

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

# TA2056FN

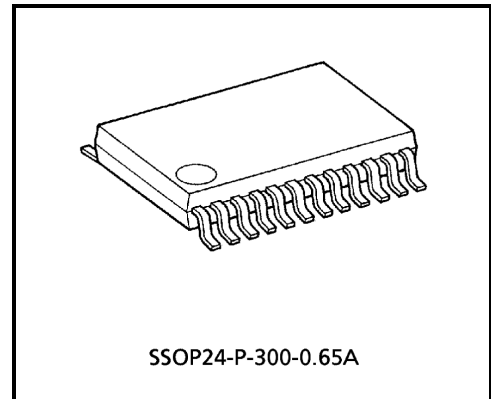
## 1.5V Cordless Headphone Receiver

The TA2056FN is an infrared ray linear audio signal receiver IC developed for IR cordless headphone systems. It is two built in FM receivers for stereo and muting function etc.

### Features

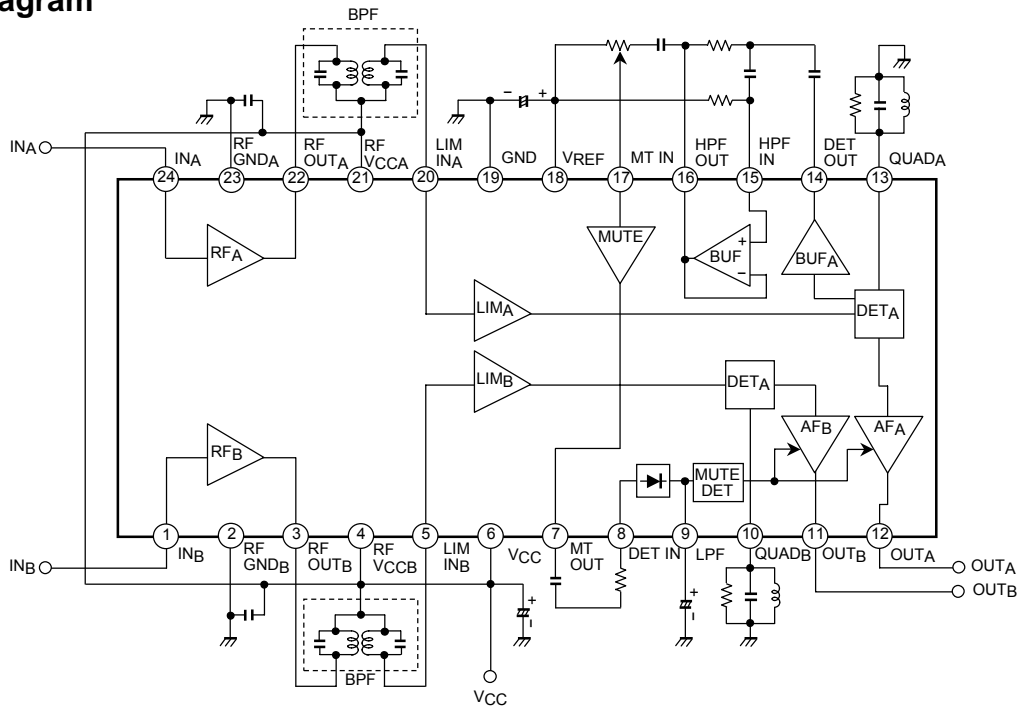
- Two built-in FM receivers for stereo  
( $f = 2.3 / 2.8\text{MHz}$ )
- Excellent spurious radiation by direct detection type
- Built-in muting function (retuned noise detection type)
  - Built-in buffer amplifier for muting signal detection
  - Built-in muting amplifier
  - Built-in detector circuit
- Muting attenuation ( $V_{CC} = 1.2\text{V}$ ,  $T_a = 25^\circ\text{C}$ )  
 $ATT = 65\text{dB}$  (typ.)
- Two built-in RF amplifiers
- Low supply current ( $V_{CC} = 1.2\text{V}$ ,  $T_a = 25^\circ\text{C}$ )  
 $ICC = 4.0\text{mA}$  (typ.)
- Operating supply voltage range ( $T_a = 25^\circ\text{C}$ )  
 $V_{CC}(\text{opr}) = 0.95\sim 2.2\text{V}$

(\*) Handle with care to prevent devices from deterioration by static electricity.



