

# AN80xx/AN80xxM Series

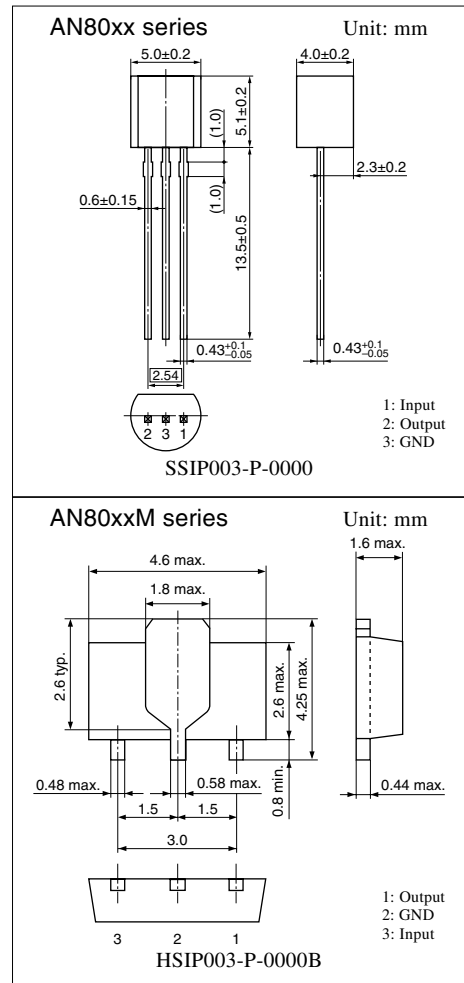
3-pin, positive output, low dropout voltage regulator (50 mA type)

## ■ Overview

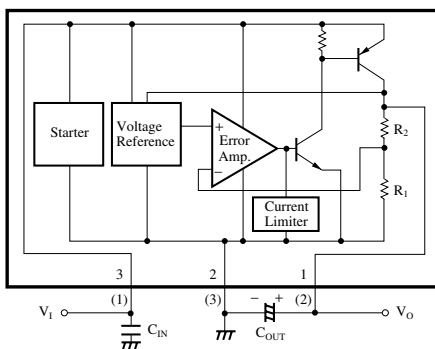
The AN80xx series and the AN80xxM series are 3-pin, low dropout, fixed positive output type monolithic voltage regulators. Since their power consumption can be minimized, they are suitable for battery-used power supply and reference voltage. 13 types of output voltage are available; 2V, 2.5V, 3V, 3.5V (SSIP003-P-0000 only), 4V, 4.5V, 5V, 6V, 7V, 8V, 8.5V, 9V, and 10V.

## ■ Features

- Input/output voltage difference: 0.3V max.
- Output current of up to 50mA
- Low bias current: 0.6mA typ.
- Output voltage: 2V, 2.5V, 3V, 3.5V (SSIP003-P-0000 only), 4V, 4.5V, 5V, 6V, 7V, 8V, 8.5V, 9V, and 10V
- Built-in overcurrent protection circuit



## ■ Block Diagram (AN80xxM series)



$R_1 = 5k\Omega$   
 $C_{IN} = 0.33\mu F$   
 $C_{OUT} = 10\mu F$

Note) The number in ( ) shows the pin number for the AN80xx series.

Note) The packages (SSIP003-P-0000 and HSIP003-P-0000B) of this product will be changed to lead-free type (SSIP003-P-0000S and HSIP003-P-0000Q). See the new package dimensions section later of this datasheet.

### ■ Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter		Symbol	Rating	Unit
Supply voltage		$V_I$	20	V
Supply current		$I_{CC}$	100	mA
Power dissipation		$P_D$	650 *	mW
Operating ambient temperature		$T_{opr}$	-30 to +80	$^\circ\text{C}$
Storage temperature	AN80xx series	$T_{stg}$	-55 to +150	$^\circ\text{C}$
	AN80xxM series		-55 to +125	

\* AN80xxM series is mounted on standard board (glass epoxy: 20mm × 20mm × t1.7mm with Cu foil of 1cm<sup>2</sup> or more).

