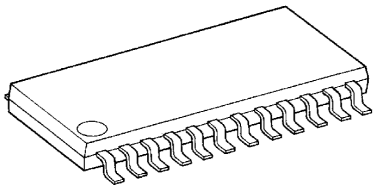
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA2041F

Sound Field Reproduction IC

The TA2041F is sound field reproduction IC developed for stereo audio equipment as radio cassette and music center.
This IC has made it possible to reproduce stereo phonic sound with more presence by forcing difference signals of R−ch and L−ch to delay and applying these signals to R−ch and L−ch again.



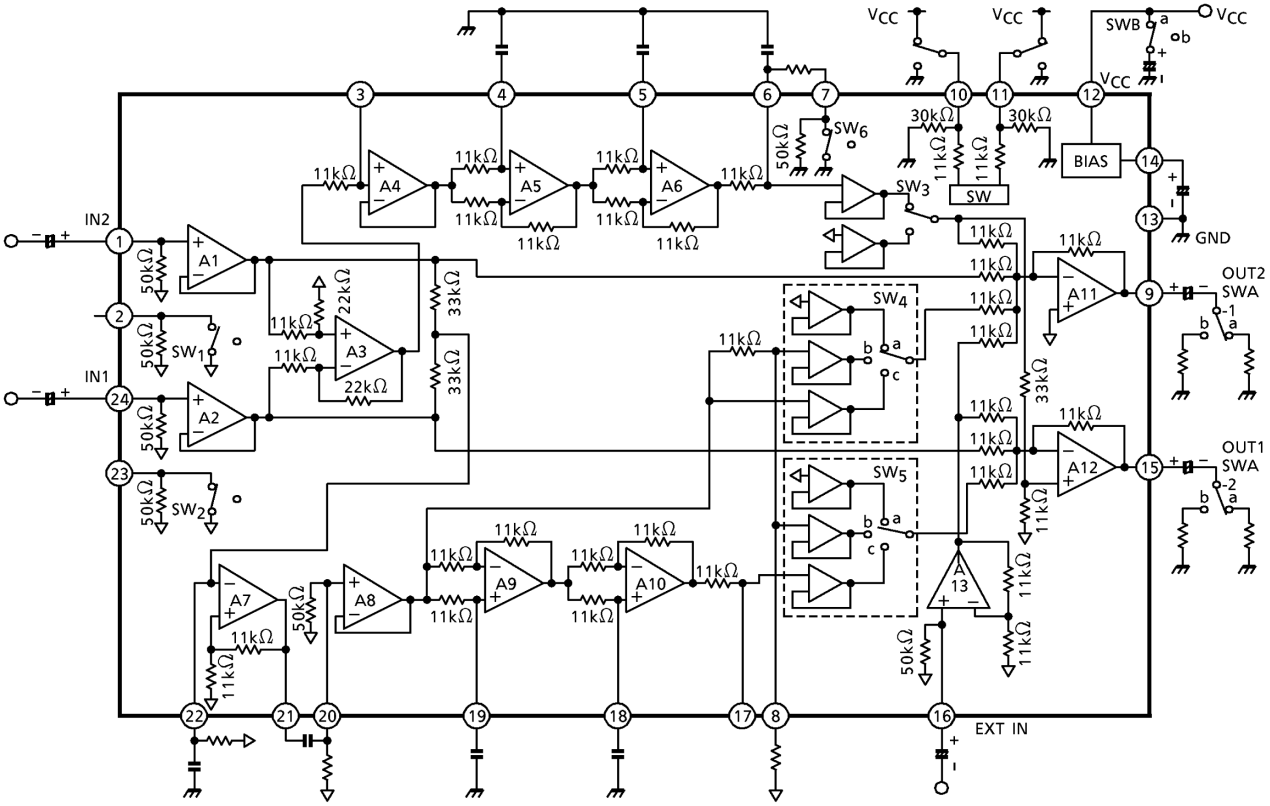
SSOP24-P-300-1.00

Weight: 0.31g (typ.)

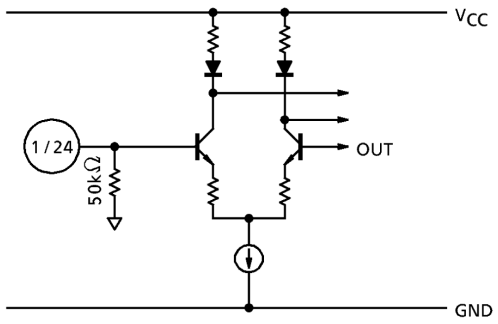
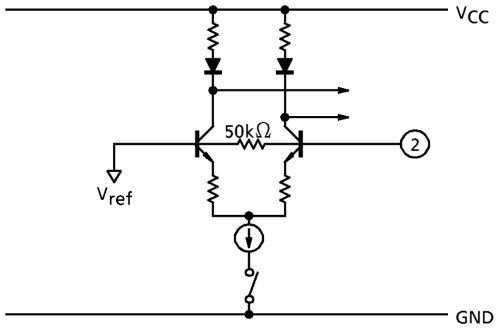
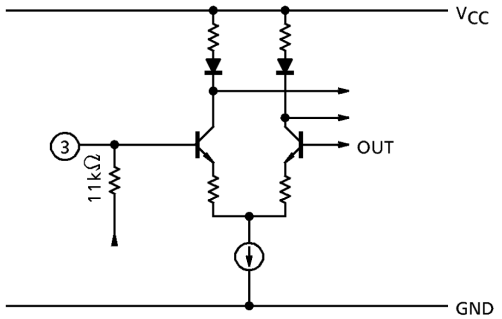
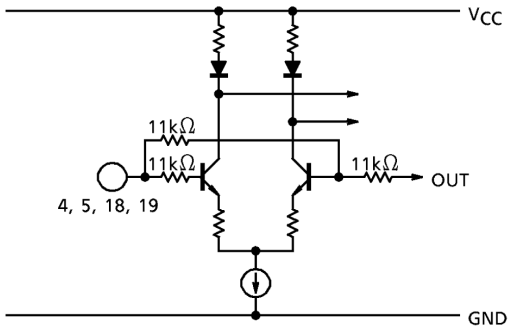
Features

