

To all our customers

Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.

The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

M62419FP

SOUND CONTROLLER FOR CAR STEREO

FEATURES

- 4-channel source selector with gain setting buffer amplifier by the external resistances
- Volume (balance),loudness,tone (bass and treble) and fader control by serial data from MCU
- Input maximum voltage level ; 2.8Vrms

APPLICATION

Car audio , Mini stereo,etc

RECOMMENED OPERATING CONDITIONS

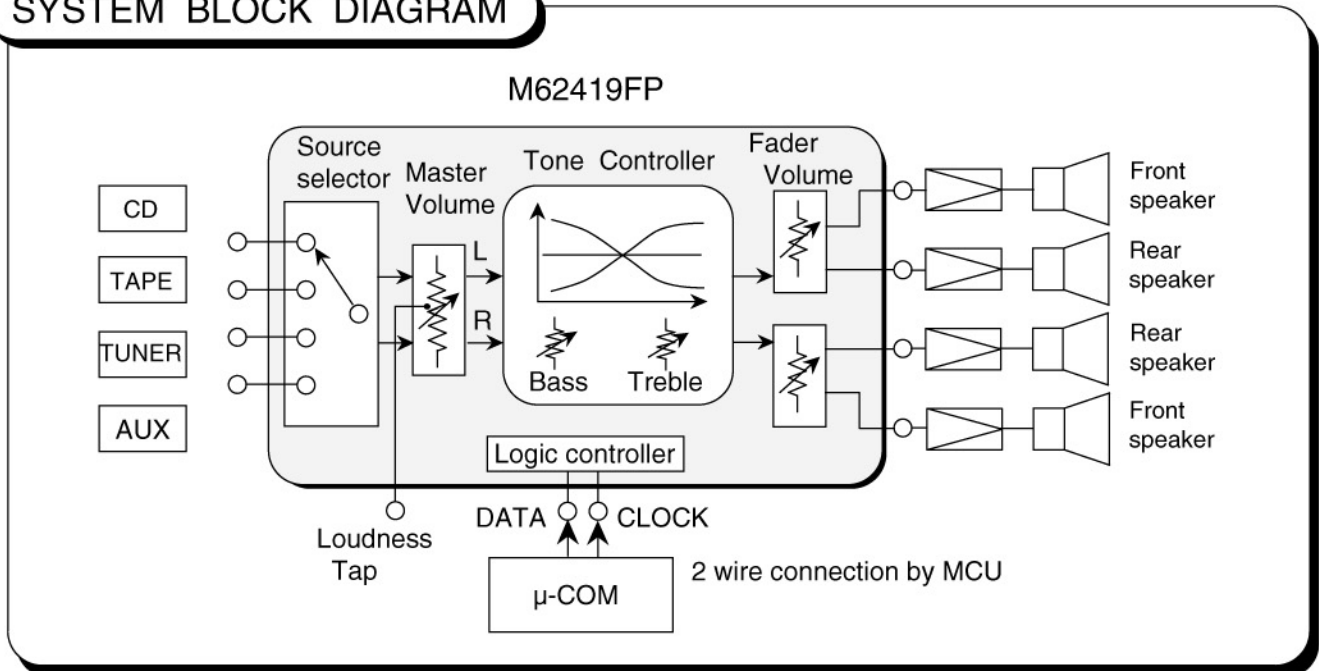
Supply voltage range.....Vcc=6~9V Rated voltage.....Vcc=8V
 Vdd=4~6V Vdd=5V

