12V Maximum ratings voltage 1000mA LDO

MM1866 Series

Overview

This IC is a small, stable power supply with output voltage precision of ±2% (when Io = 250mA), maximum output current of 1000mA, and Dropout Voltage of 0.2V typ. at 500mA.
Output noise reduction and output ON/OFF control pins are provided, making it ideal for portable equipment.

Overview

- Over current protection
- Thermal shutdown

Main specifications

- Maximum rating supply voltage : -0.3V to 12V
- Operating voltage range : Vo(Typ.)+0.7 to 10V
- Operating ambient temperature : -40℃ to 85℃
- Output current : 1000mA
- Input current (OFF) : Max. 1μA
- No-load input current : Typ. 2.5mA
- Output voltage range : 1.5V to 5.0V (0.1V step)
- Output voltage accuracy : ±2%
- Line regulation : Max. 20mV (VIN=VOUT(Typ.)+1.5Vto2.5V)
- Load regulation : Typ. 20mV (IOUT=0mAto1000mA)
- Dropout voltage : Typ. 0.2V (I_{OUT}=500mA)
- PSRR : Typ. 65dB (f=120Hz)
- Output capacitor : 1uF (Ceramic capacitor)
- Protection function : Over current protection, Thermal shutdown
- Additional function : ON/OFF control

Packages

- HSOP-8A
- TO-252C

Application

- Audio visual equipment
- Office equipment / Printer
- Home appliance equipment

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Model Name

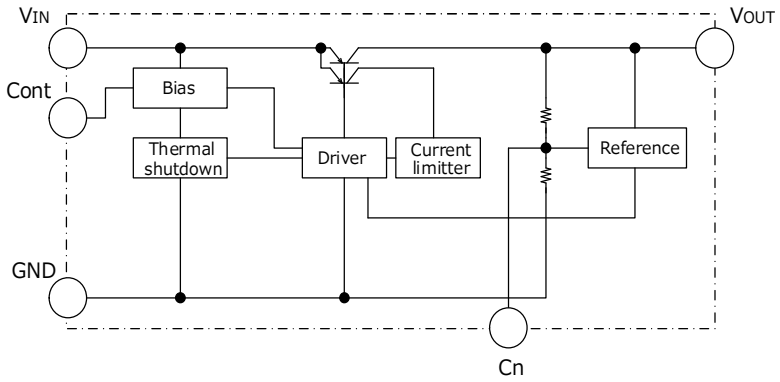
M M 1 8 6 6 X X X X X X

Series name (A) (B) (C) (D) (E)

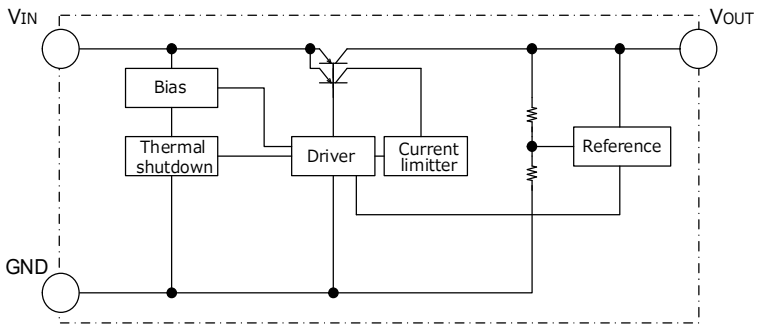
(A)	Function Type		A	Cont=H active、without discharge function
(B)	Output voltage rank		15 ~ 50	Output voltage can be designated in the range from 1.5V(15) to 5.0V(50) in 0.1V steps.
(C)	Package		H	HSOP-8A
			T	TO-252C
(D)	Packing specifications 1	HSOP-8A	B	B housing (Standard)
			F	F housing
		TO-252C	R	R housing (Standard)
			L	L housing
(E)	Packing specifications 2	HSOP-8A	E	Emboss tape / Halogen contained
		TO-252C	E	Emboss tape / Halogen free

Block Diagram

- HSOP-8A

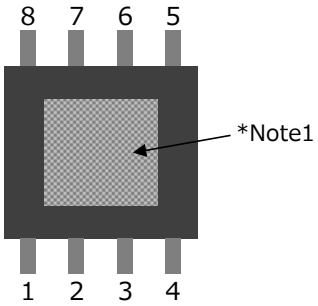


- TO-252C



Pin Configuration

- HSOP-8A

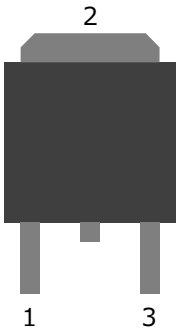


Top view

Pin No.	Pin name	Function
1	V_{OUT}	Output pin
2	NC	No connection
3	GND	GND pin
4	Cn	Noise reduction pin
5	Cont	ON/OFF-control pin Connect Cont pin with V_{IN} pin, when it is not used.
6	NC	No connection
7	NC	No connection
8	V_{IN}	Voltage supply pin

*Note1:Heat spreader bottom with GND.

