

# World's Smallest Micro DC/DC with Integrated Coil

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Low Capacitance TVS Diode Array for ESD Protection

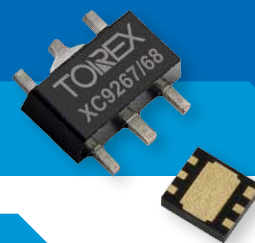
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Ultra Low Capacitance TVS Diode for ESD Protection

### **XBP14E5UFN-G**

Ultra Low Capacitance TVS Diode Array for ESD Protection

## XC9267/68 36V 0.6A Synchronous Step-Down DC/DC Converter



The XC9267/68 is a synchronous step-down DC/DC with **P-Ch High Side Switch** to ensure low voltage operation with 100% max duty ratio. It can operate from 3.0V~36.0V and deliver loads up to 600mA making it an ideal replacement for inefficient Linear Regulators used in many industrial applications.

Designed for very **high efficiencies at low output loads**, with low quiescent current and automatic PFM/PWM mode. The XC9267/68 also works with Low ESR ceramic capacitors and comes with a choice of two switching frequencies, adjustable soft start and a power good output.

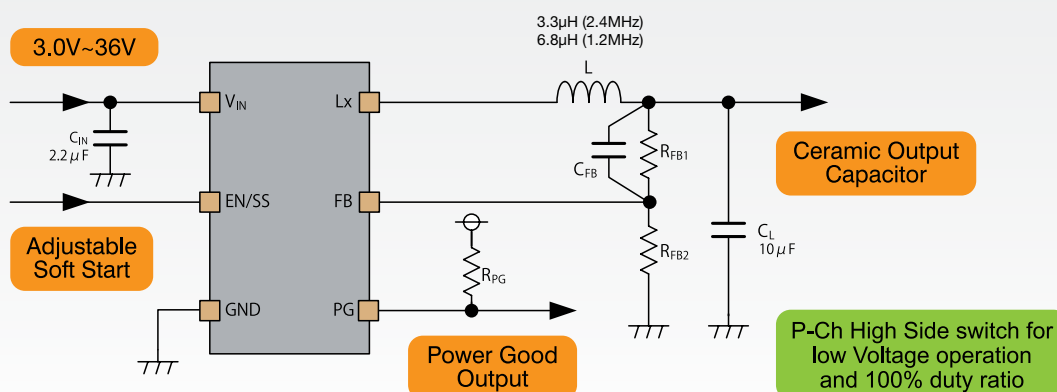
Available in the ultra-small USP-6C package, measuring only 2.0 x 1.8 x 0.6mm an extremely small DC/DC circuit can be implemented with a minimal number of external components.

The XC9267/68 includes a **fold-back type current limit circuit** and the IC will automatically resume normal operation as soon as the over-current condition disappears.

### KEY FEATURES

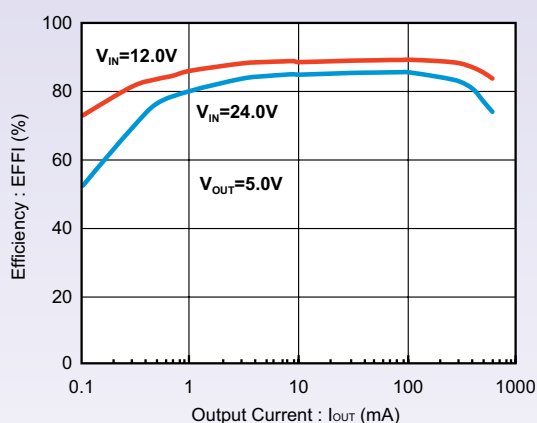
|                         |                                 |                             |
|-------------------------|---------------------------------|-----------------------------|
| Output Current          |                                 | 600mA                       |
| ON Resistance           | N-Ch                            | 0.44Ω (typ)                 |
|                         | P-Ch                            | 1.12Ω (typ)                 |
| Input Voltage Range     |                                 | 3.0V ~ 36V (Ab. Max 40V)    |
| FB Voltage              |                                 | 0.75V±1.5%                  |
| Output Voltage Range    |                                 | 1.0V ~ 25.0V                |
| Switching Frequency     |                                 | 1.2MHz or 2.4MHz            |
| Quiescent Current       |                                 | 11.6μA (1.2MHz)             |
| Product Select          | XC9267                          | Fixed PWM Control           |
|                         | XC9268                          | PWM/PFM Automatic Switching |
| Max Duty Cycle          |                                 | 100%                        |
| Protection Circuits     | Current Limit Fold-back Circuit |                             |
|                         | UVLO (2.7V)                     |                             |
|                         | Thermal Shutdown                |                             |
| Additional Features     | Adjustable Soft-start           |                             |
|                         | Optional Power Good Output      |                             |
|                         | Low ESR Ceramic capacitors      |                             |
| Op. Ambient Temperature |                                 | -40°C ~ +105°C              |
| Package                 |                                 | USP-6C or SOT89-5           |

### TYPICAL APPLICATION CIRCUIT



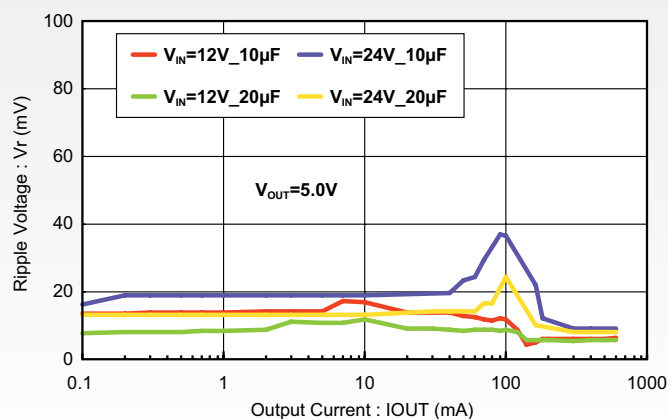
### EFFICIENCY VS. OUTPUT CURRENT

XC9268B75C (PWM/PFM, 1.2MHz), L = 6.8μH, CIN = 2.2μF, CL = 10μF



### OUTPUT RIPPLE VS. OUTPUT CURRENT

XC9268B75D (PWM/PFM, 2.4MHz), L=3.3μH, CIN = 2.2μF



## FOLD-BACK TYPE CURRENT LIMIT PROTECTION

The current limiting circuit has both High Side Switch Current Limit and Low Side Switch Current Limit. These two current limits realise the fold-back current limiting operation and the Oscillation Frequency goes down automatically under current limit situation.

### A Inductor Current reaches to the High Side Current Limit

When inductor current reaches to the High Side current limit (ILMH), the Low Side switch is kept on until the current reached to the Low Side current limit (ILML).

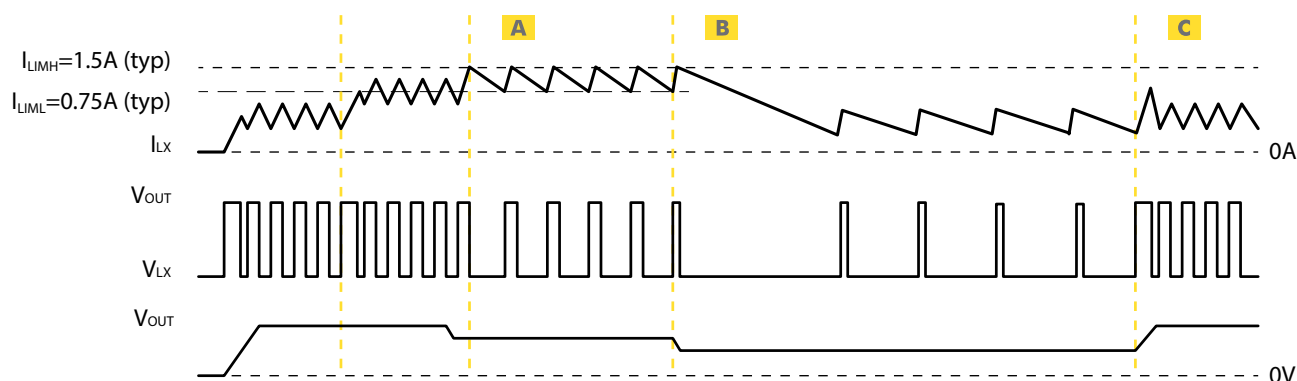
It makes the oscillation frequency lower.

### B Fold-back Operation

When  $V_{OUT}$  (FB) voltage falls down with the current limit operation, ILMH and ILML values go down also for the fold-back operation.

### C Automatic Restart

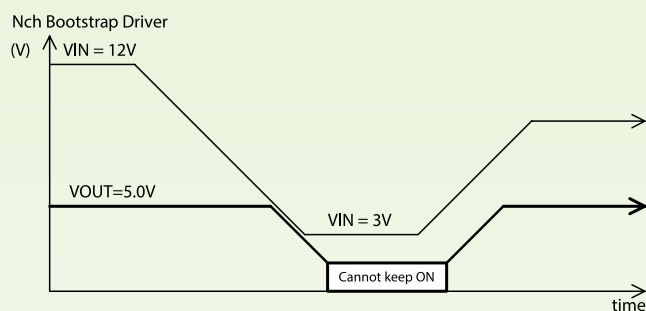
When the load becomes lighter,  $V_{OUT}$  rises up automatically without inrush current along with the fold-back current limit rising.



## STABLE OPERATION FROM LOWER INPUT VOLTAGES

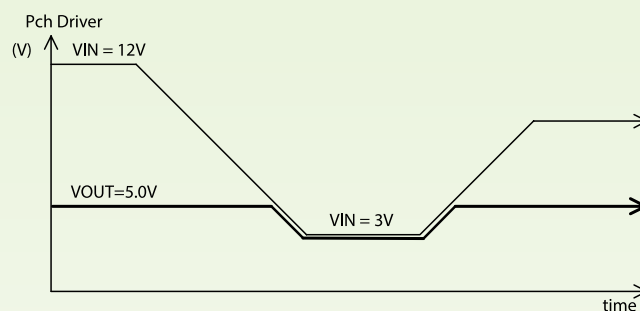
Many traditional mid-voltage DC/DC converters use an Nch MOSFET for the High Side switch. Whilst an Nch FET is excellent for high speed switching it normally needs a special bootstrap circuit to drive it.

A bootstrap circuit has the advantage of being simple and low cost, but it also has limitations. The Duty-cycle and on time is limited by the requirement to refresh the charge in the bootstrap capacitor, which means the maximum duty ratio can never be 100% and this has implications when the input Voltage goes below  $V_{OUT}$  as shown in the diagram below.

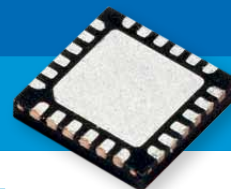


The XC9267/68 uses a Pch MOSFET for the High Side Switch that does not need a bootstrap circuit, so the maximum duty ratio can be 100%. This means that the output remains stable even when the input drops beneath  $V_{OUT}$  as shown in the diagram below:

The XC9267/68 output follows the input when it goes below  $V_{OUT}$  and this can be important for automotive 'cold crank' applications or for when the  $V_{IN}$  source has a high impedance (for example from a long cable).



## XC9273 5.5V 3A Hi-SAT COT Step-Down DC/DC Converter



The XC9273 incorporates Hi-SAT COT, Torex's own Constant On-Time architecture, to deliver **extremely fast transient response** performance and high efficiency.

With Hi-SAT the XC9273 only needs one low cost 47 $\mu$ F ceramic capacitor at the output side, whilst competitors often need multiple capacitors to achieve similar levels of performance. However adding an extra capacitor will allow the user to reduce output ripple further if required.

Hi-SAT COT also provides **less fluctuation in oscillation frequency against load and input voltage** when compared to traditional COT control architectures.

With a 0.6V reference voltage source the output voltage can be set freely from 0.8V using external resistors. Furthermore, it is possible to control the output voltage dynamically using an external digital-to-analog converter (DAC).

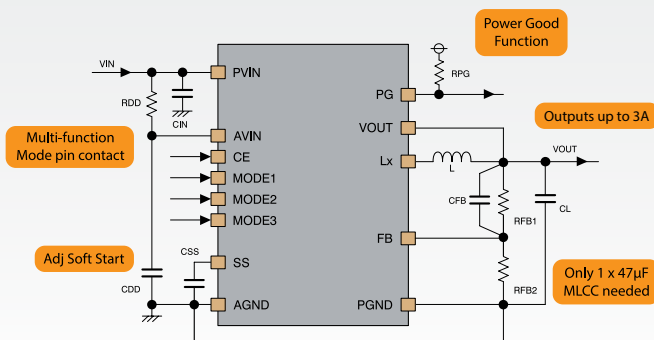
The XC9273 also allows the engineer to select different features using the MODE pins. Using a High or Low signal the engineer can select PWM control or PWM/PFM auto switching control (MODE1), Short Protection with latch or hiccup mode (MODE2) and optional CL discharge with soft OFF (MODE3).

The integral soft start time can be adjusted with an external capacitor (CSS) and a Power Good feature is also included to help with system power-up sequencing.

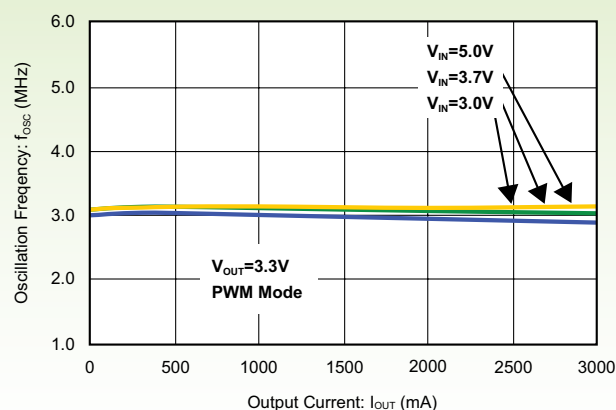
### KEY FEATURES

|                         |                                 |                    |
|-------------------------|---------------------------------|--------------------|
| Control Method          | Hi-SAT COT                      |                    |
| Output Current          | 3.0A                            |                    |
| ON Resistance           | N-Ch                            | 38m $\Omega$ (typ) |
|                         | P-Ch                            | 50m $\Omega$ (typ) |
| Input Voltage Range     | 2.7V ~ 5.5V                     |                    |
| FB Voltage              | 0.6V $\pm$ 1%                   |                    |
| Output Voltage Range    | 0.8V ~ 3.6V                     |                    |
| Switching Frequency     | 1.2MHz or 3.0MHz                |                    |
| Mode Select             | PWM or PWM/PFM Auto Switching   |                    |
| Max Duty Cycle          | 100%                            |                    |
| Protection Circuits     | Current Limit (Hiccup or Latch) |                    |
|                         | Thermal Shutdown                |                    |
|                         | Short Circuit Protection        |                    |
|                         | UVLO                            |                    |
| Additional Features     | Adjustable Soft-start           |                    |
|                         | CL Discharge with Soft Off      |                    |
|                         | Low ESR Ceramic capacitors      |                    |
| Op. Ambient Temperature | -40°C ~ +105°C                  |                    |
| Packages                | QFN0404-24C                     |                    |

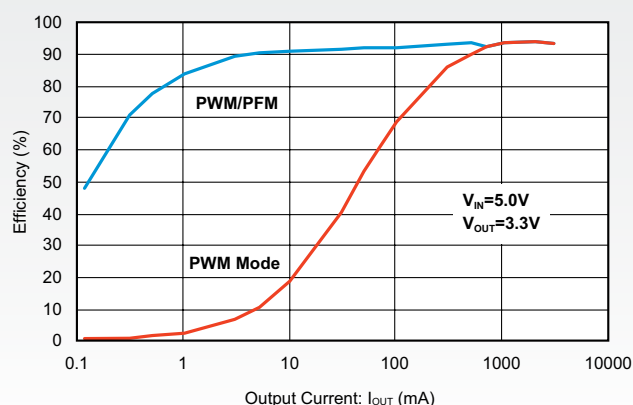
### TYPICAL APPLICATION CIRCUIT



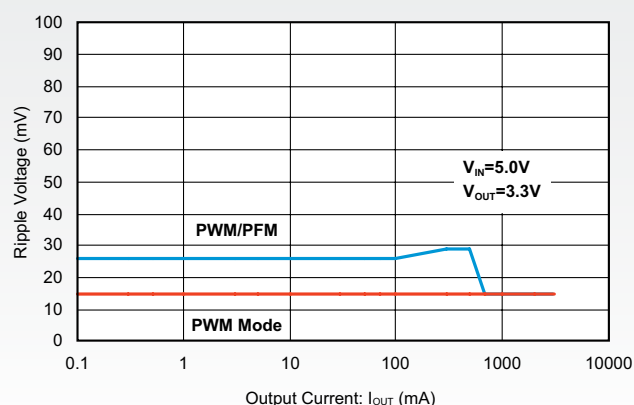
### OSCILLATION FREQUENCY VS. OUTPUT CURRENT



### EFFICIENCY VS. OUTPUT CURRENT



### OUTPUT RIPPLE VS. OUTPUT CURRENT



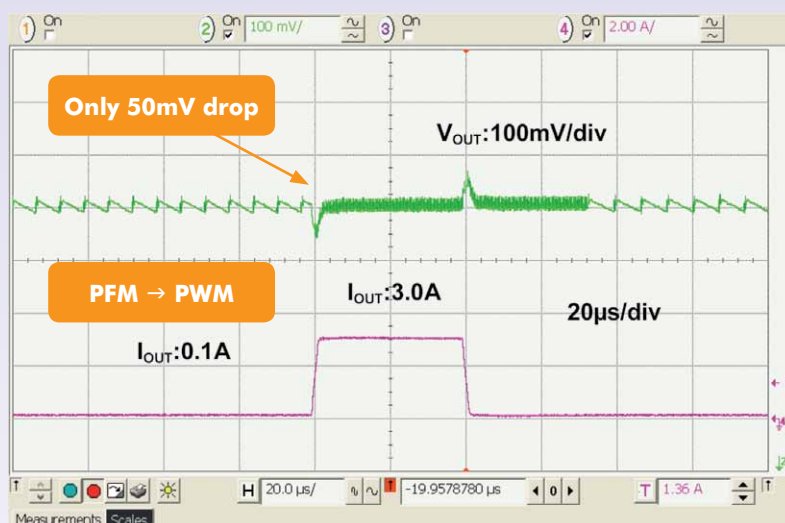
#### XC9273B06D (3MHz)

L = MWSA0624 (0.22 $\mu$ H), CIN = 47 $\mu$ F (GRM31CR61A476ME15L), CL = 94 $\mu$ F (GRM31CR60J476ME19Lx2), RFB1 = 68k $\Omega$ , RFB2 = 15 $\Omega$ , CFB = 820pF

## FAST TRANSIENT RESPONSE WITH HI-SAT COT

With only 1 x 47 $\mu$ F / 10V Ceramic Capacitor (1206 size) for  $C_L$

**Hi-SAT COT**  
For Fast Transient Response

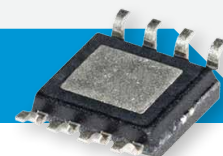


### XC9273B06D

$V_{IN} = 5.0V$   $V_{OUT} = 1.8V$   $f_{OSC} = 3.0MHz$   $I_{OUT} = 0.1A \rightarrow 3.0A$ ,  $T_r = 2.0\mu s$ ,  $T_f = 2.0\mu s$

$L = MWSA0624$  (0.22 $\mu H$ ),  $C_{IN} = 47\mu F$  (GRM31CR61A476ME15L),  $C_L = 47\mu F$  (GRM31CR60J476ME19L)  $R_{FB1} = 36k\Omega$ ,  $R_{FB2} = 18k\Omega$ ,  $CFB = 1500pF$   $MODE1 = L$  (PFM/PWM)

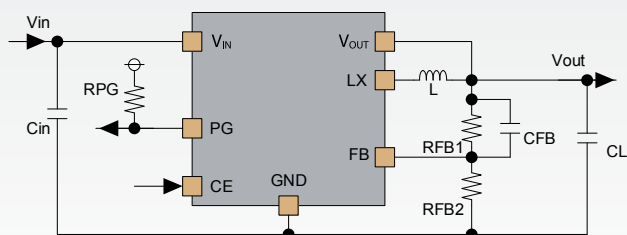
# XC9274/75 5.5V 3A Hi-SAT COT Step-Down DC/DC Converter



The XC9274/75 are simplified versions of the XC9273 without the extra MODE pins. Many of the features are still available, but the parameters are set at the factory and users select their preferences through the part number ordered.

