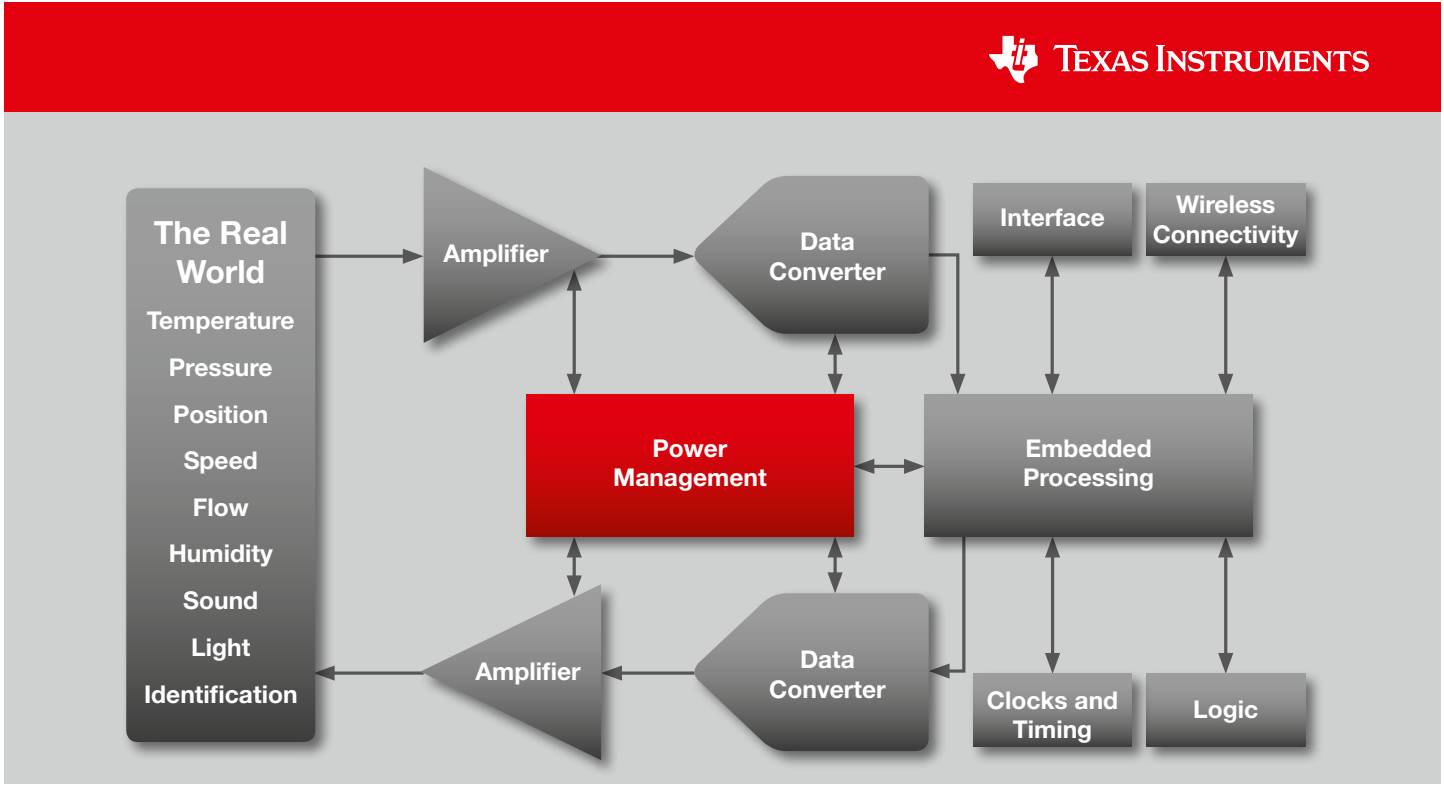
Power Management Portfolio Overview



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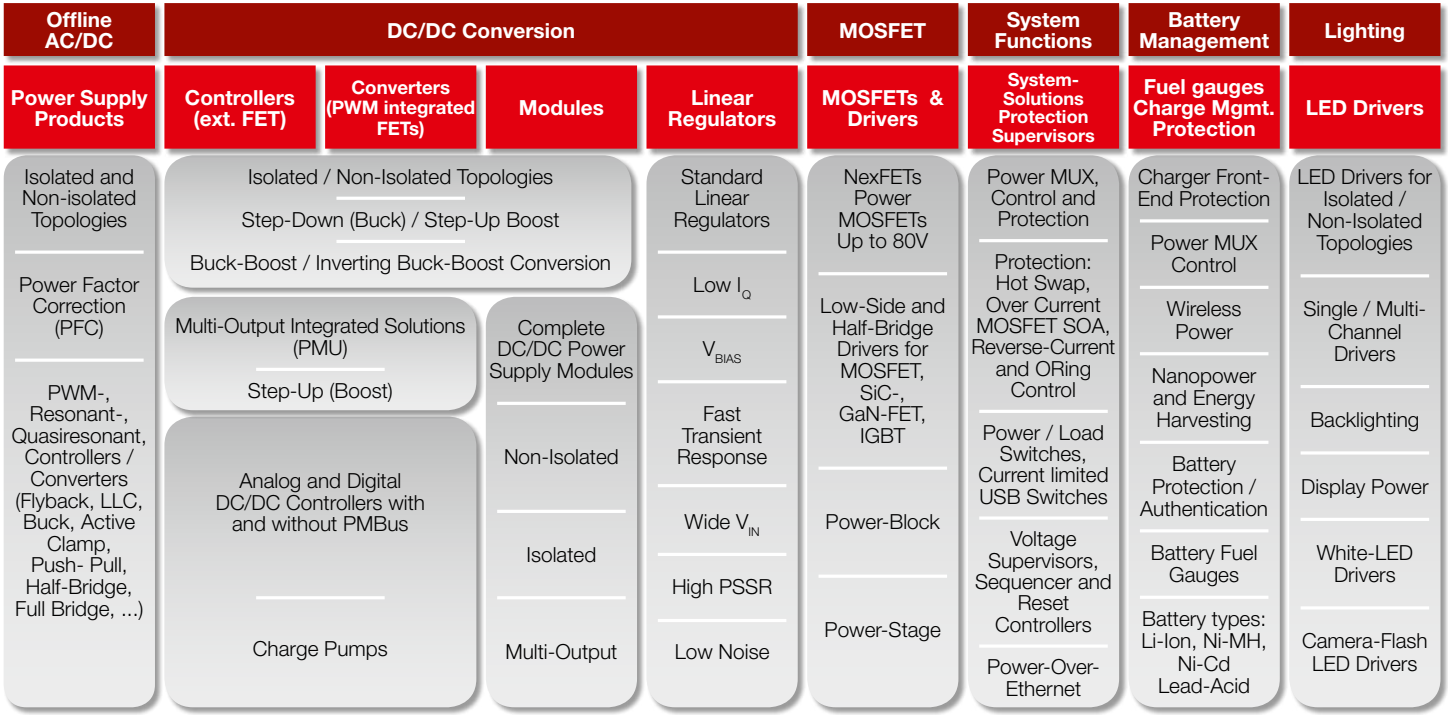
