TCA3089

LINEAR INTEGRATED CIRCUIT

FM-IF RADIO SYSTEM

- HIGH LIMITING SENSITIVITY
- HIGH AMR
- HIGH RECOVERED AUDIO
- GOOD CAPTURE RATIO
- LOW DISTORTION
- MUTING CAPABILITY

The TCA 3089 is a monolithic integrated circuit in a 16-lead dual in-line plastic package. It provides a complete subsystem for amplification of FM signals.
The functions incorporated are:
– FM amplification and detection
– Interchannel controlled muting
– AFC and delayed AGC for FM tuner
– Switching of stereo decoder
– Driver of a field strength meter
The TCA 3089 can be used for FM-IF amplifier application in Hi-Fi, car-radios and communication receivers.

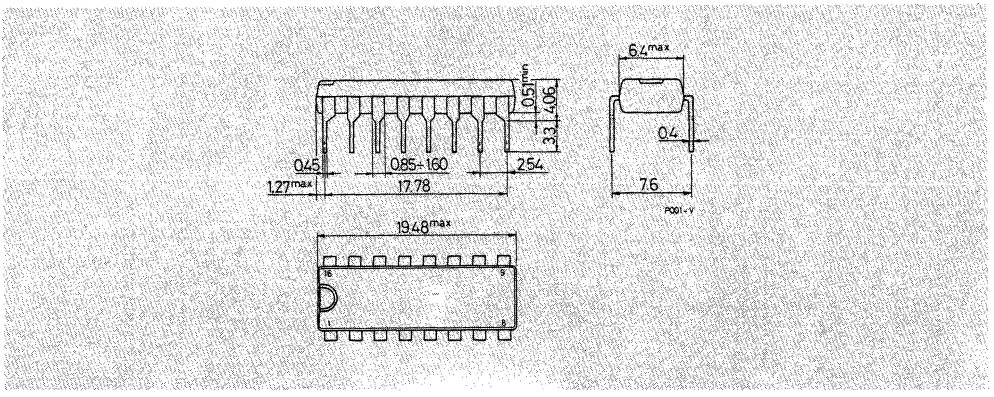
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	16	V
I_o	Output current (from pin 15)	2	mA
P_{tot}	Total power dissipation at $T_{amb} \leqslant 70°C$	800	mW
T_{stg}	Storage temperature	-55 to 150	°C
T_{op}	Operating temperature	-25 to 70	°C

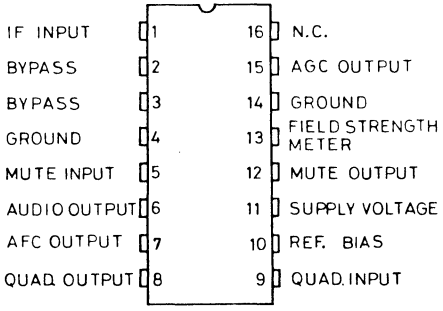
ORDERING NUMBER: TCA 3089

MECHANICAL DATA

Dimensions in mm



CONNECTION DIAGRAM
(top view)



