
VESUVIO® TECHNOLOGY

Product Brief

Version: 1.1
8-Mar-11

High-temperature DC-DC Converter Platform

General Description

VESUVIO® technology is a turnkey non-isolated DC-DC converter platform offering ultimate reliability and extreme operating temperature range **from -55°C to +225°C**. It implements a voltage mode, constant frequency and continuous current mode (CCM) synchronous buck converter topology. The technology from CISSOID provides a flexible and scalable reference design and an evaluation board for non-isolated DC-DC converters applications such as switched-mode power supplies and point-of-loads, with high-efficiency on the whole temperature range from -55°C to +225°C.

VESUVIO® is built around CISSOID's chip-set CHT-MAGMA & CHT-HYPERION (PWM controller and half-bridge driver) plus some high-temperature MOSFETs from the CISSOID's PLANET family.

The VESUVIO® technology is available under license from CISSOID. The evaluation board is available in a 10W output power configuration, suitable to deliver a 5V voltage output from a wide voltage input range. The output voltage and power range can easily be modified by the user to fit different needs.

Applications

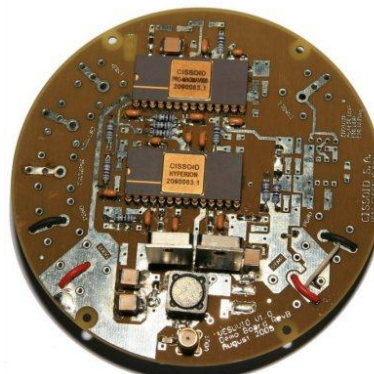
- Distributed power architectures in aeronautics, aerospace, industrial and military electronic systems:
 - PoL (Point of Loads)
 - PDU (Power Distribution Units)
- SMPS power supplies in down-hole tools such as MWD and LWD equipment

VESUVIO® Technology Kit Content:

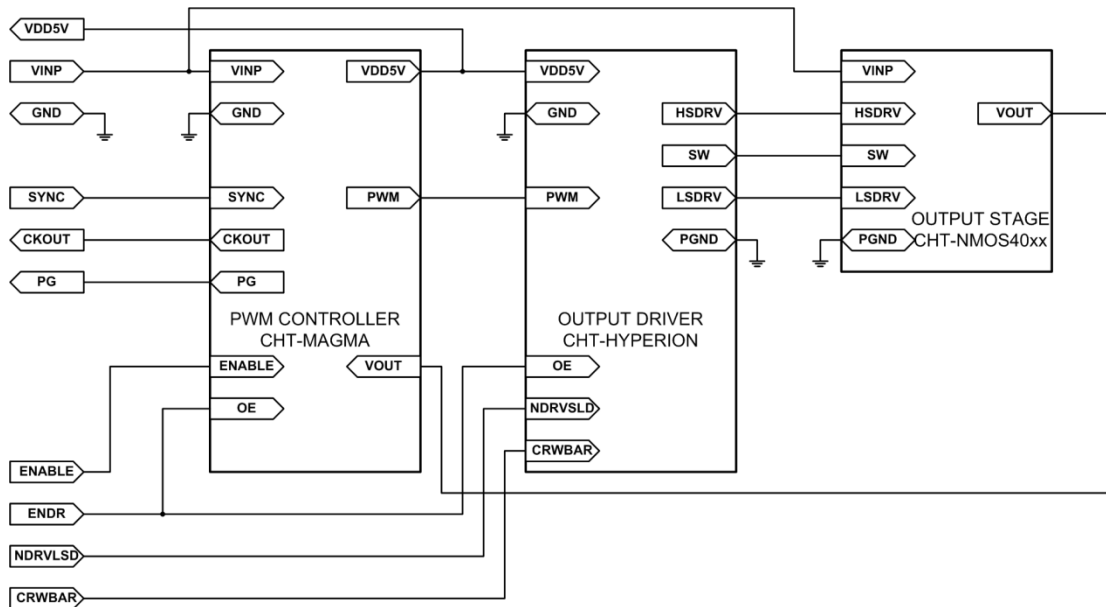
- EVK-VESUVIO-30 Evaluation-Board:
 - Qualified from -55 to +175°C (Ta)
 - 200°C Polyimide PCB
 - Active components all qualified from **-55 to +225°C (Tj)**
- Data-sheet
- Detailed electrical schematic
- Bill-of-Material
- Application Note
- User's License
- 5 hours of engineering support

Evaluation Board - Key Features

- **Input voltage range: 6V to 30V**
- **Output voltage: +5V** (other voltages possible through customization)
- **Output Power: 10W max**
- Switching frequency: 230kHz
- Soft start for inrush current limitation
- Clock synchronization input & output
- Efficiency: up to 93%
- Bill of Material:
 - Resistors (1/8W): 20 pcs
 - Capacitors (up to 22µF): 18 pcs
 - 33µH inductor: 1 pc
 - CISSOID parts: 2 ICs and 2 MOSFET transistors
- PCB Dimension: Φ 100mm [4.2"]

