DC-DC Converters 1 and 2 Watt

ICR 1: 1 or 2 outputs
IWR 1: 1 to 4 outputs
IWR 2: 1 output

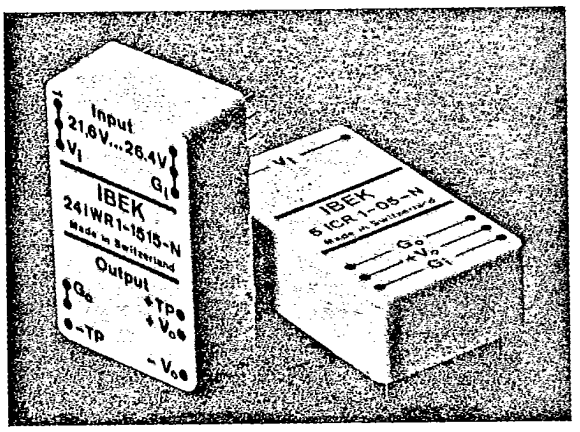
with input to output isolation

with input filter

Input : 5, 12, 15, 24, 28, 48 V DC

Outputs: 5, 12, 15 V DC

Combinations of output voltages
see Block Diagrams page 5
and Type Survey page 3



Description

The DC-DC converters have been developed as a response to the increasing need for decentralised power supply systems. They are especially suitable to power small loads on pcbs. At the same time they are an ideal element to realize redundant systems. The DC-DC converters feature low output ripple, low module height, high quality and reliability. To minimize feedback effects in the supply system, the modules are equipped with a low-pass input filter.

Features

- Input filter
- High efficiency (typ 58 %)
- High reliability
- Optimal dynamic characteristics
- Height of 10.5 mm only
- No derating

Benefits

- low noise level
- low heat generation
- MTBF = 350 000 h (T_A = +40 °C, G_F)
- excellent dynamic load behaviour
- compact circuitry and system design
- full load capability over the specified ambient temperature range

Applications

Power supply for Op-Amps, A/D- and D/A-converters
Power supply for µPs, RAMs, PROMs, opto-electronic systems

Type Designation Key

Example:

24 IWR 1-2x0505-N

- 24 — Nominal input voltage $U_{i\ nom}$
- IWR — Family
- 1 — Nominal output power
- 2 — Double positive/negative output
- 05 — Nominal output voltage $U_{o\ nom}$
- N — Operating ambient temperature range T_A

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Type Survey

$U_{i\ nom}$	Typ	$U_{o1\ nom}$	$I_{o1\ nom}$	$U_{o2\ nom}$	$I_{o2\ nom}$	Group [5]
12 V	12 IWR 2-12-. [4]	12 V	167 mA	–	–	01
15 V	15 IWR 2-15-. [4]	15 V	133 mA	–	–	
5 V	.. IWR 1-05-. [3]	5 V	200 mA	–	–	
	.. IWR 1-12-.	12 V	80 mA	–	–	
	.. IWR 1-15-.	15 V	66 mA	–	–	
5 V	.. IWR 1-0505-.	± 5 V	±50 mA	–	–	02
	.. IWR 1-1205-.	+12 V/-5 V	±40 mA	–	–	
	.. IWR 1-1212-. [1]	±12 V	±40 mA	–	–	
	.. IWR 1-1515-. [1]	±15 V	±33 mA	–	–	
12 V	.. IWR 1-05-05-. [3]	5 V	100 mA	5 V	100 mA	03
	.. IWR 1-05-12-. [3]	5 V	100 mA	12 V	40 mA	
	.. IWR 1-05-15-. [3]	5 V	100 mA	15 V	33 mA	
	.. IWR 1-12-12-. [1]	12 V	40 mA	12 V	40 mA	
	.. IWR 1-15-15-. [1]	15 V	33 mA	15 V	33 mA	
24 V	.. IWR 1-05-1212-. [1][4]	5 V	40 mA	±12 V	±33 mA	04
	.. IWR 1-12-1212-. [1][2][4]	12 V	28 mA	±12 V	±28 mA	
	.. IWR 1-15-1212-. [1][2][4]	15 V	26 mA	±12 V	±26 mA	
	.. IWR 1-05-1515-. [1][4]	5 V	40 mA	±15 V	±26 mA	
	.. IWR 1-12-1515-. [1][2][4]	12 V	24 mA	±15 V	±24 mA	
	.. IWR 1-15-1515-. [1][2][4]	15 V	22 mA	±15 V	±22 mA	
28 V	.. IWR 1-2x0505-. [4]	± 5 V	±50 mA	± 5 V	±50 mA	05
	.. IWR 1-2x1212-. [1][2][4]	±12 V	±20 mA	±12 V	±20 mA	
	.. IWR 1-2x1515-. [1][2][4]	±15 V	±17 mA	±15 V	±17 mA	
28 V	.. ICR 1-05-. [3]	5 V	200 mA	–	–	06
	.. ICR 1-12-.	12 V	80 mA	–	–	
	.. ICR 1-15-.	15 V	66 mA	–	–	
48 V [4]	.. ICR 1-1212-. [1] [2]	±12 V	±40 mA	–	–	07
	.. ICR 1-1515-. [1] [2]	±15 V	±33 mA	–	–	
	.. ICR 1-12-12-.	12 V	40 mA	12 V	40 mA	08
	.. ICR 1-15-15-.	15 V	33 mA	15 V	33 mA	

