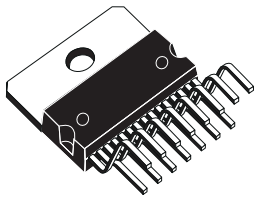
STV9306

BUS CONTROLLED VERTICAL DEFLECTION SYSTEM WITH EAST/WEST CORRECTION OUTPUT CIRCUIT

PRELIMINARY DATA

- FULLY I^2C CONTROLLED
- DMOS POWER HALF-BRIDGE AMPLIFIER
- DC COUPLED OPERATION
- INTERNAL FLYBACK GENERATOR (UP TO 60V)
- SELF ADAPTED SAWTOOTH (50/60Hz)
- 100Hz OPERATION
- VERTICAL LINEARITY, AMPLITUDE AND CENTERING ADJUSTMENTS
- HORIZONTAL WIDTH, PINCUSHION, TRAPEZOID AND CORNER ADJUSTMENTS
- BREATHING CORRECTION
- 4/3, 16/9 CRT APPLICATION
- THERMAL PROTECTION
- LINEAR VERTICAL ZOOM FUNCTION
- E/W CLASS A OUTPUT
- LOW EXTERNAL COMPONENTS



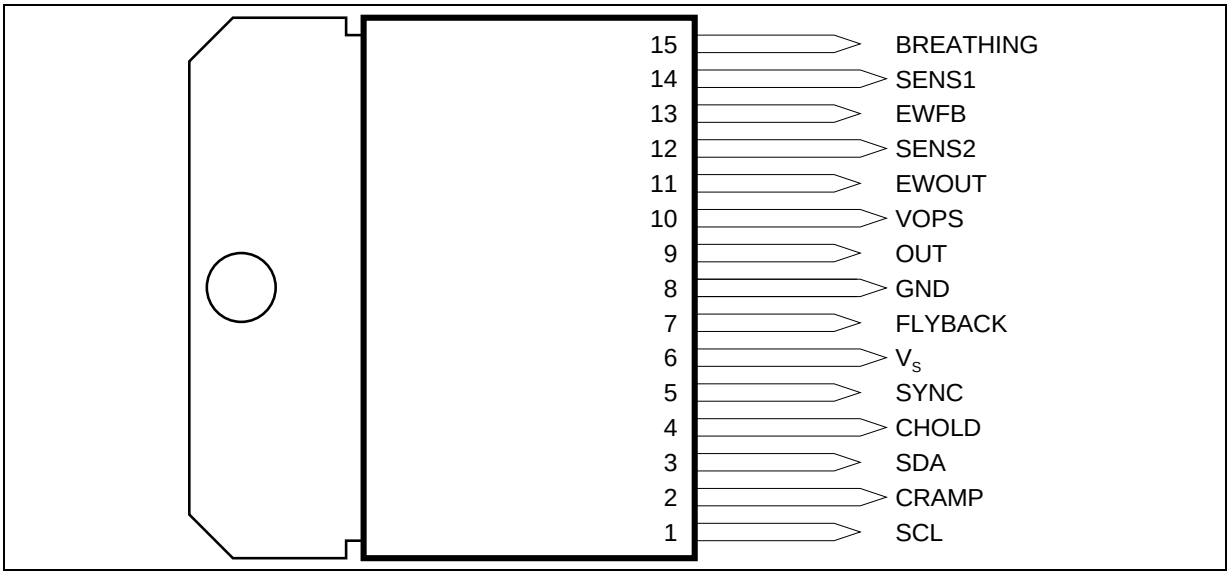
MULTIWATT15
(Plastic Package)

ORDER CODE : STV9306

DESCRIPTION

The STV9306 is a fully I^2C controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

