

TOSHIBA CMOS LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TC75W55FU, TC75W55FK**DUAL OPERATIONAL AMPLIFIER**

TC75W55 is a CMOS operational amplifier with low supply voltage, low supply current.

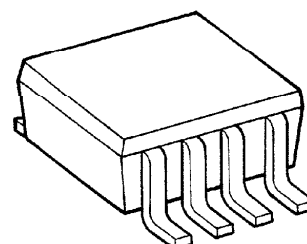
FEATURES

- Low supply voltage : $V_{DD} = \pm 0.9 \sim 3.5V$ or $1.8 \sim 7V$
- Low supply current : $I_{DD} (V_{DD} = 3V) = 20 \mu A$ (Typ.)
- The internally phase compensated operational amplifier.
- Small package

MAXIMUM RATINGS ($T_a = 25^\circ C$)

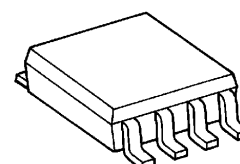
CHARACTERISTIC	SYMBOL	RATING	N
Supply Voltage	V_{DD}, V_{SS}	7	V
Differential Input Voltage	DV_{IN}	± 7	V
Input Voltage	V_{IN}	$V_{DD} \sim V_{SS}$	V
Power Dissipation	P_D	250 (SM8)	mW
		200 (US8)	
Operating Temperature	T_{opr}	$-40 \sim 85$	$^\circ C$
Storage Temperature	T_{stg}	$-55 \sim 125$	$^\circ C$

TC75W55FU



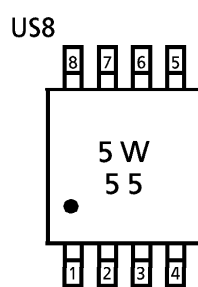
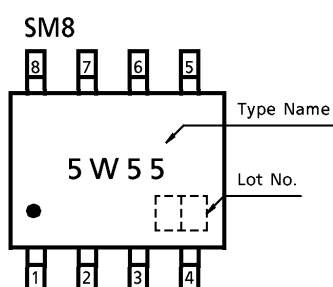
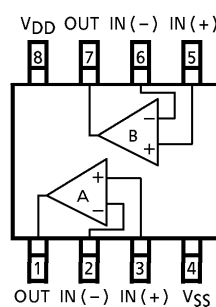
SSOP8-P-0.65

TC75W55FK



SSOP8-P-0.50A

Weight
 SSOP8-P-0.65 : 0.021g (Typ.)
 SSOP8-P-0.50A : 0.01g (Typ.)

MARKING (TOP VIEW)**PIN CONNECTION (TOP VIEW)**

980508EBA1

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ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS ($V_{DD} = 3.0V$, $V_{SS} = GND$, $T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_S = 10k\Omega$	—	2	10	mV
Input Offset Current	I_{IO}	—	—	—	1	—	pA
Input Bias Current	I_I	—	—	—	1	—	pA
Common Mode Input Voltage	CMV_{IN}	2	—	0.0	—	2.1	V
Voltage Gain (Open Loop)	G_V	—	—	60	70	—	dB
Maximum Output Voltage	V_{OH}	3	$R_L \geq 1M\Omega$	2.9	—	—	V
	V_{OL}	4	$R_L \geq 1M\Omega$	—	—	0.1	
Common Mode Input Signal Rejection Ratio	CMRR	2	$V_{IN} = 0.0 \sim 2.1V$	60	70	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$V_{DD} = 1.8 \sim 7.0V$	60	70	—	dB
Supply Current	I_{DD}	5	—	—	20	40	μA
Source Current	I_{source}	6	—	10	20	—	μA
Sink Current	I_{sink}	7	—	100	450	—	μA

DC CHARACTERISTICS ($V_{DD} = 1.8V$, $V_{SS} = GND$, $T_a = 25^\circ C$)

