Ordering number : ENA2169

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

LA59700MC — Monolithic Linear IC Adjustable Voltage Type Regulator

Overview

LA59700MC 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 Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		16	V
Maximum input voltage	V_{IN} max		16	V
Allowable power dissipation	Pd max	Mounted on a specified board *1	1.8	W
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

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

Note 1 : Absolute maximum ratings represent the values which cannot be exceeded for any length of time.

Note 2 : Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage ($V_{CC}1$)	$V_{CC}1$		3.5 to 15	V
Input voltage ($V_{CC}2$)	$V_{CC}2$		*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_{CC}1-1.5)	V

*2. V_{DROP}: Dropout voltage

Electrical Characteristics at Ta = 25°C, $V_{CC}1$ = $V_{CC}2$ = 3.5V, V_{EN} = 1.6V, V_{OUT} = 1.5V

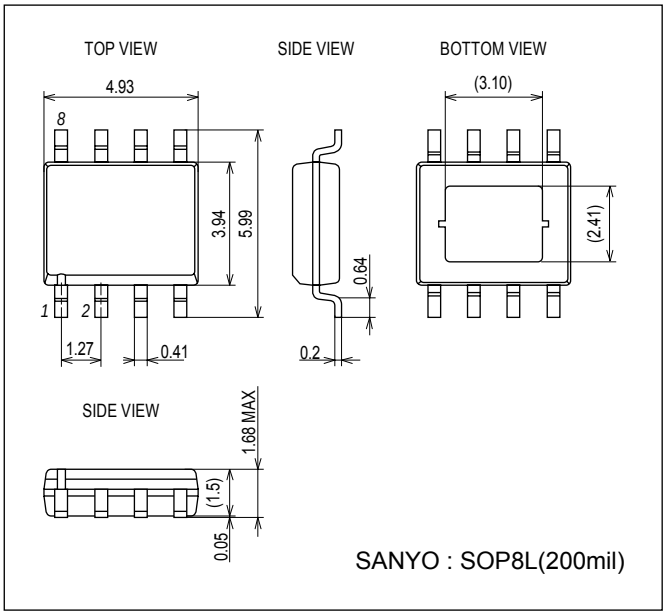
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I_{CC}	V_{EN} = 1.6V		3.5	7	mA
Standby current	I_{STBY}	V_{EN} = 0V			1	μA
Output voltage	V_{OUT}	OUT = ADJ, I_{OUT} = 10mA	1.225	1.25	1.275	V
Output current	I_{OUT}		1.0			A
Dropout voltage ($V_{CC}2$-V_{OUT})	V_{DROP}	I_{OUT} = 500mA		0.42	0.6	V
		I_{OUT} = 1.0A		0.84	1.2	V
ADJ source current	I_{ADJ}	ADJ = 0V, OUT = Open		160	300	nA
Load regulation	R_{LD}	I_{OUT} = 10mA to 500mA			10	mV
Line regulation	R_{LN}	$V_{CC}1$ = $V_{CC}2$ = 3.5V to 7V, I_{OUT} = 10mA			10	mV
Output voltage temperature coefficient *3	ΔV / ΔT	Ta = -40 to +85°C, I_{OUT} = 10mA		±100		ppm/°C
Ripple rejection *3	R_R	$V_{CC}1$ = $V_{CC}2$ = 4.25V, OUT = ADJ, I_{OUT} = 10mA, VRpp = 1V, f_{RR} = 120Hz C_{OUT} = Ceramic 10μF		65		dB
Chip enable voltage	V_{EN}		1.6			V
Disable voltage	V_{DIS}				0.4	V
EN input current	I_{EN}	V_{EN} = 1.6V		50		μA
Thermal shutdown temperature *3	T_{TSD}	Junction temperature		170		°C
TSD hysteresis *3	T_{HYS}			30		°C

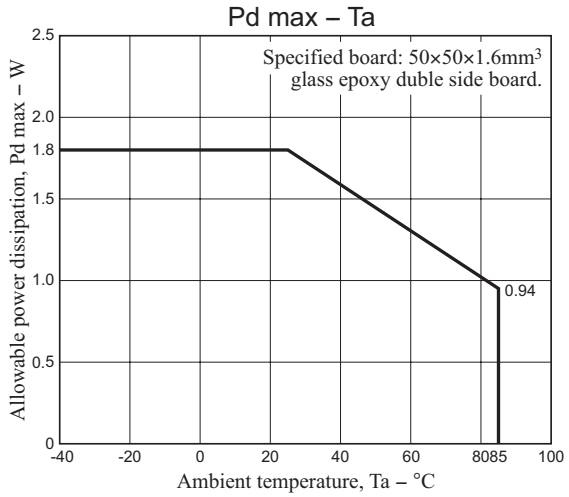
*3. Design guarantee value, Do not measurement.