.. see Type Designation Key page 2 and table below

Maximum Ratings

Characteristic		5I..1	12I.1	12I.2	15I.2	24I.1	28I.I	48I.1
Admissible input voltage $U_{i\ abs}$ without defect (max 60 s)	min	0 V	0 V	0 V	0 V	0 V	0 V	0 V
	max	6.25V	15 V	15 V	16 V	30 V	35 V	60 V
Operating input voltage U_i	min	4.75V	10.8V	11.9V	14.9V	21.6V	25.2V	43.2V
	max	5.25V	13.2V	12.1V	15.1V	26.4V	30.8V	52.8V
Storage temperature T_S		suffix N -40 °C....+85 °C suffix T -40 °C....+105°C suffix S -55 °C....+105°C						
Operating ambient temperature T_A		suffix N 0 °C....+71 °C suffix T -25 °C....+71 °C suffix S -40 °C....+85 °C						

[1] The Output current of one output may be increased by 25 % if the output current of the other output is reduced by 25 % at the same time.
Example: 5 IWR 1-1515-N
The output current of 33 mA at +15 V may be increased to 41 mA if the -15 V output is reduced to 25 mA.

[2] The output current of both outputs of the 12, 24, 28 and 48 V input types may be increased by 20 % of $I_{o\ nom}$. Additionally note [1] is applicable.
Example: 12 IWR 1-15-1212-N: I_{o1} = 37 mA, I_{o2} = ±24 mA
24 IWR 1-2x1212-N : I_{o1} = +29 mA/-19 mA, I_{o2} = +19 mA/-29 mA
or: I_{o1} = ±19 mA, I_{o2} = ±29 mA

[3] **Important:** The 5 V outputs need an external tantalum electrolytic capacitor with a value of at least 22 µF, 10 V.

[4] Temperature range N or T available only.

