STA810M Series Separate Excitation Switching Mode Regulator ICs with Flywheel Diode

■Features

- Output current: 1.5A
- High efficiency: TYP83% (STA811M)
- Built-in flywheel diode (schottky-barrier diode)
- Requires only 3 discrete components: output coil, input and output capacitors
- Phase correction and output voltage adjustment performed internally
- Built-in reference oscillator (125kHz)
- Built-in foldback-overcurrent and thermal protection circuits
- Built-in ON/OFF circuit (soft start available)

■Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies
- OA equipment
- For stabilization of the secondary-side output voltage of switching power supplies

■Lineup

Part Number	Output Voltage (V)
STA811M	6.5

Output voltage: 2.5V, 3.3V, 5V, 9V, 12V and adjustable types are projected.

■Absolute Maximum Ratings*1

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V_{IN}	43	V
Output Current	I_O	1.5	A
Power Dissipation*2	P_{D1}	18.2 (With infinite heatsink)	W
	P_{D2}	2.7 (Without heatsink, stand-alone operation)	W
Junction Temperature	T_j	+125	°C
Storage Temperature	T_{stg}	–40 to +125	°C
Thermal Resistance (junction to case)	$\theta_{j\text{-}c}$	5.5	°C/W
Thermal Resistance (junction to ambient air)	$\theta_{j\text{-}a}$	37	°C/W

*1: Absolute maximum ratings show the destructive limit. No parameter should exceed the ratings in transient or normal operations.
*2: Limited by thermal protection.

■Recommended Operating Conditions*1

Parameter	Symbol	Ratings STA811M min.	Ratings STA811M max.	Unit	Conditions
DC Input Voltage Range	V_{IN1}	8.5	9.5	V	I_O=0 to 1A
	V_{IN2}	9.5	40	V	I_O=0 to 1.5A
Output Current Range*2	I_O	0	1.5	A	$V_{IN} \geq$ 9.5V
Operating Junction Temperature Range	T_{jop}	–30	+125	°C	
Operating Temperature Range*2	T_{op}	–30	+80	°C	

*1: Recommended operating conditions show operating conditions required for normal circuit function described in the electrical characteristics. These conditions must be followed in actual use.
*2: Limited by T_a-P_D characteristics.

■Electrical Characteristics

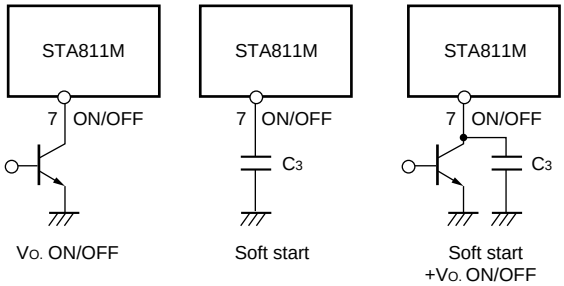
(T_a=25°C)

Parameter		Symbol	Ratings STA811M min.	Ratings STA811M typ.	Ratings STA811M max.	Unit
Output Voltage		V_O	6.37	6.5	6.63	V
		Conditions	V_{IN}=28V, I_O=1A			
Efficiency*1		η		83		%
		Conditions	V_{IN}=28V, I_O=1A			
Oscillation Frequency		f_O		125		kHz
		Conditions	V_{IN}=28V, I_O=1A			
Line Regulation		V_{Line}		40	100	mV
		Conditions	V_{IN}=10 to 30V, I_O=1A			
Load Regulation		V_{Load}		10	40	mV
		Conditions	V_{IN}=28V, I_O=0.2 to 1A			
Temperature Coefficient of Output Voltage		$\Delta V_O/\Delta T$		±0.5		mV/°C
Overcurrent Protection Starting Current		I_S	1.6			A
		Conditions	V_{IN}=28V			
ON/OFF Terminal*2	Low Level Voltage	V_{SSL}			0.5	V
	Outflow Current at Low Voltage	I_{SSL}			100	μA
		Conditions	V_{SSL}=0V			
Quiescent Circuit Current 1		I_q		7		mA
		Conditions	V_{IN}=28V, I_O=0A			
Quiescent Circuit Current 2		$I_{q(OFF)}$			200	μA
		Conditions	V_{IN}=28V, $V_{ON/OFF}$=0.3A			

