150mA Regulator
Monolithic IC MM157□□N, 161□□N

Outline

This IC is an ultra-small, low noise, stable power supply that supports ceramic capacitors (low ESR) Output current goes up to 150mA, and use of a noise pin reduces output noise even further.
Output ON/OFF can be controlled with the ON/OFF pin.

Features

1. I/O voltage difference	0.10V typ. (I_O=50mA)
2. Output noise voltage	30μVrms typ. (Cn=0.01μF)
3. Recommended maximum output current	150mA max.
4. No-load current consumption	85μA typ.
5. Built-in overcurrent protection and thermal shutdown circuits	
6. Output voltage rank	1.5 ~ 5.0V (0.1V steps)
7. Output ON/OFF control function	High: ON, Low: OFF

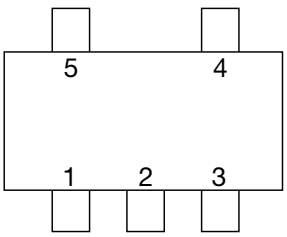
Package

SOT-25A (MM157□□N, MM161□□N)
* □□contains the output voltage rank.

Applications

1. Cordless telephone
2. Cellular telephone, PHS
3. Portable MD
4. Other battery-powered portable equipment

Pin Assignment



SOT-25A
(TOP VIEW)

MM157□□N

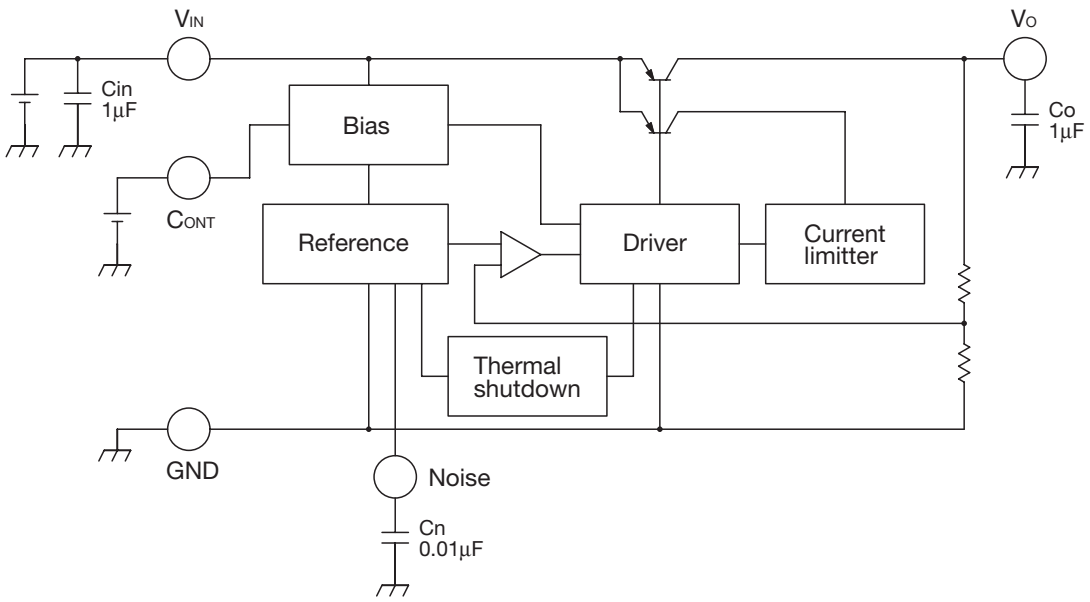
1	V_{IN}
2	GND
3	CONT
4	Noise
5	V_O

MM161□□N

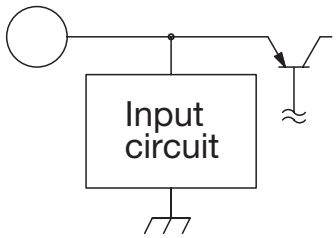
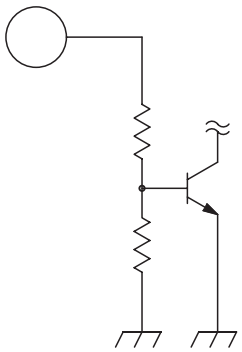
1	CONT
2	GND
3	Noise
4	V_{OUT}
5	V_{IN}

*The component MM161□□N is MM157□□N with changed pin configuration.