PIN CONNECTIONS

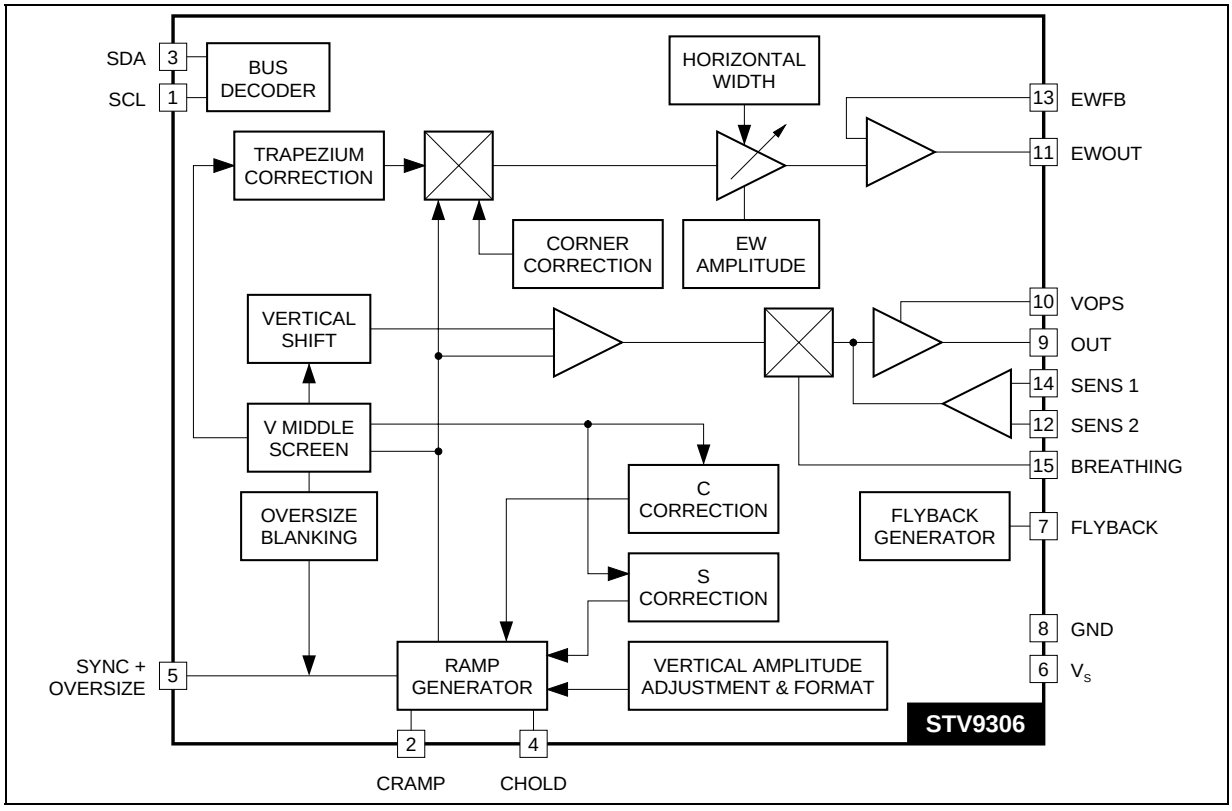


PIN LIST

Pin	Symbol	Description
1	SCL	I^2C Bus Clock
2	CRAMP	Ramp Capacitor
3	SDA	I^2C Bus Data
4	CHOLD	Hold Capacitor
5	SYNC	Sync Input
6	VS	Supply Voltage
7	FLYBACK	Flyback Output
8	GND	Ground
9	OUT	Vertical Output
10	VOPS	Vertical Output Power Supply
11	EWOUT	EW Output
12	SENS2	Vertical Current Sense 2
13	EWFB	EW Feedback
14	SENS1	Vertical Current Sense 1
15	BREATHING	Breathing Input

9306-01.TBL

BLOCK DIAGRAM



9306-02.EPS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	35	V
V_{OUT}	Flyback Peak Voltage	60	V
V_I	Input Voltage at Pins 1-3-5-12-13-14-15	-0.3, V_S	V
V_{IS}	Input Voltage at Pins 2-4	10	V
E/W OUT	East/West Output	60	V
T_{oper}	Operating Temperature	-10, +70	^oC
T_{stg}	Storage Temperature	-55, +150	^oC
T_j	Junction Temperature	+150	^oC

9306-02.TBL

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ (j-c)}$	Junction-case Thermal Resistance	Max.	3	$^oC/W$
T_t	Temperature for Thermal Shutdown	Min.	140	^oC

