

SI-3000KM Series

Surface Mount, Low Current Consumption, Low Dropout Voltage Linear Regulator IC

Features

- Compact surface mount package (TO252-5)
- Output current: 1.0 A
- Low dropout voltage: $V_{DIF} \leq 0.6\text{ V}$ (at $I_o = 1.0\text{ A}$)
- Low current consumption: $I_q \leq 350\text{ }\mu\text{A}$ (600 μA for SI-3010KM/SI-3050KM/SI-3090KM/SI-3120KM/SI-3150KM)
- Low circuit current at output OFF: $I_q(\text{OFF}) \leq 1\text{ }\mu\text{A}$
- Built-in overcurrent and thermal protection circuits
- Output ON/OFF control function
- Compatible with low ESR capacitors (SI-3012KM/SI-3018KM/SI-3025KM/SI-3033KM)

Absolute Maximum Ratings

($T_a=25^\circ\text{C}$)

Parameter	Symbol	Ratings		Unit
		SI-3012KM/3018KM/3025KM/3033KM	SI-3010KM/3050KM/3090KM/3120KM/3150KM	
DC Input Voltage	V_{IN}	17	35^{*1}	V
Output Control Terminal Voltage	V_c	V_{IN}		V
DC Output Current	I_o	1.0		A
Power Dissipation	P_D^{*2}	1		W
Junction Temperature	T_j	$-30\text{ to }+125$		$^\circ\text{C}$
Storage Temperature	T_{stg}	$-30\text{ to }+125$		$^\circ\text{C}$
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}^{*2}	95		$^\circ\text{C/W}$
Thermal Resistance (Junction to case)	θ_{j-c}	6		$^\circ\text{C/W}$

- *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 900mm² (copper laminate area 4.3%).

Applications

- Secondary stabilized power supply (local power supply)

Recommended Operating Conditions

Parameter	Symbol	Ratings									Unit
		SI-3012KM	SI-3018KM	SI-3025KM	SI-3033KM	SI-3010KM	SI-3050KM	SI-3090KM	SI-3120KM	SI-3150KM	
Input Voltage Range	V _{IN}	2.4 ^{*2} to 6.0 ^{*1}	2.4 ^{*2} to 5.0 ^{*1}	2.4 ^{*2} to 5 ^{*1}	^{*2} to 6 ^{*1}	2.4 ^{*2} to 15 ^{*1}	2.4 ^{*2} to 27 ^{*1}	^{*2} to 20 ^{*1}	^{*2} to 25 ^{*1}	^{*2} to 27 ^{*1}	V
Output Current Range	I _o	0 to 1.0									A
Operating Ambient Temperature	T _{op}	−30 to +85									°C
Operating Junction Temperature	T _j	−20 to +100									°C

- *1: V_{IN} (max) and I_o (max) are restricted according to operating conditions due to 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.
- *2: Refer to the Dropout Voltage parameter.

