24V 500mA Ultralow-Quiescent-Current LDO

General Description

The ZC2205 ultra-low quiescent current regulator features low dropout voltage and low current in the standby mode. With less than 1.5μA quiescent current at no load, the ZC2205 is ideally suited for standby micro-control-unit systems, especially for always-on applications like E-meters, fire alarms, smoke detectors and other battery operated systems. The ZC2205 retains all of the features that are common to low dropout regulators including a low dropout PMOS pass device, short circuit protection, and thermal shutdown.

The ZC2205 has a 24-V maximum operating voltage limit, a -40° C to 125° C operating temperature range, and ±2% output voltage tolerance.

Ordering Information

Part Number	Voltage
ZC2205_15	Vout=1.5V
ZC2205_18	Vout=1.8V
ZC2205_25	Vout=2.5V
ZC2205_33	Vout=3.3V
ZC2205_50	Vout=5.0V
ZC2205_XX	Vout can trim from 1.5V to 5.5V, 0.1V/step

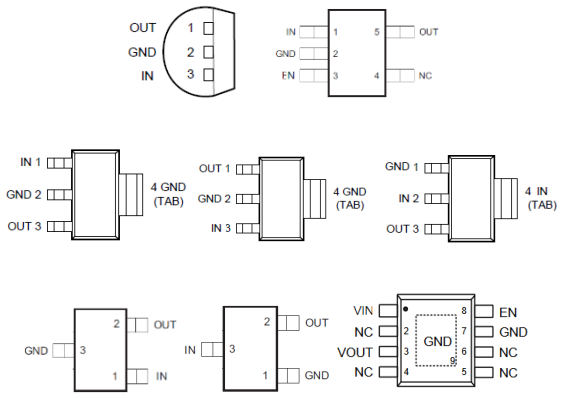
Features

- VIN Range up to 24V
- Output Voltage Tolerances of ±2%
- Output Current of 500 mA
- Ultra Low Quiescent Current (IQ = 1.5 μA)
- Dropout Voltage Typically 24V at IOUT = 500 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Ceramic Capacitor Stable

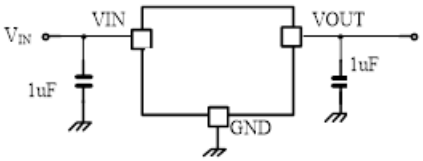
Applications

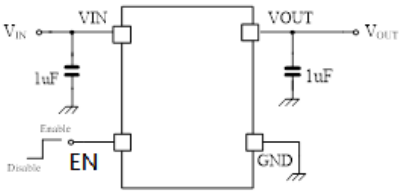
- E-meters, Water Meters and Gas Meters
- Fire Alarm, Smoke Detector
- Appliances and White Goods

Pin Configuration



Typical Application Circuit

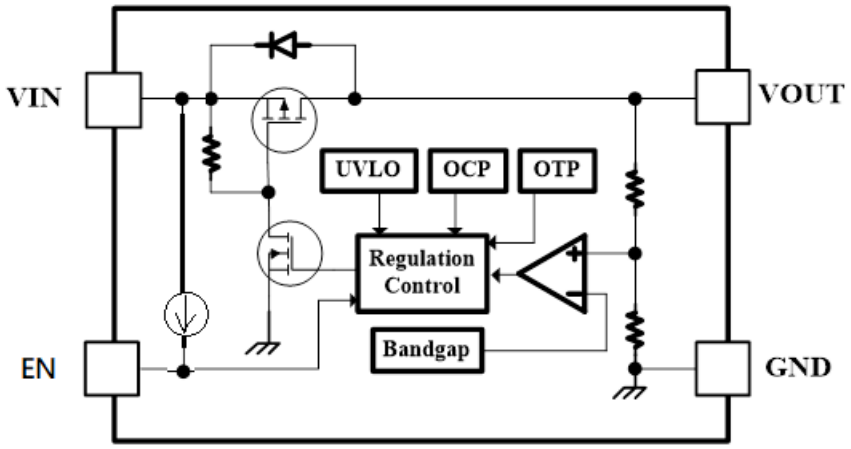




Pin Assignment

Pin Name	Pin No. TO92	Pin No. SOT235	Pin No. SOT223 SOT893	Pin No. SOT223 SOT893	Pin No. SOT233	Pin No. SOT233	Pin No. PSOP8	Pin Function
VOUT	1	5	3	3	2	2	3	Output Voltage Pin
GND	2	2	2,4	1	3	1	7,9	Ground
VIN	3	1	1	2,4	1	3	1	Input Voltage pin.
EN	--	3	--	--	--	--	8	Enable