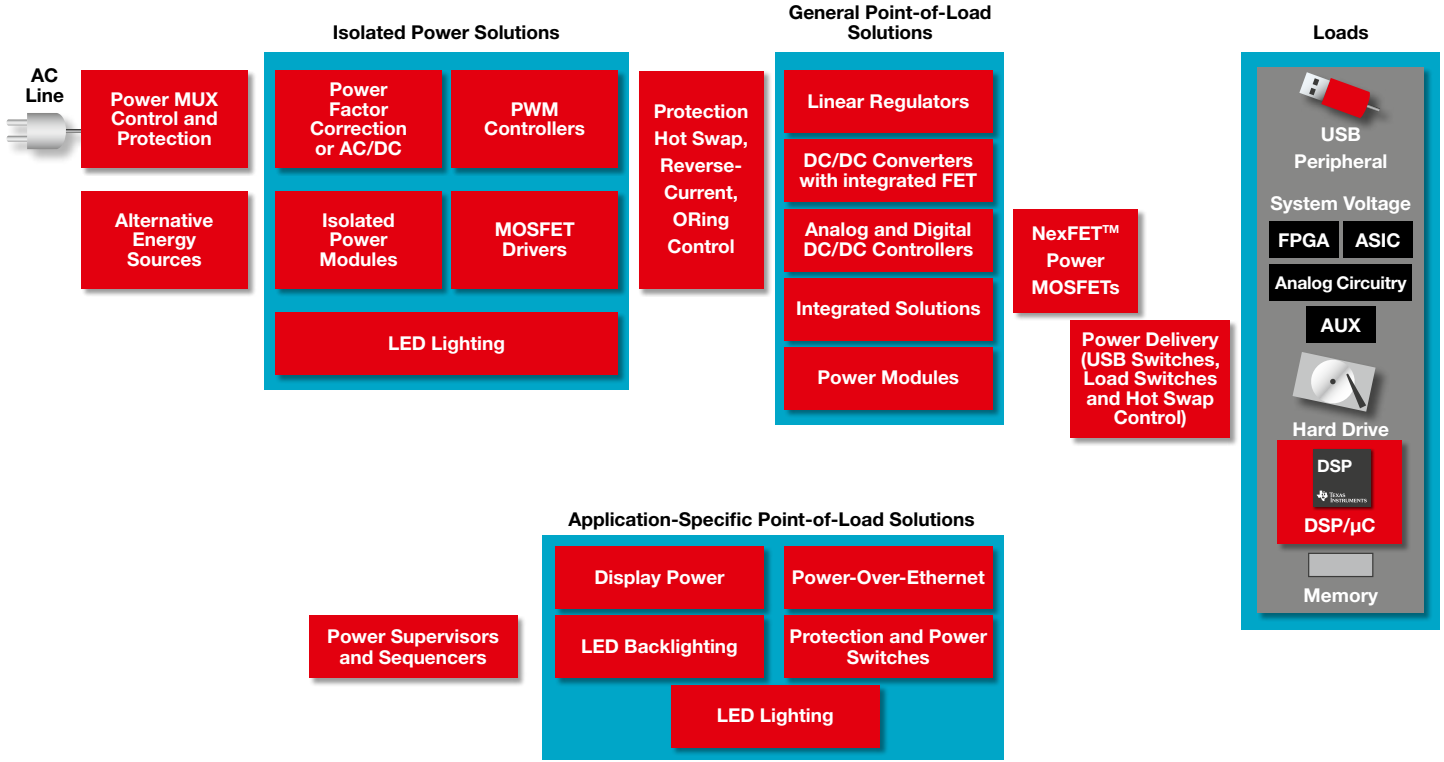
TI Power Management Portfolio



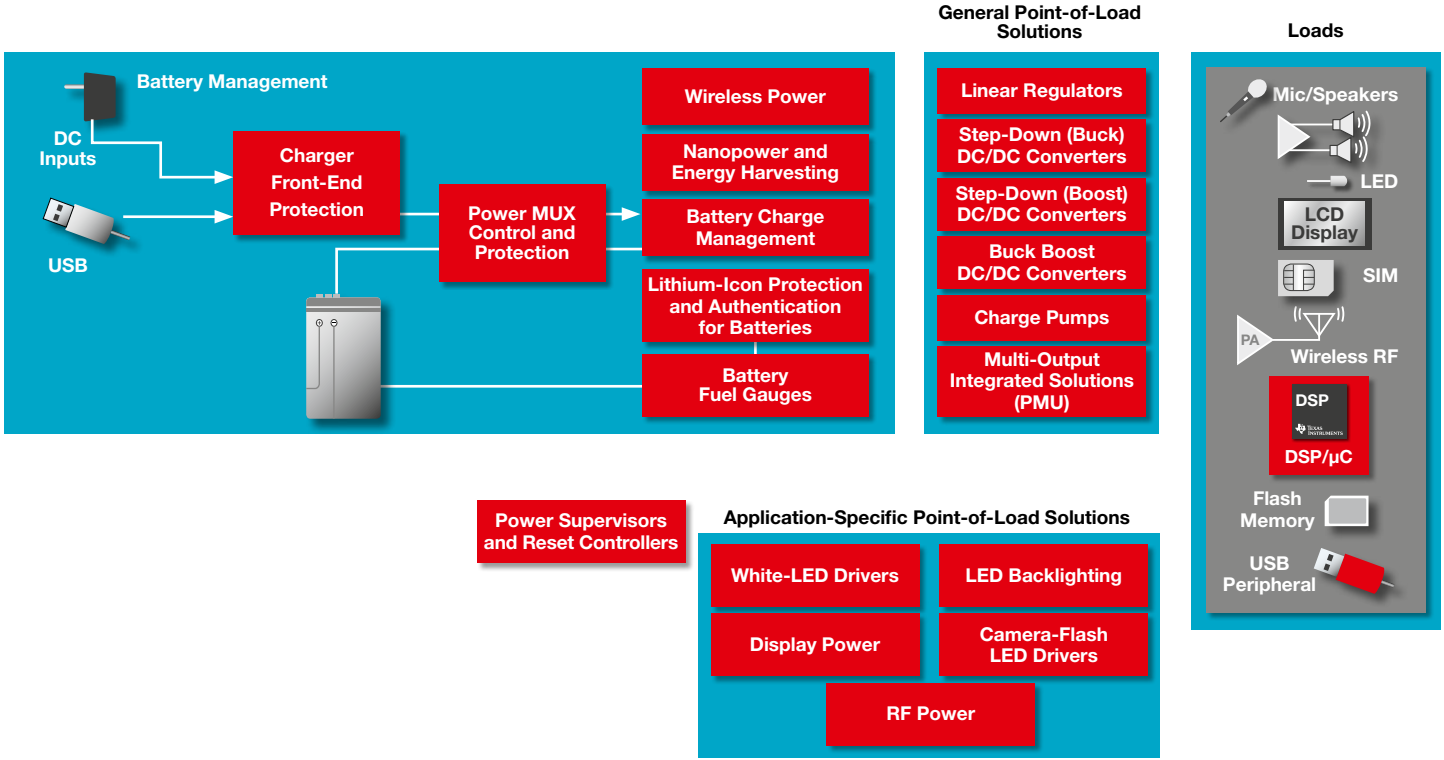
Power Design Tools: www.ti.com/powerdesigntools

