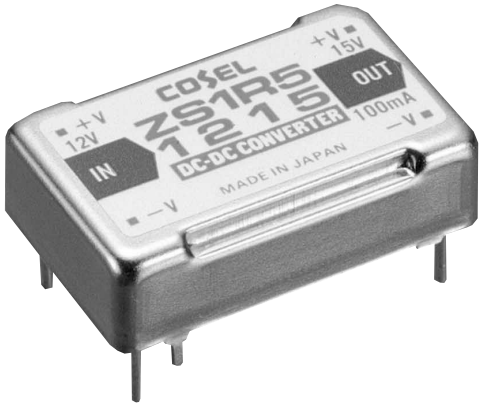
Z SERIES DC-DC CONVERTER

ZS1R5



Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMATION

ZS1R50512

- Output voltage
- Input voltage
- Output wattage
- Single output
- Series name

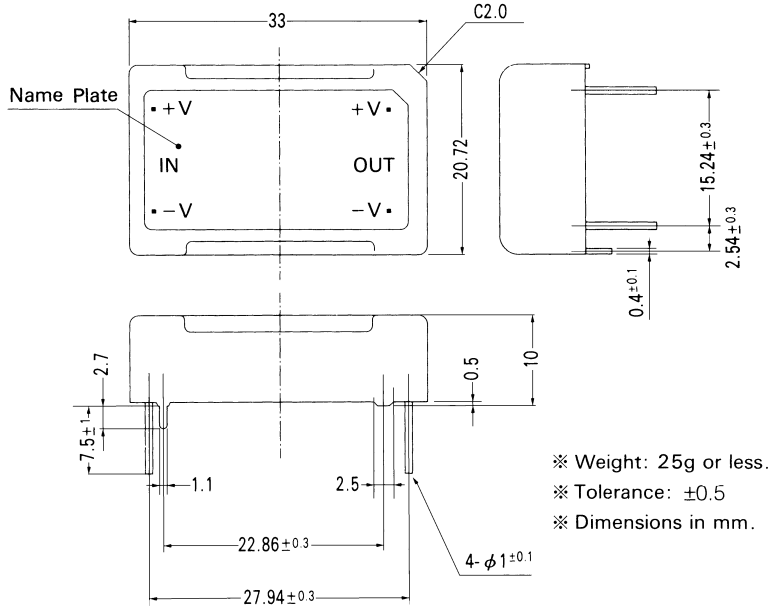
SPECIFICATIONS

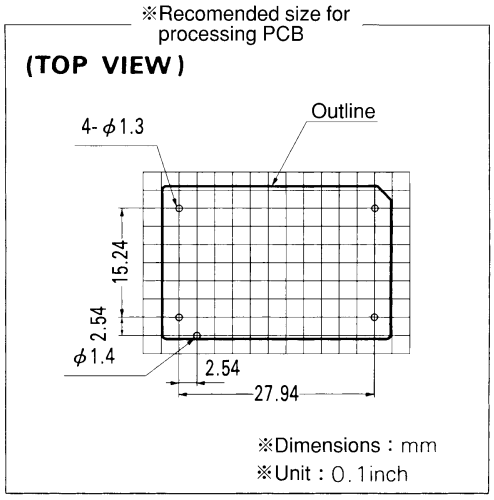
	MODEL	ZS1R50505	ZS1R50512	ZS1R50515	ZS1R51205	ZS1R51212	ZS1R51215	ZS1R52405	ZS1R52412	ZS1R52415	ZS1R54805	ZS1R54812	ZS1R54815
INPUT	VOLTAGE [V]	5 (4.5~6.0)			12 (10~15)			24 (20~30)			48 (35~63)		
	EFFICIENCY [%]	60 typ			65 typ			65 typ			65 typ		
OUTPUT	VOLTAGE [V]	5	12	15	5	12	15	5	12	15	5	12	15
	CURRENT [A]	0.25	0.12	0.1	0.25	0.12	0.1	0.25	0.12	0.1	0.25	0.12	0.1
	LINE REGULATION [mV]	25max	60max	75max	25max	60max	75max	25max	60max	75max	25max	60max	75max
	LOAD REGULATION [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	RIPPLE [mVp-p]	100max	120max		100max	120max		100max	120max		100max	120max	
	RIPPLE NOISE [mVp-p]	120max			120max			120max			120max		
	TEMPERATURE COEFFICIENT 0 ~+50°C [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)											
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically											
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)											
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)											
	STORAGE TEMP. AND HUMID.	−20~+75℃, 20~90%RH (Non condensing)											
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis											
	IMPACT	50G, 11mS, once each X, Y and Z axis											

※ Parallel operation with other model is not possible.

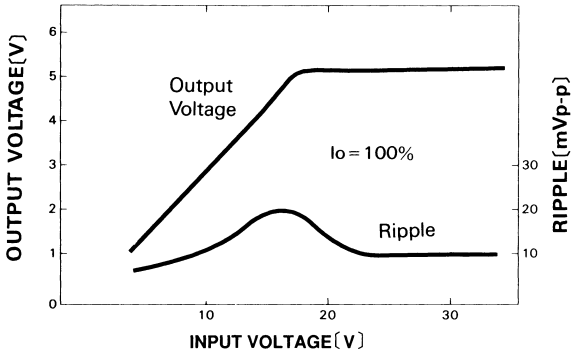
MODEL	ZS1R5				ZS1R5				ZS1R5			
	0505	1205	2405	4805	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	1.25W				1.44W				1.50W			
DC OUTPUT VOLTAGE	5V				12V				15V			
DC OUTPUT CURRENT	0.25A				0.12A				0.10A			

■EXTERNAL VIEW

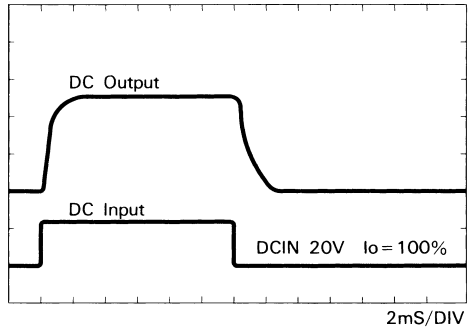




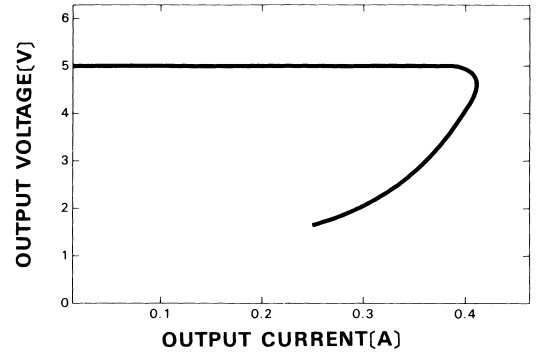
■STATIC CHARACTERISTICS (ZS1R52405)



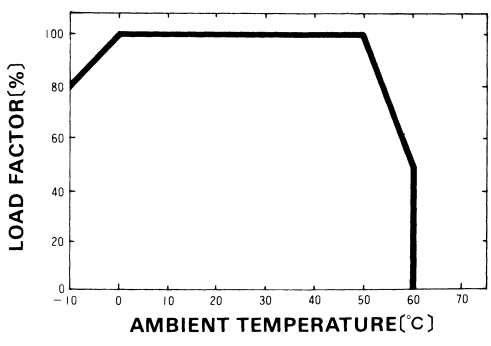
■RISE TIME & FALL TIME (ZS1R52405)



■OVERCURRENT CHARACTERISTICS (ZS1R52405)



■DERATING CURVE



Z

ZS3

Z Series DC-DC converter designed
for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Two-year warranty