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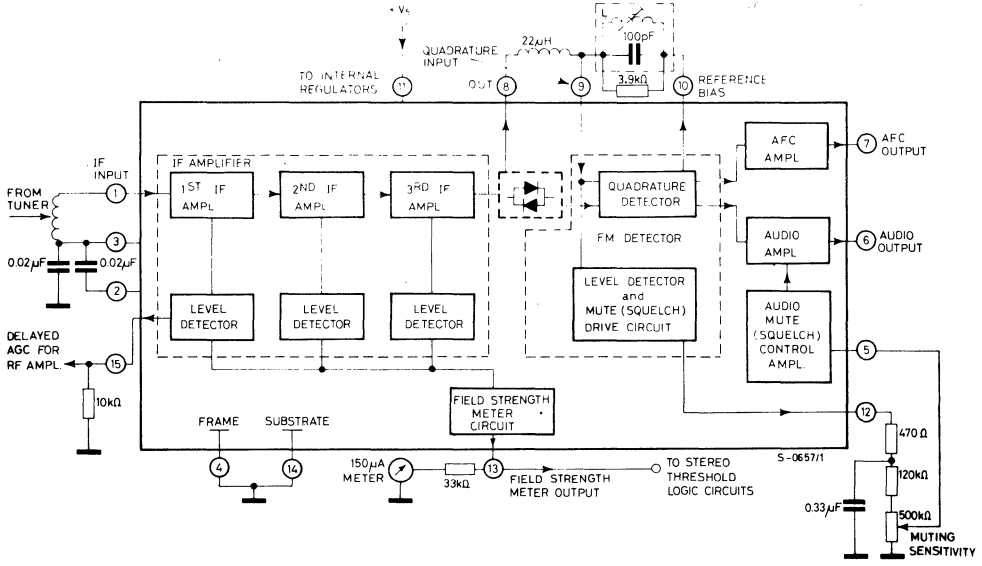
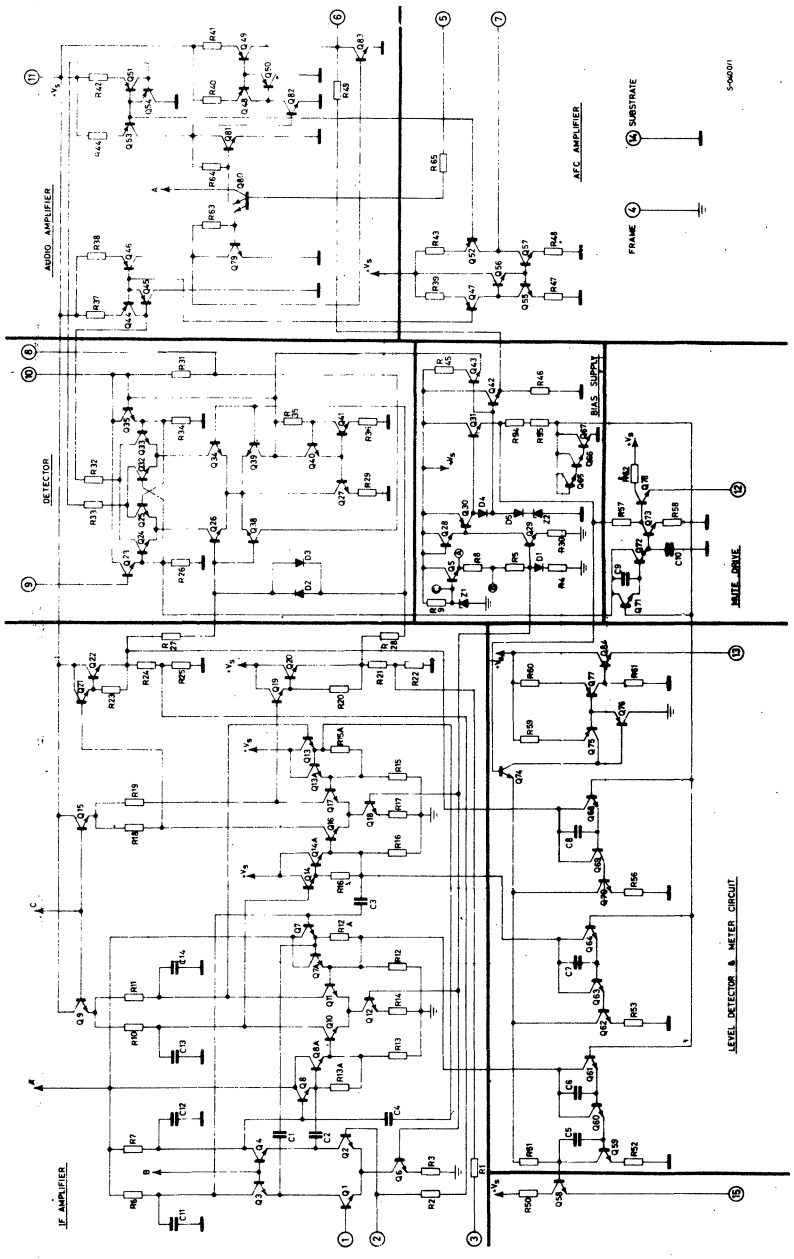
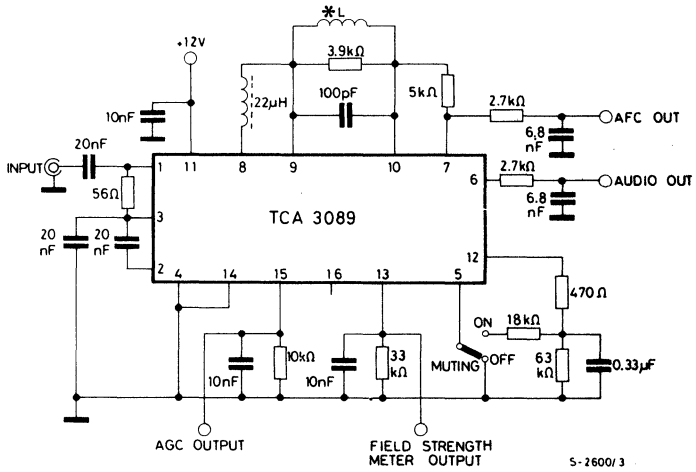
BLOCK DIAGRAM



