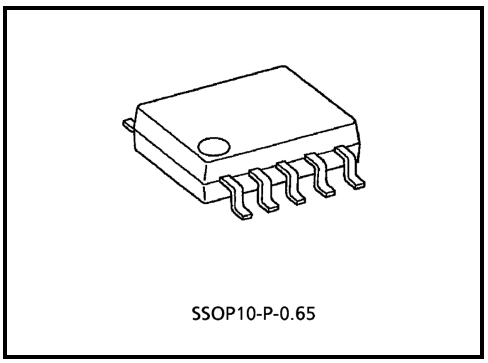
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA2016FN

1.5V Buffer Amplifier

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

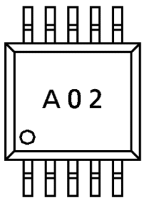


Weight: 0.04g (typ.)

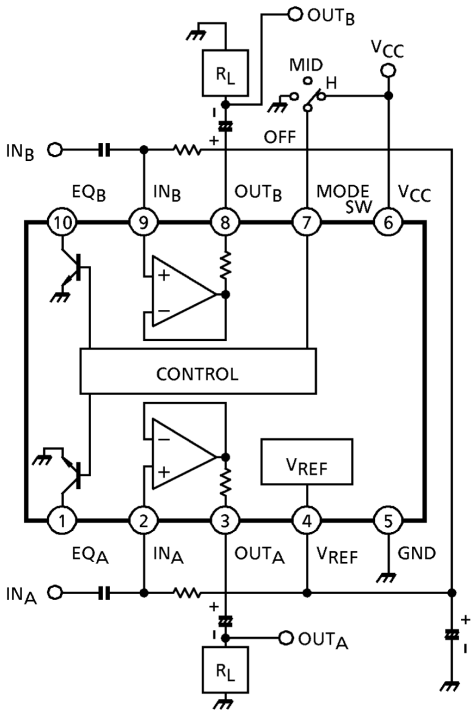
Features

- 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, Ta = 25°C)
  - H mode ..... I_{CCQ1} = 2mA (typ.)
  - MID mode .... I_{CCQ2} = 1mA (typ.)
  - OFF mode .... I_{CCQ3} = 0.8mA (typ.)
- Operating supply voltage range (Ta = 25°C)
  $V_{CC\ (opr)}$ = 0.95~2.2V

Marking



Block Diagram

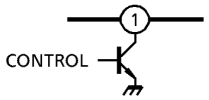
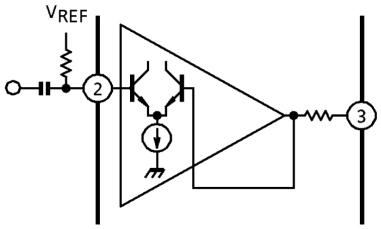
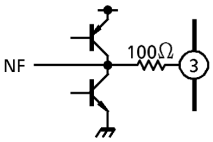


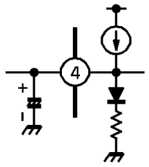
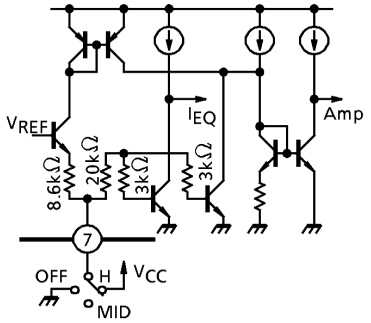
Operation Mode

Characteristic / Mode SW	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, Ta = 25°C)

Terminal No.	Terminal Name	Function	Internal Circuit	Terminal Voltage (V)
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 No.	Terminal Name	Function	Internal Circuit	Terminal Voltage (V)
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 (pin(2), (9)) and V_{REF} terminal (pin(4)) 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	

