



## CXA1191

## LINEAR INTEGRATED CIRCUIT

### FM/AM Radio

#### DESCRIPTION

The UTC **CXA1191** is a one-chip FM/AM radio IC designed for radio-cassette tape recorders and headphone tape recorders.

#### FEATURES

- \*Small number of peripheral components
- \*Low current consumption ( $V_{CC}=3V$ )
  - FM:  $I_D=5.3mA$  (Typ.)
  - AM:  $I_D=3.4mA$  (Typ.)
- \*Built-in FM/AM select switch
- \*Large current of AF amplifier

#### FUNCTIONS

##### FM section

- RF amplifier, Mixer and OSC  
(incorporating AFC variable capacitor)
- IF amplifier
- Quadrature detection
- Tuning LED driver

##### AM section

- RF amplifier, Mixer and OSC (with RF AGC)
- IF amplifier (with IF AGC)
- Detector
- Tuning LED driver

##### AF section

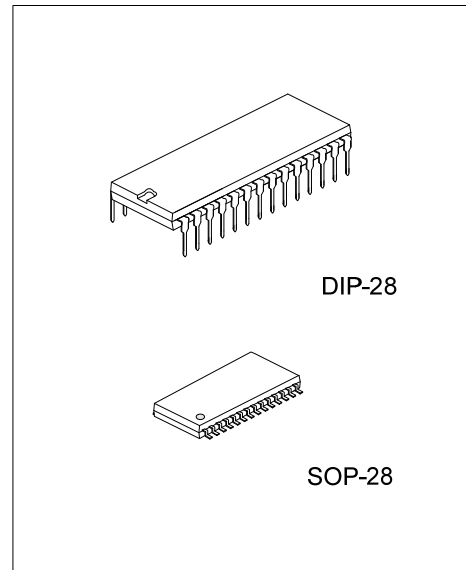
- Electronic volume control
- FM muting

##### Structure

- Bipolar silicon monolithic IC

#### ORDERING INFORMATION

Ordering Number			Package	Packing
Normal	Lead Free Plating	Halogen Free		
CXA1191-D28-T	CXA1191L-D28-T	CXA1191G-D28-T	DIP-28	Tube
CXA1191-S28-R	CXA1191L-S28-R	CXA1191G-S28-R	SOP-28	Tape Reel
CXA1191-S28-T	CXA1191L-S28-T	CXA1191G-S28-T	SOP-28	Tube



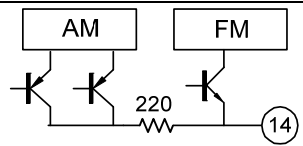
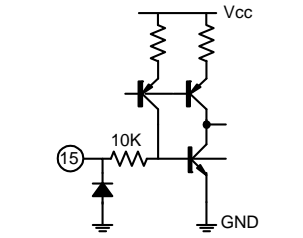
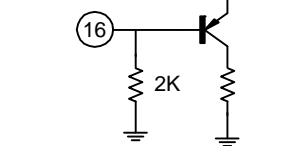
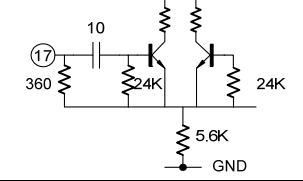
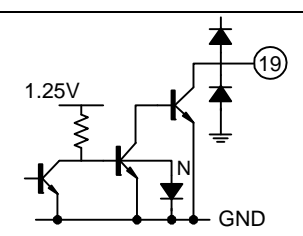
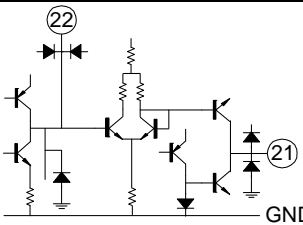
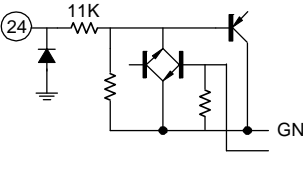
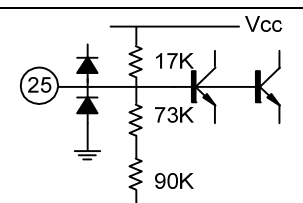
Lead-free: CXA1191L  
Halogen-free: CXA1191G

<p>CXA1191L-D28-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Lead Plating</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel, T: Tube</li> <li>(2) D28: DIP-28, S28: SOP-28</li> <li>(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</li> </ul>
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### ■ PIN CONFIGURATIONS

