

150mA CMOS Regulator

Monolithic IC MM3081JL□□~MM3085AL□□

Outline

This IC is a CMOS regulator with an even smaller package than the conventional product. Characteristics also have been greatly improved, and high stability is achieved with the ultra-low drop voltage characteristic.

Features

1. Supports lead-free soldering.
2. Supports smaller output capacitor (1μF ceramic capacitor).
3. Input/output voltage difference 60mV when $I_o = 150\text{mA}$
4. High precision output voltage $\pm 2\%$
5. High output voltage stability, input fluctuation 0.005%/V load fluctuation 0.0004%/mA
6. Built-in output ON/OFF switch

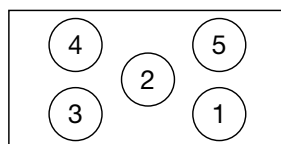
Package

WLCSP-5B

Applications

1. Mobile phones, PHS
2. Office equipment
3. AV equipment
4. Portable devices

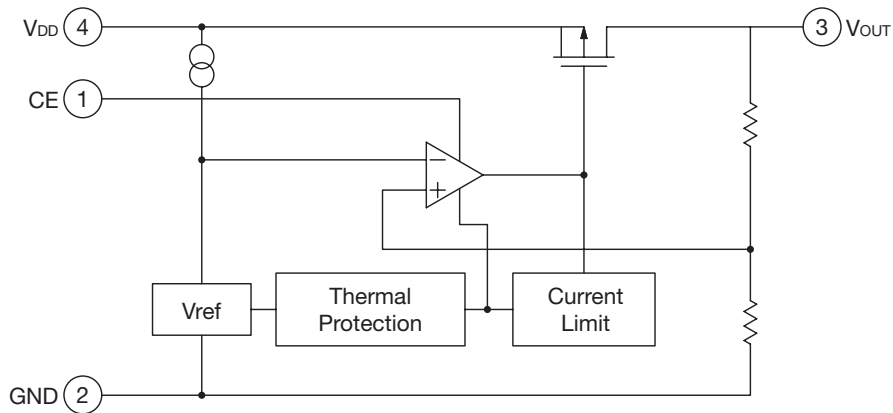
Pin Assignment



WLCSP-5B
(BOTTOM VIEW)

1	CE
2	GND
3	V _{OUT}
4	V _{DD}
5	NC

Block Diagram



Pin Description

Pin no.	Pin name	Pin Description	
1	CE	ON/OFF-control pin	
		CONT	V _{OUT}
		L	OFF
		H	ON
		Connect CE pin with V _{DD} pin, When it is not used.	
2	GND	CND pin	
3	V _{OUT}	Output pin	
4	V _{DD}	Voltage-supply pin	
5	NC		

Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-40~+150	°C
Operating temperature	T _{OPR}	-40~+85	°C
Supply voltage	V _{DD}	-0.3~+6.5	V
Output current	I _{o max}	200	mA
Allowable loss	Pd	244 (Not attached)	mW
		900 (★)	

Note: ★ With the double sided PC Board of glass epoxy. (Copper plane70%, 25 X25 X1.6mm)

Recommended Operating Conditions (Ta=25°C)

Item	Symbol	Ratings	Units
Operating junction voltage	T _{JOP}	-40~125	°C
Output current	I _o	0~150	mA
Operating voltage	V _{OP}	2.5~6	V

Electrical Characteristics (Except where noted otherwise, $T_a=25^\circ\text{C}$, $V_{DD}=V_o$ typ.+0.5V, $I_o=1\text{mA}$, $V_{CE}=1.4\text{V}$)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Input current (OFF) *1	I_{DDOFF}	$V_{CE}=0.4\text{V}$		0.0	1.0	μA
No-load input current *1	I_{Q1}	$I_o=0\text{mA}$		60	130	μA
		$T_j=-40\sim 125^\circ\text{C}$			150	
Quiescent current *1	I_{Q2}	$I_o=0\sim 150\text{mA}$		105	190	μA
		$T_j=-40\sim 125^\circ\text{C}$			200	
Output voltage *1	V_o		$\times 0.98$		$\times 1.02$	V
		$T_j=-40\sim 125^\circ\text{C}$	$\times 0.97$		$\times 1.03$	
Line regulation *1	V_{LINE}	$V_{DD}=V_o$ typ.+0.5~6V, $T_j=40\sim 125^\circ\text{C}$		0.005	± 0.10	%/V
Load regulation *1	V_{LOAD}	$I_o=1\sim 150\text{mA}$, $T_j=-40\sim 125^\circ\text{C}$		0.0004	0.002	%/mA
Ripple rejection 1 *2	RR1	$f=1\text{kHz}$, $I_o=50\text{mA}$, $V_{DD}=V_o+0.2\text{V}$ $V_{RIPPLE}=1\text{V}$		60		dB
Ripple rejection 2 *2	RR2	$f=10\text{kHz}$, $I_o=50\text{mA}$, $V_{DD}=V_o+0.2\text{V}$ $V_{RIPPLE}=1\text{V}$		50		dB
Output noise voltage *2	V_{N1}	$f_{BW}=10\sim 100\text{kHz}$		30		μV_{rms}
Output short-circuit current	I_{lim}	$V_o=0\text{V}$		200		mA
CE input current	I_{CE}	$V_{CE}=0.4$, $V_{DD}=6\text{V}$		± 1		nA
CE high threshold voltage	V_{CEH}	$V_{DD}=2.5\sim 6\text{V}$	1.4		V_{DD}	V
CE low threshold voltage	V_{CEL}	$V_{DD}=2.5\sim 6\text{V}$	0		0.4	V
Turn-On time *2	T_{ON}			100		μs
Output capacitor	C_o		1		20	μF
Equivalent series resistance	ESR		5		500	m Ω

