S8350D

Linear LED Driver IC

◈ Description

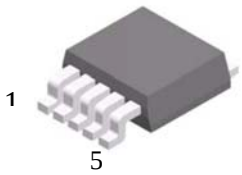
The S8350D is an integrated adjustable constant-current source, driving loads up to 1200mA. The output current level can be adjusted via an external resistor. The integrated SHDN input of the S8350D permits LED brightness regulation by pulse width modulation (PWM), with the SHDN input, the LED brightness can be regulated via duty cycle. Also, SHDN low sets the S8350D in sleep mode, the SHDN pin also can be used as an enable input.

This discrete integration technology eliminates individual components by combining them into a single package, which results in a significant reduction of both system cost and board space.

◈ Features

- Supplies stable bias current for LEDs
- LED drive current adjustable via single external resistor (Max 1200mA)
- Low Cost, Low External Parts Count
- Halogen-Free Package is Available

◈ Pin Assignment & Description



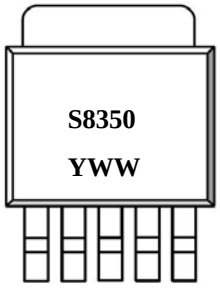
Package : TO-252-5L

Pin No	Symbol	Description
1	OUTPUT	Open Collector Output
2	FB	Feedback / 0.2V Reference
3	GND	Ground
4	VCC	Power Supply
5	SHDN	Disable On/Off

◈ Ordering Information

Package Type	Device Name	Marking
TO-252-5L	S8350D	S8350

◈ Marking Information



Marking

Line 1 S8350 : Device Name

Line 2 YWW : Y-Year Code

WW-Weekly Code

◈ Absolute maximum ratings

[Ta=25℃]

Characteristic	Symbol	Rating	Unit
Power Supply Voltage	$V_{CC(MAX)}$	25	V
Output Voltage	$V_{OUT(MAX)}$	25	V
Output Sink Current	$I_{OUT(MAX)}$	1200	mA
Thermal Resistance Junction-Ambient	Rth(j-a)*	96.2	℃/W
Power Dissipation	P_D*	1.3	W
Operating Temperature Range	T_{opr}	-40 ~ +85	℃
Storage Temperature Range	T_{stg}	-55 ~ +125	℃

