



16V Maximum ratings voltage, High voltage output 300mA LDO

MM1890 Series



Overview

This IC is a 300mA Low dropout regulator IC for 8-10V output voltage. The IC can use a power supply of blue laser is required for high output voltage.

Features

- Over current protection
- Thermal shutdown
- 8V to 10V output

Main specifications

- Maximum rating supply voltage : -0.3V to 16V
- Operating voltage range : $V_{OUT}(Typ.) + V_{io\ max}$ to 14V
- Operating ambient temperature : -40°C to 85°C
- Output current : 300mA
- Input current (OFF) : Max. 1 μ A
- No-load input current : Typ. 75 μ A
- Output voltage range : 8.0V to 10.0V (0.1V step)
- Output voltage accuracy : $\pm 2\%$
- Line regulation : Max. 0.1%/V ($V_{IN} = V_{OUT}(Typ.) + 1V$ to 14V)
- Load regulation : Typ. 20mV ($I_{OUT} = 1mA$ to 300mA)
- Dropout voltage : Typ. 0.45V ($I_{OUT} = 300mA$)
- PSRR : Typ. 60dB ($f = 1kHz$)
- Output capacitor : 1 μ F (Ceramic capacitor)
- Protection function : Over current protection, Thermal shutdown
- Additional function : ON/OFF control

Packages

- SOT-25A

Application

- Audio visual equipment
- Office equipment / Printer
- Home appliance equipment
- Power supply for blue laser diode



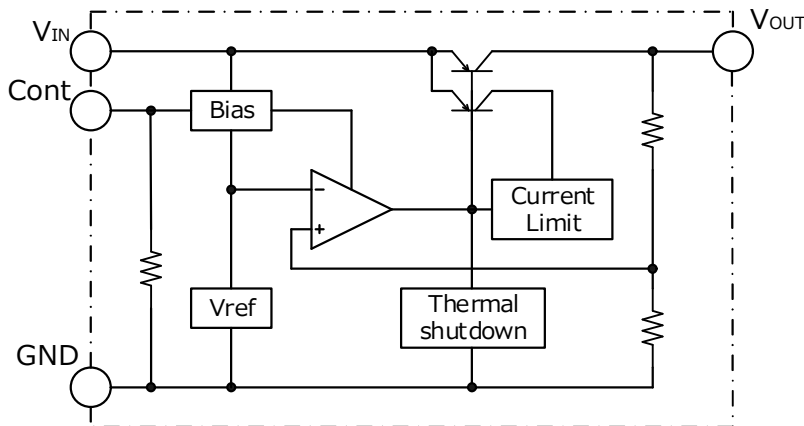


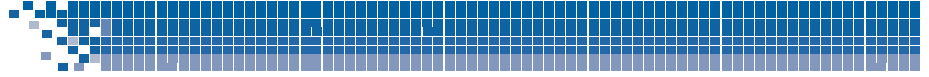
Model Name

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

(A)	Function Type	A	Cont=H active, without discharge function
(B)	Output voltage rank	80	Output voltage can be designated in the range from 8.0V(80) to 10.0V(B0) in 0.1V steps.
		?	
		B0	
(C)	Package	N	SOT-25A
(D)	Packing specifications 1	R	R housing (Standard)
		L	L housing
(E)	Packing specifications 2	E	Emboss tape / Halogen contained

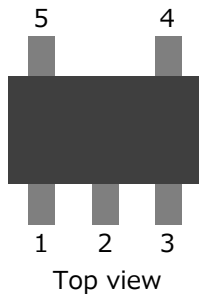
Block Diagram





Pin Configuration

- SOT-25A



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



Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Storage temperature	T _{stg}	-55	150	°C
Junction temperature *Note1	T _{jMAX}	-	150	°C
Supply voltage	V _{IN}	-0.3	16	V
Cont input voltage	V _{cont}	-0.3	16	V
Output Voltage	V _{OUT}	-0.3	V _{IN} +0.3V	V
Output current	I _{omax}	0	350	mA
Power Dissipation 1 *Note2	Pd1	-	350	mW
Power Dissipation 2 *Note3	Pd2	-	700	mW

*Note1: In consideration of product life, please examine the use in less than 80%.

*Note2: PC Board of glass epoxy 60mm×40mm t=1.6mm Copper foil area 80%

*Note3: 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	T _{opr}	-40	85	°C
Operating voltage	V _{op}	V _{out(Typ.)} +V _{io max}	14.0	V
Output Current	I _{op}	0	300	mA

Electrical Characteristics

(V_{IN}=V_{OUT}(Typ.)+1V, I_{out}=1mA, V_{Cont}=1.6V, T_a=25°C, unless otherwise specified)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
No-Load Input Current	I _{CC}	I _{OUT} =0mA V _{CONT} =V _{IN}	-	75	120	μA
Input Current(OFF)	I _{CCOFF}	V _{CONT} =0V	-	0	1	μA
Output Voltage *Note4	V _{OUT}	I _{OUT} =1mA	×0.98	-	×1.02	V
Dropout Voltage	V _{io}	V _{IN} =V _{OUT} -0.2V I _{OUT} =300mA	-	0.45	0.75	V
Line Regulation	V _{LINE}	V _{IN} =V _{OUT} +1V~14V	-	-	0.10	%/V
Load Regulation	V _{LOAD}	I _{OUT} =1mA~300mA	-	20	90	mV
V _{OUT} Temperature Coefficient *Note5	ΔV _{OUT} /ΔT _{OP}	-40≤T _{op} ≤85°C	-	±100	-	ppm/°C
Ripple Rejection *Note5	RR	f=1kHz, V _{ripple} =1V I _{OUT} =10mA	-	60	-	dB
Cont PIN Input Current	I _{cont}		-	3	12	μA
Cont Pin High Threshold Voltage	V _{contH}		1.6	-	-	V
Cont Pin Low Threshold Voltage	V _{contL}		-	-	0.3	V

*Note4: Please refer to another page.

*Note5: The parameter is guaranteed by design.



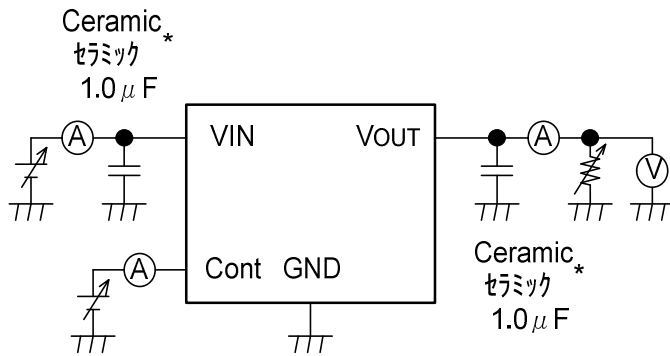
Electrical Characteristics

Model name	Item			
	Output voltage			
	V _{OUT} (V)			
	Conditions	Min.	Typ.	Max.
MM1890A80	I _{OUT} =1mA	7.840	8.000	8.160
MM1890A81		7.938	8.100	8.262
MM1890A82		8.036	8.200	8.364
MM1890A83		8.134	8.300	8.466
MM1890A84		8.232	8.400	8.568
MM1890A85		8.330	8.500	8.670
MM1890A86		8.428	8.600	8.772
MM1890A87		8.526	8.700	8.874
MM1890A88		8.624	8.800	8.976
MM1890A89		8.722	8.900	9.078
MM1890A90		8.820	9.000	9.180
MM1890A91		8.918	9.100	9.282
MM1890A92		9.016	9.200	9.384
MM1890A93		9.114	9.300	9.486
MM1890A94		9.212	9.400	9.588
MM1890A95		9.310	9.500	9.690
MM1890A96		9.408	9.600	9.792
MM1890A97		9.506	9.700	9.894
MM1890A98		9.604	9.800	9.996
MM1890A99		9.702	9.900	10.098
MM1890AB0	9.800	10.000	10.200	

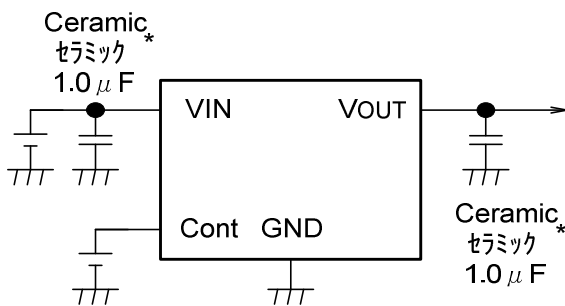




Test Circuit



Application Circuit



(Example of external parts)

- Output capacitor Ceramic capacitor 1.0μF
- Input Capacitor Ceramic capacitor 1.0μF

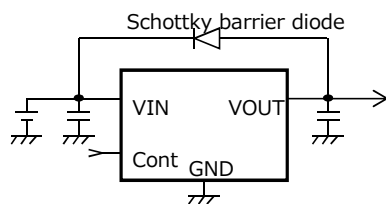
*Temperature characteristics : B

- 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 1.0 μ F 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. There is a possibility of becoming an unstable operation. when using it with Dropout voltage no margin.
Please evaluate it enough when there is no margin in Dropout voltage.
11. The overcurrent protection circuit of the vertical type is built into this IC.
12. 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.
13. The hysteresis circuit is not built into the thermal shutdown circuit.
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 Dissipation

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.