PACKAGE



42P2R

SYSTEM BLOCK DIAGRAM



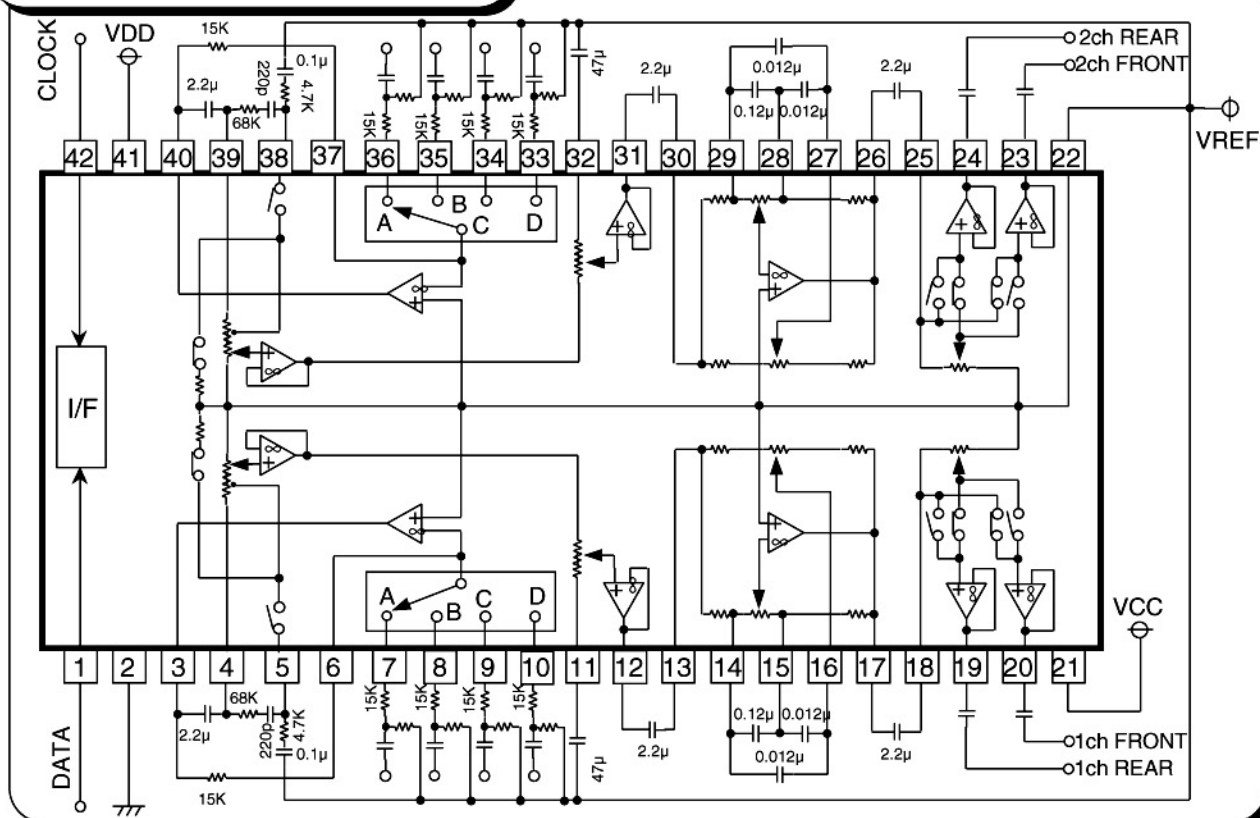
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Conditions	Ratings	Unit
Vcc,Vdd	Supply voltage		10 , 7	V
Pd	Power dissipation		990	mW
Topr	Operating temperature		-30~+85	°C
Tstg	Storage temperature		-40~+125	°C

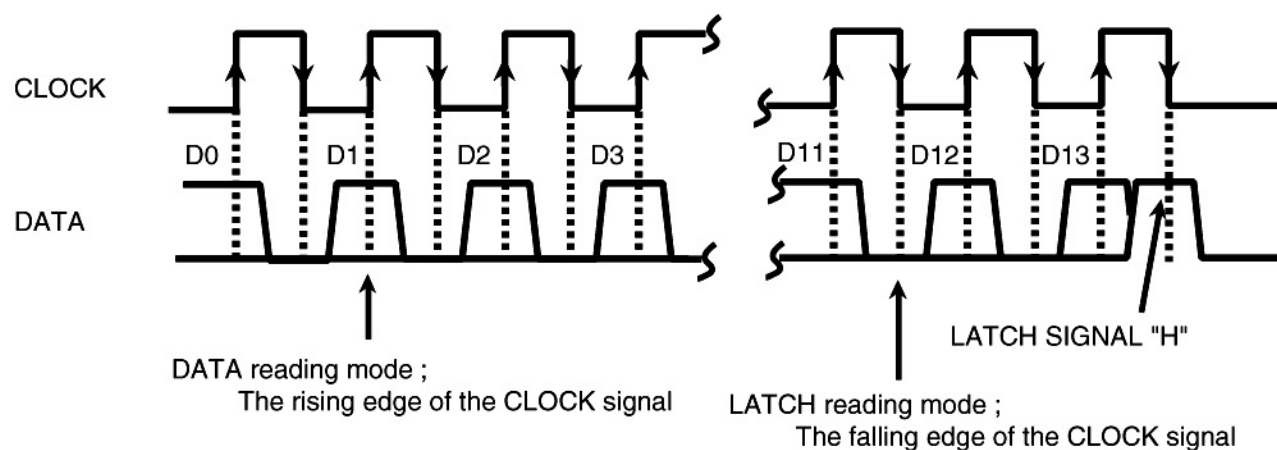
ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Limits			Unit
			Min	typ	Max	
I _{CC}	Circuit current			22	40	mA
A _{TT} (VOL)	Att maximum	A _{TT} (VOL) = - ∞	—	-90	-80	dB
Δ A _{TT} (VOL)	Att error	A _{TT} (VOL) = 0	-2.0	0	2.0	dB
V _{IM}	Maximum input voltage	THD=1%	2.0	2.8	—	Vrms
G(Bass)B	Bass boost	f=100Hz	9	12	15	dB
G(Bass)C	Bass cut	f=100Hz	-15	-12	-9	dB
G(Tre)B	Treble boost	f=10KHz	9	12	15	dB
G(Tre)C	Treble cut	f=10KHz	-15	-12	-9	dB
A _{TT} (FED)	Att maximum	A _{TT} (FED) = - ∞	—	-80	-74	dB
V _{OM}	Maximum output voltage	THD=1%	1.8	2.2	—	Vrms
V _{NO 1}	Output noise voltage	A _{TT} (VOL)=0, A _{TT} (FED)=0 R _g =0, DIN-AUDIO	—	9	18	μVrms
V _{NO 2}		A _{TT} (VOL)=∞, A _{TT} (FED)=∞ R _g =0, DIN-AUDIO	—	5.5	11	
THD	Total harmonic distortion	f=1KHz, V _o =0.5Vrms, Loud=OFF, A _{TT} (VOL)=0, A _{TT} (FED)=0	—	0.003	0.05	%
CS	Channel separation	f=1KHz	—	-90	-80	dB

