AUK Semiconductor

S78xxPI

Fixed Voltage Regulator

Descriptions

The S78xx series are three-terminal positive regulators providing over 1A output current with internal current limiting, thermal shutdown and safe area protection. These regulators are useful in a wide range of applications. Although they are just fixed voltage regulators, the S78xx series can be used with external components to obtain adjustable voltages and currents.

Features

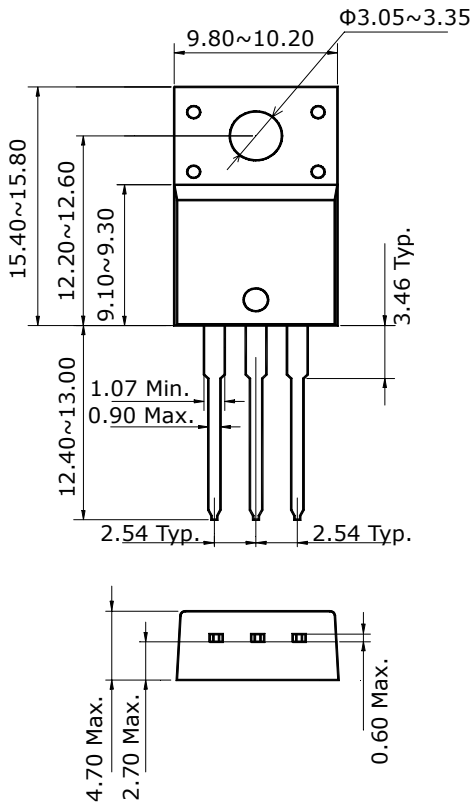
- Output Current of 1A
- Short Circuit Current Limit Protection
- Thermal Shutdown Protection
- Output Transistor Safe Area Protection

Ordering Information

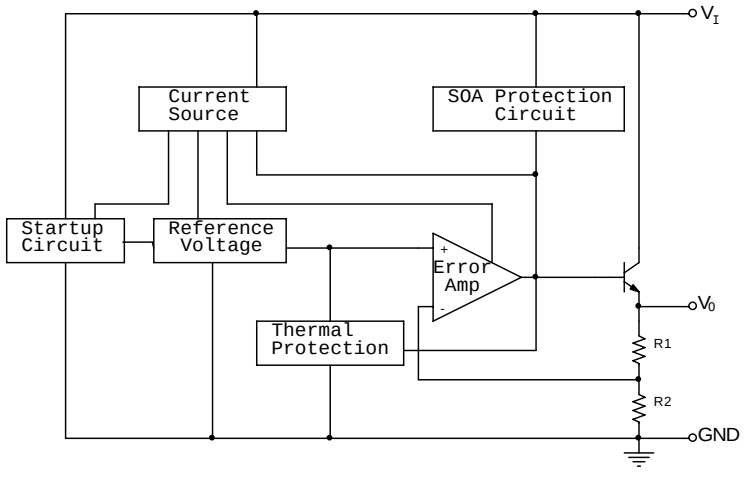
Type NO.	Marking	Package Code
S78xxPI	S78□□PI	TO-220F-3L

□□:Voltage Code (05:5V, 06:6V, 08:8V, 09:9V, 10:10V,12:12V,15:15V,24:24V)

Outline Dimensions (Unit : mm)



BLOCK DIAGRAM



PIN Connections

1. Input
2. GND
3. Output

Absolute Maximum Ratings

Ta=25°C

Characteristic	Symbol	Rating	Unit
Input voltage	V_I	40 (S7824PI)	V
		35 (ALL Others)	V
Power dissipation	$P_{D\ 1}$	2.0	W
	$P_{D\ 2}$ [T_C=25°C]	20	
Operating temperature range	T_{opr}	-40 ~ +85	°C
Junction temperature	T_J	150	°C
Storage temperature range	T_{stg}	-55 ~ +150	°C

Device Selection Guide

Device	Output Voltage
S7805PI	5V
S7806PI	6V
S7808PI	8V
S7809PI	9V
S7810PI	10V
S7812PI	12V
S7815PI	15V
S7824PI	24V

Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=10V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7805PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	4.80	5.0	5.20	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=7.0V ~ 20V	0℃≤T_J≤125℃	4.75	5.0	5.25	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=7.0V ~ 25V	T_J =25℃	-	3	100	㎷
		V_I=8.0V ~ 12V		-	1	50	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	15	100	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	5	50	
Quiescent Current	I_{QC}		T_J =25℃	-	4.2	8.0	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.1	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 7.0V ~ 25V	0℃≤T_J≤125℃	-	-	1.3	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I =8.0V ~ 18V	0℃≤T_J≤125℃	62	78	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.75	-	A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=11V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7806PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	5.75	6	6.25	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=8.0V ~ 21V	0℃≤T_J≤125℃	5.70	6	6.30	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=8.0V ~ 25V	T_J =25℃	-	5	120	㎷
		V_I=9.0V ~ 13V		-	1.5	60	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	14	120	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	60	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-0.8	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 8.0V ~ 25V	0℃≤T_J≤125℃	-	-	1.3	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I =9.0V ~ 19V	0℃≤T_J≤125℃	59	75	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.55	-	A

