300mA LDO
Monolithic IC MM189x Series

Outline

This IC is a Low noise 300mA LDO.
The output voltage line-up is 1.5-5V (0.1V step) and a adjustable type.
A protection function is built in a current limiter and a thermal shutdown.
The applications is for standard power supply of home equipment by SOT89-5 package.

Features

1.	Output current	300mA
2.	No load input current	85μA typ.
3.	Input current (OFF)	0.1μA max.
4.	Output voltage range	1.5-5.0V (0.1V step)
5.	Output voltage accuracy	±1.5%
6.	Dropout voltage	0.12V typ. (I_O=150mA)
7.	Line regulation	10mV typ. (V_{in}=Vo+1.5-2.5V)
8.	Load regulation	15mV typ. (I_O=0~300mA)
9.	Ripple rejection	70dB typ. (f=120Hz)
10.	Output noise voltage	30μVrms typ. (C_n=0.01μF)
11.	Output Capacitor	1μF (Ceramic)

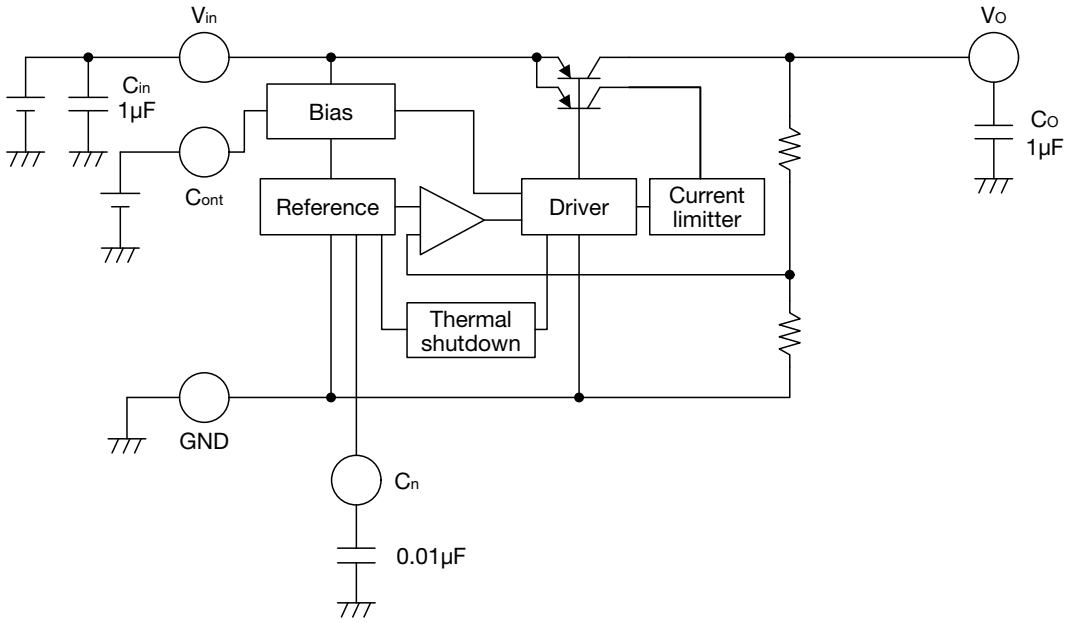
Package

SOT89-5

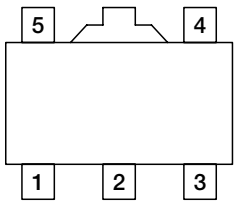
Applications

1. TVs
2. DVD, BD-Players, Recorders
3. Games

Block Diagram



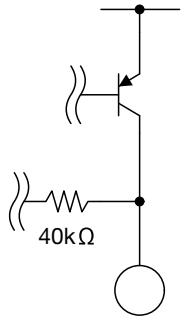
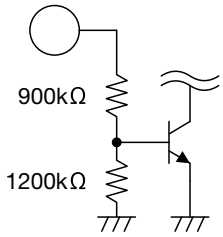
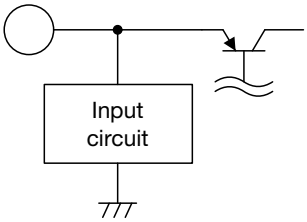
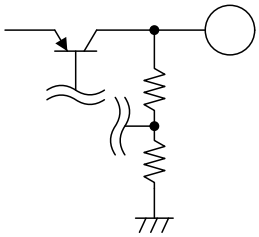
Pin Assignment



