



High Power LED Driver IC

DESCRIPTION

The AP7350S is an instant On/Off LED drive IC for high flux LED and adjustable constant-current source, easily driving loads 50mA up to 1A through an external resistor. The $\overline{\text{SHDN}}$ of the AP7350S permits LED brightness regulation by pulse width modulation (PWM). The LED brightness can be regulated via duty cycle. And if $\overline{\text{SHDN}}$ sets high, the AP7350S will be in sleep mode. the $\overline{\text{SHDN}}$ pin also can be used as an enable input. This integration technology eliminates individual components by combining them into a small package, which results in a significant reduction of both system cost and board space.

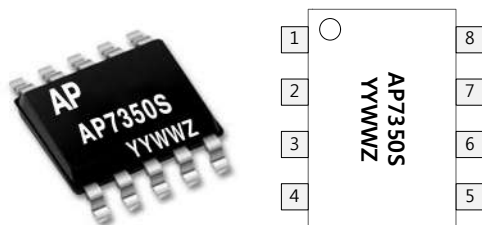
FEATURES

- Dimming control or Sleep mode by MiCOM signal
- LED drive current adjustable through external resistor (Max 1A under PWM)
- Very Simple Circuit Design and Very low cost design
- Halogen-Free Package is Available

Applications

- Backlighting LED Drive.
- High flux LED Drive
- Industrial Lamp Indicators
- Constant current source
- Automotive lighting

Pin Description & Marking Information



Package : SOP-8

Pin No	Symbol	Description
1	VCC	Power Supply
2	SHDN	Disable On/Off
3	GND	Ground
4	N.C	No connection
5	N.C	No connection
6	N.C	No connection
7	OUT	Open Collector Output
8	FB	Feedback / 0.2V Reference



Ordering Information

Part No	Package	Packing	Finish	Halogen	REEL unit	Remark
AP7350S	SOP-8	Tape & Reel	Sn	Free	2,500	MOQ 25Kp

Maximum Ratings

Characteristic	Symbol	Rating	Units
Power Supply Voltage	VCC(MAX)	25	V
Output Voltage	VOUT(MAX)	25	V
Output Sink Current	IOUT(MAX)	1	A
Power Dissipation	P _D ¹⁾	0.8	W
Thermal Resistance Junction-Ambient	R _{TH(J-A)} ¹⁾	156.3	°C/W
Operating Temperature Range	T _{OPR}	-40 ~ 85	°C
Storage Temperature Range	T _{STG}	-55 ~ 125	°C

Note

1) Mounted on a glass epoxy circuit board of 50x50mm Pad dimension of 50mm²

Recommended operating conditions

Characteristic	Symbol	Rating		Units
		Min.	Max.	
Power Supply Voltage	VCC(MAX)	3	24	V
Output Voltage	VOUT(MAX)	1.5	V _{CC}	V
Output Sink Current	IOUT(MAX)	-	1	A
Shut Down Voltage	SHDN	-0.3	V _{CC}	V



Electrical Characteristics

Test Conditions : Ta = 25°C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IQ Maximum	I _Q	V _{CC} = 3~24V, I _{out} = 20mA, V _{out} = open	-	18	24	mA
Leak Current	I _{leak}	V _{CC} = 5V, V _{out} = 24V	-	0.1	1	uA
Feedback Voltage	V _{FB}	V _{CC} = 5V, I _{out} = 10mA	192	200	208	mV
Dropout Voltage	V _{drop}	V _{CC} = 5V, I _{out} = 500mA	-	0.7	1.5	V
Line Regulation	ΔV _{FB1}	V _{CC} = 3~24V, I _{out} = 10mA	-	2	10	mV
Load Regulation	ΔV _{FB2}	V _{CC} = 5V, I _{out} = 10mA, V _{out} = V _{CC}	-	3	25	mV
SHDN Voltage ON	V _{dis on}	V _{CC} = 5V, I _{out} = 10mA, V _{out} = V _{CC}	1.5	-	-	V
SHDN Voltage Off	V _{dis off}	V _{CC} = 5V, I _{out} = 10mA	-	-	0.5	V
SHDN Pin Current	I _{dis}	V _{CC} = 5V, SHDN = 5V	230	430	630	uA
Short Circuit Current	I _{SC}	R _{FB} = 0Ω	-	1.9	-	A
Thermal Shutdown	T _{TSD}	-	-	160	-	°C