■ ORDERING INFORMATION

ZS30512

- Output voltage
- Input voltage
- Output wattage
- Single output
- Series name

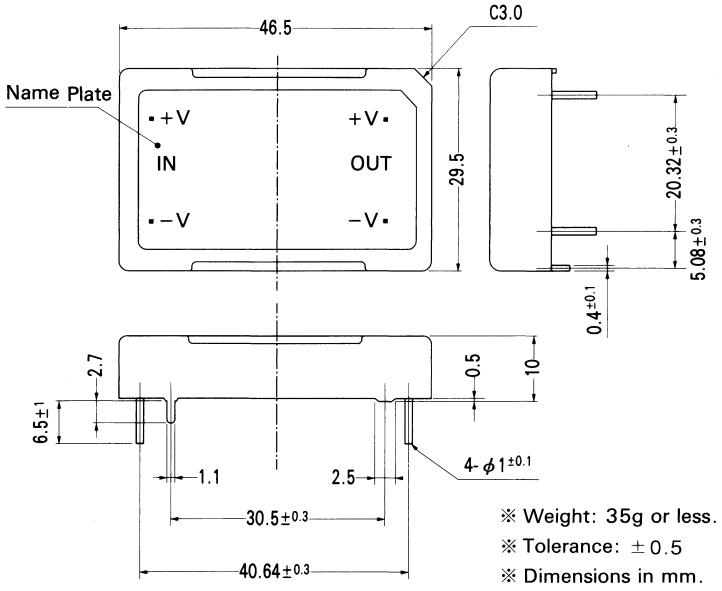
SPECIFICATIONS

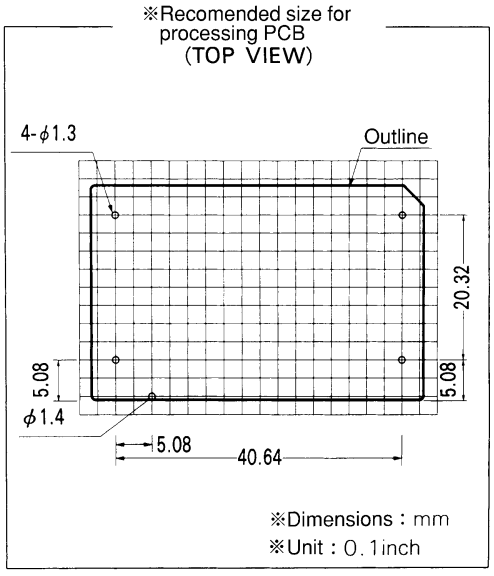
	MODEL	ZS30505	ZS30512	ZS30515	ZS31205	ZS31212	ZS31215	ZS32405	ZS32412	ZS32415	ZS34805	ZS34812	ZS34815
INPUT	VOLTAGE [V]	5 (4.5~6.0)			12 (10~15)			24 (20~30)			48 (35~63)		
	EFFICIENCY [%]	65 typ			65 typ	70 typ		70 typ	74 typ		70 typ		
OUTPUT	VOLTAGE [V]	5	12	15	5	12	15	5	12	15	5	12	15
	CURRENT [A]	0.5	0.25	0.2	0.5	0.25	0.2	0.5	0.25	0.2	0.5	0.25	0.2
	LINE REGULATION [mV]	25max	60max	75max	25max	60max	75max	25max	60max	75max	25max	60max	75max
	LOAD REGULATION [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	RIPPLE [mVp-p]	100max	120max		100max	120max		100max	120max		100max	120max	
	RIPPLE NOISE [mVp-p]	120max			120max			120max			120max		
	TEMPERATURE COEFFICIENT 0~+50℃ [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)											
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically											
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)											
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)											
	STORAGE TEMP. AND HUMID.	−20~+75℃,20~90%RH (Non condensing)											
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis											
	IMPACT	50G, 11mS, once each X,Y and Z axis											

※ Parallel operation with other model is not possible.

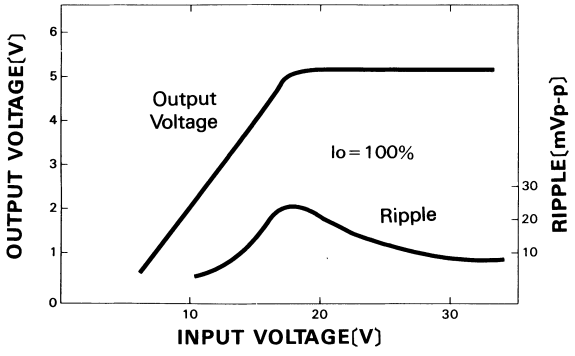
MODEL	ZS3 0505 1205 2405 4805	ZS3 0512 1212 2412 4812	ZS3 0515 1215 2415 4815
MAX OUTPUT WATTAGE	2.5W	3.0W	3.0W
DC OUTPUT VOLTAGE	5V	12V	15V
DC OUTPUT CURRENT	0.5A	0.25A	0.2A

■EXTERNAL VIEW

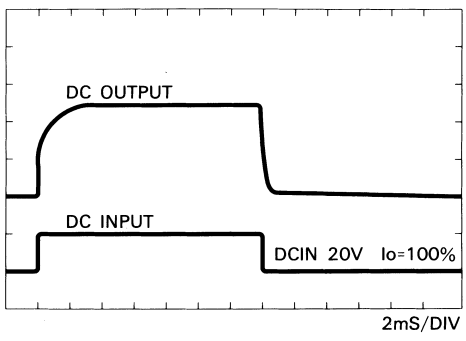




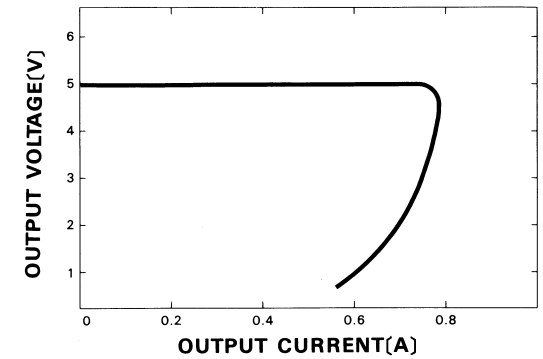
■STATIC CHARACTERISTICS (ZS32405)



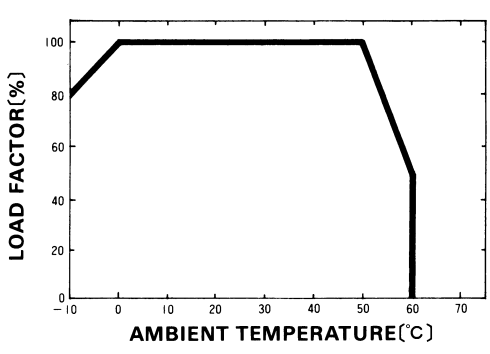
■RISE TIME & FALL TIME (ZS32405)



■OVERCURRENT CHARACTERISTICS (ZS32405)



■DERATING CURVE



Z

ZS6

Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in ovecurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMATION

ZS60512

- Output voltage
- Input voltage
- Output wattage
- Single output
- Series name

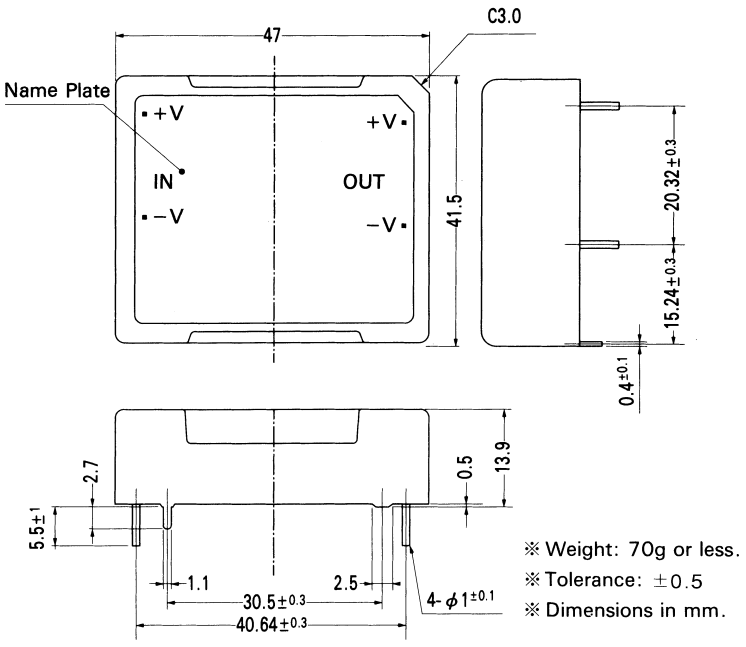
SPECIFICATIONS

	MODEL	ZS60505	ZS60512	ZS60515	ZS61205	ZS61212	ZS61215	ZS62405	ZS62412	ZS62415	ZS64805	ZS64812	ZS64815
INPUT	VOLTAGE [V]	5 (4.5~6.0)			12 (10~15)			24 (20~30)			48 (35~63)		
	EFFICIENCY [%]	65 typ			68 typ	70 typ		70 typ	74 typ		70 typ		
OUTPUT	VOLTAGE [V]	5	12	15	5	12	15	5	12	15	5	12	15
	CURRENT [A]	1	0.5	0.4	1	0.5	0.4	1	0.5	0.4	1	0.5	0.4
	LINE REGULATION [mV]	25max	60max	75max	25max	60max	75max	25max	60max	75max	25max	60max	75max
	LOAD REGULATION [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	RIPPLE [mVp-p]	100max	120max		100max	120max		100max	120max		100max	120max	
	RIPPLE NOISE [mVp-p]	120max			120max			120max			120max		
	TEMPERATURE COEFFICIENT 0~+50°C [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)											
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically											
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)											
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)											
	STORAGE TEMP. AND HUMID.	−20~+75℃, 20~90%RH (Non condensing)											
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis											
	IMPACT	50G, 11mS, once each X, Y and Z axis											

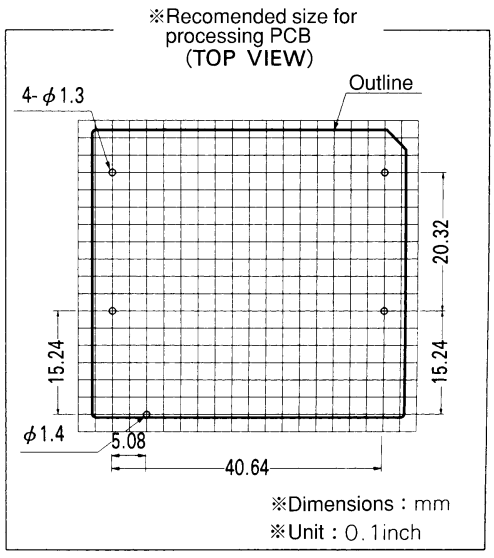
※ Parallel operation with othe model is not possible.

