

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

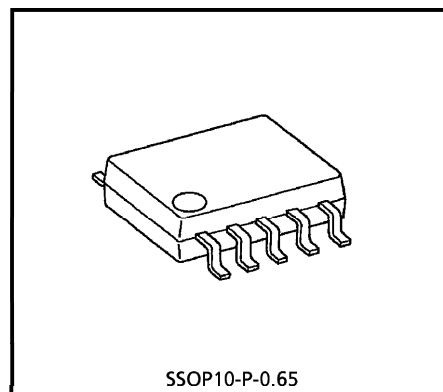
# TA2016FN

## 1.5V BUFFER AMPLIFIER

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

### FEATURES

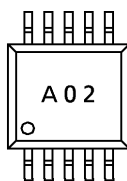
- Output impedance can be changed by mode switch.
  - H MODE .....  $230\Omega$  (Typ.)
  - MID MODE ....  $750\Omega$  (Typ.)
  - OFF MODE .... High impedance
- Built-in two switching transistors, which are synchronized with mode switch.
- Low quiescent current ( $V_{CC} = 1.2V$ ,  $V_{in} = 0$ ,  $T_a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



SSOP10-P-0.65

Weight : 0.04g (Typ.)

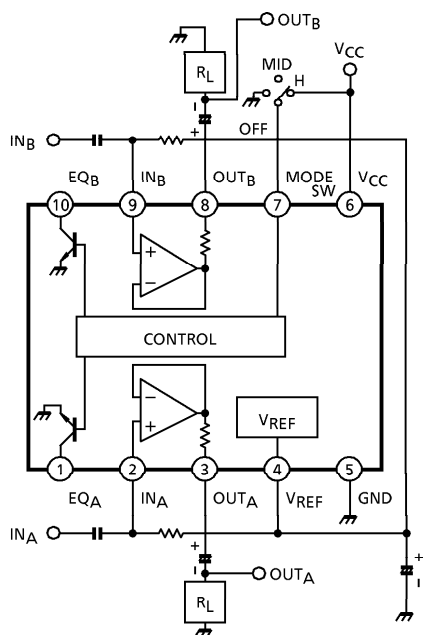
### MARKING



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**BLOCK DIAGRAM**



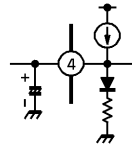
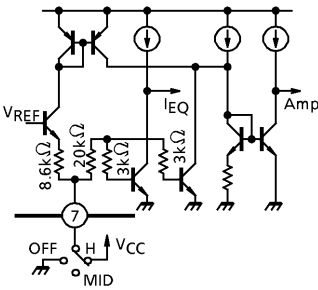
**OPERATION MODE**

MODE SW	CHARACTERISTIC	IMPEDANCE [ $\Omega$ ] (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	EQA	Equalizer Switch ( MID / OFF MODE : EQ ON H MODE : EQ OFF		—
10	EQB			
2	INA	Input of Buffer Amplifier		0.75
9	INB			
3	OUTA	Output of Buffer Amplifier		0.75
8	OUTB			

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

**APPLICATION NOTE**

- (1) V<sub>REF</sub>  
 V<sub>REF</sub> circuit should be stabilized, because this IC operate on V<sub>REF</sub> voltage.
- (2) Input stage  
 The resistor between input terminal (Pin②, ③) and V<sub>REF</sub> 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 <sub>CC</sub>	3	V
Power Dissipation	P <sub>D</sub> (Note)	300	mW
Equalizer Current	I <sub>EQ</sub>	50	mA
Operating Temperature	T <sub>opr</sub>	- 10~60	°C
Storage Temperature	T <sub>stg</sub>	- 55~150	

