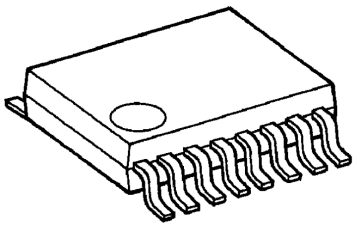
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8145FN

Stereo Headphone Amplifier (1.5V USE)

The TA8145FN is a stereo headphone power amplifier IC, which is developed for low voltage operation (1.5V).
It is especially suitable for a stereo headphone cassette player.



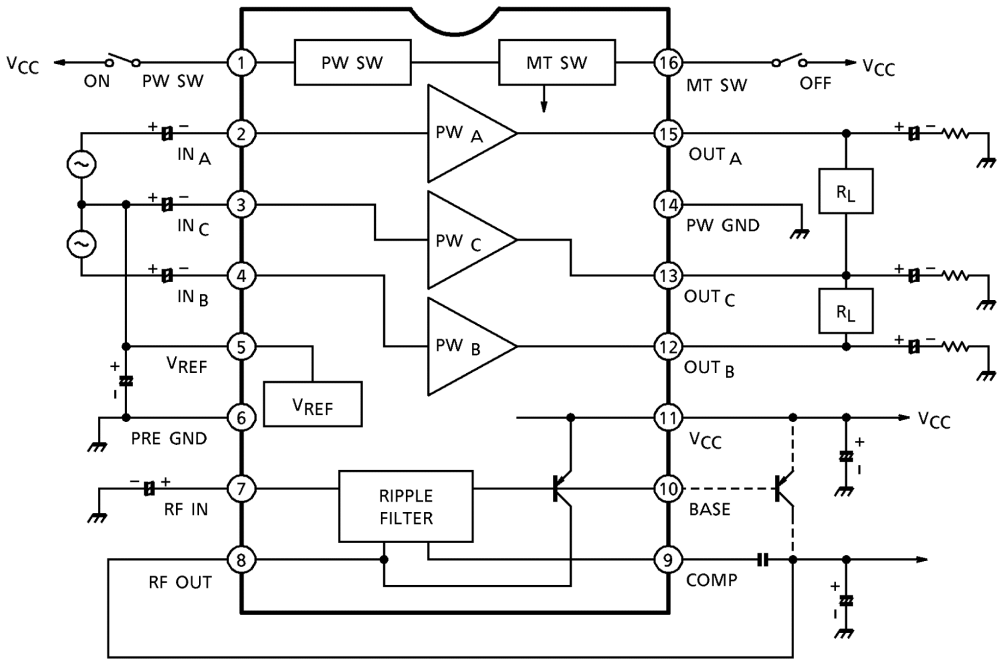
SSOP16-P-225-0.65B

Weight: 0.09g (typ.)

Features

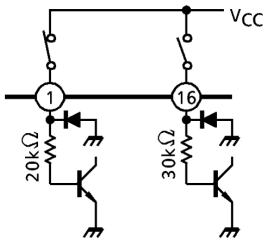
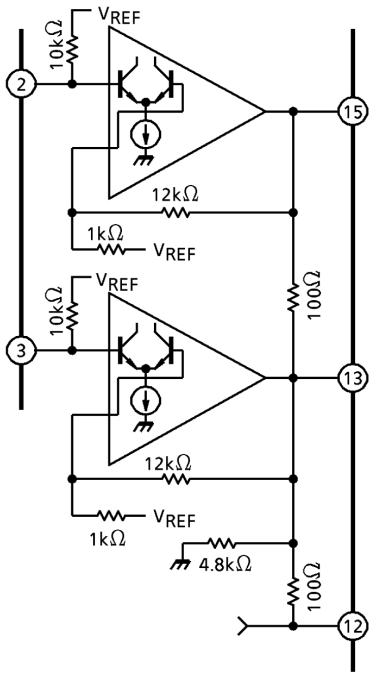
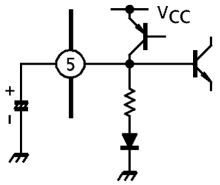
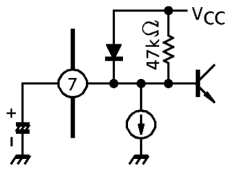
- OCL (output condenser−less)
- Built−in a ripple filter
- G_V = 22dB (typ.)
- Output power: P_o = 8mW (typ.)
  (V_{CC} = 1.5V, R_L = 16Ω, THD = 10%, Ta = 25°C)
- Built−in a power switch.
- Built−in a power amplifier mute.
- Excellent ripple rejection ratio: RR = 52dB (typ.)
- Low noise: V_{no} = 27μV_{rms} (typ.)
- Operating supply voltage range (Ta = 25°C)
  $V_{CC\ (opr)}$ = 0.9~2.2V

