SGS-THOMSON MICROELECTRONICS

TDA7359

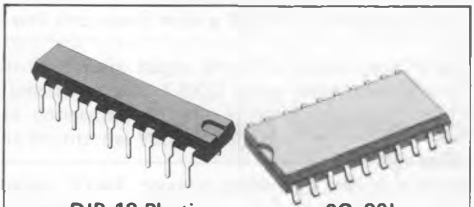
LOW VOLTAGE NBFM IF SYSTEM

- OPERATION FROM 1.8V TO 9V
- LOW DRAIN CURRENT (4mA, V_s = 4V)
- HIGH SENSITIVITY (-3dB INPUT LIMITiNG AT 3μV)
- 8μV INPUT FOR 20dB S/N
- AFC OUTPUT
- LOW EXTERNAL FAIR COUNT

The TDA7359 is a low-power narrow band FM IF demodulation system operable to less than 2V supply voltage.

The device includes Oscillator, Mixer, Limiting Amplifier, Quadrature Discriminator, Op. Amp., Squelch, Scan Control and Mute Switch.

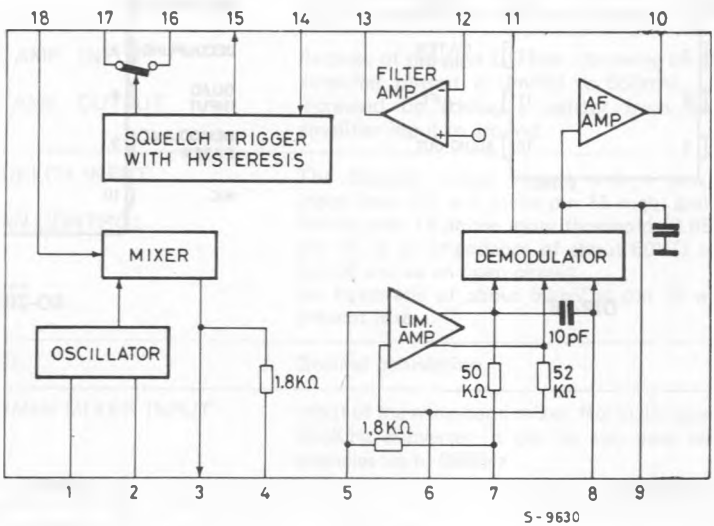
The TDA7359 is designed for use in NBFM dual conversion communication equipments using a 455KHz ceramic filter like cordless telephones, walkie-talkies, scan receivers, etc.



DIP-18 Plastic SO-20L

ORDERING NUMBERS: TDA7359 (DIP-18)
TDA7359D (SO-20L)

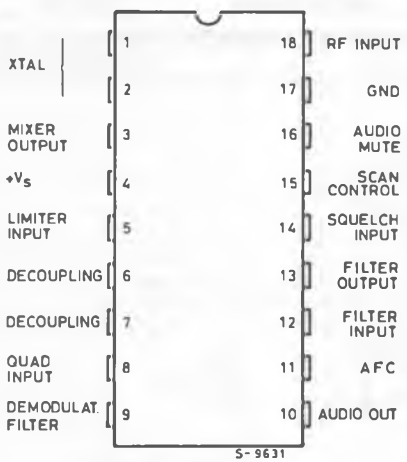
BLOCK DIAGRAM (PIN. NUMBERS are for DIP-18)



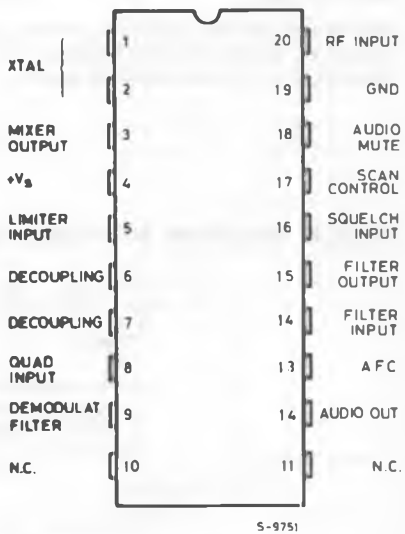
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	9	V
V_I	RF input voltage (pin 18)	1	V_{rms}
V_8	Detector input voltage	1	V_{pp}
V_{14}	Mute function voltage	-0.5 to 5	V
T_{op}	Operating ambient temperature	0 to 70	°C
T_j	Junction temperature	150	°C
T_{stg}	Storage temperature	-65 to 150	°C

CONNECTION DIAGRAMS
(Top view)



DIP-18



SO-20L

THERMAL DATA

			DIP-18	SO-20L
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	100°C/W	200°C/W

PIN FUNCTION (DIP-18)

N°	NAME	FUNCTION
1-2	XTAL OSCILLATOR	Connections for the Colpitts XTAL oscillator. The XTAL may be replaced by an inductor (see fig. 5) if the application does not require high stability.
3	MIXER OUT	The Mixer is double balanced to reduce spurious products. The output impedance is 1.8KΩ to match the input impedance of a 455KHz ceramic filter.
4	SUPPLY VOLTAGE	Must be well decoupled with a 100nF ceramic capacitor.
5	IF LIMITER INPUT	Input pin of the six stages amplifier with about 50μV limiting sensitivity and 1.8KΩ input impedance. The if output is connected to the external quadrature coil (pin 8) via an internal 10pF capacitor.
6-7	DECOUPLING	Good quality 100nF ceramic capacitors and a suitable layout are important.
8	QUADRATURE COIL	A quadrature detector is used to demodulate the 455KHz FM signal. The Q of the quad coil has direct effect on output level and distortion (see fig. 6). For proper operation the voltage should be $100mV_{rms}$.
10	AUDIO OUTPUT	The Audio signal after detection and deemphasis is buffered by an internal emitter follower.
11	AFC OUT	AFC output, with high gain and high output impedance. If not needed, it should be grounded or connected to pin 9 (to double the recovered audio).
12 13	OP AMP. INPUT OP AMP. OUTPUT	Because of the low DC bias, the swing on the operational amplifier output is limited to $550mV_{rms}$. This can be increased by adding a resistor from the operational amplifier input to ground.
14 15 16	SQUELCH INPUT SCAN CONTROL MUTE	The Squelch trigger circuit with a low bias on the input (pin 14) will force pin 15 high; and pin 16 Low. Pulling pin 14 above mute threshold (0.65V) will force pin 15 to an impedance of about 60KΩ to ground and pin 16 will be an open circuit. An hysteresis of about 50mV at pin 12 will effectively prevent jitter.
17	GND	Ground connection.
18	10.7MHz MIXER INPUT	Input of the wide-band mixer. Normally used as 10.7MHz/455KHz converter, it can be also used with input frequencies up to 60MHz.