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

Parameter		Symbol	Ratings												Unit
			SI-3012KM (Variable type)			SI-3018KM			SI-3025KM			SI-3033KM			
			min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Input Voltage		V _{IN}	2.4 ^{*1}			^{*1}			^{*1}			^{*1}			V
Output Voltage (Reference voltage V _{ADJ} for SI-3012KM)		V _O (V _{ADJ})	1.24	1.28	1.32	1.764	1.800	1.836	2.45	2.50	2.55	3.234	3.300	3.366	V
		Conditions	V _{IN} =3.3V, I _O =10mA			V _{IN} =2.5V, I _O =10mA			V _{IN} =3.3V, I _O =10mA			V _{IN} =5V, I _O =10mA			
Line Regulation		ΔV _{OLINE}			15			15			15			15	mV
		Conditions	V _{IN} =3.3 to 8V, I _O =10mA (V _O =2.5V)			V _{IN} =2.5 to 6V, I _O =10mA			V _{IN} =3.3 to 8V, I _O =10mA			V _{IN} =5 to 10V, I _O =10mA			
Load Regulation		ΔV _{OLOAD}			40			40			40			50	mV
		Conditions	V _{IN} =3.3V, I _O =0 to 1A (V _O =2.5V)			V _{IN} =2.5V, I _O =0 to 1A			V _{IN} =3.3V, I _O =0 to 1A			V _{IN} =5V, I _O =0 to 1A			
Dropout Voltage		V _{DIF}			0.4			0.6			0.4			0.4	V
		Conditions	I _O =0.5A (V _O =2.5V)			I _O =0.5A			I _O =0.5A			I _O =0.5A			
					0.6			0.6			0.6			0.6	
		Conditions	I _O =1A (V _O =2.5V)			I _O =1A			I _O =1A			I _O =1A			
Quiescent Circuit Current		I _q			350			350			350			350	μA
		Conditions	V _{IN} =3.3V, I _O =0A, V _C =2V, R ₂ =24kΩ			V _{IN} =2.5V, I _O =0A, V _C =2V			V _{IN} =3.3V, I _O =0A, V _C =2V			V _{IN} =5V, I _O =0A, V _C =2V			
Circuit Current at Output OFF		I _q (OFF)			1			1			1			1	μA
		Conditions	V _{IN} =3.3V, V _C =0V			V _{IN} =2.5V, V _C =0V			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			±0.3			±0.3		mV/°C
		Conditions	T _J =0 to 100°C (V _C =2.5V)			T _J =0 to 100°C			T _J =0 to 100°C			T _J =0 to 100°C			
Ripple Rejection		R _{REJ}		55			55			55			55		dB
		Conditions	V _{IN} =3.3V, f=100 to 120Hz (V _O =2.5V)			V _{IN} =2.5V, f=100 to 120Hz			V _{IN} =3.3V, f=100 to 120Hz			V _{IN} =5V, f=100 to 120Hz			
Overcurrent Protection Starting Current ^{*2}		I _{S1}	1.1			1.1			1.1			1.1			A
		Conditions	V _{IN} =3.3V			V _{IN} =2.5V			V _{IN} =3.3V			V _{IN} =5V			
V _C Terminal	Control Voltage (Output ON)	V _C , I _H	2.0			2.0			2.0			2.0			V
	Control Voltage (Output OFF)	V _C , I _L			0.8			0.8			0.8			0.8	
	Control Current (Output ON)	I _C , I _H			40			40			40			40	μA
	Conditions	V _C =2V			V _C =2V			V _C =2V			V _C =2V				
	Control Current (Output OFF)	I _C , I _L	-5	0		-5	0		-5	0		-5	0		μA
Conditions	V _C =0V			V _C =0V			V _C =0V			V _C =0V					

- *1: Refer to the Dropout Voltage parameter.
- *2: I_{S1} is specified at the 5% drop point of output voltage V_o on the condition that V_{IN} =overcurrent protection starting current, $I_o = 10\text{ mA}$.
- *3: Output is OFF when 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.

■Electrical Characteristics 2 (High Vo type)

