

FEATURES

- Universal Input Voltage Range of 120VAC \pm 16% or 230VAC \pm 16%
- Adjusted Constant Current Operation
- Low Quiescent Current
- Simplifies Circuit and System Designs
- Compact Component Count
- Temperature Compensated Constant Current
- Over Current Protection
- Over Temperature Protection
- LED Current Thermal Foldback for Thermal Protection
- PWM Dimming Control
- DFN-8L Exposed Pad Package

APPLICATIONS

- LED Driver
- Lighting Applications
- Lamp Indicators
- Candle Light
- Low Cost solution
- Constant Current Sink

GENERAL DESCRIPTION

The EC4215 is a constant current linear high voltage LED driver for replace discrete solutions in AC/DC power application (up to 270VAC). The device can drive an output power of \pm 10% variation from a universal input voltage range of 120VAC \pm 16%, or 230VAC \pm 16% for different LED strings. The solution eliminates the need of individual components by combining them into a single package, which results in a significant reduction of both system cost and board space. The EC4215 can as a constant current sink for high voltage LED or low voltage LED strings in series. For higher current application, multiple EC4215s can also be used in parallel such as 60mA, 80mA or 160mA. The EC4215 is capable of a dimming input for adjustable LED brightness control by Pulse Width Modulation (PWM). The EC4215 is self-protected against over temperature and over current. Internal thermal foldback function regulates LED driving current automatically to limit die temperature during high power operation or high ambient temperature conditions. These features provide maximum system protection for the demanding lighting applications. The EC4215 is available in a space saving DFN-8L exposed pad package, and the operating temperature is from -40°C to $+125^{\circ}\text{C}$.

TYPICAL APPLICATION CIRCUIT

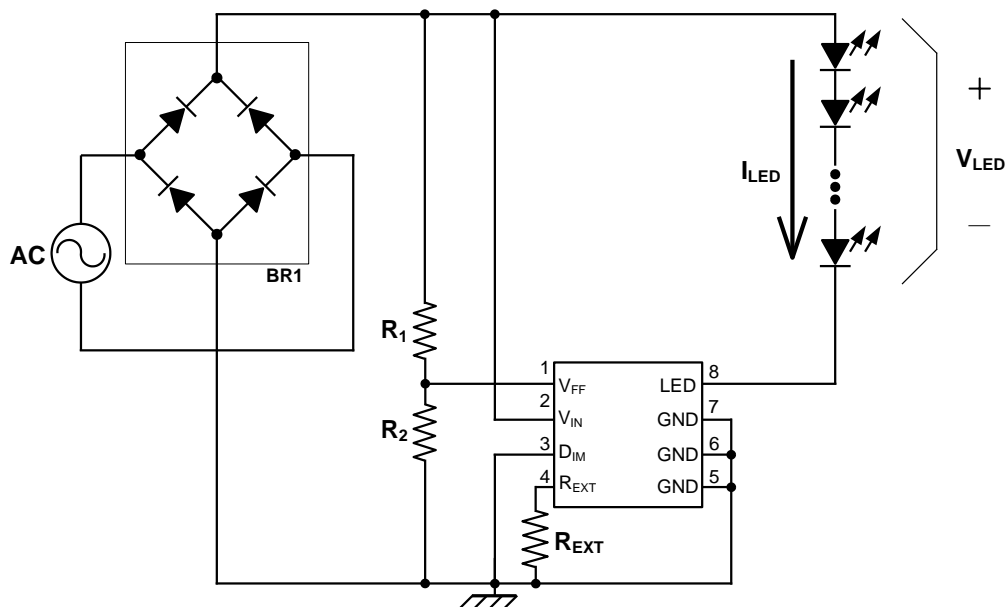


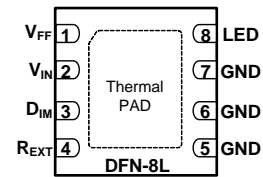
Fig. 1 Simplified Application Circuit



ABSOLUTE MAXIMUM RATINGS

V_{IN} , LED Supply Voltage.....	550V
V_{FF} , R_{EXT} , D_{IM} Operation Voltage.....	6V
Operating Temperature.....	-40°C to +125°C
Storage Temperature.....	-55°C to +150°C
Maximum Die Temperature.....	+150°C
Lead Temperature.....	+260°C
ESD HBM Voltage HV Pin.....	1.2kV
ESD HBM Voltage LV Pin.....	3.5kV
ESD MM Voltage.....	250V

PIN CONFIGURATION



TOP View

Note:

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability.

