SIEMENS

Video IF IC with Quasi-Parallel Sound and AFC

TDA 5835

Bipolar IC

Video IF Section

Controlled AM broadband amplifier with synchronous demodulator, video amplifier, 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, internal AGC voltage generation, and an AFC section which can be disabled.

The TDA 5835 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

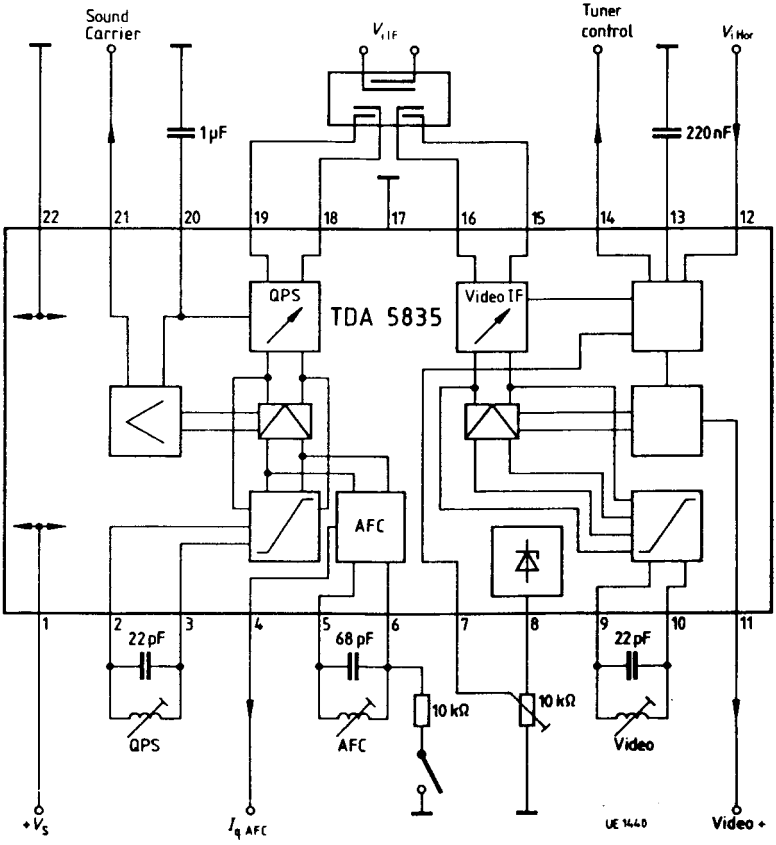
Type	Ordering Code	Package
TDA 5835	Q67000-A2507	P-DIP-22

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 signal is used for gated control and a threshold amplifier to derive the delayed tuner AGC from the AGC voltage.

The quasi-parallel sound section also includes in 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 1st sound IF. The control voltage is generated by a peak value rectifier from

