AUK Semiconductor

S78xxD

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

- Internal Short Circuit Current Limiting
- Maximum Output Current (1A Max.)
- Thermal Overload Protection
- Output Transistor Safe Area Protection

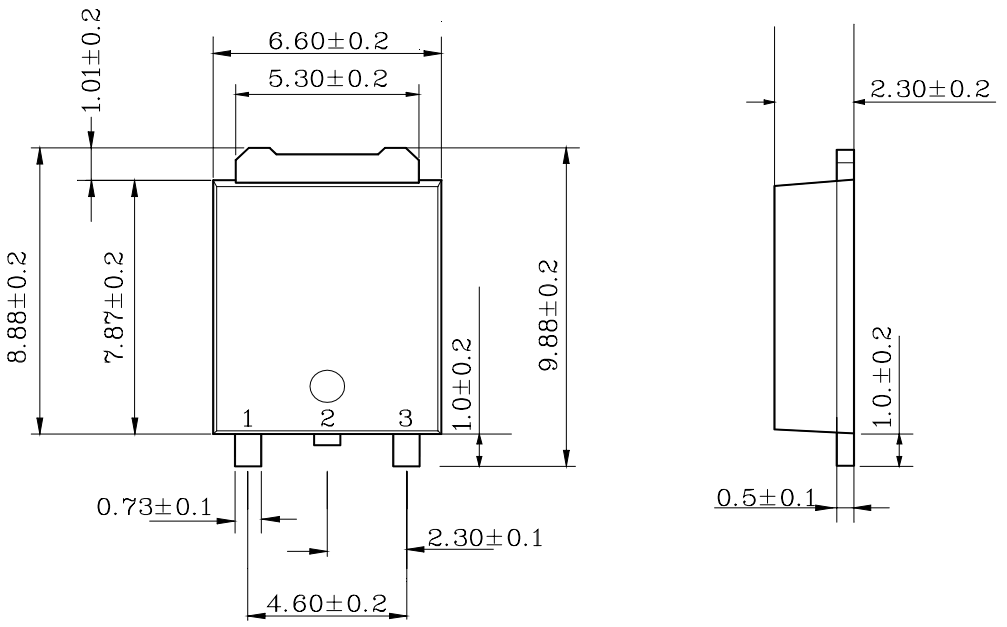
Ordering Information

Type NO.	Marking	Package Code
S78xxD	S78□□D	D-Pak

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

Outline Dimensions

unit : mm



PIN Connections
1. Input
2. GND
3. Output

Absolute Maximum Ratings

Ta=25°C

Characteristic	Symbol	Ratings	Unit
Operating Input voltage	V_{IN}	40 (S7824D)	V
		35 (ALL Others)	V
Power Dissipation (without Heatsink)	P_D	1.3	W
Operating Junction Temperature	T_J	-30 ~ 125	°C
Storage Temperature	T_{stg}	-55 ~ 150	°C

Electrical Characteristics

(V_{IN} = 10V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7805D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	4.8	5.0	5.2	V
		I_{OUT}=5mA ~ 1A V_{IN}=7.0V ~ 20V, $P_O \leq$ 15W		4.75	5.0	5.25	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=7.0V ~ 25V	T_j =25℃	-	3	100	mV
		V_{IN}=8.0V ~ 12V		-	1	50	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	15	100	mV
		I_{OUT}=250mA ~ 750mA		-	5	50	
Quiescent Current	I_B		T_j =25℃	-	4.2	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 7.0V ~ 25V		-	-	1.3	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz	T_j =25℃	-	40	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =8.0V ~ 18V		62	78	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.75	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.1	-	mV/°C
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	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.

Electrical Characteristics

(V_{IN} = 11V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7806D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	5.75	6.0	6.25	V
		I_{OUT}=5mA ~ 1A V_{IN}=8.0V ~ 21V, $P_O \leq$ 15W		5.7	6.0	6.3	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=8.0V ~ 25V	T_j =25℃	-	5	120	mV
		V_{IN}=9.0V ~ 13V		-	1.5	60	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	14	120	mV
		I_{OUT}=250mA ~ 750mA		-	4	60	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 8.0V ~ 25V		-	-	1.3	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz	T_j =25℃	-	45	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =9.0V ~ 19V		59	75	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.55	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-0.8	-	mV/°C
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	A

