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LLC Switcher IC Delivers 1650 W Of Continuous Output Power

Power Integrations' HiperLCS2-HB has announced a two-fold increase in power output from the HiperLCS-2 chipset, which was introduced in March 2022. Featuring advanced half-bridge switch technology and an innovative POWeDIP package, the new primary-side device in the chipset (LCS7269Z) can deliver up to 1650 W of continuous output power with heatsinking while achieving over 98% efficiency.

The new family member targets industrial power supplies as well as chargers for e-scooters and outdoor power tools, where its high efficiency and high level of integration reduce enclosure volume and eliminate the need for air vents and fans, enhancing reliability and resistance to dust and moisture. The table lists the LCS7269Z primary-side controller alongside other devices in the HiperLCS-2 chipset family, which feature different-sized power MOSFETs to accommodate different power levels.

According to the vendor, the highly integrated HiperLCS-2 family reduces component count and board area of half-bridge LLC resonant power converters by 30% to 60% in applications of 50 W and higher (Fig. 1). The new IC increases continuous power to more than 1.6 kW and permits brief peak loads of 2.5 kW by leveraging a new, thermally efficient POWeDIP package. This package includes an electrically insulating, thermally conductive ceramic pad that can be easily attached to any flat, heatsinking surface. It provides sufficient creepage to the package pins, enabling an overall thermal performance of less than 1°C/W (Fig. 2).

Zeeshan Kabeer, product marketing manager at Power Integrations, said, "High power and high efficiency are non-negotiable requirements for fully sealed chargers and adapters. For those who rely on power tools or personal transportation for their livelihood, charger failure due to dust, moisture, insects, or damage to electromechanical components is unacceptable. Our new, high-efficiency, 1650-W HiperLCS-2 device allows the manufacture of completely sealed chargers for these mission-critical applications."

The primary-side HiperLCS2-HB devices in the chipset incorporate 600-V FREDFETs in a half-bridge configuration. Self-bias and start-up control enable operation without an external bias supply, reducing system cost and complexity.

The companion IC in the chipset, the HiperLCS2-SR, incorporates a secondary-side master controller that provides optimized synchronous rectification (SR) to reduce output rectification losses. It also includes a FluxLink isolator for robust, high-speed feedback to the primary-side IC, eliminating the need for a slow and unreliable optocoupler. This IC controls multi-mode burst operation, ensuring excellent light- and no-load performance while eliminating audible noise and reducing output ripple. To ensure high reliability, the IC also provides comprehensive fault protection.

Reference designs for a 1650-W dc-dc LLC half-bridge resonant converter (DER-1060, see Fig. 3), a 720-W dc-dc LLC half-bridge resonant converter (DER-978), and a 720-W PFC LLC PSU with constant-voltage and constant-current-mode control (DER-984) are available for download.

Pricing for HiperLCS-2 POWeDIP ICs starts at $5.39 for 10,000-unit quantities. For further information, see the HiperLCS-2 page and the DER-1060, DER-978, and DER-984 pages. Or contact a Power Integrations sales representative or one of the company's authorized worldwide distributors—DigiKey, Newark, Mouser and RS Components.

Table. The LCS7269Z is the highest rated of the primary-side devices in the HiperLCS-2 family. The POWeDIP-20B is just one of two packages that the controller is offered in. It also comes in a surface-mount InSOP-24C.

Power Device	Safety Isolation Device	385 VDC ±5%		
		Adapter[1]	Forced Air Cooled[2]	Peak Power[3]
LCS7260C	**LSR2000C**	80 W	N/A	135 W
LCS7262C		120 W	N/A	205 W
LCS7265C		220 W	N/A	375 W
LCS7265Z		460 W	520 W	780 W
LCS7268Z		720 W	830 W	1225 W
LCS7269Z		1440 W	1650 W	2450 W

Table 1. Output Power Table.
Notes:
1. Power Device: Minimum continuous power in a typical non-ventilated enclosed typical size adapter measured at 40 °C ambient. Max output power is dependent on the design, with condition that T_J <110 °C.
2. Forced air cooled: With combination of heat sink and airflow, sufficient to maintain T_J < 110 ºC
3. Power Device: Minimum peak power capability (not thermally limited).
Where Duty (Pk) = P(pk 50 ms) / P(adapter) < = 170%.

