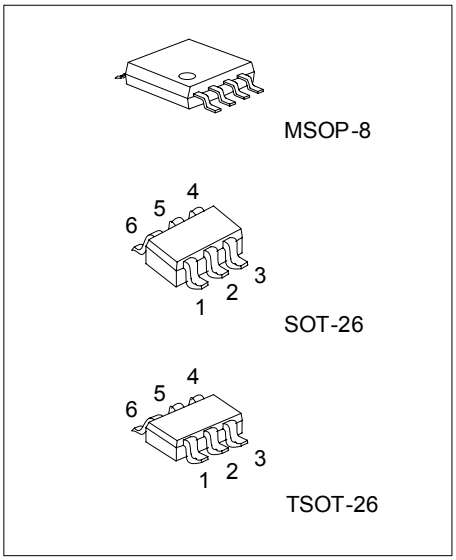
LOW NOISE, REGULATED CHARGE PUMP DC/DC CONVERTERS



*Pb-free plating product number: L5201L

■ DESCRIPTION

The UTC **L5201-xx** series are low noise, constant frequency charge pump DC/DC converters and designed to increase efficiency in white LED application. The operating voltage range is 2.7V ~ V_{OUT} input with up to 100mA of output current. Low external parts counts (one flying capacitor and two small bypass capacitors at V_{IN} and V_{OUT}) make the UTC **L5201-xx** series ideally suited for small, battery-powered applications.

A charge-pump architecture maintains constant switching frequency to zero load and reduces both output and input ripple. The UTC **L5201-xx** series have thermal shutdown capability to escape the device damaged from a continuous short-circuit. With built-in soft-start circuitry to prevents excessive current flow at V_{IN} during start-up. High switching frequency enables the use of small ceramic capacitors. A low-current shutdown feature disconnects the load from V_{IN} and reduces quiescent current to <1μA.

The **L5201-ADJ** is available in MSOP-8 package and **L5201-fixed** in SOT-26 and TSOT-26 package.

■ FEATURES

* Low Noise Constant Frequency Operation
* Output Current:
  90mA@3.0V<V_{IN}<5V
  100mA@3.0V<V_{IN}<4.5V
* 1MHz Switching Frequency
* 4.5V/5.0V Fixed Output Voltage
* V_{IN} Range: 2.7V ~ V_{OUT}
* Automatic Soft-Start.
* No Inductors
* Less than 1μA of Shutdown Current

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Normal	Lead Free Plating		
L5201-AD-SM1-R	L5201L-AD-SM1-R	MSOP-8	Tape Reel
L5201-AD-SM1-T	L5201L-AD-SM1-T	MSOP-8	Tube
L5201-xx-AG6-R	L5201L-xx-AG6-R	SOT-26	Tape Reel
L5201-xx-AH6-R	L5201L-xx-AH6-R	TSOT-26	Tape Reel

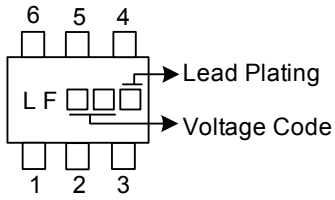
Note: xx :output voltage

L5201L-AD-SM1-R
(1)Packing Type
(2)Package Type
(3)Output Voltage
(4)Lead Plating

(1) R: Tape Reel, T: Tube
(2) SM1: MSOP-8, AG6: SOT-26, AH6: TSOT-26
(3) AD: ADJ, xx: 45:4.5V, 50:5.0V
(4) L: Lead Free Plating Blank: Pb/Sn

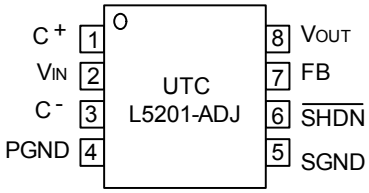
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■ MARKING (For SOT-26/TSOT-26)