SCHEMATIC DIAGRAM



TEST CIRCUIT



*L tunes with 100pF at 10.7 MHz (Q_O=75)

THERMAL DATA

$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	100	°C/W

ELECTRICAL CHARACTERISTICS

(Refer to the test circuit; V_s= 12V, f_o = 10.7 MHz, V_5= 0V, T_{amb}= 25°C)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
DC CHARACTERISTICS						
I_s	Supply current		16	23	30	mA
V_i	Voltage at the IF amplifier input		1.2	1.9	2.4	V
V_2, V_3	Voltage at the input bypassing		1.2	1.9	2.4	V
V_6	Voltage at the audio output		5	5.6	6	V
V_{10}	Reference bias voltage		5	5.6	6	V

ELECTRICAL CHARACTERISTICS (continued)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
AC CHARACTERISTICS						
$V_{i(threshold)}$	Input limiting voltage (-3 dB) at pin 1	f_m= 1 kHz Δf= ± 75 kHz		12	25	μV
V_o	Recovered audio voltage (pin 6)	$V_i \geqslant 100\ \mu V$ f_m= 1 kHz Δf= ± 75 kHz	300	400	500	mV
V_7	Recovered audio voltage (pin 7)		200	350	500	mV
d	Distortion	$V_i \geqslant 1$ mV f_m= 1 kHz Δf= ± 75 kHz		0.5	1	%
$\frac{S+N}{N}$	Signal to noise ratio		60	67		dB
AMR	Amplitude modulation rejection	V_i = 100 mV f_m= 1 kHz Δf = ± 75 kHz m = 0.3	45	55		dB
V_i	Input voltage for delayed AGC action (pin 1)			10		mV
V_{15}	AGC output	V_i = 100 mV			0.5	V
$\frac{\Delta I_7}{\delta f}$	AFC control slope (note 1)	V_i = 10 mV		1.2		$\frac{\mu A}{kHz}$
V_{13}	Field strength meter output sensitivity	V_i = 0.5 mV		1.5		V
	No signal mute (note 2)	muting: ON	55			dB

Note: 1) $\Delta I_7 = \frac{\Delta V_{7,10}}{R_{7,10}}$

2) No signal mute = $20 \log \frac{V_o @ V_i \geqslant 100\ \mu V}{V_o @ V_i = 0}$