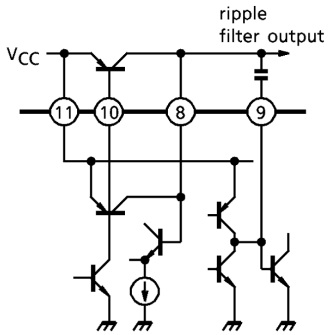
Block Diagram



Terminal Explanation

Terminal Voltage: Typical Terminal Voltage at no Signal with Test Circuit
(V_{CC} = 1.2V, Ta = 25°C)

Terminal No.	Terminal Name	Function	Internal Circuit	Terminal Voltage (V)
1	PW SW	Power on / off switch. V_{CC}: Power ON GND / OPEN: Power OFF		—
16	MT SW	Muting switch. V_{CC}: Muting OFF GND / OPEN: Muting ON		—
2	IN_A	Input of power amplifier		0.75
4	IN_B			
15	OUT_A	Output of power amplifier		0.6
12	OUT_B			
3	IN_C	Input of center amplifier		0.75
13	OUT_C	Output of center amplifier		0.6
5	V_{REF}	Reference voltage		0.75
6	PRE GND	—	—	0
7	RF IN	Ripple filter terminal		1.2

Terminal No.	Terminal Name	Function	Internal Circuit	Terminal Voltage (V)
8	RF out	Ripple filter output.		1.1
9	Comp	Phase–compensation terminal for a ripple filter circuit.		0.7
10	Base	Base bias for an external PNP transistor of ripple filter.		0.5
11	V_{CC}	—	—	1.2
14	PW GND	—	—	0

Application Note

(1) Center amplifier

It is necessary to insert the coupling capacitor between the terminal of center amplifier input and V_{REF}, because it is necessary to stabilize the center amplifier circuit. Input signal should not be applied to the input terminal of center amplifier, because the internal circuit has unbalance and center amplifier doesn't operate normally.

(2) Power amplifier input

The input signal should be applied to power amplifier input through a coupling capacitor, because in case that DC current or DC voltage is applied to the terminal of IN_A (pin 2) and IN_B (pin 4), the internal circuit has unbalance and center amplifier doesn't operate normally.

(3) Muting switch

The leak current flows through the terminal of MT SW (pin 16), in case that the terminal is connected with V_{CC} line independently, even though this IC is off–mode (the terminal of PW SW (pin 1) is off–mode).

(4) Power switch

It is necessary to connect an external pull–down resistor with the terminal of PW SW (pin 1), in case that this IC is turned on due to external noise etc.

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Supply voltage		V_{CC}	4.5	V
Output current	Power amplifier	$I_{O\ (peak)}$	60	mA
	Ripple filter (built−in transistor)	I_{RF}	5	
Power dissipation (Note)		P_D	400	mW
Operating temperature		T_{opr}	−25~75	°C
Storage temperature		T_{stg}	−55~150	

