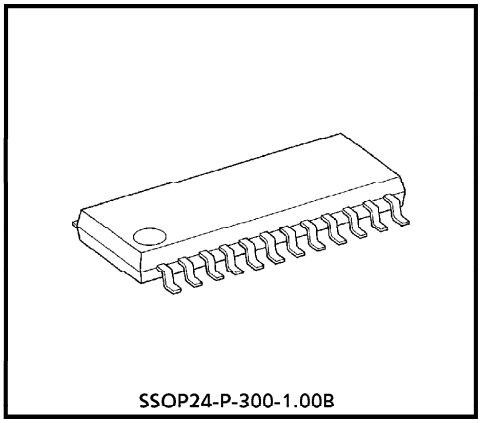
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT MULTI-CHIP

TA8461F

DUAL POWER OPERATIONAL AMPLIFIER

The TA8461F is a multiple chip IC consisting of 4 saturated voltage discrete transistors and 1 dual operational amplifier.



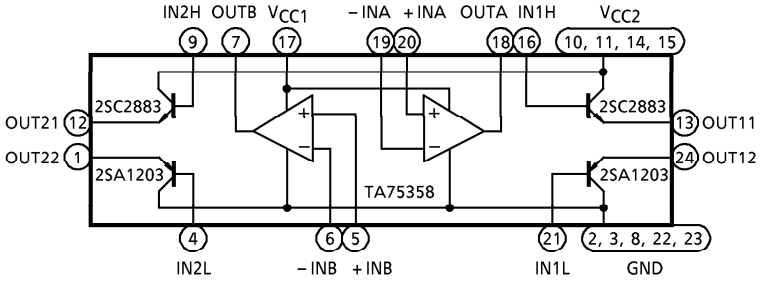
SSOP24-P-300-1.00B

Weight : 0.27g (Typ.)

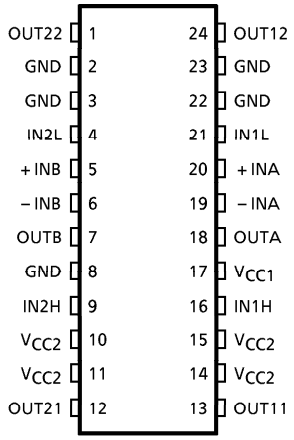
FEATURES

- Large Output Current : I_{OUT} = 1.5A (MAX.)
- Sealed in a Small Package : SSOP24

BLOCK DIAGRAM



PIN CONNECTION



961001EBA2

PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	OUT22	PNP (2) Emitter
2	GND	GND
3	GND	GND
4	IN2L	PNP (2) Base
5	+INB	OP. Amp (B) input (+)
6	−INB	OP. Amp (B) input (−)
7	OUTB	OP. Amp (B) output
8	GND	GNB
9	IN2H	NPN (2) Base
10	V_{CC2}	Output transistor voltage supply
11	V_{CC2}	Output transistor voltage supply
12	OUT21	NPN (2) Emitter
13	OUT11	NPN (1) Emitter
14	V_{CC2}	Output transistor voltage supply
15	V_{CC2}	Output transistor voltage supply
16	IN1H	NPN (1) Base
17	V_{CC1}	OP. Amp. voltage supply
18	OUTA	OP. Amp. (A) output
19	−INA	OP. Amp. (A) input (−)
20	+INA	OP. Amp. (A) input (+)
21	IN1L	PNP (1) Base
22	GND	GND
23	GND	GND
24	OUT12	PNP (1) Emitter

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	30	V
Output Transistor	Collector-Base Voltage	V_{CBO}	30	V
	Collector-Emitter Voltage	V_{CEO}	30	V
	Emitter-Base Voltage	V_{EBO}	5	V
	Output Current	$I_{OUT\ (AVE.)}$	1.5	A
		$I_{OUT\ (PEAK)}$	(Note 1) 3.0	
	Base Current	I_B	0.3	A
OP. Amp.	Amplifier Differential Input Voltage	DV_{IN}	30	V
	Amplifier Input Voltage	V_{IN}	30	V
Power Dissipation		P_D	(Note 2) 1.0	W
Junction Temperature		T_j	125	°C
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~125	°C

(Note 1) Pulse measured : Pulse width = 10ms (MAX.)
Repetition cycle = 30% (MAX.)