MODEL	ZS6				ZS6				ZS6			
	0505	1205	2405	4805	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	5.0W				6.0W				6.0W			
DC OUTPUT VOLTAGE	5V				12V				15V			
DC OUTPUT CURRENT	1.0A				0.5A				0.4A			

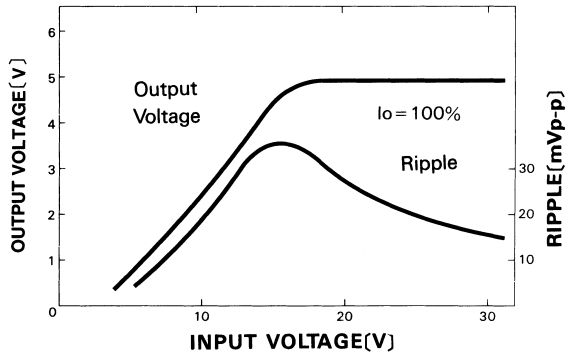
■EXTERNAL VIEW



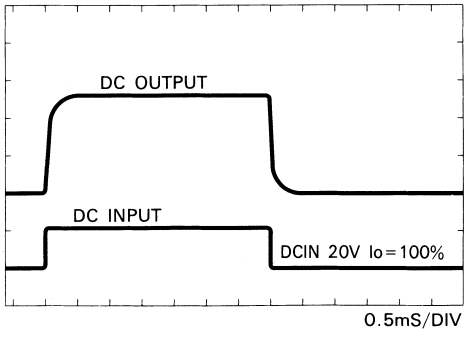
※Weight: 70g or less.
※Tolerance: ±0.5
※Dimensions in mm.



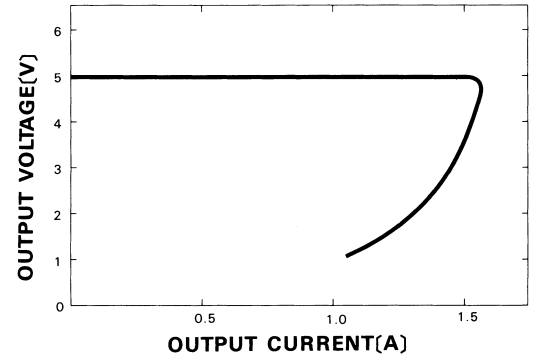
■STATIC CHARACTERISTICS (ZS62405)



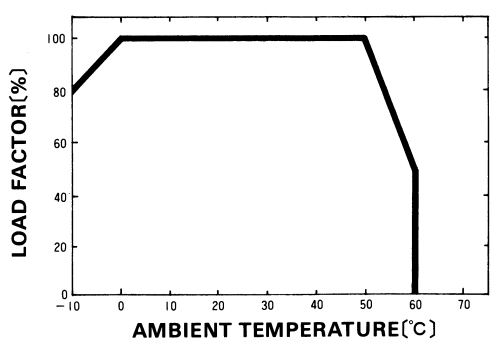
■RISE TIME & FALL TIME (ZS62405)



■OVERCURRENT CHARACTERISTICS (ZS62405)



■DERATING CURVE



Z

ZS10

COSEL®

Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMATION

ZS100512

- Output voltage
- Input voltage
- Output wattage
- Single output
- Series name

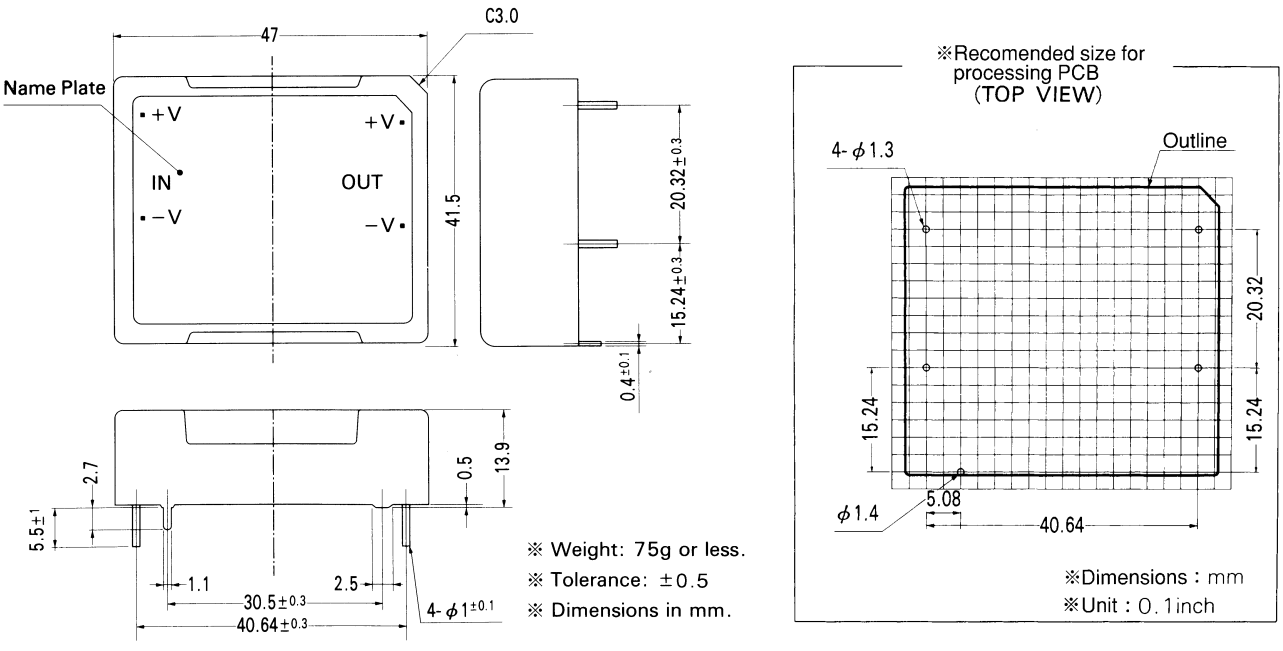
SPECIFICATIONS

	MODEL	ZS100505	ZS100512	ZS100515	ZS101205	ZS101212	ZS101215	ZS102405	ZS102412	ZS102415	ZS104805	ZS104812	ZS104815
INPUT	VOLTAGE [V]	5 (4.5~6.0)			12 (10~15)			24 (20~30)			48 (35~63)		
	EFFICIENCY [%]	72 typ			80 typ			80 typ			80 typ		
OUTPUT	VOLTAGE [V]	5	12	15	5	12	15	5	12	15	5	12	15
	CURRENT [A]	1.6	0.7	0.6	2.0	0.9	0.7	2.0	0.9	0.7	2.0	0.9	0.7
	LINE REGULATION [mV]	25max	60max	75max	25max	60max	75max	25max	60max	75max	25max	60max	75max
	LOAD REGULATION [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	RIPPLE [mVp-p]	100max	120max		100max	120max		100max	120max		100max	120max	
	RIPPLE NOISE [mVp-p]	120max			120max			120max			120max		
	TEMPERATURE COEFFICIENT 0~+55°C [mV]	50max	120max	150max	50max	120max	150max	50max	120max	150max	50max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)											
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically											
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)											
ENVIRONMENT	OPERATING TEMP. AND HUMID.	-10~+70℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)											
	STORAGE TEMP. AND HUMID.	-20~+75℃, 20~90%RH (Non condensing)											
	VIBRATION	10~55Hz, 10G, 3 minutes period, 30 minutes along X, Y and Z axis											
	IMPACT	50G, 11mS, once each X, Y and Z axis											

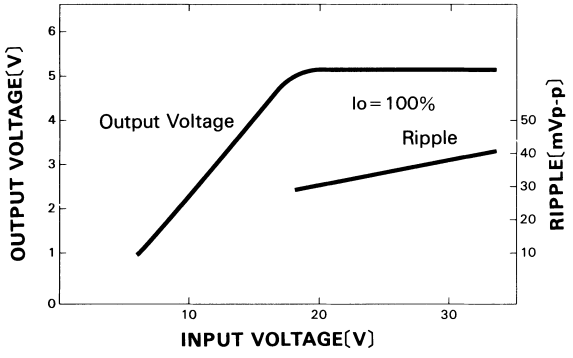
※ Parallel operation with other model is not possible.