Note 1: *1 Limits over the operating temperature range are guaranteed through correlation using Statistical Quality Control (SQC) methods.

Note 2: *2 The parameter is guaranteed by design.

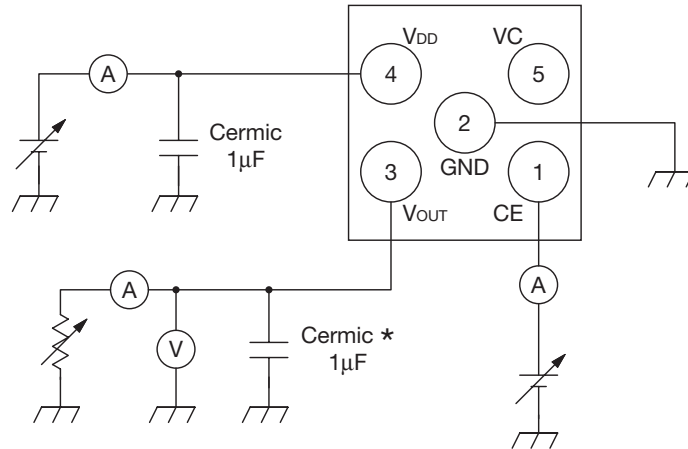
Electrical Characteristics (Output voltage another chapter) (Except where noted otherwise, Ta=25°C, VDD=Vo typ.+0.5V, Io=1mA, VCE=1.4V)

Product name	Item												
	Output voltage			Drop voltage 1 *1			Drop voltage 2 *1			Drop voltage 3 *1			
	VOUT (V)			VIO1 (mV)			VIO2 (mV)			VIO3 (mV)			
	Test condition	Min.	Typ.	Max.	Test condition	Typ.	Max.	Test condition	Typ.	Max.	Test condition	Typ.	Max.
MM3081J	1.764	1.800	1.836										
MM3081K	1.862	1.900	1.938										
MM3082A	1.960	2.000	2.040										
MM3082B	2.058	2.100	2.142										
MM3082C	2.156	2.200	2.244										
MM3082D	2.254	2.300	2.346										
MM3082E	2.352	2.400	2.448										
MM3082F	2.450	2.500	2.550										
MM3082G	2.548	2.600	2.652										
MM3082H	2.646	2.700	2.754										
MM3082J	2.744	2.800	2.856										
MM3082K	2.842	2.900	2.958										
MM3083A	2.940	3.000	3.060	*2			*2			*2			
MM3083B	3.038	3.100	3.162										
MM3083C	3.136	3.200	3.264	IOUT=50mA	20	35	IOUT=100mA	45	70	IOUT=150mA	60	100	
MM3083D	3.234	3.300	3.366	Tj=			Tj=			Tj=			
MM3083E	3.332	3.400	3.468	-40~125°C			-40~125°C			-40~125°C			
MM3083F	3.430	3.500	3.570										
MM3083G	3.528	3.600	3.672										
MM3083H	3.626	3.700	3.774										
MM3083J	3.724	3.800	3.876										
MM3083K	3.822	3.900	3.978										
MM3084A	3.920	4.000	4.080										
MM3084B	4.018	4.100	4.182										
MM3084C	4.116	4.200	4.284	*2			*2			*2			
MM3084D	4.214	4.300	4.386										
MM3084E	4.312	4.400	4.488	IOUT=50mA	25	45	IOUT=100mA	50	85	IOUT=150mA	70	120	
MM3084F	4.410	4.500	4.590	Tj=			Tj=			Tj=			
MM3084G	4.508	4.600	4.692	-40~125°C			-40~25°C			-40~125°C			
MM3084H	4.606	4.700	4.794										
MM3084I	4.704	4.800	4.896										
MM3084K	4.802	4.900	4.998										
MM3085A	4.900	5.000	5.100										