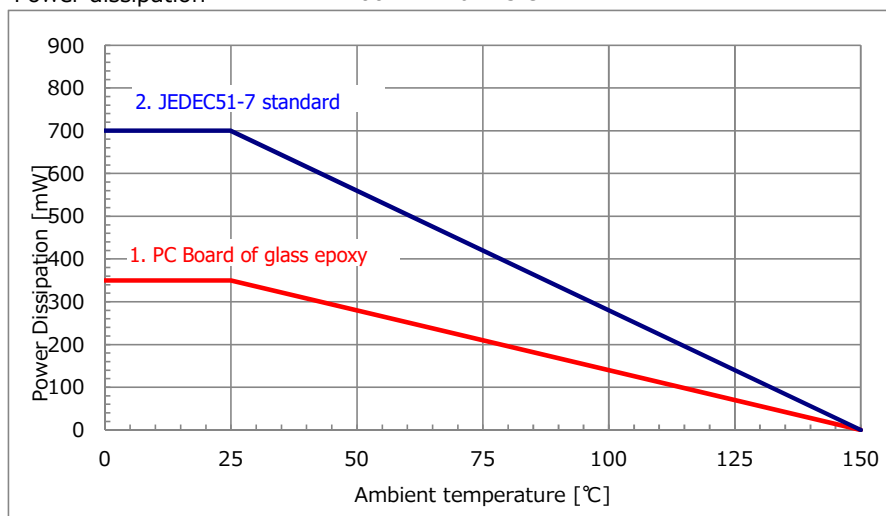
- SOT-25A

1. PC Board of glass epoxy

Board size 60mm×400mm t=1.6mm Copper foil area 60%
 Power dissipation 350mW Ta=25°C

2. JEDEC51-7 standard (4 layer FR-4 board)

Board size 114.3mm×76.2mm t=1.6mm Copper foil area 80%
 Power dissipation 700mW Ta=25°C



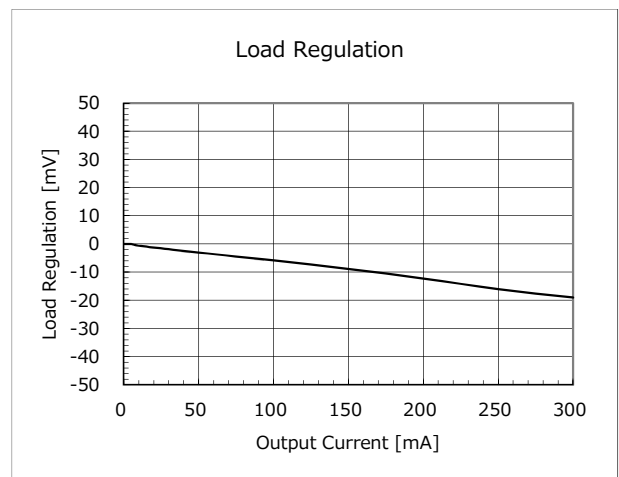
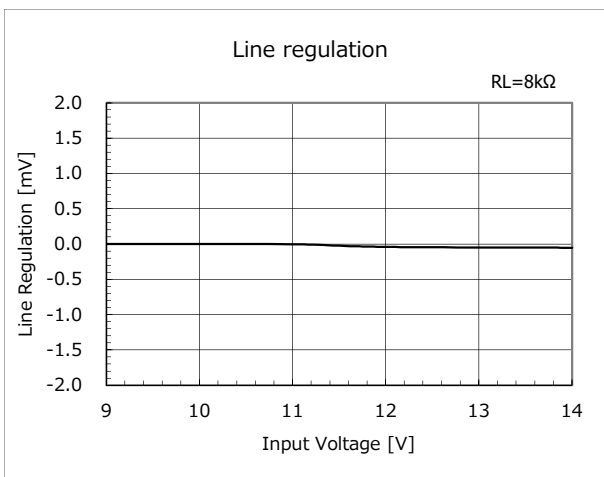
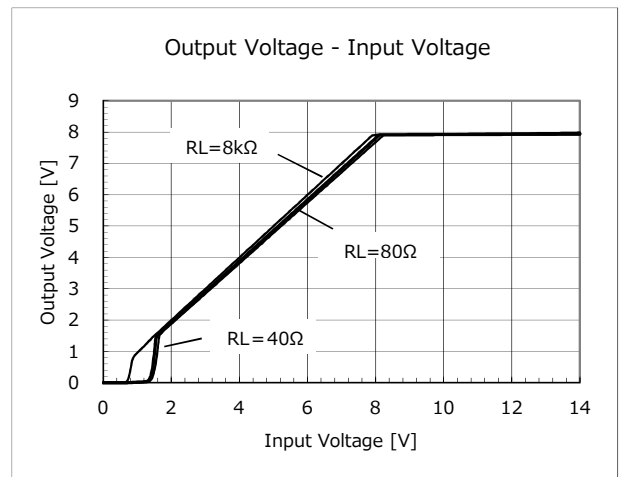
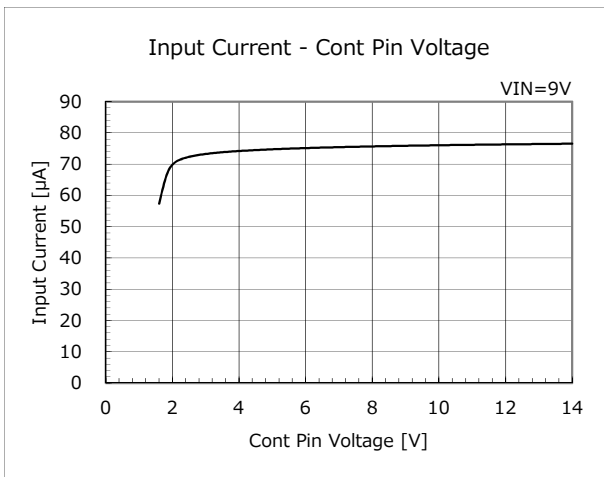
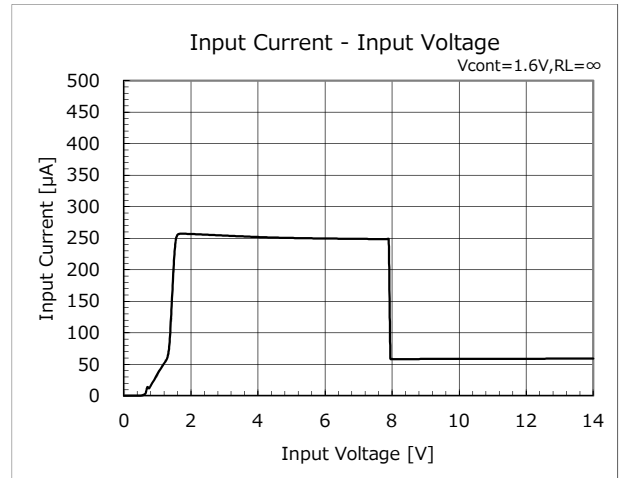
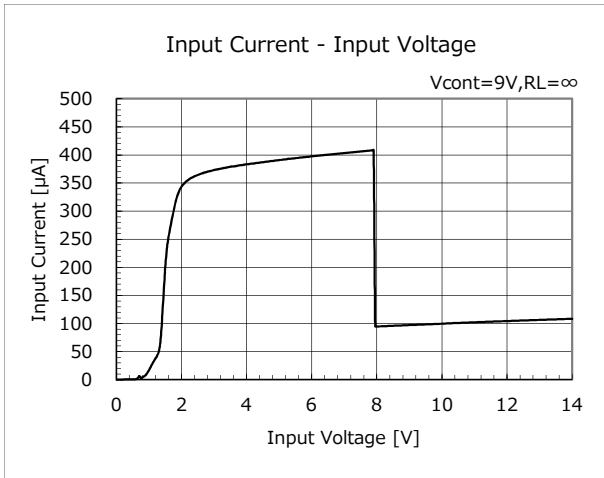
It is recommended to layout the VIA for heat radiation in the GND pattern of reverse (of IC) when there is the GND pattern in the inner layer (in using multiplayer substrate). By increasing these copper foil pattern area of PCB, Power dissipation improves.