Texas Instruments

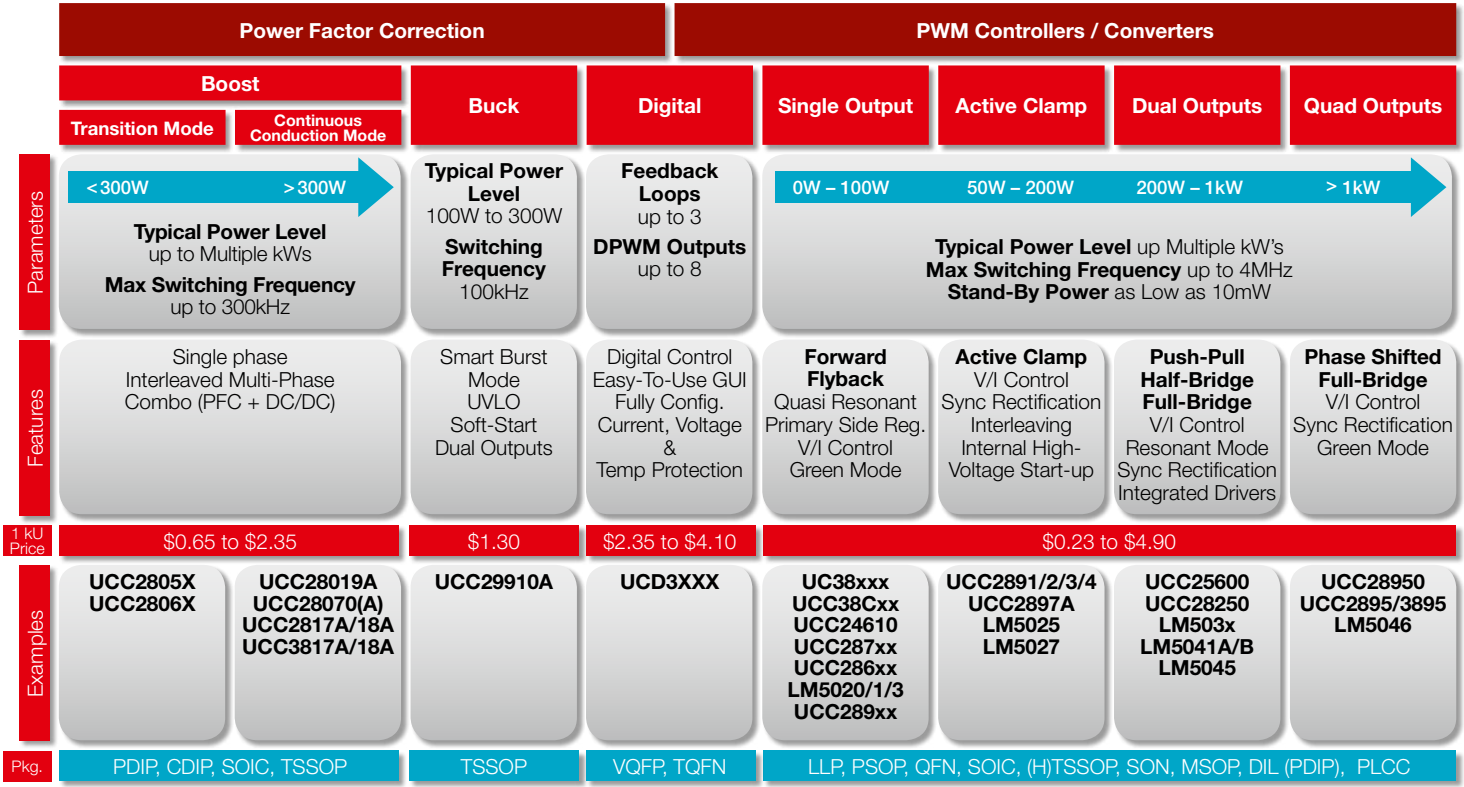
Line Power Solutions



Portable Power Solutions



Offline Power Supply Products



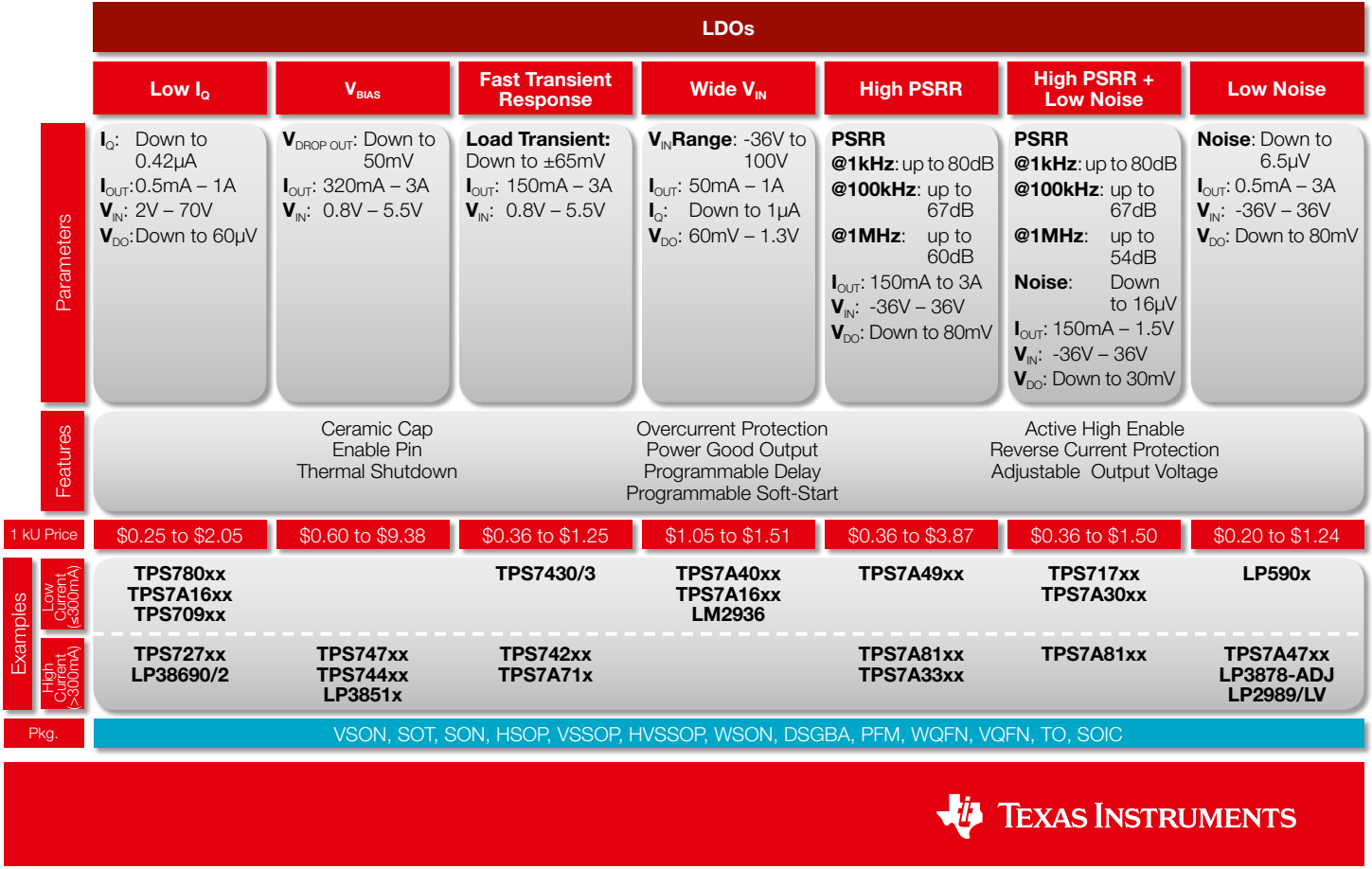
DC/DC Conversion: Non-Isolated Controllers

