

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

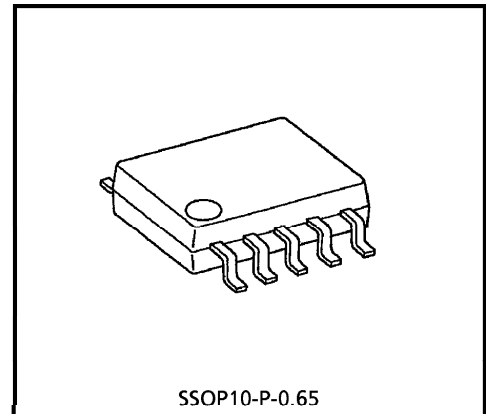
TA2016FN

1.5V BUFFER AMPLIFIER

The TA2016FN is dual buffer amplifier IC, which is developed for 1.5V Headphone stereo.

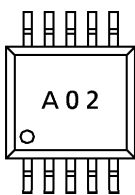
FEATURES

- Output impedance can be changed by mode switch.
 - H MODE 230Ω (Typ.)
 - MID MODE 750Ω (Typ.)
 - OFF MODE High impedance
- Built-in two switching transistors, which are synchronized with mode switch.
- Low quiescent current ($V_{CC} = 1.2V, V_{in} = 0, T_a = 25^\circ C$)
 - H MODE $I_{CCQ1} = 2mA$ (Typ.)
 - MID MODE $I_{CCQ2} = 1mA$ (Typ.)
 - OFF MODE $I_{CCQ3} = 0.8mA$ (Typ.)
- Operating supply voltage range ($T_a = 25^\circ C$)
 - $V_{CC(opr)} = 0.95 \sim 2.2V$



Weight : 0.04g (Typ.)

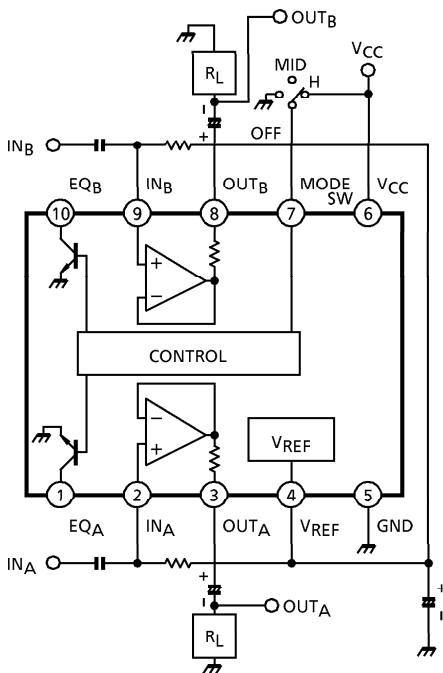
MARKING



961001EBA2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

BLOCK DIAGRAM



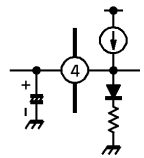
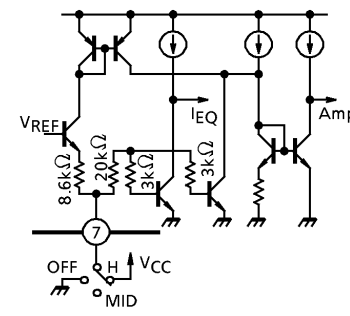
OPERATION MODE

MODE SW	CHARACTERISTIC	IMPEDANCE [Ω] (TYP.)	SW Tr
	H	230	OFF
	MID	750	ON
	OFF	High impedance	ON

TERMINAL EXPLANATION

Terminal voltage : Typical terminal voltage with test circuit at no signal. ($V_{CC} = 1.2V$, $T_a = 25^\circ C$)

TERMINAL		FUNCTION	INTERNAL CIRCUIT	TERMINAL VOLTAGE (V)
No.	NAME			
1	EQ_A	Equalizer Switch (MID / OFF MODE : EQ ON H MODE : EQ OFF		—
10	EQ_B			
2	IN_A	Input of Buffer Amplifier		0.75
9	IN_B			
3	OUT_A	Output of Buffer Amplifier		0.75
8	OUT_B			