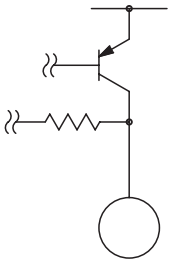
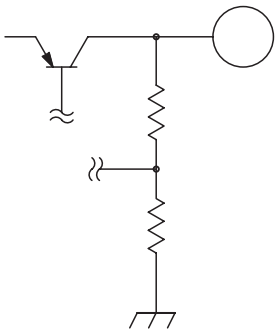
Equivalent Circuit Diagram



Pin Description Typical model: MM157□□N

Pin No.	Pin name	Function	Internal equivalent circuit diagram
1	VIN	Input pin The capacitor is required to connect with input pin more than 1µF.	
2	GND	Ground	
3	CONT	ON/OFF Control pin CONT pin must be connected with VIN pin, if it is not used.	

CONT	VO
H	ON
L	OFF

Pin No.	Pin name	Function	Internal equivalent circuit diagram
4	Noise	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.	
5	V_O	Output pin The capacitor must be connected with output pin more than 1µF.	

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T_{STG}	–40~+150	°C
Operating temperature	T_{OPR}	–30~+85	°C
Supply voltage	V_{IN}	–0.3~+12	V
Allowable loss	Pd	150 (Not attached)	mW

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Output current	I_{OUT}	0~150	mA
Operating voltage	V_{OP}	V_{OUT} Typ. +0.5~+12	V

Electrical Characteristics 1 (Except where noted otherwise, Ta=25°C, V_{IN}=V_O Typ. +1V, I_O=1mA, V_{CONT}=2V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
No-Load input current	I_{CC}	I_O=0mA		85	130	µA
Input current (OFF)	I_{CCOFF}	V_{CONT}=0V		0	0.1	µA
Output voltage	V_{OUT}		×0.98		×1.02	V
Dropout voltage *2	Vio	V_{IN}=V_O–0.2V, I_O=50mA		0.1	0.2	V
Line regulation	⊿V1	V_{IN}=V_O Typ. +1~10V		10	20	mV
Load regulation	⊿V2	I_O=1~150mA		30	90	mV
V_{OUT} temperature coefficient *1	⊿V_{OUT}/⊿T	Tj=–30~+85°C		100		ppm/°C
Ripple rejection 1 *1	RR1	f=120Hz V_{RIPPLE}=1V	50	70		dB
Ripple rejection 2 *1	RR2	f=1kHz, Cn=0.01µF V_{RIPPLE}=1V		60		dB
Output noise voltage *1	Vn	fBW=20~80kHz Cn=0.01µFC		30		µVrms
C_{ONT} pin input current	I_{CONT}	V_{CONT}=5V		5	15	µA
C_{ONT} pin high threshold level	V_{CONT}H		1.6		V_{IN}+0.3	V
C_{ONT} pin low threshold level	V_{CONT}L		–0.3		0.4	V

Note 1: *1 The parameter is guaranteed by design.
Note 2: *2 The parameter is not guaranteed in the model less than V_{OUT}=2V

