UTC1018   LINEAR INTEGRATED CIRCUIT

FM IF SYSTEM FOR CAR RADIO

DESCRIPTION

The UTC1018 has versatile muting characteristics and allows receiver designers to realize the muting performance according to their design concept.

FUNCTIONS

* FM IF Amplifier/Limiter

* Quadrature Detector

* AFC Clamp

* AGC Drive

* AF Mute Amplifier

* Signal Meter Drive

* DC Level Detector

FEATURES

* Adjustable muting sensitivity

* Soft muting function

* Variable maximum muting attenuation (6dB~40dB)

* Variable muting slope with respect to input signal level

* High limiting sensitivity with muting off

* Good S/N ratio

* Clamped AFC output

* Delayed AGC output for front end circuit

* Recommended supply voltage: VCC =8V

* Operating supply voltage range: VCC =7.5V~16V

* Low distortion
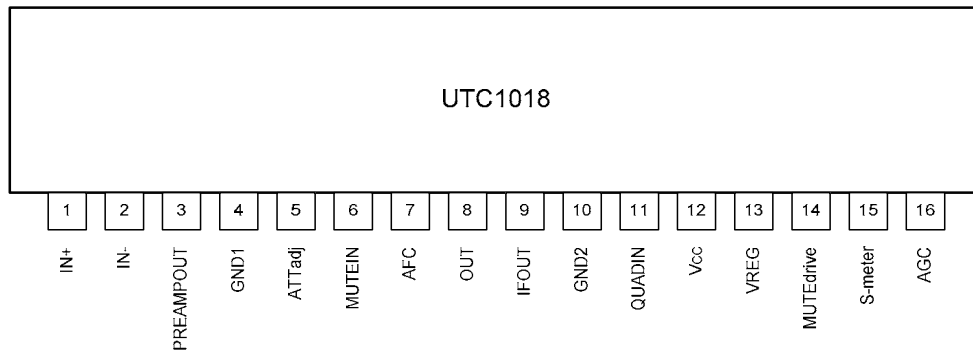
* Good AMR

APPLICATION

* FM car stereo receiver
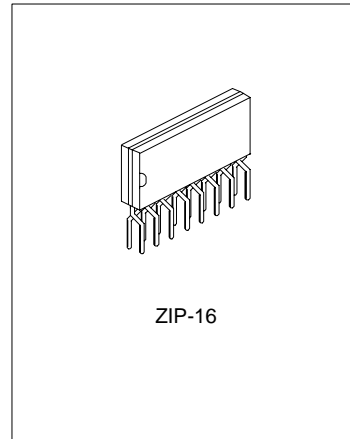
ZIP-16

ORDERING INFORMATION

Device	Package
UTC1018	ZIP-16

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PIN CONFIGURATIONS

UTC1018

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

IN+ · IN- · PREAMPOUT · GND1 · ATTadj · MUTEIN · AFC · OUT · IFOUT · GND2 · QUADIN · Vcc · VREG · MUTEdrive · S-meter · AGC

BLOCK DIAGRAM

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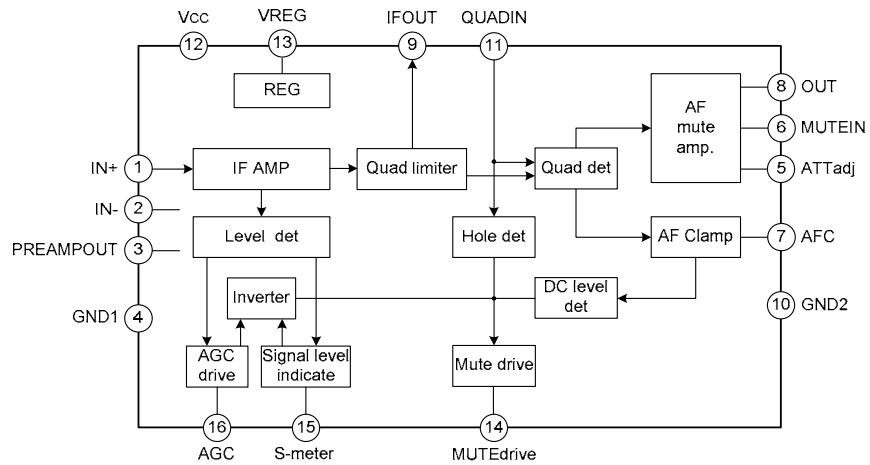
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ABSOLUTE MAXIMUM RATING (T$_{amb}$=25°C)