Package Dimensions

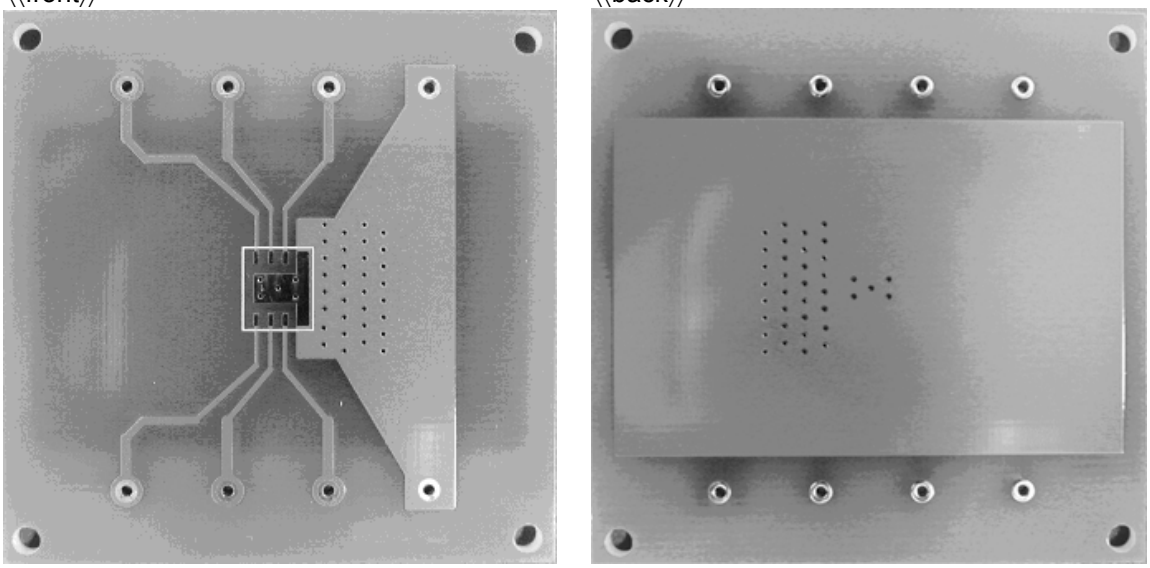
unit : mm (typ)

3439



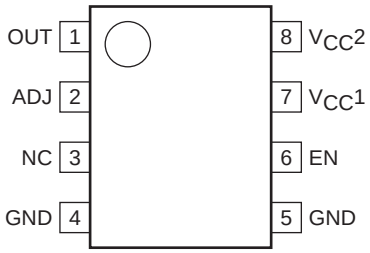


〈〈front〉〉 〈〈back〉〉



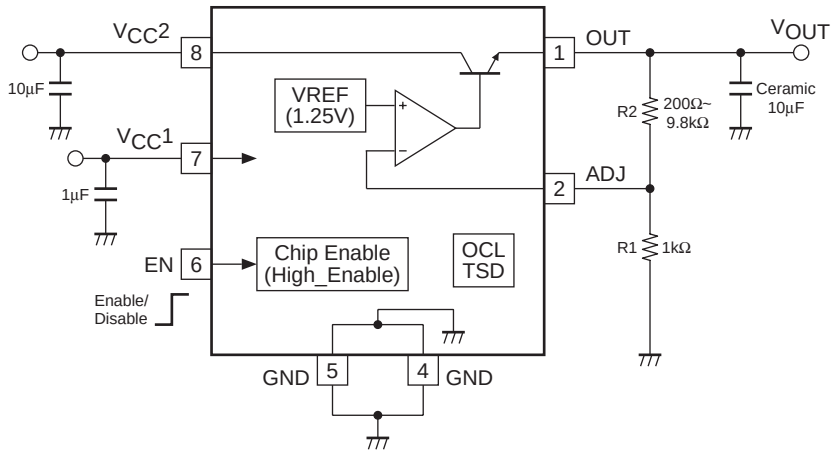
Specification of evaluation board: 50mm × 50mm × 1.6tmm, glass epoxy, double side board