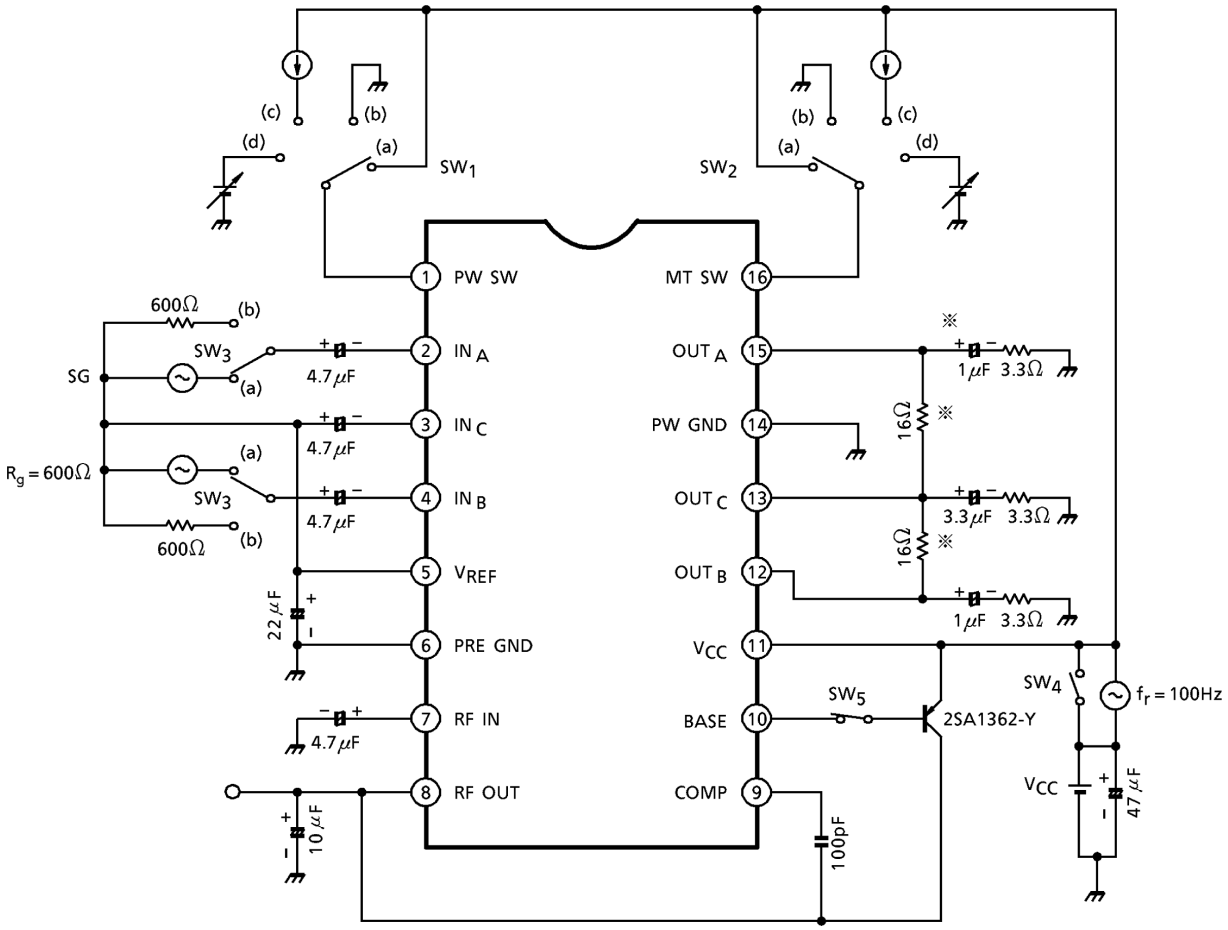
Note: Derated above Ta = 25°C in the proportion of 3.2mW / °C.

