

The TDA 4001 has been designed to convert, amplify, and demodulate AM signals. In addition, the component provides a search tuning stop pulse.

### Features

- Internal demodulation
- Search tuning stop signal
- Low total harmonic distortion
- Minimal IF leakage at the AF output
- 2-stage integrated low pass filter

### Maximum ratings

Supply voltage	$V_S$	15	V
Junction temperature	$T_J$	150	°C
Storage temperature range	$T_{stg}$	-40 to 125	°C
Thermal resistance (system-air)	$R_{th SA}$	70	K/W

### Operating range

Supply voltage	$V_S$	7 to 15	V
Ambient temperature	$T_A$	-25 to 85	°C

**Characteristics**

$V_S = 12 \text{ V}$ ;  $T_A = 25 \text{ }^\circ\text{C}$ ;  $V_{iRF\text{ rms}} = 1 \text{ mV}$ ;  $R_g = 50 \text{ }\Omega$ ;  $f_{iRF} = 1 \text{ MHz}$ ;  
referred to measurement circuit

	min	typ	max	
Current consumption		15		$I_S$ mA
AF output voltage	$m = 0.8 \%$	800		$V_{qAF\text{ rms}}$ mV
	$m = 0.3 \%$	300		$V_{qAF\text{ rms}}$ mV
	$V_{iRF\text{ rms}} = 15 \text{ }\mu\text{V}$ ; $m = 0.8 \%$	150	320	$V_{qAF\text{ rms}}$ mV
$20 \lg \left( \frac{V_1}{V_2} \right)$	$V_1 = V_{qAF}$ at 30 mV		3	dB
	$V_2 = V_{qAF}$ at 1 mV			
Total harmonic distortion	$m = 0.8 \%$		2	%
	$m = 0.3 \%$		1	%
	$V_{iRF\text{ rms}} = 30 \text{ mV}$ ; $m = 0.8 \%$		5	%
Signal-to-noise ratio				
$m = 0.3$ ; $V_{iRF\text{ rms}} = 10 \text{ }\mu\text{V}$		6		dB
$m = 0.3$ ; $V_{iRF\text{ rms}} = 1 \text{ mV}$		46		dB
Reference voltage		4.8		V
Oscillator voltage		100		mV
Counter output voltage		100		mV
Input impedance RF input		10/1.5		$k\Omega/pF$
IF amplifier		3.3/1.5		$k\Omega/pF$
AFC offset current without signal			$\pm 10$	$\mu\text{A}$
AFC offset current in the whole control range			$\pm 10$	$\mu\text{A}$
AFC output current		$\pm 80$		$\mu\text{A}$
$f_{iRF} = 1 \text{ MHz} \pm 3 \text{ kHz}$				
Search tuning stop output current		2		mA
Search tuning stop output voltage			0.4	V
Search tuning stop output voltage				
$V_{iRF} = 0 \text{ V}$	11			V
$f_{iRF} > 1 \text{ MHz} + 3 \text{ kHz}$	11			V
$f_{iRF} < 1 \text{ MHz} - 3 \text{ kHz}$	11			V

**Additional data with respect to application<sup>1)</sup>**

IF suppression	$a_{iF}$	40	dB
3 dB limit frequency of the integrated TP	$f_G$	5	kHz
Conversion gain	$G_C$	30	dB
AGC IF amplifier	$V_{iIF\text{ rms}}$	100	$\mu\text{V}$
Control range ( $\Delta V_{qAF} = 6 \text{ dB}$ )	$a$	60	dB
Input sensitivity	$V_{iRF\text{ rms}}$	30	$\mu\text{V}$
$V_{qAF}$ at $V_{iRF} \geq 0.7$ ; $V_{qAF}$ at $V_{iRF} = 1 \text{ mV}$			

