

(19)  
(12)

(KR)  
(B1)

(51) 。 Int. Cl.<sup>6</sup>  
H02M 3/335

(45)  
(11)  
(24)

2004 02 19  
10-0405118  
2003 10 30

(21)	10-1997-0703674	(65)	10-1998-0700724
(22)	1997 06 02	(43)	1998 03 30
	1997 06 02		
(86)	PCT/IB1996/000972	(87)	WO 1997/13314
(86)	1996 09 20	(87)	1997 04 10

[illegible]

(30)	95870111.2	1995 10 02	EP(EP)
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[illegible]

(72)  $\frac{5656}{6}$

(74)

•

(54)

$$\begin{aligned}
& \frac{1}{(12)} \quad \frac{2}{(10)} ; \quad \frac{1^{(2)}}{(14)} \quad \frac{2^{(4)}}{1} (8) ; \quad \frac{1}{(6)}, \quad \frac{1}{(14)} \\
& \frac{(8)}{(4)} \text{ 가 } \frac{1}{(6)} ; \quad \frac{2}{(14)} \quad \frac{2}{(10)} \\
& \frac{(24)}{\cdot 1} \quad \frac{(8)}{1} , \quad \text{가 } \frac{(36)}{(10)}
\end{aligned}$$

(switched-mode power supply), (primary supply voltage) 1 2 ; 1 1 (a first winding end) 2 (a second winding end) 1 (primary winding),

(transformer) ; 2 2 1 1  
(drive signal) 가 ;  
4 425 611 5 138 543 , 가 ,  
TV ,  
(standby power supplies), 가 .  
(SMPS; switched-mode power supply)  
(electric mains) 가 .  
2 (secondary side) 1 (primary side) 2 가  
2 1 가  
(optocoupler) 2 1 가  
2 1 가  
2 가 , Off-Line Switching Regulator LT 110  
3/1105  
(isolation) 2 가  
1 1 가  
1 2 5 448 469 (time-selectively) 1  
가  
(zero crossing) 1 2 ; 1  
(set signal) 1 (set input) 2  
(reset signal) 가 ,  
(commutation) 1 2 가 0  
2 0 가  
(leakage inductance) 1 2 (magnetizing current) 1 2  
(snubber) 가  
가 0( ) 가 , 가

가 1 가 (parasiti  
c capacitance) , 1  
1 1  
가 0( )  
(unipolar)(MOS)  
가 1 (high rectified mains voltage)  
1 1  
(clamp) 2 2 3  
2 2 1  
1  
(starting current source) 3 4  
3 2  
3 4 3 2  
가 1 2  
가 가 가  
(attenuate).  
가 가 1  
가 가 가  
(current-carrying element)  
(current carrying element) (pulsating current)  
EP-A-0,574,982

1  
2  
3  
4

5  
6  
7  
8

1 (power supply) 1 (mains voltage) 2 (2) (4) (Ui) (rectified) (positive) (2) (4) (10) 가 (6) 1 (8) 1 (2) 2 (14) MOS (4) (6) 가 (12) 1 (6) , 2 (16) (18) 가 (20) (22) , (10) 가 (6) (U<sub>d</sub>) (U<sub>c</sub>) (U<sub>d</sub>) (24) (26) , (28) (30) (32) 1 (8) (30) (30) (I<sub>sn</sub>) 2 (14) (U<sub>sw</sub>) (I<sub>m</sub>) (36) 가 (38) 가 , (38) (WS) (WS) (I<sub>m</sub>) (40) (40) (24) ) (U<sub>c</sub>) 가 (6)가 1 (primary current; I<sub>p</sub>) 가 (18) 가 (6)가 (magnetizing current) 2 (I<sub>p</sub>) (t<sub>c</sub>) 1 (8) 2 (16) (positive) (28) 2 2 (14) (U<sub>sw</sub>) (I<sub>s</sub>) , 2 (U<sub>sw</sub>) (U<sub>i</sub>) 1 (22) 2 (6)가 (discontinuous conduction mode; DCM) (I<sub>s</sub>)가 0 , (continuous conduction mode; CCM) (6) 2 (I<sub>s</sub>)가 0 t<sub>s</sub> (flyback time) , (t<sub>c</sub>) 2 (I<sub>s</sub>) 0 2 (U<sub>s</sub>) (22) (8) (U<sub>s</sub>) (16) (16) (18) 2 (16) (I<sub>s</sub>) 2 (I<sub>s</sub>\*R<sub>p</sub>) , R<sub>p</sub> 2 (18) 2 (16) (6)가 (t<sub>c</sub>) , (I<sub>p</sub>)가 0 (t<sub>c</sub>) (6)가 (30) (t<sub>w</sub>) 가 0 1 (back-transformed secondary voltage) 가 1 LC , LC (U<sub>c</sub>) 2 (I<sub>s</sub>)가, DCM , 0 (t<sub>w</sub>) 1 CCM 가 (6)가