TERMINAL		FUNCTION	INTERNAL CIRCUIT	TERMINAL VOLTAGE (V)
No.	NAME			
4	V _{REF}	Reference Voltage		0.75
5	GND	—	—	0
6	V _{CC}	—	—	1.2
7	MODE SW	Mode Switch (V _{CC} : H MODE OPEN : MID MODE GND : OFF MODE)		—

APPLICATION NOTE

- (1) V_{REF}
V_{REF} circuit should be stabilized, because this IC operate on V_{REF} voltage.
- (2) Input stage
The resistor between input terminal (Pin②, ③) and V_{REF} terminal (Pin④) should be 33kΩ or less. In case that this resistance is larger than 33kΩ, this IC doesn't operate normally. Because, voltage drop at this resistor is increased and constant current source of input stage is saturated.
- (3) MODE SW
In case of MID mode, care should be taken to operate normally. There is a possibility that this IC doesn't operate normally, because switch condition is open.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	3	V
Power Dissipation	P _D (Note)	300	mW
Equalizer Current	I _{EQ}	50	mA
Operating Temperature	T _{opr}	- 10~60	°C
Storage Temperature	T _{stg}	- 55~150	

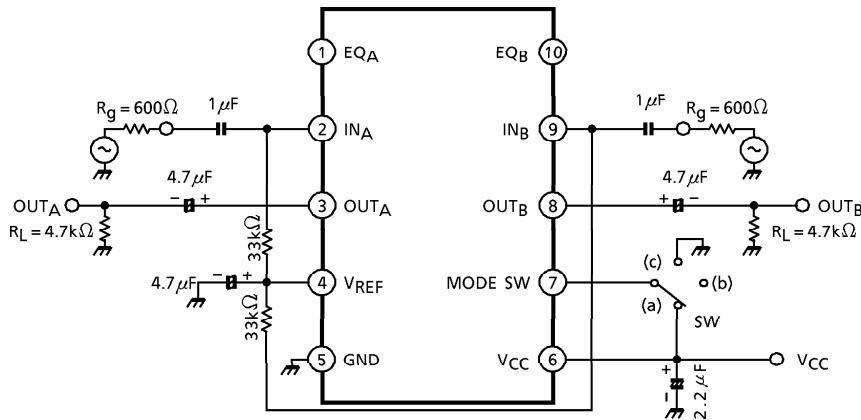
(Note) Derated above Ta = 25°C in proportion of 2.4mW/°C.

ELECTRICAL CHARACTERISTICS

Unless otherwise specified : $V_{CC} = 1.2V$, $f = 1kHz$, $R_L = 4.7k\Omega$, $T_a = 25^\circ C$