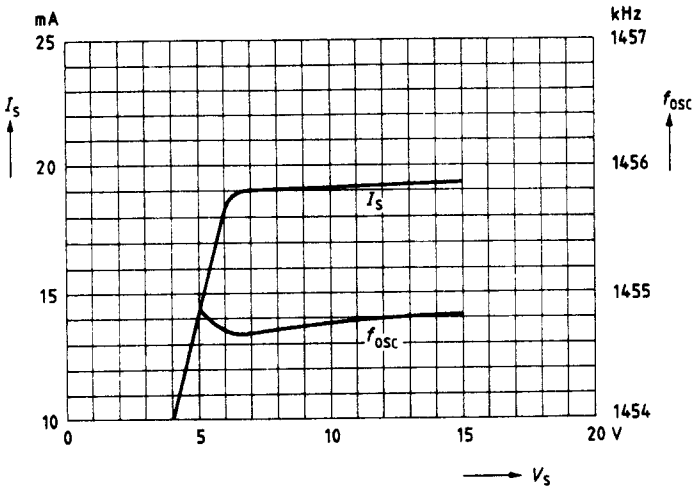
**Circuit description**

The impedance converter forwards the input signal  $V_{iRF}$  to the symmetrical double balanced mixer. Subsequently the signal is converted to IF with the amplitude-controlled oscillator. An external filter forwards the IF signal to the controlled IF amplifier. The amplifier IF signal and the carrier signal will be converted to AF in the subsequent synchronous demodulator (SD). The 2-stage low pass filter forwards the available AF to the AF output. Via an additional limiter amplifier (LA), the AF uses the carrier signal to control the coincidence demodulator (CD). The output signal of the coincidence demodulator provides the stop pulse during exact tuning and sufficient field strength.

1) Data does not apply to series measurement processes.

