15kV IEC Air Gap, 8kV IEC Contact
TPD2E001-Q1	Ideal for Automotive Infotainment: Single USB2.0	2-Channel, 1.5pF, ESD Protection, 15kV IEC Air Gap, 8kV IEC Contact
TPD4E05U06-Q1	Ideal for Automotive Infotainment: USB3.0 and HDMI	4-Channel, 0.5pF, ESD Protection, 15kV IEC Air Gap, 12kV IEC Contact
TPD2E2U18-Q1	Ideal for Automotive Infotainment: High Voltage ESD Protection for Single USB2.0, Ethernet, and LVDS	2-Channel, 2pF, 18VRWM, ESD Protection, 15kV IEC Air Gap, 8kV IEC Contact
TPD3S714-Q1	Ideal for Automotive Infotainment: USB Interface Protection with Short-to-Battery and Short-to-Ground Protection	3-Channel, 18VRWM, Short-to-Battery and Short-to-Ground Protection, ESD Protection, 15kV IEC Air Gap, 8kV IEC Contact

Preview products ar elisted in bold blue.

Voltage Level Translators

Device	Product Description	Key Specifications
SN74AVC4T245-Q1	4-Bit Dual-Supply Bus Transceiver With Configurable Voltage Translation	4-Bit, 1.2-3.6V, 380Mbps, ICC 16 µA, Output Enable Pin
SN74AVC8T245-Q1	8-Bit Dual-Supply Bus Transceiver With Configurable Voltage Translation	8-Bit, 1.2-3.6V, 320Mbps, ICC 25 µA, Output Enable Pin
SN74AVC16T245-Q1	16-Bit Dual-Supply Bus Transceiver With Configurable Voltage Translation	16-Bit, 1.2-3.6V, 380Mbps, ICC 60 µA, Output Enable Pin
TXB0104-Q1	4-Bit Bidirectional Voltage-Level Translator with Auto Direction Sensing	4-Bit, 1.2-3.6V on Port A, 1.65-5.5V on Port B, 100Mbps
TXB0106-Q1	6-Bit Bidirectional Voltage-Level Translator with Auto Direction Sensing	6-Bit, 1.2-3.6V on Port A, 1.65-5.5V on Port B, 100Mbps

Thermal Management

Device	Product Description	Key Specifications
TMP101-Q1	Digital Temperature Sensor with I2C Serial Interface, Prog. Thermostat/Alarm Func	±3°C MAX Accuracy, Alert Function, IQ=75µA MAX, I2C Interface to MCU, SOT-23 Package
TMP102-Q1	Low Power Digital Temperature Sensor with SMBus/Two-Wire Serial Interface in SOT563	±3°C MAX Accuracy, Alert Function, IQ=10µA MAX, I2C Interface to MCU, 1.6mm x 1.6mm SOT-563 Package
TMP411-Q1	+/-1degC Remote and Local Digital Temperature Sensor with N-Factor and Series Resistance Correction	Local=±1°C MAX Accuracy, Remote=±1°C MAX Accuracy, Dual Alert Functions, IQ=475µA MAX, I2C Interface to MCU
TMP451-Q1	1.8V Supply Remote and Local Digital Temperature Sensor with N-Factor and Series Resistance Correction	Local=±1°C MAX Accuracy, Remote=±1°C MAX Accuracy, Dual Alert Functions, IQ=250µA MAX, I2C Interface to MCU
LM60-Q1	Analog Temperature Sensor with 2.7V Supply	±3°C MAX Accuracy, Gain=6.25mV/°C, IQ=130µA MAX
LM26LV-Q1	1.6 V, LLP-6 Factory Preset Temperature Switch and Temperature Sensor	Local Sensor=±2.3°C MAX Accuracy Switch: Factory Preset Trip Point, ±2.3°C MAX Accuracy
TMP300-Q1	1.8V, Resistor-Programmable Temperature Switch and Analog Out Temperature Sensor	Local Sensor=±5°C MAX Accuracy Switch: Resitor Programmed Trip Point, ±6°C MAX Accuracy
TMP302-Q1	Low Power, 1.4V Temperature Switch in SOT563	16 Pin-Selectable Trip Points, Trip Point Accuracy=±2°C MAX from +40°C to +125°C, IQ=15µA MAX, SOT563 PACKAGE: 1.6mmx1.6mm SOT563 Package
INA210-214-Q1	Analog Voltage Output, High/Low-Side Measurement, Bi-Directional Zero-Drift Series Current Shunt Monitor	Gain Options of 50, 100, 200, 500, & 1000 V/V, VOS=35µV (Gain of 200-1000) MAX, IQ=115µA MAX, -0.3V to +26V Cpmmon Mode Voltage Range
INA220B-Q1	Bi-Directional Current/Power Monitor With I2C Interface	Current, Volatge, or Power Output, VOS=50µV MAX, 0V to +26V Common Mode Voltage Range, I2C Interface to MCU

Preview products ar elisted in bold blue.

