HA11580 色度信号处理电路

日立公司

性能说明

本电路是双列直插24线封装的集成电路，在日立牌CTP-216D等机芯采用，它具有从带通放大直到色同步和解调信号处理的所有功能，可用于NTSC制彩色电视机，同时也能与μPC1351C配合组成完整的PAL制彩色电视机。μPC1351C利用HA11580 19 端色信号输出端和 2、3、4端色差信号输出端进行PAL 制色差信号矩阵及PAL 开关处理，并利用从HA11580 17端输出的色同步脉冲和 5端输出的副载波信号对PAL 开关信号进行识别，HA11580和μPC1351C组合使用时，所需的外围元件少、调整简单、解调角度和相对增益可由外部电容选定。

极限值 (T_A=25℃)

参数名称	符号	极限值	单位
电源电压	V_{CC}	15	V
功耗 (T_A=60℃)	P_D	600	mW
工作环境温度	T_A	-20～85	℃
贮存温度	T_{stg}	-55～125	℃

电特性 (T_A=25℃)

参数名称	符号	测试条件	最小	典型	最大	单位
电源电流	I_{CC}	彩色接收平均电流	29	36	48	mA
最大色度输出(峰峰值)	e_C			0.71		V
色同步输出(峰峰值)	e_b		1	1.3	1.7	V
ACC范围(峰峰值)	e_a		0.7			V
消色器残留彩色	e_K				1	mVrms
色控残留彩色	e_B				1	mVrms
18端电压	V_{18}	18端开路	6.9	7.2	7.5	V
20端电压	V_{20}	20端开路		6.2		V
APC检波输出差分电压	V_P	色同步信号幅度 =0.65V(峰峰值)	-50	0	50	mV
APC牵引范围	f_P		±240	±375		Hz
VCO频率控制灵敏度	β			1.0		Hz/mV
鉴相器录敏度	μ			25		Hz/deg

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电特性(续表)

参数名称		符号	测试条件	最小	典型	最大	单位
频率稳定度		f_{OV}	V_{CC}=12±1V	-20	0	20	Hz
消色器电流	彩色	I_{KC}	色同步信号幅度0.65V(峰峰值)	30	65		μA
	黑白	I_{KB}	同上	5	15	35	μA
APC检波器温度稳定性		$\triangle V_{PT}$	T_A=25±35	-70	0	70	mV
色解调输出电压		$E_{O(DC)}$		6.6	7.2	7.8	V
输出直流电压温度系数		SE_Q/ST			0		mV/℃
差分输出电压		$\triangle E_{Q(DC30)}$		-0.3	0	0.3	V
色度输出(峰峰值)			ACC关,色度信号0.2V(峰峰值)		1.95		V
彩色解码最大输出电压			ACC关,色度信号1.2V(峰峰值)	4.5	5.5		V
残留载波(峰峰值)			3.6MHz			0.2	V
残流载波(峰峰值)			ACC通			0.2	V
色过饱和差分输出				1.23	1.95	3.10	V

引出端说明 (24-DIP 见封装图B45)

代号	引出端说明与符号	代号	引出端说明与符号	代号	引出端说明与符号
1	G-Y 输出	2	B-Y 色度输入	3	R-Y 色度输入
4	G-Y 色度输入	5	偏置	6	3.58MHz振荡输入
7	3.58MHz振荡输入	8	3.58MHz振荡输出	9	APC检波滤波器
10	APC及消色检波	11	色选通脉冲输入	12	地
13	门脉冲输入	14	接旁路电容	15	色度输入
16	ACC检波滤波器	17	色同步脉冲输出	18	色度增益控制
19	色度输出	20	色度增益控制	21	消色检波滤波
22	电源	23	B-Y 输出	24	R-Y 输出