가 (6)가 1 가 0 1 (8)

가 가

(38) (I<sub>m</sub>) (U<sub>c</sub>) (40) (22) (24) (U<sub>d</sub>) (dut

y cycle) 가 (10) (6) 가 (26) (28)

가 (30) 1 (2) 1 (12) 3 5

1 (8) 1 (32) (t<sub>c</sub>) (6)가 CCM

(t<sub>c</sub>) (24) (36) (6)가

(t<sub>c</sub>) (30, 32) 1 (30) 1

(32) (42) (2) (42) PMOS (44) (44)

1 (I<sub>sn</sub>) (52) (46) (34) (46) PMOS (48) (48)

PMOS (48) (52) (14) (U<sub>sw</sub>) (U<sub>i</sub>) (50) 1 PMOS (2)

(I<sub>m</sub>) PMOS (48) (60) (58) (I<sub>sn</sub>) 1 (56) (54) (62

) 3 (66) (70) (74) (78) 3 (66) (68) (76) (7

0) (72) (ST) (U<sub>sw</sub>) (ST) (RT) (RT) (Ui)

2 (14) (decay) (ST) (falling edge) (RT)

(30) (U<sub>sw</sub>) (36) (ST) (WS) (80)

(ST) (80) (RT) 가

(24) (36) (I<sub>d</sub>) (6) 가

5 1 (32) (82) (50)

(84) (28) (30) PMOS (82) (88)

(52) (34) 가, 3 PMOS (88)

PMOS (88) (2) PMOS (88) (88)

B) (90) (54) PMOS (86) PMOS (87)

(56) (87) 1 (2) (89) PMOS (87) (89)

(60) (75)가 PMOS (87) (87) PMOS (86) 2

86, 87) 가 PMOS (87) 가 PMOS (U<sub>i</sub>)

가 (isolation) 가

(I<sub>m</sub>) (60) 3 (66) (66)

2 3 (66)

2 (60) (68) (94) (92) (mirrored current;  $I_m$ )  
 (94) (94) ( $I_{ref}$ ) 가 (38) (96) ,  
 (36) (WS) (6) (22) (24)  
 (96) ( $U_c$ ) ( $U_d$ )  
 NMOS (94) ( $I_{ref}$ ) 가 (6) 가  
 (6) 6 (98)가 , 가 (6)가  
 1 ( $I_p$ )가 (98) (100) (96)  
 ( $U_c$ ) , (flip-flop; 104) (102) -  
 (106) (108) (recurrent pulse) - (  
 104) ( $U_d$ ) 가 (6) ( $U_i$ ) , 1 ( $I_p$ )  
 ( $U_c$ ) (6) ,  
 가 6 (98) (96)  
 7 ( $U_c$ ) 3 2 - (34) (110) (118) ( $I_{sw}$ )  
 ( $I_c$ ) ( $I_c$ ) (104) (102) , 2  
 (112) - ( $I_s * R_p$ ) 가 , 1 ( $I_p$ )  
 ( $I_m$ ) ( $I_{cmp}$ ) (94) ( $I_{ref}$ ) ( $I_m$ )  
 (110) ( $I_{cmp}$ ) 2 , 1 ( $U_c$ ) 1  
 , ( $U_c$ ) ( $I_c$ ) 2  
 , ( $I_{cmp}$ )  
 2 , 2 가 0 1 0 ( $t_f$ )가  
 , , ( $t_f$ ) , (114) (96) ( $t_f$ ) (1  $I_{crr}$ )  
 0 (96) ( $I_m$ ) (96) (T) (charge surplus) (t  
 f) (114) 가 , ( $t_c$ ) (114) ( $I_{crr}$ )  
 EP-A-0 574 982  
 , ( $U_d$ )  
 8 (120) , (120) - (104)  
 (106) (6) , (6) (98) - (104)  
 (122) (98) ( $V_{ref}$ ) 가 (122) - (104)  
 ) (102) 1 (124  $I_{corr2}$ ) ( $I_{ref}$ )  
 (WS)가 가 (120) (inhibit input; 126) (126)  
 (WS) (120) (WS)  
 ( - ) ( $t_f / t_c$ ) 1  
 가 , 가  
 , , ,  
 가  
 MOS 1 , 2  
 MOS  
 1 (6) ( $U_d$ ) - (pulse-width modulation; PWM)  
 , ( $U_c$ )  
 ( $U_d$ )