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=14V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7808PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	7.70	8	8.30	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=10.5V ~ 23V	0℃≤T_J≤125℃	7.60	8	8.40	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=10.5V ~ 25V	T_J =25℃	-	6	160	㎷
		V_I=11V ~ 17V		-	2	80	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	160	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	80	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-0.8	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 10.5V ~ 25V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I =11.5V ~ 21.5V	0℃≤T_J≤125℃	55	72	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.45	-	A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=16V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7809PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	8.65	9	9.35	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=11.5V ~ 24V	0℃≤T_J≤125℃	8.55	9	9.45	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=11.5V ~ 27V	T_J =25℃	-	7	180	㎷
		V_I=13V ~ 19V		-	2	90	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	180	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	90	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.0	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 11.5V ~ 27V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I=12V ~ 22V	0℃≤T_J≤125℃	55	70	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.4	-	A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=17V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7810PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	9.60	10	10.4	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=12.5V ~ 25V	0℃≤T_J≤125℃	9.50	10	10.5	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=12.5V ~ 28V	T_J =25℃	-	7	200	㎷
		V_I=14V ~ 20V		-	2	100	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	200	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	100	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.0	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 12.5V ~ 28V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I =13V ~ 23V	0℃≤T_J≤125℃	55	71	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.4	-	A

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=19V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7812PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	11.5	12	12.5	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=14.5V ~ 27V	0℃≤T_J≤125℃	11.4	12	12.6	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=14.5V ~ 30V	T_J =25℃	-	10	240	㎷
		V_I=16V ~ 22V		-	3	120	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	240	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	120	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.0	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 14.5V ~ 30V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection	RR	f=120 ㎐ V_I=15V ~ 25V	0℃≤T_J≤125℃	55	71	-	㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.35	-	A

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=23V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7815PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	14.40	15	15.60	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=17.5V ~ 30V	0℃≤T_J≤125℃	14.25	15	15.75	
Line Regulation	$\Delta V_{O(\triangle VI)}$	V_I=17.5V ~ 30V	T_J =25℃	-	12	300	㎷
		V_I=20V ~ 26V		-	3	150	
Load Regulation	$\Delta V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	300	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	150	
Quiescent Current	I_{QC}		T_J =25℃	-	4.3	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.0	-	㎷/℃
Quiescent Current Change	ΔI_{QC}	V_I = 17.5V ~ 30V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection Ratio	RR	f=120 ㎐ V_I =18.5V ~ 28.5V	0℃≤T_J≤125℃	54	70		㏈
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.23	-	A

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Electrical Characteristics

(Electrical Characteristics at 0℃≤T_J≤125℃ and V_I=33V, I_O=500 ㎃, Unless otherwise specified)

Characteristic	Symbol	Test Condition*		S7824PI			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O		T_J =25℃	23.0	24	25.0	V
		I_O=5 ㎃ ~ 1000 ㎃ V_I=27V ~ 38V	0℃≤T_J≤125℃	22.8	24	25.2	
Line Regulation	$\triangle V_{O(\triangle VI)}$	V_I=27V ~ 38V	T_J =25℃	-	18	480	㎷
		V_I=30V ~ 36V		-	6	240	
Load Regulation	$\triangle V_{O(\triangle IL)}$	I_O=5 ㎃ ~ 1000 ㎃	T_J =25℃	-	12	480	㎷
		I_O=250 ㎃ ~ 750 ㎃		-	4	240	
Quiescent Current	I_{QC}		T_J =25℃	-	4.6	8	㎃
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5 ㎃	0℃≤T_J≤125℃	-	-1.5	-	㎷/℃
Quiescent Current Change	$\triangle I_{QC}$	V_I = 27V ~ 38V	0℃≤T_J≤125℃	-	-	1	㎃
		I_O = 5 ㎃ ~ 1000 ㎃		-	-	0.5	
Dropout Voltage	V_{DROP}	I_O=1000 ㎃	T_J =25℃	-	2.0	4.0	V
Ripple Rejection Ratio	RR	f=120 Hz V_I =28V ~ 38V	0℃≤T_J≤125℃	50	66	-	dB
Short-Circuit Current Limit	I_{SO}		T_J =25℃	-	0.15	-	A

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Fig.1 Quiescent Current vs. Junction Temperature