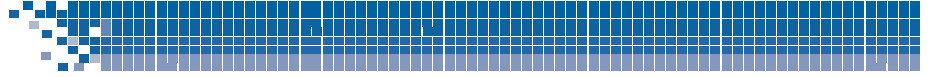




Typical Performance Characteristics (VOUT=8.0V)

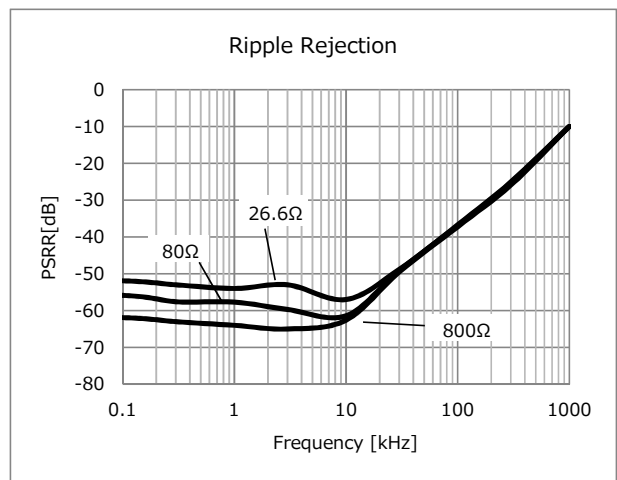
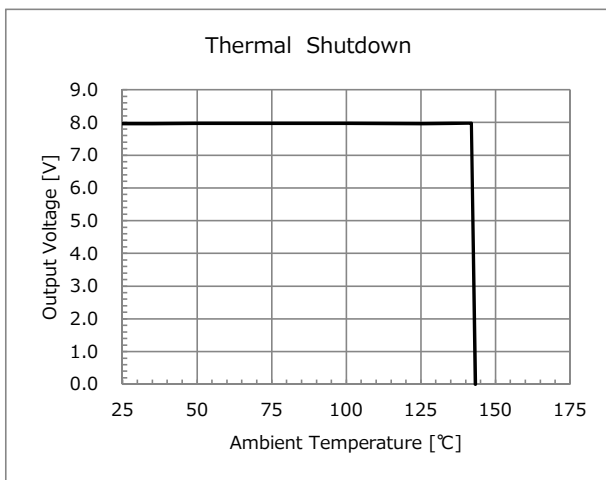
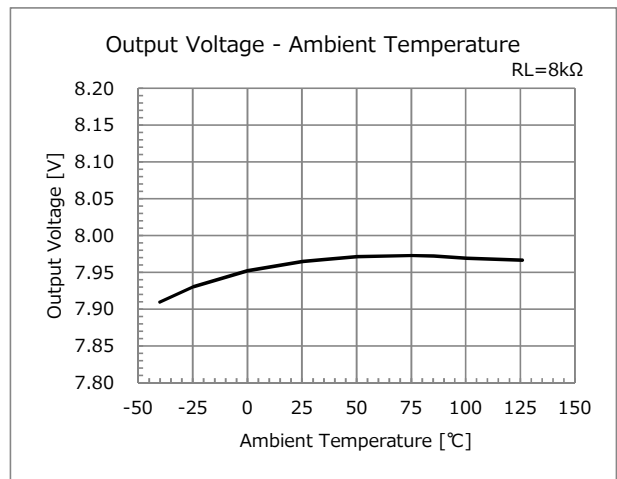
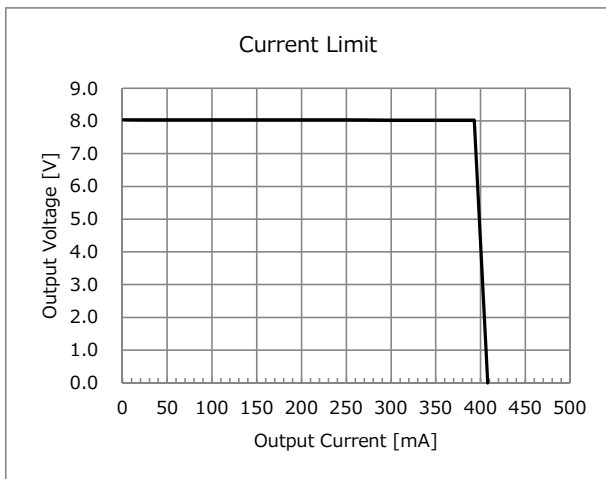
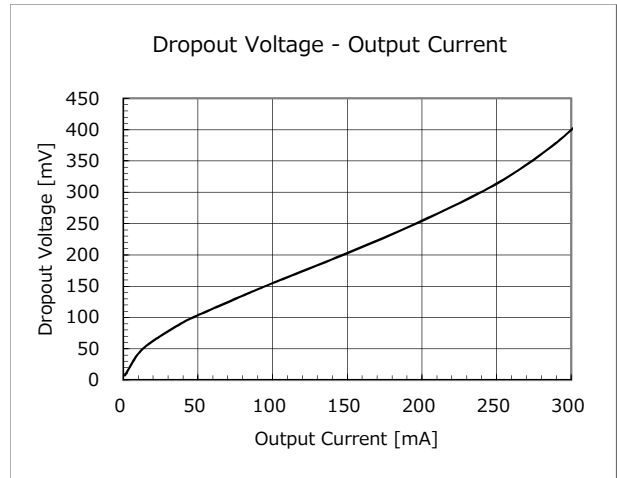
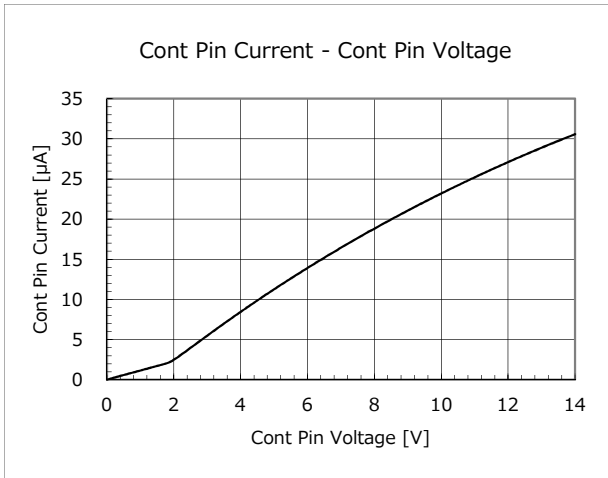
(VIN=VOUT(Typ.)+1V, Iout=1mA, VCont=1.6V, Ta=25°C unless otherwise specified)





Typical Performance Characteristics (V_{OUT}=8.0V)