Electrical Characteristics 2 Typical model: MM157□□N

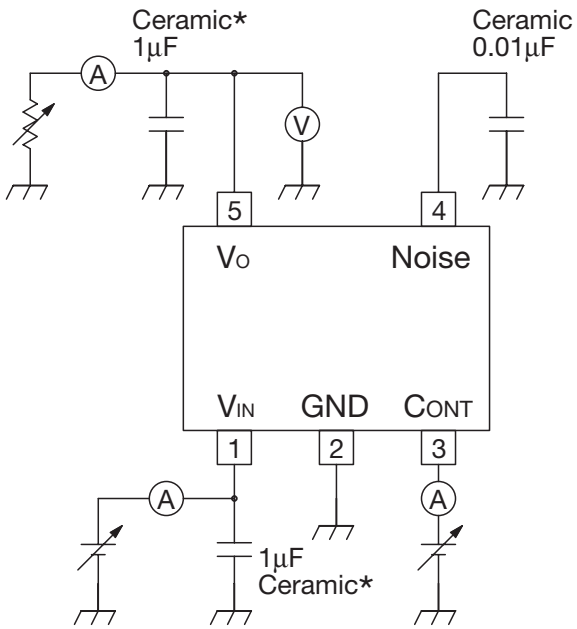
Output Voltage

Product name	Test conditions	Output voltage Min.	Typ.	Max.
MM1571F	I_O=1mA	1.470	1.5	1.530
MM1571G		1.568	1.6	1.632
MM1571H		1.666	1.7	1.734
MM1571J		1.764	1.8	1.836
MM1571K		1.862	1.9	1.938
MM1572A		1.960	2.0	2.040
MM1572B		2.058	2.1	2.142
MM1572C		2.156	2.2	2.244
MM1572D		2.254	2.3	2.346
MM1572E		2.352	2.4	2.448
MM1572F		2.450	2.5	2.550
MM1572G		2.548	2.6	2.652
MM1572H		2.646	2.7	2.754
MM1572J		2.744	2.8	2.856
MM1572K		2.842	2.9	2.958
MM1573A		2.940	3.0	3.060
MM1573B		3.038	3.1	3.162
MM1573C		3.136	3.2	3.264
MM1573D		3.234	3.3	3.366
MM1573E		3.332	3.4	3.468
MM1573F		3.430	3.5	3.570
MM1573G		3.528	3.6	3.672

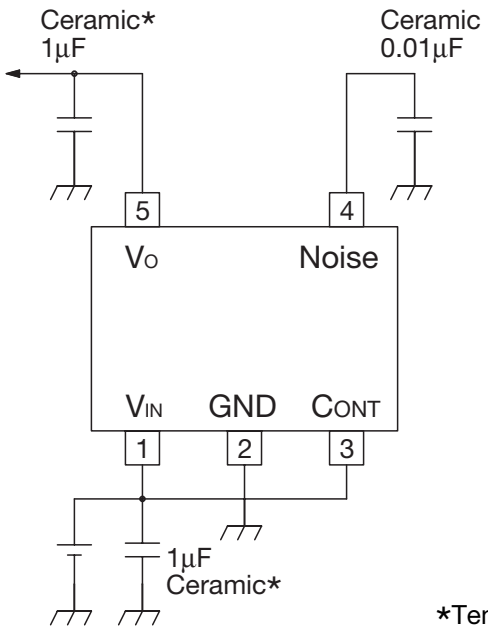
Product name	Test conditions	Output voltage Min.	Typ.	Max.
MM1573H	I_O=1mA	3.626	3.7	3.774
MM1573J		3.724	3.8	3.876
MM1573K		3.822	3.9	3.978
MM1574A		3.920	4.0	4.080
MM1574B		4.018	4.1	4.182
MM1574C		4.116	4.2	4.284
MM1574D		4.214	4.3	4.386
MM1574E		4.312	4.4	4.488
MM1574F		4.410	4.5	4.590
MM1574G		4.508	4.6	4.692
MM1574H		4.606	4.7	4.794
MM1574J		4.704	4.8	4.896
MM1574K		4.802	4.9	4.998
MM1575A		4.900	5.0	5.100

* Rank is indicated inside□□for MM161□□N.
Example: MM1613N is 3.9V typ.

Measuring Circuit Typical model: MM157□□N



Application Circuit Typical model: MM157□□N



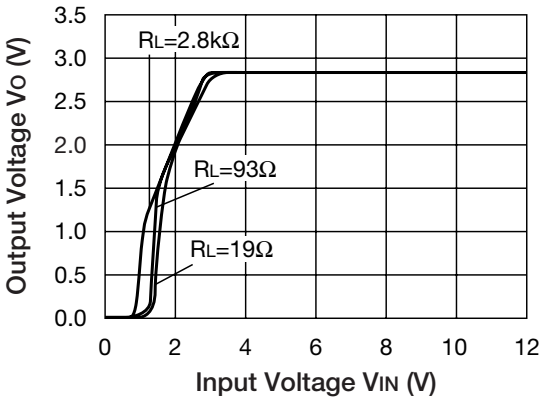
*Temperature Characteristics: B Type

Note

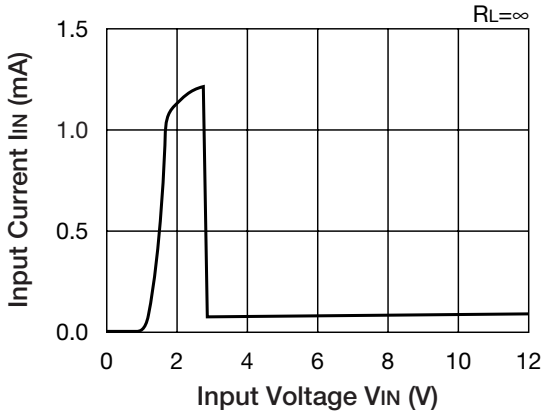
1. The output capacitor is required between output and GND to prevent oscillation.
2. Use a capacitance that is within the ESR characteristics stable range for output capacity.
   It is possible to use a ceramic capacitor without ESR resistance for output.
   The ceramic capacitor must be used more than 1µF and B type temperature characteristics.
3. The wire of Vcc 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.

