

# STW-60W Series

# SCHMID-M

## 60W 4:1 Regulated Single & Dual output

### Features

- Wide 4:1 Input Range
- 1600 VDC Isolation
- Efficiency up to 93%
- Extended Operating Temperature Range -40 ~ 100°C max.
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Over Temperature Protection
- Soft Start
- No minimum load required



The STW-60W series is a family of cost effective 60W single DC-DC converters. These converters combine copper package in a 2"x1" case with high performance features such as Active Clamp Technology, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 24 and 48 with output voltage of 5, 12, 15, ±12, ±15Vdc. High performance features include high efficiency operation up to 93%.

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

OUTPUT SPECIFICATIONS	
Output Voltage Accuracy	±1%, max.
Output Voltage Adjustability (Trim)	±10%, max.
Maximum Output Current	See table, max.
Line Regulation	±0.5%, max.
Load Regulation (0% to 100%)	<b>Single:</b> ±0.5%, max. <b>Dual:</b> ±1%, max.
Cross Regulation (1)	<b>Dual:</b> ±5%
Ripple&Noise (2)	100mVpk-pk, max.
Over Voltage Protection (Zener diode clamp)	5V output 6.2V 12V output 15V 15V output 20V
Over Load Protection	120%~140% of Iout, typ.
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load (3)	See table, max.
Transient Recovery Time (4)	250µs, typ.
Transient Response Deviation (4)	±3%, max.

INPUT SPECIFICATIONS	
Input Voltage Range	See table
Under Voltage Lockout	
24V Models	Module ON / OFF 8.6Vdc / 7.9Vdc, typ.
48V Models	Module ON / OFF 17.8Vdc / 16Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)	60mS, typ.
Input Filter	Pi Type
Input Current (No-Load)	See table, max.
Input Current (Full-Load)	See table, typ.
Input Reflected Ripple Current (5)	20mA <sub>p-p</sub> , typ.
Remote On/Off (CTRL) (6)	
ON:	3.0 ... 12Vdc or open circuit
OFF:	0 ... 1.2Vdc or Short circuit pin2 and pin3
OFF idle current:	5 mA, typ.

ENVIRONMENTAL SPECIFICATIONS	
Operating Ambient Temperature	-40°C ~ +100°C(See Derating Curve) -40°C ~ +50°C(For 100% load)
Maximum Case Temperature	110°C
Thermal Impedance (Mounting at FR4 (5.9*2.75 inch) PCB)	Without Heat-sink 9.5°C/W, min. With Heat-sink 8.5°C/W, min.
Storage Temperature	-55°C ~ +125°C
Over Temperature Protection (Case)	115°C, typ.
Cooling(7)	Nature Convection

GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage (60sec)	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1G Ω, min.
Isolation Capacitance	2200 pF, typ.
Switching Frequency	225kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF (MIL-HDBK-217 F)	>210 khrs
Safety Standard (designed to meet)	IEC/EN 60950-1