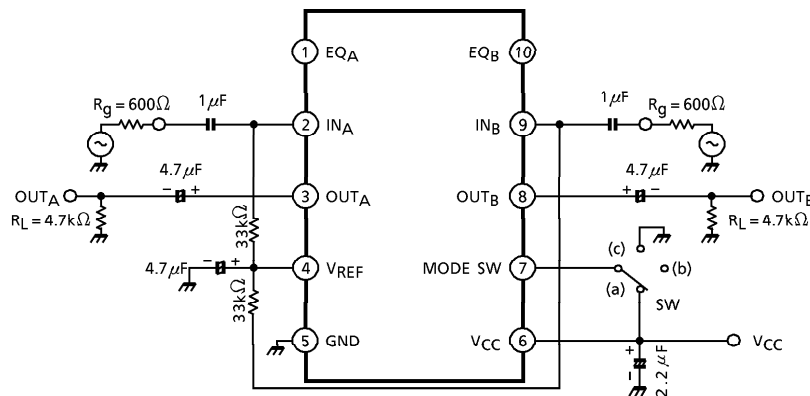
(Note) Derated above Ta = 25°C in proportion of 2.4mW/°C.

**ELECTRICAL CHARACTERISTICS**

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

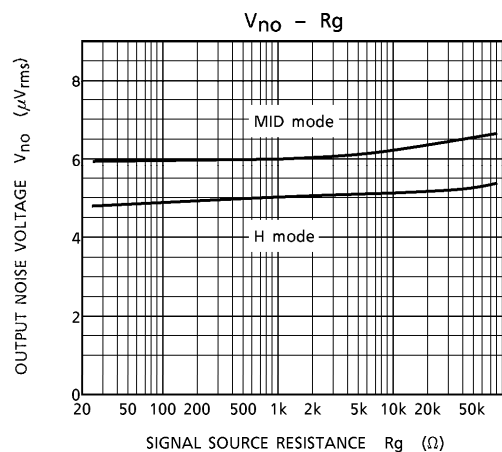
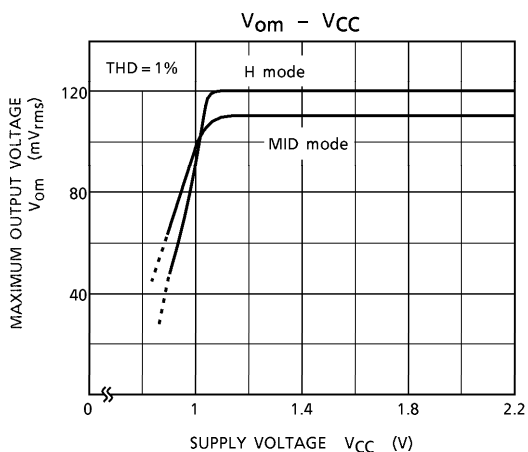
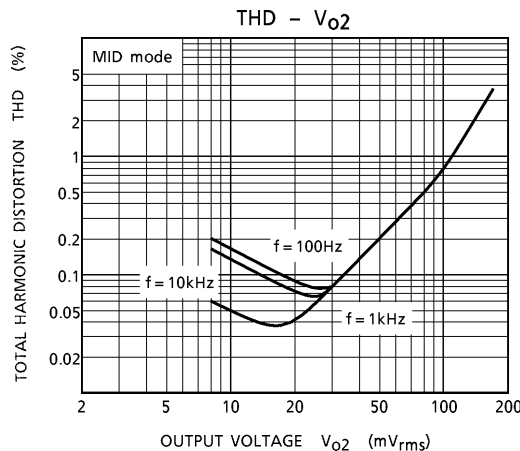
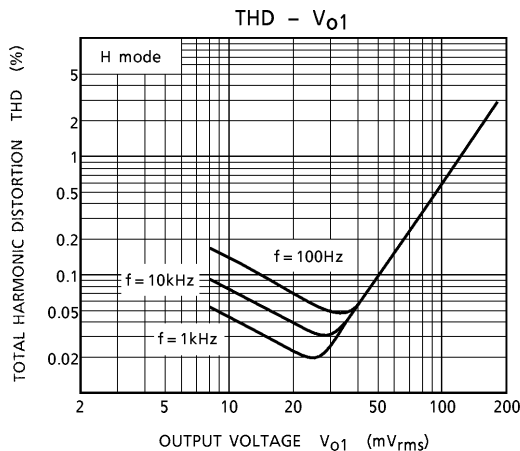
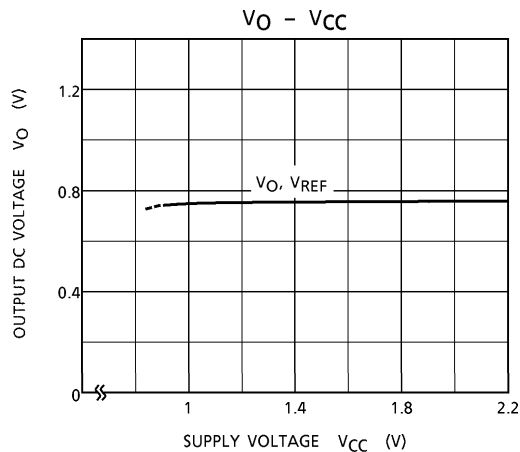
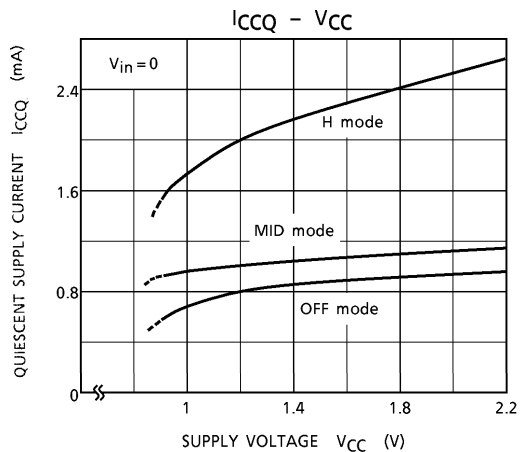
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	MODE SW	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current	I <sub>CCQ1</sub>	—	H	V <sub>in</sub> = 0	—	2	3	mA
	I <sub>CCQ2</sub>		MID		—	1	1.6	
	I <sub>CCQ3</sub>		OFF		—	0.8	1.4	
Voltage Gain	G <sub>V1</sub>	—	H	V <sub>in</sub> = -32dBV	-2.4	-0.4	1.6	dB
	G <sub>V2</sub>		MID		-3.6	-1.6	0.4	
Maximum Output Voltage	V <sub>om1</sub>	—	H	THD = 1%	70	120	—	mV <sub>rms</sub>
	V <sub>om2</sub>		MID		60	110	—	
Total Harmonic Distortion	THD1	—	H	V <sub>O</sub> = 50mV <sub>rms</sub>	—	0.1	0.6	%
	THD2		MID		—	0.2	0.8	
Output Noise Voltage	V <sub>no1</sub>	—	H	R <sub>g</sub> = 600Ω	—	5	10	μV <sub>rms</sub>
	V <sub>no2</sub>		MID		—	6	12	
Cross Talk	CT1	—	H	V <sub>in</sub> = -32dBV	—	76	—	dB
	CT2		MID		—	74	—	
H Mode On Current	I <sub>7</sub>	—	MID→H	I <sub>EQ</sub> ≤ 300μA	5	—	—	μA
Off Mode Voltage	V <sub>7</sub>	—	MID→OFF	V <sub>in</sub> = -32dBV ATT ≥ 45dB	0	—	0.12	V