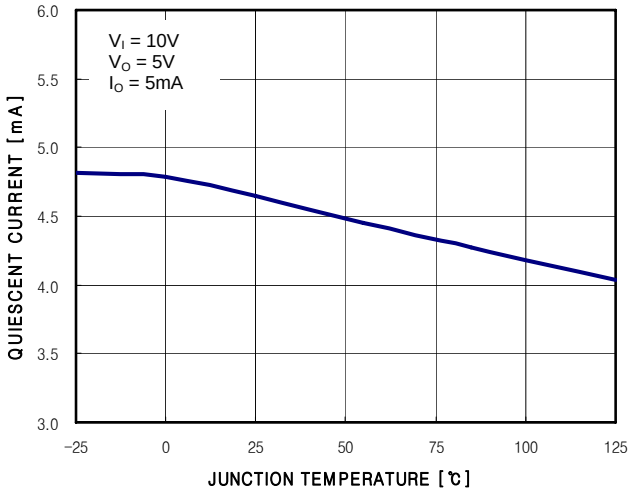


Fig.2 Peak Output Current vs. Input to Output Current

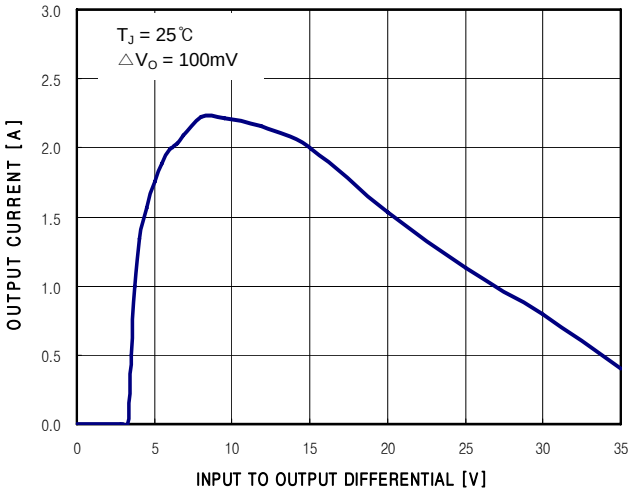


Fig.3 Normalized Output Voltage vs. Junction Temperature

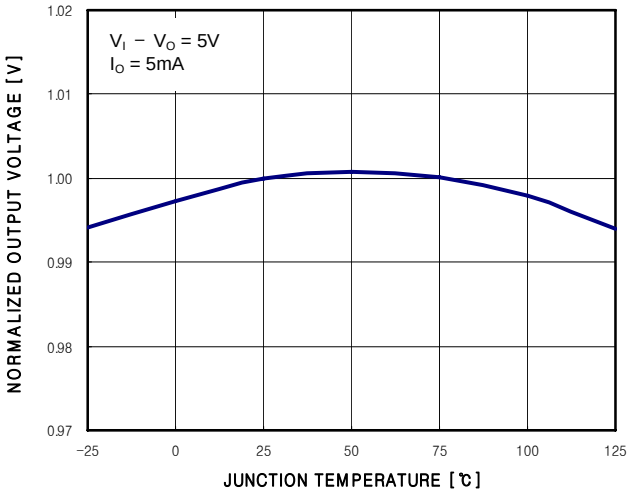


Fig.4 Quiescent Current vs. Input Voltage

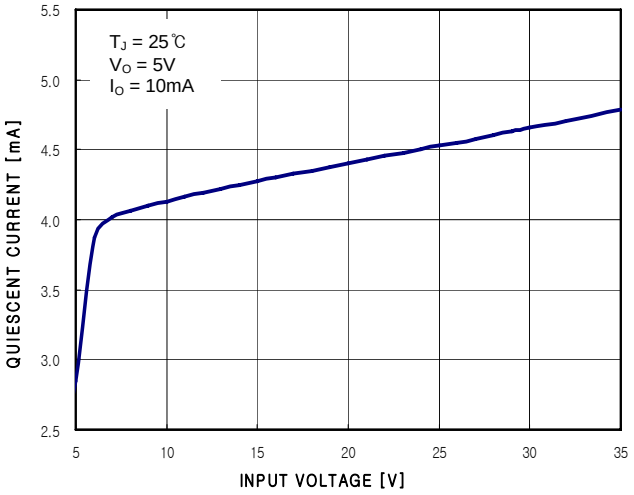
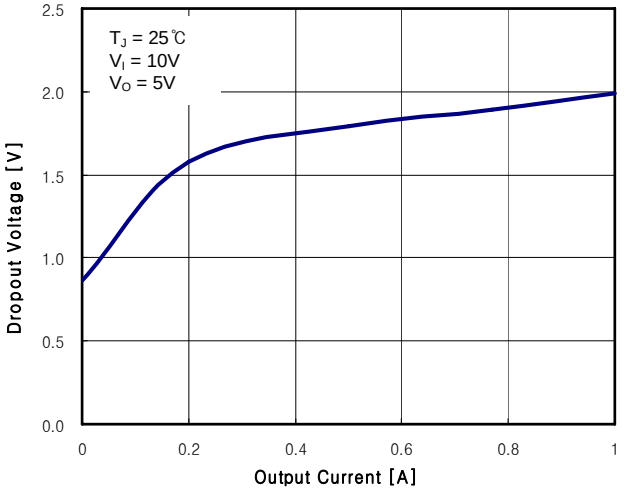


Fig.5 Dropout Voltage vs. Output Current



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