* : Mounted on a glass epoxy circuit board of 30x30mm Pad dimension of $50mm^2$

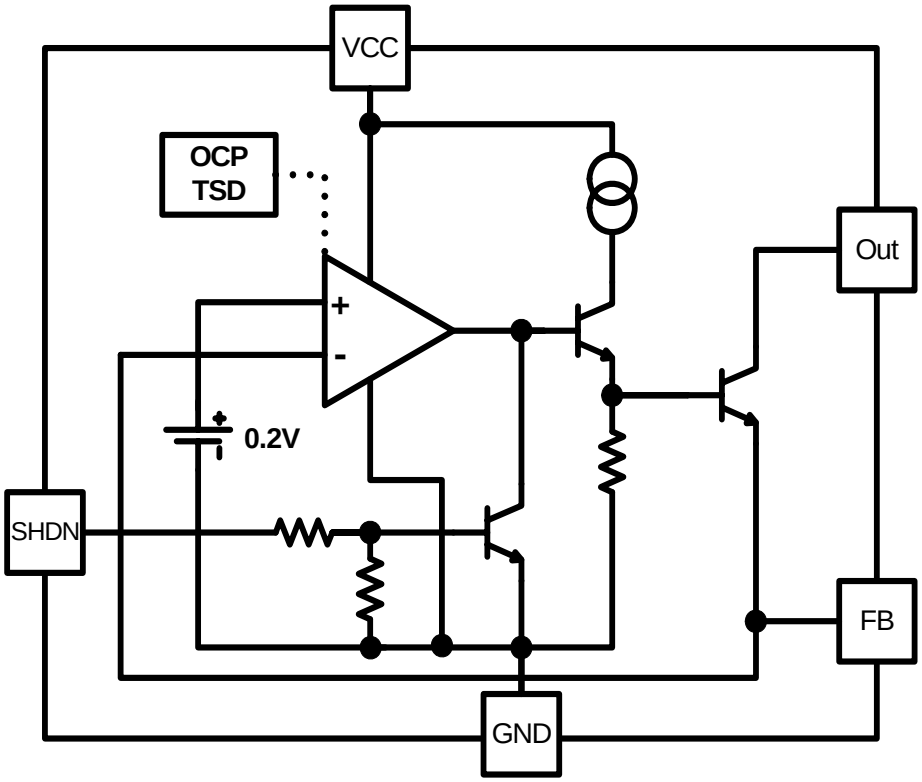
◈ Recommended operating conditions

Characteristic	Symbol	Rating		Unit
		Min	Max	
Power Supply Voltage	V_{CC}	3	24	V
Output Voltage	V_{OUT}	1.5	Vcc	V
Output Sink Current	I_{OUT}	-	1000	mA
Shut Down Voltage	SHDN	-0.3	Vcc	V

◈ Electrical Characteristics (Ta=25℃, unless otherwise noted.)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
IQ Maximum	I_Q	V_{CC}=3~24V, Iout=20mA, Vout=open	-	18	24	mA
Leak Current	Ileak	Vcc=5V, Vout=24V	-	0.1	1	μA
Feedback Voltage	V_{FB}	V_{CC}=5V, Iout=10mA	192	200	208	mV
Dropout Voltage	Vdrop	V_{CC}=5V, Iout=1000mA	-	0.7	1.5	V
Line Regulation	$\triangle V_{FB1}$	V_{CC}=3V~24V, Iout=10mA	-	2	10	mV
Load Regulation	$\triangle V_{FB2}$	V_{CC}=5V, Iout=10mA~Iomax	-	3	25	mV
SHDN Voltage On	Vdis on	V_{CC}=5V, Iout=10mA, Vout=Vcc	1.5	-	-	V
SHDN Voltage Off	Vdis off	V_{CC}=5V, Iout=10mA	-	-	0.5	V
SHDN Pin Current	Idis	Vcc=5V, SHDN=5V	230	430	630	μA
Short Circuit Current	I_{SC}	R_{FB}=0Ω	-	1900	-	mA
Thermal Shutdown	T_{TSD}	-	-	160	-	℃

◈ Functional block diagram



◈ Design Consideration

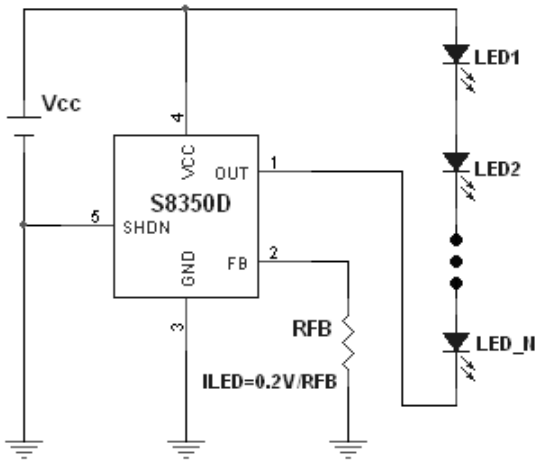
1) Calculation for R_{FB}
- $R_{FB} = 0.2V / I_{LED}$

2) Calculation for Vdrop
- $Vdrop = V_{CC} – V_{LED}$

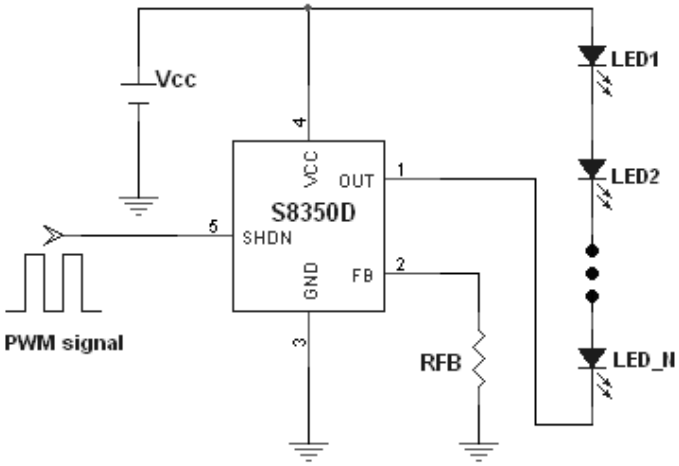
3) Calculation for Power Dissipation on the S8350D
- $P_{D1} = (Vdrop – V_{FB}) \times I_{LED}$
- $P_{D2} = V_{CC} \times I_Q$
- $P_{D(total)} = P_{D1} + P_{D2}$

