



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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# LA59700MX

## Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input Voltage (V <sub>CC1</sub> )	V <sub>CC1</sub>		3.5 to 15	V
Input Voltage (V <sub>CC2</sub> )	V <sub>CC2</sub>		*2 (V <sub>OUT</sub> +V <sub>DROP</sub> ) to 15	V
Input Voltage(EN)	V <sub>EN</sub>		0 to 15	V
Output Voltage	V <sub>OUT</sub>		1.5 to (V <sub>CC1</sub> -1.5)	V

\*2. V<sub>DROP</sub>: Dropout voltage

## Electrical Characteristics at Ta = 25°C, V<sub>CC1</sub> = V<sub>CC2</sub> = 3.5V, V<sub>EN</sub> = 1.6V, V<sub>OUT</sub> = 1.5V

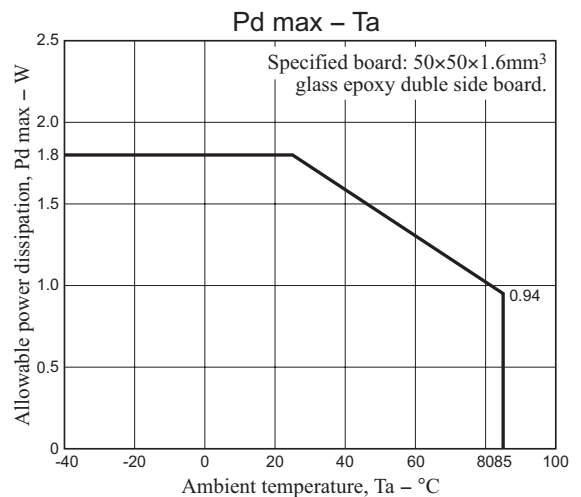
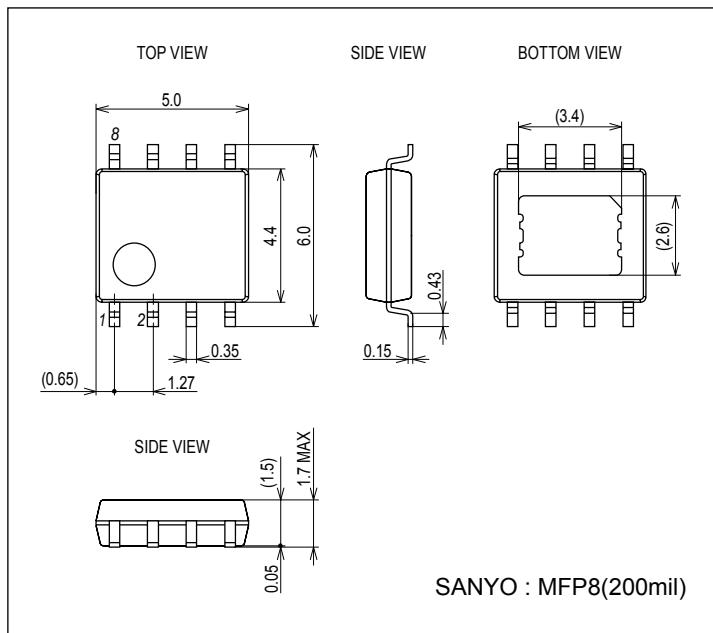
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I <sub>CC</sub>	V <sub>EN</sub> = 1.6V		3.5	7	mA
Standby current	I <sub>STBY</sub>	V <sub>EN</sub> = 0V			1	μA
Output voltage	V <sub>OUT</sub>	OUT = ADJ, I <sub>OUT</sub> = 10mA,	1.225	1.25	1.275	V
Output current	I <sub>OUT</sub>		1.0			A
Dropout voltage (V <sub>CC2</sub> -V <sub>OUT</sub> )	V <sub>DROP</sub>	I <sub>OUT</sub> = 500mA		0.42	0.6	V
		I <sub>OUT</sub> = 1.0A		0.84	1.2	V
ADJ source current	I <sub>ADJ</sub>	ADJ = 0V, OUT = Open		160	300	nA
Load regulation	R <sub>LD</sub>	I <sub>OUT</sub> = 10mA to 500mA			10	mV
Line regulation	R <sub>LN</sub>	V <sub>CC1</sub> = V <sub>CC2</sub> = 3.5V to 7V, I <sub>OUT</sub> = 10mA			10	mV
Output voltage temperature coefficient *3	ΔV / ΔT	Ta = -40 to +85°C, I <sub>OUT</sub> = 10mA		±100		ppm/°C
Ripple rejection *3	R <sub>RR</sub>	V <sub>CC1</sub> = V <sub>CC2</sub> = 4.25V, OUT = ADJ, I <sub>OUT</sub> = 10mA, V <sub>Rpp</sub> = 1V, f <sub>RR</sub> = 120Hz, C <sub>OUT</sub> = Ceramic 10μF		65		dB
Chip enable voltage	V <sub>EN</sub>		1.6			V
Disable voltage	V <sub>DIS</sub>				0.4	V
EN input current	I <sub>EN</sub>	V <sub>EN</sub> = 1.6V		50		μA
Thermal shutdown temperature *3	T <sub>TSD</sub>	Junction Temperature		170		°C
TSD hysteresis *3	T <sub>HYS</sub>			30		°C

