

SI-3000KD Series

Surface-Mount, Low Current Consumption, Low Dropout Voltage

Features

- Compact surface-mount package (TO263-5)
- Output current: 1.0A
- Low dropout voltage: $V_{DIF} \leq 0.6V$ (at $I_o = 1.0A$)
- Low circuit current consumption: $I_q \leq 350 \mu A$ (600 μA for SI-3010KD, SI-3050KD)
- Low circuit current at output OFF: $I_q (OFF) \leq 1 \mu A$
- Built-in overcurrent, thermal protection circuits
- Compatible with low ESR capacitors (SI-3012KD and SI-3033KD)

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings		Unit
		SI-3012KD/3033KD	SI-3010KD/3050KD	
DC Input Voltage	VIN	17	35*1	V
Output Control Terminal Voltage	Vc	VIN		V
DC Output Current	Io	1.0		A
Power Dissipation	PD*2	3		W
Junction Temperature	Tj	-30 to +125		°C
Storage Temperature	Tstg	-30 to +125		°C
Thermal Resistance (Junction to Ambient Air)	θ_{JA}	33.3		°C/W
Thermal Resistance (Junction to Case)	θ_{JC}	3		°C/W

*1: A built-in input-overvoltage-protection circuit shuts down the output voltage at the Input Overvoltage Shutdown Voltage of the electrical characteristics.

*2: When mounted on glass-epoxy board of 1600mm² (copper laminate area 100%).

Applications

- Secondary stabilized power supply (local power supply)

Electrical Characteristics 1 (Low Input Voltage type compatible with low ESR output capacitor)

(Ta=25°C, Vc=2V, unless otherwise specified)

Parameter		Symbol	Ratings						Unit
			SI-3012KD (Variable type)			SI-3033KD			
			min.	typ.	max.	min.	typ.	max.	
Input Voltage		V _{IN}	2.4*3		*4	*3		*4	V
Output Voltage (Reference Voltage for SI-3012KD)		V _O (V _{ADJ})	1.24	1.28	1.32	3.234	3.300	3.366	V
		Conditions	V _{IN} =3.3V, I _O =10mA			V _{IN} =5V, I _O =10mA			
Line Regulation		ΔV _{OLINE}			15			15	mV
		Conditions	V _{IN} =3.3 to 8V, I _O =10mA (V _O =2.5V)			V _{IN} =5 to 10V, I _O =10mA			
Load Regulation		ΔV _{OLOAD}			40			50	mV
		Conditions	V _{IN} =3.3V, I _O =0 to 1A (V _O =2.5V)			V _{IN} =5V, I _O =0 to 1A			
Dropout Voltage		V _{DIF}			0.4			0.4	V
		Conditions	I _O =0.5A (V _O =2.5V)			I _O =0.5A			
					0.6			0.6	
		Conditions	I _O =1A (V _O =2.5V)			I _O =1A			
Quiescent Circuit Current		I _Q			350			350	μA
		Conditions	V _{IN} =3.3V, I _O =0A, V _C =2V, R ₂ =2.4kΩ			V _{IN} =5V, I _O =0A, V _C =2V			
Circuit Current at Output OFF		I _Q (OFF)			1			1	μA
		Conditions	V _{IN} =3.3V, V _C =0V			V _{IN} =5V, V _C =0V			
Temperature Coefficient of Output Voltage		ΔV _O /ΔT _a		±0.3			±0.3		mV/°C
		Conditions	T _J =0 to 100°C (V _O =2.5V)			T _J =0 to 100°C			
Ripple Rejection		R _{REJ}		55			55		dB
		Conditions	V _{IN} =3.3V, f=100 to 120Hz, I _O =0.1A (V _O =2.5V)			V _{IN} =5V, f=100 to 120Hz, I _O =0.1A			
Overcurrent Protection Starting Current*1		I _{S1}	1.1			1.1			A
		Conditions	V _{IN} =3.3V			V _{IN} =5V			
Vc Terminal	Control Voltage (Output ON)*2	V _C , I _H	2			2			V
	Control Voltage (Output OFF)	V _C , I _L			0.8			0.8	
	Control Current (Output ON)	I _C , I _H			40			40	μA
	Conditions	V _C =2V			V _C =2V				
	Control Current (Output OFF)	I _C , I _L	-5	0		-5	0		μA
Conditions	V _C =0V			V _C =0V					

*1: IS1 is specified at the 5% drop point of output voltage Vo under the condition of Output Voltage parameter.

*2: Output is OFF when the output control terminal (Vc terminal) is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.

*3: Refer to the Dropout Voltage parameter.

