

UNISONIC TECHNOLOGIES CO., LTD

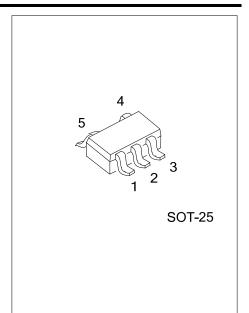
L3060 **Preliminary CMOS IC**

30V/500mA HIGH DIMMING **RATIO LED CONSTANT** CURRENT DRIVER

DESCRIPTION

The UTC L3060 is a continuous conduction mode inductive step-down converter, designed for driving single or multiple series connected LEDs efficiently from a voltage source higher than the total LEDs chain voltage. The device provides an externally adjustable output current of up to 500mA for a single LED. A dedicated DIM pin accepts either a DC voltage (0.5V~2.5V) dimming or a wide range of pulsed dimming. Applying a voltage of 0.3V or lower to the DIM pin turns the output off and switches the device into a low current standby state.

The UTC L3060 has a build-in power switch, based on different input voltage, UTC L3060 can drive several 1W or 2W LEDs.



FEATURES

- * 5V~30V input voltage range
- * Simple low parts count
- * Typical ±3% output current accuracy
- * Up to 500mA output current
- * Single DIM pin on/off and brightness control using DC voltage or PWM signal
- * High efficiency up to 97%
- * Adjustable constant LED current
- * Protection features:

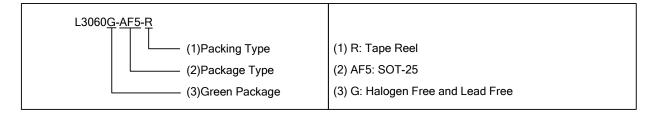
LED open-circuit protection

LED short-circuit protection

Internal thermal shutdown protection.

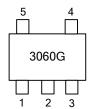
ORDERING INFORMATION

Ordering Number	Package	Packing
L3060G-AF5-R	SOT-25	Tape Reel

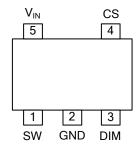


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■ MARKING



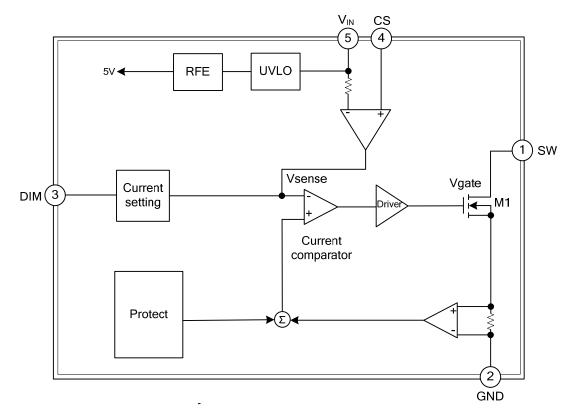
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION	
1	SW	Switch output.	
2	GND	Signal and power ground.	
3	DIM	Enable switch, analog and PWM dimming input.	
4	CS	Current sense input, sampling resistor connected between CS and VIN	
5	V_{IN}	Input supply pin. Must be locally bypassed.	

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{IN}	-0.3~40	V
Drain Voltage of the Internal Power Switch	S _W	-0.3~40	V
Current Sense Input (Respect to V _{IN})	Cs	+0.3~(-6.0)	V
Logic Level Dimming Input	D _{IM}	-0.3~6	V
Switch Output Current	I _{SW}	0.6	Α
Power Dissipation	P _D	0.2	W
ESD Susceptibility (Note 2)	ESD	2	KV
Operation Junction Temperature Range	TJ	-40~150	°C
Storage Temperature	T _{STG}	-55~150	°C

Notes: 1. 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.

■ RECOMMENDED OPERATING RANGE

PARAMETER	SYMBOL	RATINGS	UNIT	
V _{DD} Supply Voltage	V_{IN}	0~30	V	
Operating Temperature	T_OPR	-40~+85	°C	

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT	
Junction to Ambient	θ_{JA}	300	°C/W	

^{2.} Human body model, 100pF capacitor discharged through a 1.5k Ω resistor.

■ ELECTRICAL CHARACTERISTICS (Note 1, 2)

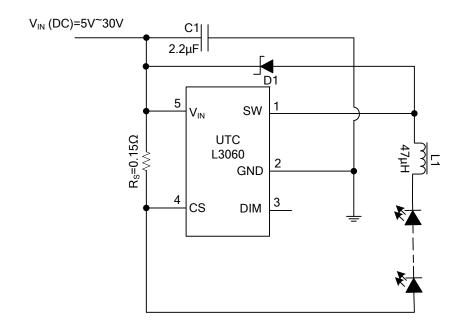
(The following specifications apply for V_{IN} =12V, T_A =25°C, unless specified otherwise.)