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: a, SW_4: ON, SW_5: ON

Characteristic			Symbol	Test Cir−cuit	Test Condition	Min.	Typ.	Max.	Unit
Quiescent current			I_{CCO1}	—	Power off, SW_1: b, SW_2: b	—	0.1	5	μA
			I_{CCO2}	—	Mute on, SW_2: b	—	1.6	3	mA
			I_{CCO3}		V_{in} = 0, SW_3: b	—	10	14	
Power amplifier	Voltage gain		G_V	—	$V_{o\ (A)} = V_{o\ (B)}$ = −22dBV	20	22	24	dB
	Channel balance		CB		V_o = −22dBV	—	0	1.5	
	Output power		P_o	—	V_{CC} = 1.5V, THD = 10% $V_{in\ (A)} = V_{in\ (B)}$	5	8	—	mW
	Total harmonic distortion		THD	—	V_{CC} = 1V $P_{o\ (A)} = P_{o\ (B)}$ = 0.5mW	—	0.7	1.5	%
	Output noise voltage		V_{no}	—	SW_3: b, BPF = 20Hz~20kHz	—	27	40	μV_{rms}
	Cross talk		CT	—	V_o = −22dBV	31	37	—	dB
	Ripple rejection ratio		RR1		V_{CC} = 1V, f_r = 100Hz V_r = −32dBV, SW_4: open	45	52	—	
	Muting attenuation		ATT		V_o = −22dBV, SW_2: a→b	65	80	—	
Ripple filter output voltage			V_{RF}	—	V_{CC} = 1V, I_{RF} = 30mA	0.86	0.9	—	V
Ripple rejection ratio of ripple filter output			RR2	—	V_{CC} = 1V, I_{RF} = 30mA f_r = 100Hz, V_r = −32dBV SW_4: open	30	37	—	dB
Power switch	Power on current		I_1	—	V_{CC} = 0.9V, V_5 ≥ 0.5V, SW_1: c	5	—	—	μA
	Power off voltage		V_1	—	V_{CC} = 0.9V, V_5 ≤ 0.1V SW_1: d	0	—	0.3	V
Mute switch	Mute off current		I_{16}	—	V_{CC} = 0.9V, V_{13} ≥ 0.3V, SW_2: c	5	—	—	μA
	Mute on voltage		V_{16}	—	V_{CC} = 0.9V, V_{13} ≤ 0.3V SW_2: d	0	—	0.3	V

