AN7700/AN7700F Series

3-pin Low Power Loss Voltage Regulator (1.2A Type)

■ Overview

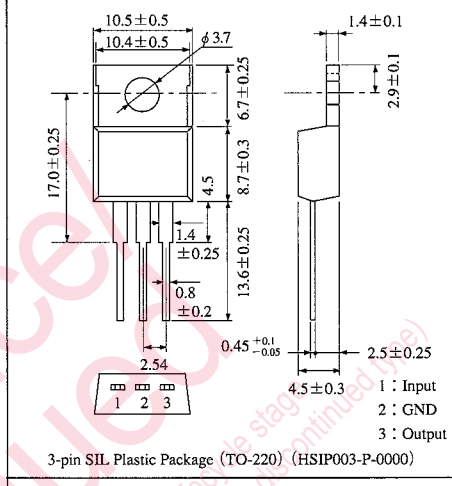
The AN7700/AN7700F series is a stabilized constant voltage power supply with a low input/output voltage (typ. 0.5V). It is suitable for the low-voltage equipment using batteries, and consumer/industrial equipments with great fluctuation of the supply voltage.

A wide range of output voltage is available from 3V through 10V, 12V, 15V, 18V, 20V, and 24V.

■ Features

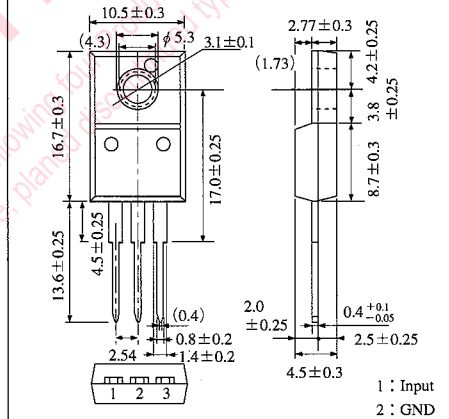
- Minimum input/output voltage difference : 0.5V (typ)
- Built-in overcurrent limiting circuit (ASO protective circuit)
- Built-in overheat protective curuit
- Built-in rush current preventive circuit at saturation voltage rise time
- Built-in input short-circuit protective circuit

AN7700 Series Unit : mm



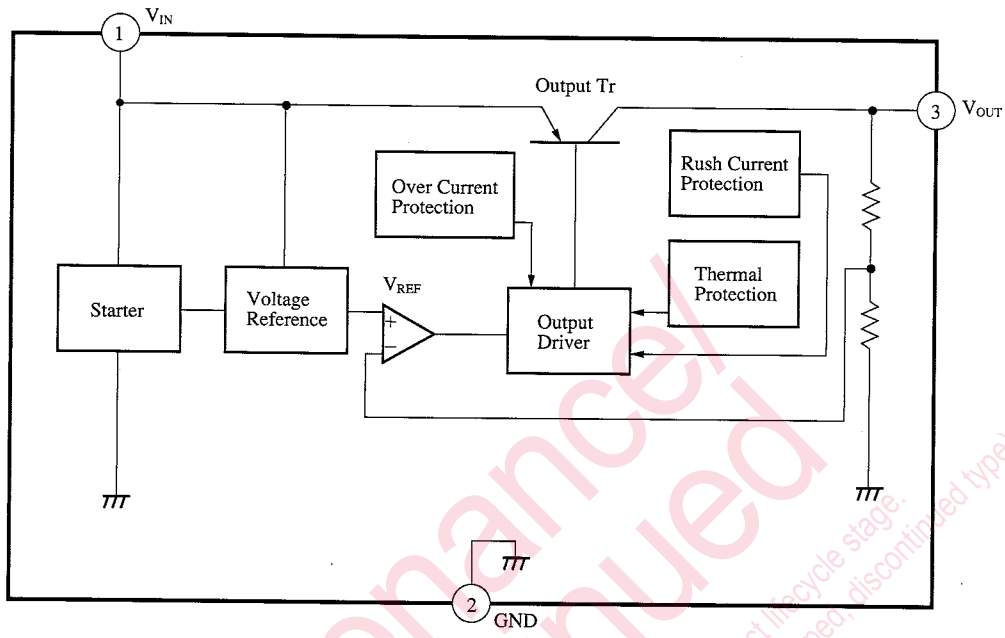
3-pin SIL Plastic Package (TO-220) (HSIP003-P-0000)

