

*Building
Partnerships
in a Global
Market*

RESISTIVE COMPONENTS



Resistors for Lighting Applications

Resistor selected / designed
to customer specifications

Available technologies
include:

Metal Film

Metal Oxide

Wirewound

Surface Mount



Increasing safety standards and the growing trend towards more efficient lighting methods have greatly increased the complexity of lighting circuits and placed new stresses upon components.

In a market where customers demand low prices, small physical size, plus the latest safety standards, designers are faced with a difficult task.

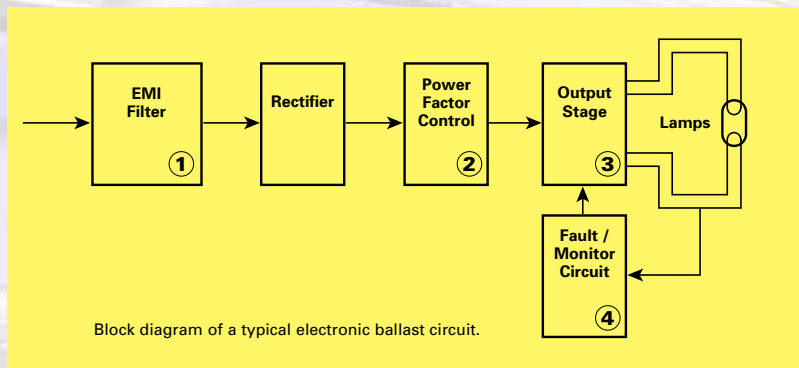
Welwyn Components has worked closely with lighting designers and manufacturers to make this task easier. Welwyn can provide not only standard Metal Film/Oxide and Wirewound resistors, for general non-critical circuitry, but also fusible resistors for circuit

protection and pulse withstand resistors capable of withstanding the high surges present during tube start up or strike. Welwyn can also design and manufacture custom resistors to meet specific circuit requirements.

Applications are not limited to fluorescent light ballast circuits, Welwyn can provide resistors for use in any lighting application. Some of the more common applications are detailed below.

- High Intensity Discharge
- Mercury Vapour
- Metal Halide
- High Pressure Sodium
- Low Pressure Sodium

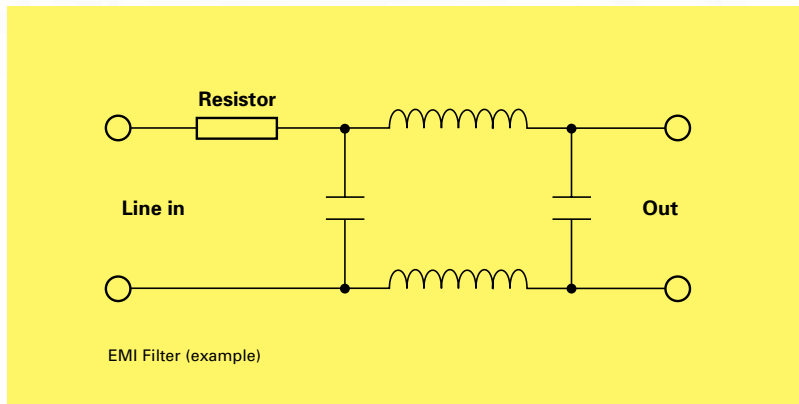
Typical Electronic Ballast Circuit



THE FOLLOWING ARE EXAMPLES OF APPLICATIONS REQUIRING RESISTORS

1. EMI Filter

Ballasts have an inrush current during the initial start-up several times greater than their normal operating current and in general electronic ballasts have a higher inrush current than electromagnetic or hybrid ballasts. Inrush current limiting resistors are designed to withstand these surges but to fuse safely should a fault occur, for example if a capacitor were to go short resulting in a mains short circuit. Typical parts used are FA8025, FM and WFF series in axial form and the FCR series in surface mount form.



