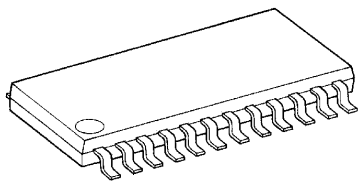
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8157AF, TA8157AFN

STEREO HEADPHONE POWER AMPLIFIER (1.5V USE)

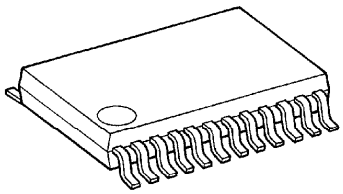
The TA8157AF and TA8157AFN are developed for play-back stereo headphone equipments at low voltage operation (1.5V use). Those are built in bass boost function.

TA8157AF



SSOP24-P-300-1.00

TA8157AFN



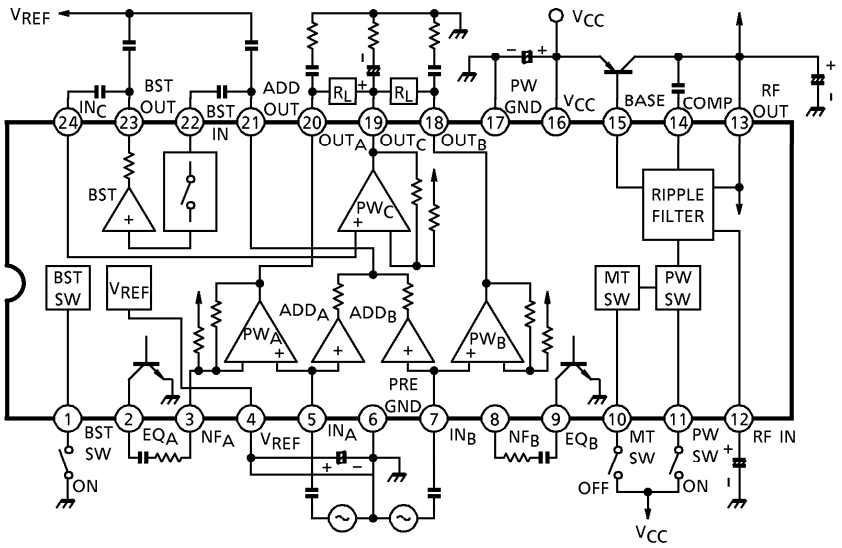
SSOP24-P-300-0.65A

Weight
SSOP24-P-300-1.00 : 0.32g (Typ.)
SSOP24-P-300-0.65A : 0.14g (Typ.)

FEATURES

- OCL (Output Condenser Less)
- Built-in ripple filter
- Output power (V_{CC} = 1.5V, f = 1kHz, THD = 10%, R_L = 16Ω)
  P_O = 9mW (Typ.)
- Voltage gain : G_V = 24dB (Typ.)
- Built-in boost amplifier
- Built-in power switch
- Built-in muting circuit
- Low quiescent supply current (Ta = 25°C)
  I_{CCQ} = 8mA (Typ.)
- Excellent ripple rejection ratio : RR = 55dB (Typ.)
- Low noise : V_{no} = 25μV_{rms} (Typ.)
- Operating supply voltage range (Ta = 25°C)
  V_{CC} (opr) = 0.9~2.2V

BLOCK DIAGRAM



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	4.5	V
Output Current		$I_{O\ (Peak)}$	100	mA
Power Dissipation	TA8157AF	P_D (Note)	400	mW
	TA8157AFN		500	
Operating Temperature		T_{opr}	−25~75	°C
Storage Temperature		T_{stg}	−55~150	

(Note) Derated above Ta = 25°C in the proportion of 3.2mW / °C for TA8157AF, and of 4mW / °C for TA8157AFN.