(Note 2) No heat sink

ELECTRICAL CHARACTERISTICS

Output transistor unit (Ta = 25°C)

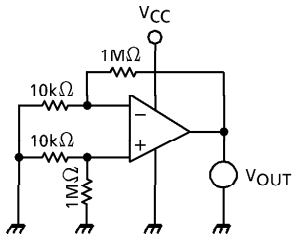
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Current Amplification Factor	h_{FE} (1)	—	V_{CE} = 2V, I_C = 0.5A	160	—	600	
	h_{FE} (2)	—	V_{CE} = 2V, I_C = 1.5A	50	100	—	
Output Saturation Voltage	V_{CE} (sat) (NPN)	—	I_C = 0.5A, I_B = 10mA	—	0.2	0.50	V
			I_C = 1.5A, I_B = 30mA	—	—	2.0	
	V_{CE} (sat) (PNP)	—	I_C = 0.5A, I_B = 10mA	—	0.2	0.50	
			I_C = 1.5A, I_B = 30mA	—	—	2.0	
Transition Frequency	f_T	—	V_{CE} = 2V, I_C = 0.5A	—	120	—	MHz
Output Leakage Current	I_{OL} (NPN)	—	V_{CC} = 30V	—	0	10	μA
	I_{OL} (PNP)	—	V_{CC} = 30V	—	0	10	
Base-Emitter Voltage	V_{BE} (NPN)	—	V_{CE} = 2V, I_C = 0.5A	—	—	1.0	V
	V_{BE} (PNP)	—	V_{CE} = 2V, I_C = 0.5A	—	—	1.0	

Operational amplifier unit (V_{CC} = 5V, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_g \leqq 10k\Omega$	—	2	7	mV
Input Offset Current	I_{IO}	2	—	—	5	50	nA
Input Bias Current	I_I	2	—	—	45	250	nA
In-Phase Input Voltage	CMV_{IN}	3	V_{CC} = 30V	0	—	V_{CC} – 1.5	V
Supply Current	I_{CC}	4	$R_L = \infty$, ALL OP Amps	—	0.7	1.2	mA
Voltage Gain	G_V	5	$R_L \geqq 2k\Omega$	86	100	—	dB
Maximum Output Amplitude Voltage	V_{Op-p}	6	$R_L = 2k\Omega$	0	—	V_{CC} – 1.5	V
Common Mode Rejection Ratio	CMRR	3	—	60	85	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g \leqq 10k\Omega$	60	100	—	dB
Source Current	I_{source}	6	IN (–) = $0V_{DC}$, IN (+) = $1V_{DC}$	20	40	—	mA
Sink Current	I_{sink}	6	IN (–) = $0V_{DC}$, IN (+) = $1V_{DC}$	10	20	—	mA
Cut-off Frequency	f_T	—	—	—	1.5	—	MHz
Slew Rate	S_R	—	—	—	0.8	—	V / μs

TEST CIRCUIT

(1) V_{IO}, SVRR

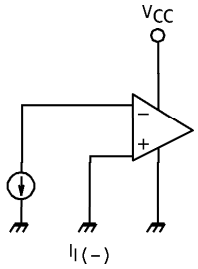


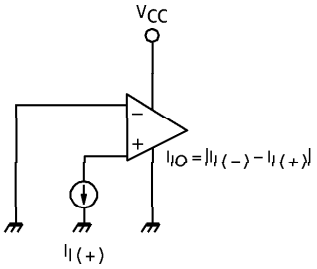
- $V_{IO} = V_{OUT} / 100$
- SVRR = 20ℓog E (dB)

$$E = \left| \frac{V_{OUT1} - V_{OUT2}}{V_{CC1} - V_{CC2}} \right| \times \frac{1}{100}$$