APPLICATION EXAMPLE



RELATIONSHIP BETWEEN DATA AND CLOCK



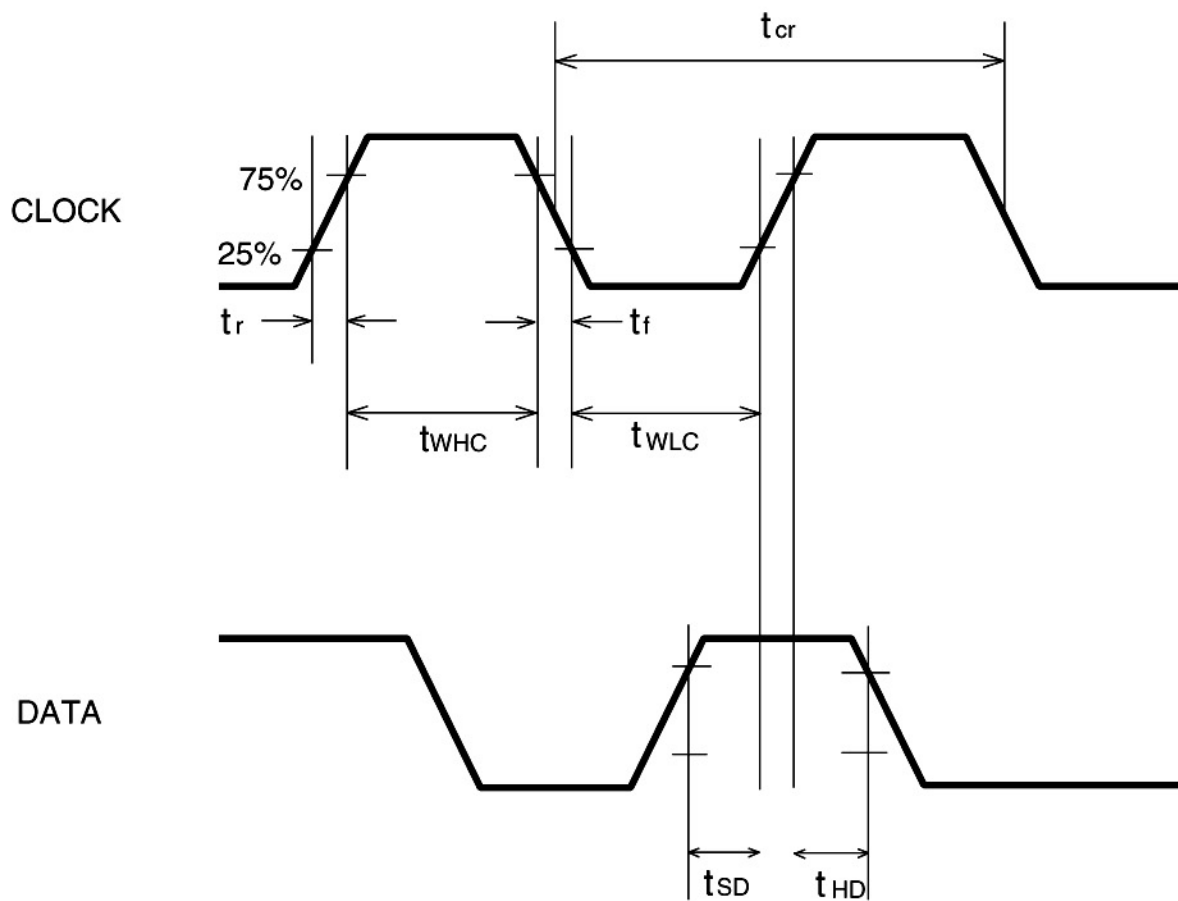
DIGITAL CIRCUIT DC CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	typ	Max	
V_{IL}	"L" level input voltage	DATA, CLOCK pins	0	~	$0.2V_{DD}$	V
V_{IH}	"H" level input voltage		$0.8V_{DD}$	~	V_{DD}	
I_{IL}	"L" level input current	$V_I=0$	-10	-	10	μA
I_{IH}	"H" level input current	$V_I=V_{DD}$	-	-	10	