9306-03.TBL

ELECTRICAL CHARACTERISTICS

V_S = 24V, R_{SENS} = 0.5Ω, Normal mode, T_{amb} = 25°C, unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
SUPPLY						
V_S	Operating Supply Voltage		16		28	V
I_S	Supply Current on Pins 6-10	I_O = 0		40	60	mA
RAMP GENERATOR CONTROL						
V_{Rlow}	Minimum V_{RAMP} Voltage at Pin 2		1.8	2	2.2	V
t_D	Discharge Time at Pin 2			50		µs
I_{ISY}	Synchro Input Current at Pin 5	V_{SY} = 0	-6	-3		µA
V_{THSY}	Synchro Threshold Voltage at Pin 5		2.5	3	3.5	V
I_{OB}	Oversize Blank Input Current at Pin 5		70	100		µA
POWER AMPLIFIER						
I_{IBR}	Breathing Current Input Current at Pin 15	V_{BREATH} = 0V	-10	-5		µA
V_{BREATH}	Breathing Operating Voltage at Pin 15		0		9	V
V_{7H}	Saturation Voltage to supply at Pin 7	I_O = -1.5A, $V_9 > V_S$ + 5V		2.5	3.5	V
V_{7L}	Saturation Voltage to Ground at Pin 7	I_O = 100mA		1.5	2.5	V
I_{SENS1} I_{SENS2}	Bias Input Current at Pin 14 Bias Input Current at Pin 12	V_{14} = 0V V_{12} = 0V	-20 -20	-10 -10		µA µA
V_{9H}	Saturation Voltage to supply at Pin 9 versus Pin 10	I_O = -1.5A		2.5	3.5	V
V_{9L}	Saturation Voltage to Ground at Pin 9	I_O = 1.5A		1.5	2.5	V
dV_{9H}/st dV_{9L}/dt				+10 +5		mV/°C mV/°C
VERTICAL OUTPUT (Pin 9)						
I_{PP}	Vertical Deflection Current (see Figure 1)	V_SAW = 000000 V_SAW = 111111		1.8 3		A A
I_{DC}	Average Current (vertical shift) at V_SAW = 111111	V_SH = 01111 V_SH = 11111		-0.35 0.35		A A
Z_{SLP}	$Z_{SLP} = \frac{\text{slope in zoom mode}}{\text{slope in normal mode}}$ (see Figure 2)	V_ZOOM = 000 V_ZOOM = 111		106 130		% %
I_{SC}	S Correction = I_{SC}/I_{PP} (see Figure 3)	V_SC = 0000 V_SC = 1111		0 6		% %
I_{CC}	C Correction = I_{CC}/I_{PP} (see Figure 4)	V_CC = 0111 V_CC = 1111		-3 3		% %
BR	Breathing BR = $\frac{I_{PP} - I_{PPB}}{I_{PP}}$ (see Figure 5)	$BR_{Min.}$ V_{15} = 9V $BR_{Max.}$ V_{15} = 1V		0 10		% %
EAST/WEST CORRECTION (V_SAW = 100000, V_SH = 10000, V_SC = 0000, V_CC = 1000) (see Figure 6)						
I_{BIAS}	Input Bias Current at Pin 13		-1	-0.5		µA
V_{PAR}	Parabola Amplitude (pincushion correction) at Pin 13 (see Figure 7)	EW_AMP = 00000 EW_AMP = 11111		0 5		V V
V_{DCEW}	Horizontal Width Adjustment at Pin 13 (see Figure 8)	EW_DC = 00000 EW_DC = 11111 HShrink active		1 6 +6		V V V
Trap	Trapezium Correction at Pin 13 (see Figure 9) Trap = $V_{PARTUP}/V_{PARTLOW}$	EW_TRAP = 01111 EW_TRAP = 11111		0.6 1.7		
Shape	Parabola Shape (corner correction) at Pin 13 (see Figure 10) - Shape = V_{COR}/V_{PAR}	EW_SHAPE = 00000 EW_SHAPE = 11111		0 50		% %
V_{11L}	Saturation Voltage	I_{OUT} = 500mA			2	V

