


SANYO Semiconductors

DATA SHEET

Monolithic Linear IC

LA7458W — 8mm VCR monaural audio signal processing system

Overview

The LA7458W is a 8mm VCR monaural audio signal processing system.

Functions

- Speaker amplifier
- Monaural audio system with built-in bandpass filter
- FM modulation and demodulation

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		7	V
Allowable power dissipation	Pd max	Ta ≤ 65°C *	650	mW
Operating temperature	Topr		-10 to +65	°C
Storage temperature	Tstg		-55 to +150	°C

* When mounted on a 114.3mm×76.1mm×1.6mm, glass epoxy board.

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V _{CC1}	Pin 20 and pin 57	3.15	V
	V _{CC2}	Pin 57	4.8	V
	V _{CC3}	Pin 35	4.8	V
Allowable operating voltage range	V _{CC1} opg		3.0 to 3.6	V
	V _{CC2} opg		4.5 to 5.5	V
	V _{CC3} opg		4.5 to 6.0	V

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LA7458W

Electrical Characteristics at Ta = 25°C, V_{CC1} = 3.15V, V_{CC2} = 4.8V, V_{CC3} = 4.8V

Parameter	Symbol	Input point	Test point	Conditions	Ratings			Unit
					min	typ	max	
Record mode current consumption 1	I _{CC3R1}		9	V _{CC1} = 3.15V, record mode, no signal Speaker and headphone amplifiers off	14.5	18.5	22.5	mA
Record mode current consumption 2	I _{CC5R1}		9	V _{CC1} = 4.8V, record mode, no signal Speaker and headphone amplifiers off	2.6	3.2	3.8	mA
Record mode current consumption 3	I _{CC3R2}		9	V _{CC2} = 3.15V, record mode, no signal Speaker amplifier on	15.0	19.0	23.0	mA
Record mode current consumption 4	I _{CC5R2}		9	V _{CC2} = 4.8V, record mode, no signal Speaker amplifier on	10.5	13.5	16.5	mA
Record mode current consumption 5	I _{CC3R3}		9	V _{CC1} = 3.15V, record mode, no signal Headphone amplifier on	15.0	19.0	23.0	mA
Record mode current consumption 6	I _{CC5R3}		9	V _{CC2} = 4.8V, record mode, no signal Headphone amplifier on	6.0	7.5	9.0	mA
Playback mode current consumption 1	I _{CC3P1}		9	V _{CC1} = 3.15V, playback mode, no signal Speaker amplifier on	17.0	21.5	26.0	mA
Playback mode current consumption 2	I _{CC5P1}		9	V _{CC1} = 4.8V, playback mode, no signal Speaker amplifier on	10.5	13.5	16.5	mA
Playback mode current consumption 3	I _{CC3P2}		9	V _{CC1} = 3.15V, playback mode, no signal Headphone amplifier on	17.0	21.5	26.0	mA
Playback mode current consumption 4	I _{CC5P2}		9	V _{CC1} = 4.8V, playback mode, no signal Headphone amplifier on	6.0	7.5	9.0	mA
Internal microphone power supply output voltage	DCMIC		10	The pin 60 DC voltage when connected to a 10kΩ load	2.15	2.3	2.45	V
Microphone amplifier voltage gain 1	VGMIC1	1	1	Internal microphone input	15	16	17	dB
Microphone amplifier voltage gain 2	VGMICE	2	1	External microphone input	21	22	23	dB
Microphone amplifier distortion	THMIC	1, 2	1	Internal and external microphones, V _O = -10dBs		0.05	0.20	%
Microphone amplifier maximum output	V _O MAX	1, 2	1	Internal and external microphones, THD = 1%	-6.5	-5.0		dBs
Microphone amplifier output noise voltage 1	V _N MIC1	1	1	Internal microphone, R _g = 1kΩ, A-curve filter		-99	-95	dBs
Microphone amplifier output noise voltage 2	V _N MICE	2	1	External microphone, R _g = 1kΩ, A-curve filter		-95	-91	dBs
Microphone amplifier input impedance	ZINMIC	1, 2		Internal and external microphones	56	70	84	kΩ
Microphone mode Line reference output voltage	V _O ML	3	2	V _{IN} = -43dBs, f = 400Hz	-8	-7	-6	dBs
Microphone mode Line output distortion (THD)	THAL1	3	2	V _{IN} = -43dBs, f = 1kHz		0.15	0.30	%
Microphone ALC Line reference output level	V _O AL	3	2	V _{IN} = -23dBs, f = 400Hz	-5	-3	-1	dBs
Microphone ALC Line output distortion (THD)	THAL2	3	2	V _{IN} = -23dBs, f = 1kHz		0.4	0.6	%
Microphone ALC mode Maximum input level	V _O LN	3	2	f = 1kHz, THD = 1%			-7	dBs
Line muting attenuated output level	V _M LM	3	2	V _{IN} = -33dBs, f = 1kHz, A-curve filter		-73	-71	dBs
Maximum attenuation fader output	VFAL	3	2	V _{IN} = -43dBs, f = 1kHz, A-curve filter			-69	dBs

Note : Unless otherwise specified, a 30kHz low-pass filter is used. For level measurements, f = 400Hz. Distortion and crosstalk related measurements are tested with f = 1kHz.

