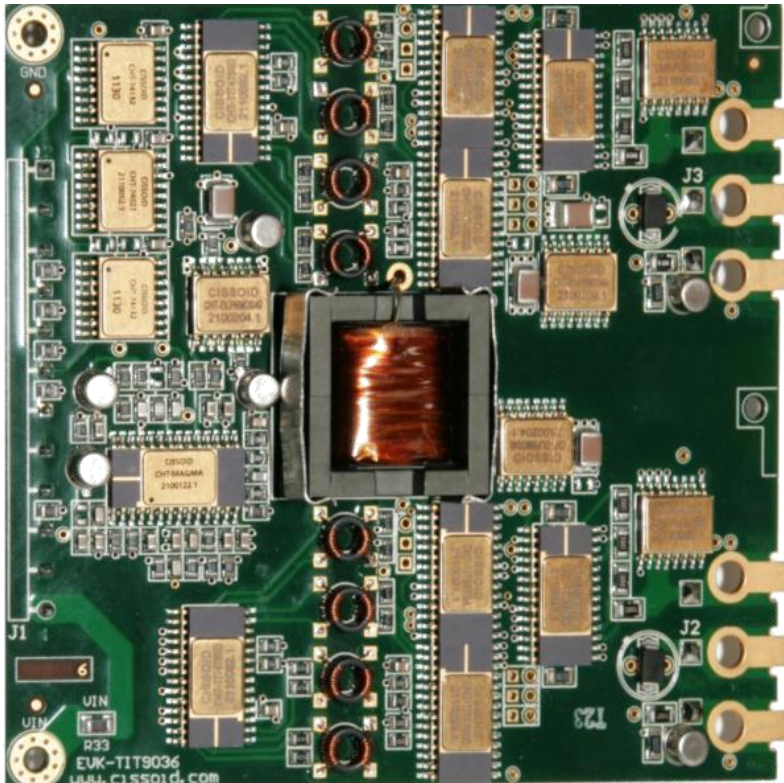


EVK-HADES®

Product Brief

PRODUCT BRIEF

Version: 1.2
Nov 17, 2011



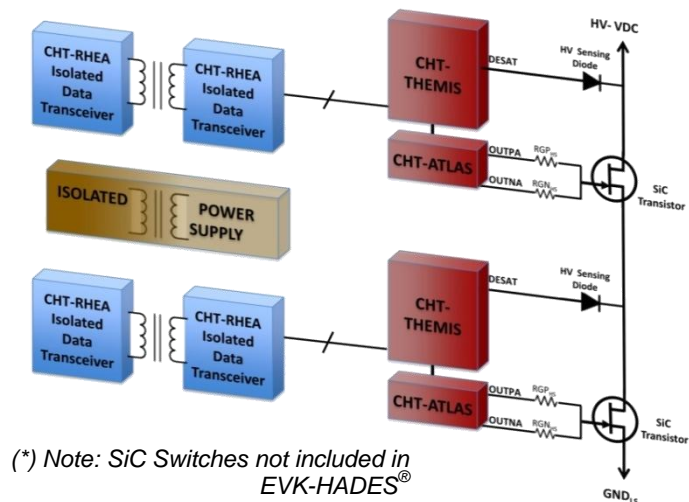
EVK-HADES®
Evaluation Board

Applications

- Motor drives
- Battery chargers
- Electrical distribution:
 - AC-DC converters
 - DC-DC converters
 - DC-AC inverters

For:

- Oil & Gas down-hole tools
- Aeronautics & aerospace
- Renewable energies
- Smart grid
- HEV / EV