MODEL	ZS10				ZS10				ZS10			
	0505	1205	2405	4805	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	8W	10.0W			8.4W	10.8W			9.0W	10.5W		
DC OUTPUT VOLTAGE	5V				12V				15V			
DC OUTPUT CURRENT	1.6A	2.0A			0.7A	0.9A			0.6A	0.7A		

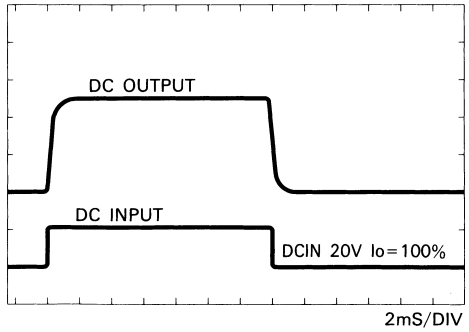
■EXTERNAL VIEW



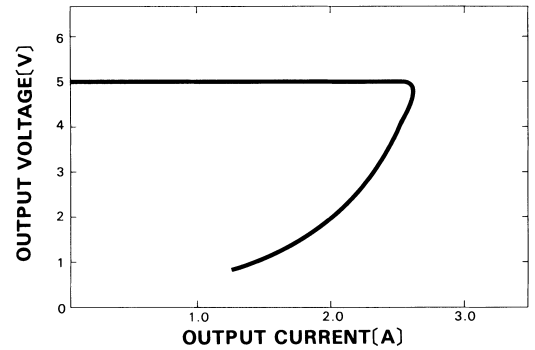
■STATIC CHARACTERISTICS (ZS102405)



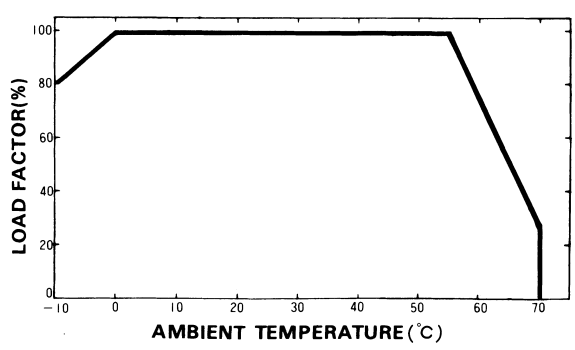
■RISE TIME & FALL TIME (ZS102405)



■OVERCURRENT CHARACTERISTICS (ZS102405)

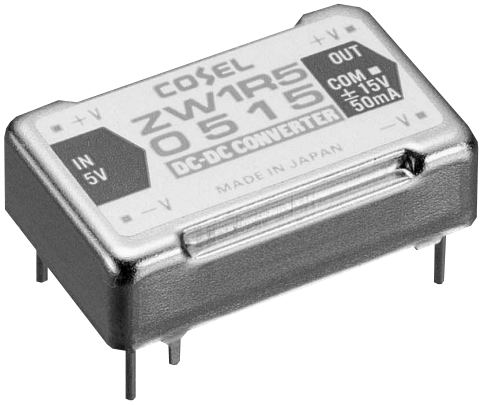


■DERATING CURVE



Z

ZW1R5



Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMATION

ZW1R50512

- Output voltage
- Input voltage
- Output wattage
- Dual output
- Series name

SPECIFICATIONS

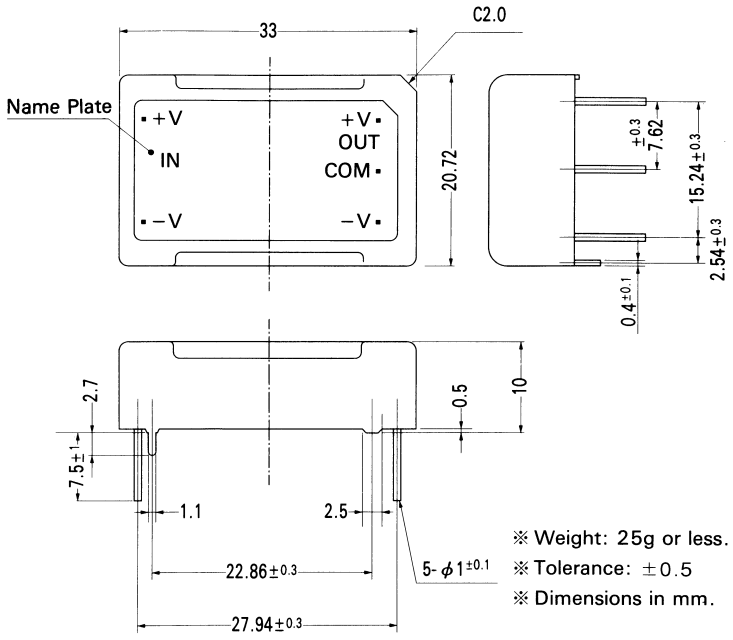
Output pins can be connected in series to make a 24V/30V output.

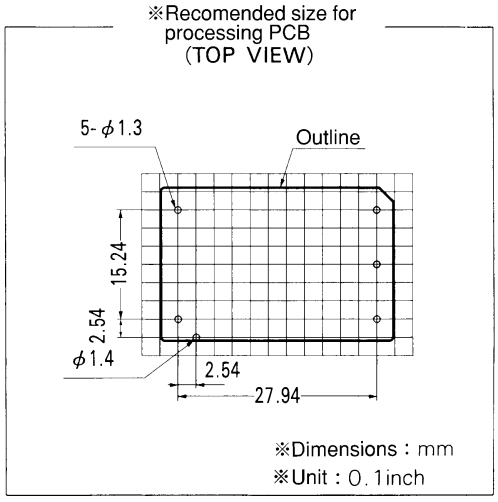
	MODEL	ZW1R50512	ZW1R50515	ZW1R51212	ZW1R51215	ZW1R52412	ZW1R52415	ZW1R54812	ZW1R54815
INPUT	VOLTAGE [V]	5 (4.5~6.0)		12 (10~15)		24 (20~30)		48 (35~63)	
	EFFICIENCY [%]	60 typ		65 typ		65 typ		65typ	
OUTPUT	VOLTAGE [V]	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)
	CURRENT [A]	0.06	0.05	0.06	0.05	0.06	0.05	0.06	0.05
	LINE REGULATION [mV]	60max	75max	60max	75max	60max	75max	60max	75max
	LOAD REGULATION [mV]	600max	750max	600max	750max	600max	750max	600max	750max
	RIPPLE [mVp-p]	120max		120max		120max		120max	
	RIPPLE NOISE [mVp-p]	120max		120max		120max		120max	
	TEMPERATURE COEFFICIENT [mV] 0~+50°C	120max	150max	120max	150max	120max	150max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)							
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically							
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)							
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)							
	STORAGE TEMP. AND HUMID.	−20~+75℃,20~90%RH (Non condensing)							
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis							
	IMPACT	50G, 11ms,once on each X,Y and Z axis							

※ The output specification is at ±12V and ±15V.
※ Parallel operation with other model is not possible.

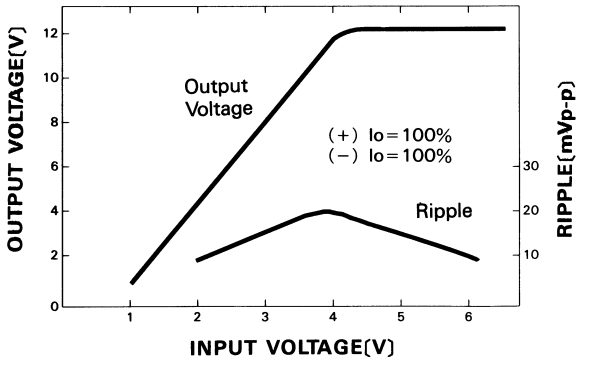
MODEL	ZW1R5				ZW1R5			
	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	1.44W				1.50W			
DC OUTPUT VOLTAGE	±12V(+24V)				±15V(+30V)			
DC OUTPUT CURRENT	0.06A				0.05A			

■EXTERNAL VIEW

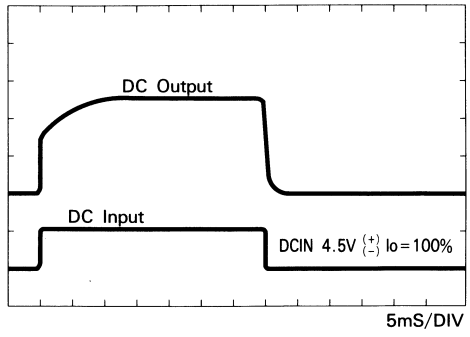




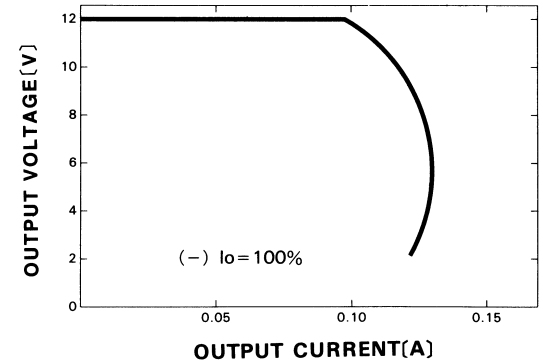
■STATIC CHARACTERISTICS (ZW1R50512)



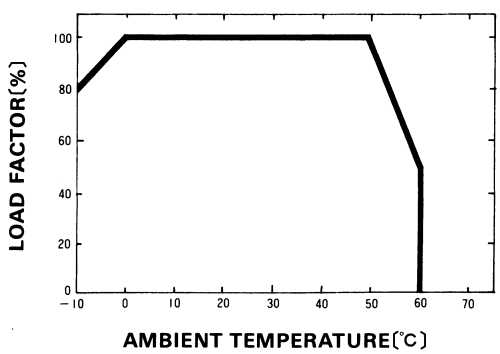
■RISE TIME & FALL TIME (ZW1R50512)



■OVERCURRENT CHARACTERISTICS (ZW1R50512)



■DERATING CURVE



Z

ZW3

COSEL®

Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMA

ZW30512

- Output voltage
- Input voltage
- Output wattage
- Dual output
- Series name

SPECIFICATIONS

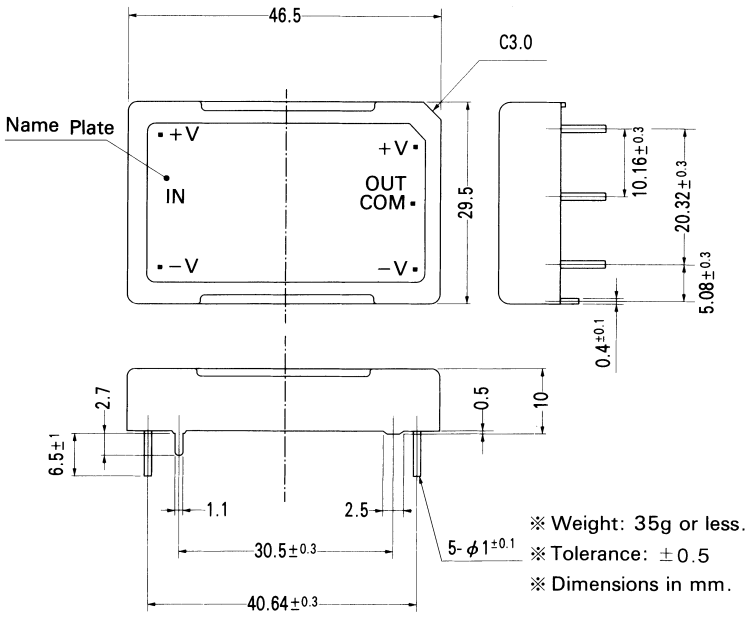
Output pins can be connected in series to make a 24V/30V output.

