

# OC1-SC

DC/DC Regulator  
Single Output

# 5-15W

The OC1-series is a non-insulating, low cost and highly efficient DC/DC regulator. This series is suitable as a replacement for series bus (three-terminal regulator) when overheating problems arise. The chopper method allows for high efficiency regardless of input voltage.



## Features

Wide input voltage range (10.2-56Vdc)  
High efficiency & reliability  
Switching frequency: 160kHz (fix)  
MTBF: 1.5 million hours  
Warranty: 3 years

## Mechanical features

Dimensions (WxLxH): 21.4x32x10mm  
Weight: 8g  
Open frame type

## Possible applications

Office equipment  
Telecommunications  
Industrial electronics & machines  
Automation  
Robotics  
Household appliances & equipment

## Control features

Over current protection: Current limiting, auto recovery  
Over voltage protection: Zener diode limiting



Specifications<DC/DC>	Model							
OC1**SC1224/48 SINGLE	OC1-3.3SC1224		OC1-0SC1224		OC1-06SC1224		OC1-24SC48	
<b>Input Characteristics</b>								
Input Voltage DC[V]	12	24	12	24	12	24	48	
Input Range DC[V]	10.2 to 32							
Inrush Current [A]	Not specified							
Input Range								
at no load [mA](typical)	4	5	5	3	5	3	5	
at full load[mA](typical)	814	416	639	355	814	416	645	
Input Current when Remote control is off	0.2	0.56	0.24	0.6	0.24	1.15	0.56	
Line Back Noise [mVp-p](typical)			1	1	1	1	3	
Efficiency [%] (typical) *1	78	75	84	82	86	84	93	
<b>Output Characteristics</b>								
Output Voltage [V]	3.3		5		6		24	
Output Current [A]	1.4		1.4		1.4		1.2	
Voltage Tolerance +/-[mV](maximum)	100		150		180		720	
Ripple and Noise [mVp-p](maximum) *2	200							
<b>Regulation</b>								
a. Static Line Regulation [mV](maximum)	18		25		30		120	
b. Dynamic Line Regulation +/-[mV](maximum) *3	500		600		600		400	
c. Static Load Regulation +/-[mV](maximum) *4	18		25		30		120	
d. Temperature Coefficient *5	0.03%/°C(maximum) at temperature -20 to +71°C							
e. Drift[mV](maximum) *6	30		40		45		135	
f. Dynamic Load Regulation +/- [mV](maximum) *7	200							
g. Recovery Time *3,*7	5mS(typical)							
Rise up time	5mS(maximum) at rated input/output							
Hold up time	Not specified							
<b>Over current Protection</b>								
Current Limiting with automatic recovery								
> 110% of Rated Output Current [A]	1.54		1.54		1.54		1.54	
Over voltage Protection	6		6		7.5		12	
Remote Control	Turn on by inputing voltage(4.5 to 56V) between "RC"pin and "0V"pin .Put a 5k ohm resistor between "+ in"pin and "RC"pin when remote on/off is not used							
Remote Sense	Not available							
Trimming of output voltage[mV]	Not available							
Input Fuse	Installed[2A]							
<b>Environmental</b>								
Operating Temperature	-20 to + 71°C							
(derating)	2%/°C(50°C to 71°C) (out of warranty>71°C)							
Operating Humidity	20-90%/RH(non-condensing)							
Storage Temperature	-20 to +85°C							
Storage Humidity	20 to 90%/RH(non-condensing)							
Vibration	5-10Hz:10mm double amplitude,10-55Hz:2G,3minutes' period for 30minutes each along X,Y,Z axes(non-operating)							
Shock	30G							
Cooling	Convection							
Weight (typical)	open board type:8g							

Conditions:

\*1 at 25°C and rated input/output

\*2 measured by a bayonet probe at the output connector at a 0 to 100MHz bandwidth

\*3 when input voltage is changed from 10.2V to 32V rapidly at rated output

\*4 when output current is changed from 0mA to rated current keeping the current of other channel below minimum rated current at rated input