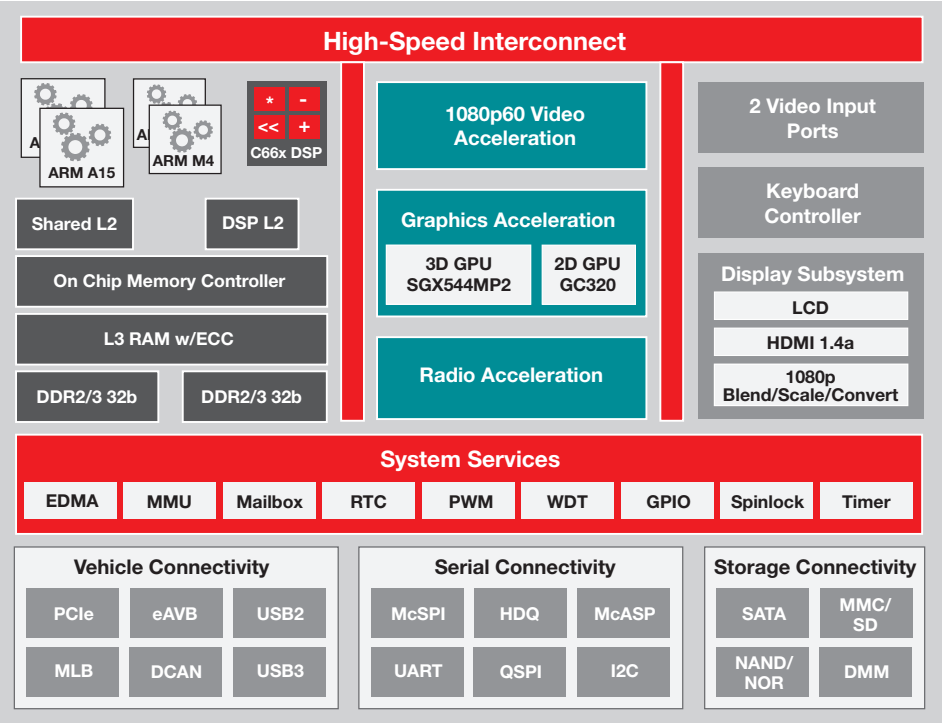
Clocks

Device	Product Description	Key Specifications
CDCE937-Q1	3-PLL, Integrated VCXO, Spread Spectrum Clocking, 2.5V or 3.3V LVCMOS Outputs	Low Jitter of 60ps Peak to Peak Period, EEPROM/I2C/Pin Programming, XTAL or LVCMOS Input, Integrated on-chip VCXO with External XTAP, 7 LVCMOS Outputs
CDCE949-Q1	4-PLL, Integrated VCXO, Spread Spectrum Clocking, 2.5V or 3.3V LVCMOS Outputs	Low Jitter of 60ps Peak to Peak Period, EEPROM/I2C/Pin Programming, XTAL or LVCMOS Input, Integrated On-Chip VCXO with External XTAP, 9 LVCMOS Outputs
CDCS503-Q1	Spread Spectrum Clock Generator	Up to +/-2% Spread Spectrum Clocking to Reduce EMI, Pin Programmable, 1 LVCMOS Input and Output, Single 3.3V supply
CDCVF2505-Q1	3.3V PLL Clock Driver for General Purpose & SDRAM Apps, w/Spread Spectrum Clock Compatibility	24M to 200MHz Operating Frequency, <150ps Cycle-to-Cycle Jitter, <150ps Propagation Delay, on-Chip Series Damping Resistor, Automatic Input Clock Detector

Automotive Infotainment Processors

Texas Instruments provides full system solutions for connected automotive infotainment. Our unparalleled solutions combine industry-leading hardware and solutions with a comprehensive software ecosystem. Automotive infotainment processors enable cost-effective, scalable, and feature-rich automotive applications such as automotive infotainment head units and rear-seat entertainment systems with solutions that smartly integrate industry-leading ARM® cores, graphics accelerators, software-defined radio, speech recognition, high-definition video, and both wired and wireless connectivity, as well as the right mix of peripherals for automotive use cases.

TI provides processor technology leadership, complete bills of materials that are optimized for innovative automotive capabilities, and full solution interoperability. TI further demonstrates its commitment to quality by pursuing applicable automotive qualifications for its parts and has a zero-DPPM strategy.



Functional block diagram.

Key Features

- 45–nanometer CMOS process for maximum system performance and low power
- ARM® Cortex™-A8 Core
  - Up to 800 MHz
  - VFPv3 floating point
- DSP Core: C674x™
  - Up to 570 MHz
  - Floating point extension
- 3D Graphics accelerator
  - Up to 250 MHz
  - ~23M polygons/sec
- IVA-HD Video co-processor – 1080-p video encode/decode support
- Two ARM® Cortex™-M3 cores
  - 200 MHz
- Highly flexible display subsystem
  - Multiple video/graphics pipelines
  - Flexible video processing
  - Multiple simultaneous display outputs
- Other peripheral highlights (1.8/ 3.3-V IOs)
  - Multiple configurable video input ports
  - Multiple USB 2.0 ports with PHY, MMC/SD, and NAND/Async interface support
  - Vehicle peripherals: MOST MLB 150, PCIe, 10/100/1000 Ethernet AVB w/ optional 2 port switch, PATA, SATA, multiple CAN, Audio serial ports, SPI, UART, and I2C ports
  - EMIF: two 32-bit wide DDR2/3 @333MHz
  - Optional security features
- Power (1.1-V/1.2-V Core, 1.8-V/3.3-V IOs): Support for dynamic voltage scaling and SmartReflex™ technology for power/performance management

Learn more at: **www.ti.com/solution/automotive_infotainment**

Microcontrollers/Embedded Processors

Component Recommendations

Embedded Proceccors – Automotive Infotainment Processors

Device	Product Description	Key Specifications
DRA64x Jacinto 4 Family	5High performance ARM® Cortex™-A8 (CA8) + Neon Infotainment Processor targeted at mid to high-tier automotive applications like fully featured head units requiring High Definition video support. Rich automotive peripheral integration. Includes programmable DSP to support software customizations like digital radio.	CA8 + Neon, 2x Cortex M3, SGX530 3D graphics, 2D composition, C674x DSP with radio accelerators, IVA-HD multi-standard codecs (up to 1080p30fps), hardware accelerated display subsystem, 2x 32 bit EMIFs supporting DDR2-800 and DDR3-800 (400 MHz), multiple video input & display output ports (including HDMI v1.3), support of key automotive interfaces such as CAN, MOST, gigabit Ethernet AVB , SATA, PCIe, MLB
DRA60x / DRA61x Jacinto 5 Entry Family	High performance ARM® Cortex™-A8 (CA8) + Neon Infotainment Processor targeted at entry-level automotive applications like telematics / e-call boxes & entry head units. Key automotive peripheral integration. Optional display and graphics support.	CA8+ Neon, optional SGX530 3D graphics engine and optional 24 bit WXGA LCD Controller, 1x 16 bit EMIF supporting DDR2-400 (200 MHz) or DDR3-600 (300 MHz), support of key automotive interfaces such as CAN, MOST, gigabit Ethernet AVB
DRA62x Jacinto 5 Eco Family	Cost-optimized version of J5, high performance ARM® Cortex™-A8 (CA8) + Neon Infotainment Processor targeted at mid to high-tier automotive applications like fully featured head units (without need of video support). Rich automotive peripheral integration. Includes programmable DSP to support software customizations like digital radio.	CA8 + Neon, 2x Cortex M3, SGX530 3D graphics, 2D composition, C674x DSP with radio accelerators, hardware accelerated display subsystem, single 32 bit EMIFs supporting DDR2-800 and DDR3-800 (400 MHz), multiple video input & display output ports (including HDMI v1.3), support of key automotive interfaces such as CAN, MOST, gigabit Ethernet AVB , SATA, PCIe, MLB
DRA65x Jacinto 5 Family	High performance ARM® Cortex™-A8 (CA8) + Neon Infotainment Processor targeted at mid to high-tier automotive applications like fully featured head units (without need of video support). Rich automotive peripheral integration. Includes programmable DSP to support software customizations like digital radio.	CA8 + Neon, 2x Cortex M3, SGX530 3D graphics, 2D composition, C674x DSP with radio accelerators, hardware accelerated display subsystem, 2x 32 bit EMIFs supporting DDR3-1066, multiple video input & display output ports (including HDMI v1.3), support of key automotive interfaces such as CAN, MOST, gigabit Ethernet AVB , SATA, PCIe, MLB
DRA74x Jacinto 6 Family	High performance dual ARM® Cortex™-A15 (CA15) + Neon + HW virtualization extensions Infotainment Processor targeted at mid to high-tier automotive applications like fully featured head units requiring High Definition video support. Rich automotive peripheral integration. Includes programmable DSP to support software customizations like digital radio.	Dual CA15 + Neon, 2x Cortex M4, dual SGX530 3D graphics, 2D composition, upgraded C66x DSP with radio accelerators, upgraded IVA-HD multi-standard codecs (up to 1080p60fps), hardware accelerated display subsystem, 2x 32 bit EMIFs supporting DDR2-800 and DDR3-800 (400 MHz), multiple video input & display output ports (including HDMI v1.4a), support of key automotive interfaces such as CAN, MOST, gigabit Ethernet AVB , SATA, PCIe gen2, MLB