[5] See Block Diagrams page 5

Electrical Data

T_A = +25 °C

Characteristic		Conditions	5I..	12I..	15I..	24I..	28I..	48I..
No load input current $I_{i\,0}$	typ max	$U_{i\,nom}$, I_o = 0	85mA 110mA	35mA 45mA	28mA 37mA	15mA 23mA	17mA 20mA	8mA 12mA
RFI voltage at the input $u_{i\,rfi}$	typ	$U_{i\,nom}$, $I_{o\,nom}$ $L_{source} \approx 1\ \mu H$	50 mV_{pp}	80 mV_{pp}	90 mV_{pp}	100 mV_{pp}	130 mV_{pp}	200 mV_{pp}
RFI current at the input $i_{i\,rfi}$	typ		10 mA_{pp}					
Switching freq. f_s	typ	$U_{i\,nom}$, $I_{o\,nom}$	25 kHz					
Impulse voltage withstand test		IEC 255.4	IWR Class III: 5 kV (1.2/50; 500Ω)					
		Appendix E	ICR Class II: 1 kV (1.2/50; 500Ω)					
Isolation test voltage U_{is} input to outputs and output 1 to output 2		input short-circuited as well as outputs short-circuited	all IWR 3 kV_{pp}					
			all ICR 500 V_{pp}					
Coupling Cap. C_{io}	typ		all IWR 10 pF, all ICR 20 pF					
Isolation resistance R_{is}	typ	100 V DC after 1 min	2000 MΩ					
Output voltage U_o	min nom max	$U_{i\,nom}$, $I_{o\,nom}$	$U_{o\,nom}$ -5 % $U_{o\,nom}$ $U_{o\,nom}$ +5 %					
Temp. coefficient α_{Uo}		$U_{i\,nom}$, $I_{o\,nom}$	± 0.02 %/K					
Static control deviation versus input voltage $\Delta U_{o\,U}$	typ	$U_{i\,min}$...$U_{i\,max}$ $I_{o\,nom}$	± 0.2 % [1]					
Static control deviation versus output current $\Delta U_{o\,I}$	typ	$U_{i\,nom}$ I_o = 0...$I_{o\,nom}$	± 0.1 % [2]					
Output ripple (BW = 20 MHz) u_o	typ	$U_{i\,nom}$ $I_{o\,nom}$	25 mV_{pp}	35 mV_{pp}	40 mV_{pp}	45 mV_{pp}	50 mV_{pp}	55 mV_{pp}
Efficiency η	min typ		50 % 58 %					

[1]) for 5 V outputs: typ ±0.3 %

[2]) for 5 V outputs: typ ±0.8 %

Pin Configuration see page 5 and table below

Group	1	2	3	8	10	11	12	13	14	15	16	17	22	23	24
01	Vi	Vi	Vi	-	-	-	Go	Vo	-	-	-	+TP	Gi	Gi	Gi
02	Vi	Vi	Vi	-	Go	Go	-TP	-Vo	-	+Vo	+TP	-	Gi	Gi	Gi
03	Vi	Vi	Vi	Go1	-	-	Vo1	Vo2	-	-	Go2	-	Gi	Gi	Gi
04	Vi	Vi	-	-	Go1	-	Vo1	+Vo2	-	Go2	-	-Vo2	-	Gi	Gi
05	Vi	Vi	-	-Vo1	Go1	-	+Vo1	+Vo2	-	Go2	-	-Vo2	-	Gi	Gi
06	Vi	-	-	-	Go	Vo	Gi	Gi	Vo	Go	-	-	-	-	Vi
07	Vi	-Vo	Go	-	Go	+Vo	Gi	Gi	+Vo	Go	-	-	Go	-Vo	Vi
08	Vi	Go2	Vo2	-	Go1	Vo1	Gi	Gi	Vo1	Go1	-	-	Vo2	Go2	Vi