ELECTRICAL CHARACTERISTICS

Unless otherwise specified : V_{CC} = 1.2V, R_L = 16Ω, R_g = 600Ω, f = 1kHz, Ta = 25°C
SW_1 : a, SW_2 : a, SW_3 : b, SW_4 : a, SW_5 : a
SW_6 : a, SW_7 : ON, SW_8 : OPEN

CHARACTERISITC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current		I_{CC1}	1	Power off, SW_1 : b, SW_2 : b	—	0.1	5	μA
		I_{CC2}		Power Amp. off, SW_2 : b	—	2.4	4.0	mA
		I_{CC3}		V_{in} = 0	—	8	11.5	
Power amplifier stage	Voltage Gain 1	G_{V1}	2	$V_{o\ (A)} = V_{o\ (B)}$ = −22dBV	22	24	26	dB
	Channel Balance	CB1			—	0	1.5	
	Output Power 1	P_{o1}	2	V_{CC} = 1.5V, THD (A) = THD (B) = 10%	5	9	—	mW
	Output Power 2	P_{o2}		V_{CC} = 1.5V, THD (A) = THD (B) = 10%, $V_{in\ (A)} = V_{in\ (B)} = -V_{in\ (C)}$, f = 100Hz, * BTL operation, SW_3 : a, SW_5 : b	8	14	—	
	Total Harmonic Distortion	THD	2	$P_{o\ (A)} = P_{o\ (B)}$ = 1mW	—	0.6	1	%
	Output Noise Voltage	V_{no}	2	BPF = 20Hz~20kHz, SW_4 : b	—	25	40	μV_{rms}
	Cross Talk	CT	2	V_o = −22dBV, SW_4 : b	35	42	—	dB
	Ripple Rejection Ratio	RR1	2	V_{CC} = 1.0V, f_r = 100Hz, V_r = −32dBV, SW_7 : OPEN	45	55	—	
	Muting Attenuation	ATT1	2	V_o = −22dBV, SW_2 : a→b	—	73	—	

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Bass Boost Function Stage	ADD Amp. Voltage Gain	G_{V2}	2	$V_{in\,(A)} = V_{in\,(B)}$, $R_L = 12k\Omega$ $V_{o\,(ADD)} = -22dBV$ SW_3 : a / b	15	17.5	20	dB
	ADD Amp. Maximum Output Voltage	V_{om2}	2	$V_{in\,(A)} = V_{in\,(B)}$, $R_L = 12k\Omega$ THD (ADD) = 1%, SW_3 : a / b	80	130	—	mV_{rms}
	BST Amp. Voltage Gain	G_{V3}	2	$V_o = -37dBV$, $R_L = 16k\Omega$ SW_6 : b	14	16.5	19	dB
	BST Amp. Maximum Output Voltage	V_{om3}	2	THD (BST) = 3%, $R_L = 16k\Omega$ SW_6 : b	55	90	—	mV_{rms}
	BST Amp. Attenuation	ATT3	2	$V_o = -32dBV$, SW_3 : a→b SW_6 : b	—	73	—	dB
Ripple Filter Output Voltage		$V_{RF\,OUT}$	2	$V_{CC} = 1V$, $I_{RF} = 20mA$	0.9	0.93	—	V
Ripple Rejection Ratio		RR4	2	$V_{CC} = 1V$, $I_{RF} = 20mA$ $f_r = 100Hz$, $V_r = -37dBV$ SW_7 : OPEN	35	43	—	dB
Equalizer On Resistance		R_{ON}	1	$I_{EQ} = 100\mu A$, SW_3 : a SW_8 : ON	—	60	—	Ω
Power Switch	On Current	I_{11}	1	$V_{CC} = 0.9V$, $V_4 \geqq 0.5V$ SW_1 : c, SW_2 : b	5	—	—	μA
	Off Voltage	V_{11}	1	$V_{CC} = 0.9V$, $V_4 \leqq 0.2V$ SW_1 : d, SW_2 : b	0	—	0.3	V
Mute Switch	Off Current	I_{10}	1	$V_{CC} = 0.9V$, $I_{CC} \geqq 4.5mA$ SW_2 : c	5	—	—	μA
	On Voltage	V_{10}	1	$V_{CC} = 0.9V$, $I_{CC} \leqq 3.5mA$ SW_2 : d	0	—	0.3	V
Boost Switch	Off Current	I_1	1	$V_{CC} = 0.9V$, $I_{EQ} = 100\mu A$ $V_2 \geqq 0.7V$, SW_3 : c, SW_8 : ON	5	—	—	μA
	On Voltage	V_1	1	$V_{CC} = 0.9V$, $I_{EQ} = 100\mu A$ $V_2 \leqq 0.2V$, SW_3 : d, SW_8 : ON	0.6	—	0.9	V