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Electrical Characteristics

(V_{IN} = 14V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7808D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	7.7	8.0	8.3	V
		I_{OUT}=5mA ~ 1A V_{IN}=10.5V ~ 23V, $P_O \leq$ 15W		7.6	8.0	8.4	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=10.5V ~ 25V	T_j =25℃	-	6	160	mV
		V_{IN}=11.0V ~ 17V		-	2	80	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	160	mV
		I_{OUT}=250mA ~ 750mA		-	4	80	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 10.5V ~ 25V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz	T_j =25℃	-	52	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =11.5V ~ 21.5V		55	72	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.45	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-0.8	-	mV/℃
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	A

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Electrical Characteristics

(V_{IN} = 16V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7809D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	8.65	9.0	9.35	V
		I_{OUT}=5mA ~ 1A V_{IN}=11.5V ~ 24V, $P_O \leq$ 15W		8.55	9.0	9.45	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=11.5V ~ 27V	T_j =25℃	-	7	180	mV
		V_{IN}=13.0V ~ 19V		-	2	90	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	180	mV
		I_{OUT}=250mA ~ 750mA		-	4	90	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 11.5V ~ 27V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz,	T_j =25℃	-	60	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =12V ~ 22V		55	70	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.4	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.0	-	mV/℃
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	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.

Electrical Characteristics

(V_{IN} = 17V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7810D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	9.6	10.0	10.4	V
		I_{OUT}=5mA ~ 1A V_{IN}=12.5V ~ 25V, $P_O \leq$ 15W		9.5	10.0	10.5	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=12.5V ~ 28V	T_j =25℃	-	7	200	mV
		V_{IN}=14.0V ~ 20V		-	2	100	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	200	mV
		I_{OUT}=250mA ~ 750mA		-	4	100	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 12.5V ~ 28V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz,	T_j =25℃	-	70	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =13V ~ 23V		55	71	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.4	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.0	-	mV/℃
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	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.

Electrical Characteristics

(V_{IN} = 19V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7812D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	11.5	12.0	12.5	V
		I_{OUT}=5mA ~ 1A V_{IN}=14.5V ~ 30V, $P_O \leq$ 15W		11.4	12.0	12.6	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=14.5V ~ 30V	T_j =25℃	-	10	240	mV
		V_{IN}=16.0V ~ 22V		-	3	120	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	240	mV
		I_{OUT}=250mA ~ 750mA		-	4	120	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 14.5V ~ 30V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz,	T_j =25℃	-	75	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =15V ~ 25V		55	71	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.35	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.0	-	mV/℃
Peak Output Current	I_{PK}		T_j =25℃	-	2.2	-	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.

Electrical Characteristics

(V_{IN} = 23V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7815D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	14.4	15.0	15.6	V
		I_{OUT}=5mA ~ 1A V_{IN}=17.5V ~ 30V, $P_O \leq$ 15W		14.25	15.0	15.75	
Line Regulation	$\triangle V_{OUT}$	V_{IN}=17.5V ~ 30V	T_j =25℃	-	12	300	mV
		V_{IN}=20V ~ 26V		-	3	150	
Load Regulation	$\triangle V_{OUT}$	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	300	mV
		I_{OUT}=250mA ~ 750mA		-	4	150	
Quiescent Current	I_B		T_j =25℃	-	4.3	8.0	mA
Quiescent Current Change	$\triangle I_B$	V_{IN} = 17.5V ~ 30V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz,	T_j =25℃	-	90	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =18.5V ~ 28.5V		54	70	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.23	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.0	-	mV/℃
Peak Output Current	I_{PK}		T_j =25℃	-	2.1	-	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.