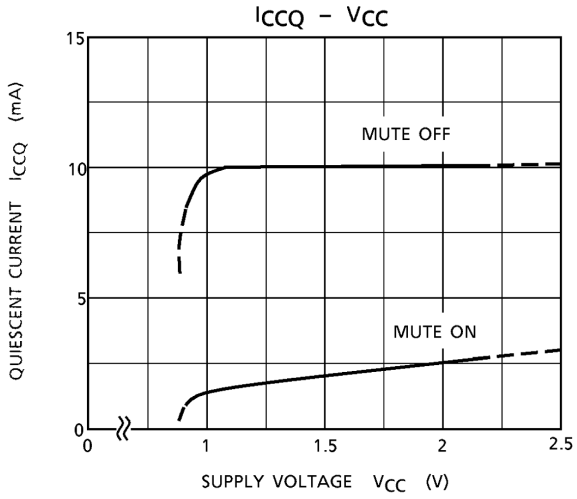
Test Circuit

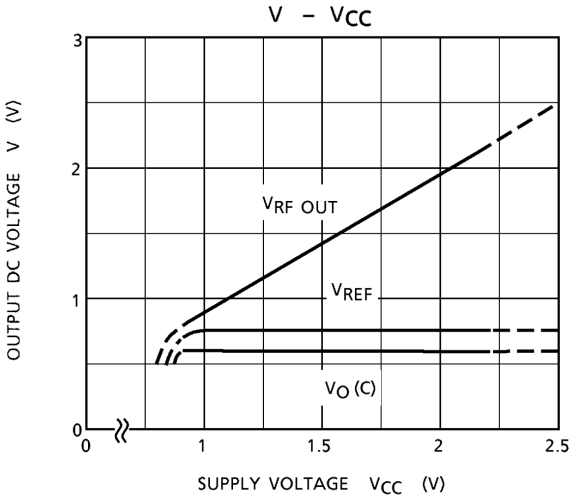


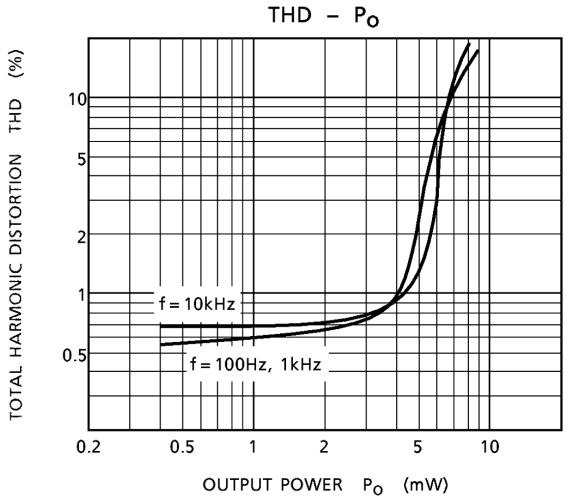
※ Tantalum condenser

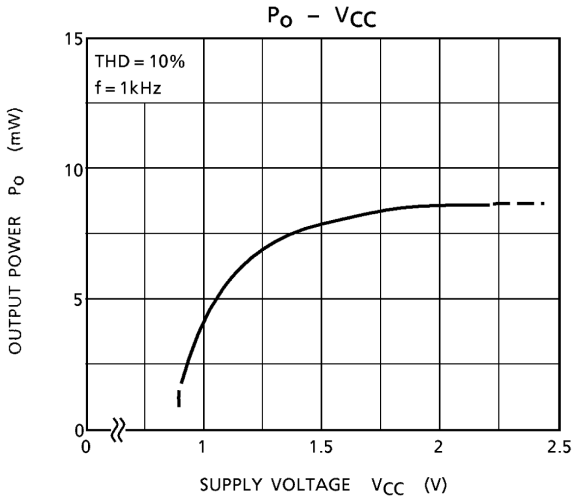
Characteristics Curves

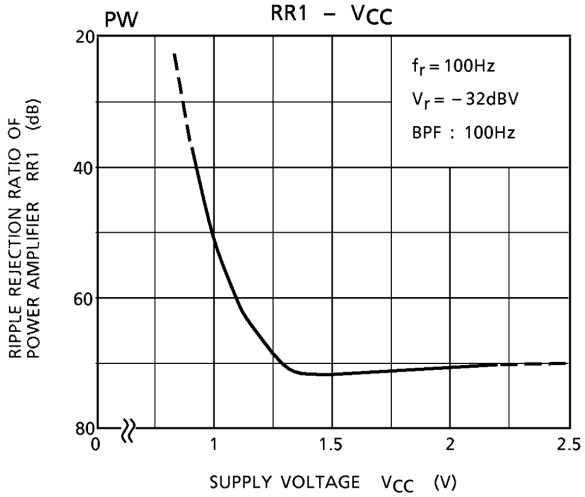
Unless Otherwise Specified, V_{CC} = 1.2V, R_g = 600Ω, f = 1kHz, R_L = 16Ω, Ta = 25°C