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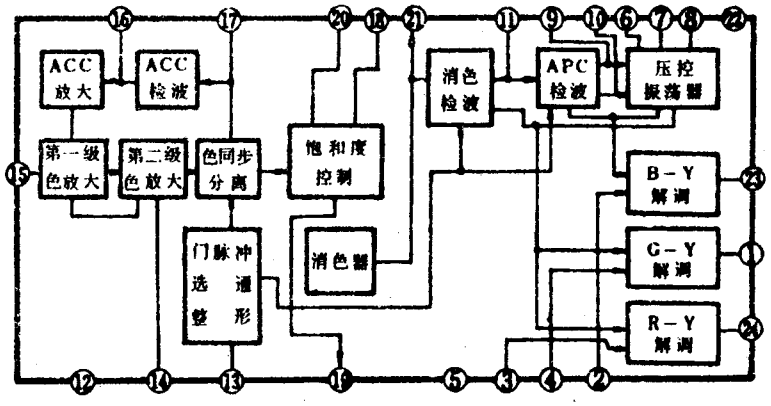
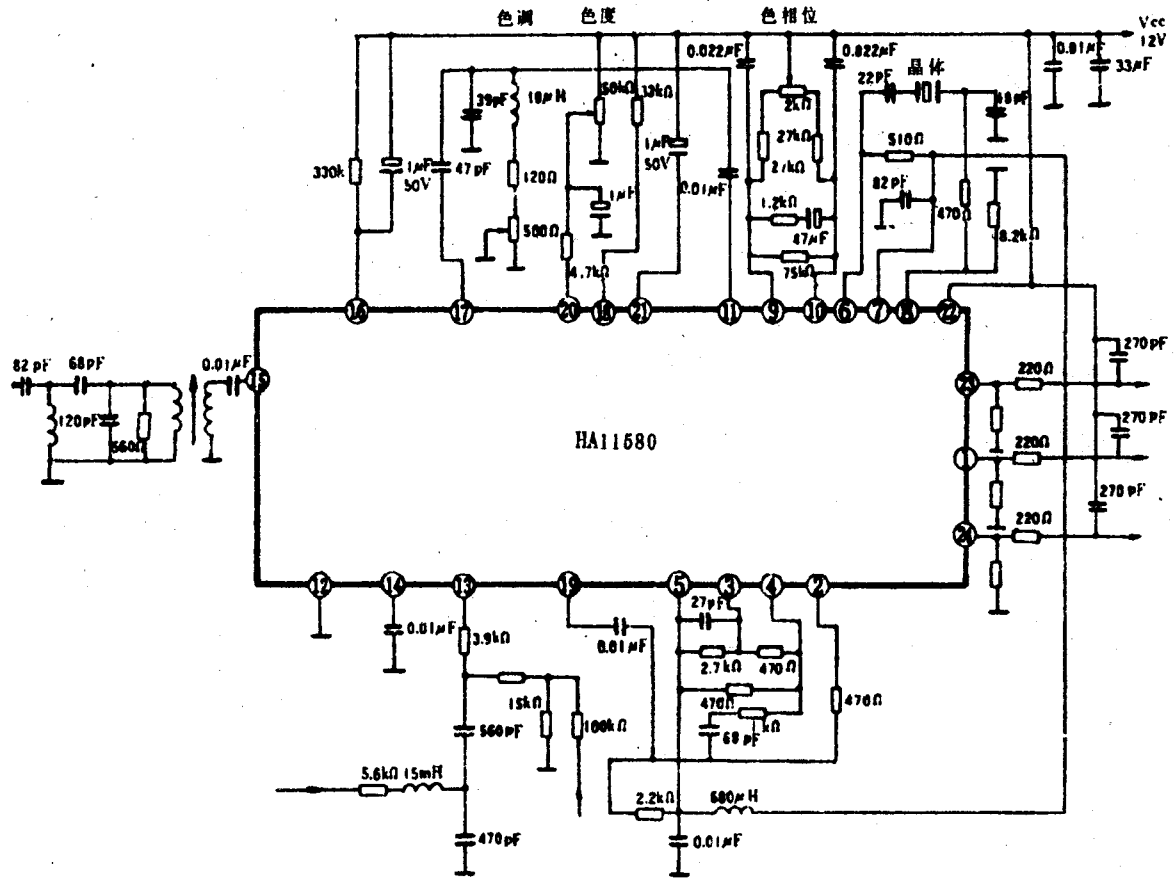
功能框图



应用图例



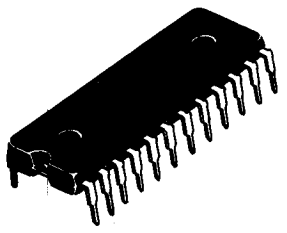
HA11580

COLOR TV CHROMA SYSTEM

HA11580 is a monolithic silicon integrated circuit which constitutes a complete chroma processing system for color television receivers.

HA11580 consists of band-pass amplifier, color sync and color demodulator and designed to minimize number of external components.

Demodulation angles and relative gains are optional with set designers by choosing external components values.

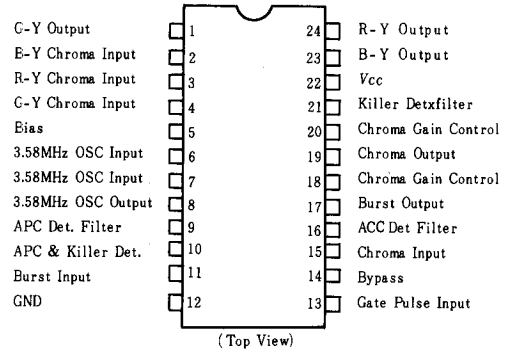


(DP-24A)