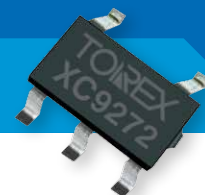
This reduces the number of pins needed and the XC9274/75 is available in SOP-8FD measuring 6.0mm x 4.9mm x 1.55mm and the package incorporates an exposed GND tab to maximise heat dissipation.

## TYPICAL APPLICATION CIRCUIT



## KEY FEATURES

|                      |                                 |                        |
|----------------------|---------------------------------|------------------------|
| Control Method       |                                 | Hi-SAT COT             |
| Output Current       |                                 | 3.0A                   |
| ON Resistance        | N-Ch                            | 47m $\Omega$ (typ)     |
|                      | P-Ch                            | 47m $\Omega$ (typ)     |
| Input Voltage Range  |                                 | 2.7V ~ 5.5V            |
| FB Voltage           |                                 | 0.6V $\pm$ 1%          |
| Output Voltage Range |                                 | 0.8V ~ 3.6V            |
| Switching Frequency  |                                 | 1.2MHz or 3.0MHz       |
| Product Select       | XC9274                          | PWM only               |
|                      | XC9275                          | PWM/PFM Auto Switching |
| Max Duty Cycle       |                                 | 100%                   |
| Protection Circuits  | Current Limit (Hiccup or Latch) |                        |
|                      | Thermal Shutdown                |                        |
|                      | Short Circuit Protection        |                        |
|                      | UVLO                            |                        |
| Additional Features  | Soft-start                      |                        |
|                      | CL Discharge with Soft Off      |                        |
|                      | Low ESR Ceramic capacitors      |                        |
| Op. Amb. Temperature |                                 | -40°C ~ +105°C         |
| Packages             |                                 | SOP-8FD                |



The XC9272 series of DC/DC converters supports lower output voltages from 0.6V to 0.95V, and achieves an ultra-low supply current of 0.5 $\mu$ A. This enables power to be supplied with high-efficiency to chipsets that require a core voltage under 1.0V and maximises the performance of low-voltage chipsets.

Optimization of the analog circuitry to realise a supply current of 0.5 $\mu$ A and the use of PFM control for the operation method enable this product to achieve a significant increase of efficiency at light loads compared to conventional products.

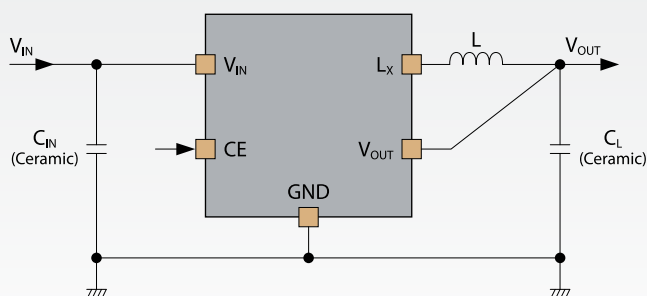
These characteristics make this power IC ideal for applications that require a long battery drive time, such as devices with a GPS function, wearable devices, energy harvesting and other devices in which efficiency in the sleep state is important.

The XC9272 series also features an enable pin to turn the IC on and off and an optional CL discharge function that can quickly discharge the output capacitor when the IC is turned off. During stand-by, all circuits are shutdown to reduce consumption to less than 0.1 $\mu$ A.

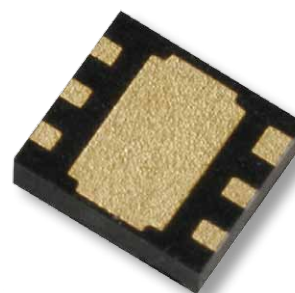
### KEY FEATURES

|                         |      |                                 |
|-------------------------|------|---------------------------------|
| Quiescent Current       |      | 0.5μA                           |
| Output Current          |      | 50mA                            |
| PFM Switching Current   |      | 180mA                           |
| ON Resistance           | N-Ch | 0.4Ω (typ)                      |
|                         | P-Ch | 0.4Ω (typ)                      |
| Input Voltage Range     |      | 2.0V ~ 6.0V                     |
| Output Voltage Range    |      | 0.6V~0.95V (±20mV, 0.05V steps) |
| Control Method          |      | PFM                             |
| Protection Circuits     |      | Current Limit Circuit           |
|                         |      | Short Circuit Protection        |
|                         |      | UVLO (1.8V)                     |
| Additional Features     |      | CL Auto Discharge               |
|                         |      | Low ESR Ceramic capacitors      |
| Op. Ambient Temperature |      | -40°C ~ +85°C                   |
| Packages                |      | SOT-25, USP-6EL                 |

### TYPICAL APPLICATION CIRCUIT



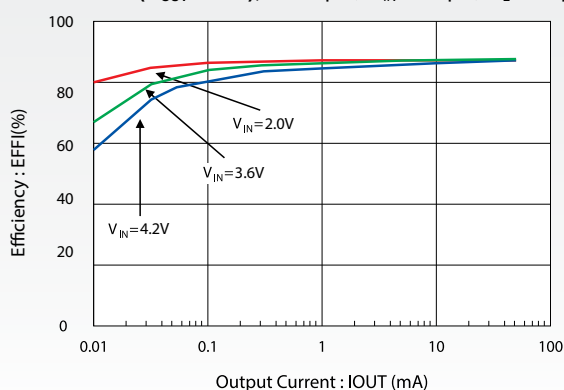
Available in  
**Ultra-Small Package**



**USP-6EL**  
(2.0 x 1.8 x 0.4mm)

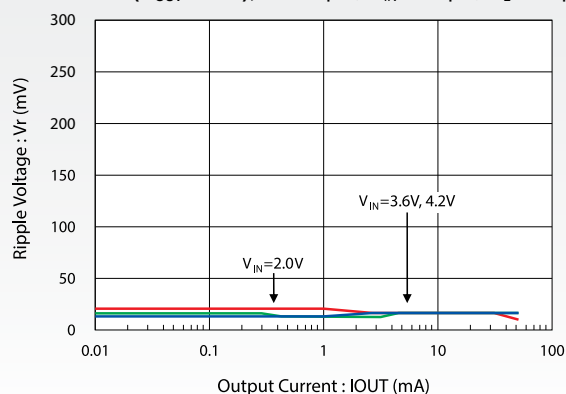
### EFFICIENCY VS. OUTPUT CURRENT

XC9272A09B ( $V_{OUT}=0.9V$ ),  $L=10\mu H$ ,  $C_{IN}=10\mu F$ ,  $C_L=22\mu F$



### OUTPUT RIPPLE VS. OUTPUT CURRENT

XC9272A09B ( $V_{OUT}=0.9V$ ),  $L=10\mu H$ ,  $C_{IN}=10\mu F$ ,  $C_L=22\mu F$



## BENEFITS OF OPERATING AT LOWER VOLTAGES FOR CHIPSET CORE SUPPLY

It's well known that operating a microprocessor core at lower voltages will reduce overall power consumption, which in turn leads to less heat being produced and cooler devices can be made to run faster.

So as designers look to improve battery life whilst also increasing levels of performance the trend is inevitably towards lower and lower chipset voltages as can be seen in fig.1 to the right.

Previously core voltages operated between 1.8V and 1.1V but increasingly voltages below 1.0V are becoming popular for wearable devices and energy harvesting applications

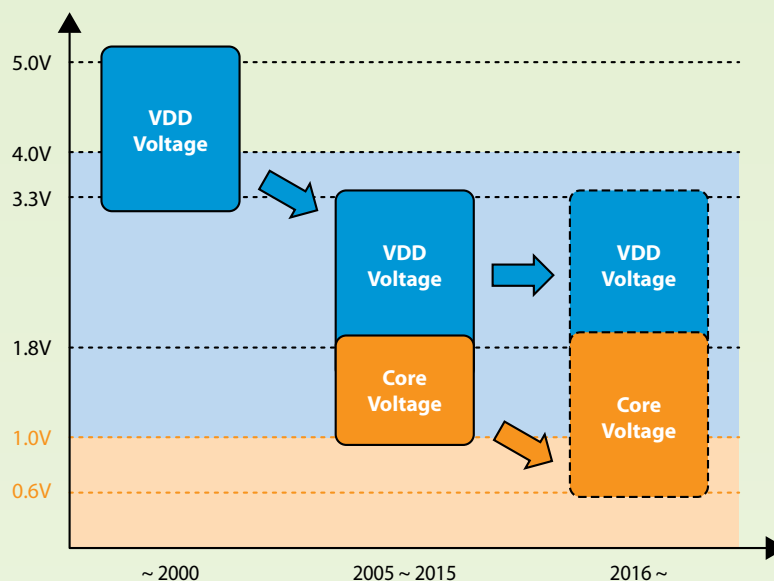


Fig.1 The evolution of chipset operating voltages

**The new XC9272 combines small size, high-efficiency and the ability to supply a low voltage under 1V with high accuracy and this enables the engineer to significantly extend battery life.**

To explore this further, we compare the performance under the following conditions at different output voltages.

### Test Condition

$V_{IN} = 3.6V$

Operating Modes

- Active:  $I_{OUT} = 10mA$  for 10ms
- Sleep:  $I_{OUT} = 10\mu A$  for 5s

First, we tested a standard DC/DC with an IQ of  $15\mu A$  and used it to generate 1.8V which is the typical core voltage required for many of today's microprocessor cores.

We then used the same DC/DC to generate 0.7V under the same conditions and finally we used the new XC9272 in the same circuit to generate 0.7V.

All three tests used the active and sleep modes indicated above and in fig.2 and fig.3 you can see the results.

Using the XC9272 to drive a 0.7V core voltage dramatically reduced overall power consumption and subsequently increased the system battery life almost 5 times.

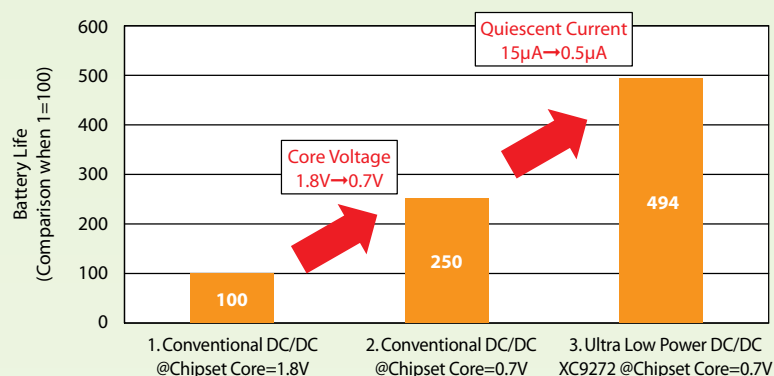


Fig.2 Battery life time vs. product and core voltage

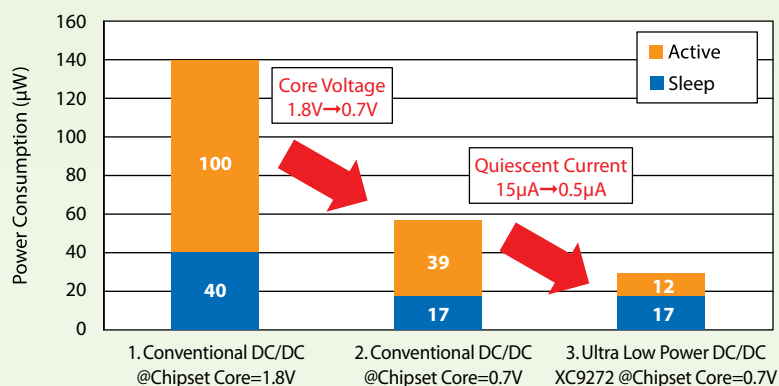


Fig.3 Power consumption vs. product and core voltage

## XC6806 Li-Ion / Li-Polymer Battery Charger with Temperature Monitoring, Current Path & Shutdown



The XC6806 is a linear Li-Ion/Li-Po battery charger with a 450mA Input Current Limit and integrated Current Path to maintain and prioritise the system load during the charging cycle. It also includes a novel Storage Mode Shutdown function to help conserve battery life whilst the end product is in transit to the shops.

The integral input current limit makes the XC6806 ideal for USB charging or applications that use smaller AC/DC adaptors. The temperature monitoring function meets JEITA standards and by controlling the charge voltage and charge current as appropriate for the temperature, the battery can be charged safely. Additional protective functions include a safety timer, UVLO, thermal control, and reverse current protection.

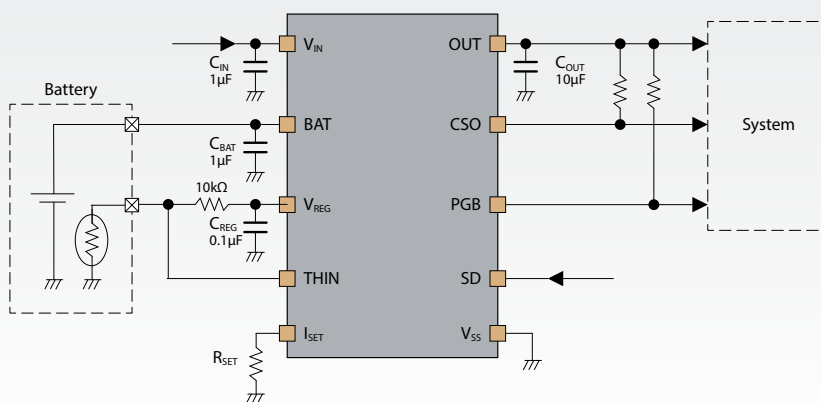
The Storage Mode Shutdown function completely shuts off power supply from the battery to the system to prevent battery leakage current while the device is in storage. When a power is connected to  $V_{IN}$  the Shutdown Mode is cleared. This allows the device to be operated with full battery immediately after purchase even if it has been in storage for extended periods of time.

The XC6806 is available in the small USP-10B or LGA-10B01 package and a charging circuit can be designed with minimal external components.