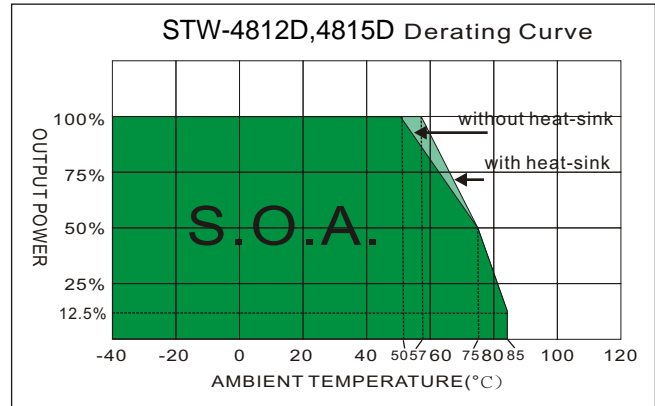
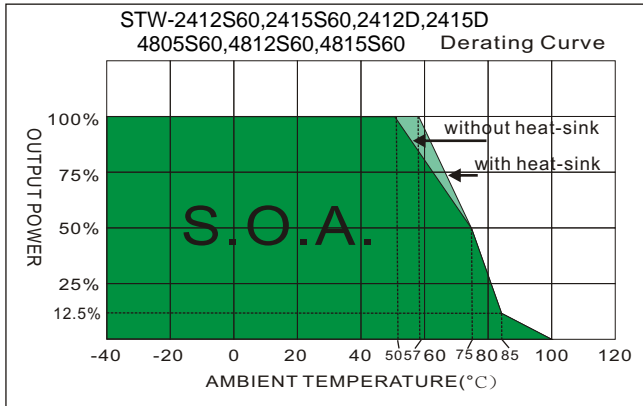
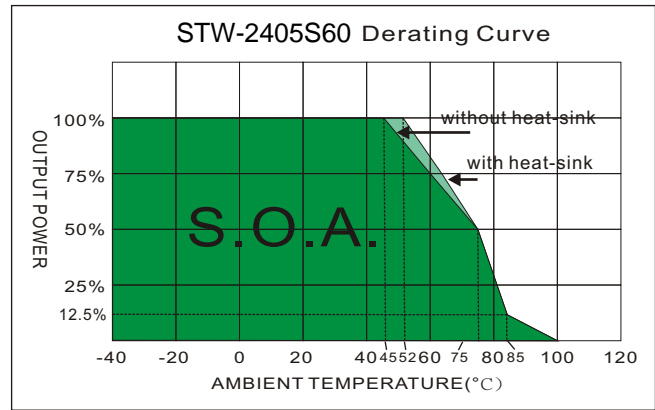
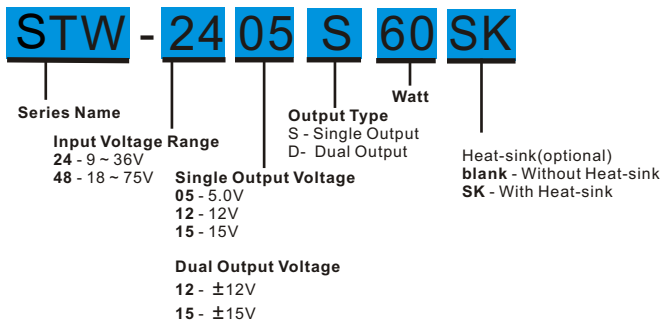
PHYSICAL SPECIFICATIONS	
Case Material	Copper
Base Material	Non-conductive Black Plastic (UL94V-0 rated)
Pin Material	1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	45.0g
Dimensions	2.00"x1.00"x0.45"

ABSOLUTE SPECIFICATIONS (8)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage (100mS)	
24 Models	50 Vdc, max.
48 Models	100 Vdc, max.
Soldering Temperature (1.5mm from case 10sec max.)	260°C, max.

EMC CHARACTERISTICS		
Radiated Emissions (9)	EN55032	CLASS A
Conducted Emissions (9)	EN55032	CLASS A
ESD	IEC61000-4-2	Perf. Criteria A
RS	IEC61000-4-3	Perf. Criteria A
EFT (10)	IEC61000-4-4	Perf. Criteria A
Surge (10)	IEC61000-4-5	Perf. Criteria A
CS	IEC61000-4-6	Perf. Criteria A
PFMF	IEC61000-4-8	Perf. Criteria A