AN7700F Series Unit : mm



3-pin SIL Plastic Package with Fin (TO-220F) (HSIP003-P-0000A)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Supply voltage		V_I	30	V
Supply current		I_I	2.4 *1	A
Power dissipation	AN7700 Series	P_D	15	W
	AN7700F Series		10.25	
Operating ambient temperature		T_{opr}	−30 to +85	℃
Storage temperature		T_{stg}	−55 to +150	℃

*1 No current larger than this one flows because of the protective circuit inside the IC.

■ Recommended Operating Conditions (Ta=25℃, I_O=500mA)

Part No.	Output voltage (V_I)	Operating supply voltage range (V_I)	Unit
AN7703/F	3	4 to 14	V
AN7704/F	4	5 to 15	V
AN7705/F	5	6 to 16	V
AN7706/F	6	7 to 17	V
AN7707/F	7	8 to 18	V
AN7708/F	8	9 to 19	V
AN7709/F	9	10 to 20	V
AN7710/F	10	11 to 21	V
AN7712/F	12	13 to 23	V
AN7715/F	15	16.5 to 26.5	V
AN7718/F	18	19.5 to 29.5	V
AN7720/F	20	21.5 to 29.5	V
AN7724/F	24	25.5 to 29.5	V

■ Electrical Characteristics (Ta=25℃)

• AN7703/F (3V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=4V, I_{out}=500mA	2.91	3	3.09	V
Input stability	REG_{IN}	V_{in}=4 to 14V, I_{out}=500mA	—	3	30	mV
Load stability	REG_{LOA}	V_{in}=4V, I_{out}=0 to 1200mA	—	15	60	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=4 to 14V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=4V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=4V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=2.7V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=3.5V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=3.5V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=4V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=13V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=18V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=4 to 6V, I_{out}=100mA, f=120Hz	54	74	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=4V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=4V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7704/F (4V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=5V, I_{out}=500mA	3.88	4	4.12	V
Input stability	REG_{IN}	V_{in}=5 to 15V, I_{out}=500mA	—	4	40	mV
Load stability	REG_{LOA}	V_{in}=5V, I_{out}=0 to 1200mA	—	20	80	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=5 to 15V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=5V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=5V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=3.6V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=3.6V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=3.6V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=5V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=14V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=19V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=5 to 7V, I_{out}=100mA, f=120Hz	52	72	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=5V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=5V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta=25℃)

• AN7705/F (5V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=6V, I_{out}=500mA	4.85	5	5.15	V
Input stability	REG_{IN}	V_{in}=6 to 16V, I_{out}=500mA	—	5	50	mV
Load stability	REG_{LOA}	V_{in}=6V, I_{out}=0 to 1200mA	—	25	100	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=6 to 16V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=6V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=6V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=4.5V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=4.5V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=4.5V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=6V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=15V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=20V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=6 to 8V, I_{out}=100mA, f=120Hz	50	70	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=6V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=6V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\ (max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7706/F (6V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=7V, I_{out}=500mA	5.82	6	6.18	V
Input stability	REG_{IN}	V_{in}=7 to 17V, I_{out}=500mA	—	6	60	mV
Load stability	REG_{LOA}	V_{in}=7V, I_{out}=0 to 1200mA	—	30	120	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=7 to 17V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=7V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=7V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=5.4V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=5.4V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=5.4V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=7V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=16V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=21V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=7 to 9V, I_{out}=100mA, f=120Hz	48	68	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=7V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=7V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\ (max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta = 25℃)