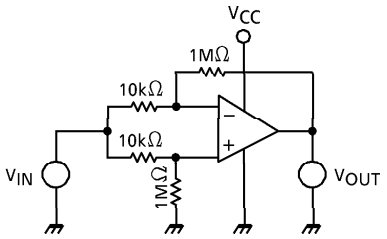
V_{OUT1} : V_{OUT} (V_{CC1} = 5V)
V_{OUT2} : V_{OUT} (V_{CC2} = 10V)

(2) I_I, I_{IO}





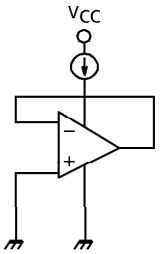
(3) CMV_{IN}, CMRR



- CMRR = 20ℓog G_D / G_C (dB)

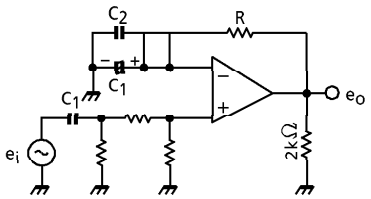
  G_D : Differential Voltage Gain
  G_C : In-phase Voltage Gain
- CMV_{IN} : V_{IN} = 0V, V_{CC} − 1.5V

(4) I_{CC}



- I_{CC} : V_{CC} = 5V

(5) G_V



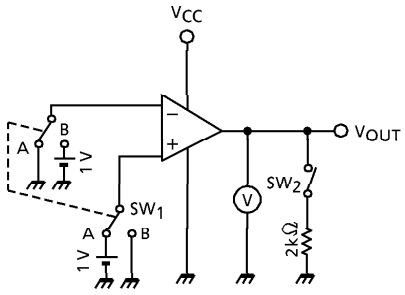
- $G_V = 20\ell og\ e_o / e_i$ (dB)

  $R \gg 1 / WC_1$

  C_1 : For Preventing DC Short-Circuit.

  C_2 : For High Frequency Short-Circuit.
  Use a Mica or Titanium Capacitor.

(6) V_{Op-p}, I_{source}, I_{sink}



- V_{Op-p}

  V_{OH} : SW_1 is to A side.

  V_{OL} : SW_1 is to B side.

- I_{source}

  SW_1 is to A side.

  $V_{OUT} \rightarrow 0V$ Measurement

- I_{sink}

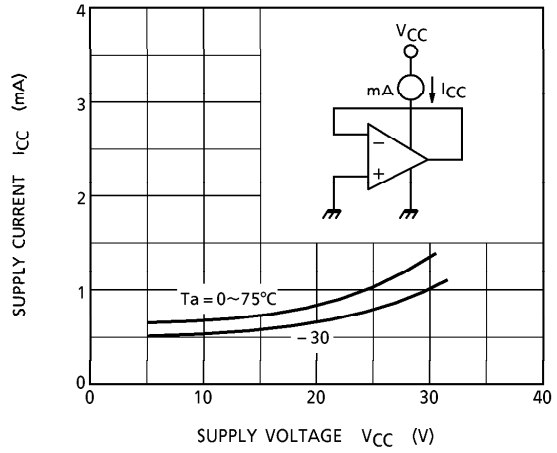
  SW_1 is to B side.

  $V_{OUT} \rightarrow 5V$ Measurement

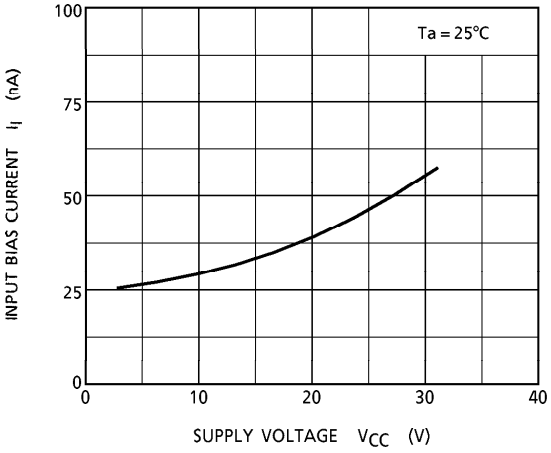
CHARACTERISTIC CURVES (Ta = 25°C)