Characteristics (2.8V product Except where noted otherwise, Ta=25°C, V_{IN}=V_O+1V, V_{CONT}=2V, C_{IN}=1µF, Co=1µF, Cn=0.01µF)

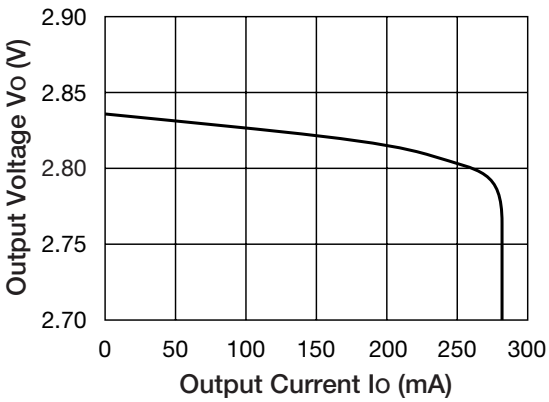
Output-Input Voltage



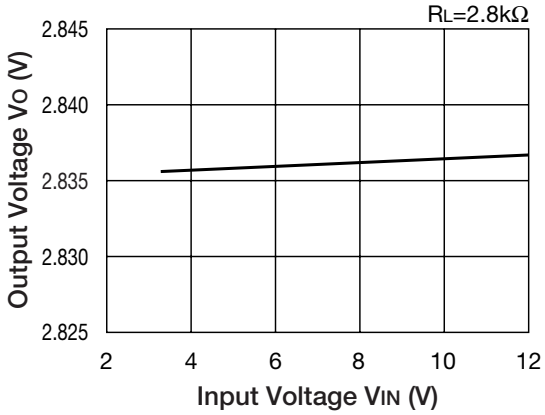
Input Current-Input Voltage



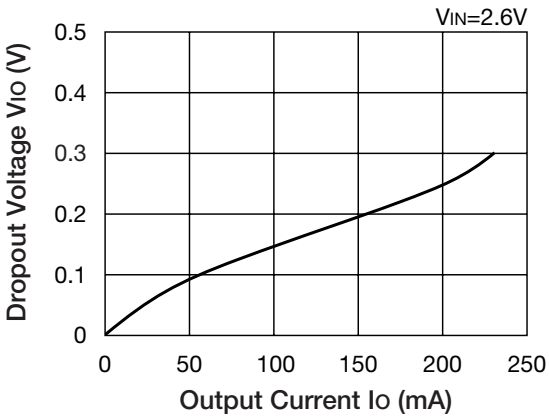
Load Regulation



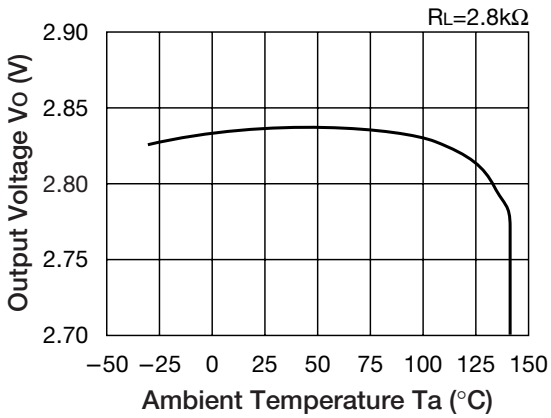
Line Regulation



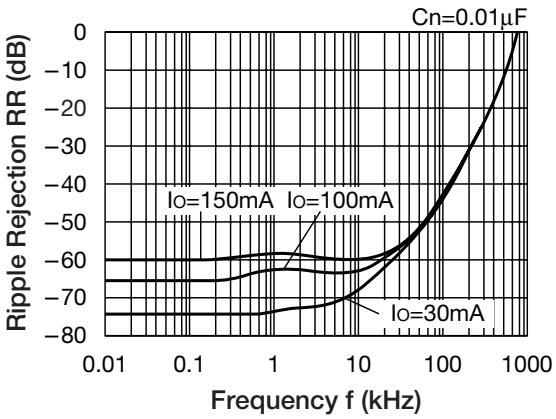
Dropout Voltage-Output Current



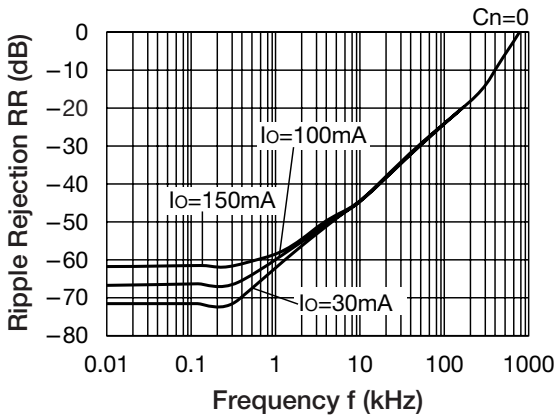
Output Voltage- Ambient Temperature



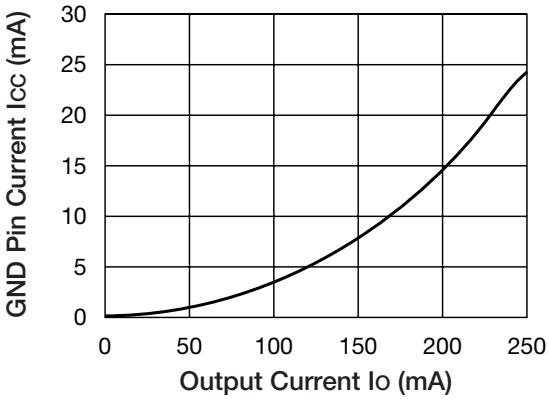
Ripple Rejection



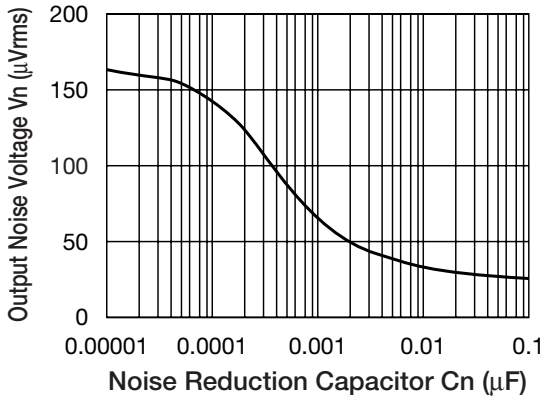