Function Block Diagram



Absolute Maximum Ratings (Note1)

- V_{IN} ---------- -0.3V to +28V
- Junction Temperature---------- 125°C
- Lead Temperature (Soldering, 10 sec.)---------- 300°C
- Storage Temperature ---------- –65°C to 150°C

Recommended Operating Conditions

- Input Voltage, V_{IN} ---------- +2.7V to +24V
- Junction Temperature ---------- -40°C to 125°C

Electrical Characteristics

V_{IN}=12V, I_{OUT}=1mA, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}		-2%		2%	V
Line Regulation	$\triangle V_{LINE}$	V_{IN}=V_{OUT} + 1V to 24V,		2	12	mV
Load Regulation	$\triangle V_{LOAD}$	I_{OUT}= 1mA to 100mA		20	30	mV
		I_{OUT}= 1mA to 500mA		100	160	
Dropout Voltage	V_{DROP}	I_{OUT}=100mA		400		mV
		I_{OUT}=500mA		2400		mV
Quiescent Current	I_Q	T_J= 25℃		1.5	4.0	uA
Current Limit	I_{CL}		520	620		mA
Enable high level	V_{ENHI}		1.0			V
Enable low level	V_{ENLO}				0.3	V
Enable pin pull high current	I_{EN}			0.1		uA
Thermal Shutdown	T_{SD}			140		℃
Thermal Shutdown Hysteresis	T_{HY}			20		℃
Power supply rejection ratio	PSRR	f=1kHz		80		dB
		f=10kHz		60		dB

Typical Characteristics

V_{IN}=12V, I_{OUT}=1mA, V_{OUT}=3.3V, C_{IN}=C_{OUT}=1uF, T_J=25℃, unless otherwise specified