Fusible Metal Film Resistors

FA8025 SERIES

- Predictable fusing characteristics
- Flameproof protection



Electrical Data

		FA8225	FA8325	FA8425
Power rating at 70°C	watts	0.25	0.5	1.5
Resistance range	ohms	0R1 - 10k	0R1 - 27k	0R15 - 22k
Limiting element voltage	volts	250	350	500
TCR	ppm/°C	250	250	250
Resistance tolerance	%	5		
Standard values		E24 preferred		
Thermal impedance	°C/watt	150	120	90
Ambient temperature range	°C	-55 to 155		

Fast Fusible Metal Film Resistors

WFF SERIES

- Low power fusing
- Predictable fusing characteristics
- Flameproof protection

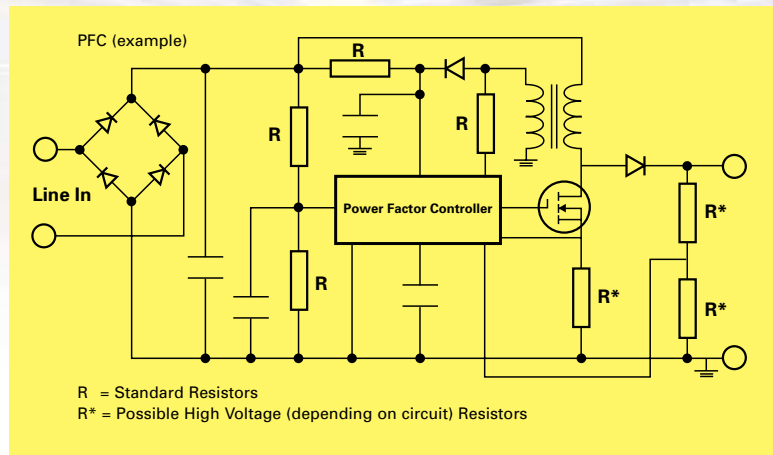


Electrical Data

		WFF1/4	WFF1/2	WFF1
Power rating at 70°C	watts	0.25	0.5	1
Resistance range	ohms	0R1 - 10K	0R10 - 27K	0R2 - 1K5
Limiting element voltage	volts	250	350	350
TCR	ppm/°C	250		
Resistance tolerance	%	5		
Standard values		E24 preferred		
Thermal impedance	°C/watt	150	120	100
Ambient temperature range	°C	-55 to 155		

2. Power Factor Control

As a general rule electronic ballasts use a large capacitor reservoir associated with a bridge rectifier. As a result the power factor is low, the European regulation EEC555-2 specifies the minimum power factor value acceptable for any electronic circuit that is connected to the mains supply. In order to meet this regulation designers usually incorporate either a passive or active circuit to improve the power factor. These circuits usually contain general purpose resistors such as the axial MFR series and surface mount resistors such as the WCR and CR series.



Metal Film Resistors

MFR SERIES

- Approved to BSCECC 40101-803 and 019
- Tolerances down to 0.5%
- Temperature coefficient down to 50ppm/°C



Electrical Data

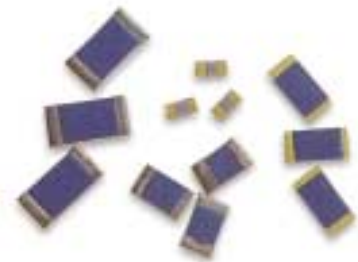
Commercial		MFR3	MFR4	MFR5
Power rating at 70°C	watts	0.4	0.5	0.75
Resistance range	ohms	1R0 - 1M	1R0 - 10M	1R0 - 1M
Limiting element voltage	volts	200	350	350
TCR	ppm/°C	<10 and >150K: 100* 10 to 150K:50	50	≤10:150 >10:100*
Resistance tolerance	%	1,2	0.5, 1,2	0.5, 1,2

* Note:- Tighter TCR'S are available, consult factory for details.
Approved to CECC 40101-019, CECC 40101-803

Surface Mounted Resistors

CR SERIES

- CECC released products
- Custom designs/sizes available
- Any resistance value available within specified range
- Terminations available for wire bonding or soldering
- Available in sizes down to 0503
- Resistance range 1 ohm to 100M ohms
- Tolerances down to 0.1%
- Solder terminations have a nickel barrier layer
- Shorting Links available



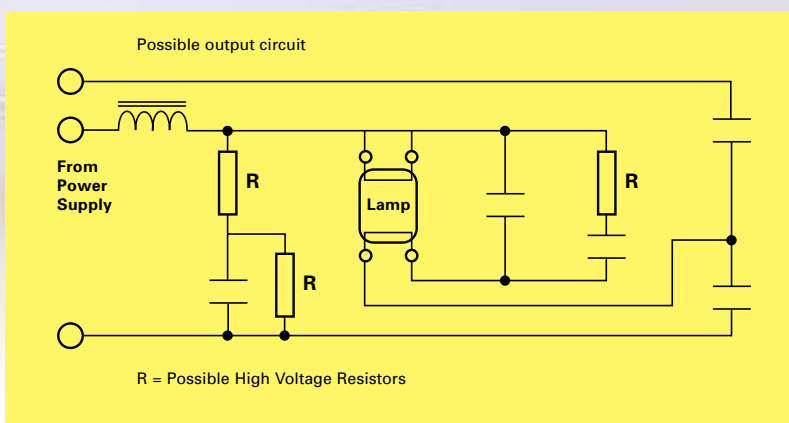
Electrical Data

COMMERCIAL		CR0503	CR0805	CR1005	CR1206	CR2010	CR2512	NOTES
Power rating at 70°C	watts	0.063	0.1	0.125	0.25	0.5	1.0	
Resistance range	ohms	1R to 10M	1R to 100M			1 to 1M		
Limiting element voltage	volts	50	100	150	200	400	500	
TCR -55° to +155°C	ppm/°C	<10 ohms 350: 10 to 100 ohms 200: 100 to 1M ohm 100: >1M ohm 250						
Resistance tolerance	%	0.1, 0.25, 0.5, 1, 2, 5						See table of value ranges
Ambient temperature range	°C	-55 to 155						

Approved to CECC 40401-008, CECC 40401-003

3 & 4. Output/Fault Monitoring

The output stage and fault/monitoring stage of the ballast can subject components to high electrical stresses, for example a typical fluorescent tube has a strike voltage of 1000V or more, depending upon lamp size, and an operating frequency greater than 20KHz. In these conditions a standard resistor is likely to be unsuitable, Welwyn can offer standard high voltage resistors, MH series, cement coated wirewound resistors with excellent pulse handling capabilities, WA series, and specially designed pulse withstand resistors suitable for these applications. Welwyn is also developing a new range of High Voltage surface mount resistors and is currently seeking BS415 (BS EN 60065) approval for the MH series resistors.



High Voltage Metal Film Resistors

MH SERIES

- BSEN 60065 (BS415) 1998 + 1994
- High working voltage to 3.5KV
- Small size
- High pulse load capability
- Robust cement resistors element
- Value up to 10M



Electrical Data

		MH25	MH37
Power rating at 70°C max	watts	0.25	0.5
Resistance range	ohms	100K - 10M	100K - 1M
Limiting element voltage	volts dc or ac peak	1,600	3,500
Isolation voltage	volts	700	
TCR	ppm/°C	100	
Resistance tolerance	%	1, 2, 5	
Standard values		E24 and E96 preferred	
Thermal impedance	°C/watt	140	112
Ambient temperature range	°C	- 55 to 155	

General Purpose Cement Coated Wirewound Resistors

WA80 SERIES

- Cost effective
- Flameproof protection
- Can replace carbon comp. in many applications
- Resistance values down to 0.01 ohms
- Ideal for pulse handling applications



