Skycore®

EVK_HAS_DIC14_IE_D

SCG10ECX Evaluation Kit - 36-60 V Input, 9-15 V, 30 A Output, 300W

Features

- Peak efficiency: 97.2%
- Full load efficiency: 95.9 %
- 32.6 x 19 mm (1.283 x 0. 748 inches)
- Low profile converter: 1.6 mm (3.2 mm inc. PCB)
- Power density: 5800 W/in^3 (power converter)
- Fixed voltage conversion ratio from input to output voltage: 1/4 or 1/3
- Selectable switch conductance
- Selectable frequency
- Selectable dead time
- Soft startup into full resistive load

Applications

- Data centers
- Servers
- 48 V Power supply
- Computing
- Intermediate Bus Converter (IBC)

General Description

The EVK_HAS_DIC14_IE_D evaluation board is a 300 W, 36-60 V input switched-capacitor power converter that operates as a DC transformer with a fixed voltage conversion ratio of 1/4 or 1/3. The simplified schematic is shown in Figure 2. It features the preliminary SCG10ECX chip, as the core of the switched-capacitor power converter, which drives external OptiMOS™ Power transistors for high power output. The board includes the Microchip dsPIC33EV64GM103 16-bit 5 V digital signal controller to configure the operation of the power converter.

Efficiency

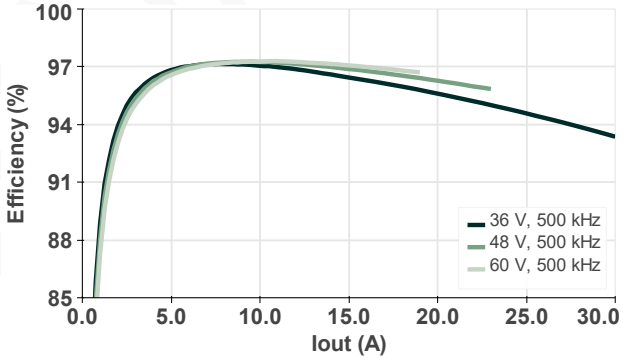

Figure 1. EVK typical efficiency using the 1/4 voltage conversion ratio.

**The power is currently limited by the measurement equipment to 300W. Further measurements at higher power levels will be done.*

Electrical Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Input voltage		36	48	60	V
VIN,on	Input UVLO turn on voltage			24		V
$V_{OUT,1/4}$	Output Voltage	Fixed ratio 1/4 based on V_{IN}	9	12	15	V
$V_{OUT,1/3}$	Output Voltage	Fixed ratio 1/3 based on V_{IN}	12	16	20	V
I_{OUT}	Continuous output current				30	A
f_S	Switching frequency	Set via jumpers		500	1000	kHz
VDD5	Logic power supply		4.75	5	5.25	V
T_C	Junction operating temperature				125	°C

1. Simplified schematic

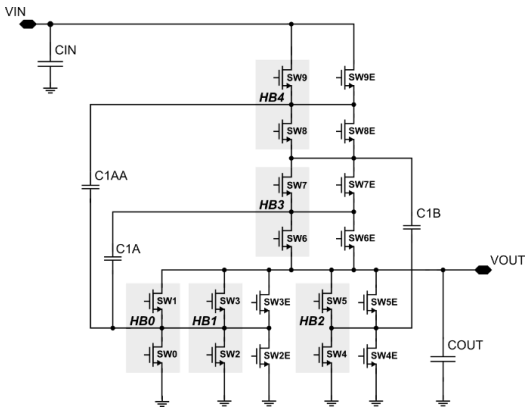

Figure 2. Simplified schematic of the switched-capacitor power converter implemented in the SCG10ECX Evaluation Kit. The highlighted transistors are integrated inside the SCG10ECX chip.