SOT89-5
(TOP VIEW)

1	Cn
2	GND
3	Cont
4	V_{in}
5	V_O

Pin Description

Pin No.	Pin name	Functions	Internal equivalent circuit diagram
1	Cn	Noise decrease pin Connecting 0.01µF capacitor can decrease output noise. If the noise decrease capacitor is not connected, the pin may be influenced by outside noise.	
2	GND	Ground	
3	Cont	ON/OFF Control pin Cont: H / L Cont pin must be connected with Vin pin, if it is not used.	
4	V_{in}	Input pin The capacitor is required to connect with input pin more than 1µF.	
5	V_O	Output pin The capacitor must be connected with output pin more than 1µF.	

Absolute Maximum Ratings (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Storage Temperature	T_{stg}	−55~+150	°C
Operating Temperature	T_{opr}	−40~+85	°C
Supply Voltage	V_{in}	−0.3~+13.2	V
Max Output Current	I_{out}	400	mA
Power Dissipation	Pd	690(Note1)	mW

Note1 : With the PC Board of glass epoxy.
(50 × 50 × 1.6mm)

Recommended Operating Conditions (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Output Current	I_{out}	0~300	mA
Operating Voltage	V_{op}	2.2~12.6	V

Electrical Characteristics 1 (Except where noted otherwise V_{in}=V_O(typ.)+1V, I_O=1mA, V_{cont}=1.6V, Ta=25°C)

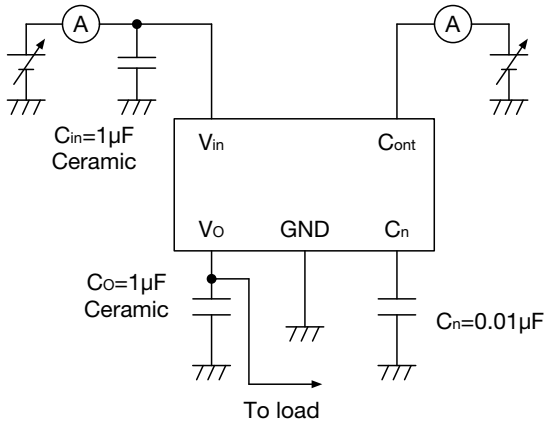
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
No-Load Input Current	I_{CC}	I_O=0mA		85	140	μA
Input Current(OFF)	Iccoff	V_{cont}=0V		0	0.1	μA
Output Voltage (Note3)	V_{OUT}	I_O=1mA	×0.985		×1.015	V
Dropout Voltage (Note4)	Vio	V_{in}=V_O−0.2V, I_O=150mA		0.12	0.24	V
Line Regulation	⊿V1	V_{in}=V_O+1.5~V_O+2.5V, I_O=1mA		10	20	mV
Load Regulation	⊿V2	I_O=0~300mA		15	60	mV
V_{OUT} Temperature Coefficient (Note2)	$\Delta V_{OUT}/\Delta T$	Tj=−40~+85°C		±100		ppm/°C
Ripple Rejection (Note2)	RR	f=120Hz Vripple=1V, I_O=100mA	50	70		dB
Output Noise Voltage (Note2)	V_n	f_{BW}=20~80kHz, C_n=0.01μF, I_{out}=100mA		30		μVrms
		f_{BW}=20~80kHz, C_n=OPEN, I_{out}=100mA		150		
Cont Pin Input Current	I_{cont}		10	20	30	μA
Cont Pin High Threshold Level	V_{cont}H		1.6		V_{in}+0.3	V
Cont Pin Low Threshold Level	V_{cont}L		−0.3		0.4	V

Note2 : The parameter is guaranteed by design.
Note3 : Please refer to another page.
Note4 : The parameter is not guaranteed in the model less than V_{OUT}=2V.