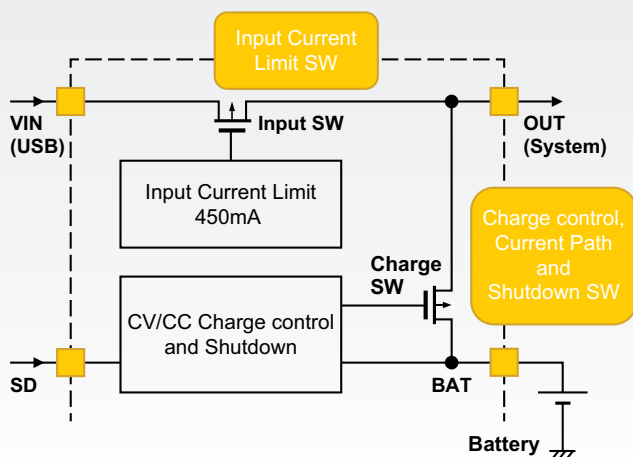
### KEY FEATURES

|                             |                      |
|-----------------------------|----------------------|
| Operating Voltage Range     | 4.5V ~ 6.0V          |
| CC Charge Current           | 10mA ~ 380mA         |
| CV Charge Voltage           | 3.5V ~ 4.45V         |
| BAT Sink Reverse Current    | 0.1 $\mu$ A          |
| Supply Current              | 200 $\mu$ A          |
| Trickle Charge Mode         | Yes                  |
| Recharge Function           | Yes                  |
| Recharge Voltage 25°C       | V <sub>CV</sub> -0.1 |
| Battery Temperature Monitor | Optional             |
|                             | JEITA                |
| Thermal Shutdown            | Thermal Control      |
| Reverse Current Protection  | Yes                  |
| Mains Charge Hold Time      | 5hr                  |
| Trickle Charge Hold Time    | 0.5hr                |
| Current Path                | Yes                  |
| Shutdown Mode               | Yes                  |
| Packages                    | USP-10B, LGA-10B01   |

### TYPICAL APPLICATION CIRCUIT



### OPERATION OF STORAGE-MODE, SHUTDOWN FUNCTION



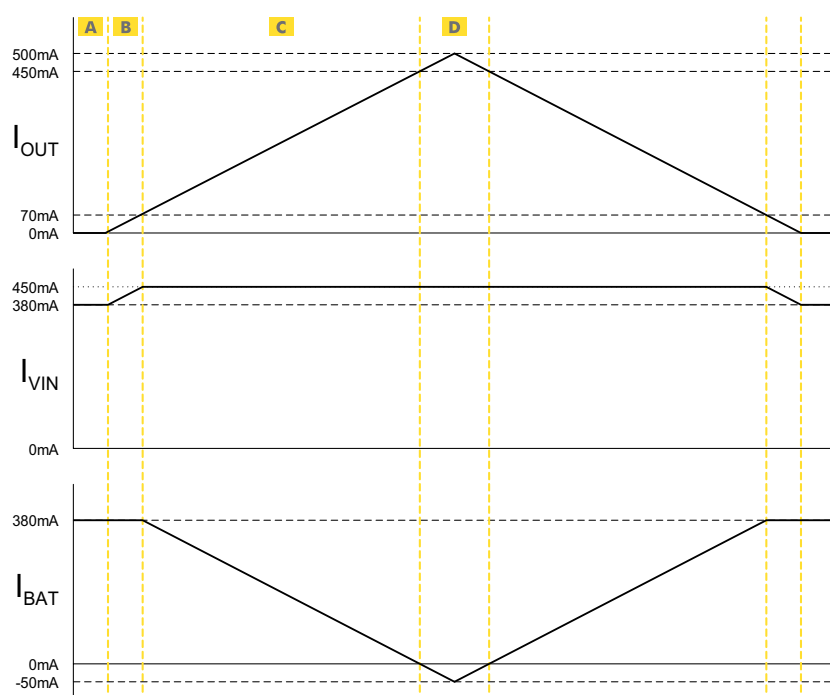
### Shutdown Operation

After production, the time from shipment of finished goods to them being sold and used by the end customer may be a few months or more, depending on the supply route from factory to warehouse and to retail outlet.

During this time, to avoid the battery discharging, the Li-ion / Li-Po cell should ideally be disconnected from the system. This is not always possible with traditional Charging IC, but the XC6806 includes an additional Charge Switch to allow the user to cut-off the connection between battery and the System

The connection is cut using the integral diode of the Charge SW. A toggle signal to the SD pin enables the Shutdown mode operation when there is no VIN and once enabled, the consumption current from the BAT pin is only 0.1 $\mu$ A.

## XC6806: OPERATION OF CURRENT PATH FUNCTION



### Example: CC = 380mA case

**A**  $I_{OUT}$  for the system is 0mA, so, both  $I_{IN}$  and the charge current ( $I_{BAT}$ ) are 380mA.

**B** When the system uses 0 to 70mA,  $I_{BAT}$  is kept as 380mA and  $I_{IN}$  increases 380mA to 450mA.

**C** When the system needs more current, the charge current ( $I_{BAT}$ ) decreases to fit to the input current limit: 450mA as total.

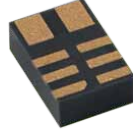
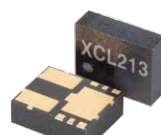
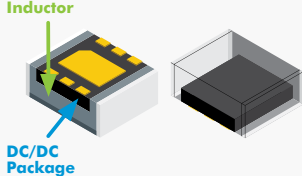
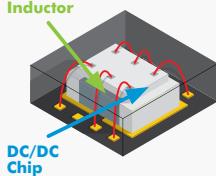
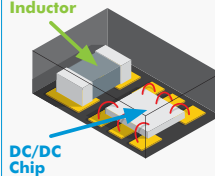
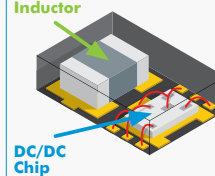
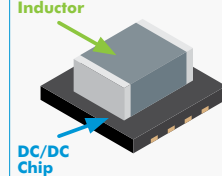
**D** When the system requires higher current larger than the input current limit: 450mA, the battery supports the gap, therefore  $I_{BAT}$  value goes to minus.

## KEY FEATURES

| SERIES                           | XC6801                     | XC6802                                | XC6803          | XC6804             | XC6805          | XC6806               |
|----------------------------------|----------------------------|---------------------------------------|-----------------|--------------------|-----------------|----------------------|
| Operating Voltage Range          | 4.25V~6.0V                 | 4.25V~6.0V                            | 4.5V~6.0V       | 4.5V~6.0V          | 4.5V~6.0V       | 4.5V~6.0V            |
| CC Charge Current                | 100mA~500mA                | 100mA~800mA                           | 40mA~280mA      | 200mA~800mA        | 5mA~40mA        | 10mA~380mA           |
| CV Charge Voltage                | 4.2V                       |                                       |                 |                    |                 | 3.5V~4.45V           |
| BAT Pin Reverse Current          | 2.0μA                      | 1.0μA                                 | 0.5μA           | 4.5μA              | 0.5μA           | 0.1μA                |
| Supply Current                   | 12μA                       | 15μA                                  | 100μA           | 100μA              | 100μA           | 200μA                |
| Charge Functions                 |                            |                                       |                 |                    |                 |                      |
| Trickle Charge Mode              | Yes                        |                                       |                 |                    | Optional        | Yes                  |
| Recharge Function                | Yes                        |                                       | Optional        |                    | Yes             |                      |
| Recharge Voltage (25°C)          | -                          |                                       | 3.9V            |                    |                 | V <sub>CV</sub> -0.1 |
| Battery Temperature Monitor      | No                         |                                       | Yes             |                    | Optional        | Yes                  |
|                                  | -                          |                                       | JEITA           |                    |                 |                      |
| Protection Circuits              |                            |                                       |                 |                    |                 |                      |
| Thermal Shutdown                 | Yes                        |                                       |                 |                    |                 | Thermal Control      |
| Reverse Current Protection       | -                          |                                       | Yes             |                    |                 |                      |
| Main Charge Hold Time            | -                          |                                       | 5hr             | 10hr               | 5hr             |                      |
| Trickle Charge Hold Time         | -                          |                                       | 0.5hr           | 2hr                | 0.5hr           |                      |
| Other Functions                  |                            |                                       |                 |                    |                 |                      |
| Current Path                     | -                          |                                       |                 |                    |                 | Yes                  |
| Shutdown Mode                    | -                          |                                       |                 |                    |                 | Yes                  |
| Packages                         | SOT89-5<br>SOT25<br>USP-6C | SOT89-5<br>SOT25<br>USP-6C<br>USP-6EL | USP-6EL         | USP-6EL<br>SOP-8FD | USP-6EL         | USP-10B<br>LGA-10B01 |
| Smallest Package Dimensions (mm) | 2.0 x 1.8 x 0.6            | 2.0 x 1.8 x 0.4                       | 2.0 x 1.8 x 0.4 | 2.0 x 1.8 x 0.4    | 2.0 x 1.8 x 0.4 | 2.5 x 1.6 x 0.4      |

# One Concept – Four Solutions

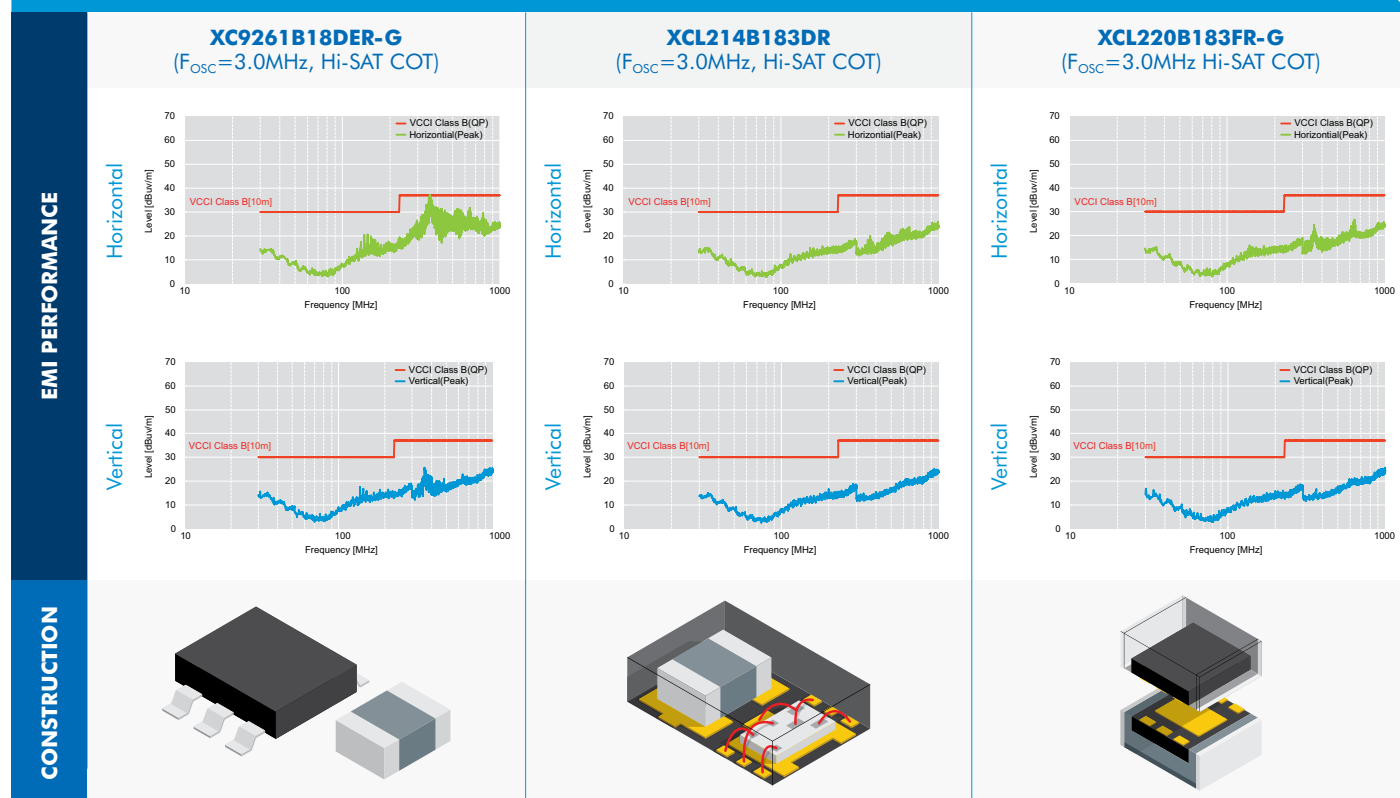
Torex offer MICRO DC/DC with four different internal constructions. Each one has advantages, so you can choose the one that best fits your application. Please see the table below.

|              | Packaged DC/DC<br>Embedded into coil                                                                                           | DC/DC chip<br>on top of coil                                                                                                | DC/DC chip<br>beside coil                                                                                                   |                                                                                                                                          | DC/DC package<br>below coil                                                                                                   |
|--------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| PHOTO        | <div>2.5 x 2.0 x 1.0mm</div>                  | <div>2.5 x 2.15 x 1.05mm</div>             | <div>2.25 x 1.5 x 0.75mm</div>             | <div>3.2 x 2.5 x 1.05mm<br/>4.7 x 3.1 x 1.35mm</div>  | <div>3.0 x 3.0 x 1.6mm</div>               |
| CONSTRUCTION |  <div>Inductor</div> <div>DC/DC Package</div> |  <div>Inductor</div> <div>DC/DC Chip</div> |  <div>Inductor</div> <div>DC/DC Chip</div> |  <div>Inductor</div> <div>DC/DC Chip</div>            |  <div>Inductor</div> <div>DC/DC Chip</div> |
| SERIES       | XCL101, XCL102/03, XCL201/02,<br>XCL205/06/07, XCL210,<br>XCL219/20, XCL221/22                                                 | XCL208/09                                                                                                                   | XCL223/24                                                                                                                   | XCL211/12, XCL213/14                                                                                                                     | XCL225/26                                                                                                                     |
| COIL         | The coil lies flat on the IC package.<br>This shortens the path of the switching<br>current and minimises noise.               | Lowest cost as very<br>standard coil can be used.                                                                           | Special wire bonding for<br>ultra-low profile.                                                                              | The IC and coil have good<br>heat dissipation, so large<br>currents can be used.                                                         | New construction for<br>mid-voltage products                                                                                  |

## Low EMI / Radiated Noise

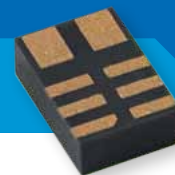
Another benefit for Torex MICRO DC/DC is much lower radiated noise compared with a normal DC/DC IC with an external coil. The data below compares the EMI performance and magnetic field strength for the different packaging options. When the IC is embedded under the Coil we see the lowest emissions (XCL220 type), but all MICRO DC/DC generate considerably less radiated noise compared to the traditional topology (XC9261 type):

### MICRO DC/DC – UNBEATABLE EMI PERFORMANCE



# XCL223/24

Low Profile, Step-Down, Micro DC/DC Converter with Integrated Coil



11

The XCL223/24 is a family of Ultra Low Profile Micro DC/DC Step-Down Converters with integrated coil. Measuring only 2.25mm x 1.5mm x 0.75mm (max), the XCL223/24 series is designed to minimise EMI emissions and maximize efficiency, while delivering a very stable output with low peak to peak ripple Voltage (<10mV).

Utilising Hi-SAT COT, Torex's Constant ON Time architecture gives the XCL223/24 extremely fast load transient response performance in comparison to standard DC/DC solutions. Hi-SAT COT also provides less fluctuation in oscillation frequency against load and input voltage when compared to traditional COT control architectures.

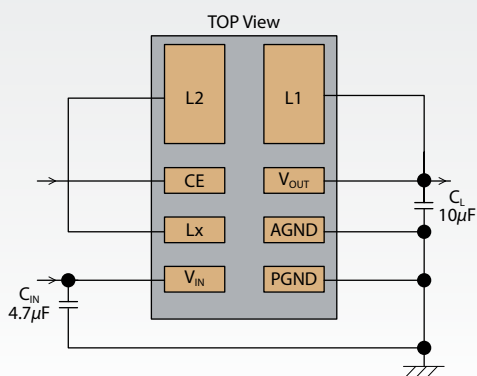
The small size and simple circuit architecture makes the XCL223/24 an ideal replacement for inefficient LDO voltage regulators and by integrating the coil, Torex has simplified the circuit layout for the designer and reduced the number of external components normally needed to implement this type of DC/DC solution. The smaller circuit layout also means less PCB tracking, which helps further reduce the radiated noise.

**World's Smallest Micro DC/DC**  
**2.25 x 1.5 x 0.75mm**

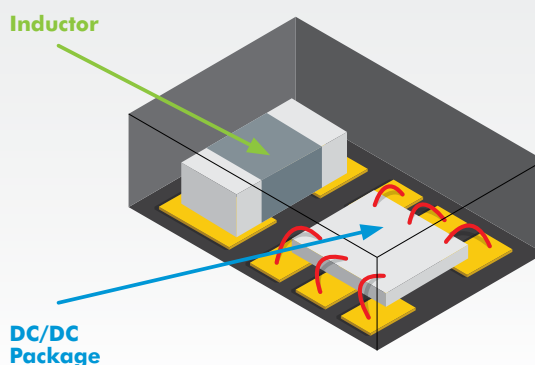
## KEY FEATURES

|                      |               |                             |
|----------------------|---------------|-----------------------------|
| Output Current       |               | 400mA (B Type)              |
|                      |               | 700mA (A Type)              |
| ON Resistance        | N-Ch          | 0.10Ω (typ)                 |
|                      | P-Ch          | 0.14Ω (typ)                 |
| Input Voltage Range  |               | 2.7V ~ 5.5V                 |
| Output Voltage Range |               | 0.8V ~ 3.6V                 |
| Switching Frequency  |               | 3.0MHz                      |
| Quiescent Current    |               | 25μA (typ)                  |
| Max Duty Cycle       |               | 100%                        |
| Product Select       | <b>XCL223</b> | Fixed PWM Control           |
|                      | <b>XCL224</b> | PWM/PFM Automatic Switching |
| Protection Circuits  |               | Current Limit Circuit       |
|                      |               | Thermal Shut Down           |
|                      |               | Short Circuit Protection    |
|                      |               | ULVO (2.0V)                 |
| Additional Features  |               | High Speed Soft-start       |
|                      |               | CL Discharge                |
|                      |               | Low ESR Ceramic capacitors  |
| Package              |               | USP-8B01                    |

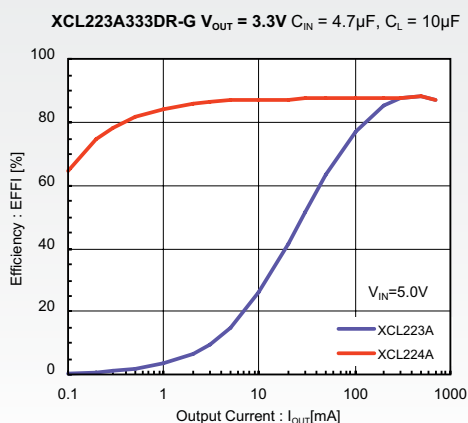
## TYPICAL APPLICATION CIRCUIT



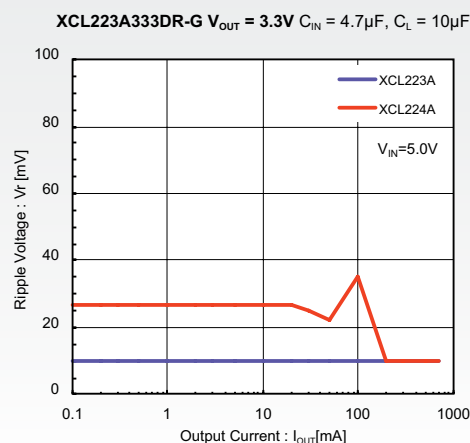
## INTERNAL CONSTRUCTION



## EFFICIENCY VS. OUTPUT CURRENT



## OUTPUT RIPPLE VS. OUTPUT CURRENT



# XCL225/26 18V 500mA Step-Down Micro DC/DC Converter with Integrated Coil

The XCL225/26 series is a synchronous step-down Micro DC/DC converter with integrated coil in an ultra-small 3.0 x 3.0 x 1.6mm DFN3030-10B package.