\*3. Design guarantee value, Do not measurement.

## Package Dimensions

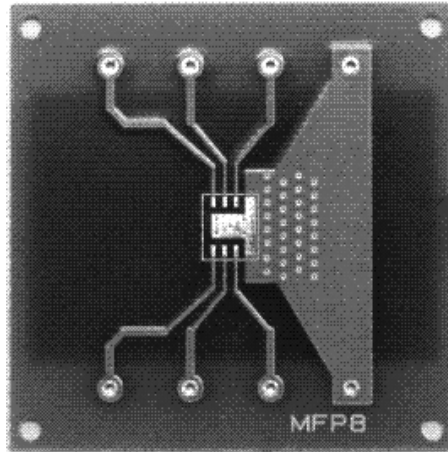
unit : mm (typ)

3372

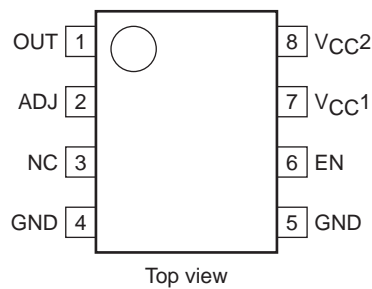


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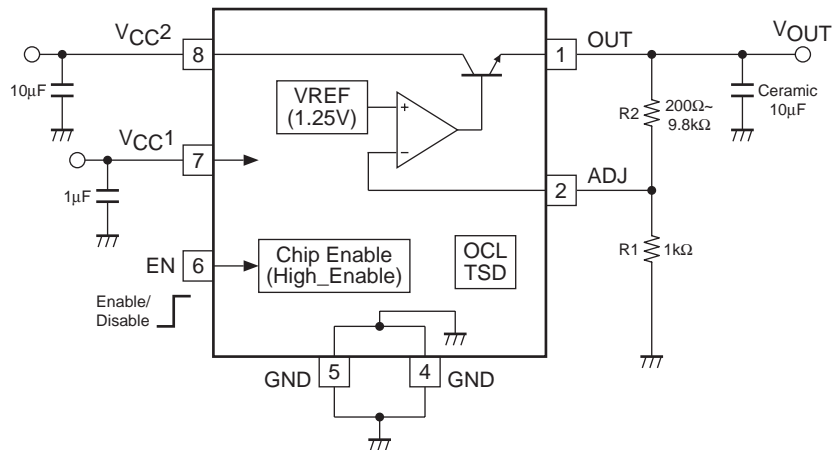
**Specified Board** (50mm × 50mm × 1.6mm, glass epoxy double side board)