	Buck		Boost / Flyback / Sepic		Non-Inverting Buck/Boost
	Synchronous	Non-Synchronous	Synchronous	Non-Synchronous	
Parameters	V_{IN}: 1.8V – 100V V_{OUT}: 0.3V – 70V **Frequency**: up to 2000kHz I_{DRIVE}: 0.4A – 8A	V_{IN}: 1.8V – 75V V_{OUT}: 0.7V – 70V **Frequency**: up to 1000kHz I_{DRIVE}: 0.2A – 2A	V_{IN}: 1.8V – 100V V_{OUT}: 1A peak **Frequency**: up to 2000kHz		V_{IN}: 1.8V – 75V V_{OUT}: 0.8V – 70V **Frequency**: up to 2MHz I_{DRIVE}: 3A/3.5A peak
Features	DDR-Compatible Multiphase PMBus Interface Short Circuit Protection UVLO Programmable Soft-Start Voltage Mode/Current Mode/D-Cap Mode	Integrated Gate Driver Voltage Mode/Emulated Current Mode Programmable Soft-Start External Synchronization UVLO PMBus Interface Hiccup Timer	Short Circuit protection UVLO Soft Start Internal Gate Driver Thermal Shutdown Current Limit		Ultra Low Shutdown Current Hysteretic Mode Slope Compensation Current Mode/Voltage Mode
1 kU Price	$0.52 to $4.05	$0.75 to $1.47	$0.80 to $2.25		$0.93 to $2.30
Examples	**LM27xx** **TPS40xxx** **LM34/37xx** **LM50/51xx** **Light Load Efficient** **TPS5321x** **TPS59xxx** **Multiple Outputs** **TPS51xxx, TPS531xx**	**TPS40200** **LM5088** **LM25088**	**TPS4306x** **TPS43000** **LM512x**	**LM3478** **LM3481/8LM502x** **TPS4021x**	**High-Side/Low-Side Controller** **LM5118**
Pkg.	QFN, LLP, PowerPAD, SOIC, (e/H) TSSOP, MSOP, SON, SOT23	HTSSOP, SOIC	LLP, MSOP, MSSOP, SON, (e) TSSOP, WSON		(e)TSSOP

DC/DC Conversion: Converters & Modules

	Converters			POL Modules (Integrated Inductor)		
	Synchronous and Non-Synchronous					
	Buck / Inverting Buck-Boost	**Boost / Flyback / SEPIC**	**Non-Inverting Buck-Boost**	**Isolated Open Frame Modules**	**Non-Isolated Open Frame Modules**	**Power Modules**
Parameters	I_{OUT}: 50mA – 30A I_Q: Down to 20nA V_{IN}: 1.8V – 100V V_{OUT}: -36.3V – 5.0V $f_{SWITCHING}$: up to 6MHz $T_{J\ MAX}$: -40°C to 150°C	I_{OUT}: 50mA – 3.6A I_Q: Down to 4µA V_{IN}: 0.3V – 100V V_{OUT}: 1.24V – 40V $f_{SWITCHING}$: up to 3.5MHz $I_{SWITCHING}$: 250mA – 4.5A	I_{OUT}: 300mA – 3A I_Q: Down to 25µA V_{IN}: 0.7V – 8V V_{OUT}: 1.2V – 12V $f_{SWITCHING}$: up to 2.4MHz	I_{OUT}: 33mA – 20A P_{OUT}: 1W – 200W V_{IN}: 5V – 60V V_{OUT}: 1.8V – 15V	I_{OUT}: 1.5A – 60A P_{OUT}: 12W – 25W V_{IN}: 3.3V – 36V V_{OUT}: -15V – 22V	I_{OUT}: 0.8A – 30A V_{IN}: 2.95V – 50V V_{OUT}: 0.8V – 15V $f_{SWITCHING}$: up to 2MHz $T_{J\ MAX}$: -55°C to 125°C
Features	Eco-Mode Synchronize to External Clock Adjustable Slow Start Time Enable and Track Pin Over Current Limiting Over Temperature Protection Charge Pumps High Efficiency Low Noise Low Power Power Good Soft Start			TurboTrans™ (Fast Transient) Remote Sense Output Inhibit Adjustable Output Voltage Auto-Track™ Sequencing EMI EN55022/CISPR22 Class B Certification Undervolatage Lockout Low Noise Precision Enable Soft-Start Over-Temperature Shutdown Overcurrent protection Military STD-883 (Power Modules)		
1 kU Price	$0.21 to $5.25	$0.65 to $2.10	$1.40 to $2.50	$4.25 to $62.00	$4.28 to $36.00	$3.75 to $18.00
Examples	**TPS533xx LM5017/8/9 TPS621xx TPS54x40/x60 LM2267x**	**TPS55340 LMR61428**	**TPS63060 LM3668**	**PTMAxxxxxx PTBxxxxx PTEAxxxxxx PTQAxxxxxx DCxxxxxxxx**	**Positive Output PTNxxxxx PTHxxxxx Negative Output PT6910 PTNxxxxx**	**TPS8xxxx LMZxxxxx**
	Charge Pumps TPS60xxx					
Pkg.	QFN, e/T/HTSSOP, SOIC, LLP, M/P/HMSOP, WCSP, SON, Micro SMD, SOT			SMD, TO-PMOD		