Block Diagram



Pin Functions

Pin No.	Function
1	Supply voltage
2	Demodulator tank circuit QPS
3	Demodulator tank circuit QPS
4	Push-pull current output AFC
5	Demodulator tank circuit AFC
6	Demodulator tank circuit AFC and switch-off
7	Tuner AGC threshold
8	Reference voltage
9	Demodulator tank circuit video IF
10	Demodulator tank circuit video IF
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_8	V_1	V
Max. DC voltage	V_4	0	V_1	V
Max. DC voltage	$V_{5,6}$	V_8	V_1	V
Max. DC voltage	V_7	0	V_1	V
Max. DC current	I_8	– 2	2	mA
Max. DC voltage	$V_{9,10}$	V_8	V_1	V
Max. DC current	$-I_{11}$	– 1	3	mA
Max. DC voltage	V_{12}	– 10	V_1	V
Max. DC voltage	$V_{13,14,15}$	0	V_1	V
Max. DC voltage	$V_{16,18}$	0	V_1	V
Max. DC voltage	$V_{19,20}$	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)	$R_{th\,SA}$		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		102	134	mA	
Stab. reference voltage	$V_{8/22}$		6.7	7.0	V	
Video IF						
Control current for tuner	I_{14}		4.5		mA	
Tuner AGC threshold	$V_{7/22}$	0		4.0	V	
Gating pulse voltage	V_{12} V_{12}	4.0 – 10		V_1 – 4.0	V V	pos. gating pulse neg. gating pulse
Input voltage at Gmax	$V_{I\,15/16}$		30	60	µV	$V_{11\,pp}$ = 3 V
AGC range	ΔG		60		dB	
IF control voltage	$V_{13/22}$ $V_{13/22}$	0		 4.0	V V	Gmax Gmin
Video output voltage	$V_{Q\,11\,pp}$		3.0		V	$R_L = \infty$
Sync pulse leve	$V_{11/22}$		2.0		V	
DC voltage V_{13} = 4 V; $V_{15/16}$ = 0 V	 $V_{Q\,11\,pp}$		 5.3		 V	
Output current	$I_{Q\,11}$ $I_{Q\,11}$		– 5.0 + 2.0		mA mA	to ground via R to plus V_{11} = 7 V
AFC output current	$I_{Q\,4}$		± 1		mA	di/df < 0
AFC OFF ON	$V_{5/22}$ $V_{5/22}$	0	 6.0	4.0	V V	$V_5 = V_6$; R = 10 kΩ
Quasi-Parallel Sound						
Sound carrier output voltage	$V_{Q\,21}$	10			mV	$V_{I\,PC}$ = 1 mV $V_{I\,SC}$ = 300 µV
Input voltage at Gmax	$V_{I\,18/19}$		50	100	µV	$V_{21} = V_{21}$ -3 dB
AGC range	ΔG		60		dB	$V_{21} = V_{21}$ ± 3 dB
Signal-to-noise-ratio						IEC 468
White/staircase signal			61		dB	peak weighting
Black picture			66		dB	

Characteristics

V_S = 12 V; T_A = 25 °C

Parameter	Symbol	Limit Values			Unit	Test Condition
		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	$Z_{I\,15/16}$ $Z_{I\,18/19}$		1.8/2 1.8/2		kΩ/pF kΩ/pF	
Output impedance	$Z_{Q\,2/3}$ $Z_{Q\,9/10}$ $Z_{Q\,5/6}$		6.6/2 6.6/2 20		kΩ/pF kΩ/pF kΩ	
Output resistance	$R_{Q\,11}$		150		Ω	
Residual IF (fundamental wave)	V_{11}		10		mV	
Video bandwidth (-3 dB)	B_{video}		6.0		MHz	
Intermodulation ratio with reference to f_{cc}	α_{IM}		50		dB	sound color interference
Output resistance	$R_{Q\,21}$		200		Ω	
IF control voltage	$V_{20/22}$ $V_{20/22}$	0		4	V V	G_{max} G_{min}

Alignment Procedures

a) Video IF

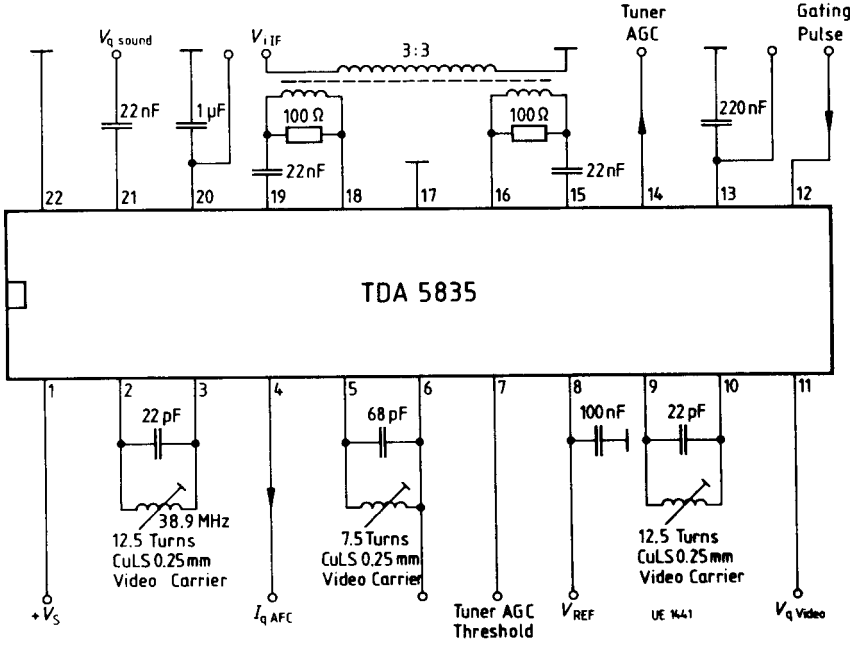
At a video carrier input level of $V_{15/16\ rms}$ = 10 mV and a superimposed AGC voltage of V_{13} = 3 V, the demodulator tank circuit is preliminarily aligned so that the demodulated video signal $V_{11\ pp}$ reaches its maximum output level at the positive video output. Any suitable video test signal 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.