Pin Assignment



Top view

Block Diagram and Application Circuit Example



Formula of Output Voltage Adjustment

V_{OUT} = VADJ (≈1.25V) × (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:

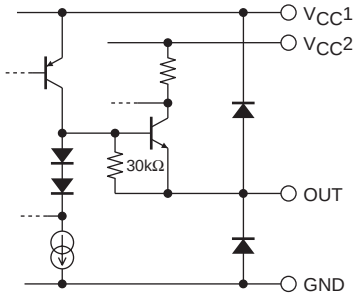
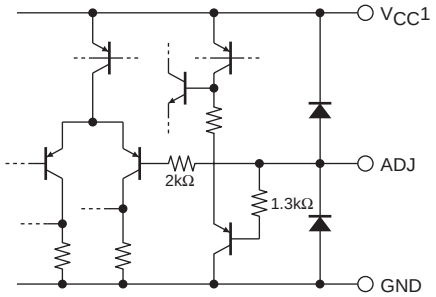
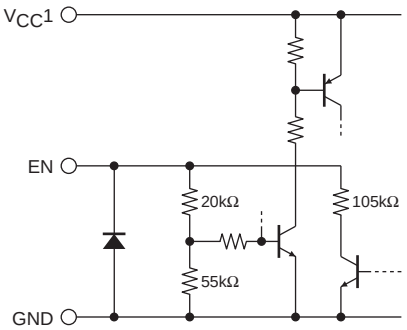
(1) Start the IC by turning on and off the EN pin after applying power to $V_{CC}1$ and $V_{CC}2$.

(2) Short circuit the $V_{CC}1$, $V_{CC}2$, and EN pins.

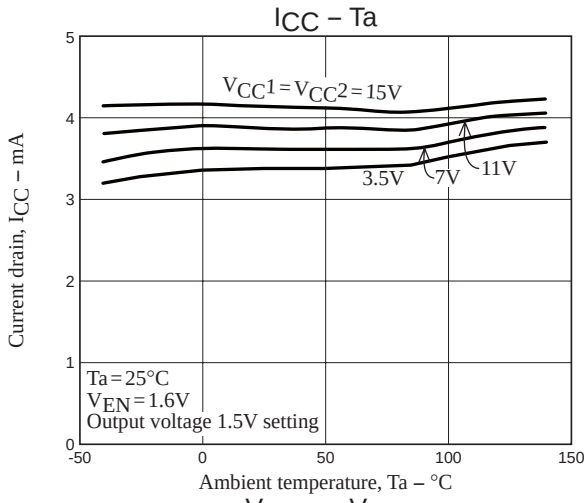
When using method (1), apply power to $V_{CC}1$ and $V_{CC}2$ simultaneously, or in the order of $V_{CC}1$ to $V_{CC}2$, then to the EN pin.

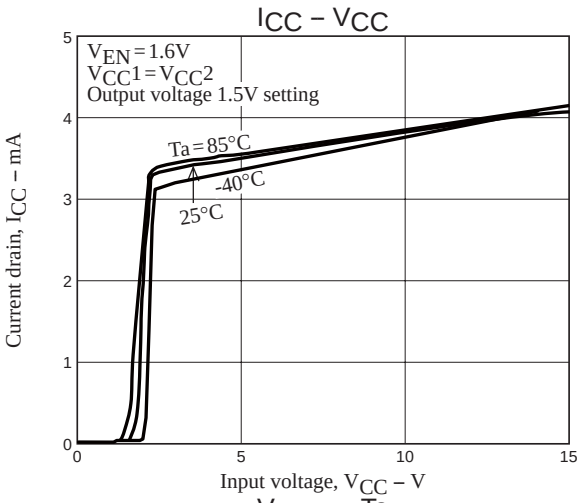
To shutdown the IC, follow the start-up procedure in reverse order.

