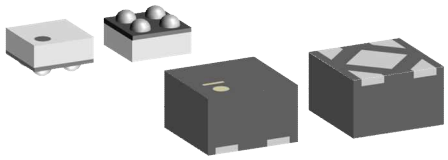
MITSUMI

PRELIMINARY

250mA Ultra Low Noise LDO

MM3847 series



Outline

The MM3847 is ultra low noise LDO capable of supplying 250mA output current. Designed to meet the requirements of RF circuits, Image sensor and high resolution audio codec, the MM3847 device provides low noise, High PSRR. It is available in WLCSP (0.65 mm×0.65 mm max.) and PLP-4 (1.0mm×1.0mm), which are suitable for smartphones, wireless earphones and wearable devices.

Features

■ Ultra low output voltage noise	10uV$_{RMS}$
■ High PSRR	82dB at 1kHz
■ Low Iq	13uA at no-load
■ Low dropout	110mV (typ) at 250mA (V_{OUT}=2.8V)
■ Operating input voltage range	2.2V to 5.5V
■ Output voltage range	1.2V to 4.5V
■ Output voltage accuracy	±2% at I_O=1mA to 250mA
■ Output capacitor for stable operation	Ceramic 1.0uF (min)
■ Output capacitor auto discharge function	
■ Very small package	

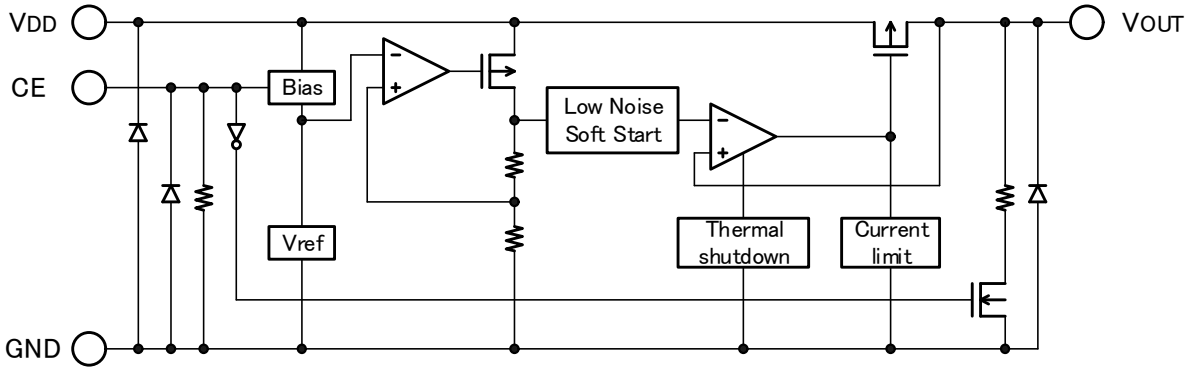
Package type

- WLCSP-4 0.65mm × 0.65mm max, t=0.4mm max
- PLP-4 1.00mm × 1.00mm, t=0.6mm max

Applications

- Smartphones
- Tablets
- Wireless earphones
- Wearable devices
- Digital camera

Block Diagram



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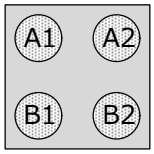
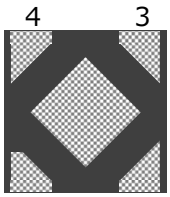
Passion to Create Value through Difference

Package and pin configuration

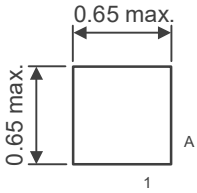
WLCSP-4	Pin No.	Symbol	Function
 Top view	A1	VDD	Regulator input
	A2	VOUT	Regulator output
	B1	CE	Chip enable
	B2	GND	Ground

PLP-4	Pin No.	Symbol	Function
 Top view	1	VOUT	Regulator output
	2	GND	Ground
	3	CE	Chip enable
	4	VDD	Regulator input

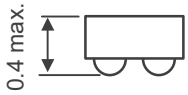
Package dimensions

■ **WLCSP-4**

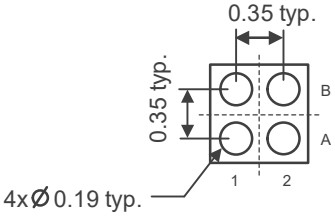
Top View



Side View



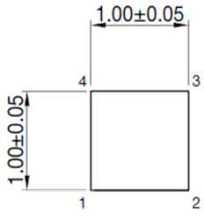
bottom View



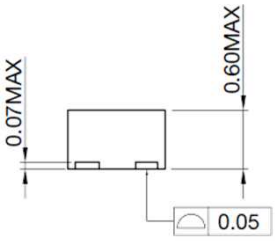
Unit:mm

■ **PLP-4**

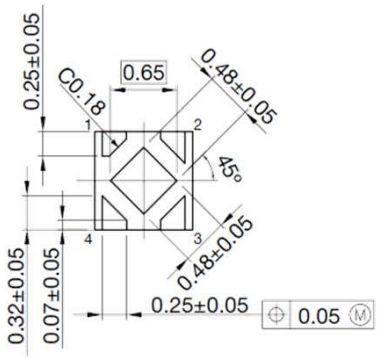
Top View



Side View



bottom View



Unit:mm

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Input voltage	V_{DD}	-0.3	6.0	V
Output voltage	V_{OUT}	-	VDD+0.3	V
CE Input voltage	V_{CE}	-	6.0	V
Output current	I_{OUT}	250	-	mA
Junction temperature	T_{jMAX}	-	150	℃
Storage temperature	T_{stg}	-55	150	℃
Power dissipation	Pd	-	TBD	mW

