

SAI Series

Surface-Mount, Separate Excitation Step-down Switching Mode Regulator ICs

Features

- Surface-mount power package
- Output current: 0.4 to 0.5A
- High efficiency: 75 to 88%
- Requires only 4 discrete components
- Internally-adjusted phase correction and output voltage
- Built-in reference oscillator (60kHz)
- Built-in overcurrent and thermal protection circuits

Applications

- Power supplies for telecommunication equipment
- Onboard local power supplies

Line up

Part Number	SAI01	SAI02	SAI03
V _o (V)	5.0	3.3	12.0
I _o (A)	0.5		0.4

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Input Voltage	V _{IN}	35	V
Power Dissipation	P _D	0.75	W
Junction Temperature	T _J	+125	°C
Storage Temperature	T _{stg}	−40 to +125	°C
Thermal Resistance(junction to case)	θ _{J-C}	20	°C/W

Recommended Operating Conditions

Parameter	Symbol	Ratings			Unit
		SAI01	SAI02	SAI03	
DC Input Voltage Range	V _{IN}	7 to 33	5.3 to 28	15 to 33	V
Output Current Range	I _o	0 to 0.5			A
Operating Junction Temperature Range	T _{JOP}	−30 to +125			°C

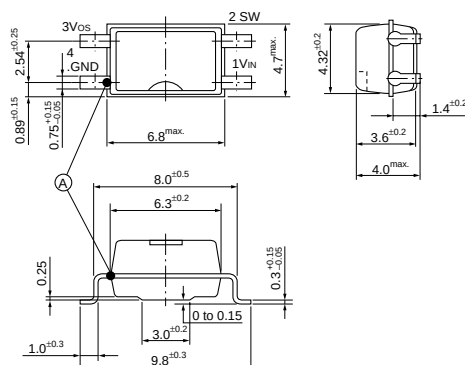
Electrical Characteristics

(T_a=25°C)

Parameter	Symbol	Ratings									Unit
		SAI01			SAI02			SAI03			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Output Voltage	V _O	4.80	5.00	5.20	3.17	3.30	3.43	11.40	12.00	12.60	V
	Conditions	V _{IN} =20V, I _O =0.3A			V _{IN} =15V, I _O =0.3A			V _{IN} =24V, I _O =0.3A			
Efficiency	η		80			75			88		%
	Conditions	V _{IN} =20V, I _O =0.3A			V _{IN} =15V, I _O =0.3A			V _{IN} =24V, I _O =0.3A			
Oscillation Frequency	f		60			60			60		kHz
	Conditions	V _{IN} =20V, I _O =0.3A			V _{IN} =15V, I _O =0.3A			V _{IN} =24V, I _O =0.3A			
Line Regulation	ΔV _{OLINE}		80	100		60	80		100	130	mV
	Conditions	V _{IN} =10 to 30V, I _O =0.3A			V _{IN} =8 to 28V, I _O =0.3A			V _{IN} =18 to 30V, I _O =0.3A			
Load Regulation	ΔV _{OLOAD}		30	40		20	30		70	95	mV
	Conditions	V _{IN} =20V, I _O =0.1 to 0.4A			V _{IN} =15V, I _O =0.1 to 0.4A			V _{IN} =24V, I _O =0.1 to 0.4A			
Temperature Coefficient of Output Voltage	ΔV _O /ΔT _a		±0.5			±0.5			±1.5		mV/°C
Ripple Rejection	R _{REJ}		45			45			45		dB
	Conditions	f=100 to 120Hz			f=100 to 120Hz			f=100 to 120Hz			
Overcurrent Protection Starting Current	I _{Sl}	0.55			0.55			0.45			A
	Conditions	V _{IN} =10V			V _{IN} =8V			V _{IN} =18V			

External Dimensions (PS4)

(unit : mm)



Ⓐ Case Temperature Measuring Point

Pin Assignment

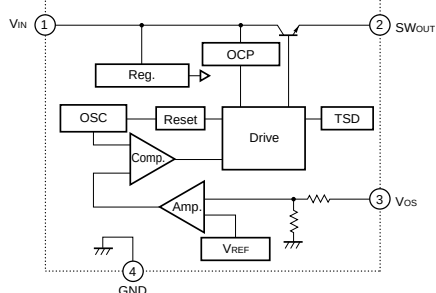
- ① V_{IN}
- ② SW_{OUT}
- ③ V_{OS}
- ④ GND

Plastic Mold Package Type

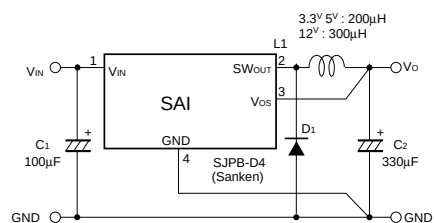
Flammability: UL94V-0

Product Mass: Approx. 0.22g

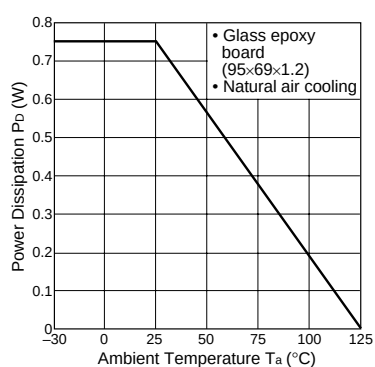
Block Diagram



Typical Connection Diagram



T_a - P_D Characteristics



$$P_D = V_O \cdot I_O \left(\frac{100}{\eta\chi} - 1 \right) - V_F \cdot I_O \left(1 - \frac{V_O}{V_{IN}} \right)$$

The efficiency depends on the input voltage and the output current. Therefore, obtain the value from the efficiency graph and substitute the percentage in the formula above.

V_O : Output voltage
 I_O : Output current
 $\eta\chi$: Efficiency (%)
 V_F : Diode D_1 forward voltage
 SJPB-D4-0.3V

Thermal design for D_1 must be considered separately.