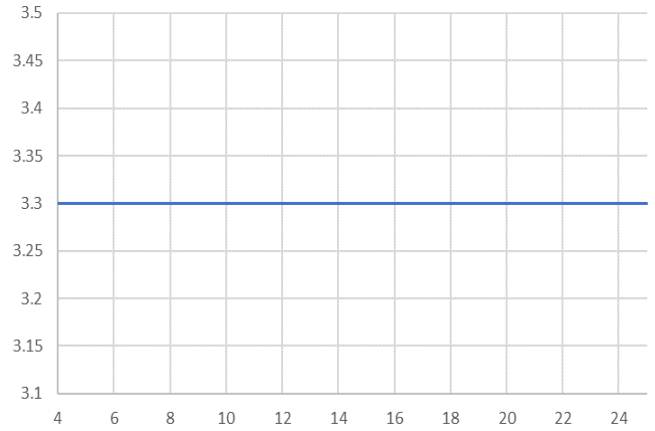


Fig 1 Vout vs Vin

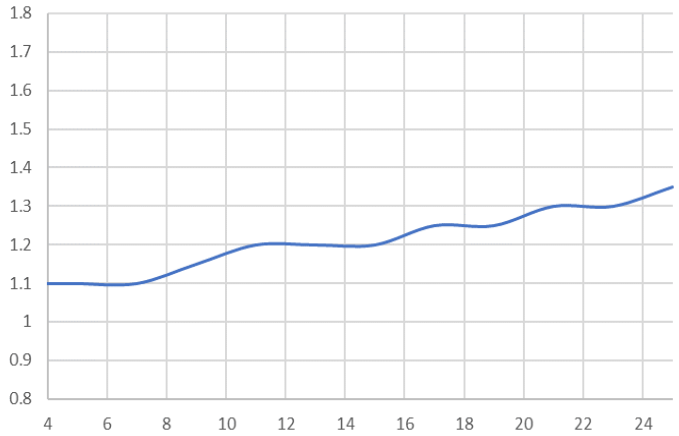


Fig 2 Iq vs Vin

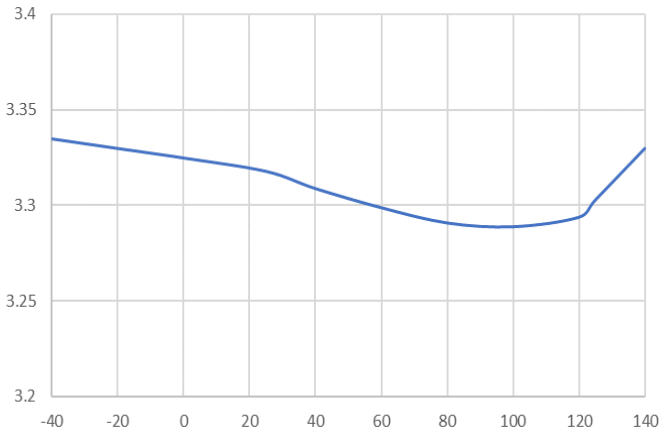


Fig 3 Vout (3.3V) vs Temperature

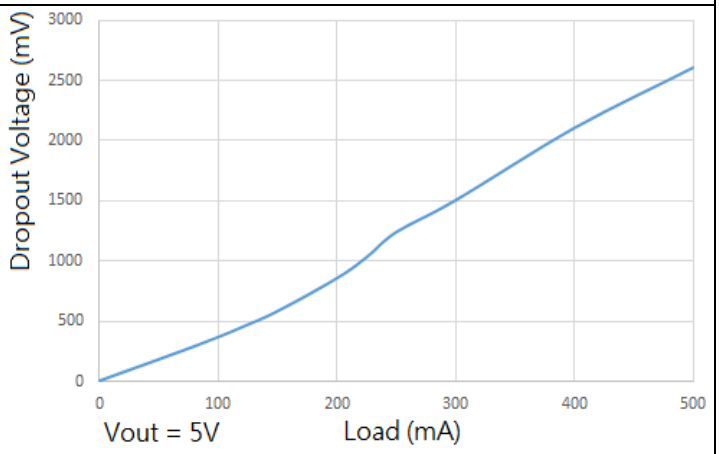


Fig 4 Dropout vs Load

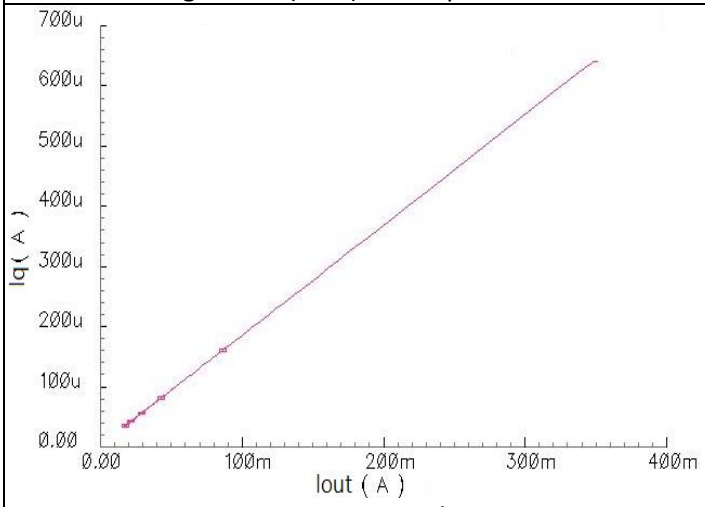


Fig 5 Iq vs Load

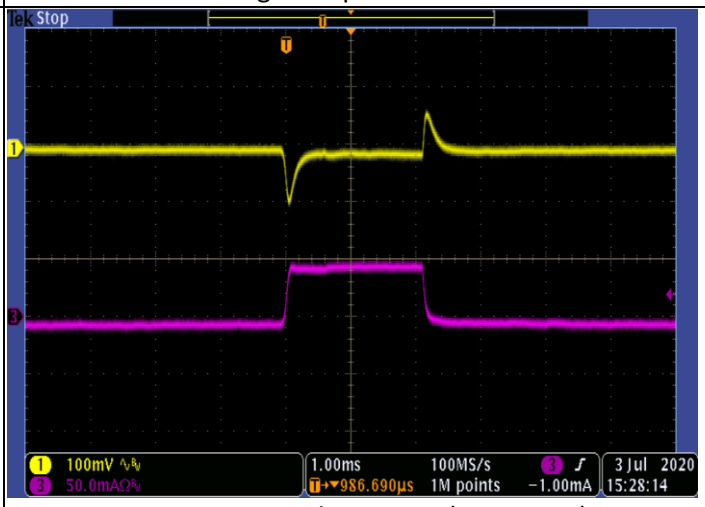


Fig 6 Vout Load Transient (0 to 50mA)

