NXP GreenChip low power SMSP controller TEA172x

Ultra-low standby, cost-effective power supplies up to 11 W

These highly integrated devices enable low no-load power consumption below 10 mW, reduce component count for a cost-effective application design, and provide advanced control modes that deliver exceptional efficiency.

Key features
- SMPS controller with integrated power switch up to 5 or 11 W
- 700 V high-voltage MOSFET for global mains operation
- Primary sensed output voltage control eliminates opto coupler
- Operates with advanced control modes for optimal performance and high efficiency
- Variable switching frequency up to 50.5 kHz
- EEPROM-programmable burst frequencies create flexibility between transient response and no-load power consumption
- Avoids audible noise in all operating modes (min \(f_{sw}\) > 22 kHz)
- Includes compensation of cable impedance
- Jitter function for reduced EMI
- USB battery charging (CC/CV) and Energy Star 2.0 compliant
- Enables no-load power consumption below 10 mW
- High-voltage start-up with zero current under normal switching operation
- Safe restart mode for system fault conditions
- OverVoltage Protection (OVP) with auto-restart
- UnderVoltage LockOut (UVLO) and clamp protection
- OverTemperature Protection (OTP)
- Soft-start by reduced peak current for zero and low output voltage
- Demagnetization protection for guaranteed DCM mode
- FB open pin and short-circuit protection
- Available in halogen-free and RoHS SO7 package with HV spacing

Applications
- Mobile USB chargers
- Battery chargers for smartphones and media tablets
- Power supplies for white goods
- Industrial systems, including smart meters

The NXP TEA172x family is a series of small, low-cost module Switched Mode Power Supply (SMPS) controller ICs that operate directly from the rectified universal mains input and are tailored for low-power applications up to 5 or 11 W. Each device is equipped with a high-voltage power MOSFET switch (700 V) and is optimized for flyback, buck, and buck-boost converter topologies. The result is high efficiency over
footprint, and lower overall cost. Primary side-sensing, which eliminates the need for a power-consuming opto-coupler. The architecture meets EMI specification without an external Y-cap, and integrated active HV start-up eliminates resistor bleeder circuitry. Fewer than 30 external components are required for a complete bill of materials.

Advanced control modes enable very high average efficiency (above 77%) over the entire load range, and compliance with USB 1.1 and 1.2 makes them well suited for use in mobile phone charger applications. Switching losses are kept low with a burst frequency of 430 Hz, and a variety of protection features ensure reliable operation under a wide range of conditions.

Design tools for the TEA172x family include a range of demo boards, extensive application notes, and an online calculator that helps predict real-world performance.

The TEA1721 supports operation up to 5 W and is ideally suited for use in mobile USB chargers, major home appliances, and industrial systems. The TEA1723 runs at up to 11 W and targets tablet PCs, e-readers, and set-top boxes (STBs). All three TEA172x devices have the same feature set but use a different power MOSFET, tailored for operation up to 5 or 11 W, respectively.

The TEA172x architecture provides a circuit for start-up directly from the rectified mains voltage without any external bleeder circuits. The converter operates as a regulated voltage source from no-load up to the maximum output current and operates as a current source that delivers the maximum current over a broad output voltage range.

The architecture includes several features that serve to reduce total component count, minimize the design

Selection guide

<table>
<thead>
<tr>
<th>Product</th>
<th>Cable comp (Ω)</th>
<th>Power (W)</th>
<th>No-load (mW)</th>
<th>Turn-on (kHz)</th>
<th>CV (%)</th>
<th>CC (%)</th>
<th>Package</th>
<th>Applications</th>
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<td>AT 0</td>
<td>10</td>
<td>&lt;10</td>
<td>50.5</td>
<td>430</td>
<td>±5</td>
<td>SO-7</td>
<td>White goods, industrial, smart meters, mobile USB chargers, general-purpose adapters</td>
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<td></td>
<td>BT 1</td>
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<td>Mobile USB chargers</td>
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<td>FT 2</td>
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<td>Chargers for smartphones and media tablets</td>
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TEA1721AT application diagram