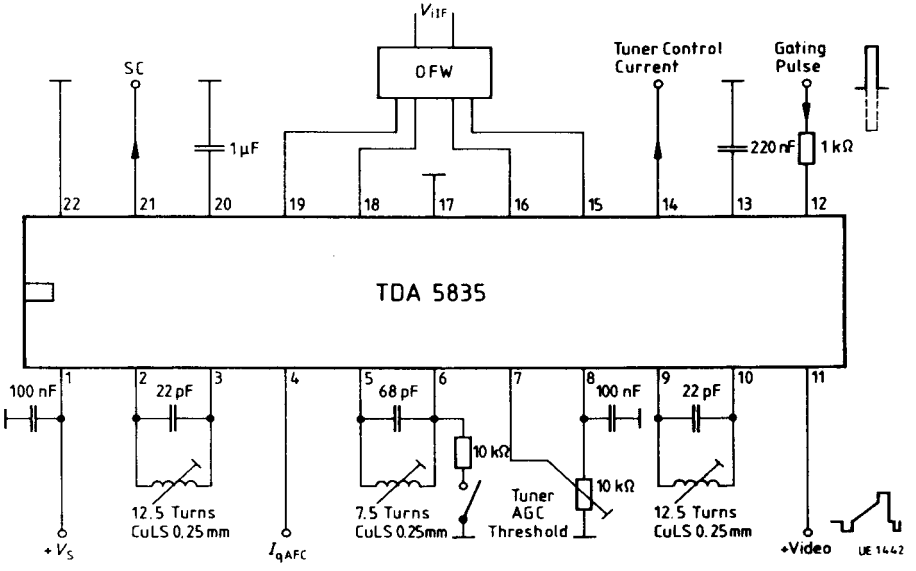
b) QPS

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.

