

## Multistandard AM FM Sound IF IC

TDA 2460-2

### Preliminary Data

Bipolar IC

Controlled AM IF amplifier including a quasi-synchronous demodulator and integral mean value control for French sound IF, limiter amplifier with FM demodulator, AF part with SCART input and output, volume control and AF output.

### Features

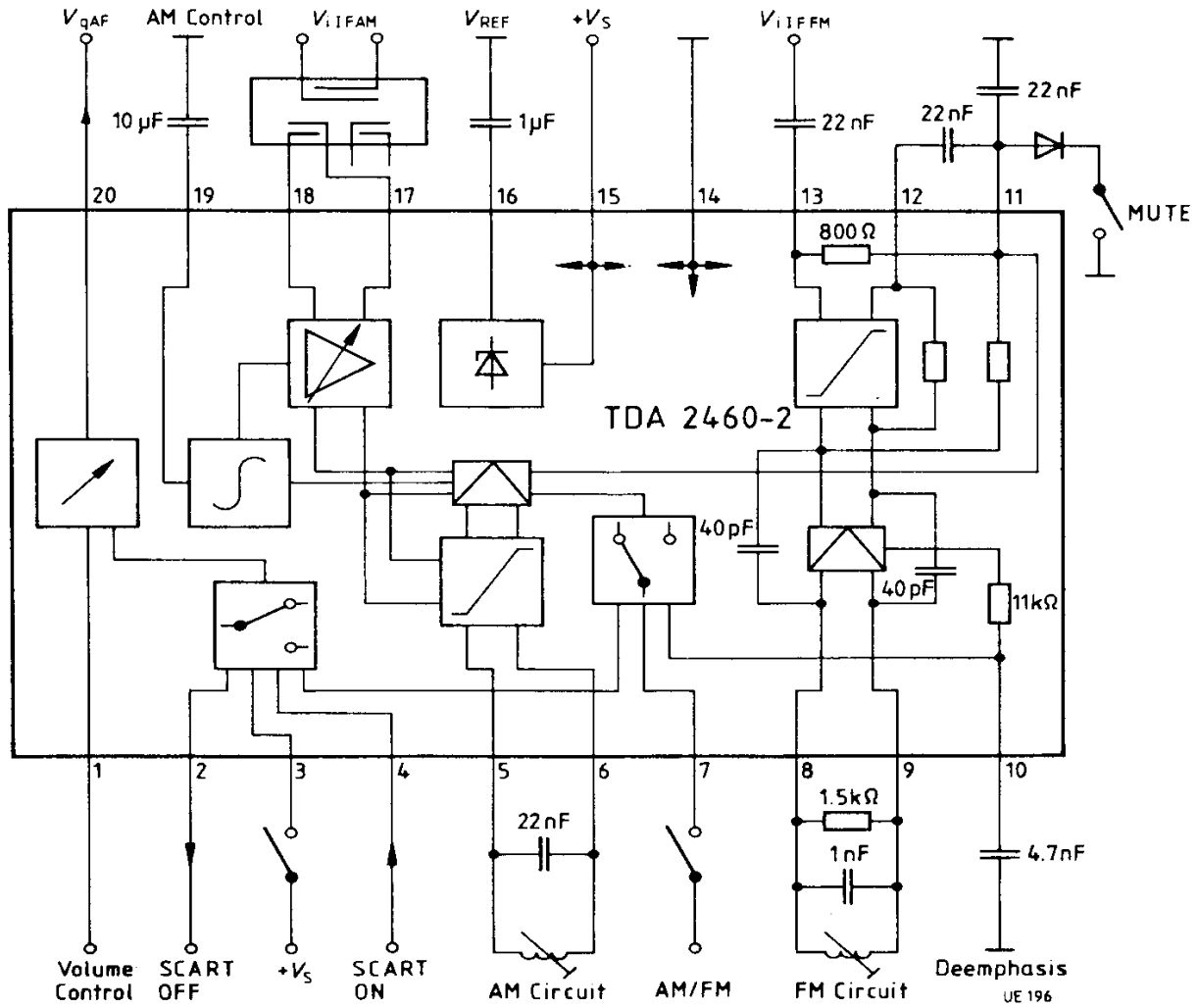
- Switch-over mode to CCIR standard for B/G and L systems
- Integral control for AF sound
- Standardized SCART interface
- High AM and FM sensitivity
- Low distortion factor