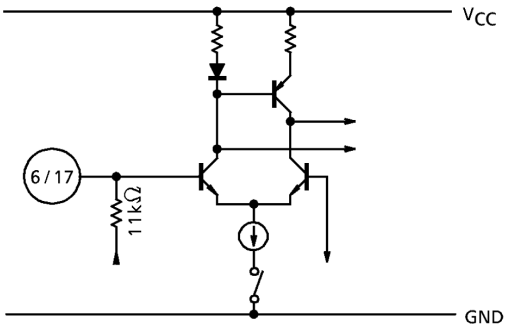
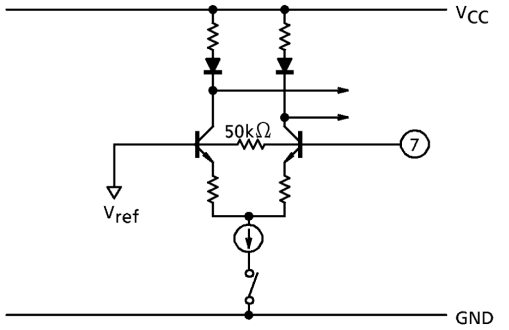
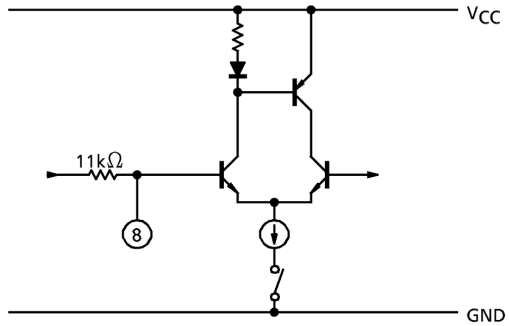
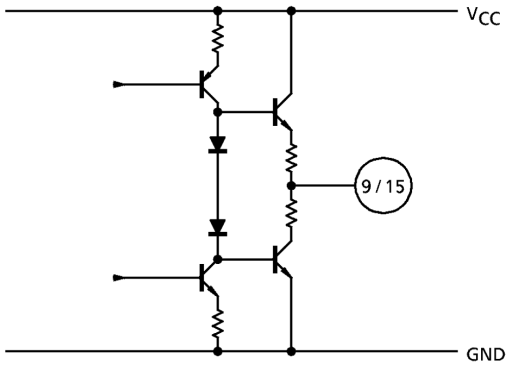
- Dual channel
- 3−type surround mode and normal mode are available
- Built−in mode switch
- Built−in EXT−in terminal
- Operating supply voltage range: $V_{CC\ (opr.)}$ = 4.0~12.0V (Ta = 25°C)

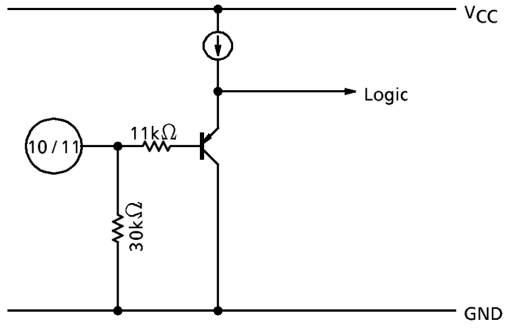
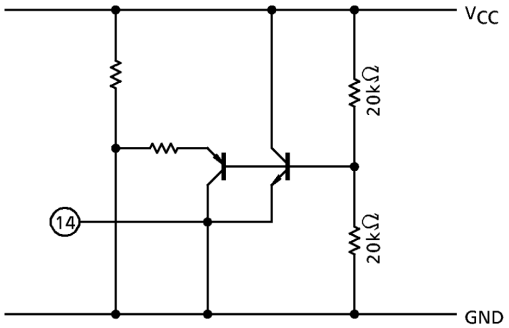
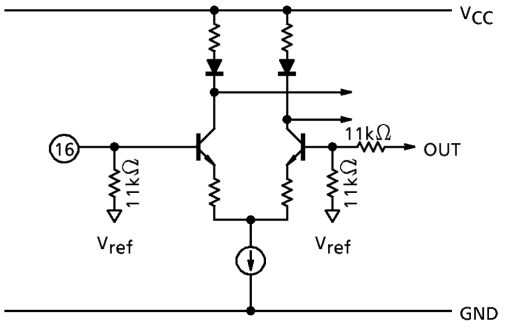
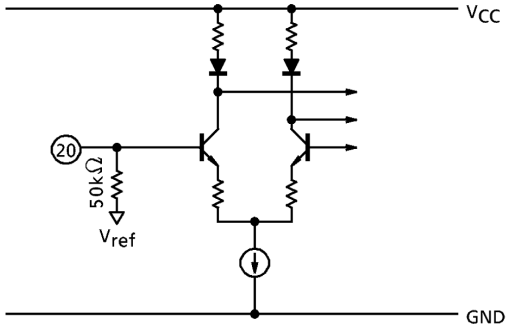
Block Diagram