SWIFT™ 6-V, 6-A Synchronous Step-Down Converter
TPS54618RTE-Q1

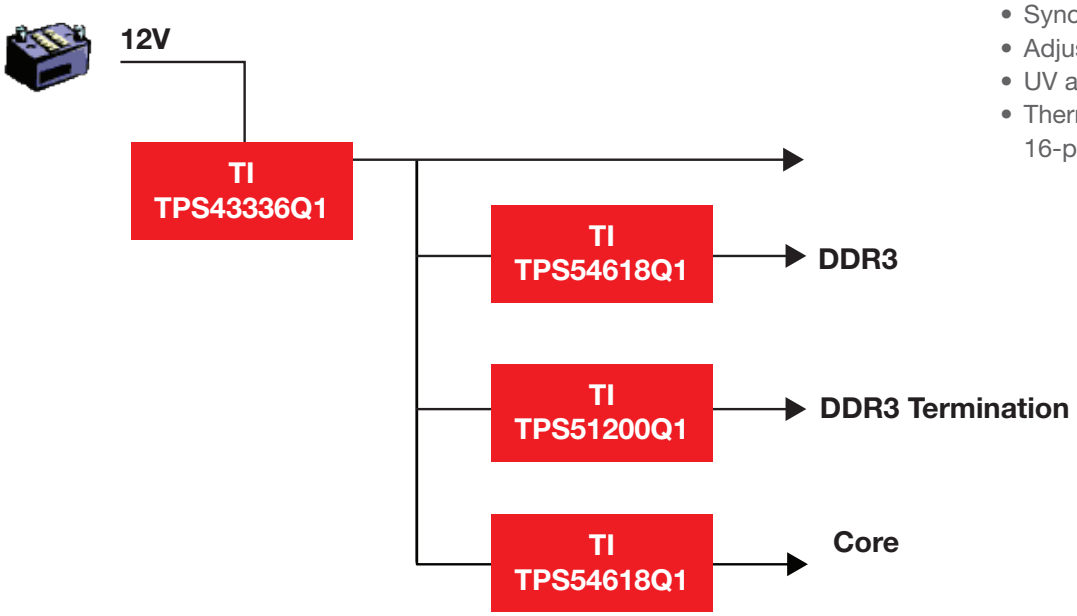
The TPS54618RTE-Q1 SWIFT™ integrated circuit is a full-featured 6-V, 6-A, synchronous step-down current-mode converter with two integrated MOSFETs. The input voltage range of 2.95 V to 6 V is well suited for regulating off the 5 V and 3.3 V bus voltage in an automotive subsystem.

The TPS54618RTE-Q1 enables small designs by integrating the MOSFETs, implementing current-mode control to reduce external component count, reducing inductor size by enabling up to 2-MHz switching frequency, and minimizing the IC footprint with a small 3-mm × 3-mm thermally enhanced QFN package.

The SwitcherPro™ software tool, available at **www.ti.com/switcherpro**, supports the TPS54618RTE-Q1.

Key Features

- Device temperature Grade 1:
- –40°C to 125°C ambient operating temperature range
- Device HBM ESD classification Level H2
- Device CDM ESD classification Level C4B
- Two 12-mΩ (Typical) MOSFETs for high efficiency at 6-A loads
- 300-kHz to 2-MHz switching frequency
- 0.8-V ±1% voltage reference overtemperature (–40°C to 150°C)
- Synchronizes to external clock
- Adjustable slow start and sequencing
- UV and OV power-good output
- Thermally enhanced 3-mm × 3-mm 16-pin QFN



Learn more at: **www.ti.com/tps54618rte-q1**

Power Management
Component Recommendations

Low-Dropout Regulators (LDOs)

