AN1281SSM

Ripple filter IC

■ Overview

The AN1281SSM is a ripple filter IC that rejects the ripple component superimposed on the regulator output. Use for the VCO bias of cellular phones improves C/N and S/N.

■ Features

- Small I/O voltage difference
- The mounting area is reduced by adopting the SSmini-type package

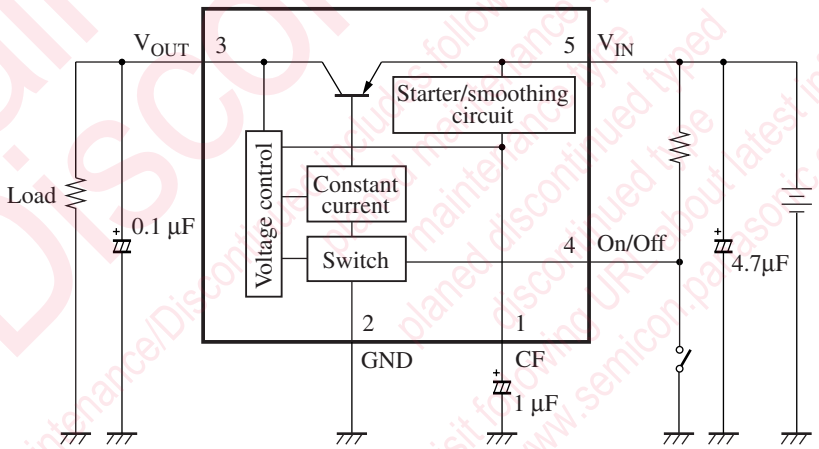
■ Applications

- Cellular phones and others

■ Package

- SSMINI-5DA

■ Block Diagram



■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{IN}	4.5	V
Supply current	I_{CC}	20	mA
Power dissipation *2	P_D	60	mW
Operating ambient temperature *1	T_{opr}	−25 to +75	°C
Storage temperature *1	T_{stg}	−40 to +125	°C
Output current	I_O	−15	mA
Allowable application voltage for on/off pin *3	$V_{ON/OFF}$	V_{IN}	V
Allowable maximum capacitance for CF pin	CF	10	µF

Note) 1. Do not apply external currents or voltages to any pins not specifically mentioned.
For circuit currents, '+' denotes current flowing into the IC, and '−' denotes current flowing out of the IC.
2. ∗1: Except for the power dissipation, the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.
∗2: The power dissipation shown is the value for T_a = 75°C.
∗3: Do not over the supply voltage.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	2.5 to 4.3	V

■ Electrical Characteristics at T_a = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage 1	V_{O1}	V_{IN} = 2.5 V, I_{OUT} = −1 µA	2.10	2.30	—	V
Output voltage 2	V_{O2}	V_{IN} = 2.5 V, I_{OUT} = −15 mA	1.97	2.17	—	V
Output voltage 3	V_{O3}	V_{IN} = 3.0 V, I_{OUT} = −1 µA	2.62	2.82	—	V
Output voltage 4	V_{O4}	V_{IN} = 3.0 V, I_{OUT} = −15 mA	2.55	2.70	—	V
Output voltage 5	V_{O5}	V_{IN} = 4.3 V, I_{OUT} = −1 µA	3.95	4.15	—	V
Output voltage 6	V_{O6}	V_{IN} = 4.3 V, I_{OUT} = −15 mA	3.83	4.03	—	V
Consumption current 1	I_{CC1}	V_{IN} = 2.5 V, I_{OUT} = −1 µA	−485	−370	—	µA
Consumption current 2	I_{CC2}	V_{IN} = 2.5 V, I_{OUT} = −15 mA	−420	−320	—	µA
Consumption current 3	I_{CC3}	V_{IN} = 3.0 V, I_{OUT} = −1 µA	−735	−565	—	µA
Consumption current 4	I_{CC4}	V_{IN} = 3.0 V, I_{OUT} = −15 mA	−670	−515	—	µA
Consumption current 5	I_{CC5}	V_{IN} = 4.3 V, I_{OUT} = −1 µA	−1.42	−1.09	—	mA
Consumption current 6	I_{CC6}	V_{IN} = 4.3 V, I_{OUT} = −15 mA	−1.36	−1.04	—	mA
Load regulation 1	REG_{L1}	V_{IN} = 2.5 V, I_{OUT} = −1 µA to −15 mA	0	130	230	mV
Load regulation 2	REG_{L2}	V_{IN} = 3.0 V, I_{OUT} = −1 µA to −15 mA	0	120	220	mV
Load regulation 3	REG_{L3}	V_{IN} = 4.3 V, I_{OUT} = −1 µA to −15 mA	0	120	220	mV
Consumption current against load change 1	I_{REG1}	V_{IN} = 2.5 V, I_{OUT} = −1 µA to −15 mA	0	49	110	µA
Consumption current against load change 2	I_{REG2}	V_{IN} = 3.0 V, I_{OUT} = −1 µA to −15 mA	0	51	110	µA

■ Electrical Characteristics at $T_a = 25°C$ (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Consumption current against load change 3	I_{REG3}	$V_{IN} = 4.3$ V, $I_{OUT} = -1$ µA to -15 mA	0	51	110	µA
Ripple rejection ratio 1	RR_1	$V_{IN} = 3$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 1 kHz	26.5	29.5	—	dB
Ripple rejection ratio 2	RR_2	$V_{IN} = 3$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 25 kHz	30.5	33.5	—	dB
Ripple rejection ratio 3	RR_3	$V_{IN} = 3$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 100 kHz	26.5	29.1	—	dB
Consumption current at off	I_{OFF}	$V_{IN} = 4.3$ V, On/Off = 0 V	—	—	1	µA