Type	Ordering Code	Package
TDA 2460-2	Q67000-A8200	P-DIP-20

### Circuit Description

The component contains a four-stage, capacitatively coupled control amplifier, a quasi-synchronous demodulator, an integral mean value control voltage generator and an AF pre-amplifier according to the French sound IF standard. The FM section contains an eight-stage symmetrical limiter amplifier with a coincidence modulator and an AF pre-amplifier with connection for the deemphasis capacitor. The two AF sources are routed to the volume control via an analog switch of the SCART socket and a record/playback switch.

Block Diagram



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**Pin Definitions and Functions**

Pin No.	Function
1	Volume control adjustment voltage for AF output
2	SCART AF output
3	SCART recording/playback switch
4	SCART AF input
5	Demodulator circuit AM
6	Demodulator circuit AM
7	AM/FM bidirectional switch
8	Demodulator circuit FM
9	Demodulator circuit FM
10	Deemphasis FM
11	Operation point feedback input FM and muting
12	Operation point feedback FM
13	AF input FM
14	GND
15	Supply voltage
16	Reference voltage
17	IF input AM
18	IF input AM
19	Control time constant AM amplifier
20	AF output

**Maximum Ratings**

Parameter	Symbol	Limit Values	Unit
Supply voltage	$V_S$	16	V
Control voltage	$V_{19}$	4	V
Reference current	$I_{REF}$	2	mA
DC voltages	$V_{3, 4, 7, 10}$	$V_S$	V
	$V_{17, 18, 1}$	$V_S$	V
	$V_{11, 12, 13}$	$V_{REF}$	V
	$V_{5, 6}$	$V_{REF}$ to $V_S$	V
DC currents	$I_{2, 20}$	- 1 to 2	mA
	$I_{8, 9}$	2	mA
IF input voltage AM $m = 80\%$	$V_{I 17/18 \text{ rms}}$	300	mV
IF input voltage FM	$V_{I 13 \text{ rms}}$	600	mV
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	- 55 to 125	°C
Thermal resistance (system-air)	$R_{th SA}$	58	K/W

**Operating Range**

Supply voltage	$V_S$	10.5 to 15.75	V
Frequency range AM	$f_{AM}$	15 to 45	MHz
Frequency range FM	$f_{FM}$	0.1 to 12	MHz
Ambient temperature	$T_A$	0 to 70	°C

**Characteristics** $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}$ 

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Current consumption	$I_S$	48	61	75	mA
Supply voltage	$V_{15}$	10.5		15.5	V

**AM Section** $f_{\text{IF}} = 39.2\text{ MHz}; f_{\text{mod}} = 1\text{ kHz}$ 

Input voltage for AGC threshold $m = 80\%$ ; $V_2$ (at $V_{17/18} = 1\text{ mV}$ ) $- 3\text{ dB}$	$V_{17/18}$		40	80	$\mu\text{V}$
AGC range $m = 80\%$ ; $V_2$ (at $V_{17/18} = 1\text{ mV}$ ) $\pm 3\text{ dB}$	$\Delta G$	60	66		dB
Output voltage (SCART) $V_{\text{IF}} = 1\text{ mV}; m = 80\%$	$V_{Q2\text{ rms}}$	700	800	900	mV
Controlled AF output voltage $V_1 = 0.8 V_{\text{REF}}; V_{\text{IF}} = 1\text{ mV};$ $m = 80\%$	$V_{Q20\text{ rms}}$	650	800	950	mV
DC voltage $V_{\text{IF}} = 1\text{ mV}; m = 0$	$V_{Q2}$	3.5	4.0	4.5	V
	$V_{Q20}$	5	6	7	V
Total harmonic distortion $V_{\text{IF}} = 1\text{ mV}; V_1 = 0.8 V_{\text{REF}};$ $m = 30\%$  $m = 80\%$	$THD_2$		0.3	1	%
	$THD_{20}$		0.3	1	%
	$THD_2$		1	2.5	%
	$THD_{20}$		1	2.5	%

