

LED DRIVER SOLUTION FOR LCD BACKLIGHTING

DEVICE DESCRIPTION

The 310 is a single or multi cell LED driver designed for LCD backlighting applications. The input voltage range of the device is between 0.8V and 8V. This means the 310 is compatible with single NiMH, NiCd or Alkaline cells, as well as multi-cell or Lilon batteries.

The device features a shutdown control, resulting in a standby current less than 5 μ A, and an output capable of driving serial or parallel LED's. The circuit generates constant power output, which are ideal for driving single or multiple LED's over a wide range of operating voltages. These features make the device ideal for driving LED's particularly in LCD backlight applications for Digital Still cameras and PDA's.

FEATURES

- 94% efficiency
- Minimum operating input voltage 0.8V
- Maximum operating input voltage 8V
- Standby current less than 5 μ A
- Programmable output current
- Series or parallel LED configuration
- Low saturation voltage switching transistor
- SOT23-5 package

APPLICATIONS

- LCD backlights:
 - Digital still camera
 - PDA
 - Mobile phone
- LED flashlights and torches
- White LED driving
- Multiple LED driving

ORDERING INFORMATION

DEVICE	REEL SIZE	TAPE WIDTH	QUANTITY PER REEL
310E5TA	180mm	8mm	3000

DEVICE MARKINGS

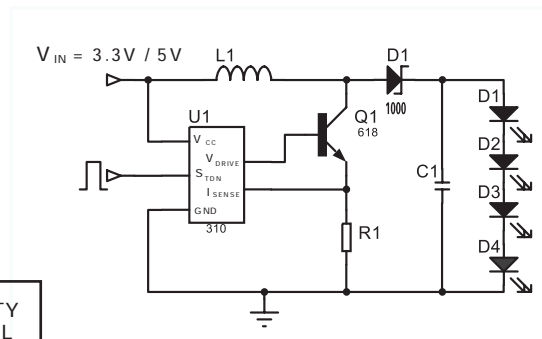
- C310
- Package SOT23-5

The 310 is a PFM DC-DC controller IC that drives an external switching transistor with a very low saturation resistance. These transistors are the best switching devices available for this type of conversion enabling high efficiency conversion with low input voltages. The drive output of the 310 LED driver generates a dynamic drive signal for the switching transistor.

The circuit can start up under full load and operates down to an input voltage of 0.8 volts. The solution configuration ensures optimum efficiency over a wider range of load currents; several circuit configurations are possible depending on battery life versus brightness considerations.

The 310 is offered in the SOT23-5 package which, when combined with a SOT23 switching transistor, generates a high efficiency small size circuit solution. The IC and discrete combination offers the ultimate cost Vs performance solution for LED backlight applications.

TYPICAL APPLICATIONS CIRCUIT



ABSOLUTE MAXIMUM RATINGS:

Supply Voltage	-0.3 to 10V
Maximum Voltage other pins	-0.3 to $V_{CC}+0.3V$
Power Dissipation	450mW
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150°C

ELECTRICAL CHARACTERISTICS:Test conditions unless otherwise stated: $V_{CC}=1.5V$, $T_{AMB}=25^{\circ}C$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
η	Efficiency ¹				94	%
V_{CC}	Recommended supply voltage range		0.8		8	V
$V_{CC(min)}$	Minimum startup and operating voltage	$I_{DRIVE}=-600\mu A$, $V_{DRIVE}=0.7V$ $I_{DRIVE}=-600\mu A$, $V_{DRIVE}=0.7V$, $T_{AMB}=-10^{\circ}C^3$		0.8 0.9	0.92	V
I_Q	Quiescent current ²	$V_{EN} = V_{CC}$ (enabled) $V_{EN} = 0V$ (standby)		0.2 5	10	mA μA
I_{VDRIVE}	Base drive current	$V_{DRIVE} = 0.7V$, $V_{ISENSE} = 0V$	1.5		3.5	mA
I_{CC}	Supply current ³	$V_{DRIVE} = 0.7V$, $V_{ISENSE} = 0V$	2		4	mA
$V_{VDRIVE(high)}$	High level drive voltage	$V_{ISENSE} = 0V$, $I_{VDRIVE} = -0.5mA$	V_{CC} -0.3		V_{CC}	V
$V_{VDRIVE(low)}$	Low level drive voltage	$V_{ISENSE} = 50mV$, $I_{VDRIVE} = 5mA$	0		0.2	V
$V_{STDN(high)}$	Device enabled		0.7			V
$V_{STDN(low)}$	Device in standby mode				0.15	V
I_{STDN}	Enable input current		-1		1	μA
V_{ISENSE} (threshold)	Output current reference voltage		14	19	24	mV
$T_{CVISENSE}$	I_{SENSE} voltage temp co. ²			0.4		%/ $^{\circ}C$
I_{ISENSE}	I_{SENSE} input current	$V_{ISENSE} = 0V$	0	-30	-65	μA
T_{DRV}	Discharge Pulse Width		1.2	1.7	3.2	μs

OPERATING CONDITIONS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
F_{OSC}	Recommended operating frequency ⁴				200	kHz

1 Application dependent, see reference designs

2 These parameters guaranteed by Design and characteristics

3 Total supply current = $I_Q + I_{VDRIVE}$, see typical characteristics

4 Operating frequency is application circuit dependent. See applications section.

618

For the circuits described in the applications section 618 is the recommended pass transistor. The following indicates outline data for the device, more detailed information can be found in the surface mount products data book or on Web

ELECTRICAL CHARACTERISTICS:

Test conditions unless otherwise stated: T_{AMB}=25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _{CE(sat)}	Collector-Emitter Saturation Voltage ⁵	I _C =0.1A, I _B =10mA		8	15	mV
		I _C =1A, I _B =10mA		70	150	
		I _C =2.5A, I _B =50mA		130	200	
V _{(BR)CEO}	Collector-Emitter Breakdown Voltage ⁵	I _C =10mA	20	27		V

⁵ Measured under pulse conditions. Pulse width=300µs. Duty cycle ≤2%

1000

For the maximum brightness circuit described in the applications section 1000 is the recommended Schottky diode. The following indicates outline data for the more detailed information can be found on Web

ELECTRICAL CHARACTERISTICS:

Test conditions unless otherwise stated: T_{AMB}=25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _F	Forward voltage	I _F = 500mA I _F = 1A			400 500	mV
t _{rr}	Reverse Recovery Time	Switched from I _F =500mA to I _R =500mA. Measured at I _R =50mA		12		ns
I _R	Reverse Current	V _R = 30V		50	100	µA

Part Number	V _R	I _F	I _{FSM}	V _F at		I _R at		Capacitance at V _R = 25V, f = 1MHz	Package
	Max. V	Max. mA	Max. A	Max. mV	I _F mA	Max. µA	V _R V	Typ. pF	
BAT54	30	200	0.6	500	30	250	25	10	SOT23-6
2000	40	2000	20	500	2000	1000	30	60	SOT23
1000	40	1000	12	500	1000	100	30	25	SOT23
750	40	750	12	540	750	100	30	25	SOT23
500	40	500	6.75	550	500	40	30	20	SOT23
400	40	400	6.75	500	400	40	30	20	SOT323