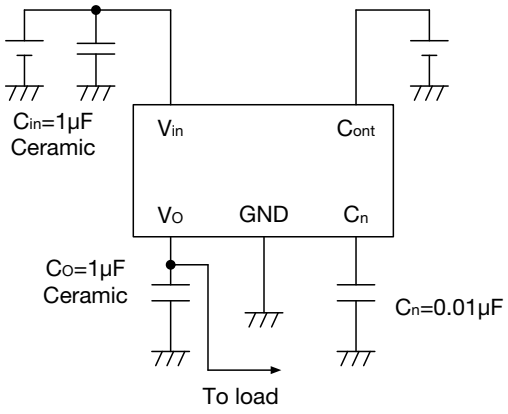
Electrical Characteristics 2 (Except where noted otherwise $V_{in}=V_O$(typ.)+1V, I_O=1mA, V_{cont}=1.6V, Ta=25°C)

Model No.	Measurement Conditions	Output Voltage (V)		
		Min.	Typ.	Max.
MM1891F	I_O=1mA	1.478	1.5	1.523
MM1891G		1.576	1.6	1.624
MM1891H		1.675	1.7	1.726
MM1891J		1.773	1.8	1.827
MM1891K		1.872	1.9	1.929
MM1892A		1.970	2.0	2.030
MM1892B		2.069	2.1	2.132
MM1892C		2.167	2.2	2.233
MM1892D		2.266	2.3	2.335
MM1892E		2.364	2.4	2.436
MM1892F		2.463	2.5	2.538
MM1892G		2.561	2.6	2.639
MM1892H		2.660	2.7	2.741
MM1892J		2.758	2.8	2.842
MM1892K		2.857	2.9	2.944
MM1893A		2.955	3.0	3.045
MM1893B		3.054	3.1	3.147
MM1893C		3.152	3.2	3.248
MM1893D		3.251	3.3	3.350
MM1893E		3.349	3.4	3.451
MM1893F		3.448	3.5	3.553
MM1893G		3.546	3.6	3.654
MM1893H		3.645	3.7	3.756
MM1893J		3.743	3.8	3.857
MM1893K		3.842	3.9	3.959
MM1894A		3.940	4.0	4.060
MM1894B		4.039	4.1	4.162
MM1894C		4.137	4.2	4.263
MM1894D		4.236	4.3	4.365
MM1894E		4.334	4.4	4.466
MM1894F		4.433	4.5	4.568
MM1894G		4.531	4.6	4.669
MM1894H		4.630	4.7	4.771
MM1894J		4.728	4.8	4.872
MM1894K		4.827	4.9	4.974
MM1895A		4.925	5.0	5.075

Measuring Circuit



Application Circuit



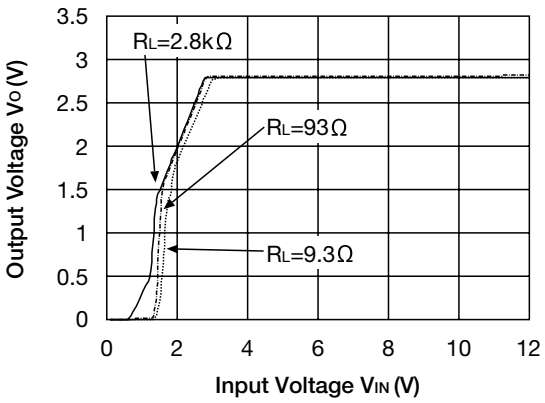
∗ Temperature Characteristics : B Type

· Note

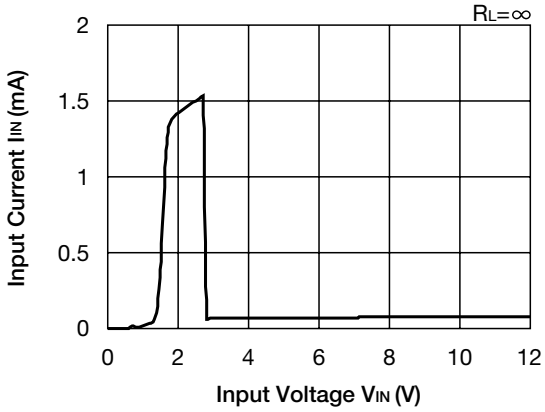
1. The output capacitor is required between output and GND to prevent oscillation.
2. The ESR of capacitor must be defined in ESR stability area.
   It is possible to use a ceramic capacitor without ESR resistance for output.
   The ceramic capacitor must be used more than 1μF and B type temperature characteristics.
3. The wire of V_{CC} and GND is required to print full ground plane for noise and stability.
4. The input capacitor must be connected a distance of less than 1cm from input pin.
5. In case the output voltage is above the input voltage, the overcurrent flow by internal parasitic diode from output to input. In such application, the external bypass diode must be connected between output and input pin.
6. The heatsink(Tab) pin must be connected with GND.