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

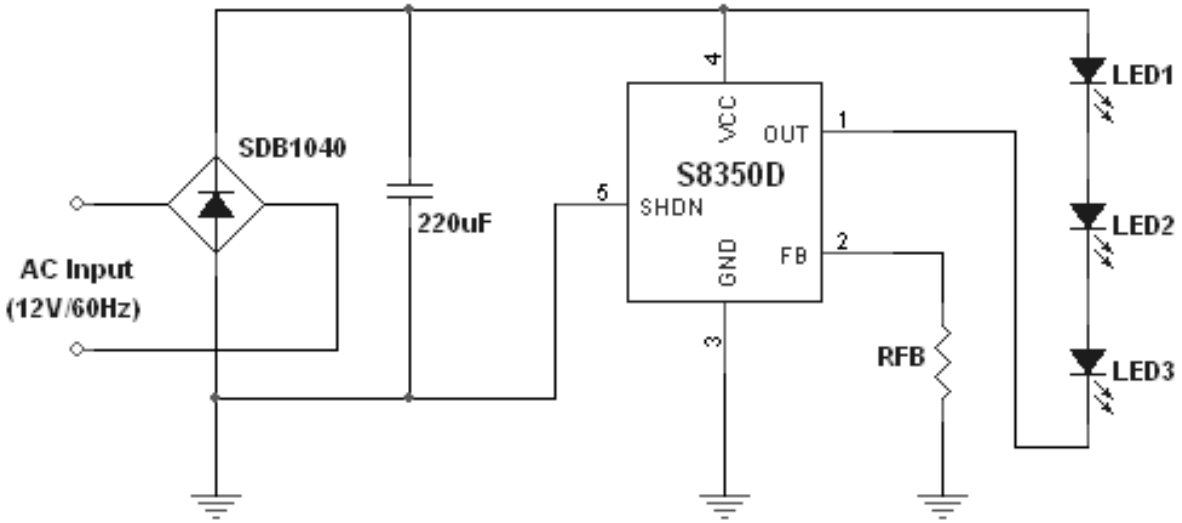
◈ Typical Applications



<APP1. Constant Current LED Driver Circuit>

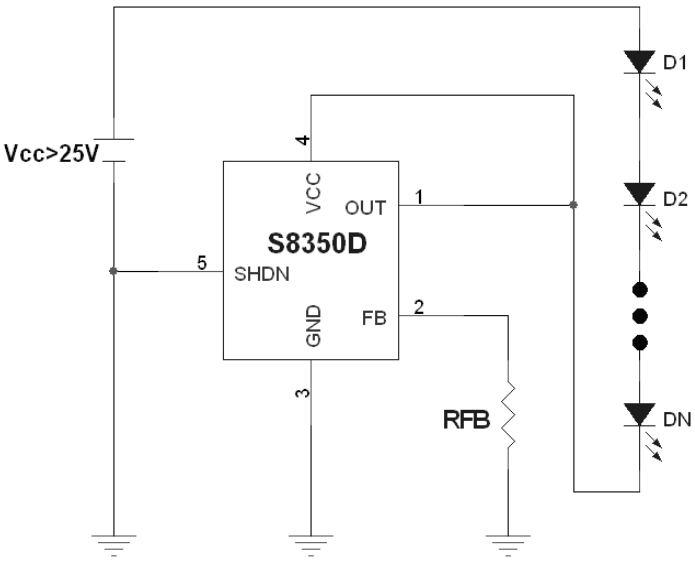


<APP2. PWM Dimming LED Driver Circuit>

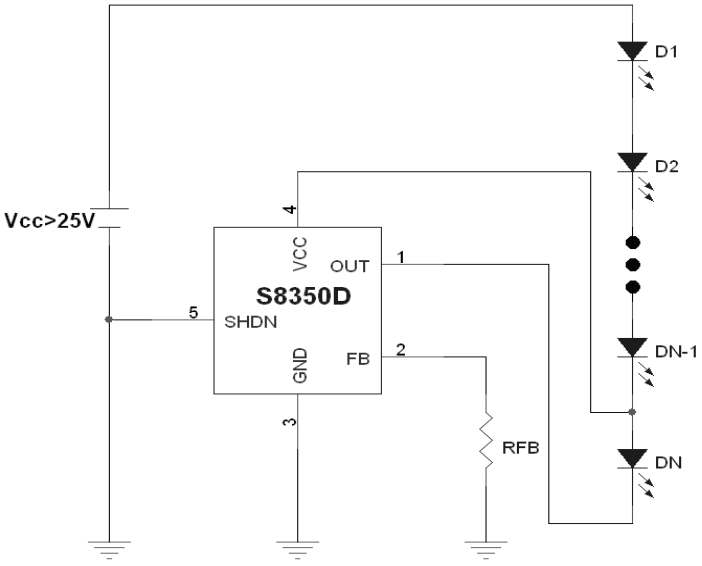


<APP3. V_{AC} Landscape Lighting Application Circuit>