Input Voltage	The following specifications apply for VIN-12V,	A 20 0, ui	ticoo opcomea outer wiec.)						
Under Voltage Lock Out V _{UVLO} V _{IN} Falling 4.7 N UVLO Hysteresis V _{UVLO, HYS} V _{IN} Rising 100 m Current Sense Mean Current Sense Threshold Voltage V _{CS} V _{IN} -V _{CS} 97 100 103 m Sense Threshold Hysteresis V _{CS} HYS ±15 9 CS Pin Input Current I _{CS} V _{IN} -V _{CS} =50mV 8 µ Operating Frequency Maximum Operation Frequency F _{SW} 1 M Operating Current Quiescent Supply Current with Output Off I _{OFF} V _{DIM} 0.3 V Quiescent Supply Voltage V _{DIM} DIM Floating 5 N DIM Input Voltage High V _{DIM} 2.5 N DIM Input Voltage High V _{DIM} 2.5 N DIM Pull Up Resistor to Internal Supply Voltage R _{DIM} 150 K DIM Input Leakage to Ground I _{DIM} L V _{DIM} =0 33 µ DIM Brightness Dimmer Description of the proper Supplies of the proper Supplies Supplies Supplies Su	PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
UVLO Hysteresis	Input Voltage	V_{IN}		5		30	V		
Current Sense Mean Current Sense Threshold Voltage V _{CS} V _{IN} -V _{CS} 97 100 103 m Sense Threshold Hysteresis V _{CS} HYS ±15 97 ±15 97 CS Pin Input Current I _{CS} V _{IN} -V _{CS} =50mV 8 µ µ Operating Frequency Maximum Operation Frequency F _{SW} 1 M Operating Current Quiescent Supply Current with Output Off I _{OFF} V _{DIM} <-0.3V	Under Voltage Lock Out	V_{UVLO}	V _{IN} Falling		4.7		V		
Mean Current Sense Threshold Voltage V _{CS} V _{IN} -V _{CS} 97 100 103 m Sense Threshold Hysteresis V _{CS} HYS ±15 9 CS Pin Input Current I _{CS} V _{IN} -V _{CS} =50mV 8 µ Operating Frequency Maximum Operation Frequency F _{SW} 1 M Operating Current Quiescent Supply Current with Output Off I _{OFF} V _{DIM} 100 µ DIM Input Internal Supply Voltage V _{DIM} D DIM Floating 5 N DIM Input Voltage High V _{DIM} H 2.5 N DIM Pull Up Resistor to Internal Supply Voltage R _{DIM} D 150 K DIM Input Leakage to Ground I _{DIM} L V _{DIM} =0 33 µ DIM Brightness Dimmer DC Brightness Control Range V _{DIM} DC 0.5 2.5 N Description Scottrol Ratio D _{PWM_L} F F _{DIM} =100Hz 0.05% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_L} F F _{DIM} =20KHz	UVLO Hysteresis	$V_{\text{UVLO, HYS}}$	V _{IN} Rising		100		mV		
Sense Threshold Hysteresis	Current Sense								
CS Pin Input Current	Mean Current Sense Threshold Voltage	V_{CS}	V _{IN} -V _{CS}	97	100	103	mV		
Description	Sense Threshold Hysteresis	V _{CS HYS}			±15		%		
Maximum Operation Frequency F _{SW} 1 M Operating Current Quiescent Supply Current with Output Off I _{OFF} V _{DIM} < 0.3V	CS Pin Input Current	I _{CS}	V_{IN} - V_{CS} =50mV		8		μΑ		
Operating Current Quiescent Supply Current with Output Off I _{OFF} V _{DIM} <0.3V 100 μ DIM Input	Operating Frequency	-					<u>.</u>		
Quiescent Supply Current with Output Off I_OFF V_DIM < 0.3V 100 µ DIM Input	Maximum Operation Frequency	F_{SW}				1	MHz		
DIM Input	Operating Current	_		_					
Internal Supply Voltage	Quiescent Supply Current with Output Off	I _{OFF}	V _{DIM} <0.3V		100		μΑ		
DIM Input Voltage High V _{DIM_H} 2.5 N DIM Input Voltage Low V _{DIM_L} 0.3 N DIM Pull Up Resistor to Internal Supply Voltage R _{DIM} 150 K DIM Input Leakage to Ground I _{DIM_L} V _{DIM_D} 33 μ DIM Brightness Dimmer DC Brightness Control Range V _{DIM_DC} 0.5 2.5 N Max. DIM Frequency f _{DIM} f _{OSC} =500kHz 50 kł Duty Cycle Range of Low Frequency Dimming D _{PWM_LF} f _{DIM} =100Hz 0.05% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Drught Power Switch R _{SW} 0.8 0.8 0	DIM Input	_		_					