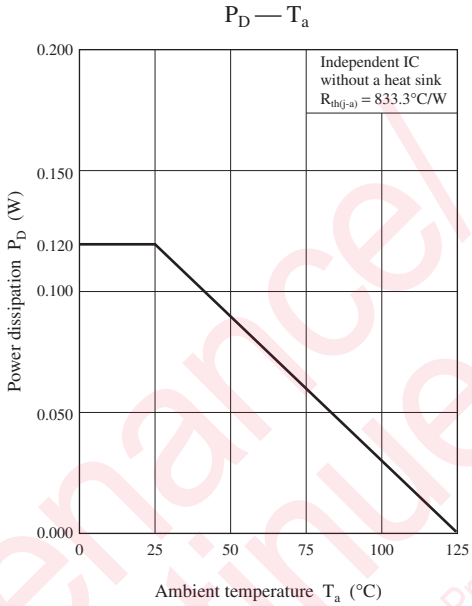
• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Reference value	Unit
Output voltage 7	V_{O7}	$V_{IN} = 3.0$ V, $I_{OUT} = -15$ mA $T_a = -25°C$ to $+75°C$	2.50 to 2.8	V
Consumption current 7	I_{CC7}	$V_{IN} = 3.0$ V, $I_{OUT} = -15$ mA $T_a = -25°C$ to $+75°C$	400 to 800	µA
Load regulation 4	REG_{L4}	$V_{IN} = 3.0$ V, $I_{OUT} = -1$ µA to -15 mA $T_a = -25°C$ to $+75°C$	100 to 350	mV
Consumption current against load change 4	I_{REG4}	$V_{IN} = 3.0$ V, $I_{OUT} = -1$ µA to -15 mA $T_a = -25°C$ to $+75°C$	to 200	µA
Ripple rejection ratio 4	RR_4	$V_{IN} = 3.0$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 1 kHz, $T_a = -25°C$ to $+75°C$	20 to	dB
Ripple rejection ratio 5	RR_5	$V_{IN} = 3.0$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 25 kHz, $T_a = -25°C$ to $+75°C$	20 to	dB
Ripple rejection ratio 6	RR_6	$V_{IN} = 3.0$ V$\pm$ 0.1 V, $I_{OUT} = -15$ mA f = 100 kHz, $T_a = -25°C$ to $+75°C$	18 to	dB
Output voltage rise time	t_r	$V_{IN} = 3$ V, $V_{ON/OFF} = 0$ V $\rightarrow$ 3 V $I_{OUT} = -15$ mA, V_{OUT}: 10% $\rightarrow$ 90% $T_a = -25°C$ to $+75°C$	to 10	µs
Output voltage fall time	t_f	$V_{IN} = 3$ V, $V_{ON/OFF} = 3$ V $\rightarrow$ 0 V $I_{OUT} = -15$ mA, V_{OUT}: 90% $\rightarrow$ 10% $T_a = -25°C$ to $+75°C$	to 500	µs
Oscillation frequency margin	G_f	$C_{OUT} \geq 0.1$ µF, $V_{IN} = 3.0$ V $I_{OUT} = -1$ µA to -15 mA $T_a = -25°C$ to $+75°C$	Without abnormal oscillation.	

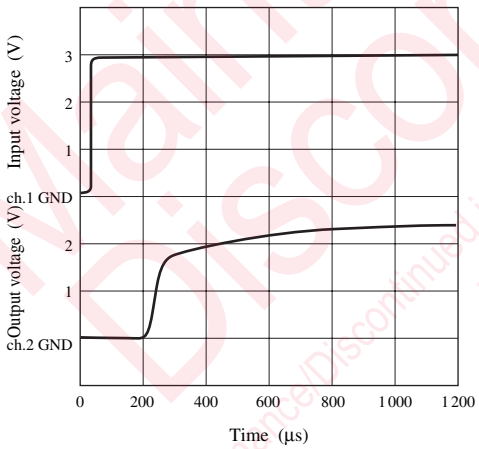
■ Application Notes

• P_D — T_a curves of SSMINI-5DA package

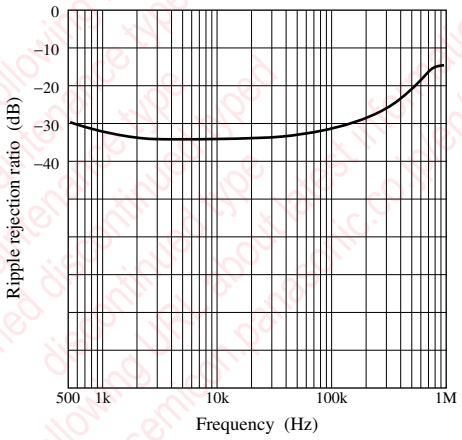


• Main characteristics

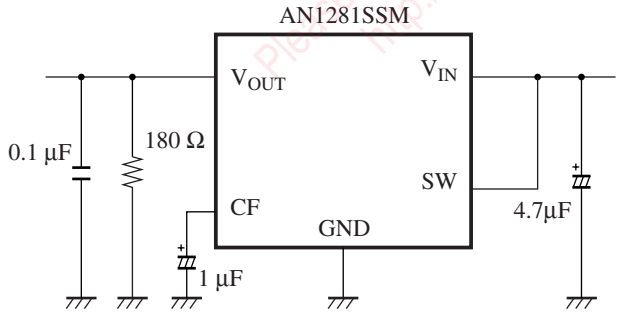
Output voltage rise time



Ripple rejection ratio — Frequency



Measurement circuit



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