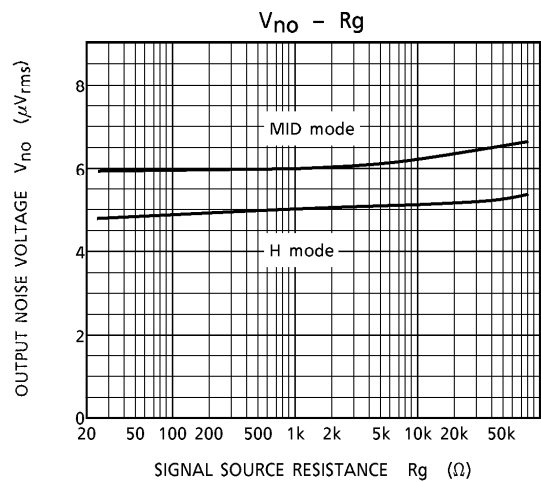
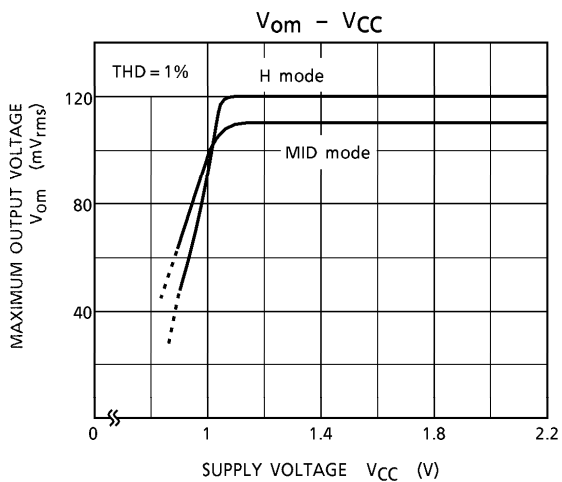
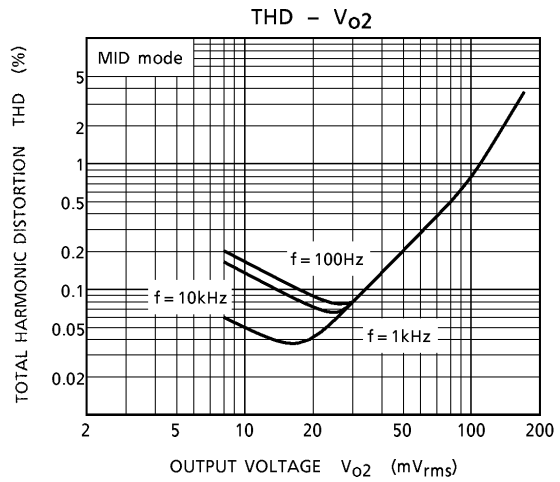
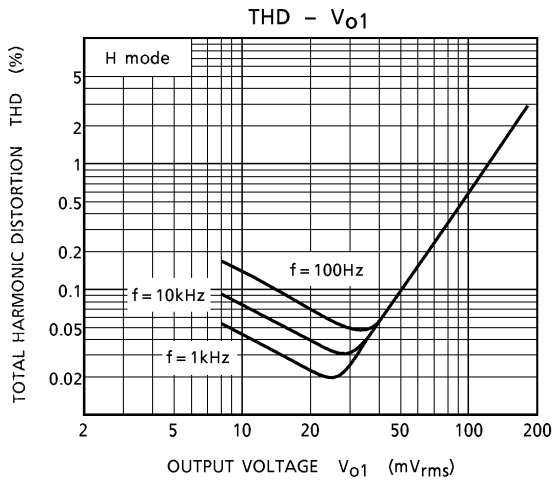
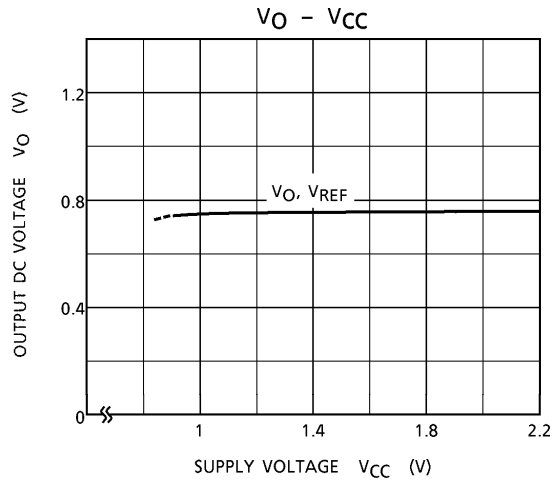
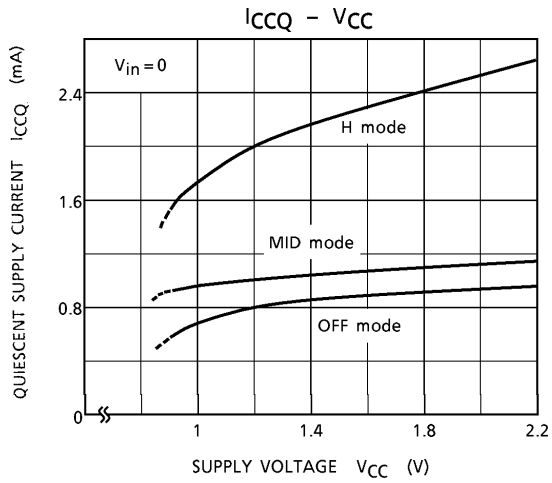
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	MODE SW	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current	I_{CCQ1}	—	H	$V_{in} = 0$	—	2	3	mA
	I_{CCQ2}		MID		—	1	1.6	
	I_{CCQ3}		OFF		—	0.8	1.4	
Voltage Gain	G_{V1}	—	H	$V_{in} = -32dBV$	-2.4	-0.4	1.6	dB
	G_{V2}		MID		-3.6	-1.6	0.4	
Maximum Output Voltage	V_{om1}	—	H	THD = 1%	70	120	—	mV _{rms}
	V_{om2}		MID		60	110	—	
Total Harmonic Distortion	THD1	—	H	$V_o = 50mV_{rms}$	—	0.1	0.6	%
	THD2		MID		—	0.2	0.8	
Output Noise Voltage	V_{no1}	—	H	$R_g = 600\Omega$	—	5	10	μV_{rms}
	V_{no2}		MID		—	6	12	
Cross Talk	CT1	—	H	$V_{in} = -32dBV$	—	76	—	dB
	CT2		MID		—	74	—	
H Mode On Current	I_7	—	MID→H	$I_{EQ} \leq 300\mu A$	5	—	—	μA
Off Mode Voltage	V_7	—	MID→OFF	$V_{in} = -32dBV$ $ATT \geq 45dB$	0	—	0.12	V

