

DIGITAL WE DAYS

2023



INTRODCUTION OF MAGI<sup>3</sup>C POWER  
MODULE DESIGNER IN REDEXPERT

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

## TODAY'S SPEAKERS



### **PRESENTATION**

Timur Uludag  
Product Manager



### **MODERATION**

Markus Eberle  
Marketing Department

# INFORMATION ABOUT THE WEBINAR

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**Duration of the presentation** 30 Min  
**Q&A:** 10 – 15 Min

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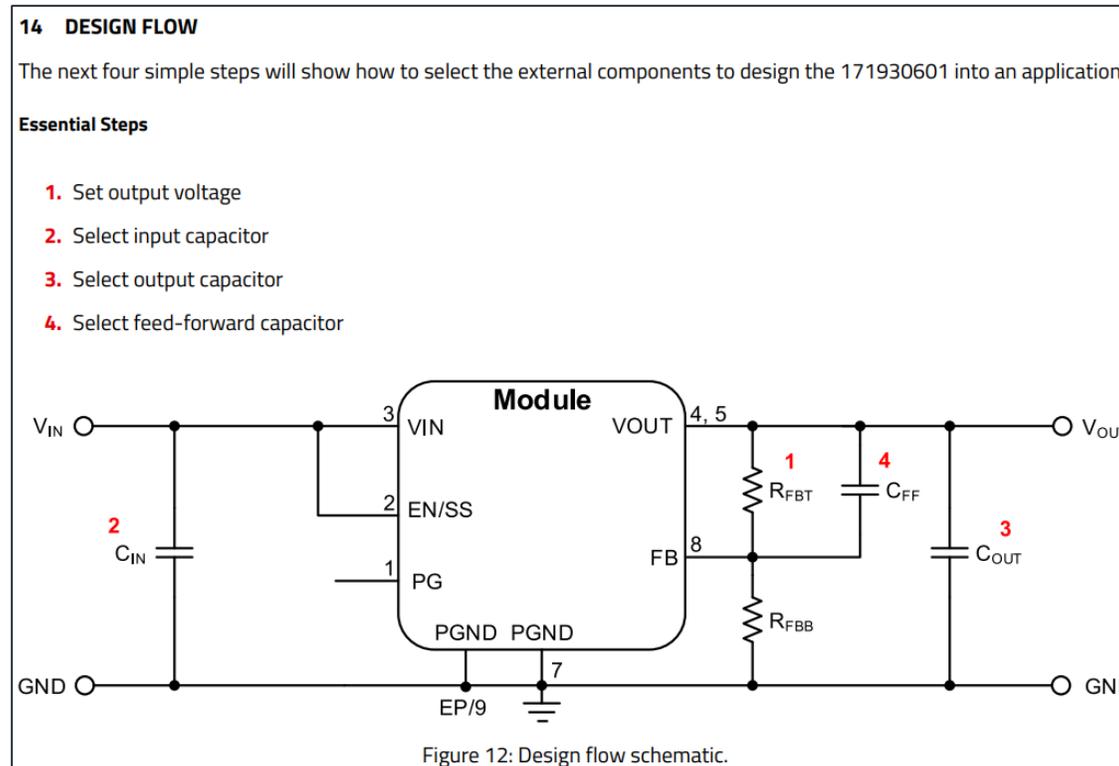


# MAGI<sup>3</sup>C MODULE DESIGNER

What are the benefits?

## Background:

The Magi<sup>3</sup>C Designer is based on the „DESIGN FLOW“ section that is an integral part of every Magi<sup>3</sup>C power module datasheet.



**Example: Datasheet screenshot 171930601**

# MAGI<sup>3</sup>C MODULE DESIGNER

What are the benefits?

## **Philosophy of the MagI<sup>3</sup>C Module Designer.**

*"Simplify and accelerate the design-in of power modules into the customer application.  
Generate the optimal circuit for the power module without detailed knowledge!"*