◈ Typical Applications



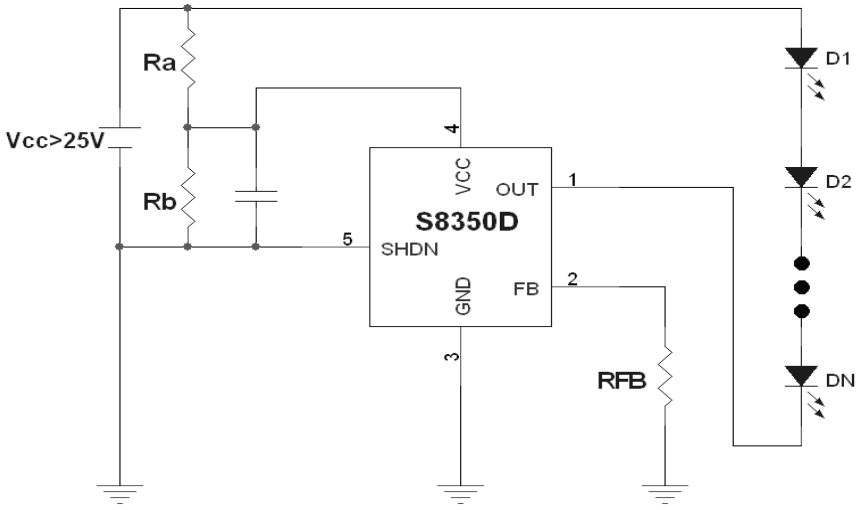
<APP4. High Voltage Operation of S8350D (1) >



<APP5. High Voltage Operation of S8350D (2) >

For operation in excess of S8350D 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 S8350D 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 S8350D is < 25V.