• AN7707/F (7V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=8V, I_{out}=500mA	6.79	7	7.21	V
Input stability	REG_{IN}	V_{in}=8 to 18V, I_{out}=500mA	—	7	70	mV
Load stability	REG_{LOA}	V_{in}=8V, I_{out}=0 to 1200mA	—	35	140	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=8 to 18V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=8V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=8V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=6.3V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=6.3V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=6.3V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=8V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=17V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=22V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=8 to 10V, I_{out}=100mA, f=120Hz	47	67	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=8V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=8V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\,(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7708/F (8V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=9V, I_{out}=500mA	7.76	8	8.24	V
Input stability	REG_{IN}	V_{in}=9 to 19V, I_{out}=500mA	—	8	80	mV
Load stability	REG_{LOA}	V_{in}=9V, I_{out}=0 to 1200mA	—	40	160	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=9 to 19V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=9V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=9V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=7.2V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=7.2V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=7.2V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=9V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=18V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=23V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=9 to 11V, I_{out}=100mA, f=120Hz	46	66	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=9V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=9V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\,(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta=25℃)

• AN7709/F (9V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=10V, I_{out}=500mA	8.73	9	9.27	V
Input stability	REG_{IN}	V_{in}=10 to 20V, I_{out}=500mA	—	9	90	mV
Load stability	REG_{LOA}	V_{in}=10V, I_{out}=0 to 1200mA	—	45	180	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=10 to 20V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=10V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=10V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=8.1V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=8.1V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=8.1V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=10V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=19V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=24V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=10 to 12V, I_{out}=100mA, f=120Hz	45	65	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=10V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=10V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\ (max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7710/F (10V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=11V, I_{out}=500mA	9.70	10	10.3	V
Input stability	REG_{IN}	V_{in}=11 to 21V, I_{out}=500mA	—	10	100	mV
Load stability	REG_{LOA}	V_{in}=11V, I_{out}=0 to 1200mA	—	50	200	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=11 to 21V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=11V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=11V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=9V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=9V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=9V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=11V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=20V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=25V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=11 to 13V, I_{out}=100mA, f=120Hz	44	64	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=11V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=11V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D\ (max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta=25℃)

• AN7712/F (12V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=13V, I_{out}=500mA	11.64	12	12.36	V
Input stability	REG_{IN}	V_{in}=13 to 23V, I_{out}=500mA	—	12	120	mV
Load stability	REG_{LOA}	V_{in}=13, I_{out}=0 to 1200mA	—	60	240	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=13 to 23V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=13V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=13V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=10.8V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=10.8V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=10.8V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=13V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=22V	1	1.5	2	A
Peak output current (3) Note 1)	$I_{O(peak)3}$	V_{in}=27V	0.5	1	1.5	A
Ripple rejection ratio	RR	V_{in}=13 to 15V, I_{out}=100mA, f=120Hz	42	62	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=13V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=13V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7715/F (15V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=16.5V, I_{out}=500mA	14.55	15	15.45	V
Input stability	REG_{IN}	V_{in}=16.5 to 26.5V, I_{out}=500mA	—	15	150	mV
Load stability	REG_{LOA}	V_{in}=16.5V, I_{out}=0 to 1200mA	—	75	300	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=16.5 to 26.5V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=16.5V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=16.5V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=13.5V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=13.5V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=13.5V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=16.5V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=25V	1	1.5	2	A
Ripple rejection ratio	RR	V_{in}=16.5 to 18.5V, I_{out}=100mA, f=120Hz	40	60	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=16.5V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=16.5V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta=25℃)

• AN7718/F (18V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=19.5V, I_{out}=500mA	17.46	18	18.54	V
Input stability	REG_{IN}	V_{in}=19.5 to 29.5V, I_{out}=500mA	—	18	180	mV
Load stability	REG_{LOA}	V_{in}=19.5V, I_{out}=0 to 1200mA	—	90	360	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=19.5 to 29.5V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=19.5V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=19.5V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=16.2V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=16.2V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=16.2V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)1}$	V_{in}=19.5V	1.2	1.8	2.4	A
Peak output current (2) Note 1)	$I_{O(peak)2}$	V_{in}=28V	1	1.5	2	A
Ripple rejection ratio	RR	V_{in}=19.5 to 21.5V, I_{out}=100mA, f=120Hz	39	59	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=19.5V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=19.5V, T_j=25 to 125℃	—	−40	—	ppm/℃

Note 1) Since it is the parameter of abnormal operation (over-current), it exceeds $P_{D(max)}$, it should be usually set according to the derating curve.
Note 2) These values are design reference values, not guaranteed values.