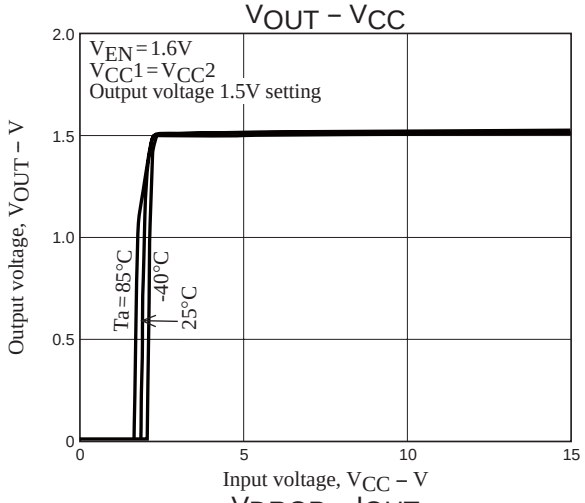
Pin Function

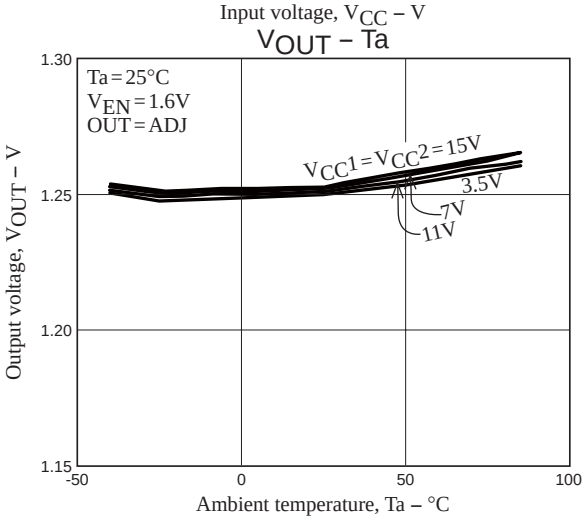
Pin No.	Pin name	Function	Equivalent circuit
1	OUT	Output.	
2	ADJ	Adjustable input.	
3	NC	No connection.	
4	GND	Ground. Connect to Pin 5 internally.	
5	GND	Ground. Connect to Pin 4 internally.	
6	EN	Chip Enable. (High Enable)	
7	$V_{CC}1$	Analog power supply.	
8	$V_{CC}2$	Output power supply.	

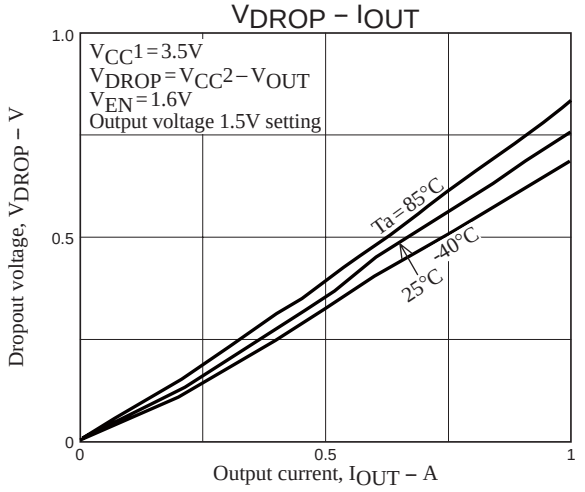
*4 When you use this IC, Please short-circuit Exposed-Pad and GND-pin on the IC mounting side.

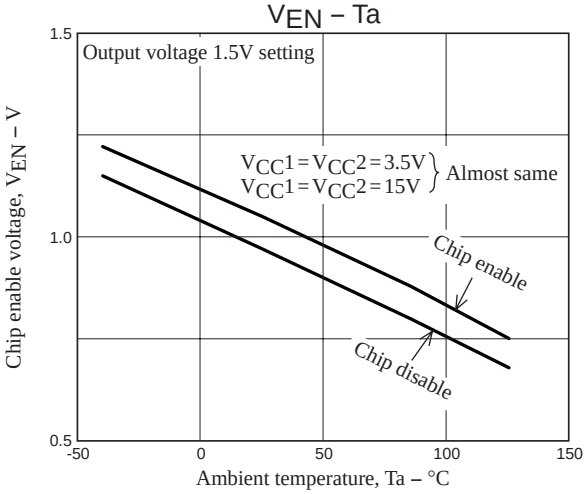

ICC – Ta
VCC1 = VCC2 = 15V
3.5V
7V
11V
Ta = 25°C
VEN = 1.6V
Output voltage 1.5V setting
Current drain, ICC – mA
Ambient temperature, Ta – °C

