

## The Leader in High Temperature Semiconductor Solutions

# **EREBUS® TECHNOLOGY Product Brief**

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# High-temperature DC-DC Converter Platform

#### **General Description**

EREBUS® 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 package 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.

Compared to CISSOID' VESUVIO® technology, EREBUS® brings a wider voltage input range (40V or 50V max.), a scalable output current (from 2A to 8A) as well as protection against short circuit on the output.

EREBUS® is built around CISSOID's chipset CHT-MAGMA & CHT-HYPERION (PWM controller and half-bridge driver) plus some high-temperature MOSFETs from the CISSOID' PLANET family. The bill of materials also includes a CHT-555 timer and two additional small-signal transistors which implement the short-circuit protection stage. This stage can be removed by the user if not needed.

The EREBUS ® technology is available under license from CISSOID. The evaluation board is available in 2 versions: with a 40V or 50V maximum input voltage. The output is set to a 5V voltage with 2A current capability. The design is scalable by replacing MOSFET transistors, increasing the current capability to 4A (and up to 8A for EVK-EREBUS-40). The output voltage can easily be modified by the user to fit different needs.

# EREBUS® Technology Kit Content:

- One EVK-EREBUS-x0 Eval-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 schematics
- Bill-of-Material
- Application Note
- User's License
- · 5 hours of engineering support

#### **Evaluation Board - Key Features**

- Input voltage range:
  - o EVK-EREBUS-40: 12V to 40V
  - o EVK-EREBUS-50: 12V to 50V
- Output voltage: +5V (other voltages possible thru customization)
- Max. output current: 2A (scalable to 4A and 8A)
- Switching frequency: 230kHz
- Soft start for inrush current limitation
- · Clock synchronization input & output
- Short-circuit protection
- Efficiency: up to 85% at maximum power at room temperature
- Bill of Material:
  - o Resistors (1/8W): 36 pcs
  - Capacitors (up to 22μF): 32 pcs
  - o 33μH inductor: 1 pc
  - o CISSOID: 3 ICs and 4 MOSFET
- PCB Dimension: Φ 100mm [4.2"]

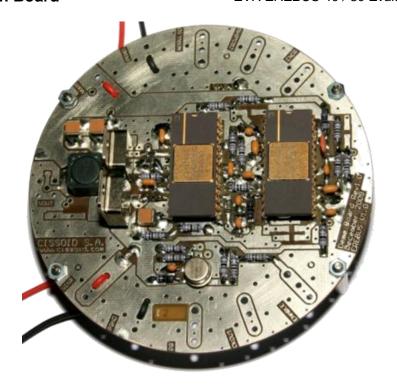
#### **Applications**

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

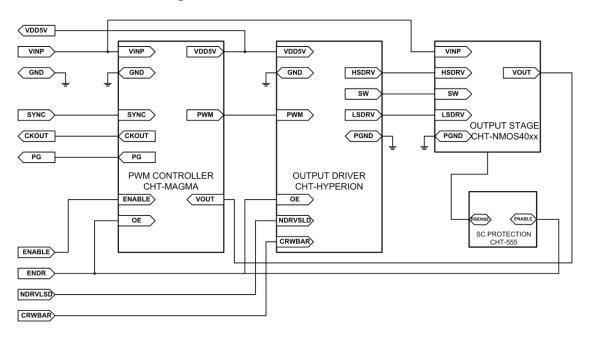


#### **Evaluation Board**

#### EVK-EREBUS-40 / 50 Evaluation Board



## **Functional Block Diagram**



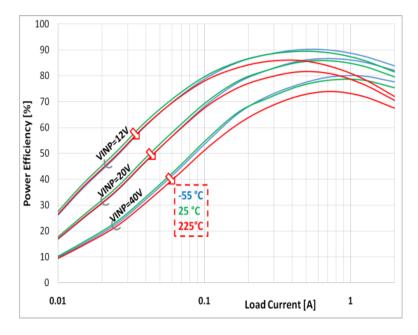
EREBUS® DC-DC Converter Technology is based on a synchronous buck architecture which provides voltage step-down capability with high efficiency compared to traditional voltage regulator solutions.

