

# SM15 SERIES

## 1.5W DC/DC CONVERTERS Single Output & Dual Outputs



H5.7×W13×L20(mm)

### ■ Features

- Possible to Reflow Solder (250°C~260°C)
- Transfer Molding Package, and Washable after Soldering
- Remote ON/OFF Control
- Input-Output Isolated AC3000V
- High Efficiency 78%~80% typ.
- Low Output Ripple and Noise 30mVp-p (0~100MHz)
- Conformity to RoHS Directive
- Please add external Fuse connected to input for protection
- リフロー炉によるハンダ付け可能 (250°C~260°C)
- トランスファモールドにより基板洗浄可能
- リモートON/OFFコントロール
- 入出力間絶縁 AC3000V
- 高効率 78%~80% typ.
- 低出力リップル、ノイズ 30mVp-p (0~100MHz)
- RoHS指令対応
- 保護のため入力にヒューズを外付けて下さい

### ■ General Characteristics

- (at Ta : 25°C, Full Load, Nominal Vin)
- Input Voltage, Range DC 5, 12, 24, 48V (See Table 1)
  - Output Voltage, Current DC 3.3, 5, 6, 12, 15, 24V ±5, ±12, ±15V (See Table 1)
  - Output Voltage Accuracy ±3%
  - Efficiency See Table 1
  - Line Regulation 0.3% max. (at Vin Range)
  - Load Regulation Single : ±0.5% max. (0~100% Load)  
Dual : ±3% max. (±5V Vout : ±5% max.) (10~100% Load)
  - Reflected Input Ripple (2% Vin)Vp-p max.
  - Reflected Input Noise (2% Vin)Vp-p max.
  - Output Ripple 20mVp-p max. (0~100MHz)
  - Output Noise 30mVp-p max. (0~100MHz)
  - Short Circuit Protection Built-in, Auto-restart
  - Remote ON/OFF Control ON : Short or 0~0.8V  
OFF : Open or 2~10V
  - Temperature Coefficient 0.02%/°C max.
  - Operating Ambient Temp. -40°C~+85°C (See Fig 1)  
-30°C~+85°C (5V Vin)
  - Storage Temperature -40°C~+100°C
  - Isolation Voltage AC3000V or DC6000V one minute (Input-Output)
  - Isolation Impedance 100MΩ min. (at DC1000V) (Input-Output)
  - Isolation Capacitance 10pF max.
  - Switching Frequency 400kHz typ.
  - Weight 2.7g max.
  - Humidity 20~95% RH
  - Shock 490m/s<sup>2</sup> (11msec 3directions)
  - Vibration 10~55Hz 98m/s<sup>2</sup> (30minutes 3directions)
  - MTBF Single : 1,200,000H  
Dual : 1,000,000H (Ta : 25°C, 80% Load, Nominal Vin)
  - Warranty 5 years