Weight: 0.14g (typ.)

**Block Diagram**



**BPF**

We recommend

2.3MHz: TH353BFI-8300 (TOKO, INC.)

2.8MHz: TH353BFI-8301 (TOKO, INC.)

## Terminal Explanation

Terminal Voltage: Typical Voltage at no Signal with Test Circuit ( $V_{CC} = 1.2V$ ,  $T_a = 25^\circ C$ )

Terminal No.	Name	Function	Internal Circuit	Terminal Voltage (V)		
1	IN <sub>B</sub>	Input of RF amplifier • Input impedance : 3.3k $\Omega$ (typ.) • A resistor ( $R \leq 330\Omega$ ) should be connected to GND through a capacitor		0.7		
24	IN <sub>A</sub>			0		
2	RF GND <sub>B</sub>	GND of RF amplifier			—	
23	RF GND <sub>A</sub>				1.2	
3	RF OUT <sub>B</sub>	Output of RF amplifier				1.2
22	RF OUT <sub>A</sub>					—
4	RF VCC <sub>B</sub>	$V_{CC}$ , for RF amplifier and part of limiter amplifier				
21	RF VCC <sub>A</sub>		1.2			
5	LIM IN <sub>B</sub>	Input of limiter amplifier • Input impedance : 1.8k $\Omega$ (typ.)				
20	LIM IN <sub>A</sub>			1.2		
6	V <sub>CC</sub>	$V_{CC}$ , except RF $V_{CC}$		—		
7	MT OUT	Output of muting amplifier			0.5	
17	MT IN	Input of muting amplifier It is necessary to connect a resistor between $V_{REF}$ terminal (pin(18)) and this terminal (pin(17)) for bias.			0.7	
8	DET IN	Input of muting detector circuit			0.7	

Terminal No.	Name	Function	Internal Circuit	Terminal Voltage (V)
9	LPF	Smoothing circuit of muting signal		—
10	QUAD <sub>B</sub>	Quad detector		0
13	QUAD <sub>A</sub>			
11	OUT <sub>B</sub>	Output of audio signal • Output impedance : 1kΩ (typ.)		0.6
12	OUT <sub>A</sub>			
14	DET OUT	Detector output for muting function • This terminal is detector output of FM detector, it can be used for muting signal detection. • Output impedance : 2kΩ (typ.)		0.5
15	HPF IN	Input of HPF for muting signal detection		0.7
16	HPF OUT	Output of HPF for muting signal detection		0.7
18	V <sub>REF</sub>	Reference circuit		0.7
19	GND	—	—	0

**Application Note**

1. Input of RF amplifier (pin(1) / (24))

A resistor ( $R \leq 330\Omega$ ) should be connected to GND through a capacitor. Because input impedance of this terminal is designed for  $3.3k\Omega$  (typ.), internal circuit doesn't operate normally.

2. Muting function (retuned noise detection type)

The muting function is operated by audio amplifier muting which is decided by noise level which is taken out by high-pass filter from recovered output voltage of channel A.

Muting signal is detected only channel A, not from channel B.

The detected noise level peaks near the input limiting voltage. Below the input limiting voltage, the noise level decreases and there is a possibility that the muting function doesn't operate normally. Thus in case that muting sensitivity is set near the input limiting voltage, it is necessary to caution that the muting function operate normally.