DC/DC Conversion: Linear Regulators



Power Management Units

		Processor Specific PMUs				
	General Purpose PMUs	**ARM® Cortex™ – R4**	**ARM® Cortex™ A8**	**ARM® Cortex™ A9**	**ARM® Cortex™ A15**	**Special Function**
Key Parameters	**V_{IN} Range:** 18V – 28V **Regulator Outputs:** 1 – 9 **LDOs:** 1 – 7 **DC/DC Step Down Converters:** 1 – 3	**V_{IN} Range:** 2.7V – 36V **Regulator Outputs:** 5/11 **LDOs:** 4/9 **DC/DC Step Down Converters:** 1/3	**V_{IN} Range:** 2.5V – 6.8V **Regulator Outputs:** 5 – 20 **LDOs:** 2 – 16 **DC/DC Step Down Converters:** 2 – 4	**V_{IN} Range:** 2.3V – 6.5V **Regulator Outputs:** 13 – 26 **LDOs:** 9 – 22 **DC/DC Step Down Converters:** 3 – 7 **DC/DC Step Down Controllers:** 0/1	**V_{IN} Range:** 2.3V – 5.5V **Regulator Outputs:** 3 – 18 **LDOs:** 5/11 **DC/DC Step Down Converters:** 3 – 7	**V_{IN} Range:** 2.5V – 40V **Regulator Outputs:** 0 – 5 **LDOs:** 1/2 **DC/DC Step Down Converters:** 1 – 3
Features	I²C & Logic H/L Interface Linear Charger WLED Boost Low Power Applications Low Ripple PFM Mode Industrial Applications Integrated DC/DC & LDOs	I²C/2x I²C Interface Automotive Qualified AM335x Solutions Dedicated Power Solutions WLED Boost Charge Integrated SVS/DVS	I²C/2x I²C / SPI Interface Audio Codec USB 2.0 OTG WLED Boost Linear Charger Automotive Qualified Single Phase DC/DC Converters Integrated	Interface USB 2.0 OTG WLED Boost Linear/Switch Charger Bypass Switch Thermal Monitoring Multiphase DC/DC Converters Integrated	I²C/2x I²C Interface WLED Boost Automotive Qualified Soft Start Power Good Power Save Mode High Integration Energy Harvesting	I²C/SPI Interface WLED Boost Linear/Switch Charger Energy Harvesting Eco-ModeTM Q100 Qualified Integrated LDO
1 kU Price	$0.95 to $3.95	$2.60 to $5.72	$2.95 to $4.50	$4.45 to $6.35	TBC	$1.10 to $4.95
Examples	**TPS650250** **TPS65051/3** **TPS65000** **TPS65251** **LP3906** **LP3972** **LP5553**	**TPS65217** **TPS65910** **TPS65218** **TPS65381-Q1** **AM335x** **TPS650250**	**TPS65912x** **Nvidia Tegra 2** **TPS65862x/4x** **Nvidia Tegra 3** **TPS65911x**	**TPS650380 LP8755** **Nvidia Tegra 4** **TPS65913/14**	**Front-End PMU** **TPS65090** **Energy Harvesting** **TPS65290**	**TPS659119-Q1** **TPS65038-Q1** **TPS65039-Q1**
Pkg.	QFN/WCSP/LLP/SMD/ Micro SMD	HTSSOP/HTQFP/QFN/BGA/WCSP/FBGA+PBGA/NanoFree/Micro SMD				

MOSFETs and Drivers

	MOSFETS		Gate-Drivers			
	NexFETs	**Half-Bridge Blocks**	**Single Low-Side**	**Dual Low-Side**	**High-Side/Low-Side**	**Programmable**
Parameters	$V_{ds\ MAX}$: 12V – 60V $V_{gs\ MAX}$: 6V – 20V $I_{d\ MAX}$: 1.2A – 187A $R_{ds(ON)}$: 1.3mΩ – 175mΩ Q_g: 1.5nC – 37nC	$V_{ds\ MAX}$: 25V – 30V $V_{gs\ MAX}$: 6V – 10V I_{MAX}: 20A – 120A	I_{OUTMAX}: 2A – 9A V_{SUPPLY}: 4V – 35V	I_{OUTMAX}: 1A – 5A V_{SUPPLY}: 3.5V – 40V	I_{OUTMAX}: 12A – 5A V_{BOOT}: up to 120V	I_{OUTMAX}: 4A – 6A V_{SUPPLY}: 22V – 18V
Features	Low FOM = Qg x Rds(on) DualCool™ Package Dual Channel RoHS Compliant Halogen Free	Higher Power Density High Efficiency High Frequency Operation Ultra Low Inductance	CMOS/TTL Input Best-in-class Propagation Delay Symmetrical/Asymmetrical Inverting/Non-inverting Enable TrueDrive™/Split/Single/Bipolar Outputs PowerPad™ Packages			Fully Analog Devices Compatible With Digital Controllers CMOS/TTL Input TrueDrive™ Single/Dual Output
1 kU Price	$0.15 to $1.05	$0.65 to $1.50	$0.49 to $0.99	$0.50 to $0.95	$0.60 to $1.70	$0.60 to $1.20
Examples	**N-FETs** **CSD16XXX** **CSD17XXX** **CSD18XXX** **P-FETs** **CSD25XXX** **CSD23XXX** **Dual N – Channel** **CSD86311** **Dual P – channel** **CSD75XXX**	**Power Blocks** **CSD86XXX** **CSD873XX** **Power Stages (driver incl.)** **CSD9XXXX**	**TPS28xx** **UCC2751x** **UCC37xxx** **UC27xx/37xx** **LM5114** **UCC27511/611** **ISO5500 (IGBT)** **UCC2753xx (IGBT)**	**LM5110/1** **UCC2732x** **UCC2742x** **UCC2752x**	**UCC272xx** **LM510x** **TPS28xxx** **TPS283x** **GAN-FET** **LM5113 (GaN-FET)**	**UCD7XXX**
Pkg.	SON, WLP, TO-220	SON	QFN, SOT-23, PDIP, TO-220	SOT-23, PDIP, SON, DSBGA, MSOP, SOIC	SON, DSBGA, HTSSOP, SOIC	(V)QFN, HTSSOP