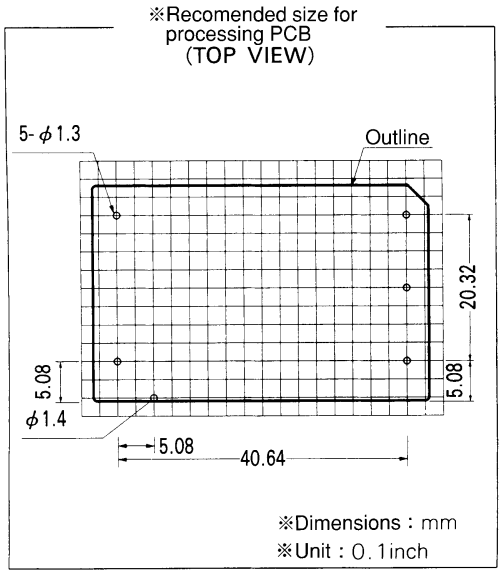
	MODEL	ZW30512	ZW30515	ZW31212	ZW31215	ZW32412	ZW32415	ZW34812	ZW34815
INPUT	VOLTAGE [V]	5 (4.5~6.0)		12 (10~15)		24 (20~30)		48 (35~63)	
	EFFICIENCY [%]	65typ		70 typ		74 typ		70typ	
OUTPUT	VOLTAGE [V]	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)
	CURRENT [A]	0.12	0.1	0.12	0.1	0.12	0.1	0.12	0.1
	REGULATION LINE [mV]	60max	75max	60max	75max	60max	75max	60max	75max
	REGULATION LOAD [mV]	600max	750max	600max	750max	600max	750max	600max	750max
	RIPPLE [mVp-p]	120max		120max		120max		120max	
	RIPPLE NOISE [mVp-p]	120max		120max		120max		120max	
	TEMPERATURE COEFFICIENT [mV] 0~+50℃	120max	150max	120max	150max	120max	150max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)							
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically							
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)							
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)							
	STORAGE TEMP. AND HUMID.	−20~+75℃,20~90%RH (Non condensing)							
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis							
	IMPACT	50G, 11mS,once each X,Y and Z axis							

※ The output specification is at ±12V and ±15V.
※ Parallel operation with other model is not possible.

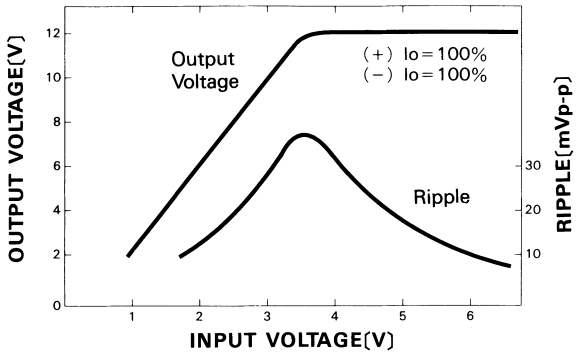
MODEL	ZW3				ZW3			
	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	2.88W				3.0W			
DC OUTPUT VOLTAGE	±12V(+24V)				±15V(+30V)			
DC OUTPUT CURRENT	0.12A				0.10A			

■EXTERNAL VIEW

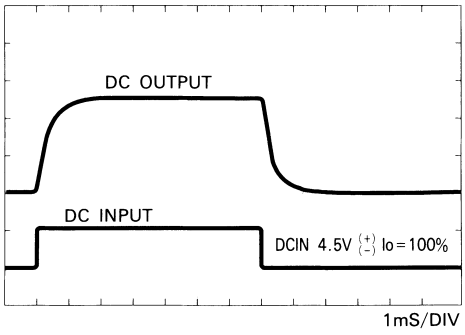




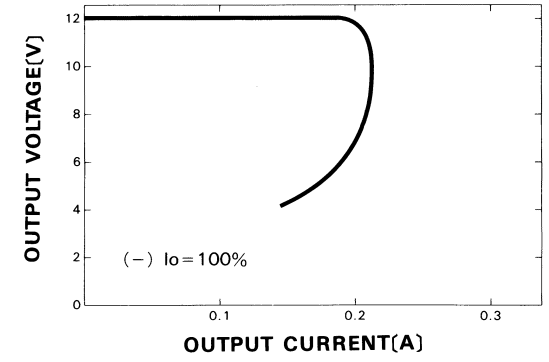
■STATIC CHARACTERISTICS (ZW30512)



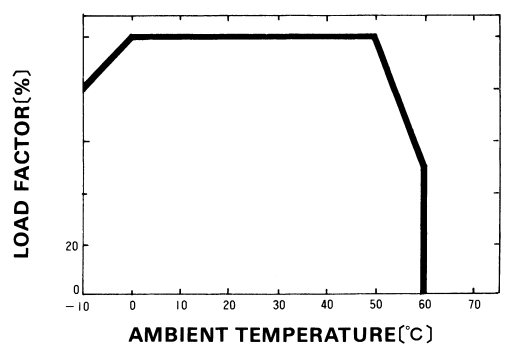
■RISE TIME & FALL TIME (ZW30512)



■OVERCURRENT CHARACTERISTICS (ZW30512)



■DERATING CURVE



Z

ZW6

Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMA

ZW60512

- Output voltage
- Input voltage
- Output wattage
- Dual output
- Series name

SPECIFICATIONS

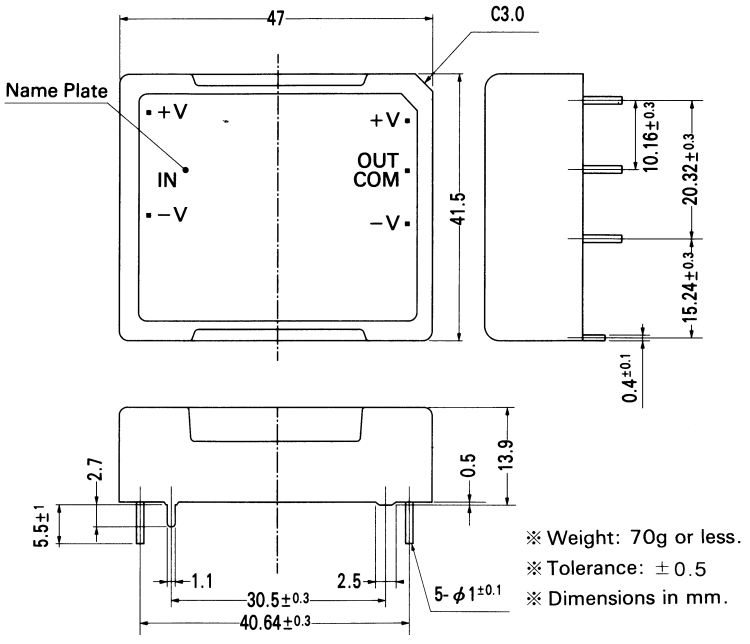
Output pins can be connected in series to make a 24V/30V output.