Notes

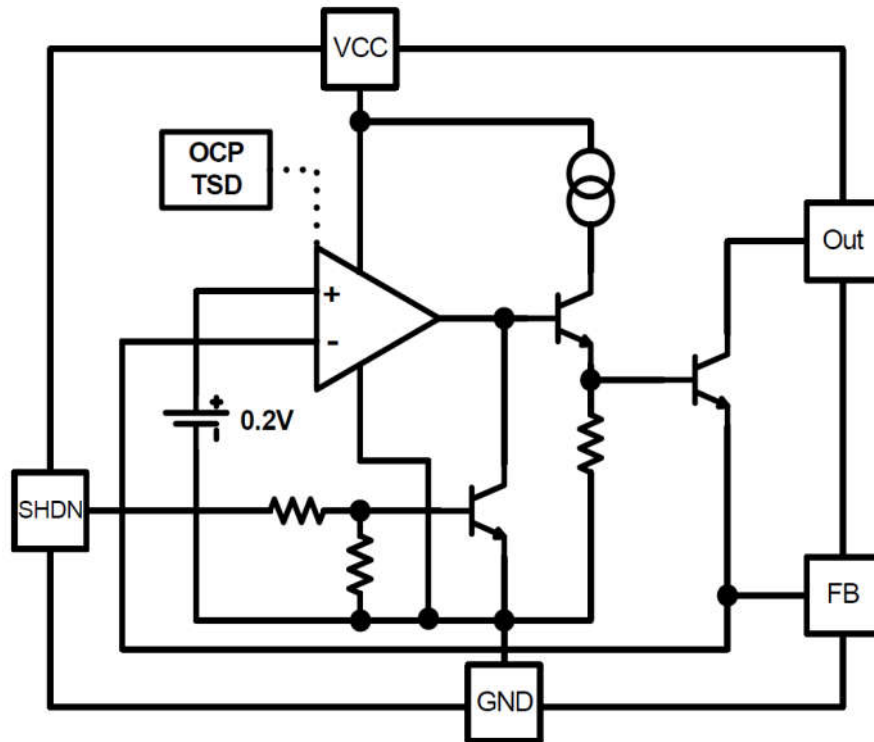
1. These parameters, although guaranteed, are not 100% tested in production.

Switching Characteristics

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Propagation Delay Time ("L" to "H")	tp _{LH}	V _{CC} = 3.5V V _{SHDN} .H = 5V V _{SHDN} .L = GND R _{FB} = 0.2Ω (I _{OUT} = 1A) R _{OUT} = 2Ω CL = 10pF	0.6	1	-	μs
Propagation Delay Time ("H" to "L")	tp _{HL}		0.2	1	-	μs
Pulse width	tw		1			μs
Output Rise Time (turn off)	tr		0.5	1	-	μs
Output Fall Time (turn on)	tf		0.1	0.2	-	μs



