

Regulator with ON/OFF

Monolithic IC MM3051□~MM3055□U

Outline

This IC is a low current consumption (1.5μA typ.), ultra-small CMOS regulator with ON/OFF control function. The ON/OFF control pin logic for MM3051H ~ MM3055F and MM3051T ~ MM3055R is reversed.

Features

- | | |
|--|--|
| 1. I/O voltage difference (MM3054□~ MM3055□) | 25mV typ. ($I_o=1\text{mA}$) |
| 2. Current consumption | 1.5μA typ. ($V_{IN}=V_O+2\text{V}$) |
| 3. Output current | 80mA min. ($V_{IN}-V_{OUT}=2\text{V}$) |
| 4. Output voltage rank | 1.7~5.5V (0.1V step) |
| 5. Output ON/OFF control function | High: ON, Low: OFF (MM3051H~MM3055F)
High: OFF, Low: ON (MM3051T~MM3055R) |

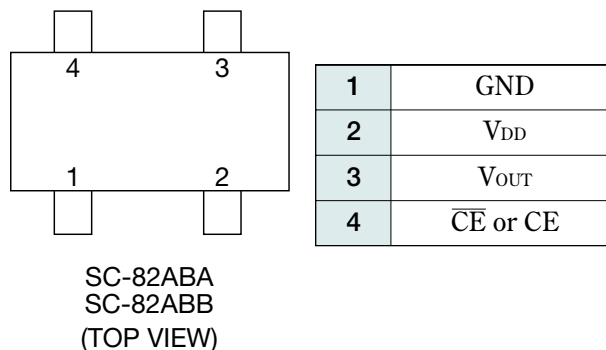
Package

- SC-82ABA
- SC-82ABB

Applications

1. Portable equipment
2. Cellular telephone, PHS
3. Cordless telephone
4. Other battery-powered portable equipment

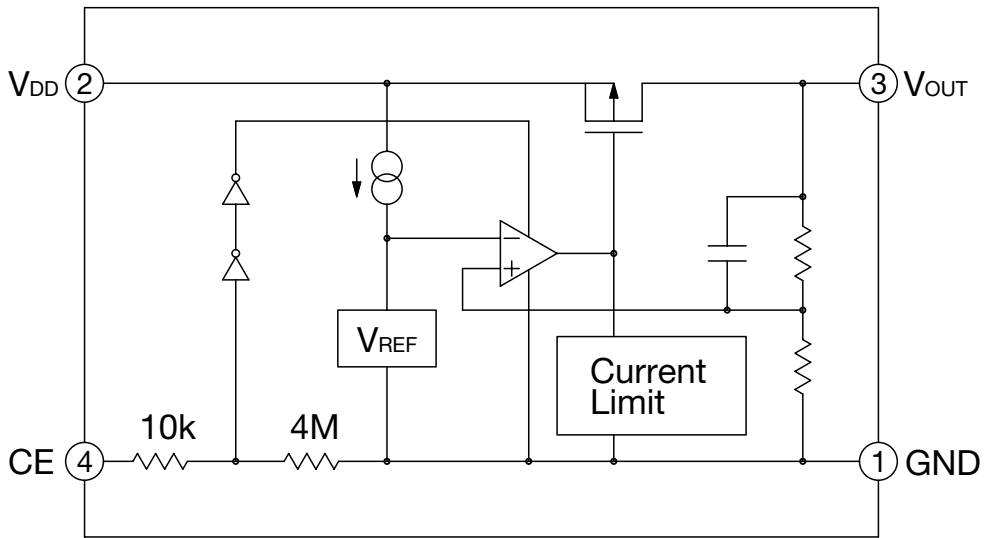
Pin Assignment



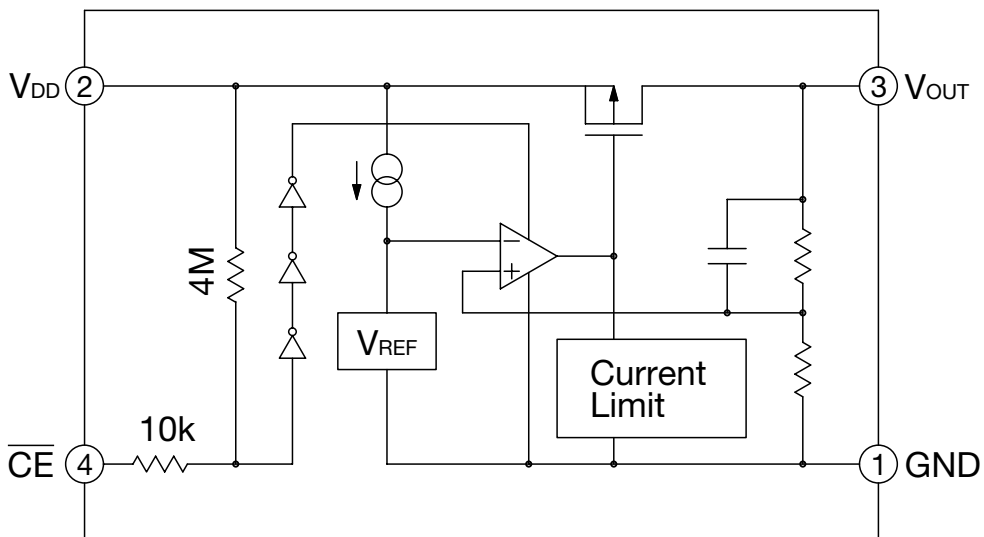
The ON/OFF control pin logic for MM3051H ~ MM3055F and MM3051T ~ MM3055R is reversed

Equivalent Circuit Diagram

MM3051H ~ MM3055FU



MM3051T ~ MM3055RU



Pin Description

Pin No.	Pin name	Function
1	GND	GND Pin
2	V _{DD}	Voltage supply pin
3	V _{OUT}	Regulator output voltage pin
4	\overline{CE} or CE	Output voltage ON/OFF-Control pin
		MM3051T~MM3055R
		MM3051H~MM3055F
		Connect \overline{CE} pin with GND pin, when it is not used. Connect the CE pin to V _{DD} when not using it.

Absolute Maximum Ratings (Except where noted otherwise, Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-40~+125	°C
Operating temperature	T _{OPR}	-30~+85	°C
Supply voltage	V _{DD}	-0.3~+9	V
Output current	I _{OUT}	150	mA
Allowable loss	P _d	150 (Alone)	mW

Recommended Operating Conditions (Except where noted otherwise, Ta=25°C)

Item	Symbol	Ratings	Units
Operating temperature	T _{OP}	-30~+85	°C
Supply voltage	V _{OP}	V _{OUT} +0.3~8	V

Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{CE}=V_{IN})

■ MM3051H ~ MM3055FU

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply current	I _{SS}	V _{IN} =V _{OUT} +2.0V, Excluding CE Pin Current (I _{CE})		1.5	3.0	μA
Supply current (OFF)	I _{standby}	V _{IN} =V _{OUT} +2.0V, V _{CE} =V _{IN}		0.1	1.0	μA
Line regulation	ΔV _{OUT} /ΔV _{IN}	I _{OUT} =1mA, V _{OUT} +0.5V ≤ V _{IN} ≤ 8V	0	0.05	0.20	%/V
Input voltage	V _{IN}				8.0	V
Vo temperature coefficient	ΔV _{OUT} /ΔV _{opt}	I _{OUT} =10mA -30°C ≤ T _{OPT} ≤ 85°C		±100		ppm/°C
Output short-circuit current	I _{lim}	V _{IN} =V _{OUT} +2.0V, V _{OUT} =0V		60		mA
CE pull down resistance	R _{PD}	V _{IN} =V _{OUT} +2.0V	1.5	4.0	12.0	MΩ
CE high threshold voltage	V _{CEH}	V _{IN} =V _{OUT} +2.0V	1.5			V
CE low threshold voltage	V _{CEL}	V _{IN} =V _{OUT} +2.0V			0.25	V

Note: V_{OUT} is the output voltage typ. value in the specifications.
 Make sure that output current does not exceed loss tolerance.

■ MM3051T ~ MM3055RU (Except where noted otherwise, Ta=25°C, V_{CE}=GND)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply current	I _{SS}	V _{IN} =V _{OUT} +2.0V, Excluding CE Pin Current (I _{CE})		1.5	3.0	μA
Supply current (OFF)	I _{standby}	V _{IN} =V _{OUT} +2.0V, V _{CE} =V _{IN}		0.1	1.0	μA
Line regulation	ΔV _{OUT} /ΔV _{IN}	I _{OUT} =1mA, V _{OUT} +0.5V ≤ V _{IN} ≤ 8V	0	0.05	0.20	%/V
Input voltage	V _{IN}				8.0	V
Vo temperature coefficient	ΔV _{OUT} /ΔV _{opt}	I _{OUT} =10mA -30°C ≤ T _{OPT} ≤ 85°C		±100		ppm/°C
Output short-circuit current	I _{lim}	V _{IN} =V _{OUT} +2.0V, V _{OUT} =0V		60		mA
CE pull up resistance	R _{PU}	V _{IN} =V _{OUT} +2.0V	1.5	4.0	12.0	MΩ
CE high threshold voltage	V _{CEH}	V _{IN} =V _{OUT} +2.0V	1.5			V
CE low threshold voltage	V _{CEL}	V _{IN} =V _{OUT} +2.0V			0.25	V

Note: V_{OUT} is the output voltage typ. value in the specifications.
 Make sure that output current does not exceed loss tolerance.