**Characteristics (cont,d)** $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}$ 

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	

**FM Section** $f_{\text{IF}} = 5.5\text{ MHz}; f_{\text{mod}} = 1\text{ kHz}$ 

Input voltage for limiter threshold ( $V_{Q2} = -3\text{ dB}$ ) $\Delta f = \pm 50\text{ kHz}$	$V_{I13\text{ rms}}$		40	80	$\mu\text{V}$
Output voltage (SCART) $\Delta f = \pm 50\text{ kHz}; V_{\text{IF}} = 10\text{ mV}$	$V_{Q2\text{ rms}}$	850	1200		mV
Controlled AF output voltage $V_1 = 0.8 V_{\text{REF}}$	$V_{Q20\text{ rms}}$	850	1200		mV
DC voltage portion $V_{\text{IF}} = 10\text{ mV}; \Delta f = 0; THD_{\text{min}}$	$V_{Q2}$	3.6	4.1	4.6	V
	$V_{Q20}$	5	6	7	V
Total harmonic distortion $\Delta f = \pm 12.5\text{ kHz}; V_{\text{IF}} = 10\text{ mV}$	$THD_2$		0.2	0.3	%
Total harmonic distortion controlled AF output $V_1 = 0.8 V_{\text{REF}}$	$THD_{20}$		0.2	0.3	%
AM suppression $V_{\text{IF}} = 500\text{ }\mu\text{V}; m = 30\%$	$\alpha_{\text{AM}}$	60	70		dB

**Characteristics** $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}$ 

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
<b>AF Section</b>					
AGC range for volume control $V_1 = 0\text{ V} \dots 0.8 V_{REF}$	$\Delta G$	80	85		dB
Gain SCART input/AF output $V_1 = 0.8 V_{REF}$	$V_{4-20}$	-1	0	1.5	dB
Input voltage SCART	$V_{114\text{ rms}}$	2			V
Switching voltage SCART					
Playback	$V_3$	8		$V_S$	V
Record	$V_3$	0		5	V
Switching voltage muting					
ON (AF off)	$V_{11}$	0		1	V
OFF	$V_{11}$	5		$V_S$	V
Switching voltage FM					
AM	$V_7$	0		0.8	V
	$V_7$	2.5		6	V