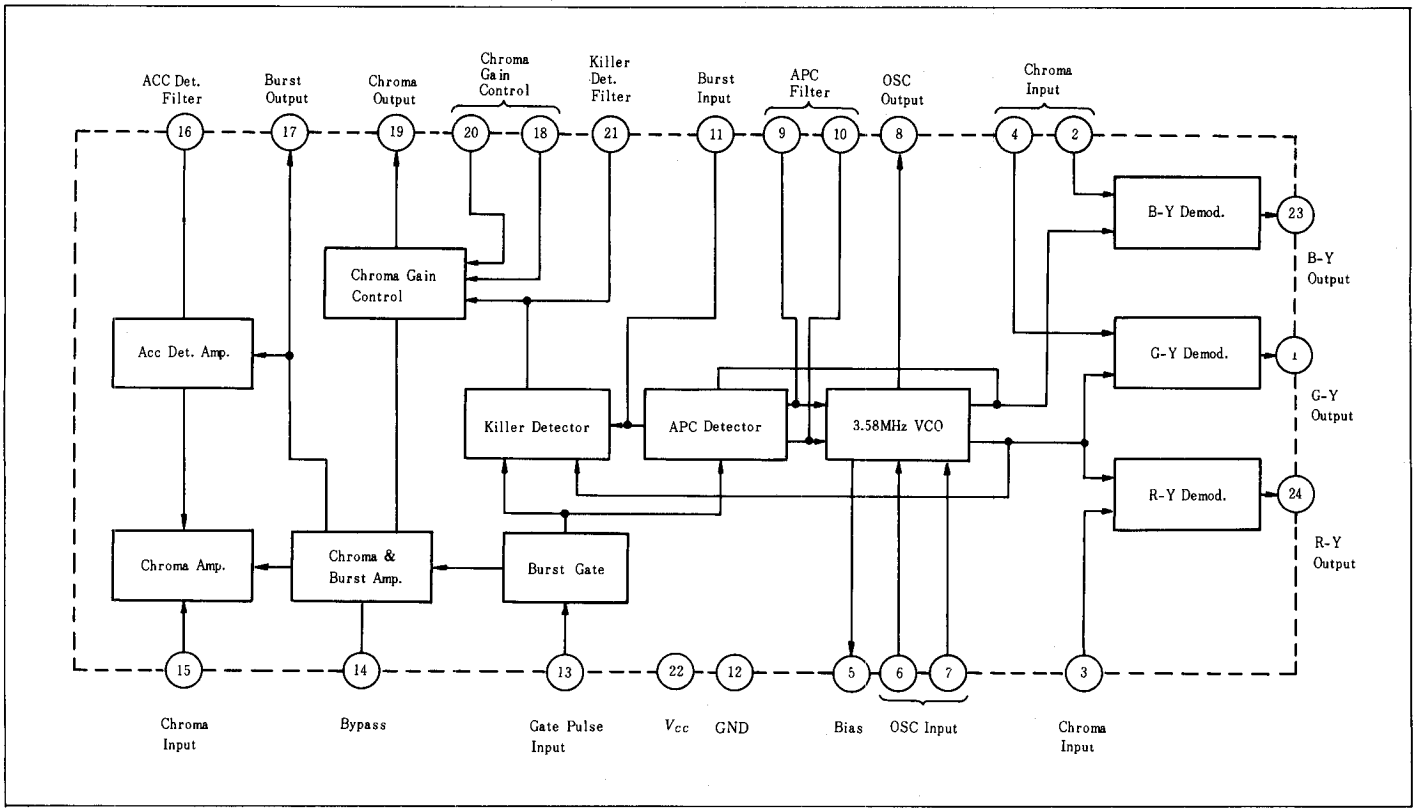
■ FEATURES

- Band-pass amplifier
  - Peak detection type ACC detector
  - ACC & killer adjustments are unnecessary
  - DC color control
- Color sync
  - APC type subcarrier regenerator
  - Transformerless VCO
- Color demodulator
  - 3 axes demodulation
  - Regenerated subcarrier are let from color sync in the IC

■ PIN ARRANGEMENT



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

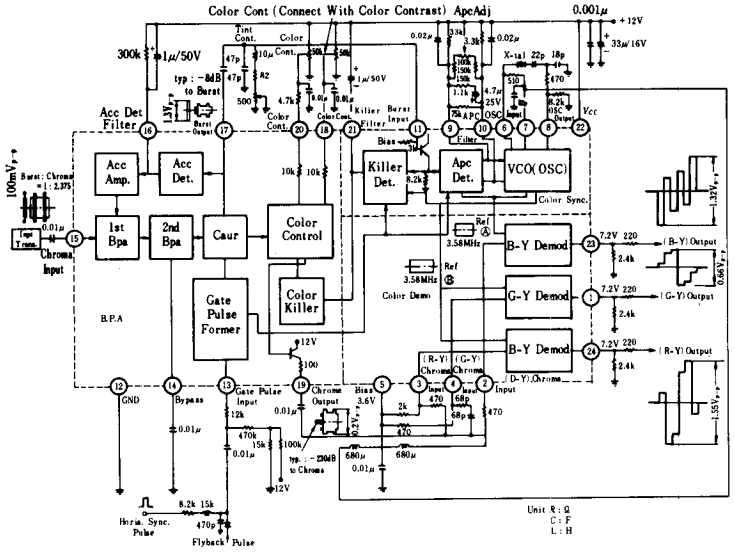
Item	Symbol	Rating	Unit
Supply Voltage (Positive)	V_{CC}	15	V
Power Dissipation	P_T*	600	mW
Operating Temperature	T_{opr}	−20 to +85	°C
Storage Temperature	T_{stg}	−55 to +125	°C