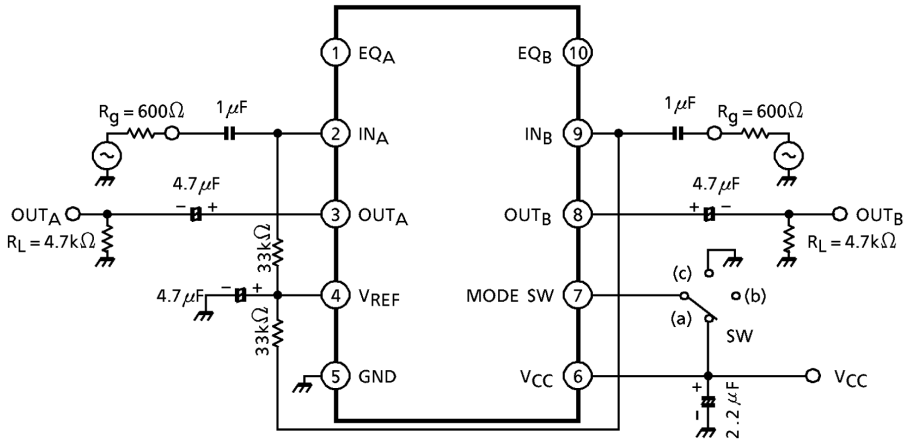
(Note) Derated above Ta = 25°C in proportion of 2.4mW / °C.

Electrical Characteristics

Unless Otherwise Specified: V_{CC} = 1.2V, f = 1kHz, R_L = 4.7kΩ, Ta = 25°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 = 600Ω	—	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} ≤ 300μA	5	—	—	μA
Off mode voltage	V_7	—	MID→OFF	V_{in} = −32dBV ATT ≥ 45dB	0	—	0.12	V