**Characteristics** $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}$ 

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	

**Design-Related Values**

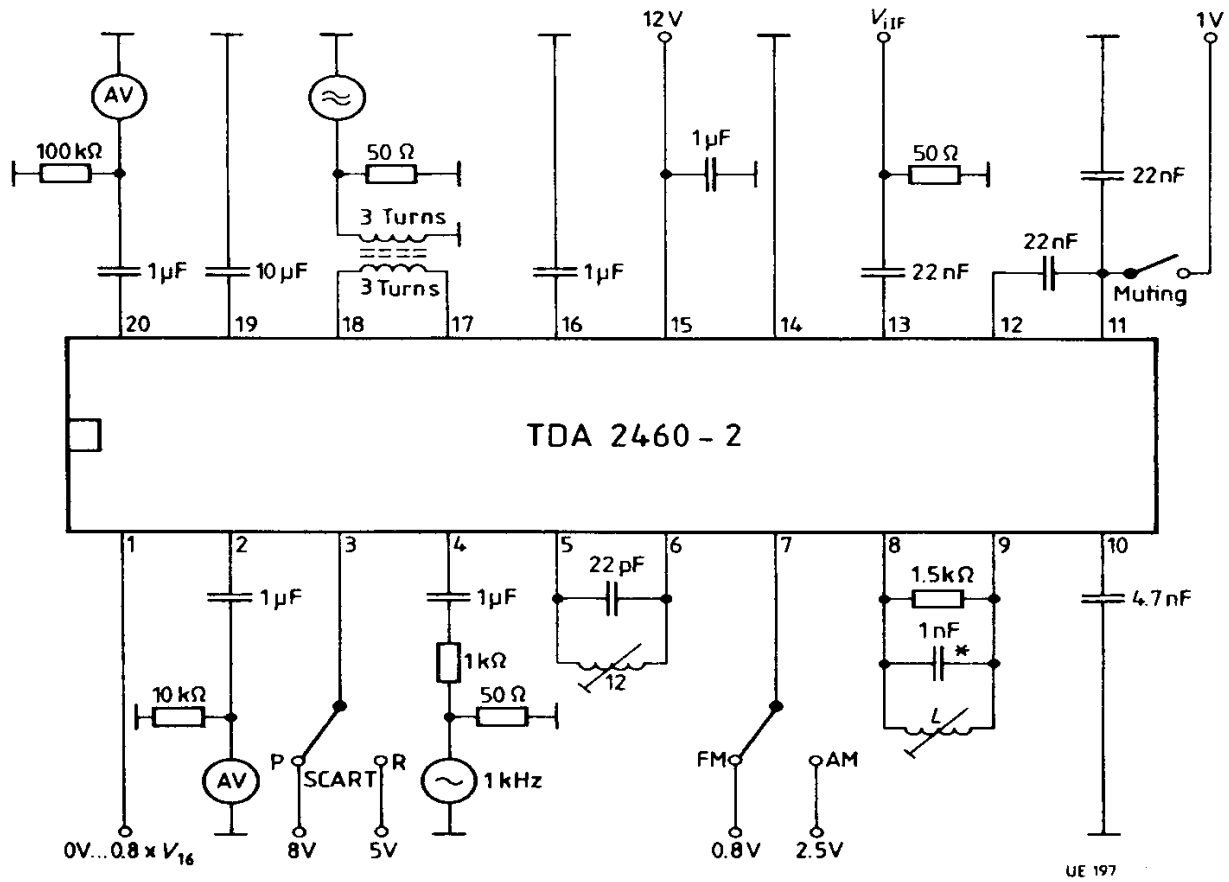
Input resistance	$R_{18,9}$	22			$\text{k}\Omega$
Output resistance	$R_{Q2,20}$			200	$\Omega$
Input impedance	$Z_{11,13}$		800		$\Omega$
Frequency deviation $AM_{\min} / THD_{\min}$ $f_{FM}$ section			$\pm 10$		$\text{kHz}$
Input resistance	$R_{17/18}$		1.8		$\text{k}\Omega$
Output resistance	$R_{5/6}$		6.6		$\text{k}\Omega$
Input resistance	$R_4$	20			$\text{k}\Omega$
Input current	$I_1$			15	$\mu\text{A}$
Cross-talk rejection $V_3 = 5\text{ V}; V_{4\text{ rms}} = 2\text{ V}$	$\alpha_{4-20}$	60			$\text{dB}$
Control current ratio for high speed load circuit/integral	$\Delta I_{19}$		140		

**Switching Currents**

SCART record	$I_{3L}$	-1		0	$\mu\text{A}$
SCART playback $V_3 = 8\text{ V}$	$I_{3H}$	30		150	$\mu\text{A}$
MUTE OFF	$I_{11H}$	-1		0	$\mu\text{A}$
MUTE ON	$I_{11L}$	3		50	
AF/FM switch FM	$I_{7L}$	-1		0	$\mu\text{A}$
AM ( $V_7 = 5\text{ V}$ )	$I_{7H}$	80		250	