*Value at Ta=60°C

■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

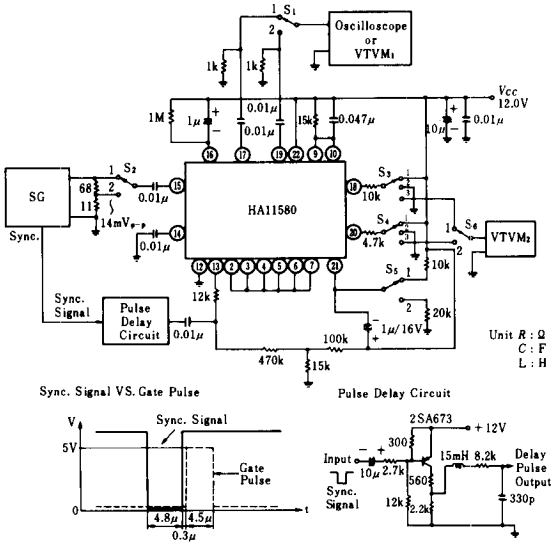
Item		Symbol	Test Circuit	Test Condition	min	typ	max	Unit
Supply Current		I_{CC}	4	Average value of total current at color reception	29	36	48	mA
Maximum Chroma Output		e_{cmax}	1		—	0.71	—	Vp-p
Burst Output		e_b	1		1.0	1.3	1.7	Vp-p
ACC Range		e_a	1		0.7	—	—	Vp-p
Residual Color (by color killer)		e_k	1		—	—	1	mVrms
Residual Color (by color control)		e_s	1		—	—	1	mVrms
Terminal Voltage of pin 18		V_{18}	1	pin 18 open	6.9	7.2	7.5	V
Terminal Voltage of pin 20		V_{20}	1	pin 20 open	—	6.2	—	V
Differential Voltage of APC Detector Output		V_p	2		−50	0	+50	mV
APC Pull-in Range		f_p	2	Burst signal amplitude =0.65Vp-p	±240	±375	—	Hz
Frequency Control Sensitivity (VCO)		β	2		—	1.0	—	Hz/mV
Phase Detector Sensitivity		μ	2		—	25	—	Hz/deg
Frequency Stability		f_{ov}	2	V_{CC}=12±1V	−20	0	+20	Hz
Killer Current	Color	I_{kc}	2	Burst signal amplitude =0.65Vp-p	30	65	—	μA
	B & W	I_{kb}	2		5	15	35	μA
Temperature Stability of APC detector		$\triangle V_{PT}$	2	Ta=25±35°C	−70	0	+70	mV
Color Demod. Output DC Voltage		$E_{O(DC)}$	3		6.6	7.2	7.8	V
Temperature Coefficient of Output DC Voltage		$\frac{\delta E_{O(DC)}}{\delta T}$	3		—	0	—	mV/°C
Differential Output Voltage		$\triangle E_{O(DC)}$	3		−0.3	0	+0.3	V
Temperature Coefficient of Output Voltage		$\frac{\delta \triangle E_{O(DC)}}{\delta T}$	3		—	0	—	mV/°C
Chroma Output		e_{O1}	3	ACC OFF at input chroma signal amplitude 0.2Vp-p	—	1.95	—	Vp-p
Color Demod. Maximum Output Voltage		e_{Omax}	3	ACC OFF at input chroma signal amplitude 1.2Vp-p	4.5	5.5	—	Vp-p
Residual Carrier		e_{car}	3	3.6MHz component	—	—	0.2	Vp-p
Residual Harmonic		e_{ham}	3		—	—	2.2	Vp-p
Overall Color Difference Output		e_{O2}	4	ACC ON	1.23	1.95	3.10	Vp-p