Parameter		Symbol	Ratings															Unit
			SI-3010KM (Variable type)			SI-3050KM			SI-3090KM			SI-3120KM			SI-3150KM			
			min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Input Voltage		V _{IN}	2.4 ¹			¹			¹			¹			¹			V
Output Voltage (Reference voltage V _{ADJ} for SI-3010KM)		V _O (V _{ADJ})	0.98	1.00	1.02	4.90	5.00	5.10	8.82	9.00	9.18	11.76	12.00	12.24	14.70	15.00	15.30	V
		Conditions	V _{IN} =7V, I _O =10mA			V _{IN} =7V, I _O =10mA			V _{IN} =11V, I _O =10mA			V _{IN} =14V, I _O =10mA			V _{IN} =17V, I _O =10mA			
Line Regulation		ΔV _{OLINE}			30			30			54			72			90	mV
		Conditions	V _{IN} =6 to 11V, I _O =10mA (V _O =5V)			V _{IN} =6 to 11V, I _O =10mA			V _{IN} =10 to 15V, I _O =10mA			V _{IN} =13 to 18V, I _O =10mA			V _{IN} =16 to 26V, I _O =10mA			
Load Regulation		ΔV _{OLOAD}			75			75			135			180			225	mV
		Conditions	V _{IN} =7V, I _O =0 to 1A (V _O =5V)			V _{IN} =7V, I _O =0 to 1A			V _{IN} =11V, I _O =0 to 1A			V _{IN} =14V, I _O =0 to 1A			V _{IN} =17V, I _O =0 to 1A			
Dropout Voltage		V _{DIF}			0.3			0.3			0.3			0.3			0.3	V
		Conditions	I _O =0.5A (V _O =5V)			I _O =0.5A			I _O =0.5A			I _O =0.5A			I _O =0.5A			
					0.6			0.6			0.6			0.6			0.6	
		Conditions	I _O =1A (V _O =5V)			I _O =1A			I _O =1A			I _O =1A			I _O =1A			
Quiescent Circuit Current		I _q			600			600			600			600			600	μA
		Conditions	V _{IN} =7V, I _O =0A, V _C =2V R ₂ =10kΩ			V _{IN} =7V, I _O =0A, V _C =2V			V _{IN} =11V, I _O =0A, V _C =2V			V _{IN} =14V, I _O =0A, V _C =2V			V _{IN} =17V, I _O =0A, V _C =2V			
Circuit Current at Output OFF		I _q (OFF)			1			1			1			1			1	μA
		Conditions	V _{IN} =7V, V _C =0V			V _{IN} =7V, V _C =0V			V _{IN} =11V, V _C =0V			V _{IN} =14V, V _C =0V			V _{IN} =17V, V _C =0V			
Temperature Coefficient of Output Voltage		ΔV _O /ΔT _a			±0.5			±0.5			±1.0			±1.5			±1.5	mV/°C
		Conditions	T _J =0 to 100°C (V _O =5V)			T _J =0 to 100°C			T _J =0 to 100°C			T _J =0 to 100°C			T _J =0 to 100°C			
Ripple Rejection		R _{REJ}			75			75			68			66			63	dB
		Conditions	V _{IN} =7V, f=100 to 120Hz (V _O =5V)			V _{IN} =7V, f=100 to 120Hz			V _{IN} =11V, f=100 to 120Hz			V _{IN} =14V, f=100 to 120Hz			V _{IN} =17V, f=100 to 120Hz			
Overcurrent Protection Starting Current ²		I _{S1}	1.1			1.1			1.1			1.1			1.1			A
		Conditions	V _{IN} =7V			V _{IN} =7V			V _{IN} =11V			V _{IN} =14V			V _{IN} =17V			
V _C Terminal	Control Voltage (Output ON)	V _C , I _H	2.0			2.0			2.0			2.0			2.0			V
	Control Voltage (Output OFF)	V _C , I _L			0.8			0.8			0.8			0.8			0.8	
	Control Current (Output ON)	I _C , I _H			40			40			40			40			40	μA
	Conditions	V _C =2V			V _C =2V			V _C =2V			V _C =2V			V _C =2V				
	Control Current (Output OFF)	I _C , I _L	-5	0		-5	0		-5	0		-5	0		-5	0		μA
	Conditions	V _C =0V			V _C =0V			V _C =0V			V _C =0V			V _C =0V				
Input Overvoltage Shutdown Voltage		V _{OVP}	33			26			30			33			33			V
		Conditions	I _O =10mA			I _O =10mA			I _O =10mA			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 on the condition that V_{IN}=overcurrent protection starting current, I_O = 10 mA).

*3: Output is OFF when 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.