FEATURES

- CISSOID Active components guaranteed for -55° to +225°C (Tj)
- 200°C Polyimide PCB
- Board qualified for 175°C ambient
 - Short excursions to 225°C for testing allowed
- High-side and Low-side gate driver
- DC Bus voltage: 600V Typ.(designed for 1200V max)
- Gate output current $\pm 4A$
- Isolation (primary – secondary):
 - 2,500VAC @50Hz (for 1mn)
 - $>100M\Omega$ @ 500VDC
 - Common mode transient immunity:30kV/ μs Typ. (designed for 50kV/ μs)
- Delay time (PWM to NGH/NGL): 200ns typ.
- Gate voltage: 20V / -5V nominal
- Rise time (on a 1nF load): 10ns Typ.
- Fall time (on a 1nF load): 10ns typ.
- Switching frequency: 150kHz Typ. (possibly beyond)
- Single power supply: +12V $\pm 10\%$
- Interfacing voltage (digital I/Os): 5V $\pm 10\%$
- Under voltage lockout (UVLO)
- Independent PWM inputs for HS and LS drivers or single PWM input with on-board non-overlapping
- Active Miller clamping
- Desaturation protection
- Isolated fault outputs

- Availability:
 - EVK-HADES[®] for SiC MOSFETs: Nov 2011
 - EVK-HADES[®] for SiC JFETs normally-On: Jan 2011
 - Other devices (SiC BJTs; JFETs normally-Off): contact CISSOID

General description

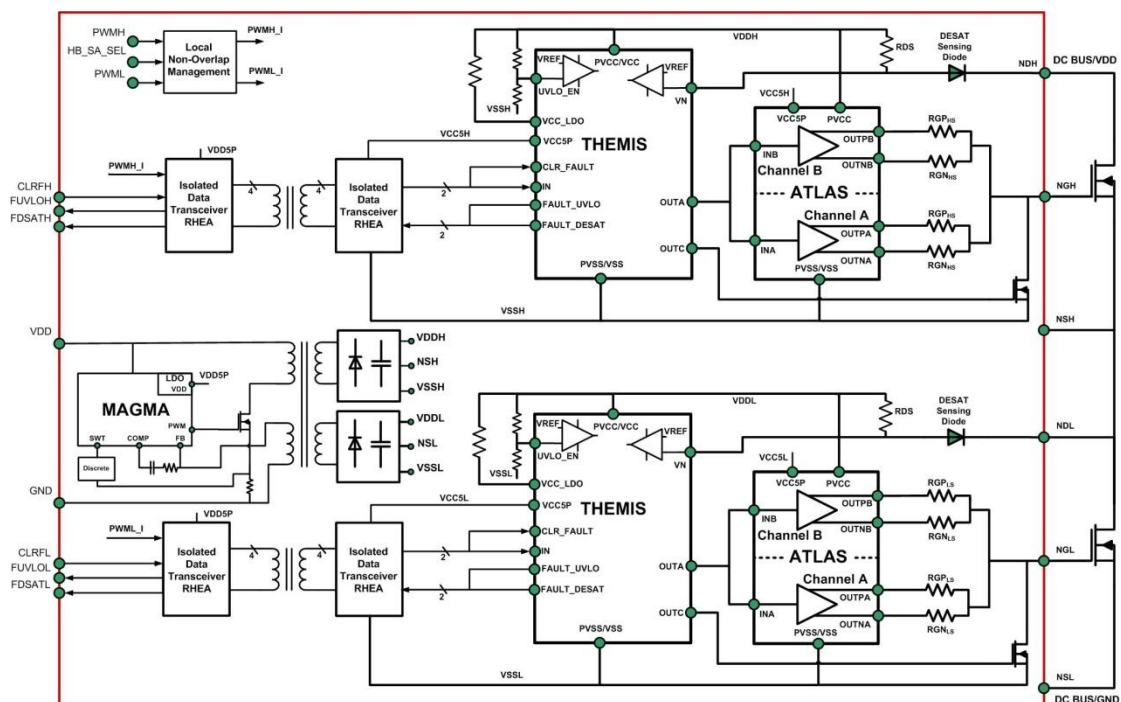
HADES[®] is a complete half-bridge gate driver Reference Design dedicated to drive power switches, in particular (but not exclusively) the newest generation of wide-bandgap power switch devices such as SiC and GaN (e.g. MOSFETs and JFETs). Other types of devices (JFETs, BJTs, IGBTs) can be supported but may require some hardware adaptations. The Evaluation Board EVK- HADES[®] is a turnkey gate driver solution that can be used immediately to implement a power converter or a motor drive, supporting a bus voltage up to 600V / 1200V and gate currents up to $\pm 4A$. The two channels can be controlled independently of each other or used in a half-bridge configuration. TEVK-HADES[®] board in combination with power switches can form a complete 1-leg inverter solution for immediate evaluation.

