



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LA59700MX — Monolithic Linear IC Adjustable Voltage Type Regulator

Overview

LA59700MX is an adjustable voltage regulator which has chip enable function.

The maximum current of 1.0A can be output.

Features

- Adjustable output voltage
- Maximum output current: 1.0A
- Chip enable function
- Build-in over current protection circuit
- Available ceramic capacitors

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		16	V
Maximum input voltage	$V_{IN \text{ max}}$		16	V
Allowable power dissipation	$P_d \text{ max}$	Mounted on a specified board *1	1.8	W
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

*1. Specified board: 50mm × 50mm × 1.6mm, glass epoxy double side board.

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Recommended Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage (V_{CC1})	V_{CC1}		3.5 to 15	V
Input Voltage (V_{CC2})	V_{CC2}		*2 ($V_{OUT} + V_{DROP}$) to 15	V
Input Voltage(EN)	V_{EN}		0 to 15	V
Output Voltage	V_{OUT}		1.5 to ($V_{CC1} - 1.5$)	V

*2. V_{DROP} : Dropout voltage

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC1} = V_{CC2} = 3.5\text{V}$, $V_{EN} = 1.6\text{V}$, $V_{OUT} = 1.5\text{V}$

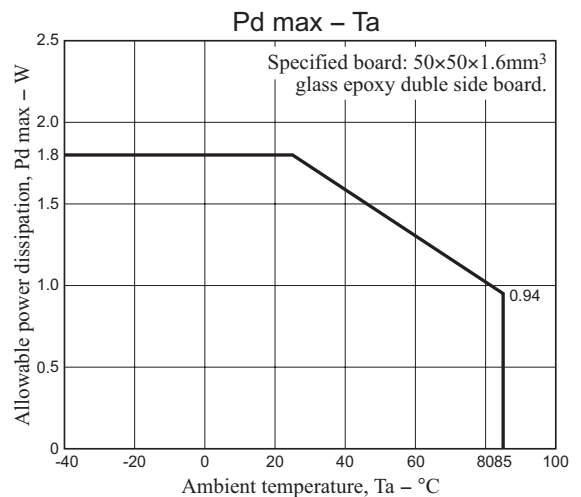
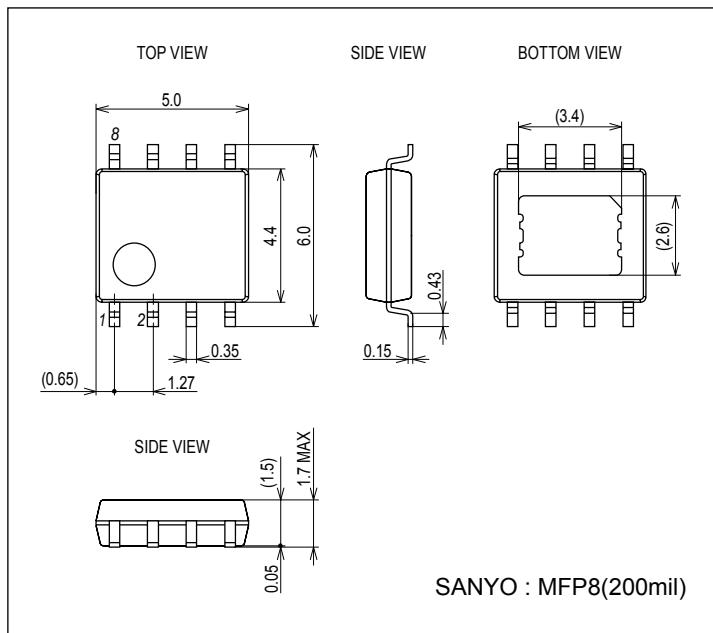
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	$V_{EN} = 1.6\text{V}$		3.5	7	mA
Standby current	I_{STBY}	$V_{EN} = 0\text{V}$			1	μA
Output voltage	V_{OUT}	OUT = ADJ, $I_{OUT} = 10\text{mA}$,	1.225	1.25	1.275	V
Output current	I_{OUT}		1.0			A
Dropout voltage ($V_{CC2} - V_{OUT}$)	V_{DROP}	$I_{OUT} = 500\text{mA}$		0.42	0.6	V
		$I_{OUT} = 1.0\text{A}$		0.84	1.2	V
ADJ source current	I_{ADJ}	ADJ = 0V, OUT = Open		160	300	nA
Load regulation	R_{LD}	$I_{OUT} = 10\text{mA}$ to 500mA			10	mV
Line regulation	R_{LN}	$V_{CC1} = V_{CC2} = 3.5\text{V}$ to 7V , $I_{OUT} = 10\text{mA}$			10	mV
Output voltage temperature coefficient *3	$\Delta V / \Delta T$	$T_a = -40$ to $+85^\circ\text{C}$, $I_{OUT} = 10\text{mA}$		± 100		ppm/ $^\circ\text{C}$
Ripple rejection *3	R_{RR}	$V_{CC1} = V_{CC2} = 4.25\text{V}$, OUT = ADJ, $I_{OUT} = 10\text{mA}$, $V_{Rpp} = 1\text{V}$, $f_{RR} = 120\text{Hz}$ $C_{OUT} = \text{Ceramic } 10\mu\text{F}$		65		dB
Chip enable voltage	V_{EN}		1.6			V
Disable voltage	V_{DIS}				0.4	V
EN input current	I_{EN}	$V_{EN} = 1.6\text{V}$		50		μA
Thermal shutdown temperature *3	T_{TSD}	Junction Temperature		170		$^\circ\text{C}$
TSD hysteresis *3	T_{HYS}			30		$^\circ\text{C}$