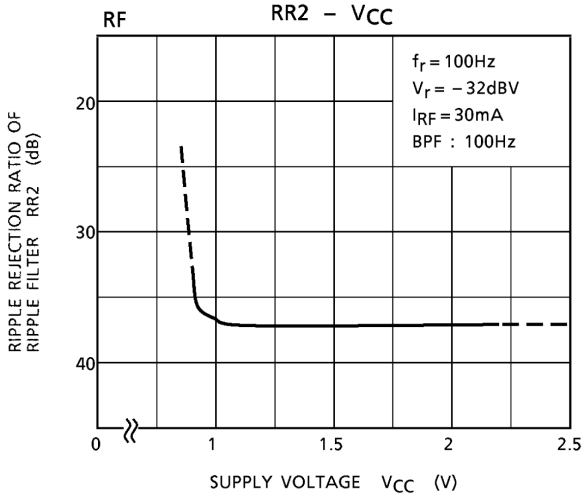




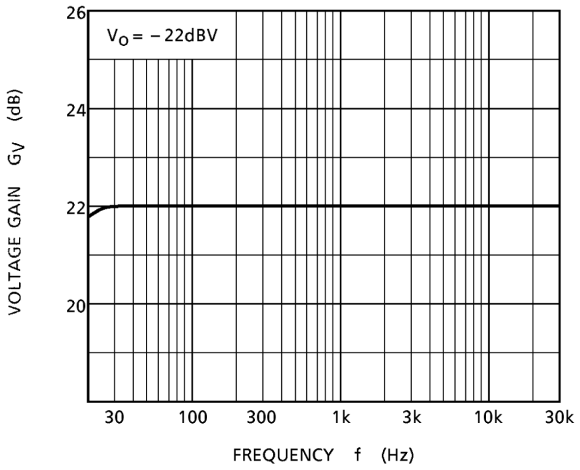




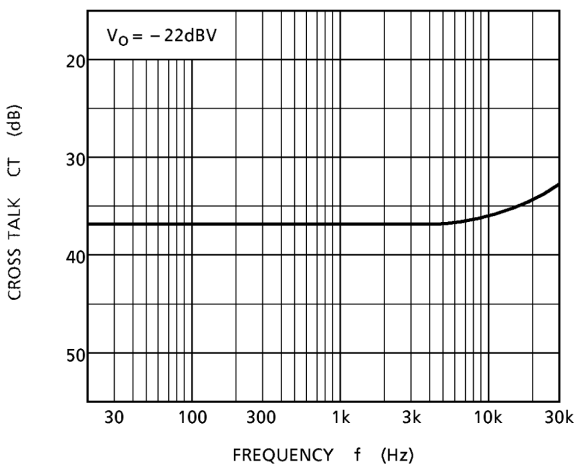




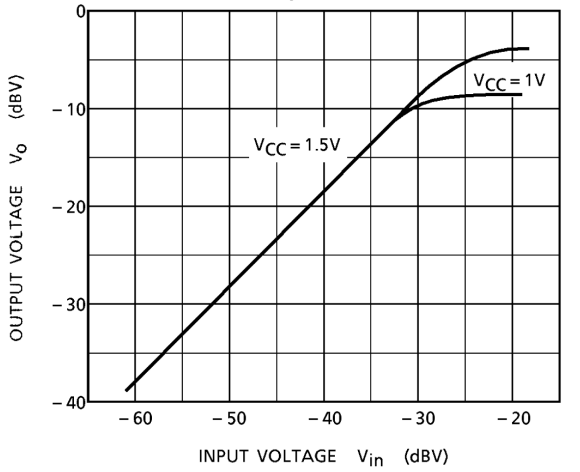
G_V – f



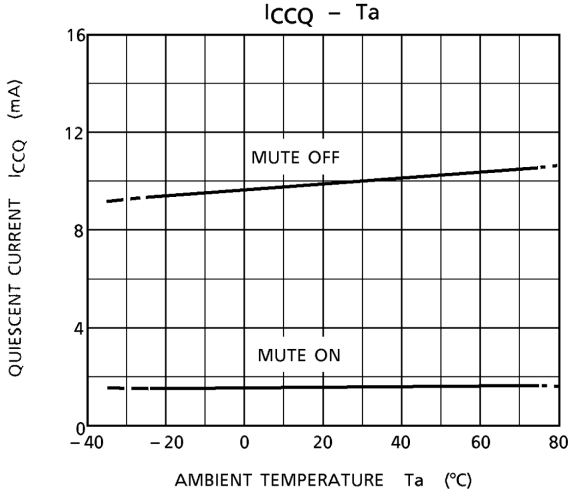
CT – f



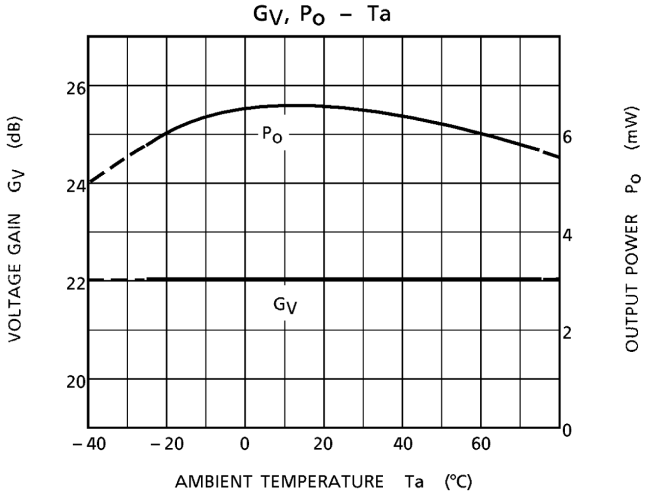
