



## FM/AM RADIO CIRCUIT      CXA1691M

### DESCRIPTION

The CXA1691M is a one-chip FM/AM radio IC designed for radio-cassette tape recorders and headphone tape recorders.

### FEATURE

- 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 output of AF amplifier

### FUNCTIONS

#### FM section

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

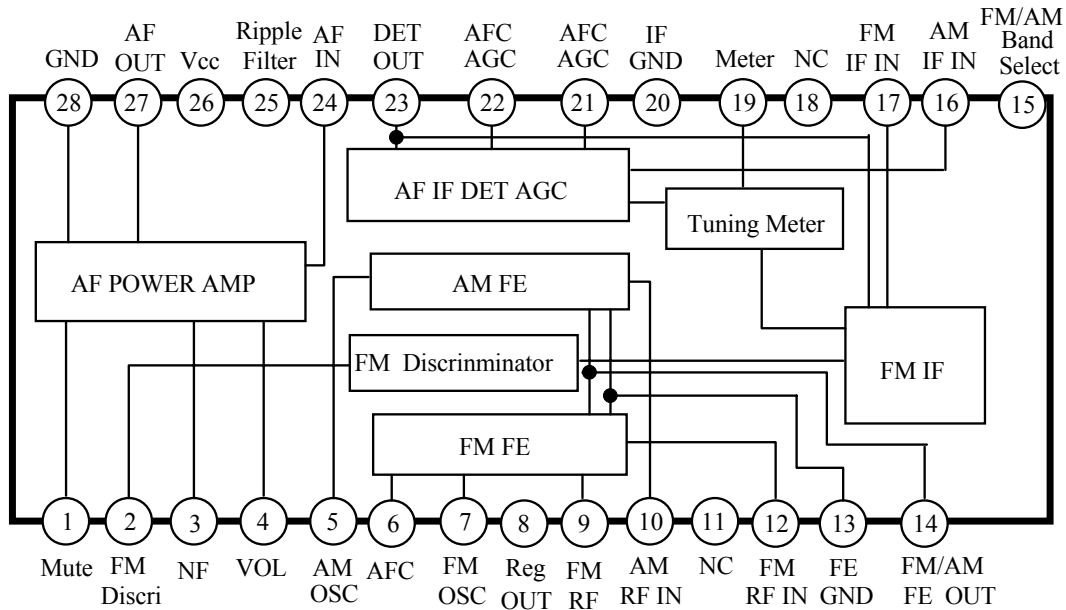
#### AM section

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

#### AF section

- Electronic volume control
  - FM muting
-

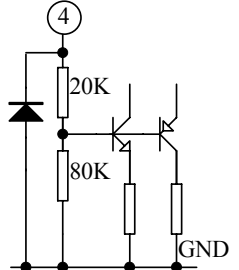
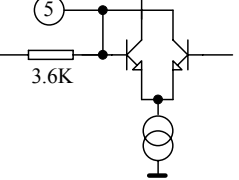
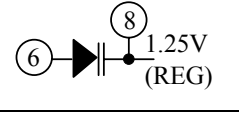
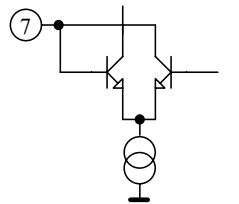
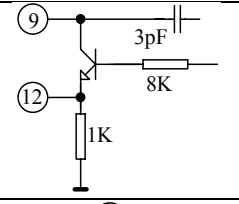
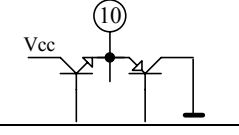
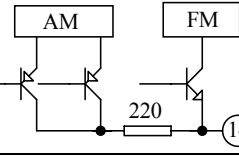
**BLOCK DIAGRAM**



**PIN CONFIGURATIONS**

Pin	Symbol	Description	Voltage (V)				Equivalent circuit
			Vcc=3V		Vcc=6V		
			FM	AM	FM	AM	
1	MUTE		0	0	0	0	
2	FM DISCRI	Phase-Shift circuit, Connect ceramic discriminator	2.18	2.70	4.88	5.43	
3	NF	Negative feedback pin	1.5	1.5	3.0	3.0	
27	AF OUT	Power amplifier output pin	1.5	1.5	3.0	3.0	