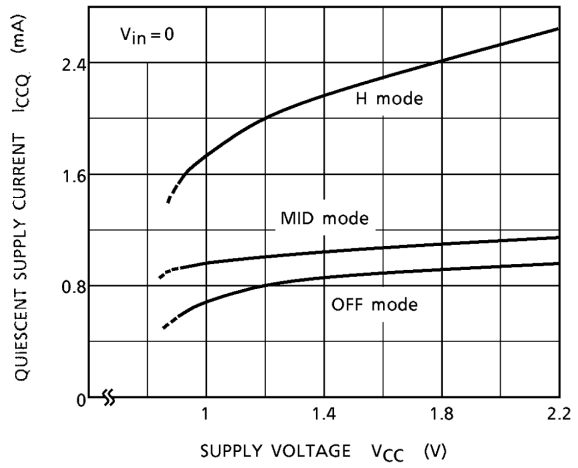
Test Circuit



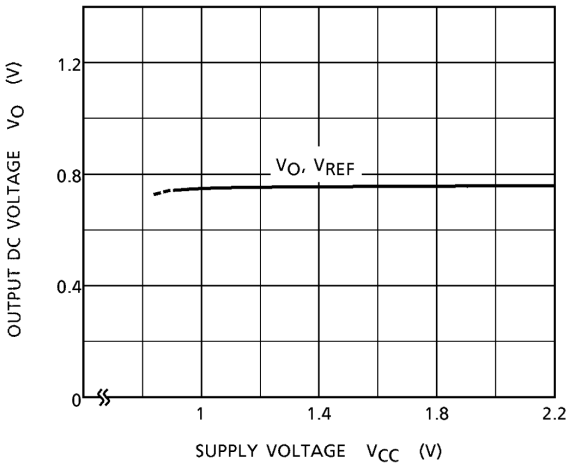
Characteristics Curves

Unless Otherwise Specified: V_{CC} = 1.2V, f = 1kHz, R_L = 4.7kΩ, Ta = 25°C

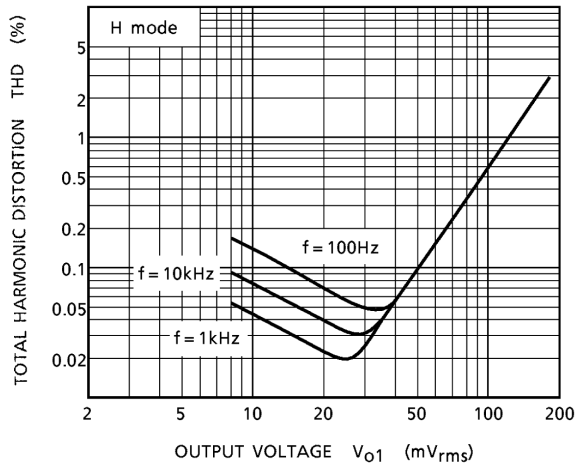
I_{CCQ} – V_{CC}