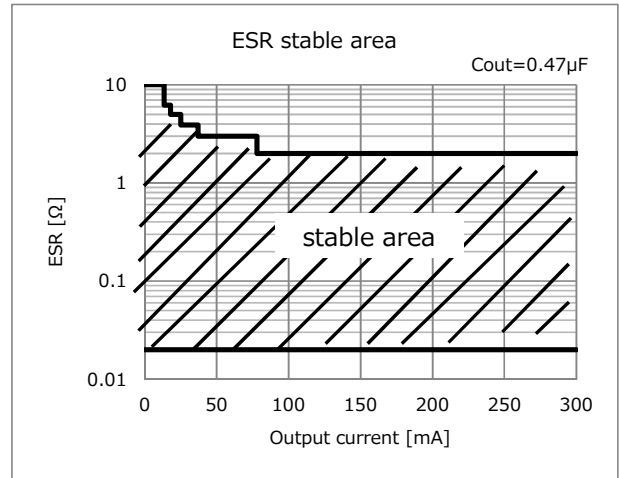
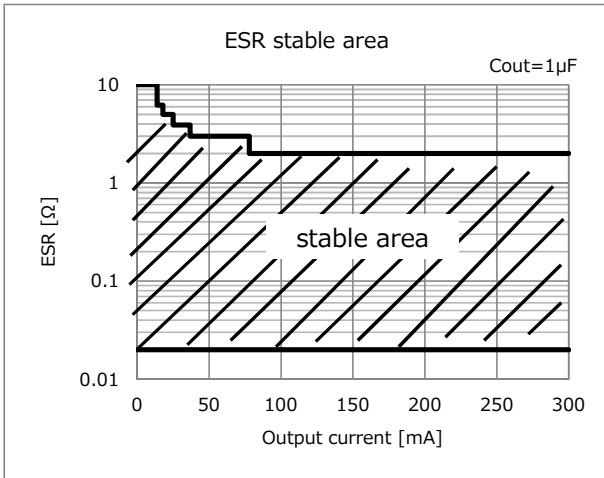
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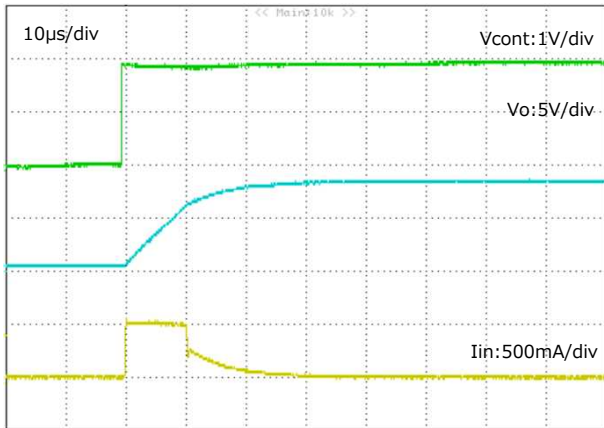


Typical Performance Characteristics (V_{OUT}=8.0V)

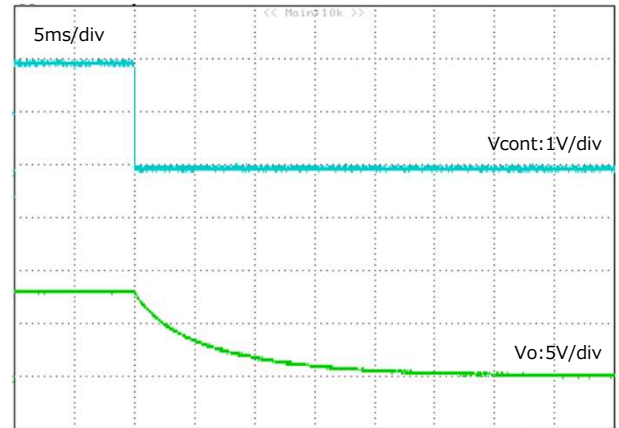
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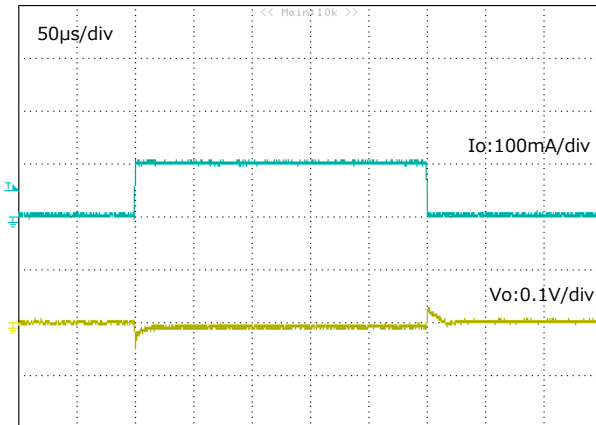
- Turn - On Transient response
V_{IN}=9V, V_{cont}=0V→2V, R_L=8kΩ



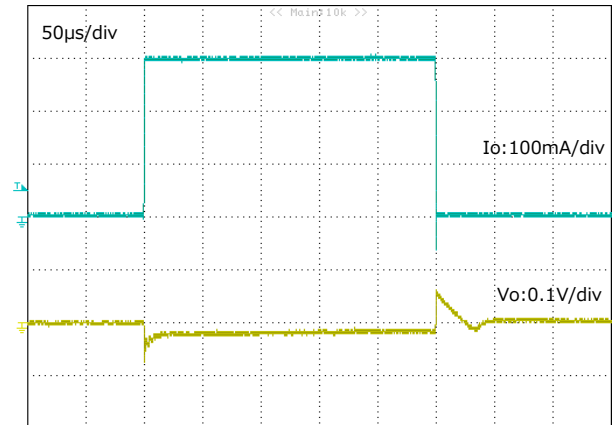
- Turn - Off Transient response
V_{IN}=9V, V_{cont}=2V→0V, R_L=8kΩ



- Load transient response
I_{out}=1mA↔100mA



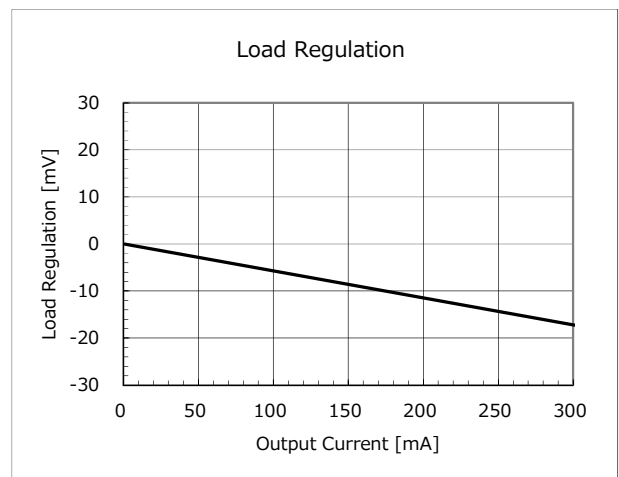
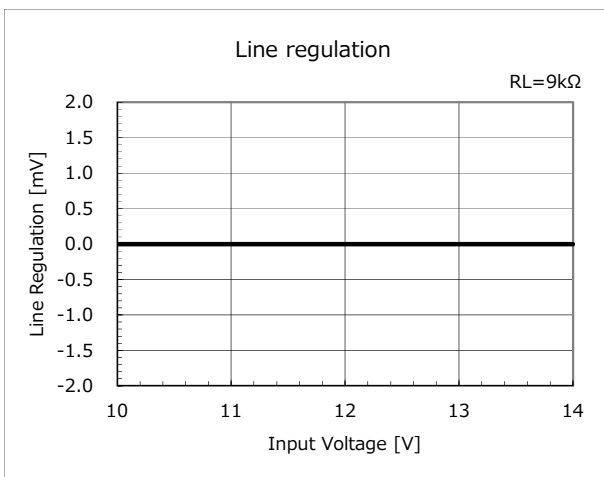
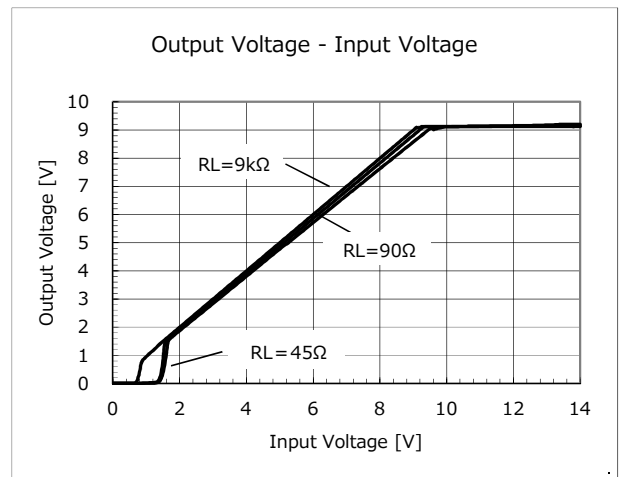
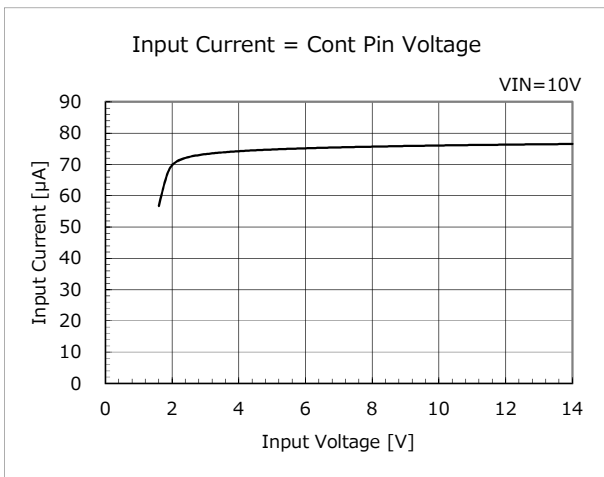
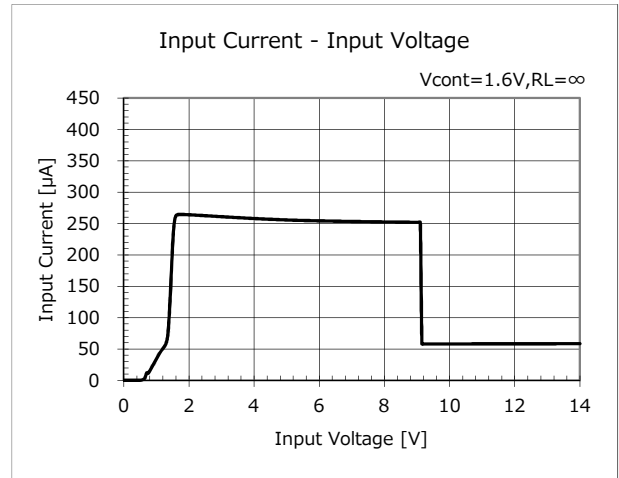
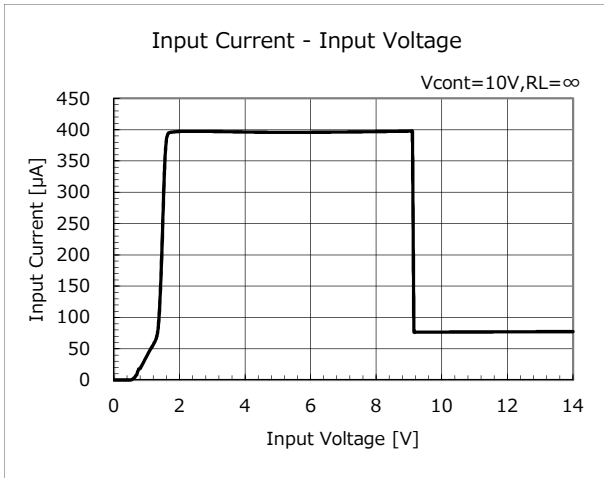
- I_{out}=1mA↔300mA