### ■ Selection Guide

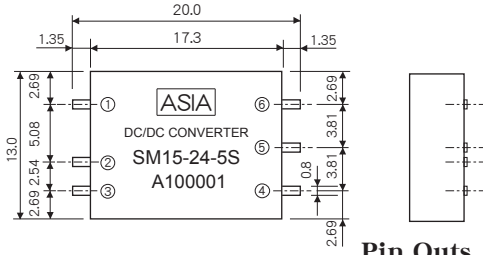
Table 1

Model Number	Input Volt. (Range) (V. DC)	Output Voltage (V. DC)	Output Current (mA)	Efficiency (Typical) (%)
SM15- 5 - 3.3 S	5 (4.5~9)	3.3	400	78
SM15- 5 - 5 S		5	300	80
SM15- 5 - 6 S		6	250	80
SM15- 5 - 12 S		12	125	80
SM15- 5 - 15 S		15	100	80
SM15- 5 - 24 S		24	60	80
SM15- 5 - 5 D		±5	±150	80
SM15- 5 - 12 D		±12	±60	80
SM15- 5 - 15 D		±15	±50	80
SM15- 12 - 3.3 S	12 (8~18)	3.3	400	78
SM15- 12 - 5 S		5	300	80
SM15- 12 - 6 S		6	250	80
SM15- 12 - 12 S		12	125	80
SM15- 12 - 15 S		15	100	80
SM15- 12 - 24 S		24	60	80
SM15- 12 - 5 D		±5	±150	80
SM15- 12 - 12 D		±12	±60	80
SM15- 12 - 15 D		±15	±50	80
SM15- 24 - 3.3 S	24 (16~36)	3.3	400	78
SM15- 24 - 5 S		5	300	80
SM15- 24 - 6 S		6	250	80
SM15- 24 - 12 S		12	125	80
SM15- 24 - 15 S		15	100	80
SM15- 24 - 24 S		24	60	80
SM15- 24 - 5 D		±5	±150	80
SM15- 24 - 12 D		±12	±60	80
SM15- 24 - 15 D		±15	±50	80
SM15- 48 - 3.3 S	48 (32~72)	3.3	400	78
SM15- 48 - 5 S		5	300	80
SM15- 48 - 6 S		6	250	80
SM15- 48 - 12 S		12	125	80
SM15- 48 - 15 S		15	100	80
SM15- 48 - 24 S		24	60	80
SM15- 48 - 5 D		±5	±150	80
SM15- 48 - 12 D		±12	±60	80
SM15- 48 - 15 D		±15	±50	80

※ 上記仕様以外にも対応可能ですので お問い合わせ下さい。  
Please consult with us about other specification.

# SM15 SERIES DATA SHEET

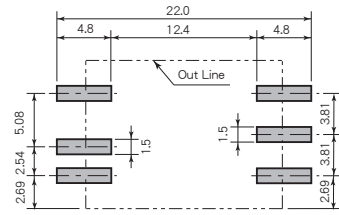
## Pin Outs & Dimensions ( $\pm 0.3\text{mm}$ )



### Pin Outs

Single Output		Dual Outputs	
①	+Vdc in	①	+Vdc in
②	0 Vdc in	②	0 Vdc in
③	ON/OFF Control	③	ON/OFF Control
④	No Connection	④	-Vdc out
⑤	0 Vdc out	⑤	Common
⑥	+Vdc out	⑥	+Vdc out

## Pad Configurations on PCB (Top View)



## Characteristic Curves

Fig 1 Derating Curve

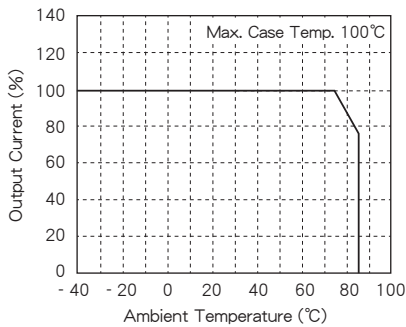


Fig 2 Temperature Characteristic on Case Surface

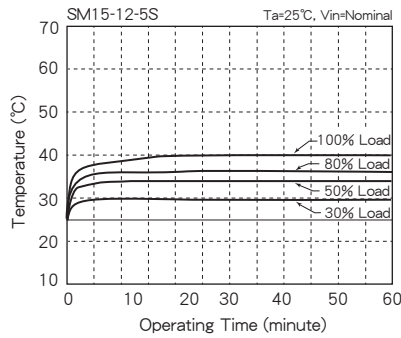
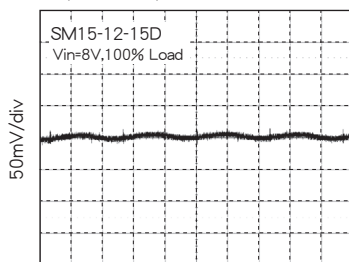


Fig 3 Output Ripple and Noise

Fig 3.1

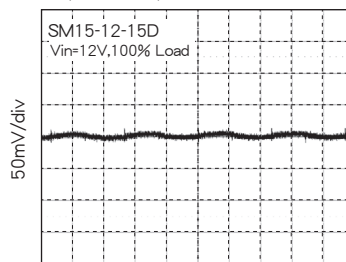
BW(0~100MHz)



1 µs/div

Fig 3.2

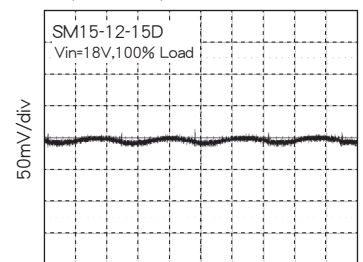
BW(0~100MHz)



1 µs/div

Fig 3.3

BW(0~100MHz)