**PIN CONFIGURATIONS**

Pin	Symbol	Description	Voltage (V)				Equivalent circuit
			Vcc=3V		Vcc=6V		
			FM	AM	FM	AM	
4	VOL CONT	Connect variable resistor for electronic volume control	1.25	1.25	1.25	1.25	
5	AM OSC	AM local oscillation circuit	1.25	1.25	1.25	1.25	
6	AFC	AFC variable capacitor pin	1.25	*	1.25	*	
8	REG OUT	Regulator pin 1.25V(Typ.)	1.25	1.25	1.25	1.25	
7	FM OSC	FM local oscillation circuit	1.25	1.25	1.25	1.25	
9	FM RF	Connect FM RF tuning coil	1.25	1.25	1.25	1.25	
12	FM RF IN	FM RF input pin	0.3	0	0.3	0	
10	AM RF IN	AM RF input	1.25	1.25	1.25	1.25	
11	NC		0	0	0	0	
13	GND(FE GND)		0	0	0	0	
14	FM/AM FE OUT	IF output pin of FM and AM, Connect IF filter	0.36	0.2	0.36	0.2	

**PIN CONFIGURATIONS**

Pin	Symbol	Description	Voltage (V)				Equivalent circuit
			Vcc=3V		Vcc=6V		
			FM	AM	FM	AM	
15	BAND SELECT	FM and AM bands selection switch pin. During GND it becomes AM and during open it becomes FM	0.84	0	0.88	0	
16	AM IF IN	Input pin of AM IF	0	0	0	0	
17	FM IF IN	Input pin of FM IF	1.3	0	1.3	0	
18	NC		0	0	0	0	
19	METER	Meter drive circuit (For tuning indicator)	1.6	1.6	4.5	4.5	
20	GND		0	0	0	0	
21	AFC/AGC	AFC pin of W band. During AM, it determines time constant of AGC	1.25	1.49	1.25	1.49	
22	AFC/AGC	AFC pin of J band. During AM, it determines time constant of AGC	1.25	1.25	1.25	1.25	
23	DET OUT	Detection output pin	1.25	1.0	1.25	1.0	

**PIN CONFIGURATIONS**

Pin	Symbol	Description	Voltage (V)				Equivalent circuit
			Vcc=3V		Vcc=6V		
			FM	AM	FM	AM	
24	AF IN	Power amplifier input pin	0	0	0	0	
25	RIPPLE FILTER	Ripple filter	2.71	2.71	5.4	5.4	
26	Vcc	Power supply pin	3.0	3.0	6.0	6.0	
28	GND	Power GND	0	0	0	0	

\* Note: The pin voltage of pin 6 during AM, it is the same pin voltage of pin22 during J BAND and is the same pin voltage of pin21 during W BAND.

**ABSOLUTE MAXIMUM RATINGS (Ta=25°C)**

Characteristic	Symbol	Value	Unit
Supply Voltage	Vcc	14	V
Allowable power dissipation	P <sub>D</sub>	700	mW
Operating temperature	T <sub>opr</sub>	-10~60	°C
Storage Temperature	T <sub>stg</sub>	-50~125	°C

**RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	Value	Unit
Supply voltage	Vcc	2~7.5	V

**ELECTRICAL CHARACTERISTICS**

(Unless otherwise specified: Ta=25°C, Vcc=6V)

