



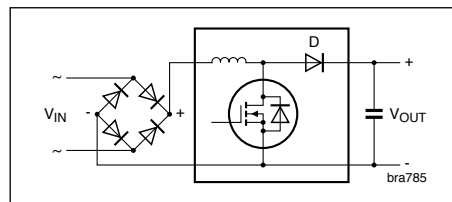
Understanding PFC

Lighting applications

What is Power Factor Correction (PFC)

- It can be defined as the reduction of the harmonic content, and / or the aligning of the phase angle of incoming current
- PFC is required to reduce disturbance on the AC distribution net and maximize the real power drawn by the power supply from the AC line.

Boost PFC circuit



PFC benefits

- Fully compliant with regional regulations imposing restrictions on power factor and total harmonic distortion (THD) in high-power applications (>75W), including:
 - CCC or '3C' in China
 - IEC1000-3-2/EN61000-3-2 in Europe
 - '80plus policy' in America
 - JICC61000-3-2 in Japan
- Meets energy saving and 'green energy' trends to reduce electricity costs
- Optimizes and improves circuit performance
 - reduces mains harmonic content
 - decreases peak current at mains frequency
 - minimizes the electrolytic bulk capacitor used at PFC stage output
 - shrinks mains transformer size and weight
 - improves output regulation of downstream DC-DC converters

PHILIPS

Bipolar-power diodes and transistors for electronic ballast

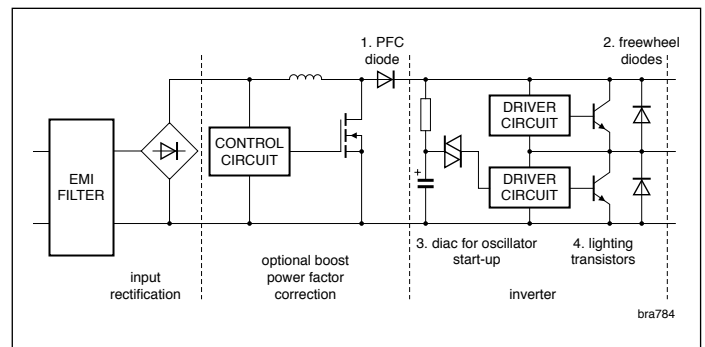
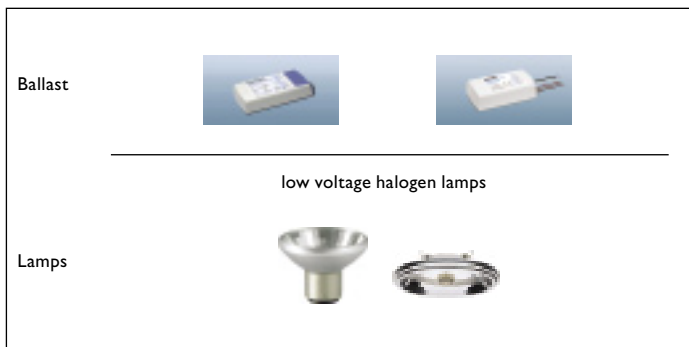
Electronic Ballast for Fluorescent lamps



Electronic Ballast for High Intensity Discharge Lamps



Electronic Ballast for Halogen Lamps



Hyperfast & Ultrafast recovery diodes for PFC

VRRM (V)	IF(AV) (A)	trr (typ) @25c (V)	VF(typ) @150c (V)	D2PAK (SOT404)	TO220AC (SOD59)	TO220AB (SOT78)	SOD113 (2-pin SOT186A)	SOT186A (Insulated TO220)
Hyperfast for Continuous Current Mode								
600	5	19	1.4	BYC5B-600	BYC5-600			
600	8	19	1.4	BYC8B-600	BYC8-600		BYC8X-600	
600	10	19	1.4	BYC10B-600	BYC10-600		BYC10X-600	
600	2x5	19	1.4			BYC10-600CT		
Ultrafast for Discontinuous or Critical Current Mode								
600	9	55	1	BYV29B-600	BYV29-600		BYV29X-600	
600	15	60	1.05		BYT79-600		BYT79X-600	
600	2x10	60	1.12			BYV34-600		BYV34X-600
500	9	60	1.03		BYV29-500		BYV29X-500	
500	10	60	1.05			BYV28-500		
500	14	60	1.05		BYT79-500			
500	20	60	1.12			BYV34-500		
500	30	60	1.12			BYV44-500		

Diac for oscillator start-up

I(FRM) (A)	V(BO) (V)	I(BO) max (uA)	SOD27
2	28-36	50	BRI00/03

Bipolar-power diodes and transistors for electronic ballast

Ultrafast recovery diodes (for freewheel diodes and output rectifiers)