The Reference Design is based on the chipset CHT-THEMIS/CHT-ATLAS and CHT-RHEA. The solution also includes an isolated power supply built with CHT-MAGMA PWM controller. For applications

that require gate currents greater than $\pm 4A$, designers can modify HADES[®] reference design and build their own board by adding up to 4 four additional CHT-ATLAS circuits per channel (high-side and low side) in order to sink / source up to $\pm 20A$ to the gate of the power switch devices.

The Evaluation Board EVK-HADES[®] can be used for immediate testing with SiC MOSFET devices. The board is populated with CISSOID integrated circuits in ceramic package and metal can forms (CSOIC16/CSOIC28 and TO18), guaranteed for $-55^{\circ}C$ to $+225^{\circ}C$. The board is based on a polyimide PCB (rated $200^{\circ}C$). The passive components and the desaturation diode allow operation up to $175^{\circ}C$, with possible short excursions to $225^{\circ}C$ for testing. The evaluation board is delivered with the complete electrical schematic, the bill of materials including active and passive components, the Gerber files.

Simplified Block Diagram



Electrical Performance

EVK-HADES exhibits high-temperature operation, combining high efficiency and high frequency capabilities, making it ideal for high power density solutions such as power converter sub-systems and Intelligent Power Modules (IPMs).

Double pulse switching tests were carried out with two SiC MOSFET CMF20120D¹ from CREE driven by HADES[®] gate driver. The power transistors were connected in a half-bridge and used to drive a clamped inductive load at 600V/15A/T_a=175°C.

The same half-bridge has been tested in a 3kW Buck DC-DC converter test board, which demonstrated power efficiencies in the range 97.0% and 94.5% for switching frequencies of 50kHz and 150kHz and running at 175°C (ambient) - the majority of the losses being dynamic losses within the MOSFET switches.



EVK-HADES[®]
Evaluation Board +
3kW Buck DC-DC
Converter Test Set-up

(*) Note: SiC switches and heatsink not included in EVK-HADES[®]

¹ In this DC-DC converter test set-up, plastic-packaged CREE MOSFETs CMF20120D were driven with standard HADES[®] EVK-TIT0636A gate drive voltage levels, i.e. +20V / -5V nominal. Adjustment of these gate voltage levels might be required to meet the newest SiC MOSFET manufacturer's recommendations, including CREE's. It is user's responsibility when using HADES[®] EVK-TIT0636A to ensure that these gate voltages are compatible with the latest MOSFET driving requirements in order to obtain proper operation. Hardware modifications of HADES[®] EVK-TIT0636A might be required for each MOSFET switch type.

Ordering Information

| Product Name | Ordering Reference | Package | Marking |
|--------------------|--------------------|---------|-------------|
| EVK-HADES (MOSFET) | EVK-TIT0636A | NA | EVK-TIT0636 |

Contact & Ordering

CISSOID S.A.

| | |
|--------------------------------|---|
| Headquarters and contact EMEA: | CISSOID S.A. – Rue Francqui, 3 – 1435 Mont Saint Guibert - Belgium T : +32 10 48 92 10 - F: +32 10 88 98 75 Email: sales@cissoid.com |
| Sales Representatives: | Visit our website: http://www.cissoid.com |

Disclaimer

Neither CISSOID, nor any of its directors, employees or affiliates make any representations or extend any warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, and the absence of latent or other defects, whether or not discoverable. In no event shall CISSOID, its directors, employees and affiliates be liable for direct, indirect, special, incidental or consequential damages of any kind arising out of the use of its circuits and their documentation, even if they have been advised of the possibility of such a damage. The circuits are provided "as is". CISSOID has no obligation to provide maintenance, support, updates, or modifications.