9306-04.TBL

Figure 1

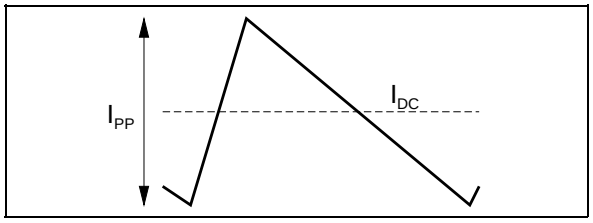


Figure 2

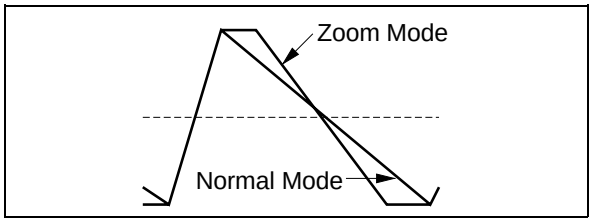


Figure 3

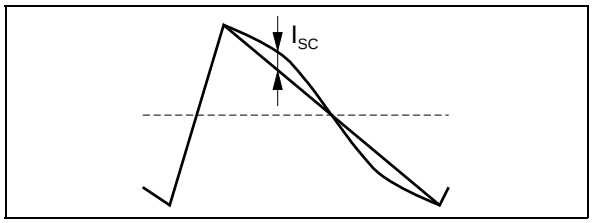


Figure 4

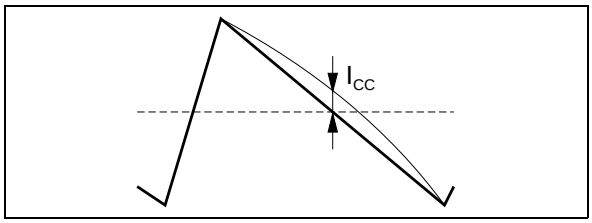


Figure 5

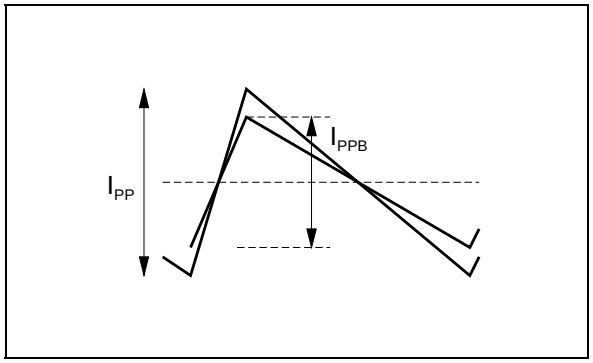


Figure 6

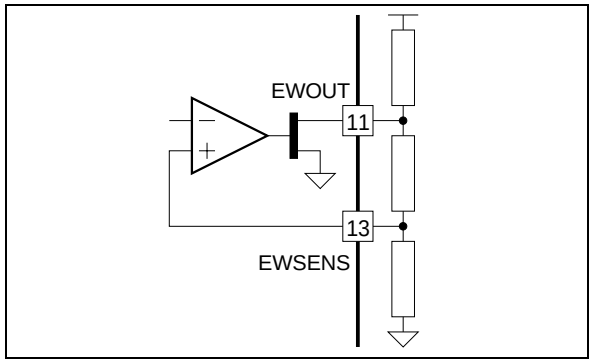


Figure 7

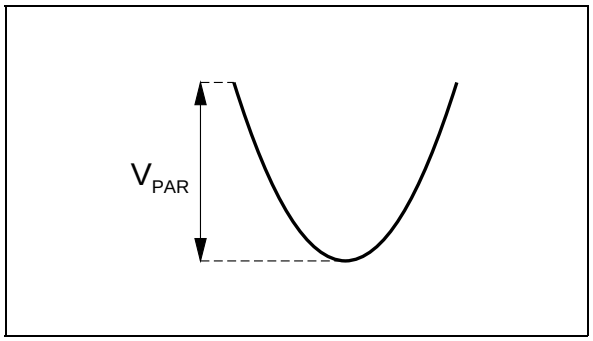


Figure 8

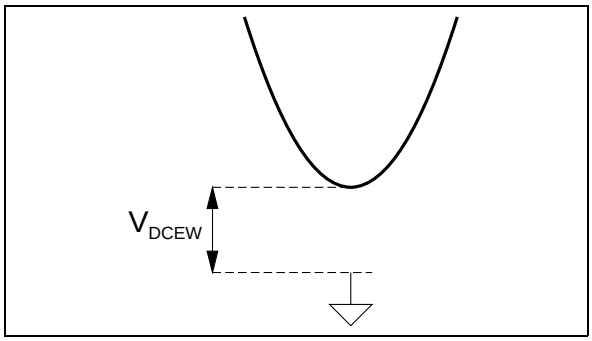


Figure 9

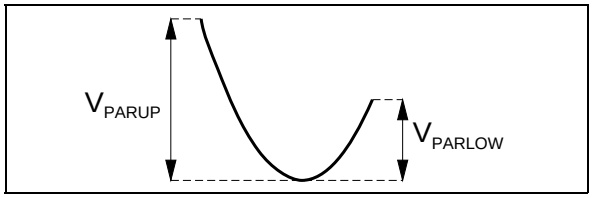
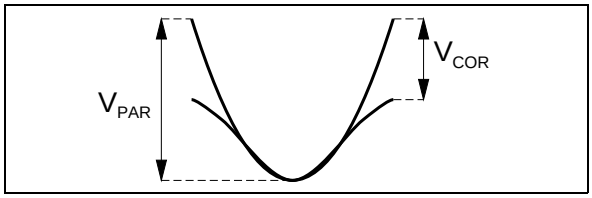