A stable and efficient power supply circuit can be configured by simply adding only two ceramic capacitors externally thereby contributing to PCB space saving and the shortening of development time. Integration of the coil simplifies the board layout and minimises any unwanted radiated noise.

With a P-Ch High Side Switch to ensure low Voltage operation and 100% max duty ratio, the XCL225/26 can operate from 3.0V~18.0V and deliver loads up to 500mA. It's designed for very high efficiencies at low output loads, with low quiescent current and automatic PFM/PWM mode.

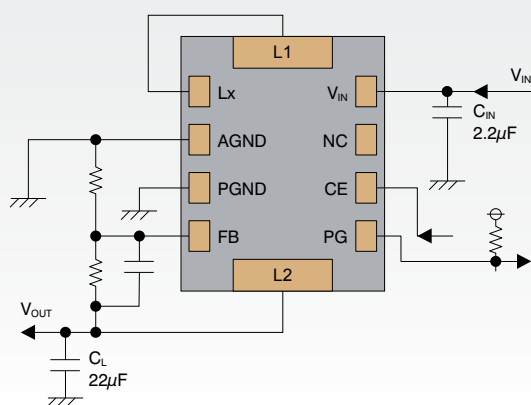
The XCL225/26 includes Current Limit Fold-back circuit, adjustable soft start and a power good output.

**Wide  $V_{IN}$  Range: 3.0V ~ 18V**  
**Low Quiescent Current: 12 $\mu$ A**

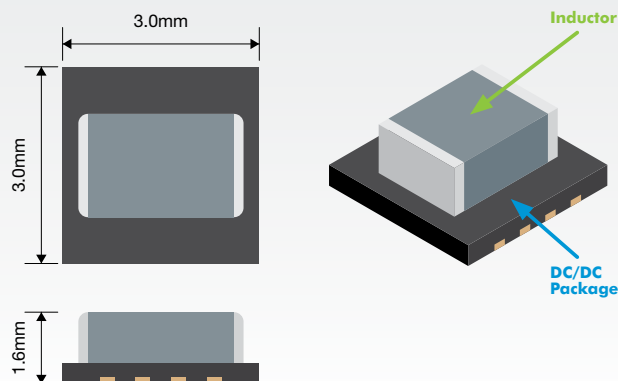
## KEY FEATURES

|                         |                                 |                             |
|-------------------------|---------------------------------|-----------------------------|
| Output Current          |                                 | 500mA                       |
| ON Resistance           | N-Ch                            | 0.64 $\Omega$ (typ)         |
|                         | P-Ch                            | 0.99 $\Omega$ (typ)         |
| Input Voltage Range     |                                 | 3.0V ~ 18V (Ab. Max 20V)    |
| FB Voltage              |                                 | 0.75V $\pm$ 1.5%            |
| Output Voltage Range    |                                 | 1.0V ~ 15.0V                |
| Switching Frequency     |                                 | 1.2MHz                      |
| Quiescent Current       |                                 | 12 $\mu$ A                  |
| Product Select          | XCL225                          | Fixed PWM Control           |
|                         | XCL226                          | PWM/PFM Automatic Switching |
| Max Duty Cycle          |                                 | 100%                        |
| Protection Circuits     | Current Limit Fold-back Circuit |                             |
|                         | UVLO (2.7V)                     |                             |
|                         | Thermal Shutdown                |                             |
| Additional Features     | Adjustable Soft-start           |                             |
|                         | Power Good Output               |                             |
|                         | Optional CL Discharge           |                             |
|                         | Low ESR Ceramic capacitors      |                             |
| Op. Ambient Temperature |                                 | -40°C ~ +105°C              |
| Package                 |                                 | DFN3030-10B                 |

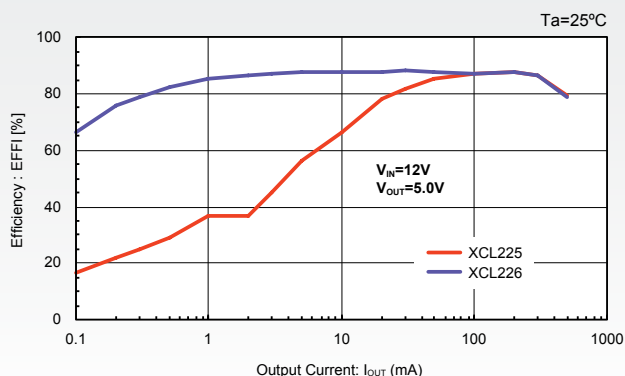
## TYPICAL APPLICATION CIRCUIT



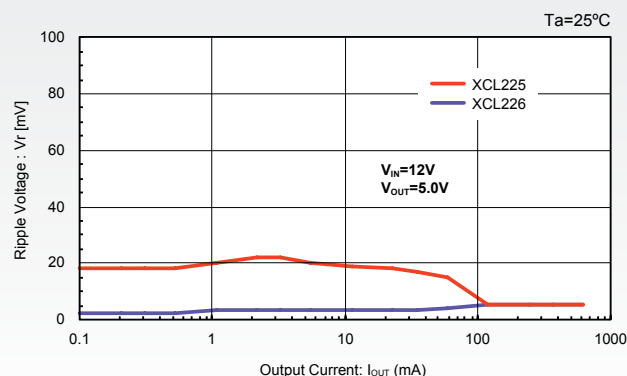
## INTERNAL CONSTRUCTION



## EFFICIENCY VS. OUTPUT CURRENT



## OUTPUT RIPPLE VS. OUTPUT CURRENT





The XCL102/03 series is a synchronous boost converter with integrated coil that is optimised to provide high efficiencies under all load conditions. The DC/DC circuit integrates a  $0.30\Omega$  Nch driver transistor and a  $0.30\Omega$  synchronous Pch switching transistor. The internal switching frequency is 3.0MHz and output currents up to 500mA can be realised with only two low cost ceramic capacitors.

The internal circuit can start operation from Input voltages as low as 0.85V and once started will continue to operate until the input goes below 0.65V.

The output voltage is set internally between 2.2V~5.5V ( $\pm 2\%$ ) in 0.1V increments and with a quiescent current of only  $26\mu\text{A}$  reducing to  $0.1\mu\text{A}$  during standby, the XCL102/03 helps to further maximise battery life in portable applications.

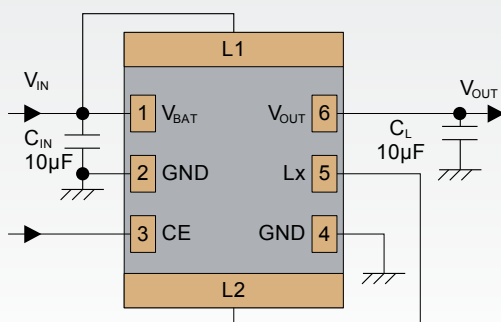
This series also features an optional load disconnect function that prevents the battery charge from leaking to the output while the IC is not operating or an Input bypass mode function to keep the connection between the input and output side during shutdown.

**Ultra Small Size**  
**2.5 x 2.0 x 1.0mm**

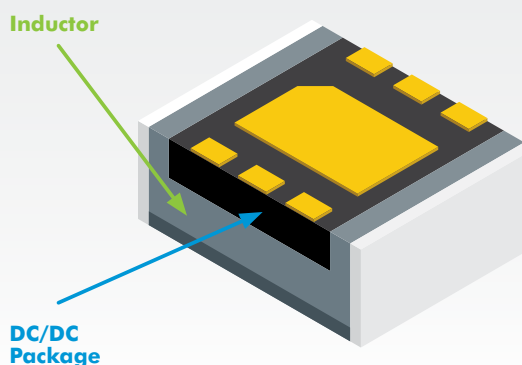
## KEY FEATURES

|                         |        |                                            |
|-------------------------|--------|--------------------------------------------|
| Input Current Limit     |        | 800mA                                      |
| ON Resistance           | N-Ch   | $0.30\Omega$ (typ)                         |
|                         | P-Ch   | $0.30\Omega$ (typ)                         |
| Input Voltage Range     |        | 0.65V ~ 6.0V                               |
| Output Voltage Range    |        | 2.2V ~ 5.5V (0.1V steps)                   |
| Switching Frequency     |        | 3.0MHz ( $\pm 15\%$ )                      |
| Quiescent Current       |        | $26\mu\text{A}$                            |
| Product Select          | XCL102 | Fixed PWM Control                          |
|                         | XCL103 | PWM/PFM Automatic Switching                |
| Max Duty Cycle          |        | 93% (TYP)                                  |
| Protection Circuits     |        | Current Limit                              |
|                         |        | Short Circuit                              |
| Additional Features     |        | Soft Start                                 |
|                         |        | Load Disconnect (D Type)                   |
|                         |        | $180\Omega$ Bypass Switch (E Type)         |
|                         |        | Ceramic Capacitors                         |
| Op. Ambient Temperature |        | $-40^\circ\text{C} \sim +85^\circ\text{C}$ |
| Package                 |        | CL-2025-02                                 |

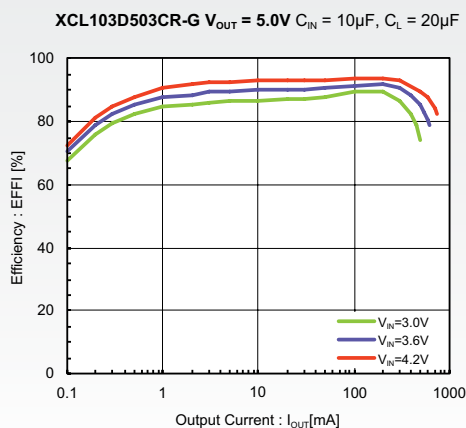
## TYPICAL APPLICATION CIRCUIT



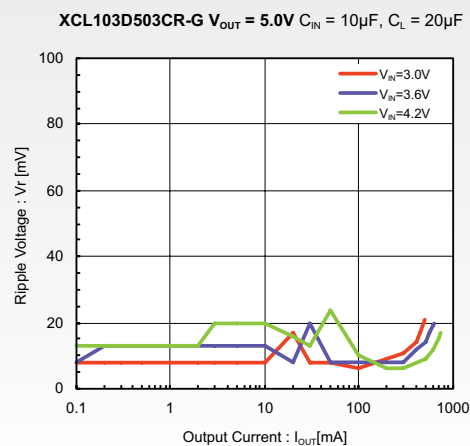
## INTERNAL CONSTRUCTION



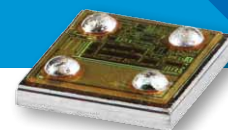
## EFFICIENCY VS. OUTPUT CURRENT



## OUTPUT RIPPLE VS. OUTPUT CURRENT



## XC6501 200mA High Speed LDO in an Ultra Low Profile Package



This low noise CMOS LDO regulator can provide a stable output voltage without needing an external load capacitor ( $C_L$ ) because unlike other LDO the phase compensation is carried out internally, on chip.

The CE function enables the circuit to be put into stand-by mode by inputting a low level signal to the CE pin thereby reducing current consumption from an already low  $13\mu\text{A}$  (in operation) to less than  $0.1\mu\text{A}$ .

The current limit fold-back circuit operates as a short circuit protection and a current limiter function for the output pin.

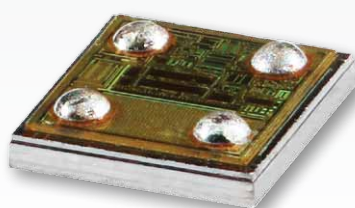
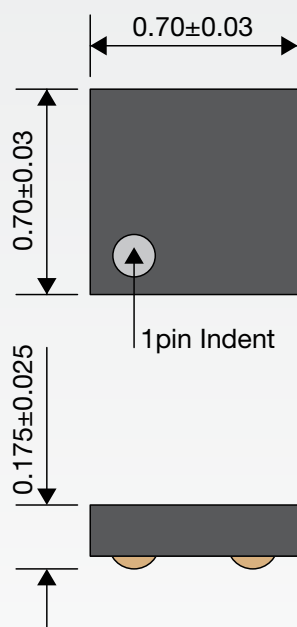
The XC6501 is now available in the new tiny, ultra-low profile WLP-4-01 package. It is one of the thinnest on the market, making it ideal for smart card and wearable applications.

Available in  
**Ultra-Small Package**

### PACKAGE DIMENSIONS

#### WLP-4-01

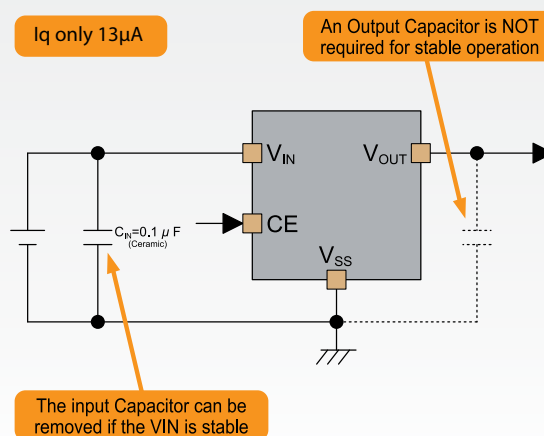
Maximum Height 0.2mm



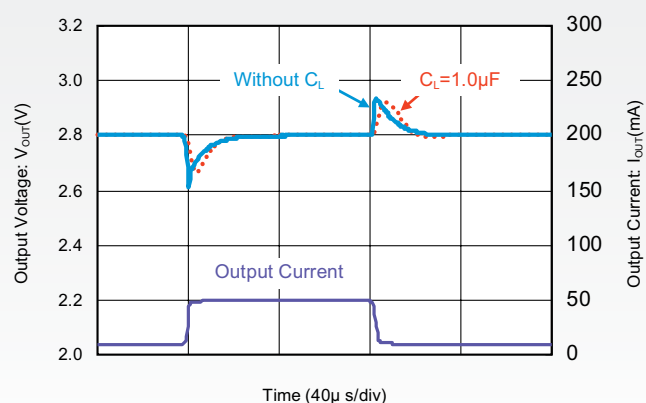
### KEY FEATURES

|                                    |                                                |
|------------------------------------|------------------------------------------------|
| Output Current                     | 200mA                                          |
| Dropout Voltage ( $V_{OUT}=3.0V$ ) | 150mV @ $I_{OUT}=100mA$                        |
| Operating Voltage Range            | 1.4V ~ 6.0V                                    |
| Output Voltages                    | 1.2V ~ 5.0V (0.05V steps)                      |
| Output Accuracy                    | $\pm 1\%$ or $\pm 20mV$                        |
| Quiescent Current (TYP)            | $13\mu A$                                      |
| Stand-by Current (TYP)             | $0.01\mu A$                                    |
| Ripple Rejection                   | 50dB                                           |
| Current Limit Threshold (TYP)      | 300mA                                          |
| Short Circuit Protection (TYP)     | 25mA                                           |
| Additional Features:               | Optional CL Discharge                          |
| Packages                           | SOT25, SSOT24, USP-4, USP-4, USP-3 or WLP-4-01 |

### TYPICAL APPLICATION CIRCUIT



### LOAD TRANSIENT RESPONSE



The XC6230 is a small and fast multifunction LDO regulator with a maximum output current of 2A and an adjustable output voltage and current limit value.

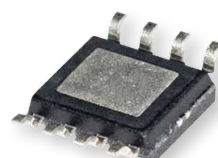
An internal  $0.17\Omega$  low ON resistance P-ch Tr. and a stable output voltage with small dropout voltage make these products ideal for post regulators (DC/DC rear-stage ripple removal), various types of microcontrollers, regulators for logic applications, and secondary power supplies. The XC6230 series can also be used in consumer electronics, industrial equipment, communication modules, and electricity smart meters.

In addition to a function that enables the output voltage and current limit value to be set externally and a function that prevents a reverse current higher than the input pin (VIN) from flowing into the output pin (VOUT), a rich variety of protective circuits such as overheating protection (TSD) and startup rush current prevention can be added.

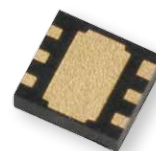
The output voltage and over-current limit value can be set using a total of only five chip capacitors and chip resistors.