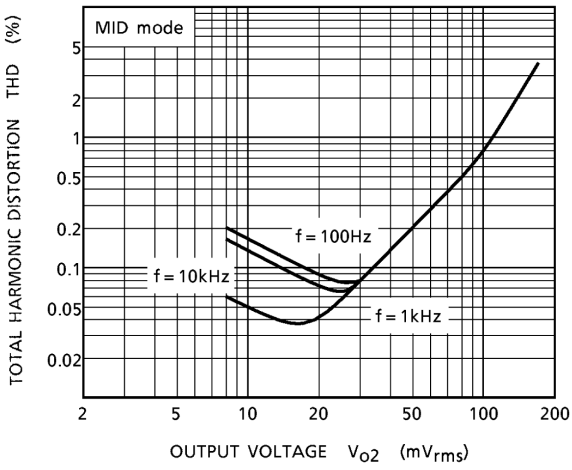
V_O – V_{CC}



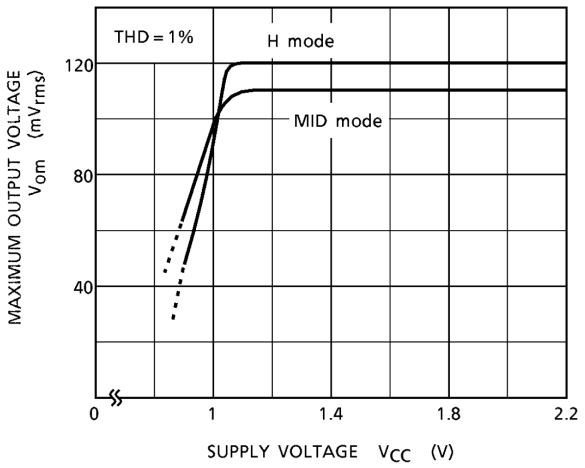
THD – V_{o1}



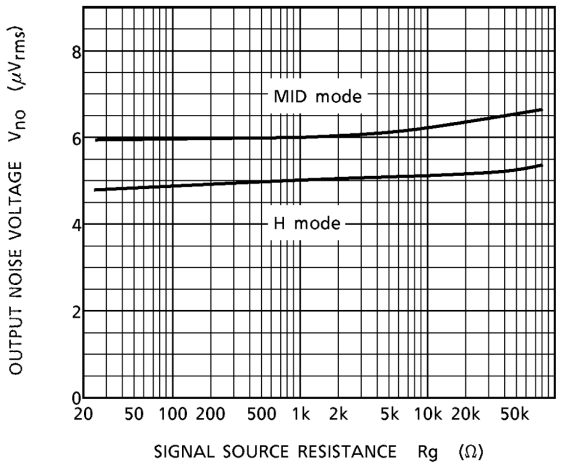
THD – V_{o2}



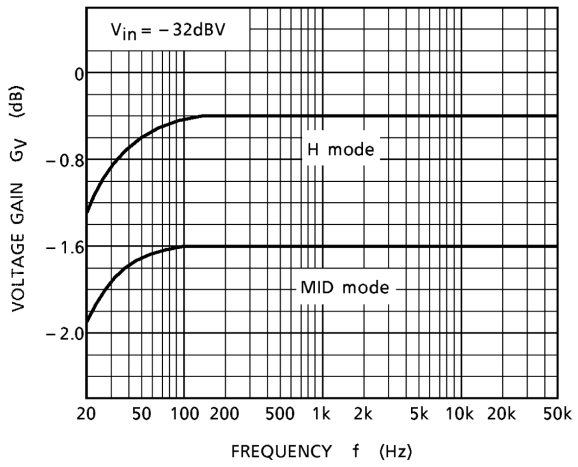
V_{om} – V_{CC}



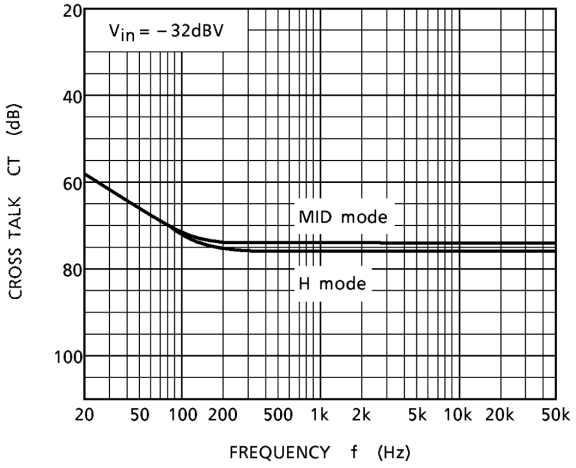
V_{no} – Rg