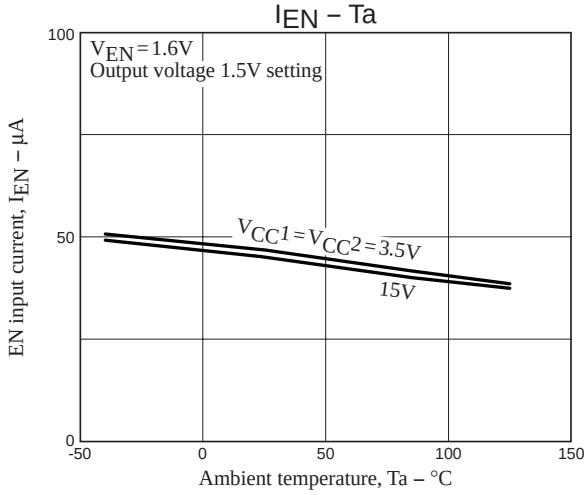

ICC – VCC
VEN = 1.6V
VCC1 = VCC2
Output voltage 1.5V setting
Ta = 85°C
-40°C
25°C
Current drain, ICC – mA
Input voltage, VCC – V


VOUT – VCC
VEN = 1.6V
VCC1 = VCC2
Output voltage 1.5V setting
Ta = 85°C
-40°C
25°C
Output voltage, VOUT – V
Input voltage, VCC – V

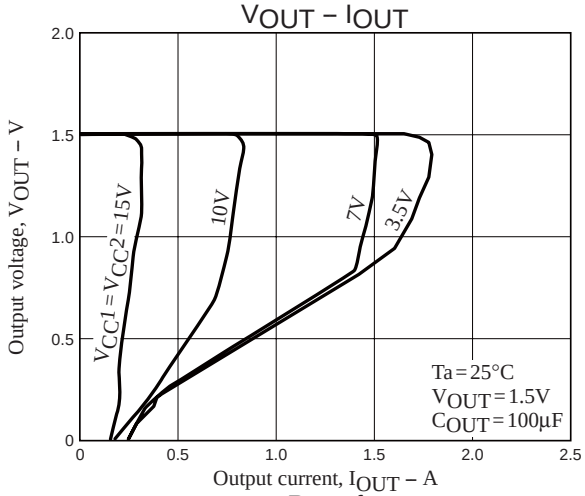

VOUT – Ta
Ta = 25°C
VEN = 1.6V
OUT = ADJ
VCC1 = VCC2 = 15V
3.5V
7V
11V
Output voltage, VOUT – V
Ambient temperature, Ta – °C


VDROP – IOUT
VCC1 = 3.5V
VDROP = VCC2 – VOUT
VEN = 1.6V
Output voltage 1.5V setting
Ta = 85°C
-40°C
25°C
Dropout voltage, VDROP – V
Output current, IOUT – A

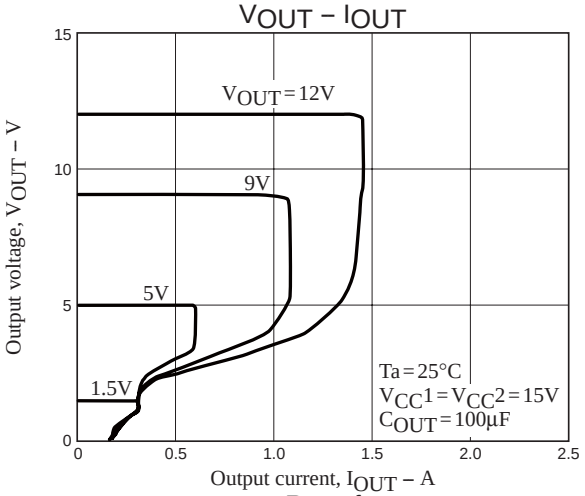

VEN – Ta
Output voltage 1.5V setting
VCC1 = VCC2 = 3.5V
VCC1 = VCC2 = 15V
Almost same
Chip enable
Chip disable
Chip enable voltage, VEN – V
Ambient temperature, Ta – °C


