SIEMENS

Video IF IC with VTR Connection and Quasi-Parallel Sound

TDA 5830-2

Bipolar IC

Video IF Section

Controlled AM broadband amplifier with synchronous demodulator, video amplifier, VTR input and output, and AGC voltage generation for the video IF amplifier and tuner.

Quasi-Parallel Sound Section

Controlled AM broadband amplifier with quadrature demodulator, sound carrier output, and internal AGC voltage generation.

The TDA 5830-2 is especially suitable for application with black and white or color television receivers and/or VTR systems with PNP/MOS tuners for TV standards with negative video modulation and FM sound.

| Type	Ordering Code	Package
TDA 5830-2	Q67000-A2504	P-DIP-22

Circuit Description

The video IF section is comprised of a 4-stage controllable AM amplifier, a limiter, and a mixer for the synchronous demodulation of video signals as well as an amplifier for the positive video output signal.

The positive video signal is used for gated control. In addition, the IC includes a standard VTR connection via an external transistor. The delayed tuner AGC is generated by a threshold amplifier driven by the control voltage.

The quasi-parallel sound section also includes a 4-stage AM amplifier, a limiter, and a mixer for the quadrature demodulation of the 1st sound IF with subsequent sound carrier output for the 2nd sound IF. The control voltage is generated by a peak value rectifier from the 1st sound IF signal.

Block Diagram
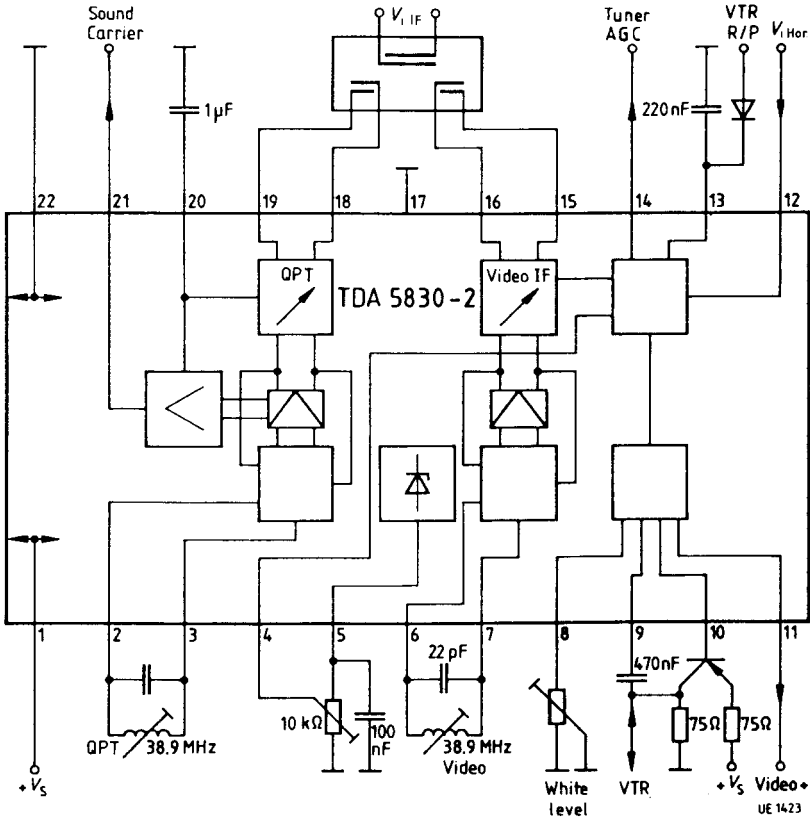
Pin Functions

Pin No.	Function
1	Supply voltage
2	Demodulator tank circuit QPS
3	Demodulator tank circuit QPS
4	Tuner AGC threshold
5	Reference voltage
6	Demodulator tank circuit video IF
7	Demodulator tank circuit video IF
8	White level setting
9	VTR input
10	VTR output
11	Video output
12	Gating pulse input
13	AGC time constant video IF
14	Delayed tuner AGC
15	Video IF input
16	Video IF input
17	GND
18	QPS IF input
19	QPS IF input
20	AGC time constant QPS
21	Sound carrier output
22	GND

Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply voltage	V_1		13	V
Max. DC voltage	$V_{2,3}$	V_5	V_1	V
Max. DC voltage	V_4	0	V_1	V
Max. DC current	I_5	-2	2	mA
Max. DC voltage	$V_{6,7}$	V_5	V_1	V
Max. DC voltage	$V_{8,9}$	0	V_1	V
Max. DC current	I_{10}	-1	3	mA
Max. DC current	$-I_{11}$	-1	3	mA
Max. DC voltage	V_{12}	-10	V_1	V
Max. DC voltage	$V_{13,14}$	0	V_1	V
Max. DC voltage	$V_{15,16}$	0	V_1	V
Max. DC voltage	$V_{18,19,20}$	0	V_1	V
Max. DC current	I_{21}	-1	2	mA
Junction temperature	T_j		150	°C
Storage temperature range	T_{stg}	-40	125	°C
Thermal resistance (system-air)	R_{thSA}		55	K/W

Operating Range

Supply voltage	V_S	10.5	12.6	V
IF frequency	f_{IF}	15	75	MHz
Ambient temperature	T_A	0	70	°C

Characteristics

$V_S = 12$ V; $T_A = 25$ °C

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Current consumption	I_1		95		mA	
Stab. reference voltage	$V_{5/22}$		6.7	7.0	V	

Video IF

Control current for tuner	I_{14}		4.5		mA	
Tuner AGC threshold	$V_{4/22}$	0		4.0	V	
Gating pulse voltage	V_{12}	4.0		V_1	V	pos. gating pulse
	V_{12}	– 10		– 4.0	V	neg. gate pulse
Input voltage at G max	$V_{I\,15/16}$		30	60	μV	$V_{11\,pp} = 3$ V
AGC range	ΔG		60		dB	
IF control voltage	$V_{13/22}$	0			V	G max
	$V_{13/22}$			4.0	V	G min
Video output voltage	$V_{Q\,11\,pp}$		3.0		V	$R_L = \infty$
Sync pulse level	$V_{11/22}$		2.0		V	
DC voltage $V_{13} = 4$ V; $V_{15/16} = 0$ V	$V_{11/22}$		5.3		V	
Output current	$I_{Q\,11}$		– 5.0		mA	to ground via R
	$I_{Q\,11}$		2.0		mA	to plus $V_{11} = 7$ V
VTR output voltage (neg.)	$V_{Q10\,pp}$		2.0		V	VTR record. $R_L = \infty$
Sync pulse level	$V_{10/22}$		V_1–1.6		V	VTR record. $R_L = \infty$
DC voltage $V_{13} \leq 5$ V; $V_{15/16} = 0$ V	$V_{10/22}$		V_1–3.8		V	VTR recording
DC voltage $V_{13} = 8$ V	$V_{10/22}$		V_1–0.9		V	VTR playback
Output current	$I_{Q\,10}$		–5.0		mA	to ground via R
	$I_{Q\,10}$		1.0		mA	to plus $V_{10} = V_1$
Video amplifier (VTR playback)	V_{video}		3.0			$V = V_{11}/V_9$; $V_{9\,pp} = 1$ V

Quasi-Parallel Sound

Sound carrier output voltage	V_{21}	10			mV	$V_{I\,vc} = 1$ mV $V_{I\,sc} = 300$ μV
Input voltage at G max	$V_{I\,18/19}$		50	100	μV	$V_{21} = V_{21}$ -3 dB
AGC range	ΔG		60		dB	$V_{21} = V_{21} \pm 3$ dB
Signal-to-noise-ratio						IEC 468
White/staircase signal			61		dB	Peak weighting
Black picture			66		dB	

Characteristics (cont,d)
$V_S = 12$ V; $T_A = 25$ °C

Parameter	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Test Conditions						
Video carrier/sound carrier			10		dB	
Modulation frequency			1		kHz	
Frequency deviation			50		kHz	
IF input voltage			20		mV	
Design-Related Characteristics						
Input impedance	$Z_{I\,15/16}$		1.8/2		kΩ/pF	
	$Z_{I\,18/19}$		1.8/2		kΩ/pF	
Output impedance	$Z_{Q\,2/3}$		6.6/2		kΩ/pF	
	$Z_{Q\,6/7}$		6.6/2		kΩ/pF	
Output resistance	R_{11}		150		Ω	
Residual IF (fundamental wave)	V_{11}		10		mV	
Video bandwidth (– 3 dB)	B_{video}		6.0		MHz	
Intermodulation ratio	α_{iM}		50		dB	sound color
with reference to f_{CC}						interference
Output resistance	$R_{Q\,21}$		200		Ω	
IF control voltage	$V_{20/22}$	0			V	G_{max}
	$V_{20/22}$			4	V	G_{min}