## 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.

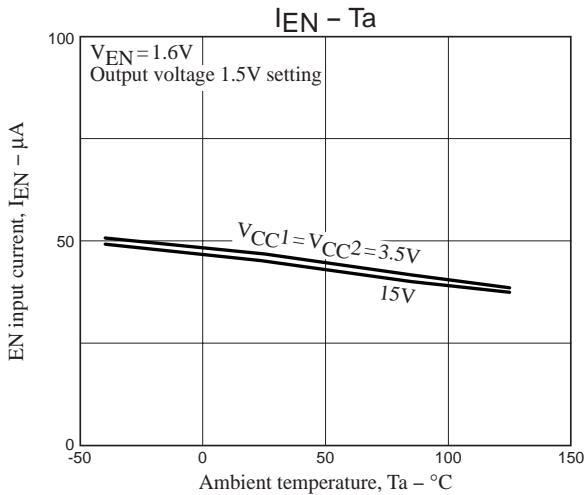
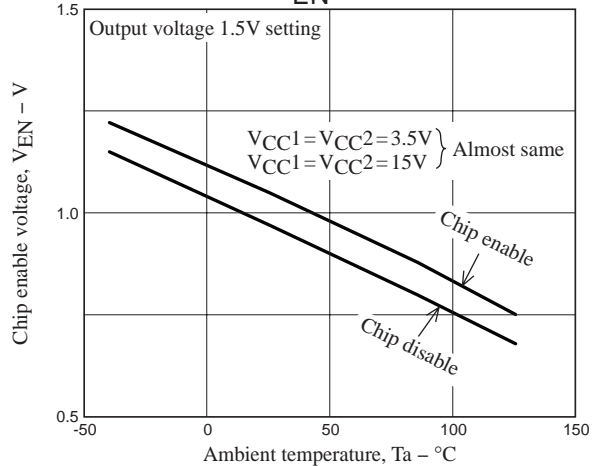
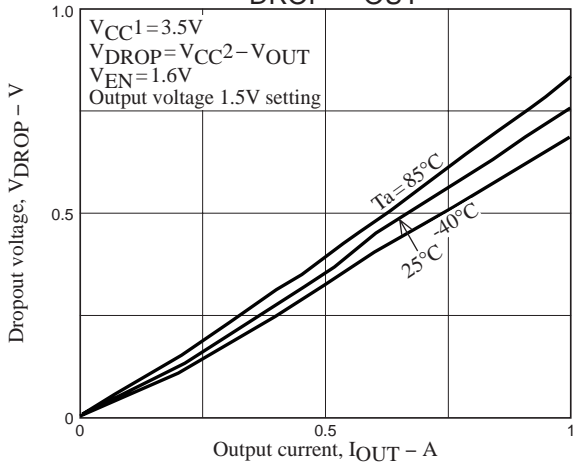
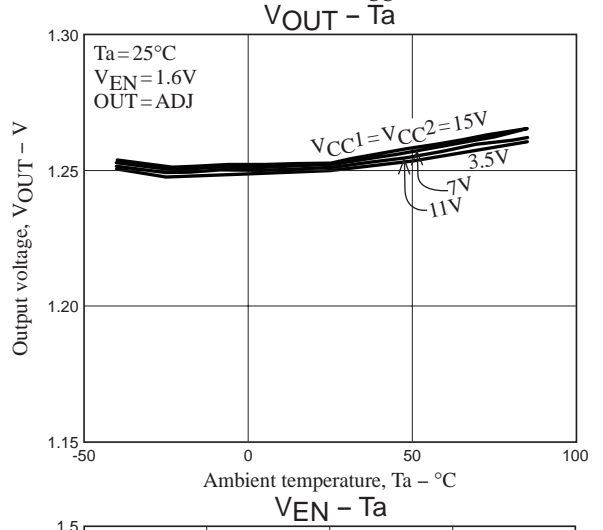