PIN	DESCRIPTION	SYMBOL	VOLTAGE(V)				EQUIVALENT CIRCUIT
			V <sub>CC</sub> =3V		V <sub>CC</sub> =6V		
			FM	AM	FM	AM	
1		MUTE	0	0	0	0	
2	Phase-shift circuit, Connect ceramic discriminator.	FM DISCRI	2.18	2.7	4.88	5.43	
3	Negative feedback pin	NF	1.5	1.5	3.0	3.0	
27	Power amplifier output pin	AF OUT	1.5	1.5	3.0	3.0	
4	Connect variable resistor for electronic volume control.	VOL CONT	1.25	1.25	1.25	1.25	
5	AM local oscillation circuit	AM OSC	1.25	1.25	1.25	1.25	
6	AFC variable capacitor pin	AFC	1.25	Note	1.25	Note	
8	Regulator pin 1.25V (Typ.)	REG OUT	1.25	1.25	1.25	1.25	
7	FM local oscillation circuit	FM OSC	1.25	1.25	1.25	1.25	
9	Connect FM RF tuning coil.	FM RF	1.25	1.25	1.25	1.25	
12	FM RF input pin	FM RF IN	0.3	0	0.3	0	
10	AM RF input	AM RF IN	1.25	1.25	1.25	1.25	
11		NC	0	0	0	0	
13		GND (FE GND)	0	0	0	0	

### ■ PIN CONFIGURATIONS(Cont.)

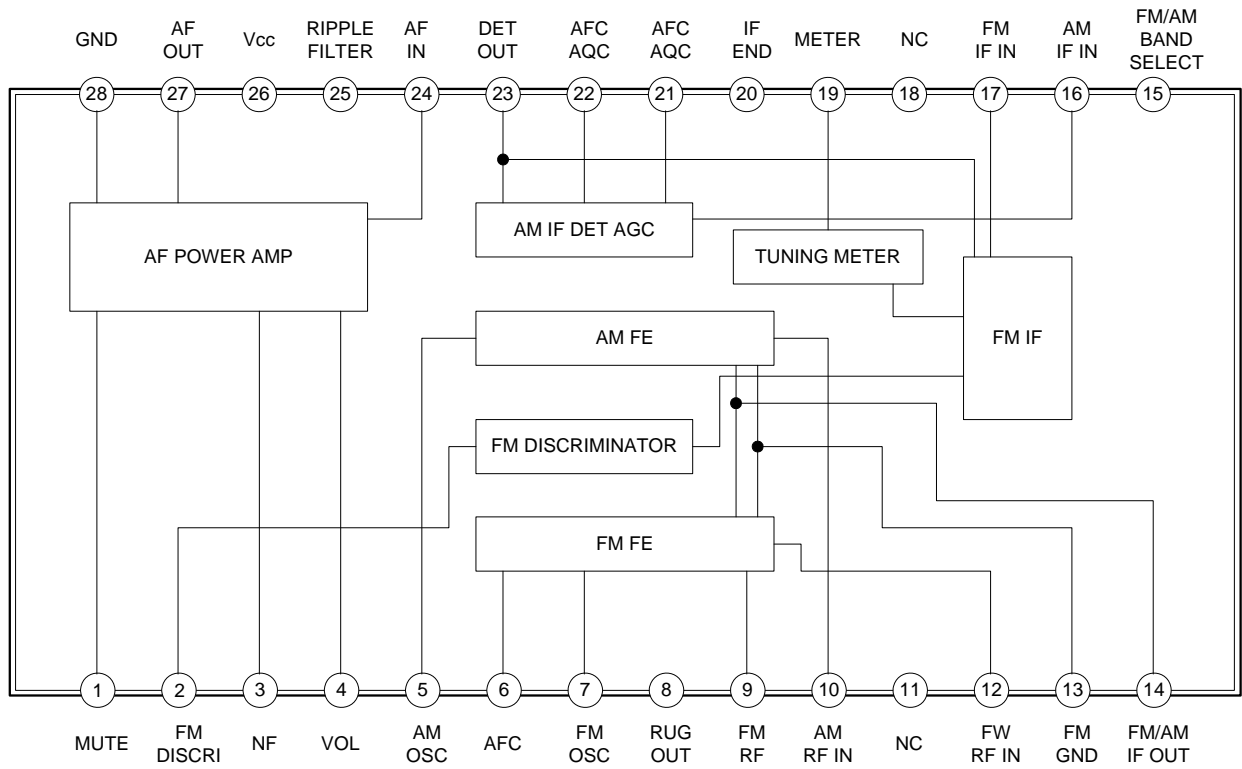
PIN	DESCRIPTION	SYMBOL	VOLTAGE(V)				EQUIVALENT CIRCUIT
			V <sub>CC</sub> =3V		V <sub>CC</sub> =6V		
			FM	AM	FM	AM	
14	IF output pin of FM and AM, Connect IF filter	FM/AM FE OUT	0.36	0.2	0.36	0.2	
15	FM and AM bands selection switch pin. During GND it becomes AM and during open it becomes FM.	BAND SELECT	0.84	0	0.88	0	
16	Input pin of AM IF	AM IF IN	0	0	0	0	
17	Input pin of FM IF	FM IF IN	0.34	0	0.88	0	
18		NC	0	0	0	0	
19	Meter drive circuit (For tuning indicator)	METER	1.6	1.6	4.5	4.5	
20		GND	0	0	0	0	
21	AFC pin of W band. During AM, it determines time constant of AGC.	AFC/AGC	1.25	1.49	1.25	1.49	
22	AFC pin of J band. During AM, it determines time constant of AGC.	AFC/AGC	1.25	1.25	1.25	1.25	
23	Detection output pin	DET OUT	1.25	1.0	1.25	1.0	
24	Power amplifier input pin	AF IN	0	0	0	0	
25	Ripple filter	RIPPLE FILTER	2.71	2.71	5.4	5.4	