Alignment Procedures

a) Video IF

At a video carrier input level of $V_{15/16\,rms} = 10$ mV and a superimposed AGC voltage of V_{13} = 3 V, the demodulator tank circuit is preliminary aligned so that the demodulated video signal $V_{11\,pp}$ reaches its maximum output level at the positive video output. Any suitable video test signal can be used for modulation. Subsequently, the AGC voltage V_{13} is reduced until the video signal equals approx. 3 V (peak-to-peak). By fine-aligning the demodulator tank circuit, the maximum output level of the video signal is reached. The flat response characteristic of the demodulator ensures a non-critical alignment procedure.
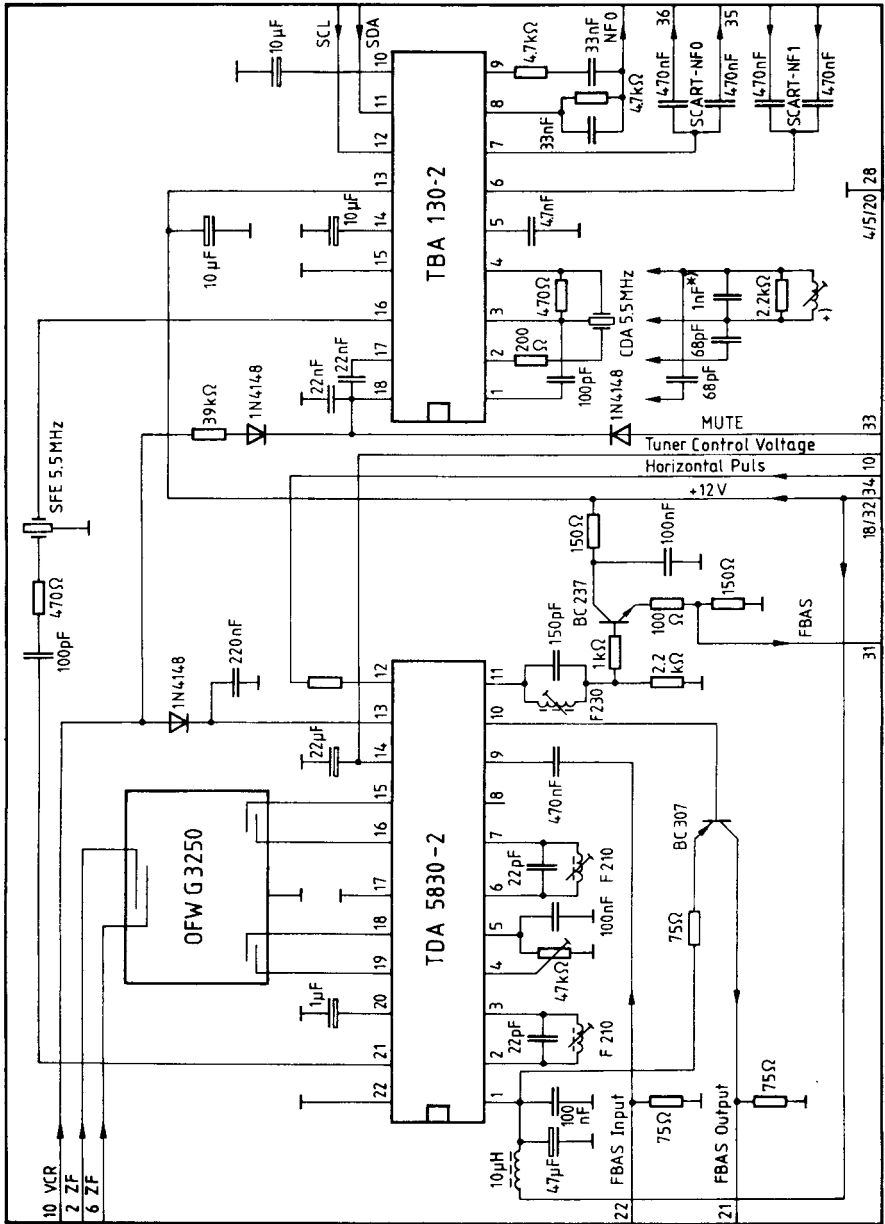
b) QPS