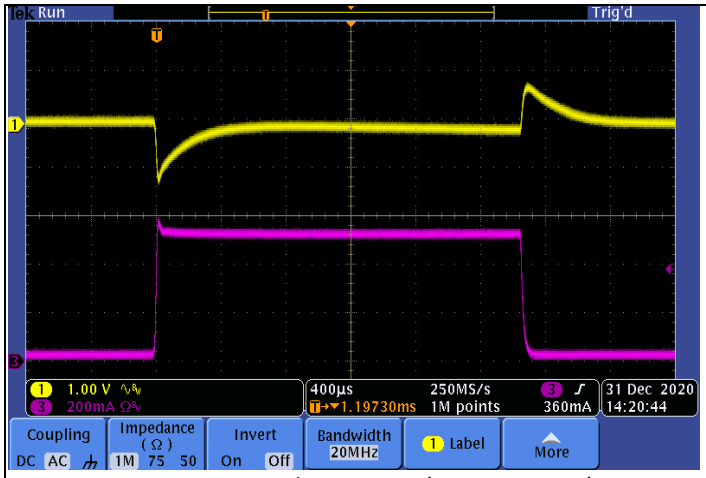


Fig 7 Vout Load Transient (10 to 500mA)

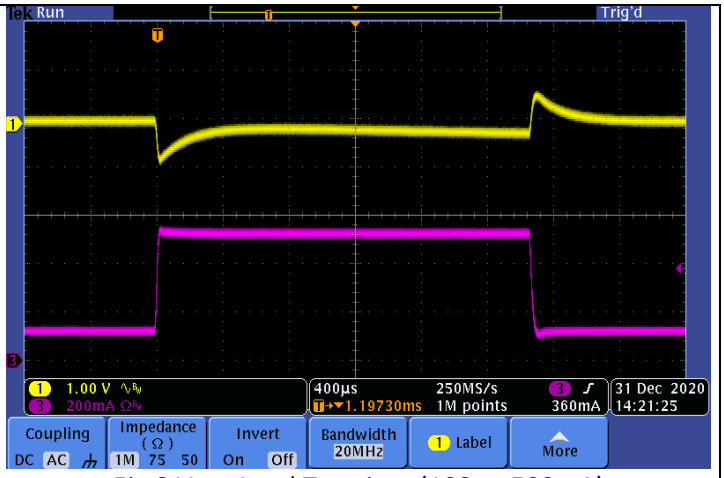


Fig 8 Vout Load Transient (100 to 500mA)

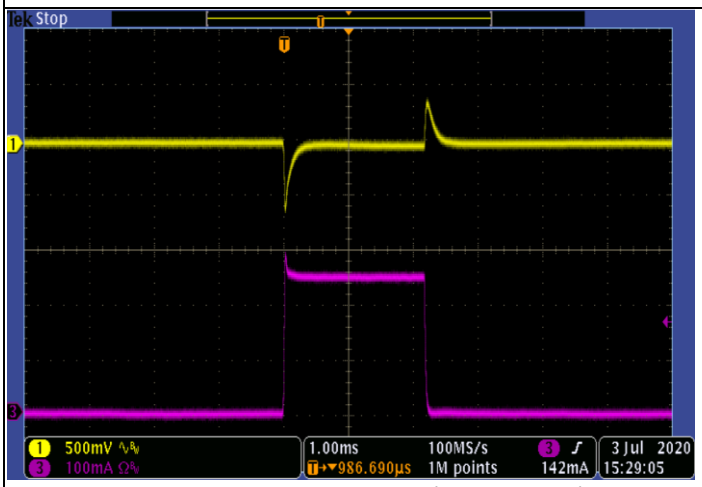


Fig 9 Vout Load Transient (1 to 250mA)