Ripple Rejection



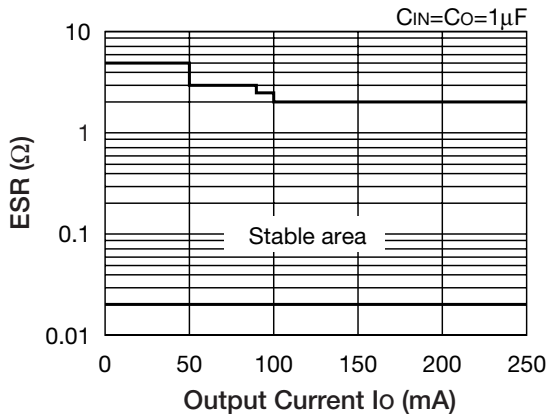
GND Pin Current



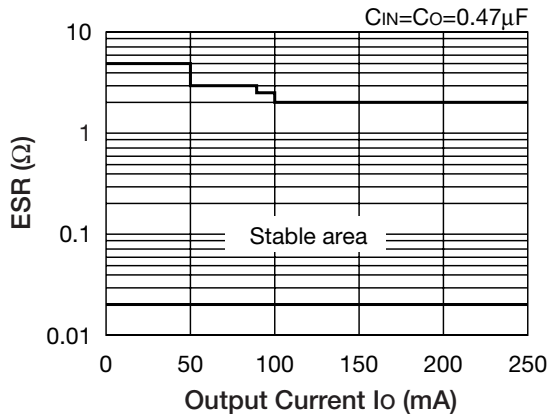
Output Noise Voltage



ESR Stability Area

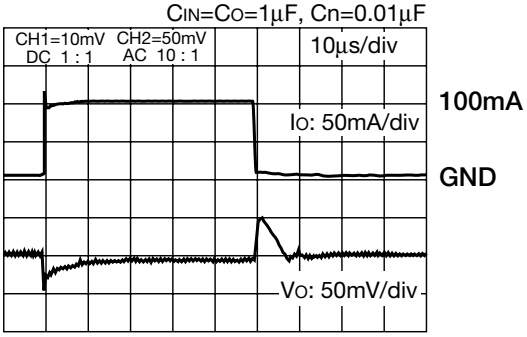


ESR Stability Area



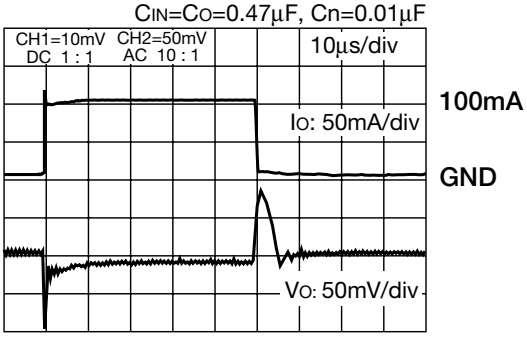
Load Transient Respones (Io=0→100mA)

CIN=CO=1μF, Cn=0.01μF



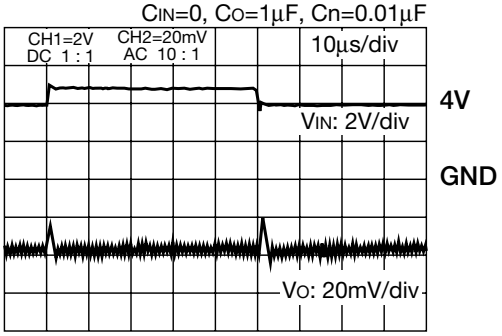
Load Transient Respones (Io=0→100mA)

CIN=CO=0.47μF, Cn=0.01μF



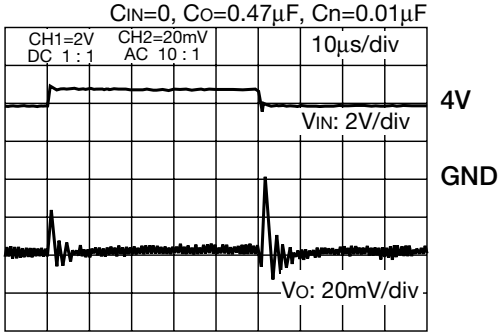
Line Transient Respones (VIN=3.8→4.8V, Io=30mA)

CIN=0, CO=1μF, Cn=0.01μF



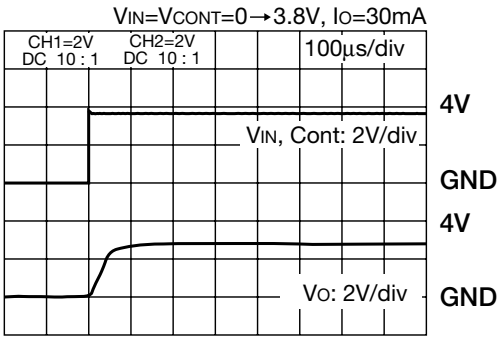
Line Transient Respones (VIN=3.8→4.8V, Io=30mA)