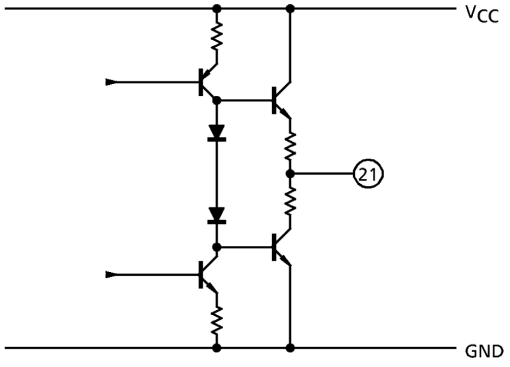
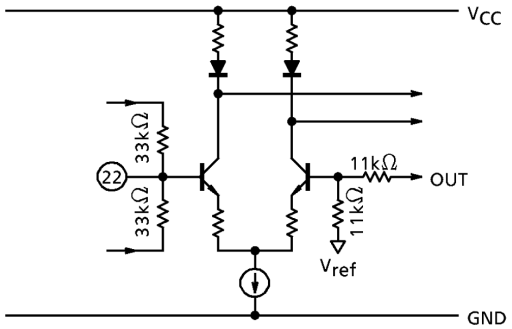


Terminal Explanation

Terminal Name	Symbol	Contents	Equivalent Circuit
1	In1	Input terminal	
24	In2		
2	LF in2	Low pass filter switch	
23	LF in1		
3	LF1	Low pass filter	
4	PS1	(L − R) signal delay time constant	
5	PS2		
19	PS3	(L + R) signal delay time constant	
18	PS4		

Terminal Name	Symbol	Contents	Equivalent Circuit
6	LF2	(L − R) low pass filter	
17	LF5	(L + R) low pass filter	
7	Mix level1	(L − R) mixing level adjustment	
8	Mix level2	(L + R) mixing level adjustment	
15	Out1	Output terminal	
9	Out2		

Terminal Name	Symbol	Contents	Equivalent Circuit
10	SW A	Mode select switch	
11	SW B		
12	V_{CC}	V_{CC} terminal	—
13	GND	GND terminal	—
14	V_{ref}	Reference voltage	
16	EXT in	External input	
20	LF4	(L + R) low pass filter input	

Terminal Name	Symbol	Contents	Equivalent Circuit
21	LF3	(L + R) low pass filter output	
22	HF1	(L + R) high pass filter	

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Supply voltage		V_{CC}	14	V
Power dissipation	(Note)	P_D	400	mW
Operating temperature		T_{opr}	−25~75	°C
Storage temperature		T_{stg}	−55~150	°C

(Note) Derated above 25°C in the proportion of 3.2mW / °C for TA2041F.