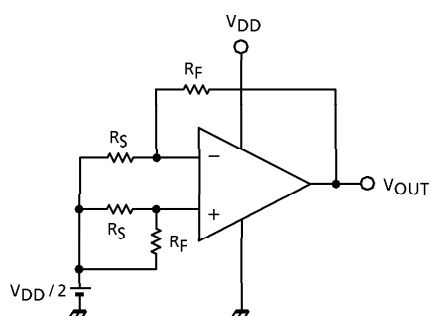
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_S = 100k\Omega$	—	2	10	mV
Input Offset Current	I_{IO}	—	—	—	1	—	pA
Input Bias Current	I_I	—	—	—	1	—	pA
Common Mode Input Voltage	CMV_{IN}	2	—	0.0	—	0.9	V
Voltage Gain (Open Loop)	G_V	—	—	60	70	—	dB
Maximum Output Voltage	V_{OH}	3	$R_L \geq 1M\Omega$	1.7	—	—	V
	V_{OL}	4	$R_L \geq 1M\Omega$	—	—	0.1	
Supply Current	I_{DD}	5	—	—	16	32	μA
Source Current	I_{source}	6	—	8	16	—	μA
Sink Current	I_{sink}	7	—	100	400	—	μA

AC CHARACTERISTICS ($V_{DD} = 3.0V$, $V_{SS} = GND$, $T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	—	—	—	0.08	—	V / μs
Unity Gain Cross Frequency	f_T	—	—	—	160	—	kHz

AC CHARACTERISTICS ($V_{DD} = 1.8V$, $V_{SS} = GND$, $T_a = 25^\circ C$)

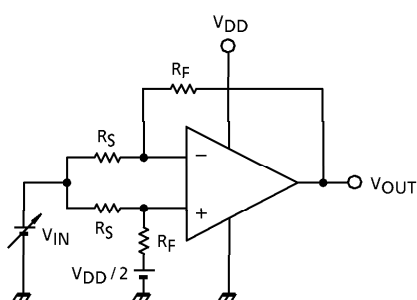
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	—	—	—	0.06	—	V / μs
Unity Gain Cross Frequency	f_T	—	—	—	140	—	kHz

TEST CIRCUIT
1. SVRR, V_{IO}

• SVRR
 $V_{DD} = 1.8V : V_{DD} = V_{DD1}, V_{OUT} = V_{OUT1}$
 $V_{DD} = 7.0V : V_{DD} = V_{DD2}, V_{OUT} = V_{OUT2}$

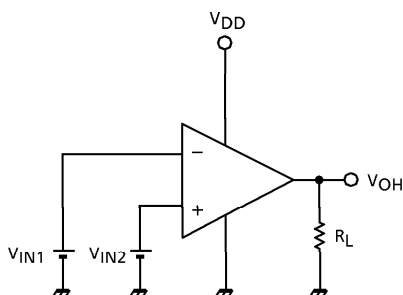
$$SVRR = 20 \log \left(\left| \frac{V_{OUT1} - V_{OUT2}}{V_{DD1} - V_{DD2}} \right| \times \frac{R_S}{R_F + R_S} \right)$$

• V_{IO}

$$V_{IO} = \left(V_{OUT} - \frac{V_{DD}}{2} \right) \times \frac{R_S}{R_F + R_S}$$

2. CMRR, CMV_{IN}

• CMRR
 $V_{IN} = 0.0V : V_{IN} = V_{IN1}, V_{OUT} = V_{OUT1}$
 $V_{IN} = 2.1V : V_{IN} = V_{IN2}, V_{OUT} = V_{OUT2}$

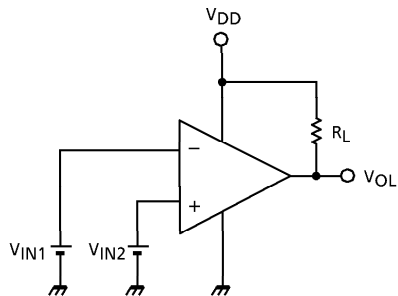
$$CMRR = 20 \log \left(\left| \frac{V_{OUT1} - V_{OUT2}}{V_{IN1} - V_{IN2}} \right| \times \frac{R_S}{R_F + R_S} \right)$$

