FM IF limiter amplifier and detector

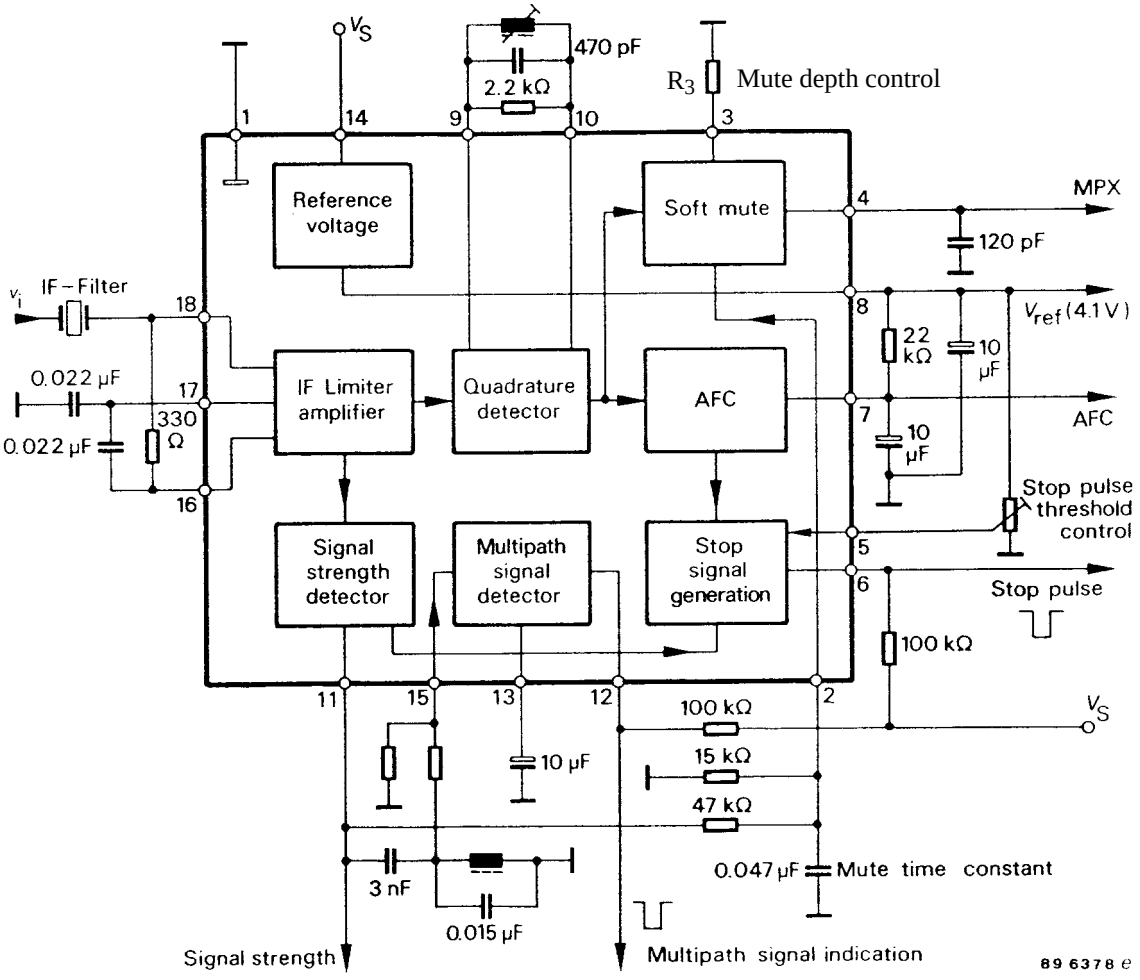
Description

The T 4270 B is an integrated bipolar FM-IF amplifier circuit with field strength indicator, stop signal generator, multipath detector and controllable mute function. It is designed for car radios and home receiver applications.

