



## Reference Design Note



### MagI<sup>3</sup>C Power Modules

#### DNS004 MagI<sup>3</sup>C Current Source

## 2. Specifications

### Electrical Specifications

▪ Input Voltage Range	4V – 18V
▪ Input Voltage Transients	Max. 20V
▪ Output Voltage Range	0V – 17V
▪ Output Current Limit	0A – 3A
▪ Maximum Output Power	51W
▪ Switching Frequency	850kHz

### Features

▪ Adjustable Vout Limit	1.45 / 3.6 / 4.1 / 4.1 / 6.8 / 14.4V
▪ Adjustable Iout limit	0.35 / 0.7 / 1.05 / 1.5 / 2 / 3A
▪ External Iout control	0-3.3Vdc or PWM

## 3. Functional Diagram

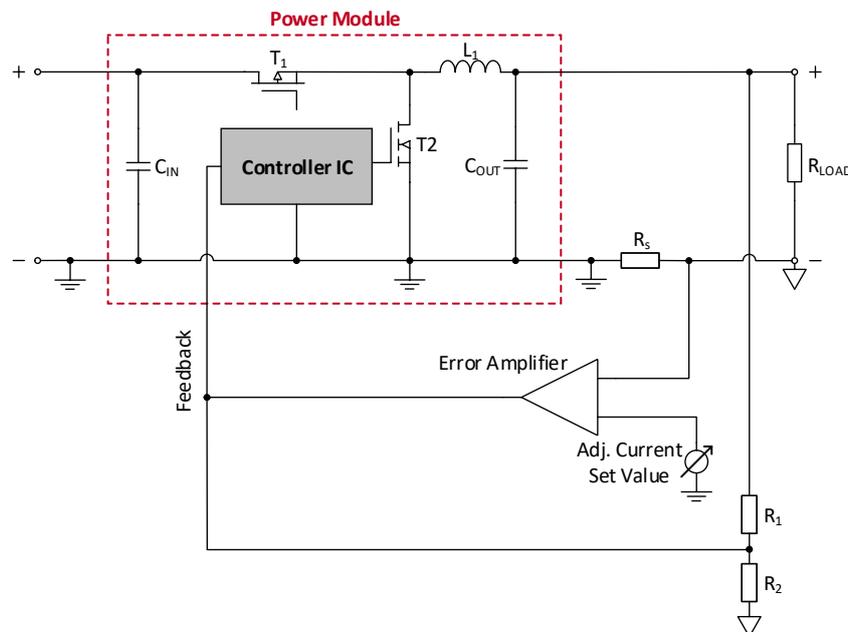


Figure 2. Functional Diagram

The output voltage of the MagI<sup>3</sup>C Power Module is defined by the resistor divider  $R_1$  and  $R_2$ .  $R_2$  can be changed by the jumper on the reference design. This adjusted output voltage is the maximum possible voltage which is achievable at the output when the output current is lower than the adjusted current limit, or if the output is not connected to a load.

The output current is measured by  $R_s$  and compared with an internal reference by the external error amplifier. This external error amplifier interacts with the feedback of the power module in a way that the adjusted output current is not exceeded. The output current is maintained to the adjusted set value.