• AN7720/F (20V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=21.5V, I_{out}=500mA	19.4	20	20.6	V
Input stability	REG_{IN}	V_{in}=21.5 to 29.5V, I_{out}=500mA	—	16	160	mV
Load stability	REG_{LOA}	V_{in}=21.5V, I_{out}=0 to 1200mA	—	100	400	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=21.5 to 29.5V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=21.5V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=21.5V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=18V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=18V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=18V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)}$	V_{in}=21.5V	1.2	1.8	2.4	A
Ripple rejection ratio	RR	V_{in}=21.5 to 23.5V, I_{out}=100mA, f=120Hz	38	58	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=21.5V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=21.5V, T_j=25 to 125℃	—	−40	—	ppm/℃

* These values are design reference values, not guaranteed values.

■ Electrical Characteristics (Ta=25℃)

• AN7724/F (24V Type)

Parameter	Symbol	Condition	min	typ	max	Unit
Output voltage	V_O	V_{in}=25.5V, I_{out}=500mA	23.28	24	24.72	V
Input stability	REG_{IN}	V_{in}=25.5 to 29.5V, I_{out}=500mA	—	9.6	96	mV
Load stability	REG_{LOA}	V_{in}=25.5V, I_{out}=0 to 1200mA	—	120	480	mV
Input bias current stable	$\Delta I_{bias(IN)}$	V_{in}=25.5 to 29.5V, I_{out}=500mA	—	1	10	mA
Bias current fluctuation under load	$\Delta I_{bias(LOA)}$	V_{in}=25.5V, I_{out}=0 to 1200mA	—	10	50	mA
Bias current under no load	I_{bias}	V_{in}=25.5V, I_{out}=0mA	—	2.6	5	mA
Bias current before regulation start	I_{rush}	V_{in}=21.6V, I_{out}=0mA	—	3	5	mA
Min. input/output voltage difference (1)	$V_{DIF(min)1}$	V_{in}=21.6V, I_{out}=500mA	—	0.4	0.6	V
Min. input/output voltage difference (2)	$V_{DIF(min)2}$	V_{in}=21.6V, I_{out}=1200mA	—	0.5	1	V
Peak output current (1)	$I_{O(peak)}$	V_{in}=25.5V	1.2	1.8	2.4	A
Ripple rejection ratio	RR	V_{in}=25.5 to 27.5V, I_{out}=100mA, f=120Hz	36	56	—	dB
Output short-circuit current Note 2)	$I_{O(short)}$	V_{in}=30V, Load short-circuit	—	10	—	mA
Thermal protection operating temperature Note 2)	$T_{j(TH)}$	V_{in}=25.5V	—	150	—	℃
Output voltage temperature coefficient Note 2)	α	V_{in}=25.5V, T_j=25 to 125℃	—	−40	—	ppm/℃

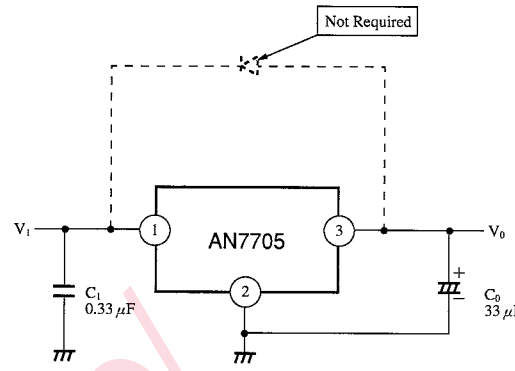
* These values are design reference values, not guaranteed values.

■ Precautions on Use

1. Input Short-Circuit Protection Circuit

For the conventional Matsushita 3-pin regulators (such as of the AN7800 series), when DC input Pin ③ is short-circuited with GND ② in the normal operation condition, the potential of output Pin ③ becomes higher than that of DC input pin and the electric charges which is charged in output capacitor C_O flows in the input side, resulting in the breakage of elements.