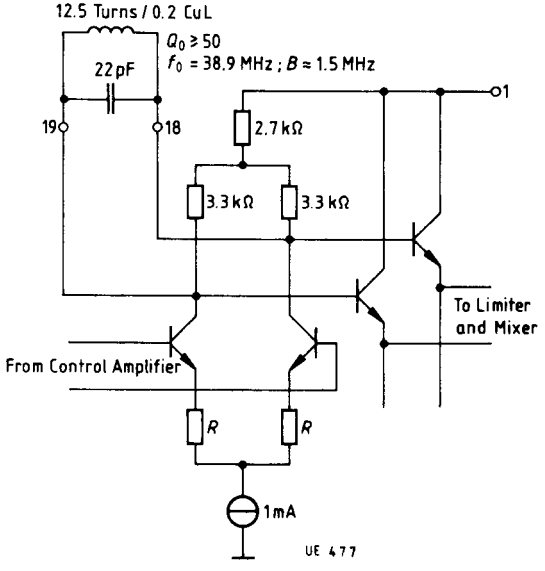
Measurement Circuit



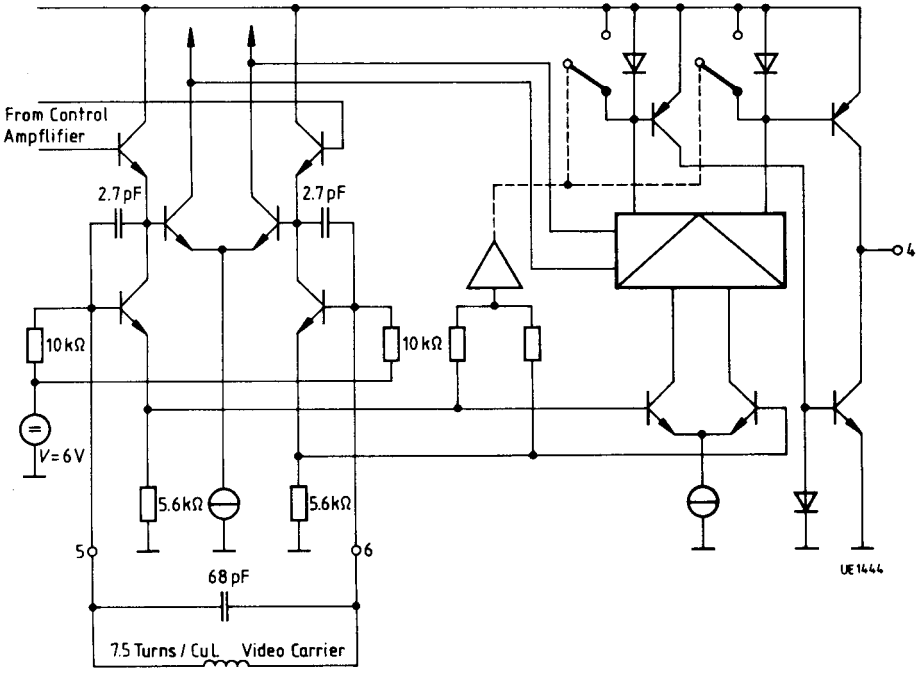
Application Circuit



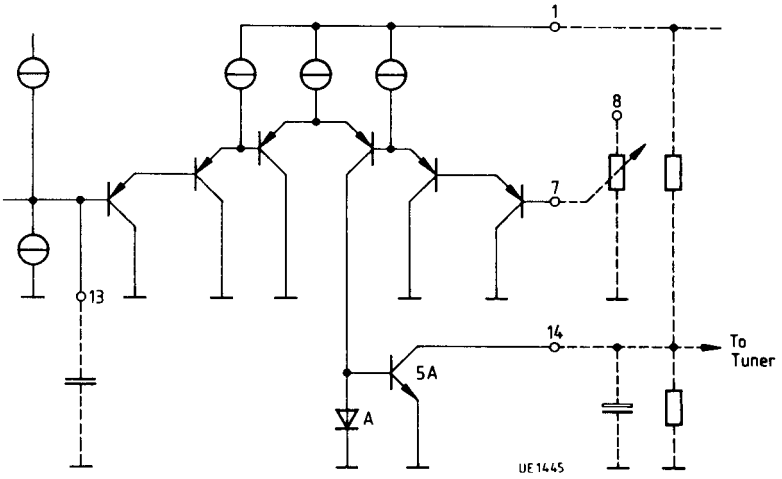
Demodulator Tank Circuit of QPS Unit



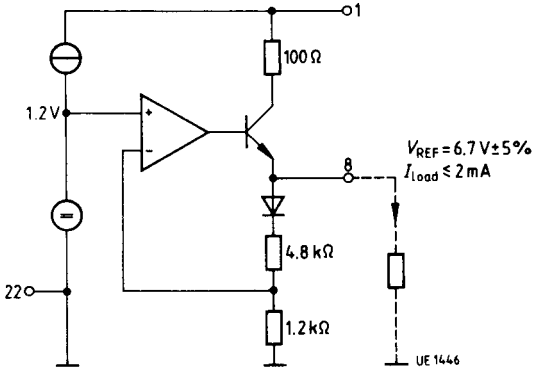