V_O – V_{in}



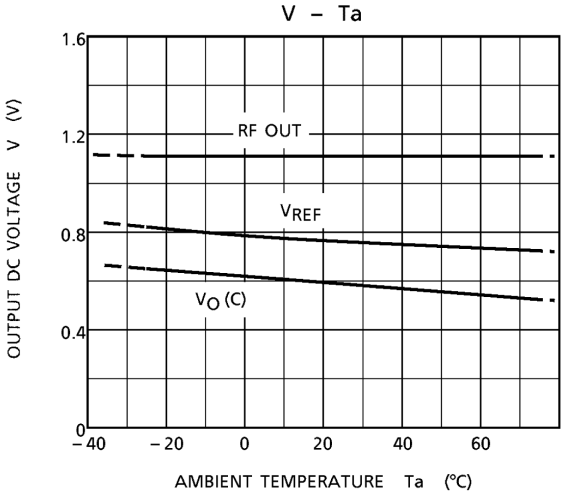
I_{CCQ} – Ta



G_V, P_O – Ta

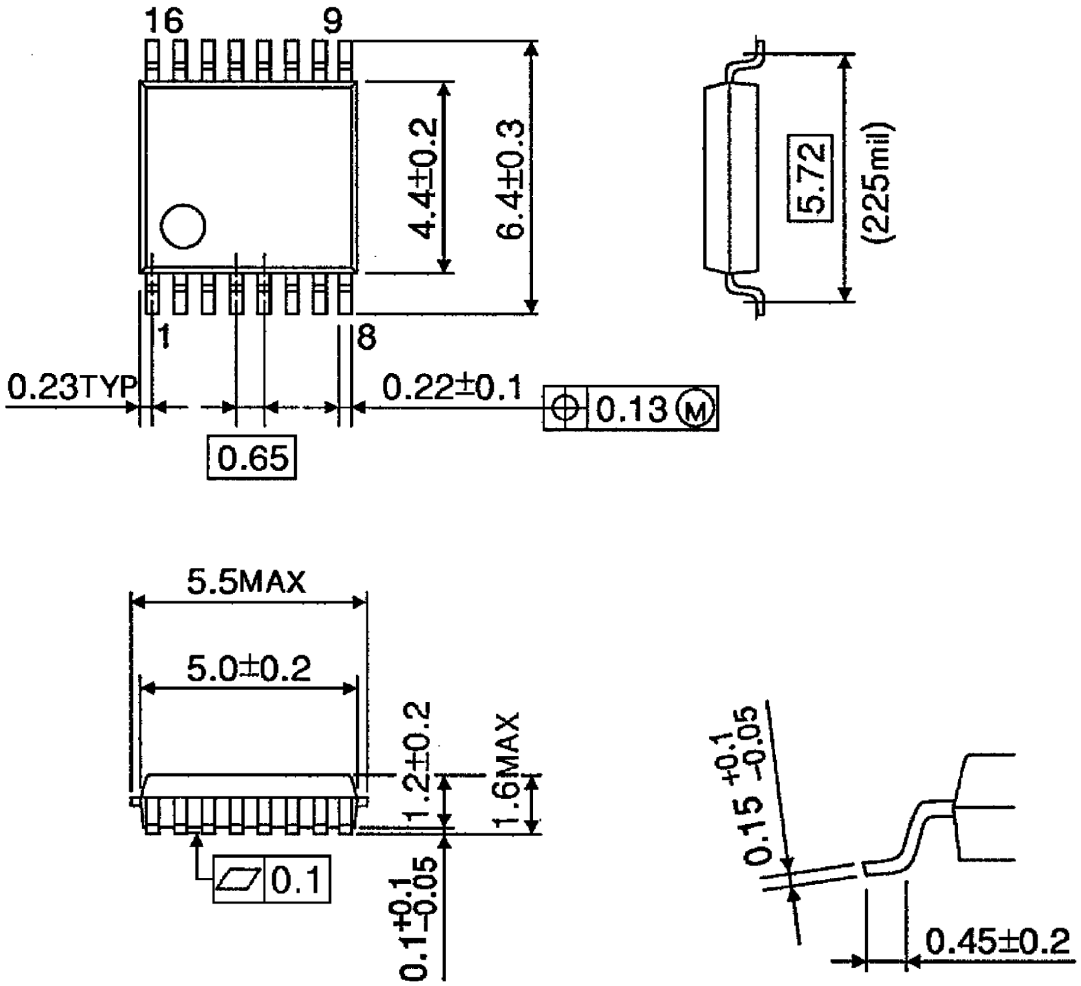


V – Ta



Package Dimensions

SSOP16-P-225-0.65B Unit : mm



Weight: 0.09g (typ.)

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