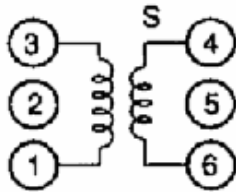
Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
AM circuit current	No signal, AM	I <sub>Q1</sub>		3.5	10	mA
FM circuit current	No signal, FM	I <sub>Q2</sub>		7.0	14	mA
FM front end voltage gain	Vin1=40dBμV, 100MHz	G <sub>V1</sub>	32	39	46	dB
FM detection output level	Vin3=90dBμV, 10.7MHz (1kHz, 22.5kHz,DEV)	V <sub>D1</sub>	39	77.5	155	mVrms
FM-IF knee level	Vin3=90dBμV 10.7MHz (-3dBpoint) (1kHz, 22.5kHz,DEV)	V <sub>D2</sub>		24	32	dBμV
FM detection output distortion factor	Vin3=90dBμV, 10.7MHz (1kHz, 75kHz,DEV)	THD <sub>1</sub>		0.3	2.0	%
FM meter current	Vin3=60dBμV, 10.7MHz	I <sub>B1</sub>	1.8	3.5	7.0	mA
AM front end voltage gain	Vin2=60dBμV, 1660kHz	G <sub>V2</sub>	15	22	29	dB
AM detection output level	Vin3=85 dBμV, 455kHz (1kHz, MOD=30%)	V <sub>D3</sub>	39	77.5	155	mVrms
AM-IF voltage gain	Vin3 when 455kHz (1kHz, MOD=30%) Output is -34dBm	G <sub>V3</sub>	14	20	27	dBμV
AM detection output distortion factor	Vin2=95dBμV, 1660kHz Vcc=7.8V (1kHz, MOD=30%)	THD <sub>2</sub>		0.6	2.0	%
AM meter current	Vin3=85dBμV, 455kHz (1kHz, MOD=30%)	I <sub>B2</sub>	1.3	3.0	7.0	mA
Audio voltage gain	Vin=60dBμV, 10.7MHz Vin4=-30dBm, 1kHz	G <sub>V4</sub>	27	31.5	36	dB
Audio distortion factor	Vin4=-20dBm, 1kHz 10.7MHz, Po=50mW, Vin3=60dBμV	THD		0.3	2.5	%
Audio output power	Vcc=6V, THD=10%, R <sub>L</sub> =8Ω	P <sub>o</sub>	400	500		mW
Muting level	Po=50mW, Vin3=OFF, Vin4=-20dBm, 1kHz	V <sub>D4</sub>	8	15	22	dB



Coil Data

AM OSC

Core diameter  $\phi 0.06\text{mm}$  2UEW

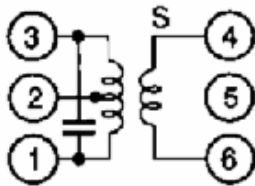


f (kHz)	L( $\mu\text{H}$ ) 1 to 3	Qo 1 to 3	Number of windings(t)	
			1 to 3	4 to 6
796	270	125	107	796

Equivalent to L-5K7-H5 R12-1684X. Mitsumi Electric Co.,Ltd. or 7TRS-8441X TOKO Co., Ltd.

AM IFT

Core diameter  $\phi 0.07\text{mm}$  UEW

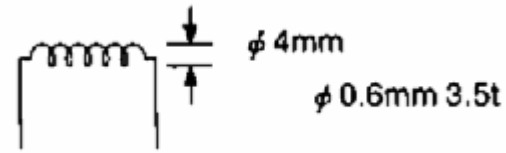
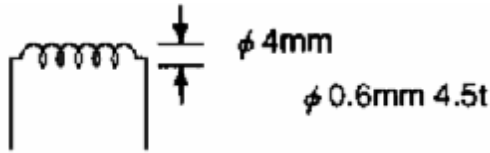


Co(pF) 1 to 3	Qo 1 to 3	Number of windings (t)		
		1 to 2	2 to 3	4 to 6
180	90	111	35	7

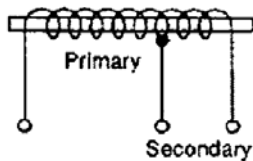
Equivalent to 21K7-H5 R12-8558A. Mitsumi Electric Co.,Ltd. or 7MC-7789N TOKO Co., Ltd.

FM RF

FM OSC



AM bar antenna



f (kHz)	L( $\mu\text{H}$ )	Primary	Secondary
796	650	91t	20t

BPF

PFW8

(88 to 108MHz)

Soshin Electric Co., Ltd.

CF1

SFU-455B

Murata Mfg. Co., Ltd. Or BFCFL-455 TOKO Co., Ltd.

CF2

SFE10.7MA5

Murata Mfg. Co., Ltd.