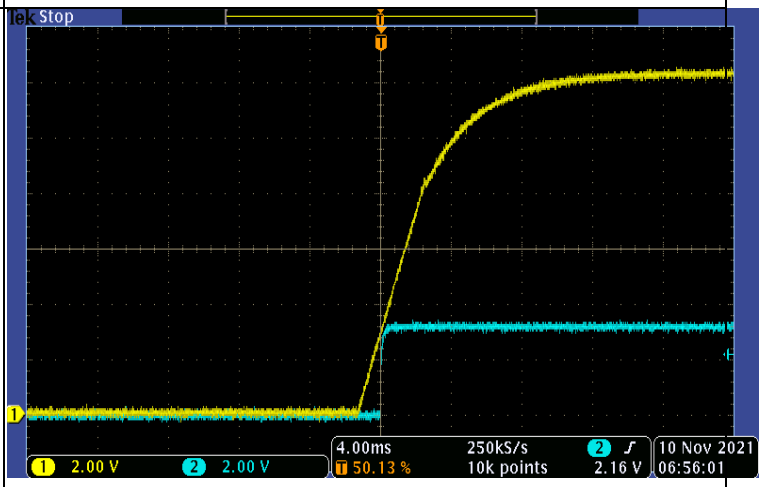


Fig 10 Vin Start up

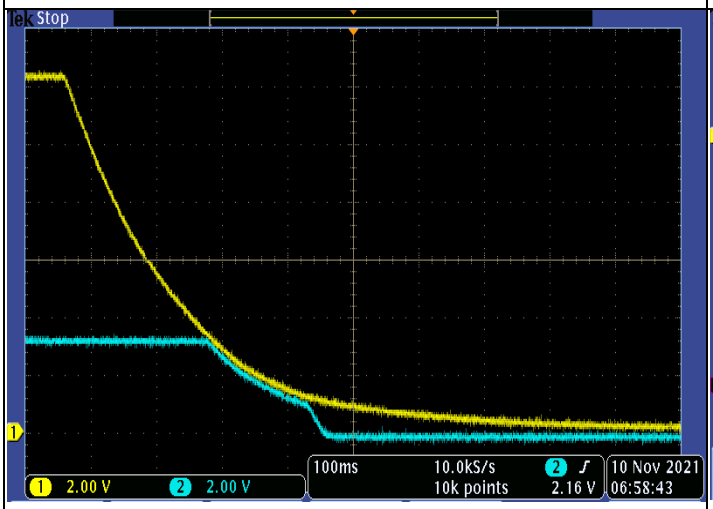


Fig 11 Vin power off

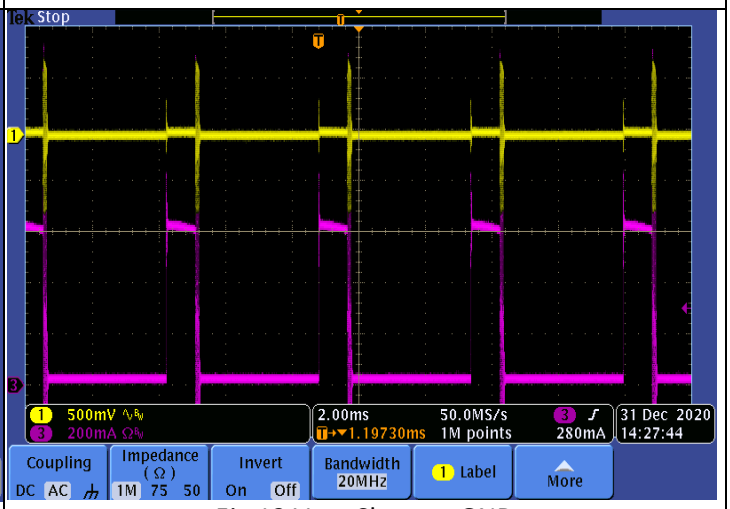
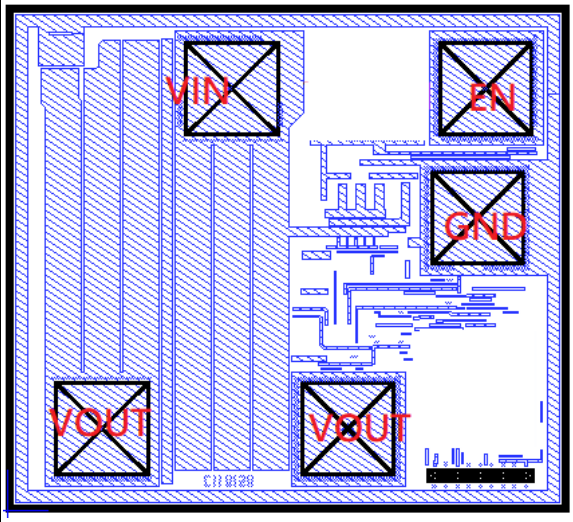