VRRM (V)	IF(AV) (A)	VF (V)	IF (A)	trr (ns)	DPAK (SOT428)	D2PAK (SOT404)	SOD113 (2-pin SOT186A)	SOD59 (TO220AC)	SOT186A (Isolated TO220AB)	TO220AB (SOT78)	TO247 (SOT429)
100	20	0.95	8	25						BYV32E-100	
150	8	0.895	8	25				BYW29E-150			
150	20	0.85	8	25						BYV32E-150	
150	30	0.85	15	28						BYV42E-150	
200	8	0.895	8	25	BYW29ED-200			BYW29E-200	BYW29EX-200		
200	10	0.895	5	25	BYQ28ED-200		BYQ28X-200			BYQ28E-200	
200	14	0.9	14	30				BYV79E-200			
200	16	0.95	8	25						BYQ30E-200	
200	20	0.85	8	25		BYV32EB-200				BYV32E-200	
200	30	0.82	15	28							BYV72EW-200
200	30	0.85	15	28						BYV42E-200	
200	40	0.85	20	30							BYQ40EW-200
300	10	1.05	5	60						BYT28-300	
400	9	1.03	8	60						BYV29-400	
400	20	1.05	10	60							
400	30	1.12	15	60							
500	9	1.03	8	60			BYV29X-500	BYV29-500			
500	10	1.05	5	60						BYT28-500	
500	14	1.05	15	60				BYT79-500			
500	20	1.05	10	60						BYV34-500	
500	30	1.12	15	60						BYV44-500	
600	8	1.5	8	75			BYR29X-600	BYR29-600			
600	9	1	5	55		BYV29B-600	BYV29X-600				
600	2x10	1.12		60					BYV34X-600	BYV34-600	
600	15	1.05		60			BYT79X-600	BYT79-600			
800	8	1.5	8	75				BYR29-800			

Lighting transistors

VCEM (V)	IC(DC) (A)	IC (sat) (A)	tf (max) (us)	SOT82	TO220AB (SOT78)	SOT186A (isolated TO220AB)	TO92 (SOT54)	D2-PAK (SOT404)	D-PAK (SOT 428)
700	1	0.5	0.05				BUJ100		
700	1	0.5	0.05				BUJ100B		
700	4	3	0.033		BUJ103A	BUJ103AX			BUJ103AD
700	4	2	0.16		PHE13005				
700	8	4	0.045		BUJ105A			BUJ105AB	BUJ105AD
700	8	5	0.04		PHE13007				
700	10	6	0.05		BUJ106A				
700	12	6	0.15		PHE13009				
800	0.5		0.28	BUX86P					
1000	0.5		0.28	BUX87P					
1000	2	1	0.4		BUX85				
1000	5	2.5	0.8		BUT11A	BUT11AX			
1000	5	2.5	0.8		BUT11AI				
1000	5	3	0.145		BUJ303A				
1000	6	4	0.03						
1000	6	4	0.8		BUT18A				
1000	8	5	0.8			BUT12AX			
1000	8	5	0.8		BUT12AI				
1050	5	3	0.45		BUJ303B				
1200	6	2	0.17		BUJ403A				

Bipolar-power diodes and transistors for electronic ballast

Lighting transistor selection guide

Topology	Voltage fed push pull		Current fed push pull		Current fed half bridge		Voltage fed half bridge		
A.C. Supply	120V	BUJ100	25W	BUX87P	13W	BUJ100	20W	BUJ100	13W
		BUJ100B	25W	BUX85	55W	BUJ100B	20W	BUJ100B	13W
		BUT11AI	80W	BUT11A	140W	BUT11AI	70W	BUT11AI	40W
		PHE13005	100W	BUT11AI	140W	PHE13005	80W	PHE13005	50W
		BUJ103A	110W	BUT11AX	140W	BUJ103A	90W	BUJ103A	55W
		BUT12AI	120W	BUT18A	160W	BUT12AI	100W	BUT12AI	60W
		PHE13007	170W	BUJ303A	170W	PHE13007	135W	PHE13007	85W
		BUJ105A	180W	BUJ303B	170W	BUJ105A	145W	BUJ105A	90W
		BUJ105AB	180W	BUT12AI	220W	BUJ105AB	145W	BUJ105AB	90W
		PHE13009	210W	BUT12AX	220W	PHE13009	165W	PHE13009	105W
		BUJ106A	220W			BUJ106A	175W	BUJ106A	110W
	230V	BUJ403A	215W			BUX87P	13W	BUJ100	25W
						BUX85	55W	BUJ100B	25W
						BUT11A	140W	BUT11AI	80W
						BUT11AI	140W	PHE13005	100W
						BUT11AX	140W	BUJ103A	110W
						BUT18A	160W	BUT12AI	120W
						BUJ303A	170W	PHE13007	170W
						BUJ303B	170W	BUJ105A	180W
						BUT12AI	220W	BUJ105AB	180W
						BUT12AX	220W	PHE13009	210W
								BUJ106A	220W

Bipolar diodes in various PFC power applications

Computer	Consumer	Telecom	Lighting
Desktop	Adapter	AC/DC converter	Ballast
File server	Plasma TV	UPS	
Notebook adapter	LCD TV		
	CRT TV		



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