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Unit
Operating ambient temperature	T_{aopr}	-40	85	℃
Operating junction temperature	T_{jopr}	-40	125	℃
Operating input voltage	V_{DDop}	2.2	5.5	V
CE Operating voltage	V_{CEop}	0	5.5	V

Electrical characteristics

(Unless otherwise specified, Ta=25℃, V_{DD}=V_{OUT}+1V, V_{CE}=1.2V, I_{OUT}=1mA)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input voltage	V_{DD}		2.2	-	5.5	V
Standby current	I_{STBY}	V_{CE}=0.3V(Disabled)	-	0.2	1.0	uA
Quiescent current	I_{DD1}	V_{CE}=1.2V, I_{OUT}=0mA	-	13	25	uA
	I_{DD2}	V_{CE}=1.2V, I_{OUT}=250mA	-	250	425	uA
Output voltage tolerance	V_{OUT}	V_{DD}=V_{OUT}+1V to 5.5V I_{OUT}=1mA to 250mA	-2	-	2	%
		V_{DD}=V_{OUT}+1V to 5.5V I_{OUT}=1mA to 250mA (VOUT<1.8V)	-3	-	3	%
Line regulation	V_{LINE}	V_{DD}=V_{OUT}+1V to 5.5V I_{OUT}=1mA to 250mA	-	0.02	-	%/V
Load regulation	V_{LOAD}	I_{OUT}=1mA to 250mA	-	0.001	-	%/mA
Dropout voltage	V_{DO1}	V_{OUT}=1.8V,I_{OUT}=250mA (WLCSP)	-	TBD	TBD	mV
	V_{DO2}	V_{OUT}=2.8V,I_{OUT}=250mA (WLCSP)	-	110	TBD	mV
	V_{DO3}	V_{OUT}=4.5V,I_{OUT}=250mA (WLCSP)	-	90	TBD	mV

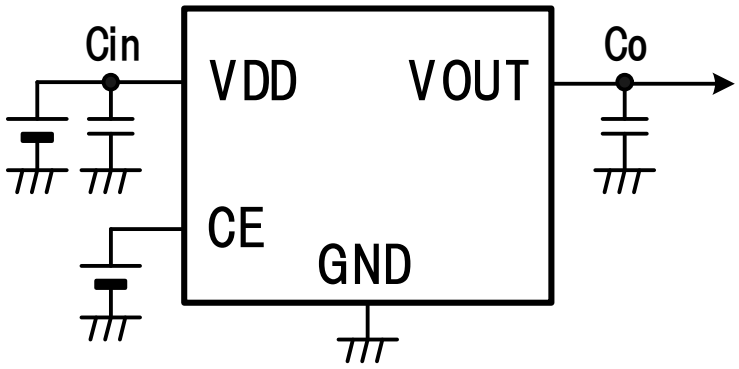
Electrical characteristics

(Ta=25℃, V_{DD}=V_{OUT}+1V, V_{CE}=1.2V, I_{OUT}=1mA, C_O=1uF, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply rejection ratio *Note1	PSRR1	f=1kHz, I_{OUT}=20mA	-	82	-	dB
	PSRR2	f=10kHz, I_{OUT}=20mA	-	65	-	dB
	PSRR3	f=100kHz, I_{OUT}=20mA	-	60	-	dB
Output noise voltage *Note1	V_{n1}	f_{BW}=10Hz to 100kHz I_{OUT}=1mA	-	10	-	uVrms
	V_{n2}	f_{BW}=10Hz to 100kHz I_{OUT}=250mA	-	6.5	-	uVrms
Load current	I_{LOAD}		0	-	250	mA
Maximum output current	I_{OUT_MAX}		250	-	-	mA
Short circuit current	I_{SC}		250	500	-	mA
CE High input threshold	V_{TH_H}	V_{DD}=2.2V to 5.5V	1.2	-	-	V
CE Low input threshold	V_{TH_L}	V_{DD}=2.2V to 5.5V	-	-	0.4	V
CE Input current	I_{CE_H}	V_{CE}=5.5V, V_{DD}=5.5V	-	5.5	-	uA
Turn-on time	t_{ON}	From V_{CE} > V_{TH_H} to V_{OUT}*95%	-	80	150	us
Overshoot on start-up *Note1	V_{OS}		-	-	5	%
Line transient 1 *Note1	$V_{LINE-T1}$	V_{DD}=V_{OUT}+1V to V_{OUT}+1.6V t_r=30us	-1	-	-	mV
Line transient 2 *Note1	$V_{LINE-T2}$	V_{DD}=V_{OUT}+1.6V to V_{OUT}+1V t_f=30us	-	-	1	mV
Load transient 1 *Note1	$V_{LOAD-T1}$	I_{OUT}=1mA to 250mA t_r=10us	-40	-	-	mV
Load transient 2 *Note1	$V_{LOAD-T2}$	I_{OUT}=250mA to 1mA t_f=10us	-	-	40	mV
Thermal shutdown *Note1	TSD	T_j rising	-	160	-	℃
Thermal shutdown hysteresis *Note1	TSD_{HYS}	T_j falling from shutdown	-	15	-	℃
Output discharge resistance	R_{DC}	V_{CE}<V_{TH_L}(Output disabled)	-	230	-	Ω

*Note1:The parameter is guaranteed by design

Typical application circuit



Recommended external parts
・Input capacitor： 1uF
・Output capacitor： 1uF