(1) Operational amplifier

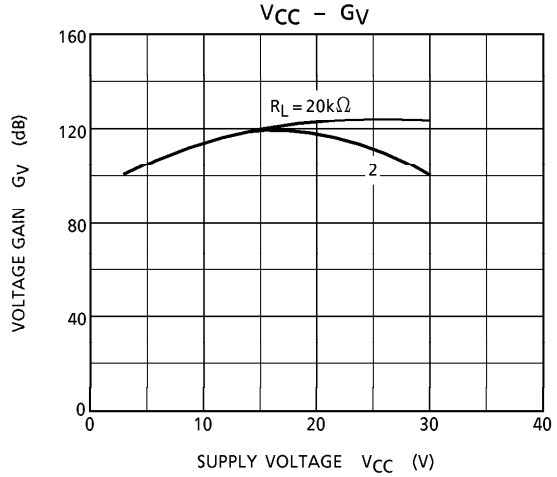
V_{CC} – I_{CC}



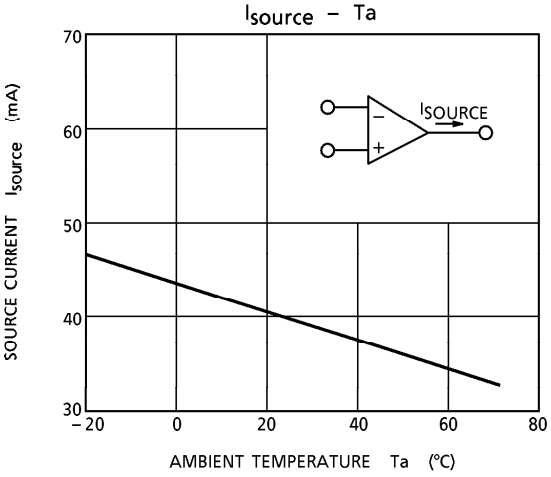
V_{CC} – I_I



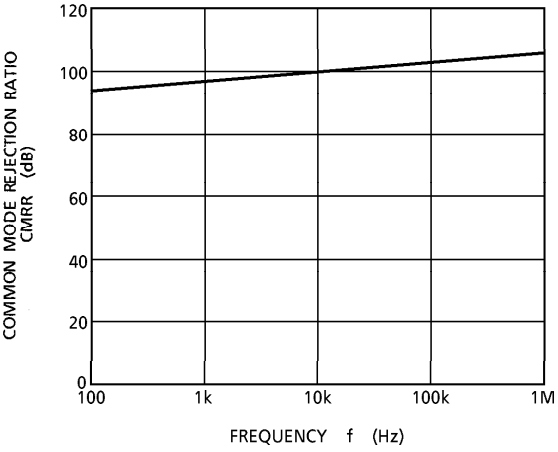
V_{CC} – G_V



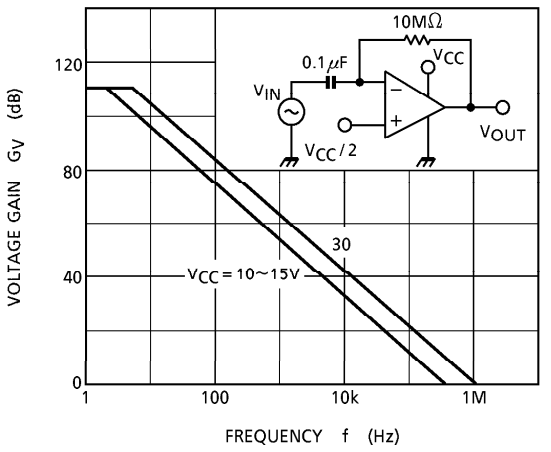
I_{source} – Ta