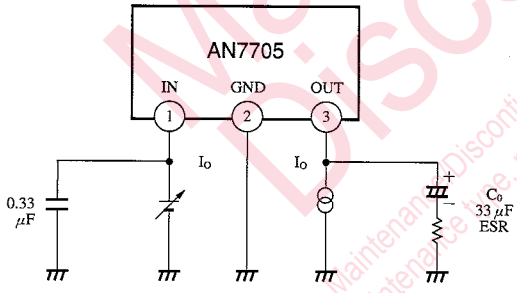
In the above case, the common silicone diode is connected as shown in the right figure (the dotted line). However, for the AN77XX/F series, since the protection circuit, which protects the elements from the discharging current, is incorporated in the internal circuit, the protection diode is not required.



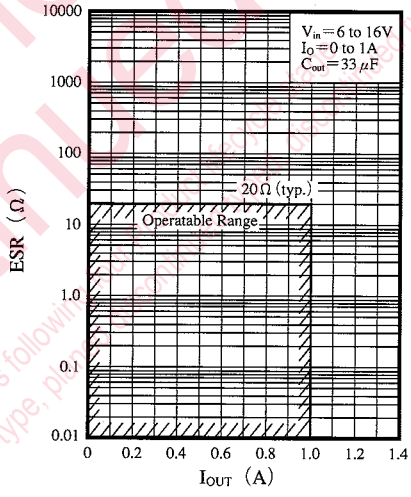
2. Capacitor for External Compensation

In order to secure the safety, the capacitor of 33 μF is required in the output side and it should be added as near as possible to output Pin ③ and GND ②. When it is used under low temperature, oscillation may occur due to the decrease of the aluminum electrolytic capacitor and increase of ESR.

For the AN77XX/F, it is recommended that the tantalum capacitor or aluminum electrolytic capacitor whose serial-connected resistance equivalent with that of output capacitor C_O has temperature characteristics within the recommended range specified in the right.



Output Capacitor ESR (Equivalent Serial Connected Resistor) Under Ta = 25 ℃



3. Others

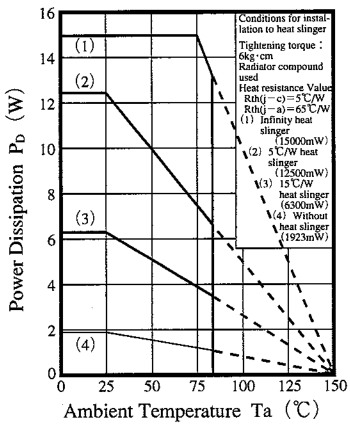
Precautions for the input voltage exceeding the operating supply voltage

a) When V_{CC} of 30V is applied, the overvoltage protection function is activated and the output may be shut down (3 V type to 10 V type).

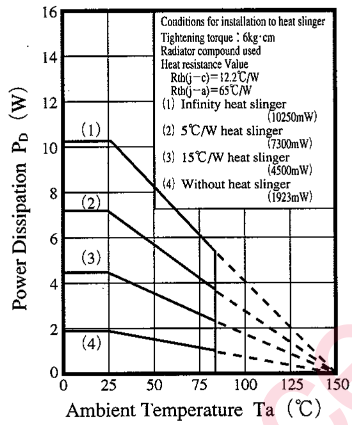
b) When it is used under $I_{OUT} \leqq 2$ mA, the output voltage may rise over the maximum value within the operating supply voltage range (12 V type to 24 V type).

■ Characteristics Curve

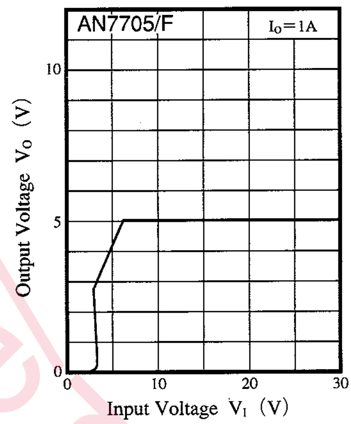
P_D — Ta (AN7700 series)


Conditions for installation to heat slinger
Tightening torque : 6kg·cm
Radiator compound used
Heat resistance Value
Rth(j−c)=5℃/W
Rth(j−a)=65℃/W
(1) Infinity heat slinger (15000mW)
(2) 5℃/W heat slinger (12500mW)
(3) 15℃/W heat slinger (6300mW)
(4) Without heat slinger (1923mW)
Power Dissipation P_D (W)
Ambient Temperature Ta (℃)
0 2 4 6 8 10 12 14 16
0 25 50 75 100 125 150