*4: VIN (max) and Io (max) are restricted by the relation $P_D = (V_{IN} - V_o) \times I_o$. Please calculate these values referring to the Copper laminate area vs. Power dissipation data.

■Electrical Characteristics 2 (High Input Voltage Type)

Parameter		Symbol	Ratings						Unit
			SI-3010KD (Variable type)			SI-3050KD			
			min.	typ.	max.	min.	typ.	max.	
Input Voltage		V _{IN}	2.4 ^{*1}		27 ^{*5}	^{*1}		15 ^{*5}	V
Output Voltage (Reference Voltage V _{ADJ} for SI-3010KD)		V _O (V _{ADJ})	0.98	1.00	1.02	4.90	5.00	5.10	V
		Conditions	V _{IN} =7V, I _O =10mA			V _{IN} =7V, I _O =10mA			
Line Regulation		ΔV _{OLINE}			30			30	mV
		Conditions	V _{IN} =6 to 11V, I _O =10mA (V _O =5V)			V _{IN} =6 to 11V, I _O =10mA			
Load Regulation		ΔV _{OLOAD}			75			75	mV
		Conditions	V _{IN} =7V, I _O =0 to 1A (V _O =5V)			V _{IN} =7V, I _O =0 to 1A			
Dropout Voltage		V _{DIF}			0.3			0.3	V
		Conditions	I _O =0.5A (V _O =5V)			I _O =0.5A			
					0.6			0.6	
		Conditions	I _O =1A (V _O =5V)			I _O =1A			
Quiescent Circuit Current		I _q			600			600	μA
		Conditions	V _{IN} =7V, I _O =0A, V _C =2V R2=10kΩ			V _{IN} =7V, I _O =0A, V _C =2V			
Circuit Current at Output OFF		I _q (OFF)			1			1	μA
		Conditions	V _{IN} =7V, V _C =0V			V _{IN} =7V, V _C =0V			
Temperature Coefficient of Output Voltage		ΔV _O /ΔT _a		±0.5			±0.5		mV/°C
		Conditions	T _J =0 to 100°C (V _O =5V)			T _J =0 to 100°C			
Ripple Rejection		R _{REJ}		75			75		dB
		Conditions	V _{IN} =7V, f=100 to 120Hz, I _O =0.1A (V _O =5V)			V _{IN} =7V, f=100 to 120Hz, I _O =0.1A			
Overcurrent Protection Starting Current ^{*2} ^{*4}		I _{S1}	1.1			1.1			A
		Conditions	V _{IN} =7V			V _{IN} =7V			
V _C Terminal	Control Voltage (Output ON) ^{*3}	V _C , I _H	2.0			2.0			V
	Control Voltage (Output OFF) ^{*3}	V _C , I _L			0.8			0.8	
	Control Current (Output ON)	I _C , I _H			40			40	μA
	Control Current (Output OFF)	I _C , I _L	-5	0		-5	0		μA
		Conditions	V _C =0V			V _C =0V			
Input Overvoltage Shutdown Voltage		V _{OVP}	33			26			V
		Conditions	I _O =10mA			I _O =10mA			

*1: Refer to the Dropout Voltage parameter.

*2: I_{S1} is specified at the 5% drop point of output voltage V_O under the condition of Output Voltage parameter.

*3: Output is OFF when the output control terminal (V_C terminal) is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.