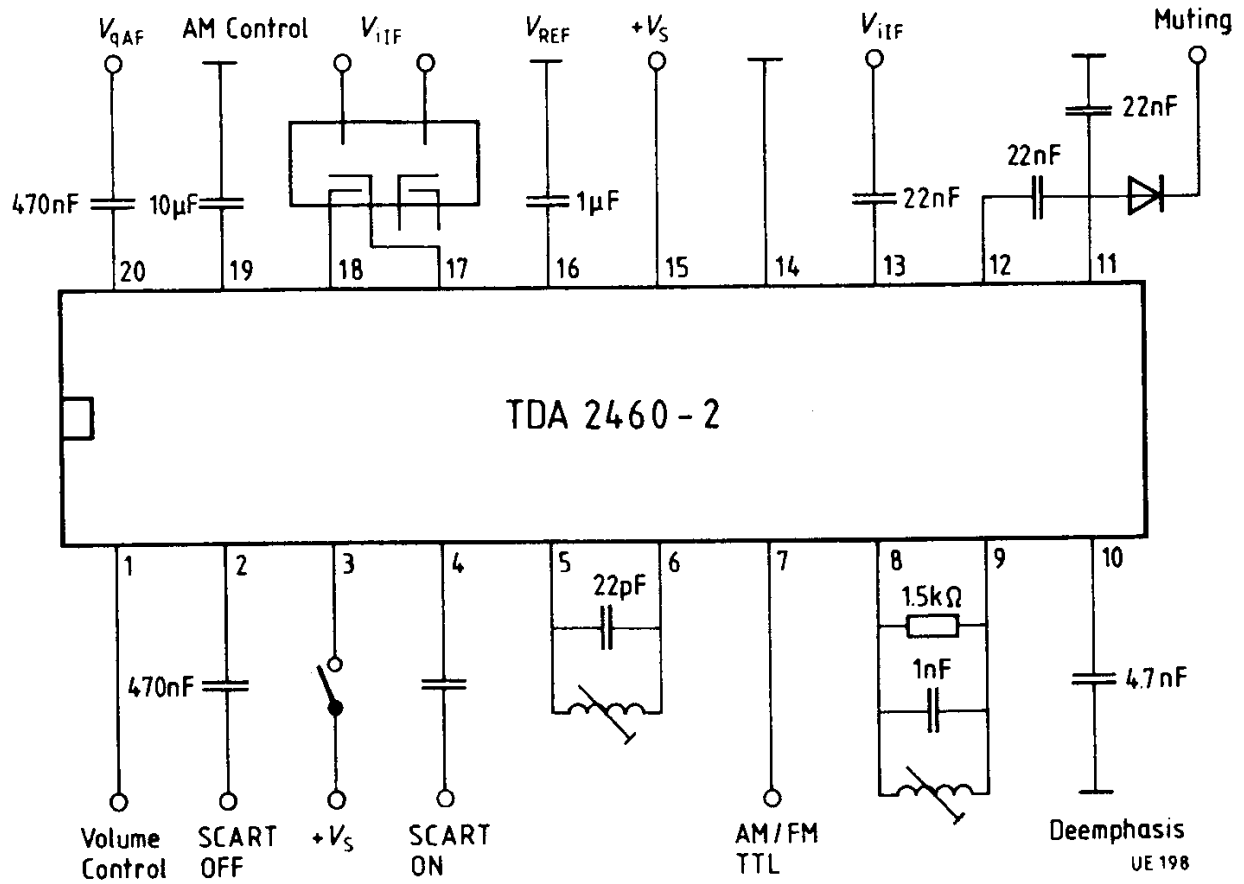
Test and Measurement Circuit



$L = 10$  Turns  $0.2$  CuL;  $Q_B$  approx.  $25$   
 e.g. Coil Assembly Vogt 517120000

\* STYROFLEX Capacitor  
 AV = Audio Voltmeter

Application Circuit



### Simplified External Circuitry for the TDA 2460 Demodulator Circuit

The TDA 2460 AM (double side-band) demodulator circuit allows simplified external circuitry.

The new sound demodulator circuit, developed for application in television L standard and multistandard sets, provides the user with the following advantages:

**Cost savings** by not requiring the carrier select circuit (L, C) and the necessary tuning (time).

The circuit that is part of the carrier generation circuit becomes unnecessary because of the excellent capture ratio features of the limiter.

**Capture ratio** defines the ability of a limiter amplifier to distinguish a useable signal from an interference signal with a lower amplitude.

In this specific section, the modulation side-bands represent the interference signal and the carrier the useable signal (desired switching carrier).

Even with a 100% modulation (France 80%) the distance from the side-bands to the carrier is 6 dB.