Characteristics (Vo=2.8V) (Except where noted otherwise Ta=25°C, V_{in}=V_O+1V, V_{cont}=1.6V, C_{in}=1µF, C_O=1µF, C_n=0.01µF)

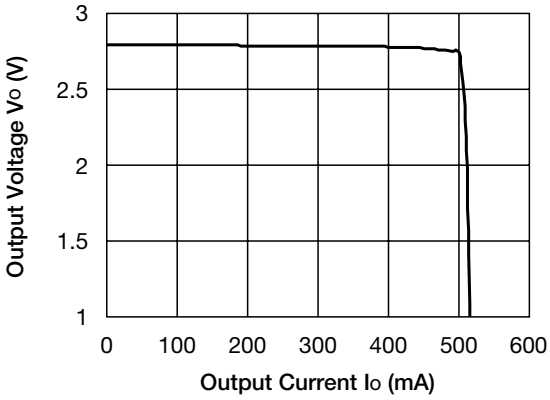
Output - Input voltage



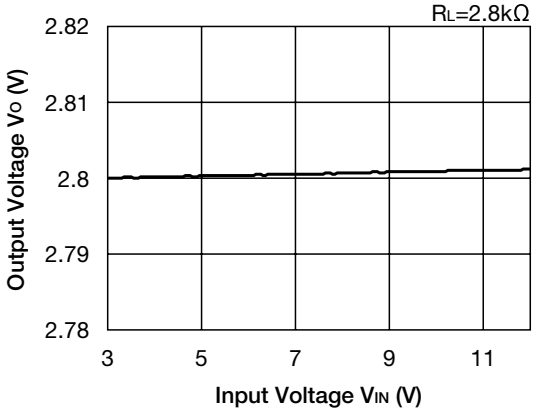
Input current - Input voltage



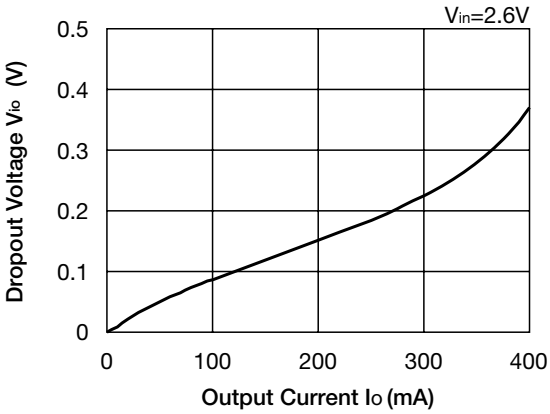
Load regulation



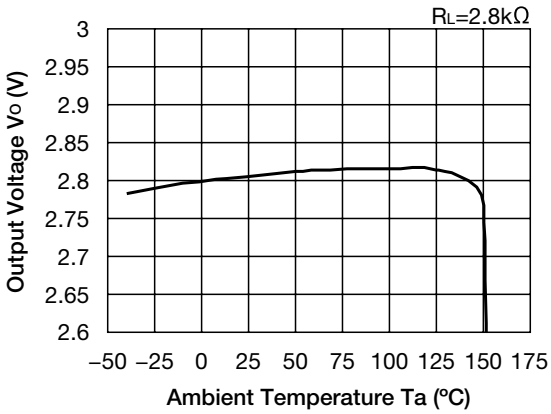
Line regulation