*1: Efficiency is calculated from the following formula.

$$\eta\,(\%) = \frac{V_O \cdot I_O}{V_{IN} \cdot I_{IN}} \times 100$$

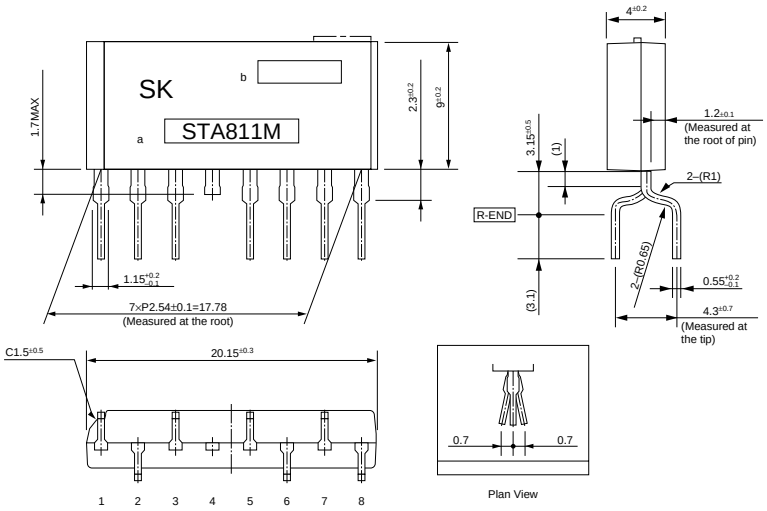
*2: Pin 7 is the ON/OFF pin. Soft start at power on can be performed by connecting a capacitor to this pin. The output can also be turned ON/OFF with this pin. The output is stopped by setting the voltage of this pin to V_{SSL} or lower. ON/OFF-pin voltage can be changed with an open-collector drive circuit of a transistor. When using both the soft-start and ON/OFF functions together, the discharge current from C_3 flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C_3 capacitance is large. The ON/OFF pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited. If this pin is not used, leave it open.



V_O. ON/OFF | Soft start | Soft start +V_O. ON/OFF

■External Dimensions (SIP8 [STA 8Pin])

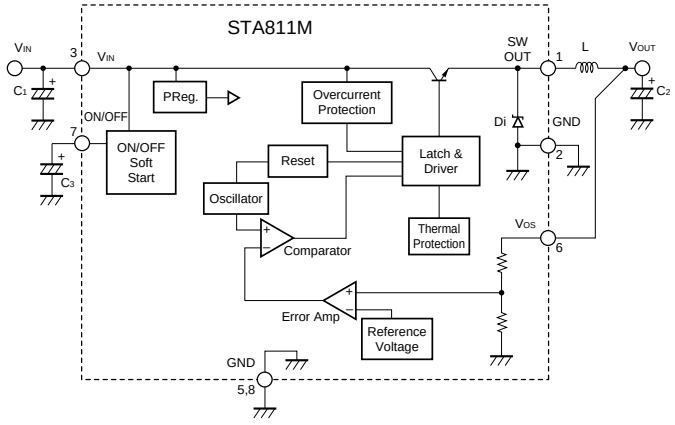
(Unit : mm)



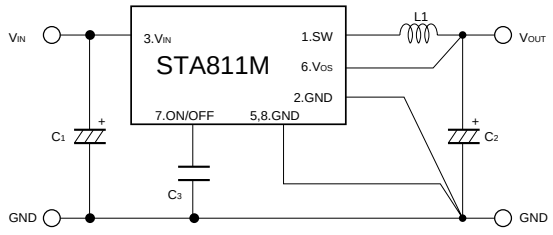
Pin Assignment
① SWOUT
② GND
③ VIN
④ N.C
⑤ GND
⑥ VOS
⑦ ON/OFF
⑧ GND