At an input signal of $V_{18/19\,rms} = 10$ mV, the demodulator tank circuit is preliminarily aligned until a max. AM suppression of the demodulated video signal V_{21} is reached at the sound carrier output. A video signal critical for the sound-interference ratio should be used for modulation (white/staircase, FuBK). Subsequent fine-aligning is performed by measuring the sound-interference ratio at the output of a FM demodulator and fine-aligning the demodulator tank circuit for a max. interference ratio. If several sound carriers are used in a device, the sound carrier with the lowest level should be used for alignment purposes.
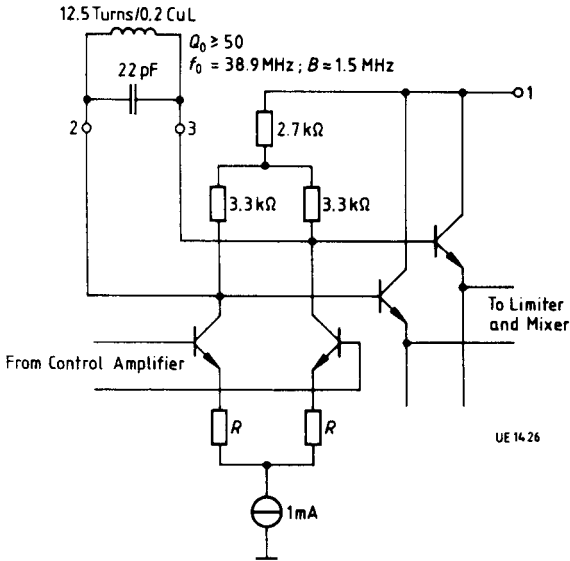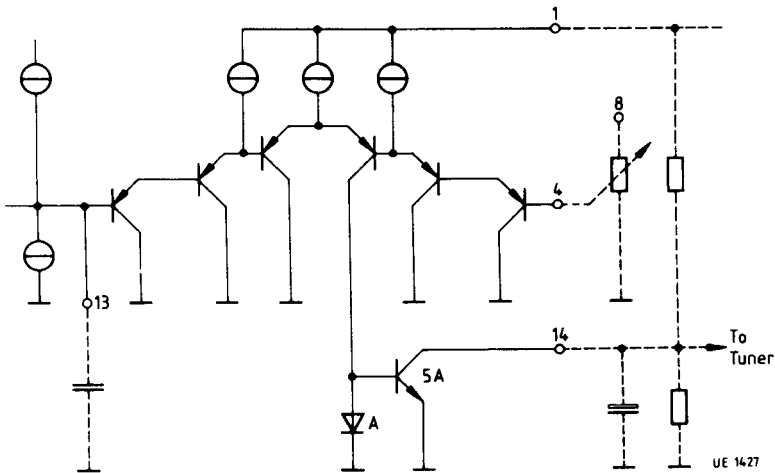
Measurement Circuit
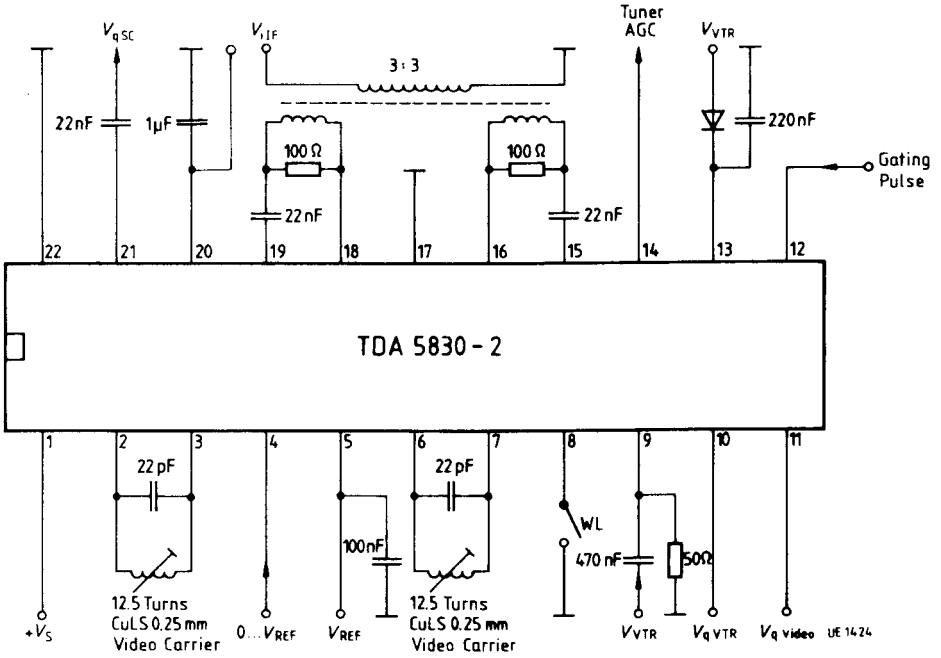
Application Circuit