Figure 2. Primary-Side Packages. (Left) POWeDIP-20B (Right) InSOP-24C Top View.

Figure 3. HiperLCS2-SR. Safety Isolation Package, InSOP-24D Top View.

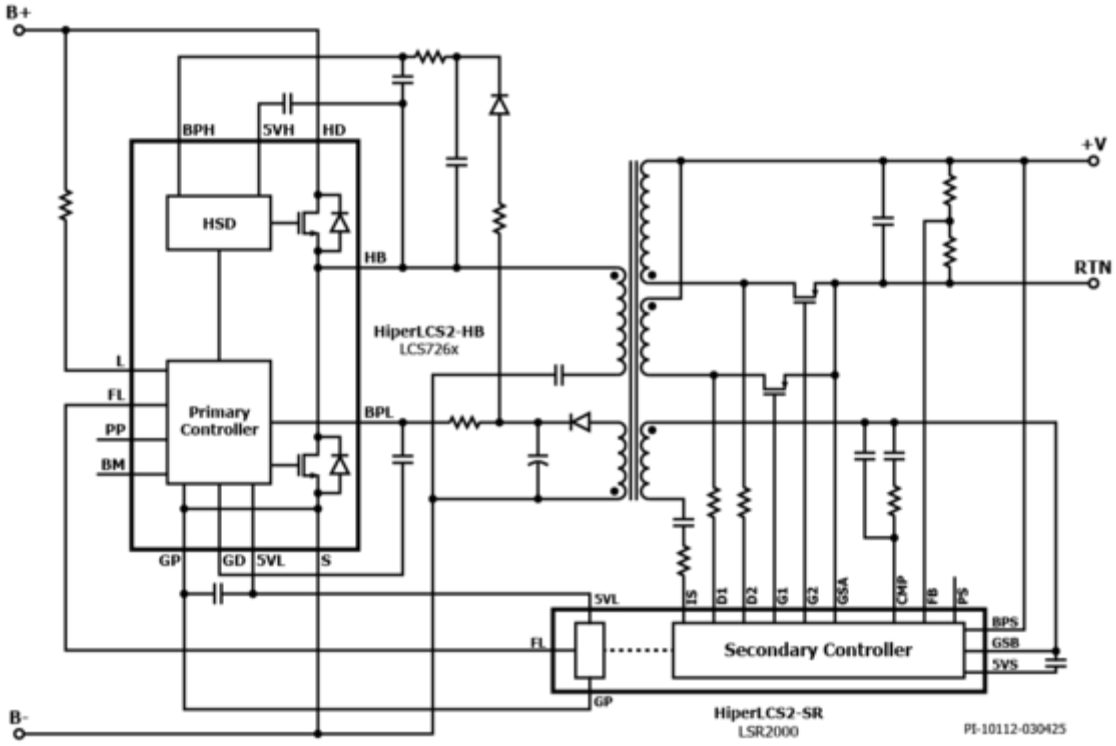


Fig. 1. The HiperLCS-2 chipset achieves high efficiency and compact size in power supplies up to 220 W with no heat sink and 1650 W with heat sink. This IC chipset simplifies the design and manufacture of LLC resonant power converters. The LCS726x primary-side devices incorporate 600-V FREDFETs in a half-bridge arrangement with control, level shifting, drive and self-powered start-up. The LSR2000C master controller device provides reinforced isolated feedback, output sensing and SR management.

