SI-3000KFE Series Low Current Consumption, Low Dropout Voltage Linear Regulator ICs

■Features

- Compact full-mold package (equivalent to TO220)
- Output current: 1.0A
- Low dropout voltage: $V_{DIF} \leq 0.5V$ (at $I_O = 1.0A$)
- High ripple rejection: 75dB
- Low circuit current at output OFF: Iq (OFF) ≤ 1μA
- Built-in overcurrent and thermal protection circuits

■Applications

- Secondary stabilized power supply (local power supply)

■Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbol	Ratings	Unit	Remarks
		SI-3010KFE		
DC Input Voltage	V_{IN}	35*1	V	
Output Control Terminal Voltage	Vc	V_{IN}	V	
DC Output Current	Io	1.0	A	
Power Dissipation	P_{D1}	16.6	W	With infinite heatsink
	P_{D2}	1.72	W	Without heatsink, stand-alone operation
Junction Temperature	Tj	–40 to +125	°C	
Storage Temperature	Tstg	–40 to +125	°C	
Operating Ambient Temperature	Top	–40 to +100	°C	
Thermal Resistance (Junction to Case)	θj-c	6.0	°C/W	
Thermal Resistance (Junction to Ambient Air)	θj-a	58	°C/W	Without heatsink, stand-alone operation

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

■Recommended Operating Conditions

Parameter	Symbol	Ratings	Unit
		SI-3010KFE	
Input Voltage Range	V_{IN}	2.4*2 to 27*1	V
Output Current Range	Io	0 to 1.0*1	A
Output Voltage Variable Range	VoADJ	1.1 to 16	V
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 by the relationship P_D (max) = (V_{IN} - V_O) × I_O = 16.6W.
*2: Refer to the Dropout Voltage parameter.

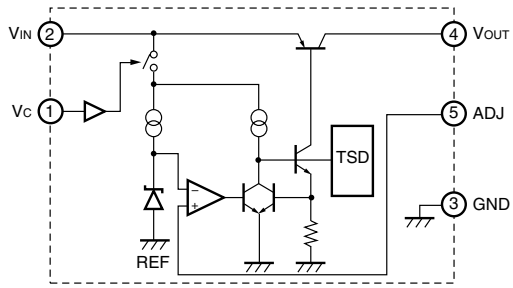
■Electrical Characteristics

Parameter		Symbol	Ratings SI-3010KFE min.	typ.	max.	Unit
Reference Voltage		V_{ADJ}	0.98	1.00	1.02	V
		Conditions	V_{IN}=7V, I_O=0.01A, V_C=2V, V_O=5A			
Line Regulation		ΔV_{OLINE}			30	mV
		Conditions	V_{IN}=6 to 15V, I_O=0.01A, V_C=2V, V_O=5A			
Load Regulation		ΔV_{OLOAD}			75	mV
		Conditions	V_{IN}=7V, I_O=0 to 1A, V_C=2V, V_O=5A			
Dropout Voltage		V_{DIF}			0.3	V
		Conditions	I_O=0.5A, V_C=2V, V_O=5V			
					0.5	
		Conditions	I_O=1.0A, V_C=2V, V_O=5V			
Quiescent Circuit Current		I_q			600	μA
		Conditions	V_{IN}=7V, I_O=0A, V_C=2V			
Circuit Current at Output OFF		I_q (OFF)			1	μA
		Conditions	V_{IN}=7V, V_C=0V			
Temperature Coefficient of Output Voltage		$\Delta V_O/\Delta T_a$		±0.5		mV/°C
		Conditions	V_{IN}=7V, I_O=0.01A, V_C=2V, Tj=0 to 100°C, V_O=2.5V			
Ripple Rejection		R_{REJ}		75		dB
		Conditions	V_{IN}=7V, I_O=0.1A, V_C=2V, f=100 to 120Hz V_O=5V			
Overcurrent Protection Starting Current*3		I_{S1}	1.1			A
		Conditions	V_{IN}=7V, V_C=2V			
Vc Terminal	Control Voltage (Output ON)*4	V_C, IH	2			V
		Conditions	V_{IN}=7V			
	Control Voltage (Output OFF)	V_C, IL			0.8	V
		Conditions	V_{IN}=7V			
	Control Current (Output ON)	I_C, IH			40	μA
		Conditions	V_{IN}=7V, V_C=2V			
	Control Current (Output OFF)	I_C, IL	–5	0		μA
		Conditions	V_{IN}=7V, V_C=0V			
Input Overvoltage Shutdown Voltage		V_{OVP}	33			V
		Conditions	I_O=0.01A			

