Philips Semiconductors

Data sheet	
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TDA7088T
FM receiver circuit for battery supply

FEATURES

- Provided with all stages of a mono receiver from antenna to audio output
- Mute circuit
- Search tuning applicable with a single varicap diode
- Mechanical tuning with integrating AFC applicable
- AM application supported
- Power supply polarity protection
- Power supply voltage down to 1.8 V

GENERAL DESCRIPTION

The TDA7088T is a monolithic bipolar integrated circuit for mono portable and pocket radios, wherein a minimum of peripheral components (of small dimensions and low costs) are needed. The circuit is performed with a FLL system (frequency locked loop) and has an FM-IF of about 70 kHz. Selectivity is obtained by active RC-filters. Detuning referred to the IF and too weak input signals is suppressed by muting.

The circuit is applicable for mechanical as well as for electrical tuned radios. Whereas mechanical tuning is possible with or without integrating AFC circuit; electrical tuning is realized by one directional (band-up) search tuning facility, including RESET to the lower band limit.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_P	supply voltage (pin 4)	1.8	3	5	V
I_P	supply current	4.2	5.2	6.6	mA
f_{iRF}	radio input frequency range	0.5	-	110	MHz
$V_{I\ (rms)}$	input sensitivity for –3 dB limiting (RMS value, mute disable)	- -	 3	 6	 μV
	signal handling	100	200	-	mV
$V_{o\ (rms)}$	AF output signal (R_L = 22 kΩ)	-	85	-	mV
T_{amb}	operating ambient temperature	–10	-	+70	°C

ORDERING AND PACKAGE INFORMATION

EXTENDED TYPE NUMBER	PACKAGE			
	PINS	PIN POSITION	MATERIAL	CODE
TDA7088T	16	mini-pack	plastic	SOT109A