Internal Block Diagram



Design Consideration

1) Calculation for RFB

- $R_{FB} = 0.2V / I_{LED}$

2) Calculation for Vdrop

- $V_{drop} = V_{CC} - V_{LED}$

3) Calculation for Power Dissipation on the AP7350S

- $PD1 = (V_{drop} - V_{FB}) \times I_{LED}$

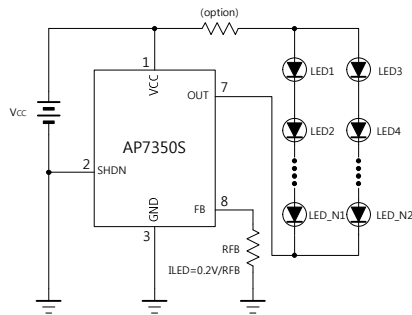
- $PD2 = V_{CC} \times I_Q$

- $PD_{(total)} = PD1 + PD2$

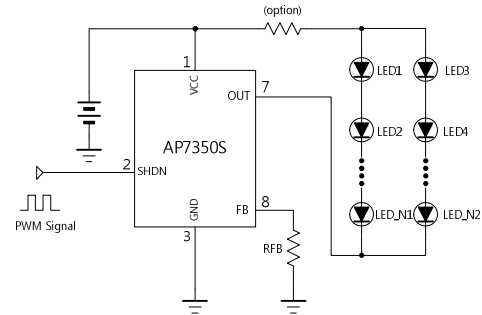
4) If does not use an Dimming function, connect SHDN Pin with the ground.



Typical Applications



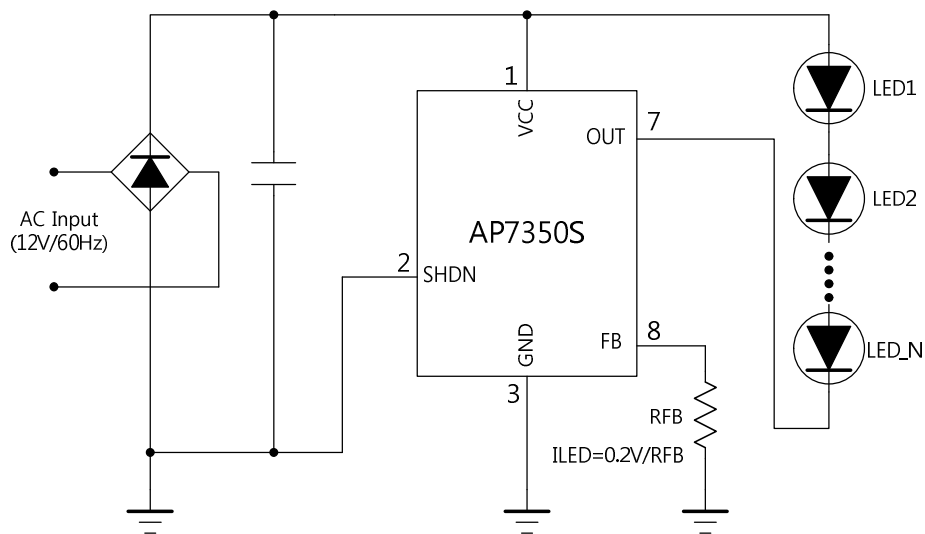
<APP1. Constant Current LED Driver Circuit>



<APP2. PWM Dimming LED Driver Circuit>

※ Caution

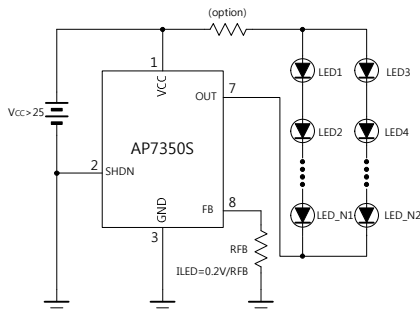
In the case of high current application, we recommend to control the PWM using by $\overline{\text{SHDN}}$.
If user cannot use the PWM control, the application must be limited in $P_D (= V_{\text{DROP}} \times I_{\text{LED}})$.
So, in this case we recommend to minimize V_{DROP} or I_{LED} . (See page 9)



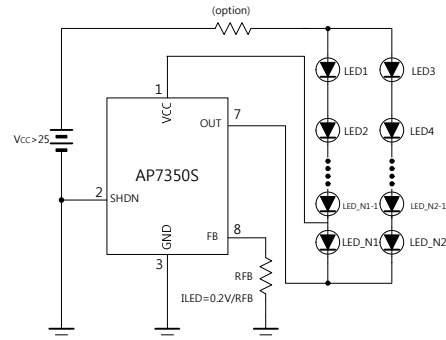
<APP3. VAC Landscape Lightning Application Circuit>