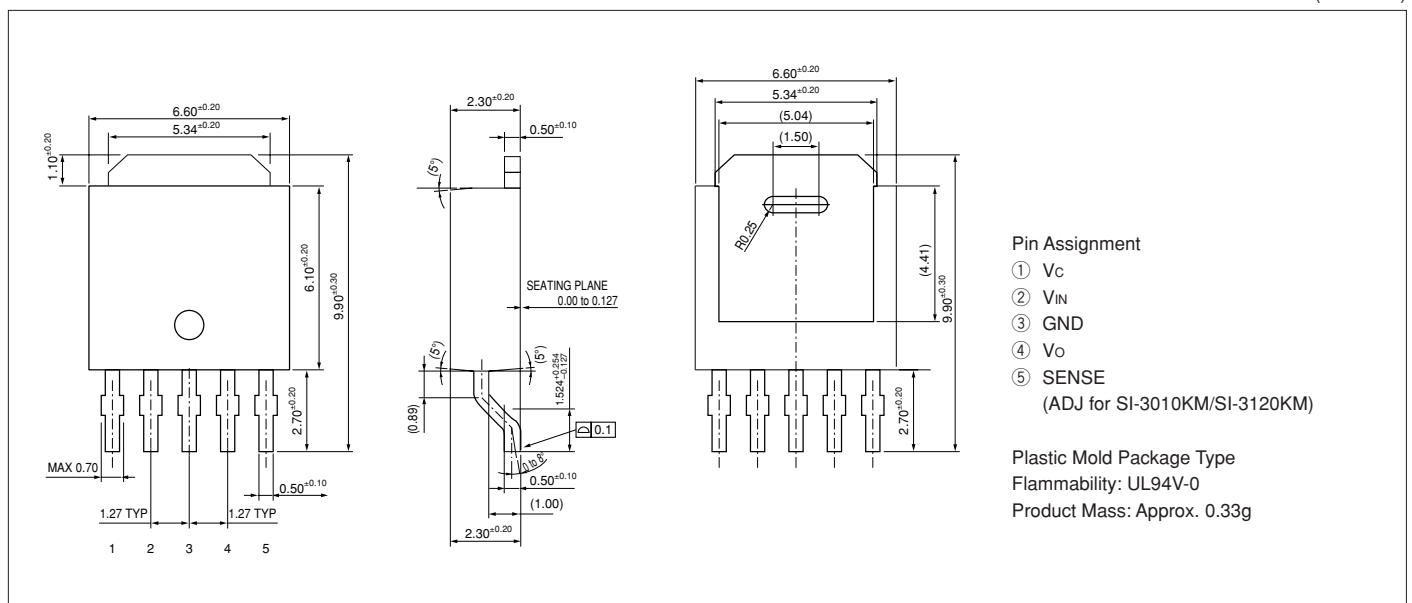
*4: SI-3010KM, SI-3050KM, SI-3090KM, SI-3120KM and SI-3150KM cannot be used in the following applications because the built-in foldback-type overcurrent protection may cause errors during start-up stage.

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

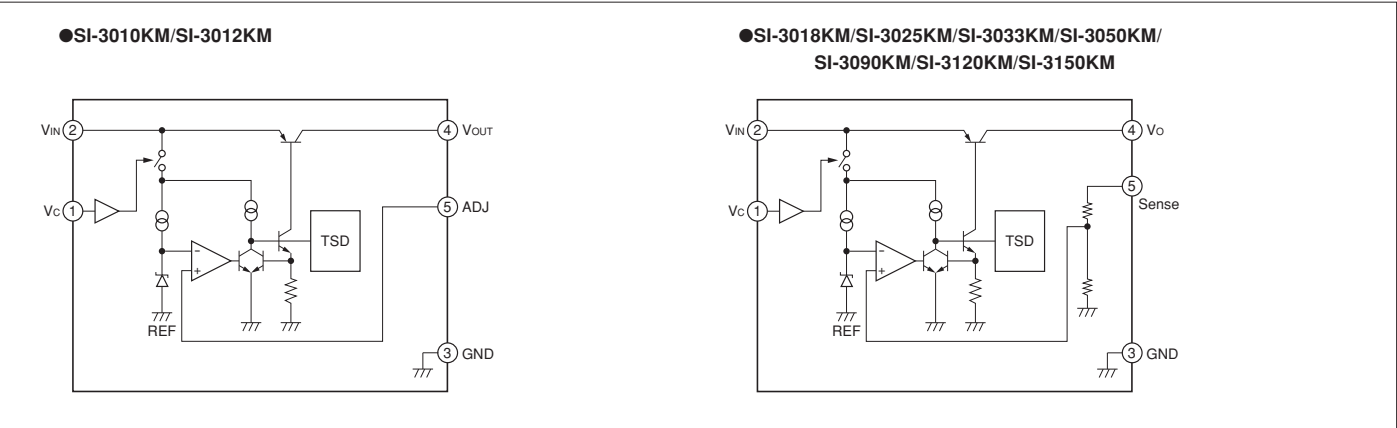
*5: V_{IN} (max) and I_O (max) are restricted by the relation P_D = (V_{IN} - V_O) × I_O. Please calculate these values referring to the Copper Laminate Area vs. Power Dissipation data as shown hereinafter.