■ FUNCTIONAL BLOCK DIAGRAM



■ TEST CIRCUIT

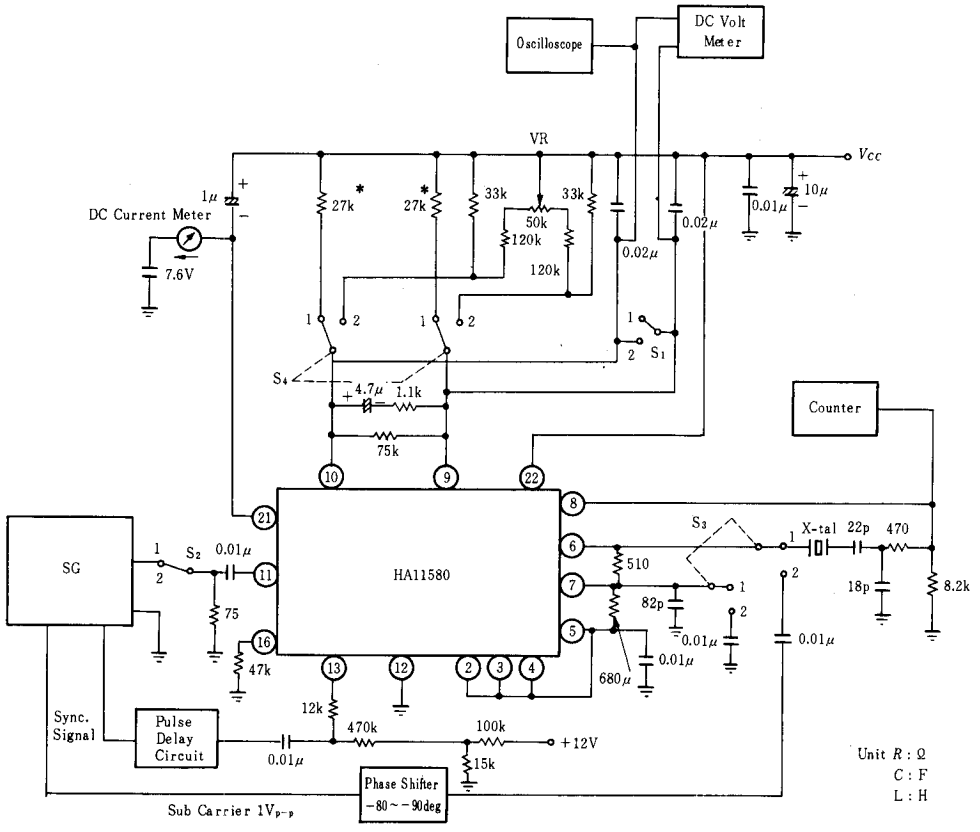
1.



■ TEST PROCEDURE

Symbol	Switch Position						Oscilloscope or VTVM
	S_1	S_2	S_3	S_4	S_5	S_6	
e_c max	1	2	1	1	2	—	Oscilloscope
e_b	1	1	1	1	2	—	Oscilloscope
e_e	2	1	1	1	2	—	Oscilloscope
e_o	1	2	1	1	1	—	$VTVM_1$
e_r	1	2	1	2	2	—	$VTVM_1$
V_{18}	1	2	3	1	1	1	$VTVM_2$
V_{20}	1	2	1	3	1	2	$VTVM_2$

2.