Typical Applications



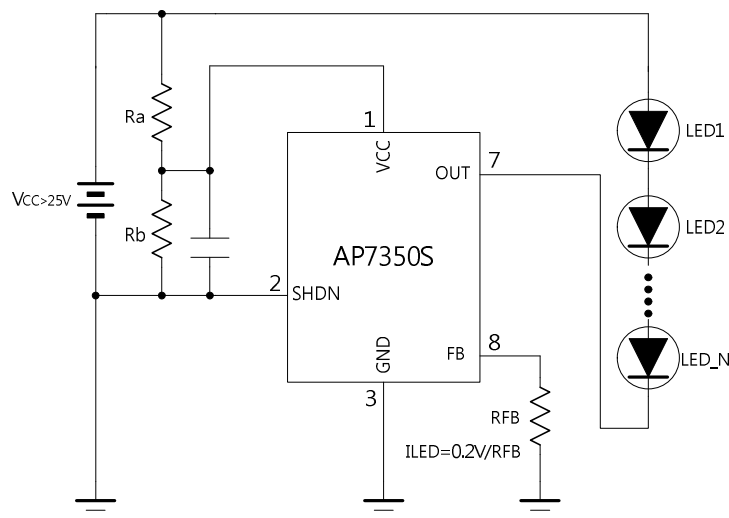
<APP4. High Voltage Operation of AP7350S (1)>



<APP5. High Voltage Operation of AP7350S (2)>

For operation in excess of AP7350S specified maximum voltage (V_{CC} & V_{OUT}) of 25V, one way is to connect a sufficient number of LEDs between the power supply voltage and the DC input of the V_{CC} & V_{OUT} such that the voltage seen at pin(V_{CC} & V_{OUT}) is less than 25V. That is to say, use additional LEDs to drop the voltage fed to the AP7350S below its maximum rating, in the usual way. Refer to **APP4,5** Note that the exact number of diodes required will depend on the supply voltage V_{CC} and output voltage V_{OUT} , the voltage drops across the particular LEDs being used. (Red, Blue and White LEDs have different forward voltage drop.) Use enough LEDs such that voltage at pin(V_{CC} & V_{OUT}) of AP7350S is < 25V.

※ Caution : When V_{CC} uses to exceed 25V, Dimming functions the use is impossible.