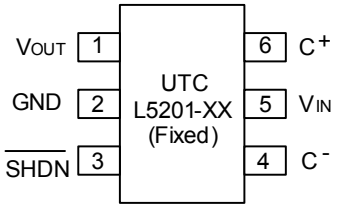


■ PIN CONFIGURATIONS

MSOP-8



SOT-26/TSOT-26



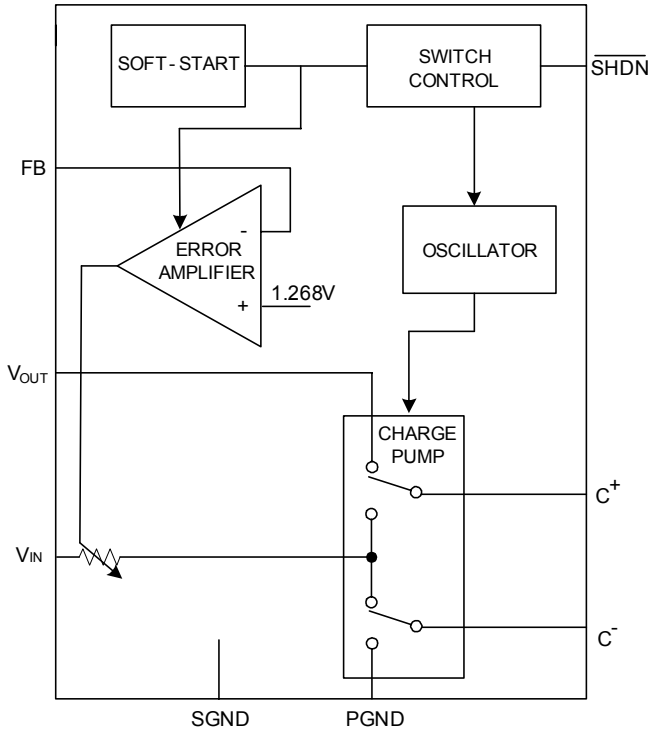
■ PIN DESCRIPTION

PIN NO.		PIN NAME	FUNCTION
L5201-ADJ	L5201-xx		
MSOP-8	SOT-26/TSOT-26		
1	6	C+	Flying Capacitor Positive Terminal
2	5	V_{IN}	Input Supply Voltage, should be bypassed with at least 6.8μf low ESR ceramic capacitor.
3	4	C^-	Flying Capacitor Negative Terminal
4, 5	2	GND	Ground terminal, should be tied to a ground plane for best performance
6	3	$\overline{SHDN}$	Shutdown Mode, Active-Low Input. A low on $\overline{SHDN}$ disables the L5201 series. $\overline{SHDN}$ must not be allowed to float.
7	X	FB	Feedback Input Pin for Adjustable output. An output divider should be connected from V_{OUT} to FB to program the output voltage.
8	1	V_{OUT}	Regulated Output Voltage, should be bypassed with at least 6.8μf low ESR ceramic capacitor as close as possible to the pin for best performance

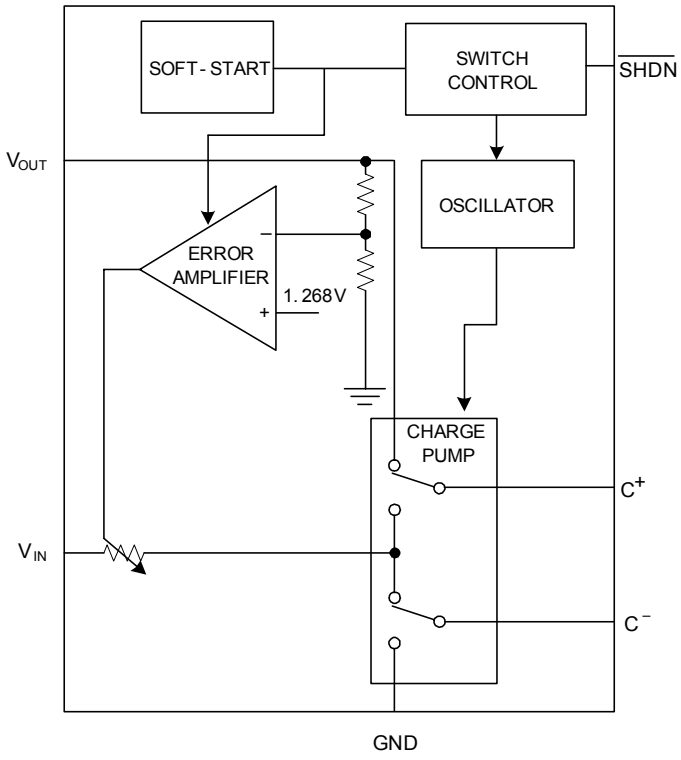
X : The pin is Inexistent for SOT-26 and TSOT-26 package.