Demodulator Tank Circuit of AFC Unit



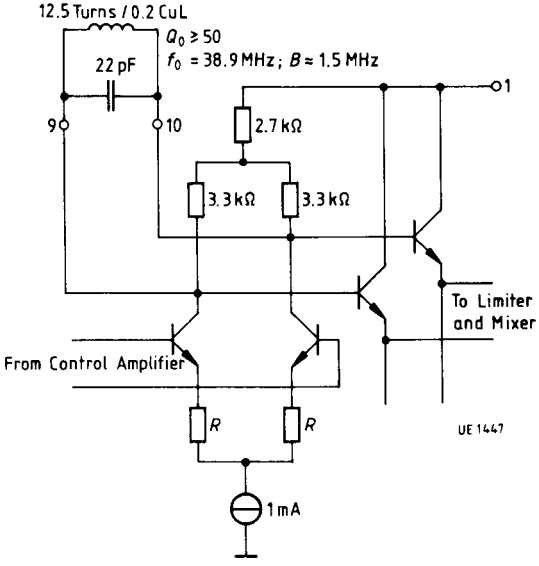
Tuner AGC Threshold and Output



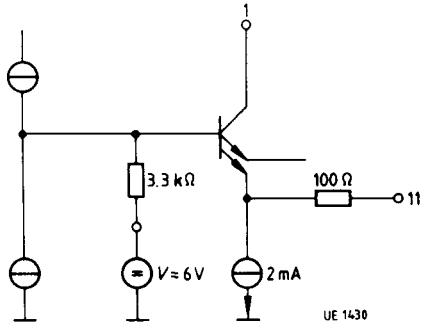
Reference Voltage



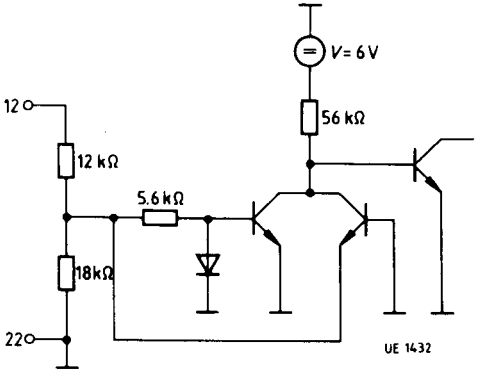
Demodulator Tank Circuit of Video IF Unit