Note : Input point 1.INT MIC IN 2.EXT MIC IN 3.ALC MIC IN 4.ALC LINE IN 5.SP/HP AMP IN 6.PB FM IN
Test point 1.MIC AMP OUT 2.LINE OUT 3.EVR OUT 4.REC NR OUT 5.SP AMP OUT 6.HP AMP OUT 7.REC FM OUT 8.BPF MONITOR
9.V_{CC} input current 10.INT MIC V_{CC}

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Parameter	Symbol	Input point	Test point	Conditions	Ratings			Unit
					min	typ	max	
E-E system monitor frequency characteristics 1	V _{OLF1}	3	2	V _{IN} = -43dBs The ratio of the 20kHz/400Hz levels	-2	0	1	dBs
E-E system monitor frequency characteristics 2	V _{OLF2}	3	2	V _{IN} = -43dBs The ratio of the 50kHz/400Hz levels			-5	dBs
Microphone mode output noise voltage	V _{NAL}	3	2	R _g = 1k Ω , A-curve filter		-68	-66	dBs
Microphone/line inter-input crosstalk	V _{CTIN}	3, 4	2	V _{IN} = -28dBs, 1k Ω , A-curve filter *1		-73	-69	dBs
Electronic volume control standard output level	V _{EVRTYP}	4	3	V _{IN} = -34dBs, line mode With the electronic volume control at its center setting	-34	-32	-30	dBs
Electronic volume control maximum output level	V _{EVRTYP}	4	3	V _{IN} = -34dBs, line mode With the electronic volume control at its maximum setting	-17	-20	-15	dBs
Electronic volume control minimum output level	V _{EVRTYP}	4	3	V _{IN} = -34dBs, line mode With the electronic volume control at its maximum setting		-89	-85	dBs
Speaker amplifier voltage gain	V _{GSP}	5	5	V _{IN} = -20dBs, f = 1kHz, R _L = 16 Ω	24.6	25.6	26.6	dB
Speaker amplifier distortion	THSP	5	5	V _{IN} = -20dBs, f = 1kHz, R _L = 16 Ω		0.2	1.0	%
Speaker amplifier maximum output	V _O SP	5	5	THD = 10%, R _L = 16 Ω	10			dBs
Speaker amplifier output noise voltage	V _N SP	5	5	R _g = 1k Ω , A-curve filter, R _L = 16 Ω		-83	-78	dBs
H/P amplifier voltage gain	V _G HP	5	6	V _{IN} = -20dBs, f = 1kHz, R _L = 16 Ω	5.5	6.5	7.5	dB
H/P amplifier distortion	THHP	5	6	V _{IN} = -20dBs, f = 1kHz, R _L = 16 Ω		0.1	1.0	%
H/P amplifier maximum output	V _O HP	5	6	THD = 10%, R _L = 16 Ω	-5			dBs
H/P amplifier output noise voltage	V _N HP	5	6	R _g = 1k Ω , A-curve filter, R _L = 16 Ω		-95	-90	dBs
NR encoder standard output level	V _O RL	4	4	V _{IN} = -33dBs, 400Hz, line input	-21	-20	-19	dBs
NR encoder frequency linearity	V _O XL	4	4	V _{IN} = -33dBs and -73dBs, line input, the ratio of those levels	-22.5	-21.5	-20.5	dB
NR encoder frequency characteristics SP mode	V _F SRL	4	4	V _{IN} = -33dBs The ratio of the 10kHz/400Hz levels	3.8	4.8	5.8	dB
NR encoder frequency characteristics LP mode (NTSC only)	V _F PRL	4	4	V _{IN} = -43dBs f = 10kHz, the ratio of LP/SP modes	2.5	3.0	3.5	dB
VCO (NTSC mode) 1.5MHz oscillator frequency	FONT		7	fsc = 3.579545 (Hz)	1.499	1.500	1.501	MHz
VCO (PAL mode) 1.5MHz oscillator frequency	FOPA		7	fsc = 4.433619 (Hz)	1.499	1.500	1.501	MHz
VCO output level (1.5MHz)	V _V CO		7	Measure the 1.5MHz carrier level.	198	220	245	mVp-p
FM (VCO) output second-order harmonic distortion, 1.5MHz	V _V CO2		7	NTSC mode With the reference event flag at 0dB.		-45	-35	dB
FM (VCO) output third-order harmonic distortion, 1.5MHz	V _V COL		7	NTSC mode With the reference event flag at 0dB.		-38	-34	dB
VCO (PM-record) reference frequency deviation, 1.5MHz	FDO	4	7	V _{IN} = -33dBs, 400Hz, line input, SP mode	±57	±60	±63	kHz
Standard FM modulation distortion	THDFM	4	7	V _{IN} = -33dBs, 400Hz line input, SP mode, up to the 10th order		0.2	0.4	%
Overmodulation prevention limiter level	FDMX	4	7	The frequency shift when the FM modulation distortion is 1%.	±100	±110	±120	k/Hz
Bandpass filter monitor level	BFM150	6	8	V _{IN} = 15.0mVp-p, f = 1.50MHz, SP mode	80	105	130	mVp-p

Note : When one of the two inputs is in the no input state, the other input is has a reference signal input, and the no input state input is selected.