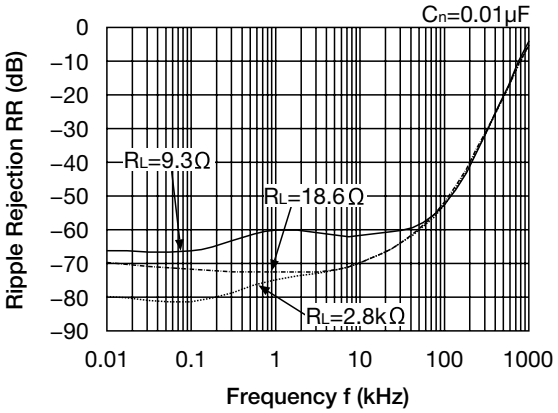
Dropout voltage - Output current



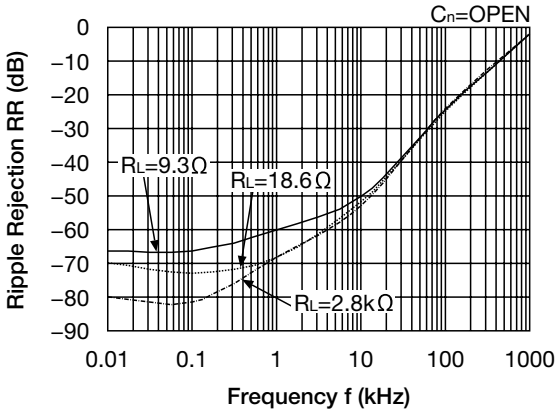
Output voltage - Ambient temperature



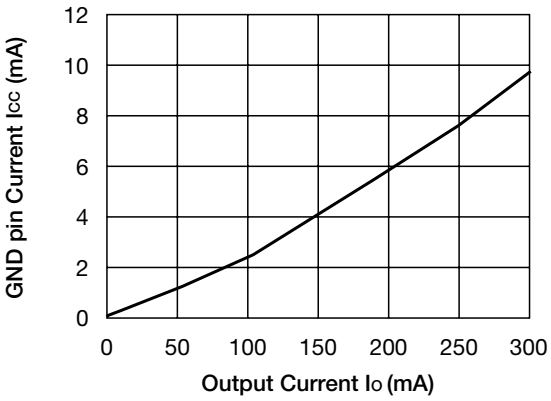
Ripple Rejection



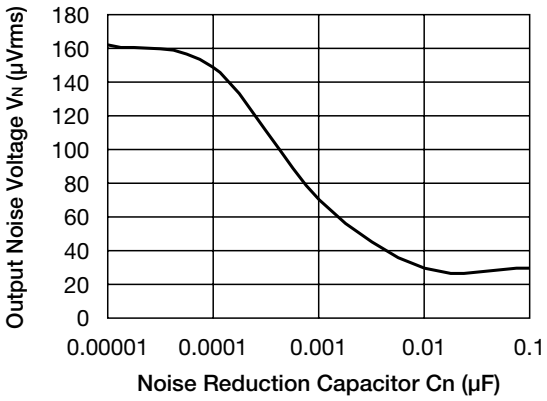
Ripple Rejection



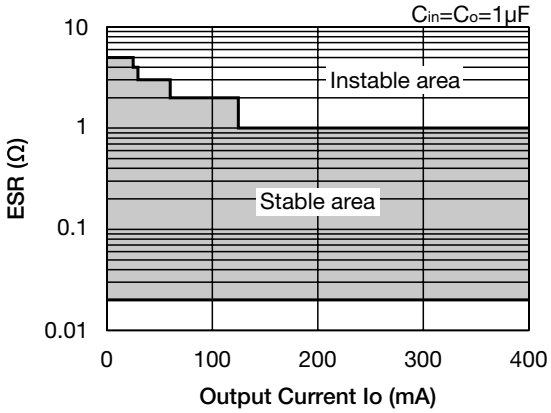
GND pin current



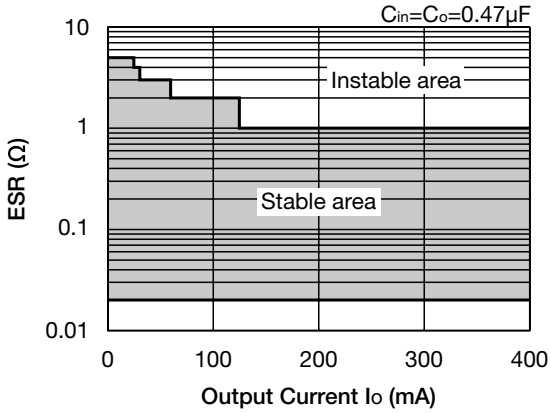