Device	Product Description	Key Specifications
TPS79850-Q1	50 V High-Voltage Micropower Low-Dropout Linear Regulators	50mA, 50V Vin, 40 µA Operating and 1 µA in Shutdown
TPS7B4250-Q1	40 V, 50 mA Low-Dropout Tracking Regulator	4 to 40 V Vin, 5 mV Ultra-Low Tracking Accuracy, Short to GND, Reverse Polarity and Short to Battery Protection
TPS7A1650-Q1	60V, 5uA IQ, 100mA, Low-Dropout Voltage Regulator with Enable and Power Good	Wide Input Voltage Range: 3 V to 60 V; Ultra-low Quiescent Current: 5 µa; QuiescentCurrent at Shutdown: 1 µA
TPS7A6601-Q1	40 V, 20 uA IQ, Low-Dropout 150 mA Linear Regulator	4 to 40V Vin, 1.5 to 5 V Adjustable Output 2% Accuracy, Very Low Quiescent Current, 12 uA Typical at Light Load with Enable and PG and Programmable Delay
TPS7A6633-Q1	40 V, 20 uA IQ Low-Dropout 150mA Linear Regulator	4-40V Vin, 3.3V Fixed Output 2% Accuracy, Very Low Quiescent Current, 12uA Typical at Light Load, with Enable and PG and Programmable Delay
TPS7A6550-Q1	300-mA 40-V Low-Dropout Regulator With Ultra-Low Quies- cent Current	Low Dropout Voltage; 4-V to 40-V Wide Input Voltage Range With up to 45-V Transients; 300-mA MaximumOutput Current
TPS7A6933-Q1	40 V, 20 uA IQ Low-Dropout 150mA Linear Regulator	4-40V Vin, 3.3V Fixed Output 2% Accuracy, Very Low Quiescent Current, 12uA Typical at Light Load with Voltage Supervision and RESET, PG and Programmable Delay
TPS7A6950-Q1	150 mA, 5 V Low Quiescent Current Low-Dropout Voltage Regulator	4-40V Vin, 5V Fixed Output, 2% Accuracy, Very low Quiescent Current, 12uA Typical at Light Load, with Enable and PG and Programmable Delay
TPS76501-Q1	5-V, Low-Dropout Voltage Regulator	150 mA, 3% Tolerance, Open-Drain Power Good Output with Thermal Shutdown Protection
TPS7A6050-Q1	300-mA 40-V Low-Dropout Regulator With Ultra-Low Quies- cent Current	4-V to 40-V Wide Input Voltage Range With up to 45-V Transients; 300-mA Maximum Output Current; Ultra-Low Quiescent Current
TPS7A6150-Q1	300-mA 40-V Low-Dropout Regulator With Ultra-Low Quies- cent Current and enable	4-V to 40-V Wide Input Voltage Range With up to 45-V Transients; Low Dropout Voltage; 300-mA Maximum Output Current; Ultra-Low Quiescent Current
TPS7A6650-Q1	150 mA, 5 V Low Quiescent Current Low-Dropout Voltage Regulator	4-40V Vin, 5V Fixed Output, 2% Accuracy, Very low Quiescent Current, 12uA Typical at Light Load, with Enable and PG and Programmable Delay
TPS7B6701-Q1	40 V, 25 uA IQ, Low-Dropout 450 mA Linear Regulator	4 to 40V Vin, 1.5 to 18 V Adjustable Output 2% Accuracy, Very Low Quiescent Current, 15 uA Typical at Light Load with Enable and Reset and Programmable Delay
TPS76950-Q1	Ultra-Low Power, 100 mA, Low-Dropout Linear Regulator	Adjustable Voltage, 1-µA Quiescent Current in Standby Mode, Over-Current Limitation
TLE4275-Q1	5-V, Low-Dropout Voltage Regulator , 450mA	5.5-V to 42-V Supply, 2% Accuracy, Very Low Current Consumption and ESD Protection > 6kV
LM2936Q-Q1	Ultra-Low Quiescent Current LDO Voltage Regulator	5.5-60V Vin; Vout: 3V,3.3V,5V; Iq<= 15uA; 2% Tolerance; Vdo = 200mV; Reverse Battery Protection; Internal Thermal Shutdown Protection
LM9036Q-Q1	Ultra-Low Quiescent Current Voltage Regulator	-45-40V Vin; Vout: 3.3V,5V; Reverse Transient Protection (-45V); Ultra Low Ground Pin Current
LM9076Q-Q1	150mA Ultra-Low Quiescent Current LDO Regulator with Delayed Reset Output	3.65-40V Vin; Vout: 3.3V,5V; Ultra Low Ground Pin Current; 1.5% Vout Accurancy; Low Dropout Voltage; Delayed RESET Output Pin for Low Vout Detection
LP2951-33-Q1	Automotive Single Output LDO, 100mA, Fixed(3.3V), Wide Vin Range, RESET Flag	Rated Output Current of 100 Ma; Low Dropout: 380 mV (Typ) at 100 mA; Low Quiescent Current: 75 µA (Typ); 1.4% Vout Accuracy
LP2951-50-Q1	Automotive Catalog Single Output, 100mA, Fixed, Wide Vin Range	Rated Output Current of 100 Ma; Low Dropout: 380 mV (Typ) at 100 mA; Low Quiescent Current: 75 µA (Typ); 1.4% Vout Accuracy
LP38691-ADJ-Q1	500mA Low Dropout CMOS Linear Regulators with Adjustable Output Stable with Ceramic Output Capacito	Precision (Trimmed) Bandgap Reference; All WSON Packages Available in AECQ; Thermal Overload Protection; 2.7-10V Vin; Vdo: 250mV; 2% Vout Accuracy;
LP38691-Q1	500mA Low Dropout CMOS Linear Regulators Stable with Ceramic Output Capacitors	Precision (Trimmed) Bandgap Reference; All WSON Packages Available in AECQ; Thermal Overload Protection; 2.7-10V Vin; 1uA Off-State Quiescent Current; 55uA Iq
LP38693-ADJ-Q1	500mA Low Dropout CMOS Linear Regulators with Adjustable Output Stable with Ceramic Output Cap.	Precision (Trimmed) Bandgap Reference; All WSON Packages Available in AECQ; Thermal Overload Protection; 1µA Off-State Quiescent Current; 55uA Iq
LP38693-Q1	500mA Low Dropout CMOS Linear Regulators Stable with Ceramic Output Capacitors	Precision (Trimmed) Bandgap Reference; All WSON Packages Available in AECQ; Thermal Overload Protection; 2.7-10V Vin; 55uA Iq; Vdo 250mV,330mV,430mV
LP3988-Q1	Micropower, 150mA Ultra Low-Dropout CMOS Voltage Regulator With Power Good	2.7- 6V Vin, 85 uA Iq, Power Good Flag Output, Short Circuit Current Limit and Thermal Shutdown
LP3996-Q1	Dual Linear Regulator with 300mA and 150mA Outputs and Power-On-Reset for Automotive Applications	Power-On-Reset Function with Adjustable Delay; 1.5% Accuracy; Independent Enable Pin; 300mA Iout2; 36uVrms; Compatible with Ceramic Caps

New Products in bold red.