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Parameter	Symbol	Input point	Test point	Conditions	Ratings			Unit
					min	typ	max	
Bandpass filter frequency characteristics 1.00MHz/1.50MHz	BFM100	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.00\text{MHz}$		-35	-31	dB
Bandpass filter frequency characteristics 1.20MHz/1.50MHz	BFM200	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.20\text{MHz}$		-34	-30	dB
Bandpass filter frequency characteristics 1.30MHz/1.50MHz	BFM130	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.30\text{MHz}$		-15.5	-14.5	dB
Bandpass filter frequency characteristics 1.40MHz/1.50MHz	BFM140	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.40\text{MHz}$	-6	-4	-2	dB
Bandpass filter frequency characteristics 1.60MHz/1.50MHz	BFM160	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.60\text{MHz}$	-6	-4	-2	dB
Bandpass filter frequency characteristics 1.70MHz/1.50MHz	BFM170	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.70\text{MHz}$		-14.0	-13.0	dB
Bandpass filter frequency characteristics 1.80MHz/1.50MHz	BFM180	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 1.80\text{MHz}$		-23	-19	dB
Bandpass filter frequency characteristics 2.00MHz/1.50MHz	BFM200	6	8	$V_{IN} = 15.0\text{mVp-p}$, $f = 2.00\text{MHz}$		-23	-19	dB
LP/SP Bandpass filter input/output gain difference	GBLPSP	6	8	$V_{IN} = 2.5\text{mVp-p}$, $f = 1.50\text{MHz}$, LP/SP	1	2	3	dB
Playback FM demodulation output voltage	VBLPL	6	2	$V_c = 15\text{mVp-p}$ 1.5MHz, DEV = 60kHz, fm = 400kHz	-9	-7	-5	dBs
Playback FM demodulation output distortion	THBLPL	6	2	$V_c = 15\text{mVp-p}$ 1.5MHz, DEV = 60kHz, fm = 1kHz		0.2	0.4	%
Playback FM demodulation output noise	VNRP	6	2	$V_c = 15\text{mVp-p}$ 1.5MHz, DEV = 0kHz, SP mode		-80	-74	dBs
Self record-playback level	VBRP			The difference between the EE mode line output level and the self record/playback output level	-0.5	0	0.5	dB
Dropout detection on level	DODON	6	7	$V_c = 15\text{mVp-p}$ is set to 0dB fc = 1.5MHz, SP mode	-15	-12	-9	dB
Dropout detection off hysteresis	DODOFF	6	7	The difference with DODON when $V_c = 15\text{mVp-p}$ is set to 0dB.	3	5	7	dB
Muting on time	TMTON	6	7		260	340	430	μs
Muting release time Muting hold time (NTSC)	TMIOFF	6	7	The muting hold time when muting is released	130	150	170	ms
Hold start time	THOSL	6	7	The time from PG input to hold start.	1.0	1.5	2.0	μs
Hold complete time	THOFL	6	7	The time from PG input to hold termination.	8.5	10.0	11.5	μs
Serial/parallel switching Hold voltage - serial mode	V48SI				2.8		V_{CC1}	V
Serial/parallel switching Hold voltage - parallel mode	V48PA			Parallel when open	0		2.0	V
SP/LP switching Hold voltage - SP mode	V48SP			SP when open	1.6		2.0	V
SP/LP switching Hold voltage - LP mode	V48LP				0		0.8	V
NTSC/PAL switching Hold voltage - NTSC	V55NT				2.0		V_{CC2}	V
NTSC/PAL switching Hold voltage - PAL	V55PA			PAL when open	0		1.0	V
Line mute switching Hold voltage - Mute on	V46MO				2.5		V_{CC2}	V
Line mute switching Hold voltage - Mute off	V46MF			Mute off when open	0		1.0	V
Playback/record switching Hold voltage - Playback mode	V54PB				2.5		V_{CC2}	V

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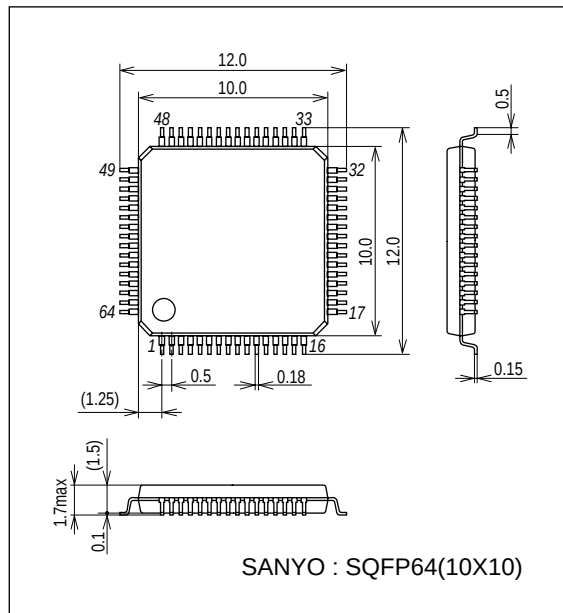
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Parameter	Symbol	Input point	Test point	Conditions	Ratings			Unit
					min	typ	max	
Playback/record switching Hold voltage - Record mode	V54RE			Record mode when open	0		1.0	V
Input switching hold voltage External microphone mode	V53EXT			External microphone when open	1.5		2.3	V
Input switching hold voltage Internal microphone mode	V53INT				2.9		3.5	V
Input switching hold voltage Line input mode	V53LIN				0		0.8	V
PLL quick charge hold voltage - on	V16PON				2.0		V _{CC2}	V
PLL quick charge hold voltage - off	V16POFF				0		1.0	V
SC, DATA, CLK low-level input voltage	VSIL				0		1.0	V
SC, DATA, CLK high-level input voltage	VSIH				2.0		V _{CC1}	V
Camera record switching hold voltage Camera record mode	V47H				2.0		V _{CC2}	V
Camera record switching hold voltage Modes other than camera record mode	V47L			Modes other than camera record when open	0		1.0	V
A-switch pulse High-level input voltage	V25H				2.5		V _{CC2}	V
A-switch pulse Low-level input voltage	V25L				0		1.0	V