- TO-252C



Top view

Pin No.	Pin name	Function
1	V_{IN}	Voltage supply pin
2	GND	GND pin
3	V_{OUT}	Output pin

Absolute Maximum Ratings

Item		Symbol	Min.	Max.	Unit
Storage temperature		Tstg	-40	150	℃
Junction temperature *Note2		Tj_{MAX}	-	150	℃
Supply voltage		V_{IN}	-0.3	12	V
Cont input voltage		V_{cont}	-0.3	12	V
Output Voltage		V_{OUT}	-0.3	V_{IN}+0.3V	V
Power Dissipation 1*Note3	HSOP-8A	Pd1	-	1800	mW
	TO-252C		-	2500	mW
Power Dissipation 2*Note4	HSOP-8A	Pd2	-	3500	mW
	TO-252C		-	4900	mW

*Note2:In consideration of product life, please examine the use in less than 80%.

*Note3:PC Board of glass epoxy 37mm×37mm t=1.6mm Copper foil area 80% / HSOP-8A

:PC Board of glass epoxy 150mm×100mm t=1.6mm Copper foil area 60% / TO-252C

*Note4:JEDEC51-7 standard 114.3mm×76.2mm t=1.6mm Copper foil area 80%

Recommended Operating Conditions

Item	Symbol	Min.	Max.	Unit
Operating Ambient temperature	Topr	-40	85	℃
Operating voltage *Note5	Vop	Vo(Typ.)+0.7	10.0	V
Output Current	Iop	0	1	A

*Note5:The minimum Input Voltage is 2.5V when Vout is less than 2V.(Io=800mA)

Electrical Characteristics HSOP-8A

(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃, unless otherwise specified)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
No-Load Input Current	I_{CC}	I_{OUT}=0mA	-	2.5	5.0	mA
Input Current(OFF)	I_{CCOFF}	V_{CONT}=0V	-	0	1	μA
Output Voltage *Note6	V_{OUT}	I_{OUT}=250mA	×0.98	-	×1.02	V
Dropout Voltage *Note7	Vio	V_{IN}=V_{OUT}-0.2V I_{OUT}=500mA	-	0.2	0.5	V
Line Regulation	V_{LINE}	VIN=VOUT+1.5V to 2.5V I_{OUT}=250mA	-	10	20	mV
Load Regulation	V_{LOAD}	IOUT=0A to 1A	-	20	100	mV

*Note6:Please refer to another page.

*Note7:The parameter is not guaranteed in the model less than Vout=2.0V.

Electrical Characteristics HSOP-8A

(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃, unless otherwise specified)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
VOUT Temperature Coefficient *Note8	ΔV_{OUT} /ΔT_{OP}	-40≦Ta≦85℃	-	±100	-	ppm/℃
Ripple Rejection *Note8	RR	f=120Hz, Vripple=1V I_{OUT}=250mA	50	65	-	dB
Output Noise Voltage *Note8	Vn	fBW=20Hz~80kHz,Cn=470pF I_{OUT}=250mA	-	45	-	μVrms
		fBW=20Hz~80kHz,Cn=OPEN I_{OUT}=250mA	-	90	-	μVrms
Cont Pin Input Current	Icont	Vcont=5.0V	10	20	30	μA
Cont Pin High Threshold Voltage	VcontH		1.6	-	10.0	V
Cont Pin Low Threshold Voltage	VcontL		-0.3	-	0.4	V

*Note8:The parameter is guaranteed by design.

Electrical Characteristics TO-252C

(V_{IN}=V_{OUT}(Typ.)+2V, Ta=25℃, unless otherwise specified)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
No-Load Input Current	I_{CC}	I_{OUT}=0mA	-	2.5	5.0	mA
Output Voltage *Note6	V_{OUT}	I_{OUT}=250mA	×0.98	-	×1.02	V
Dropout Voltage *Note7	Vio	V_{IN}=V_{OUT}-0.2V I_{OUT}=500mA	-	0.2	0.5	V
Line Regulation	V_{LINE}	VIN=VOUT+1.5V to 2.5V I_{OUT}=250mA	-	10	20	mV
Load Regulation	V_{LOAD}	IOUT=0A to 1A	-	20	100	mV
VOUT Temperature Coefficient *Note8	ΔV_{OUT} /ΔT_{OP}	-40≦ to p≦85℃	-	±100	-	ppm/℃
Ripple Rejection *Note8	RR	f=120Hz, Vripple=1V I_{OUT}=250mA	50	65	-	dB
Output Noise Voltage *Note8	Vn	fBW=20Hz to 80kHz I_{OUT}=250mA	-	90	-	μVrms

*Note6:Please refer to another page.