## KEY FEATURES

|                            |                          |
|----------------------------|--------------------------|
| Output Current             | 2.0A                     |
| Adjustable Current Limit   | 0.3A ~ 2.5A              |
| On Resistance              | $0.17\Omega$ @ 3.3V / 1A |
| Dropout Voltage            | $0.17V$ @ 3.3V / 1A      |
| Input Voltage              | 1.7V ~ 6.0V              |
| Output Voltage             | 1.2V ~ 5.0V              |
| Quiescent Current          | 45 $\mu$ A               |
| Reverse Current Protection | YES                      |
| Inrush Current Prevention  | YES                      |
| CL High Speed Discharge    | YES                      |
| Thermal shutdown           | YES                      |
| Op. Ambient Temperature    | -40°C ~ +105°C           |

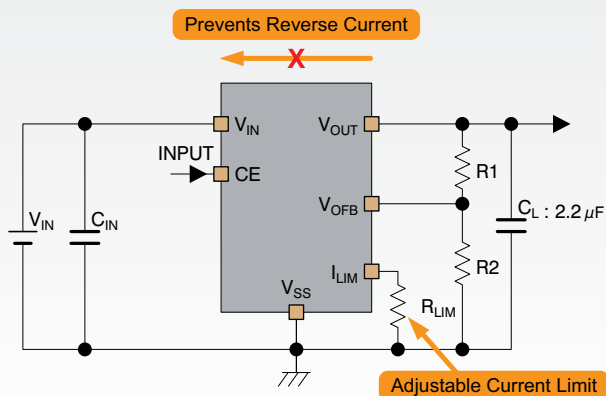


**SOP-8FD**  
(6.0 x 4.9 x 1.55mm)

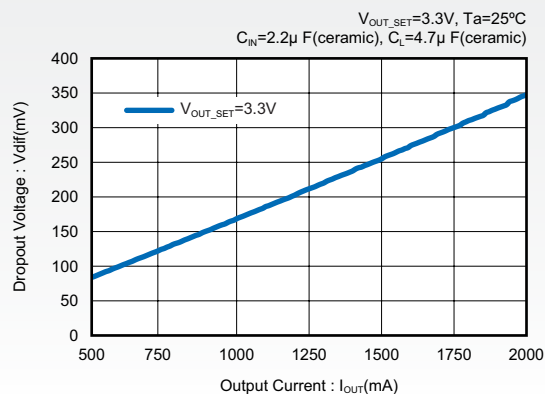


**USP-6C**  
(2.0 x 1.8 x 0.6mm)

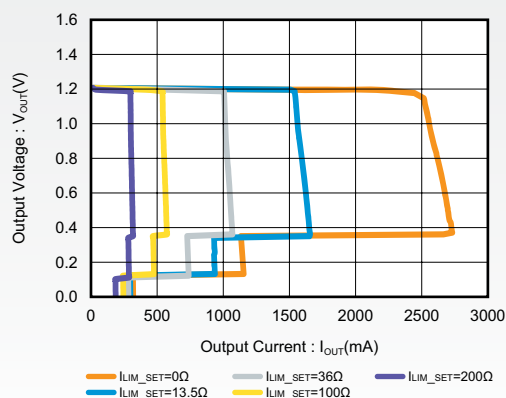
## TYPICAL APPLICATION CIRCUIT



## ULTRA LOW VOLTAGE DROP

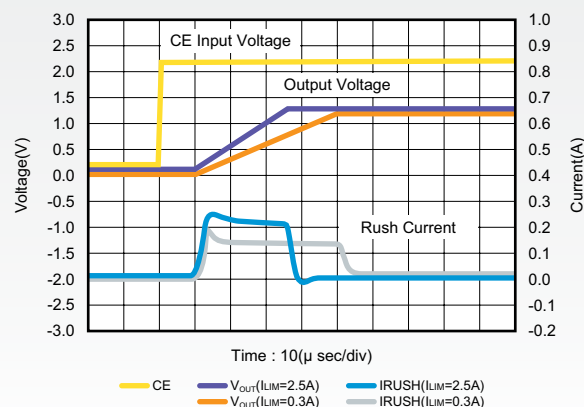


## ADJUSTABLE CURRENT LIMIT



$V_{OUT\_SET} = 1.2V$ ,  $V_{IN} = 2.2V$ ,  $C_{IN} = 2.2\mu F$  (Ceramic),  $C_L = 4.7\mu F$  (Ceramic),  $T_a = 25^\circ C$

## INRUSH CURRENT PROTECTION



## XBP15SVR05W-G

Low Capacitance TVS Diode Array  
for ESD Protection



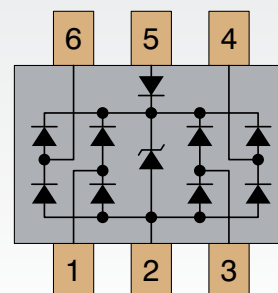
- IEC61000-4-2 (ESD) Air  $\pm 15$  kV
- IEC61000-4-2 (ESD) Contact  $\pm 10$  kV

### ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$

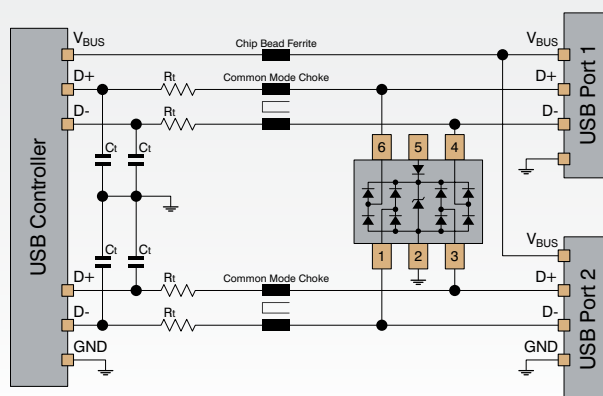
| PARAMETER                              | SYMBOL    | TEST CONDITIONS                                                  | LIMITS |      |      | UNIT          |
|----------------------------------------|-----------|------------------------------------------------------------------|--------|------|------|---------------|
|                                        |           |                                                                  | MIN.   | TYP. | MAX. |               |
| Stand-Off Voltage                      | $V_{RWM}$ |                                                                  | -      | -    | 5    | V             |
| Breakdown Voltage                      | $V_{BR}$  | $I_R = 1\text{ mA}$ , Pin5 to Pin2                               | 6      | -    | -    | V             |
| Leakage Current                        | $I_R$     | $V_R = 5\text{ V}$ , Pin5 to Pin2                                | -      | -    | 5    | $\mu\text{A}$ |
| Clamping Voltage (8/20 $\mu\text{s}$ ) | $V_C$     | $I_{PP} = 3\text{ A}$ , I/O pin to Pin2                          | -      | -    | 10   | V             |
| Terminal Capacitance                   | $C_t$     | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ Between I/O pin and Pin2 | -      | 1.0  | 1.2  | pF            |
|                                        | $C_t$     | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ Between I/O pins         | -      | 0.5  | 0.6  | pF            |

### INTERNAL CONFIGURATION



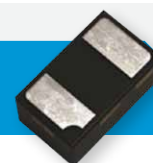
**SOT26P**  
(2.9 x 2.8 x 1.45mm)

### TYPICAL APPLICATION CIRCUIT



## XBP06V0U25R-G

Ultra Low Capacitance TVS Diode  
for ESD Protection



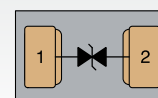
- IEC61000-4-2 (ESD) Air  $\pm 15$  kV
- IEC61000-4-2 (ESD) Contact  $\pm 15$  kV

### ELECTRICAL CHARACTERISTICS

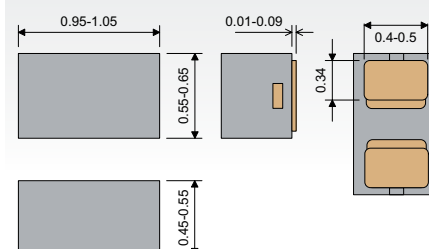
$T_a = 25^\circ\text{C}$

| PARAMETER                              | SYMBOL    | TEST CONDITIONS                         | LIMITS |       |       | UNIT          |
|----------------------------------------|-----------|-----------------------------------------|--------|-------|-------|---------------|
|                                        |           |                                         | MIN.   | TYP.  | MAX.  |               |
| Stand-Off Voltage                      | $V_{RWM}$ |                                         |        |       | 5     | V             |
| Breakdown Voltage                      | $V_{BR}$  | $I_R = 1\text{ mA}$                     | 6      | 8.4   | 11.2  | V             |
| Leakage Current                        | $I_R$     | $V_R = 5\text{ V}$                      | -      | -     | 1     | $\mu\text{A}$ |
| Clamping Voltage (8/20 $\mu\text{s}$ ) | $V_C$     | $I_{PP} = 1\text{ A}$                   | -      | 12.00 | 14.00 | V             |
| Terminal Capacitance                   | $C_t$     | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | -      | 0.25  | 0.35  | pF            |

### INTERNAL CONFIGURATION



### PACKAGE DIMENSIONS



# XBP14E5UFN-G

Ultra Low Capacitance TVS Diode Array  
for ESD Protection



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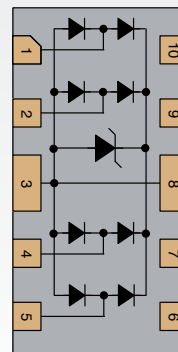
- IEC61000-4-2 (ESD) Air  $\pm 15$  kV
- IEC61000-4-2 (ESD) Contact  $\pm 8$  kV

## ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$

| PARAMETER                              | SYMBOL    | TEST CONDITIONS                                                 | LIMITS |      |      | UNIT          |
|----------------------------------------|-----------|-----------------------------------------------------------------|--------|------|------|---------------|
|                                        |           |                                                                 | MIN.   | TYP. | MAX. |               |
| Stand-Off Voltage                      | $V_{RWM}$ |                                                                 |        |      | 5    | V             |
| Breakdown Voltage                      | $V_{BR}$  | $I_R = 1\text{mA}$ , I/O pin to Pin3                            | 6      | -    | 9    | V             |
| Leakage Current                        | $I_R$     | $V_R = 5\text{V}$ , I/O pin to Pin3                             | -      | -    | 1    | $\mu\text{A}$ |
| Clamping Voltage (8/20 $\mu\text{s}$ ) | $V_C$     | $I_{pp} = 2.5\text{A}$ , I/O pin to Pin3                        | -      | 11   | 13   | V             |
| Terminal Capacitance                   | $C_i$     | $V_R = 0\text{V}$ , $f = 1\text{MHz}$ , between I/O pin to Pin3 | -      | 0.6  | 0.8  | pF            |
|                                        | $C_1$     | $V_R = 0\text{V}$ , $f = 1\text{MHz}$ , between I/O pins        | -      | 0.35 | 0.4  | pF            |

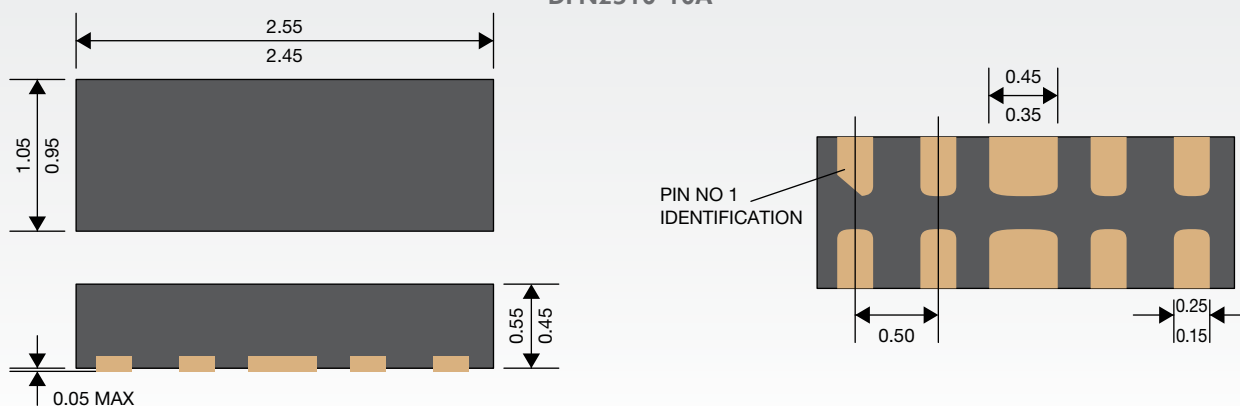
## INTERNAL CONFIGURATION



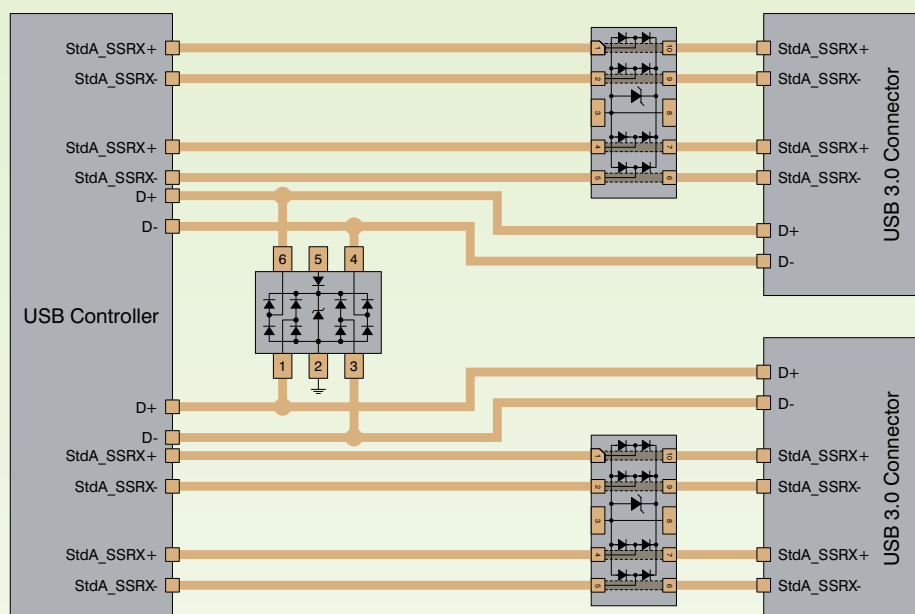
DFN2510-10A

## PACKAGE DIMENSIONS

DFN2510-10A



## TYPICAL APPLICATION CIRCUIT



## INDUCTOR BUILT-IN MICRO DC/DC CONVERTERS

| SERIES | TYPE      | CONTROL              | EFFICIENCY | INPUT VOLTAGE                                | OUTPUT VOLTAGE        | ACCURACY | OSCILLATION FREQUENCY | OUTPUT CURRENT | PACKAGE             |
|--------|-----------|----------------------|------------|----------------------------------------------|-----------------------|----------|-----------------------|----------------|---------------------|
| XCL101 | Step-Up   | PFM                  | 90%        | 0.9 ~ 5.5V                                   | 1.8 ~ 5.0V            | ±2.0%    | 1.2MHz                | 100mA          | CL-2025, CL-2025-02 |
| XCL102 | Step-Up   | PWM                  | 90%        | 0.85 ~ 6.0V                                  | 2.2 ~ 5.5V            | ±2.0%    | 3MHz                  | 500mA          | CL-2025-02          |
| XCL103 |           | PWM/PFM              |            |                                              |                       |          |                       |                |                     |
| XCL201 | Step-Down | PWM                  | 92%        | 2.0 ~ 6.0V                                   | 0.8 ~ 4.0V            | ±2.0%    | 1.2MHz                | 400mA          | CL-2025, CL-2025-02 |
| XCL202 |           | PWM/PFM              |            |                                              |                       |          |                       |                |                     |
| XCL205 | Step-Down | PWM                  | 85%        | 2.0 ~ 6.0V                                   | 0.8 ~ 4.0V            | ±2.0%    | 3MHz                  | 600mA          | CL-2025, CL-2025-02 |
| XCL206 |           | PWM/PFM              |            |                                              |                       |          |                       |                |                     |
| XCL207 |           | PWM/PFM Manual       |            |                                              |                       |          |                       |                |                     |
| XCL208 | Step-Down | PWM                  | 90%        | 1.8 ~ 6.0V (F Type)<br>2.0 ~ 6.0V (A/B Type) | 0.8 ~ 4.0V            | ±2.0%    | 3MHz                  | 400mA          | USP-10B03           |
| XCL209 |           | PWM/PFM              |            |                                              |                       |          |                       |                |                     |
| XCL210 | Step-Down | PFM                  | 93%        | 2.0 ~ 6.0V                                   | 1.0 ~ 4.0V            | ±2.0%    | -                     | 50mA, 200mA    | CL-2025-02          |
| XCL211 | Step-Down | PWM                  | 94%        | 2.7 ~ 6.0V                                   | 0.9 ~ V <sub>IN</sub> | ±2.0%    | 2.4MHz                | 2000mA         | USP-11B01           |
| XCL212 | Step-Down | PWM/PFM              | 94%        | 2.7 ~ 6.0V                                   | 0.9 ~ V <sub>IN</sub> | ±2.0%    | 2.4MHz                | 2000mA         | USP-11B01           |
| XCL213 | Step-Down | Hi-SAT COT + PWM     | 92%        | 2.7 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 1500mA         | USP-9B01            |
| XCL214 | Step-Down | Hi-SAT COT + PWM/PFM | 92%        | 2.7 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 1500mA         | USP-9B01            |
| XCL219 | Step-Down | Hi-SAT COT + PWM     | 92%        | 2.5 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 1000mA         | CL-2025-02          |
| XCL220 | Step-Down | Hi-SAT COT + PWM/PFM | 92%        | 2.5 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 1000mA         | CL-2025-02          |
| XCL223 | Step-Down | PWM                  | 90%        | 2.7 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 400mA, 700mA   | USP-8B01            |
| XCL224 | Step-Down | PWM/PFM              | 90%        | 2.7 ~ 5.5V                                   | 0.8 ~ 3.6V            | ±2.0%    | 3MHz                  | 400mA, 700mA   | USP-8B01            |
| XCL225 | Step-Down | PWM                  | 90%        | 3.0 ~ 18V                                    | 1.0 ~ 15V             | ±1.5%    | 500kHz, 1.2MHz, 3MHz  | 500mA          | DFN3030-10B         |
| XCL226 | Step-Down | PWM/PFM              | 90%        | 3.0 ~ 18V                                    | 1.0 ~ 15V             | ±1.5%    | 500kHz, 1.2MHz, 3MHz  | 500mA          | DFN3030-10B         |