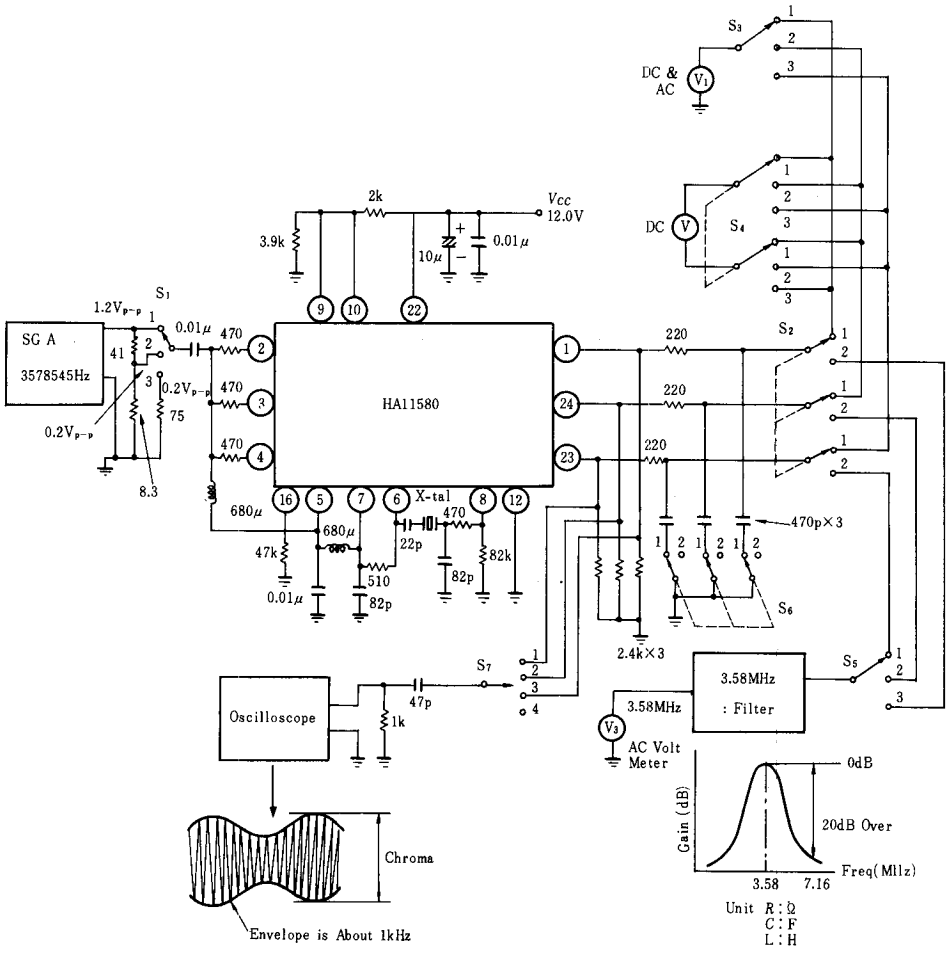


Note: 1. SG: Burst Signal Generator (Shiba-Soku Co. 397A),
V_{out} = 0.65Vp-p, Burst 10 cycles
2. X-tal: Crystal Oscillator (TEW 280561)
3. *: Accuracy ±0.3%

■ TEST PROCEDURE

Symbol	Switch Position				Test Condition
	S_1	S_2	S_3	S_4	
V_P	1	2	1	1	DC Volt. Meter
f_P	1	2	1	2	Adjust VR for f_{osc} = 3,579,545Hz ± 10Hz
	1	1	1	2	Change frequency of burst signal generator. Measure and record the pull-in range
β	1	1	1	1	Change into 3,579,595Hz from 3,579,495Hz burst signal frequency. Measure the variation of DC volt. meter. Calculate controled sensitivity. β = 100/variation of DC volt. meter
μ	1	1	2	1	Fix burst frequency for 3,579,545Hz ± 10Hz. Turn phase shift to −80 deg. from −90 deg. Measure and record the DC volt. meter. Calculate the detection sensitivity. μ = variation of DC volt. meter/10
f_{OV}	1	2	1	1	Change V_{CC} for 12 ± 1.0V. Measure and record the counter.
I_{KC}	1	1	1	1	Measure and record the DC current meter. Test value is negative direction.
I_{KB}	1	2	1	1	Measure and record the DC current meter. Test value is positive direction.
$\triangle V_{PT}$	1	1	2	1	Measure and record the DC volt. meter at Ta = 25 ± 35°C

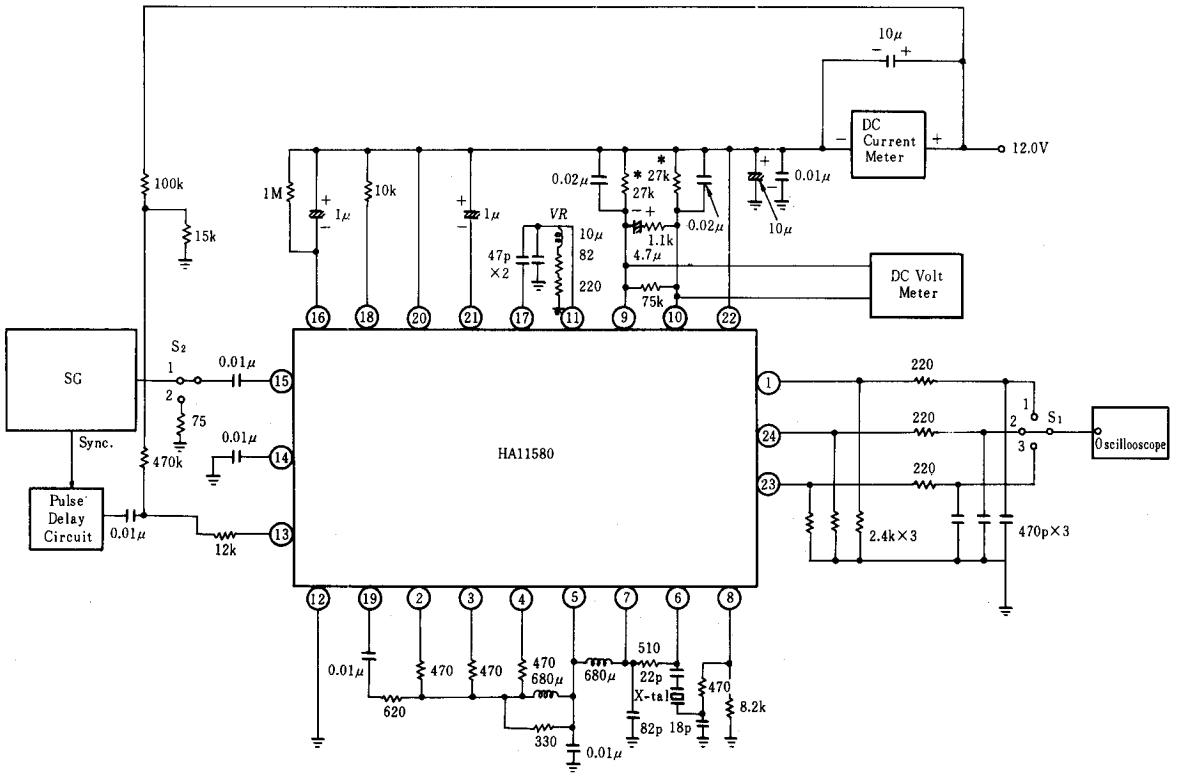
3.