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### 4. Schematic

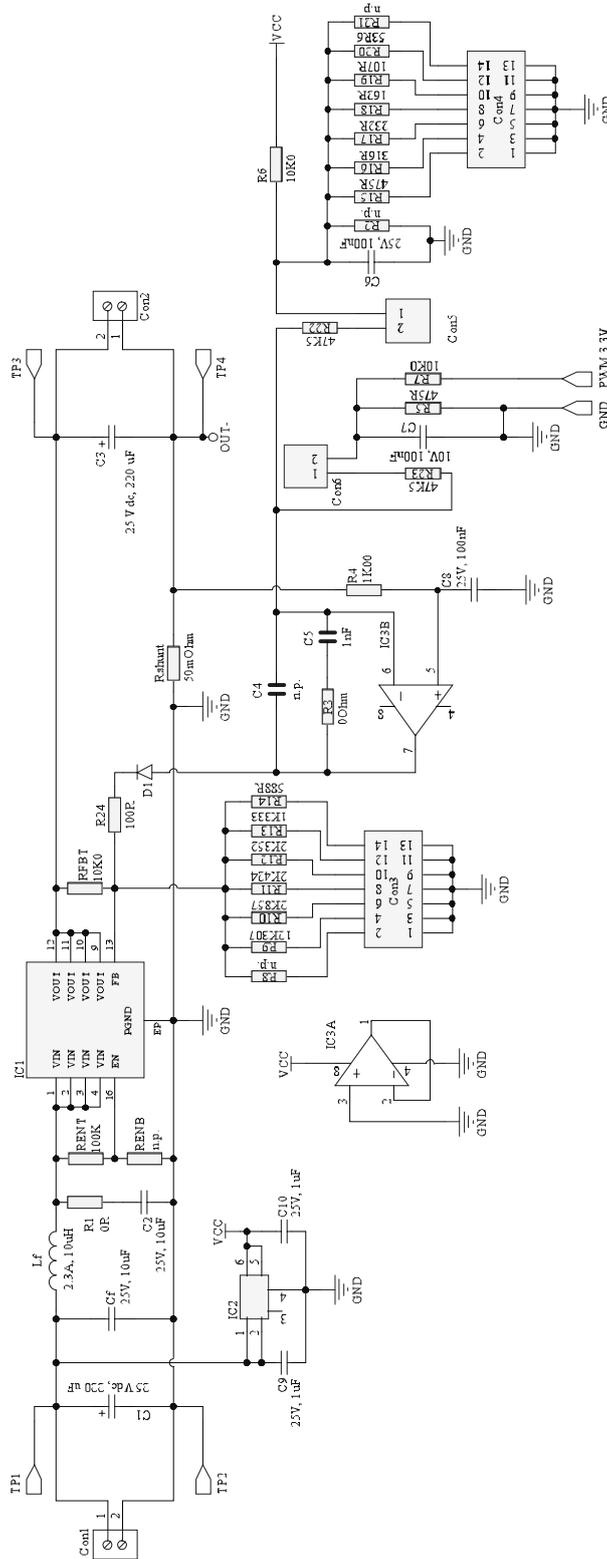


Figure 3. Schematic



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## 6. Bill of Material

Designator	Value	Description	Quantity	Package	Manufacturer	Order Code
C1,C3	330μ/25V	Electrolytic Capacitor	2		Würth Elektronik	860010474012
C2	22μ/25V/X5R/20%	Ceramic Capacitor	1	1210	Würth Elektronik	885012109014
C4	Not placed			0402		
C5	1n0/50V/X7R/10%	Ceramic Capacitor	1	0402	Würth Elektronik	885012205061
C6,C8	100n/25V/X7R/10%	Ceramic Capacitor	2	0402	Würth Elektronik	885012205018
C7	100n/10V/X7R/10%	Ceramic Capacitor	1	0805	Würth Elektronik	885012207016
C9,C10	1μ/25V/X5R/20%	Ceramic Capacitor	2	0603	Würth Elektronik	885012106022
CF	10μ/25V/X7R/10%	Ceramic Capacitor	1	1210	Würth Elektronik	885012209028
R1	0Ω	Resistor	1	0805	Rohm Semiconductor	TRR10EZPJ000
R2	1.21kΩ /1%/TK100	Resistor	1	0805	Rohm Semiconductor	MCR10ERTF1211
R3	0Ω	Resistor	1	0402	Rohm Semiconductor	PMR01ZZPJ000
R4	1.00kΩ /1%/TK100	Resistor	1	0402	Rohm Semiconductor	ESR01MZPF1001
R5,R15	475Ω/1%/TK100	Resistor	2	0805	Rohm Semiconductor	MCR10ERTF4750
R6, RFBT	10.0kΩ/1%/TK100	Resistor	1	0402	Rohm Semiconductor	TRR01MZPF1002
R7	10.0kΩ/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF1002
R8	not placed	Resistor	1	0805		
R9	12.4kΩ/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF1242
R10,R12	2.37kΩ/1%/TK100	Resistor	2	0805	Rohm Semiconductor	KTR10EZPF2371
R11	2.43kΩ/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF2431
R13	1.33kΩ/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF1331
R14	590Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF5900
R16	316Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF3160
R17	232Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	SFR10EZPF2320
R18	162Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF1620
R19	107Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF1070
R20	53.6Ω/1%/TK100	Resistor	1	0805	Rohm Semiconductor	KTR10EZPF53R6
R21	not placed		1	0805		
R22,R23	47.5kΩ/1%/TK100	Resistor	2	0603	Rohm Semiconductor	TRR03EZPF4752
R24	100Ω/1%/TK100	Resistor	1	0402	Rohm Semiconductor	TRR01MZPF1000
RENT	100kΩ/1%/TK100	Resistor	1	0402	Rohm Semiconductor	TRR01MZPF1003
RENB	not placed		1	0402		
RSHUNT	50mΩ	Shunt Resistor	1	2010	Isabellenhütte	VMP-R050-1.0
LF	4.7μ	Inductor WE-PD2	1	7850	Würth Elektronik	744775047
D1	BAS70	Diode	1	0402	Diodes Inc.	BAS70LP-7B
IC1	171031801	MagI <sup>3</sup> C Power Module	1	LGA16	Würth Elektronik	171031801
IC2	MAX15006A	Linear Regulator	1	6TDFN	Maxim	MAX15006AATT
IC3	LM258	Operational Amplifier	1	DFN8	ST Microelectronics	LM258QT
CON1,CON2		Terminal Block	2		Würth Elektronik	691502710002
CON3,CON4		Pin Header 2*7	2		Würth Elektronik	61301421121
CON5,CON6		Pin Header 1*2	2		Würth Elektronik	61300211121
TP1-TP6		Test Pin	6		Stelvio Kontek	3110325000500
J1,J2,J3		Jumper	3		Würth Elektronik	609976302001

Figure 5. Bill of Material

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## 7. Important Notes

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Application Notes / Reference Design Notes  
<https://www.we-online.com/app-notes>

REDEXPERT Design Tool  
<https://www.we-online.com/redexpert>

Toolbox  
<https://www.we-online.com/toolbox>

MagI<sup>3</sup>C Product Catalog  
<https://katalog.we-online.com/en/pm>

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