Demodulator Tank Circuit QPS

12.5 Turns/0.2 CuL

$Q_0 \geq 50$

22 pF $f_0 = 38.9\,\text{MHz}$; $B \approx 1.5\,\text{MHz}$

2   3

2.7 kΩ

3.3 kΩ   3.3 kΩ

To Limiter and Mixer

From Control Amplifier

R   R

UE 1426

1 mA

Tuner AGC Threshold and Output
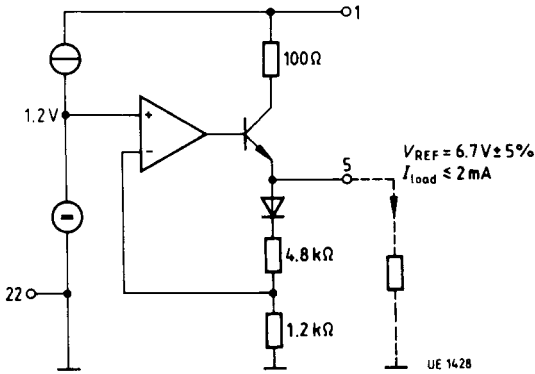
13

8

4

14   To Tuner

5A

A

UE 1427

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Reference Voltage

$V_{REF} = 6.7\,V \pm 5\%$
$I_{load} \leq 2\,mA$

100 Ω

1.2 V

4.8 kΩ

22

1.2 kΩ

UE 1428

Demodulator Tank Circuit Video IF

12.5 Turns / 0.2 CuL

$Q_0 \geq 50$

22 pF

$f_0 = 38.9\,MHz\,;\, B \approx 1.5\,MHz$

2.7 kΩ

3.3 kΩ   3.3 kΩ

To Limiter
and Mixer

From Control Amplifier

R   R

UE 1429

1 mA

Siemens Aktiengesellschaft   552

Positive Video Output

UE 1430

AGC Time Constant Video IF

UE 1431

Gating Pulse Input

UE 1432
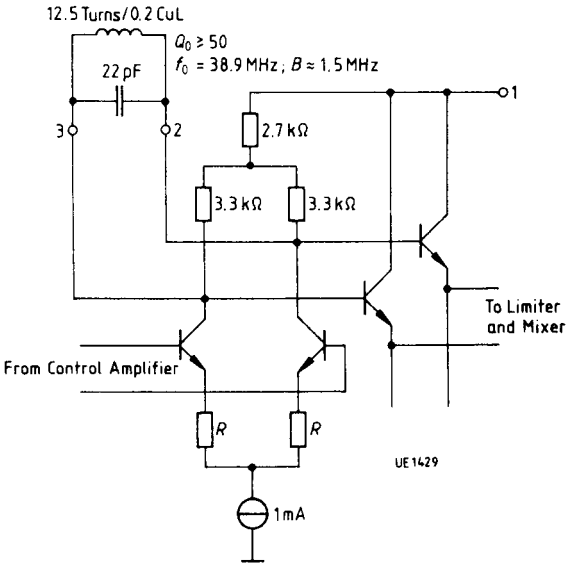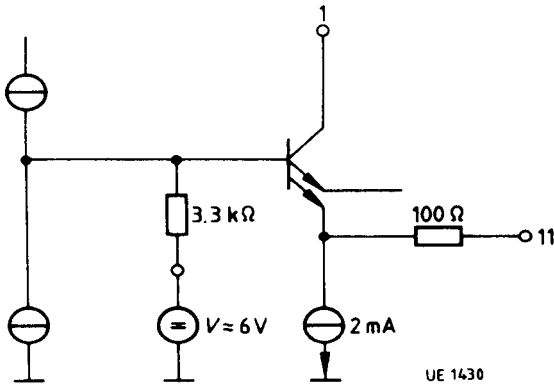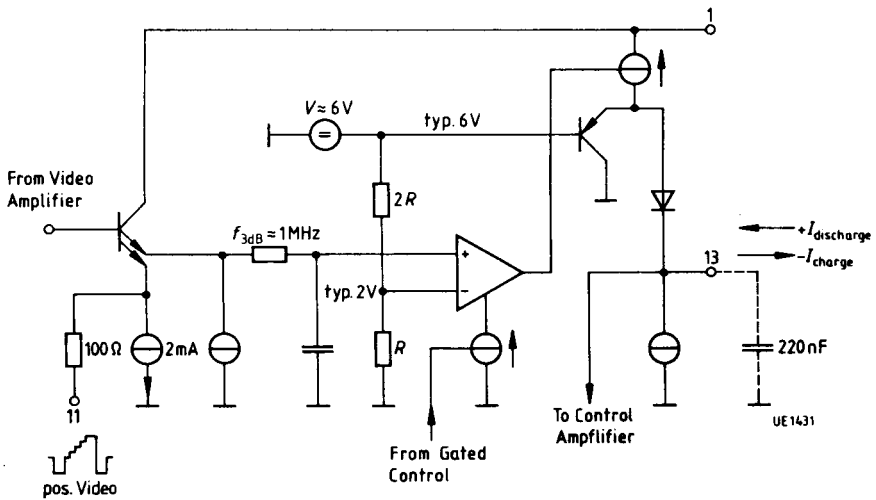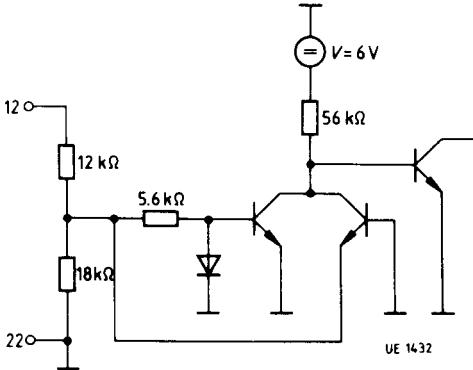
IF Input Video IF
IF Input QPS

