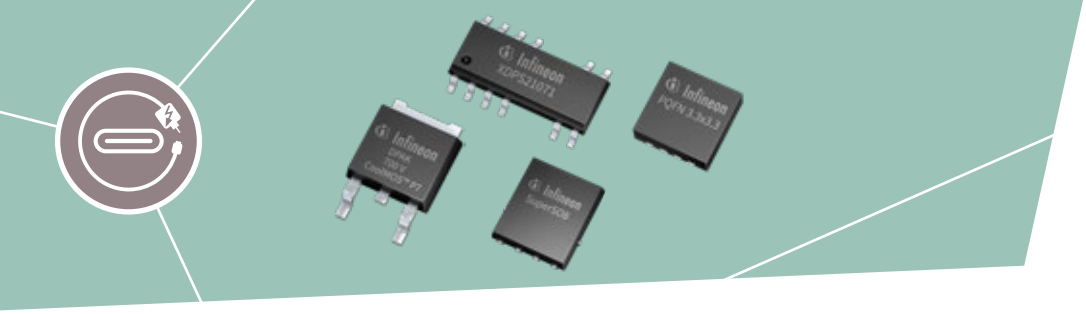


Solution Brief

A 45 W digital based USB-PD solution

A productive ultrahigh power-density reference design

The 45 W USB-PD reference design from Infineon offers a robust, high-density, low-cost and efficient solution. Thanks to the forced-frequency-resonant (FFR) digital controller, the XDPS21071, and the high-performing CoolMOS™ and OptiMOS™ MOSFETs, power density above 20 W/in³ (50CC) can be achieved.

The digitally controlled zero-voltage-switching (ZVS) function of the XDPS21071 helps significantly reducing switching losses at high line and can run under a switching frequency of 140 kHz. The controller can achieve high efficiency at both medium and light load conditions by implementing frequency-resonant mode (FRM) or active-burst mode (ABM). The IC allows for highest design flexibility for tailor-made system dimensioning via a set of advanced configurable parameters and state machines. The XDPS21071 integrates a HV start-up cell, supports various protection, such as OCP, V_{out} OVP, OLP, OTP, latch enable, CS pin short before power-up, brown-in/out, etc.

The 700 V CoolMOS™ P7 SJ MOSFET family is orientated towards low-power flyback designs. The series has a low gate-source threshold voltage as of 3 V and a very narrow tolerance of +/- 0.5 V. This makes the P7 easy to design-in and enables the usage of lower gate-source voltage, which makes it easy to drive, and leads to less idle losses. To increase the ESD ruggedness up to HBM class 2 level, the 700 V CoolMOS™ P7 has an integrated Zener diode. This supports increased assembly yield, leads to less production related failures and, eventually, saves manufacturing costs.

The logic-level OptiMOS™ PD provides a low gate-source threshold voltage (V_{GSth}) allowing MOSFETs to be driven at 5 V; the low gate charge (Q_g) reduces switching losses without compromising conduction losses; the improved figures of merit (FOM) allow operations at high-switching frequencies. The OptiMOS™ PD power MOSFETs are tailored to increase efficiency, power density and cost-effectiveness.

System features

- Planar transformer for slim design, noise cancellation, and reduced copper losses
- Zero-voltage-switching forced-frequency-resonant (ZVS FFR) operation mode reducing power losses
- Operating frequency up to 140 kHz

System benefits

- Productive design, shorter time-to-market
- High power density, ~22W/in³ uncased
- Planer transformer and SMD design to improve the production capabilities
- Silicon-based solution, proven quality and cost advantage
- BOM cost reduction and easy manufacturing
- Full USB-PD capability

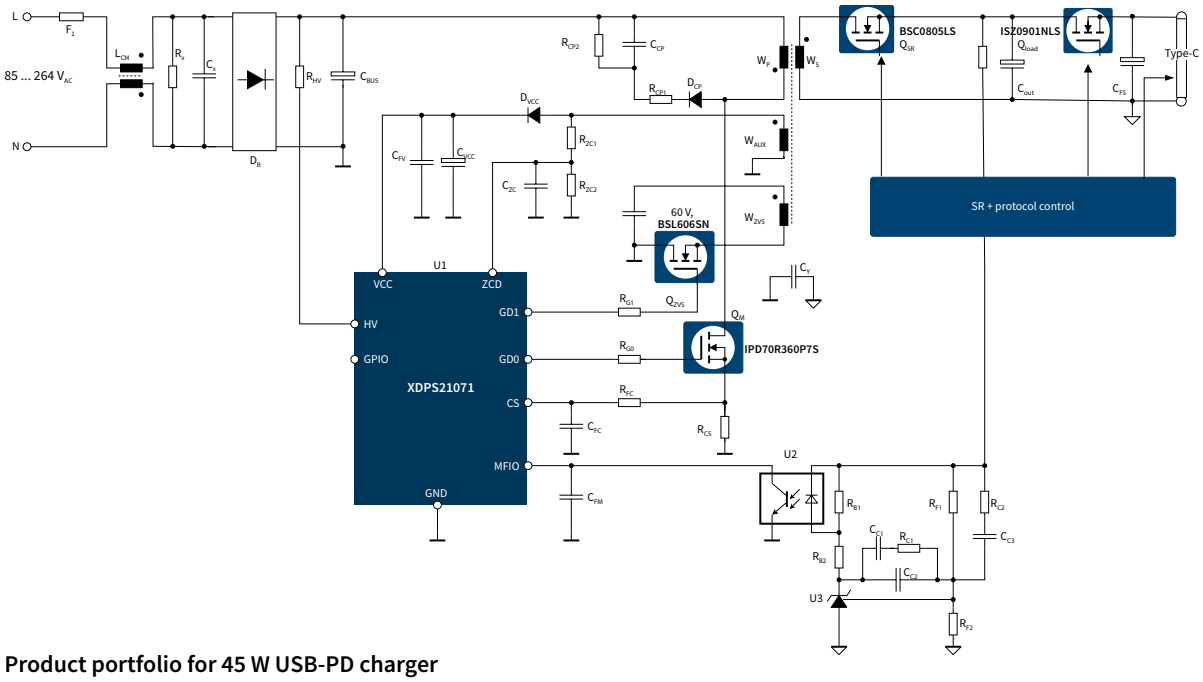
The 45 W USB-PD SMPS reference design with the XDPS21071

www.infineon.com/USB-PD
www.infineon.com/xdps21071
www.infineon.com/p7
www.infineon.com/optimos-pd

A 45 W digital based USB-PD solution

A productive ultrahigh power-density reference design

One-stop-shop solution for USB-PD chargers



Product portfolio for 45 W USB-PD charger

Type	Description	Ordering code
REF_XDPS21071_45W1	45W USB-PD 3.0 Type C charger	SP005405679

OptiMOS™ PD product portfolio

Part number	Package	Voltage [V]	$R_{DS(on)}$ max [mΩ]
ISZ0901NLS	PQFN 3.3x3.3	25	6
BSC0804LS	SuperSO8	100	9.8
BSC0805LS	SuperSO8	100	7
BSC0302LS*	SuperSO8	120	8.2

* Coming soon

700 V CoolMOS™ P7 product portfolio

TO-220 FullPAK narrow leads	IPAK short leads	DPAK	ThinPAK 5x6	$R_{DS(on)}$ [mΩ]
IPAN70R600P7S	IPS70R600P7S	IPD70R600P7S	IPLK70R600P7*	600
IPAN70R360P7S	IPS70R360P7S	IPD70R360P7S	IPLK70R360P7*	360

* Coming soon

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