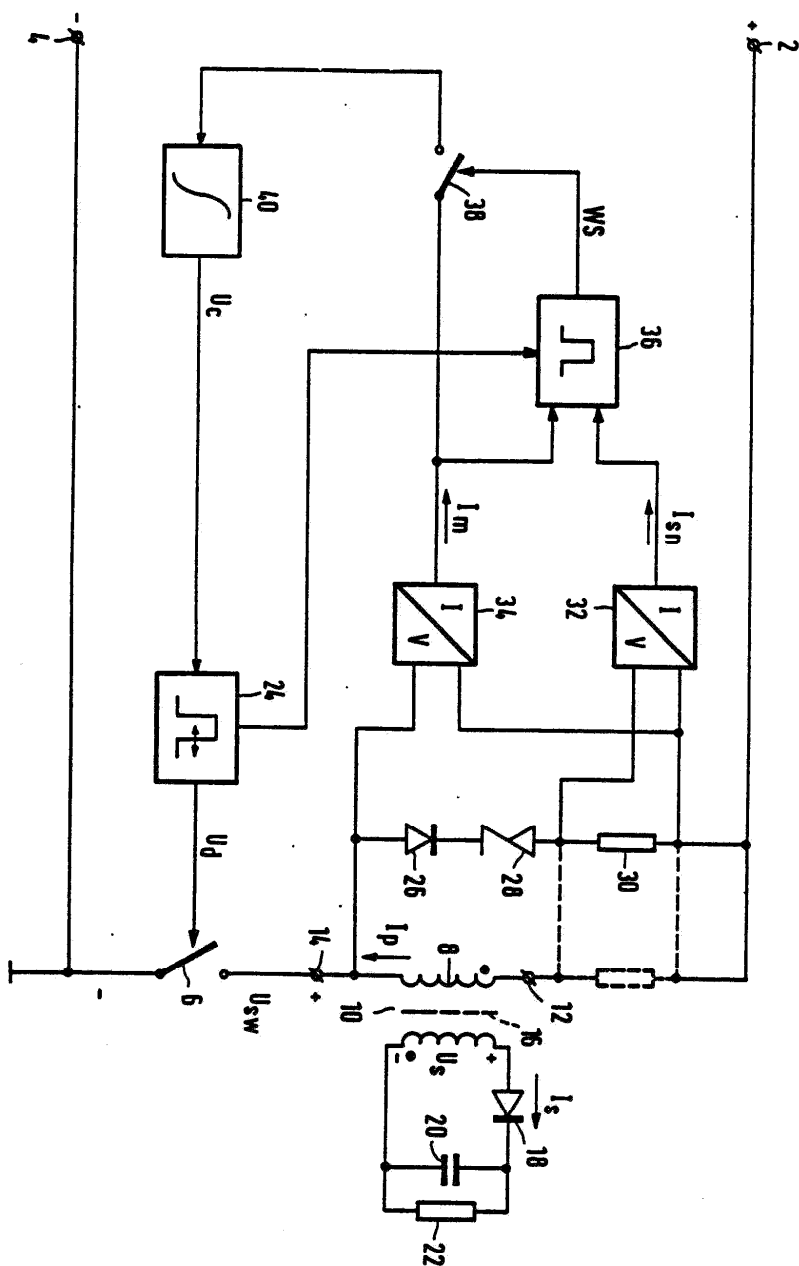
(57)