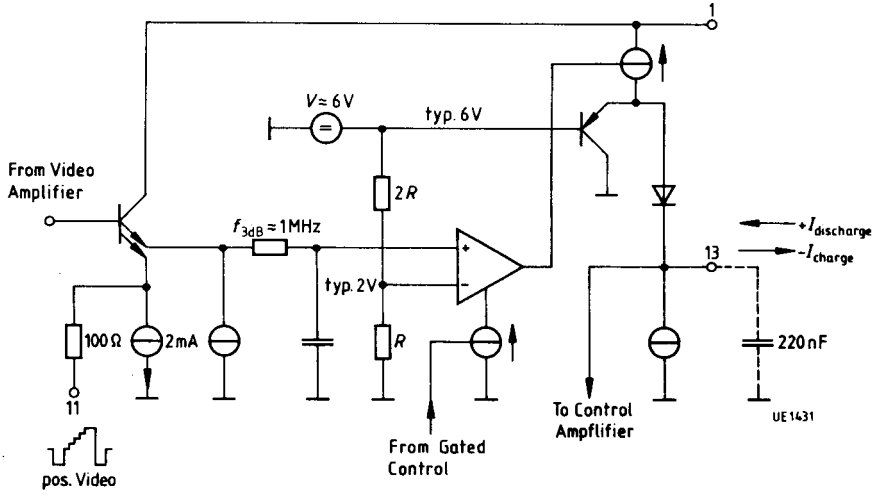
Positive Video Output



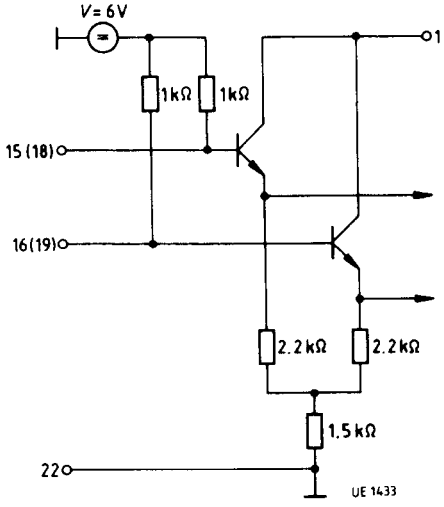
Gating Pulse Input



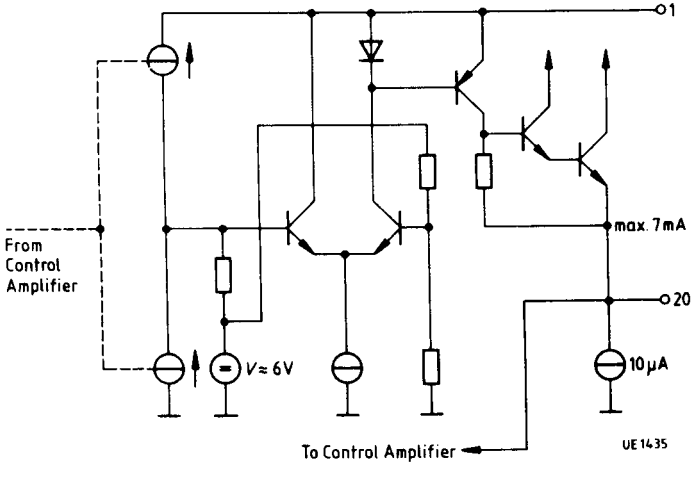
AGC Time Constant of Video IF Unit



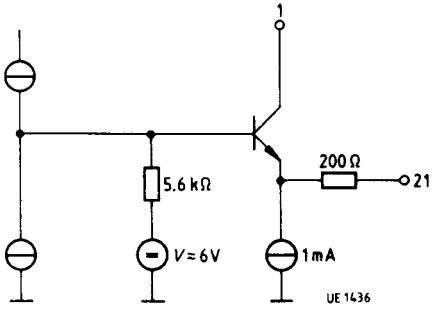
IF Input of Video IF
IF Input of QPS



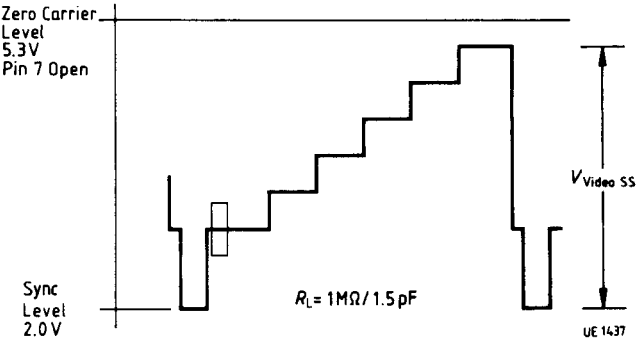
AGC Time Constant of QPS Unit



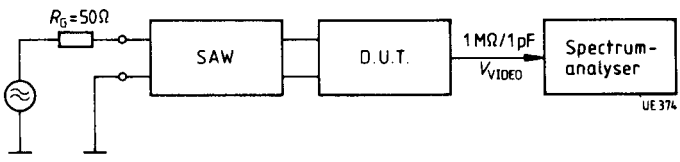
Sound Carrier Output of QPS Unit



Pos. Video Output

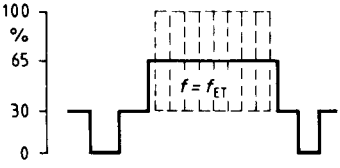


Measurement Configuration

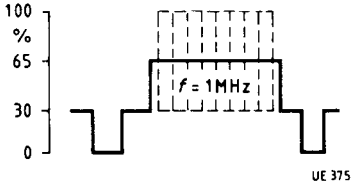


Test signal: f_{VC} = 38.9 MHz with test signal modulated with 10% residual carrier; sound carrier –13 dB (transmitter side)

Intermodulation



Reference



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

The 50% IRE signal with ± 50% IRE color carrier corresponds to Cyan with 75% color saturation.