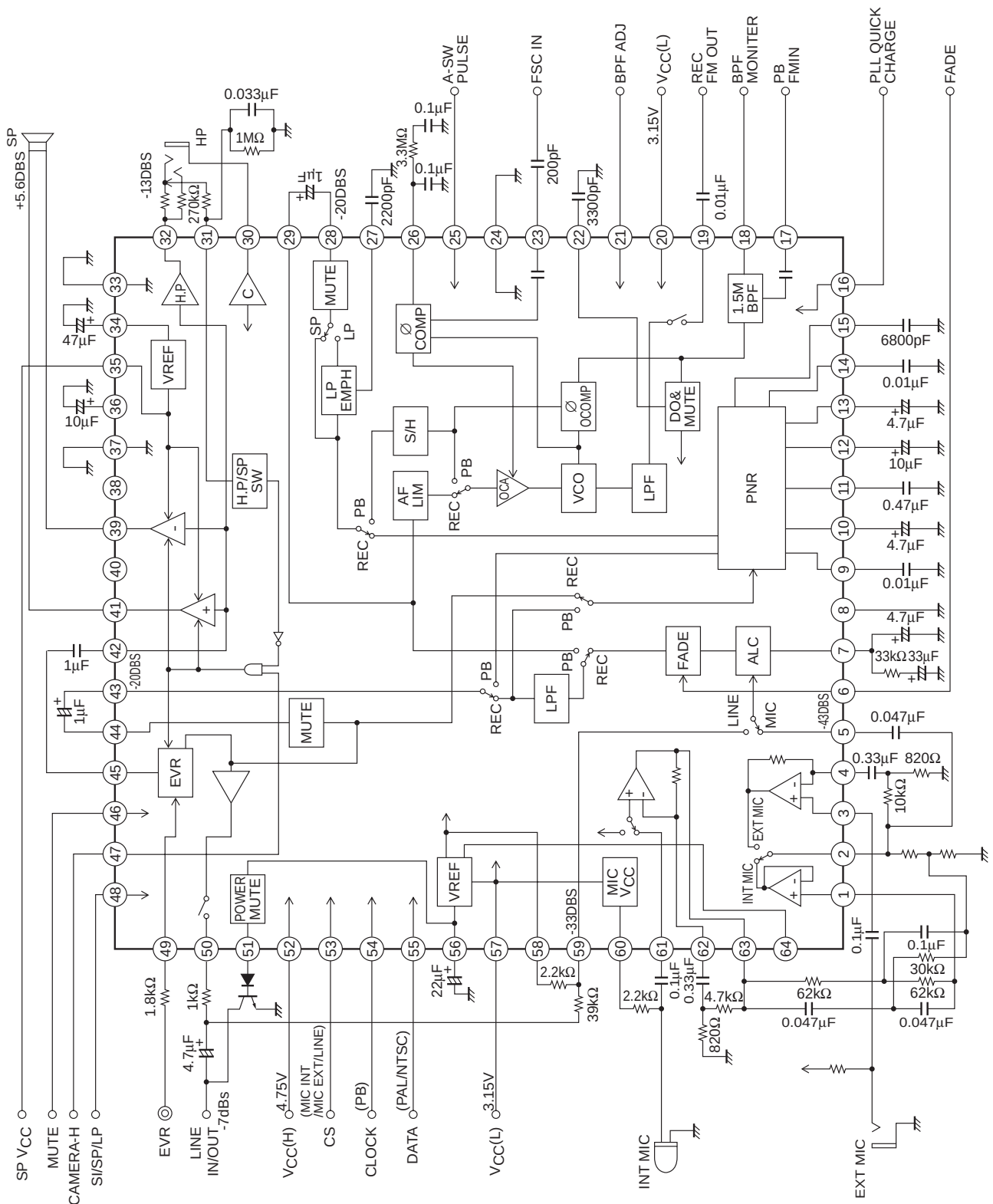
Package Dimensions

unit : mm (typ)

3190A



Block Diagram



Pin Functions

Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
1	BUFFER IN			External filter buffer input. This is a high-impedance input.	
2	MIC OUT	1.575V (VREFL)		Microphone amplifier output. This is a low-impedance output.	
3	EXT MIC IN	1.575V		External microphone input. The input impedance is 70kΩ.	
4	EXT MIC ANP FB			External microphone amplifier negative feedback input.	
5	MIC ALC IN	1.85V (VREFH)	Standard input: -43dB	Microphone input (ALC).	
6	FADE CTL			Fader control input. The input voltage must be between 0V and VCC1.	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
7	ALC FILTER			An external capacitor is connected between this pin and ground for ALC detection. IR MIC $\approx 0.4\mu\text{A}$ LINE $\approx 0.1\mu\text{A}$	
8	GND			Ground for the block that handles low-level audio signals.	
9	WEIGHTING	1.575V		Audio weighting characteristics are created by an external capacitor connected to this pin and an internal 2.9kΩ resistor.	
10	NR FWR	1.575V		Audio weighting characteristics are created by an external capacitor connected to this pin and an internal 4.5kΩ resistor.	
11	NR HOLD			The NR characteristics hold function is created by connecting an external capacitor between this pin and ground.	
12	NR DET			The NR signal is detected by connecting an external capacitor between this pin and ground.	
13	VCA BIAS	1.575V		Adds bias to the NR VCA.	
14	EMPHASIS2	1.575V		This pin creates the NR emphasis 2 characteristics.	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
15	EMPHASIS1	1.575V		This pin creates the NR emphasis 1 characteristics.	
16	PLL QUICK CHARGE			This pin is used to make the record PLL pull-in time faster. (This is performed forcibly internally at power on.) When from 2.0V to V _{CC2} : the PLL quick charge function is enabled. When from 0V to 1.0V or open: this function is turned off.	
17	PB FMIN			Playback FM input. The standard input is a 15mVp-p AFM signal.	
18	BPF MONITER		130mVp-p	Bandpass filter output monitor.	
19	REC FM OUT		220mVp-p	In record mode, the FM output. In playback mode, functions as the muting state monitor or if pin 27 is at the ground level, the S/H and DO monitor.	
20	V _{CC} L	3.15V		V _{CC3} for the block that handles low-level audio signals. This is a V _{CC} that operates at 3.15V.	
21	BPF ADJ	1.65V		Bandpass filter control current control.	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
22	MUTE DET			Playback self-muting detection filter connection.	
23	FSC IN	1.8V		FSC input. The input level is 300 to 400mVp-p.	
24	GND			Ground for blocks that handle high frequencies (FM).	
25	A-SW PULSE			RF switching pulse input.	
26	PLL FILTER	1.575V		Record system PLL low-pass filter.	
27	LP EMPHASIS	1.575V		Creates the LP emphasis characteristics (NTSC mode only). If this pin is pulled to ground, pin 19 will function as the DO and S/H monitor.	
28	NR OUT/S/H OUT	1.575V	In standard input mode : -20dBs	In playback mode : S/H output In record mode : NR output	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
29	AF LIM IN/AF LPF IN	1.575V	In standard input mode : -20dBs	In playback mode : AF low-pass filter input In Record mode : AF limiter internal	
30	HP COMMON	2.1V		HP common. Can be used without a capacitor by outputting the same DC level as the HP output pin.	
31	SP/HP SELECT			Switches between HP and SP mode. When open, HP mode is selected. When shorted to the common pin, SP mode is selected.	
32	HP OUT	2.1V	VR max 13dBs	HP output.	
33	GND			Ground for the speaker and headphone amplifier block.	
34	VREF FIL	2.2V		VREF ripple rejection filter connection.	
35	SP VCC	4.8V		VCC for the speaker and headphone amplifier block.	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
36	VREF FIL2	2.28V		VREF ripple rejection filter connection.	
37	GND			Ground for the logic circuit and line amplifier blocks	
38	N.C.				
39	SP OUT ⁻	2.1V	When VR is maximum : -0.4dBs	Speaker output. This is the BTL amplifier minus side output.	
40	N.C.				
41	SP OUT ⁺	2.1V	When VR is maximum : -0.4dBs	Speaker output. This is the BTL amplifier plus side output.	
42	SP/HP AMP IN	2.2V	When VR is maximum : -20dBs	Speaker and headphone input.	
43	AF OUT				

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
44	AF IN	1.575V			
45	EVR OUT	1.575V	When VR is maximum : -20dBs	Electronic volume control output.	
46	MUTE CTL			Muting control. Open : Muting low	
47	CAMERA H			When the camera is used, setting this pin high stops the speaker and headphone functions and reduces power consumption. Note, however, that the IC will not switch to power saving mode if a headphone jack is inserted.	
48	SI/SP/LP CTL			Serial/parallel control selection and SP/LP control.	
49	EVR CTL			Electronic volume control input. Since it is possible that a large current could flow if power is applied to an IC connected to this pin when power is not applied to this IC, a resistor with a value under 2kΩ must be inserted to function as a limiting resistor.	
50	LINE IN/OUT		Standard input : -7dB	Line input/output shared-function connection.	

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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
51	POWER MUTE OUT			External muting transistor drive output.	
52	V _{CC} H	4.8V		V _{CC} for blocks that handle comparatively high-level audio signals.	
53	CS (MIC INT /MIC EXT/LINE)			Chip select input in serial control mode. Used for internal/external microphone and line input switching in parallel control mode.	
54	CLOCK (PB/REC)			Clock input in serial control mode. Used for playback/record switching in parallel control mode.	
55	DATA (PAL/NTSC)			Data input in serial control mode. Used for PAL/NTSC switching in parallel control mode.	
56	VREF PIL	2.3V		Connection for the external capacitor used for internal circuit (VREF) ripple rejection.	
57	V _{CC} L	3.15V		V _{CC} for blocks that handle high frequencies (FM).	
58	VREF H OUT	1.85V		VREF bias voltage output.	

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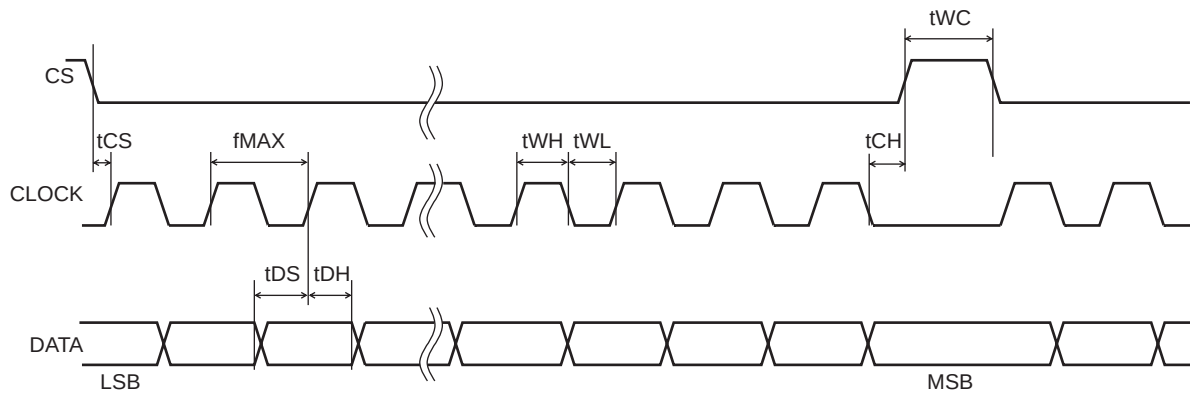
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Pin No.	Pin name	DC voltage	AC voltage	Function	Equivalent Circuit
59	LINE IN	1.85V (VREFH)	Standard input : -33dBs	Line input (ALC).	
60	INT MIC V _{CC}	2.3V		Internal microphone power supply.	
61	INT MIC IN	1.575V		Internal microphone amplifier input. The input impedance is 70kΩ.	
62	INT MIC MAP FB			Internal microphone amplifier negative feedback input.	
63	INT MIC OUT	1.575V		Internal microphone amplifier output. This is a low-impedance output.	
64	VREF L OUT	1.575V		VREF bias voltage output.	

Serial Control States

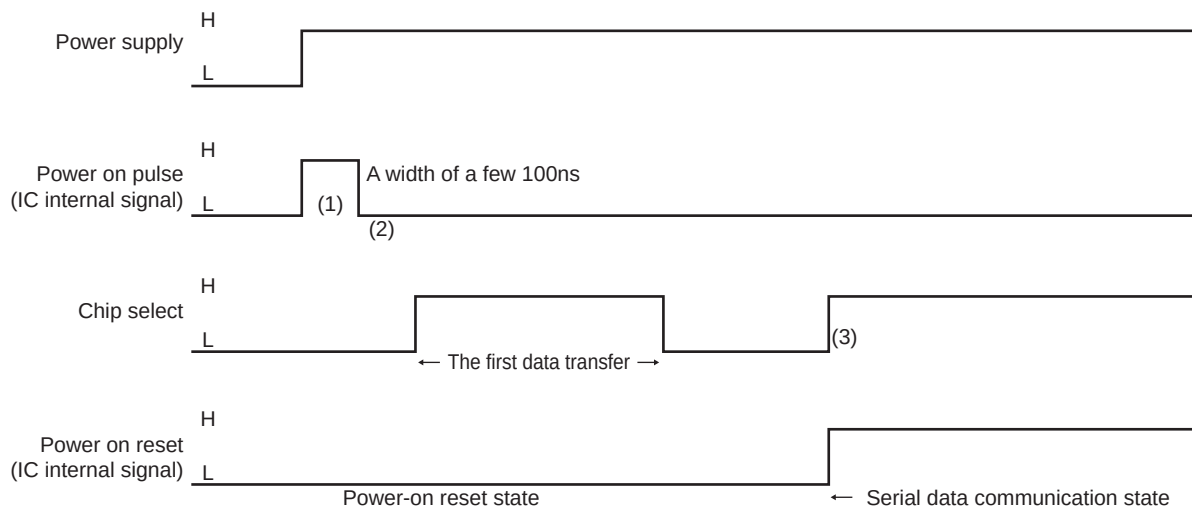
No.	Data contents	Serial communication control		Power on state
1	DUMMY			
2	DUMMY			
3	DUMMY			
4	DUMMY			
5	PLL QUICK CHARGE	H : PLL QUICK CHARGE ON	L : OFF	PLL QUICK CHARGE
6	DUMMY			
7	DUMMY			
8	DUMMY			
9	DUMMY			
10	CAMERA REC	H : CAMERA REC	L : Modes other than camera record mode	CAMERA REC
11	INPUT SEL1	H : MIC INT	L : MIC EXT	MIC INT
12	INPUT SEL2	H : MIC	L : LINE	MIC
13	SP/LP	H : NTSC	L : LP	SP
14	NTSC/PAL	H : NTSC	L : PAL	NTSC
15	MUTE ON/OFF	H : MUTEON	L : MUTE OFF	MUTE ON
16	PB/REC	H : PB	L : REC	REC

Serial Transfer Timing



Maximum clock frequency	f_{MAX}	800kHz
Clock pulse width (low)	t_{WL}	At least 625 ns
Clock pulse width (high)	t_{WH}	At least 625 ns
Chip enable setup time	t_{CS}	At least 625 ns
Chip enable hold time	t_{CH}	At least 625 ns
Data setup time	t_{DS}	At least 625 ns
Data hold time	t_{DH}	At least 625 ns
Chip enable pulse width	t_{WC}	At least 625 ns

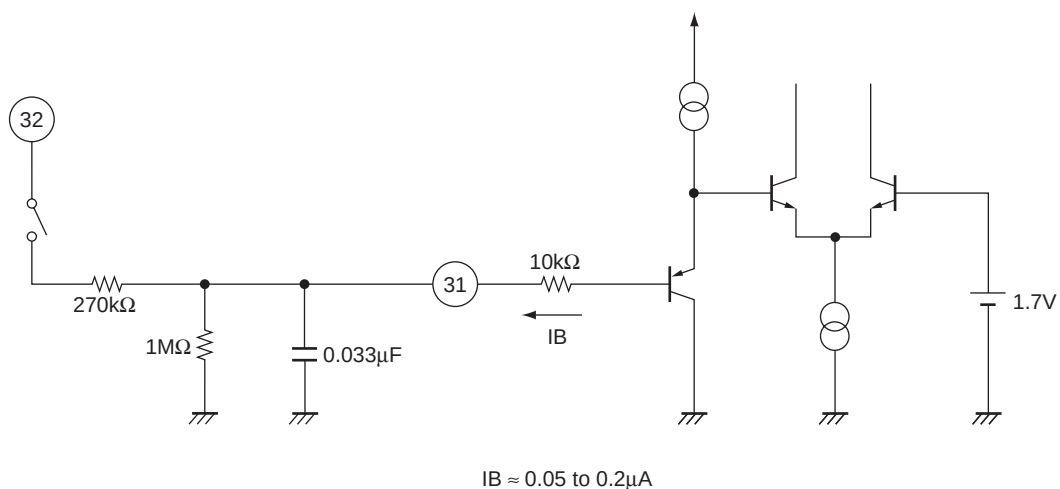
Serial Transfer Timing



The power on reset state continues until the second chip select signal rising edge input after the falling edge (2) of the power on pulse (1) created internally to the IC when the power is applied. Therefore, the first data communication operation is invalid and the data communication operations following the second chip select rising edge (3) are valid.

Notes on headphone/speaker switching and the power saving state

- This IC can switch automatically between the headphone amplifier and the speaker amplifier when the headphone jack is inserted or removed by using a headphone jack that includes a switch. When the headphone jack is inserted the headphone amplifier operates, and the speaker amplifier is turned off. When the headphone jack is removed, the speaker amplifier operates and the headphone amplifier is turned off.
- When the speaker amplifier is operating, if the IC's pin 47, the CAMERA-H pin, goes high, the speaker amplifier will be turned off to save power. The headphone amplifier, however, will remain operating even if the CAMERA-H pin goes high.
- When pin 46, the MUTE pin, is high, the headphone and speaker amplifiers are forcibly turned off to save power regardless of the states of the headphone jack and CAMERA-H pin.
- Smoothing is applied using an external RC circuit to prevent impulse noise at switching.
- Open headphone condition: $V_{31} \leq 0.3V$



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Switch Operation Table

Parameter	Symbol	Input point	Test point	SW No.																Remark
				1	3	5	6	16	23	31	42	46	47	48	53	54	55	59	61	
Record mode current consumption 1	I _{CC} 3R1		A20+ A57	B	B	B	B	B	A	A	B	B	A	B	A	A	A	B	B	
Record mode current consumption 2	I _{CC} 5R1		A35+ A52	B	B	B	B	B	A	A	B	B	A	B	A	A	A	B	B	
Record mode current consumption 3	I _{CC} 3R2		A20+ A57	B	B	B	B	B	A	A	B	B	B	B	A	A	A	B	B	
Record mode current consumption 4	I _{CC} 5R2		A35+ A52	B	B	B	B	B	A	A	B	B	B	B	A	A	A	B	B	
Record mode current consumption 5	I _{CC} 3R3		A20+ A53	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	B	
Record mode current consumption 6	I _{CC} 5R3		A35+ A52	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	B	
Playback mode current consumption 1	I _{CC} 3P1		A20+ A57	B	B	B	B	B	A	A	B	B	B	B	A	B	A	B	B	
Playback mode current consumption 2	I _{CC} 5P1		A35+ A52	B	B	B	B	B	A	A	B	B	B	B	A	B	A	B	B	
Playback mode current consumption 3	I _{CC} 3P2		A20+ A57	B	B	B	B	B	A	B	B	B	B	B	A	B	A	B	B	
Playback mode current consumption 4	I _{CC} 5P2		A35+ A52	B	B	B	B	B	A	B	B	B	B	B	A	B	A	B	B	
Internal microphone power supply output voltage	DCMIC		TA60	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	B	
Microphone amplifier voltage gain 1	V _G MICI	TA61	TA63	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	A	
Microphone amplifier voltage gain 2	V _G MICE	TA3	TA2	B	A	B	B	B	A	B	B	B	B	B	B	A	A	B	B	
Microphone amplifier distortion	THMIC	TA61 TA3	TA63 TA2	B	B A	B	B	B	A	B	B	B	B	B	A B	A	A	B	A B	
Microphone amplifier maximum output	V _O MAX	TA61 TA3	TA63 TA2	B	B A	B	B	B	A	B	B	B	B	B	A B	A	A	B	A B	
Microphone amplifier output noise voltage 1	V _N MICI	TA61	TA63	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	A	
Microphone amplifier output noise voltage 2	V _N MICE	TA3	TA2	B	A	B	B	B	A	B	B	B	B	B	B	A	A	B	B	
Microphone amplifier input impedance	ZINMIC	TA61 TA3		B	B A	B	B	B	A	B	B	B	B	B	A B	A	A	B	A B	
Microphone mode Line reference output voltage	V _O ML	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
Microphone mode Line output distortion (THD)	THAL1	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
Microphone ALC Line reference output level	V _O AL	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
Microphone ALC Line output distortion (THD)	THAL2	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
Microphone ALC mode Maximum input level	V _O LN	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
Line muting attenuated output level	V _M LM	TA5	TA50	B	B	A	B	B	A	B	B	A	B	B	A	A	A	B	B	
Maximum attenuation fader output	V _F AL	TA5	TA50	B	B	A	A	B	A	B	B	B	B	B	A	A	A	B	B	
E-E system monitor frequency characteristics 1	V _O LF1	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	
E-E system monitor frequency characteristics 2	V _O LF2	TA5	TA50	B	B	A	B	B	A	B	B	B	B	B	A	A	A	B	B	