DIM Input Voltage Low DIM Pull Up Resistor to Internal Supply Voltage DIM Input Leakage to Ground DIM Brightness Dimmer DC Brightness Control Range Max. DIM Frequency Duty Cycle Range of Low Frequency Dimming Brightness Control Ratio Duty Cycle Range of High Frequency Dimming Brightness Control Ratio Duty Cycle Range of High Frequency Dimming Brightness Control Ratio Drywm_HF Dryw	Internal Supply Voltage	V_{DIM}	DIM Floating		5		V		
DIM Input Voltage Low V _{DIM_L} 0.3 N DIM Pull Up Resistor to Internal Supply Voltage R _{DIM} 150 K DIM Input Leakage to Ground I _{DIM_L} V _{DIM} =0 33 μ DIM Brightness Dimmer DC Brightness Control Range V _{DIM_DC} 0.5 2.5 N Max. DIM Frequency f _{DIM} f _{OSC} =500kHz 50 kł Duty Cycle Range of Low Frequency Dimming D _{PWM_LF} f _{DIM} =100Hz 0.05% 1 Brightness Control Ratio D _{PWM_HF} f _{DIM} =20KHz 10% 1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Drum Power Switch Sw On Resistance R _{SW} 0.8 0.8 0	DIM Input Voltage High	V_{DIM_H}		2.5			V		
DIM Pull Up Resistor to Internal Supply Voltage R_DIM I50 K	DIM Input Voltage Low					0.3	V		
DIM Brightness Dimmer DC Brightness Control Range V _{DIM_DC} 0.5 2.5 N Max. DIM Frequency f _{DIM} f _{OSC} =500kHz 50 kł Duty Cycle Range of Low Frequency Dimming D _{PWM_LF} f _{DIM} =100Hz 0.05% 1 Brightness Control Ratio D _{PWM_LF} f _{DIM} =20KHz 10% 1 Drymm_HF D _{PWM_HF} 10:1 1 Output Power Switch R _{SW} 0.8 0.8	DIM Pull Up Resistor to Internal Supply Voltage				150		ΚΩ		
DC Brightness Control Range V _{DIM_DC} 0.5 2.5 N Max. DIM Frequency f _{DIM} f _{OSC} =500kHz 50 kł Duty Cycle Range of Low Frequency Dimming D _{PWM_LF} f _{DIM} =100Hz 0.05% 1 Brightness Control Ratio D _{PWM_HF} f _{DIM} =20KHz 10% 1 Description D _{PWM_HF} 10.1 1 Output Power Switch R _{SW} 0.8 0.8	DIM Input Leakage to Ground	I_{DIM_L}	V _{DIM} =0		33		μΑ		
Max. DIM Frequency f _{DIM} f _{OSC} =500kHz 50 kł Duty Cycle Range of Low Frequency Dimming D _{PWM_LF} f _{DIM} =100Hz 0.05% 1 Brightness Control Ratio 2000:1 2000:1 Duty Cycle Range of High Frequency Dimming D _{PWM_HF} f _{DIM} =20KHz 10% 1 Brightness Control Ratio 10:1 Output Power Switch SW On Resistance R _{SW} 0.8 0	DIM Brightness Dimmer								
Duty Cycle Range of Low Frequency Dimming Brightness Control Ratio Duty Cycle Range of High Frequency Dimming Brightness Control Ratio Dewm_lf Dewm_lf Dewm_lf Demm=100Hz 0.05% 1 2000:1 10:1 Demm=20KHz 10% 10:1 Demm=100Hz 10% 10:1	DC Brightness Control Range	V_{DIM_DC}		0.5		2.5	V		
Brightness Control Ratio Duty Cycle Range of High Frequency Dimming Brightness Control Ratio Dewm_HF Demm_HF Demm_HF	Max. DIM Frequency	f_{DIM}	f _{OSC} =500kHz			50	kHz		
Duty Cycle Range of High Frequency Dimming Brightness Control Ratio Dewm_HF Dewm_HF Demm=20KHz 10% 10:1 Output Power Switch SW On Resistance Rsw 0.8	Duty Cycle Range of Low Frequency Dimming	D	f _{DIM} =100Hz	0.05%		1			
Brightness Control Ratio Output Power Switch SW On Resistance R _{SW} 10:1	Brightness Control Ratio	DPWM_LF			2000:1				
Output Power Switch SW On Resistance R _{SW} 0.8 0	Duty Cycle Range of High Frequency Dimming	D	f _{DIM} =20KHz	10%		1			
SW On Resistance R _{SW} 0.8	Brightness Control Ratio	DPWM_HF			10:1				
	Output Power Switch								
Continuous CNA Comment	SW On Resistance	R_{SW}			8.0		Ω		
Continuous Svv Current Iswmean 0.5 /	Continuous SW Current	I _{SWmean}				0.5	Α		
SW Leakage Current I _{LEAK} 0.5 5 µ	SW Leakage Current	I _{LEAK}			0.5	5	μA		
Thermal Shutdown									
Thermal Shutdown Threshold T _{SD} 150 °	Thermal Shutdown Threshold	T _{SD}			150		°C		
	Thermal Shutdown hysteresis				20		°C		

Notes: 1. Typical parameters are measured at 25°C and represent the parametric norm.

^{2.} Datasheet min/max specification limits are guaranteed by design, test, or statistical analysis.

■ TYPICAL APPLICATION CIRCUIT



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