UE 1433

VTR Interface

UE 1434

AGC Time Constant QPS

UE 1435
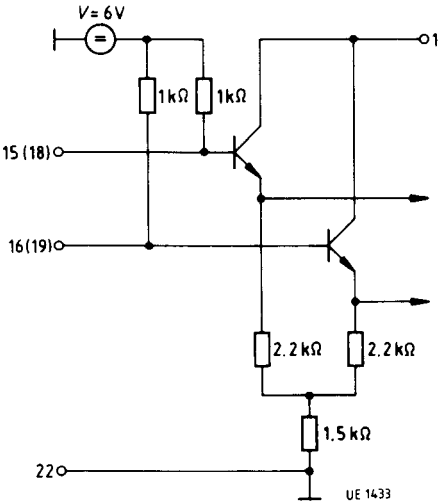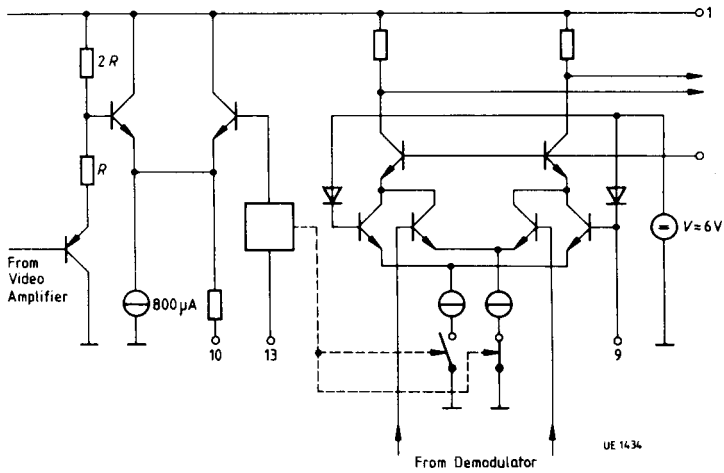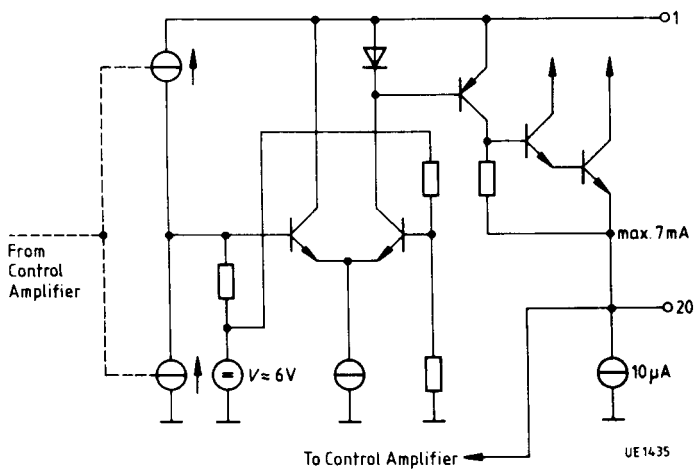
Sound Carrier Output QPS
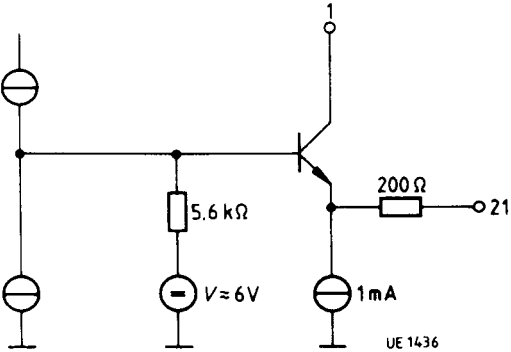
AGC Time Constant QPS
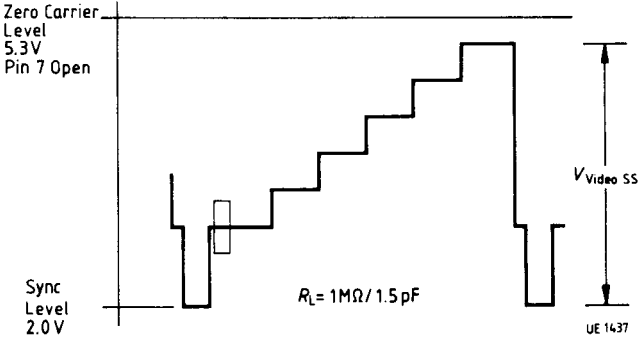
Measurement Configuration

(SAW 351 D)
(SAW 361 S)
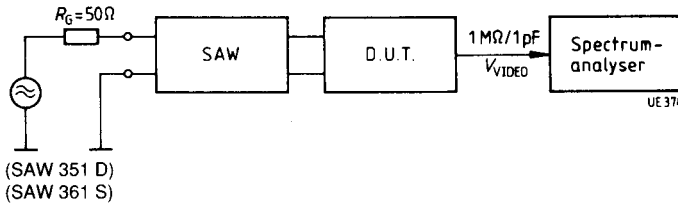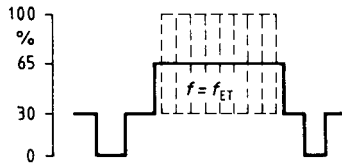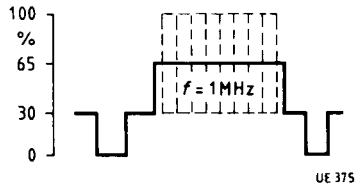
Test signal: $f_{VC} = 38.9$ MHz with test signal modulated with 10% residual carrier; sound carrier $- 13$ dB (transmitter side)

Intermodulation   Reference

Intermodulation ratio $a_{IM} = 20 \log \dfrac{V_{video\,(f\,=\,1\,MHz)}}{V_{video\,(f\,=\,f_{SC}-f_{CC})}}$

The 50% IRE signal with $\pm$ 50% IRE color carrier corresponds to Cyan with 75% color saturation.