*Note7:The parameter is not guaranteed in the model less than Vout=2.0V.

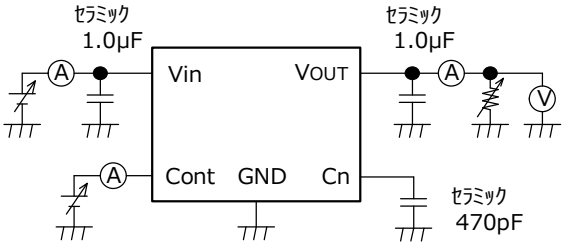
*Note8:The parameter is guaranteed by design.

Electrical Characteristics

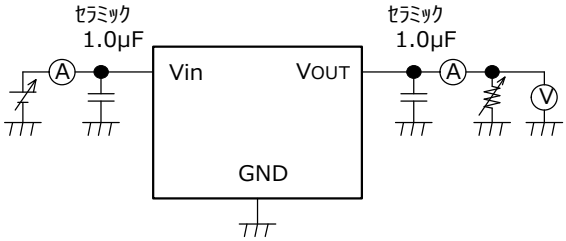
Model name	Item			
	Output voltage			
	V_{OUT} (V)			
	Conditions	Min.	Typ.	Max.
MM1866A15	I_{OUT}=250mA	1.470	1.500	1.530
MM1866A16		1.568	1.600	1.632
MM1866A17		1.666	1.700	1.734
MM1866A18		1.764	1.800	1.836
MM1866A19		1.862	1.900	1.938
MM1866A20		1.960	2.000	2.040
MM1866A21		2.058	2.100	2.142
MM1866A22		2.156	2.200	2.244
MM1866A23		2.254	2.300	2.346
MM1866A24		2.352	2.400	2.448
MM1866A25		2.450	2.500	2.550
MM1866A26		2.548	2.600	2.652
MM1866A27		2.646	2.700	2.754
MM1866A28		2.744	2.800	2.856
MM1866A29		2.842	2.900	2.958
MM1866A30		2.940	3.000	3.060
MM1866A31		3.038	3.100	3.162
MM1866A32		3.136	3.200	3.264
MM1866A33		3.234	3.300	3.366
MM1866A34		3.332	3.400	3.468
MM1866A35		3.430	3.500	3.570
MM1866A36		3.528	3.600	3.672
MM1866A37		3.626	3.700	3.774
MM1866A38		3.724	3.800	3.876
MM1866A39		3.822	3.900	3.978
MM1866A40		3.920	4.000	4.080
MM1866A41		4.018	4.100	4.182
MM1866A42		4.116	4.200	4.284
MM1866A43		4.214	4.300	4.386
MM1866A44		4.312	4.400	4.488
MM1866A45		4.410	4.500	4.590
MM1866A46		4.508	4.600	4.692
MM1866A47		4.606	4.700	4.794
MM1866A48		4.704	4.800	4.896
MM1866A49		4.802	4.900	4.998
MM1866A50		4.900	5.000	5.100

Test Circuit

- HSOP-8A

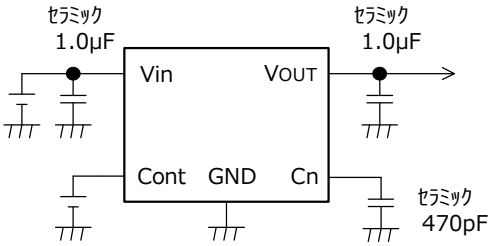


- TO-252C

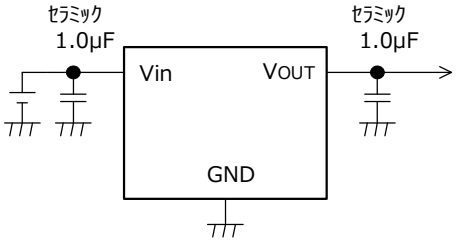


Application Circuit

- HSOP-8A



- TO-252C



(Example of external parts)

- Output capacitor Ceramic capacitor 1.0μF
- Input Capacitor Ceramic capacitor 1.0μF
- Cn Capacitor Ceramic capacitor 470pF

- In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, we shall not be liable for any such problem, nor grant a license therefore.

Note

1. Please use this IC within the stated absolute maximum ratings.
   The IC is liable to malfunction should the ratings be exceeded.