Typical Performance Characteristics (V_{OUT}=9.0V)

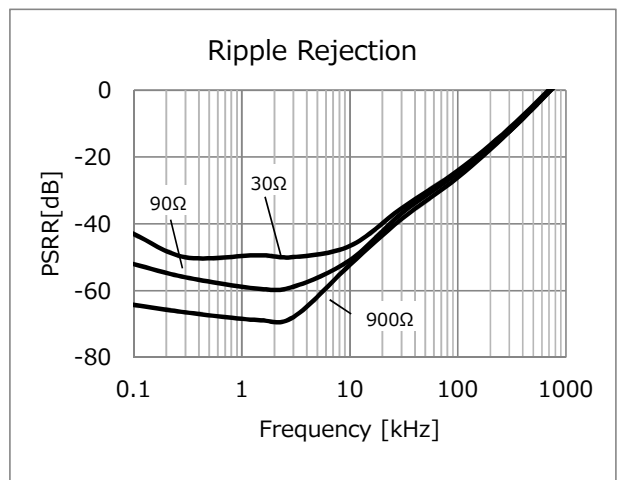
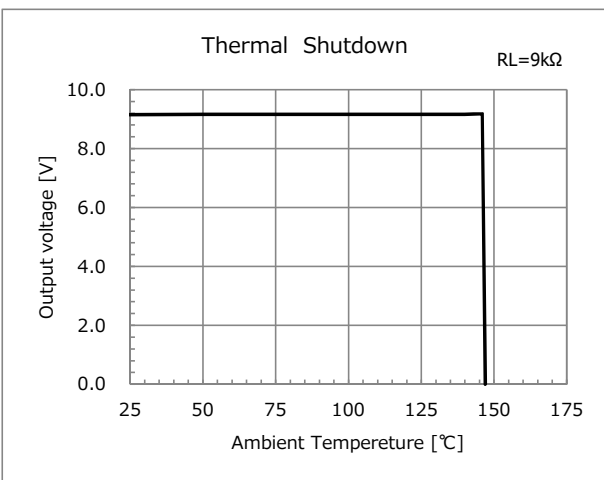
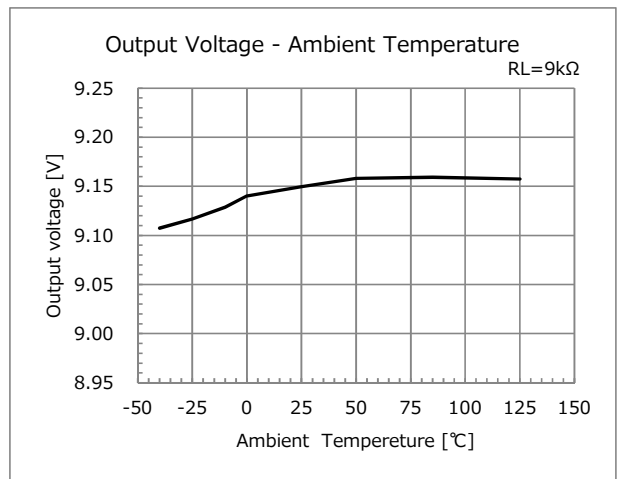
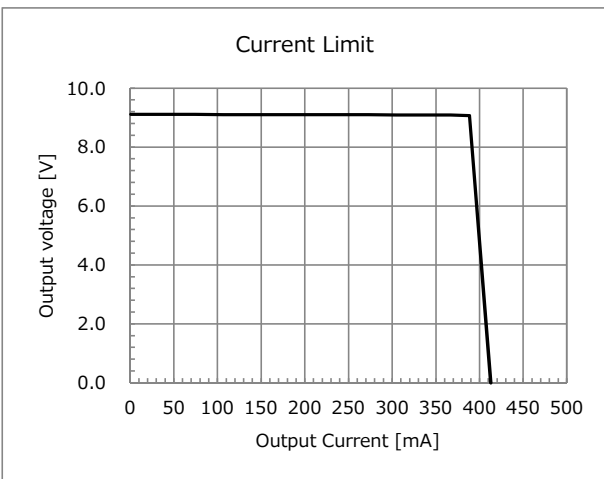
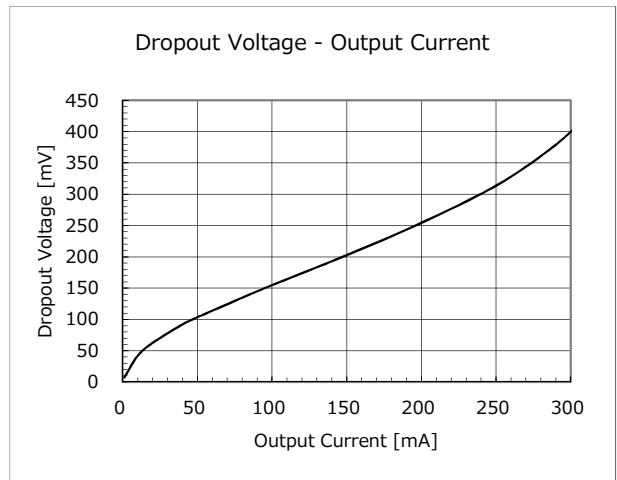
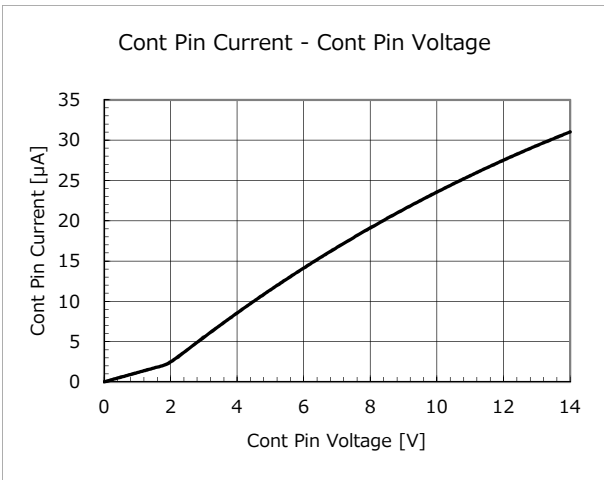
(V_{IN}=V_{OUT}(Typ.)+1V, I_{out}=1mA, V_{Cont}=1.6V, T_a=25°C unless otherwise specified)