Ordering Information

Part No.	Package Type	Marking Information	Remark
EC42151NNF2R	DFN-8L	EC4215 LLLLL YYWWT	YYWW : Date Code LLLLL : Lot No T : internal tracking code

ELECTRICAL CHARACTERISTICS

$T_A = 25^\circ\text{C}$ unless otherwise specified

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNIT
Electrical Characteristic						
V_{IN}	Operation Voltage		25		500	V
I_{LED}	Current Regulation (Note 1)	$V_{IN}=25\text{Vdc}$, $R_{EXT}=15\Omega$	38	40	42	mA
		$V_{IN}=25\text{Vdc}$, $R_{EXT}=30\Omega$	19	20	21	mA
$I_{LED(MAX)}$	Maximum Current Regulation	$V_{DROP} \geq 16\text{V}$ (Note 2)			120	mA
I_Q	Quiescent Current	$V_{IN}=25\text{Vdc}$, $R_{EXT}=\text{Open}$		150		μA
V_{REF}	Reference Voltage (Note 3)			0.6		V
$V_{DROP(MAX)}$	Maximum Dropout Voltage (Note 4)	$V_{IN}=265\text{Vac}$, $R_{EXT}=30\Omega$, $V_{LED}=220\text{V}$			170	V
V_{DIM-H}	D_{IM} PIN High Threshold	V_{DIM} Rising	1.4			V
V_{DIM-L}	D_{IM} PIN Low Threshold	V_{DIM} Falling			0.4	V
Thermal Characteristic						
$\Delta V_{REF}(T)$	V_{REF} Temperature Coefficient	$T_A=-40^\circ\text{C} \sim 125^\circ\text{C}$		0.01		%/°C
T_A	Operating Temperature		-40		125	°C
P_D	Total Power Dissipation (Operation)				1	W
$R_{\theta JA}$	Thermal Resistance	DFN-8L Package		33.2		°C/W
Protection						
OCP	Over Current Protection			180		mA
OTP	Over Temperature Protection			150		°C
TFP	Thermal Foldback Protection			100		°C
Note:						
1. $I_{LED}=0.6/R_{EXT}$, $V_{FF}=0\text{V}$, $D_{IM}=0\text{V}$, $V_{LED}=25\text{V}$						
2. $V_{DROP}=V_{IN}-V_{LED}$, $P_D < 1\text{W}$ (No heat sink)						
3. $V_{REF}=V(R_{EXT})$, $V_{FF}=0\text{V}$, $D_{IM}=0\text{V}$						
4. The current regulation is for an instantaneous AC line input current only, not to exceed thermal characteristics of package.						

FUNCTION DIAGRAM

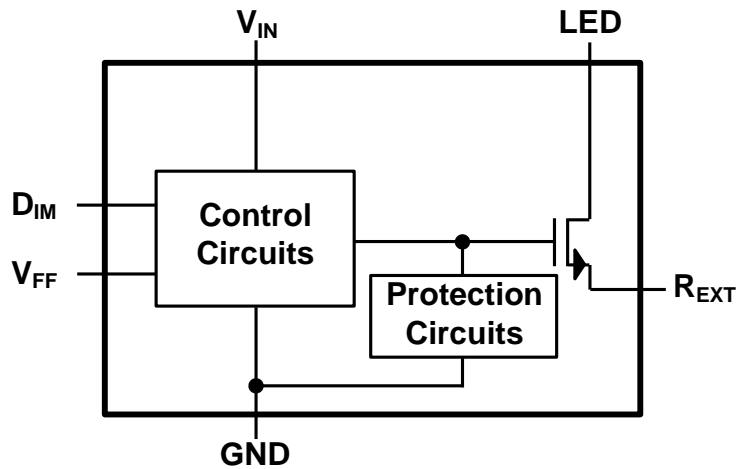


Fig. 2 Detailed Bloam

PIN DESCRIPTIONS

PIN	Symbol	Description
1	V_{FF}	Input voltage sensing through a voltage divider for constant output power regulation.
2	V_{IN}	Input supply voltage.
3	D_{IM}	Connect a logic level PWM signal for adjustable brightness of LED strings.
4	R_{EXT}	An external resistor sets different current regulation for LED strings between R_{EXT} and GND pin.
5	GND	Ground.
6	GND	Ground.
7	GND	Ground.
8	LED	The LED strings are connected from input supply voltage to this pin.