■ BLOCK DIAGRAM

UTC L5201 Adjustable version (MSOP-8)



UTC L5201 fixed version (SOT-26/TSOT-26)



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage(to GND)	V_{IN}	-0.3 ~ 6	V
Charge Pump Voltage(to GND)	V_{OUT}	-0.3 ~ 5.5	V
Shutdown Voltage(to GND)	$V_{\overline{SHDN}}$	-0.3 ~ (V_{IN}+0.3)	V
Maximum DC Output Current (Note 1)	I_{OUT}	150	mA
V_{OUT} Short-Circuit Duration		Indefinite	
Operating Temperature	T_{OPR}	-40 ~ +85	℃
Storage Temperature	T_{STG}	-40 ~ +150	℃

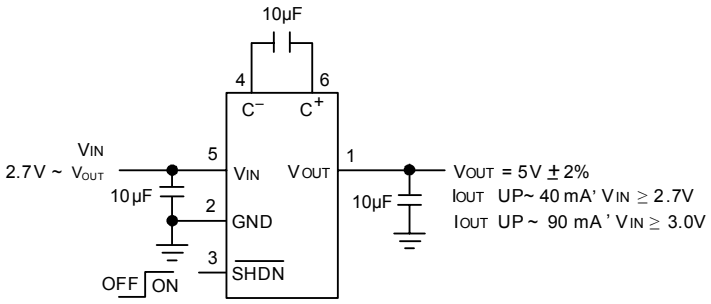
Note: 1. Based on long-term current density limitations.
2. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

(V_{CC}=$V_{\overline{SHDN}}$ = 3V, Ta=25°C, C_{FLY}=1μF, C_{IN}=10μF, C_{OUT}=10μF, unless otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage		V_{IN}	V_{OUT}=5.0V	2.7		V_{OUT}	V
No Switching Supply Current		I_Q	2.7V＜V_{IN}＜5V, I_{OUT}=0mA, SHDN=V_{IN}, V_{OUT}=5.5V		90	140	μA
Output Voltage	L5201-4.5V	V_{OUT}	2.7V＜V_{IN}＜5V, I_{OUT}≤ 50mA	4.32	4.5	4.68	V
			3.0V＜V_{IN}＜5V, I_{OUT}≤ 100mA				
	L5201-5.0V		2.7V＜V_{IN}＜5V, I_{OUT} ≤ 40mA	4.8	5	5.2	
			3.0V＜V_{IN}＜5V, I_{OUT}≤ 90mA				
$\overline{SHDN}$ Input Threshold	High	V_{IH}		1.4			V
	Low	V_{IL}				0.3	V
Feedback Voltage **(For L5201-ADJ)**		V_{FB}		1.217	1.268	1.319	V
Ripple Voltage **(For L5201-Fixed)**		V_R	V_{IN} = 3V, I_{OUT} = 50mA		25		mV_{P-P}
			V_{IN} = 3V, I_{OUT} = 90mA		25		
Shutdown Supply Current		I_{SHDN}	2.7V＜V_{IN}＜5V, I_{OUT}=0mA, $V_{\overline{SHDN}}$ = 0			1	μA
Feedback Input Current **(For L5201-ADJ)**		I_{FB}	V_{FB}=1.4V	-50		50	nA
Efficiency **(For L5201-Fixed)**		η	V_{IN} = 2.7V, I_{OUT} = 40mA		88		%
			V_{IN} = 3V, I_{OUT} = 90mA		80		
Frequency		F_{OSC}	Oscillator Free Running	0.7	1	1.3	MHz
V_{OUT} Turn-on time		t_{ON}	V_{IN} = 3V, I_{OUT} = 0mA		0.35		ms
Short-Circuit Current		I_{SC}	V_{IN} = 3V, V_{OUT} = GND, SHDN = 3V		340		mA
Thermal Shutdown Temperature		T_{SD}			150		℃
Thermal Shutdown Hysteresis					30		℃