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



<APP6. Power Supply Where Separates Operation of S8350D >

◈ Electrical Characteristic Curves

Fig.1 V_{FB} vs T_A

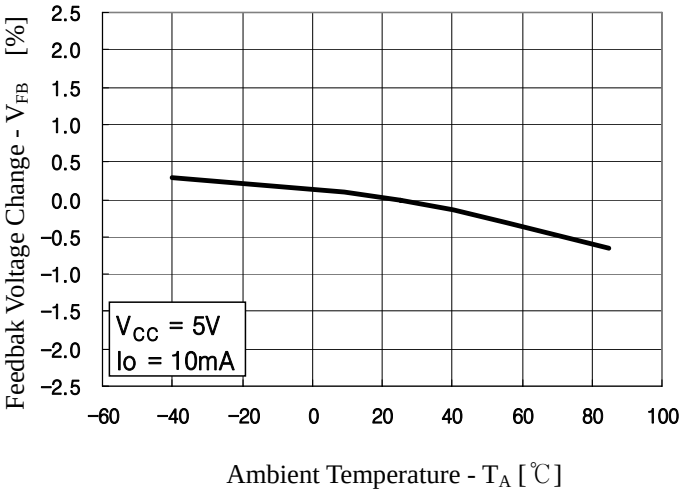


Fig.2 Line Regulation vs T_A

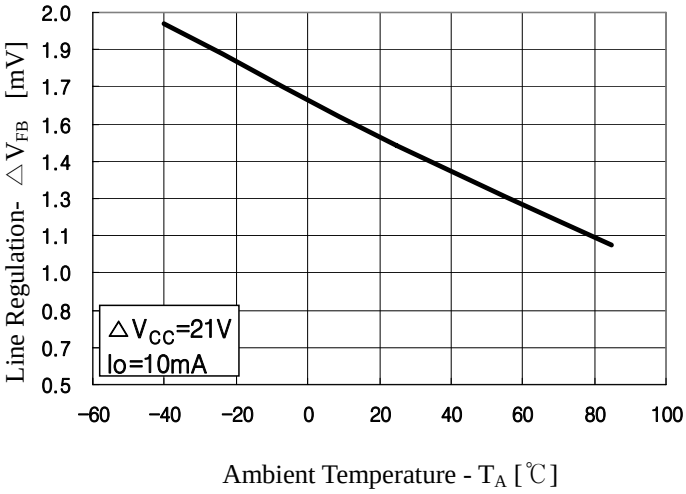


Fig.3 Load Regulation vs T_A

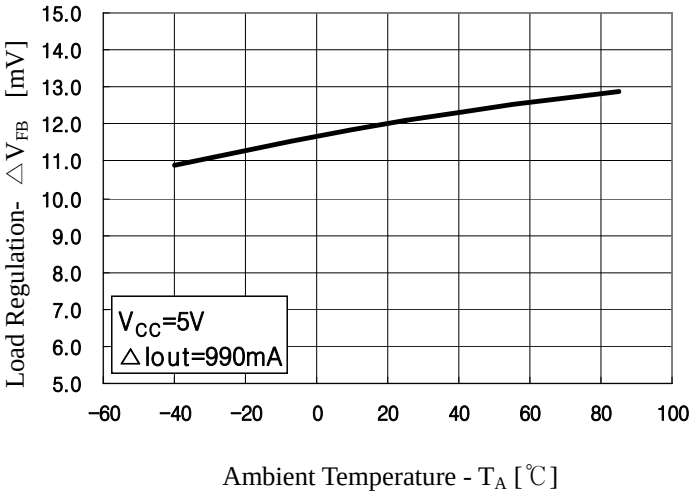


