ST Series

30W 2:1 Regulated Single & Dual output

SCHMID-M

Features

- Ultra Wide 2:1 Input Range
- Full SMD Technology
- 1600 VDC Isolation
- Efficiency up to 92%
- Extended Operating Temperature Range -40 ~ 75°C max.
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protect
- Over Current Protection
- Over Voltage Protection
- Over Temperature Protection
- Soft Start

1 Year Warranty SCHMID-M

RoHS SCHMID-M

CE

The ST series is a family of cost effective 30W single & dual & output DC-DC converters. These converters combine nickle-coated 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 12 and 24 and 48 with output voltage of 3.3 , 5, 5.1, 12, 15, ±5, ±12, ±15Vdc . High performance features include high efficiency operation up to 92% .

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

OUTPUT SPECIFICATIONS

Output Voltage Accuracy		**Single&Dual:** ±1%
Output Voltage Adjustability **(Single Output Only)**		±10%, max.
Maximum Output Current		See table
Line Regulation		**Single&Dual:** ±0.5%, max.
Load Regulation		**Single (0% to 100%):** ±0.5%, max.
		Dual (0% to 100%): ±1%, max(balanced load)
Cross Regulation **(1)**		**Dual:** ±5%
Ripple&Noise **(2)**		**Single&Dual :** 100mVp-p,max.
Over Voltage Protection (Zener diode clamp)	3.3V output	3.9V
	5V output	6.2V
	5.1V output	6.2V
	12V output	15V
	15V output	18V
	±5V output	±6.2V
	±12V output	±15V
	±15V output	±18V
Over Load Protection		150% of FL, typ.
Short Circuit Protection		Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient		±0.02%/°C
Capacitive Load **(3)**		See table
Transient Recovery Time **(4)**		250us, typ.
Transient Response Deviation **(4)**		±3%, max.

INPUT SPECIFICATIONS

Input Voltage Range		See table
Under Voltage Lockout		
12V Models	Module ON / OFF	8.6Vdc / 7.9Vdc, typ.
24V Models	Module ON / OFF	17.8Vdc / 16Vdc, typ.
48V Models	Module ON / OFF	33.5Vdc / 30.5Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)		30mS, typ.
Input Filter		Pi Type
Input Current **(No-Load)**		See table, max.
Input Current **(Full-Load)**		See table, typ.
Input Reflected Ripple Current **(5)**		20mAp-p, typ.

Remote On/Off **(CTRL) (6)**

ON: 3.0 ... 12Vdc or open circuit

OFF: 0 ... 1.2Vdc or Short circuit pin2 and pin 3

OFF idle current: 5 mA, typ.

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
I/O Isolation Voltage **(3 sec)**	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1000 MΩ, min.
Isolation Capacitance	1500 pF, typ.
Switching frequency	330kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF **(MIL-HDBK-217 F)**	**Single&Dual:** >435 khrs
Safety Standard (designed to meet)	IEC/EN 60950-1

EMC CHARACTERISTICS

Radiated Emissions	EN55022	CLASSA
Conducted Emissions**(7)**	EN55022	CLASSA
ESD	EN61000-4-2	Perf. Criteria A
RS	EN61000-4-3	Perf. Criteria A
EFT**(8)**	EN61000-4-4	Perf. Criteria A
Surge **(8)**	EN61000-4-5	Perf. Criteria A
CS	EN61000-4-6	Perf. Criteria A
PFMF	EN61000-4-8	Perf. Criteria A

PHYSICAL SPECIFICATIONS

Case Material	Nickel-coated Copper
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	Ø1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	31.0g
Dimensions	2.00"x1.00"x0.40"

ABSOLUTE SPECIFICATIONS (9)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

Input Surge Voltage (100mS)	
12 Models	25 Vdc max.
24 Models	50 Vdc max.
48 Models	100 Vdc max.
Soldering Temperature (1.5mm from case 10 sec. max.)	260°C max.