\*5 at -20 to +71°C

\*6 for 7hours from 1hour after switch-on at 25°C and rated input/output

\*7 when output current is changed from 25% of rated current to 75% rapidly at rated input

input



Specifications<DC/DC>	Model													
	OC1**SC2448 SINGLE		OC1-3.3SC2448		OC1-05SC2448		OC1-06SC2448		OC1-09SC2448		OC1-12SC2448		OC1-15SC2448	
<b>Input Characteristics</b>														
Input Voltage DC[V]	24	48	24	48	24	48	24	48	24	48	24	48	24	48
Input Range DC[V]	20.4 to 56													
Inrush Current [A]	Not specified													
Input Range														
at no load [mA](typical)	4	5	2	2	2	2	3	2	4	4	6	4		
at full load[mA](typical)	260	139	355	187	416	218	596	312	714	369	806	416		
Input Current when Remote control is off	0.39	0.9	0.42	0.93	0.42	0.92	0.37	0.9	0.34	1.47	0.2	1.5		
Line Back Noise [mVp-p](typical)	1	1	1	1.3	1.2	1.3	1.5	2	1.5	2.0	1.5	2.5		
Efficiency [%] (typical) *1	74	69	81	78	84	80	88	85	91	88	93	90		
<b>Output Characteristics</b>														
Output Voltage [V]	3.3		5		6		9		12		24			
Output Current [A]	1.4		1.4		1.4		1.4		1.3		1.2			
Voltage Tolerance +/-[mV](maximum)	100		150		180		270		360		450			
Ripple and Noise [mVp-p](maximum) *2	200													
Regulation														
a. Static Line Regulation [mV](maximum)	18		25		30		45		60		75			
b. Dynamic Line Regulation +/-[mV](maximum) *3	500		600		600		600		1000		1000			
c. Static Load Regulation +/-[mV](maximum) *4	18		25		30		45		60		75			
d. Temperature Coefficient *5	0.03%/°C (maximum)													
e. Drift[mV](maximum) *6	30		40		45		60		75		90			
f. Dynamic Load Regulation +/- [mV](maximum) *7	200													
g.Recovery Time *3,*7	5mS(typical)													
Rise up time	5mS(maximum) at rated input/output													
Hold up time	Not specified													
<b>Functions</b>														
Over current Protection	Current Limiting with automatic recovery													
> 110% of Rated Output Current [A]	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.43	1.32				
Over voltage Protection	6	6	7.5	12	15	18								
Remote Control	Turn on by inputting voltage(4.5 to 56V) between "RC"pin and "0V"pin .Put a 5k ohm resistor between "+ in"pin and "RC"pin when remote on/off is not used													
Remote Sense	Not available													
Trimming of output voltage[mV]	Not available													
Input Fuse	Installed[2A]													
<b>Environmental</b>														
Operating Temperature (derating)	-20 to +71°C 2%/°C (50°C to 71°C) (out of warranty>71°C)													
Operating Humidity	20-90%/RH(non-condensing)													
Storage Temperature	-20 to +85°C													
Storage Humidity	20 to 90%/RH(non-condensing)													
Vibration	5-10Hz:10mm double amplitude,10-55Hz:2G,3minutes' period for 30minutes each along X,Y,Z axes(non-operating)													
Shock	30G													
Cooling	Convection													
Weight (typical)	open board type:8g													

Conditions:

\*1 at 25°C and rated input/output

\*2 measured by a bayonet probe at the output connector at a 0 to 100MHz bandwidth

\*3 when input voltage is changed from 20.4V to 56V rapidly at rated output

\*4 when output current is changed from 0mA to rated current keeping the current of other channel below minimum rated current at rated input