Features

- 7 stage limiter amplifier
- Multipath signal detector
- Stop signal generator with controllable threshold
- Signal strength output
- Controllable mute function
- High signal/noise ratio and low signal distortion

Block Diagram



Absolute Maximum Ratings

Reference point Pin 1, unless otherwise specified

Parameters	Symbol	Value	Unit
Supply voltage Pin 14	V_S	18	V
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	– 40 to + 150	°C
Ambient temperature range	T_{amb}	– 25 to + 85	°C

Thermal Resistance

Parameters	Symbol	Maximum	Unit
Junction ambient	R_{thJA}	100	K/W

Electrical Characteristics

V_S = 8.5 V, reference point Pin 1, f_i = 10.7 MHz, adjusted at I_7 = 0, V_i = 10 mV, FM-deviation ± 75 kHz, f_{mod} = 1 kHz, Q_0 = 20, T_{amb} = 25 °C, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Supply voltage	Pin 14	V_S	7.5		15	V
Supply current	Pin 14	I_S	19		23	mA
Field strength output	**Pin 11**					
Output voltage	V_i = 200 mV V_i = 50 mV V_i = 1 mV V_i = 0 mV	V_{OUT}	4.4 4.2 2.5 0.01		4.9 4.6 2.8 0.42	V
Audio output signal	**Pin 4**					
Output voltage		V_{AF}	290		330	mV
Distortion		THD	0.48		0.88	%
(S+N)/N ratio	deviation ± 75 kHz	S+N/N	77		81	dB
AM-rejection	m = 30 %		62		66	dB
Mute depth	V_2 = 0 V, R_3 = ∞ V_2 = 0 V, R_3 = 0	a_{mute}	6.7 34	7 36	9 39	dB
Maximum sink current		I_4	0.9		1.1	mA
Stop signal output	**Pin 6**					
Input frequency window	R_{7-8} = 22 kΩ	f_{win}	± 23		± 28	kHz
Output voltage HIGH LOW	 I_6 < 0.5 mA	V_6	 7	 0.1	 0.2	V
Input voltage threshold	V_6 = 0.5 V, Pin 5 open V_6 = 0.5 V, V_5 = V_8	V_i	25 0.6		45 1.3	µV mV

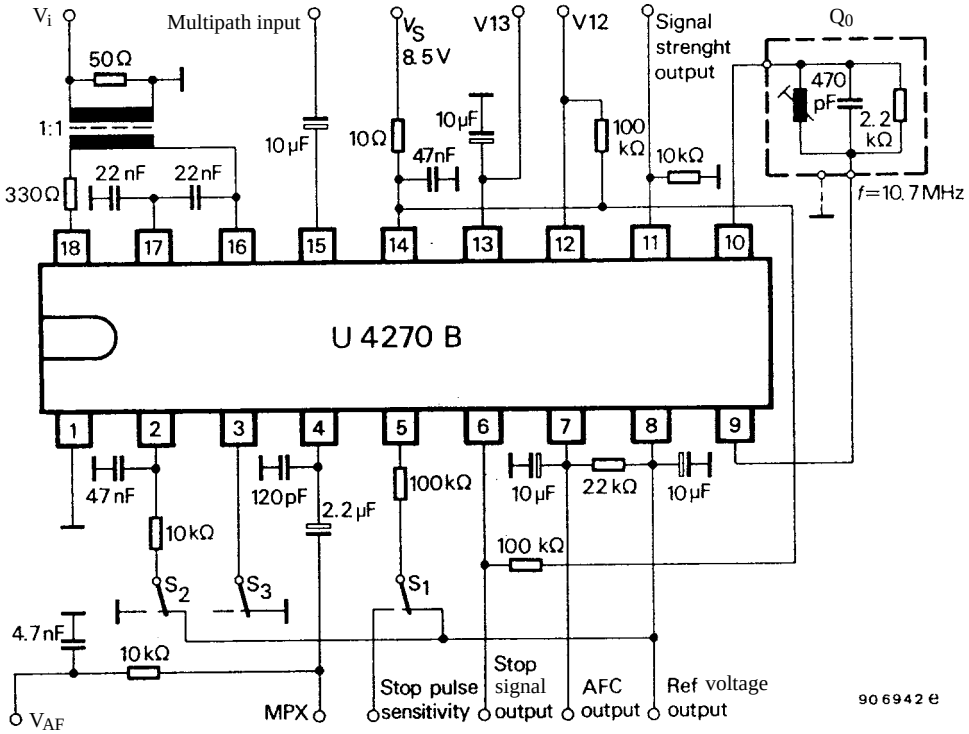
Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
AFC output	**Pin 7**					
Output current	deviation ± 50 kHz	$\pm I_{AFC}$	90	110	140	µA
Input frequency offset	I_{AFC} = 0	± f_{off}	2		12	kHz
Reference voltage output	**Pin 8**					
Output voltage	I_8 = 0.5 mA	V_8	3.9		4.2	V
Maximum load current		I_8		3	5	mA
Multipath detection	**Pin 12, 13, 15**					
Detector threshold	V_{12} < 1 V, f_{V15} = 20 kHz	V_{15}	5.4		7	mV
Output leakage current	$V_{12} = V_S$	I_{12}		1.5		µA
Charge current	Pin 15 connected to ground	I_{13}	3		3.6	mA
Discharge current	Pin 15 open circuit $V_{13} \leq 1$ V	I_{13}	– 7		– 10	µA
Mute function	**Pin 2**					
Mute “off ” voltage	V_{out} – 2 dB	V_{off}	0.22		0.33	V
IF-Input signal	**Pin 18**					
Limiting threshold	V_{out} – 3 dB	V_i	25		33	dBµV