FM receiver circuit for battery supply TDA7088T

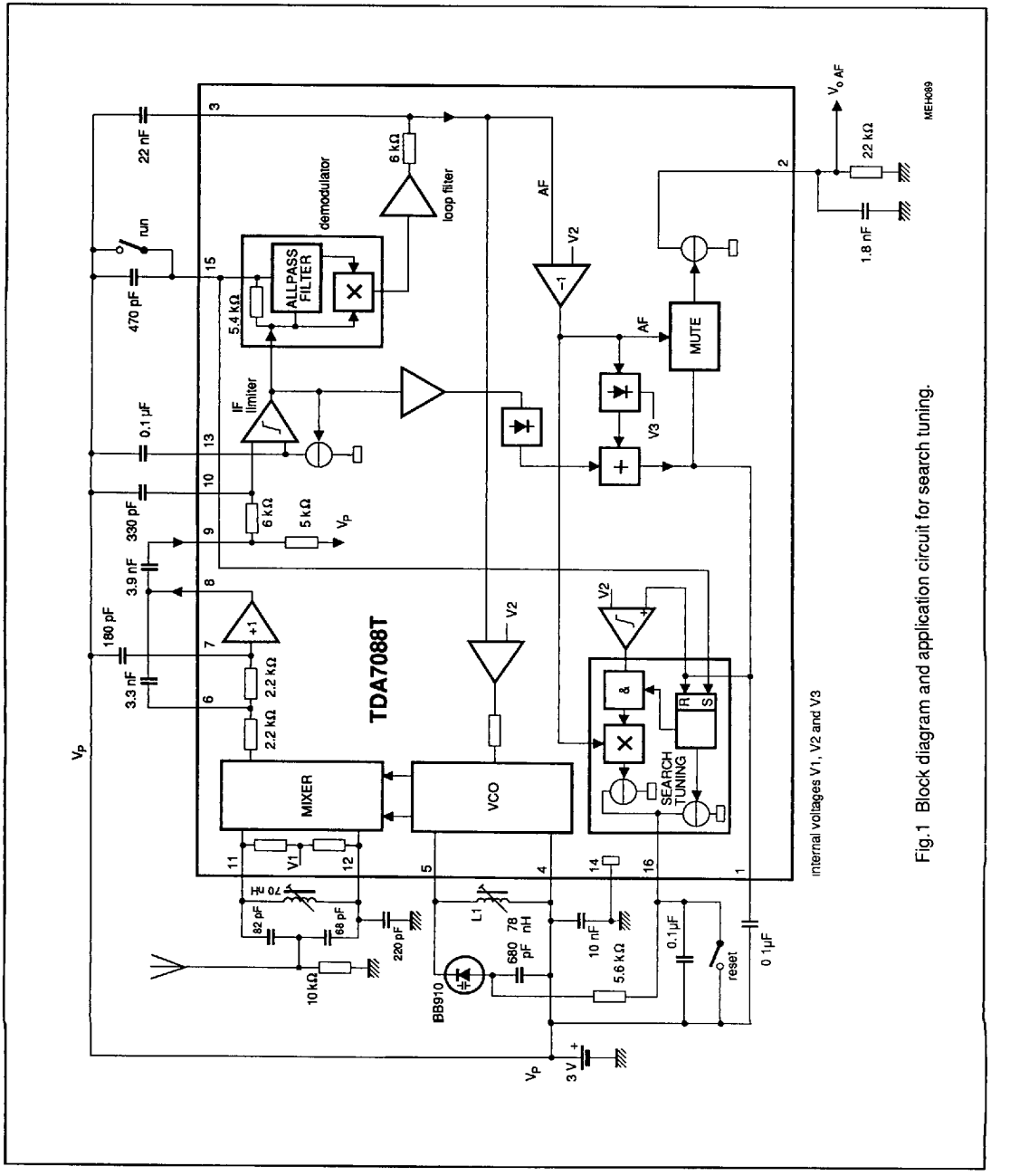

Fig.1 Block diagram and application circuit for search tuning.

FM receiver circuit for battery supply

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PINNING

SYMBOL	PIN	DESCRIPTION
MUTE	1	mute output
V_{oAF}	2	audio frequency output signal
LOOP	3	AF loop filter
V_P	4	+3 V supply voltage
OSC	5	oscillator resonant circuit
IFFB	6	IF feedback
C_{LP1}	7	low-pass capacitor of 1 dB amplifier
V_{oIF}	8	IF output to external coupling capacitor (high-pass)
V_{iIF}	9	IF input to limiter amplifier
C_{LP2}	10	low-pass capacitor of IF limitter amplifier
V_{iRF}	11	radio frequency input
V_{iRF}	12	radio frequency input
C_{LIM}	13	limiter offset voltage capacitor
GND	14	ground (0 V)
C_{AP}	15	all-pass filter capacitor / input for search tuning
TUNE	16	electrical tuning respectively AFC output

PIN CONFIGURATION

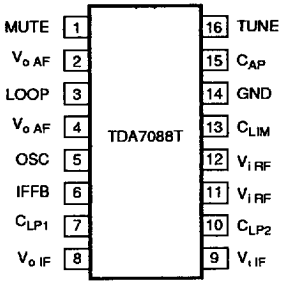


Fig.2 Pin configuration.

LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_P	supply voltage (pin 4)	0	5	V
T_{stg}	storage temperature range	–55	150	°C
T_{amb}	operating ambient temperature range	–10	+70	°C
V_{ESD}	electrostatic handling*		-	

* There is no special ESD protection circuit built in; ESD data on request.

DC CHARACTERISTICS

V_P = 3 V and T_{amb} = 25 °C, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_P	supply voltage range (pin 4)		1.8	3	5	V
I_P	supply current		4.2	5.2	6.6	mA
V_1	DC voltage		2.50	2.55	2.60	V
V_3	DC voltage		2.64	2.69	2.74	V
$V_{6,7}$	DC voltage		2.38	2.44	2.50	V
V_8	DC voltage		1.60	1.67	1.74	V
$V_{9,10,13}$	DC voltage		2.42	2.47	2.52	V
$V_{11,12}$	DC voltage		0.91	0.94	0.98	V
V_{15}	DC voltage		2.06	2.12	2.18	V
V_{16}	DC voltage		t.b.n.	-	-	V
I_2	AF output current		45	60	80	µA
I_5	oscillator current		275	375	500	µA

AC CHARACTERISTICS

V_P = 3 V; T_{amb} = 25 °C ; f_{iRF} = 96 MHz modulated with f_{mod} = 1 kHz and ±22.5 kHz deviation; EMF = 400 µV (R_S = 75 Ω) and measurements taken in Fig.3, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{i\,RF}$	input sensivity at –3 dB before limiting					
	(RMS value, pins 11–12, Fig.4)	mute-off	-	3	6	µV
	input sensivity	–3 dB muting	3	6	12	µV
		S/N = 26 dB	-	5	10	µV
	signal handling (RMS value, pins 11–12)	Δf = ±75 kHz; THD < 10%	100	200	-	mV
S/N	signal-to-noise ratio	Fig.4	52	56	-	dB
THD	total harmonic distortion	Δf = ±22.5 kHz	-	1	1.4	%
		Δf = ±75 kHz	-	2.4	3.3	%
α_{AM}	AM suppression:	FM: 1 kHz; ±75 kHz				
		AM: 1 kHz; m = 0.8	47	52	-	dB
RR_{1000}	ripple rejection, measurements taken with 100 mV (RMS) ripple on V_P	f = 1 kHz	7	10	-	dB
V_o	audio output signal (RMS value, pin 2)	R_L = 22 kΩ	60	85	120	mV