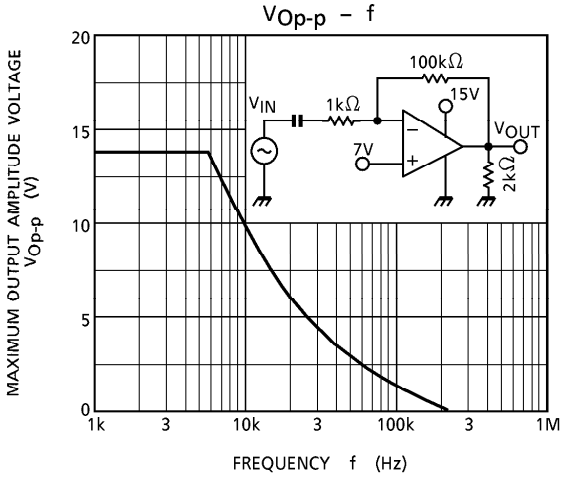
CMRR – f



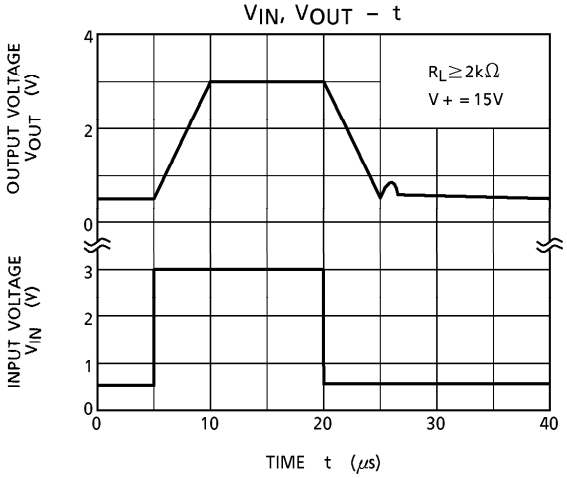
G_V – f



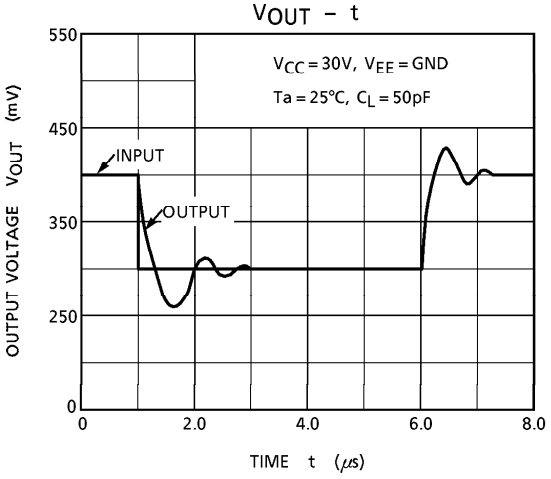
V_{Op-p} – f



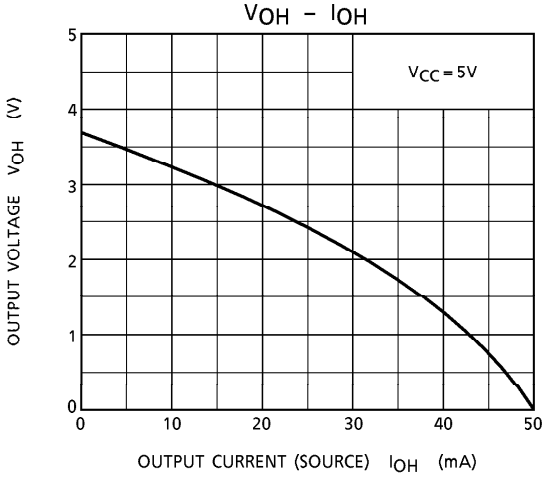
V_{IN}, V_{OUT} – t



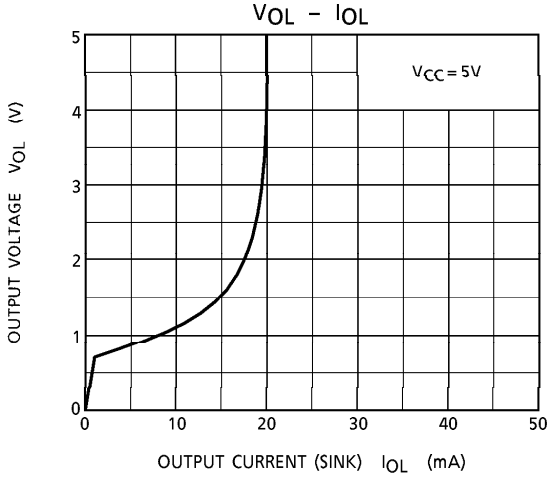
V_{OUT} – t



V_{OH} – I_{OH}