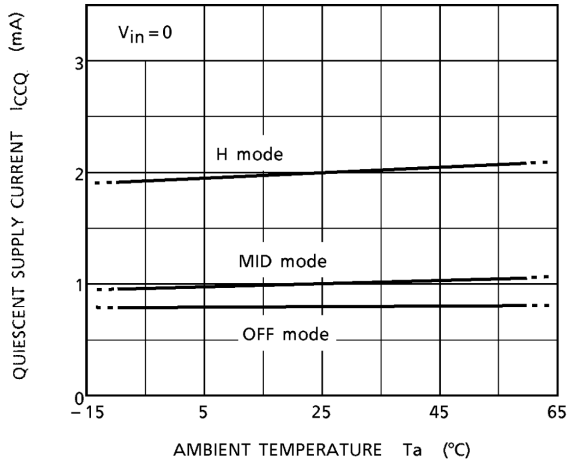
G_V – f



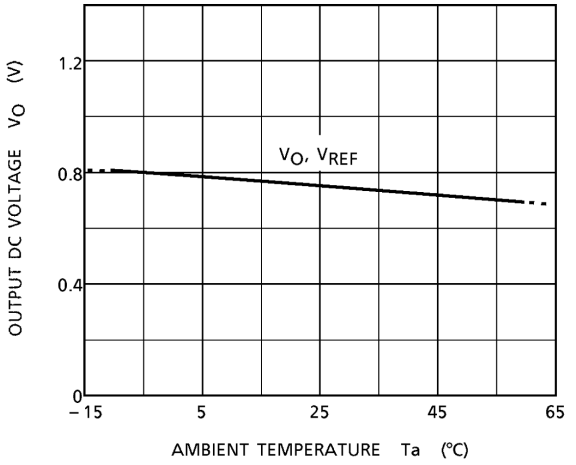
CT – f



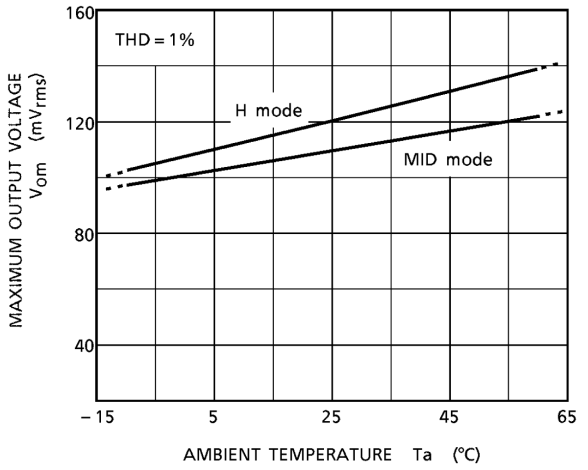
I_{CCQ} – Ta



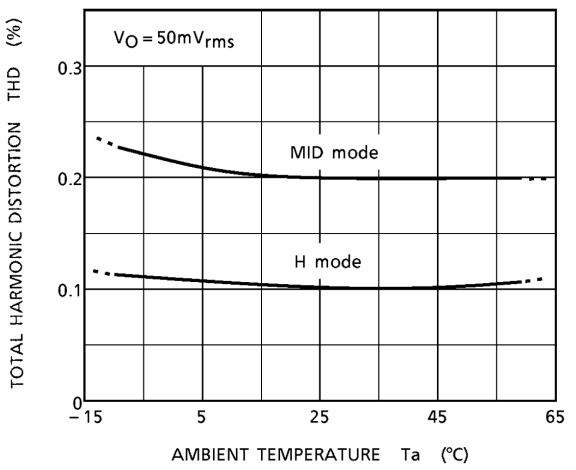
V_O – Ta



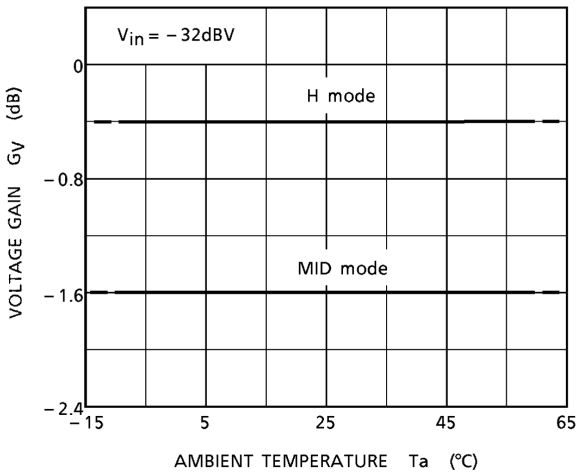
V_{om} – Ta