• CMV_{IN}
3. V_{OH}

• V_{OH}

$$V_{IN1} = \frac{V_{DD}}{2} - 0.05V$$

$$V_{IN2} = \frac{V_{DD}}{2} + 0.05V$$

4. V_{OL}

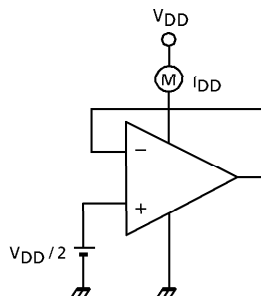


- V_{OL}

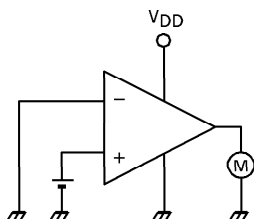
$$V_{IN1} = \frac{V_{DD}}{2} + 0.05V$$

$$V_{IN2} = \frac{V_{DD}}{2} - 0.05V$$

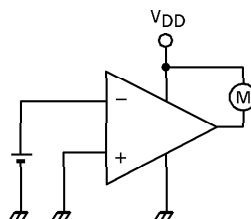
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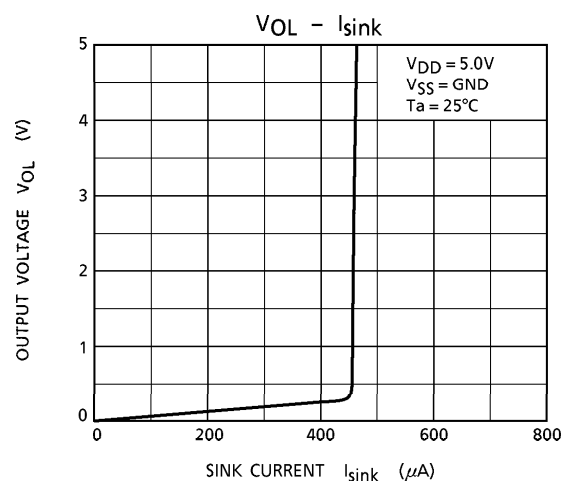
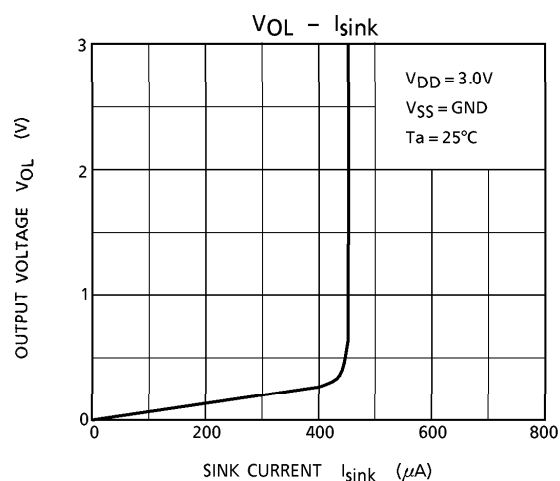
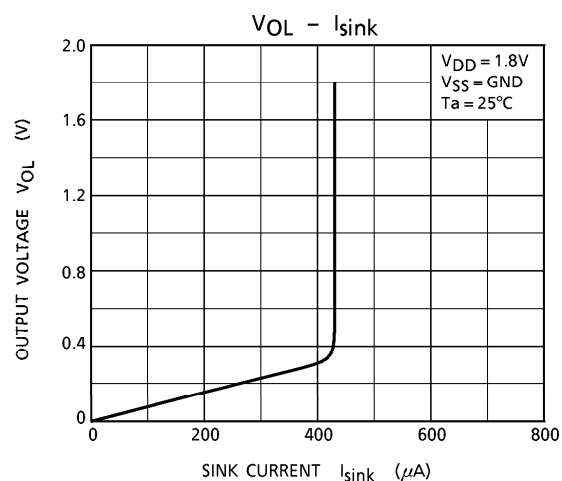
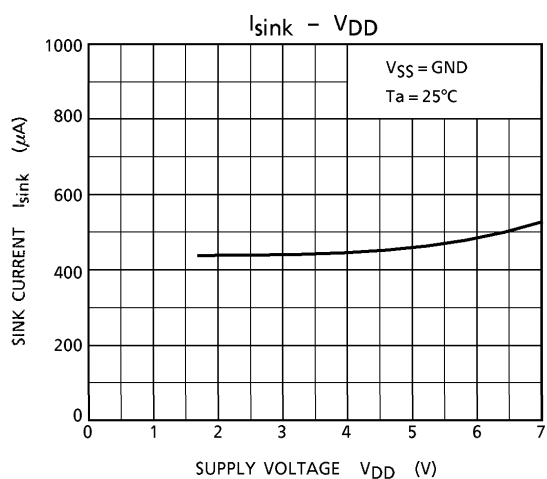
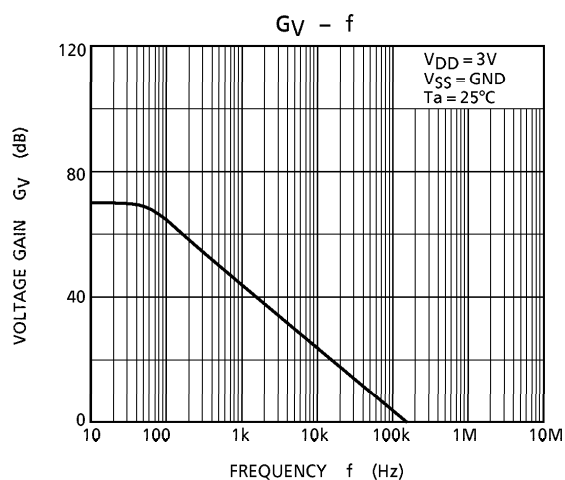
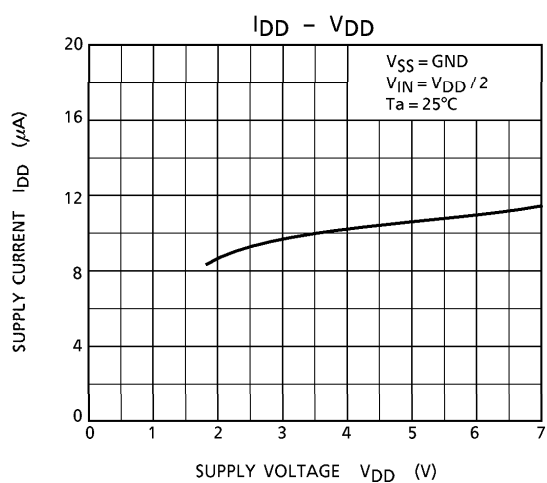