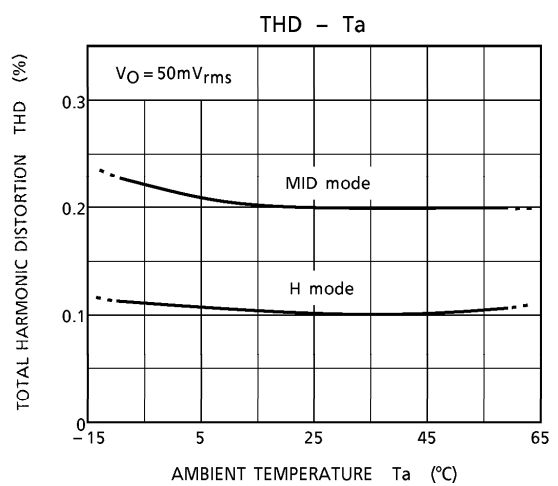
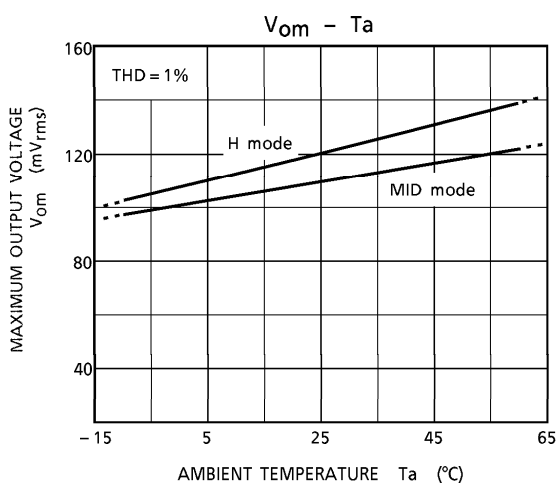
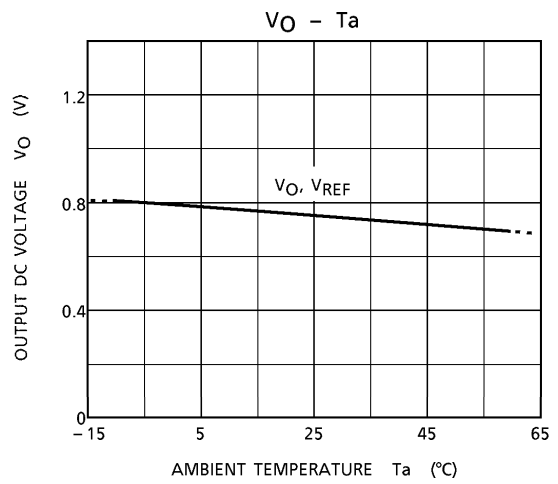
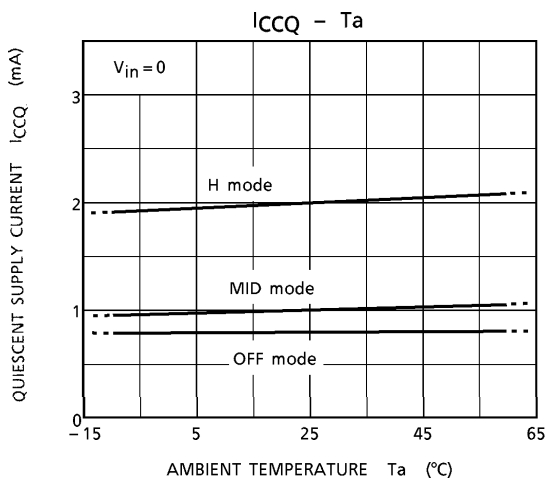
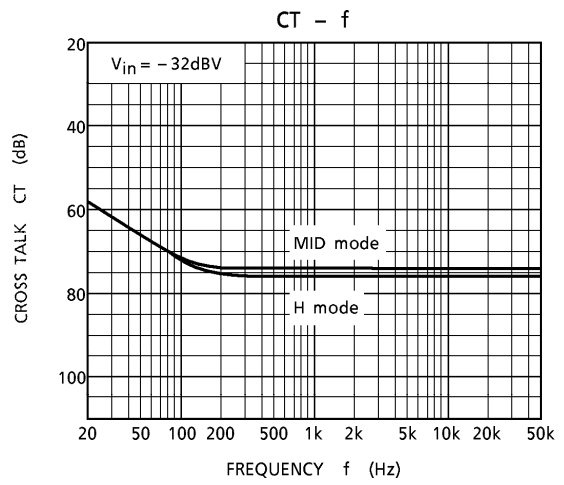
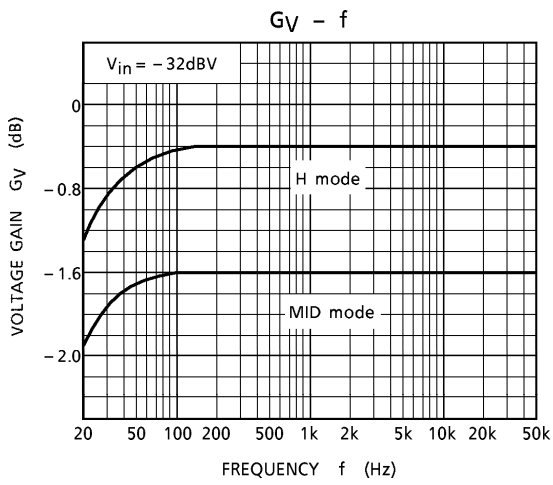
TEST CIRCUIT