2. Evaluation kit

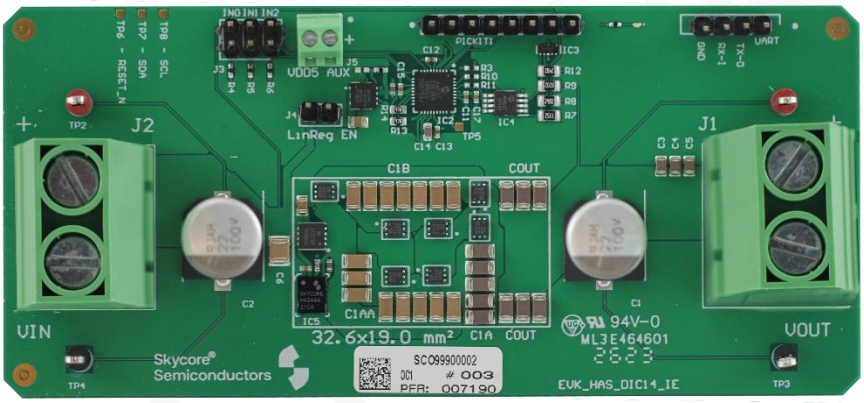

Figure 3. SCG10ECX Evaluation Kit with external power transistors. All the components of the power converter are enclosed in the white rectangle.

3. Bill of materials (Power converter)

Manufacturer	Manufacturer Part Number	Description	Quantity
Skycore Semiconductors	**SCG10ECX**	***SCG10ECX preliminary**	**1**
Infineon Technologies	**BSZ099N06LS5**	***OptiMOS™ 5 power MOSFET 60V, 14 mΩ**	**1**
Infineon Technologies	**ISK036N03LM5**	***OptiMOS™ 5 power MOSFET 30 V, 3.6 mΩ**	**7**
Murata	**GRM31CC71E226ME15L**	***Capacitor 22 µF, X7S, 25 V, 1206**	**11**
Murata	**GRM31CD71H106KE11L**	***Capacitor 10 µF, X7T, 50 V, 1206**	**15**
Würth Elektronik	**885012209071**	***Capacitor 2.2 µF, X7R, 100 V, 1210**	**1**
Würth Elektronik	**885012205084**	***Capacitor 4.7 nF, X7R, 100 V, 0402**	**1**
Würth Elektronik	865060857004	Capacitor Aluminum 33uF 100V	2
Würth Elektronik	885012107014	Capacitor 10 µF, X5R, 16 V, 0805	3
Murata	GRM155R62A104KE14D	Capacitor 0.1 uF, X5R, 100 V, 0402	1
Würth Elektronik	885012105020	Capacitor 10 µF, X5R, 6.3 V, 0402	2
Würth Elektronik	885012205018	Capacitor 0.1 µF, X7R, 10 V, 0402	5
TAIYO YUDEN	TMK107BBJ106MA-T	Capacitor 10 µF, X5R, 25 V, 0603	1

onsemi	NCP781BMN050TAG	Linear regulator Vin=150V Vout=5V	1
Microchip	DSPIC33EV32GM003-I/M5	MCU 16bit 70MHz 36 pin QFN 5x5	1
onsemi	ESD7004MUTAG	TVS diode	1
Microchip	MCP6042-E/MS	Operational Amplifier	1
Amphenol Anytek	VP0265540000G	Connector terminal block 2 pin 10.16mm 65 A	2
Würth Elektronik	61300621121	Connector header 6 position 2.54 mm	1
Würth Elektronik	61300211121	Connector header 2pin 2.54 mm	1
Würth Elektronik	691210910002	Connector terminal block 2 pin 2.54 mm	1
Würth Elektronik	10129378-908001BLF	Connector header 8pin 2.54 mm	1
Lumex	SML-LX0201UPGC-TR	LED 0201 green	1
Würth Elektronik	560112110001	Resistor 0Ω 0402	1
Würth Elektronik	560112110020	Resistor 10 kΩ 0402	4
Würth Elektronik	560112120012	Resistor 510 kΩ 0805	1
Bourns	CR0805-FX-2402ELF	Resistor 24 kΩ 0805	2
Bourns	CR0805-JW-823ELF	Resistor 82 kΩ 0805	1
Würth Elektronik	560112110022	Resistor 100 Ω 0402	2
Würth Elektronik	560112116128	Resistor 3 kΩ 0603	2
Panasonic	ERJ2GEJ102X	Resistor 1 kΩ 0402	1
Keystone Electronics	5010	Connector Hook red color	2
Keystone Electronics	5011	Connector Hook black color	2
Würth Elektronik	61300411121	Connector header 4 pin 2.54mm	1

*Component used for the power converter

4. Revision History

Table 1. *Revision history description.*

Date	Revision	Description
30/06/2023	1	Initial release.
25/08/2023	2	Added measurement data and picture of the EVK.
01/07/2024	3	Updated Bill of Materials

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