EC4215 LED Lighting Application Circuit Schematic

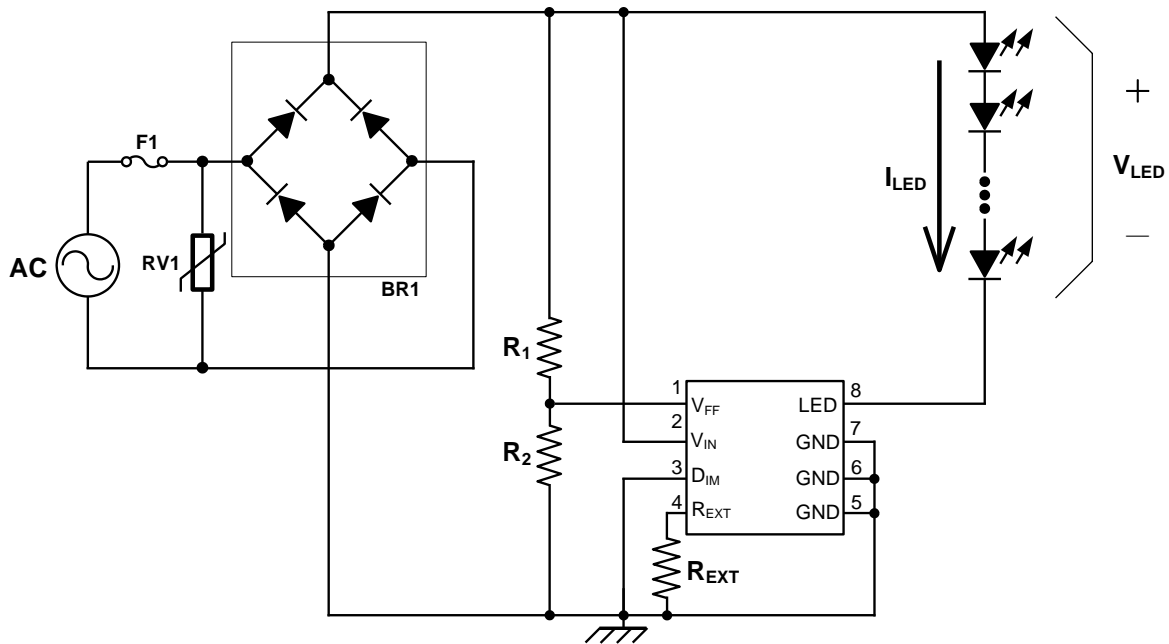


Fig. 3 Typical Application Circuit

110VAC 4W LED Lighting Demo Board Part List

COMPONENT	VALUE	PACKAGE
U1	EC4215	DFN-8L
BR1	B10S	SMD
F1	1A	DIP
RV1	221KD14 (140VAC)	DIP
R ₁	1.2MEG	0603
R ₂	6.19k	0603
R _{EXT}	10	0603
V _{LED}	110V	NA

220VAC 4W LED Lighting Demo Board Part List

COMPONENT	VALUE	PACKAGE
U1	EC4215	DFN-8L
BR1	B10S	SMD
F1	1A	DIP
RV1	431KD14 (275VAC)	DIP
R ₁	2.49MEG	0603
R ₂	7.32k	0603
R _{EXT}	19.1	0603
V _{LED}	220V	NA