DIGITAL CIRCUIT AC CHARACTERISTICS

Symbol	Parameter	Limits			Unit
		Min	typ	Max	
t_{cr}	CLOCK Cycle time	4	-	-	μS
t_{WHC}	CLOCK pulse width("H" level)	1.6	-	-	
t_{WLC}	CLOCK pulse width("L" level)	1.6	-	-	
t_r	CLOCK rise time	-	-	0.4	
t_f	CLOCK fall time	-	-	0.4	
t_{SD}	DATA setup time	0.8	-	-	
t_{HD}	DATA hold time	0.8	-	-	

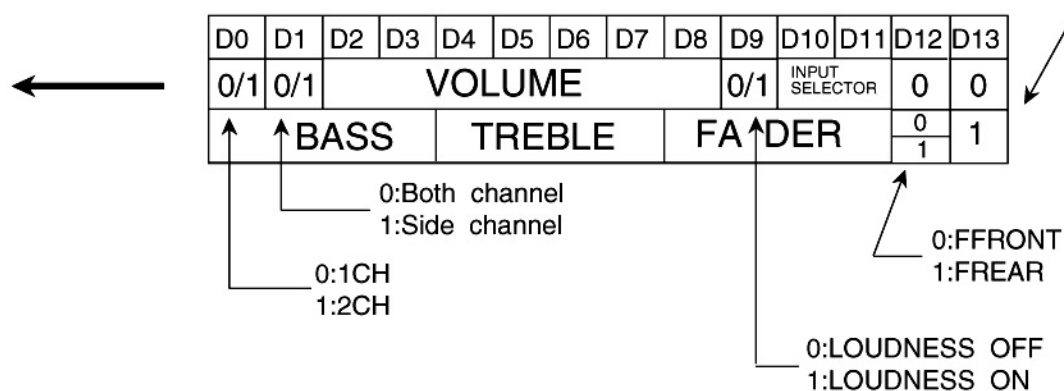
CLOCK DATA TIMING



DATA FORMAT

DATA SELECT

0:VOLUME / LOUDNESS / INPUT SELECTOR
1:BASS / TREBLE / FADER



VOLUME CODE

ATT1	D2	D3	D4	D5	D6
0dB	H	L	H	L	H
-4dB	L	L	H	L	H
-8dB	H	H	L	L	H
-12dB	L	H	L	L	H
-16dB	H	L	L	L	H
-20dB	L	L	L	L	H
-24dB	H	H	H	H	L
-28dB	L	H	H	H	L
-32dB	H	L	H	H	L
-36dB	L	L	H	H	L
-40dB	H	H	L	H	L
-44dB	L	H	L	H	L
-48dB	H	L	L	H	L
-52dB	L	L	L	H	L
-56dB	H	H	H	L	L
-60dB	L	H	H	L	L
-64dB	H	L	H	L	L
-68dB	L	L	H	L	L
-72dB	H	H	L	L	L
-76dB	L	H	L	L	L
-80dB	H	L	L	L	L
-∞	L	L	L	L	L

ATT2	D7	D8
0dB	H	H
-1dB	L	H
-2dB	H	L
-3dB	L	L

TONE CODE

BASS	D0	D1	D2	D3
TREBLE	D4	D5	D6	D7
12dB	H	H	H	H
10dB	L	H	H	H
8dB	H	L	H	H
6dB	L	L	H	H
4dB	H	H	L	H
2dB	L	H	L	H
0dB	H	L	L	H
-2dB	L	L	L	H
-4dB	H	H	H	L
-6dB	L	H	H	L
-8dB	H	L	H	L
-10dB	L	L	H	L
-12dB	H	H	L	L

FADER CODE

FADER	D8	D9	D10	D11
0dB	H	H	H	H
-1dB	L	H	H	H
-2dB	H	L	H	H
-3dB	L	L	H	H
-4dB	H	H	L	H
-6dB	L	H	L	H
-8dB	H	L	L	H
-10dB	L	L	L	H
-12dB	H	H	H	L
-14dB	L	H	H	L
-16dB	H	L	H	L
-20dB	L	L	H	L
-30dB	H	H	L	L
-45dB	L	H	L	L
-60dB	H	L	L	L
-∞	L	L	L	L

INPUT SELECTOR CODE

INPUT SELECTOR	D10	D11
A CH	H	H
B CH	L	H
C CH	H	L
D CH	L	L