1. (switched-mode power supply) , 1(first; 2) 2(seco  
nd; 4) ; 1 (2) 1 (12) 2 (14) 1 (8)  
(10) ; (6) (14)  
2 1 (8) 가 1 (6) ; 2 (14)  
(24) , 1 (8) ,  
(6) (I<sub>m</sub>) ,  
(WS) (32, 34, 36) ,  
(6) 1 (8) 1 (26, 28, 30, 3  
2, 56, 72) , (6) 1 (8) 1 2  
(34, 14, 60, 78), 1 (ST) 2  
(RT) 가 , (WS)  
(36, 80) , .
2. 1 ,  
1 , 1 (8) , (6) (26, 28);  
(26, 28) (30, 32)  
,
3. 2 ,  
1 (30) ; 1 (30) (2) (26, 28)  
(I<sub>sn</sub>) (82) (28, 26) 1 (88)  
1 , .
4. 1 ,  
1 , 1 (8) (30, 32)  
,
5. 4 ,  
, 1 (2) 1 (12) 1 (30) ;  
1 (30) ; 1 (12) 1 (88)  
(I<sub>sn</sub>) (82) , 1 (88)  
1 , .
6. 3 5 ,  
1 , 1 (2) 1 , 1 (90)  
2 , 2 (88) 2 1 (82)  
2 (88) , .
7. 6 ,  
, (90) 1 (82) 2 (82) 2  
(54) , (ST) 1 (56) , (6  
2)  
1
8. 1 ,  
2 , 1 (8) (6) (50) ;  
(50) 2 (14) (50) 2  
(52) ; 2 (52) (50) 1 , 2 (52)  
(I<sub>m</sub>) (86) 2 , 2 (87)  
3 , .
9. 8 ,  
2 , 3 (86) 2 (58) , (R  
T) (70) (74) 2 (60)

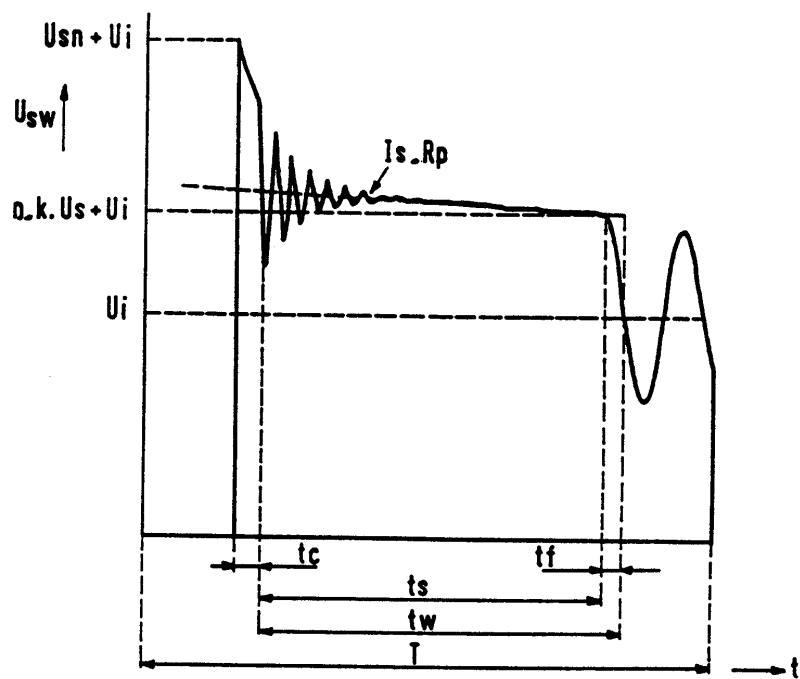
10. 9 2 , 1 (2) 1 2 (89) 2  
(60) (75) 2 , 4 (87) 2  
2 (86) 4 (87) ,
11. 9 2 (60) , (94) (92)  
; (96) (WS)  
(96) 가 (38) ,
12. 11 , (6) 1 (I<sub>sw</sub>)  
(98, 118) ; (96) (U<sub>c</sub>) 2 (I<sub>c</sub>) 1 (I<sub>sw</sub>)  
(110, 112) ; 1 (I<sub>sw</sub>) 2 (I<sub>c</sub>) (U<sub>d</sub>)  
(104, 108) ,
13. 12 , (96) (I<sub>cmp</sub>) (116,  
110); 가 ,
14. 11 , (96) (96) (I<sub>crr</sub>)  
- (current-carrying element; 114) ,
15. 14 , (6) ,  
(I<sub>crr</sub>) ,