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Search tuning with BB910 (Fig.1)		C_{16} = 0.1 µF				
V_{16}	minimum output voltage	limiting point	-	V_P–1.85	-	V
$\Delta V/\Delta t$	tuning steepness	voltage pin 16	95	210	420	mV/s
$\Delta f_{osc}/\Delta t$	oscillator steepness		1.25	2.83	5.6	MHz/s
$\Delta I_{AFC}/\Delta V_3$	AFC steepness	voltage pin 3	4.75	9.5	19	µA/V

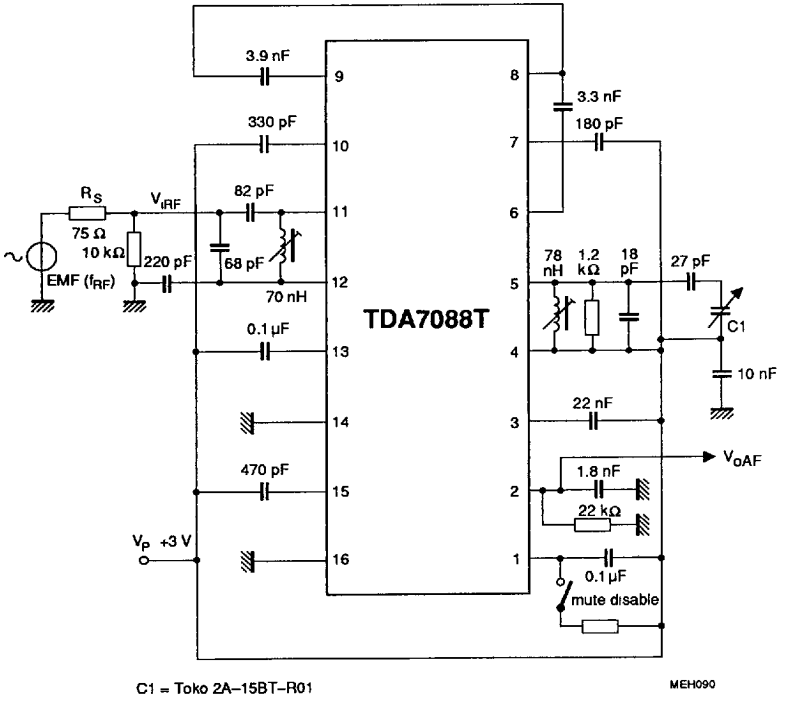


Fig.3 Test circuit and application for mechanical tuning.

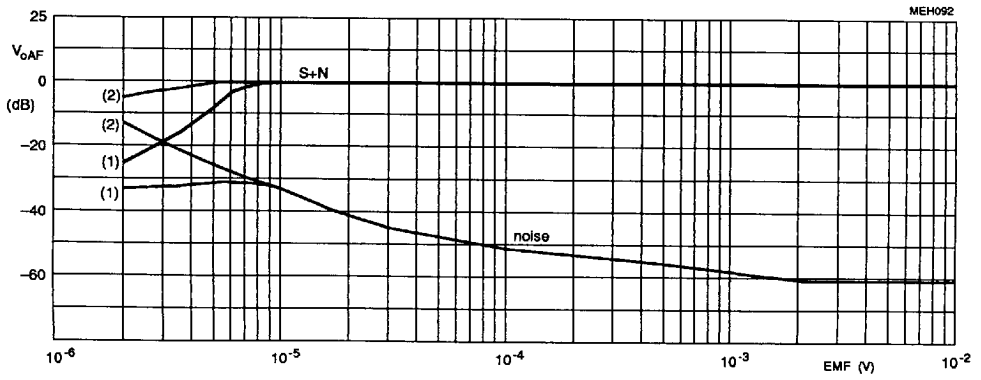
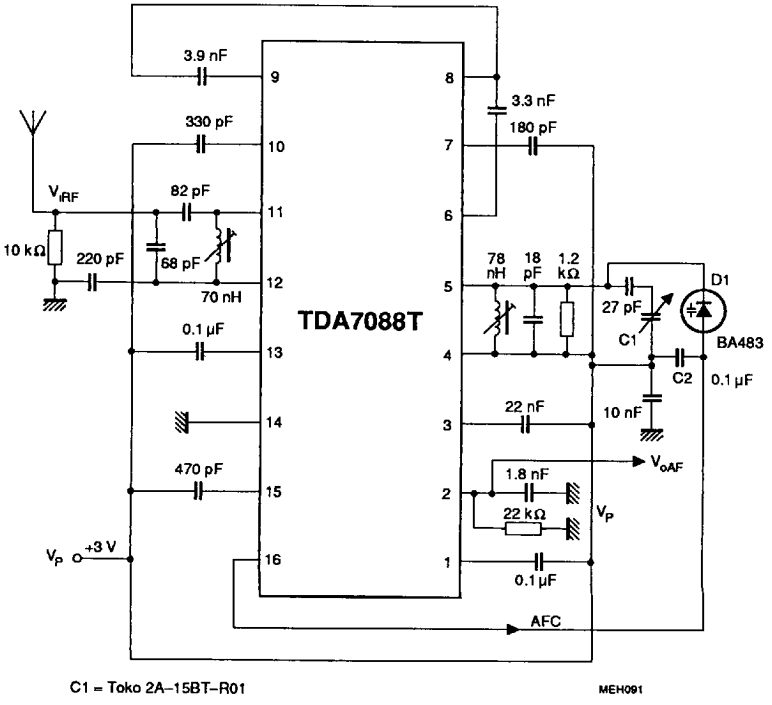