## STEP UP DC/DC CONVERTERS &amp; CONTROLLERS

| SERIES | CONTROL        | EFFICIENCY | INPUT VOLTAGE | OUTPUT VOLTAGE            | ACCURACY     | OSCILLATION FREQUENCY            | FUNCTIONS                                                                                                                                           | PACKAGE                           |
|--------|----------------|------------|---------------|---------------------------|--------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| XC6371 | PWM            | 85%        | 0.9 ~ 10V     | 2.0 ~ 7.0V                | ±2.5%        | 50kHz 100kHz<br>180kHz           | 100mA (V <sub>IN</sub> = 3.0V, V <sub>OUT</sub> = 5.0V)                                                                                             | SOT-89, SOT-89-5,<br>USP-6B       |
| XC6372 | PWM/PFM        |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9103 | PWM            | 85%        | 0.9 ~ 10V     | 1.5 ~ 30V<br>ADJ = 0.9V   | ±2.0%        | 100kHz, 180kHz<br>300kHz, 500kHz | 400mA (V <sub>IN</sub> = 1.8V, V <sub>OUT</sub> = 3.3V)<br>FB = 0.9V (1.5 ~ 30V)                                                                    | SOT-25, USP-6B                    |
| XC9104 | PWM/PFM        |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9105 | PWM/PFM Manual |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9106 | PWM            | 85%        | 0.9 ~ 10V     | ADJ = Variable            | ±2.0%        | 100kHz 300kHz                    | Variable Output Voltage 30mA<br>(V <sub>IN</sub> = 3.3V, V <sub>OUT</sub> = 20V)                                                                    | SOT-25, USP-6B                    |
| XC9107 | PWM/PFM        |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9110 | PFM            | 87%        | 0.9 ~ 10V     | 1.5 ~ 7.0V                | ±2.5%        | 100kHz                           | 200mA (V <sub>IN</sub> = 2.4V, V <sub>OUT</sub> = 3.3V)                                                                                             | SOT-23, SOT-25,<br>SOT-89, USP-6C |
| XC9111 |                |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9119 | PWM            | 86%        | 2.5 ~ 6.0V    | ADJ = 1.0V                | ±2.0%        | 1MHz                             | 50mA (V <sub>IN</sub> = 3.6V, V <sub>OUT</sub> = 15V)<br>FB = 1.0V (2.5 ~ 19.5V)                                                                    | SOT-25, USP-6C                    |
| XC9120 | PWM            | 85%        | 0.9 ~ 6.0V    | 1.5 ~ 3.0V<br>ADJ = 0.9V  | ±2.0%        | 100kHz                           | 80mA (V <sub>IN</sub> = 3.6V, V <sub>OUT</sub> = 15V)<br>FB = 0.9V (1.5 ~ 30V)                                                                      | SOT-25, USP-6C                    |
| XC9121 | PWM/PFM        |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9122 | PWM/PFM Manual |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9128 | PWM/PFM Manual | 93%        | 0.8 ~ 6.0V    | ADJ = 0.45V               | 0.45V ± 10mV | 1.2MHz                           | 700mA (V <sub>IN</sub> = 3.7V, V <sub>OUT</sub> = 5.0V)                                                                                             | USP-10B                           |
| XC9129 |                |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9131 | PWM PWM/PFM    | 93%        | 0.9 ~ 5.5V    | 1.8 ~ 5.0V                | ±10mV        | 1.2MHz                           | 500mA@V <sub>OUT</sub> = 3.3V, V <sub>IN</sub> = 1.8V(TYP.) 100mV,<br>V <sub>OUT</sub> = 3.3V, V <sub>IN</sub> = 1.8V, I <sub>OUT</sub> = 1mA 200mA | USP-10B                           |
| XC9133 | PWM            | 85%        | 2.5 ~ 6.0V    | 2.5 ~ 17.5V<br>ADJ = 0.2V | 0.2V ± 5.0%  | 1MHz                             | 3 white LEDs in series V <sub>IN</sub> = 3.6V, I <sub>LED</sub> = 20mA                                                                              | SOT-25                            |
| XC9135 | PWM PWM/PFM    | 93%        | 0.9 ~ 5.5V    | 1.8 ~ 5.0V                | ±10mV        | 1.2MHz                           | 500mA@V <sub>OUT</sub> = 3.3V, V <sub>IN</sub> = 1.8V(TYP.) 100mV<br>V <sub>OUT</sub> = 3.3V, V <sub>IN</sub> = 1.8V, I <sub>OUT</sub> = 1mA 200mA  | USP-10B                           |
| XC9136 |                |            |               |                           |              |                                  |                                                                                                                                                     |                                   |
| XC9140 | PFM            | 90%        | 0.9 ~ 5.5V    | 1.8 ~ 5.0V                | ±2.0%        | 1.2MHz                           | 100mA (V <sub>IN</sub> = 1.8V, V <sub>OUT</sub> = 3.3V)<br>Load Disconnect or Input Bypass<br>Quiescent Current 6.3µA                               | USP-6EL, SOT-25                   |
| XC9141 | PWM            | 93%        | 0.9 ~ 6.0V    | 2.2 ~ 5.5V                | ±2.0%        | 1.2MHz, 3MHz                     | 500mA@V <sub>OUT</sub> = 5.0V, V <sub>IN</sub> = 3.3V(TYP.)<br>100mV, V <sub>OUT</sub> = 3.3V, V <sub>IN</sub> = 1.8V, I <sub>OUT</sub> = 1mA 200mA | SOT-25, USP-6C,<br>WLP-6-01       |
| XC9142 | PWM/PFM        |            |               |                           |              |                                  |                                                                                                                                                     |                                   |

## STEP-DOWN DC/DC CONVERTERS &amp; CONTROLLERS

| SERIES | CONTROL        | EFFICIENCY | OPERATING VOLTAGE | OUTPUT VOLTAGE | ACCURACY | OUTPUT CURRENT | OSCILLATION FREQUENCY     | SUPPLY CURRENT | PACKAGE                              |
|--------|----------------|------------|-------------------|----------------|----------|----------------|---------------------------|----------------|--------------------------------------|
| XC9220 | PWM            | 92%        | 2.8 ~ 16V         | ADJ=0.9V       | ±1.5%    | 3A             | 300kHz 500kHz<br>1MHz     | 25μA           | SOT-25, USP-6C                       |
| XC9221 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9223 | PWM/PFM Manual | 95%        | 2.5 ~ 6.0V        | ADJ=0.8V       | ±2.5%    | 1A             | 1MHz<br>2MHz              | 30μA           | MSOP-10, USP-10B                     |
| XC9224 |                |            |                   |                |          |                |                           |                |                                      |
| XC9235 | PWM            | 92%        | 1.8 ~ 6.0V        | 0.8 ~ 4.0V     | ±2%      | 600mA          | 1.2MHz<br>3MHz            | 15μA           | SOT-25, USP-6C,<br>USP-6EL, WLP-5-03 |
| XC9236 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9237 | PWM/PFM Manual |            |                   |                |          |                |                           |                |                                      |
| XC9242 | PWM            | 95%        | 2.7 ~ 6.0V        | 0.9 ~ 6.0V     | ±2%      | 2A             | 1.2MHz<br>2.4MHz          | 41μA           | USP-10B, SOP-8FD                     |
| XC9243 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9244 | PWM            | 90%        | 2.3 ~ 6.0V        | 0.8 ~ 4.0V     | ±2%      | 400mA          | 1.2MHz                    | 18μA           | USPN-6                               |
| XC9245 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9246 | PWM            | 90%        | 4.5 ~ 16V         | 1.2 ~ 5.5V     | ±2%      | 1A             | 1.2MHz                    | 100μA          | USP-6C, SOT-26W                      |
| XC9247 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9248 | PWM            | 93.8%      | 4.5 ~ 18.0V       | 1 ~ 12V        | ±1.5%    | 2.2A           | 500kHz                    | 800μA          | SOP-8FD                              |
| XC9252 | PWM/PFM        | 90%        | 3.0 ~ 30V         | 1.5 ~ Vin V    | ±2%      | 3A             | 280kHz, 550kHz            | 30μA           | TSSOP-16, USP-10B                    |
| XC9260 | PWM            | 90%        | 2.7 ~ 5.5V        | 0.8 ~ 3.6V     | ±2%      | 1.5A           | 1.2MHz, 3MHz              | 250μA          | SOT-89-5, USP-6C                     |
| XC9261 | PWM/PFM        | 90%        | 2.7 ~ 5.5V        | 0.8 ~ 3.6V     | ±2%      | 1.5A           | 1.2MHz, 3MHz              | 15μA           | SOT-89-5, USP-6C                     |
| XC9262 | PWM/PFM Manual | 92%        | 2.5 ~ 5.5V        | 0.8 ~ 3.6V     | ±2%      | 1.5A           | 1.2MHz, 3MHz              | 250μA          | LGA-8B01                             |
| XC9263 | PWM            | 90%        | 3.0 ~ 18V         | 1.0 ~ 15V      | ±1.5%    | 0.5A           | 500kHz, 1.2MHz,<br>2.2MHz | 11.5μA         | SOT-25, USP-6C                       |
| XC9264 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9265 | PFM            | 90%        | 2.0 ~ 6.0V        | 1.0 ~ 4.0V     | ±2%      | 50mA, 200mA    | -                         | 0.5μA          | SOT-25, USP-6EL                      |
| XC9266 | PWM PWM/PFM    | 93%        | 2.7 ~ 5.5V        | 0.8 ~ 3.6V     | ±1%      | 6A             | 1.2MHz, 3MHz              | 40μA           | QFN0404-24C                          |
| XC9267 | PWM            | 85%        | 3.0 ~ 36V         | 1.0 ~ 25V      | ±1.5%    | 0.6A           | 1.2MHz, 2.4MHz            | 11.6μA         | SOT-89-5, USP-6C                     |
| XC9268 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |
| XC9270 | PWM            | 91%        | 7.0 ~ 30V         | 1.2 ~ 12V      | ±2%      | 2A             | 300kHz, 500kHz            | 200μA          | SOP-8FD                              |
| XC9271 | PWM/PFM        | 91%        | 7.0 ~ 30V         | 1.2 ~ 12V      | ±2%      | 2A             | 300kHz, 500kHz            | 200μA          | SOP-8FD                              |
| XC9272 | PFM            | 90%        | 2.0 ~ 6.0V        | 0.6 ~ 0.95V    | ±2%      | 50mA           | -                         | 0.5μA          | SOT-25, USP-6EL                      |
| XC9273 | PWM PWM/PFM    | 91.5%      | 2.7 ~ 5.5V        | 0.8 ~ 3.6V     | ±1%      | 3A             | 1.2MHz, 3MHz              | 40μA           | QFN0404-24C                          |
| XC9274 | PWM            | 93%        | 2.7 ~ 5.5V        | 0.8 ~ 3.6V     | ±1%      | 3A             | 1.2MHz, 3MHz              | 40μA           | SOP-8FD                              |
| XC9275 | PWM/PFM        |            |                   |                |          |                |                           |                |                                      |

## STEP-UP/DOWN DC/DC CONVERTERS &amp; CONTROLLERS

| SERIES | CONTROL        | EFFICIENCY | OPERATING VOLTAGE | OUTPUT VOLTAGE | ACCURACY | OSCILLATION FREQUENCY | OUTPUT CURRENT                 | PACKAGE |
|--------|----------------|------------|-------------------|----------------|----------|-----------------------|--------------------------------|---------|
| XC9303 | PWM/PFM Manual | 84%        | 2.0 ~ 10V         | ADJ=0.9V       | ±2%      | 300kHz                | 800mA (VIN=2.7V,<br>VOUT=3.3V) | MSOP-8A |
| XC9306 | PWM/PFM        | 92%        | 2.5 ~ 5.5V        | 0.8 ~ 5.0V     | ±2%      | 6MHz                  | 800mA (VIN=3.1V,<br>VOUT=4.5V) | WLP-20  |

## MULTI CHANNEL DC/DC CONVERTERS &amp; CONTROLLERS

| SERIES | TYPE                       | CONTROL        | EFFICIENCY | OPERATING VOLTAGE | OUTPUT VOLTAGE                       | ACCURACY | OSCILLATION FREQUENCY            | OUTPUT CURRENT                                             | PACKAGE         |
|--------|----------------------------|----------------|------------|-------------------|--------------------------------------|----------|----------------------------------|------------------------------------------------------------|-----------------|
| XC9501 | Step-up + Step-up          | PWM/PFM Manual | 83%        | 0.9 ~ 10V         | ADJ=0.9V                             | ±2.0%    | 100kHz, 180kHz<br>300kHz, 500kHz | ~200mA (VIN=1.8V, VOUT=3.3V)                               | MSOP-10, USP-10 |
| XC9502 | Step-up + Step-down        | PWM/PFM Manual | 92%        | 2.0 ~ 10V         | ADJ=0.9V                             | ±2.0%    | 180kHz,<br>300kHz, 500kHz        | ~300mA (VIN=1.8V, VOUT=3.3V)<br>~1A (VIN=3.3V, VOUT=1.8V)  | MSOP-10, USP-10 |
| XC9503 | Step-down + Step-down      | PWM/PFM Manual | 92%        | 2.0 ~ 10V         | ADJ=0.9V                             | ±2.0%    | 180kHz,<br>300kHz, 500kHz        | ~1A (VIN=5.0V, VOUT=3.3V)                                  | MSOP-10, USP-10 |
| XC9504 | Step-up + Inverting        | PWM/PFM Manual | 83%        | 2.0 ~ 10V         | ADJ=0.9V                             | ±2.0%    | 180kHz,<br>300kHz, 500kHz        | ~20mA (VIN=3.3V, VOUT=15V)<br>~20mA (VIN=3.3V, VOUT=-7.0V) | MSOP-10, USP-10 |
| XC9505 | Step-down + Inverting      | PWM/PFM Manual | 92%        | 2.0 ~ 10V         | ADJ=0.9V                             | ±2.0%    | 180kHz,<br>300kHz, 500kHz        | ~1A (VIN=5.0V, VOUT=3.3V)<br>~200mA (VIN=5.0V, VOUT=-3.3V) | MSOP-10, USP-10 |
| XC9515 | Step-down + Step-down + VD | PWM            | 95%        | 2.5 ~ 5.5V        | VOUT1=1.2 ~ 4.0V<br>VOUT2=1.2 ~ 4.0V | ±2.0%    | 1MHz                             | 800mA                                                      | QFN-20          |
| XC9516 | Step-up + 2x Charge Pump   | -              | 95%        | 2.5 ~ 5.5V        | 19V (Step-up DC/DC)                  | ±1.5%    | 300kHz ~ 1.2MHz                  | 500mA (VIN=5.0V, VOUT=9.0V)                                | QFN-20          |
| XC9519 | Step-up + Inverting        | PWM PWM/PFM    | 83%        | 2.7 ~ 5.5V        | 4.0 ~ 18.0V, -15.0 ~ -4.0V           | ±1.5%    | 1.2MHz                           | 500mA @ VIN=3.7V,<br>(VOUTP=5.0V, VOUTN=-5.0V)             | QFN-24          |

## CHARGE PUMPS

| SERIES           | TYPE            | EFFICIENCY | OPERATING VOLTAGE | OUTPUT VOLTAGE | SUPPLY CURRENT             | OSCILLATION FREQUENCY | OUTPUT CURRENT                                            | PACKAGE        |
|------------------|-----------------|------------|-------------------|----------------|----------------------------|-----------------------|-----------------------------------------------------------|----------------|
| XC6351A          | Inverter        | 90%        | -1.2 ~ 5.0V       | Inverting      | 310 $\mu$ A<br>100 $\mu$ A | 120kHz<br>35kHz       | 10mA                                                      | SOT-26, USP-6B |
| XC9801<br>XC9802 | Step-up Doubler | 69%        | 1.8 ~ 5.5V        | 2.5 ~ 6.0V     | 80 $\mu$ A                 | 300kHz                | 80mA (V <sub>IN</sub> = 3.6V,<br>V <sub>OUT</sub> = 5.0V) | MSOP-8A, USP-8 |