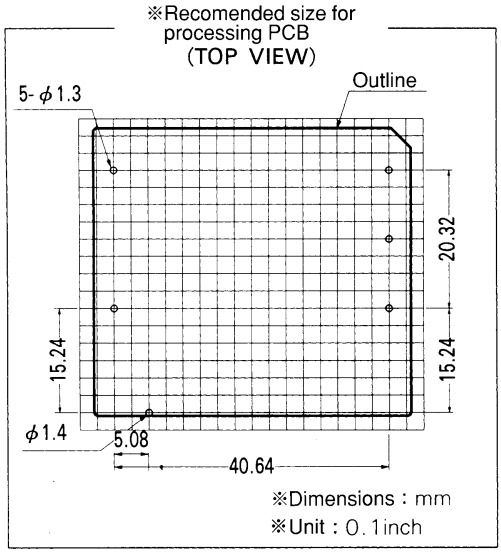
	MODEL	ZW60512	ZW60515	ZW61212	ZW61215	ZW62412	ZW62415	ZW64812	ZW64815
INPUT	VOLTAGE [V]	5 (4.5~6.0)		12 (10~15)		24 (20~30)		48 (35~63)	
	EFFICIENCY [%]	65typ		70 typ		74 typ		70typ	
OUTPUT	VOLTAGE [V]	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)
	CURRENT [A]	0.25	0.2	0.25	0.2	0.25	0.2	0.25	0.2
	LINE REGULATION [mV]	60max	75max	60max	75max	60max	75max	60max	75max
	LOAD REGULATION [mV]	600max	750max	600max	750max	600max	750max	600max	750max
	RIPPLE [mVp-p]	120max		120max		120max		120max	
	RIPPLE NOISE [mVp-p]	120max		120max		120max		120max	
	TEMPERATURE COEFFICIENT [mV] 0~+50°C	120max	150max	120max	150max	120max	150max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output, Ta=25℃)							
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically							
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)							
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+60℃, 20~90%RH (Non condensing) (Refer to DERATING CURVE)							
	STORAGE TEMP. AND HUMID.	−20~+75℃,20~90%RH (Non condensing)							
	VIBRATION	10~55Hz, 2G, 3 minutes period, 30 minutes along X, Y and Z axis							
	IMPACT	50G, 11mS,once each X,Y and Z axis							

※ The output specification is at ±12V and ±15V.
※ Parallel operation with other model is not possible.

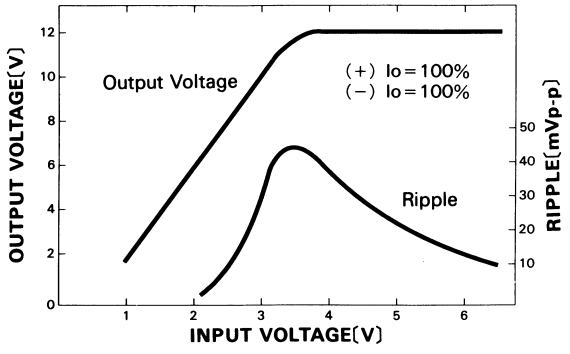
MODEL	ZW6				ZW6			
	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	6.0W				6.0W			
DC OUTPUT VOLTAGE	±12V(+24V)				±15V(+30V)			
DC OUTPUT CURRENT	0.25A				0.2A			

■EXTERNAL VIEW

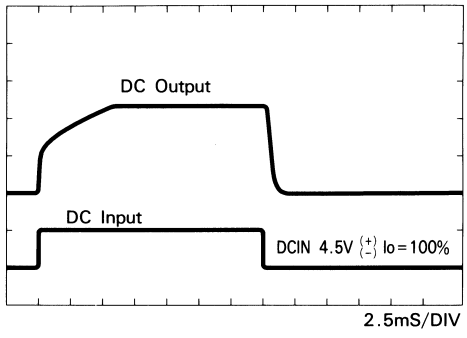




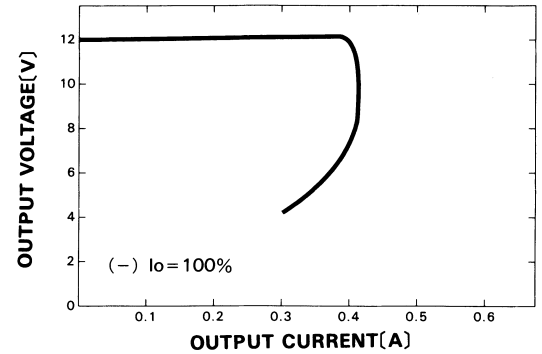
■STATIC CHARACTERISTICS (ZW60512)



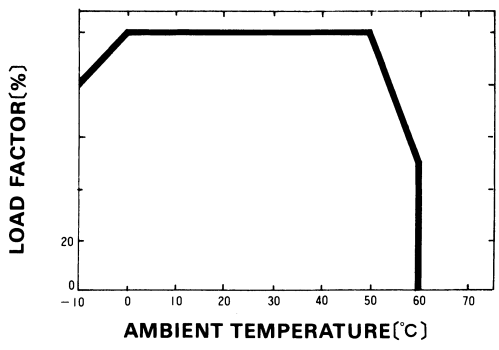
■RISE TIME & FALL TIME (ZW60512)



■OVERCURRENT CHARACTERISTICS (ZW60512)



■DERATING CURVE



Z

ZW10

Z Series DC-DC converter designed for small size and high reliability

- Isolated between input-output
- Built-in overcurrent protection circuit
- Small and compact size
- Five-year warranty

■ ORDERING INFORMA

ZW100512

- Output voltage
- Input voltage
- Output wattage
- Dual output
- Series name

SPECIFICATIONS

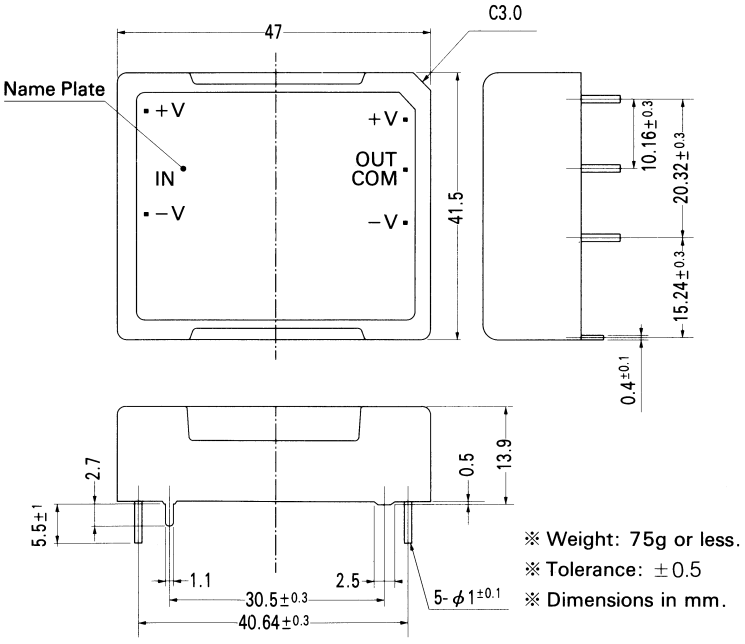
Output pins can be connected in series to make a 24V/30V output.

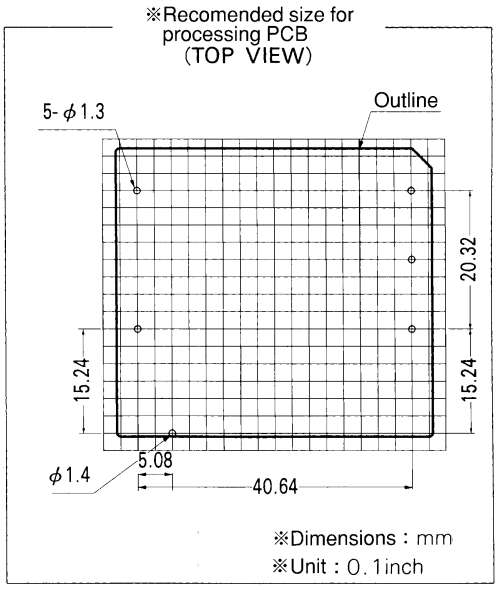
	MODEL	ZW100512	ZW100515	ZW101212	ZW101215	ZW102412	ZW102415	ZW104812	ZW104815
INPUT	VOLTAGE [V]	5 (4.5~6.0)		12 (10~15)		24 (20~30)		48 (35~63)	
	EFFICIENCY [%]	72typ		80 typ		80 typ		80typ	
OUTPUT	VOLTAGE [V]	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)	±12 (+24)	±15 (+30)
	CURRENT [A]	0.35	0.3	0.45	0.35	0.45	0.35	0.45	0.35
	LINE REGULATION [mV]	60max	75max	60max	75max	60max	75max	60max	75max
	LOAD REGULATION [mV]	600max	750max	600max	750max	600max	750max	600max	750max
	RIPPLE [mVp-p]	120max		120max		120max		120max	
	RIPPLE NOISE [mVp-p]	120max		120max		120max		120max	
	TEMPERATURE COEFFICIENT [mV] 0~+55°C	120max	150max	120max	150max	120max	150max	120max	150max
	OUTPUT VOLTAGE SET(FIXED) [%]	±5max (Rated input/output,Ta=25℃)							
PROTECTION CIRCUIT	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically							
ISOLATION	INPUT,OUTPUT,CASE	AC500V, 1 minute, Cutoff current=10mA, DC500V, 50MΩ min. (At Room Temperature)							
ENVIRONMENT	OPERATING TEMP. AND HUMID.	−10~+70℃,20~90%RH (Non condensing) (Refer to DERATING CURVE)							
	STORAGE TEMP. AND HUMID.	−20~+75℃,20~90%RH (Non condensing)							
	VIBRATION	10~55Hz, 10G, 3 minutes period, 30 minutes along X, Y and Z axis							
	IMPACT	50G, 11mS,once each X,Y and Z axis							

※ The output specification is at ±12V and ±15V.
※ Parallel operation with other model is not possible.