IEN – Ta
VEN = 1.6V
Output voltage 1.5V setting
VCC1 = VCC2 = 3.5V
15V
EN input current, IEN – µA
Ambient temperature, Ta – °C

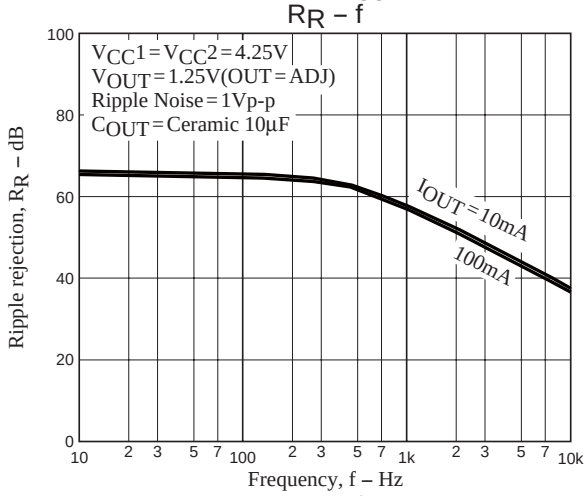
V_{OUT} – I_{OUT}



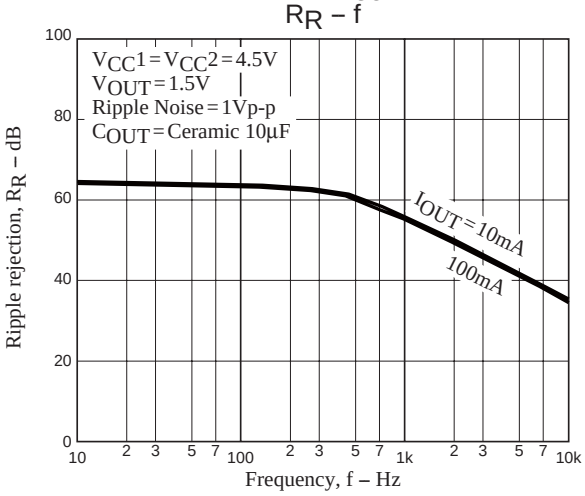
V_{OUT} – I_{OUT}



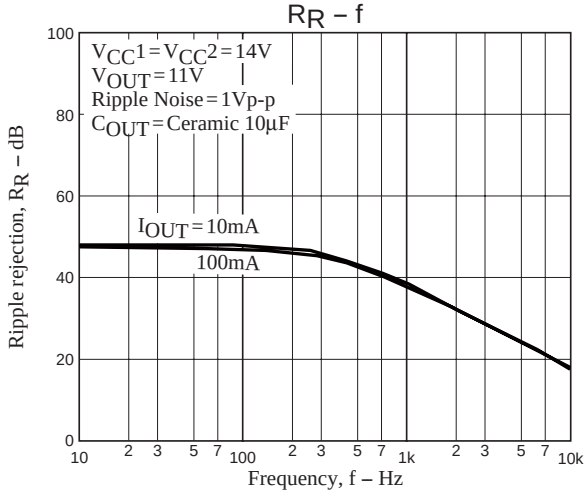
R_R – f



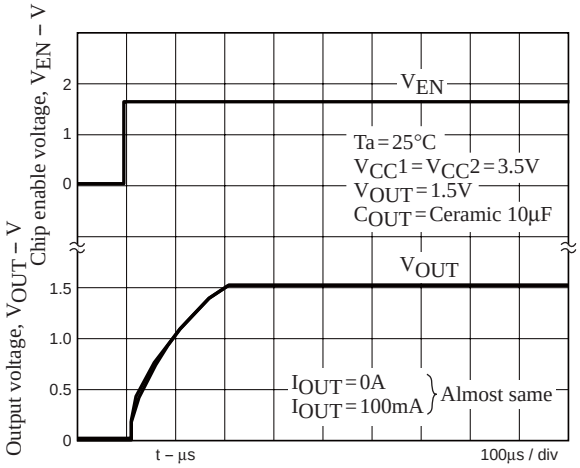
R_R – f

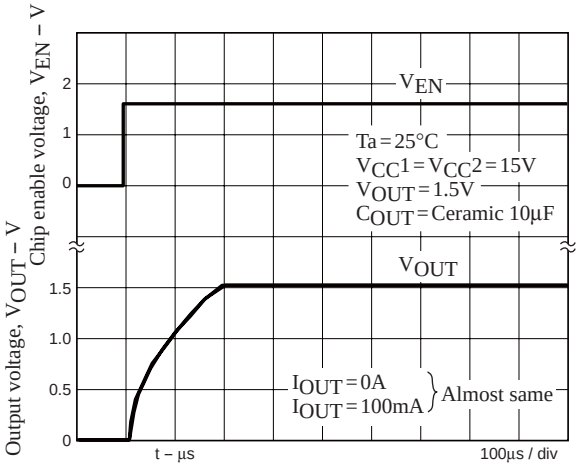