## VOLTAGE REGULATORS

| SERIES           | TYPE                                     | INPUT VOLTAGE | OUTPUT VOLTAGE                   | ACCURACY        | MAX. OUTPUT CURRENT | SUPPLY CURRENT | DROPOUT VOLTAGE@100mA | OUTPUT CAPACITOR | PACKAGE                                                                   |
|------------------|------------------------------------------|---------------|----------------------------------|-----------------|---------------------|----------------|-----------------------|------------------|---------------------------------------------------------------------------|
| XC6201           | Low Power                                | 2.0 ~ 10V     | 1.3 ~ 6.0V                       | ±2%(1%)         | 250mA               | 2 $\mu$ A      | 160mV                 | Ceramic          | SOT-25, SOT-89,<br>TO-92, USP-6B                                          |
| XC6203           | Large Current                            | 2.0 ~ 8.0V    | 1.8 ~ 6.0V                       | ±2%(1%)         | 400mA               | 8 $\mu$ A      | 150mV                 |                  | SOT-89, SOT-223,<br>TO-92, SOT-23                                         |
| XC6204           | High Speed                               | 2.0 ~ 10V     | 1.8 ~ 6.0V                       | ±2%(1%)         | 300mA               | 70 $\mu$ A     | 200mV                 | Ceramic          | SOT-25, USP-6B, SOT-89-5                                                  |
| XC6205           | High Speed                               | 2.0 ~ 10V     | 0.9 ~ 1.75V                      |                 | 150mA               |                |                       |                  |                                                                           |
| XC6206           | Low Power                                | 1.8 ~ 6.0V    | 1.2 ~ 5.0V                       | ±2%(1%)         | 250mA               | 1 $\mu$ A      | 250mV                 | Ceramic          | SOT-23, SOT-89,<br>TO-92, USP-6B                                          |
| XC6209           | High Speed                               | 2.0 ~ 10V     | 0.9 ~ 6.0V                       | ±2%             | 300mA               | 25 $\mu$ A     | 200mV                 | Ceramic          | SOT-25, USP-6B, SOT-89-5                                                  |
| XC6210           | High Speed<br>Large Current              | 1.5 ~ 6.0V    | 0.8 ~ 1.5V                       | ±2%             | 500mA               | 35 $\mu$ A     | 50mV                  | Ceramic          | SOT-25, USP-6B, SOT-89-5                                                  |
|                  |                                          |               | 1.6 ~ 5.0V                       |                 | 700mA               |                |                       |                  |                                                                           |
| XC6214           | Large Current                            | 1.8 ~ 6.0V    | 1.2, 1.5, 1.8, 2.5,<br>3.0, 3.3V | ±2%             | 500mA               | 8 $\mu$ A      | 100mV                 | Ceramic          | SOT-89, TO-252                                                            |
| XC6215           | Low Power CE Pin                         | 1.5 ~ 6.0V    | 0.9 ~ 5.0V                       | ±2%             | 200mA               | 0.8 $\mu$ A    | 320mV                 | Ceramic          | USP-4, SSOT-24, USP-3,<br>SOT-25, USPN-4                                  |
| XC6216<br>XE6216 | 28V Input Low<br>Power Consumption       | 2.0 ~ 28V     | 2.0 ~ 23V ADJ                    | ±2%(1%)         | 150mA               | 5 $\mu$ A      | 1500mV                | Ceramic          | SOT-23, SOT-25, SOT-89,<br>SOT-89-5, SOT-223,<br>TO-252, USP-6C, USP-6B06 |
| XC6217           | High Speed<br>"GreenOperation"           | 1.6 ~ 6.0V    | 0.8 ~ 4.0V                       | ±2%             | 200mA               | 4.5 $\mu$ A    | 80mV                  | Ceramic          | USP-4D, SOT-25,<br>SSOT-24, USPN-4                                        |
| XC6218           | Low Power                                | 1.5 ~ 6.0V    | 0.9 ~ 4.0V                       | ±2%             | 200mA               | 1 $\mu$ A      | 200mV                 | Ceramic          | USP-3, SSOT-24                                                            |
| XC6219           | High Speed                               | 2.0 ~ 6.0V    | 0.9 ~ 5.0V                       | ±2%(1%)         | 300mA               | 25 $\mu$ A     | 200mV                 | Ceramic          | SOT-25, USP-6B, SOT-89-5                                                  |
| XC6220           | 1A LDO                                   | 1.6 ~ 6.0V    | 0.8 ~ 5.0V                       | ±1%             | 1000mA              | 8 $\mu$ A      | 20mV                  | Ceramic          | USP-6C, SOT-25,<br>SOT-89-5, SOP-8FD                                      |
| XC6221           | High Speed                               | 1.6 ~ 6.0V    | 0.8 ~ 5.0V                       | ±2%(1%)         | 200mA               | 25 $\mu$ A     | 80mV                  | Ceramic          | USPN-4, USP-4,<br>SOT-25, SSOT-24                                         |
| XC6222           | High Speed                               | 1.7 ~ 6.0V    | 0.8 ~ 5.0V                       | ±1%             | 700mA               | 100 $\mu$ A    | 40mV                  | Ceramic          | USP-6C, SOT-25, SOT-89-5                                                  |
| XC6223           | High Speed                               | 1.6 ~ 5.5V    | 1.0 ~ 4.0V                       | ±1%             | 300mA               | 100 $\mu$ A    | 70mV                  | Ceramic          | USPQ-4B03, SSOT-24, SOT-25,<br>SOT-89-5, USP-4                            |
| XC6224           | Low Power High Speed                     | 1.2 ~ 3.6V    | 0.8 ~ 3.0V                       | ±1.5%           | 150mA               | 33 $\mu$ A     | 140mV                 | Ceramic          | USPN-4B02, SOT-25                                                         |
| XC6225           | High Speed                               | 2.5 ~ 6.0V    | 0.8 ~ 5.0V                       | ±2%             | 30mA                | 25 $\mu$ A     | —                     | Ceramic          | USP-4, SOT-25, SSOT-24                                                    |
| XC6227           | High Speed Reverse<br>Current Protection | 1.7 ~ 6.0V    | 0.8 ~ 5.0V                       | ±1%             | 700mA               | 100 $\mu$ A    | 40mV                  | Ceramic          | USP-6C, SOT-25, SOT-89-5                                                  |
| XC6229           | Ultra-Small<br>Inrush Current Protection | 1.6 ~ 5.5V    | 1.2 ~ 4.0V                       | ±1%             | 300mA               | 100 $\mu$ A    | 60mV                  | Ceramic          | LGA-4B01                                                                  |
| XC6230           | 2A LDO                                   | 1.7 ~ 6.0V    | 1.2 ~ 5.0V                       | ±1%             | 2000mA              | 45 $\mu$ A     | 17mV                  | Ceramic          | USP-6C, SOP-8FD                                                           |
| XC6231           | High Speed                               | 2.0 ~ 10V     | 0.9 ~ 5.5V                       | ±2%             | 500mA               | 35 $\mu$ A     | 200mV                 | Ceramic          | SOT-89-5                                                                  |
| XC6233           | High Speed Inrush<br>Current Protection  | 1.7 ~ 5.5V    | 1.2 ~ 3.6V                       | ±1%             | 200mA               | 45 $\mu$ A     | 140mV                 | Ceramic          | USP-4, SSOT-24, SOT-25,<br>USPQ-4B04                                      |
| XC6501           | Ct Capacitor-Less                        | 1.4 ~ 6.0V    | 1.2 ~ 5.0V                       | ±1%             | 200mA               | 13 $\mu$ A     | 150mV                 | -                | USP-3, USP-4, USPN-4,<br>SSOT-24, SOT-25, WLP-4-1                         |
| XC6503           | Ct Capacitor-Less<br>High Speed          | 1.7 ~ 6.0V    | 1.2 ~ 5.0V                       | ±1%             | 500mA               | 15 $\mu$ A     | 60mV                  | -                | USP-4, SOT-25,<br>SOT-89-5, SOT-89                                        |
| XC6504           | Ct Capacitor-Less<br>Ultra Low IQ        | 1.4 ~ 6.0V    | 1.1 ~ 5.0V                       | ±1%             | 150mA               | 0.6 $\mu$ A    | 340mV                 | -                | USPN-4B02, SSOT-24,<br>SOT-25, USPQ-4B04                                  |
| XC6505           | 10.5V Operation<br>High Speed            | 1.7 ~ 10.5V   | 1.5 ~ 8.0V                       | ±1%             | 200mA               | 5.5 $\mu$ A    | 190mV                 | Ceramic          | USP-6C, SOT-25,<br>SOT-89-5                                               |
| XC6601           | N Channel Driver Low Voltage             | 1.0 ~ 3.0V    | 0.7 ~ 1.8V                       | ±20mV           | 400mA               | 25 $\mu$ A     | 38mV                  | Ceramic          | USP-6C, SOT-25, SOT-89-5                                                  |
| XC6602           | N Channel Driver<br>Low Voltage 1A       | 0.5 ~ 3.0V    | 0.5 ~ 1.8V                       | ±15mV<br>±20mV  | 1A                  | 100 $\mu$ A    | 15mV                  | Ceramic          | USP-6C, SOT-26W, SOT-89-5,<br>WLP-5-02                                    |
| XC6603           | Adjustable Soft-start                    | 0.5 ~ 3.0V    | 0.5 ~ 1.8V                       | ±0.015V ±0.020V | 1A                  | 100 $\mu$ A    | 15mV                  | Ceramic          | USP-6C, SOT-26W                                                           |
| XC6604           | Adjustable Current Limit                 | 0.5 ~ 3.0V    | 0.5 ~ 1.8V                       | ±0.015V ±0.020V | 1A                  | 100 $\mu$ A    | 15mV                  | Ceramic          | USP-6C, SOT-26W                                                           |
| XC6701           | 28V Operation<br>High Speed              | 2 ~ 28V       | 1.8V ~ 18V                       | ±2%             | 150mA               | 50 $\mu$ A     | 1300mV                | Ceramic          | SOT-25, SOT-89, SOT-89-5,<br>USP-6C, SOT-223, TO-252                      |
| XC6702           | 36V Operation High Speed                 | 4.5V ~ 36V    | 1.8V ~ 18V                       | ±1%             | 300mA               | 40 $\mu$ A     | 450mV                 | Ceramic          | SOP-8FD, SOT-89-5, USP-6C                                                 |
| XC62FJ           | Low Power                                | 1.8 ~ 10V     | 1.7 ~ 6.0V                       | ±2%             | 200mA               | 2 $\mu$ A      | 160mV                 | Ceramic          | SOT-89                                                                    |

## NEGATIVE VOLTAGE REGULATORS

| SERIES | TYPE             | INPUT VOLTAGE | OUTPUT VOLTAGE | ACCURACY | MAX. OUTPUT CURRENT | SUPPLY CURRENT | DROPOUT VOLTAGE@100mA | OUTPUT CAPACITOR | PACKAGE                       |
|--------|------------------|---------------|----------------|----------|---------------------|----------------|-----------------------|------------------|-------------------------------|
| XC62KN | Negative Voltage | -2.1 ~ -10V   | -2.1 ~ -6.0V   | ±2%(1%)  | 100mA               | 3μA            | 380mV                 |                  | SOT-23, SOT-89, TO-92, USP-6B |
| XC6901 | Negative Voltage | -2.4 ~ -12.4V | -0.9 ~ -12V    | ±1.5%    | 200mA               | 100μA          | 400mV                 | Ceramic          | SOT-25, SOT-89-5, USP-6C      |
| XC6902 | Negative Voltage | -2.4 ~ -16.0V | -0.9 ~ -12V    | ±1.5%    | 200mA               | 100μA          | 400mV                 | Ceramic          | SOT-23, SOT-89, USP-6C        |

## DUAL CHANNEL VOLTAGE REGULATORS

| SERIES | TYPE                            | INPUT VOLTAGE | OUTPUT VOLTAGE | ACCURACY | MAX. OUTPUT CURRENT        | SUPPLY CURRENT           | DROPOUT VOLTAGE@100mA    | OUTPUT CAPACITOR | PACKAGE                  |
|--------|---------------------------------|---------------|----------------|----------|----------------------------|--------------------------|--------------------------|------------------|--------------------------|
| XC6415 | High Speed Dual                 | 1.5 ~ 6.0V    | 0.8 ~ 5.0V     | ±1%      | 200mA                      | 28μA                     | 95mV                     | Ceramic          | SOT-26, USPN-6, USP-6C   |
| XC6416 | Dual                            | 1.5 ~ 6.0V    | 0.8 ~ 4.0V     | ±1%      | 200mA                      | 10μA                     | 95mV                     | Ceramic          | USP-6C, SOT-26           |
| XC6419 | ON/OFF 2ch                      | 1.5 ~ 6.0V    | 0.8 ~ 5.0V     | ±2%(1%)  | 300mA (ch1)<br>100mA (ch2) | 28μA (ch1)<br>23μA (ch2) | 60mV(ch1)<br>230mV (ch2) | Ceramic          | USP-6C, SOT-26           |
| XC6420 | Small 150mA High Speed          | 1.6 ~ 5.5V    | 1.2 ~ 3.6V     | ±1.5%    | 150mA                      | 55μA                     | 130mV                    | Ceramic          | SOT-26, USPN-6, USP-6B04 |
| XC6421 | Inrush Current Protection 300mA | 1.6 ~ 5.5V    | 1.2 ~ 3.6V     | ±1%      | 300mA                      | 90μA                     | 70mV                     | Ceramic          | USP-6C                   |

## VOLTAGE REGULATORS WITH BUILT-IN DETECTOR

| SERIES | TYPE                  | INPUT VOLTAGE | OUTPUT VOLTAGE | ACCURACY | MAX. OUTPUT CURRENT | SUPPLY CURRENT | DROPOUT VOLTAGE@100mA | OUTPUT CAPACITOR | PACKAGE                  |
|--------|-----------------------|---------------|----------------|----------|---------------------|----------------|-----------------------|------------------|--------------------------|
| XC6402 | 700mA LDO with VD     | 1.5 ~ 6.0V    | 0.8 ~ 5.0V     | ±2%      | 700mA               | 35μA           | 50mV                  | Ceramic          | SOT-25, SOT-89-5, USP-6B |
| XC6403 | 300mA LDO with VD     | 2.0 ~ 6.0V    | 0.9 ~ 5.6V     | ±2%      | 300mA               | 35μA           | 200mV                 | Ceramic          | SOT-25, SOT-89-5, USP-6B |
| XC6404 | 500mA LDO with VD     | 2.0 ~ 6.0V    | 0.9 ~ 5.1V     | ±2%      | 500mA               | 35μA           | 200mV                 | Ceramic          | SOT-25, SOT-89-5, USP-6B |
| XC6405 | 500mA LDO with VD     | 2.0 ~ 6.0V    | 0.9 ~ 5.1V     | ±2%      | 500mA               | 90μA           | 200mV                 | Ceramic          | SOT-25, SOT-89-5         |
| XC6408 | Large Current         | 2.0 ~ 28V     | 2.0 ~ 18V      | ±1%      | 150mA               | 8μA            | 1100mV                | Ceramic          | SOT-89-5, SOT-25, USP-6C |
| XC6413 | 10V Input LDO with VD | 2.0 ~ 10V     | 0.9 ~ 5.5V     | ±2%      | 300mA               | 35μA           | 200mV                 | Ceramic          | SOT-25, SOT-89-5, USP-6B |
| XC6414 | 10V Input LDO with VD | 2.0 ~ 10V     | 0.9 ~ 5.5V     | ±2%      | 500mA               | 35μA           | 200mV                 | Ceramic          | SOT-25, SOT-89-5, USP-6B |

## POWER SWITCHES

| SERIES | TYPE              | INPUT VOLTAGE | OUTPUT CURRENT     | SUPPLY CURRENT | ON RESISTANCE                | PACKAGE                        |
|--------|-------------------|---------------|--------------------|----------------|------------------------------|--------------------------------|
| XC8102 | Low On-Resistance | 1.2 ~ 6.0V    | 0.4A               | 3μA            | 280mΩ @V <sub>IN</sub> =5.0V | USPN-4, USP-4, SOT-25, SSOT-24 |
| XC8107 | Low On-Resistance | 2.5 ~ 5.5V    | 0.5A, 1A, 1.5A, 2A | 40μA           | 85mΩ @V <sub>IN</sub> =5.0V  | USP-6C, SOT25                  |
| XC8108 | Low On-Resistance | 2.5 ~ 5.5V    | 0.9A ~ 2A          | 40μA           | 85mΩ @V <sub>IN</sub> =5.0V  | USP-6C                         |
| XC8109 | Low On-Resistance | 2.5 ~ 5.5V    | 0.075A ~ 0.9A      | 40μA           | 85mΩ @V <sub>IN</sub> =5.0V  | USP-6C                         |

## BATTERY CHARGER ICs

| SERIES | TYPE           | OPERATING VOLTAGE RANGE |      | CHARGE TERMINATION VOLTAGE | CHARGE CURRENT | SUPPLY CURRENT | PACKAGE                           |
|--------|----------------|-------------------------|------|----------------------------|----------------|----------------|-----------------------------------|
|        |                | TYP.                    | MAX. |                            |                |                |                                   |
| XC6801 | 1Cell + Li-ion | 4.25V                   | 6.0V | 4.2V±0.7%                  | 500mA          | 12μA           | SOT-89-5 SOT-25, USP-6C           |
| XC6802 | 1Cell + Li-ion | 4.25V                   | 6.0V | 4.2V±0.7%                  | 800mA          | 15μA           | SOT-89-5, SOT-25, USP-6C, USP-6EL |
| XC6803 | 1Cell + Li-ion | 4.5V                    | 6.0V | 4.2V±0.7%                  | 40 ~ 280mA     | 100μA          | USP-6EL                           |
| XC6804 | 1Cell + Li-ion | 4.5V                    | 6.0V | 4.2V±0.7%                  | 200 ~ 800mA    | 100μA          | USP-6EL, SOP-8FD                  |
| XC6805 | 1Cell + Li-ion | 4.5V                    | 6.0V | 4.2V±0.7%                  | 5 ~ 40mA       | 100μA          | USP-6EL                           |
| XC6806 | Current Path   | 4.5V                    | 6.0V | 4.2V±0.7%                  | 10 ~ 380mA     | 200μA          | USP-10B, LGA-10B01                |

## VOLTAGE DETECTORS

| SERIES      | TYPE                      | DETECT VOLTAGE | ACCURACY  | OPERATING VOLTAGE | SUPPLY CURRENT                                                                              | OUTPUT          | PACKAGE                 |
|-------------|---------------------------|----------------|-----------|-------------------|---------------------------------------------------------------------------------------------|-----------------|-------------------------|
| XC61C       | Standard                  | 0.8 ~ 1.5V     | ±2%       | 0.7 ~ 6.0V        | 0.7μA (V <sub>IN</sub> =1.5V)                                                               | Open Drain CMOS | SSOT-24, SOT-23, SOT-89 |
| XE61C       |                           | 1.6 ~ 6.0V     | ±2% (±1%) | 0.7 ~ 10V         |                                                                                             |                 |                         |
| XC61F       | Delay Built-in            | 1.6 ~ 6.0V     | ±2%       | 0.7 ~ 10V         | 1.0μA (V <sub>IN</sub> =2V)                                                                 | Open Drain CMOS | SOT-23 SOT-89           |
| XC61G       | Small Package             | 0.8 ~ 6.0V     | ±2%       | 0.7 ~ 10V         | 0.7μA (V <sub>IN</sub> =1.5V)                                                               | Open Drain CMOS | USP-3                   |
| XC61H       | Delay Circuit Built-in    | 1.6 ~ 6.0V     | ±2%       | 0.7 ~ 10V         | 1.0μA(TYP.)(V <sub>IN</sub> =2.0V)                                                          | Open Drain CMOS | SOT-23                  |
| XC6101~6103 | Watchdog & Manual Reset   | 1.6 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 5μA (TYP.)                                                                                  | Open Drain CMOS | SOT-25, USP-6C          |
| XC6111~6113 | Watchdog & Manual Reset   | 1.6 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 5μA (TYP.)                                                                                  | Open Drain CMOS | SOT-25, USP-6C          |
| XC6104~6105 | Watchdog                  | 1.6 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 5μA (TYP.)                                                                                  | Open Drain CMOS | SOT-25, USP-6C          |
| XC6114~6115 | Watchdog                  | 1.6 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 5μA (TYP.)                                                                                  | Open Drain CMOS | SOT-25, USP-6C          |
| XC6118      | Separated Sense Pin       | 0.8 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 0.8μA (V <sub>IN</sub> =2.0V)                                                               | Open Drain CMOS | USP-4, SOT-25           |
| XC6119      | External Delay Capacitor  | 0.8 ~ 5.0V     | ±2%       | 0.7 ~ 6.0V        | 0.9μA (V <sub>IN</sub> =2.0V)                                                               | Open Drain CMOS | USPN-4, SSOT-24         |
| XC6120      | Super Small, Low Supply   | 1.0 ~ 5.0V     | ±2%       | 0.7 ~ 6.0V        | 0.6μA (V <sub>IN</sub> =2.0V)                                                               | Open Drain CMOS | USP-3, SSOT-24          |
| XC6121~24   | Watchdog, ON/OFF          | 1.6 ~ 5.0V     | ±2%       | 1.0 ~ 6.0V        | 5μA (V <sub>IN</sub> =V <sub>DF</sub> ×0.9)<br>10μA (V <sub>IN</sub> =V <sub>DF</sub> ×1.1) | Open Drain CMOS | SOT-25, USP-6C          |
| XC6126      | Ultra-Small High Accuracy | 1.5 ~ 5.5V     | ±0.8%     | 0.7 ~ 6.0V        | 0.6μA(TYP.)(V <sub>IN</sub> =1.62V)                                                         | Open Drain CMOS | USPN-4B0, SSOT-24       |
| XC6127      | Manual Reset Function     | 1.5 ~ 5.5V     | ±0.8%     | 0.7 ~ 6.0V        | 0.6μA(TYP.)(V <sub>IN</sub> =1.62V)                                                         | Open Drain CMOS | USPN-4, SSOT-24, SOT-25 |
| XC6130~31   | Watchdog                  | 1.6 ~ 5.0V     | ±1%       | 1.5 ~ 6.0V        | 8.1μA (V <sub>IN</sub> =V <sub>DF</sub> ×0.9)                                               | Open Drain      | SOT-26                  |
| XC6132      | Separated Sense Pin       | 0.8 ~ 2.0V     | ±1.2%     | 1.6 ~ 6.0V        | 1.28μA                                                                                      | Open Drain CMOS | USP-6C, SOT26           |
| XC6133      | Separated Sense Pin       | 1.0 ~ 5.0V     | ±1.2%     | 1.6 ~ 6.0V        | 1.28μA                                                                                      | Open Drain CMOS | USP-6C, SOT26           |
| XC6134      | Separated Sense Pin       | 0.8 ~ 5.0V     | ±1.2%     | 1.6 ~ 6.0V        | 1.28μA                                                                                      | Open Drain CMOS | USP-6C, SOT26           |