The system guarantees secure function. This is also shown by measurements with respect to:

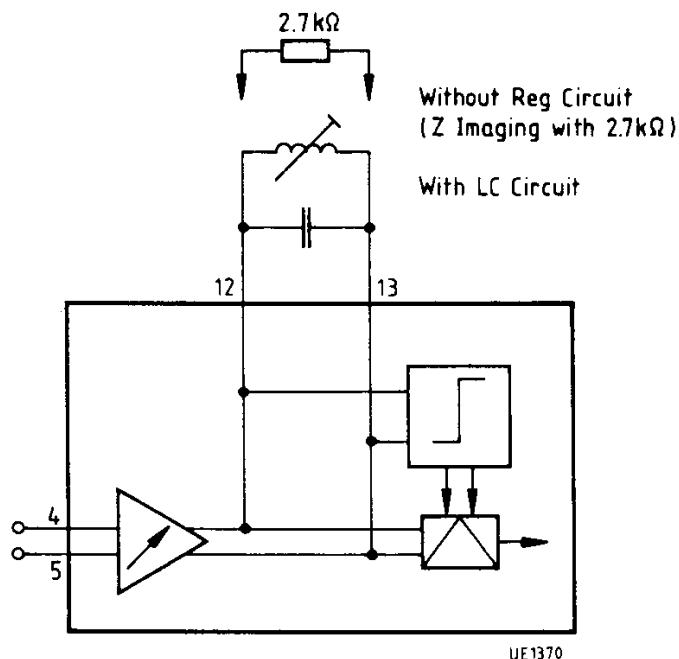
harmonic distortion

noise

signal/noise ratio

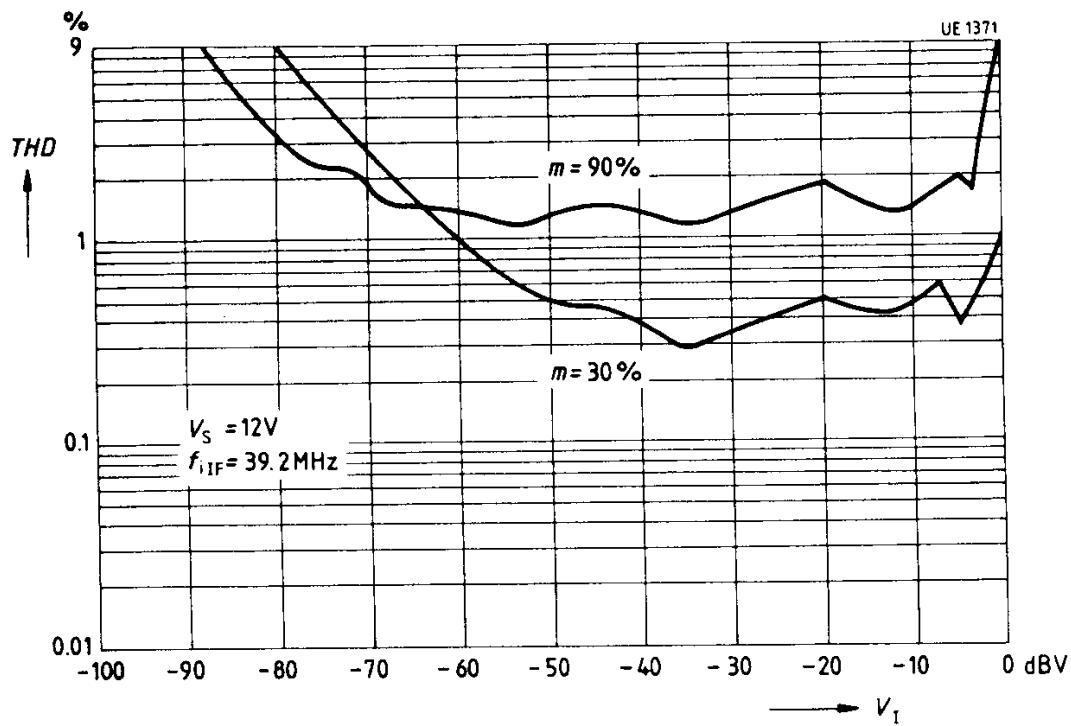
in a comparison with/without regenerative circuit. Only the control threshold shifts by 2 dB.