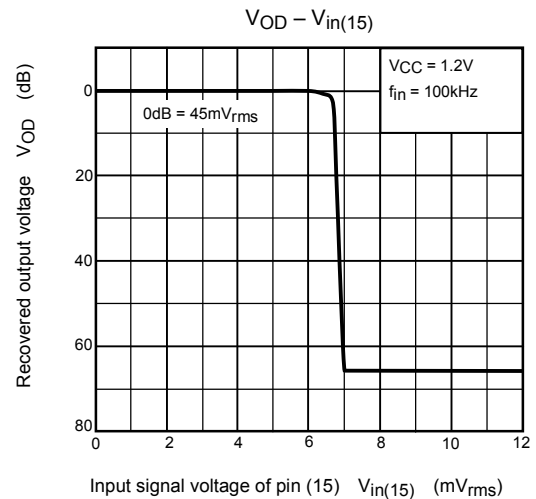


Fig.muting sensitivity

3. Pattern layout

The TA2056FN has three  $V_{CC}$  and GND terminals. External parts should be connected with each  $V_{CC}$  and GND shortly, these pattern layouts should be isolated.

- RF  $V_{CCA}$  (pin(21))、 RF  $GND_A$  (pin(23)).....RF amp. (A-ch), part of LIM amp. (A-ch)
- RF  $V_{CCB}$ (pin(4))、 RF  $GND_B$  (pin(2)).....RF amp. (B-ch), part of LIM amp. (B-ch)
- $V_{CC}$  (pin(6))、 GND (pin(19))..... Except RF  $V_{CC}$  and RF GND

## Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	3	V
Power dissipation	P <sub>D</sub> (Note)	500	mW
Operating temperature	T <sub>opr</sub>	-25~75	°C
Storage temperature	T <sub>stg</sub>	-55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 4mW / °C