Electrical Characteristics 2 High Active (Except where noted therwise, Ta=25°C, VIN=VCE)

■ MM3051H ~ MM3055FU

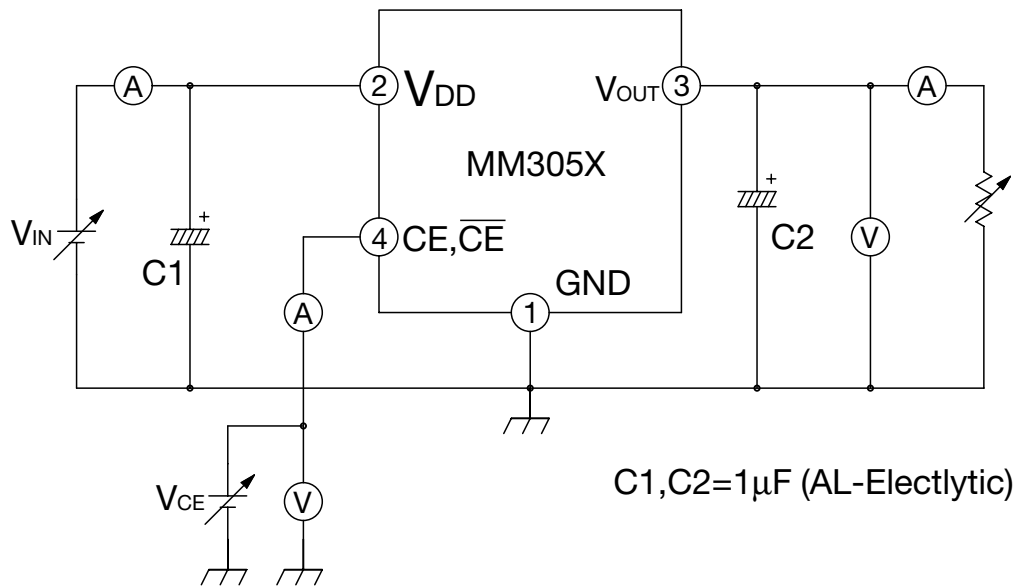
Product name	Item												
	Output voltage			Output current			Load regulation			Input-Output differential voltage			
	V _{OUT} (V)			I _{OUT} (mA)			ΔV _{OUT} /ΔI _{OUT} (mV)			V _{DIF} (mV)			
	Test Condisions	Min.	Typ.	Max.	Test condisions	Min.	Typ.	Test condisions	Typ.	Max.	Test condisions	Typ.	Max.
MM3051H	VIN-VOUT =2.0V 10μA ≤ IOUT ≤ 10mA	1.666	1.700	1.734	VIN-VOUT =2.0V	35		VIN-VOUT =2.0V 1mA ≤ IOUT ≤ 35mA	30	45		60	90
MM3051J													
MM3051K													
MM3052A													
MM3052B													
MM3052C													
MM3052D													
MM3052E													
MM3052F													
MM3052G													
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MM3054H													
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MM3054K													
MM3055A													
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MM3055C													
MM3055D													
MM3055E													
MM3055F													

Electrical Characteristics 3 Low Active (Except where noted otherwise, Ta=25°C, VCE=GND)