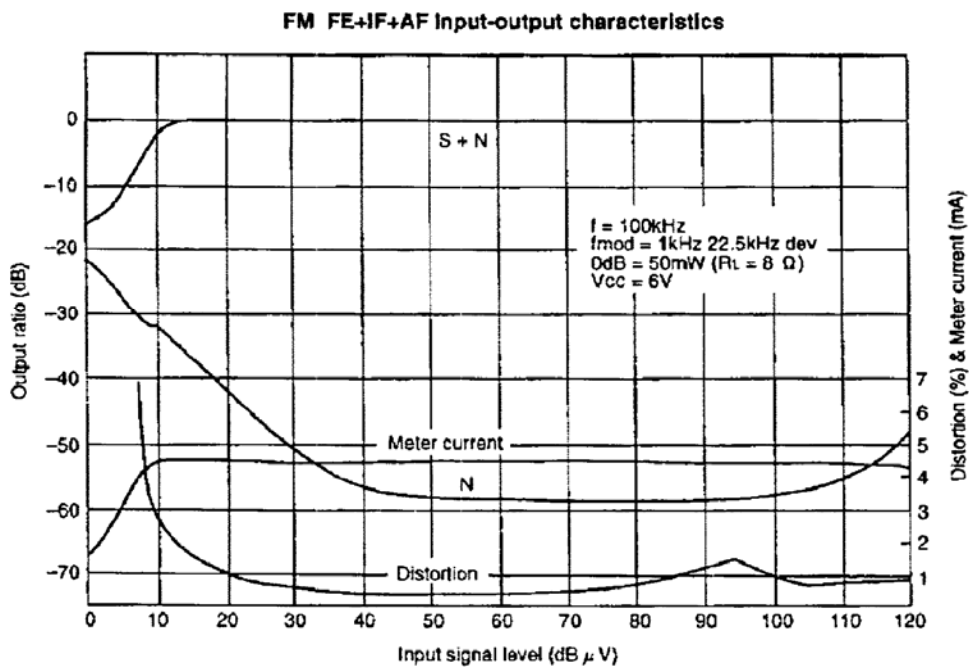
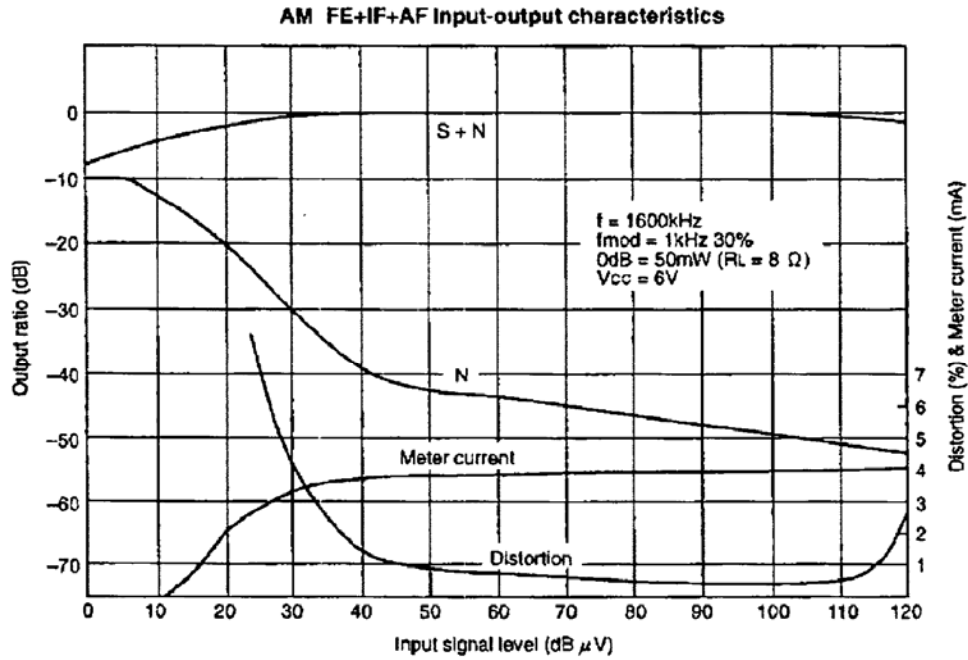
CF3

CDA10.7MC1

Murata Mfg. Co., Ltd.



CHARACTERISTICS CURVES



OUTLINE DRAWING

SOP28:

