

Lighting Ballast - American Standard

Table of Contents	
Primary Side, EMI/RFI Filter.....	3
Primary Side, Overvoltage Protection.....	4
Primary Side, Voltage Rectification.....	5
Secondary Side, Control Circuit.....	7
Secondary Side, Output Circuit.....	9
Secondary Side, Power Factor Correction.....	10
Secondary Side, Switching Circuit.....	11

Lighting Ballast - American Standard

VISHAY components used for Lighting Ballast functions, American Standard, include:

- HEXFET Power MOSFETS
- Film Capacitors
- Ceramic Capacitors, Single Layer
- Ceramic Capacitors, Multi-Layer
- Aluminum Electrolytic Capacitors
- Varistors
- Bridge Rectifiers
- Rectifier Diodes
- Schottky Diodes
- Zener Diodes
- Fast Switching Diodes
- PTC Thermistors
- Thick Film Chip Resistors

Application Overview

Lighting ballasts control the starting and operating voltages of electrical gas discharge lamps, also known as compact fluorescent lamps (CFL). Because they do not have an intrinsic feedback mechanism that limits operating current like the positive temperature coefficient of resistance of the filaments of incandescent light bulbs, gas discharge lamps need a ballast to limit electric current. Modern electronic lighting ballasts use solid-state circuitry to transform the voltage and alter the frequency of the supplied power. This eliminates any flickering of the CFL and regulates power more efficiently than is possible with standard magnetic lighting ballasts.

Lighting Ballast - American Standard : Primary Side, EMI/RFI Filter

Filter Capacitors

Product Name	Status	Description	Features	Package	Q-Level
125L		C2, C3: leaded X1/Y4 ceramic capacitor	Cap.range: 1 nF - 50 nF; 400 VAC rated;	TH / Radial	EN/IEC UL CSA
20 VL		C1: leaded X2 ceramic capacitor	Cap.range: 1 nF-100 nF; 400 VAC rated;	TH / Radial	EN/IEC UL CSA
30LV		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 10 pF - 15 nF; 400 VAC rated;	TH / Radial	EN/IEC UL CSA
30LVS		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 1 nF - 10 nF; 400 VAC rated;	TH / Radial	EN/IEC UL CSA
440L		C1: leaded X1/Y1 ceramic capacitor	Cap.range: 10 pF - 10 nF; 500 VAC rated;	TH / Radial	EN/IEC UL CSA
EMI/RFI Y1-VY1		C2, C3: leaded X1/Y1 ceramic capacitor	Cap.range: 10pF - 4700pF; 760 VAC rated;	TH / Radial	EN/IEC UL CSA
EMI/RFI Y2-DN		C1: leaded X1/Y2 ceramic capacitor	Cap.range: 10pF-10,000pF; 400 VAC rated;	TH / Radial	EN/IEC UL CSA
EMI/RFI Y2-VY2		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 10pF - 0.01 μ F; 440 VAC rated;	TH / Radial	EN/IEC UL CSA
MKP 338 6 Y2		C2, C3: leaded Y2 film capacitor	Cap.range:0.001 μ F-0.47 μ F; 300 VAC rated; self healing	TH / Radial	EN/IEC UL CSA
MKP 339 X2		C1: leaded X2 film capacitor	Cap.range:0.001 μ F-4.7 μ F; 275 VAC rated; self healing	TH / Radial	EN/IEC UL CSA
VKO		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 1nF - 4.7nF; 440 VAC rated;	TH / Radial	EN/IEC UL CSA
VKP		C1: leaded X1/Y1 ceramic capacitor	Cap.range: 470pF-4700pF; 760 VAC rated;	TH / Radial	EN/IEC UL CSA
WKO		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 33pF-4700pF; 440 VAC rated;	TH / Radial	EN/IEC UL CSA
WKP		C1: leaded X1/Y1 ceramic capacitor	Cap.range: 33 pF to 4700 pF; 760 VAC rated;	TH / Radial	EN/IEC UL CSA
WYO		C2, C3: leaded X1/Y2 ceramic capacitor	Cap.range: 1nF - 12nF; 440 VAC rated;	TH / Radial	EN/IEC UL CSA

Lighting Ballast - American Standard : Primary Side, Overvoltage Protection

Varistor

Product Name	Status	Description	Features	Package	Q-Level
VDRH - - .E		V1: leaded varistor	Max. VRMS = 680 V; max.trans.curr.=10kA	TH / Radial	
VDRS - - .E		V1: leaded varistor	Max. VRMS = 680 V; max.trans.curr.=6.5kA	TH / Radial	

Lighting Ballast - American Standard : Primary Side, Voltage Rectification

Bridge Rectifier

Product Name	Status	Description	Features	Package	Q-Level
1KABxxE		Leaded bridge rectifier	IF = 1.2 A; IFSM = 50 A	TH / Radial D-38	
2KBBxx		Leaded bridge rectifier	IF = 1.9 A; IFSM = 50 A	TH / Radial	
2KBPxx		Leaded bridge rectifier	IF = 2 A; IFSM = 60 A	TH / Radial	
2KBPxxM		Leaded bridge rectifier	IF = 2 A; IFSM = 60 A;	TH / Radial KBPM	UL
2WxxG		Leaded bridge rectifier	IF = 2 A; IFSM = 60 A;	TH / Radial WOG	UL
B380C1000G		Leaded bridge rectifier	IF = 1 A; IFSM = 45 A	TH / Radial WOG	
B380C1500G		Leaded bridge rectifier	IF = 1.5 A; IFSM = 50 A	TH / Radial WOG	
DF15xxS	NEW	SMD bridge rectifier	IF = 1.5 A; IFSM = 50 A;	SMD DFS	UL
DFL15xxS	NEW	SMD bridge rectifier	IF = 1.5 A; IFSM = 50 A; low profile of 2.5 mm;	SMD DFS	UL
DFxxM		Leaded bridge rectifier	IF = 1 A; IFSM = 50 A;	TH / Radial DFM	UL
DFxxMA	NEW	Leaded bridge rectifier	IF = 1 A; IFSM = 30 A; low cost alt. to DFxxM	TH / Radial DFM	UL
DFxxS		SMD bridge rectifier	IF = 1 A; IFSM = 50 A;	SMD DFS	UL
DFxxSA	NEW	SMD bridge rectifier	IF = 1 A; IFSM = 30 A; low cost alt. to DFxxS;	SMD DFS	UL
G2SBAXx	NEW	Leaded bridge rectifier	IF = 1.5 A; IFSM = 60 A; low cost alt. to G2SBxx;	TH / Radial GBL	UL
G2SBxx		Leaded bridge rectifier	IF = 1.5 A; IFSM = 80 A;	TH / Radial GBL	UL
KBPxxM		Leaded bridge rectifier	IF = 1.5 A; IFSM = 60 A;	TH / Radial KBPM	UL
WxxG		Leaded bridge rectifier	IF = 1.5 A; IFSM = 50 A;	TH / Radial WOG	UL

Discrete Rectifier Diode

Product Name	Status	Description	Features	Package	Q-Level
1N400x		Leaded rectifier diode max. Tj = 150 °C;	IF = 1 A; IFSM = 45 A; VF = 1.1V;	TH / Axial DO-204AL (DO-41)	
1N400xGP		Leaded rectifier diode max. Tj = 175 °C;	IF = 1 A; IFSM = 30 A; VF = 1.1V;	TH / Axial DO-204AL (DO-41)	
BYG10x		SMD rectifier diode max. Tj = 150 °C;	IF = 1.5 A; IFSM = 30 A; VF = 1.15V; Er = 20 mJ	SMD DO-214AC (SMA)	
BYG20x		SMD rectifier diode max. Tj = 150 °C;	IF = 1.5 A; IFSM = 30 A; VF = 1.4V; trr = 25ns; Er = 20 mJ	SMD DO-214AC (SMA)	
BYG21x		SMD rectifier diode max. Tj = 150 °C;	IF = 1.5 A; IFSM = 30 A; VF = 1.6V; trr = 120ns; Er = 20 mJ	SMD DO-214AC (SMA)	
BYG22x		SMD rectifier diode max. Tj = 150 °C;	IF = 2 A; IFSM = 35 A; VF = 1.1V; trr = 25ns; Er = 20 mJ	SMD DO-214AC (SMA)	

Product Name	Status	Description	Features	Package	Q-Level
BYG24x		SMD rectifier diode max. Tj = 150 °C;	IF = 1.5 A; IFSM = 30 A; VF = 1.25V; trr = 140ns; Er = 20 mJ	SMD DO-214AC (SMA)	

Lighting Ballast - American Standard : Secondary Side, Control Circuit

Fast-Switching Diode

Product Name	Status	Description	Features	Package	Q-Level
LL4x48		SMD diode	VR = 75 V; extremely fast switching	SMD SOD80 glass case Mini MELF	
LS4x48		SMD diode	VR = 75 V; extremely fast switching	SMD SOD80 glass case Quadro MELF	
MCL4x48		SMD diode	VR = 75 V; extremely fast switching	SMD glass case micro MELF	

Resistor

Product Name	Status	Description	Features	Package	Q-Level
CRCW - .e3		Thick film chip resistor, SMD	1 Ω to 10 M Ω ; E24-, E96-series; excellent stability	SMD 0201 to 2512	

Small-Signal Schottky Diode

Product Name	Status	Description	Features	Package	Q-Level
BAS28x		SMD diode	VR = 40 V to 60 V; low VF; fast switching	SMD SOD80 glass case Quadro MELF	
BAS385		SMD diode	VR = 30 V; low VF; fast switching	SMD Micro MELF	
BAV99-V		SMD diode	VR = 70 V; dual; fast switching	SMD SOT-23 plastic Case	
SL0x		SMD diode	VR = 20 V to 40 V; low profile	SMD DO-219 AB (SMF) Plastic case	

Voltage Divider

Product Name	Status	Description	Features	Package	Q-Level
CRCW - .e3		R1, R2: thick film chip resistor, SMD	1 Ω to 10 M Ω ; E24-, E96-series; excellent stability	SMD 0201 to 2512	
MCx		R1, R2: thin film chip resistor, SMD	1 Ω to 10 M Ω ; low tol.; low TC excellent stability;	SMD 0402 to 0805	
MMx		R1, R2: thin film MELF resistor, SMD	0.22 Ω to 10 M Ω ; low tol.; low TC; high P; excellent stability;	SMD 0102 to 0207 MELF	
SMM0102		R1, R2: thin film MELF resistor, SMD	10 Ω to 2.21 M Ω ; low tol.; low TC; high P; excellent stability;	SMD 0102 micro MELF	
SMM0204		R1, R2: thin film MELF resistor, SMD	0.22 Ω to 10 M Ω ; low tol.; low TC; high P; excellent stability;	TH / Axial 0204	
SMM0207		R1, R2: thin film MELF resistor, SMD	0.16 Ω to 10 M Ω ; low tol.; low TC; high P; excellent stability;	TH / Axial 0207	
VR25		R1, R2: thin film resistor, leaded	R up to 22 M Ω Voltage up to 1.6 kV Pulse Load up to 7 kV	TH / Axial 2.5x6.5mm	EN/IEC

Zener Diode

Product Name	Status	Description	Features	Package	Q-Level
BZG04		SMD diode	Zener and surge current specification	SMD DO-214AC (SMA)	
BZM55		SMD diode	Very high stability	SMD Micro MELF	

Lighting Ballast - American Standard : Secondary Side, Output Circuit

Resonance Capacitor

Product Name	Status	Description	Features	Package	Q-Level
MMKP 383		C8, C9: Leaded film capacitor	Cap.range: E24;1nF-2.7 μ F; 2.5 kV PP; small, low profile	TH / Radial	

Lighting Ballast - American Standard : Secondary Side, Power Factor Correction

Buffer Capacitor

Product Name	Status	Description	Features	Package	Q-Level
EKV		radial Al-electrolytic capacitor Long useful life	200 V to 450 V 1 μ F to 150 μ F Life@105 °C = 10000h	TH / Radial 10x12 to 18x31	

Decoupling Capacitor

Product Name	Status	Description	Features	Package	Q-Level
MKP 479		Leaded film capacitor	Cap.range:E24;10nF-3.9 μ F; 630 VDC;	TH / Radial	

HEXFET Power MOSFET

Product Name	Status	Description	Features	Package	Q-Level
IRFB11N50 A		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.52 Ohm; ID = 11 A;	TH / Radial TO-220AB	
IRFB13N50 A		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.45 Ohm; ID = 14 A;	TH / Radial TO-220AB	
IRFB16N50K		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.285 Ohm; ID = 17 A;	TH / Radial TO-220AB	
IRFR420APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 3 Ohm; ID = 3.3 A;	SMD TO-252AA D-Pak	
IRFU420APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 3 Ohm; ID = 3.3 A;	TH / Radial TO-251AA I-Pak	

High Ohmic, High Voltage Resistor

Product Name	Status	Description	Features	Package	Q-Level
VR25		leaded resistor	R up to 22 MOhm Voltage up to 1.6 kV Pulse Load up to 7 kV	TH / Axial 2.5x6.5mm	EN/IEC

PFC Diode

Product Name	Status	Description	Features	Package	Q-Level
FES(F)16xT		Leaded/SMD rectifier diode	IF = 16 A; IFSM = 250 A; VF=0.975-1.5V;trr=35-50ns ; max. Tj = 150 °C;	TH / Radial TO-220AC ITO-220AC	
FES(F)8xT		Leaded/SMD rectifier diode	IF = 8 A; IFSM = 125 A; VF=0.95-1.5V; trr=35-50ns ; max. Tj = 150 °C;	TH / Radial TO-220AC ITO-220AC	
FESB16xT		Leaded/SMD rectifier diode	IF = 16 A; IFSM = 250 A; VF=0.975-1.5V;trr=35-50ns ; max. Tj = 150 °C;	SMD TO-263AB	
FESB8xT		Leaded/SMD rectifier diode	IF = 8 A; IFSM = 125 A; VF=0.95-1.5V; trr=35-50ns ; max. Tj = 150 °C;	SMD TO-263AB	

Lighting Ballast - American Standard : Secondary Side, Switching Circuit

Capacitor

Product Name	Status	Description	Features	Package	Q-Level
MKT 303		C6, C7: Leaded film capacitor	Cap.range: 10nF - 10 μ F, E12-series; 630 VDC; low profile partly lacquered	TH / Radial	

HEXFET Power MOSFET

Product Name	Status	Description	Features	Package	Q-Level
IRFB11N50 A		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.52 Ohm; ID = 11 A;	TH / Radial TO-220AB	
IRFB13N50 A		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.45 Ohm; ID = 14 A;	TH / Radial TO-220AB	
IRFB16N50K		Leaded MOSFET	Fast switching; 500 V; RDS(on) = 0.285 Ohm; ID = 17 A;	TH / Radial TO-220AB	
IRFR420APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 3 Ohm; ID = 3.3 A;	SMD TO-252AA D-Pak	
IRFR430APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 1.7 Ohm; ID = 5 A;	SMD TO-252AA D-Pak	
IRFU420APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 3 Ohm; ID = 3.3 A;	TH / Radial TO-251AA I-Pak	
IRFU430APbF		SMD/Leaded MOSFET	Fast switching; 500 V; RDS(on) = 1.7 Ohm; ID = 5 A;	TH / Radial TO-251AA I-Pak	

NPN Transistor

Product Name	Status	Description	Features	Package	Q-Level
BUD842		NPN high-voltage switching transistor; simple switch off transistor (SWOT); optimized RBSOA;very low dynamic satura.	VCEOsus = 400 V; VBE = 1050 V; Ic = 4 A	SMD TO-252 DPAK	
BUF644		NPN high-voltage switching transistor	100-kHz switching rate, very low switching losses	TH / Radial TO-220	
BUF654		NPN high-voltage switching transistor	100-kHz switching rate, very low switching losses	TH / Radial TO-220	
BUF742-S-069		NPN high-voltage switching transistor	100-kHz switching rate,	TH / Radial TO-220	

Resistor

Product Name	Status	Description	Features	Package	Q-Level
CRCW - .e3		R1: thick film chip resistor, SMD	1 Ω to 10 M Ω ; E24-, E96-series; excellent stability	SMD 0201 to 2512	