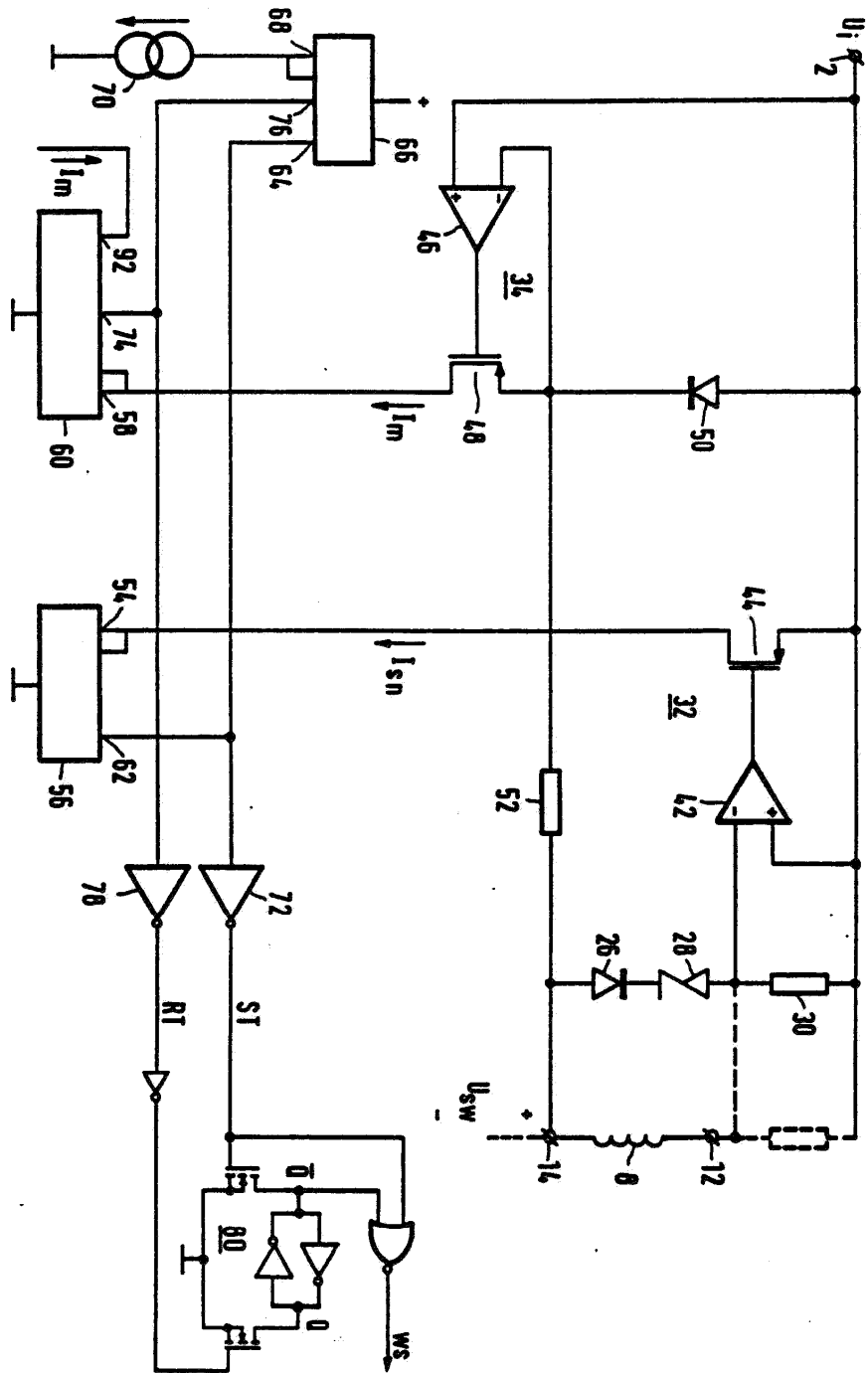
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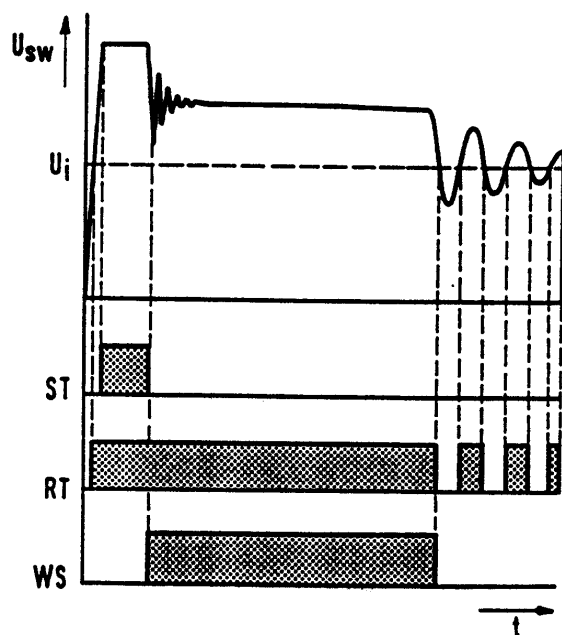
2



3



4



5