Electrical Characteristics

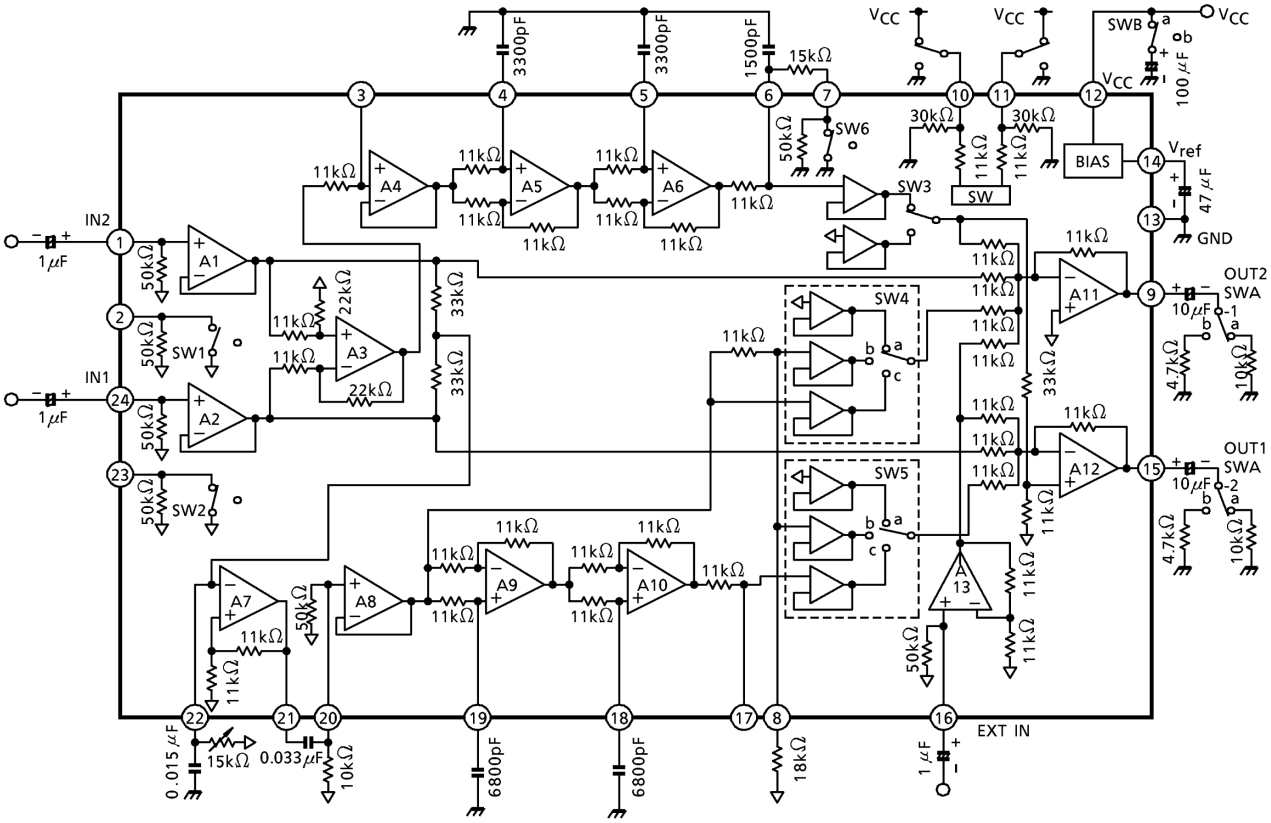
(unless otherwise specified, V_{CC} = 9V, f = 1kHz, R_L = 10kΩ, Ta = 25°C, normal mode)

Characteristic	Symbol	Test Cir− cuit	Test Condition	Min.	Typ.	Max.	Unit
Quiescent current	I_{CCQ}	—	V_{in} = 0	—	10	14.0	mA
Voltage gain	G_{v1}	—	V_{out} = 1V_{rms} (0dBV)	−2	0	2	dB
Gain tracking	ΔG_v	—	V_{out} = 1V_{rms} (0dBV)	−1	0	1	dB
Voltage gain	G_{v2}	—	Surround1 mode, f = 100Hz	4.5	6.5	8.5	dB
	G_{v3}	—	Surround2 mode, f = 100Hz	−2	0	2	dB
	G_{v4}	—	Surround3 mode, f = 100Hz	7	9	11	dB
Maximum output voltage	V_{om}	—	THD = 1%, R_L = 4.7kΩ	1.8	2.2	—	V_{rms}
Total harmonic distortion	THD	—	V_{out} = 300mV_{rms}	—	0.02	0.1	%
Output noise voltage	V_{no1}	—	Normal mode, BW = 400~30kHz	—	12	20	μV_{rms}
	V_{no2}	—	Surround1 mode, BW = 400~30kHz	—	13	22	μV_{rms}
	V_{no3}	—	Surround2 mode, BW = 400~30kHz	—	13	22	μV_{rms}
	V_{no4}	—	Surround3 mode, BW = 400~30kHz	—	15	25	μV_{rms}
Channel separation	Sep.	—	V_{out} = 1V_{rms}	−50	−58	—	dB
Ripple rejection ratio	R.R	—	f = 100Hz, V_{ripple} = −10dB, SWB = B	—	−46	—	dB
Input resistance	R_{IN}	—	—	—	50	—	kΩ
Mode switch control voltage	$V_{TH\ (H)}$	—	V_{TH} L → H	—	1.2	1.7	V
	$V_{TH\ (L)}$	—	V_{TH} H → L	0.7	1.2	—	V

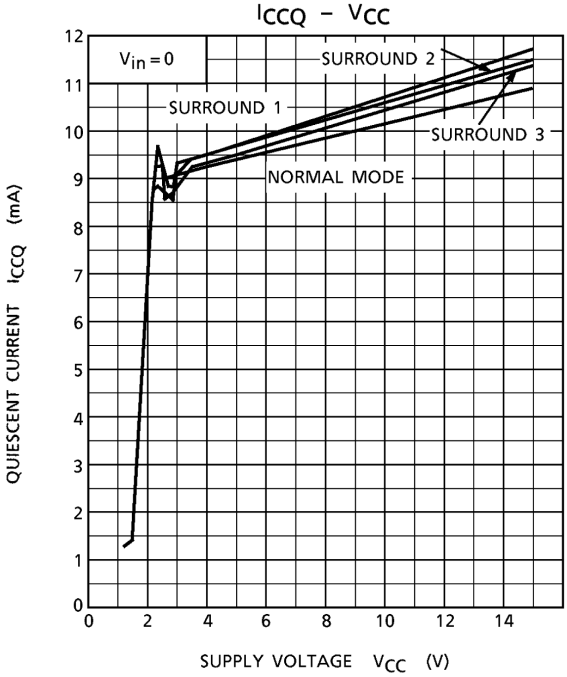
Switch position

Mode	Control Terminal		Built−In Switch					
	D1	D2	SW1	SW2	SW3	SW4	SW5	SW6
Normal	L	L	0	0	0	a	a	1
Surround1	L	H	1	1	1	b	b	1
Surround2	H	L	1	1	0	c	c	0
Surround3	H	H	1	1	1	c	c	0

