■ General Description

The OCP2019 series are monolithic IC designed for a step-down DC/DC converter, and own the ability of driving a 2A load without additional transistor. It saves board space. The external shutdown function can be controlled by logic level and then come into standby mode. The internal compensation makes feedback control having good line and load regulation without external design. Regarding protected function, thermal shutdown is to prevent over temperature operating from damage, and current limit is against over current operating of the output switch. If current limit function occurs and V_{FB} is down below 0.5V, the switching frequency will be reduced. The OCP2019 series operates at a switching frequency of 150KHz thus allow smaller sized filter components than what would be needed with lower frequency switching regulators. Other features include a guaranteed +4% tolerance on output voltage under specified input voltage and output load conditions, and +15% on the oscillator frequency. The output version included fixed 3.3V, 5V, 12V, and an adjustable type. The chips are available in a standard 8-lead SOP-8L package.

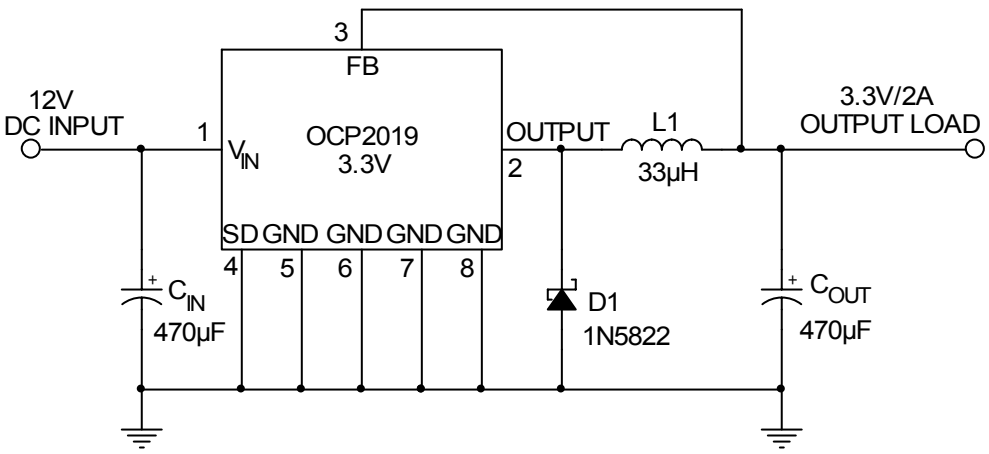
■ Features

- Output voltage: 3.3V, 5.0V, 12V and adjustable output version
- Adjustable version output voltage range:1.25~18V
- ±4% max over line and load conditions
- 150KHz±15% fixed switching frequency
- Voltage mode non-synchronous PWM control
- Thermal-shutdown and current-limit protection
- ON/OFF shutdown control input
- Operating voltage can be up to 22V
- Output load current:2A
- Low power standby mode
- Built-in switching transistor on chip
- SOP-8L package

■ Applications

- Simple High-efficiency step-down regulator
- On-card switching regulators
- Positive to negative converter

■ Typical Application Circuits



■ Absolute Maximum Ratings(Note 1)

Symbol	Paramrter	Rating	Unit
V_{CC}	Supply Voltage	+24	V
V_{SD}	ON/OFF Pin input Voltage	-0.3 to +18	V
V_{FB}	Feedback Pin Voltage	-0.3 to +18	V
V_{OUT}	Output Voltage to Ground	-1	V
P_D	Power Dissipation	Internally Limited	W
T_{ST}	Storage Temperature	-65 to +150	℃
T_{OP}	Operating Temperature	-40 to +125	℃
V_{OP}	Operating Voltage	+4.5 to +22	V

■ Electrical Characteristics

Specifications with **boldface type** are for full operating temperature range, the other type are for TJ=25°C. (Note 2)