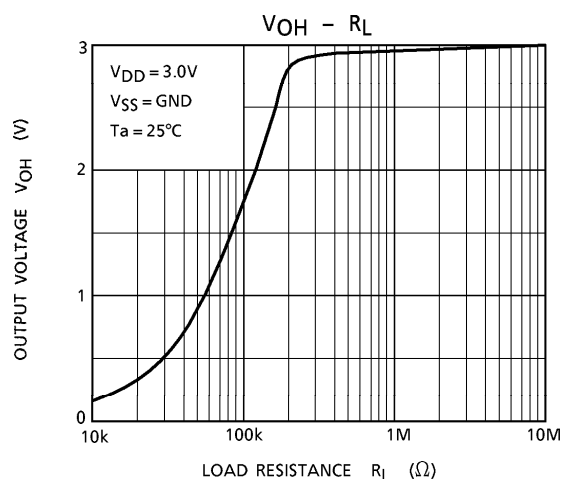
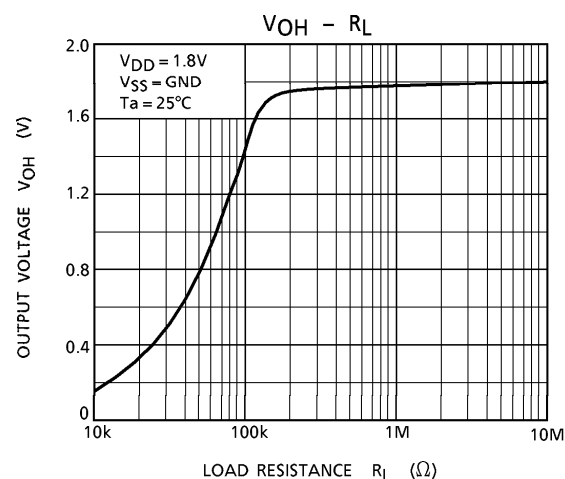
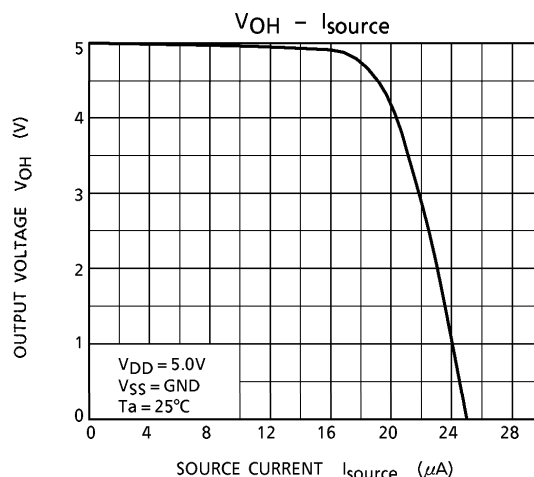
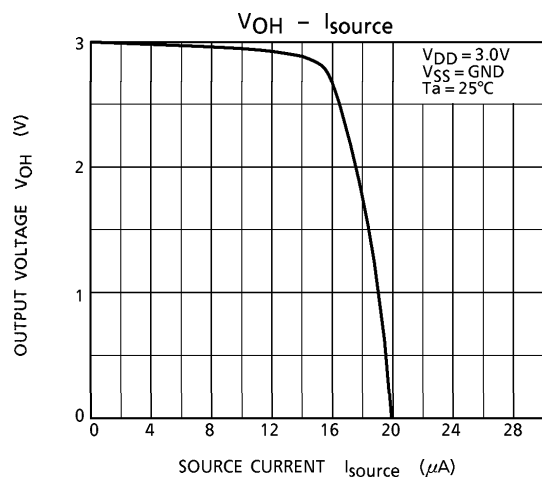
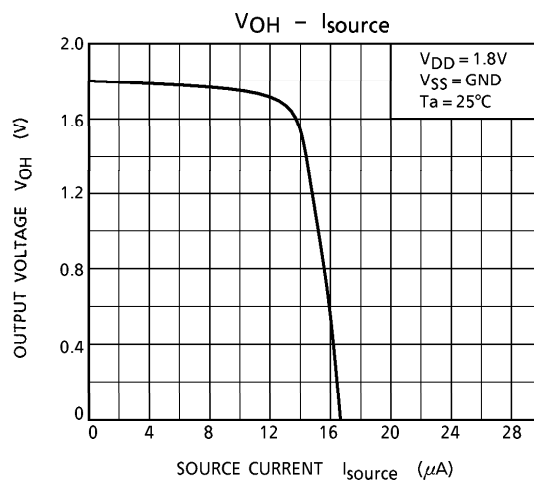
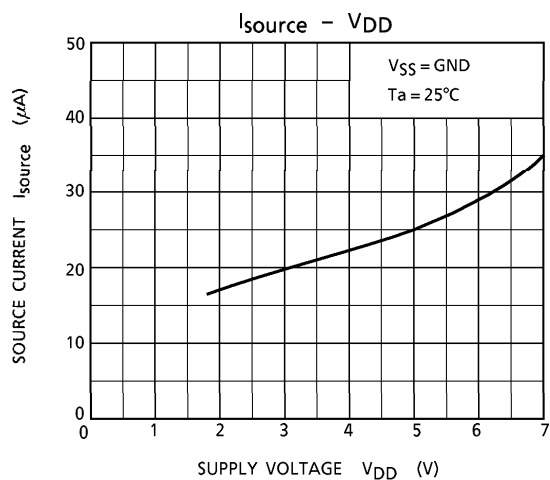
6. I_{source}