Mechanical Data

same as Family LCR, LWR, page 8

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Block Diagrams

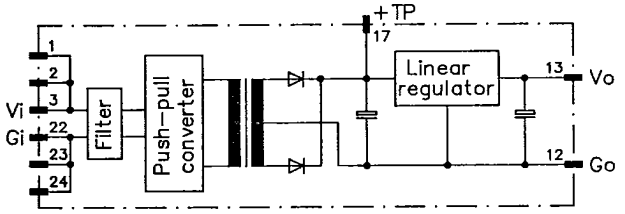

Fig. 1
IWR Group 01

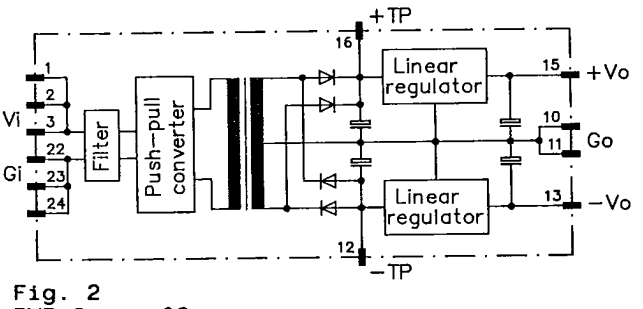

Fig. 2
IWR Group 02

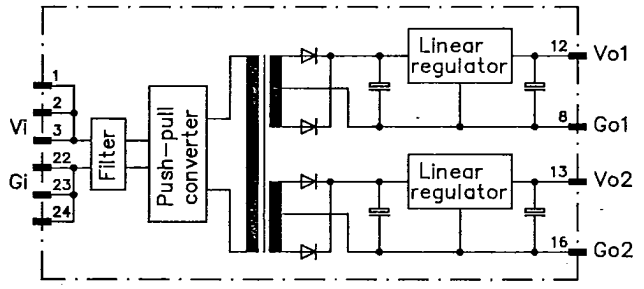

Fig. 3
IWR Group 03

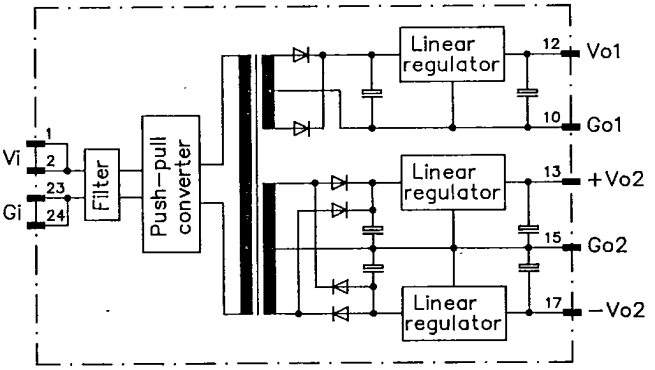

Fig. 4
IWR Group 04

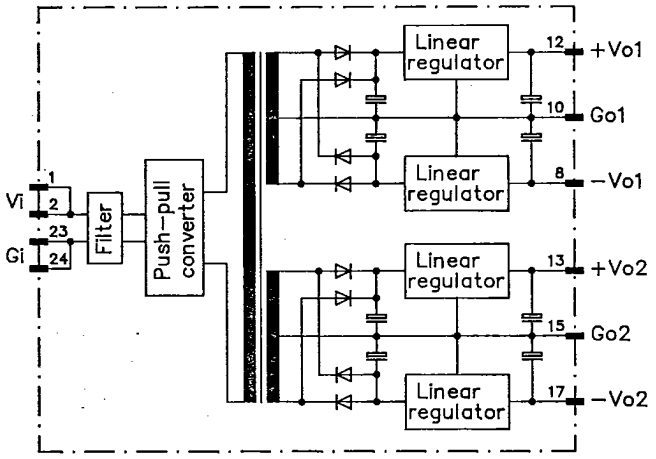

Fig. 5
IWR Group 05

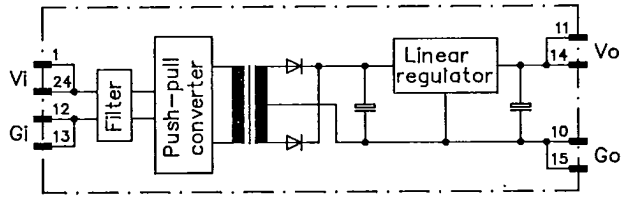

Fig. 6
ICR Group 06

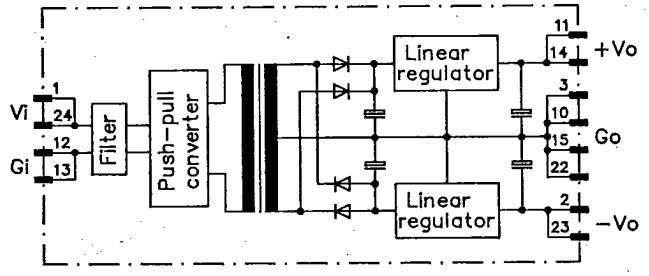

Fig. 7
ICR Group 07

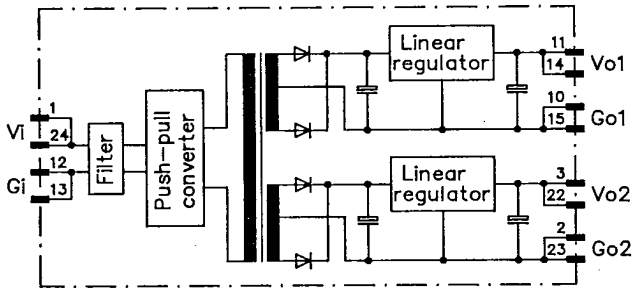

Fig. 8
ICR Group 08