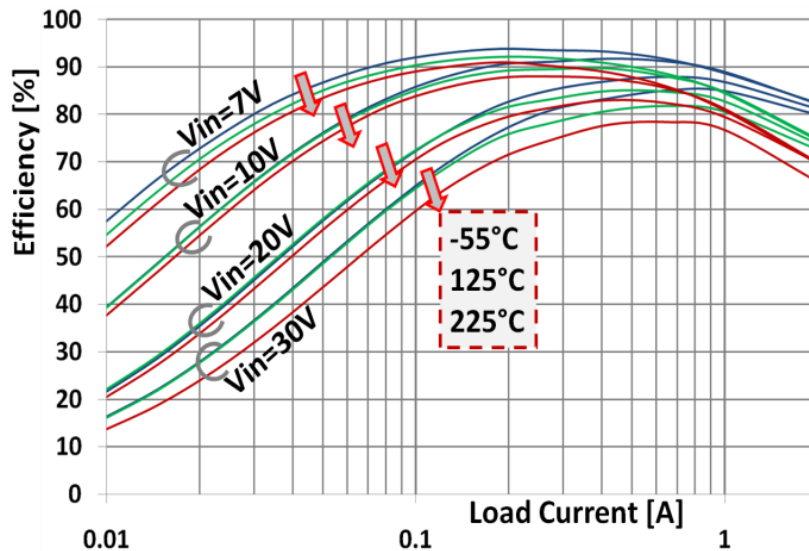


Functional Block Diagram



VESUVIO® DC-DC Converter Technology is based on a synchronous buck architecture which provides voltage step-down capability with high efficiency compared to traditional voltage regulator solutions.

Efficiency



Efficiency vs. Load current at -55°C, 125°C and 225°C (junction) for various input voltages and $V_{out}=5V$

Absolute Maximum Ratings

Supply Voltage V_{IN} to GND -0.3 to 35V
 Load current 2.5A
 (no short-circuit protection)

Operating Conditions

Supply Voltage V_{IN} to GND 6V to 30V
 Junction temperature -55°C to +225°C
 Load current 0 to 2A

Electrical Characteristics (EVK-VESUVIO-30)

Unless otherwise stated: $T_j=25^\circ\text{C}$. **Bold underlined** values indicate values over the whole temperature range ($-55^\circ\text{C} < T_j < +225^\circ\text{C}$).

| Parameter | Condition | Min | Typ | Max | Units |
|--|--|----------------------------------|--|------------------------------|------------------------------|
| Supply voltage V_{IN} | $I_{out}<100\text{mA}$ $I_{out}<1\text{A}$ $I_{out}=0$ to 2A | <u>6</u> <u>7</u> <u>8</u> | | <u>30</u> | V |
| Output current I_{out} | | <u>0</u> | | <u>2</u> | A |
| Output voltage V_{out} | $T_a=125^\circ\text{C}$; $V_{IN}=8\text{V}$; $I_{out}=0$ to 2A | 4.85 | 5 | 5.15 | V |
| Output voltage temperature drift dV_{out}/dT | $V_{IN}=7\text{V}$, $I_{out}<1\text{A}$ $V_{IN}=8\text{V}$, $I_{out}=0$ to 2A | | <u>500</u> | | $\mu\text{V}/^\circ\text{C}$ |
| Output voltage DC line regulation dV_{out}/dV_{IN} | | | <u>± 4</u> | | mV/V |
| Output voltage DC load regulation dV_{out}/dI_{out} | $V_{IN}=8\text{V}$, $I_{out}=0$ to 2A $T_a=-55^\circ\text{C}$ $T_a=225^\circ\text{C}$ | | +10 +13 | | mV/A |
| Output ripple | $I_{out}=0$ to 2A; $V_{IN}=8\text{V}$ $V_{IN}=10\text{V}$ $V_{IN}=20\text{V}$ $V_{IN}=30\text{V}$ | | <u>30</u> <u>50</u> <u>75</u> <u>80</u> | | $\text{mV}_{\text{pk-pk}}$ |
| Switching frequency | Internal default oscillator | | 230 | | kHz |
| Switching frequency drift over temperature | | | <u>0.18</u> | | kHz/ $^\circ\text{C}$ |
| Duty-cycle | | 0 | | 93 | % |
| Efficiency $(V_{out} \times I_{out}) / (V_{IN} \times I_{IN})$ | $I_{out}=500\text{mA}$; $T_a=225^\circ\text{C}$ $V_{IN}=7\text{V}$ $V_{IN}=30\text{V}$ | | 87 78 | | % |
| Current consumption at zero load current I_Q | $V_{IN}=7\text{V}$ ENDR high (-55°C) ENDR high (225°C) ENDR low (-55°C) (output is off) ENDR low (225°C) (output is off) | | 5.3 7.2 1.8 3.17 | | mA |
| Load capacitance | | | 2*22 | | μF |
| Output inductor | | | 33 | | μH |
| Current through digital inputs I_{DIN} ENDR & NDRVLSLSD • CROWBAR | Internal pull up $T_a=-55^\circ\text{C}$ $T_a=225^\circ\text{C}$ Internal pull down $T_a=-55^\circ\text{C}$ $T_a=225^\circ\text{C}$ | | 75 36 50 25 | <u>150</u> <u>100</u> | μA |
| Digital input high voltage V_{IH} | | <u>VDD-1.2</u> | | <u>VDD+0.3</u> | V |
| Digital input low voltage V_{IL} | | <u>-0.3</u> | | <u>1.5</u> | V |

Contact & Ordering

Ordering Information

| DESCRIPTION | ORDER NUMBER |
|---|----------------|
| IP VESUVIO ®: High-temperature non-Isolated DC-DC Converter Technology - Voltage input range 6V to 30V – The package includes one evaluation Board, documentation and user's license. | LIC-VESUVIO-30 |

CISSOID S.A.

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