Characteristics	Symbol	Rating	Unit
Maximum Supply Voltage	VCC max	16	V
Maximum Supply Current	ICC max	40	mA
Allowable Power Dissipation	Pd max	640	mW
		460	mW
Input Voltage	VIN	±1	Vp-p
Flow-In Current	I2	±0.2	mA
	I3	±0.2	mA
	I6	2	mA
Flow-Out Current	I5	1	mA
	I13	2	mA
	I14	2	mA
	I15	1	mA
	I16	1	mA
Operating Temperature	Topr	-20 to +70	°C
Storage Temperature	Tstg	-40 to +125	°C

ELECTRICAL CHARACTERISTICS (T$_{amb}$=25°C, VCC=8V, f=10.7MHz, see specified test circuit)

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Recommended Supply Voltage	VCC			8		V
Operating Supply Voltage Range	VCCop		7.5		16	V
Quiescent Current	ICCO	VIN=0	15	21	27	mA
Current Drain	ICC	VIN = 100 dBμ	20	25	30	mA
Demodulation Output	VO	VIN = 100 dBμ, 400 Hz 100% mod.	200	260	320	mVrms
Total Harmonic Distortion	THD	VIN = 100 dBμ, 400 Hz 100% mod.		0.05	0.2	%
Signal-To-Noise Ratio	S/N	VIN = 100 dBμ, 400 Hz 100% mod.	72	78		dB
Input Limiting Voltage	VIN (lim)	VO: 3 dB down, 400 Hz 100% mod.		25	29	dBμ
Muting Sensitivity	VIN (Mute)	V14 = 2.0 V	22	26	32	dBμ
Muting Attenuation (1)	Mute (ACC)	V6 = 2.0 V (22 kΩ), VIN = 100 dBμ, 400 Hz 100% mod.	10	15	20	dB
Muting Attenuation (2)	Mute (ACC)	V6 = 5.0 V (22 kΩ), VIN = 100 dBμ, 400 Hz 100% mod.	24	28	32	dB

Muting Bandwidth	BW (Mute)	V_{IN} = 100 dBμ, V14 = 2.0 V	140	210	370	kHz
AM Rejection Ratio	AMR	V_{IN} = 100 dBμ, FM 400 Hz. 100% mod., AM 1 kHz 30% mod.	50	63		dB
Muting Drive Output(1)	V14-0	V_{IN}=0	3.5	4.2	5.0	V
Muting Drive Output（2）	V14-100	V_{IN} = 100 dBμ	0	0	0.3	V
Signal Meter Output (1)	V15-0	V_{IN}=0	0	0.1	0.3	V
Signal Meter Output (2)	V15-50	V_{IN} = 50 dBμ	0.8	1.4	2.0	V
Signal Meter Output (3)	V15-70	V_{IN} = 70 dBμ	1.6	2.4	3.2	V
Signal Meter Output (4)	V15-100	V_{IN} = 100 dBμ	4.5	5.3	6.0	V
AGC Output (1)	V16-0	V_{IN}=0	3.5	4.1	4.5	V
AGC Output (2)	V16-100	V_{IN} = 100 dBμ	0	0.02	0.3	V
Offset Voltage (1)	V7-13	V_{IN}=0, pin 7 to 13	−0.25	0	+0.25	V
Offset Voltage (2)	V8-13	V_{IN}=0, pin 8 to 13	−0.5	0	+0.5	V

PIN DESCRIPTIONS

Pin No.	Pin Name	Description
1	IN+	Positive in
2	IN-	Negative in
3	PREAMPOUT	Out of IF preamp
4	GND1	Gnd1
5	ATTadj	Resister connected between p5 and GND determines the maximum muting attenuation
6	MUTEIN	The higher the current flowing into p6,the lower the gain (the higher the attenuation)
7	AFC	AFC clamp
8	OUT	Out of AF
9	IFOUT	Out of IF
10	GND2	Gnd2
11	QUADIN	In of quadrature det
12	VCC	Vcc
13	VREG	Regulative voltage
14	MUTEdrive	Connected to p6 through resister
15	S-meter	Signal meter
16	AGC	Automatic gain control

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FUNCTION DESCRIPTION

1．Muting Characteristic

   The muting operation is performed by an AF preamplifier, the gain of which varies continuously with control current, and a muting drive output circuit which supplies the control current.