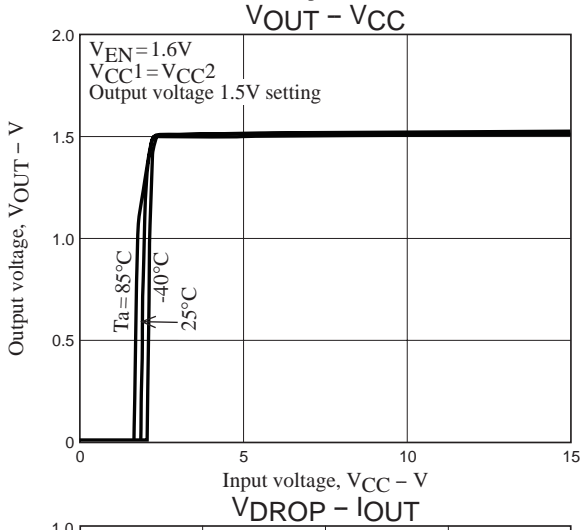
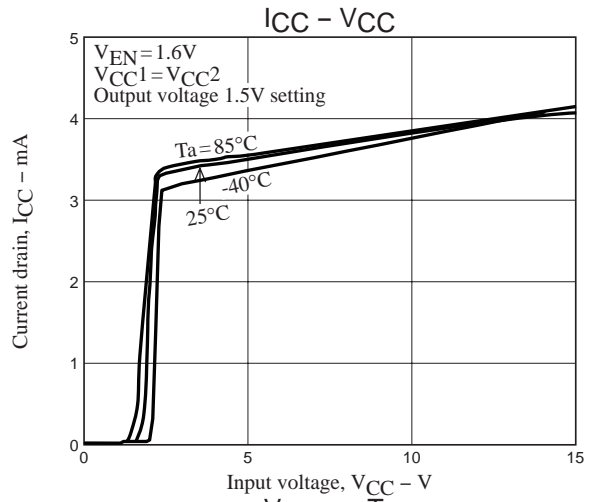
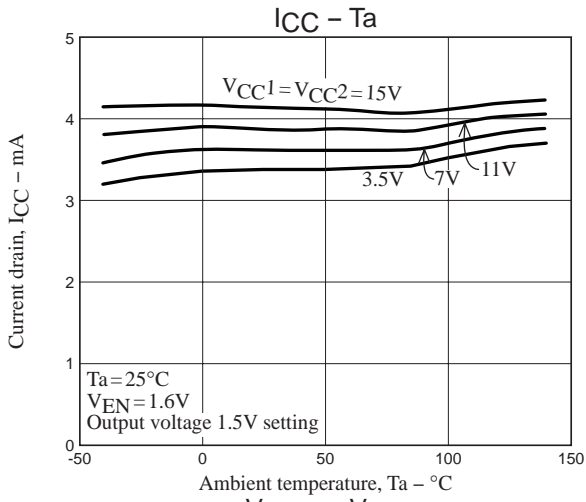
To shutdown the IC, follow the start-up procedure in reverse order.