Power Management
Component Recommendations

DC/DC Controllers and Converters

Device	Product Description	Key Specifications
LM26001/3-Q1	Switching Regulators with High Efficiency Sleep Mode	Wide Vin Range: 3 V to 38 V, High Efficiency Sleep Mode, 40 uA Typical Iq in Sleep Mode
TPIC74100-Q1	Buck/Boost Switch-Mode Regulator	Wide-Input-Voltage-Range 1.5-V to 40-V, Fixed 5V Output, Programmable Slew Rate and Frequency Modulation for EMI Consideration
TPS40200-Q1	Wide-Input Range, Nonsynchronous Voltage-Mode Controller	4.5-V to 52-V Supply, 35 kHz to 500 kHz , Integrated 200-mA PMOS-FET Driver
TPS5430-Q1	3 A, Wide-Input Range, Step-Down SWIFT™ Converter	5.5-V to 36-V Supply, Switching Frequency 500KHz Fixed, High Efficiency Due to Low rDSON
TPS5420-Q1	2 A, Wide-Input Range, Step-Down SWIFT™ Converter	5.5 V to 36 V, 95% Efficiency, Adjustable-Output Voltage
TPS54x62-Q1	48 V low-Iq, 65uA, Step-Down DC/DC Converter	3.6V - 48V Input-Voltage Range, 200kHz - 2.2MHz Switching Frequency, 1 - 3A Output Current, 0.9 - 18V Output
TPS57160-Q1	3.5V to 60V, 1.5A Step Down SWIFT™ Converter with Eco-Mode	3.5-V to 60-V Input Voltage Range, 100-kHz to 2.5-MHz Switching Frequency, Synchronizes to External Clock, 1.5A Output current (0.5A & 2.5A version also available)
TPS57114-Q1	2.95V to 6V Input, 4A, 2MHz Synchronous Step Down SWIFT™ DCDC Converter	2.95V to 6V Input Voltage Range, 200 kHz to 2 MHz Switching Frequency, Synchronizes to External Clock, 4A Output Current (2A & 3A version also available)
TPS4333x-Q1	40-V Low Iq, 30uA, Single Boost, Dual Synchronous Buck Controller	4 - 40 V Input-Voltage Range, 150 - 600 kHz Switching Frequency, 0.9 - 11V Output Voltage, 0.7 - 1.5A Peak Gate Drive Current, Boost Frontend, Frequency Spread Spectrum
TPS4334x-Q1	40-V Low Iq, 30uA, Quad Output Power Supply	4 - 40 V Input-Voltage Range, 150 - 600 kHz Switching Frequency, 0.6A Peak Gate Drive Current, 2A Buck Converter Output current, 300mA LDO output current
TPS4335x-Q1	40-V Low Iq, 30uA, Dual Synchronous Buck Controller	4 - 40 V Input-Voltage Range, 150 - 600 kHz Switching Frequency, 0.9 - 11V Output Voltage, 0.7 - 1.5A Peak Gate Drive Current, Frequency Spread Spectrum
TPS40200-Q1	Wide-Input Range, Nonsynchronous Voltage-Mode Controller	4.5-V to 52-V, 200-mA Internal P-FET Driver, UVLO, External Synchronization
TPS54061-Q1	SWIFT™ 4.7 V to 60 V, 200 mA Synchronous Step-Down DC/DC Converter	24.7 V to 60 V, 200 mA, 90 uA low Iq, 50 KHz to 1.1 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 3x3 SON
TPS54240-Q1	4.7 V to 60 V, 200 mA, 90 uA low Iq, 50 KHz to 1.1 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 3x3 SON	3.5 V to 42 V, 2.5A, 138 A low Iq, 100 KHz to 2.5 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Power Good, Adjustable Soft Start, MSOP and 3x3 SON
TPS54340-Q1	SWIFT™ 4.5 V to 42 V, 3.5 A Step-Down DC/DC Converter	4.5 V to 42 V, 3.5 A, 146 uA low Iq, 100 KHz to 2.5 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 8 pin HSOIC
TPS54360-Q1	SWIFT™ 4.5 V to 60 V, 3.5 A Step-Down DC/DC Converter	4.5 V to 60 V, 3.5 A, 146 uA low Iq, 10 0KHz to 2.5 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 8 pin HSOIC
TPS54540-Q1	SWIFT™ 4.5 V to 42 V, 5 A Step-Down DC/DC Converter	4.5 V to 42 V, 5 A, 146 uA low Iq, 100 KHz to 2.5 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 8 pin HSOIC
TPS54560-Q1	SWIFT™ 4.5 V to 60 V, 5 A Step-Down DC/DC Converter	4.5 V to 60 V, 5 A, 146 uA low Iq, 100 KHz to 2.5 MHz Switching Frequency, Frequency Synchronization, Light Load Efficiency, Fixed Soft Start, 8 pin HSOIC
TPS54618-Q1	SWIFT™ 2.95 V to 6 V, 6 A Synchronous Step-Down DC/DC Converter	2.95 V to 6 V, 6A, 200 KHz to 2 MHz Switching Frequency, Frequency Synchronization, Power Good and Tracking, Adjustable Soft Start, 3x3 SON
TPS62231-Q1	Step Down Buck Converter	0.5A, 3MHz Ultra-Small Buck, DCS-Control, 1x1.5 SON
TPS62290-Q1	Step Down Buck Converter	1A, 2.25MHz Buck, 2x2mm SON
TPS62090-Q1	Step Down Buck Converter	3A, 2.8MHz/ 1.4MHz Buck, DSC-Control, 3x3 QFN
TPS61240-Q1	Step Down Buck Converter	400mA, 4MHz Boost, 2×2 SON
LM3481-Q1	48V Wide Vin Low-Side N-Channel Controller for Switching Regulators	2.97V to 48V Supply, 100 kHz to 1 MHz Adjustable and Synchronizable Frequency, 10 µA Shutdown Current
LM22670-Q1	3A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Synchronization or Adjustable Switching Freq	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Switching Frequency and Synchronization
LM22671-Q1	500mA SIMPLE SWITCHER®, Step-Down Voltage Regulator with Adjustable Frequency	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Switching Frequency and Synchronization
LM22672-Q1	1A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Adjustable Frequency	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Switching Frequency and Synchronization
LM22673-Q1	3A SIMPLE SWITCHER®, Step-Down Voltage Reg. with Adjustable Soft-Start and Current Limit	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Soft-Start and Current Limit
LM22674-Q1	500 mA SIMPLE SWITCHER®, Step-Down Voltage Regulator with Precision Enable	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Precision Enable Pin