### AM Demodulator Circuit



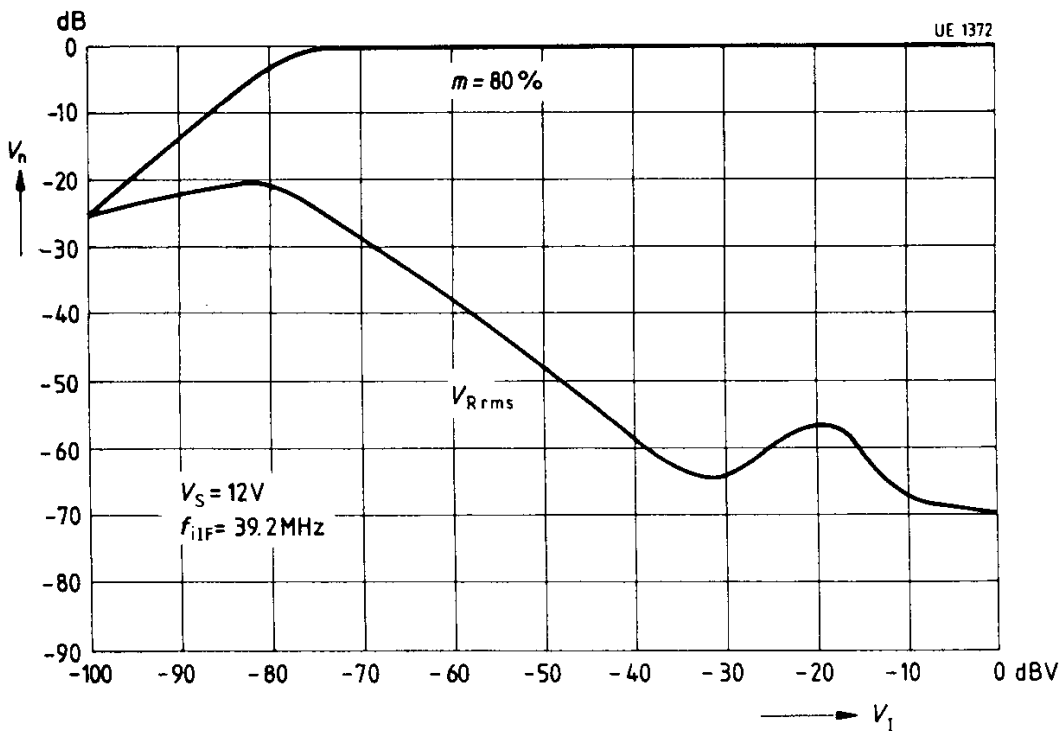
Circuit with LC Circuit

Total harmonic Distortion versus Input voltage  
Standard Circuit



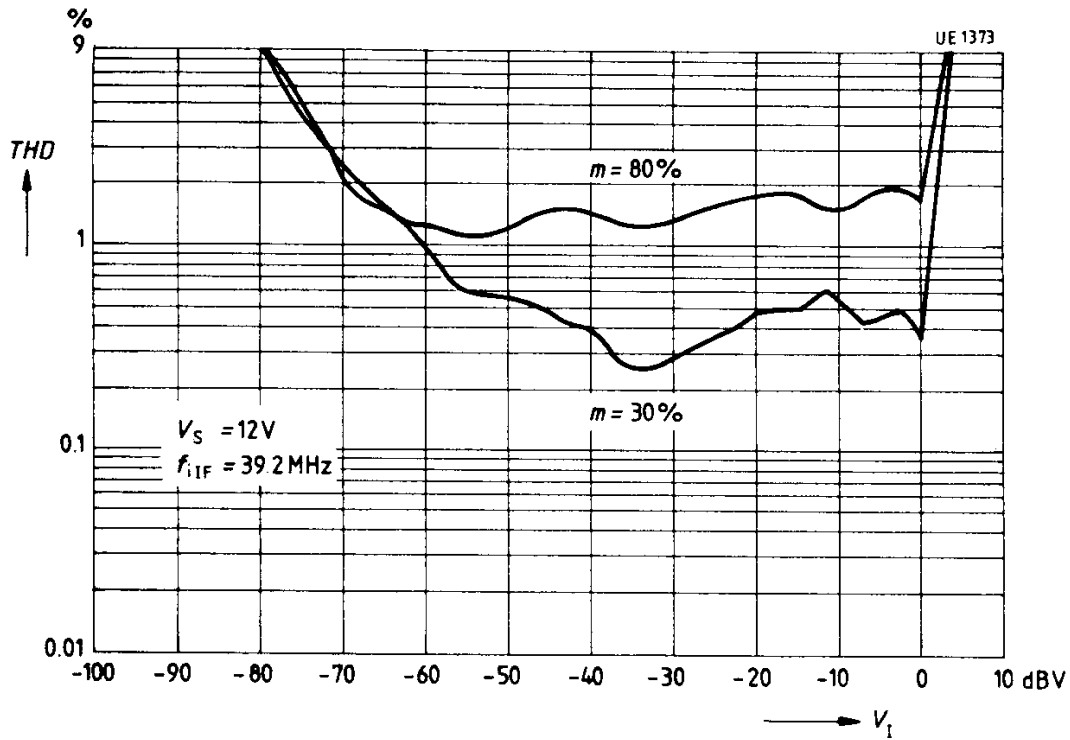
Sensitivity

Noise voltage versus input voltage  
Standard circuit