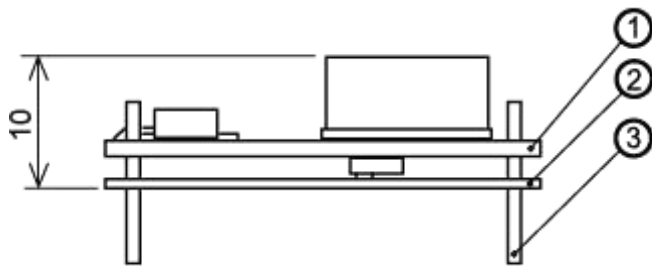
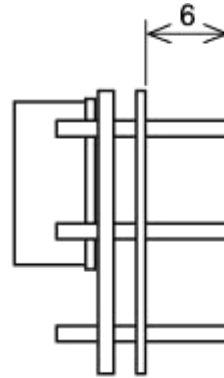
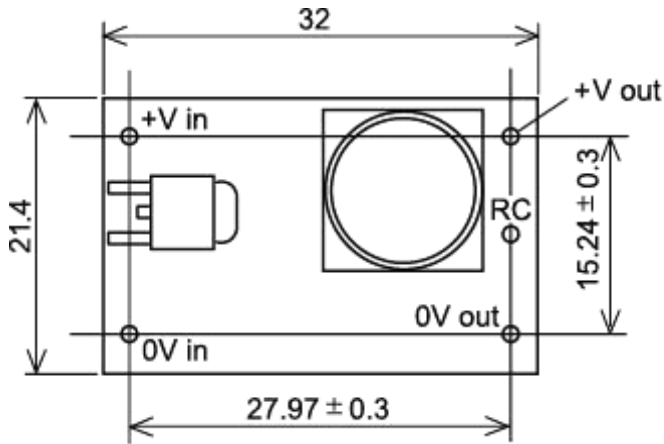
\*5 at -20 to +71°C

\*6 for 7hours from 1hour after switch-on at 25°C and rated input/output

\*7 when output current is changed from 25% of rated current to 75% rapidly at rated input



**Dimensions:**



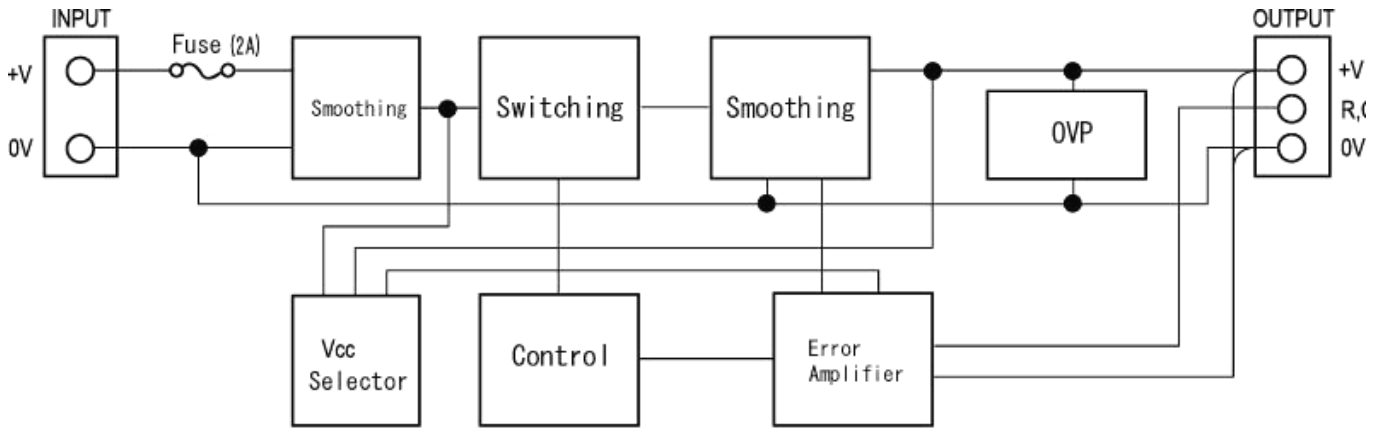
- ① Double-sided PCB FR4t=1.0
- ② t=0.5 Insulator UL94V0
- ③ 1.0DIA PIN Material:BsB 2700 1/2H