*3. Design guarantee value, Do not measurement.

Package Dimensions

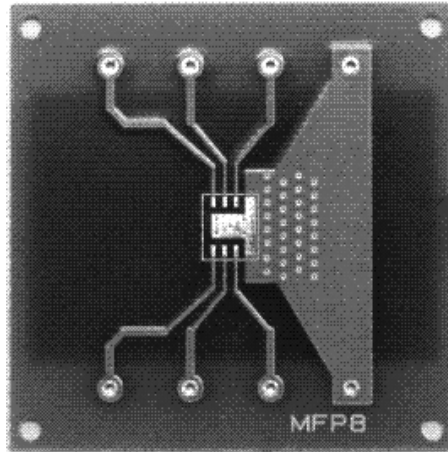
unit : mm (typ)

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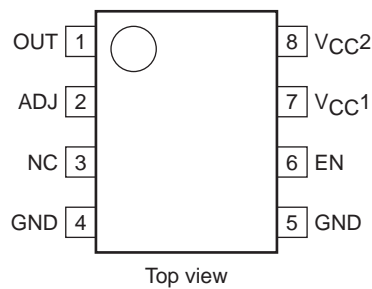


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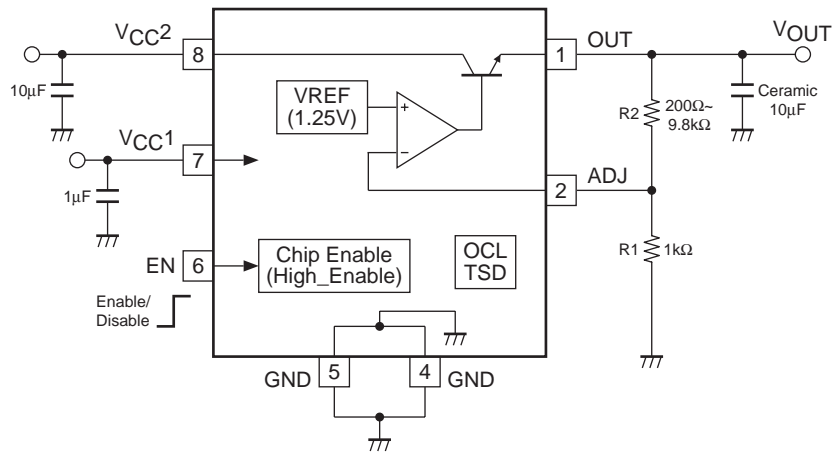
Specified Board (50mm × 50mm × 1.6mm, glass epoxy double side board)



Pin Assignment



Block Diagram and Application Circuit Example



Formula of Output Voltage Adjustment

$$V_{OUT} = V_{ADJ} (\approx 1.25V) \times (R1+R2)/R1$$

Note: Set the resistance of R1 and R2 so that a large enough current flows through the two resistors, making the effect on the source current from the ADJ pin negligible.