Naming structure NexFETs

CSD A B C D E ZZZZZ-XX

Topology
- 1 N Channel
- 2 P Channel
- 8 Power Block
- 9 Power Stage

V_{DS}
- 3 12V
- 5 20V
- 6 25–29V
- 7 30–35V
- 8 40–60V

V_{GS}
- 2 5/6V
- 3 8/10V
- 4 16/12V
- 5 20V

0–9 Serial Use

Packaging

SON

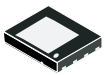
ZZZZ: Q5, Q5A, Q2, Q3

WLP

W10, W1015, W1723, W15

Power Block

Q5C, Q5D



Dual Cool SON

Q5C, Q3C

Power Stage

Q5M

Power Protection and Switches

	Power over Ethernet (PoE)		HotSwap and ORing Protection and Monitoring				Power Switches		
	Standard PoE 802.3 TYPE 1	High Power Compliant 802.3 TYPE 2	Hotswap/ Protection Controller		ORing Control & MUX		PC Express Power	USB Current Limiting	Load Switches
Parameters	**Powers**: up to 90W **ESD Capability**: 8kV-15kV **Current Limit**: 1A (FETs integrated) **Operating Current**: up to 850mA (FETs integrated)		**Operating Voltage**: Hot Swap / Protection Controller **Operating Voltage**: ORing/ORing Hotswap Controllers **Withstand Transients**:	-9V to -80V / +2V to +100V +0.8V to +75V up/Down to ±100V			**Supply Current**: 0.15µA – 150µA **V_{IN} Range**: 2.5V – 20V **Channels**: 1/2/3/4 **$R_{OS\ (ON)}$**: 24mΩ – 400mΩ		
Features	Hotswap/Pass MOSFETs Integrated DC/DC Converter Ultra-Low Power Sleep Mode Oring Support Programmable Frequency Integrated Low-Side Switch Adjustable Turn-On Thresholds		Power Good Auto Switching UV/OV Protection I²C Enable Input Integrated/External FETs UL Rated		Adjustable Current Limit Auto-Retry Programmable Start Delay Thermal Shutdown Low Standby Current Rapid Device Turnoff Dual Power Path Hotswap & ORing		Undervoltage Lockout Battery Charging 1.2 Enable Input Output Discharge Adjustable/Fixed Current Limits Soft-Start Reverse Current Blocking Fast Overcurrent Response (2µs) ESD Protection		
1 kU Price	$1.10 to $11.25	$1.00 to $6.88	$1.00 to $3.95	$1.10 to $7.50	$1.25	$1.20 to $5.00	$0.75 to $2.47	$0.59 to $1.36	$0.34 to $1.28
Examples	**PD** **TPS23750/3/7** **TPS2376-H** **LM507x** **PSE** **TPS2384** **TPS23841**	**PD** **TPS2379** **TPS2378** **TPS23751/2** **PSE** **TPS23851**	**$V_{NEGATIVE}$** **TPS2350** **TPS239x** **LM5064**	**$V_{POSITIVE}$** **TPS2300/01** **TPS249x** **UCC3919** **LM5066** **LM25066IA** **LM5069**	**$V_{NEGATIVE}$** **LM5051**	**$V_{POSITIVE}$** **TPS241x** **TPS245x** **LM5050-1/2**	**TPS2231** **TPS2236** **TPS2211A** **TPS2223A**	**TPS2560/1** **TPS2540/0A/1** **TPS2556/7** **LM3525/26/44**	**TPS22933A** **TPS22946** **TPS22949/A** **TPS22920**
Pkg.	H/TSSOP, HTQFP, LLP	HTSSOP, SSOP, Power PAD	T/VSSOP, HTSSOP, SOIC, TSOT, V/WQFN, QFN, PDIP, MSOP, SO PowerPAD,				SOIC, WQFN, UQFN, QFN, SON, SSOP, TSSOP, HTSSOP, DSBGA		

Supply Voltage Supervisors & Sequencers

	Supply Voltage Supervisors			Sequencers	
	Basic Power On Reset IC	**Programmable Power On Reset IC**	**Multi-Channel Monitors**	**≤ 8 Channel**	**> 8 Channel**
Key Parameters	V_{SUPPLY}: 0.5V – 40V $V_{THRESHOLD}$: Down to I_Q: Down to 0.65µA $V_{SUPERVISED}$: 2.5V/3V/3.3V/5V **Time Delay**: Down to 0.3ms	V_{SUPPLY}: 1V – 6.5V $V_{THRESHOLD}$: Down to 0.4V I_Q: Down to 2.4µA $V_{SUPERVISED}$: 1.8V/2.5V/2.7V/3V/3.3V/5V **Time Delay**: 1.25ms – 10s	V_{SUPPLY}: 0.4V – 15V $V_{THRESHOLD}$: Down to 0.4V **Channels**: 2/3/4 I_Q: Down to 7µA $V_{SUPERVISED}$: 0.9V/1.2V/1.5V/1.9V/2.5V/3V/3.3V/5V/12V **Time Delay**: 0.5µs – 10s	V_{SUPPLY}: 1.8V – 6.5V $V_{THRESHOLD}$: Down to 0.4V **Channels**: 3/4/8/10/11/12/13/16 I_Q: Down to 7µA	
Features	NanoPower Ultra Small Watchdog Rest Active High Power Good Reset Push Button		Manual Reset Back-Up Battery Switch Low IQ Chip-Enable Power Fail Negative Threshold Monitoring	On-Chip Flash Error Logging Flexible Alarm Processing Low Power GUI Configuration Fan Control	
1 kU Price	$0.20 to $0.85	$0.27 to $3.00	$0.41 to $1.40	$0.85 to $2.95	$3.60 to $8.50
Examples	**TLV803/9/10** **TPS3836/7/8** **TL7700**	**TPS380x** **TPS370x** **TPS3110** **LMC6953** **TPS3839**	**Dual** **TPS380x** **TPS370x** **TPS3110** **Triple** **TPS351x** **TPS3307-xx** **Quad** **TPS386xxx**	**3 Channels** **LM3880/81** **4 Channels** **TPS386xxx** **8 Channels** **UCD9081**	**10 Channel** **UCD90910** **12 Channel** **UCD90120** **16 Channel** **UCD90160**
Pkg.	SOT, WSON, SOIC,MSOP			QFN, VQFN	

Battery Charge Management

	Lithium Ion/ Lithium Polymer /$LiFePO_4$				Other Chemistries	Special Function
	Single Cell		Multi-Cell	Wireless	NiCD/NiMH/ Lead Acid	Super Cap / Solar / Energy Harvesting
	Linear	Switch-Mode				
Key Parameters	I_{CHARGE}: 0.8A – 2.0A V_{CHARGE}: 3.5V – 4.2V $V_{IN\ Operating}$: 6.4V – 28V **FET**: Integrated V_{IN} **Type**: Adapter/ USB	I_{CHARGE}: 1.25A – 2.5A V_{CHARGE}: 2.5V – 4.4V $V_{IN\ Absolute\ Max}$: 20V **FET**: Integrated V_{IN} **Type**: Adapter/USB	I_{CHARGE}: 2A – 8A $V_{CHARGE\ per\ Cell}$: up to 6V **# Cells**: 1 to 7 $V_{IN\ Operating}$: 17V – 28V **FET**: Internal/External V_{IN} **Type**: Adapter/USB	I_{CHARGE}: 1.5A V_{CHARGE}: 5V $V_{IN\ Operating}$: 10V V_{IN} **Type**: Coil/USB/ Adapter **5W Solutions**	I_{CHARGE}: >2A V_{CHARGE}: 5.5V/6V $V_{IN\ Operating}$: 5.5V/6V/ 40V $V_{IN\ Absolute\ Max}$: 7V / 40V V_{IN} **Type**: Adapter **FET**: No Integrated FET	I_{CHARGE}: 0.1A–10A (Ext) V_{CHARGE}: 2.5V–5.25V **# Cells**: 1 to 9 $V_{IN\ Absolute\ Max}$: 5.5V–33V $V_{IN\ Operating}$: 100mV–28V V_{IN} **Type**: Adapter/ USB/Solar Panel/TEG/ Low DC (0.13Vmin)
Features	Stand Alone Interface Over Voltage Protection Protection Test Mode Soft-Start Status Indication Safety Timer Charge Termination: IMIN, Adjustable, (C/10)	I²C Interface Power Path Management JEITA Compatible Watchdog & Safety Timers Adjustable Charge Current BC 1.2 Compliant Charge Termination: Host Controlled, 10% ICHG, IMIN,Voltage	SMBus Interface Dynamic Power Management Battery Detection Safety Timer Status Indication Charge Termination: Imin,Host Controlled,Adj,(C/10) ΔV,PVD,(ΔT/Δt)	WPC 1.1 Compliant Receivers & Transmitters Foreign Object Detection Dynamic Rectifier Control Dynamic Efficiency Scaling Adaptive Communication Limit Charge Termination: EPT Cmd to Tx	Battery Detection Trickle Charge Mode Average Current Mode OVP Status Indication Low Power Thermistor Interface Charge Termination: Imin, Vmax, SMBus,±ΔV,PVD, (ΔT/Δt)	MPPT Battery Detection OVP Safety Timer Sleep Mode Status Indication Charge Termination: Imin ,(C/10), Voltage
1 kU Price	$0.40 to $1.80	$0.95 to $2.10	$0.75 to $3.50	$3.50 to $4.50	$0.85 to $3.05	$3.50 to $4.50
Examples	**BQ250xx** **BQ24210** **BQ25070**	**BQ2416x** **BQ242xx** **BQ2415xx**	**BQ2417x** **BQ2461x** **BQ247xx** **BQ2419x**	**Receivers** **BQ501x** **Transmitters** **BQ500210**	**NiCd/NiMH** **BQ200x** **BQ2440x** **Lead Acid** **BQ24450** **UC3909** **BQ2031**	**Super Cap** **BQ24640** **Solar/Energy Harvesting** **BQ24210** **BQ24650** **BQ25504**
Pkg.	QFN/MLP			VQFN/QFN/DGBA	WCSP/SOIC/QFN/MLP/ MSOP/DIP	VQFN/QFN/WSON