Output noise voltage



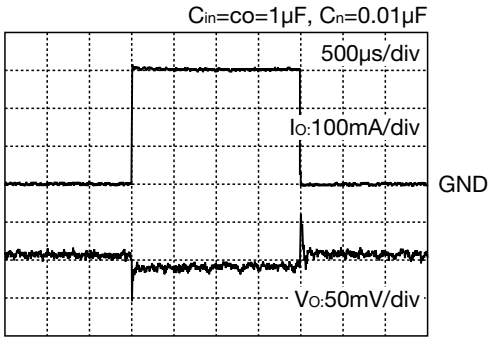
ESR Stable area

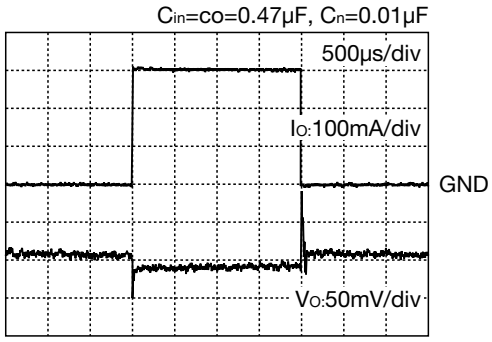


ESR Stable area

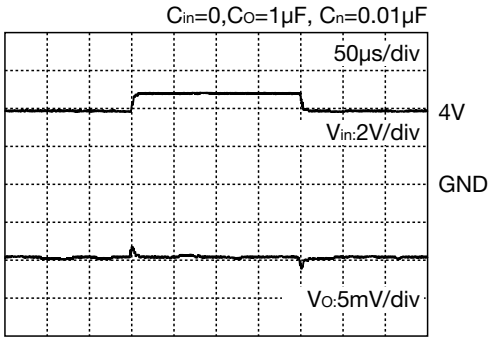


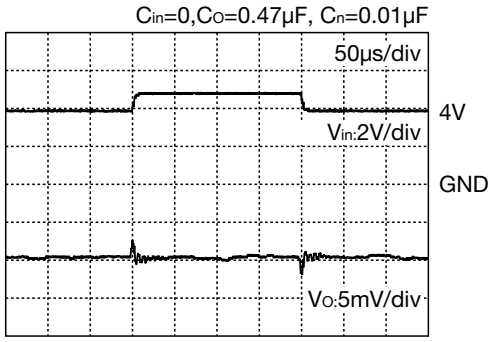
Load transient response (Io=0→300mA)



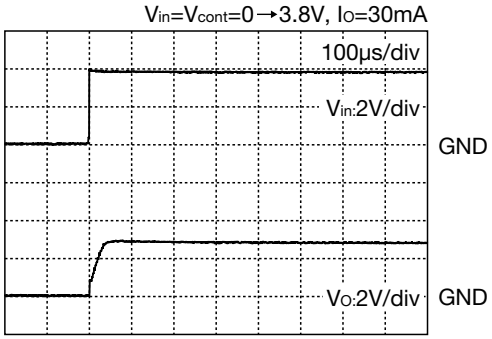


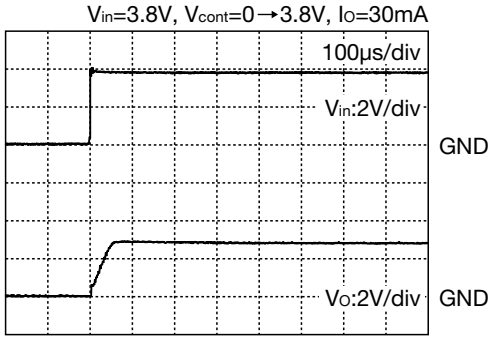
Line transient response (Vin=0→4.8V, Io=300mA)