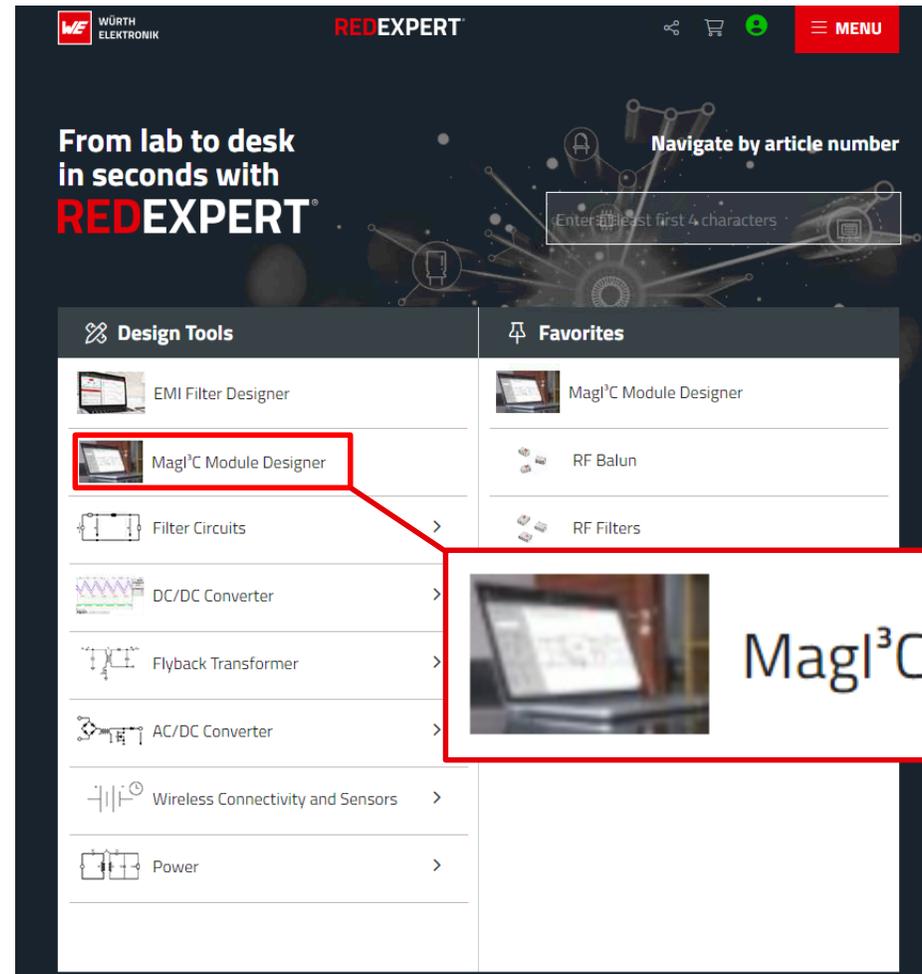
## **For what can you use the MagI<sup>3</sup>C Module Designer?**

- Set output voltage
  - Select input capacitor
  - Select output capacitor
  - Select feed-forward capacitor
  - Set switching frequency
  - Select soft start
  - ...
- 
- Adjustable parameters depend on the power module!
- The summary of the design can be downloaded in PDF format.
  - The BOM of the design can directly be sampled out of the tool.

→ The MagI<sup>3</sup>C Module Designer is currently not capable to select or design an EMC filter for a MagI<sup>3</sup>C Power Module

# MAGI<sup>3</sup>C MODULE DESIGNER

Where to find?



# MAGI<sup>3</sup>C MODULE DESIGNER

## Starting screen

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**My Magi<sup>3</sup>C Module Project**

PARAMETERS SIMULATION SUMMARY NEXT →

Use this application to design your Magi<sup>3</sup>C Power Module application and evaluate the realistic performance based on real components.

Title  
My Magi<sup>3</sup>C Module Project

**Application requirements**

Input Voltage (min)	12 V	Input Voltage (max)	12 V
Output Voltage	5 V	Output Current	200 mA
Isolation Voltage	<input type="checkbox"/> 1 kV		

**177920521**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

**177920524**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

**176920522**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

**1779205211**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

**1779205241**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

**1769205241**

Fixed Isolated SIP/SMT Module  
10.8 - 13.2V / 5V @ 0.2A

See more

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# MAGI<sup>3</sup>C MODULE DESIGNER

Starting screen section description

- 1** **Input parameters section of the application.**  
-> Here you define the input and output parameters of the power module
- 2** **Recommended suitable power modules for the chosen application parameters.**
- 3** **Navigation bar of the design flow.**  
→ Here you can see where you are in the design flow.

# MAGI<sup>3</sup>C MODULE DESIGNER

Example project

- 1 **Input parameters section of the application.**  
-> Here you define the input and output parameters of the power module

## Application parameters

Project name = High VIN range project

Input voltage (min) = 4V

Input voltage (max) = 36V

Output voltage = 3.3V

Output current = 200mA

Isolation voltage = n.a. (not ticked)

**Note:**  
 $V_{OUT} > V_{IN\ min}!$

# MAGI<sup>3</sup>C MODULE DESIGNER

## High VIN range project - Parameters

The screenshot displays the 'High VIN range project' in the 'PARAMETERS' tab of the 'Magi<sup>3</sup>C Module Designer' software. The interface includes a progress bar with 'PARAMETERS', 'SIMULATION', and 'SUMMARY' stages, and a 'NEXT' button. On the left, the 'Application requirements' section is highlighted with a red box and contains the following data:

Parameter	Value
Input Voltage (min)	4 V
Input Voltage (max)	36 V
Output Voltage	3.3 V
Output Current	200 mA
Isolation Voltage	<input type="checkbox"/> 1 kV

A red arrow points to the 'Input Voltage (min)' field with the note: **Note:  $V_{OUT} > V_{IN min}!$**

The 'Application parameters' section is also highlighted with a red box. Below the requirements, there are four suggested power modules, each with a circuit diagram and a PDF icon:

- 171930601**: Variable Step Down Micro Module, 3.5 - 36V / 1 - 6V @ 0.3A
- 171013801**: Variable Step Down LGA Module, 3.5 - 38V / 0.85 - 13V @ 1A
- 171033801**: Variable Step Down LGA Module, 3.5 - 38V / 0.85 - 6V @ 3A
- 171023801**: Variable Step Down LGA Module, 3.5 - 38V / 0.85 - 13V @ 2A

Red arrows point from the 'PDF' icons to the text 'Datasheet of the power module'. A large red arrow points from the 'NEXT' button to the text 'Starting the simulation'. A red box at the bottom right of the module selection area is labeled 'Suggested power modules'.

# MAGI<sup>3</sup>C MODULE DESIGNER

## High VIN range project - Simulation

The screenshot displays the 'High VIN range project' simulation interface. The top navigation bar includes 'PARAMETERS', 'SIMULATION' (active), and 'SUMMARY'. The left sidebar contains 'Input Parameters' and 'Module Parameters'. The main area shows a 'Typical circuit diagram with recommended component values' for a 'MagI<sup>3</sup>C-VDMM Variable Step Down Micro Module' (part number 171930601). The circuit diagram shows a 36.0 V input connected to the VIN pin (pin 3), with a 94.0 μF (2) input capacitor (C<sub>IN</sub>) to ground. The EN/SS pin (pin 2) is connected to ground. The PG pin (pin 1) is connected to ground. The PGND pins (pins 6 and 7) are connected to ground. The VOUT pins (pins 4 and 5) are connected to a 3.31 V output, with a 15.0 pF feedback capacitor (C<sub>FF</sub>) and a 331 nF output capacitor (C<sub>OUT</sub>) to ground. The feedback network consists of a 100 kΩ resistor (R<sub>FBT</sub>) connected to the VOUT pins and a 22.1 kΩ resistor (R<sub>FBB</sub>) connected to the FB pin (pin 8) and ground.

**Input Parameters**

- V<sub>in</sub> (min) 4.00 V
- V<sub>in</sub> (max) 36.0 V
- V<sub>out</sub> 3.30 V
- I<sub>out</sub> 200 mA

**Module Parameters**

- Order code 171930601
- Package LGA-8EP
- Series VDMM
- Height 1.80 mm
- Length 5.00 mm
- Width 2.50 mm

**Typical circuit diagram with recommended component values**

**Simulated values**

Results									
Efficiency	78.1 %	I <sub>in</sub> (max)	212 mA	I <sub>in</sub> (min)	23.5 mA	V <sub>out</sub>	3.31 V	V <sub>out</sub> ripple	33.1 mV
F <sub>sw</sub>	1.20 MHz	P <sub>out</sub>	662 mW						

# MAGI<sup>3</sup>C MODULE DESIGNER

## High VIN range project - Simulation

The screenshot displays the 'High VIN range project' simulation interface. The top navigation bar includes the Würth Elektronik logo, 'REDEXPERT' branding, and the title 'MagI<sup>3</sup>C Module Designer'. A progress bar shows the current step is 'SIMULATION', with 'PARAMETERS' and 'SUMMARY' also visible.

**Input Parameters:**

- Vin (min): 4.00 V
- Vin (max): 36.0 V
- Vout: 3.30 V
- Iout: 200 mA

**Module Parameters:**

- Order code: 171930601
- Package: LGA-8EP
- Series: VDMM
- Height: 1.80 mm
- Length: 5.00 mm
- Width: 2.50 mm

**Simulation Diagram:** A circuit diagram for a 'MagI<sup>3</sup>C-VDMM Variable Step Down Micro Module'. It shows a 36.0 V input connected to a capacitor C<sub>IN</sub> (94.0 μF (2)). The output is 3.31 V, connected to a capacitor C<sub>OUT</sub> (331 nF). Feedback components include R<sub>FBT</sub> (100 kΩ), R<sub>FBB</sub> (22.1 kΩ), and C<sub>FF</sub> (15.0 pF). A red text overlay states: 'Every red highlighted parameter can be manually selected.' A dropdown menu for R<sub>FBT</sub> is open, showing options: 100 kΩ (highlighted in red), 102 kΩ, 105 kΩ, 107 kΩ, and 110 kΩ. A red arrow points to the 105 kΩ option with the text: 'Example: Selection of different R<sub>FBT</sub>'. A tooltip above the dropdown indicates 'R<sub>FBT</sub> is AUTOSELECTED' and provides a 'Recommended calculated value: 100 kΩ'.