Electrical Data WA80 SERIES

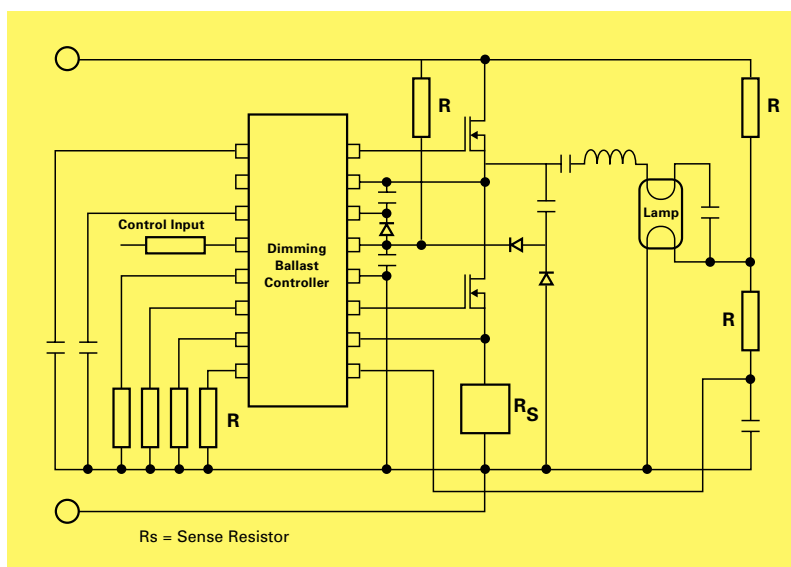
		WA82	WA83	WA835	WA84	WA85	WA87
Power rating at 25°C	watts	1	2.0	2.5	3.0	5	7
Power rating at 70°C	watts	.86	1.6	2.0	2.5	4.3	6
Resistance range	ohms	OR068 to 430	OR05 to 900R	OR05 to 900R	OR01 to 2K2	OR015 to 4K5	OR15 to 10K
Limiting element voltage	volts	50	50	75	100	150	150
Isolation voltage	volts	250	250	250	350	500	700
TCR	ppm/°C	<1Ω:350			>1Ω:200		
Resistance tolerance	%	5, 10					
Values		E24 preferred					
Thermal impedance	°C/watt	140	110	82	90	54	35
Ambient temperature range	°C	- 55 to 155					

Other applications

Welwyn can also provide resistors for specialised lighting applications, such as the increasingly popular energy saving lamps, high intensity discharge lamps for automotive applications, emergency lighting and dimmable fluorescent lighting. An example of the latter is shown here.

Dimming ballasts use not only general purpose axial and surface mount resistors as seen in other forms of ballast, but also use low value current sense resistors to provide feedback information on pre-heat, ignition, dimming and fault currents.

Welwyn can offer low value current sense resistors in either surface mount form (LR series) or pluggable form (OLV series).



Open Low Value Resistors OLV SERIES

- Values down to 5mΩ
- Low inductance
- Designed to individual customer specifications
- Pluggable style



Electrical Data

		OLV-1	OLV-3	OLV-5
Power rating at 25°C	Watts	1	3	5
Resistance range *	mΩ	5,10,15,20	5,10,15,20	10,15,20
TCR	ppm/°C	400	350	300
Resistance tolerance	%	5		
Ambient temperature range	°C	-55 to 155		

* Other values available on request.

Low Value Flat Chip Resistor

LRC/LRF SERIES

- Standard 2512, 2010 and 1206 sizes
- Resistance values down to 0.003 ohms
- Leach resistant solder-plated copper wrap-around termination
- Low inductance - less than 0.2nH
- Standard EIA Tape - 1206 = 8mm; 2010 or 2512 = 12mm



Electrical Data LRC/LRF SERIES

		LR1206	LR2010	LR2512	LR1225
Power rating at 70°C	watts	0.5	1.0	1.5/2.0*	2.0
Resistance range	ohms	OR010 to 1R	OR003 to 1R	OR003 to 1R	OR003 to OR10
Dielectric withstanding voltage	volts	200	200	200	200
TCR	ppm/°C	±100 (Contact factory for value below 0.050 ohms)			
Resistance tolerance	%	≤R020 5%, >R020 1, 2, 5%			
Temperature rise at rated power	°C	40	80	90	80
Pad and trace area for max power rating @ 70°C	mm ²	30	30	100	200

* 2 Watts with total solder pad and trace size of 300 mm²

Note: Circuit diagrams are shown for example only.

For more detailed product information and data sheets or to discuss your specific requirements please contact Welwyn Components Ltd.

**Welwyn Components Ltd. have over 60 years experience
in designing and manufacturing resistive components.**



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