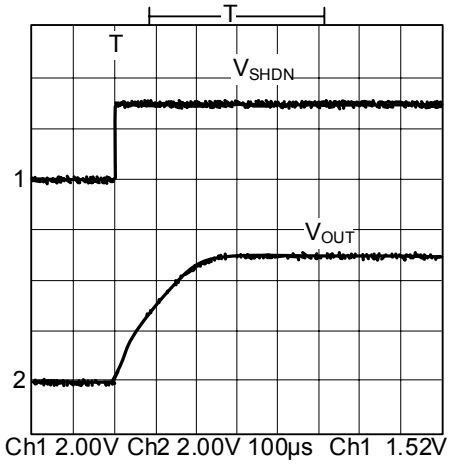
■ TYPICAL APPLICATION CIRCUIT



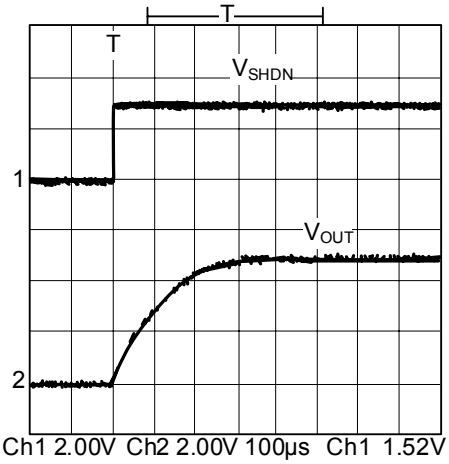
C_{IN}, C_{OUT}: TAIYO YUDEN, JMK212BJ106KG
C_{FLY}: TAIYO YUDEN, EMK212JB105KG