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

#### • AN8002, AN8002M (2V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	1.92	2	2.08	V
Line regulation	$REG_{IN}$	$V_I = 2.5$ to 8V, $T_j = 25^\circ\text{C}$	—	2	40	mV
Load regulation	$REG_L$	$I_O = 1$ to 40mA, $T_j = 25^\circ\text{C}$	—	7	20	mV
		$I_O = 1$ to 50mA, $T_j = 25^\circ\text{C}$	—	10	25	mV
Minimum input/output voltage difference	$V_{DIF(min)}$	$V_I = 1.9\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.06	0.2	V
		$V_I = 1.9\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{Bias}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.6	1	mA
Ripple rejection ratio	RR	$V_I = 3$ to 5V, $f = 120\text{Hz}$	62	74	—	dB
Output noise voltage	$V_{no}$	$f = 10\text{Hz}$ to 100kHz	—	60	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.1	—	mV/ $^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 3\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8025, AN8025M (2.5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	2.4	2.5	2.6	V
Line regulation	$REG_{IN}$	$V_I = 3$ to 8.5V, $T_j = 25^\circ\text{C}$	—	2.5	50	mV
Load regulation	$REG_L$	$I_O = 1$ to 40mA, $T_j = 25^\circ\text{C}$	—	8	20	mV
		$I_O = 1$ to 50mA, $T_j = 25^\circ\text{C}$	—	12.5	25	mV
Minimum input/output voltage difference	$V_{DIF(min)}$	$V_I = 2.4\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 2.4\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{Bias}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.6	1	mA
Ripple rejection ratio	RR	$V_I = 3.5$ to 5.5V, $f = 120\text{Hz}$	60	72	—	dB
Output noise voltage	$V_{no}$	$f = 10\text{Hz}$ to 100kHz	—	65	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.13	—	mV/ $^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 3.5\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

#### • AN8003, AN8003M (3V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	2.88	3	3.12	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 3.5$ to $9\text{V}$ , $T_j = 25^\circ\text{C}$	—	3	50	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	9	25	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	15	30	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 2.9\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 2.9\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.6	1	mA
Ripple rejection ratio	RR	$V_I = 4$ to $6\text{V}$ , $f = 120\text{Hz}$	58	70	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	70	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.15	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 4\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8035(3.5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	3.36	3.5	3.64	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 4$ to $9.5\text{V}$ , $T_j = 25^\circ\text{C}$	—	3.5	50	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	10	30	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	20	40	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 3.4\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 3.4\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.6	1	mA
Ripple rejection ratio	RR	$V_I = 4.5$ to $6.5\text{V}$ , $f = 120\text{Hz}$	57	69	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	75	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.2	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 4.5\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8004, AN8004M (4V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	3.84	4	4.16	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 4.5$ to $10\text{V}$ , $T_j = 25^\circ\text{C}$	—	3.5	50	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	10	30	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	20	40	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 3.8\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 3.8\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.6	1	mA
Ripple rejection ratio	RR	$V_I = 5$ to $7\text{V}$ , $f = 120\text{Hz}$	56	67	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	80	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.2	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 5\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