Solder Plating  
\*Tolerance  $\pm 0.5$

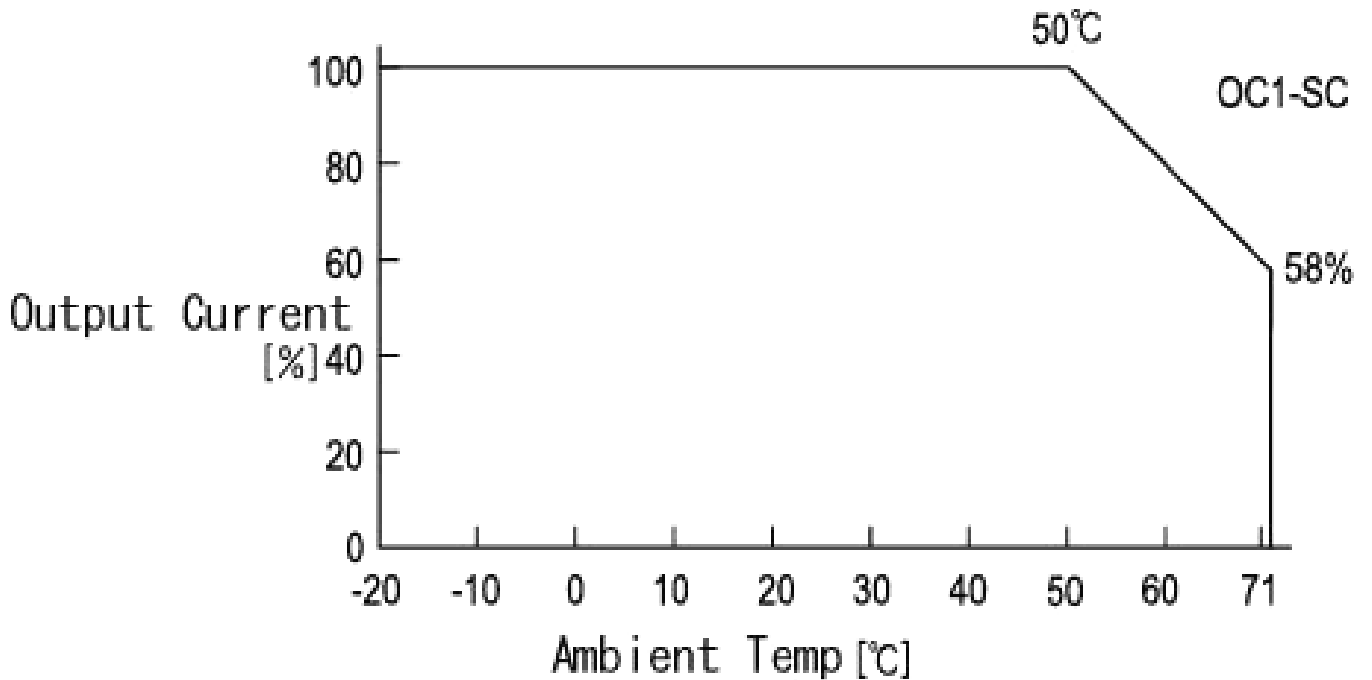
No.:	Function
1	+Vout
2	RC
3	0Vout
4	0Vin
5	+Vin