*3: 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.
*4: Output is OFF when the output control terminal V_C is open. Each input level is equivalent to LS-TTL level. Therefore, the device can be driven directly by LS-TTLs.
*5: SI-3000KFE 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

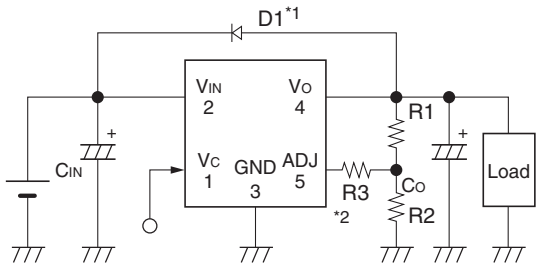
■Block Diagram

SI-3010KFE



■Typical Connection Diagram

●SI-3010KFE



CIN: Input capacitor (22μF or larger)
CO: Output capacitor (47μF or larger)
If a low ESR capacitor (such as a ceramic capacitor) is used for the output capacitor, oscillation may occur.

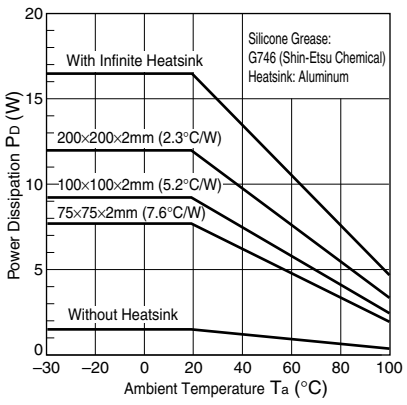
*1. D1: Reverse bias protection diode
This diode is required for protection against reverse biasing between the input and output.
(Sanken RU2Z is recommended.)

R1, R2: Output voltage setting resistors
The output voltage can be adjusted by connecting R1 and R2 as shown above.
The recommended value for R2 is 10kΩ.

$R1=(V_O-V_{ADJ})\div(V_{ADJ}/R2)$

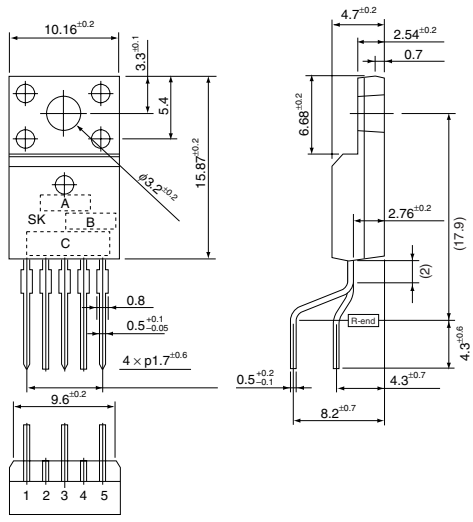
*2: For SI-3010KFE, insert R3 in case of setting VO to VO ≤ 1.5V.
The recommended value for R3 is 10kΩ.

■TA-PD Characteristics



■External Dimensions (TO220F-5)

(Unit : mm)



a. Part Number
b. Lot Number
c. Administer Number

Pin Assignment
① Vc
② VIN
③ GND
④ Vout
⑤ ADJ