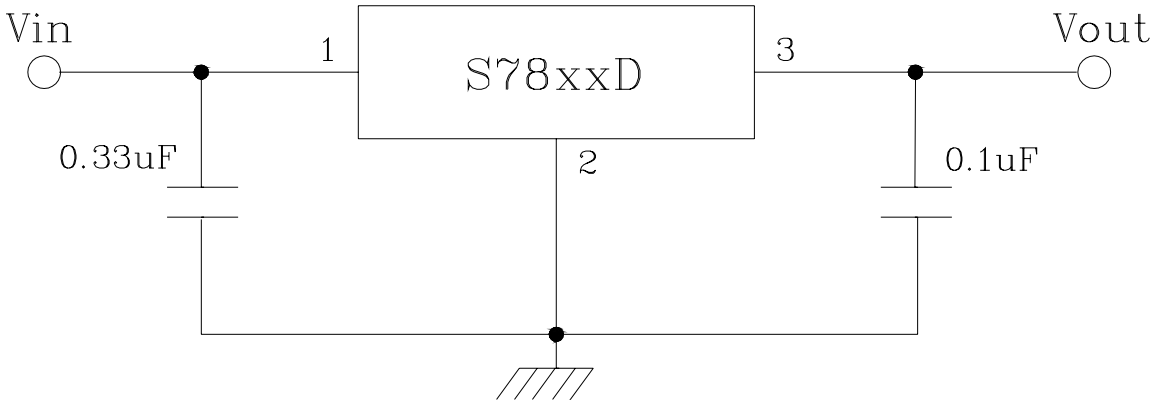
Electrical Characteristics

(V_{IN} = 33V, I_{OUT} = 500mA, T_j = 0°C ~ 125°C, Unless otherwise noted)

Characteristic	Symbol	Test Condition		S7824D			Unit
				Min.	Typ.	Max.	
Output Voltage	V_{OUT}		T_j =25℃	23.0	24.0	25.0	V
		I_{OUT}=5mA ~ 1A V_{IN}=27V ~ 38V, $P_O \leq$ 15W		22.8	24.0	25.2	
Line Regulation	ΔV_{OUT}	V_{IN}=27V ~ 38V	T_j =25℃	-	18	480	mV
		V_{IN}=30V ~ 36V		-	6	240	
Load Regulation	ΔV_{OUT}	I_{OUT}=5mA ~ 1.5A	T_j =25℃	-	12	480	mV
		I_{OUT}=250mA ~ 750mA		-	4	240	
Quiescent Current	I_B		T_j =25℃	-	4.6	8.0	mA
Quiescent Current Change	ΔI_B	V_{IN} = 27V ~ 38V		-	-	1.0	mA
		I_{OUT} = 5mA ~ 1A		-	-	0.5	
Output Noise Voltage	V_N	f=10Hz ~ 100KHz,	T_j =25℃	-	170	-	uV_{rms}
Ripple Rejection Ratio	RR	f=120Hz, V_{IN} =28V ~ 38V		50	66	-	dB
Dropout Voltage	V_D	I_{OUT}=1A	T_j =25℃	-	2.0	-	V
Short Circuit Current Limit	I_{SC}		T_j =25℃	-	0.15	-	A
Output Voltage Drift	TC_{VO}	I_{OUT}=5mA	T_j =25℃	-	-1.5	-	mV/°C
Peak Output Current	I_{PK}		T_j =25℃	-	2.1	-	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.