■ TYPICAL CHARACTERISTICS

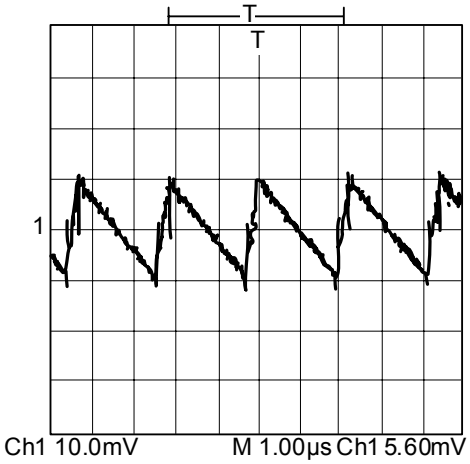
Startup Time with 50mA Load



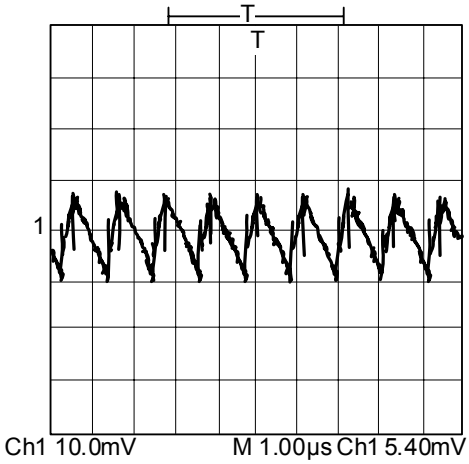
Startup Time with 90mA Load



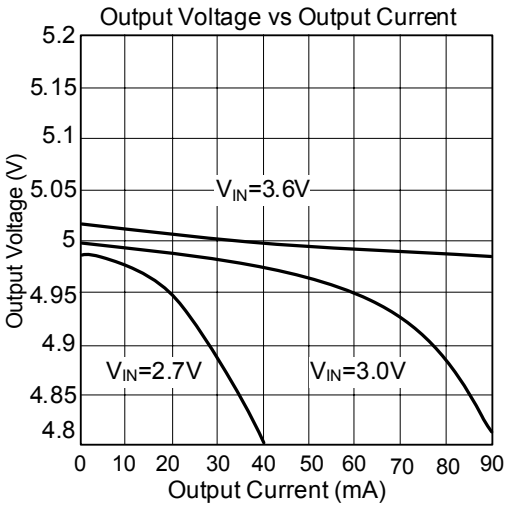
Output Ripple With I_{OUT}=50mA



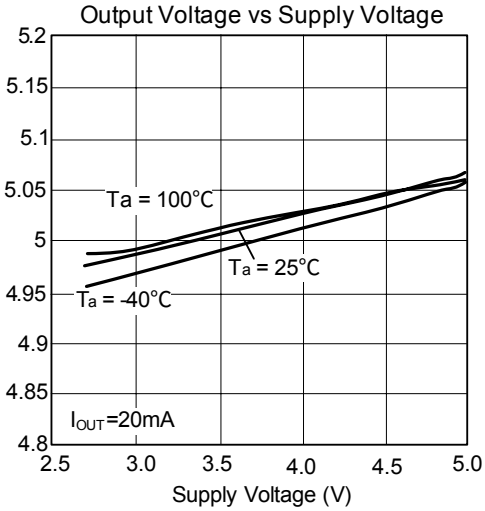
Output Ripple With I_{OUT}=90mA



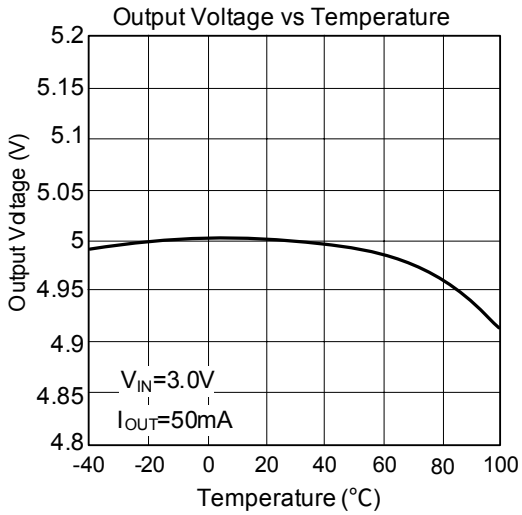
Output Voltage vs Output Current

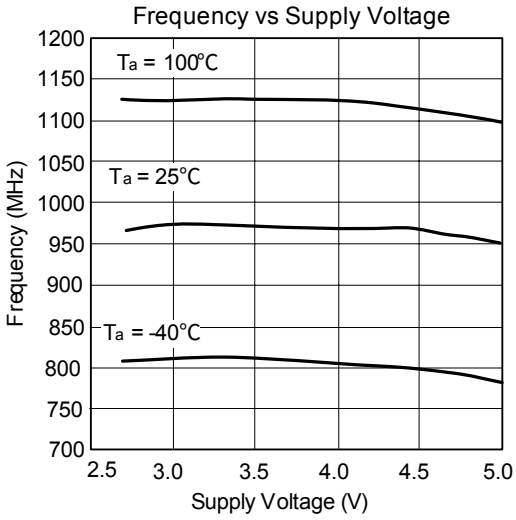


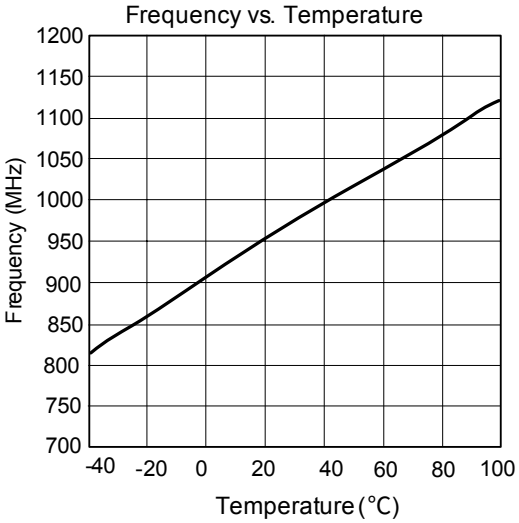
Output Voltage vs Supply Voltage

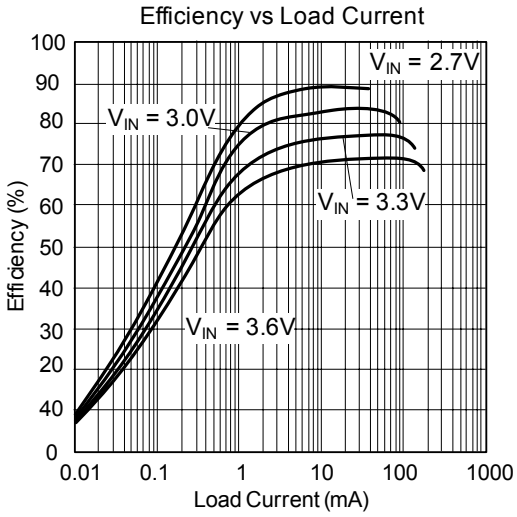


■ TYPICAL CHARACTERISTICS(Cont.)









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