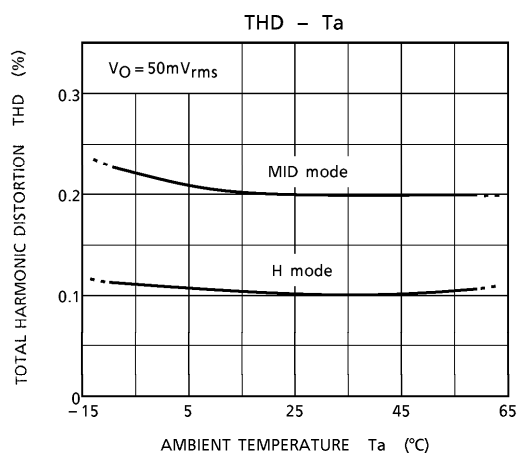
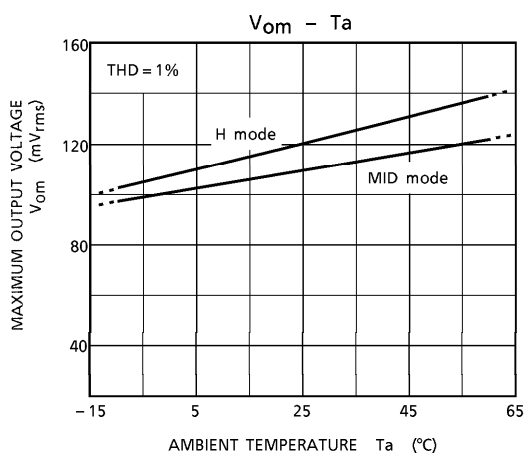
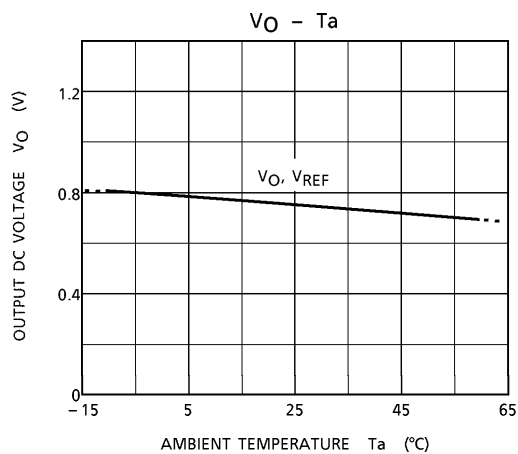
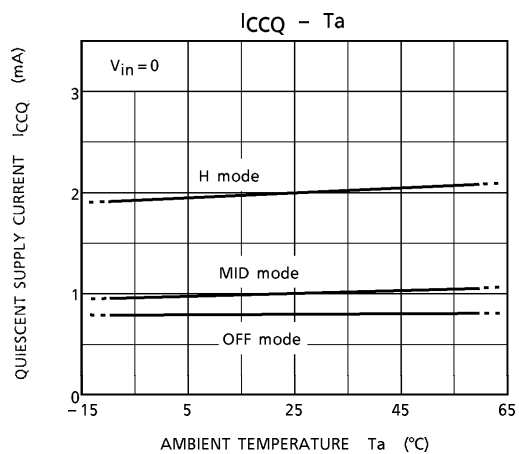
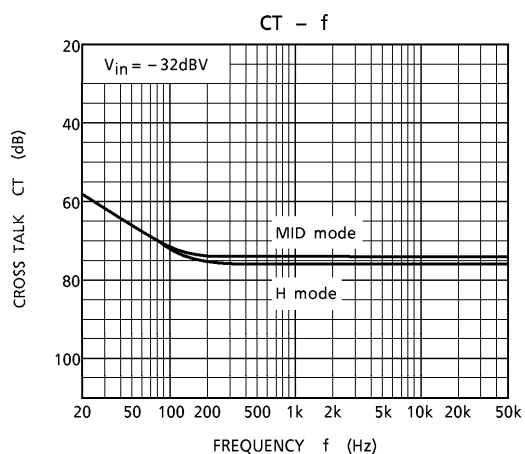
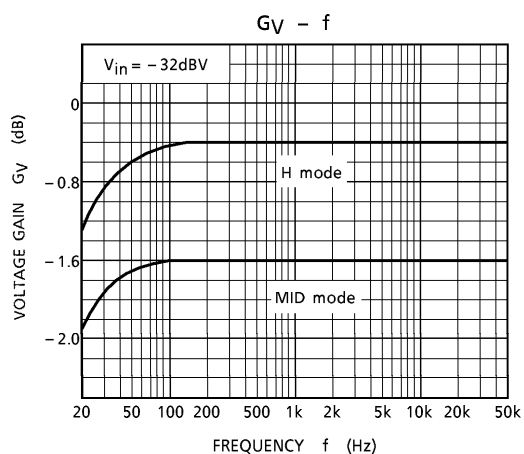
**TEST CIRCUIT**