#### • AN8045, AN8045M (4.5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	4.32	4.5	4.68	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 5 \text{ to } 10.5\text{V}, T_j = 25^\circ\text{C}$	—	4	50	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1 \text{ to } 40\text{mA}, T_j = 25^\circ\text{C}$	—	11	35	mV
		$I_O = 1 \text{ to } 50\text{mA}, T_j = 25^\circ\text{C}$	—	23	45	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 4.3\text{V}, I_O = 20\text{mA}, T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 4.3\text{V}, I_O = 50\text{mA}, T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}, T_j = 25^\circ\text{C}$	—	0.7	1	mA
Ripple rejection ratio	RR	$V_I = 5.5 \text{ to } 7.5\text{V}, f = 120\text{Hz}$	54	66	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz to } 100\text{kHz}$	—	85	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30 \text{ to } +125^\circ\text{C}$	—	0.23	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 5.5\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8005, AN8005M (5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	4.8	5	5.2	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 5.5 \text{ to } 11\text{V}, T_j = 25^\circ\text{C}$	—	4.5	50	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1 \text{ to } 40\text{mA}, T_j = 25^\circ\text{C}$	—	12	40	mV
		$I_O = 1 \text{ to } 50\text{mA}, T_j = 25^\circ\text{C}$	—	25	50	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 4.8\text{V}, I_O = 20\text{mA}, T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 4.8\text{V}, I_O = 50\text{mA}, T_j = 25^\circ\text{C}$	—	0.12	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}, T_j = 25^\circ\text{C}$	—	0.7	1	mA
Ripple rejection ratio	RR	$V_I = 6 \text{ to } 8\text{V}, f = 120\text{Hz}$	52	64	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz to } 100\text{kHz}$	—	95	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30 \text{ to } +125^\circ\text{C}$	—	0.25	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 6\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8006, AN8006M (6V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	5.76	6	6.24	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 6.5 \text{ to } 12\text{V}, T_j = 25^\circ\text{C}$	—	5.5	60	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1 \text{ to } 40\text{mA}, T_j = 25^\circ\text{C}$	—	13	45	mV
		$I_O = 1 \text{ to } 50\text{mA}, T_j = 25^\circ\text{C}$	—	28	55	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 5.8\text{V}, I_O = 20\text{mA}, T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 5.8\text{V}, I_O = 50\text{mA}, T_j = 25^\circ\text{C}$	—	0.13	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}, T_j = 25^\circ\text{C}$	—	0.7	1.2	mA
Ripple rejection ratio	RR	$V_I = 7 \text{ to } 9\text{V}, f = 120\text{Hz}$	51	63	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz to } 100\text{kHz}$	—	105	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30 \text{ to } +125^\circ\text{C}$	—	0.3	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 7\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • AN8007, AN8007M (7V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	6.72	7	7.28	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 7.5$ to $13\text{V}$ , $T_j = 25^\circ\text{C}$	—	6.5	70	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	14	50	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	31	60	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 6.8\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 6.8\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.13	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.7	1.3	mA
Ripple rejection ratio	RR	$V_I = 8$ to $10\text{V}$ , $f = 120\text{Hz}$	50	62	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	120	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.35	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 8\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

### • AN8008, AN8008M (8V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	7.68	8	8.32	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 8.5$ to $14\text{V}$ , $T_j = 25^\circ\text{C}$	—	7.5	80	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	15	55	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	34	65	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 7.8\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 7.8\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.14	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.7	1.3	mA
Ripple rejection ratio	RR	$V_I = 9$ to $11\text{V}$ , $f = 120\text{Hz}$	49	61	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	135	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.4	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 9\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

### • AN8085, AN8085M (8.5V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	8.16	8.50	8.84	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 9$ to $14.5\text{V}$ , $T_j = 25^\circ\text{C}$	—	8.3	90	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	16	60	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	36	70	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 8.3\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 8.3\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.14	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.8	1.4	mA
Ripple rejection ratio	RR	$V_I = 9.5$ to $11.5\text{V}$ , $f = 120\text{Hz}$	48	60	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	140	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.43	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 9.5\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

### ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

#### • AN8009, AN8009M (9V type)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	8.64	9	9.36	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 9.5$ to $15\text{V}$ , $T_j = 25^\circ\text{C}$	—	9	100	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	17	70	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	37	75	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 8.8\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 8.8\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.14	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.8	1.4	mA
Ripple rejection ratio	RR	$V_I = 10$ to $12\text{V}$ , $f = 120\text{Hz}$	47	59	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	150	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.45	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 10\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