## PUSH BUTTON REBOOT CONTROLLER

| SERIES | INPUT VOLTAGE RANGE | LOW POWER CONSUMPTION     | RE-BOOT DELAY TIME ACCURACY | RE-BOOT TIME | PACKAGE           |
|--------|---------------------|---------------------------|-----------------------------|--------------|-------------------|
| XC6190 | 1.65 ~ 6.0V         | 0.01μA (typ.) 0.1μA (max) | ±5%                         | 0.4s±10%     | USPN-6, USPN-6B01 |

## TEMPERATURE SENSOR

| SERIES | TYPE          | TEMPERATURE COEFFICIENTS | DETECTABLE TEMPERATURE RANGE | INPUT VOLTAGE | OUTPUT VOLTAGE | ACCURACY | SUPPLY CURRENT | PACKAGE        |
|--------|---------------|--------------------------|------------------------------|---------------|----------------|----------|----------------|----------------|
| XC3101 | Analog Output | -11.77mV/°C              | -40°C ~ +100°C               | 2.7 ~ 5.5V    | 1.6V@25°C      | ±3.5°C   | 3.5μA          | USPN-4 SSOT-24 |

## HALL IC (MAGNETIC SENSOR)

| SERIES  | TYPE                  | OPERATING VOLTAGE |        | AVERAGE SUPPLY CURRENT | OPERATING MAGNETIC FLUX DENSITY | HYSTERESIS WIDTH | PACKAGE           |
|---------|-----------------------|-------------------|--------|------------------------|---------------------------------|------------------|-------------------|
|         |                       | (TYP.)            | (MAX.) |                        |                                 |                  |                   |
| XC3202B | Low power consumption | 2.4V              | 5.5V   | 8μA                    | ±3mT                            | 1mT              | SOT-23D, QFN-0601 |

## SINGLE PHASE BRIDGE RECTIFIERS

| SERIES | IF (AV) | VRRM        | VF (MAX) | CJ (TYP) | PACKAGE |
|--------|---------|-------------|----------|----------|---------|
| XBR11A | 1.0A    | 600 ~ 1000V | 1.1V     | 10pF     | MDIP    |
| XBR12A | 1.5A    | 600 ~ 1000V | 1.1V     | 25pF     | SDIP    |

## SWITCHING DIODES

| SERIES       | IF (AV) | VR  | VF             | IR            | PACKAGE  |
|--------------|---------|-----|----------------|---------------|----------|
| XBW1SS400-G  | 100mA   | 80V | 1.2V@IF=100mA  | 0.1μA@VR=80V  | SOD-523P |
| XBW21P0204-G | 150mA   | 75V | 1.25V@IF=150mA | 0.03μA@VR=25V | SOT-323  |

## ZENER DIODES

| SERIES       | VZ (IZT=5.0mA) | ZZT1 (IZT=5.0mA) | ZZT2 (IZT=1.0mA) | IR            | PACKAGE  |
|--------------|----------------|------------------|------------------|---------------|----------|
| XBZ02Pxxx1-G | 7.5V ~ 36V     | 15Ω ~ 90Ω        | 80Ω ~ 350Ω       | 0.1μA ~ 1.0μA | SOD-523P |

## SCHOTTKY BARRIER DIODES

| SERIES       | VR(V) | IF(A) | VF(TYP)             | IR(MAX.)      | CT@VR=10Vf=1MHZ | PACKAGE  |
|--------------|-------|-------|---------------------|---------------|-----------------|----------|
| XBS013P11R-G | 30    | 0.1   | 0.35V (MAX.) @10mA  | 10μA@VR=10V   | 4pF             | SOD-923  |
| XBS013R1DR-G | 30    | 0.1   | 0.46V (MAX.) @10mA  | 0.3μA@VR=10V  | 2pF             | USP-2B01 |
| XBS013S15R-G | 30    | 0.1   | 0.71V@100mA         | 2μA@VR=25V    | 6pF             | SOD-523  |
| XBS013S16R-G | 30    | 0.1   | 0.71V@100mA         | 2μA@VR=25V    | 6pF             | SOD-723  |
| XBS013S1CR-G | 30    | 0.1   | 0.71V@100mA         | 2μA@VR=25V    | 2pF             | USP-2B02 |
| XBS013V1DR-G | 30    | 0.1   | 0.37V@10mA (MAX.)   | 7μA@VR=10V    | 2pF             | USP-2B01 |
| XBS023P11R-G | 30    | 0.2   | 0.50V (MAX.) @200mA | 100μA@VR=30V  | 5pF             | SOD-523P |
| XBS024S15R-G | 40    | 0.2   | 0.53V@200mA         | 2μA@VR=40V    | 5pF             | SOD-523  |
| XBS053P11R-G | 30    | 0.5   | 0.49V (MAX.) @500mA | 100μA@VR=20V  | 15pF            | SOD-323P |
| XBS053V13R-G | 30    | 0.5   | 0.40V@500mA         | 100μA@VR=20V  | 12pF            | SOD-323A |
| XBS053V15R-G | 30    | 0.5   | 0.40V@500mA         | 100μA@VR=20V  | 12pF            | SOD-523  |
| XBS104P11R-G | 40    | 1     | 0.56V@1A            | 500μA@VR=40V  | 230pF           | SOD-123P |
| XBS104S13R-G | 40    | 1     | 0.49V@1A            | 200μA@VR=40V  | 35pF            | SOD-323A |
| XBS104S14R-G | 40    | 1     | 0.49V@1A            | 200μA@VR=40V  | 35pF            | SOD-123A |
| XBS104V14R-G | 40    | 1     | 0.365V@1A           | 2mA@VR=40V    | 150pF           | SOD-123A |
| XBS203V19R-G | 30    | 2     | 0.35V@2A            | 3mA@VR=30V    | 110pF           | SMA-XG   |
| XBS204S19R-G | 40    | 2     | 0.485V@2A           | 200μA@VR=40V  | 70pF            | SMA-XG   |
| XBS204V19R-G | 40    | 2     | 0.46V@2A            | 0.1mA@VR=40V  | 75pF            | SMA-XG   |
| XBS206S19R-G | 60    | 2     | 0.615V@2A           | 300μA@VR=60V  | 45pF            | SMA-XG   |
| XBS303V19R-G | 30    | 3     | 0.355V@3A           | 3mA@VR=30V    | 385pF           | SMA-XG   |
| XBS303V29R-G | 30    | 3     | 0.39V@3A            | 0.9mA@VR=30V  | 190pF           | SMA-XG   |
| XBS304F11R-G | 40    | 3     | 0.45V@3A            | 1mA@VR=20V    | 120pF           | SMA-PG   |
| XBS304S19R-G | 40    | 3     | 0.465V@3A           | 300μA@VR=40V  | 180pF           | SMA-XG   |
| XBS306P11R-G | 60    | 3     | 0.75V@3A            | 100μA@VR=60V  | 80pF            | SMA-PG   |
| XBS306S19R-G | 60    | 3     | 0.59V@3A            | 300μA@VR=60V  | 195pF           | SMA-XG   |
| XBS504A1AR-G | 40    | 5     | 0.49V@5A            | 0.1mA@VR=40V  | 210pF           | SMBT     |
| XBS506A1AR-G | 60    | 5     | 0.60V@5A            | 0.05mA@VR=60V | 150pF           | SMBT     |

## TRANSIENT VOLTAGE SUPPRESSORS (TVS)

| SERIES         | BREAKDOWN VOLTAGE (MIN) | LEAKAGE CURRENT (MAX) | INTER-TERMINAL CAPACITY | ESD DURABILITY | NUMBER OF ELEMENTS | PACKAGE     |
|----------------|-------------------------|-----------------------|-------------------------|----------------|--------------------|-------------|
| XBP06V4E4GR-R  | 6.4V                    | 1.0μA                 | 40pF                    | 30kV           | 4                  | USP-4       |
| XBP06V4E2HR-G  | 6.4V                    | 1.0μA                 | 40pF                    | 30kV           | 2                  | USP-3       |
| XBP06V1E4MR-G  | 6.1V                    | 2.5μA                 | 170pF                   | 30kV           | 4                  | SOT-25      |
| XBP06V0U26R-G  | 6.0V                    | 1.0μA                 | 0.4pF                   | 8kV            | 2                  | DFN1006-2B  |
| XBP1006-G      | 6.0V                    | 1.2μA                 | 1pF                     | 8kV            | 4                  | SOT-23P     |
| XBP1007-G      | 27.27V                  | 1.0μA                 | 3pF                     | 8kV            | 3                  | SOD-323P    |
| XBP1008-G      | 6.0V                    | 20μA                  | 1pF                     | 8kV            | 4                  | SOT-23P     |
| XBP1010-G      | 6.2V                    | 1.0μA                 | 35pF                    | 8kV            | 1                  | SOD-923     |
| XBP1011-G      | 6.0V                    | 5.0μA                 | 110pF                   | 25kV           | 1                  | SOD-523P    |
| XBP1012-G      | 13.3V                   | 1.0μA                 | 100pF                   | 8kV            | 2                  | SOD-323P    |
| XBP1013-G      | 6.0V                    | 10μA                  | 300pF                   | 25kV           | 1                  | SOD-323P    |
| XBP14E5UFN-G   | 6.0V                    | 1.0μA                 | 0.6pF                   | 8kV            | 10                 | DFN2510-10A |
| XBP15SRV05W-G  | 6.0V                    | 5.0μA                 | 1pF                     | 10kV           | 10                 | SOT-26P     |
| XBP4SMAJxxxC-G | 11.1V ~ 26.7V           | 1.0μA                 | 180pF ~ 470pF           | —              | —                  | SMA-PG      |

## POWER MOSFETS

| SERIES         | CHANNEL       | Vdss (MAX.) | Vgss (MAX.) | Id (MAX.)    | Rds_ON (MAX.) | DRIVING VOLTAGE (MIN.) | PACKAGE |
|----------------|---------------|-------------|-------------|--------------|---------------|------------------------|---------|
| XP151          | Nch (Single)  | 20 ~ 30V    | ±8 ~ 20V    | 0.8 ~ 1A     | 0.1 ~ 0.33Ω   | 1.5 ~ 4.5V             | SOT-23  |
| XP152          | Pch (Single)  | -20 ~ -30V  | ±12 ~ 20V   | -0.5 ~ -0.7A | 0.3 ~ 0.48Ω   | -2.5 ~ -4.5V           | SOT-23  |
| XP202A0003MR-G | P-ch (Single) | -30V        | ±20v        | -3A          | 0.067Ω        | -4.0V                  | SOT23   |
| XP161          | Nch (Single)  | 20 ~ 30V    | ±8 ~ 20V    | 3 ~ 4A       | 0.05 ~ 0.18Ω  | 1.5 ~ 4.5V             | SOT-89  |
| XP162          | Pch (Single)  | -20 ~ -30V  | ±12 ~ 20V   | -1.5 ~ -2.5A | 0.17 ~ 0.45Ω  | -2.5 ~ -4.5V           | SOT-89  |
| XP202A0003PR-G | P-ch (Single) | -30V        | ±20v        | -5A          | 0.07Ω         | -4.0V                  | SOT-89  |

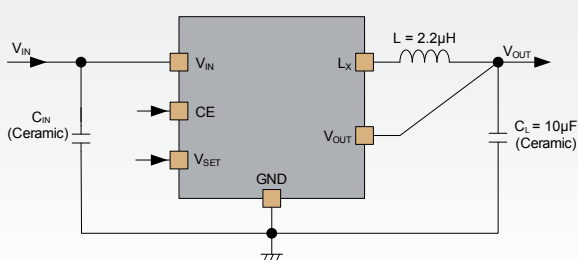
\* Values shown in the chart can be changed without any prior notice.

# XC9276

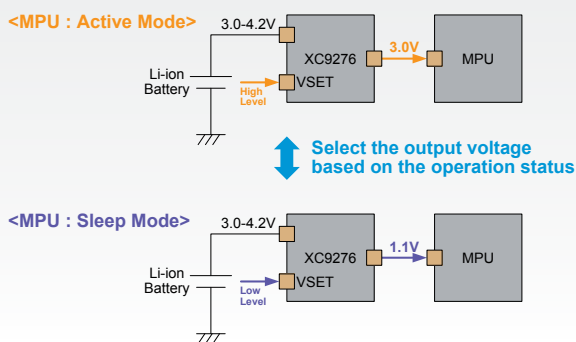
Ultra-Low Power Step-Down DC/DC Converter with VSET function

COMING SOON

## TYPICAL APPLICATION CIRCUIT



## TWO PRE-SET $V_{OUT}$ VOLTAGES ARE SELECTABLE



## KEY FEATURES

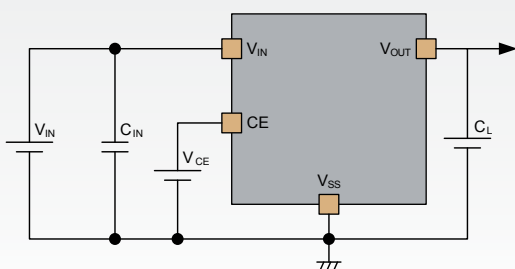
|                         |      |                                                                                        |
|-------------------------|------|----------------------------------------------------------------------------------------|
| Quiescent Current       |      | 0.5μA                                                                                  |
| Output Current          |      | 50mA or 400mA                                                                          |
| PFM Switching Current   |      | 180mA or 600mA                                                                         |
| ON Resistance           | N-Ch | 0.3Ω (typ)                                                                             |
|                         | P-Ch | 0.3Ω (typ)                                                                             |
| Input Voltage Range     |      | 1.8V ~ 6.0V                                                                            |
| Output Voltage Range    |      | 0.6V ~ 3.6V (0.1V steps)<br>2 x V <sub>OUT</sub> levels selectable by V <sub>SET</sub> |
| Control Method          |      | PFM Only                                                                               |
| Protection Circuits     |      | Current Limit Circuit                                                                  |
|                         |      | Inrush Current Protection                                                              |
|                         |      | Short Circuit Protection                                                               |
|                         |      | UVLO                                                                                   |
| Additional Features     |      | Optional CL Discharge                                                                  |
|                         |      | Low ESR Ceramic capacitors                                                             |
| Op. Ambient Temperature |      | -40°C ~ +85°C                                                                          |
| Packages                |      | DFN2020-8, WLP-6-03                                                                    |

# XC6237

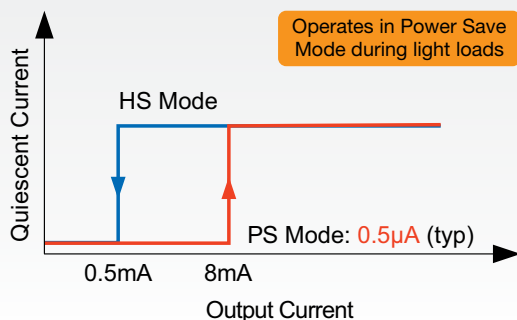
Low IQ, High Speed 'Green Operation'  
LDO Voltage Regulator

COMING SOON

## TYPICAL APPLICATION CIRCUIT



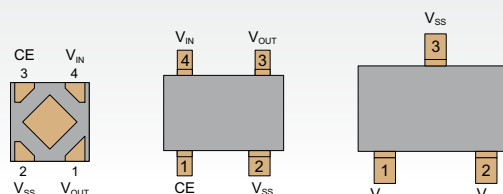
## GREEN OPERATION



## KEY FEATURES

|                         |                                           |
|-------------------------|-------------------------------------------|
| Operating Voltage       | 1.6V ~ 6.0V                               |
| Output Voltages         | 1.2V ~ 5.0V +1.0%                         |
| Temp Characteristics    | 100ppm/°C (typ)                           |
| Output Current          | 150mA                                     |
| Dropout Voltage         | 165mV @ $I_{OUT}=150mA$ ( $R_{on}=1.1Ω$ ) |
| Quiescent Current       | 0.5μA (PS:typ)                            |
| Standby Current         | ≤0.1μA                                    |
| PSRR                    | 60dB @ 1kHz (HS mode)                     |
| Protection Circuits     | Short Circuit Protection                  |
|                         | Current Limiter                           |
| Other Features          | Optional CL Discharge                     |
|                         | Low ESR Ceramic Capacitors                |
| Op. Ambient Temperature | -40°C ~ 105°C                             |
| Packages                | USPQ-4B0x, SOT-23, SSOT-24                |

## PACKAGE PINOUT



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