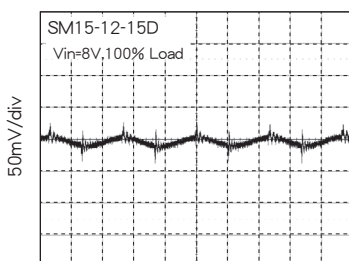


1 µs/div

Fig 4 Reflected Input Ripple and Noise

Fig 4.1

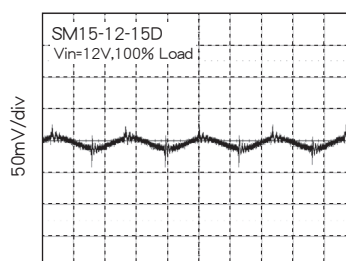
BW(0~100MHz)



1 µs/div

Fig 4.2

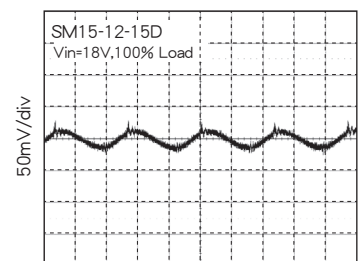
BW(0~100MHz)



1 µs/div

Fig 4.3

BW(0~100MHz)



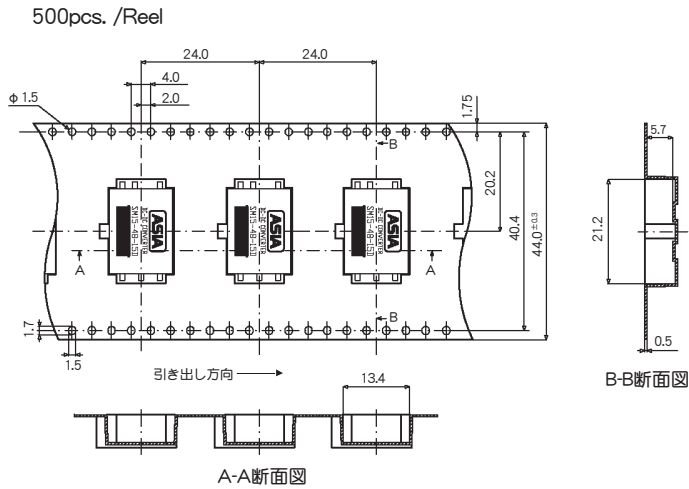
1 µs/div

# SM SERIES

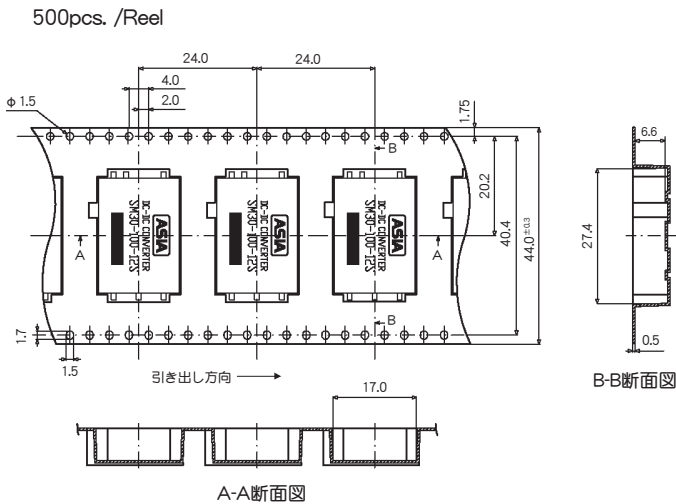
## DC/DC CONVERTERS Single Output & Dual Outputs

### ■ Tape & Reel Specifications (±0.1 mm)

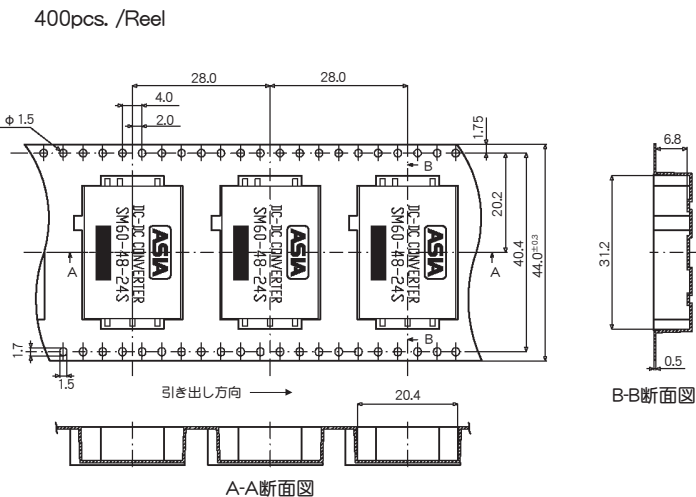
#### ■ SM15 Series Tape Outline Dimensions