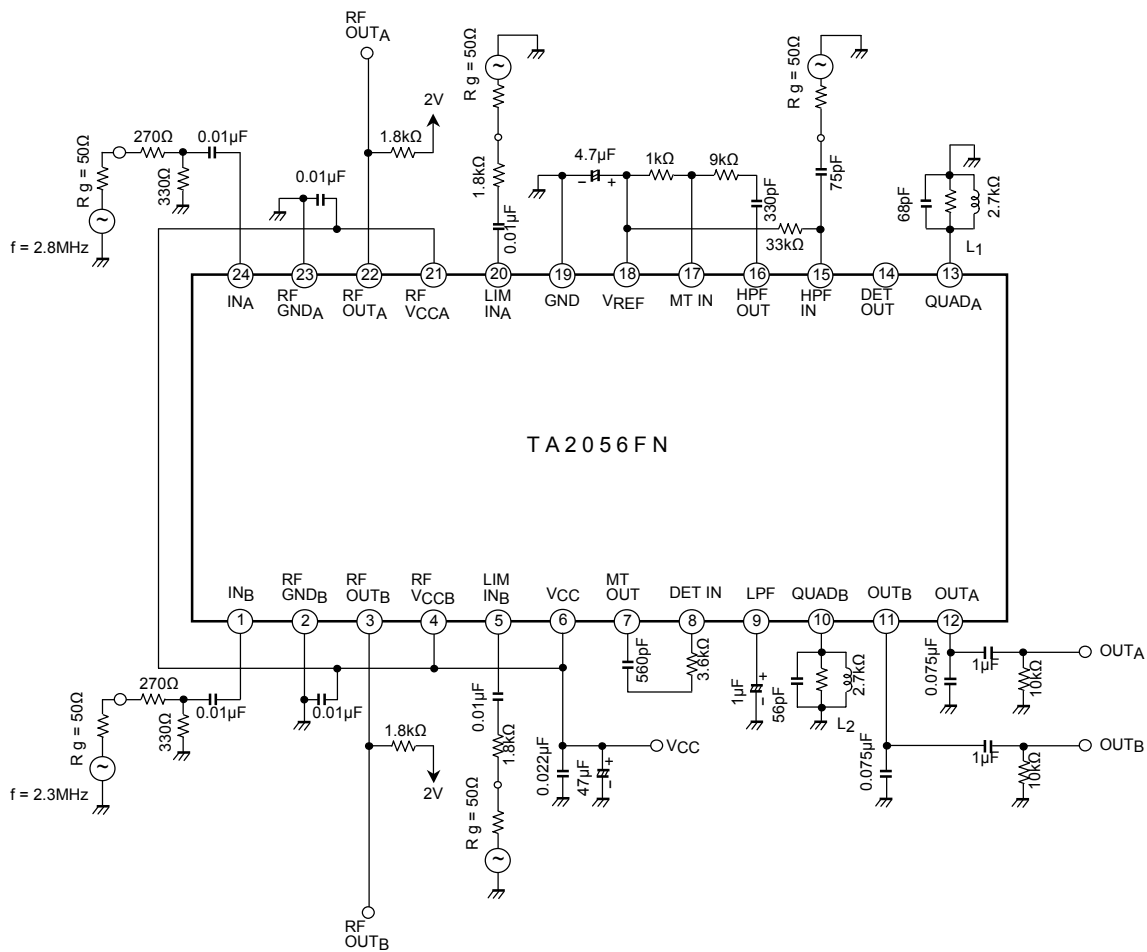
## Electrical Characteristics

Unless Otherwise Specified: V<sub>CC</sub> = 1.2V, Ta = 25°C

f = 2.3 / 2.8MHz, f<sub>m</sub> = 1kHz, Δf = ± 22.5kHz, V<sub>in</sub> = 80dBμV EMF

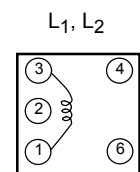
Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit	
Supply current	I <sub>CC</sub>	—	V <sub>in</sub> = 0	—	4.0	6.0	mA	
Reference voltage	V <sub>REF</sub>	—		0.65	0.75	0.85	V	
Receiver stage	RF amp. Voltage gain	G <sub>v</sub>	V <sub>in</sub> = 10mV <sub>rms</sub>	—	8	—	dB	
	Recovered output voltage 1	V <sub>OD1</sub>	f = 2.8MHz	27	45	63	mV <sub>rms</sub>	
	Recovered output voltage 2	V <sub>OD2</sub>	f = 2.3MHz	—	42	—	mV <sub>rms</sub>	
	V <sub>OD</sub> channel balance	CB	—	V <sub>OD1</sub> -V <sub>OD2</sub>	-1.4	+0.6	+2.6	dB
	Input limiting voltage	V <sub>in</sub> (lim)	—	-3dB limiting point	40	45	50	dBμV EMF
	Total harmonic distortion	THD	—		—	0.2	—	%
	Signal to noise ratio	S / N	—	Δf = ± 22.5kHz → 0	—	56	—	dB
	AM rejection ratio	AMR	—	MOD = 30%	—	45	—	dB
	Cross talk	CT	—		—	55	—	dB
Muting stage	Muting circuit off voltage	MT (OFF)	—	f = 100kHz, V <sub>OD</sub> > -3dB	—	—	2	mV <sub>rms</sub>
	Muting circuit on voltage	MT (ON)	—	f = 100kHz, V <sub>OD</sub> < -40dB	12	—	—	mV <sub>rms</sub>
	Muting attenuation	ATT	—		—	65	—	dB