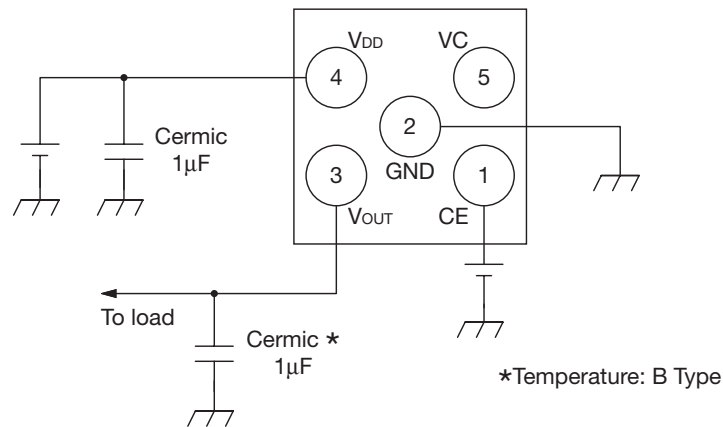
Note 1: *1 Limits over the operating temperature range are guaranteed through correlation using Statistical Quality Control (SQC) methods.

Note 2: *2 Dropout Voltage is the input-to-output voltage difference at which the output voltage is 100mV below its nominal value. This specification dose not apply for input voltage below 2.5V.

Measuring Circuit



Application Circuit



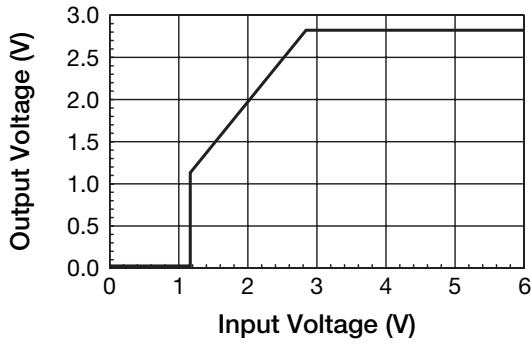
(The example of external part reference)
 Input capacitor Cermic capacitor 1µF
 Output capacitor Cermic capacitor 1µF

Note

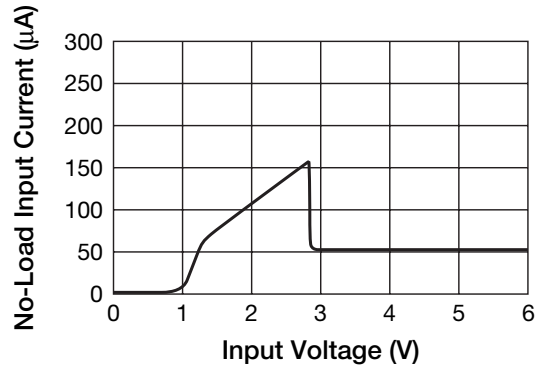
1. The output capacitor is required between output and GND to prevent oscillation.
2. The ESR of capacitor must be defined in ESR stability area.
 It is possible to use a ceramic capacitor without ESR resistance for output.
 The ceramic capacitor must be used more than 1µF and B type temperature characteristics.
3. The wire of V_{CC} and GND is required to print full ground plane for noise and stability.
4. The input capacitor must be connected a distance of less than 1cm from input pin.

Characteristics (Except where noted otherwise, $T_a=25^\circ\text{C}$)