Power Management
Component Recommendations

DC/DC Controllers and Converters

Device	Product Description	Key Specifications
LM22675-Q1	1A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Precision Enable	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Precision Enable Pin
LM22676-Q1	3A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Precision Enable	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Precision Enable Pin
LM22677-Q1	5A SIMPLE SWITCHER®, Step-Down Voltage Reg. with Synchronization or Adjustable Switching Frequency	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Switching Frequency and Synchronization
LM22678-Q1	5A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Precision Enable	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Precision Enable Pin
LM22679-Q1	5A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Adjustable Soft-Start & Current Limit	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Soft-Start and Current Limit
LM22680-Q1	2A SIMPLE SWITCHER®, Step-Down Voltage Regulator with Precision Enable	Wide Input Voltage Range: 4.5V to 42V, Internally Compensated, Adjustable Switching Frequency and Synchronization
LM5574/5/6-Q1	SIMPLE SWITCHER® 75V, Step-Down Switching Regulator	6V to 75V Input Range, Frequency Synchronization
LM25574/5/6-Q1	SIMPLE SWITCHER® 42V, Step-Down Switching Regulator	6V to 42V Input Range, Frequency Synchronization
LM2700Q-Q1	600kHz/1.25MHz, 2.5A, Step-up PWM DC/DC Converter	3.6A, 0.08Ω, Internal Switch; Operating Input Voltage Range of 2.2V to 12V
LM3671-Q1	1.2 V, 5 Vin, 2 MHz, 600 mA, Synchronous Step-Up PWM DC/DC Converter	5 V Input Range, AEC-Q100 Grade 0 and 1 Qualified
LM25085-Q1	4.5-42V Wide Vin Constant On-Time PFET Buck Switching Controller	100% Duty Cycle for Low Dropout, Ultra-Fast Transient Response
LM5085-Q1	4.5-75V Wide Vin Constant On-Time PFET Buck Switching Controller	100% Duty Cycle for Low Dropout, Ultra-Fast Transient Response
LM25088-Q1	4.5-42V Wide Vin Non-Synchronous Buck Controller	Frequency Dithering for EMI Reduction, Low Iq Standby and Shutdown
LM5088-Q1	4.5-75V Wide Vin Non-Synchronous Buck Controller	Frequency Dithering for EMI Reduction, Low Iq Standby and Shutdown
LM34919B-Q1	6-40V Ultra-Small Wide Vin 600mA Buck Converter	2.6MHz Switching, Tiny 2x2mm µSMD Package
LM34919C-Q1	4.5-40V Ultra-Small Wide Vin 600mA Buck Converter	2.6MHz Switching, Tiny 2x2mm µSMD Package
LM25010-Q1	6-42V, 1A Step-Down Switching Regulator	Constant On-Time Control, Operation up to 1MHz
LM25011-Q1	6-42V, 2A Wide Vin Constant On-Time Switching Regulator	Emulated Ripple Mode, Adjustable Current Limit
LM5121-Q1	3-65V Wide Vin Synchronous Boost Controller	Disconnection Switch Control for Input Current Limiting
LM5122-Q1	3-65V Wide Vin Stackable Synchronous Boost Controller	Current Sharing and Phase Interleaving for High Current Applications
LM5118-Q1	3-42V Wide Vin Buck-Boost Controller	Emulated Current Mode Control, Frequency Synchronization to 500kHz
LM25118-Q1	3-75V Wide Vin Buck-Boost Controller	Emulated Current Mode Control, Frequency Synchronization to 500kHz
LM5119-Q1	6-65V Wide Vin Dual Synchronous Buck Controller	2-Channel or 2-Phase Operation with Current Sharing
LM25119-Q1	4.5-42V Wide Vin Dual Synchronous Buck Controller	2-Channel or 2-Phase Operation with Current Sharing
LM25117-Q1	6-42V Wide Vin Synchronous Buck Controller	Emulated Current Mode Control, Analog Current Monitor
LM5117-Q1	4.5-42V Wide Vin Synchronous Buck Controller	Emulated Current Mode Control, Analog Current Monitor

Power Management
Component Recommendations

Integrated Power Management IC (PMIC)

Device	Product Description	Key Specifications
LP3907-Q1	Dual High-Current Step-Down DC/DC and Dual Linear Regulator with I2C-Compatible Interface 5V Input	1A/600 mA Step-down DC/DC Converters with Dynamic Voltage Management (DVM), 2-300 mA Linear Regulators, 2.1 MHz PWM Switching Frequency
LP8728Q-Q1	Quad High-Current Step-Down Synchronous DC/DC 5 V Input	1 A Synchronous Step-Down, 600 mA Synchronous Step-Down, 3.3 MHz Switching Frequency, Spread Spectrum for EMI Reduction
TPS65300-Q1	3-MHz Step-Down Regulator, 1x Linear Regulator and 2x Linear Regulator Controller	5.6 V - 40 V Input-Voltage Range, 2-3MHz Switching Frequency, Integrated 1.2A Peak Current Switch. 5V LDO 200mA, 3.3V LDO Controller, 1.2V LDO Controller
TPS65301-Q1	3-MHz Step-Down Regulator, 2x Linear Regulator and 2x Linear Regulator Controller	5.6 V - 40 V Input-Voltage Range, 2-3MHz Switching Frequency, Integrated 1.2A Peak Current Switch, 5V LDO 200mA, 5V LDO 100mA, .3V LDO Controller, 1.2V LDO Controller
TPS65320-Q1	40-V Low-Iq, 140uA, Step-Down Buck Converter and low-Iq, 40uA, LDO Regulator	3.6-V to 40V - Input-Voltag Range, adj. 100kHz - 2.5 MHz Switching Frequency, 3.2A Peak Current, 200mA LDO Output Current
TPS659119-Q1	5-V PMIC, 3 Step-Down Converter, 8 Linear Regulators /w I2C and RTC	5V, 1.5A Peak Current, 2.7MHz - 3.3MHz Swichting Frequency
TPS658629-Q1	5-V PMIC, 3 Step-Down Converter, 11 Linear Regulators /w I2C and RTC	5V, 1.5A Peak Current, 2.25MHz Swichting Frequency, LED Drivers, PWM Outputs, 11-ch ADC
TPS65000-Q1	Step Down Converter	0.6mA Buck and 2x 300mA LDOs, 3×3 QFN
TPS65023-Q1	6-Channel Power Mgmt IC with 3DC/DCs, 3 LDOs, I2C Interface and DVS	2.5V – 6V Input Voltage Range, 2.25MHz Switching Frequency, 1.5A Peak Current
TPS659038-Q1	Power Management IC with 7 DC/DCs and 11 LDOs	3.1V – 5.5V Input Voltage Range, 1.7MHz – 2.7MHz Switching Frequency with External Clock Synchronization, 9A Peak Current
TPS659039-Q1	Power Management IC with 7 DC/DCs and 6 LDOs	3.1V – 5.5V Input Voltage Range, 1.7MHz – 2.7MHz Switching Frequency with External Clock Synchronization, 9A Peak Current