**Test Circuit**



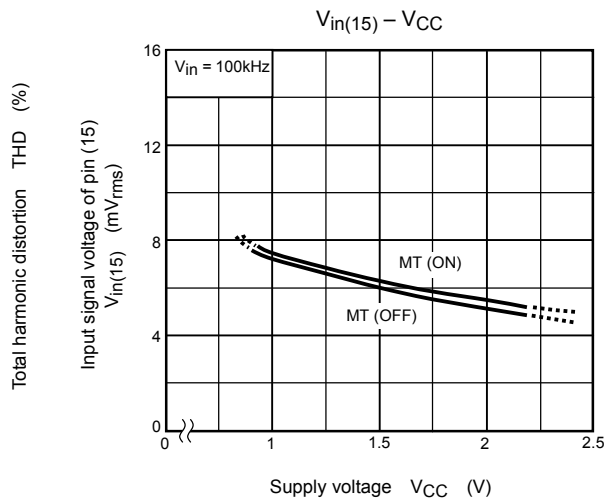
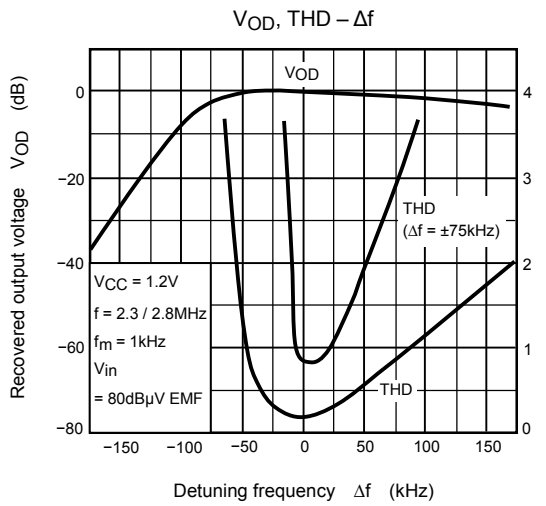
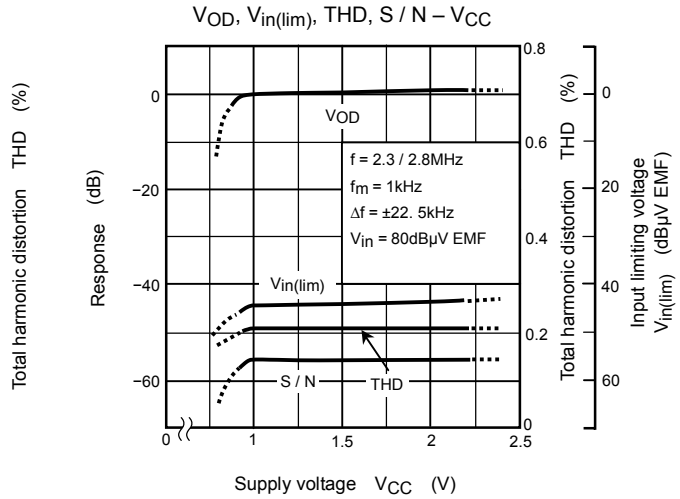
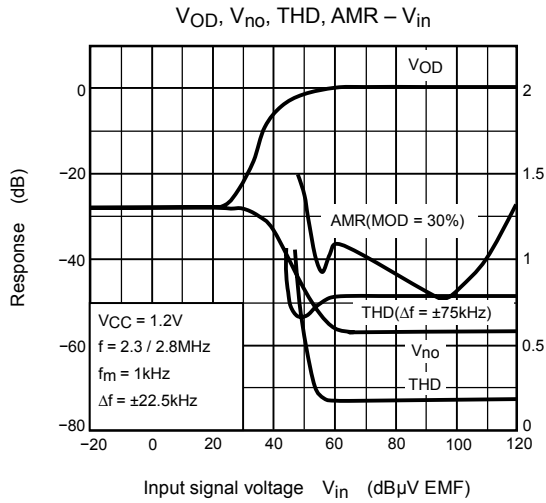
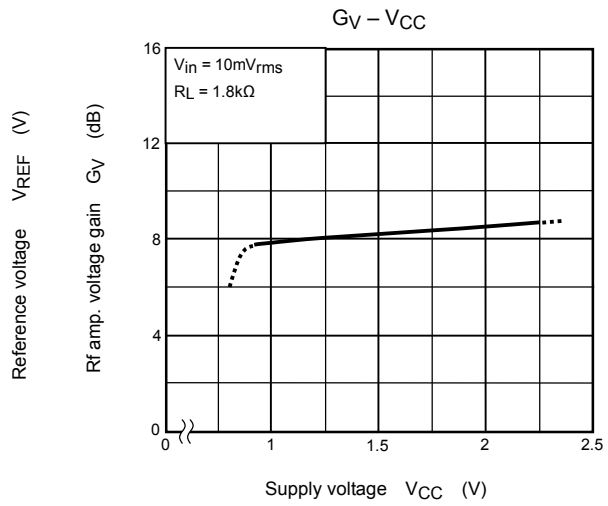
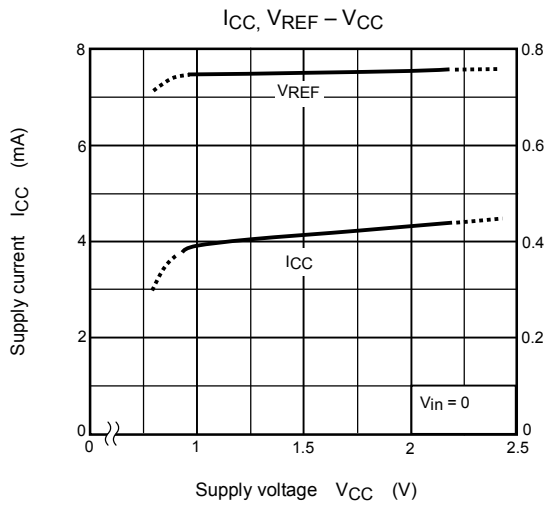
**Coil Data (test circuit)**