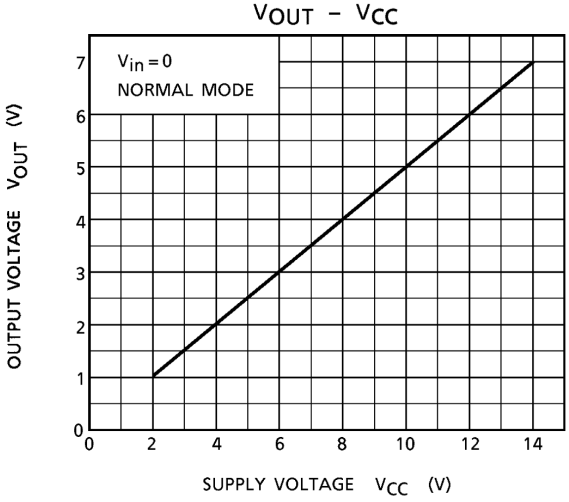
Test Circuit



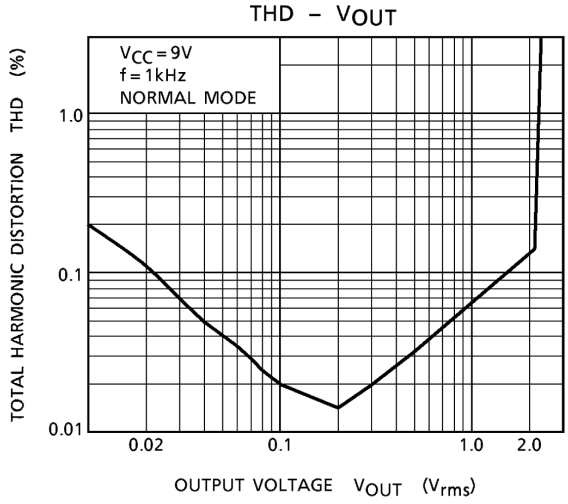
I_{CCQ} – V_{CC}



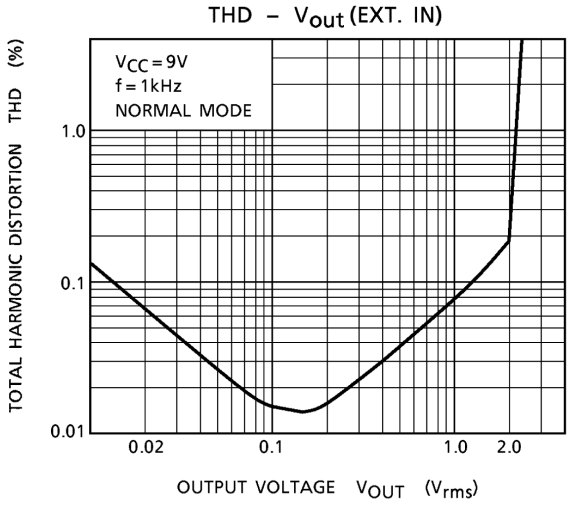
V_{OUT} – V_{CC}



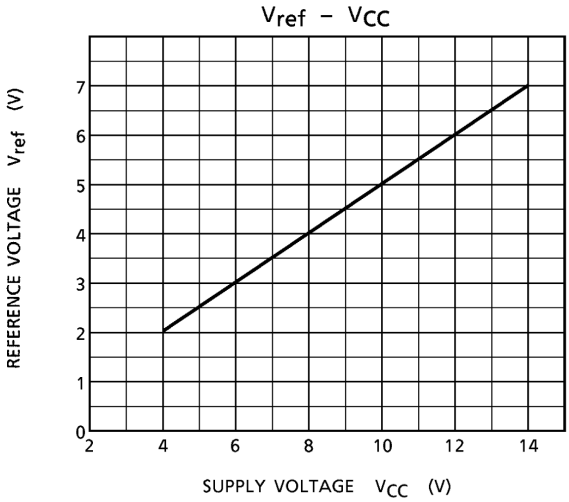
THD – V_{OUT}



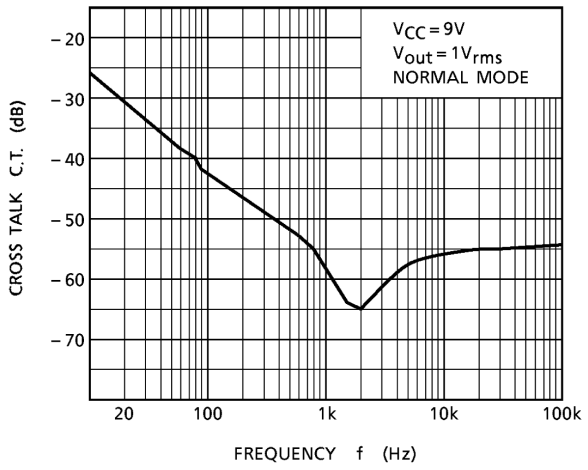
THD – V_{out} (EXT. IN)