Fig 12 Vout Short to GND

PAD Location and Coordinates

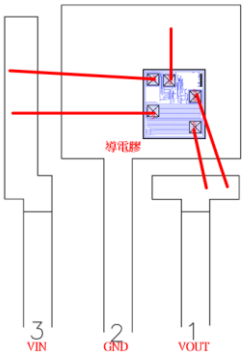
PHYSICAL CHARACTERISTICS		UNIT
Wafer Size	200	mm
Die Size (with S/L)	0.550 * 0.500	mm^2
Scribe line width	60	um
TOP Metal thickness	3	µm
Metal layers	3	layers
Top Metallization	Al-Cu	
Wafer Thickness	736	µm
CUP (circuit under PAD) or not	YES	
Bonding Wire Diameter	25	um

CHIP DRAWING

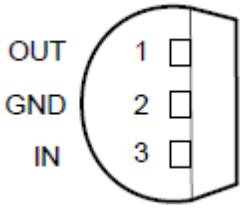


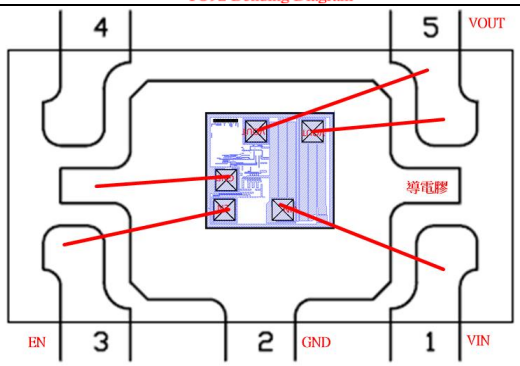
PAD NAME	PAD SIZE (μm^2)	Coordinate
VOUT	80*80	(82,71)
VOUT	80*80	(298,71)
EN	80*80	(419,369)
GND	80*80	(411,256)
VIN	80*80	(196,369)