   The gain of the AF preamplifier decreases with increasing gain control current applied to pin 6. However, the gain does not decrease further when the control current reaches approximately 120 μA or greater. The lower limit of the gain under this condition depends upon a resistor connected between pin 5 and GND, and the higher the resistance the lower the gain (the higher the attenuation). Thus the maximum muting attenuation will be set by connecting the resistor between pin 5 and GND.
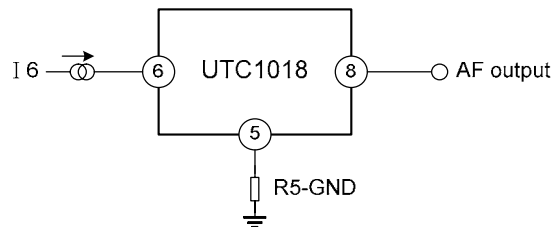
2．The muting drive output comes in three types:

 1) Hole detector output which develops a voltage when C/N (carrier-to-noise ratio) lowers under weak signal input conditions.

 2) A reversed output of the signal strength indicating output (output at pin 15)

 3) A bandwidth limited muting drive output which develops a voltage when the AFC output becomes higher than ±VBE during tuning-off operation.
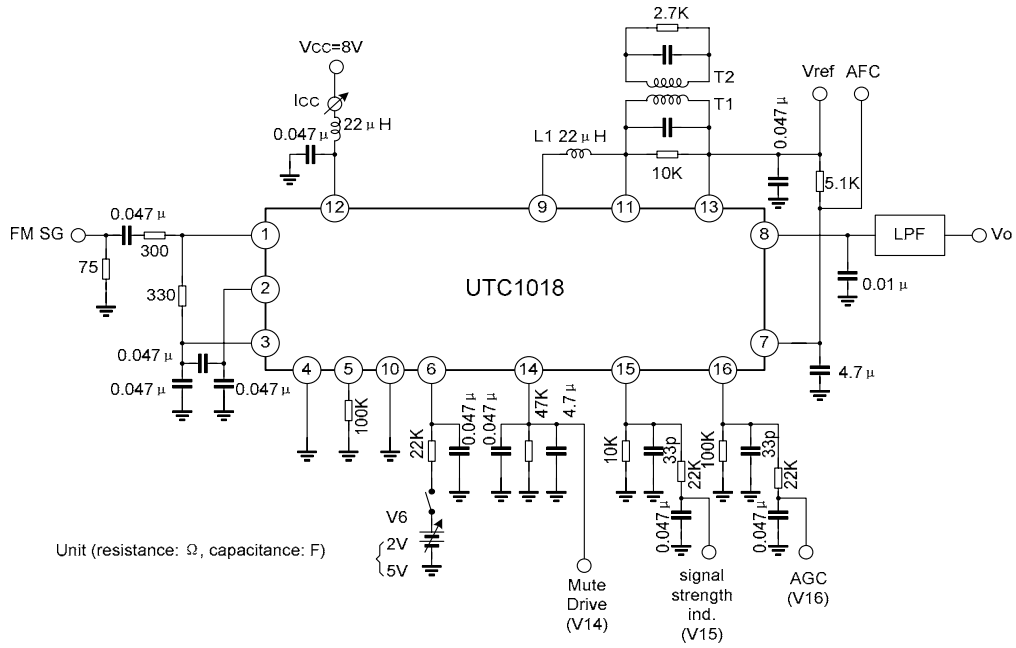
   All these outputs are led to an OR circuit and the processed output is developed at pin 14.

   3．The general method to adjust the muting circuit of the UTC1018 is: to set the signal input level required to actuate the muting circuit with the R16-G, to adjust the slope of the curve for the muting attenuation vs. antenna signal input with the R15-G, and to adjust the maximum muting attenuation (determined by setting the noise level at no signal) with the R5-G. The slope of the curve for the muting attenuation vs. antenna signal input level can also be adjusted by the resistor connected between pins 14 and 6 in addition to R15-G, however, selecting a resistor too high does not allow the muting control current flowing into pin 6 to reach 120 μA even though the maximum muting drive output (V14) is applied, namely the muting attenuation does not reach its maximum value. Accordingly a recommended value of the resistor between pins 14 and 6 is about 22 kΩ.

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TEST CIRCUITS

Unit (resistance: Ω, capacitance: F)

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TYPICAL APPLICATION CIRCUIT

ON
OFF
AF Out
Vcc(8V)
SW
220
10μF
2.2uH
47K
0.047μF
4.7μF
22K
0.01uF
0.047μF
100K VR
VGC
0.047μF

ANT
FRONT END
100
0.022μF
10K
330
330
1.8K
1K
0.022μF
0.047μ
0.047
0.047μF
100K
470

UTC1018

② ④ ⑥ ⑧ ⑩ ⑫ ⑭ ⑯
① ③ ⑤ ⑦ ⑨ ⑪ ⑬ ⑮

L1
22uH
27K
0.047μF
4.7μF
AFC
Vref
22K
MPX
2.7K
15K
33pF

PACKAGE OUTLINE

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