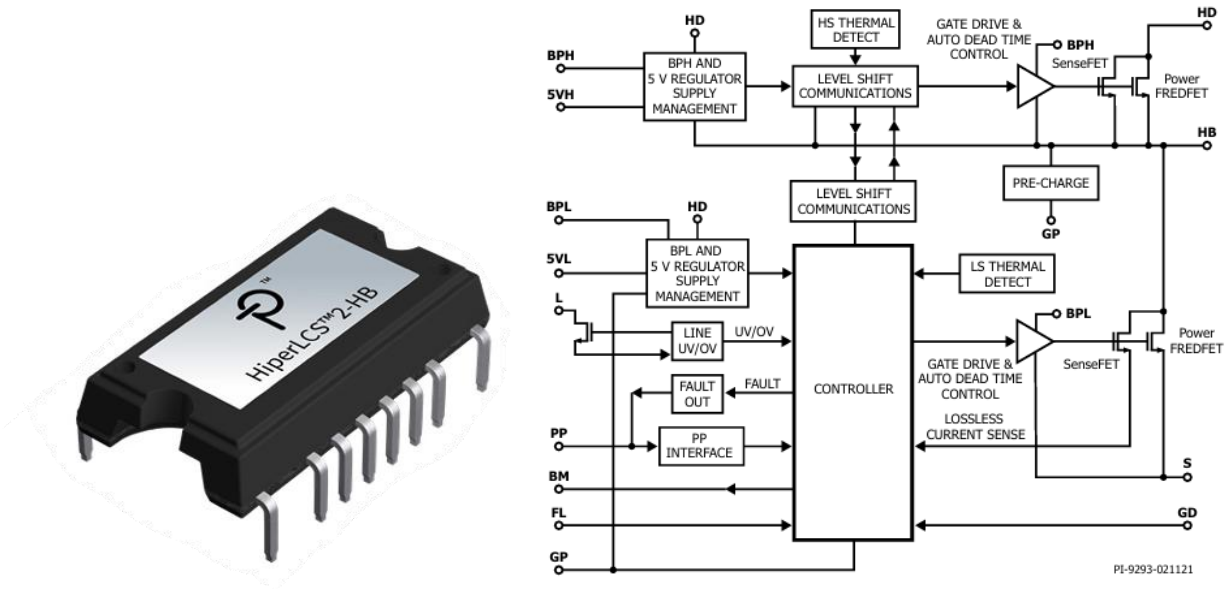
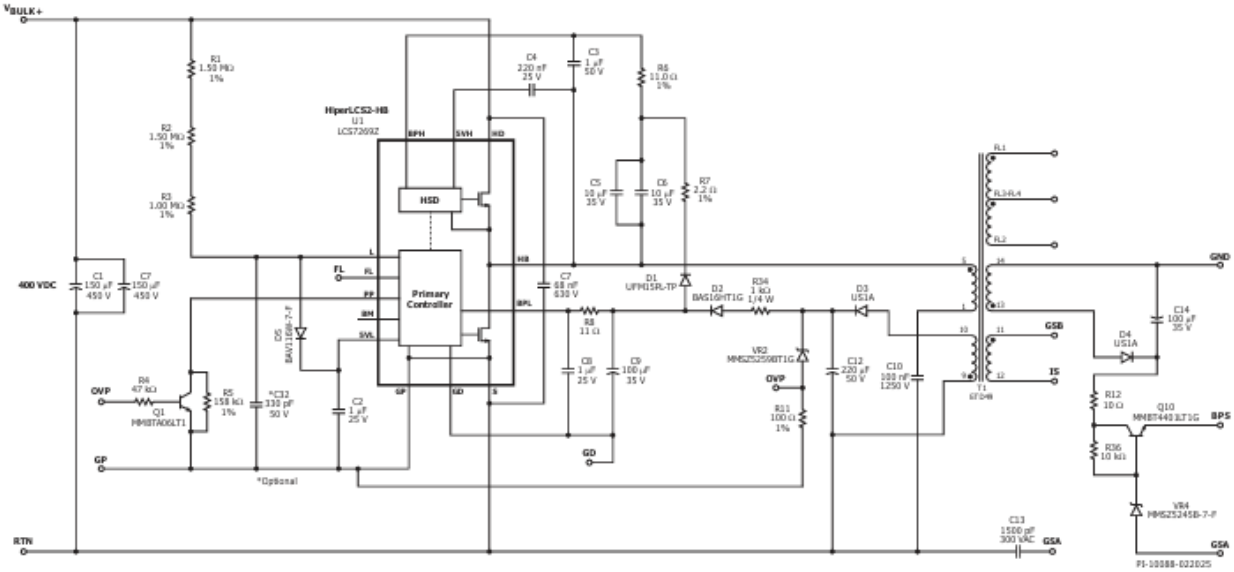
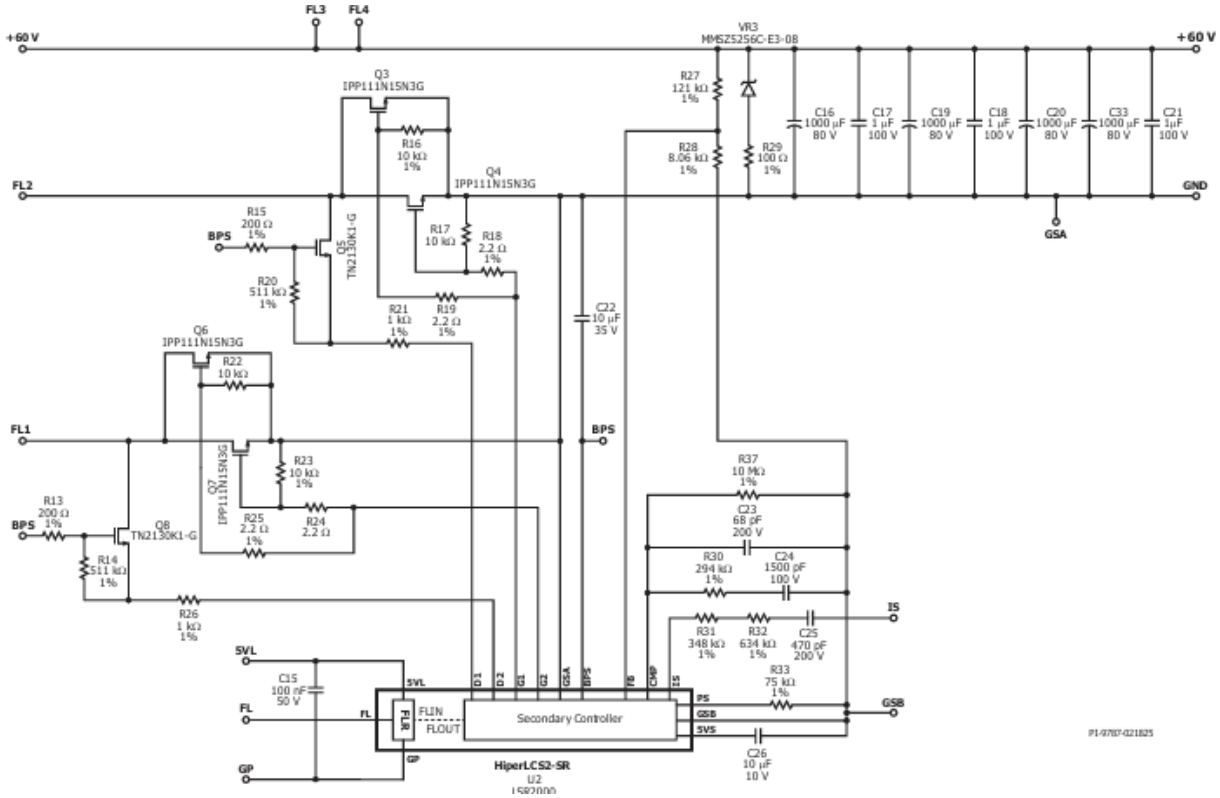


Fig. 2. The primary-side controller in the HiperLCS-2 chipset delivers continuous power greater than 1.6 kW with peak power delivery of 2.5 kW by leveraging a new, thermally efficient POWeDIP package. The package is pictured on the left and an internal block diagram of the controller is shown on the right.



(a) Schematic of LLC stage (primary side).



(b) Schematic of LLC stage (secondary side).

Fig. 3. Schematic for the DER-1060 reference design for a 1650-W dc-dc LLC resonant half-bridge converter with synchronous rectification (SR). It uses HiperLCS2-HB (LCS7269Z) half-bridge power device (primary-side controller) and HiperLCS2-SR (LSR2000C) safety isolation device