■ PIN CONFIGURATIONS(Cont.)

PIN	DESCRIPTION	SYMBOL	VOLTAGE(V)				EQUIVALENT CIRCUIT
			V <sub>CC</sub> =3V		V <sub>CC</sub> =6V		
			FM	AM	FM	AM	
6	Power supply pin	V <sub>CC</sub>	3.0	3.0	6.0	6.0	
28	Power GND	GND	0	0	0	0	

Note: The pin voltage of pin 6 during AM, it is the same pin voltage of pin22 (23) during J BAND and is the same pin voltage of pin 21 (22) during W BAND.

### ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> =25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	9	V
Power Dissipation	DIP-28	1000	mW
	SOP-28	700	mW
Junction Temperature	T <sub>J</sub>	+150	°C
Operating Temperature	T <sub>OPR</sub>	-20 ~ +85	°C
Storage Temperature	T <sub>STG</sub>	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ RECOMMENDED OPERATING CONDITIONS

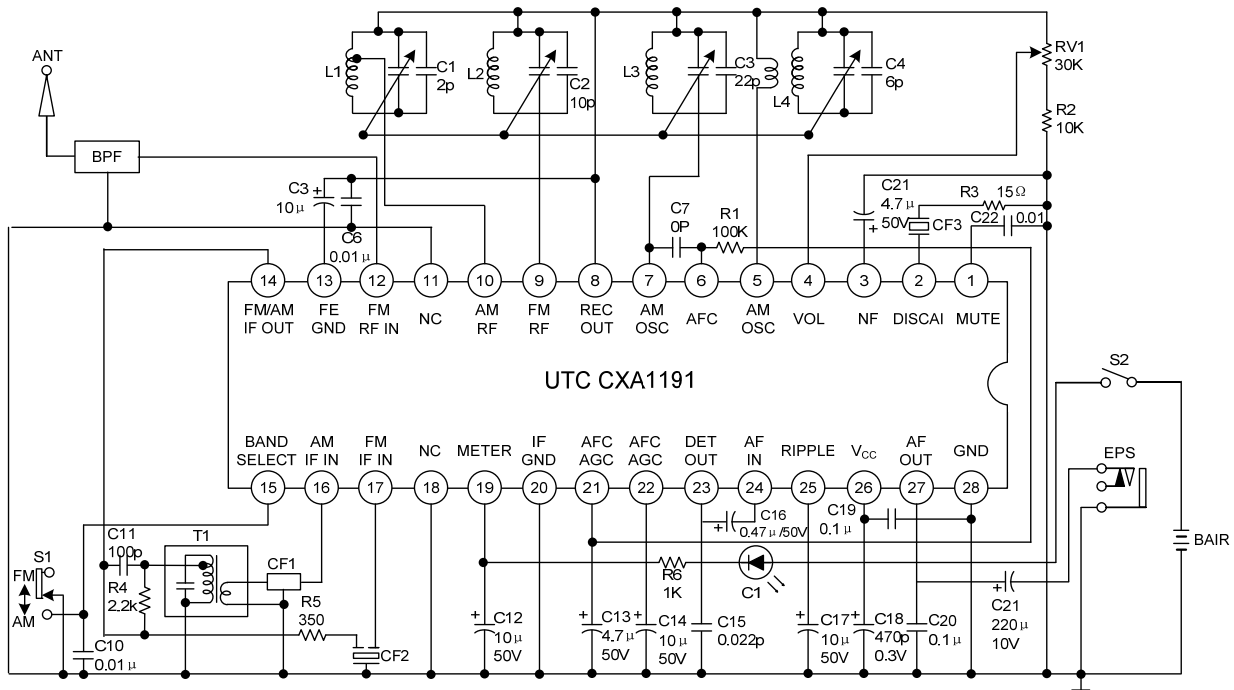
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	DIP-28	2 ~ 8.5	V
	SOP-28	2 ~ 7.5	V