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Parameter	Symbol	Input point	Test point	SW No.																	Remark
				1	3	5	6	16	23	31	42	46	47	48	53	54	55	59	61		
Microphone mode output noise voltage	V _{NAL}	TA5	TA50	B	B	B	B	B	A	B	B	B	B	B	A	A	A	B	B		
Microphone/line inter-input crosstalk	V _{CTIN}	TA5 TA59	TA50	B	B	A B	B	B	A	B	B	B	B	B	A C	A	A	B A	B		
Electronic volume control standard output level	V _{EVRTYP}	TA59	TA45	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	VEE49 1.575V	
Electronic volume control maximum output level	V _{EVRLMAX}	TA59	TA45	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	VEE49 3.15V	
Electronic volume control minimum output level	V _{EVRLMIN}	TA59	TA45	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	VEE49 0V	
Speaker amplifier voltage gain	V _{GSP}	TA42	TA39 TA41	B	B	B	B	B	A	A	A	B	B	B	C	A	A	B	B		
Speaker amplifier distortion	THSP	TA42	TA39 TA41	B	B	B	B	B	A	A	A	B	B	B	C	A	A	B	B		
Speaker amplifier maximum output	V _O SP	TA42	TA39 TA41	B	B	B	B	B	A	A	A	B	B	B	C	A	A	B	B		
Speaker amplifier output noise voltage	V _N SP	TA42	TA39 TA41	B	B	B	B	B	A	A	B	B	B	B	C	A	A	B	B		
H/P amplifier voltage gain	V _G HP	TA42	TA30 TA32	B	B	B	B	B	A	B	A	B	B	B	C	A	A	B	B		
H/P amplifier distortion	THHP	TA42	TA30 TA32	B	B	B	B	B	A	B	A	B	B	B	C	A	A	B	B		
H/P amplifier maximum output	V _O HP	TA42	TA30 TA32	B	B	B	B	B	A	B	A	B	B	B	C	A	A	B	B		
H/P amplifier output noise voltage	V _N HP	TA42	TA30 TA32	B	B	B	B	B	A	B	B	B	B	B	C	A	A	B	B		
NR encoder standard output level	V _O RL	TA59	TA28	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B		
NR encoder frequency linearity	V _O XL	TA59	TA28	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B		
NR encoder frequency characteristics (SP mode)	VFSRL	TA59	TA28	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B		
NR encoder frequency characteristics (LP mode, NTSC only)	VFPRL	TA59	TA28	B	B	B	B	B	A	B	B	B	B	C	C	A	A	A	B		
VCO (NTSC mode) 1.5MHz oscillator frequency	FONT		TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	B	B	Input fsc to TA23.	
VCO (PAL mode) 1.5MHz oscillator frequency	FOPA		TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	B	B	B	Input fsc to TA23.	
VCO output level (1.5MHz)	VVCO		TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	B	B	Input fsc to TA23.	
FM (VCO) output second-order harmonic distortion, 1.5MHz	VVCO2		TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	B	B	Input fsc to TA23.	
FM (VCO) output third-order harmonic distortion, 1.5MHz	VVCOL		TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	B	B	Input fsc to TA23.	
VCO (PM-record) reference frequency deviation, 1.5MHz	FDO	TA59	TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	Input fsc to TA23.	
Standard FM modulation distortion	THDFM	TA59	TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	Input fsc to TA23. Demodulate the TA19 output.	
Overmodulation prevention limiter level	FDMX	TA59	TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B		

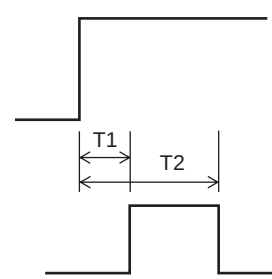
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Parameter	Symbol	Input point	Test point	SW No.																Remark
				1	3	5	6	16	23	31	42	46	47	48	53	54	55	59	61	
Bandpass filter monitor level	BFM150	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.00MHz/1.50MHz	BFM100	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.20MHz/1.50MHz	BFM120	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.30MHz/1.50MHz	BFM130	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.40MHz/1.50MHz	BFM140	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.60MHz/1.50MHz	BFM160	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.70MHz/1.50MHz	BFM170	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 1.80MHz/1.50MHz	BFM180	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Bandpass filter frequency characteristics 2.00MHz/1.50MHz	BFM200	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
LP/SP Bandpass filter input/output gain difference	GBLPSP	TA19	TA18	B	B	B	B	B	A	B	B	B	B	B C	C	A	A	A	B	The gain difference when switch 48 is switched between B and C.
Playback FM demodulation output voltage	VBLPL	TA19	TA50	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Playback FM demodulation output distortion	THBLPL	TA19	TA50	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Playback FM demodulation output noise	VNRP	TA19	TA50	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	
Self record-playback level	VBRP			B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	Input the deviation level measured in FDO.
Dropout detection on level	DODON	TA19	TA19	B	B	B	B	B	B	B	B	B	B	B	C	A	A	A	B	Refer to figure 1
Dropout detection off hysteresis	DODOFF	TA19	TA19	B	B	B	B	B	B	B	B	B	B	B	C	A	A	A	B	Refer to figure 1
Muting on time	TMTON	TA19	TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	Refer to figure 2
Muting release time Muting hold time (NTSC)	TMIOFF	TA19	TA19	B	B	B	B	B	A	B	B	B	B	B	C	A	A	A	B	Refer to figure 2
Hold start time	THOSL	TA19	TA19	B	B	B	B	B	B	B	B	B	B	B	C	A	A	A	B	Refer to figure 3
Hold complete time	THOFL	TA19	TA19	B	B	B	B	B	B	B	B	B	B	B	C	A	A	A	B	Refer to figure 3

Figure 3



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