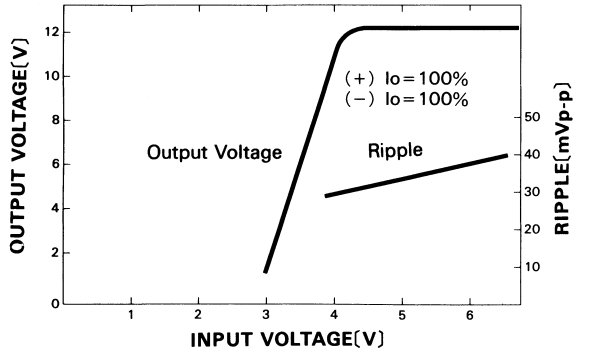
MODEL	ZW10				ZW10			
	0512	1212	2412	4812	0515	1215	2415	4815
MAX OUTPUT WATTAGE	8.4W	10.8W			9.0W	10.5W		
DC OUTPUT VOLTAGE	±12V(+24V)				±15V(+30V)			
DC OUTPUT CURRENT	0.35A	0.45A			0.30A	0.35A		

■EXTERNAL VIEW

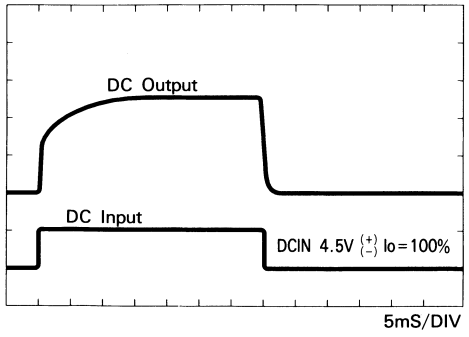




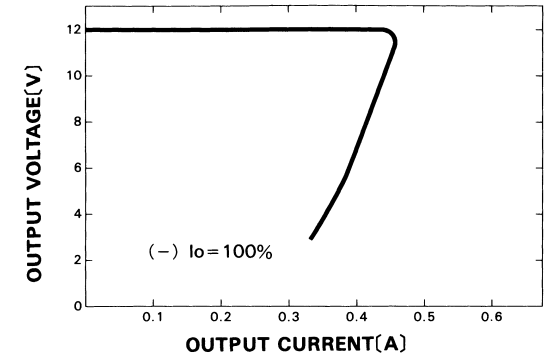
■STATIC CHARACTERISTICS (ZW100512)



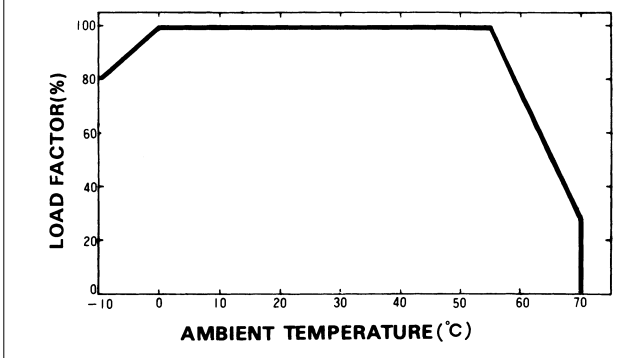
■RISE TIME & FALL TIME (ZW100512)



■OVERCURRENT CHARACTERISTICS (ZW100512)



■DERATING CURVE



Z

Instruction Manual

1. Pin Connection

No.	Pin connection	Function
1	+DC (+V) INPUT	+Side of input voltage
2	−DC (−V) INPUT	−Side of input voltage
3	+DC (+V) OUTPUT	+Side of output voltage
4	COMMON	GND of output voltage (Only applicable for Dual output)
5	−DC (−V) OUTPUT	−Side of output voltage
6	Case connecting pin	If connected to −side of input, the case potential can be fixed and the value of radiation noise can be reduced.

●Single output

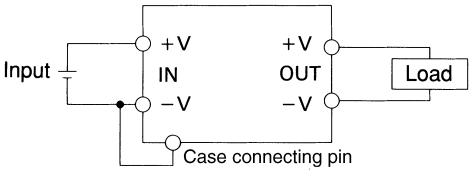


Fig. 1.1 Single output of pin connection

●Dual output

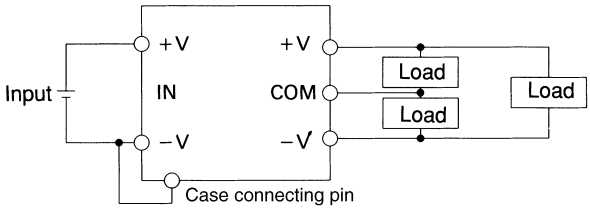


Fig. 1.2 Dual output of pin connection

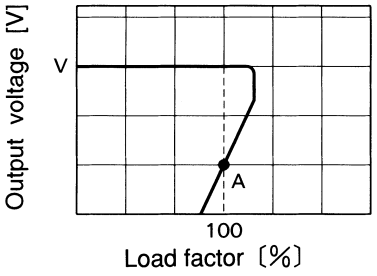
●Case connecting pin
Case connecting pin is available. By connecting this pin to −side of input, the radiation noise from main body can be reduced.

2. Function

2.1 Overcurrent protection

■Overcurrent protection circuit is built-in to be operated over 105% of the rated current.
This function works to protect against short circuit and overcurrent condition of less than 20 seconds.
When cause of activation of overcurrent protection is removed, the output will be automatically recovered.

■The power supply which has a current foldback characteristics may not start up when connected to nonlinear load such as lamp, motor or constant current load.
See the characteristics below.



——: Load characteristics of power supply
- - - - -: Characteristics of load (lamp, motor, constant current load, etc.)
Note: In case of nonlinear load, the output is locked out at A point.

Fig. 2.1 Current foldback characteristics

2.2 Isolation

■When conducting tests such as the Hi-Pot test at an incoming test, gradually increase the voltage. Also, gradually reduce the voltage for shut down. Avoid using the Hi-Pot tester with timer because it may generate the voltage a few times higher than the applied voltage when the timer starts and ends.

3. Wiring to Input/Output Pin

■Input filter is built-in. By external capacitor Ci closer to the input terminal, input connected noise from converter can be reduced by forming the π type filter. Since operating frequency is high, select the capacitor with high frequency type.

■Install Ci at input terminal when the line from source to converter is long. When Ci is not installed, it may unstabilize the output, it makes input feedback noise big and several times voltage of input voltage is applied. Moreover, install Ci at input terminal if abnormal voltage from input power supply like surge is drawn.

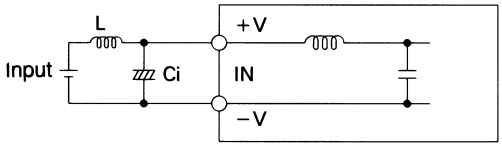


Fig. 3.1 Connecting method of external capacitor at input terminal

Table 3.1 Capacity of external capacitor at input terminal: Ci [μF]

Model / Input voltage (V)	ZS1R5 ZW1R5	ZS3 ZW3	ZS6 ZW6	ZS10 ZW10
5	100	220	470	470
12	47	100	220	220
24	33	47	100	100
48	10	22	47	47

■To decrease more ripple, install external capacitor Co at output terminal as below chart.

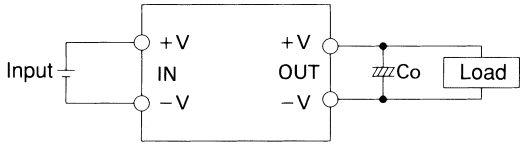


Fig. 3.2 Connecting method of external capacitor at input terminal

Table 3.2 Capacity of external capacitor at output terminal: Co [μF]

Model / Output voltage (V)	ZS1R5 ZW1R5	ZS3 ZW3	ZS6 ZW6	ZS10 ZW10
5	100	220	220	220
12	100	100	100	100
15	100	100	100	100

■When the distance between load and DC output is long, please install capacitor at load as below.

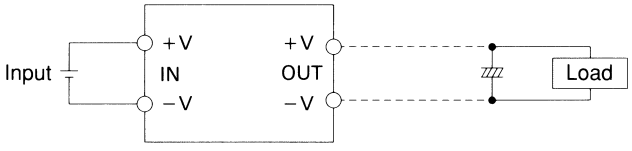


Fig. 3.3 Connection method of capacitor at load

■Since operating frequency is high, common mode noise occurs slightly. To reduce the noise more, install capacitor between −V input and −V output as below.

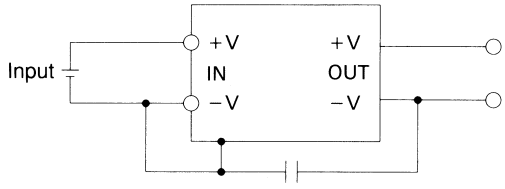


Fig. 3.4 Circuit to reduce common mode noise

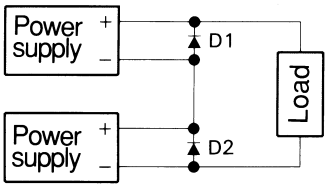
4. Series Operation and Parallel Operation

4.1 Series operation

●ZS1R5/ZW1R5 • ZS3/ZW3 • ZS6/ZW6

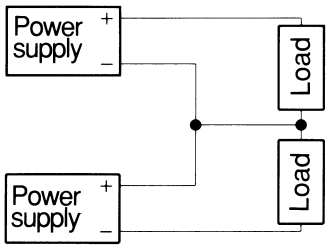
■Series operation is available by connecting below. However, output current in series connection should be lower than the lowest rated current in each unit.
But at series operation with same output voltage, diode is not required to attach even if at (a).