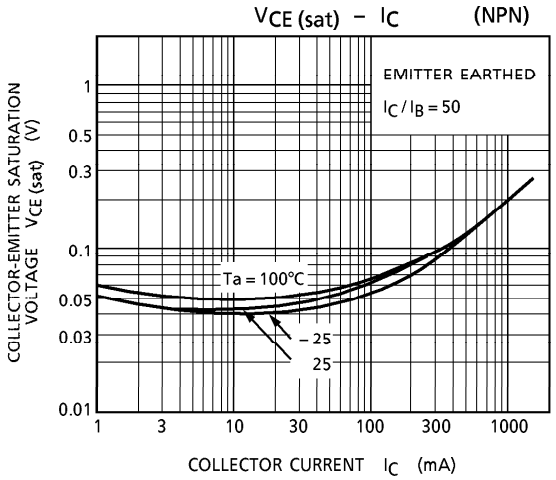


V_{OL} – I_{OL}

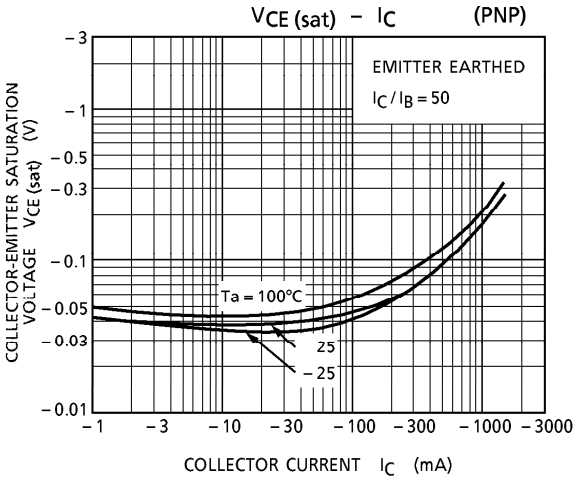


(2) NPN transistor, PNP transistor

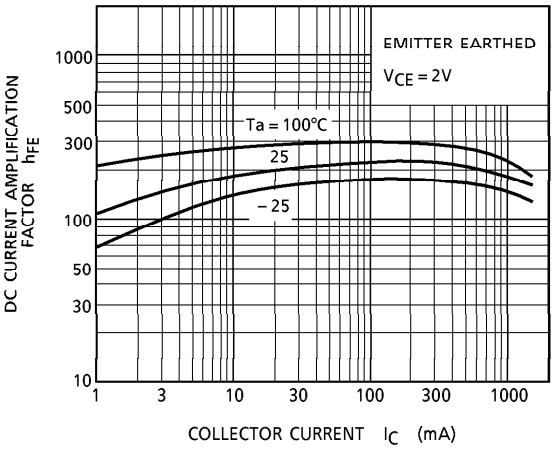
$V_{CE\,(sat)}$ – I_C (NPN)



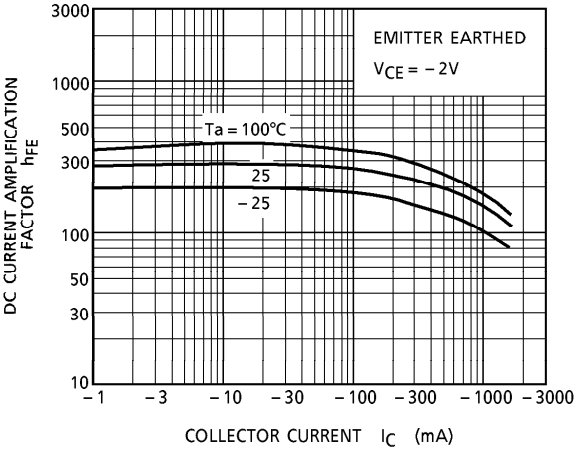
$V_{CE\,(sat)}$ – I_C (PNP)