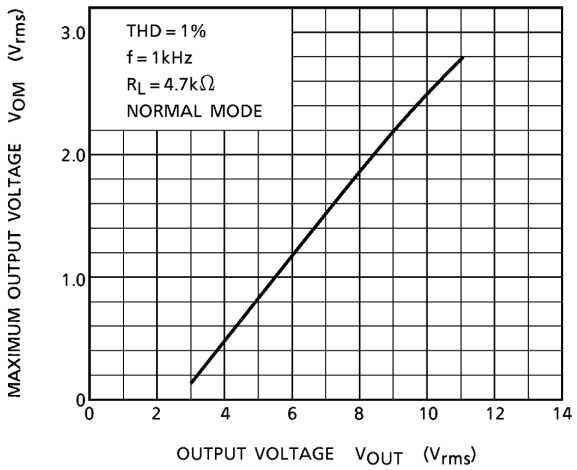
V_{ref} – V_{CC}



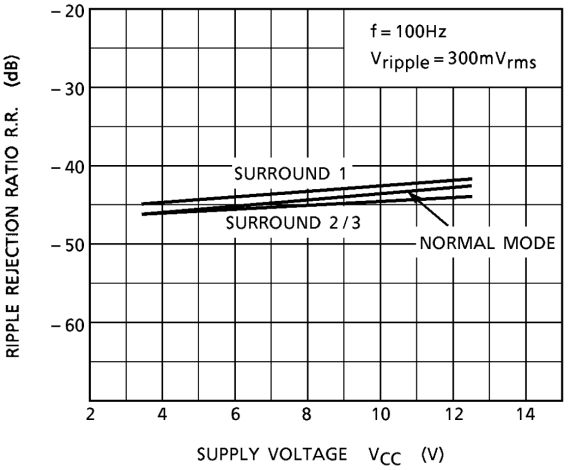
C.T. – f



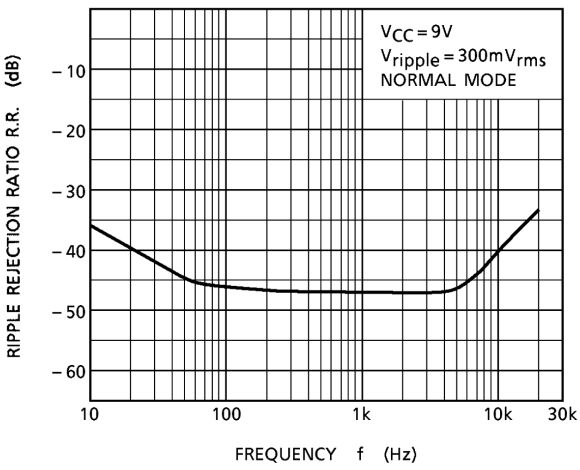
V_{OM} – V_{CC}



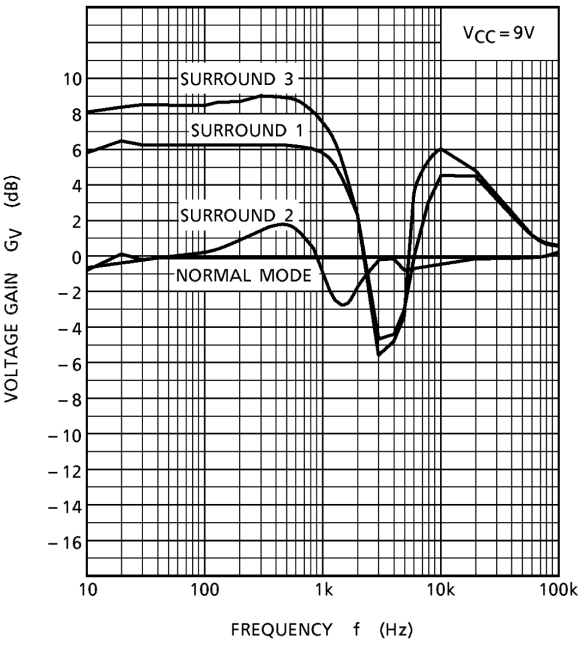
