

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: $I_q (OFF) \leq 1\mu A$
- Built-in overcurrent and thermal protection circuits

Absolute Maximum Ratings

($T_a=25^\circ C$)

Parameter	Symbol	Ratings		Unit	Remarks
		SI-3010KFE			
DC Input Voltage	V_{IN}	35 ^{*1}		V	
Output Control Terminal Voltage	V_c	V_{IN}		V	
DC Output Current	I_o	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	T_j	-40 to +125		$^\circ C$	
Storage Temperature	T_{stg}	-40 to +125		$^\circ C$	
Operating Ambient Temperature	T_{op}	-40 to +100		$^\circ C$	
Thermal Resistance (Junction to Case)	θ_{j-c}	6.0		$^\circ C/W$	
Thermal Resistance (Junction to Ambient Air)	θ_{j-a}	58		$^\circ C/W$	Without heatsink, stand-alone operation

Applications

- Secondary stabilized power supply (local power supply)

*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	I_o	0 to 1.0 ^{*1}		A
Output Voltage Variable Range	V_{oADJ}	1.1 to 16		V
Operating Ambient Temperature	T_{op}	-30 to +85		$^\circ C$
Operating Junction Temperature	T_j	-20 to +100		$^\circ C$

*1: V_{IN} (max) and I_o (max) are restricted by the relationship P_D (max) = $(V_{IN} - V_o) \times I_o = 16.6W$.

*2: Refer to the Dropout Voltage parameter.

Electrical Characteristics

Parameter	Symbol	Ratings			Unit	
		SI-3010KFE				
		min.	typ.	max.		
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	$I_o=0.5A, V_c=2V, V_o=5V$				
	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/ $^\circ C$	
	Conditions	$V_{IN}=7V, I_o=0.01A, V_c=2V, T_j=0$ to 100 $^\circ C, V_o=2.5V$				
Ripple Rejection	R_{REJ}		75		dB	
	Conditions	$V_{IN}=7V, I_o=0.1A, V_c=2V, f=100$ to 120HzV $o=5V$				
Overcurrent Protection Starting Current ^{*3}	I_{S1}	1.1			A	
	Conditions	$V_{IN}=7V, V_c=2V$				
V _c Terminal	Control Voltage (Output ON) ^{*4}	V_c, I_H	2		V	
		Conditions	$V_{IN}=7V$			
	Control Voltage (Output OFF)	V_c, I_L			0.8	V
		Conditions	$V_{IN}=7V$			
	Control Current (Output ON)	I_c, I_H			40	μA
		Conditions	$V_{IN}=7V, V_c=2V$			
Control Current (Output OFF)	I_c, I_L	-5	0		μA	
	Conditions	$V_{IN}=7V, V_c=0V$				
Input Overvoltage Shutdown Voltage	V_{OVP}	33			V	
	Conditions	$I_o=0.01A$				

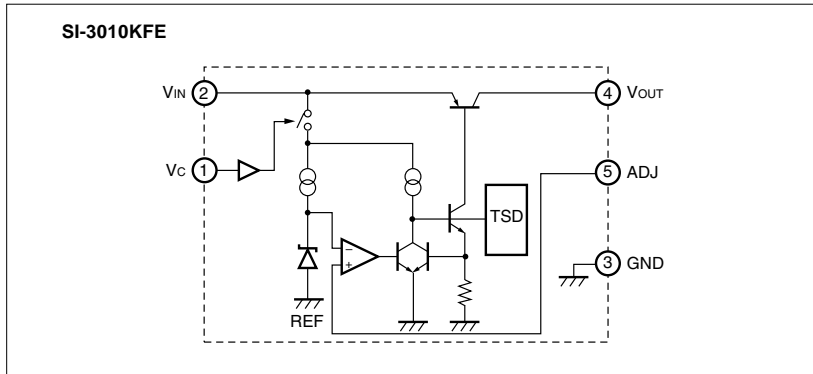
*3: I_{S1} is specified at the 5% drop point of output voltage V_o on the condition that V_{IN} = overcurrent protection starting current, $I_o = 10$ mA.

*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



■Typical Connection Diagram

●SI-3010KFE

The typical connection diagram shows the SI-3010KFE IC with the following connections:

- Pin 1 (Vc): Connected to ground.
- Pin 2 (VIN): Connected to the input terminal through an input capacitor (CIN).
- Pin 3 (GND): Connected to ground.
- Pin 4 (Vo): Connected to the output terminal through a reverse bias protection diode (D1).
- Pin 5 (ADJ): Connected to a voltage divider consisting of resistors R1 and R2. Resistor R3 is also connected between pins 4 and 5.
- An output capacitor (Co) is connected between the output terminal and ground.
- The output terminal is connected to a load.

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.

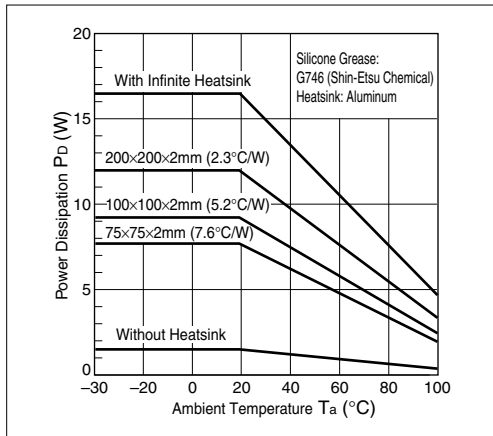
*1. D1: Reverse bias protection diode
 This diode is required for protection against reverse biasing between the input and output.
 (Sanken RU2Z is recommended.)

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 $V_O \leq 1.5V$.
 The recommended value for R3 is 10kΩ.

■Ta-Pd Characteristics



■External Dimensions (TO220F-5)

(Unit : mm)