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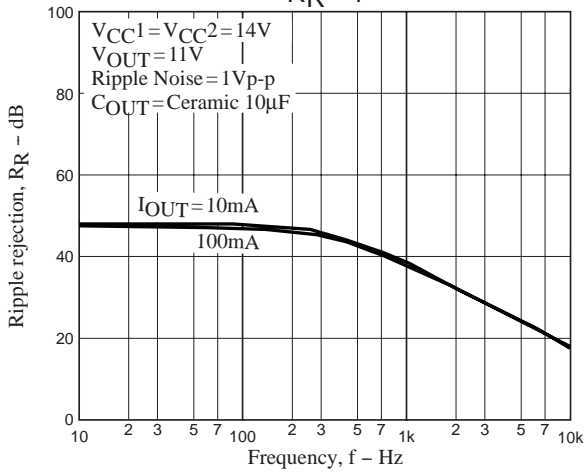
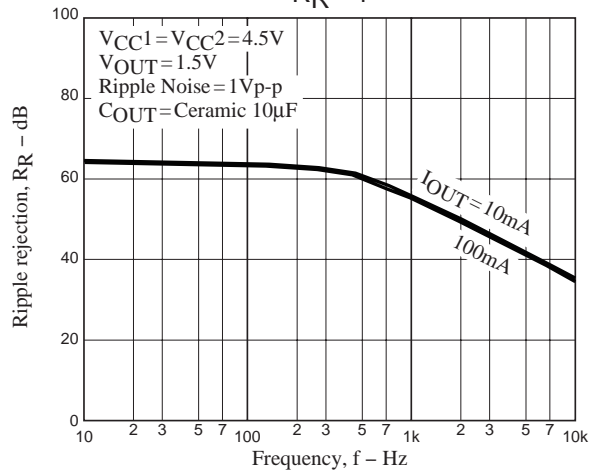
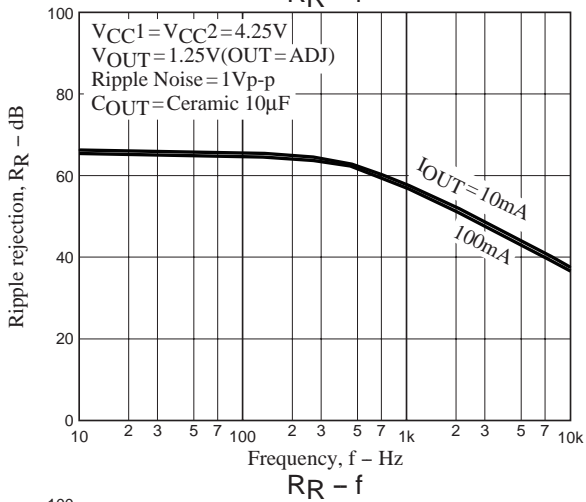
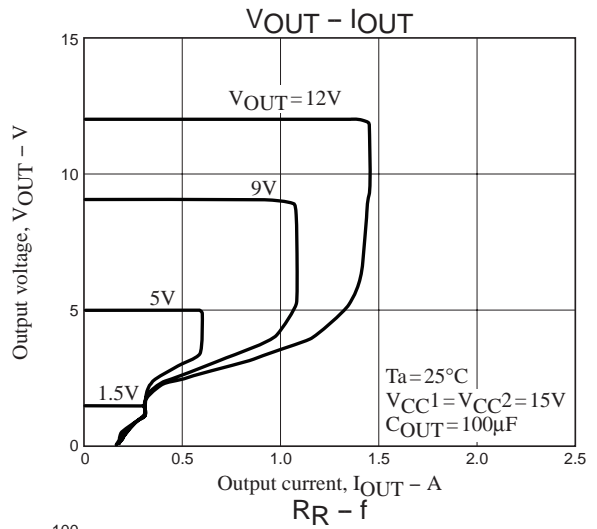
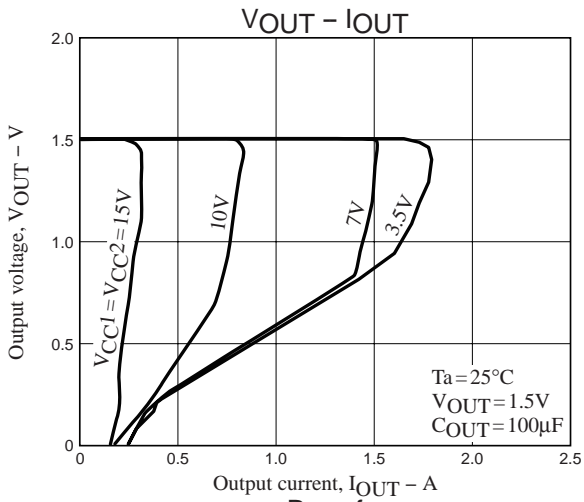
## Pin Function