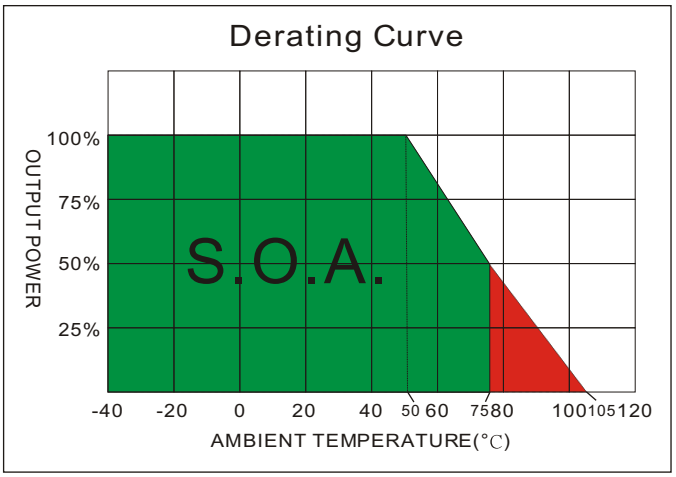
ENVIRONMENTAL SPECIFICATIONS

Operating Ambient Temperature	-40°C ~ +75°C(See Derating Curve)
	-40°C ~ +50°C(For 100% load)
Maximum Case Temperature	105°C
Storage Temperature	-55°C ~ +125°C
Over Temperature Protection **(Case)**	115°C, typ.
Cooling	Nature Convection

PART NUMBER STRUCTURE

ST - 24 05 S 30

- **ST** — Series Name
- **24** — Input Voltage Range
  - **12** - 9 ~ 18V
  - **24** - 18 ~ 36V
  - **48** - 36 ~ 75V
- **05** — Single Output Voltage
  - **3R3** - 3.3V
  - **05** - 5.0V
  - **5R1** - 5.1V
  - **12** - 12V
  - **15** - 15V
  - **Dual Output Voltage**
  - **05** - ±5V
  - **12** - ±12V
  - **15** - ±15V
- **S** — Output Type
  - S - Single Output
  - D - Dual Output
- **30** — Watt



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Min-Load (mA)	OUTPUT Current Full Load (mA)	EFFICIENCY @FL (%)	Capacitor Load(uF)
ST-123R3S30	9-18	80	2426	3.3	0	8000	89	20000
ST-1205S30	9-18	180	2874	5	0	6000	91	14000
ST-125R1S30	9-18	160	2874	5.1	0	6000	92	14000
ST-1212S30	9-18	30	2809	12	0	2500	91	2000
ST-1215S30	9-18	30	2809	15	0	2000	92	2000
ST-243R3S30	18-36	70	1185	3.3	0	8000	91	20000
ST-2405S30	18-36	100	1420	5	0	6000	92	14000
ST-245R1S30	18-36	100	1448	5.1	0	6000	92	14000
ST-2412S30	18-36	20	1436	12	0	2500	92	2000
ST-2415S30	18-36	40	1420	15	0	2000	92	2000
ST-483R3S30	36-75	50	593	3.3	0	8000	90	20000
ST-4805S30	36-75	70	702	5	0	6000	91	14000
ST-485R1S30	36-75	70	724	5.1	0	6000	91	14000
ST-4812S30	36-75	30	718	12	0	2500	91	2000
ST-4815S30	36-75	30	710	15	0	2000	91	2000
ST-1205D30	9-18	180	2874	±5	0	±3000	89	±3000
ST-1212D30	9-18	50	2874	±12	0	±1250	90	±1300
ST-1215D30	9-18	50	2874	±15	0	±1000	91	±1300
ST-2405D30	18-36	100	1437	±5	0	±3000	90	±3000
ST-2412D30	18-36	40	1453	±12	0	±1250	91	±1300
ST-2415D30	18-36	50	1437	±15	0	±1000	91	±1300
ST-4805D30	36-75	70	710	±5	0	±3000	90	±3000
ST-4812D30	36-75	50	718	±12	0	±1250	90	±1300
ST-4815D30	36-75	40	718	±15	0	±1000	90	±1300