#### • AN8010, AN8010M (10V type)

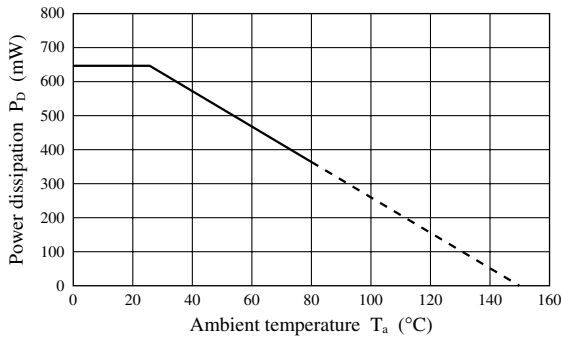
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	$V_O$	$T_j = 25^\circ\text{C}$	9.6	10	10.4	V
Line regulation	$\text{REG}_{\text{IN}}$	$V_I = 10.5$ to $16\text{V}$ , $T_j = 25^\circ\text{C}$	—	10	100	mV
Load regulation	$\text{REG}_{\text{L}}$	$I_O = 1$ to $40\text{mA}$ , $T_j = 25^\circ\text{C}$	—	18	75	mV
		$I_O = 1$ to $50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	40	85	mV
Minimum input/output voltage difference	$V_{\text{DIF}(\text{min})}$	$V_I = 9.8\text{V}$ , $I_O = 20\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.07	0.2	V
		$V_I = 9.8\text{V}$ , $I_O = 50\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.14	0.3	V
Bias current	$I_{\text{Bias}}$	$I_O = 0\text{mA}$ , $T_j = 25^\circ\text{C}$	—	0.8	1.4	mA
Ripple rejection ratio	RR	$V_I = 11$ to $13\text{V}$ , $f = 120\text{Hz}$	46	58	—	dB
Output noise voltage	$V_{\text{no}}$	$f = 10\text{Hz}$ to $100\text{kHz}$	—	165	—	$\mu\text{V}$
Output voltage temperature coefficient	$\Delta V_O/T_a$	$T_j = -30$ to $+125^\circ\text{C}$	—	0.5	—	$\text{mV}/^\circ\text{C}$

Note 1) The specified condition  $T_j = 25^\circ\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

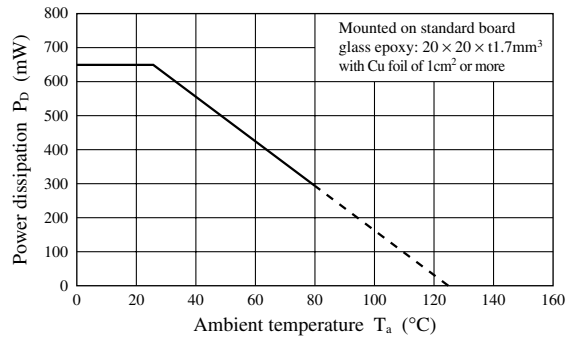
Note 2) Unless otherwise specified,  $V_I = 11\text{V}$ ,  $I_O = 20\text{mA}$  and  $C_O = 10\mu\text{F}$ .

■ Main Characteristics

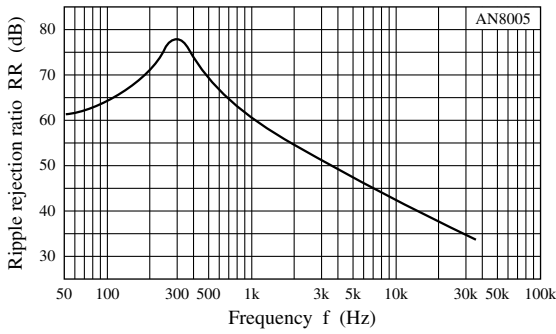
$P_D - T_a$  (AN80xx series)