### Block Diagram

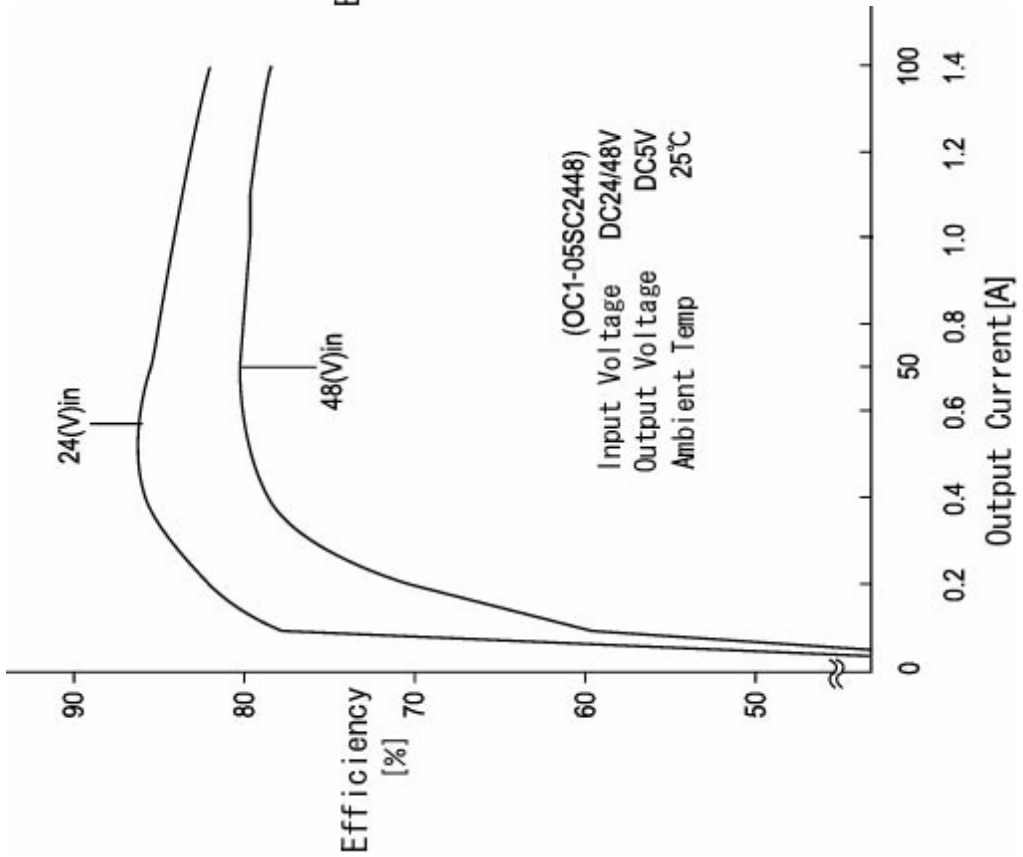
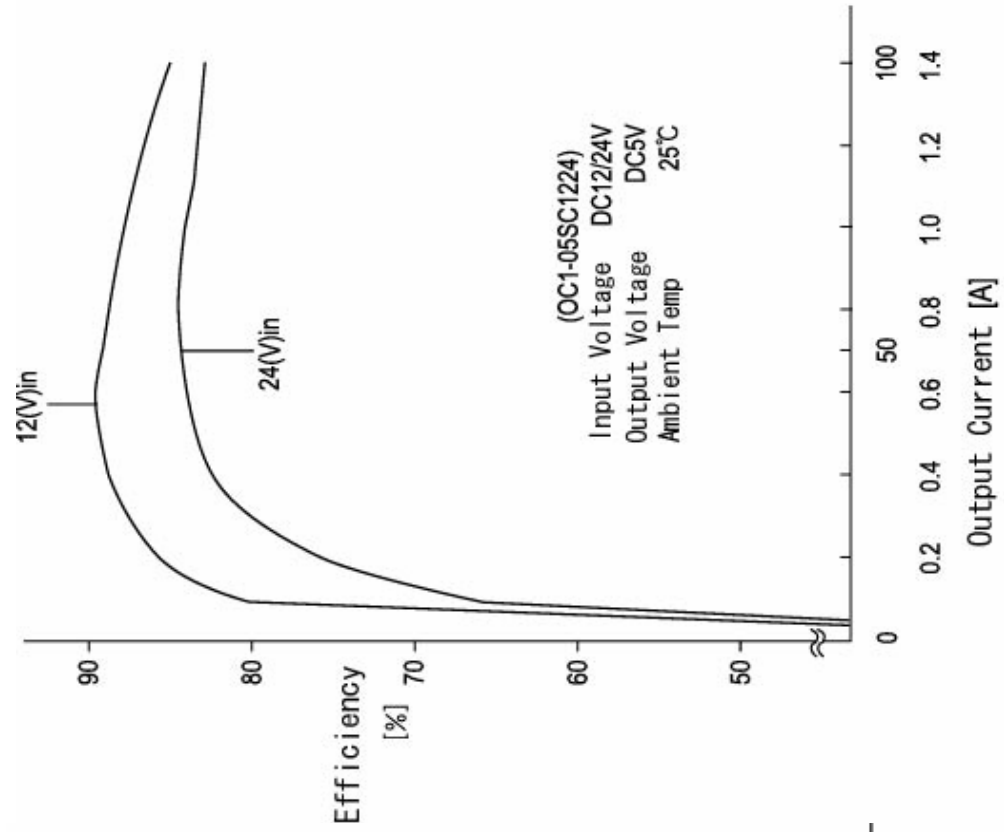