## STW - 60W 4:1 Regulated Single & Dual output

### PART NUMBER STRUCTURE



## MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
STW-2405S60	9-36, 24V Nominal	25	2703	5	0	12000	92.5	30000
STW-2412S60	9-36, 24V Nominal	25	2703	12	0	5000	92.5	5850
STW-2415S60	9-36, 24V Nominal	25	2688	15	0	4000	93	3900
STW-4805S60	18-75, 48V Nominal	25	1344	5	0	12000	93	30000
STW-4812S60	18-75, 48V Nominal	25	1351	12	0	5000	92.5	5850
STW-4815S60	18-75, 48V Nominal	25	1344	15	0	4000	93	3900
STW-2412D60	9-36, 24V Nominal	40	2747	±12	0	±2500	91	±3900
STW-2415D60	9-36, 24V Nominal	50	2747	±15	0	±2000	91	±2400
STW-4812D60	18-75, 48V Nominal	40	1373	±12	0	±2500	91	±3900
STW-4815D60	18-75, 48V Nominal	50	1373	±15	0	±2000	91	±2400

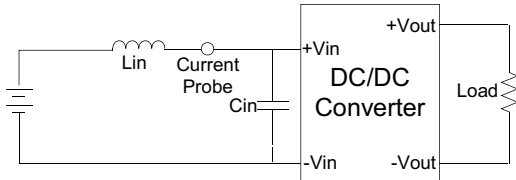
### NOTE

- Dual: One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
- Measured with 20MHz bandwidth and 1.0µF ceramic capacitor.
- Tested by minimal Vin and constant resistive load.
- Tested by normal Vin and 25% load step change ( 75%-50%-25% of Io ).
- Measured Input reflected ripple current with a simulated source inductance of 1µH and a source capacitor Cin(22µF, ESR<1.0Ω at 100KHz).
- The remote on/off control pin is referenced to -Vin(pin2).
- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Exceeding the absolute ratings of the unit could cause damage.  
It is not allowed for continuous operating.
- The STW-60W series can meet EN55022 Class A with an external filter in parallel with the input pins.
- An external filter capacitor is required if the module has to meet EN61000-4-4,EN61000-4-5.  
The STW-24XXX60 recommended an aluminum electrolytic capacitor ( Nippon chemi-con KY series, 330µF/100V) and a TVS (SMDJ58A,58V,3000Watt peak pulse power) to connect in parallel.  
The STW-48XXX60 recommended an aluminum electrolytic capacitor ( Nippon chemi-con KY series,330µF/100V) and A TVS (SMDJ120A,120V,3000Watt peak pulse power) to connect in parallel.

## TEST CONFIGURATIONS

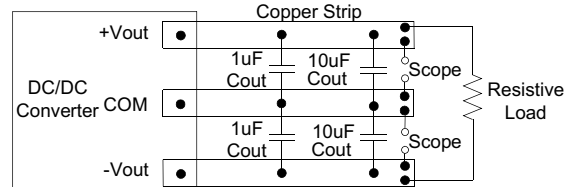
### Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor  $L_{in}(1\mu H)$  and a source capacitor  $C_{in}(22\mu F, ESR < 1.0\Omega \text{ at } 100KHz)$  at nominal input and full load.



### Output Ripple & Noise Measurement Test

To reduce ripple and noise, it is recommended to use a  $1\mu F$  ceramic disk capacitor and a  $10\mu F$  ceramic disk capacitor to at the output.



## DESIGN & FEATURE CONFIGURATIONS

### Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

### Over Temperature Protection

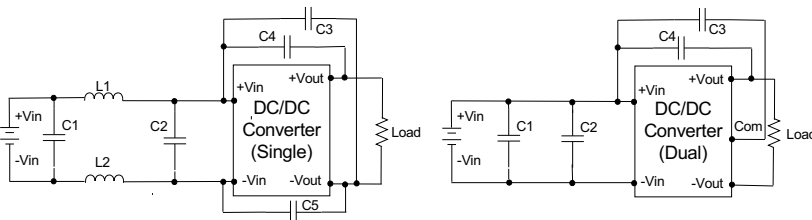
The over temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the over temperature threshold the module will shut down.

The module will try to restart after shut down, If the over temperature condition still exists during restart, the module will shut down again. This restart trial will continue until the temperature is within specification.