Startup Method

This IC can be started in one of the following two ways:

- (1) Start the IC by turning on and off the EN pin after applying power to VCC1 and VCC2.
- (2) Short-circuit the VCC1, VCC2, and EN pins.

When using method (1), apply power to VCC1 and VCC2 simultaneously, or in the order of VCC1 to VCC2, then to the EN pin.

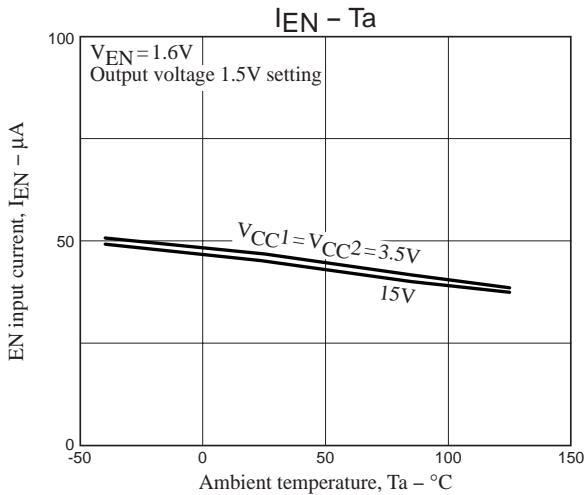
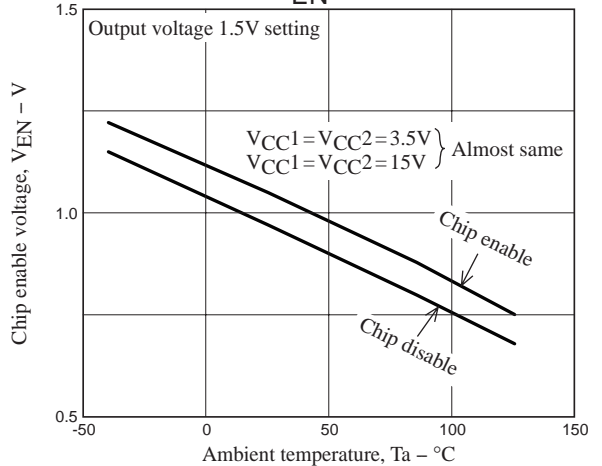
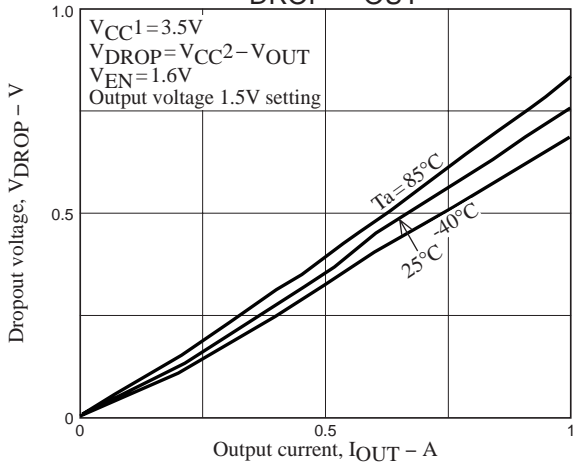
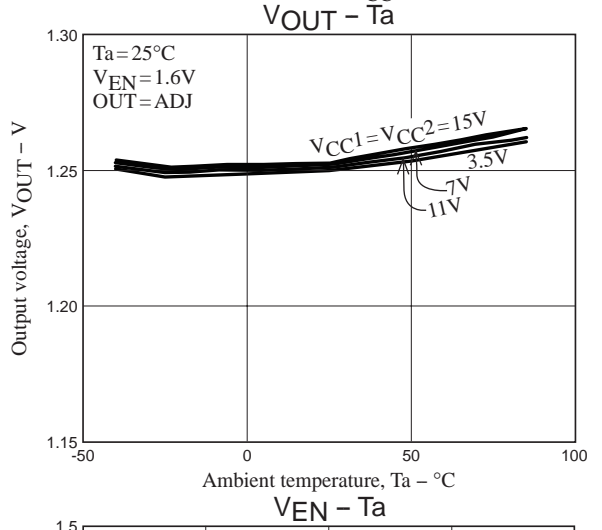
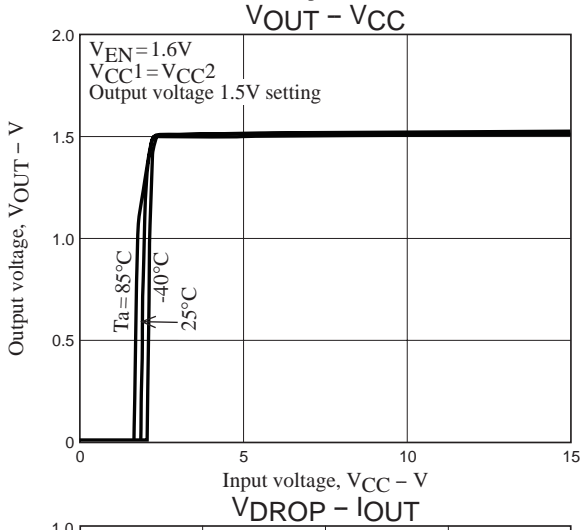
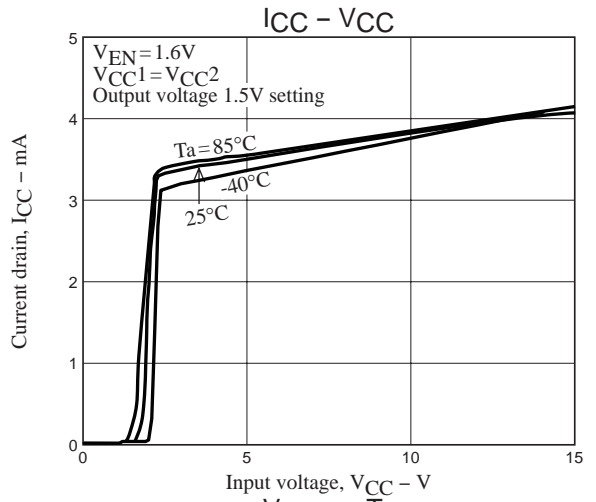
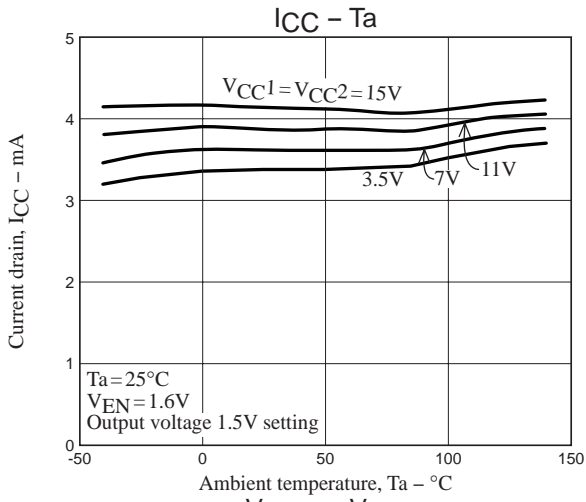
To shutdown the IC, follow the start-up procedure in reverse order.