Turn-On transient response

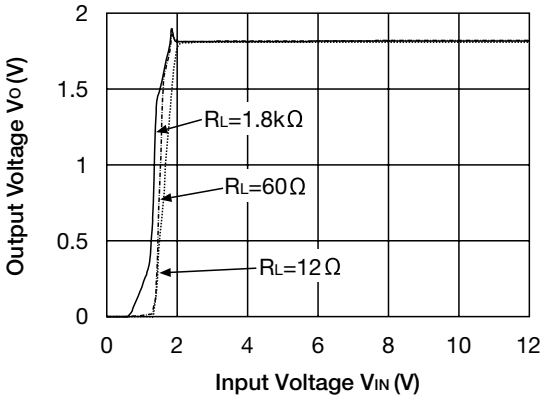




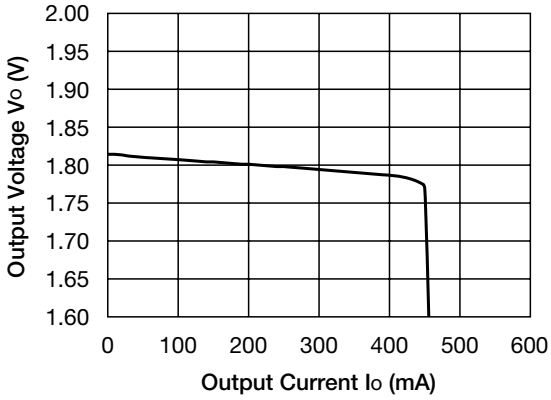
Characteristics (Vo=1.8V)

(Except where noted otherwise Ta=25°C, V_{in}=V_O+1V, V_{cont}=1.6V, C_{in}=1µF, C_O=1µF, C_n=0.01µF)