R.R. – V_{CC}



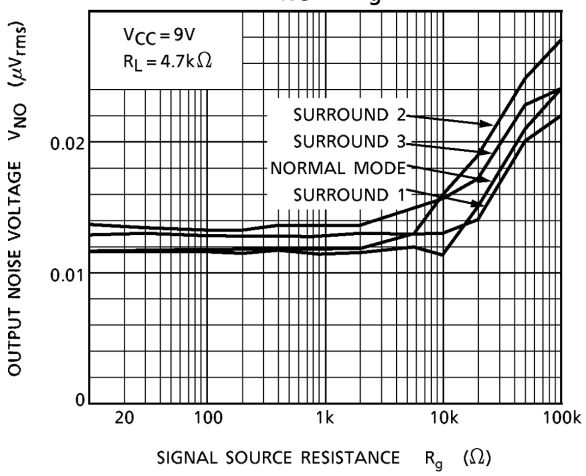
R.R. – f



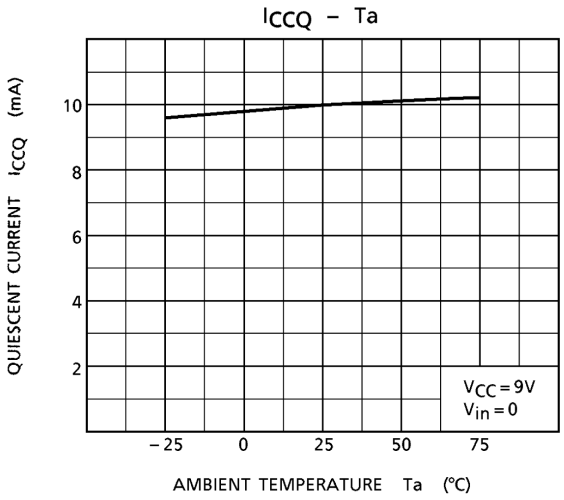
G_V – f



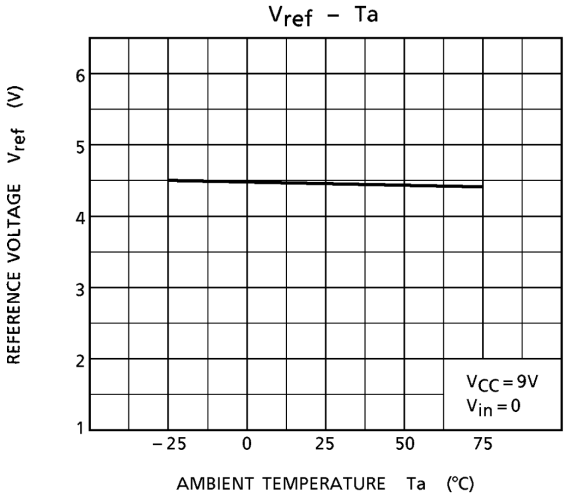
V_{NO} – R_g



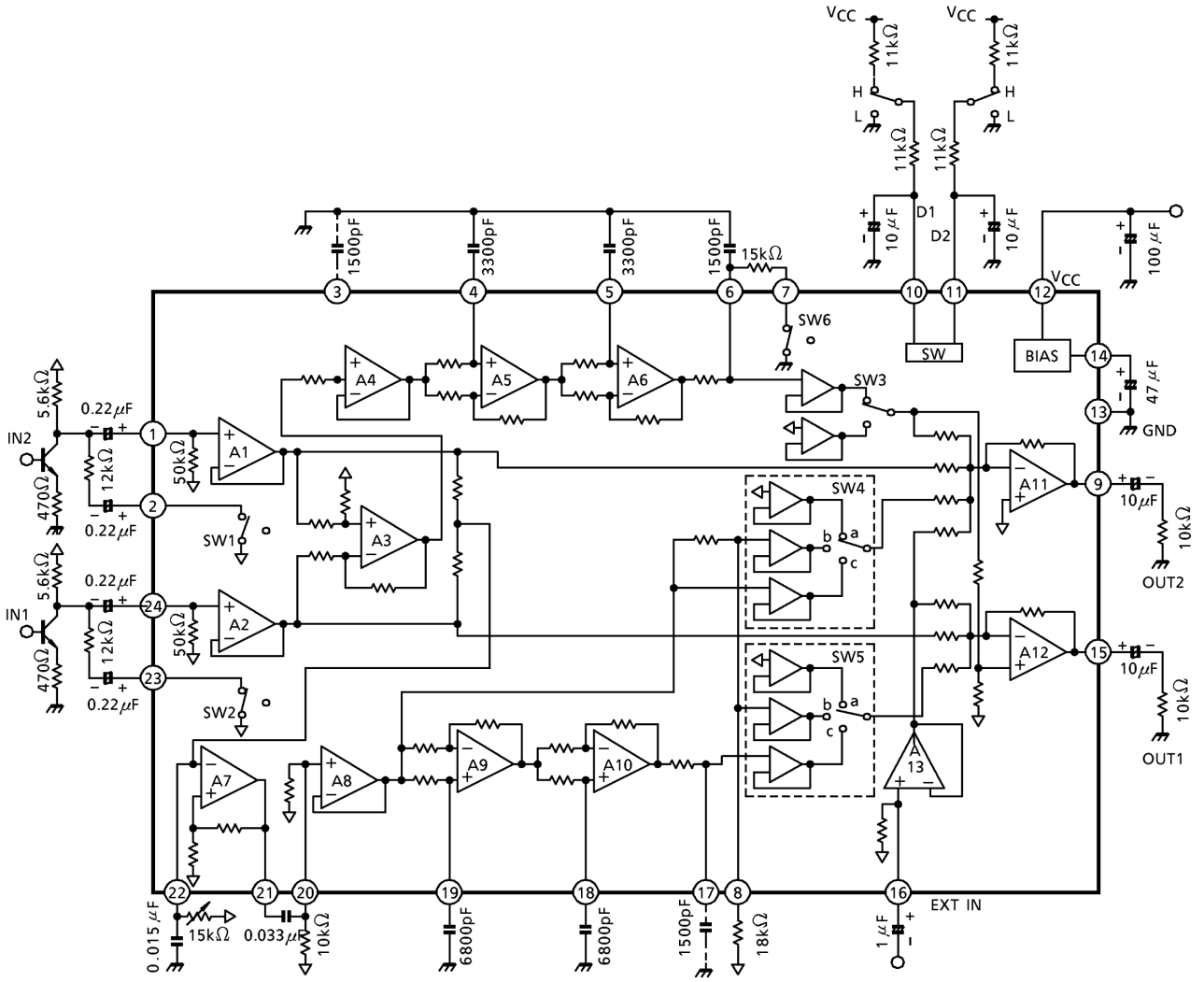
