SI-8000GL Series Compact, Separate Excitation Step-down Switching Mode Regulator ICs

Features

• DIP 8 pin package

- Output current: 1.5A
- High efficiency: 86% (at VIN = 20V, Io = 1A, Vo = 5V
- · Capable of downsize a choke-coil due to IC's high switching frequency (250kHz). (Compared with conventional Sanken devices)
- The output-voltage-variable type can vary its output voltage from 1V to 14V because of its low reference voltage (Vref) of 1V.
- Wide Input Voltage Range (8 to 50V)
- Output ON/OFF available
- · Built-in overcurrent protection and thermal protection circuits

Applications

- · Onboard local power supplies
- · OA equipment

· For stabilization of the secondary-side output voltage of switching power supplies

Recommended Operating Conditions

_	Symbol	Ratings	Linit
Parameter		SI-8010GL	Unit
DC Input Voltage Range	Vin	(8 or Vo+3)*1 to 50	V
Output Voltage Range	Vo	1 to 14	V
Output Current Range	lo	0.02 to 1.5 ^{*2}	A
Operating Junction Temperature Range	Tjop	-30 to +125	°C
Operating Temperature Range	Top	-30 to +125	°C

*1: The minimum value of an input voltage range is the higher of either 8V or Vo+3V.

*2: Please be sure to let the output current run more than 20 mA. When using by less than 20 mA, there is a possibility that the output voltage becomes unstable.

■Electrical Characteristics

Electric	cal Characte	eristics				(Ta=25°C)	
			Ratings			Unit	
Parameter	Symbol	SI-8010GL (Variable type)					
			min.	typ.	max.		
Reference Voltage	Vref	0.97	1.00	1.03	N		
	Conditions	Vin=12V, Io=1A			V		
F <i>W</i> = 1 = 1 = 1		Eff		86		0/	
Efficiency	Conditions	VIN=20V, IO=1A, VO=5V		·	%		
Oscillation Frequency		Fosc		250		kHz	
		Conditions		VIN=12V, IO=1A			
	ΔVoline		20	40			
Line Regulation		Conditions		VIN=10 to 30V, Io=1A		_ mv	
Load Regulation		ΔV oload		10	30		
		Conditions	VIN=12V, Io=0.1 to 1.5A			mv	
Temperature Co of Reference Vo	pefficient oltage	ΔV REF/ ΔT a		±0.5		mV/°C	
Overcurrent Protection		ls	1.6				
Starting Current		Conditions	Vin=12V			A	
Quiescent Circuit Current		lq		7			
		Conditions	Vin=12V, Io=0A			- ma	
Circuit Current at Output OFF		lq(OFF)			400		
		Conditions	VIN=12V, VON/OFF=0.3V			μΑ	
CE/SS [*] Terminal Low Level V Terminal Outf Current at Lo	Low Level Voltage	Vssl			0.5	V	
	Terminal Outflow	Issl			50		
	Current at Low Voltage	Conditions		Vssl=0V			

*: Pin 2 is the CE/SS pin. Soft start at power on can be performed with a capacitor connected 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 VssL or lower. CE/SS-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 C4 flows into the ON/OFF control transistor. Therefore, limit the current securely to protect the transistor if C3 capacitance is large. The CE/SS pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited.



60 ICs

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Input Voltage	Vin	53	V
Power Dissipation	PD ^{*1}	1	W
Junction Temperature	Tj	+125	°C
Storage Temperature	Tstg	-40 to +125	°C
Thermal Resistance (junction to case)	θj-c	28	°C/W
Thermal Resistance (junction to ambient air)	$ heta_{ ext{j-a}}$	100	°C/W

*1: Limited by thermal protection.

+Vo. ON/OFF

■External Dimensions (DIP8)



Block Diagram

■Ta-PD Characteristics



Typical Connection Diagram



Diode D1

• Be sure to use a Schottky-barrier diode as D1. If other diodes like fast recovery diodes are used, IC may be destroyed because of the reverse voltage generated by the recovery voltage or ON voltage. Choke coil L1

• If the winding resistance of the choke coil is too high, the efficiency may drop below the rated value.

• As the overcurrent protection starting current is approx. 2.5 A, take care concerning heat radiation from the choke coil caused by magnetic saturation due to overload or short-circuited load.

Capacitor C1, C2

• As large ripple currents flow through C1 and C2, use high-frequency and low-impedance capacitors aiming for switching-mode-power-supply use. Especially when the impedance of C2 is high, the switching waveform may become abnormal at low temperatures. For C2, do not use a capacitor with an extremely low equivalent series resistance (ESR) such as an OS capacitor or a tantalum capacitor, which may cause an abnormal oscillation. Resistors R2, R3

• R2 and R3 are the resistors to set the output voltage. Set their values so that IREF becomes approx. 2 mA. Obtain R2 and R3 values by the following formula above.

* To create the optimum operating conditions, place the components as close as possible to each other.