■ TEST PROCEDURE

Symbol	Switch Position							Test Condition
	S_1	S_2	S_3	S_4	S_5	S_6	S_7	
$E_{O(DC)}$ $\delta E_{O(DC)} / \delta_T$	3	1	Each Position	—	—	1	4	Measure and record DC voltage (Ta = −20 to +75°C)
$\triangle E_{O(DC)}$ $\delta \triangle E_{O(DC)} / \delta_T$	3	1	—	Each Position	—	1	4	Measure and record DC voltage (Ta = 20 to +75°C)
e_{O1}	2	1	Each Position	—	—	1	4	Measure 1kHz beat signal at V_{in} = 0.2Vp-p
e_{O} max	1							Measure 1kHz beat signal at V_{in} = 1.2Vp-p
e_{car}	3	2	—	—	Each Position	2	4	Measure 3.6MHz component
e_{harm}	1	2	—	—	—	1	1, 2, 3	Measure e_{harm} for synchroscope

4.

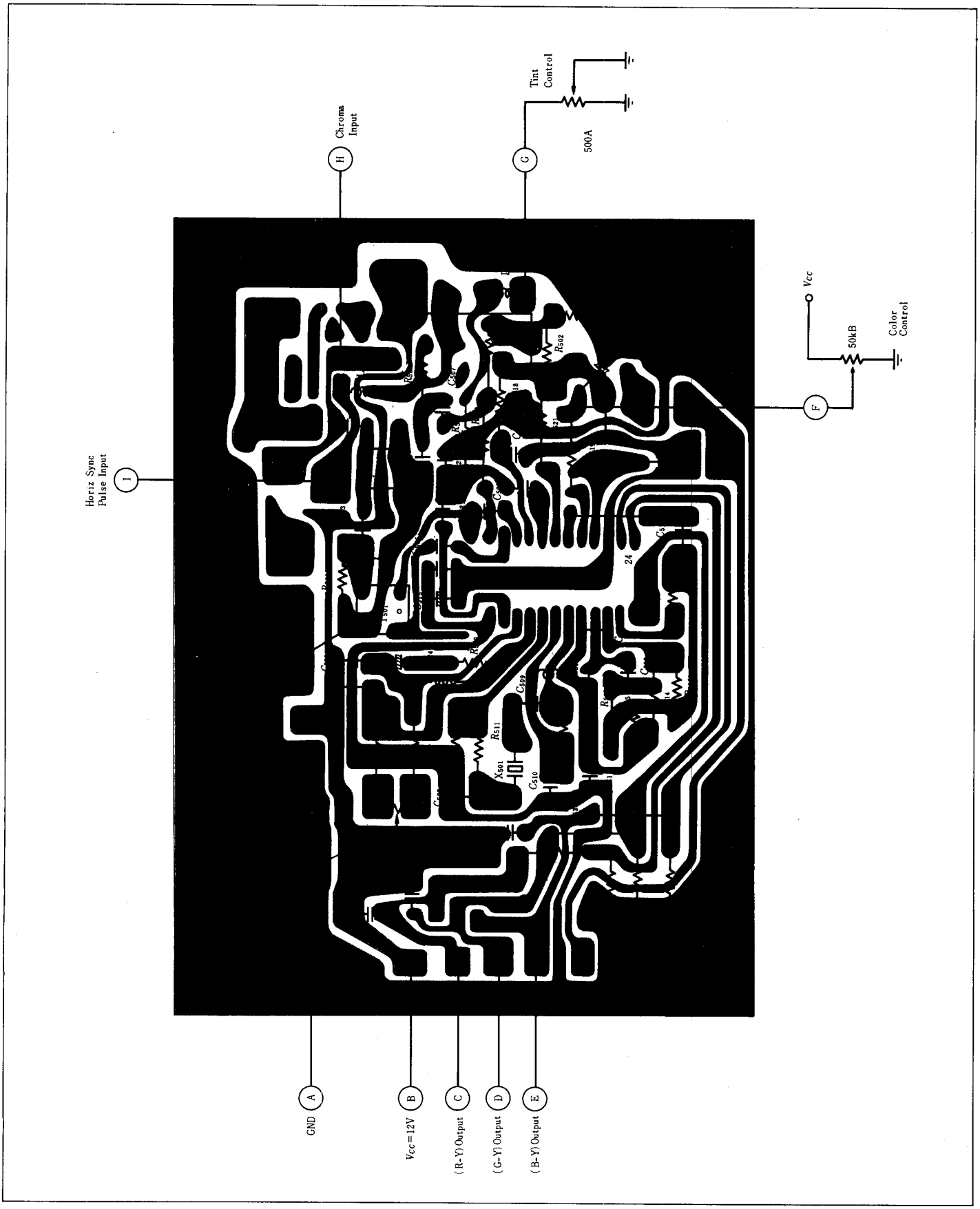


Notes 1. SG: Rainbow Color Bar Generator (Shiba-Soku Co. TG-5), V_{out} = 100mVp-p.
2. X-tal: Crystal Oscillator (TEW 280561)
3. *: Accuracy ±0.3%