### EMI Filter

Input filter components ( $C1\sim C5, L1/L2$ ) are used to help meet conducted emissions.

These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



Single	C1	L1/L2	C2	C3	C4	C5
STW-24XXSXX	1812,4.7uF, 50V	12uH	1812,4.7uF, 50V	1206,470PF, 2KV	1206,1000PF, 2KV	1206,1000PF, 2KV
STW-48XXSXX	1812,1.5uF, 100V	12uH	1812,1.5uF, 100V	1206,470PF, 2KV	1206,1000PF, 2KV	1206,1000PF, 2KV

Dual	C1	C2	C3	C4
STW-24XXDXX	1812,4.7uF, 50V	1812,4.7uF, 50V	1206,220PF, 2KV	1206,1500PF, 2KV
STW-48XXDXX	1812,1.5uF, 100V	1812,1.5uF, 100V	1206,220PF, 2KV	1206,1500PF, 2KV

### Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).

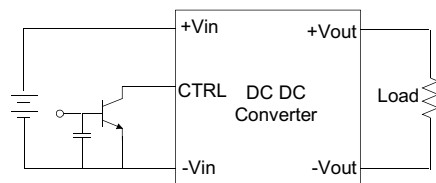
The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

### CTRL Module ON / OFF

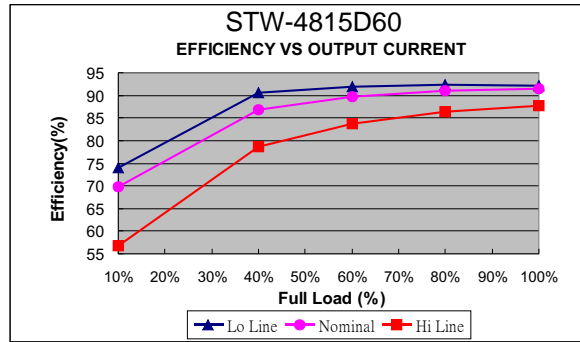
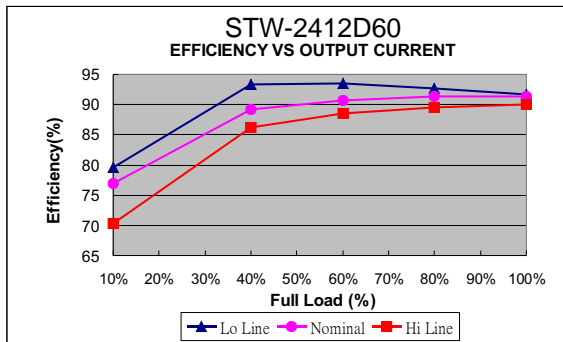
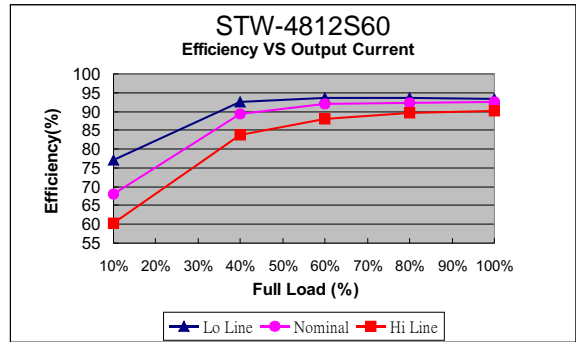
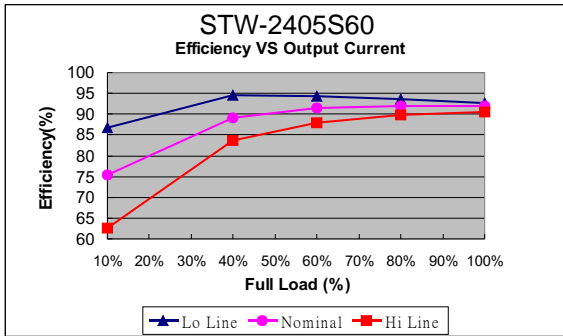
Positive logic turns on the module during high logic and off during low logic.

Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal. The switch can be an open collector or open drain

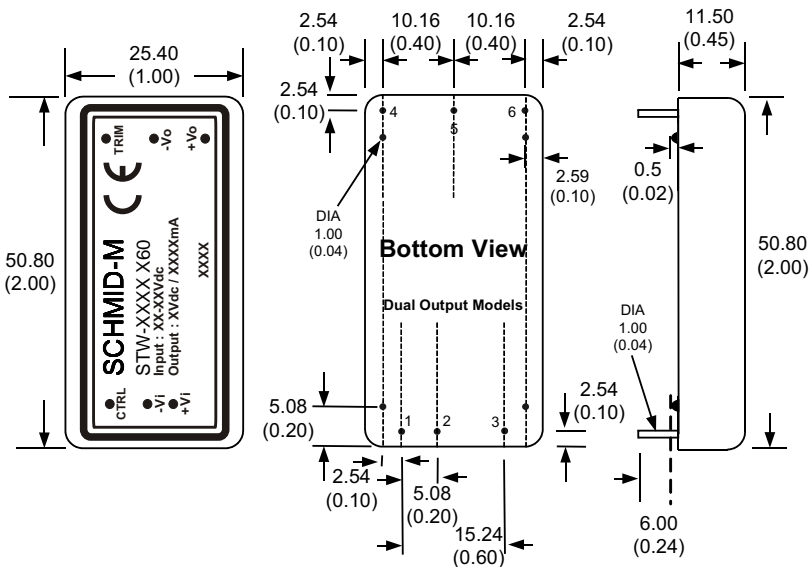
For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.



**ELECTRICAL CHARACTERISTIC CURVES**



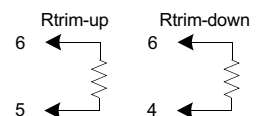
**MECHANICAL SPECIFICATIONS**



PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	-Vout	Com
6	Trim	-Vout

**EXTERNAL OUTPUT TRIMMING**

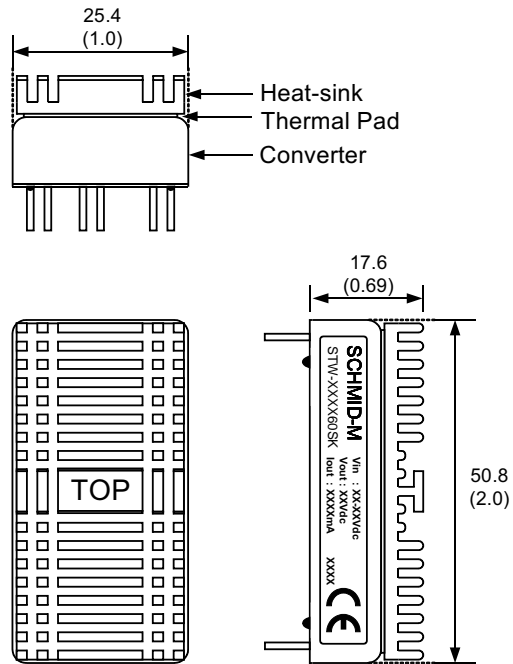
Output can be externally trimmed by using the method as below. (single output models only)



- All dimensions are typical in millimeters ( inches ).
1. Pin diameter:  $1.0 \pm 0.05$  (  $0.04 \pm 0.002$  )
  2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )
  3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )
  4. Stand-off Tolerance:  $\pm 0.1$  (  $\pm 0.004$  )

## MECHANICAL SPECIFICATIONS

### With Heat-sink



Order code: STW-XXXXXX60SK(contain: heat-sink, thermal pad)  
Material: Aluminum  
Finish: Anodic treatment (black)  
Weight: 11 g (0.39oz) (without converter)

Note:

1. Converters will be supplied with heat-sinks already mounted.  
Please contact factory for quotation.