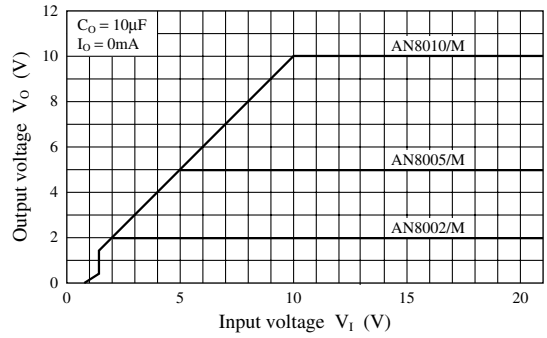
$P_D - T_a$  (AN80xxM series)



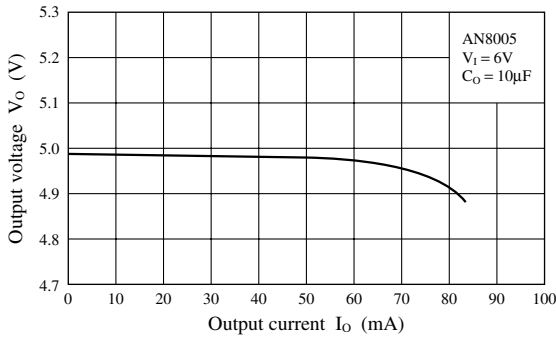
RR — f



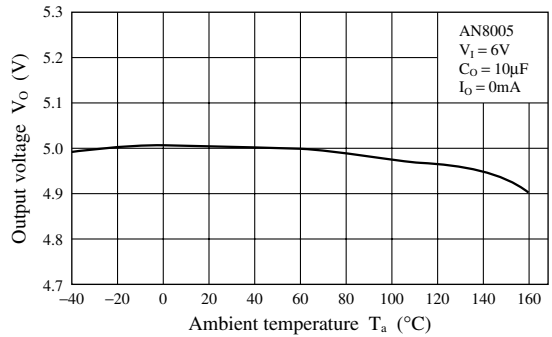
$V_O - V_I$



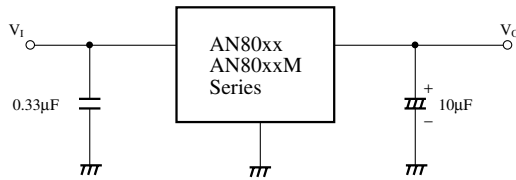
$V_O - I_O$



$V_O - T_a$



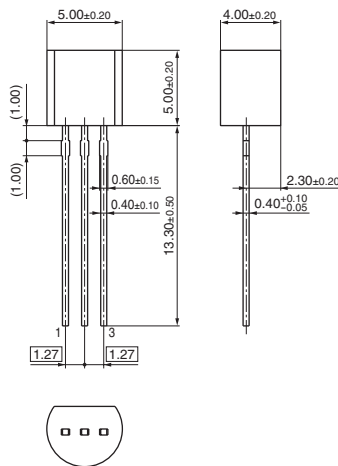
■ Application Circuit Example



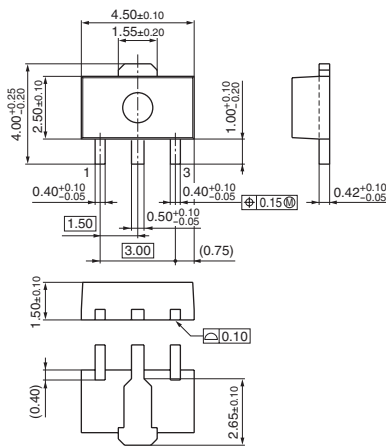
- AN80xx and AN80xxM series have their internal gain increased in order to improve performance. When the power line on the output side is long, use a capacitor of 10µF. Also, the capacitor on the output side should be attached as close to the IC as possible.
- When using at a low temperature, it is recommended to use the capacitors with low internal impedance (for example, tantalum capacitor) for output capacitors.

■ New Package Dimensions (Unit: mm)

- SSIP003-P-0000S (Lead-free package)



- HSIP003-P-0000Q (Lead-free package)





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