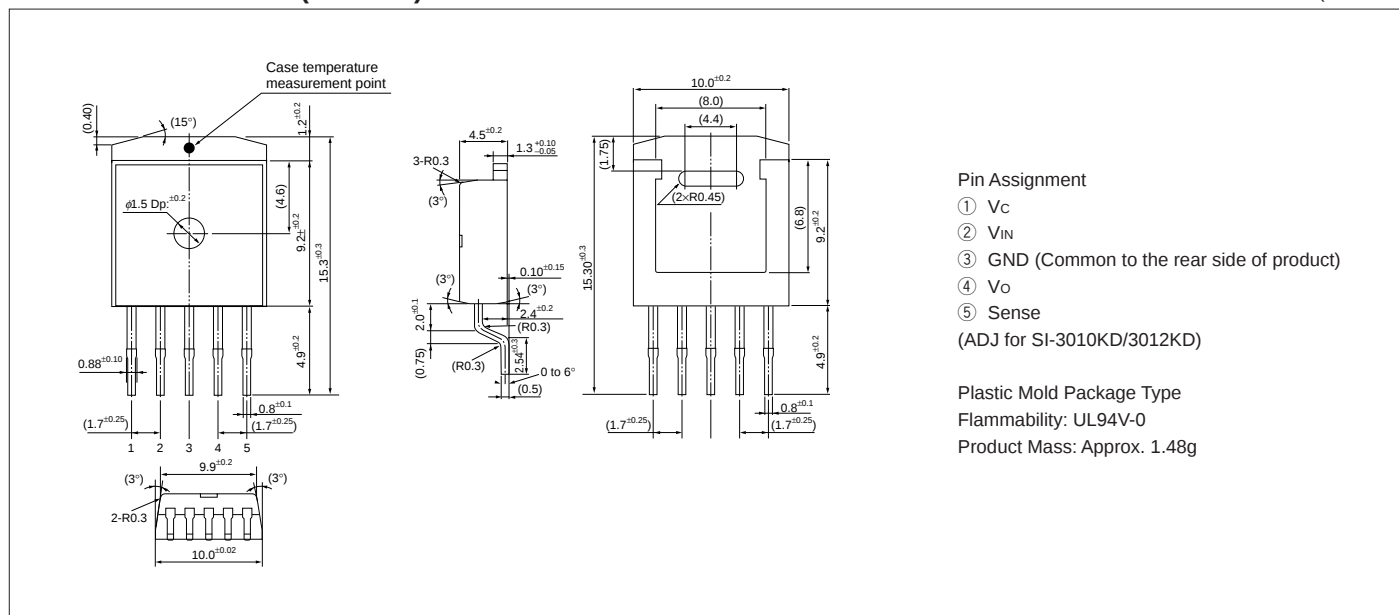
*4: SI-3010KD, SI-3050KD, cannot be used in the following applications because the built-in foldback-type overcurrent protection may cause errors during start-up stage.

(1) Constant current load (2) Positive and negative power supply (3) Series-connected power supply (4) V_O adjustment by raising ground voltage

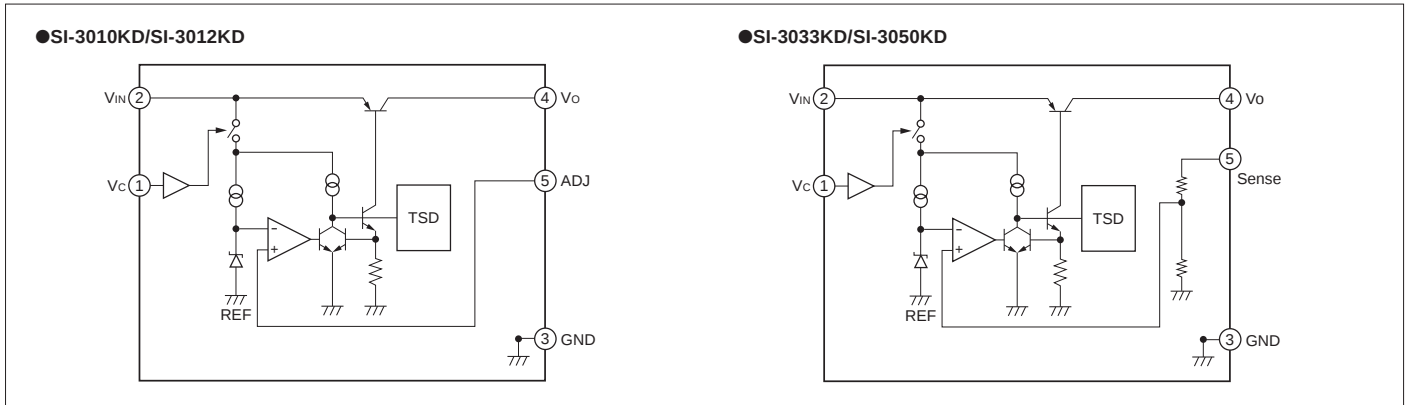
*5: V_{IN} (max) and I_O (max) are restricted by the relation $P_D = (V_{IN} - V_O) \times I_O$. Please calculate these values referring to the Copper laminate area vs. Power dissipation data as shown hereinafter.