Figure 10

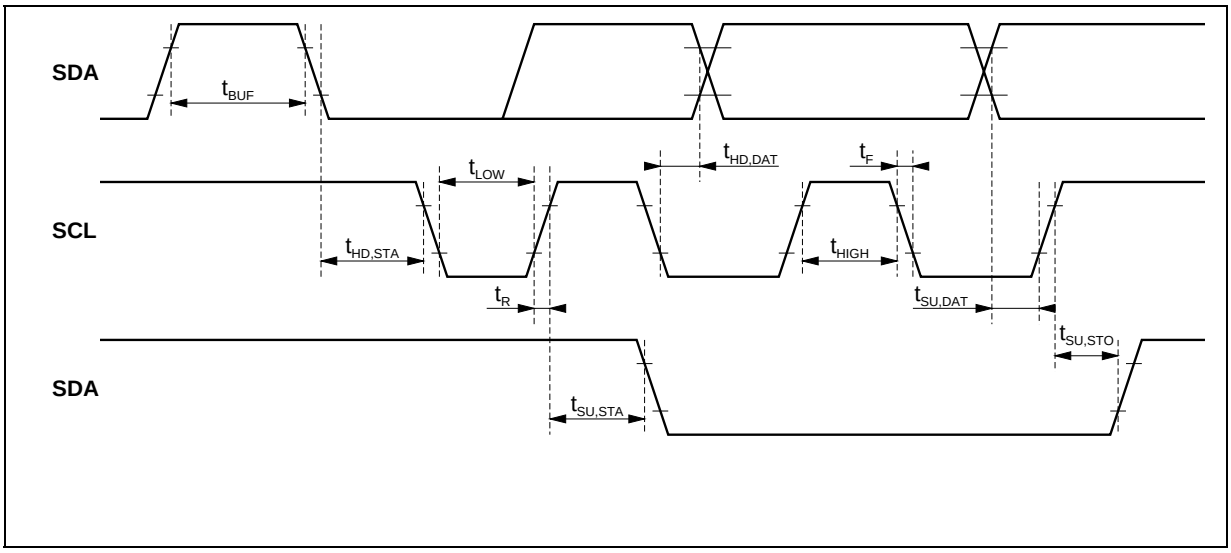


I²C BUS CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
SCL (Pin 1)						
V_{IL}	Low Level Input Voltage		-0.3		+1.5	V
V_{IH}	High Level Input Voltage		3.0		5.5	V
I_{LI}	Input Leakage Current	V_{IN} = 0 to 5V	-10		+10	µA
f_{SCL}	Clock Frequency		0		100	kHz
t_R	Input Rise Time	1.5V to 3V			1000	ns
t_F	Input Fall Time	1.5V to 3V			300	ns
C_I	Input Capacitance				10	pF
SDA (Pin 3)						
V_{IL}	Low Level Input Voltage		-0.3		+1.5	V
V_{IH}	High Level Input Voltage		3.0		5.5	V
I_{LI}	Input Leakage Current	V_{IN} = 0 to 5V	-10		+10	µA
C_I	Input Capacitance				10	pF
t_R	Input Rise Time	1.5V to 3V			1000	ns
t_F	Input Fall Time	1.5V to 3V			300	ns
V_{OL}	Low Level Output Voltage	I_{OL} = 3mA			0.4	V
t_F	Output Fall Time	3V to 1.5V			250	ns
C_L	Load Capacitance				400	pF
TIMING						
t_{LOW}	Clock Low Period		4.7			µs
t_{HIGH}	Clock High Period		4.0			µs
$t_{SU, DAT}$	Data Set-up Time		250			ns
$t_{HD, DAT}$	Data Hold Time		0		340	ns
$t_{SU, STO}$	Set-up Time from Clock High to Stop		4.0			µs
t_{BUF}	Start Set-up Time following a Stop		4.7			µs
$t_{HD, STA}$	Start Hold Time		4.0			µs
$t_{SU, STA}$	Start Set-up Time following Clock Low-to High Transition		4.7			µs

9306-05.TBL

Figure 11 : I²C Bus Timing



9306-13.EPS

I²C SELECTION

1 - Write Mode : Slave Address : 1000 1100 (8C)

Subaddress								Data							
B7	**B6**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**	**B7**	**B6**	**B5**	**B4**	**B3**	**B2**	**B1**	**B0**
0	0	0	X	X	X	X	0	VERTICAL AMPLITUDE						X	1
0	0	1	X	X	X	X	0	SIGN	VERTICAL SHIFT				X	X	1
0	1	0	X	X	X	X	0	S. CORRECTION				ZOOM MODE			1
0	1	1	X	X	X	X	0	SIGN	C. CORRECTION			ZOOM AMPLITUDE			1
1	0	0	X	X	X	X	0	HORIZONTAL WIDTH					Hshr	X	1
1	0	1	X	X	X	X	0	E/W CORRECTION					X	X	1
1	1	0	X	X	X	X	0	E/W CORNER CORRECTION					ext. T	X	1
1	1	1	X	X	X	X	0	SIGN	TRAP. CORRECTION				Himp	X	1

Data

B7	B6	B5	B4	B3	B2	B1	B0	
L0 : VERTICAL AMPLITUDE (V_SAW)								
0	0	0	0	0	0	X	1	Min. Amplitude
1	1	1	1	1	1	X	1	Max. Amplitude
L1 : VERTICAL SHIFT (V_SH)								
X	0	0	0	0	X	X	1	Min. Shift Level
X	1	1	1	1	X	X	1	Max. Shift Level
1	X	X	X	X	X	X	1	Positive Shift
0	X	X	X	X	X	X	1	Negative Shift
L2 : S CORRECTION (V_SC) & ZOOM POSITION								
0	0	0	0	X	X	X	1	Min. S Correction
1	1	1	1	X	X	X	1	Max. S Correction
X	X	X	X	0	0	X	1	Normal Mode
X	X	X	X	0	1	X	1	Unzoom
X	X	X	X	1	X	X	1	Zoom
X	X	X	X	X	X	1/0	1	Subtitle(active = 1)
L3 : C CORRECTION (V_CC) & PROGRESSIVE ZOOM (V_ZOOM)								
1	X	X	X	X	X	X	1	Positive C Correction
0	X	X	X	X	X	X	1	Negative C Correction
X	0	0	0	X	X	X	1	Min. C Correction
X	1	1	1	X	X	X	1	Max. C Correction
X	X	X	X	0	0	0	1	Min. Zoom
X	X	X	X	1	1	1	1	Max. Zoom
L4 : HORIZONTAL WIDTH ADJ (EW_VDC)								
0	0	0	0	0	X	X	1	Hwidth Min. Level
1	1	1	1	1	X	X	1	Hwidth Max. Level
X	X	X	X	X	1/0	X	1	Hwidth Shrink (active = 1)
L5 : PINCUSHION CORRECTION (EW_AMP)								
0	0	0	0	0	X	X	1	Min. Amplitude
1	1	1	1	1	X	X	1	Max. Amplitude
L6 : E/W SHAPE (EW_SHAPE)								
0	0	0	0	0	X	X	1	Min. Shape Correction
1	1	1	1	1	X	X	1	Max. Shape Correction
X	X	X	X	X	1	X	1	E/W Transistor OUT
X	X	X	X	X	0	X	1	E/W Transistor IN
L7 : TRAPEZIUM CORRECTION (EW_TRAP) & HIGH IMPEDANCE								
1	X	X	X	X	X	X	1	Positive Trapezium Correction
0	X	X	X	X	X	X	1	Negative Trapezium Correction
X	0	0	0	0	X	X	1	Min. Level Correction
X	1	1	1	1	X	X	1	Max. Level Correction
X	X	X	X	X	0	X	1	Normal Mode
X	X	X	X	X	1	X	1	High Impedance