CIN=0, CO=0.47μF, Cn=0.01μF



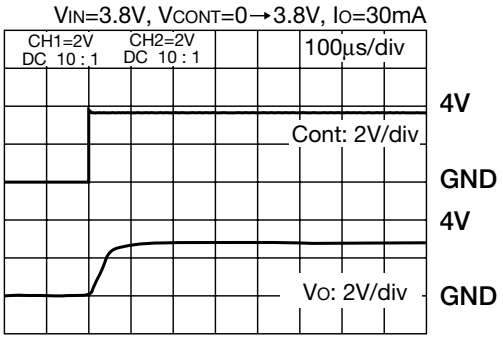
Turn-On Transient Respones

VIN=VCONT=0→3.8V, Io=30mA



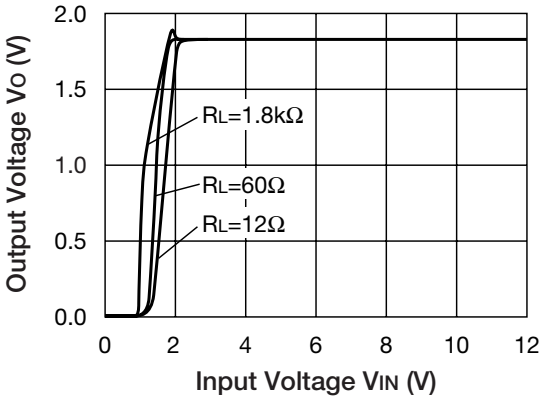
Turn-On Transient Tespones

VIN=3.8V, VCONT=0→3.8V, Io=30mA

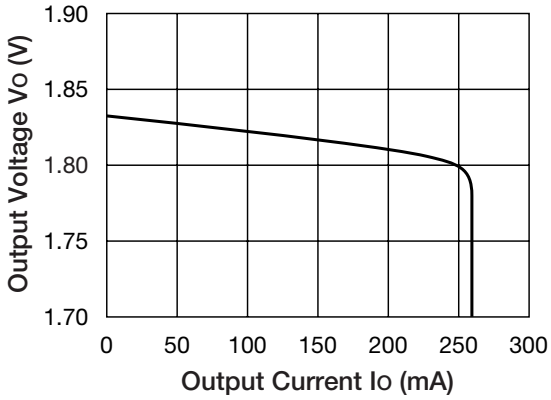


Characteristics (1.8V product Except where noted otherwise, Ta=25°C, V_{IN}=V_O+1V, V_{CONT}=2V, C_{IN}=1µF, Co=1µF, Cn=0.01µF)