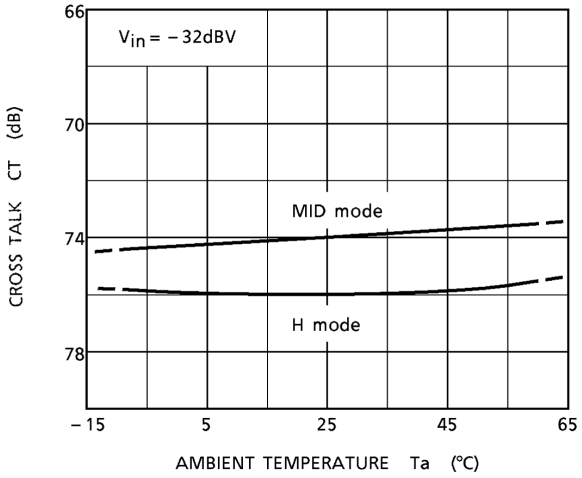
THD – Ta



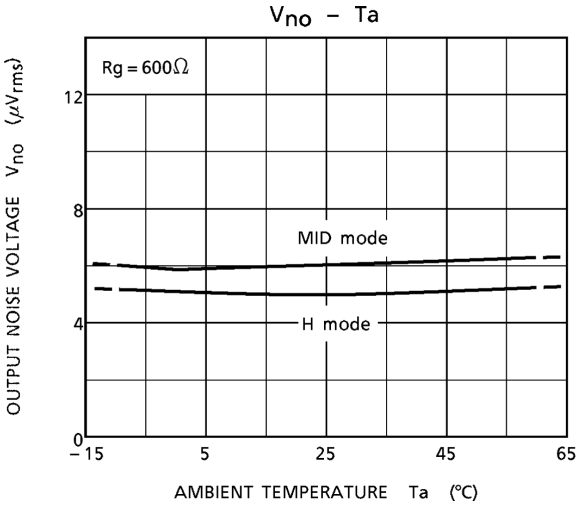
G_V – Ta



CT – Ta

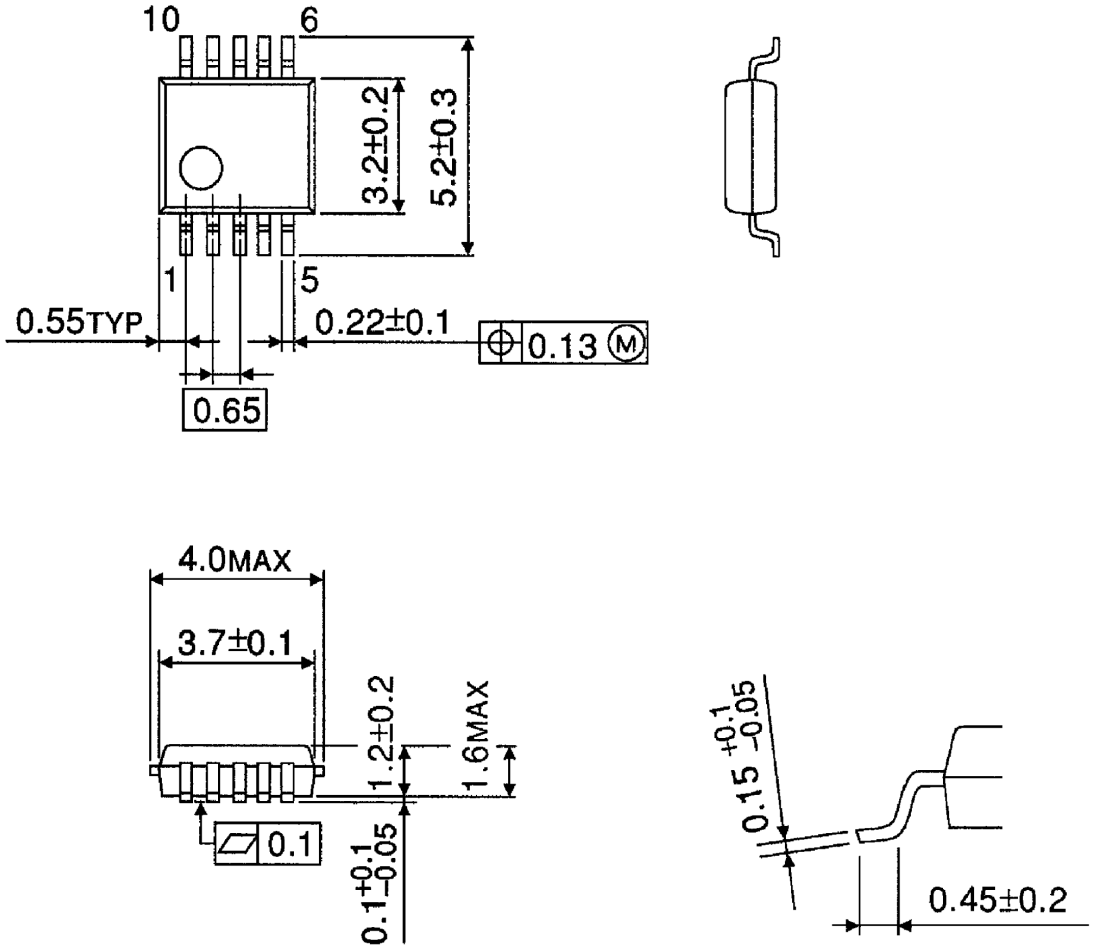


V_{no} – Ta



Package Dimensions

SSOP10-P-0.65 Unit : mm



Weight: 0.04g (typ.)

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