Fig.4 Quiescent Current vs T_A

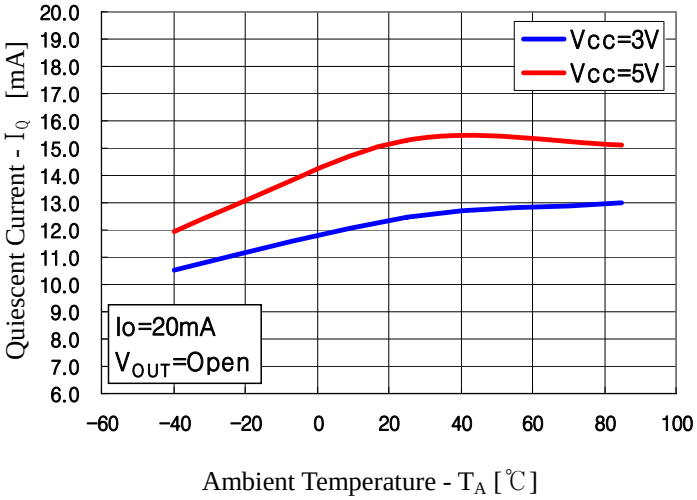


Fig.5 Dropout Voltage vs T_A

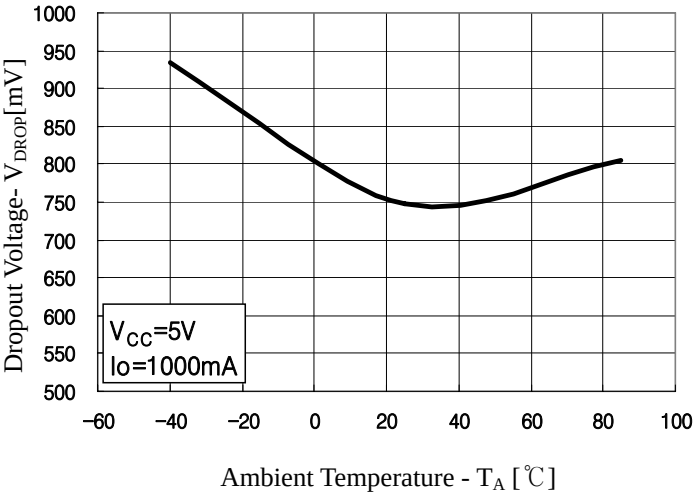
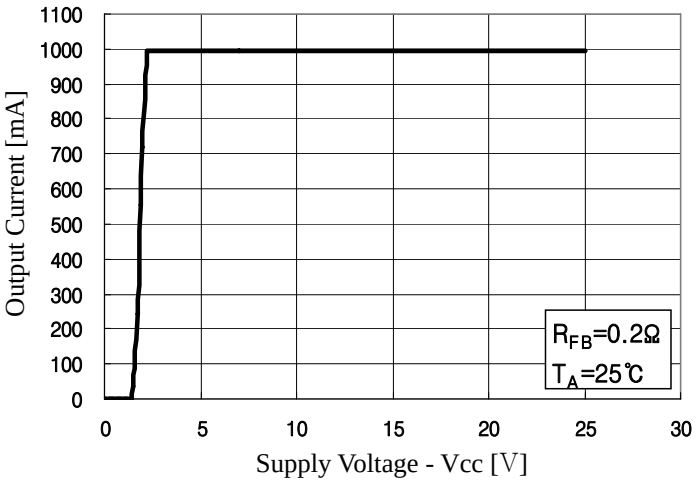
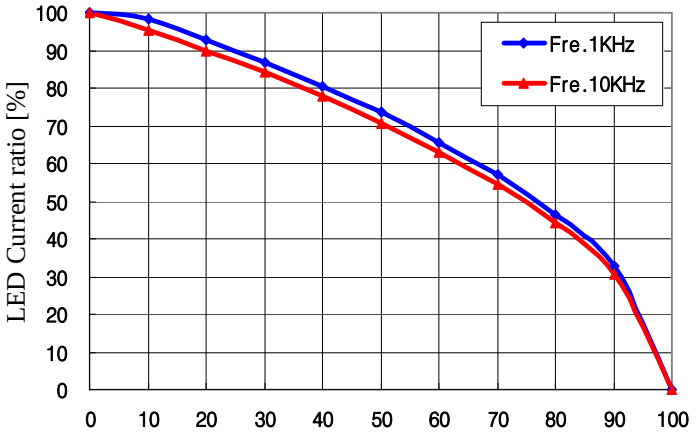


Fig.6 Output Current vs Supply Voltage



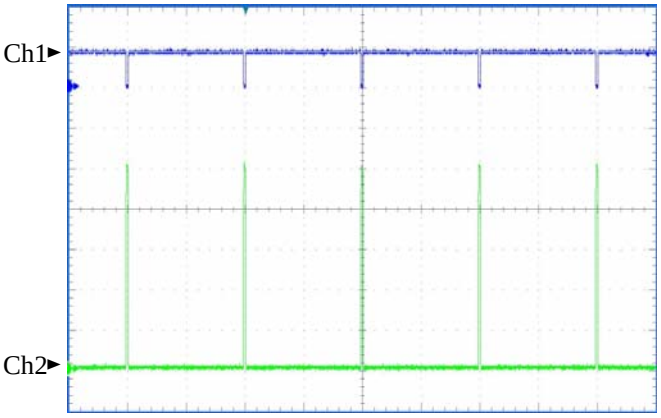
◈ Electrical Characteristic Curves

Fig.7 Dimming Curve



SHDN : Duty Ratio(%)