ELECTRICAL CHARACTERISTICS (V_s = 4V; f_o = 10.7MHz; f = ± 3KHz; f_m = 1KHz; T_{amb} = 25°C; unless otherwise noted)

Parameter		Test Conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage range		1.8	4	9	V
I_s	Supply current	Squelch OFF Squelch ON		3.8 4.7		mA
V_i	Input quieting voltage	S/N = 20dB		8		μV
V_i	Input limiting voltage	-3dB limiting		3		μV
V_o	Recovered audio output	V_i = 10mV		150		mV_{rms}
V_{10}	Detector output voltage			1.5		V_{DC}
R_{10}	Detector output impedance			400		Ω
	Detector center frequency slope			150		mV/KHz
G_v	Operating amplifier gain	f = 10KHz $G_v = V_{13}/V_{12}$	40	55		dB
V_{13}	Operating amplifier output voltage			1.5		V_{DC}
I_B	Op. Amp. input bias current	Pin 10		20		nA
V_T	Trigger hysteresis			50		mV
R_m	Mute switching impedance	LOW		50		Ω
		HIGH		10		MΩ
V_{15}	Scan voltage	pin 14 HIGH (2V) pin 14 LOW (0V)	3.0	0 3.4	0.5	V_{DC}
G_c	Mixer converter gain			30		dB
R_i	Input resistance			3.3		KΩ
C_i	Input capacitance			2.2		pF

Fig. 2 - Test circuit

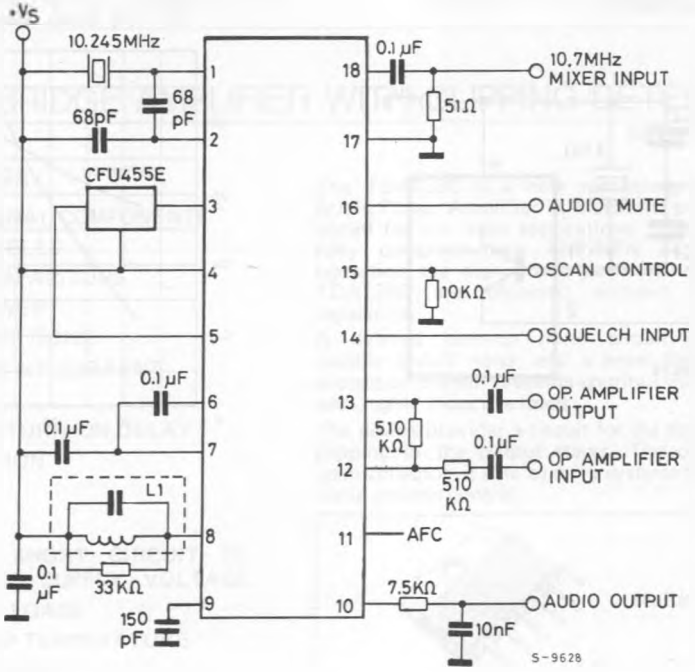


Fig. 3 - Supply current vs. supply voltage

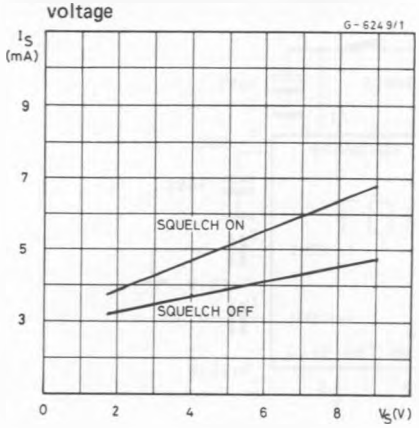


Fig. 4 - FM IF characteristics

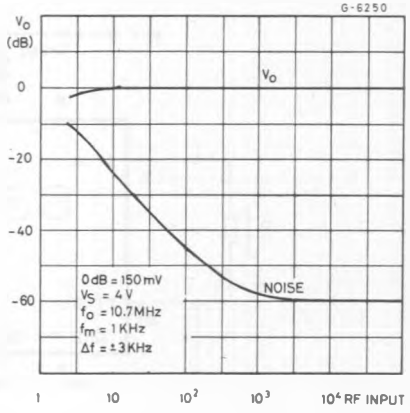


Fig. 5 - Colpitts XTAL oscillator

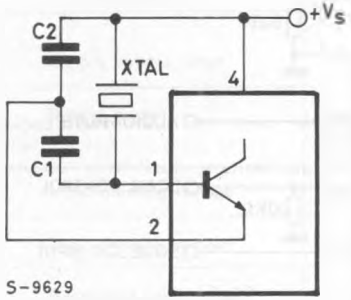


Fig. 6 - Effect of quadrature coil "Q" on audio level and distortion