■External Dimensions

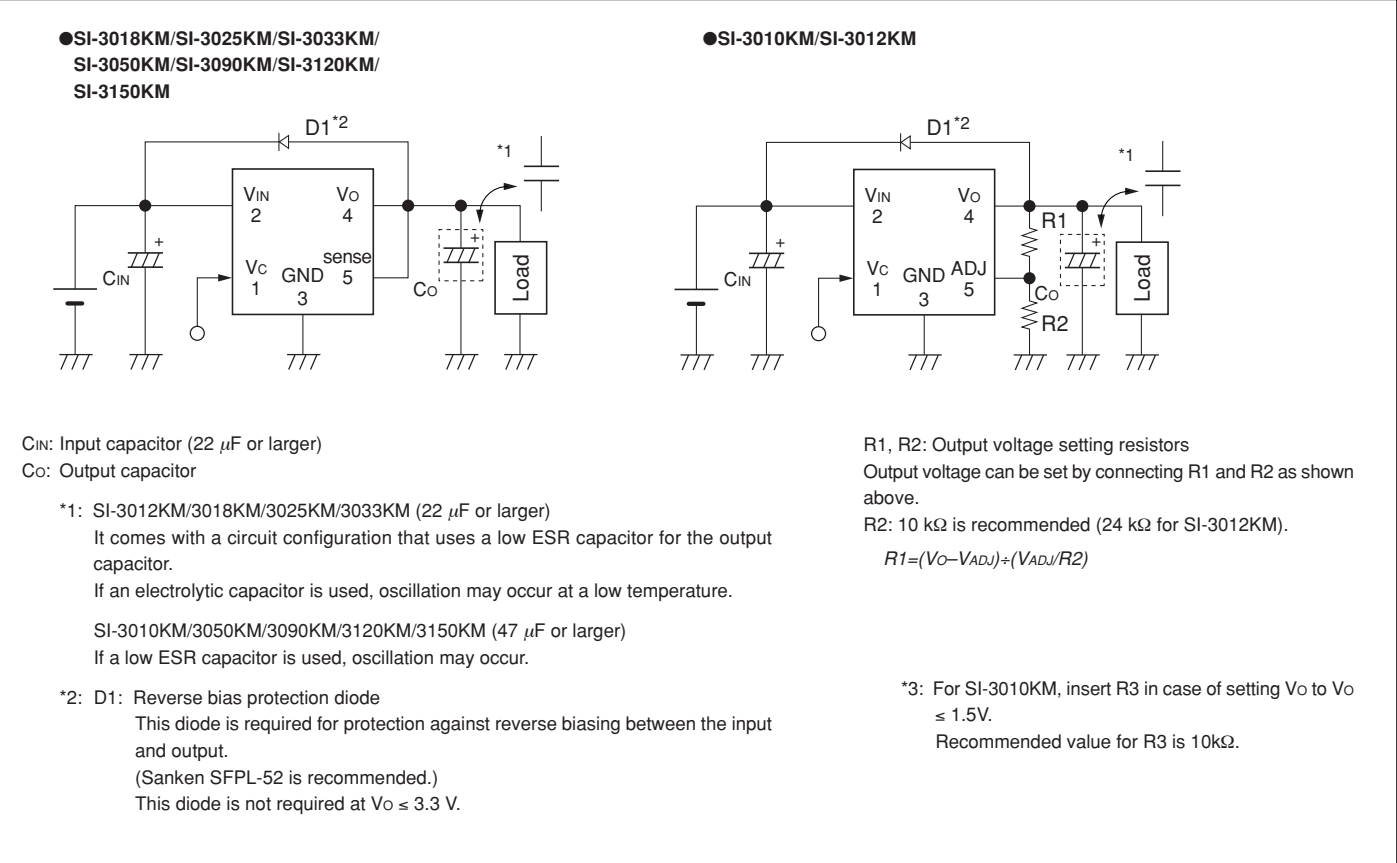
(Unit : mm)



Block Diagram



Typical Connection Diagram



Reference Data