Texas Instruments

Battery Monitoring

	Lithium Ion & Lithium Polymer			Multi Chemistry	
	Single Cell	Multi-Cell		Authentication	Fuel Gauges & Monitors
	Fuel Gauges	Fuel Gauges	Protection		
Key Parameters	**# of Series Cells**: 1 **Battery Capacity**: 300mAh – 8000mAh	**# of Series Cells**: 2 to 16 **Battery Capacity**: 800mAh – 650,000mAh **# of Signaling LEDs**: up to 5	**# of Series Cells**: up to 192 **OVP Threshold**: 4.00V – 4.60V $I_{SHUTDOWN}$: Down to 1µA	**Security Levels**: ID Number, CRC Algorithm, SHA-1 Encryption **EPROM**: 16bytes – 4Kb	**# of Series Cells**: up to 14 **Battery Capacity**: 300mAh – 327,000mAh **# of Signaling LEDs**: up to 10
Features	Impedance Track™ Pack Side/System Side Compensated EDV I²C/SMBus Integrated LDO Current & Voltage Protection	Impedance Track™ SMBus Interface Integrated Protector JEITA Compliant Voltage, Current & Temperature protection	Overvoltage Protection (OVP) Cell-Balancing Short Circuit Protection I²C Interface/Stand-Alone External FET (Charge, Discharge)	SDQ/I²C Interface Integrated LDO No Standby Power required	Impedance Track™ I²C/SMBus/UART Interface JEITA Compliant Types: NiCd, NiMH, Lead Acid, Chemistry Independent, Super Cap
1 kU Price	$1.25 to $3.15	$3.20 to $5.20	$0.30 to $2.95	$0.90 to $1.45	$1.90 to $5.60
Examples	**BQ27xxx** **BQ28xxx** **BQ28Zxxx**	**BQ30xx** **BQ20Zxx(x)-R1**	**BQ29xxx** **BQ77xxxx(x)** **BQ76PL536**	**BQ261xx** **BQ202x** **BQ2022A**	**BQ262xxx** **BQ201x(x)** **BQ78412** **BQ34Z1xx** **Chemistry Independent** **BQ2060A, BQ2092**
Pkg.	SON, QFN, CSP	TSSOP, QFN	SON, SSOP, TSSOP, QFN	DSBGA, SOT-23, TO-92, VSON	(T)SSOP, SOIC, HTQFP

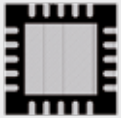
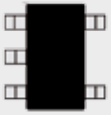
Display Power & Lighting

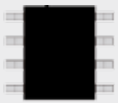
	Lighting			Display Power	
	AC/DC Lighting	**DC/DC Lighting**	**Backlight**	**Display Bias**	**Signage**
Parameters	V_{IN}: 6.3V – 36V $f_{SWITCHING}$: 70kHz – 1MHz	V_{IN}: 3.5V – 95V/ -14V – -9V $f_{SWITCHING}$: up to 2MHz $V_{OUT\ MAX}$: up to 95V $I_{LED\ MAX}$: 0.2A – 6A	V_{IN}: 1.65V – 24V $V_{OUT\ MAX}$: 3.6V – 120V $I_{LED\ MAX}$: 0.01A – 5A **# of LEDs**: 3 – 120 **# of Channels**: up to 8 **Display Size**: 2” – 50”	V_{IN}: 1.8V – 16.8V **# of Channels**: up to 6 **Display Size**: 3” – 110”	**# of Channels**: up to 24 $I_{out\ (per\ channel)}$: 35mA – 200mA V_{LED}: 10V – 30V **PWM resolution**: up to 16bits
Features	Configurable LED Voltage PFC Integrated TRIAC compatible UVLO Thermal Shutdown Primary Side Sensing Isolated/Non-Isolated	Linear/Switch Mode Power Supply Over temperature protection UVLO Inductor integrated Controller / FET integrated Dynamic Headroom Control Lighting Modules	Adaptive/PWM/Analog Dimming I²C Interface Current Sink Implemented Overvoltage Protection Current Matching	Level Shifter Integrated (LCD) Gamma Buffer Integrated (LCD) Line Transient regulation I²C Interface UVLO, Overvoltage Protection Soft-Start Thermal Shutdown	LED Open/Short Detection Pre-Thermal warning Thermal Shutdown Output Leakage Detection Constant-Current I²C/SPI/Parallel Interface
1 kU Price	$0.32 to $1.85	$0.95 to $5.50	$0.29 to $2.67	$0.80 to $2.78	$0.35 to $4.65
Products	**LM344x/5x** **TPS92xxx** **UCC2881x**	**LM34xx** **TPS925xx** **TPS40211**	**WLED/CAMERA FLASH** **TPS61xxx, LM35xx** **DISPLAYS** **LP85xx, TLC59xx(x)**	**LCD** **TPS651xx** **AMOLED** **TPS6563x**	**TLC59xx(x)**
Pkg.	SOIC, TSSOP, MSOP	(e)MSOP, (e)TSSOP, (e)PSOP, LLP, SOT23, PowerPadTM	QFN, SOT(-23), WCSP, Micro SMD, (H)TSSOP, DSBGA, SON	TSSOP, (W)QFN, (W)SON, DSBGA	HTQFP, (V)QFN, (H)TSSOP, SON, PDIP

Appendix

i) Packaging Guide
ii) Power Supply Topologies
iii) Index of Abbreviations

Packaging Guide

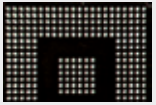
Package	QFN	SON	WSON	WCSP	SOT
Name	Quad Flat no Lead	Small Outline no Lead	Wafer Small Outline no Lead	Wafer Chip Scale Package	Small Outline Transistor
					