<APP6. Power Supply Where Separates Operation of AP7350S>



Electrical Characteristic Curves

Fig.1 V_{FB} vs T_A

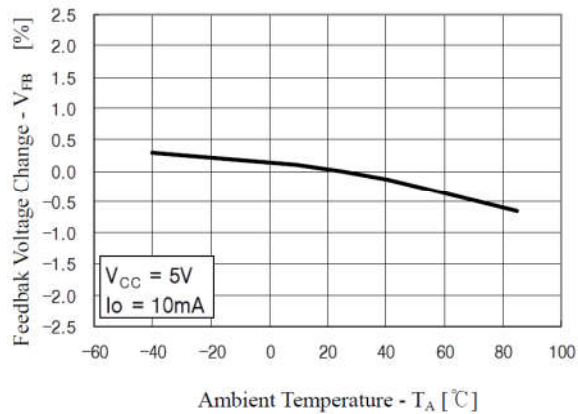


Fig.2 Line Regulation vs T_A

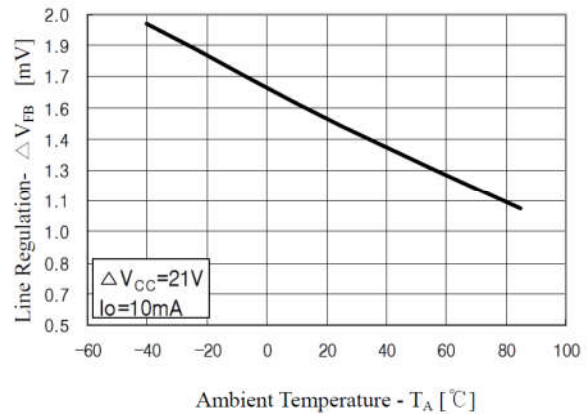


Fig.3 Load Regulation vs T_A

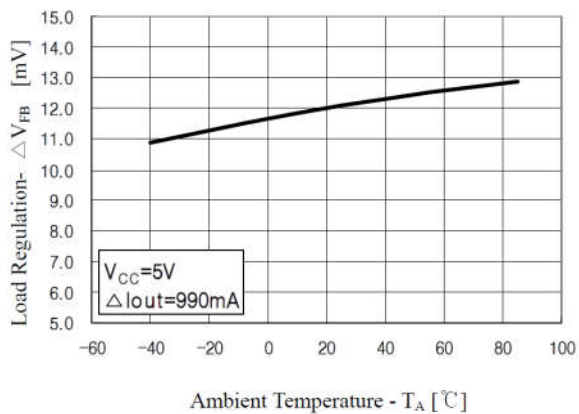


Fig.4 Quiescent Current vs T_A

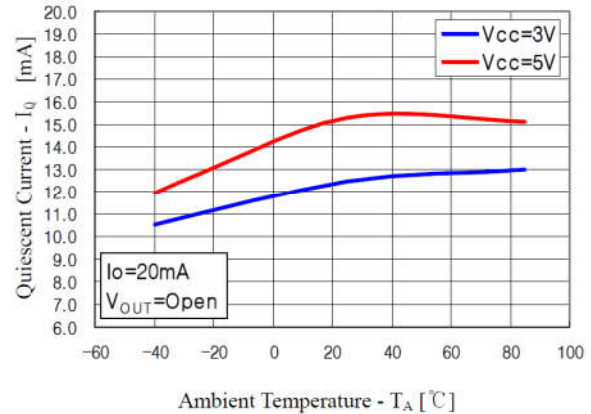


Fig.5 Dropout Voltage vs T_A

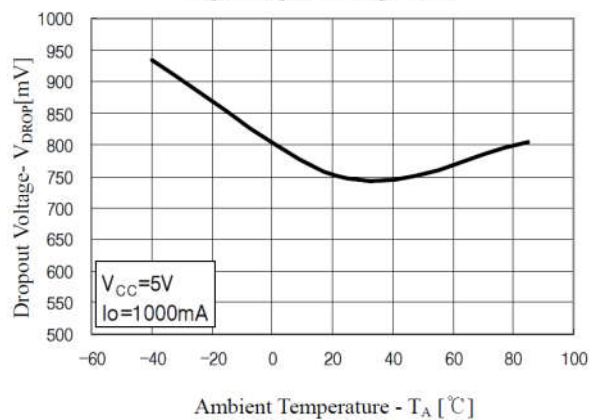
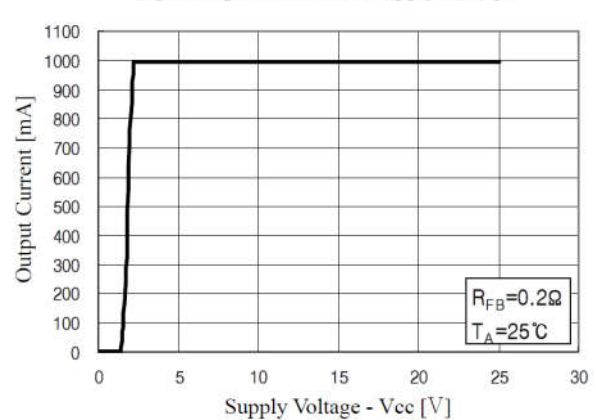