(a)



D1, D2: Please use Schottky Barrer Diode which has lower forward voltage.

(b)



●ZS10/ZW10

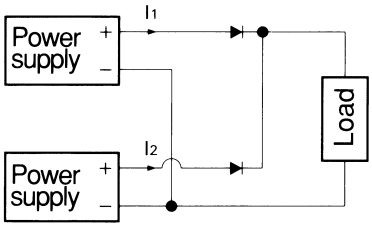
■Series operation is available. However, output current in series connection should be lower than the lowest rated current in each unit.

4.2 Parallel redundancy operation

■Parallel redundancy operation is available by connecting below.

■Values of I_1 and I_2 might be slightly different because of fine differences of output voltage. Keep balance of output current, as output current from each power supply should not exceed the rated current value.

I_1, I_2 ≦ the rated current value



Z

5. Assembring and Installation Method

5.1 Installation method

■The unit can be mounted in any direction. Position them with proper intervals to allow enough air ventilation. Ambient temperature around each power supply should not exceed the temperature range shown in delating curve.

■Avoid placing the DC input line pattern layout underneath the unit because it will increase the line conducted noise. Make sure to leave an ample distance between the line pattern layout and the unit. Also, avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.

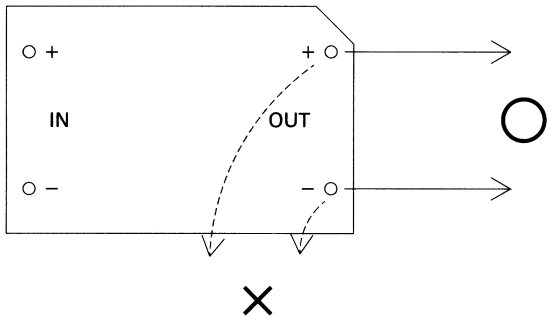


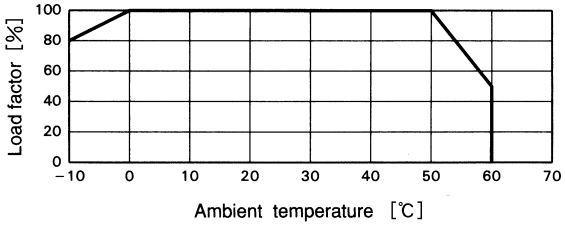
Fig. 5.1 Pattern wiring

5.2 Derating

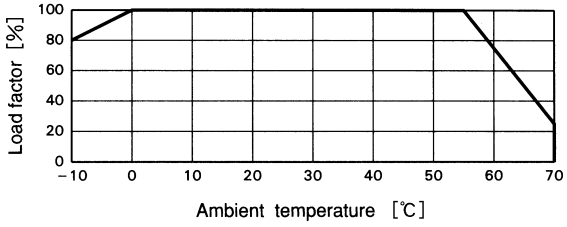
■By derating the output current, it is possible to operate the unit from −10℃~+60℃ for ZS (W) 1R5~ZS6 and from −10℃~+70℃ for ZS (W) 10.

■When unit mounted any way other than in drawings below, it is required to consider ventilated environments by forced air cooling or temperature/load derating. For details, please consult our sales or engineering department.

Except ZS(W)10



ZS(W)10



■The temperature increase of case surface at full load is shown by below table as referenced data.

Table 5.1 The surface temperature of case increase data (Z series) (Unit: deg)

Input voltage	Output voltage	1.5W	3W	6W	10W
5V	5V	20	25	28	37
	12V	21	27	30	43
	15V	22	28	28	40
	±12V	20	27	34	39
	±15V	20	29	32	44
12V	5V	14	18	24	34
	12V	13	22	23	34
	15V	14	21	22	28
	±12V	13	18	21	36
	±15V	12	20	24	34

Input voltage	Output voltage	1.5W	3W	6W	10W
24V	5V	18	14	25	33
	12V	17	17	21	29
	15V	16	19	22	29
	±12V	17	17	25	32
	±15V	18	19	24	29
48V	5V	15	25	30	32
	12V	12	29	25	27
	15V	12	22	28	26
	±12V	16	21	24	33
	±15V	16	20	25	33

6. Input Voltage/Current Range

■When a non-regulated source id used as a front end, make sure that the voltage fluctuation together with the ripple voltage will not exceed the input voltage range.

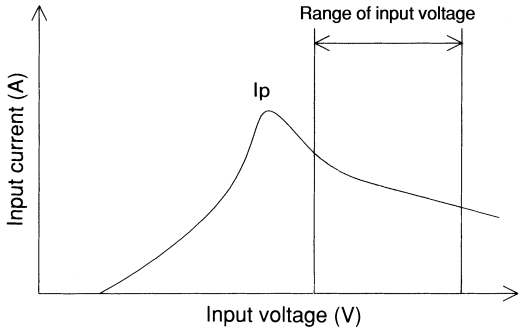


Fig. 6.1 Input current characteristics (Except ZS10, ZW10)

■Use an input power supply unit with enough power cosidering the start-up current (Ip) for the DC−DC.

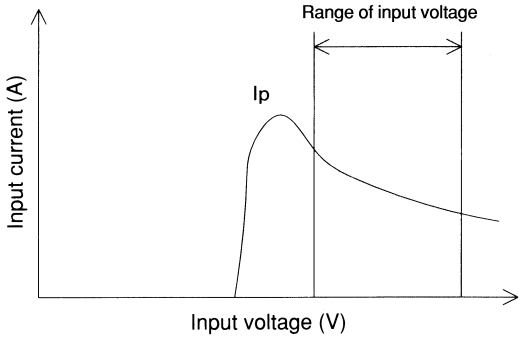


Fig. 6.2 Input current characteristics (ZS10, ZW10)

7. Cleaning

■Cleaning agents:

No.	Classification	Cleanig agents
1	Water type	Pine Alpha ST-100S (ARAKAWA CHEMICAL CO.)
2		Clean Through 750H (KAO Corporation)
3	Solvent type	IPA
4		Asahiklin AK−225AES (ASAHI GLASS CO.)

Z

■Cleaning period

The total time of varnishing, ultrasonic wave and vapor should be within 2 minutes. In case of ultrasonic wave cleaning, the ultrasonic should be less than 15W/ℓ. During cleaning to drying (the condition that cleaning liquid is soaked into the ink of name plate), do not touch on the surface of name plate.

■After cleaning, dry them enough.

8. Soldering

■Flow soldering : 260℃ less than 15 seconds.
■Soldering iron : 450℃ less than 5 seconds.

9. Input/Output Pin

■When too much stress is applied on the input/output pins of the unit, the internal connection may be weakened. As below Fig. 8.1, avoid applying stress of more than 1kgf on the pins horizontally and more than 2kgf vertically.

■The input/output pins are soldered on PCB internally, therefore, do not pull or bend them with abnormal forces.

■When additional stress is expected to be put on the input/output pins because of vibration or impacts, fix the unit on PCB (using silicone rubber or fixing fittings) to reduce the stress onto the input/output pins.

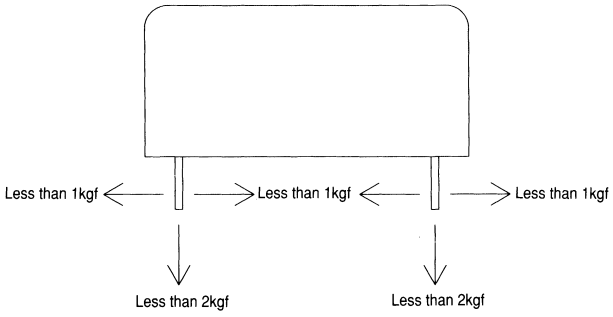
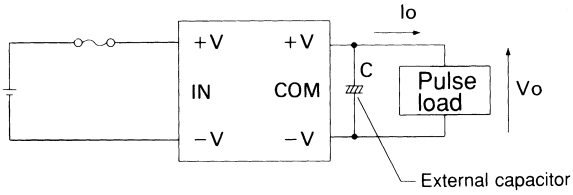
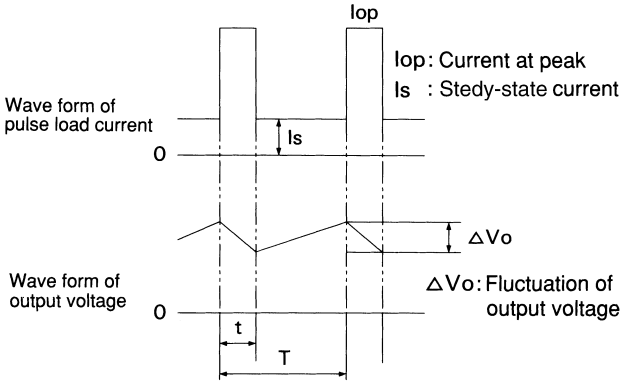


Fig. 8.1 Stress onto the pins

10. Peak Current (Pulse Load)

■When converter is used for pulse load, there is a way to supply pulse current by connecting the capacitor externally at output.





■The average current Iav of output is shown in below formula.

$$Iav = Is + \frac{(Iop - Is)\,t}{T}$$

■The required electrolytic capacitor C is found by below formula.

$$C = \frac{(Iop - Iav)\,t}{\Delta Vo}$$

Z