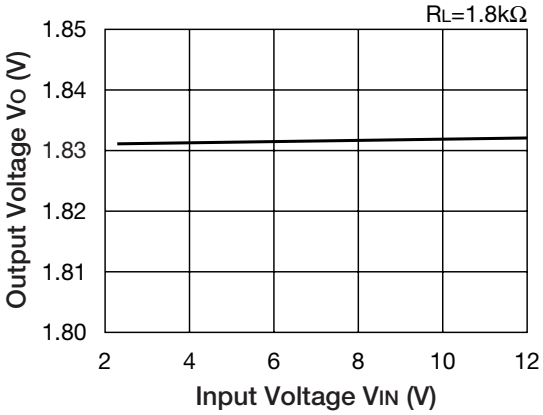
Output-Input Voltage



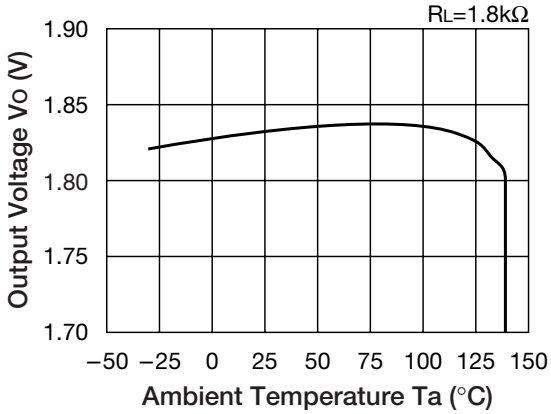
Load Regulation



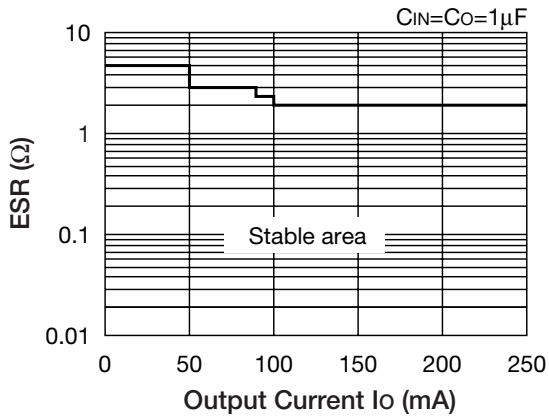
Line Regulation



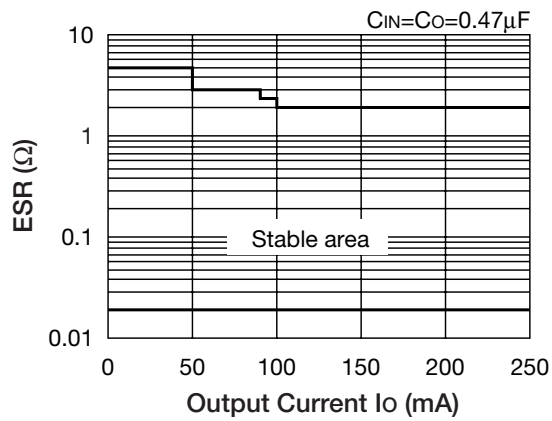
Output Voltage- Ambient Temperature



ESR Stability Area

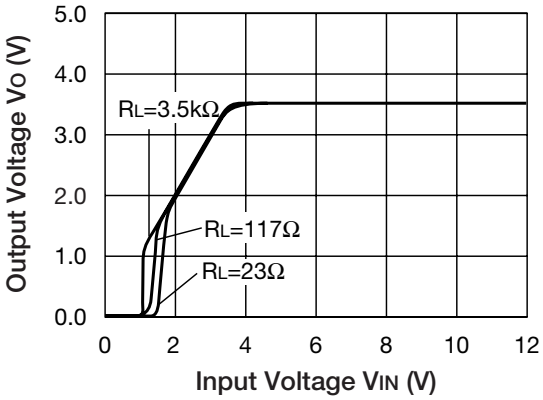


ESR Stability Area

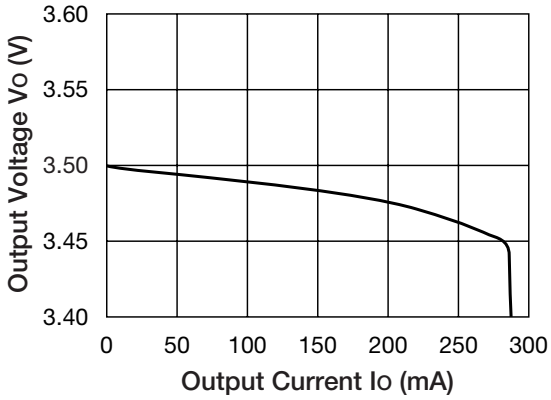