I²C SELECTION (continued)

2 - Read Mode : Slave Address : 1000 1101 (8D)

Data

B7	B6	B5	B4	B3	B2	B1	B0	
THERMAL SECURITY STATUS								
0	X	X	X	X	X	X	1	Normal Temperature
1	X	X	X	X	X	X	1	Thermal Security Active
FLYBACK PULSE DETECTION STATUS								
X	0	X	X	X	X	X	1	Flyback Pulse detected
X	1	X	X	X	X	X	1	Lack of Flyback Pulse
SYNC PULSE DETECTION STATUS								
X	X	0	X	X	X	X	1	Synchro Pulse Present
X	X	1	X	X	X	X	1	Lack of Synchro Pulse

INPUT/OUTPUT PIN CONFIGURATION

Figure 12

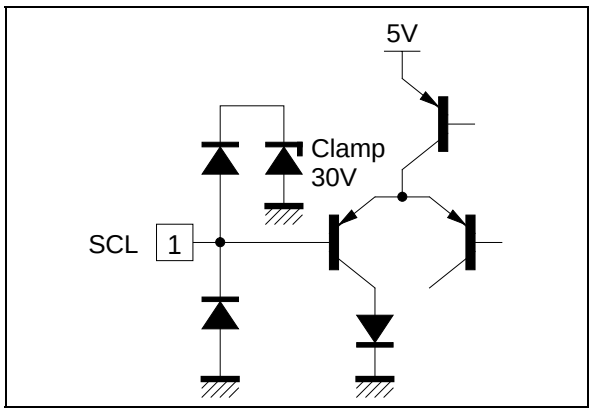


Figure 13

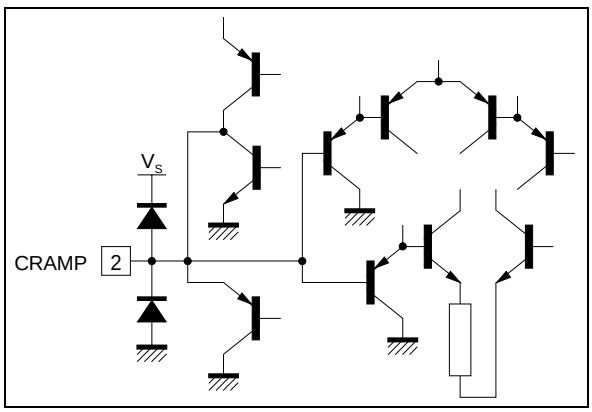


Figure 14

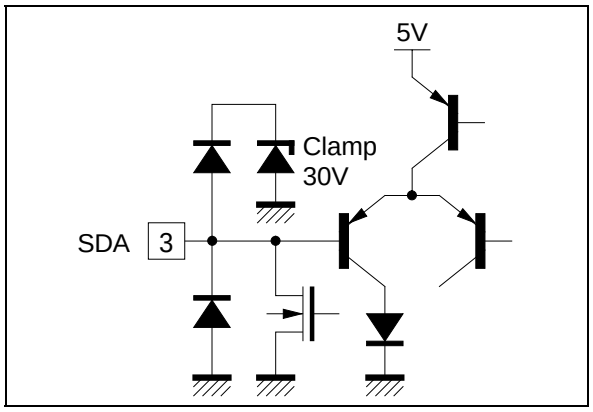


Figure 15

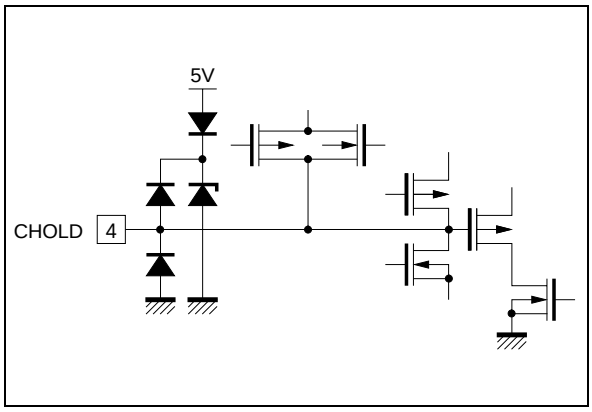


Figure 16

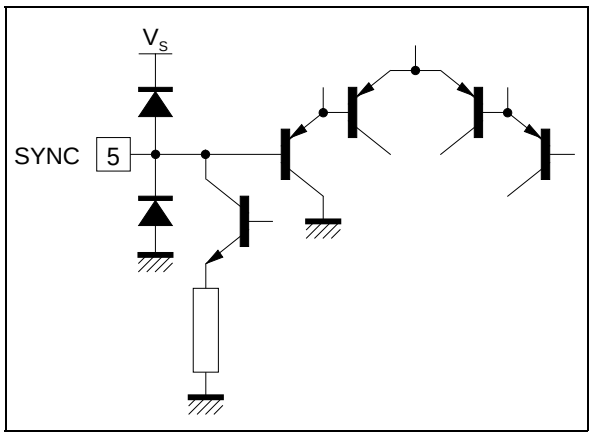
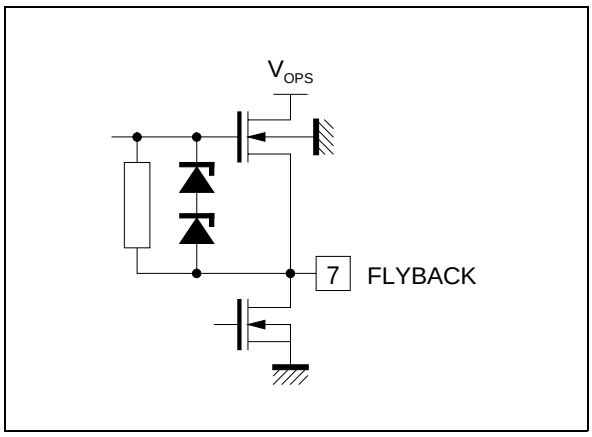


Figure 17



INPUT/OUTPUT PIN CONFIGURATION (continued)