V_S = 8.5 V, reference point Pin 1, f_i = 10.7 MHz, adjusted at I_7 = 0, V_i = 10 mV, FM-deviation ± 75 kHz, f_{mod} = 1 kHz, Q_0 = 20, T_{amb} = – 40 to + 85 °C, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Supply voltage	Pin 14	V_S	7.5		15	V
Supply current	Pin 14	I_S	17		25	mA
Field strength output	**Pin 11**					
Output voltage	V_i = 200 mV V_i = 50 mV V_i = 1 mV V_i = 0 mV	V_{OUT}	4.0 3.6 2.25 0.01		5.0 4.7 2.95 0.42	V
Audio output signal	**Pin 4**					
Output voltage		V_{AF}	250		370	mV
Distortion		THD	0.48		0.88	%
(S+N)/N ratio	deviation ± 75 kHz	S+N/N	70		81	dB
AM-rejection	m = 30 %		60		70	dB
Mute depth	V_2 = 0 V, R_3 = ∞ V_2 = 0 V, R_3 = 0	a_{mute}	6 34	7 36	10 40	dB
Maximum sink current		I_4	0.9		1.1	mA
Stop signal output	**Pin 6**					
Input frequency window	R_{7-8} = 22 kΩ	f_{win}	± 23		± 39	kHz
Output voltage HIGH LOW	 I_6 < 0.5 mA	V_6	 7	 0.1	 0.5	V
Input voltage threshold	V_6 = 0.5 V, Pin 5 open V_6 = 0.5 V, $V_5 = V_8$	V_i	14 0.6	20	54 2.0	µV mV

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
AFC output	**Pin 7**					
Output current	deviation ± 50 kHz	$\pm I_{AFC}$	60	110	140	µA
Input frequency offset	I_{AFC} = 0	$\pm f_{off}$		8	15	kHz
Reference voltage output	**Pin 8**					
Output voltage	I_8 = 0.5 mA	V_8	3.7		4.2	V
Maximum load current		I_8		3	5	mA
Multipath detection	**Pin 12, 13, 15**					
Detector threshold	V_{12} < 1 V, f_{V15} = 20 kHz	V_{15}	5.0		7	mV
Output leakage current	$V_{12} = V_S$	I_{12}		1.5		µA
Charge current	Pin 15 connected to ground	I_{13}	2.1		4.0	mA
Discharge current	Pin 15 open circuit $V_{13} \leq 1$ V	I_{13}	– 6		– 10	µA
Mute function	**Pin 2**					
Mute “off voltage	V_{out} – 2 dB	V_{off}	0.22		0.33	V
IF-Input signal	**Pin 8**					
Limiting threshold	V_{out} – 3 dB	V_i	25		33	dBµV

Test circuit



OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements and

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

Of particular concern is the control or elimination of releases into the atmosphere of those substances which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) will soon severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of any ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA and

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with and do not contain ozone depleting substances.

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