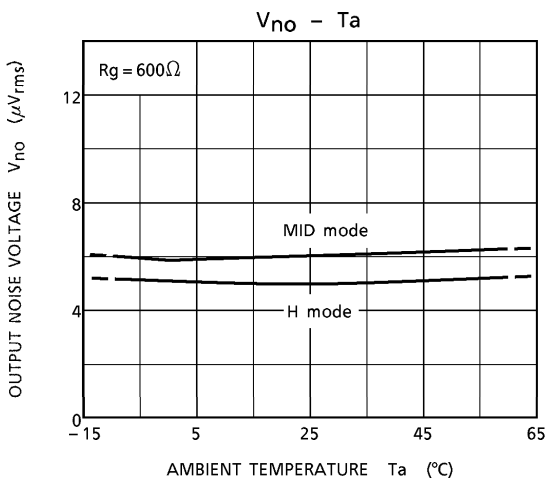
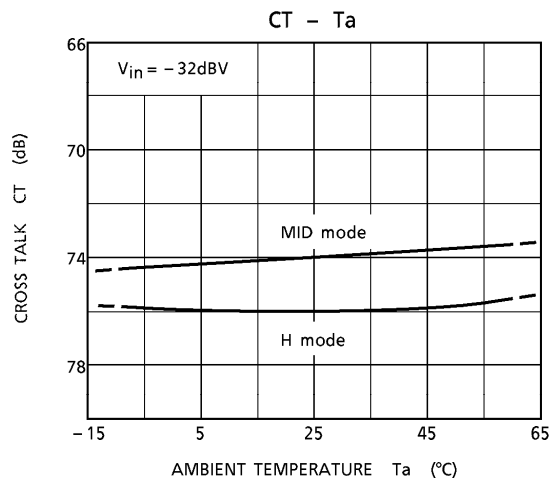
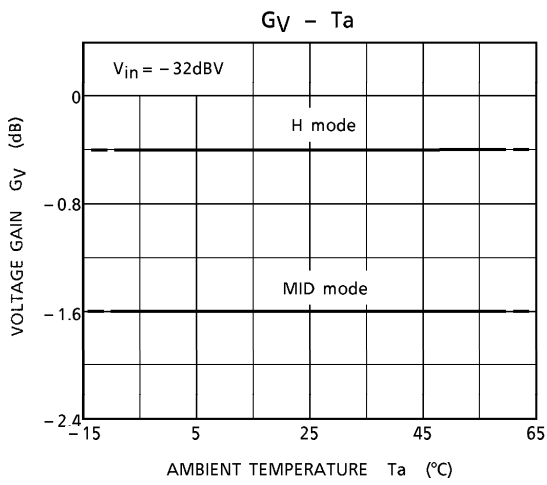