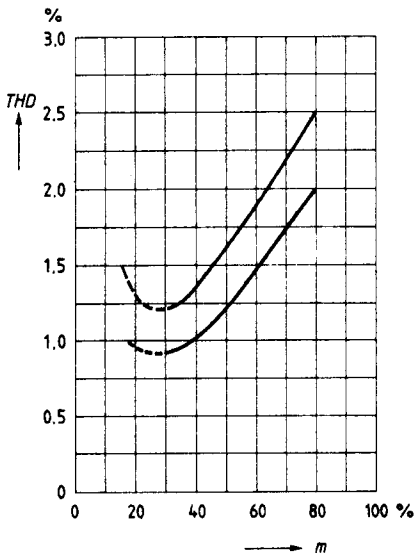


Oscillator frequency versus current consumption

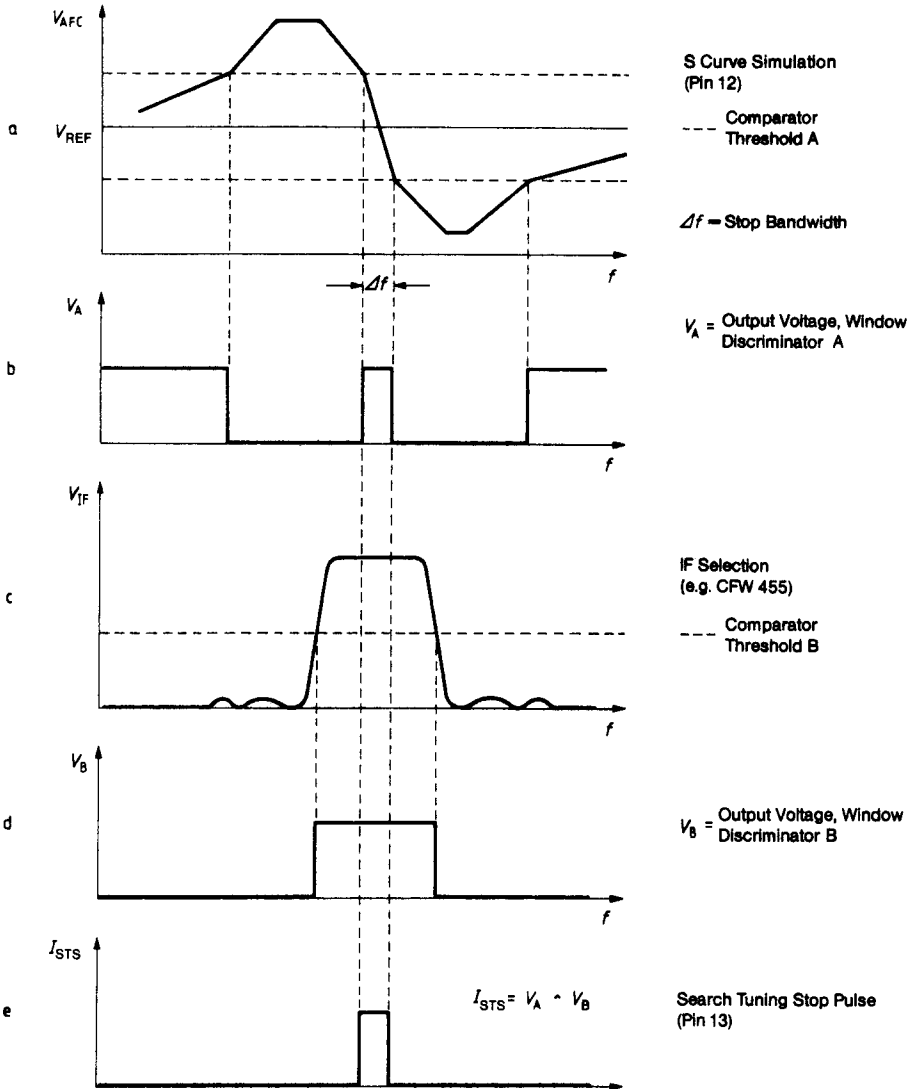


Total harmonic distortion versus modulation factor

$V_S = 15$  V;  $f_{mod} = 1$  kHz;  $V_i = 1$  mV



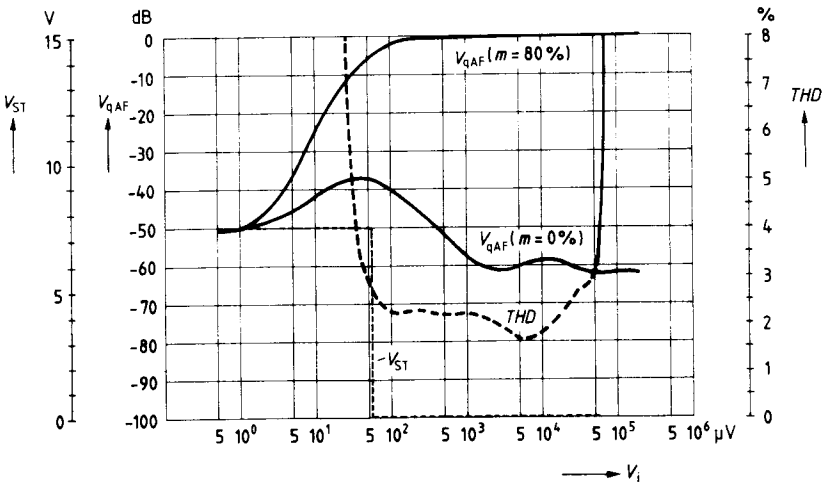
**Derivation of the AM-SL stop criterion**



**AF output voltage, total harmonic distortion, search tuning stop versus input voltage**

$V_S = 15\text{ V}$ ,  $f_{\text{mod}} = 1\text{ kHz}$ ,  $f_i = 1\text{ MHz}$

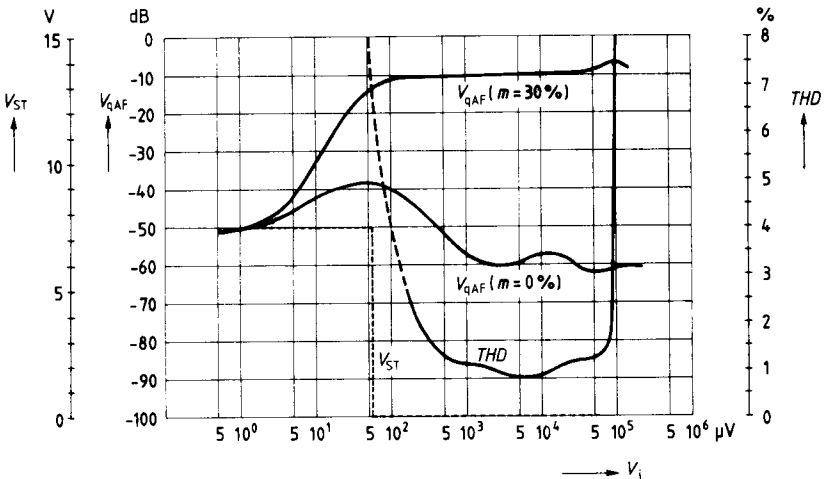
$0\text{dB} \hat{=} 775\text{ mV (rms)}$



**AF output voltage, total harmonic distortion, search tuning stop versus input voltage**

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$0\text{dB} \hat{=} 775\text{ mV (rms)}$





Plug-in location plan

Medium wave receiver with search tuning stop pulse