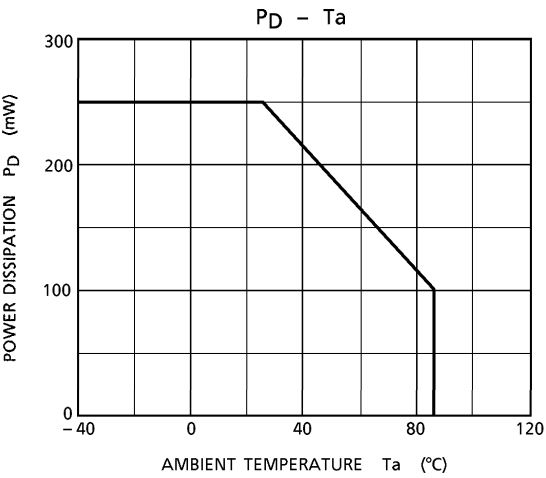
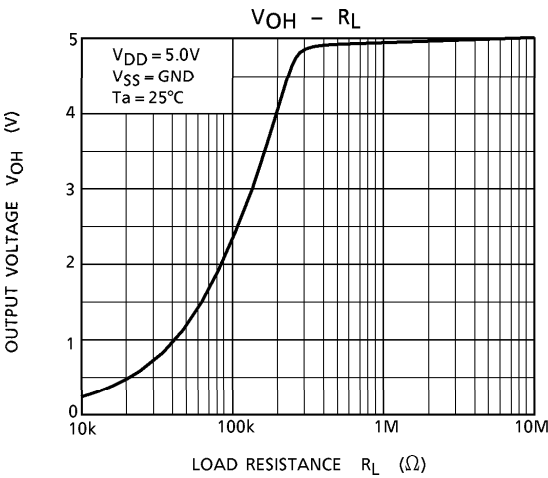