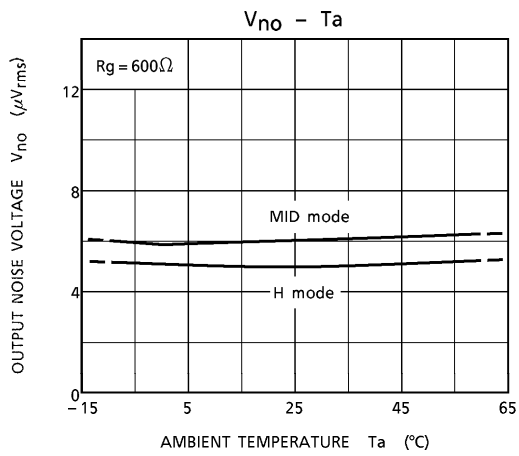
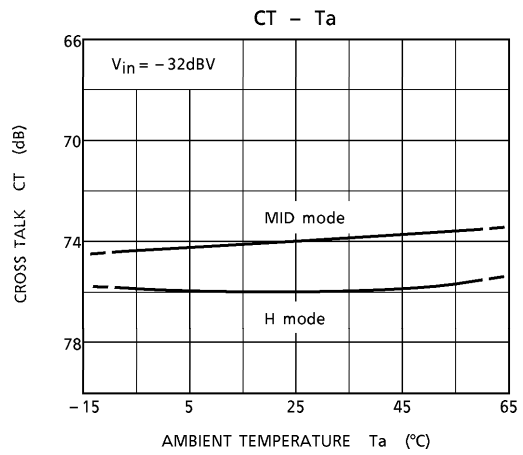
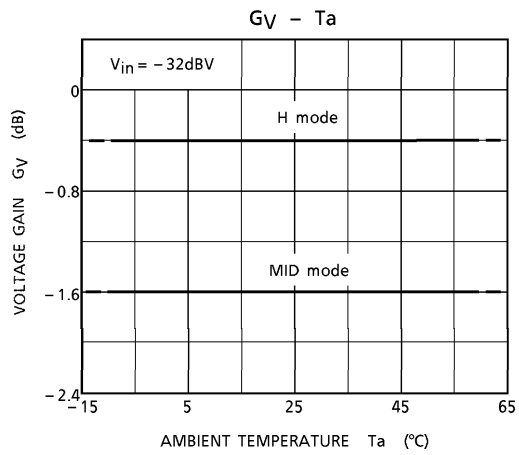


