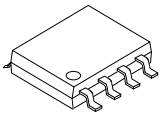
USL1650 **Preliminary** ***LINEAR INTEGRATED CIRCUIT***

HIGH EFFICIENCY PWM BUCK LED DRIVER CONTROLLER



SOP-8

■ DESCRIPTION

The UTC **USL1650** is a PWM mode step-down converter (with a high voltage power MOSFET with SOP8 package). By well regulating a constant output current. The output duty cycle of the UTC **USL1650** can be up to 100% for wider input voltage application.

The UTC **USL1650** is available in a SOP-8 package.

■ FEATURES

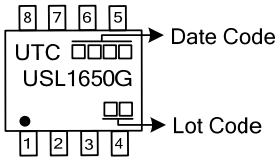
* Universal input voltage range with off-line topology
* Programmable constant LED current
* Output LED string short protection
* Output LED string open protection
* Dimmable LED current by ACTL
* OCP
* Built-in OTP

■ ORDERING INFORMATION

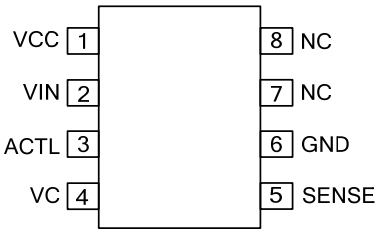
Ordering Number	Package	Packing
USL1650G-S08-R	SOP-8	Tape Reel

USL1650G-S08-R (1)Packing Type. (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free