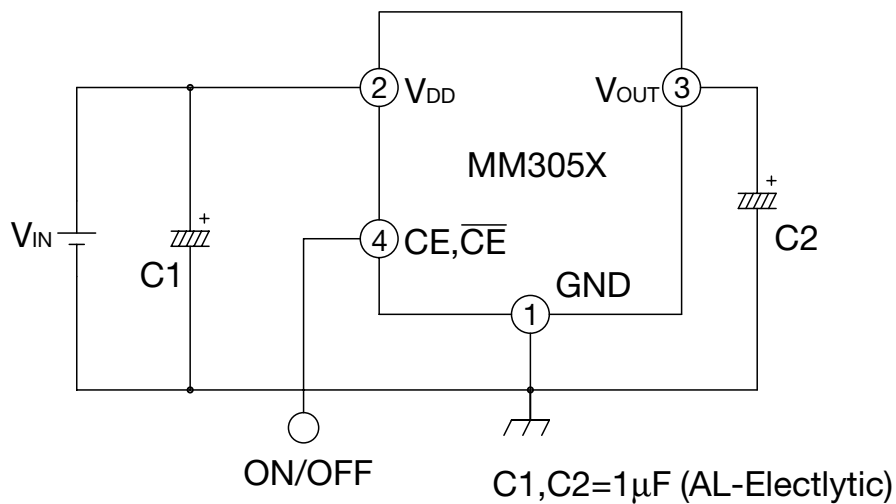
MM3051T ~ MM3055RU

Product name	Item												
	Output voltage			Output current			Load regulation			Input-Output differential voltage			
	V _{OUT} (V)			I _{OUT} (mA)			ΔV _{OUT} /ΔI _{OUT} (mV)			V _{DIF} (mV)			
	Test conditions	Min.	Typ.	Max.	Test conditions	Min.	Typ.	Test conditions	Typ.	Max.	Test conditions	Typ.	Max.
MM3051T	V _{IN} -V _{OUT} =2.0V 10μA ≤ I _{OUT} ≤ 10mA	1.666	1.700	1.734	V _{IN} -V _{OUT} =2.0V	35		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 35mA	30	45		60	90
MM3051U													
MM3051V													
MM3052L													
MM3052M													
MM3052N													
MM3052P													
MM3052Q													
MM3052R													
MM3052S													
MM3052T													
MM3052U													
MM3052V													
MM3053L													
MM3053M													
MM3053N													
MM3053P													
MM3053Q													
MM3053R													
MM3053S													
MM3053T													
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MM3053V													
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MM3054Q													
MM3054R													
MM3054S													
MM3054T													
MM3054U													
MM3054V													
MM3055L													
MM3055M													
MM3055N													
MM3055P													
MM3055Q													
MM3055R													
						50		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 50mA	40	60		35	55
						65		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 65mA	50	70		25	40
						80		V _{IN} -V _{OUT} =2.0V 1mA ≤ I _{OUT} ≤ 80mA	60	90			

Measuring Circuit



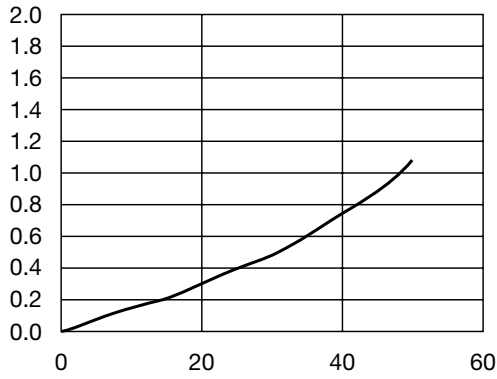
Typical Application Circuit



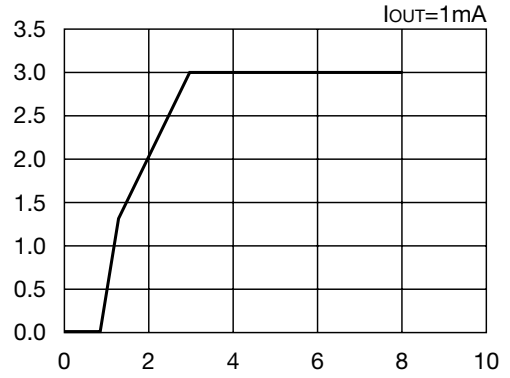
note: This regulator is not internally compensated and thus require an external output-capacitor (C_{out}) for stability.

Characteristics (3.0V product except where noted therwise, Ta=25°C)