7. I_{sink}





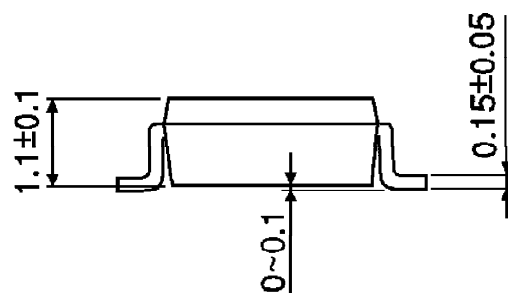
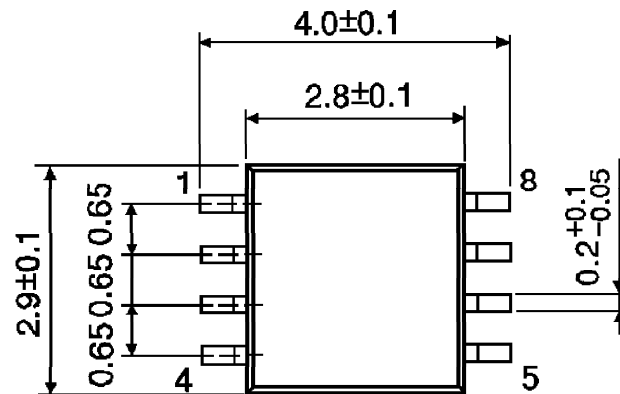




OUTLINE DRAWING

SSOP8-P-0.65

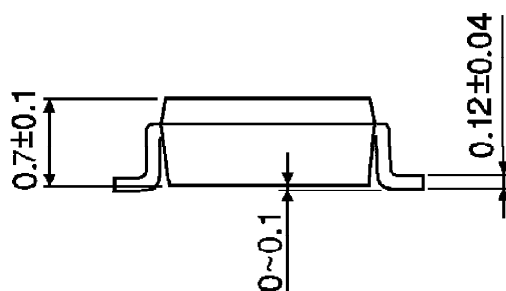
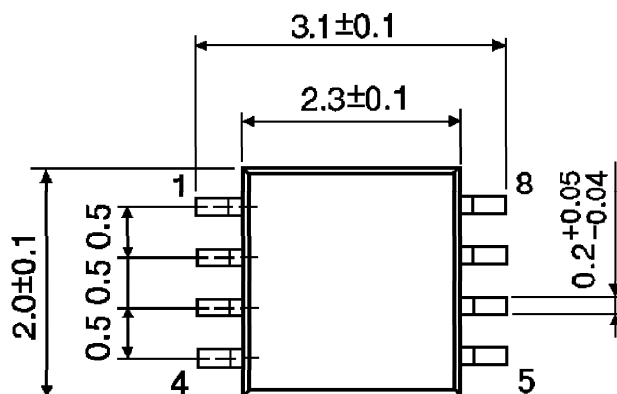
Unit : mm



Weight : 0.021g (Typ.)

OUTLINE DRAWING
SSOP8-P-0.50A

Unit : mm



Weight : 0.01g (Typ.)