LCD/LED Display Solutions

Device	Product Description	Key Specifications
LP8860-Q1	Low EMI, High Performance, 4-Channel LED Driver for Automotive Lighting	3.0 V to 40 V Input Voltage Range, 1:13000 Dimming
TPS65150-Q1	Low Input Voltage, Compact LCD Bias IC With VCOM Buffer	1.8-V to 6-V Input Voltage Range, Gate Voltage Shaping, Integrated Vcom Buffer
TPS65131-Q1	Positive and Negative Output DC/DC Converter	2.7-V to 5.5-V Input Voltage Range, Dual Adjustable Output Voltages Up to 15 V and Down to –15 V
TPS65100-Q1	Triple Output LCD Supply w/Linear Regulator and Vcom Buffer	2.7-V to 5.8-V Input-Voltage-Range, 1.6-MHz Fixed Switching Frequency, Internal Power-On Sequencing, Vcom Buffer, 3.3V LDO
TPS61085-Q1	650 kHz/1.2 MHz, 18.5 V STEP-UP DC-DC CONVERTER	2.3 V to 6 V Input Voltage Range, 18.5 V Boost Converter With 2.0 A Switch Current
TPS65140-Q1	4-Channel Power Supply for LCD Monitor (5V)	2.7-V to 5.8-V Input-Voltage-Range, 1.6-MHz Fixed Switching Frequency, Internal Power-On Sequencing
TPS65145-Q1	Triple-Output LCD Supply with Linear Regulator and Power-Good Output	2.7-V to 5.8-V, 1.6-MHz Fixed Frequency, Internal Power-On Sequencing, Thermal Shutdown
TPS61040-Q1	Low-Power DC/DC Boost Converter	1.8-V to 6-V, Adjustable Output Voltage up to 28 V, Lower Output Voltage Ripple, Low Quiescent Current
TPS61041-Q1	Low-Power DC/DC Boost Converter	1.8-V to 6-V, SOT-23 Package, Small Overall Solution Size, Lower Output Voltage Ripple
TLC6C598-Q1	8-Bit Power Shift Register LED Driver	8-Bit Power Shift Registers, 50mA Sink Current Per Channel, 40V Transient Protection on Drain Output, Controlled Switching Time for EMI with Thermal Shutdown Protection
TLC6C5912-Q1	12-Bit Power Shift RegisterLED Driver	12-Bit Power Shift Registers, 50mA Sink Current Per Channel, 40V Transient Protection on Drain Output, Controlled Switching Time for EMI with Thermal Shutdown Protection
TLC5916-Q1	8-Bit Constant Current Sink LED Driver	8-Bit Constant Current From 5mA to 120mA with 256-Step Programmable Current Gain with Open Load, Short Load and Overtemperature Protection
TLC5917-Q1	8-Bit Constant Current Sink LED Driver	8-Bit Constant Current From 5mA to 120mA with 256-Step Programmable Current Gain with Open Load, Short Load and Overtemperature Protection
TLC5926-Q1	16-Bit Constant Current Sink LED Driver	16-Bit Constant Current From 5mA to 120mA with 256-Step Programmable Current Gain with Open Load, Short Load and Overtemperature Protection
TLC5927-Q1	16-Bit Constant Current Sink LED Driver	16-Bit Constant Current From 5mA to 120mA with 256-Step Programmable Current Gain with Open Load, Short Load and Overtemperature Protection

Motor Drivers for Flip-Up Display

Device	Product Description	Key Specifications
DRV8801-Q1	2.8 A Brushed DC Motor Driver	Up to 38 V Operation; Phase Enable Control I/F, Current Sense Pin ildicates Coil Current, Fully Protected
DRV8832-Q1	1 A Brushed DC Motor Driver	2.7 to 6.8 V Operation; IN/IN Control Interface, Fully Protected, 3 x 4.9mm HTSSOP Package

Power Management
Component Recommendations

High Side Switches (Load Switches)

Device	Product Description	Key Specifications
TPS22965-Q1	Ultra-Low RON, 5.5V/4A Load Switch with Configurable Controlled Turn On (Trise)	EIntegrated Solution Providing: 16mΩ On-Resistance, Output Discharge Resistance, 2µA (Max) Shutdown Current, and Configurable Rise Time for Optimized Timing and Power Sequencing
TPS22966-Q1	On Ultra-Low RON, 5.5V/4A Dual-Channel Load Switch with Configurable Controlled Turn On (Trise)	Integrated Solution Providing: 16mΩ On-Resistance, Output Discharge Resistance, 2µA (Max) Shutdown Current, and Configurable Rise Time for Optimized Timing and Power Sequencing

Preview Products in bold blue.