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 <sub>CC1</sub>	Analog power supply.	
8	V <sub>CC2</sub>	Output power supply.	

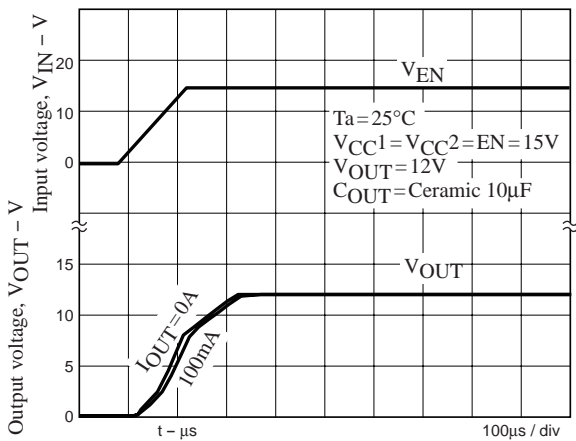
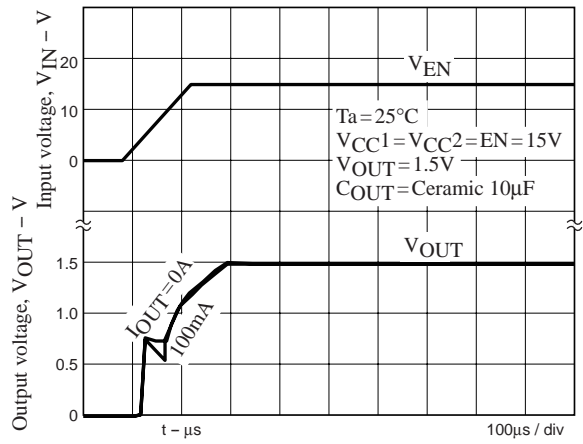
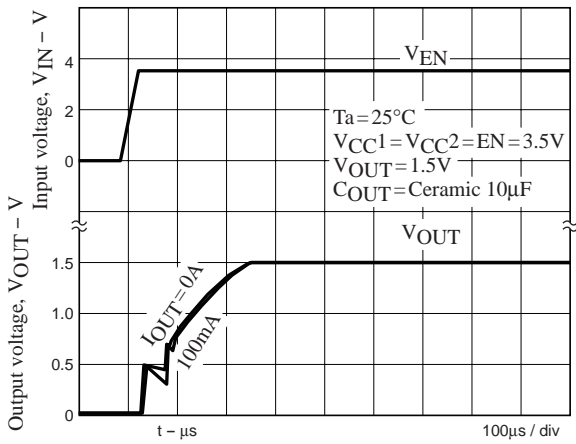
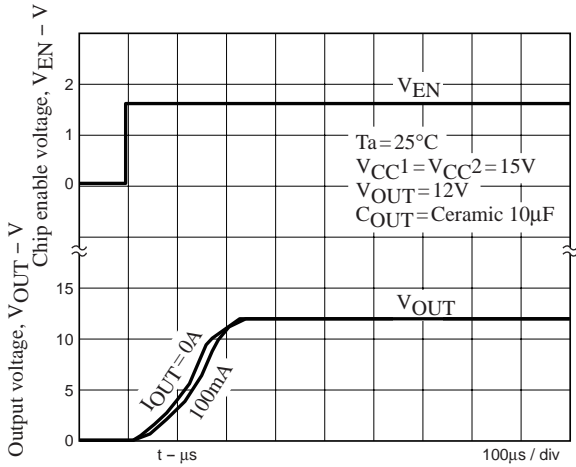
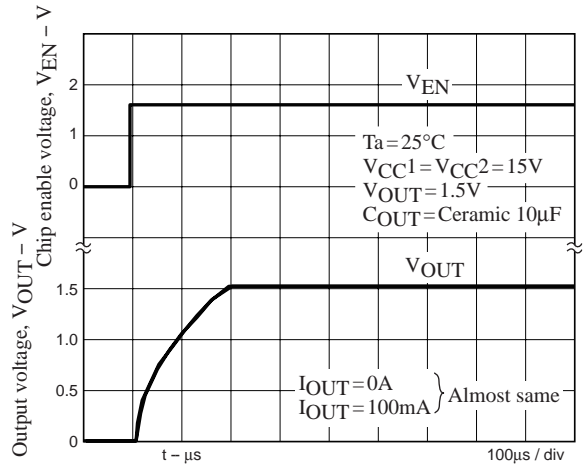