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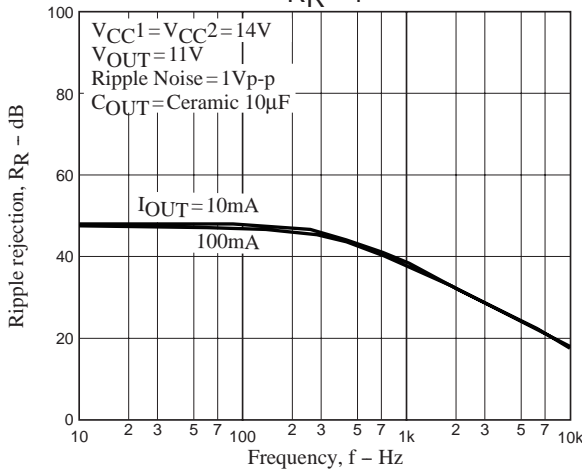
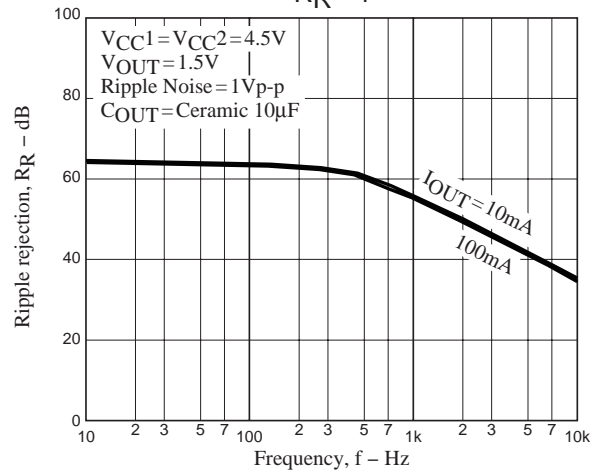
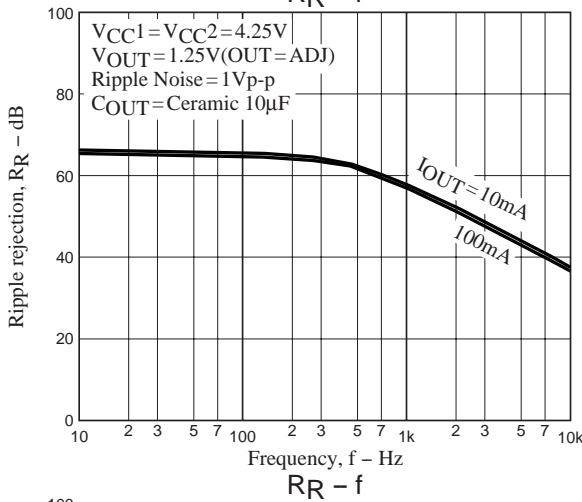
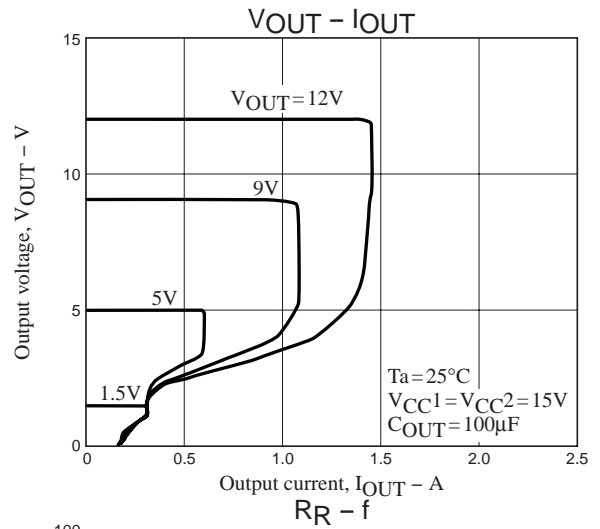
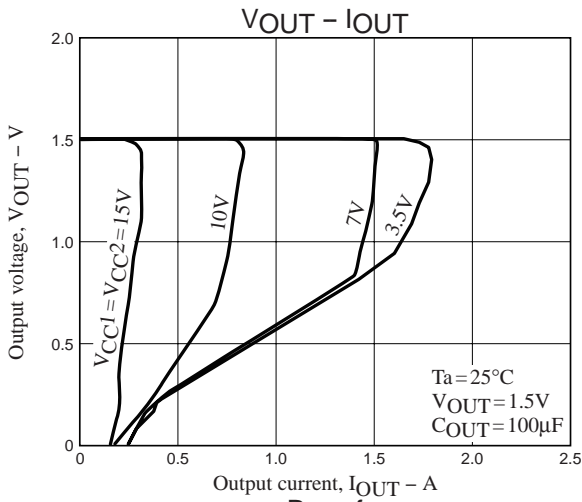
Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1	OUT	Output.	
2	ADJ	Adjustable input.	
3	NC	No connection.	
4	GND	Ground. Connect to Pin 5 internally.	
5	GND	Ground. Connect to Pin 4 internally.	
6	EN	Chip Enable. (High Enable)	
7	V _{CC1}	Analog power supply.	
8	V _{CC2}	Output power supply.	