Typical Performance Characteristics (V_{OUT}=9.0V)

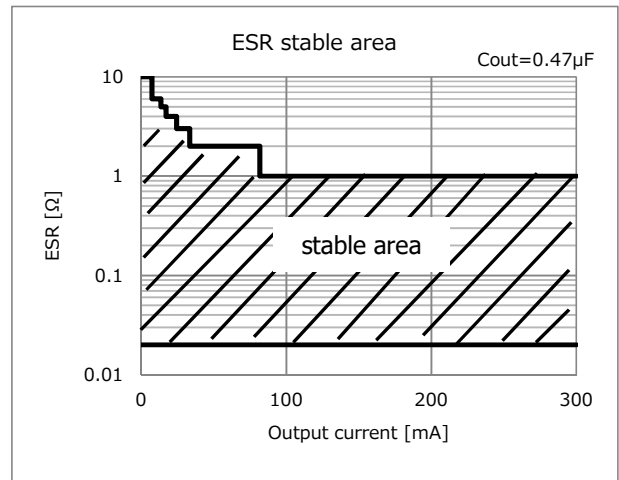
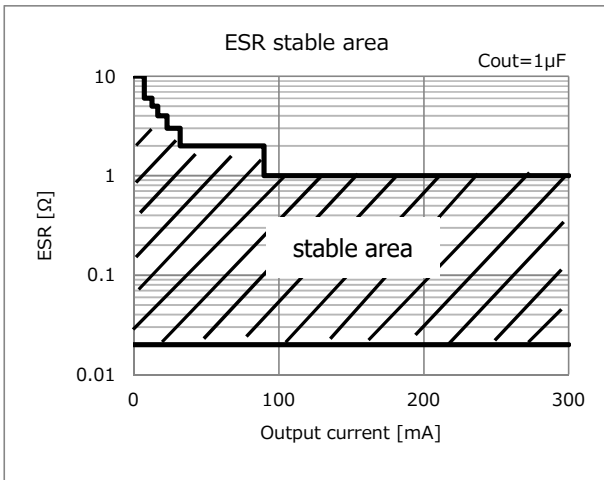
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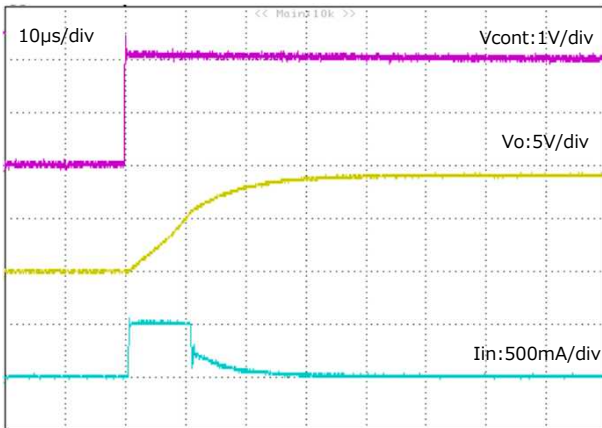


Typical Performance Characteristics (V_{OUT}=9.0V)

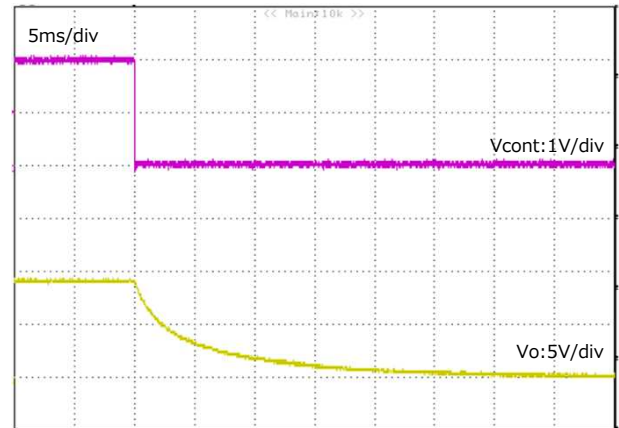
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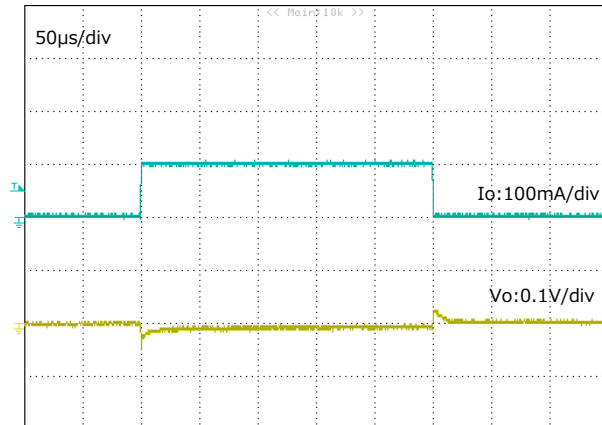
- Turn - On Transient response
V_{IN}=10V, V_{cont}=0V→2V, R_L=9kΩ



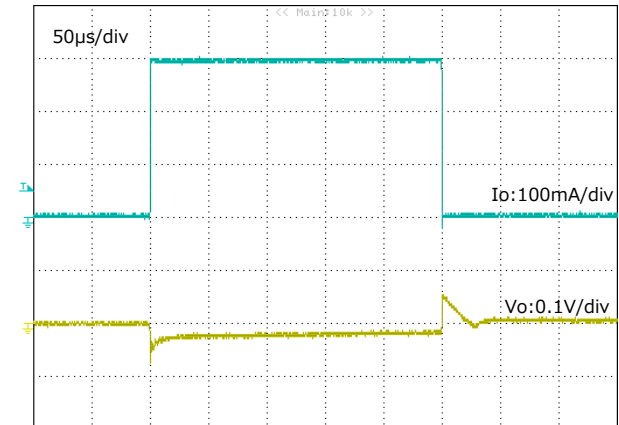
- Turn - Off Transient response
V_{IN}=10V, V_{cont}=2V→0V, R_L=9kΩ