Fig. 1 - Relative recovered audio and noise output vs. input voltage

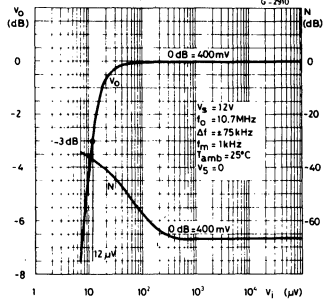


Fig. 2 - Capture ratio vs. input voltage

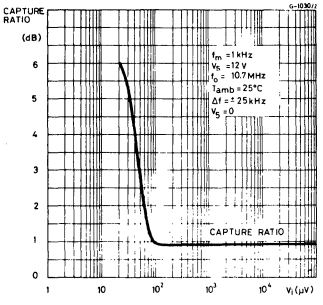


Fig. 3 - AGC (V_{15}) and field strength meter output (V_{13}) vs. input voltage

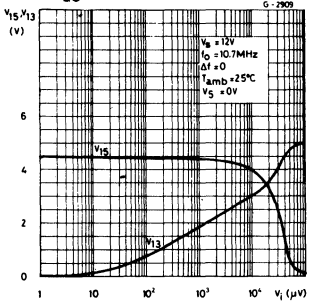


Fig. 4 - AFC output current vs. change in tuning frequency

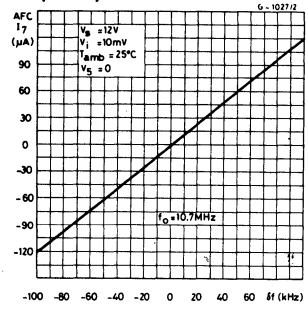


Fig. 5 - Amplitude modulation rejection vs. input voltage

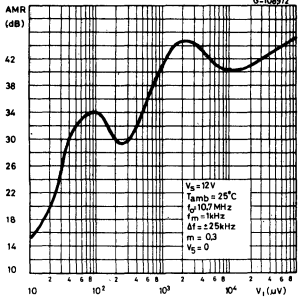
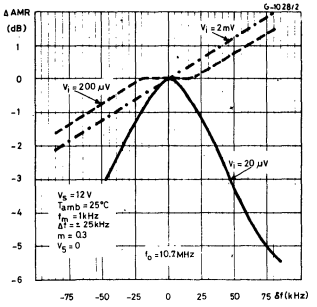


Fig. 6 - AMR vs. change in tuning frequency



APPLICATION INFORMATION

Fig. 7 - P.C. board and component layout of the circuit of fig. 8 (1:1 scale)

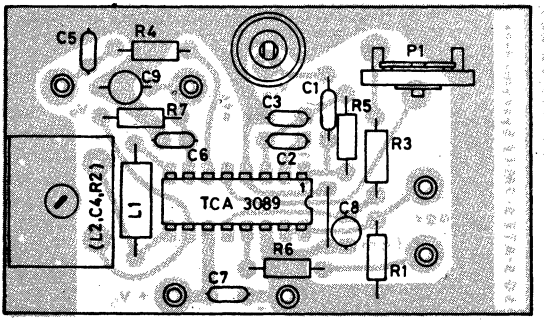


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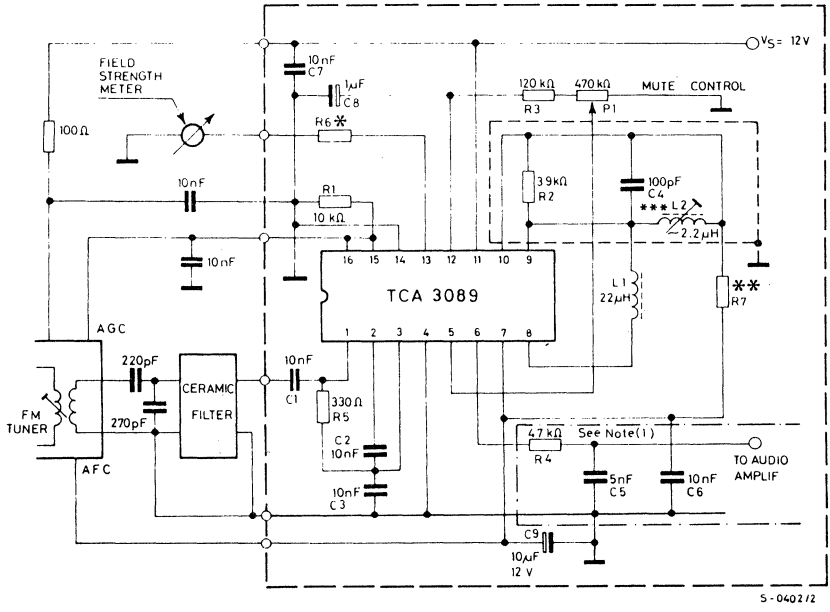
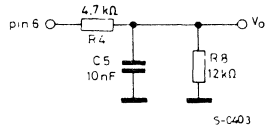
Fig. 8 - Typical application circuit



Notes (1): When V_S is less than 12V, a resistor R8= 12 kΩ must be connected between audio output and ground, and the integrator capacitor C5 must be changed to 10 nF, as follows:



* Dependent on field strength meter sensitivity.
** Dependent on the tuner's AFC circuit.
*** L2 tunes with 100 pF at 10.7 MHz (Q_o = 75)