### Derating

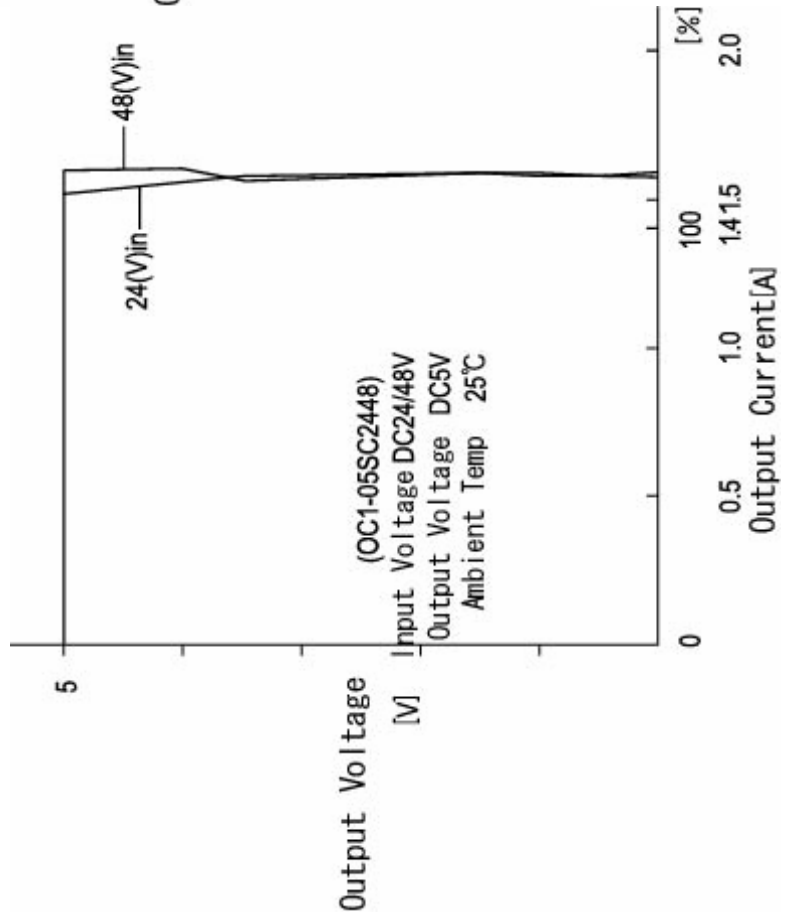
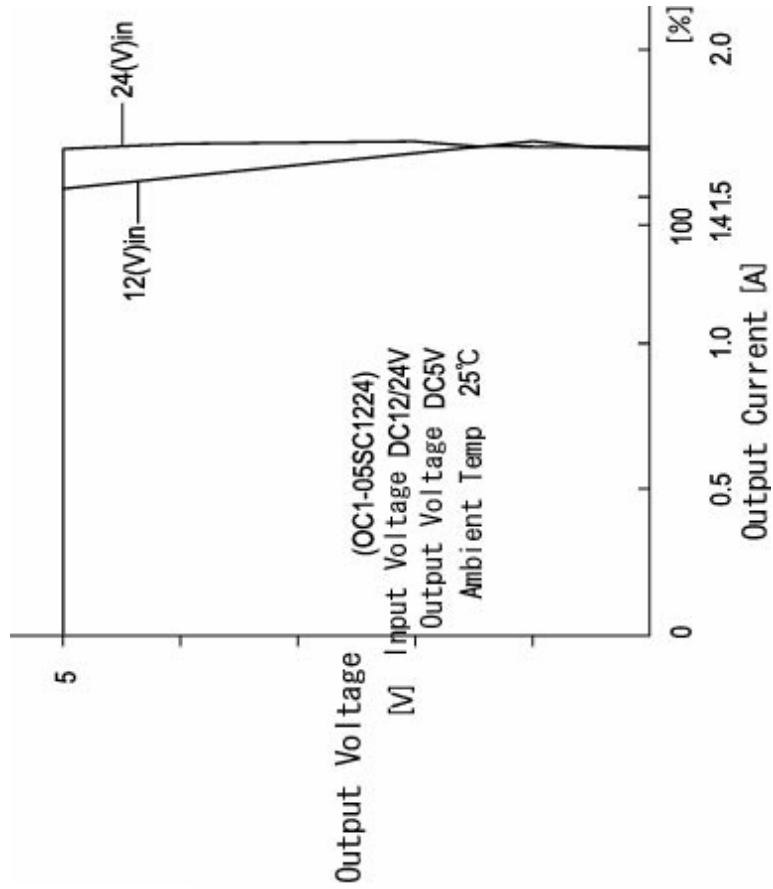