### ■ ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C, V<sub>cc</sub>=6V)

PARAMETER	SYMBOL	SW CONDITIONS						TEST POINT	CONDITIONS	MIN	TYP	MAX	UNIT
		1	2	3	4	5	6						
AM Circuit Current	I <sub>D1</sub>	A	B	A	A	A	A	I <sub>A</sub>	No signal, AM	-	3.5	10.0	mA
FM Circuit Current	I <sub>D2</sub>	A	B	A	A	B	A	I <sub>A</sub>	No signal, FM	-	7.0	14.0	mA
FM Front End Voltage Gain	G <sub>V1</sub>	A	B	A	A	B	A	V <sub>A</sub>	V <sub>IN1</sub> =40dBμV, 100MHz	32	39	46	dB
FM Detection Output Level	V <sub>D1</sub>	A	-	-	A	B	A	V <sub>D</sub>	V <sub>IN3</sub> =90dBμV, 10.7 MHz (1 kHz, 22.5kHz DEV)	39	77.5	155	V <sub>rms</sub>
FM IF Knee Level	V <sub>D2</sub>	A	-	-	A	B	A	V <sub>D</sub>	V <sub>IN3</sub> level at a point 3 dB down from V <sub>IN3</sub> =90dBμV, 10.7 MHz (1 kHz, 22.5kHz DEV)	-	24	32	dBμV
FM Detection Output Distortion Factor	THD1	A	-	-	A	B	A	V <sub>D</sub>	V <sub>IN3</sub> =90dBμV, 10.7 MHz (1 kHz, 75kHz DEV)	-	0.3	2.0	%
FM Meter Current	I <sub>B1</sub>	A	-	-	A	B	A	I <sub>M</sub>	V <sub>IN3</sub> =60dBμV, 10.7 MHz	1.8	3.5	7.0	mA
AM Front End Voltage Gain	G <sub>V2</sub>	A	A	A	A	A	A	V <sub>B</sub>	V <sub>IN3</sub> =60dBμV, 1660 kHz	15	22	29	dB
AM IF Voltage Gain	G <sub>V3</sub>	A	A	-	A	A	A	V <sub>D</sub>	V <sub>IN3</sub> when 455kHz (1kHz, 30% MOD) output is -34dBm	14	20	27	dBμV
AM Detection Output Level	V <sub>D3</sub>	A	A	-	A	A	A	V <sub>D</sub>	V <sub>IN3</sub> =85dBμV, 455kHz (1kHz, 30% MOD)	39	77.5	155	V <sub>rms</sub>
AM Meter Current	I <sub>B2</sub>	A	A	-	A	A	A	I <sub>M</sub>	V <sub>IN3</sub> =85dBμV, 455kHz (1kHz, 30% MOD)	1.3	3.0	7.0	mA
AM Detection Output Distortion Factor	THD2	A	A	B	B	A	A	V <sub>D</sub>	V <sub>IN2</sub> =60dBμV, 1660kHz (1kHz, 30% MOD), V <sub>CC</sub> =7.8V	-	0.6	2.0	%
Audio Voltage Gain	G <sub>V4</sub>	A	-	-	-	-	B	V <sub>E</sub>	V <sub>IN3</sub> =60dBμV, 10.7MHz V <sub>IN4</sub> =-30dBμV, 1kHz	27	31.5	36	dB
Audio Distortion Factor	THD3	A	-	-	-	-	B	V <sub>E</sub>	Distortion factor for output of 50mV V <sub>IN3</sub> =60dBμV, 10.7MHz V <sub>IN4</sub> =-20dBμV, 1kHz	-	0.3	2.5	%
Muting Level	V <sub>D4</sub>	A	-	-	-	-	B	V <sub>E</sub>	Muting level for 50 mW output V <sub>IN4</sub> =-20dBm, 1kHz V <sub>IN3</sub> OFF	8	15	22	dB

0dBμV=1μV

## ■ APPLICATION CIRCUIT



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