2. There is a possibility that it becomes impossible to maintain this performance and reliability IC original when using exceeding recommended operation voltage.
   Please use it in recommended operation voltage.

3. Due to restrictions on the package power dissipation, the output current value may not be satisfied.
   Attention should be paid to the power dissipation of the package when the output current is large or the voltage between Input and Output is high.

4. The output capacitor is required between output and GND to prevent oscillation.

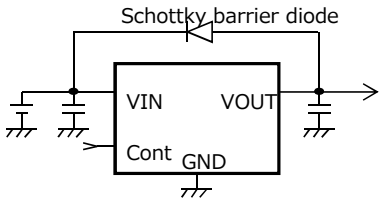
5. The ESR of capacitor must be defined in ESR stability area.
   It is possible to use a ceramic capacitor without ESR resistance for output.
   The ceramic capacitor must be used more than 1.0μF and B temperature characteristics.

6. The wire of Vin and GND is required to print full ground plane for noise and stability.

7. The input capacitor must be connected a distance of less than 1cm from input pin.

8. It is able to an unstable operation when you use the capacitor with intense capacitance change .
   The capacitor has the dependency at the power-supply voltage and the temperature.
   The capacity value changes by the environment used. Please evaluate IC in the set.

9. 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.



10. The overcurrent protection circuit of the fold back type is built into this IC.

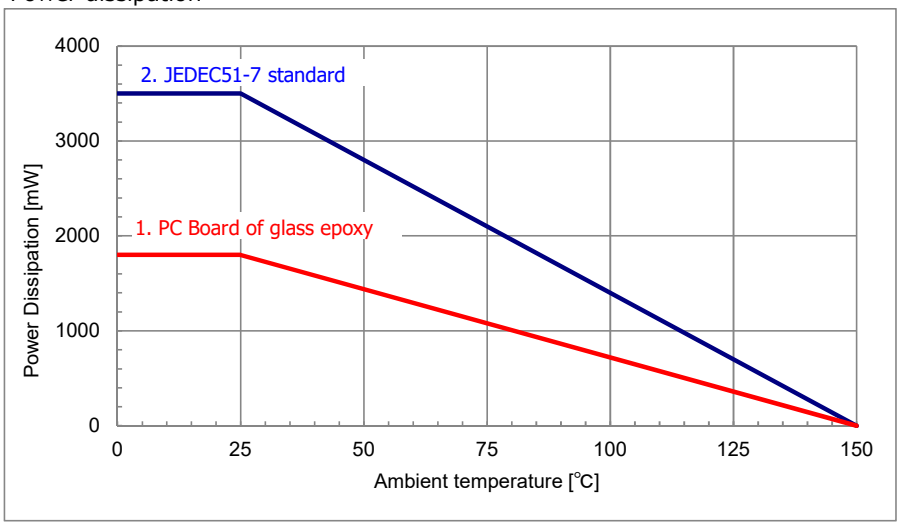
11. There is a possibility that IC generates heat when the output terminal is short-circuited.
    However, the thermal shutdown circuit operates, and it will do operation that protects IC.
    The thermal shutdown circuit is designed only to shut the IC off to prevent thermal runaway.
    Do not continue to use the IC in an environment where the operation of this circuit is assumed.
    The characteristic changes depending on the substrate condition.
    Please evaluate IC in the set.

12. It returns automatically in temperature returned after it shuts down by self-generation of heat.
    After it returns, it shuts down again by self-generation of heat.
    It is necessary to change the environment used (IC consumption, temperature) if it operates in upper cycle.

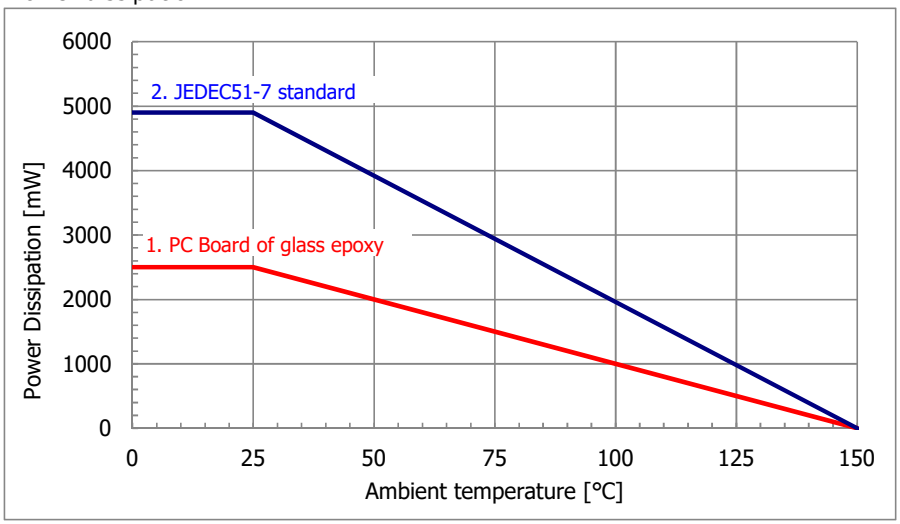
About Power Dissiopation

The Power dissipation change if board to mount IC change because radiative heat fix at board.
It is reference data below, Evaluate IC in the set.