- Load transient response
I_{out}=1mA↔100mA



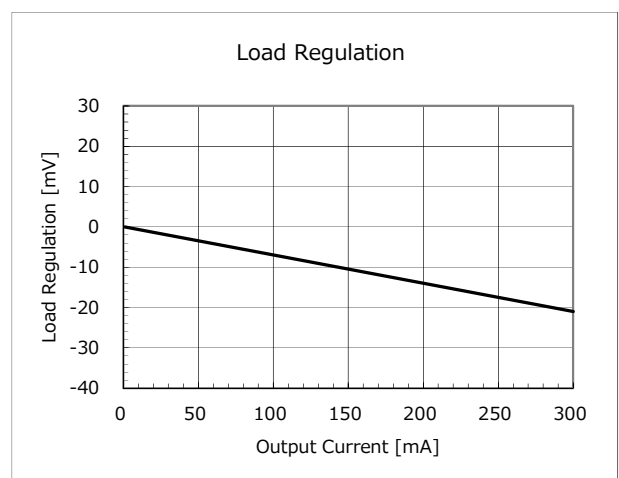
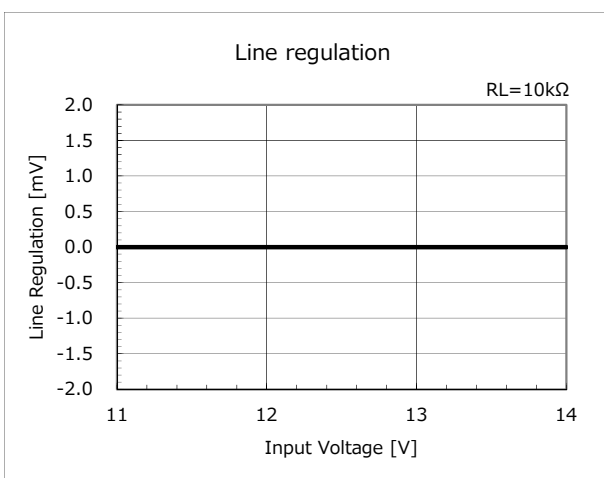
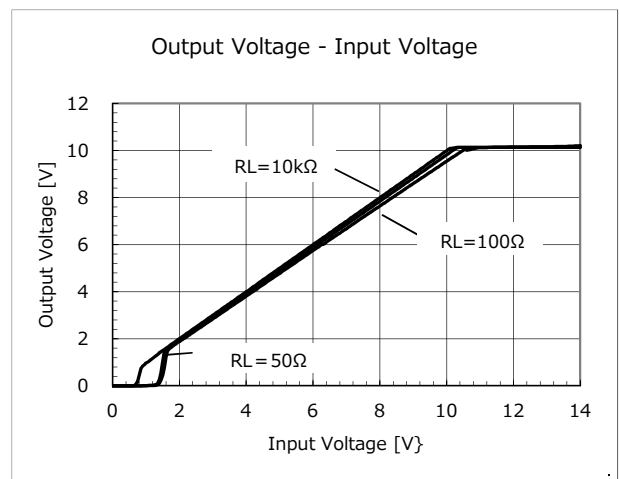
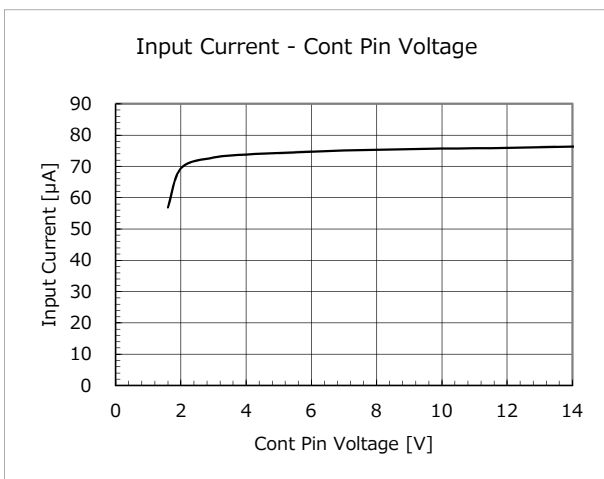
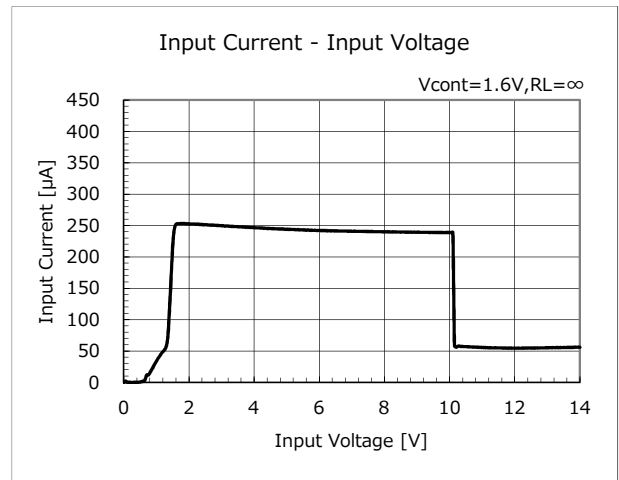
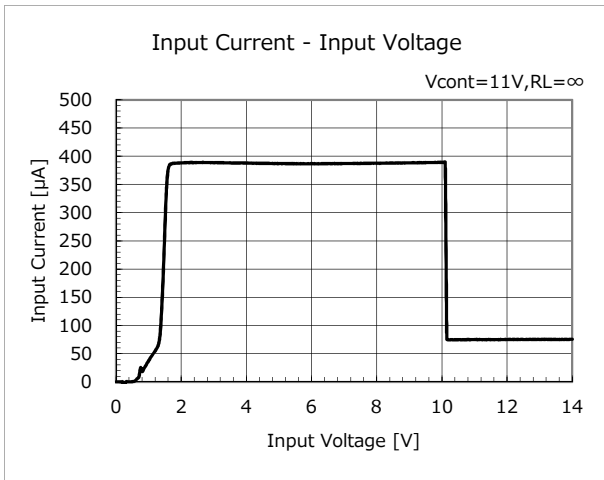
- I_{out}=1mA↔300mA





Typical Performance Characteristics (V_{OUT}=10.0V)

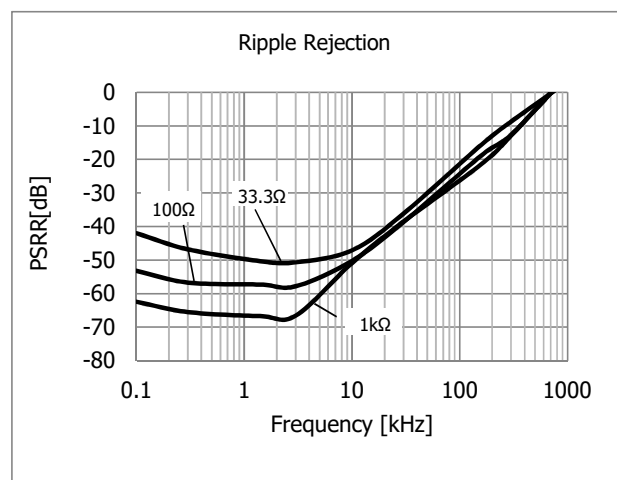
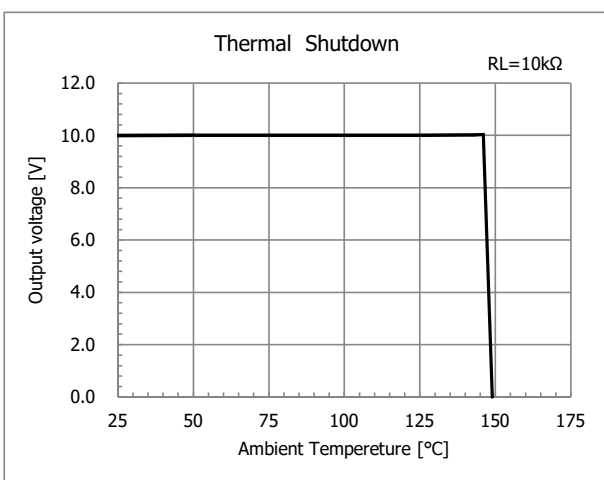
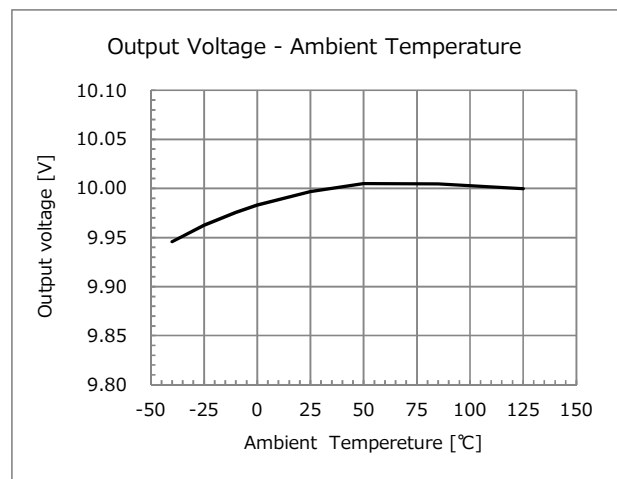
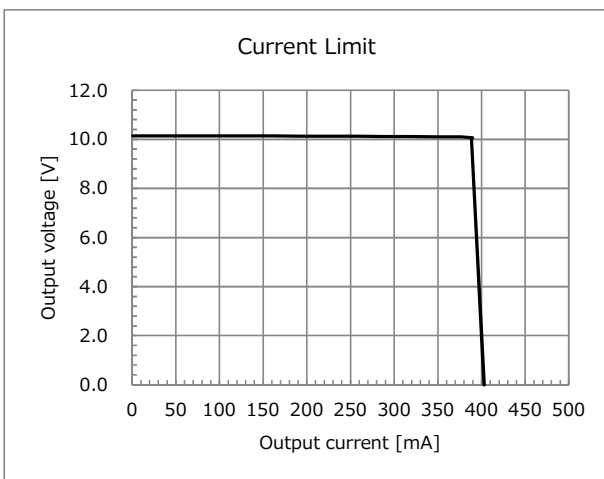
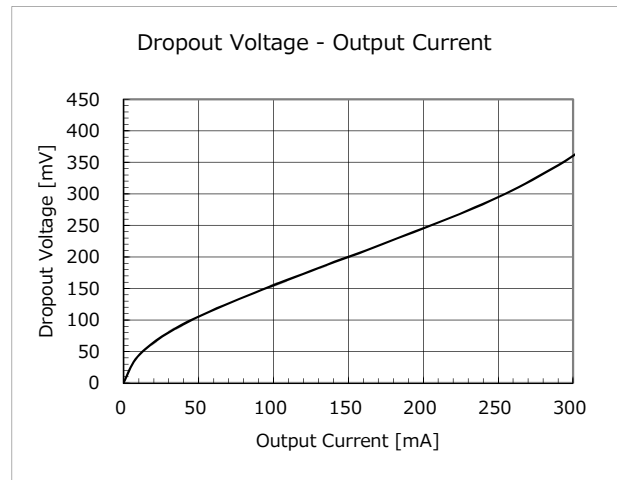
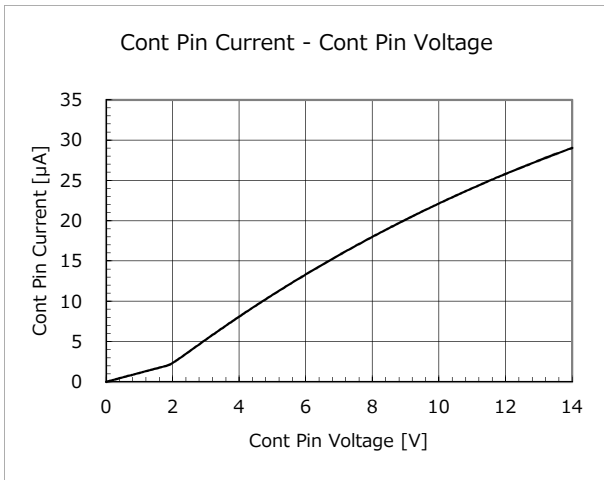
(V_{IN}=V_{OUT}(Typ.)+1V, I_{out}=1mA, V_{Cont}=1.6V, T_a=25°C unless otherwise specified)