■ MARKING



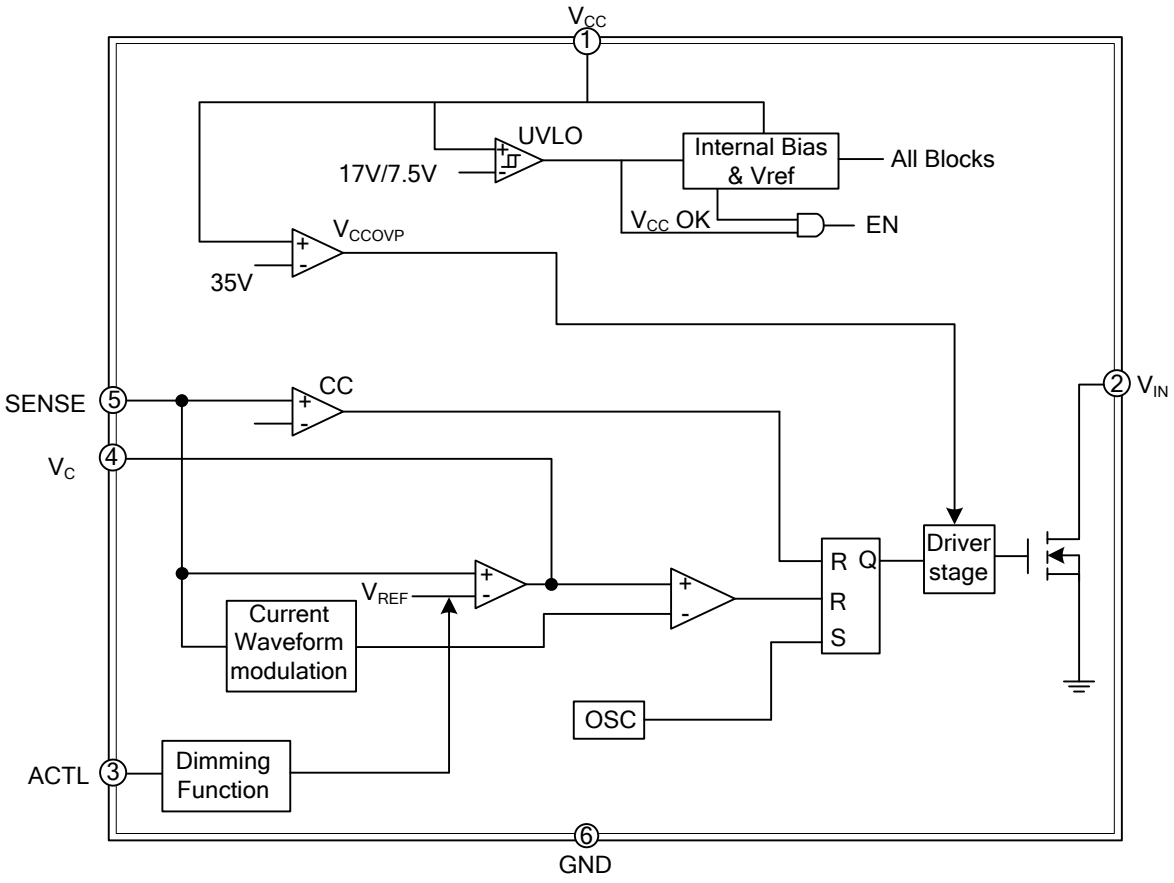
■ PIN CONFIGURATIONS



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{CC}	Power supply.
2	V_{IN}	Power MOS drain.
3	ACTL	Analog dimming control.
4	V_C	Compensation pin.
5	SENSE	LED current sense input pin.
6	GND	Ground of the chip.
7, 8	NC	

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Input Voltage		V_{CC}	40	V
GATE Voltage		V_{GATE}	14	V
ACTL Voltage (Note 1)		V_{ACTL}	8	V
VC Voltage		V_{VC}	6	V
SENSE Voltage		V_{SENSE}	-0.3~6	V
Power Dissipation	T_A=25°C	P_D	0.392	W
Junction Temperature		T_J	150	°C
Storage Temperature		T_{STG}	-65~+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.
2. If the ACTL pin is connected with a serial 1MΩ resistor, the maximum voltage can go up to 36V.

■ RECOMMENDED OPERATING CONDITIONS (Note)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage	V_{CC}	17~32	V
Junction Temperature Range	T_J	-40~125	°C

Note: The device is not guaranteed to function outside its operating conditions.

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	225	°C/W

■ ELECTRICAL CHARACTERISTICS (V_{CC}=24V_{DC}, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Start-Up Voltage	V_{ST}		15	17	19	V
Minimum Operation Voltage After Star t-Up	$V_{IN(MIN)}$		6.0	7.5	9.0	V
Input Quiescent Current	I_{QC}	After Start-Up, V_{CC}=24V		1.65	5.0	mA
Maximum Startup Current in V_{CC} Hiccup Operation	$I_{ST(MAX)}$	Maximum I_{CC} at Low End of V_{CC}		250	300	μA
Input Shutdown Current	I_{SHDN}	Before Start-Up, V_{CC}=15V		0.1	5.0	μA
Over Voltage Protection	V_{OVP}	V_{CC} Pin	32.5	35.5	36.5	V
Current Sense Voltage	V_{SENSE}			160		mV
Switching Frequency	f_{SW}		38	47	55	kHz
Oscillator Maximum Duty Cycle	D_{MAX}	V_C=3V			100	%
Minimum Turn-On Time	$t_{ON(MIN)}$		300			ns
Power MOSFET						
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=0.5A		11.5	15.5	Ω
Drain-Source Voltage	V_{DSS}	V_{GS}=0V	650			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V			10	μA
ACTL LED Dimming						
Analog Dimming ACTL Pin Input Current	I_{ACTL}			1	5	μA
Analog Dimming Range			0		1.3	V
Analog Dimming Threshold Voltage — High Level				1.2	1.3	V
Analog Dimming Threshold Voltage — Low Level			0	0.1		V
VC Threshold for PWM Switch Off	V_{VC}		1.1	1.25	1.4	V
Thermal Protection						
Thermal Shutdown Temperature	T_{SD}		150			°C

■ TYPICAL APPLICATION CIRCUIT