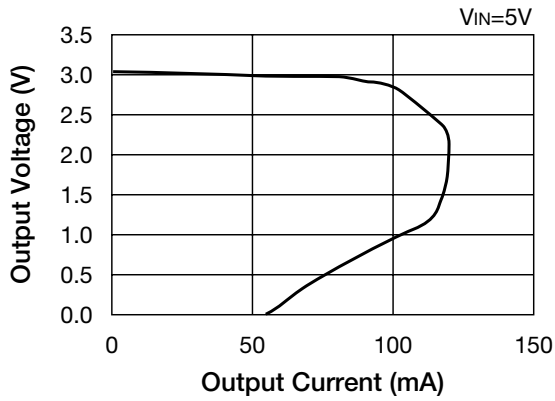
■ Input-Output Differential Voltage



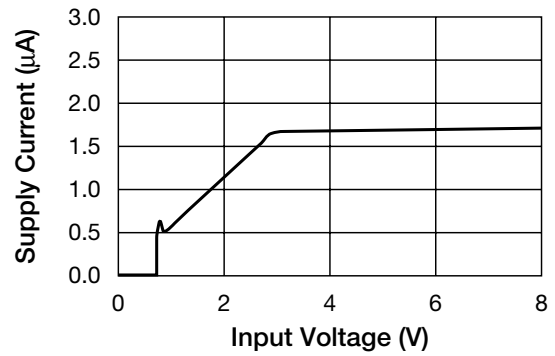
■ Line Regulation



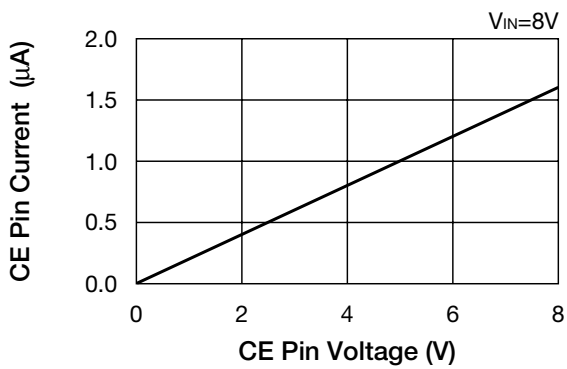
■ Load Regulation



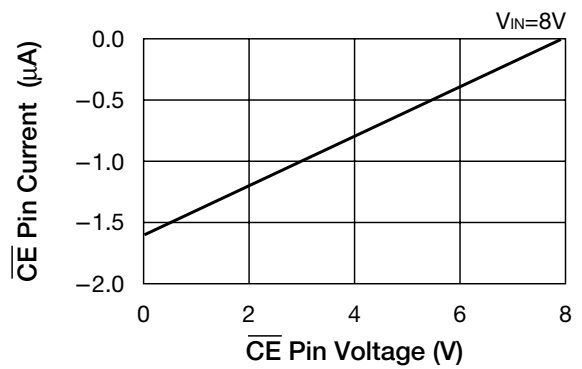
■ Supply Current



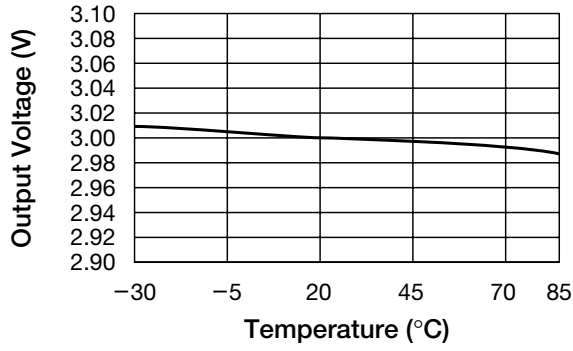
■ CE Pin Current VS CE Pin Voltage High Active



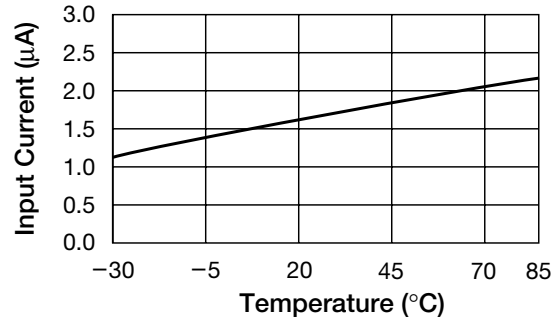
■ CE Pin Current VS CE Pin Voltage Low Active



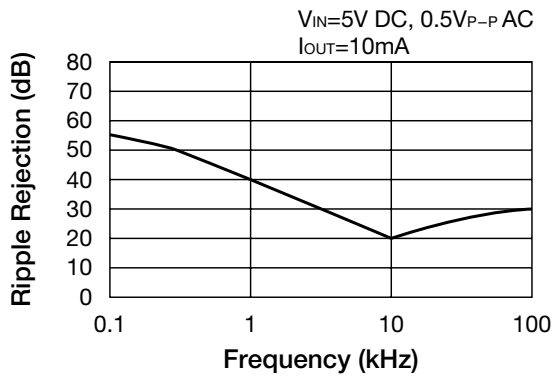
■ Output Voltage VS Temperature



■ Input Current VS Temperature



■ Ripple Rejection



■ Allowable Loss