PWM Power Supply Controllers

Device	Product Description	Key Specifications
UCC2813-1-Q1	Low-Power BICMOS Current-Mode PWM	500-µA Operating Supply Current, Operation to 1 MHz, Ideal for Battery Operated Systems
TPS2022-Q1	USB Power Distribution Switch	2.7-V to 5.5-V Supply, 50-mΩ N-Channel MOSFET, High-Side Power Switches, Short-Circuit and Thermal Protection
TPS2024-Q1	USB Power Distribution Switch	2.7-V to 5.5-V Supply, 50-mΩ N-Channel MOSFET, High-Side Power Switches, Short-Circuit and Thermal Protection
TPS2030-Q1	USB Power Distribution Switch	2.7-V to 5.5-V Supply, 50-mΩ N-Channel MOSFET, High-Side Power Switches, Short-Circuit and Thermal Protection
TPS2042B-Q1	USB Dual, Current-Limited Power-Distribution Switches	2.7-V to 5.5-V Supply, 70-mΩ N-Channel MOSFET, High-Side Power Switches, Short-Circuit and Thermal Protection
TPS2051B-Q1	USB Dual, Current-Limited Power-Distribution Switches	2.7-V to 5.5-V Supply, 70-mΩ N-Channel MOSFET, High-Side Power Switches, Short-Circuit and Thermal Protection
TPS2561-Q1	Automotive Catalog Dual Channel Precision Adjustable Current-Limited Power Switches	0.25 to 2.5A Adj Current Limit, 2.7V to 6.5V, 45mΩ Rdson, 15KV/8KV ESD Protection, Soft Start, Thermal, SC Protection
TPS2065-Q1	Automotive Catalog Single 1A Current-Limited, Power-Distribution Switches for USB Applications	Single, 1.5A, Fixed Current Limit, 2.7V to 5.5V, 70mΩ Rdson, Active High Enable, Thermal, SC Protection
TPS2066-Q1	Automotive Catalog Dual 1A Current-Limited, Power-Distribution Switches	Dual, 1.5A, Fixed Current Limit, 2.7V to 5.5V, 70mΩ Rdson, Active High Enable, Thermal, SC Protection
TPS2068-Q1	Automotive Catalog Current-Limited, Power-Distribution Switch	Single, 2.1A Fixed Current Limit, 2.7V to 5.5V, 79mΩ Rdson, Active Low enable, Thermal, SC Protection
TS3USB221A-Q1	Automotive Catalog ESD Protected,High-Speed USB 2.0 (480-Mbps) 1:2 Multiplexer/Demultiplexer Switch	USB 2.0 High-Speed 1:2 Mux/Demux, with 7kV ESD & IEC61000–4–2 Immunity
TPS2543-Q1	Automotive Catalog Programmable 2.5 A Current Limited USB-CPC Power Switch	Two Programmable ILIMITS, USB1.2 Compliant, Charge Port Control for Many Popular Phones, Tablets, with Data Switch
TPS2511-Q1	Automotive Catalog Programmable 2.2 A Current Limited USB-CPC Power Switch	USB1.2 Compliant, Charge Port Control for BC1.2 and All Popular Phones, Tablets, for Charge Only Ports. Load Detect Output for Droop Compensation
TPS2546-Q1	Automotive Catalog Programmable 2.5 A Current Limited USB-CPC Power Switch	Two Programmable ILIMITS, USB1.2 Compliant, Charge Port Control for All Popular Phones, Tablets, with Data Switch, Load Detect Output
TP2513A-Q1	Automotive Catalog Switchless Dual USB-CPC (Charge Port Controller)	Manages Data Lines of Two USB Ports to Provide Charge Port Control (CPC) I for All Popular Phones, Tablets

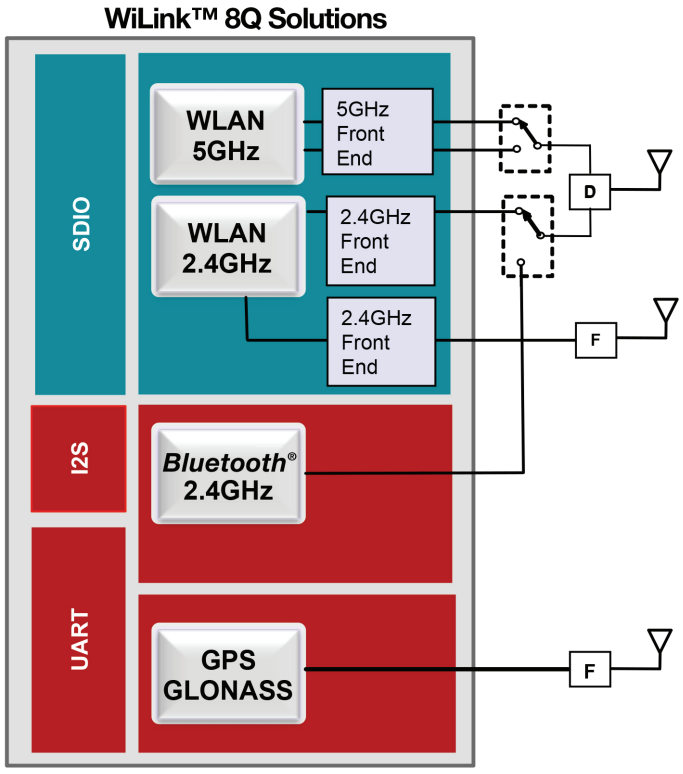
New Products in bold red.

Sequencer

Device	Product Description	Key Specifications
LM3880-Q1	Power Sequencer	Easiest Method to Sequence Rails Power Up and Power Down Control Input Voltage Range of 2.7V to 5.5V

WiLink™ 8Q – Scalable WiFi, *Bluetooth*® and GNSS

The Texas Instruments WiLink™ 8Q product family brings high performing Wi-Fi, *Bluetooth*® and GNSS positioning solutions to Infotainment systems enabling close integration with mobile handsets and high-speed data traffic to multiple devices in parallel. The WiLink 8Q family has a scalable and flexible combo chip architecture where the pin-to-pin compatible devices enable hardware and software reuse across platforms. It offers the lowest power and best-in-class RF performance and co-existence.



Functional block diagram.

Learn more at: **www.ti.com/wilink8q**

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- Integrated solution for Wi-Fi, *Bluetooth*® and GNSS
- Qualified following AEC-Q100 guidelines for automotive
- *Bluetooth*
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  - Best-in-class sensitivity
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  - PCM for audio
- Wi-Fi
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  - Station / Access Point / Wi-Fi Direct
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  - 100Mbps throughput
  - Wi-Fi Miracast™ ready
  - SDIO interface
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  - Supporting four satellite systems in parallel: GPS, Glonass, QZSS and SBAS
  - Short TTFF, fast cold start
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WiLink™ 8Q Solutions

Available technology options	WL187xQ	WL183xQ
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Wi-Fi 802.11 b/g/n	WL1871	WL1831
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GNSS	•	
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