Fig.6 Output Current vs Supply Voltage





Electrical Characteristic Curves

Fig.7 Dimming Curve

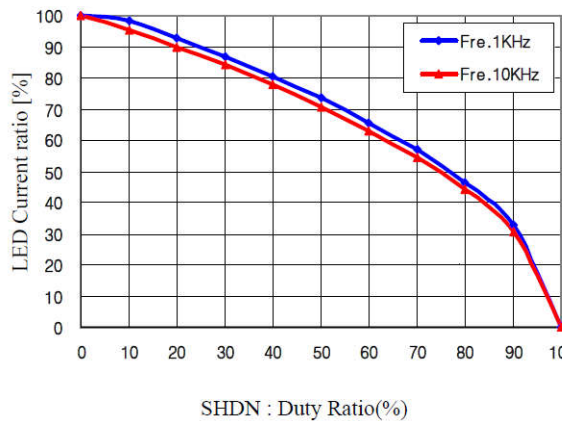


Fig.8 Power Dissipation vs TA

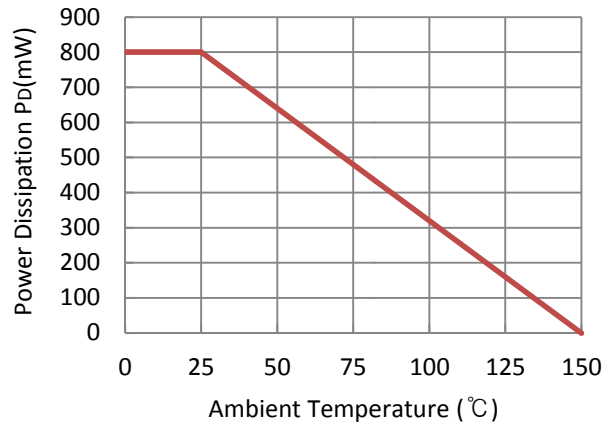


Fig.9 Dimming Waveform [1kHz]

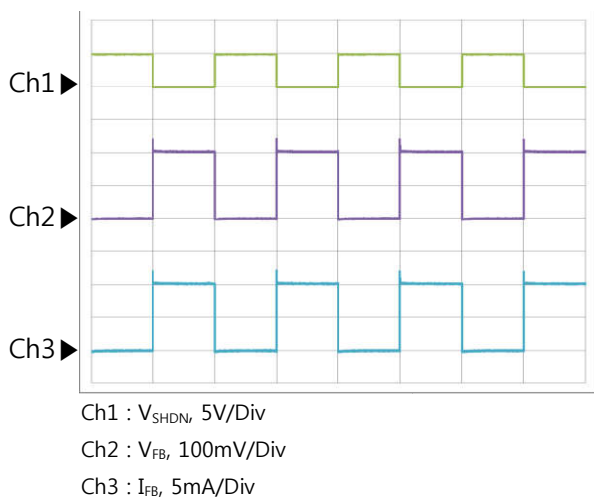


Fig.10 Dimming Waveform [10kHz]