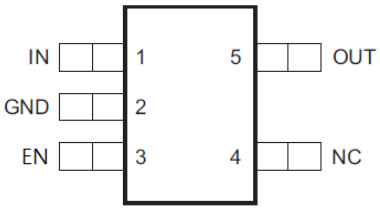
Bonding Diagram Example

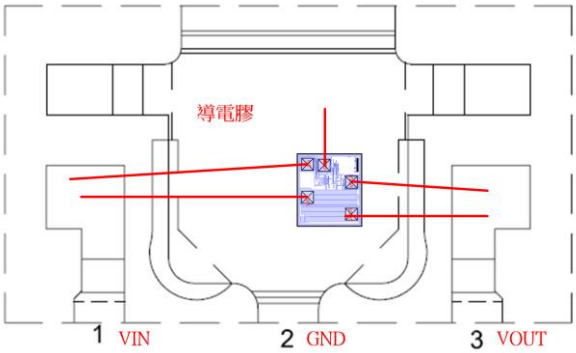


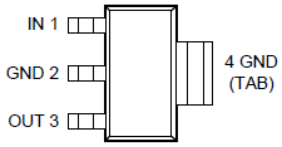
TO92 Bonding Diagram

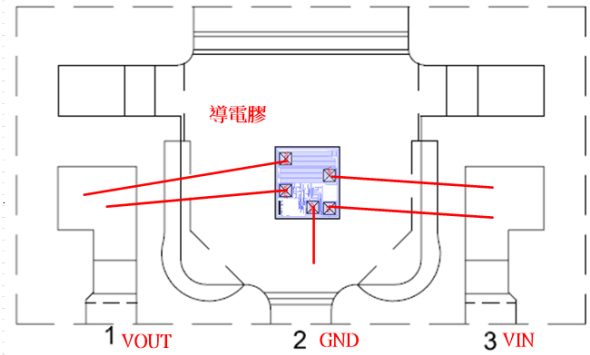


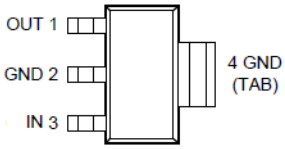


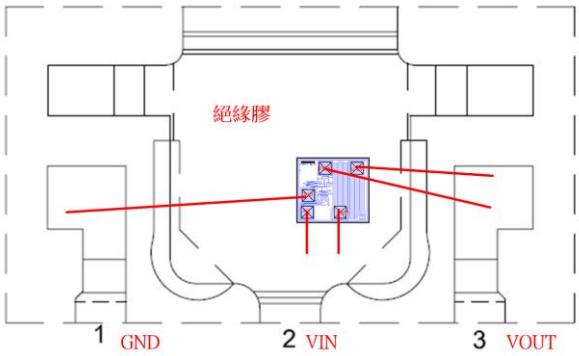


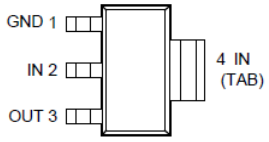


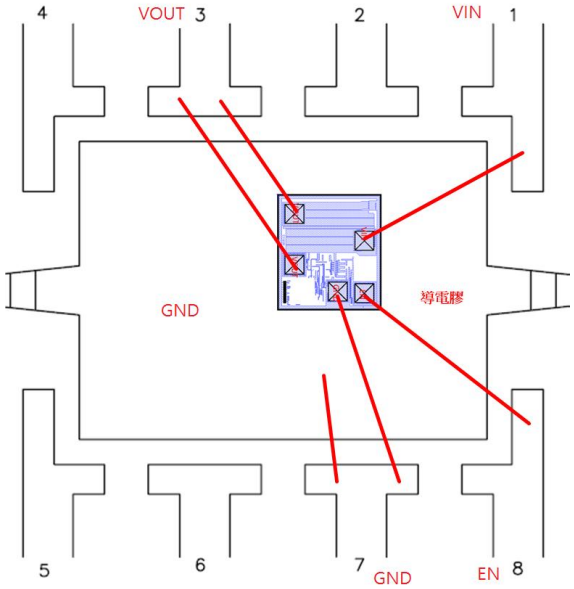


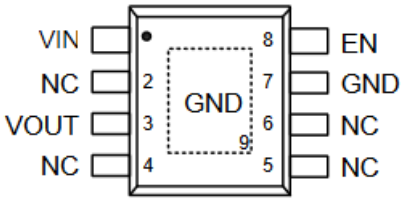


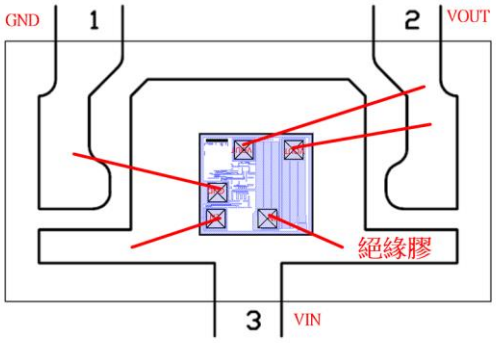












SOT-23-3
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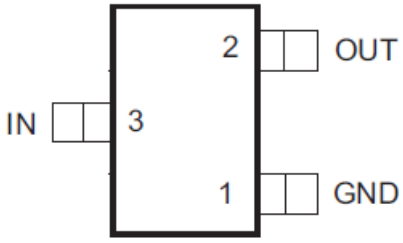

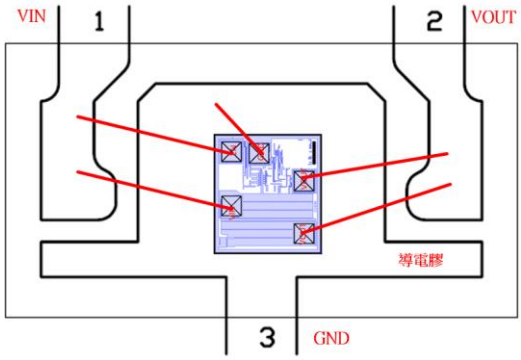

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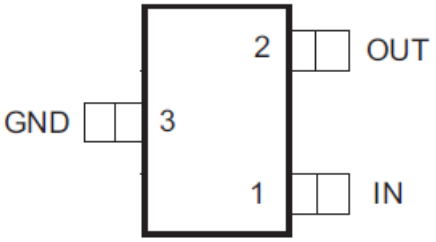
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