Part No.	Symbol	Parameter	Conditions	Min.	Typ. (Note3)	Max. (Note4)	Unit
OCP2019-ADJ	V_{OUT}	Output Voltage	4.5V≤V_{IN}≤22V, 0.2A≤I_{LOAD}≤2A V_{OUT} programmed for 3V	1.213 **1.200**	1.25	1.287 **1.300**	V
	η	Efficiency	V_{IN}=12V, V_{OUT}=3V, I_{LOAD}=2A	-	73	-	%
OCP2019-3.3V	V_{OUT}	Output Voltage	4.75V≤V_{IN}≤22V, 0.2A≤I_{LOAD}≤2A	3.168 **3.135**	3.3	3.432 **3.465**	V
	η	Efficiency	V_{IN}=12V, I_{LOAD}=2A	-	73	-	%
OCP2019-5.0V	V_{OUT}	Output Voltage	7V≤V_{IN}≤22V, 0.2A≤I_{LOAD}≤2A	4.800 **4.750**	5.0	5.200 **5.250**	V
	η	Efficiency	V_{IN}=12V, I_{LOAD}=2A	-	80	-	%
OCP2019-12V	V_{OUT}	Output Voltage	15V≤V_{IN}≤22V, 0.2A≤I_{LOAD}≤2A	11.52 **11.40**	12.0	12.48 **12.60**	V
	η	Efficiency	V_{IN}=25V, I_{LOAD}=2A	-	90	-	%

■ Electrical Characteristics (Continues) All Output Voltage Versions

Unless otherwise specified, V_{IN}=12V for 3.3V,5V, adjustable version and V_{IN}=18V for the 12V version. I_{LOAD}=0.5A

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_b	Feedback Bias Current	Adjustable Version Only, V_{FB}=1.3V	-	-10	-50 **-100**	nA
f_O	Oscillator Frequency	(Note 5)	120 **110**	150	173 **173**	KHz
V_{SAT}	Saturation Voltage	I_{OUT}=2A (Note 6,7)	-	1.3	1.4 **1.5**	V
DC	Max. Duty Cycle (ON) Min. Duty Cycle (OFF)	(Note 7) (Note 8)	-	100 0	-	%
I_{CL}	Current Limit	Peak Current (Note 6,7)	3.6	4.5	6.5 **7.5**	A
I_L	Output Leakage Current	Output=0V (Note 6,8)	-	-	-50	uA
I_Q	Quiescent Current	(Note 8)	-	5	10	mA
I_{STBY}	Standby Quiescent Current	ON/OFF pin=5V (Note 9)	-	150	250 **300**	uA
θ_{JC}	Thermal Resistance	Junction to Case	-	15	-	℃/W
θ_{JA} (Note 10)		Junction to ambient	-	70	-	℃/W
V_{IH}	ON/OFF pin logic input threshold voltage	Low (Regulator ON)	-	1.3	0.6	V
V_{IL}		High (Regulator OFF)	2.0		-	
I_{IH}	ON/OFF Pin Input Current	V_{LOGIC}=2.5V (Regulator OFF)	-	-5	-15	uA
I_{IL}		V_{LOGIC}=0.5V (Regulator ON)	-	-0.02	-5	

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.
Note 2:External components such as the catch diode, inductor, input and output capacitors, and voltage programming resistors can affect switching regulator system performance.
Note 3: Typical numbers are at 25℃ and represent the most likely norm.
Note 4: All limits guaranteed at room temperature (standard type face) and at temperature extremes (bold type face). All room temperature limits are 100% production tested. All limits at temperature extremes are guaranteed via correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).
Note 5: The switching frequency is reduced when the second stage current limit is activated.
Note 6: No diode, inductor or capacitor connected to output pin.
Note 7: Feedback pin removed from output and connected to 0V to force the output transistor switch ON.
Note 8: Feedback pin removed from output and connected to 12V for the 3.3V, 5V, ADJ. version, and 15V for the 12V version, to force the output transistor switch OFF.
Note 9: V_{IN}=22V.
Note 10: Junction to ambient thermal resistance. (With copper area of approximately 3 in^2)