CHARACTERISTIC CURVES

Unless otherwise specified : $V_{CC} = 1.2V$, $f = 1kHz$, $R_L = 4.7k\Omega$, $T_a = 25^\circ C$

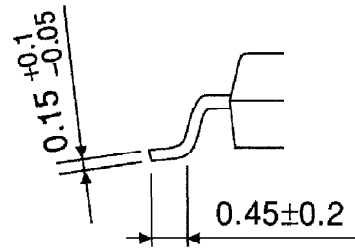
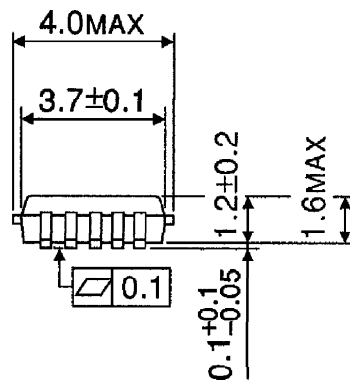
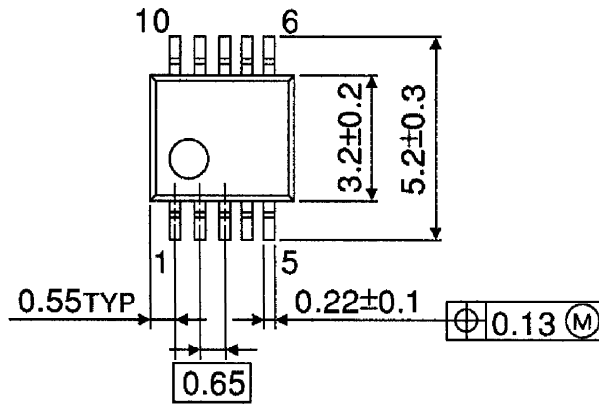






OUTLINE DRAWING
SSOP-10-P-0.65

Unit : mm



Weight : 0.04g (Typ.)