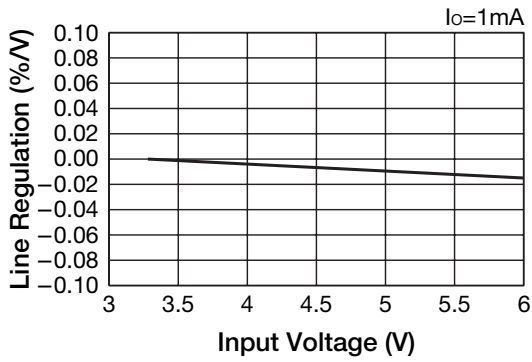
Output Voltage



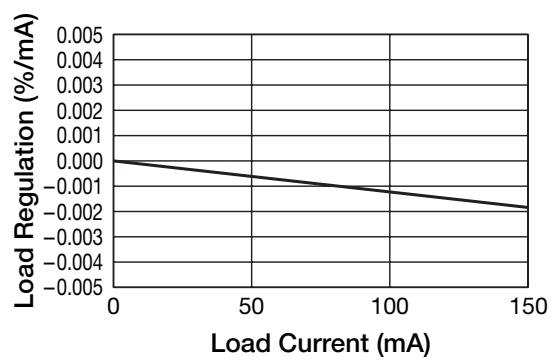
No-Load Input Current



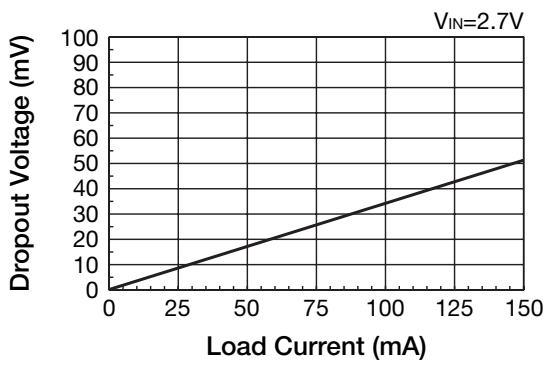
Line Regulation



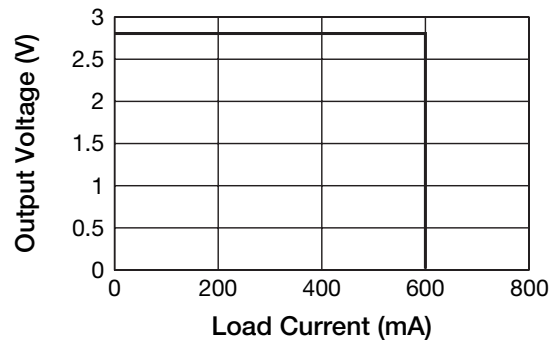
Load Regulation



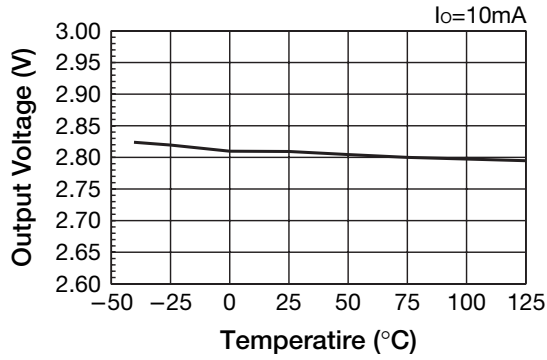
Dropout Voltage – Load Current



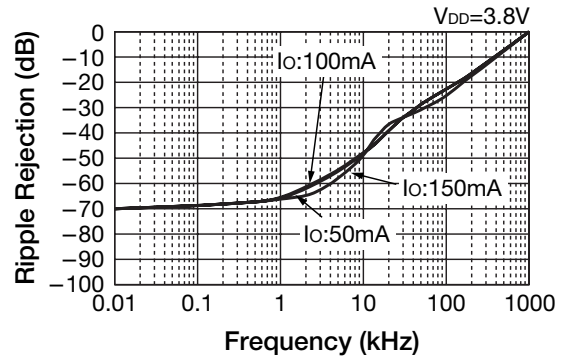
Current Limit



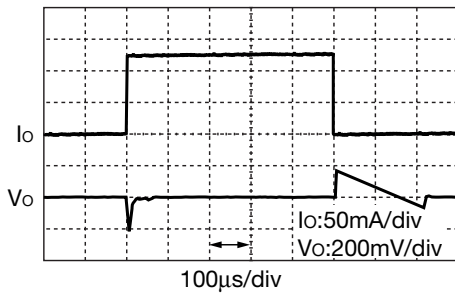
■ Output Voltage – Temperature



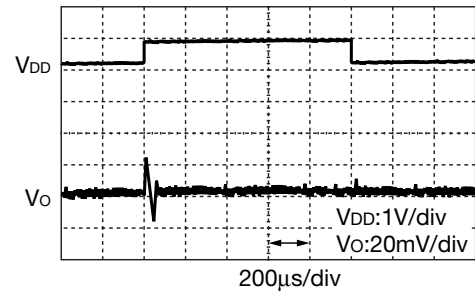
■ Ripple Rejection



■ Load Transient Response ($I_o = 1\text{mA} \rightarrow 125\text{mA}$, $C_o = 1.0\mu\text{F}$)



■ Load Transient Response ($V_{DD} = 3.3\text{V} \rightarrow 3.8\text{V}$)



■ Start Up Time ($V_{DD} = V_o + 0.5$, $V_{CE} = 0 \rightarrow 2\text{V}$, $I_o = 50\text{mA}$)