I_{CCQ} – Ta



V_{ref} – Ta

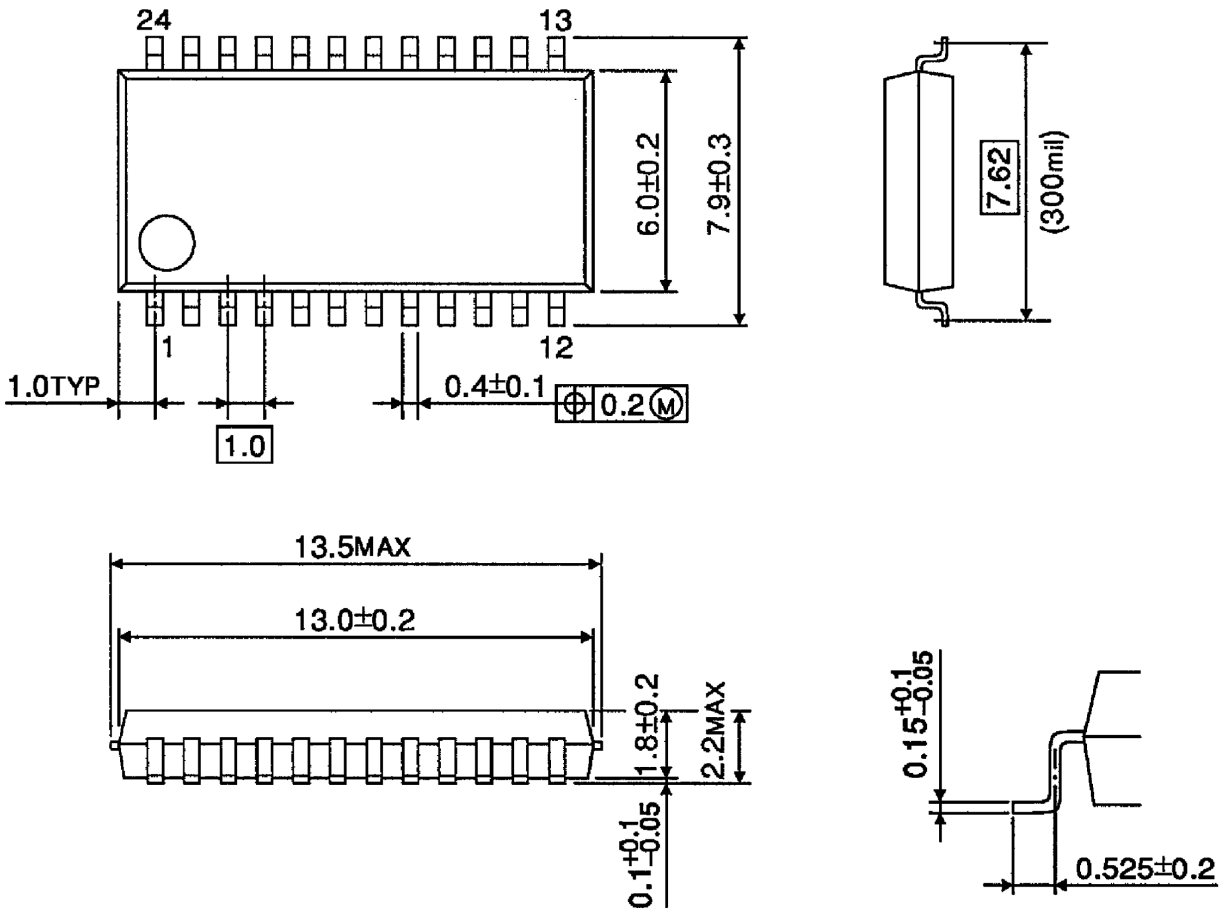


Application Circuit



Package Dimensions

SSOP24-P-300-1.00 Unit : mm



Weight: 0.31g (typ.)

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