EC4215 LED Lighting With PWM Dimming Application Circuit Schematic

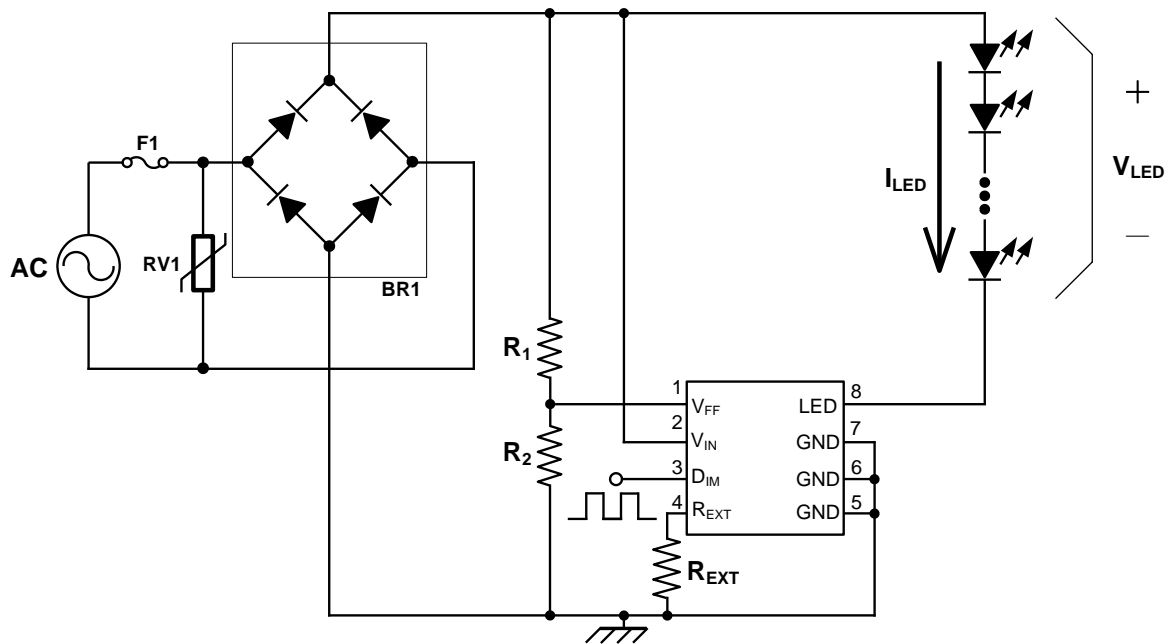
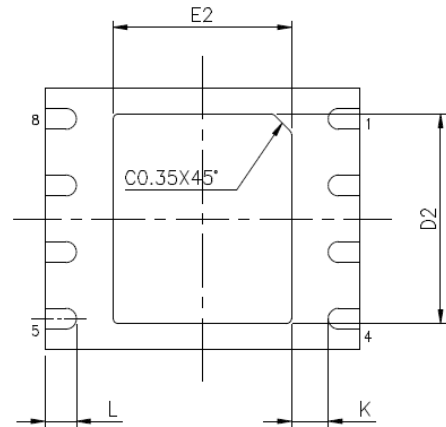
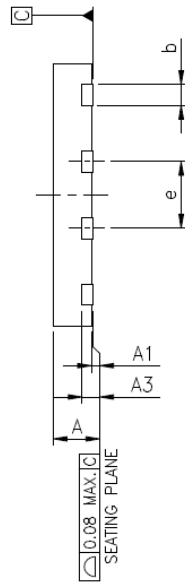
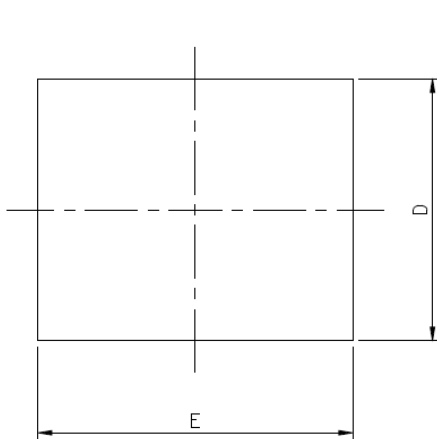


Fig. 4 Typical Application Circuit with PWM Dimming

DFN-8L Package



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15mm AND 0.30mm FROM THE TERMINAL TIP. IF THE TERMINAL HAS THE OPTIONAL RADIUS ON THE OTHER END OF THE TERMINAL, THE DIMENSION b SHOULD NOT BE MEASURED IN THAT RADIUS AREA.
3. BILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.

JEDEC OUTLINE	PACKAGE TYPE					
	N/A			VDFN(N/A)		
PKG CODE	WDFN(X608)			VDFN(N/A)		
SYMBOLS	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.80	0.85	0.90
A1	0.00	0.02	0.05	0.00	0.02	0.05
A3	0.20 REF.			0.20 REF.		
b	0.35	—	0.48	0.35	—	0.48
D	5.00 BSC			5.00 BSC		
E	6.00 BSC			6.00 BSC		
e	1.27 BSC			1.27 BSC		
L	0.50	—	0.70	0.50	—	0.70
K	0.20	—	—	0.20	—	—

PAD SIZE	E2			D2			LEAD FINISH		JEDEC CODE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	Pure Tin	PPF	
142X165 MIL	3.30	3.40	3.45	3.90	4.00	4.05	V	V	N/A
173X173 MIL	3.30	3.40	3.45	4.20	4.30	4.35	V	V	N/A