**Results:**

Parameter	Value	Parameter	Value	Parameter	Value	Parameter	Value	Parameter	Value
Efficiency	78.1 %	I <sub>in</sub> (max)	212 mA	I <sub>in</sub> (min)	23.5 mA	V <sub>out</sub>	3.31 V	V <sub>out</sub> ripple	33.1 mV
F <sub>sw</sub>	1.20 MHz	P <sub>out</sub>	662 mW						

# MAGI<sup>3</sup>C MODULE DESIGNER

## High VIN range project - Simulation

The screenshot displays the MAGI<sup>3</sup>C Module Designer interface for a High VIN range project. The simulation is in progress, showing a circuit diagram of a MagI<sup>3</sup>C-VDMM Variable Step Down Micro Module. The input voltage is 36.0 V, and the output voltage is 3.44 V. A pop-up window indicates that the feedback resistor (RFBT) is user-selected, with a value of 105 kΩ. The simulation results are shown in a table below the circuit diagram.

**Input Parameters**

- Vin (min): 4.00 V
- Vin (max): 36.0 V
- Vout: 3.30 V
- Iout: 200 mA

**Module Parameters**

- Order code: 171930601
- Package: LGA-8EP
- Series: VDMM
- Height: 1.80 mm
- Length: 5.00 mm
- Width: 2.50 mm

**Simulation Results**

Efficiency	78.1 %	Iin (max)	221 mA	Iin (min)	24.5 mA	Vout	3.44 V	Vout ripple	34.4 mV
Fsw	1.20 MHz	Pout	689 mW						

# MAGI<sup>3</sup> MODULE DESIGNER

## High VIN range project - Summary

**High VIN range project** ← BACK

PARAMETERS SIMULATION SUMMARY

### Summary

**Circuit Schematic**

**Specifications**

Project "High VIN range project"

**Input Parameters**

Vin (min)	4.00 V	Vin (max)	36.0 V
Iout	200 mA		

**Simulation Results**

Iin (min)	24.5 mA	Iin (max)	221 mA
Pout	689 mW	Vout	3.44 V
Efficiency	78.1 %	Vout ripple	34.4 mV
Fsw	1.20 MHz		

**Technical Resources**

**EDA Design example**

- Altium

**EDA Models**

- Altium
- Eagle

**CAD Files**

- IGS
- STP

[Download all files](#)

**Bill of Materials**

#	Ref. Des.	Order Code	Properties	Mount	Qty	Datasheet
1	U1	171930601	3.5 - 36V / 1 - 6V @ 0.3A Variable Step Down Micro Module Package = LGA-8EP		1	
2	Rfbb		Resistance = 22.1 kΩ		1	
	Rfbt		Resistance = 105 kΩ		1	

**Package**

**Dimensions**

**Print** **Free samples**

Create a summary report as PDF  
Order directly the BOM as samples

# MAGI<sup>3</sup>C MODULE DESIGNER

## High VIN range project - Summary – Sample order

**High VIN range project** ← BACK

PARAMETERS SIMULATION SUMMARY

### Summary

#### Circuit Schematic

#### Specifications

Project "High VIN range project"

#### Input Parameters

Vin (min) 4.00 V  
Iout 200 mA

#### Simulation Results

Iin (min) 24.5 mA  
Pout 689 mW  
Efficiency 78.1 %  
Fsw 1.20 MHz

#### Output Parameters

Vin (max) 36.0 V  
Iin (max) 22.1 mA  
Vout 3.44 V  
Vout ripple 34.4 mV

#### Bill of Materials

#	Ref. Des.	Order Code	Properties	Mount	Qty	Datasheet
1	U1	171930601	3.5 - 36V / 1 - 6V @ 0.3A Variable Step Down Micro Module Package = LGA-8EP		1	
2	Rfbb		Resistance = 22.1 kΩ		1	
	Rfbt		Resistance = 105 kΩ		1	

#### Package

#### Dimensions

- Free samples
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171930601	X	1	+
870575774003	X	2	+
885012209044	X	1	+
885012007001	X	1	+

Download all files



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Wireless Connectivity and Sensors >	
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MagI<sup>3</sup>C Module Designer



# Questions

## & Answers



We are here for you now!  
Ask us directly via our chat or via E-Mail.

[digital-we-days@we-online.com](mailto:digital-we-days@we-online.com)  
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