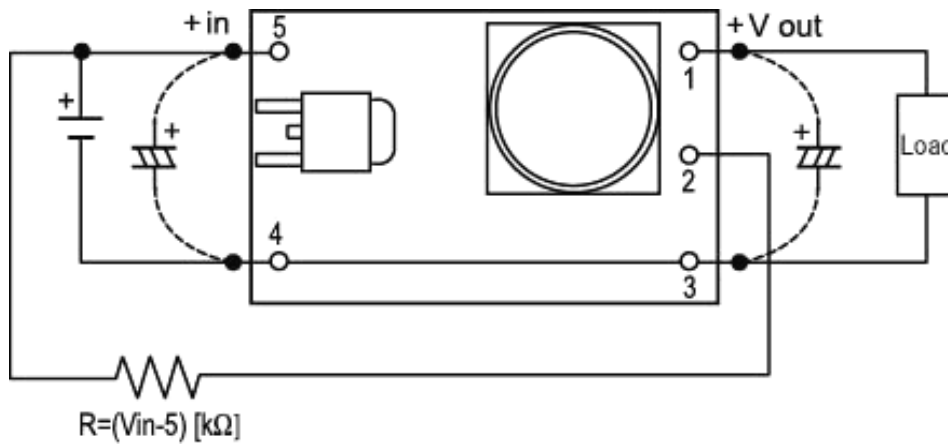
## Efficiency



OCP



## Application note



### Description:

(For example: OC1-05SC2448)

#### Pin5, Pin4:

Input V: 20.4 – 56V/dc (Rated Voltage: 24 / 48Vdc)

#### Pin1, Pin3:

Output V: 5V / 1.4A

## Pin2:

Pin2 is defined as the connector for the remote control. To run the OC1-converter it is necessary to connect Pin2 according to the below mentioned methods:

### Remote control function:

- In this application, an external circuit is necessary (for ex.: logic-circuit „high-low“).
  - High (5V) = converter on
  - Low (0V) = converter off

### Switching on the converter:

- ***If the remote control function is not used, Pin2 must be connected with Pin5.***  
 In this application, the converter is switched on because of the high level of Pin2. Depending on the tension voltage at the input, the short circuit between Pin2 and Pin5 must be realised with a resistor (see table below).

Table 1

Model	Resistor
OC1xxSC1224	** 6.8k <sub>ohm</sub>
OC1xxSC2448	** 18k <sub>ohm</sub>
OC1xxSC48	** 43k <sub>ohm</sub>

#### \*\* Please take note!

- If the DC/DC converter is operated with variable voltage (f.e. 12 – 25V/DC), the resistors for the short circuit can be used according to Table1.
- If the DC/DC converter is to be operated with a constant input voltage, we recommend applying the short circuit with an exactly calculated resistor (with regard to a higher efficiency of the DC/DC converter).  
**Example: OC1-05SC2448**  
*input voltage 36V/DC*  
 $R = U_{input} - 5 = 36 - 5 = \sim 30k\Omega$   
*Input voltage 56V/DC*  
 $R = U_{input} - 5 = 56 - 5 = \sim 50k\Omega$

### Capacitor C2, C3

The converter at the input and output is equipped with certain capacitors which are integrated to filter the noise. The capacitors are very small and can only reduce small noises at a normal ambient temperature. If the converter must work under extreme conditions (high or low temperatures, large noises) it is recommended that a capacitor be adapted at both the input *and* output sides (C2, C3).

The values of the capacitors (electrolyte or film capacitor) will depend on the application, but will be in  $\mu\text{F}$  range.