■External Dimensions (TO263-5)

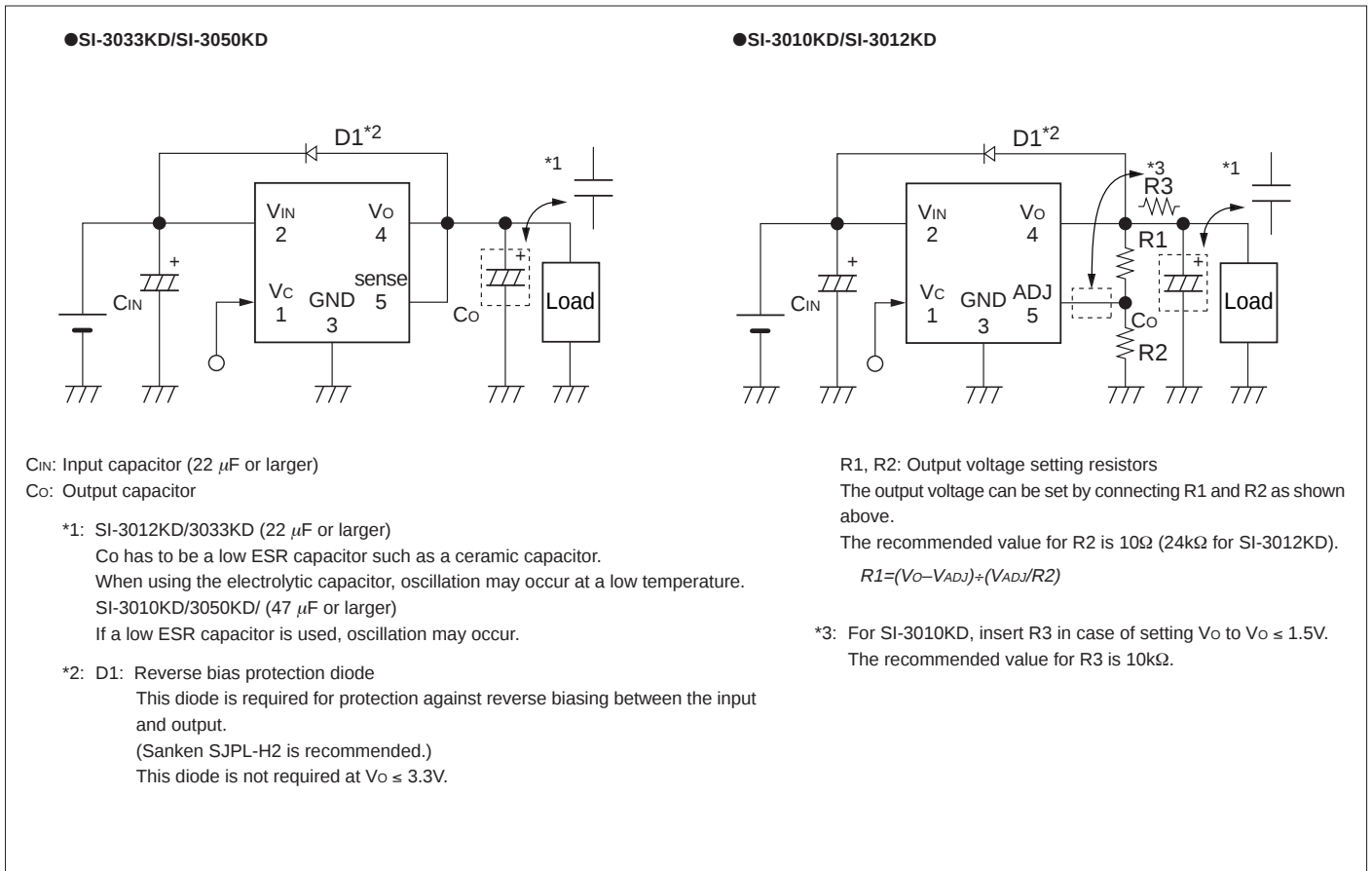
(unit : mm)



Block Diagram

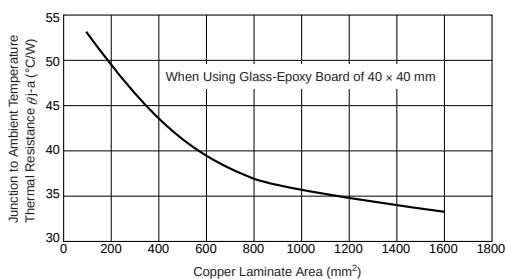


Typical Connection Diagram



Reference Data

Copper Laminate Area (on Glass-Epoxy Board) vs.
Thermal Resistance (from Junction to Ambient Temperature) (Typical Value)



- A higher heat radiation effect can be achieved by enlarging the copper laminate area connected to the inner frame to which a monolithic ICs is mounted.
- Obtaining the junction temperature
Measure the case temperature T_c with a thermocouple, etc. Then, substitute this value in the following formula to obtain the junction temperature.

$$T_J = P_D \times \theta_{J-C} + T_C \quad (\theta_{J-C} = 3^\circ\text{C/W}) \quad P_D = (V_{IN} - V_o) \cdot I_{OUT}$$