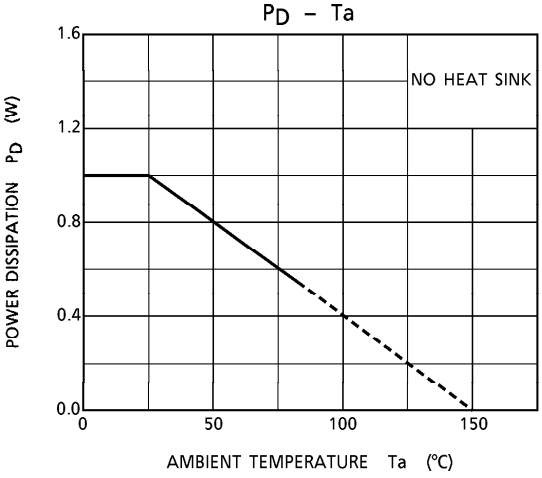
h_{FE} – I_C (NPN)



h_{FE} – I_C (PNP)



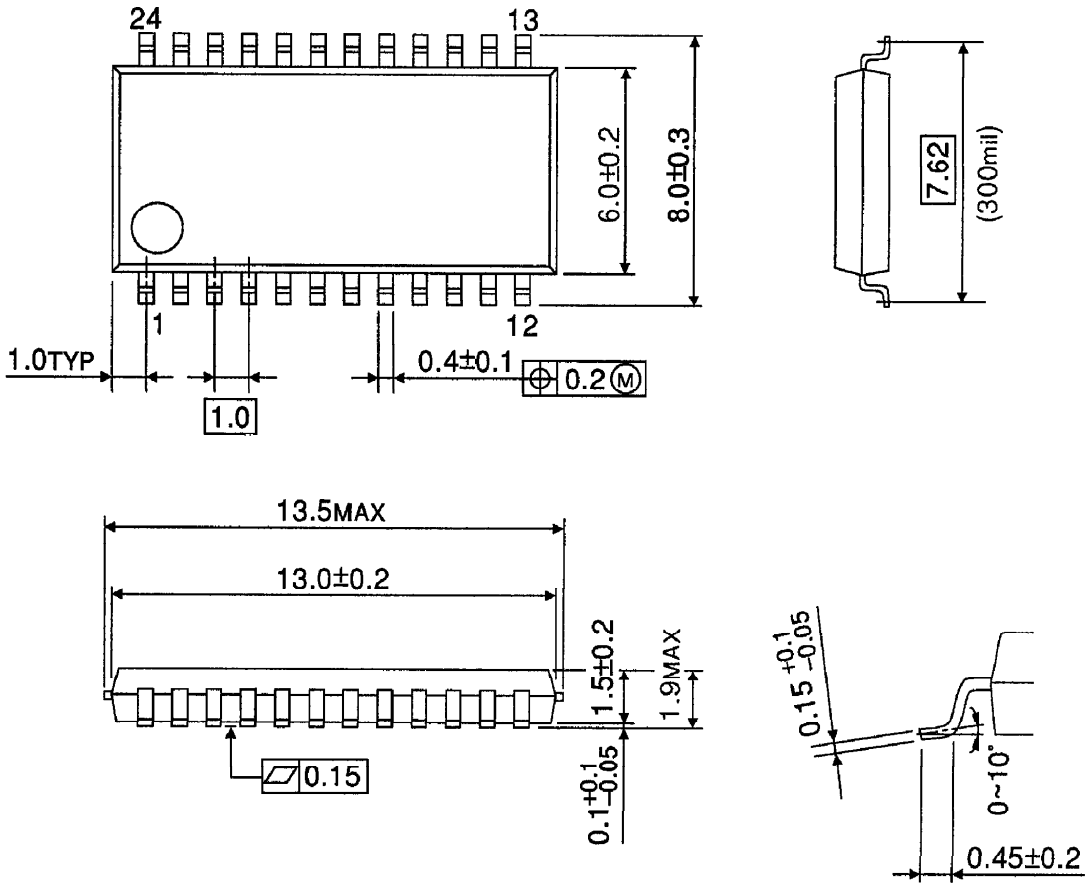
P_D – Ta



OUTLINE DRAWING

SSOP24-P-300-1.00B

Unit : mm



Weight : 0.27g (Typ.)