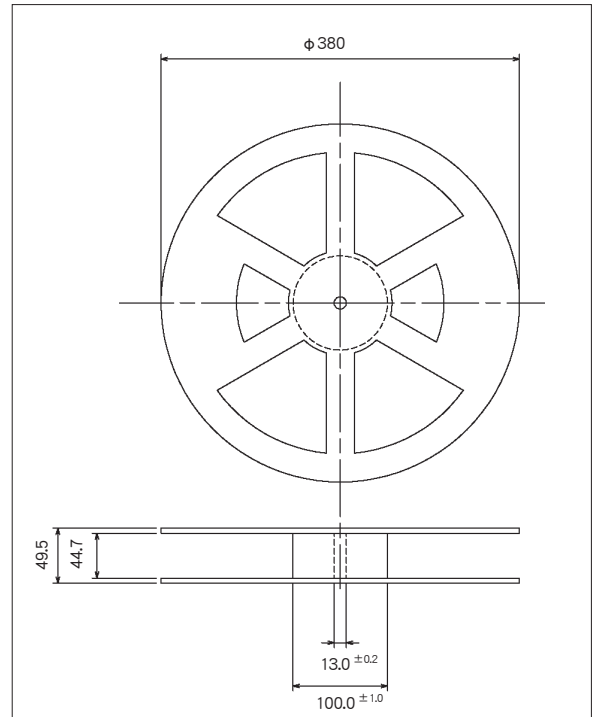
#### ■ SM30 Series Tape Outline Dimensions



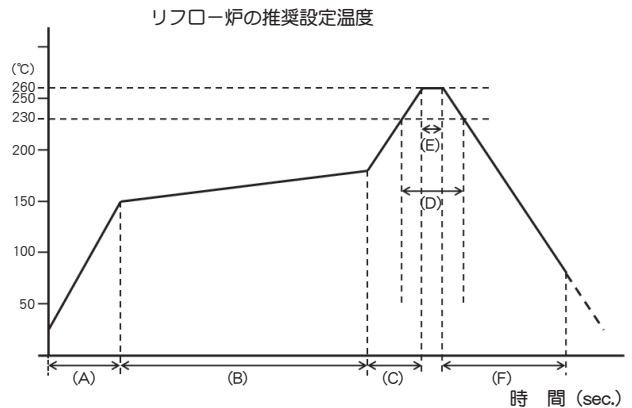
#### ■ SM60 Series Tape Outline Dimensions



#### ■ Reel Outline Dimensions (±2mm)



### ■ Recommended Solder Conditions



- (A)温度上昇勾配 : 2~4°C/sec.
- (B)予備加熱温度・時間 : 150~180°C・60~120sec.
- (C)温度上昇勾配 : 2~4°C/sec.
- (D)実装領域温度・時間 : 230°C以上・20~40sec.
- (E)ピーク温度・時間 : 260°Cmax.・10sec. min.
- (F)冷却温度勾配 : -2~-4°C/sec.

#### 注意

##### 1. リフローの場合

リフロー炉によるはんだ付けの場合次の点にご注意下さい。  
 本D/Dコンは体積容量が、SM15=1226mm<sup>3</sup>、SM30=2081mm<sup>3</sup>、SM60=3125mm<sup>3</sup>と大きい為、端子部分の温度が不足はんだ付けが不十分な場合があります。その場合は、はんだゴテによる手はんだにて、再度はんだ付けを行なって下さい。  
 手はんだの際は、コテ先温度360°C以下、3秒以内として下さい。  
 リフロー炉の温度を上げ過ぎると、製品が故障する場合がありますので、ご注意ください。

##### 2. 手付けはんだの場合

はんだゴテを使用し、はんだ付けを行なう場合は、コテ先温度360°C以下、3秒以内で行なって下さい。