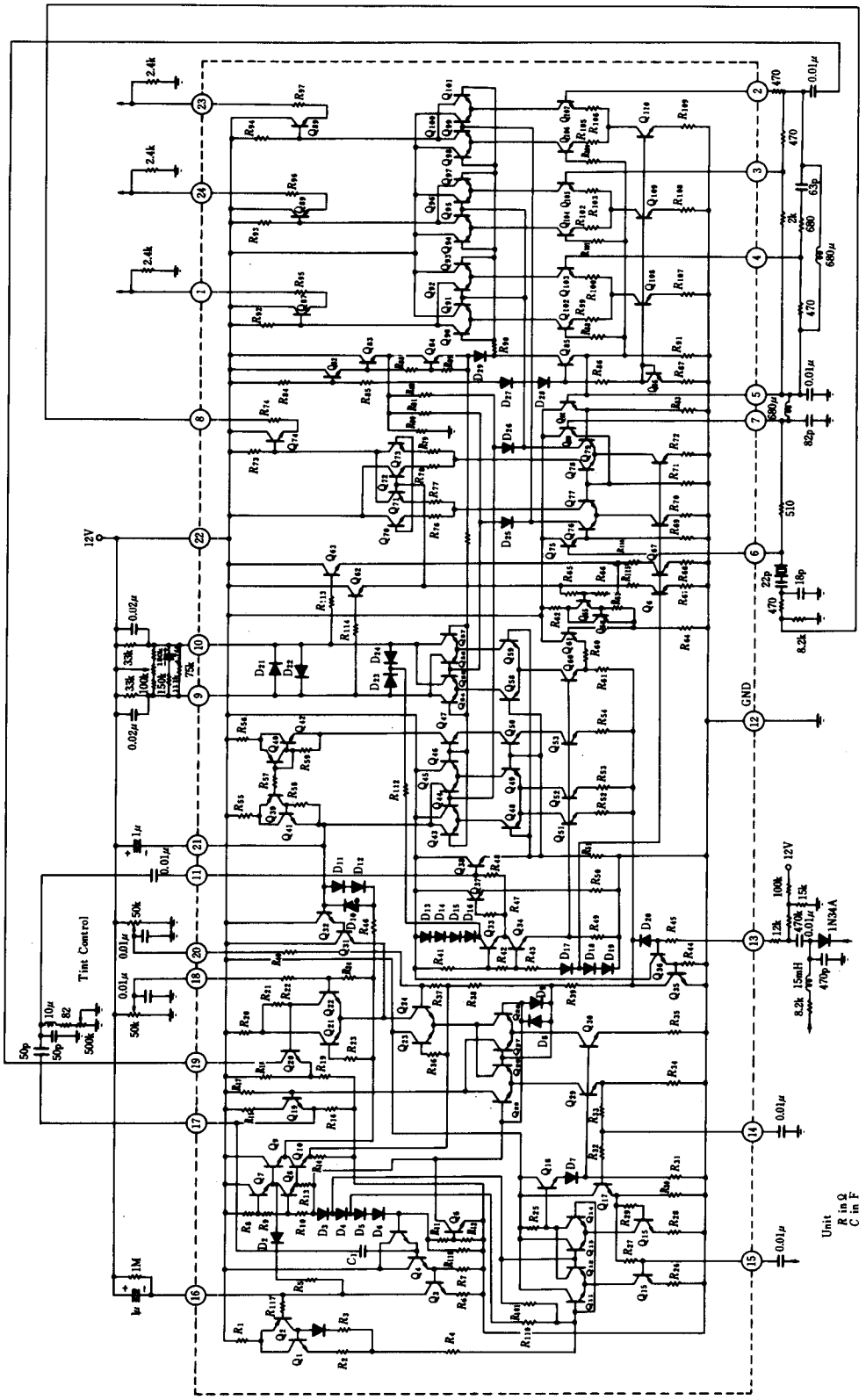
■ TEST PROCEDURE

Symbol	Switch Position		Test Condition
	S_1	S_2	
e_{02}	Each Position	1	Measure and record synchroscope at ACC-ON
I_T	—	1	Measure and record DC current meter

■ P.C. BOARD LAYOUT (Bottom View)



■ CIRCUIT SCHEMATIC AND TYPICAL EXTERNAL COMPONENTS



■ APPLICATION EXAMPLE