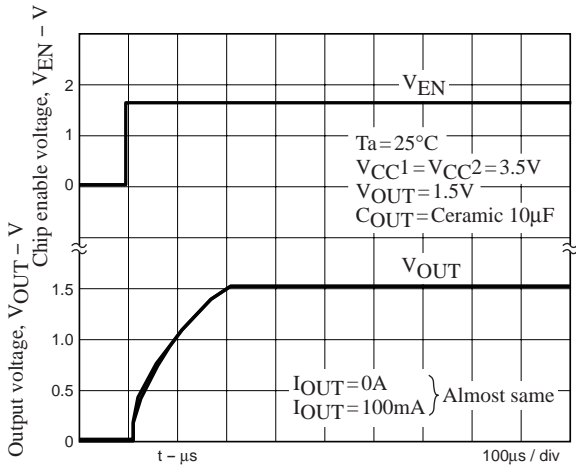
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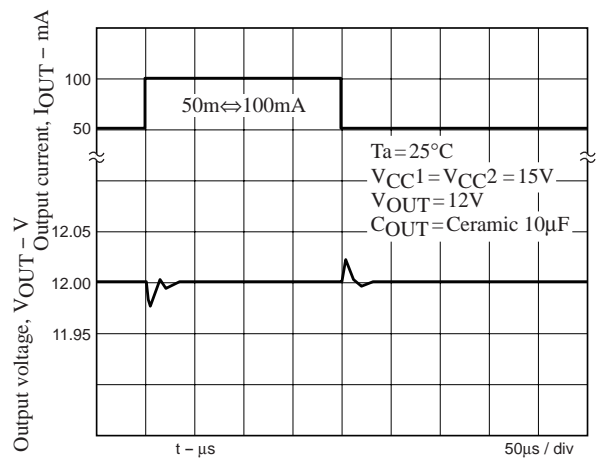
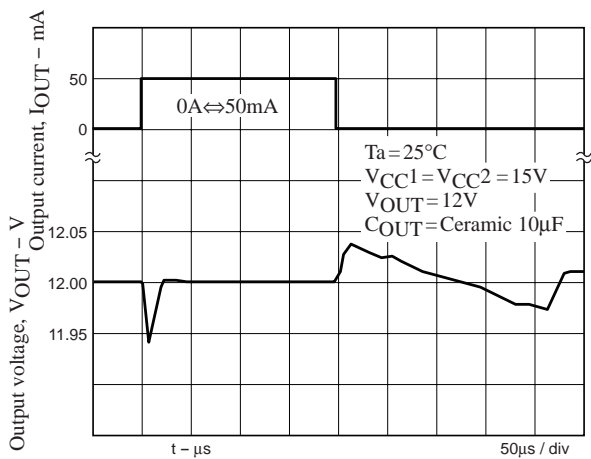
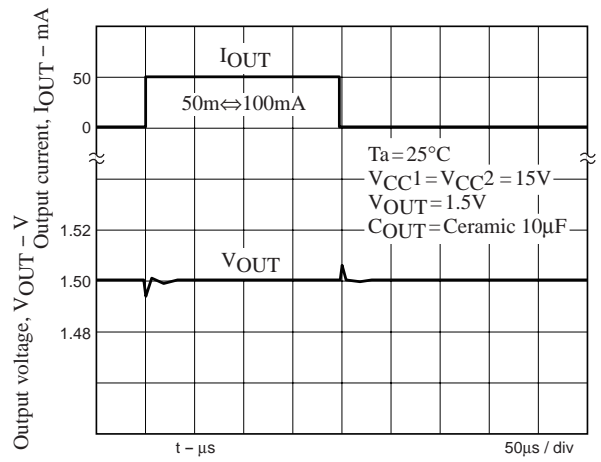
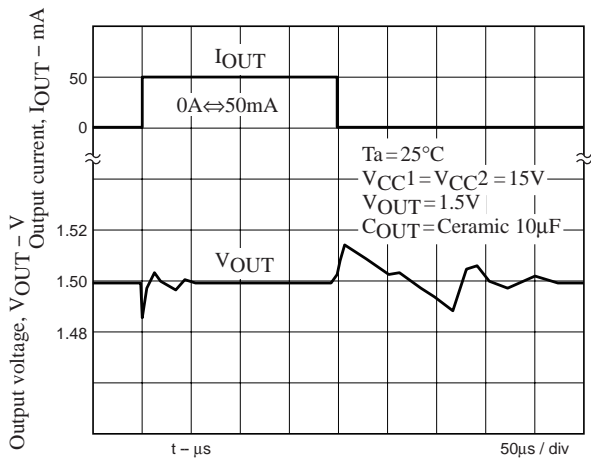
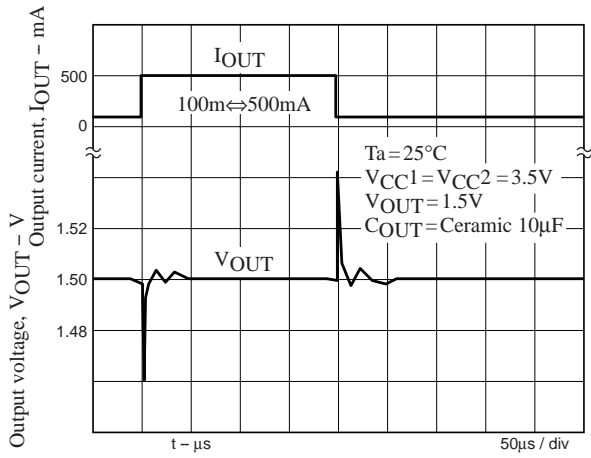
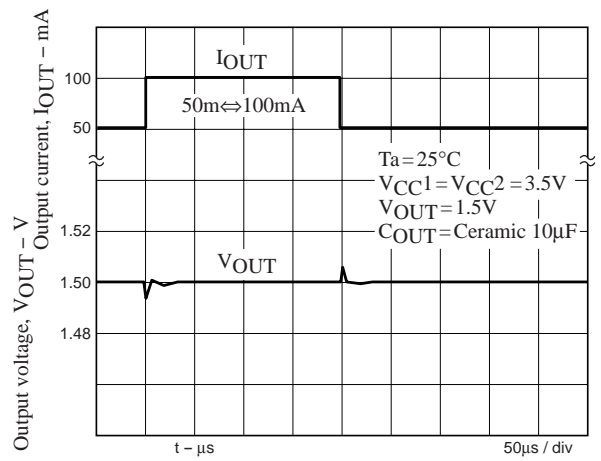