Figure 18

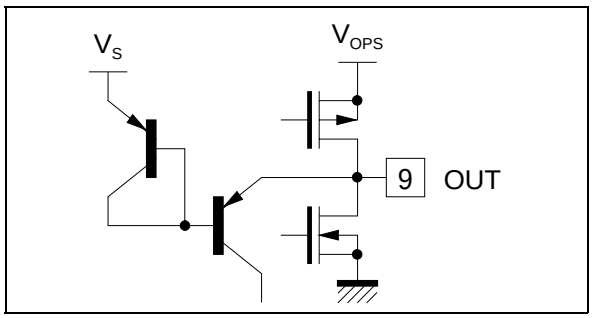


Figure 19

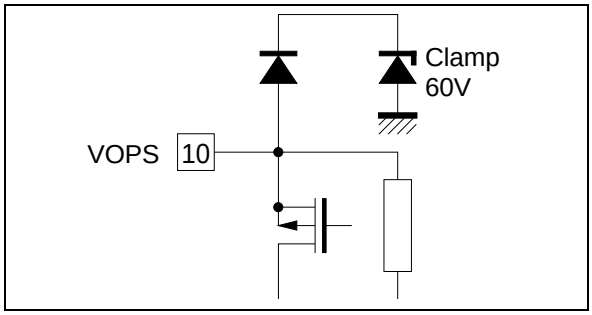


Figure 20

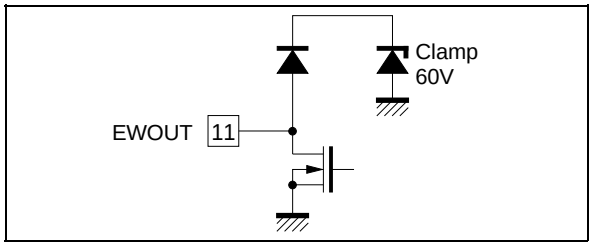


Figure 21

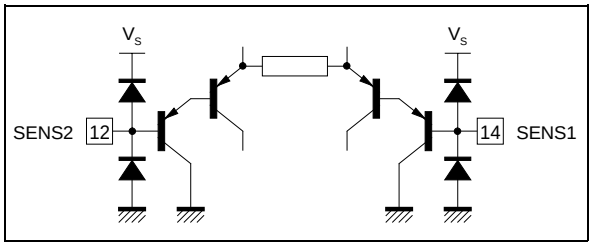


Figure 22

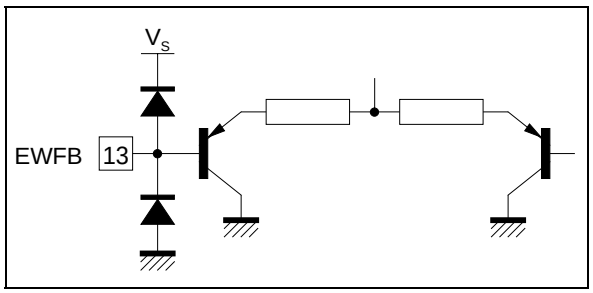
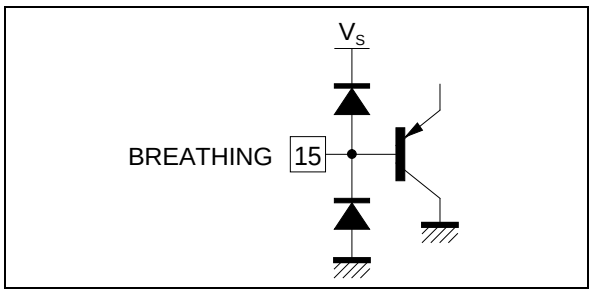
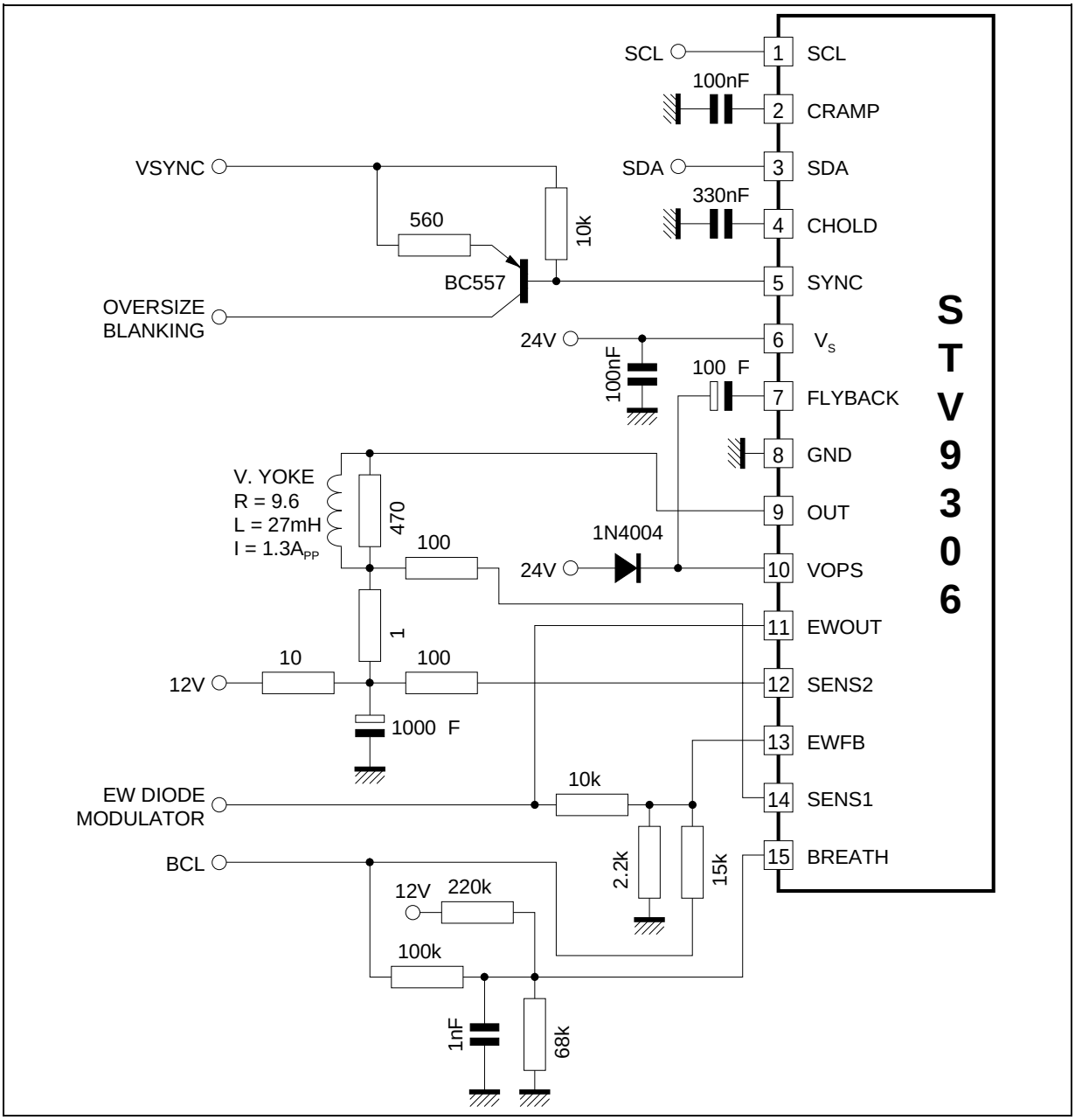


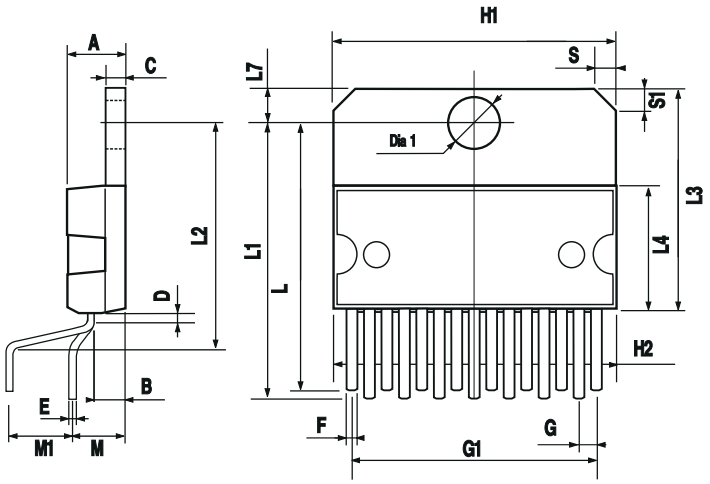
Figure 23



APPLICATION SCHEMATIC



PACKAGE MECHANICAL DATA : 15 PINS - PLASTIC MULTIWATT



PM-MW15V.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.02	1.27	1.52	0.040	0.050	0.060
G1	17.53	17.78	18.03	0.690	0.700	0.710
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.870	0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.63	5.08	5.53	0.182	0.200	0.218
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia. 1	3.65		3.85	0.144		0.152

MW15V.TBL