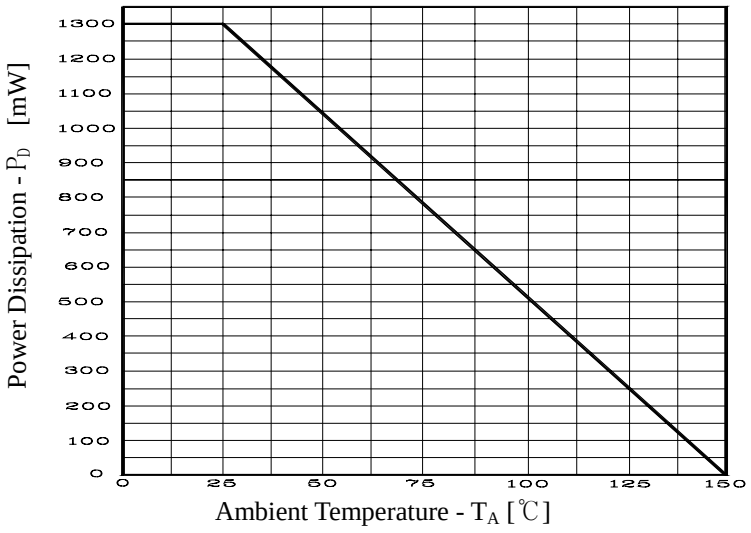
Fig.8 Short Circuit Current



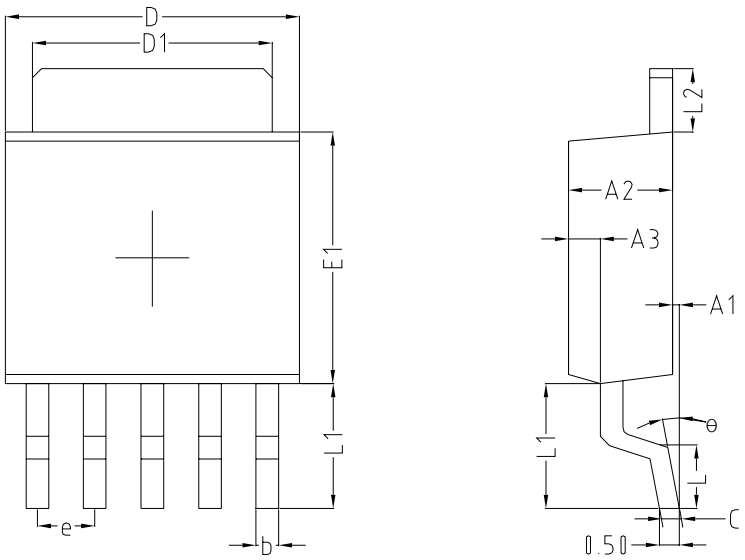
Ch1 : SHDN, 5V/Div

Ch2 : I_{OUT}, 500mA/Div

Fig.9 Power Dissipation vs T_A

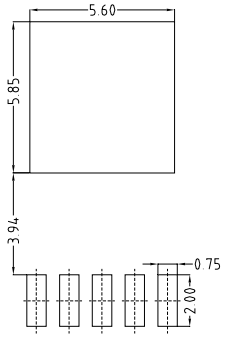


TO-252 Outline Dimension (mm)



SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A1	0.05	0.15	0.25	
A2	2.10	2.30	2.50	
A3	0.50	0.60	0.70	
b	0.46	-	0.60	
C	0.49	-	0.56	
D	6.30	6.50	6.70	
D1		5.30REF		
E1	5.30	5.50	5.70	
e		1.27BSC		
L	1.40	1.50	1.60	
L1	3.00	3.10	3.20	
L2		1.40BSC		
θ	0 °	—	8 °	

※ Recommend PCB solder land [Unit: mm]



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