PUBLIC Doc. PB-110809 V1.1

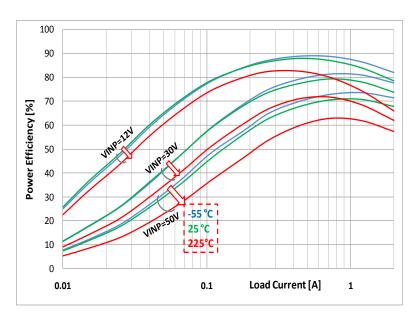


#### **Efficiency**

Efficiency vs. Load current at -55°C, 125°C and 225°C (junction) for various input voltages and Vout=5V:



**EVK-EREBUS-40** 



**EVK-EREBUS-50** 



#### **Evaluation Board Characteristics EVK-EREBUS-50 [-40]**

#### **Absolute Maximum Ratings**

#### **Operating Conditions**

Supply Voltage  $V_{\text{IN}}$  to GND Load current

-0.3 to 55V [45V] 2.5A Supply Voltage V<sub>IN</sub> to GND Junction temperature Load current

12V to 50V [40V] -55°C to +225°C 0 to 2A

#### **Electrical Characteristics**

Unless otherwise stated:  $T_j$ =25°C. **Bold underlined** values indicate values over the whole temperature range (-55°C <  $T_j$  < +225°C).

Parameter	Condition	Min	Тур	Max	Units
Supply voltage <b>V</b> <sub>IN</sub>	I <sub>out</sub> =0 to 2A	<u>12</u>		<u>50 [40]</u>	V
Ouput current I <sub>out</sub>		<u>0</u>		<u>2</u>	А
Output voltage Vout	$V_{IN}$ =50V; $I_{out}$ =0 to 2A	4.85	5	5.15	V
Output voltage temperature drift dVout/dT	V <sub>IN</sub> =1250V		<u>500</u>		μV/°C
Output voltage DC line regulation dV <sub>out</sub> /dV <sub>IN</sub>	I <sub>out</sub> =2A	<u>-4</u>		<u>4</u>	mV/V
Output voltage DC load regulation dVout/dlout	V <sub>IN</sub> =50V, I <sub>out</sub> =0.22A	<u>-10</u>		<u>+10</u>	mV/A
Output ripple	$\begin{split} I_{out} &= 0 \text{ to } 2A; \\ V_{IN} &= 12V \\ V_{IN} &= 20V \\ V_{IN} &= 30V \\ V_{IN} &= 40V \\ V_{IN} &= 50V \end{split}$		75 [130] 90 [122] 95 [130] 100 [146] 110 [144]		$mV_{pk-pk}$
Switching frequency	Internal default oscillator		230		kHz
Switching frequency drift over temperature			<u>0.18</u>		kHz/°C
Duty-cycle		0		93	%
Efficiency (see Erreur! Source du renvoi introuvable.) (V <sub>out</sub> xI <sub>out</sub> )/(V <sub>IN</sub> xI <sub>IN</sub> )	$\begin{split} I_{out} &= 100 \text{mA};  T_a \!\!=\!\! 225^\circ \text{C} \\ V_{IN} &= \!\! 12 \text{V} \\ V_{IN} &= \!\! 30 \text{V} \\ V_{IN} &= \!\! 50 \text{V} \\ I_{out} \!\!=\!\! 14;  T_a \!\!\!=\!\! 225^\circ \text{C} \\ V_{IN} &= \!\!\! 12 \text{V} \\ V_{IN} &= \!\!\! 30 \text{V} \\ V_{IN} &= \!\!\! 50 \text{V} \end{split}$		73 [78] 50 [67] 36 [51] 76 [82] 70 [78] 62 [73]		%
Current consumption at zero load current $I_Q$	V <sub>IN</sub> =1250V		<u>12</u>		mA
Load capacitance			2*22		μF
Output inductor			33		μH
Current through digital inputs I <sub>DIN</sub> ENDR & NDRVLSD	Internal pull up	25		95	
Digital input high voltage V <sub>IH</sub>	internal pull up	25 VDD5V- 1.2		85 VDD5V+ 0.3	μA V
Digital input low voltage <b>V</b> <sub>IL</sub>		<u>-0.3</u>		1.5	V
Short circuit protection cur- rent threshold	T <sub>a</sub> =25°C		2.6		А

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**Doc. PB-110809 V1.1 WWW.CISSOID.COM** 4 of 5



#### **Contact & Ordering**

#### **Ordering Information**

DESCRIPTION	ORDER NUMBER	
IP EREBUS®: High-temperature non-Isolated DC-DC Converter Technology - Voltage input range 12V to 40V – The package includes one evaluation Board, documentation and user's license.	LIC-EREBUS-40	
IP EREBUS®: High-temperature non-Isolated DC-DC Converter Technology - Voltage input range 12V to 50V – The package includes one evaluation Board, documentation and user's license.	LIC- EREBUS -50	

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