Fig.4 Input sensitivity: (1) mute-on; (2) mute-off.



C1 = Toko 2A–15BT–R01

MEH091

Fig.5 Application circuit with AFC for mechanical tuning.

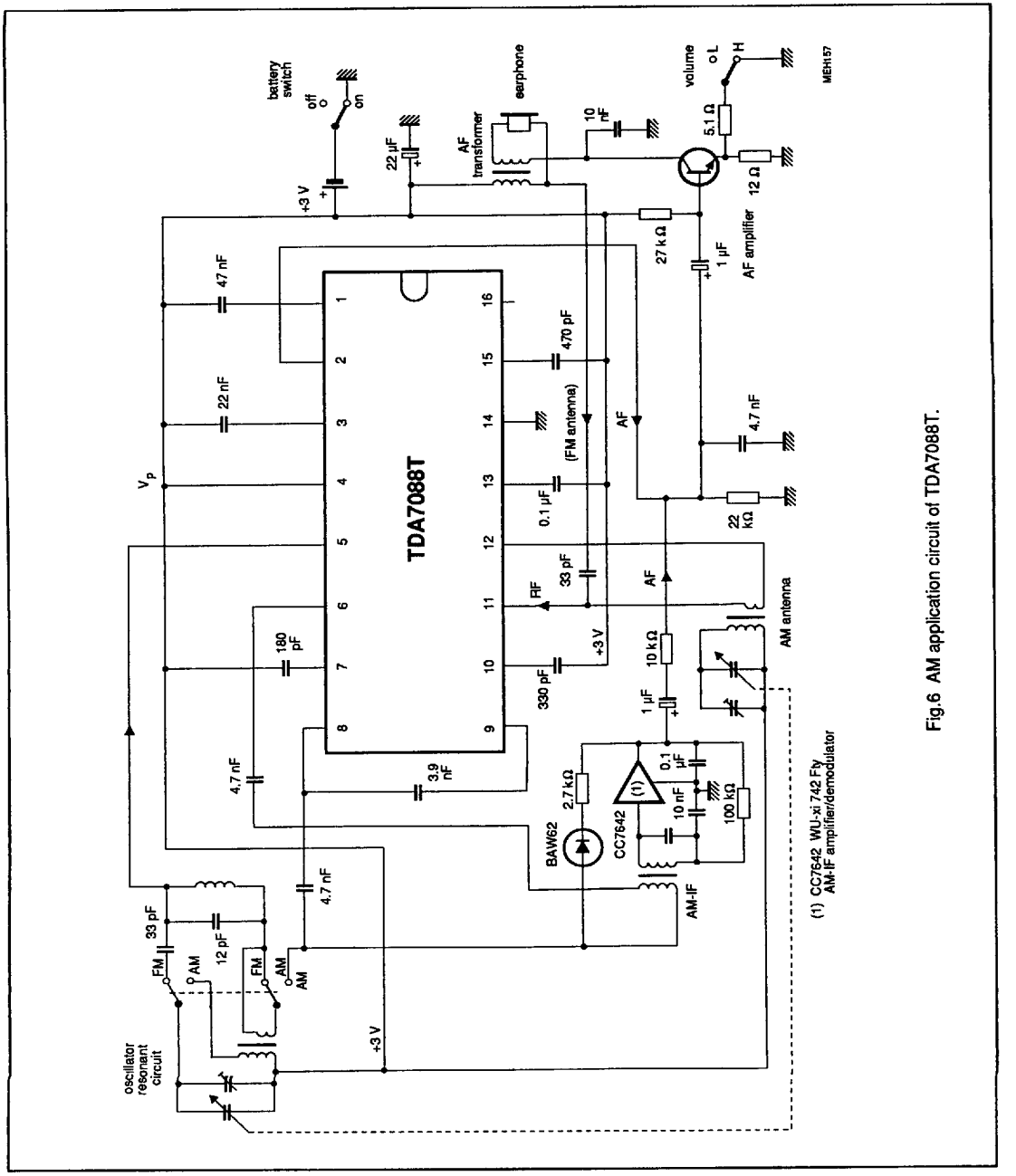


Fig.6 AM application circuit of TDA7088T.