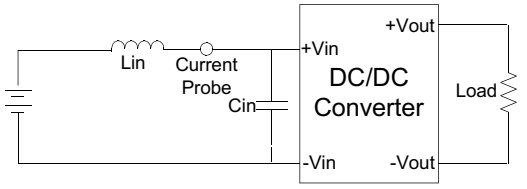
NOTE

1. Dual: One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
5. Measured Input reflected ripple current with a simulated source inductance of 4.7uH.
6. The remote on/off control pin is referenced to -Vin(pin2).
7. The ST series can meet EN55022 Class A With an external filter in parallel with the input pins .
8. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.
   The filter capacitor SCHMID-M suggest: Nippon chemi-con KY series, 220uF/100V.
9. Exceeding the absolute ratings of the unit could cause damage.
   It is not allowed for continuous operating.

TEST CONFIGURATIONS

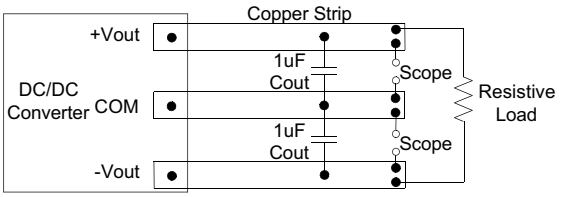
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(4.7uH) and a source capacitor Cin(33uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

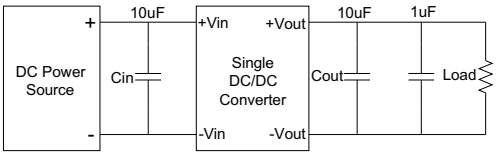
Use a capacitor Cout(1.0uF) measurement.
The Scope measurement bandwidth is 0-20MHz.



DESIGN & FEATURE CONFIGURATIONS

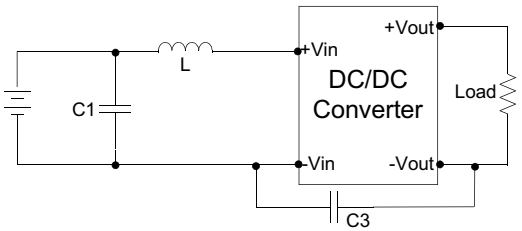
Output Ripple & Noise Reduction

To reduce ripple and noise, it is recommended to use a 1uF ceramic disk capacitor and a 10uF electrolytic capacitor to at the output.



EMI Filter

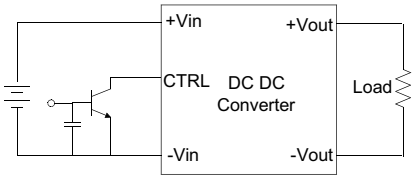
Input filter components (C1,C3, L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



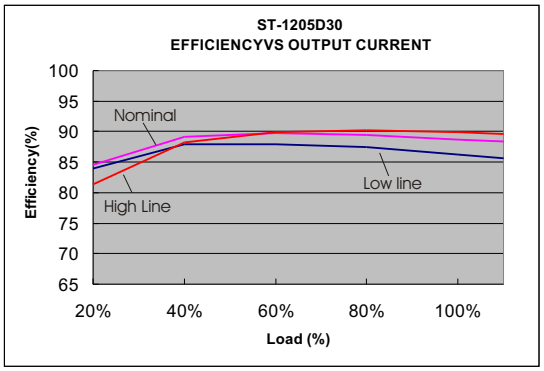
	C1	L	C3
ST-12XXXXXXXX	100uF, 100V	12uH	1206,470PF, 2KV
ST-24XXXXXXXX	100uF, 100V	12uH	1206,470PF, 2KV
ST-48XXXXXXXX	100uF, 100V	12uH	1206,470PF, 2KV