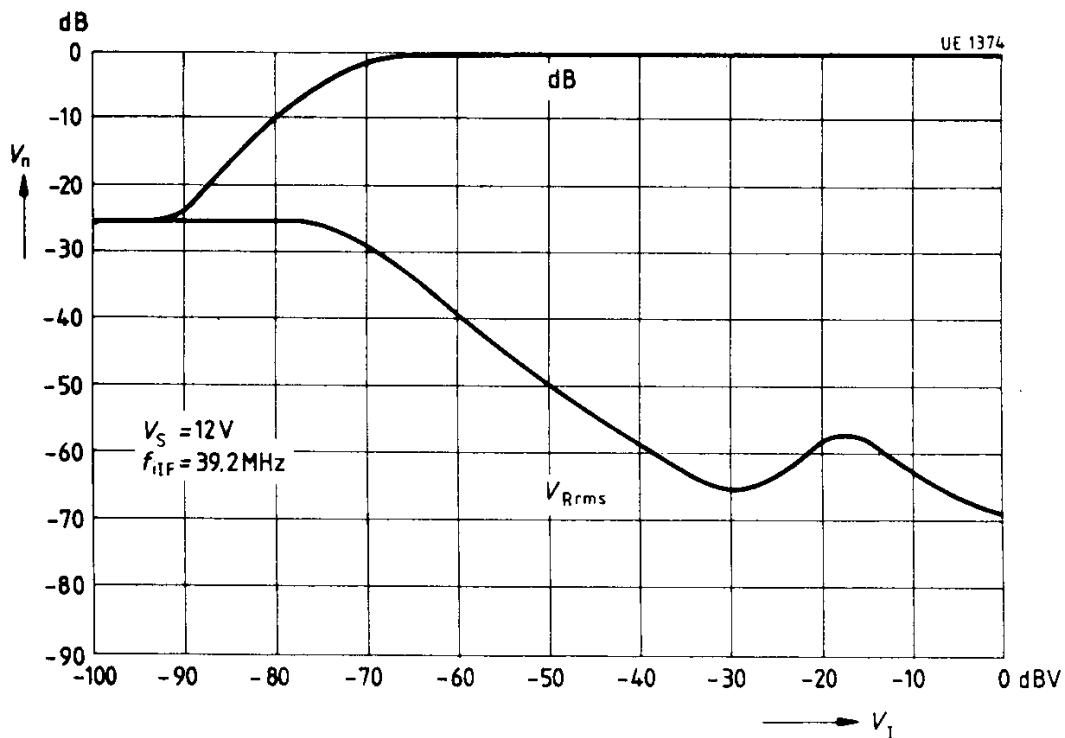
Circuit with  $R = 2.7 \text{ k}\Omega$

Total harmonic distortion versus input voltage  
Standard circuit



Sensitivity

Noise voltage versus input voltage  
Standard circuit



Circuit with  $R = 2.7 \text{ k}\Omega$

Total harmonic distortion versus input voltage

