



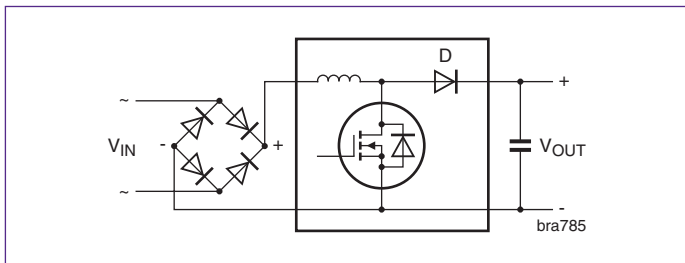
Bipolar power diodes and transistors for electronic ballast

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 '3'C in China
 - IEC1000-3-2/EN61000-3-2 in Europe
 - '80plus policy' in America
 - JIS C61000-3-2 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

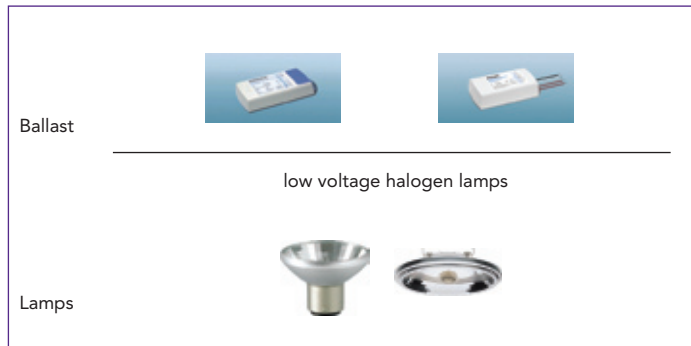
Electronic ballast for fluorescent lamps



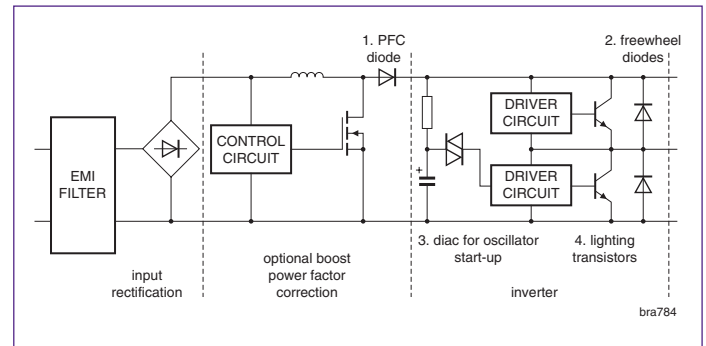
Electronic ballast for high intensity discharge lamps



Electronic ballast for halogen lamps



Typical schematic for electronic ballast with PFC function



Hyperfast & ultrafast recovery diodes for PFC

V_{RRM} (V)	$I_{F(AV)}$ (A)	V_F (typ) @ 150C (V)	@ I_F (A)	t_{rr} (typ) @ 25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)	SOT404 (D ² PAK)
Ultrafast diodes for Discontinuous or Critical Current Mode									
500	9	0.9	8	50	BYV29-500	BYV29X-500			BYV29B-500
500	2 x 5	0.95	5	50			BYT28-500		
500	14	0.9	15	50	BYT79-500				
500	2 x 10	0.87	10	50			BYV34-500		
500	2 x 15	0.95	15	50			BYV44-500		
600	8	1.07	8	60	BYR29-600	BYR29X-600			
600	9	0.9	8	50	BYV29-600	BYV29X-600			BYV29B-600
600	14	0.9	15	50	BYT79-600	BYT79X-600			
600	2 x 10	0.87	10	50			BYV34-600	BYV34X-600	
Hyperfast diodes for Continuous Current Mode									
600	5	1.4	5	19	BYC5-600	BYC5X-600			BYC5B-600
600	8	1.4	8	19	BYC8-600	BYC8X-600			BYC8B-600
600	10	1.4	10	19	BYC10-600	BYC10X-600			BYC10B-600
600	2 x 5	1.4	5	19			BYC10-600CT		