Plastic Mold Package Type
Flammability: UL 94V-0
Product Mass: Approx. 2.0 g

■Block Diagram

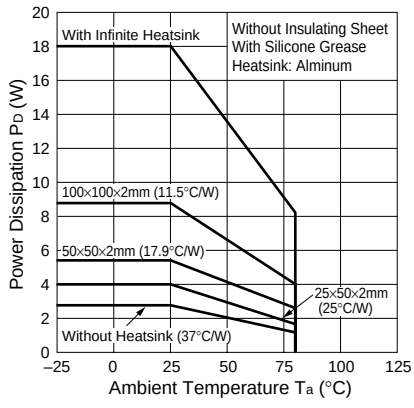


■Typical Connection Diagram



C1: 220 μF/50V
C2: 470 μF/25V
C3: 0.47 μF/10V (Only when using soft start function)
L1: 100 μH

■Thermal Derating

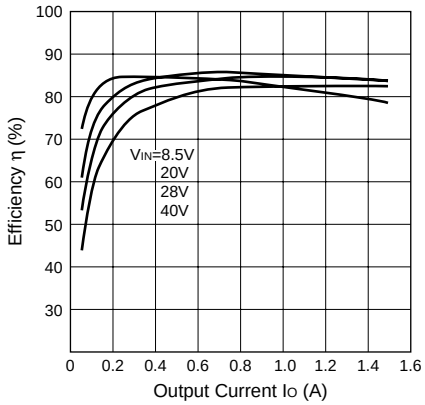


$$P_D = V_O \cdot I_O \left(\frac{100}{\eta\chi} - 1 \right)$$

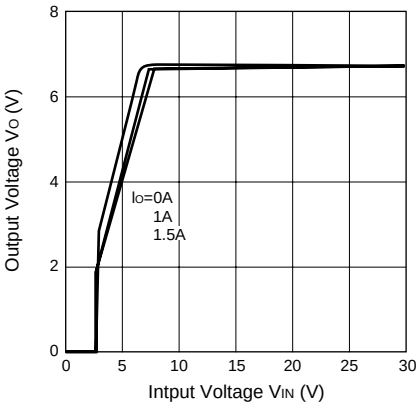
VO : Output voltage
VIN : Input voltage
IO : Otuput current
ηχ : Efficiency (%)

■Typical Characteristics

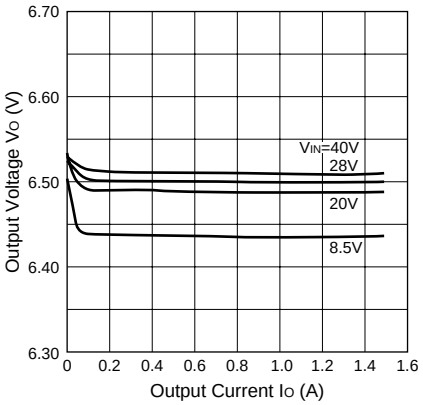
Efficiency



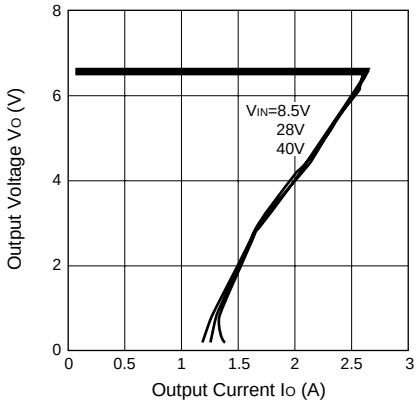
Output Voltage Rise



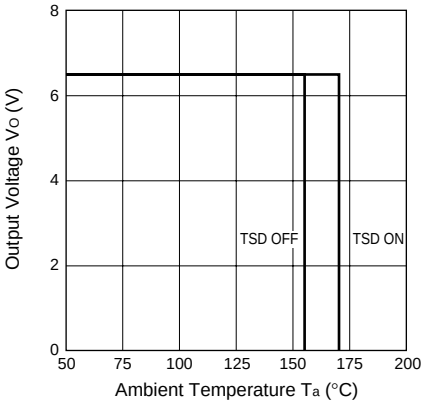
Output Voltage Fluctuation



Overcurrent Protection Characterisitcs



Thermal Protection



Temperature Characteristics