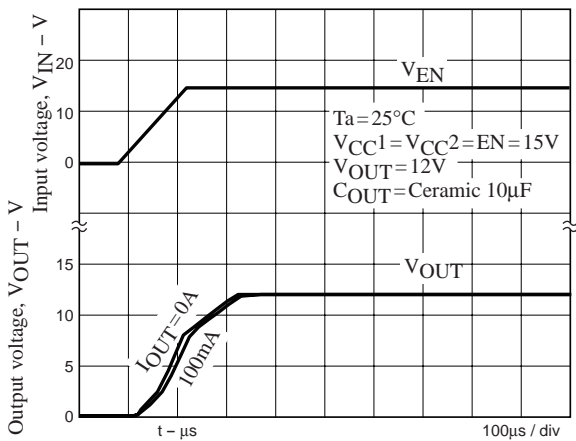
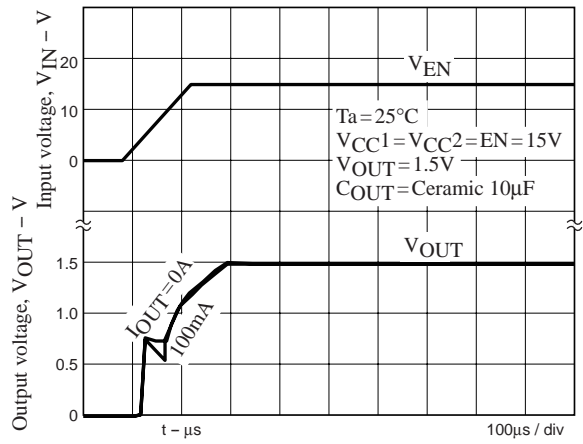
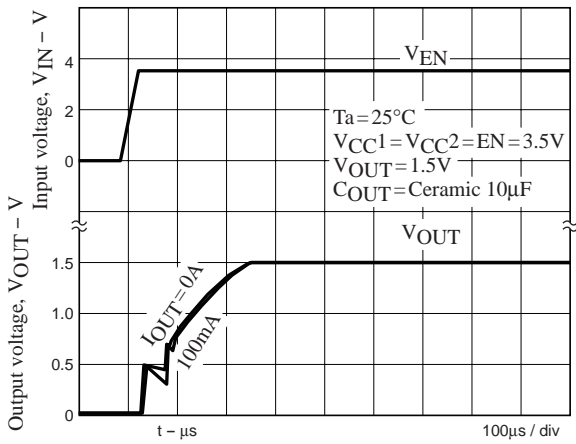
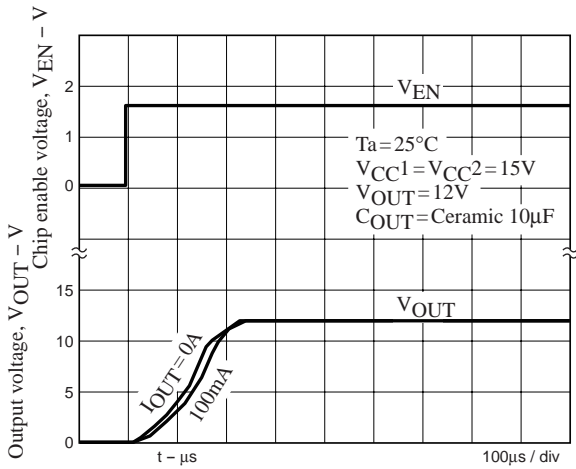
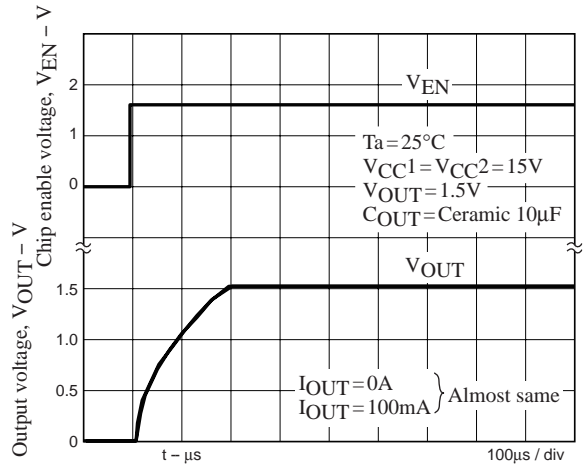
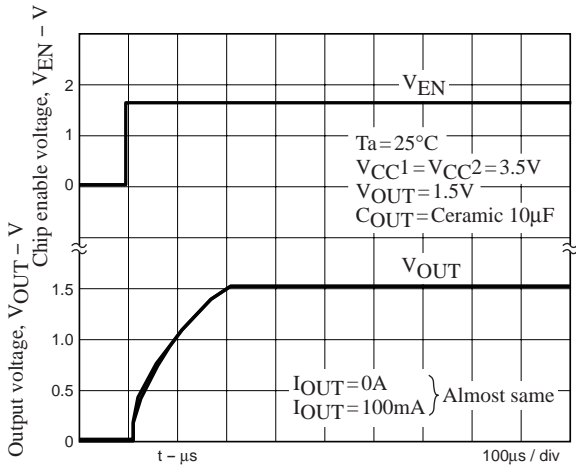
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