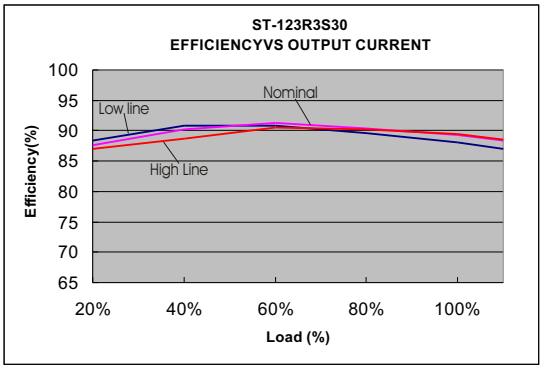
CTRL Module ON / OFF

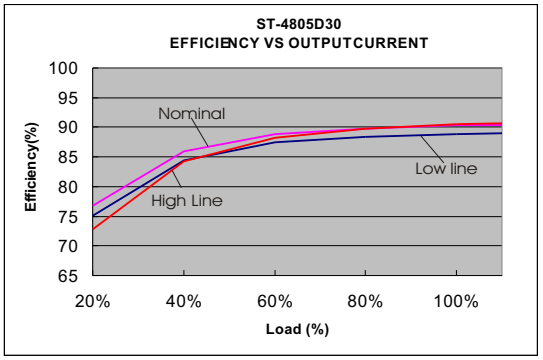
Positive logic turns on the module during high logic and off during low logic.
Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal.
The switch can be an open collector or open drain
For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.

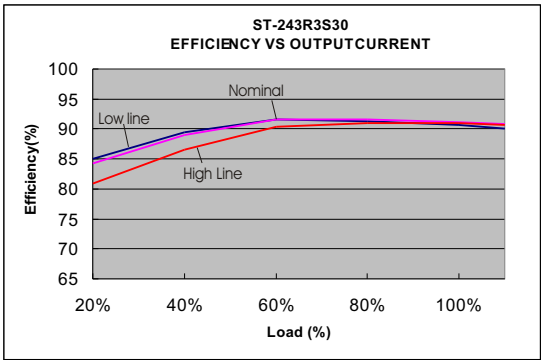


ELECTRICAL CHARACTERISTIC CURVES

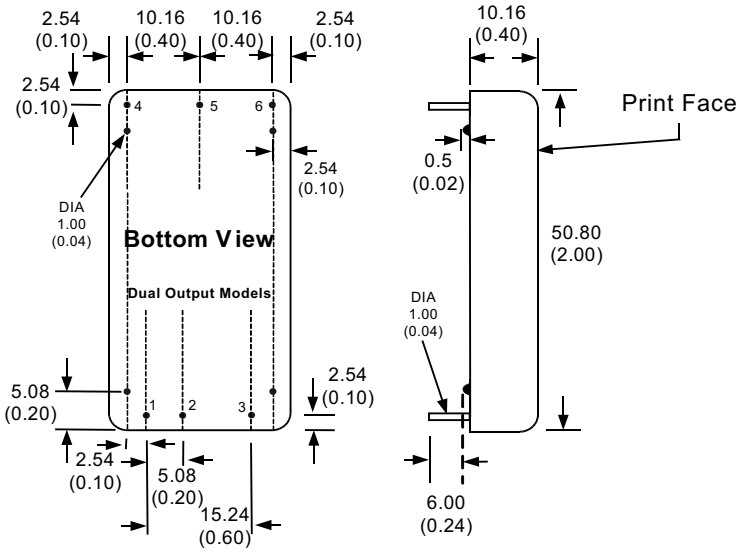








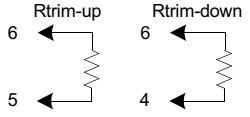
MECHANICAL SPECIFICATIONS



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 ±0.05 (0.04 ±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)
4. Stand-off Tolerance: ±0.1 (±0.004)