Coil Name.	Test Freq.	L (μH)	Q <sub>0</sub>	TURN S	Wire (mmφ)	Reference
				1-3		
L <sub>1</sub> DET	2.52MHz	35	70	59	0.06UEW	(S)4165-JPS-047-6
L <sub>2</sub> DET	2.52MHz	60	65	74	0.06UEW	(S)4165-JPS-047-11

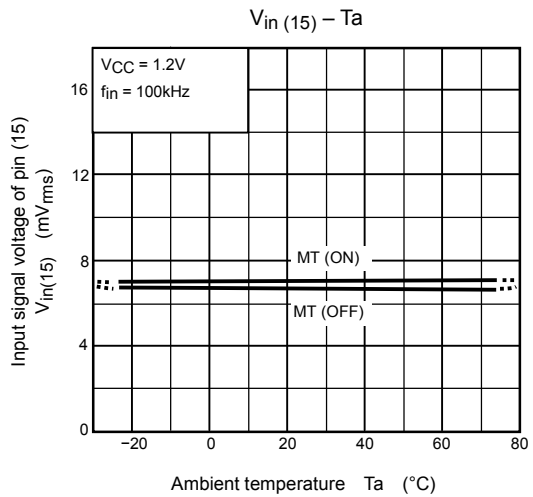
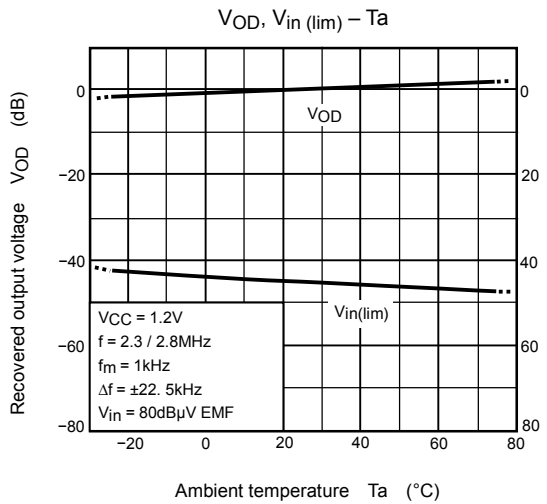
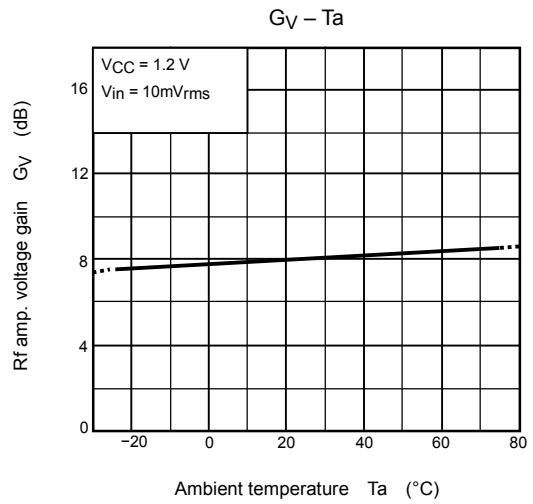
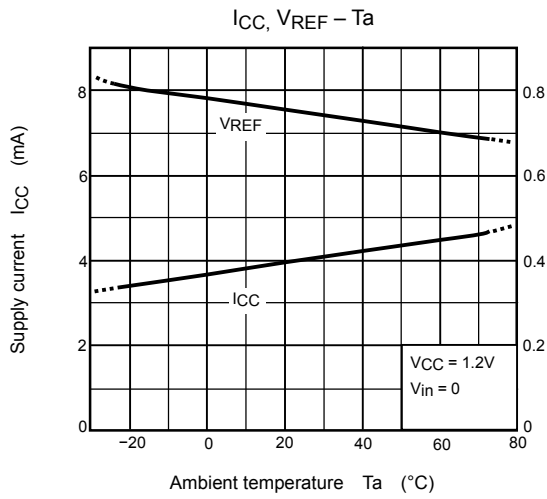