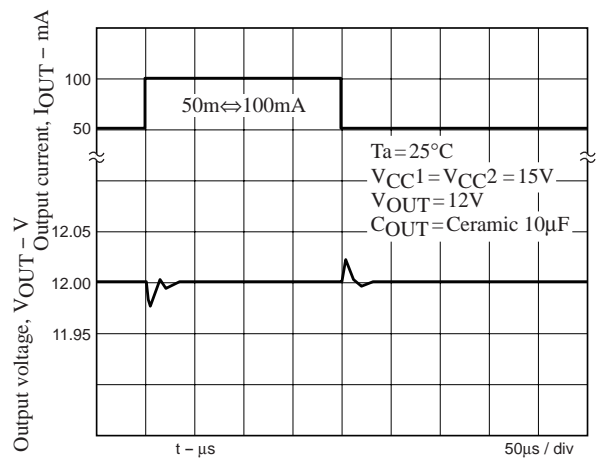
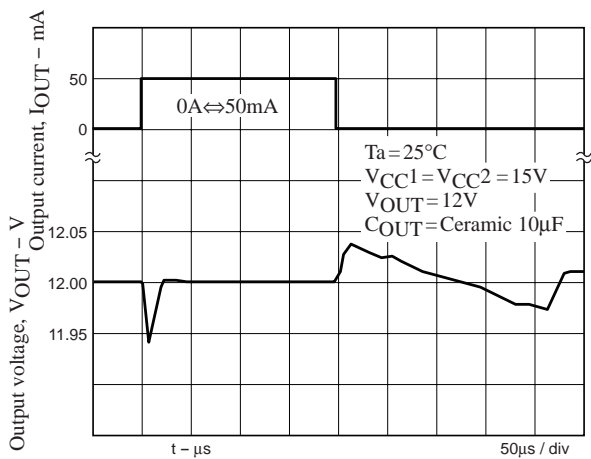
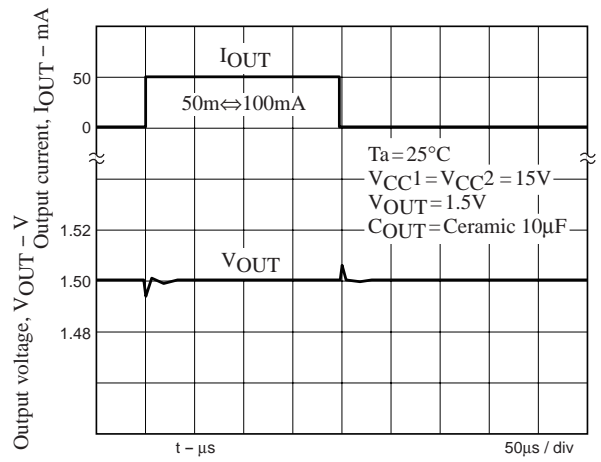
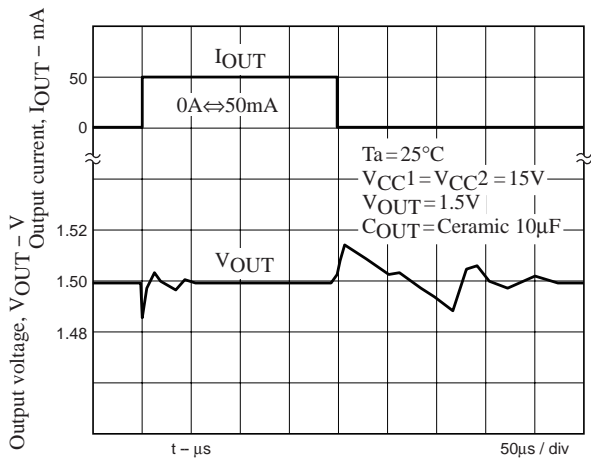
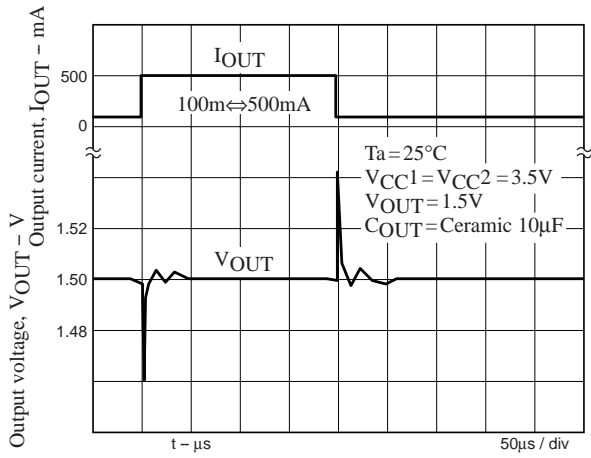
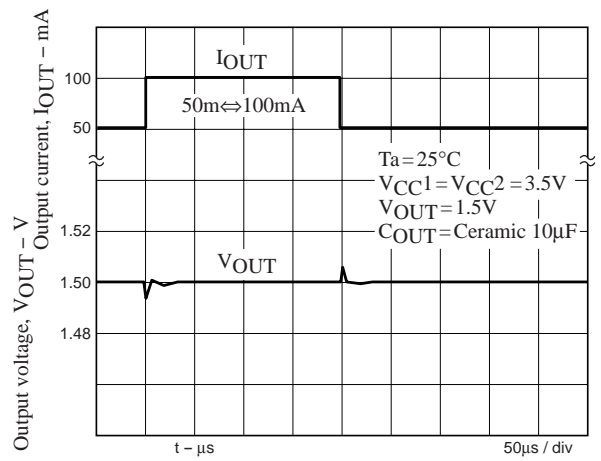
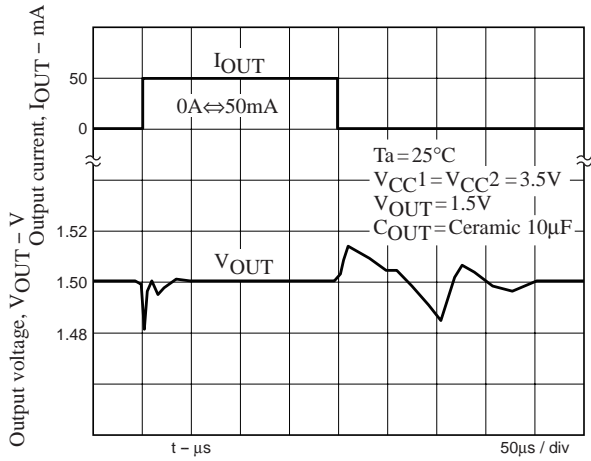


V_{OUT} Startup Characteristic

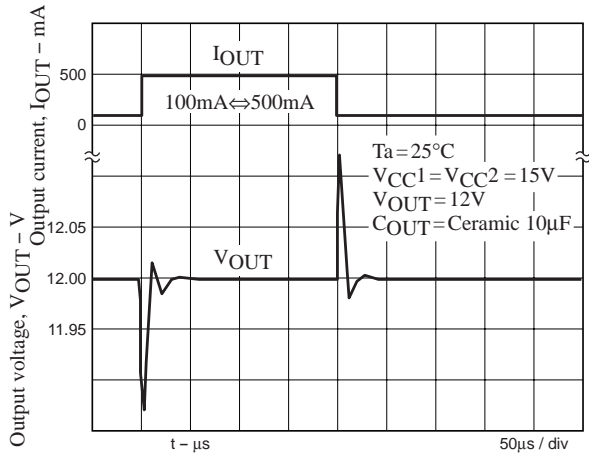


Note: The output voltage (V_{OUT}) may overshoot when V_{IN} starts up with slew rate of a voltage of 0.1V/ μs or over.

Load Transient Response Characteristics



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