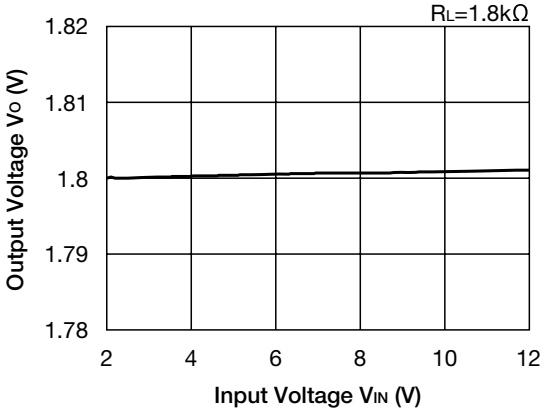
Output - Input voltage



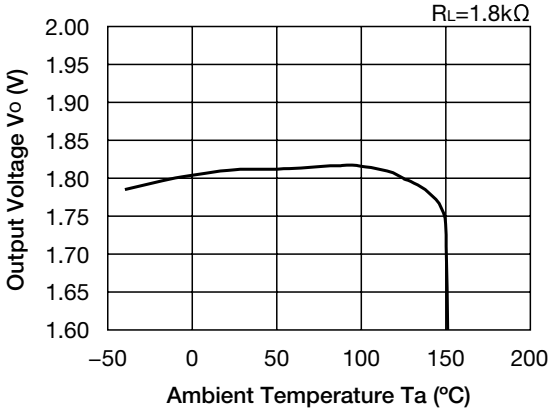
Load regulation



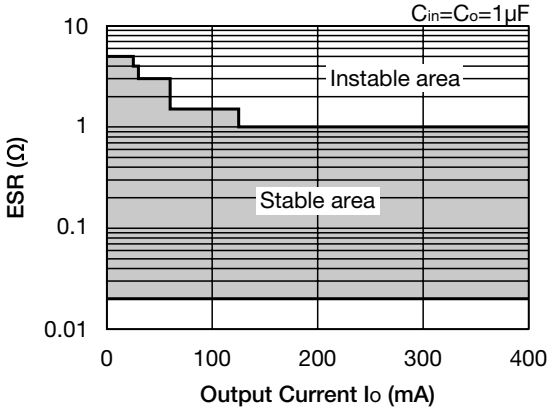
Line regulation



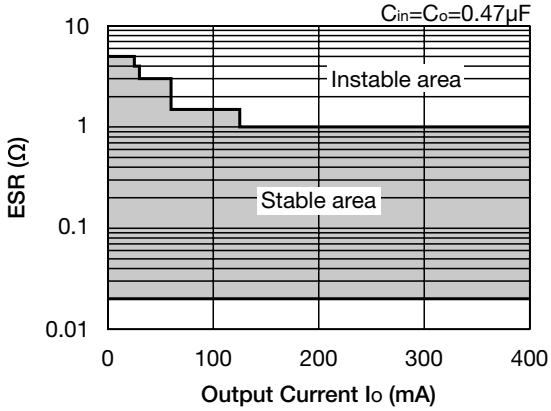
Output voltage - Ambient temperature



ESR Stable area



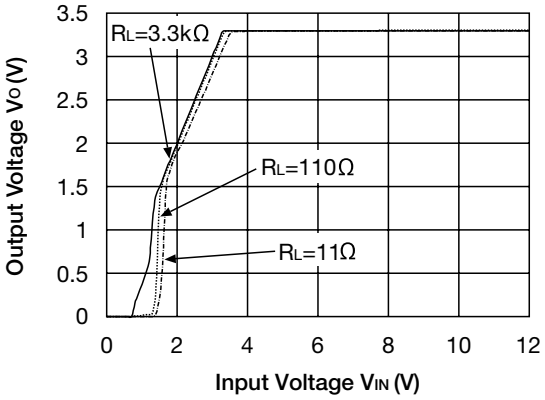
ESR Stable area



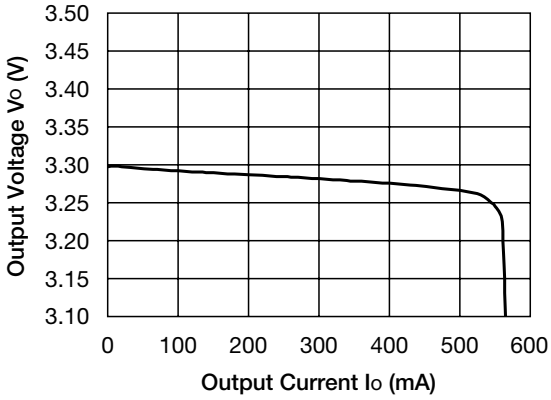
Characteristics (Vo=3.3V)

(Except where noted otherwise Ta=25°C, V_{in}=V_O+1V, V_{cont}=1.6V, C_{in}=1µF, C_O=1µF, C_n=0.01µF)

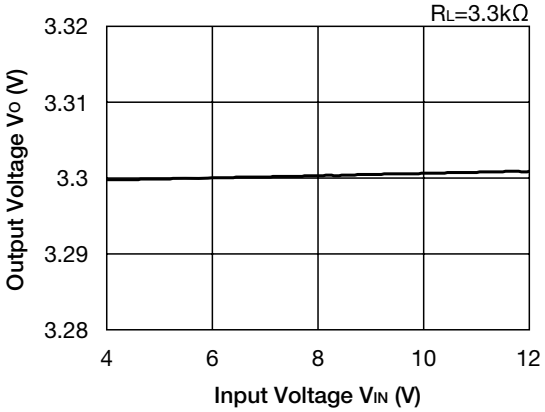
Output - Input voltage



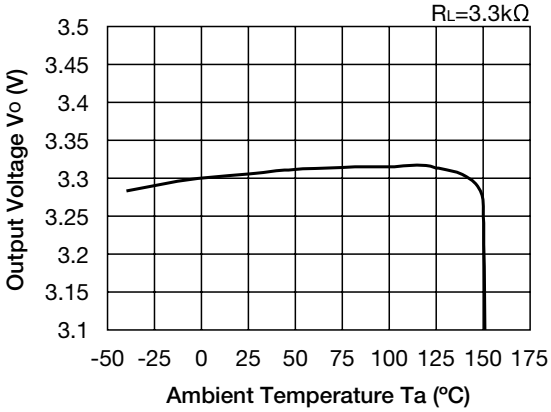
Load regulation



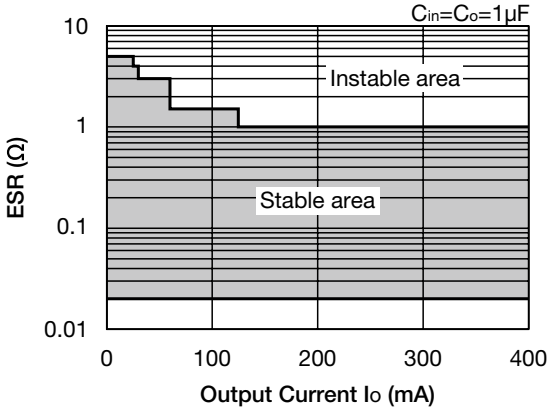
Line regulation



Output voltage - Ambient temperature



ESR Stable area



ESR Stable area