(Bottom View)

(S): Sumida electric Co., LTD.



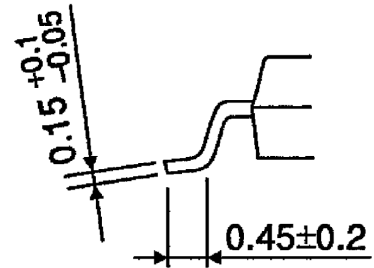
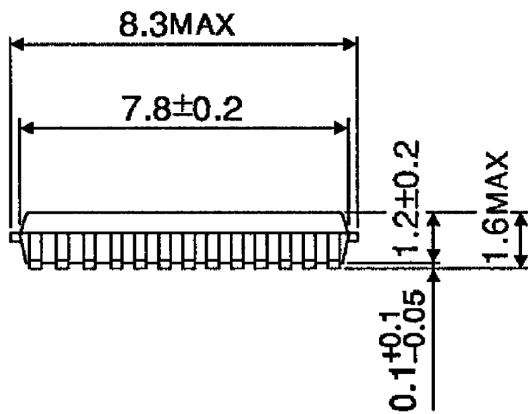
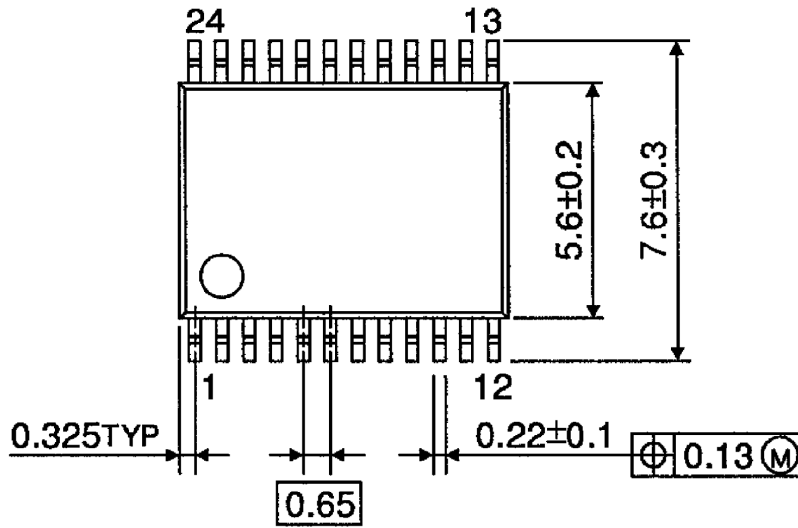




**Package Dimensions**

SSOP24-P-300-0.65A

Unit : mm



Weight: 0.14g (typ.)

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