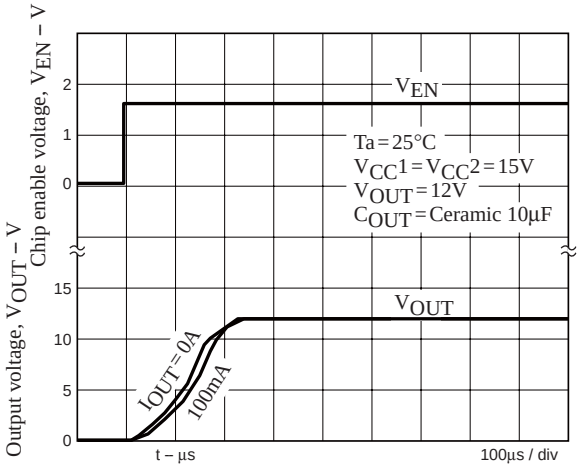
R_R – f

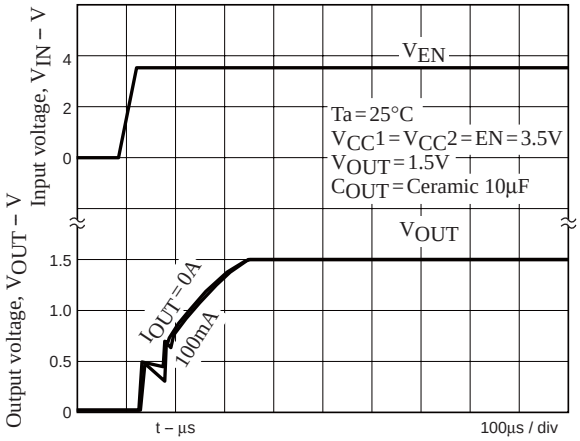


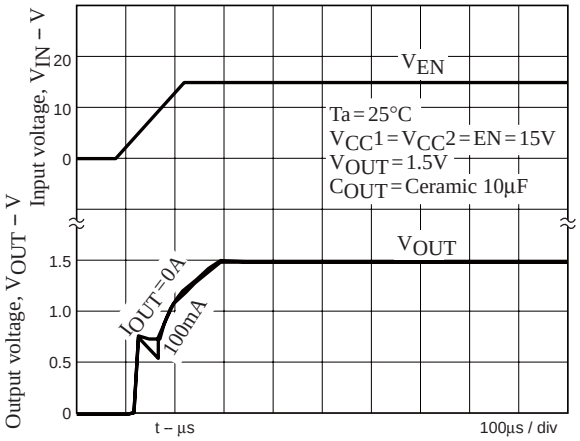
V_{OUT} Startup Characteristic



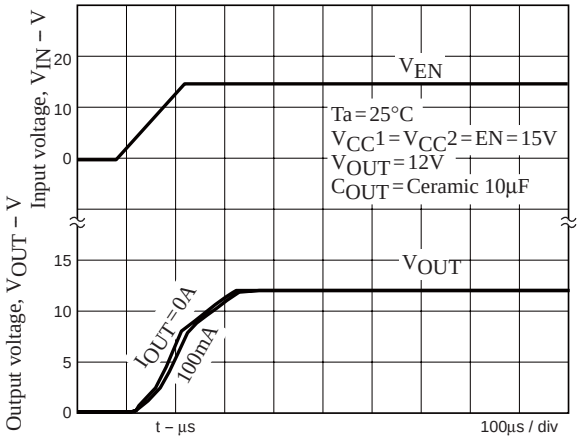








Note: The output voltage (V_{OUT}) may overshoot when V_{IN} starts up with slew rate of a voltage of 0.1V/µs or over.



Load Transient Response Characteristics