■Test circuit



Electrical Characteristic Curves

Fig. 1 $V_{D\,VS\,E}$ T_j

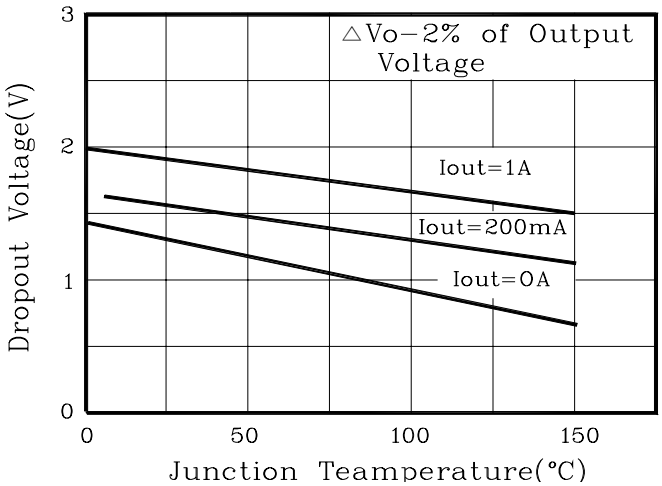


Fig. 2 I_{OUT} VS | Vin - V_{OUT} |

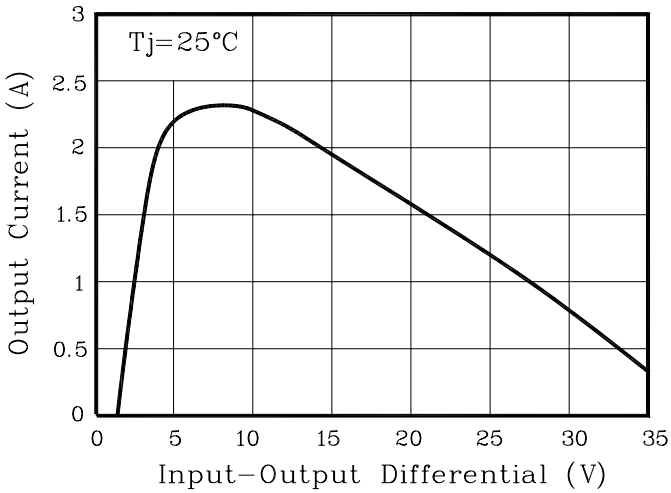


Fig. 3 $P_{D\,VS}$ Ta

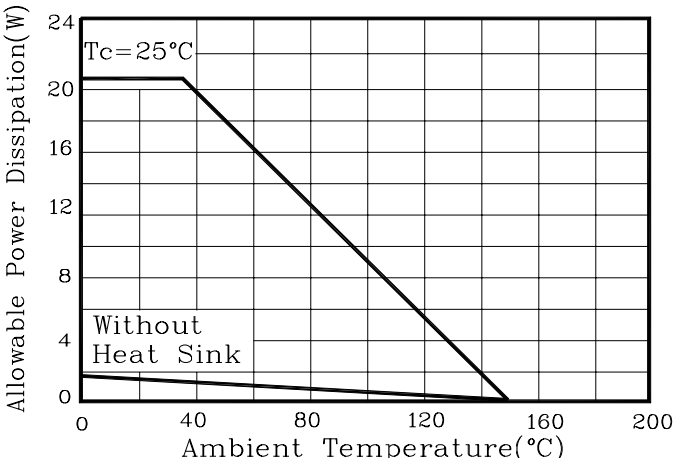


Fig. 4 $I_{QC\,VS}$ Vin

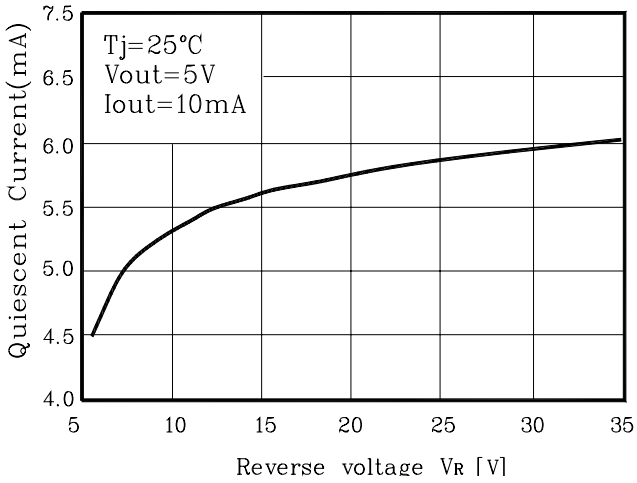
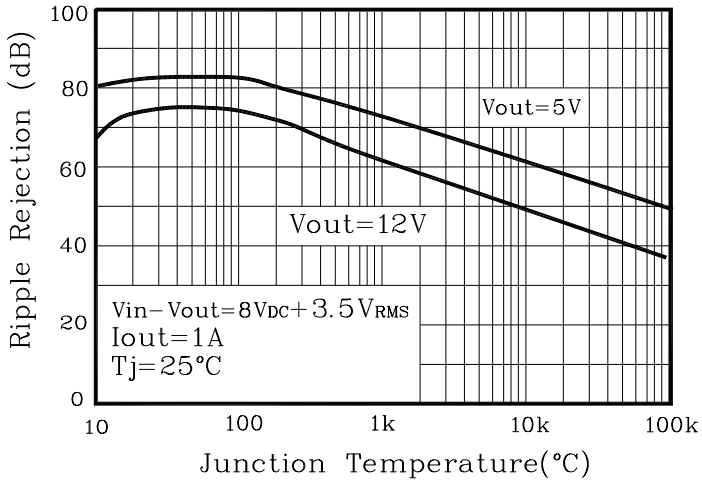



Fig. 5 Ripple Rejection