Types in bold red represent new products

Diac for oscillator start-up

I_{FRM} (A)	$V_{(BO)}$ (V)	$I_{(BO)}$ max (μ A)	SOD27
2	28~36	50	BR100/03

Ultrafast recovery diodes (for freewheel diodes and output rectifiers)

V _{RRM} (V)	I _{F(AV)} (A)	V _F (typ) @150C (V)	@ I _F (A)	t _r (typ) @ 25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)	SOT223	SOT404 (D ² PAK)	SOT428 (DPAK)	SOT429 (TO247)
100	8	0.8	8	20	BYW29E-100							
100	2 x 10	0.72	8	20			BYV32E-100					
150	2 x 0.75	0.5	0.5	10					BYV40E-150			
150	8	0.8	8	20	BYW29E-150							
150	2 x 10	0.72	8	20			BYV32E-150					
150	2 x 15	0.78	15	20			BYV42E-150					
200	8	0.8	8	20	BYW29E-200	BYW29EX-200					BYW29ED-200	
200	2 x 5	0.8	5	15			BYQ28E-200	BYQ28EX-200			BYQ28ED-200	
200	14	0.83	14	20	BYV79E-200							
200	2 x 8	0.84	8	20			BYQ30E-200					
200	2 x 10	0.72	8	20			BYV32E-200			BYV32EB-200		
200	2 x 15	0.78	15	20			BYV42E-200			BYV42EB-200		
200	2 x 15	0.83	15	20								BYV72EW-200
300	2 x 5	0.95	5	50			BYT28-300					
400	9	0.9	8	50	BYV29-400							
400	2 x 10	0.87	10	50			BYV34-400					
400	2 x 15	0.95	15	50								BYV74W-400
500	9	0.9	8	50	BYV29-500	BYV29X-500				BYV29B-500		
500	2 x 5	0.95	5	50			BYT28-500					
500	14	0.9	15	50	BYT79-500							
500	2 x 10	0.87	10	50			BYV34-500					
500	2 x 15	0.95	15	50			BYV44-500					
600	8	1.07	8	60	BYR29-600	BYR29X-600						
600	9	0.9	8	50	BYV29-600	BYV29X-600				BYV29B-600		
600	14	0.9	15	50	BYT79-600	BYT79X-600						
600	2 x 10	0.87	10	50			BYV34-600	BYV34X-600				
800	8	1.07	8	60	BYR29-800							

Types in bold red represent new products

High voltage bipolar transistors for lighting, self oscillating power supplies & industrial applications

V _{CESM} (V)	I _{C(DC)} (max) (A)	t _f (typ) (ns)	@ I _C (A)	h _{FEsat} (typ)	SOT54 (TO92)	SOT78 (TO220AB)	SOT82	SOT186A (isolated TO220AB)	SOT404 (D ² PAK)	SOT428 (DPAK)
700	1	50	1	14	BUJ100					
700	4	30	2	12,5		BUJ103A		BUJ103AX		BUJ103AD
700	4	100	2	17		PHE13005		PHE13005X		
700	8	20	5	11		BUJ105A			BUJ105AB	BUJ105AD
700	8	40	5	9		PHE13007				
700	10	20	5	11		BUJ106A				
700	12	100	5	6min - 30max		PHE13009				
800	0.5	280	0.2	28			BUX86P			
1000	0,5	280	0,2	28			BUX87P			
1000	2	400	1	13		BUX85				
1000	5	80	2,5	13		BUT11AI				
1000	5	80	2,5	13		BUT11A		BUT11AX		
1000	5	145	2,5	12		BUJ303A				
1000	6	150	4	14		BUT18A				
1000	8	150 @ 100C	5	10		BUT12AI				
1000	8	200 @ 100C	5	16				BUT12AX		
1050	5	200	2,5	10,5		BUJ303B				
1200	6	170	2,5	15,5		BUJ403A				

Types in bold red represent new products

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
				BUX85	55W				
		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
	230V	BUJ106A	220W			BUJ106A	175W	BUJ106A	110W
		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 File server Notebook adapter	Adapter Plasma TV LCD TV CRT TV	AC/DC converter UPS	Ballast



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