- HSOP-8A
  1. PC Board of glass epoxy
     Board size 37mm×37mm t=1.6mm Copper foil area 80%
     Power dissipation 1800mW Ta=25℃
  2. JEDEC51-7 standard (4 layer FR-4 board)
     Board size 114.3mm×76.2mm t=1.6mm Copper foil area 80%
     Power dissipation 3500mW Ta=25℃



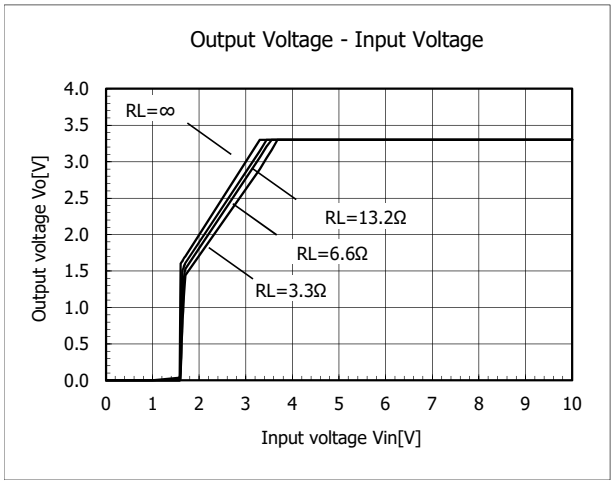
- TO-252C
  1. PC Board of glass epoxy
     Board size 150mm×100mm t=1.0mm Copper foil area 80%
     Power dissipation 2500mW Ta=25℃
  2. JEDEC51-7 standard (4 layer FR-4 board)
     Board size 114.3mm×76.2mm t=1.6mm Copper foil area 80%
     Power dissipation 4900mW Ta=25℃

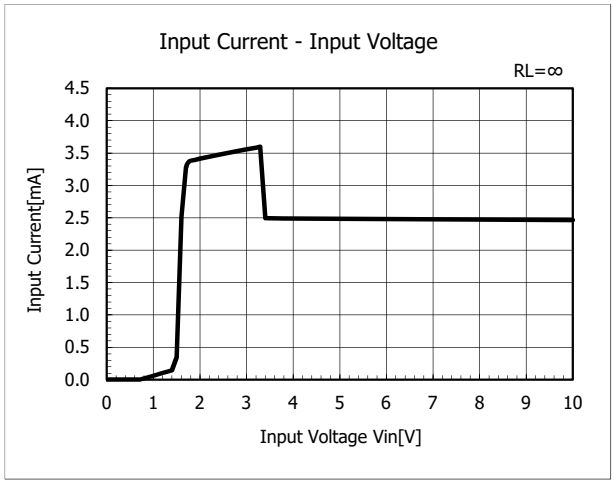


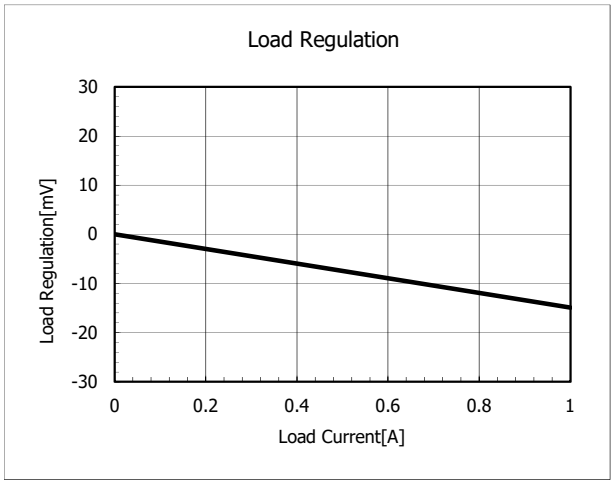
It is recommended to layout the VIA for heat radiation in the GND pattern of reverse (of IC) when there is the GND pattern in the inner layer (in using multiplayer substrate).
By increasing these copper foil pattern area of PCB, Power dissipation improves.