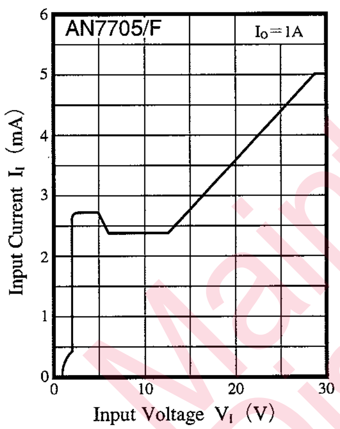
P_D — Ta (AN7700F series)


Conditions for installation to heat slinger
Tightening torque : 6kg·cm
Radiator compound used
Heat resistance Value
Rth(j−c)=12.2℃/W
Rth(j−a)=65℃/W
(1) Infinity heat slinger (10250mW)
(2) 5℃/W heat slinger (7300mW)
(3) 15℃/W heat slinger (4500mW)
(4) Without heat slinger (1923mW)
Power Dissipation P_D (W)
Ambient Temperature Ta (℃)
0 2 4 6 8 10 12 14 16
0 25 50 75 100 125 150

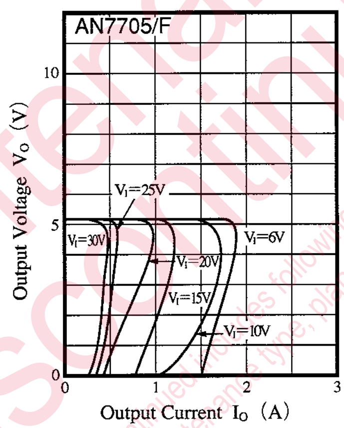
V_O — V_I



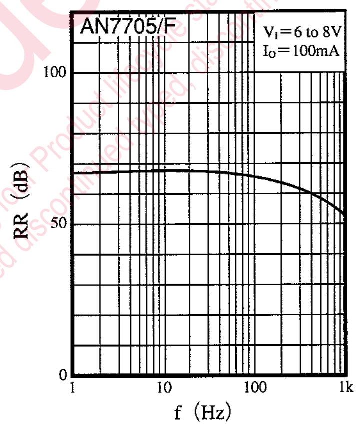
I_I — V_I



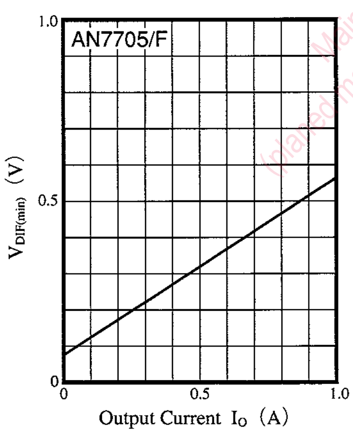
V_O — I_O



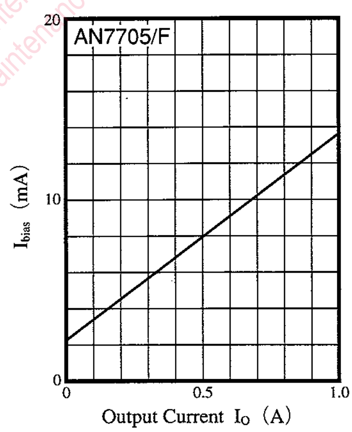
RR — f



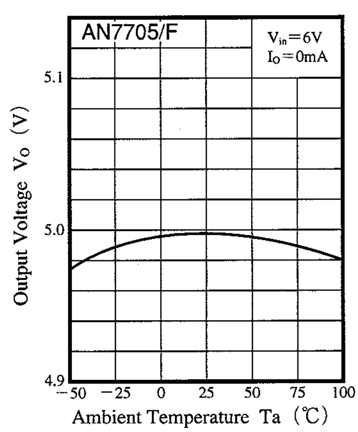
$V_{DIF(min)}$ — I_O



I_{bias} — I_O



V_O — Ta



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