Typical Performance Characteristics (V_{OUT}=10.0V)

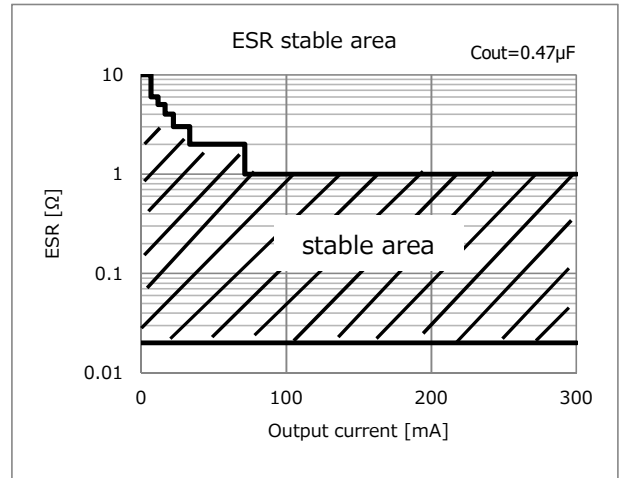
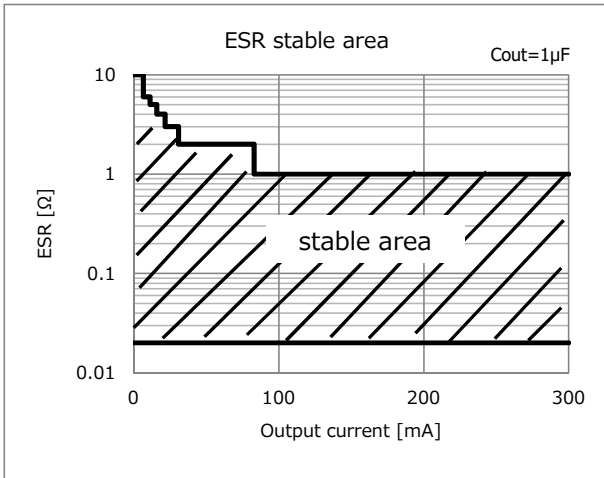
(V_{IN}=V_{OUT}(Typ.)+1V, I_{out}=1mA, V_{Cont}=1.6V, Ta=25°C unless otherwise specified)



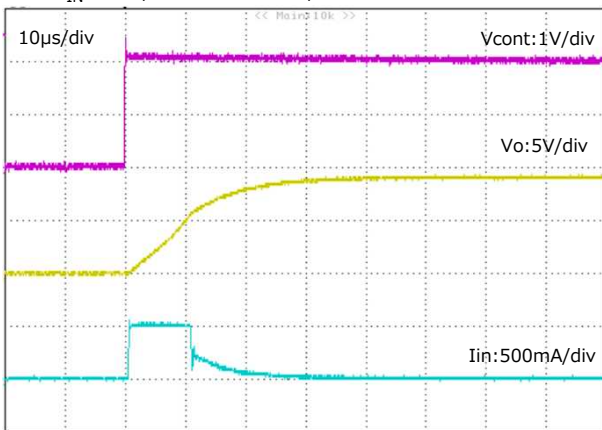


Typical Performance Characteristics (V_{OUT}=10.0V)

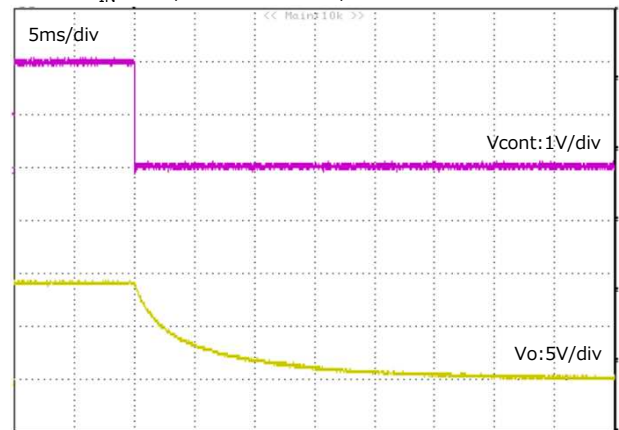
(V_{IN}=V_{OUT}(Typ.)+1V, I_{out}=1mA, V_{Cont}=1.6V, Ta=25°C unless otherwise specified)



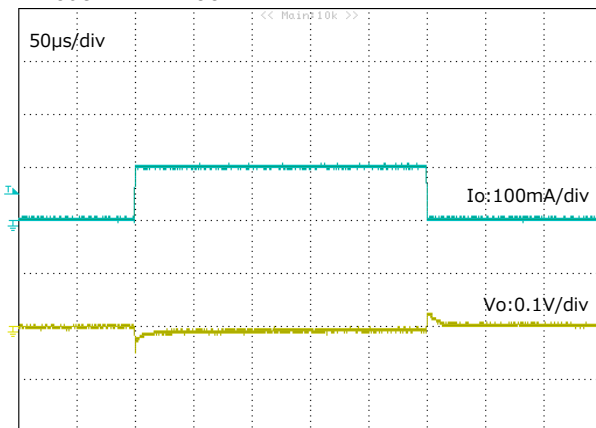
- Turn - On Transient response
V_{IN}=11V, V_{cont}=0V→2V, R_L=10kΩ



- Turn - Off Transient response
V_{IN}=11V, V_{cont}=2V→0V, R_L=10kΩ



- Load transient response
I_{out}=1mA↔100mA



- I_{out}=1mA↔300mA