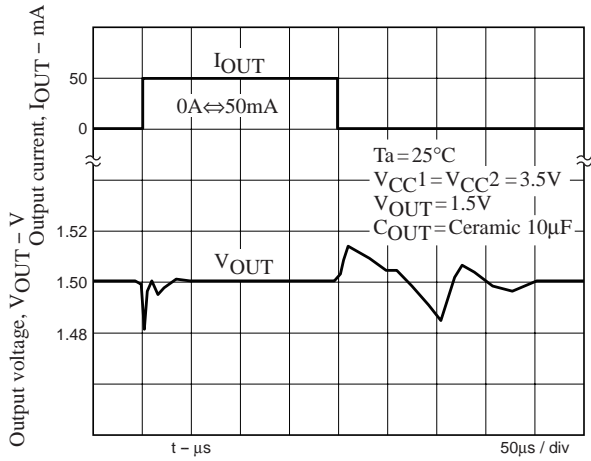


VOUT Startup Characteristic



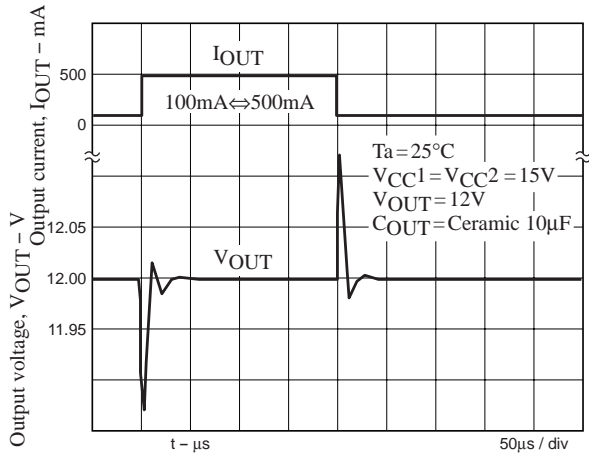
Note: The output voltage ( $V_{OUT}$ ) may overshoot when  $V_{IN}$  starts up with slew rate of  $0.1\text{V}/\mu\text{s}$  or over.

## Load Transient Response Characteristics





## LA59700MX



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