Characteristics (3.5V product Except where noted otherwise, Ta=25°C, V_{IN}=V_O+1V, V_{CONT}=2V, C_{IN}=1µF, Co=1µF, Cn=0.01µF)

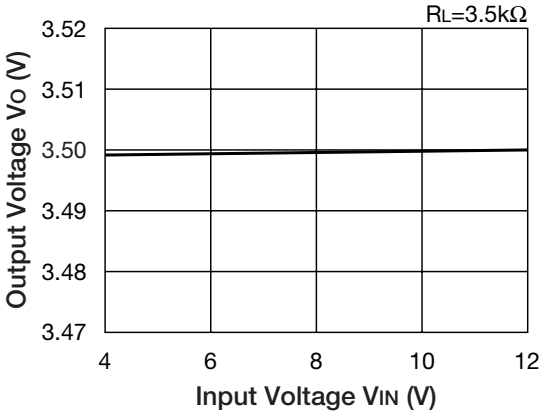
Output-Input Voltage



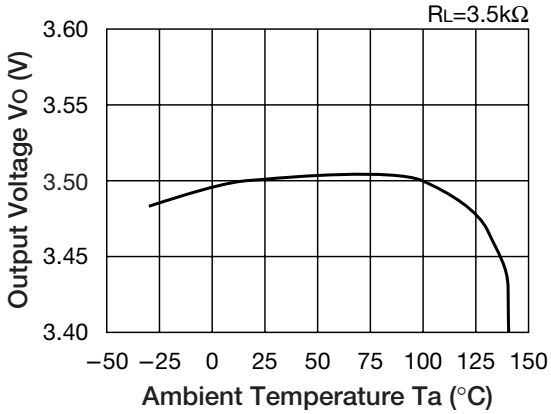
Load Regulation



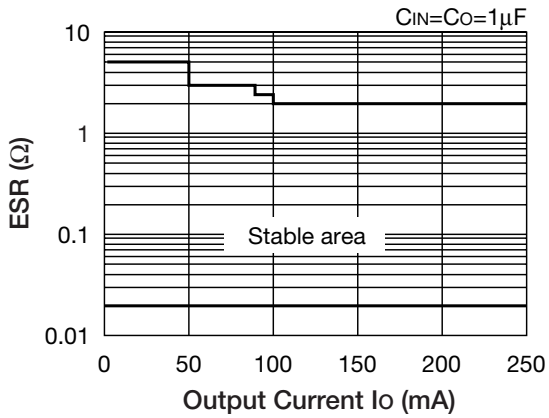
Line Regulation



Output Voltage- Ambient Temperature



ESR Stability Area



ESR Stability Area