Pin Count	6 to 64	6 to 10	6 to 16	2 to 81	3 to 8
Lead Pitch	0.4 to 1mm	0.4 to 1.05mm	0.4 to 0.95mm	0.5mm	2.54mm
Size WxLxH (mm³)	1.2x1.5x1 to 9x9x1	1x2.5x0.55 to 5x6x1	1.5x1.5x0.8 to 4x4x0.8	1.1x1.5x0.45 to 2x2x0.45	0.8x1x0.45 to 3.5x6.5x1.8

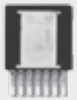
Package	TO	WQFN	MSOP	TSSOP	SOIC
Name	N/A	Wafer Quad Flat no Lead	Mini Small-Outline Package	Thin Shrink Small Outline Package	Small Outline Integrated Circuit
					
Pin Count	3 to 5	10 to 56	8 to 10	8 to 80	8 to 28
Lead Pitch	2.54mm	0.4 to 0.65mm	0.5 to 0.65mm	0.4 to 0.65mm	1.27mm
Size WxLxH (mm³)	4.3x4.3x3.6 to 25.4x38.6x9	2x2x0.8 to 9x9x0.8 (i)	4.9x3x1.1	4.4x3x1.2 to 6.1x20.8x1.15	3.9x4.9x1.7 to 7.5x17.9x2.65

TEXAS INSTRUMENTS

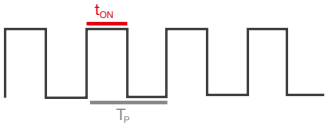
(i)

Packaging Guide

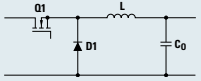
Package	BGA	FBGA	PBGA	PDIP	(P)SOP
Name	Ball Grid Array	Fine pitch Ball Grid Array	Plastic Ball Grid Array	Plastic Dual In-Line Package	(Plastic) Small Outline Package
					
Pin Count	12 to 114	6 to 361	252 to 672	8 to 24	4 to 28
Lead Pitch	0.5 to 1.5mm	0.4 to 1mm	0.5 to 1.5mm	2.54mm	1.27 to 2.54mm
Size WxLxH (mm³)	2x2x0.7 to 45x45x1.7			6.5x9.5x3.2 to 13.7x66.6x5	1.3x2.9x1 to 21.6x41.6x7.8

Package	PLCC	QFP	TO-PMOD
Name	Plastic Leaded Chip Carrier	Quad Flat Package	Power Module
			
Pin Count	20 to 84	32 to 208	7 to 11
Lead Pitch	1.27mm	0.4 to 0.65mm	1.27mm
Size WxLxH (mm³)	9x9x6 to 29.3x29.3x4.6	10x10x1.6 to 32x32x3.4	13.8x10.2 to 15x15x5.9

Power Supply Topologies

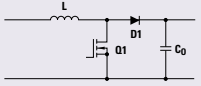


BUCK



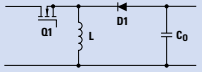
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{t_{ON}}{T_P}\right) = D$$

BOOST



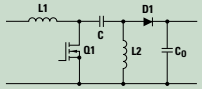
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{T_P}{T_P - t_{ON}}\right) = \frac{1}{(1-D)}$$

BUCK BOOST



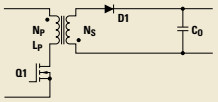
$$\frac{V_{OUT}}{V_{IN}} = -\left(\frac{t_{ON}}{T_P - t_{ON}}\right) = -\left(\frac{D}{1-D}\right)$$

SEPIC



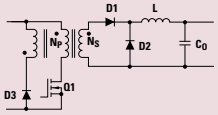
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{D}{1-D}\right)$$

FLYBACK



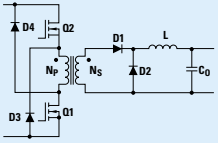
$$\frac{V_{OUT}}{V_{IN}} = D \times \sqrt{\frac{T_P \times V_{OUT}}{2 \times I_{OUT} \times L_P}}$$

FORWARD



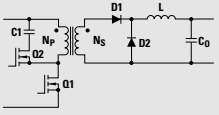
$$= \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = \left(\frac{N_S}{N_P}\right) x$$

2 SWITCH FORW



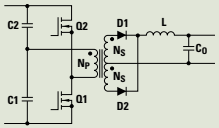
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = \left(\frac{N}{N}\right)$$

TIVE CLAMP FORW



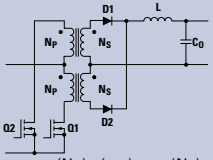
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = \left(\frac{N_S}{N_P}\right)$$

HALF BRIDGE



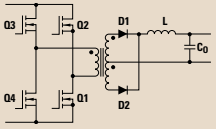
$$\frac{V_{OUT}}{V_{IN}} = \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = \left(\frac{N_S}{N_P}\right) x\ D$$

PUSH PULL



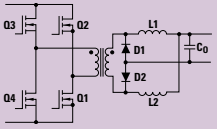
$$\frac{OUT}{IN} = 2 x \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = 2 x \left(\frac{N_S}{N_P}\right) x\ D$$

FULL BRIDGE



$$\frac{OUT}{IN} = 2 x \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = 2 x \left(\frac{N_S}{N_P}\right)$$

PHASE SHIFT ZVT



$$\frac{V_{OUT}}{V_{IN}} = 2 x \left(\frac{N_S}{N_P}\right) x \left(\frac{t_{ON}}{T_P}\right) = 2 x \left(\frac{N_S}{N_P}\right) x\ D$$

Texas Instruments

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Terminology

BC 1.2	Battery Charging Standard 1.2
BiCMOS	Bipolar Complementary Metal-Oxide Semiconductor
(C/10)	Charge at 1/10th Capacity
DDR	Double Data Rate
DPWM	Digital Pulse-Width Modulated
EDV	End of Discharge Voltage
EMI EN55022 / CISPR22	Electromagnetic Interference Test Standard
EPROM	Erasable Programmable Read Only Memory
ESD	Electrostatic Discharge
FET	Field Effect Transistor
FOM	Figure of Merit
GUI	Graphical User Interface
H/L Interface	High/Low Interface
JEITA	Japan Electronics and information Technology Association
LDO	Low Drop Out Voltage Regulator
MOSFET	Metal-Oxide Semiconductor Field Effect Transistor
MPPT	Maximum Power Point Tracking
NiCd	Nickel-Cadmium Battery
NiMH	Nickel-Metal Hydride Battery
OVP	Over Voltage Protection
PD	Powered Devices
PFC	Power Factor Correction
PFM	Pulse Frequency Modulation
PSE	Power Sourcing Equipment
PVD	Peak Voltage Detect
PWM	Pulse-Width Modulated
RoHS	Restriction of Hazardous Substances Directive
SEPIC	Single-ended primary-inductor converter
SMBus	System Management Bus
SPI	Serial Peripheral Interface Bus
TTL	Transistor-Transistor Logic
UART	Universal Asynchronous Receiver/Transmitter
UL Rated	Underwriters Laboratories Rated
USB 2.0 OTG	USB 2.0 On-The-Go
UVLO	Undervoltage Lockout
WLED	White Light Emitting Diode
WPC 1.1	Wireless Power Consortium Standard 1.1

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