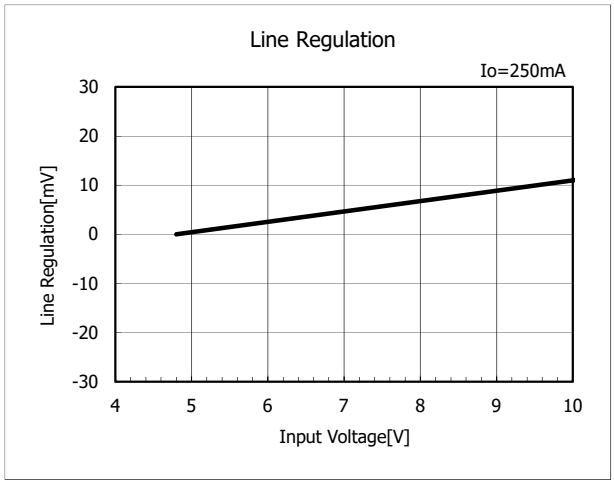
Typical Performance Characteristics (VOUT=3.3V)

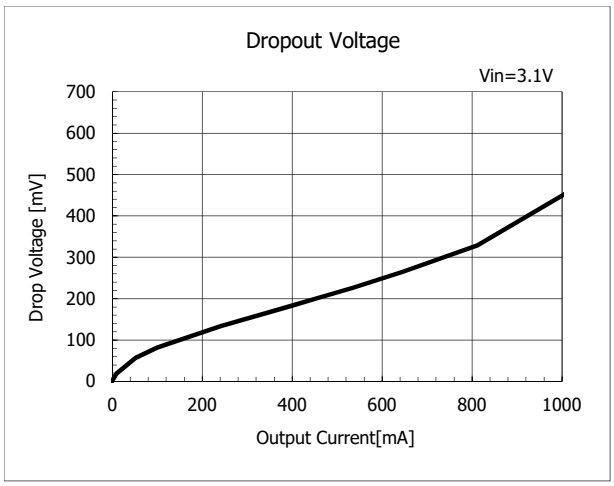
(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃ unless otherwise specified)

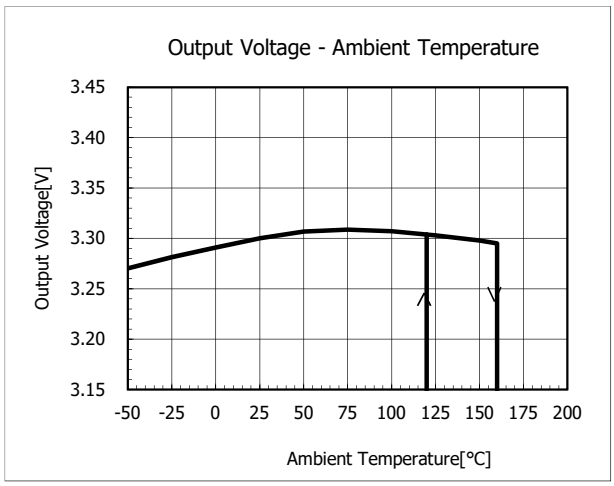






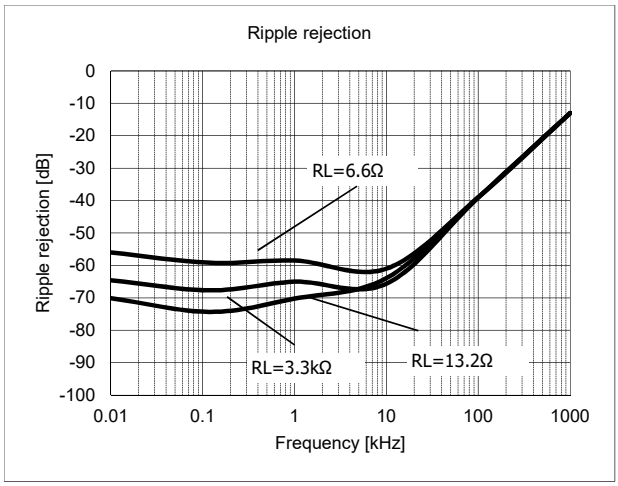


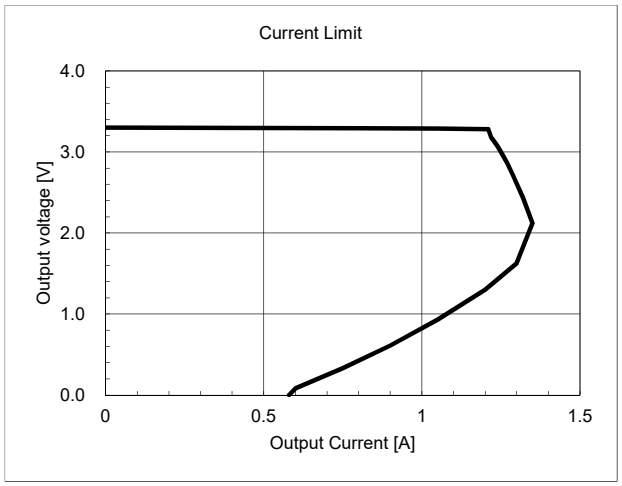


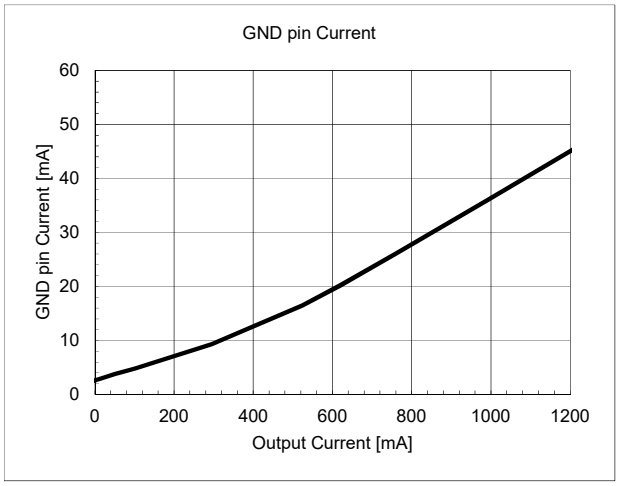


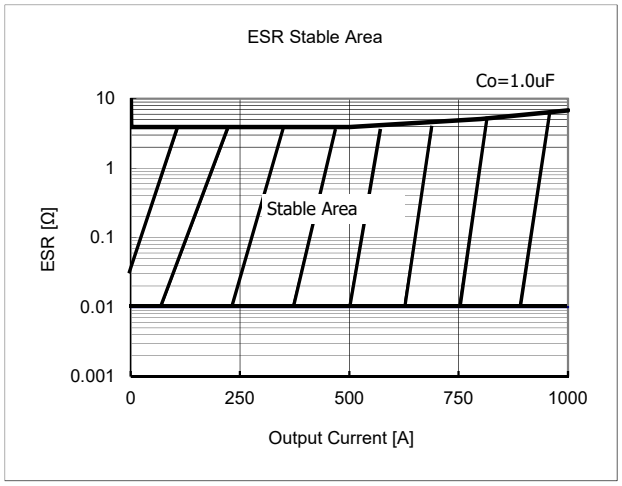
Typical Performance Characteristics (VOUT=3.3V)

(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃ unless otherwise specified)



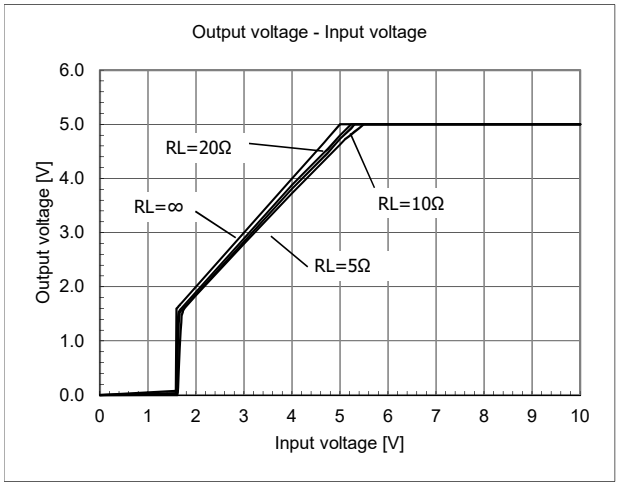


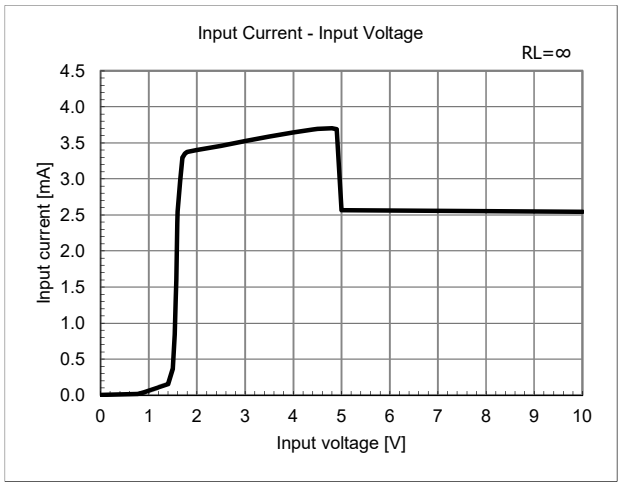


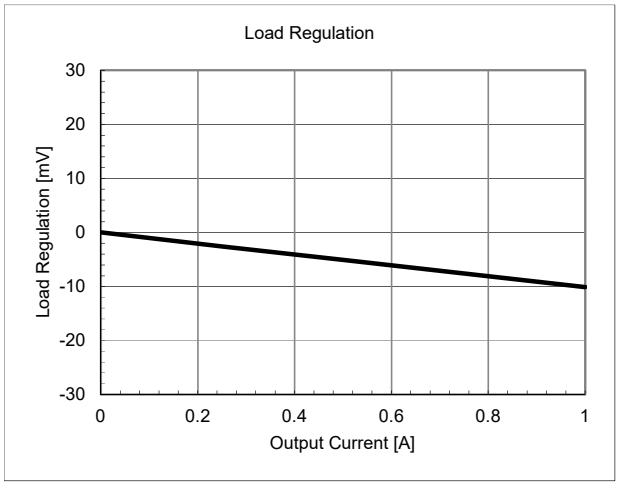


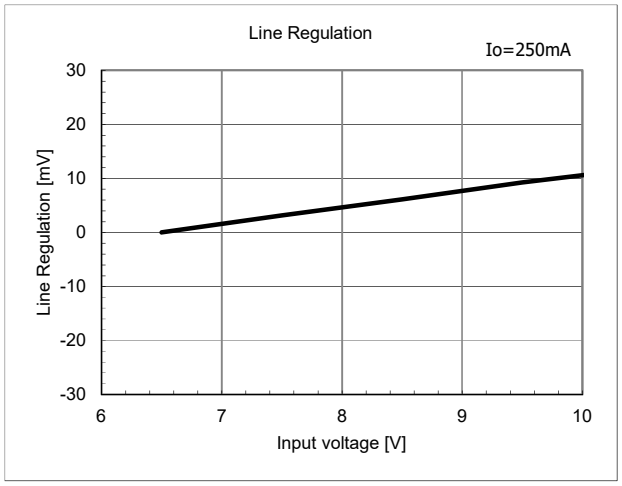
Typical Performance Characteristics (VOUT=5.0V)

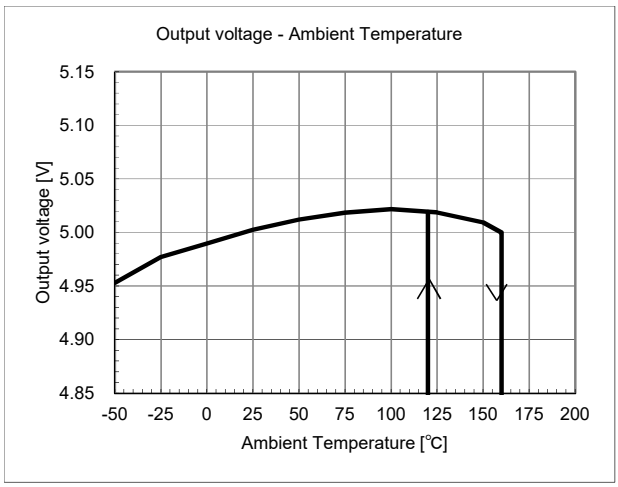
(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃ unless otherwise specified)

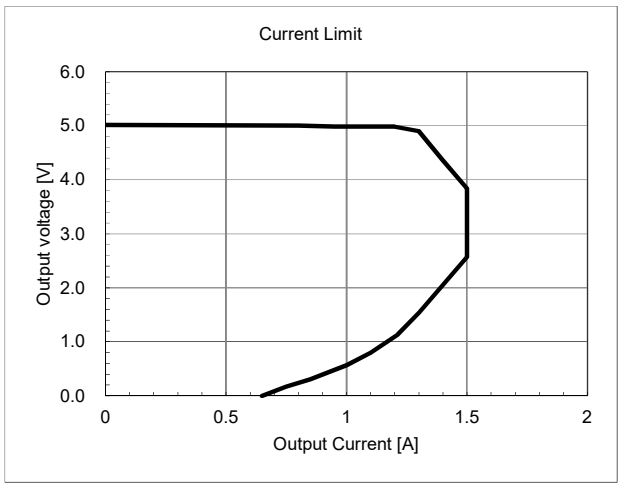












Typical Performance Characteristics (VOUT=1.8V)

(V_{IN}=V_{OUT}(Typ.)+2V, V_{Cont}=1.6V, Ta=25℃ unless otherwise specified)