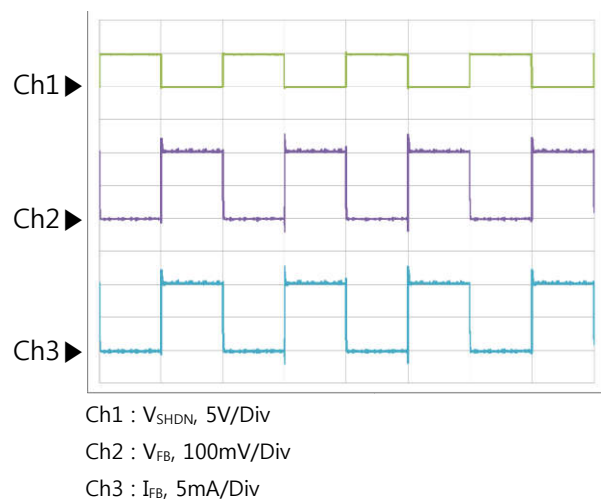
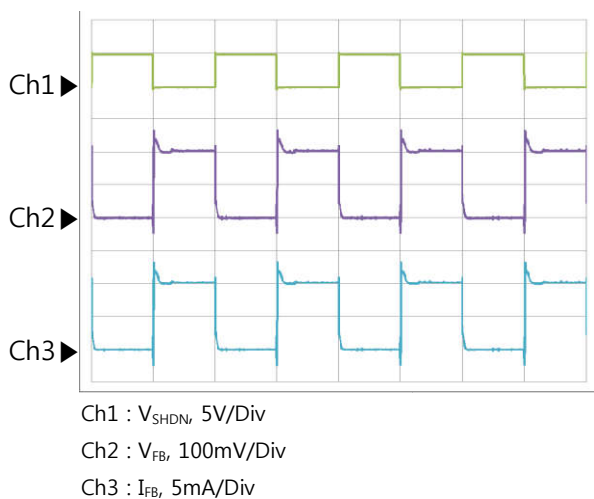


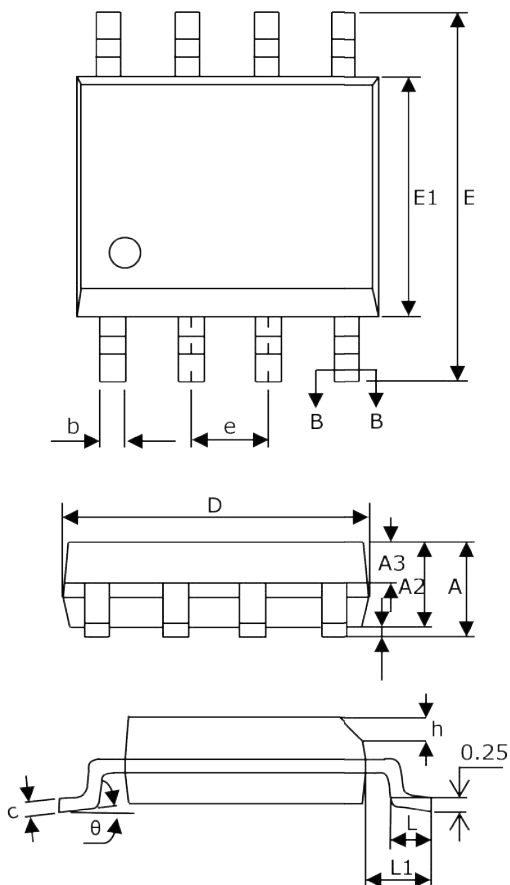
Fig.11 Dimming Waveform [50kHz]





Package Dimension

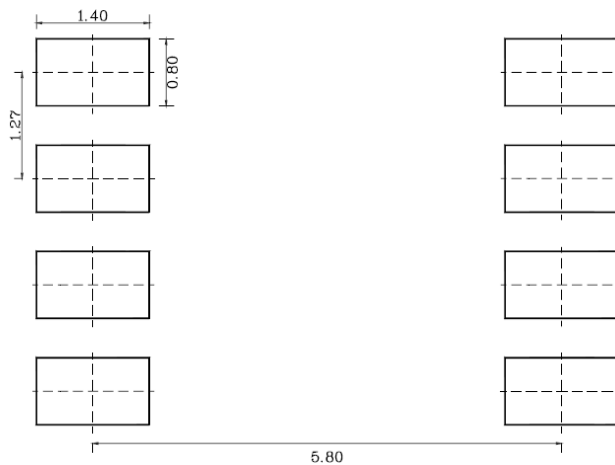
Unit : mm



SOP-8L unit : mm			
DIM	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05BSC		
θ	0	—	8°
L/F	80*80	90*90	95*130

Recommend PCB solder land

Unit : mm





Revision History

No	Date	Contents
00	2015-12-30	Initial Brief Datasheet Release
01	2016-04-01	Addition switching characteristics

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