**CHARACTERISTIC CURVES**

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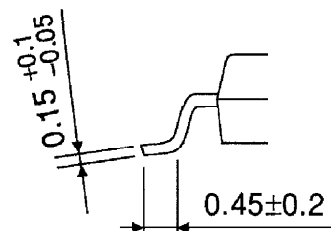
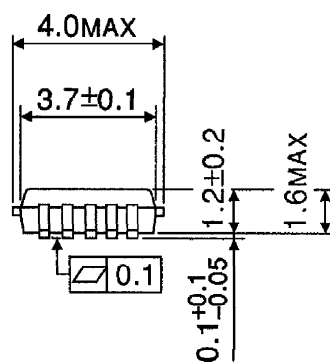
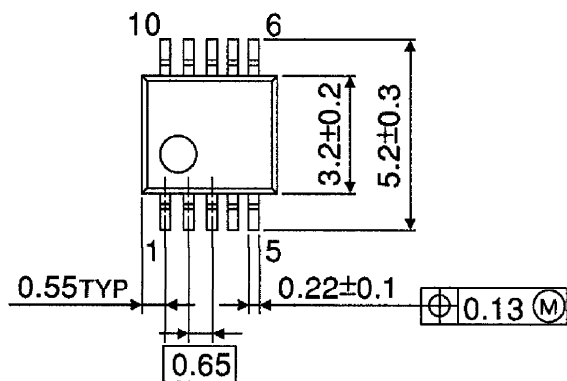






**OUTLINE DRAWING**  
SSOP-10-P-0.65

Unit : mm



Weight : 0.04g (Typ.)