SN7103/P

Dual Operational Amplifier and Voltage Reference

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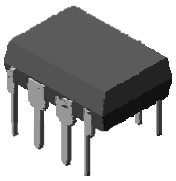
SOP-8



DIP-8

ORDERING INFORMATION

Product	Marking	Package
SN7103	SN7103	SOP-8
SN7103P	SN7103	DIP-8

▲ **Marking Detail Information**

SN7103(①)
YYWW(②)

① Device Code

② Week Code

Description

The SN7103 is a monolithic IC that includes one independent op-amp and another op-amp for which the non inverting input is wired to a 2.5V fixed Voltage Reference. This device is offering space and cost saving in many applications like power supply management or data acquisition systems.

OPERATIONAL AMPLIFIER

LOW INPUT OFFSET VOLTAGE : 1.0mV

LOW SUPPLY CURRENT : 350uA/op.(@ V_{CC} = 5V)

MEDIUM BANDWIDTH (unity gain) : 0.9MHz

LARGE OUTPUT VOLTAGE SWING : 0V to (V_{CC} - 1.5V)

INPUT COMMON MODE VOLTAGE RANGE INCLUDES GROUND

WIDE POWER SUPPLY RANGE : 3 to 32V or (±1.5 to ±16V)

VOLTAGE REFERENCE

FIXED OUTPUT VOLTAGE REFERENCE 2.5V

0.4% AND 1% VOLTAGE PRECISION

SINK CURRENT CAPABILITY : 1 to 100mA

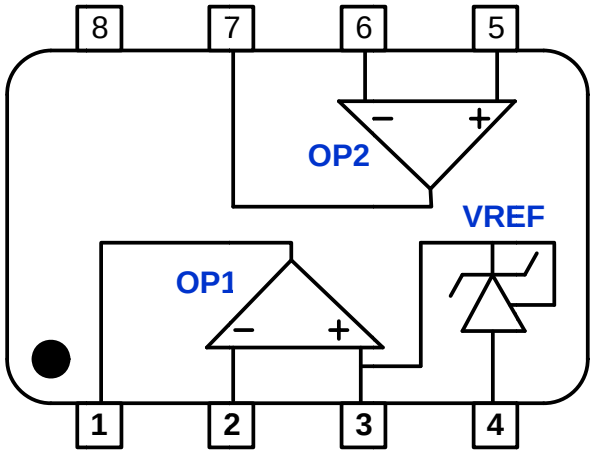
TYPICAL OUTPUT IMPEDANCE : 0.2Ω

Application

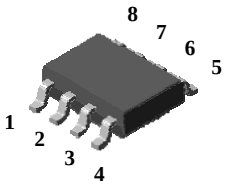
◈ Battery chargers

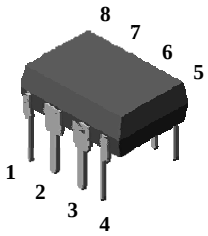
◈ AC to DC Power Supply

Block Diagram



◈ Pin connection





◈ Pin Configuration

No.	Name	Function
1	Output 1	OP-AMP 1 Output
2	Input 1 (-)	OP-AMP 1 Inverting Input
3	Input 1 (+)	OP-AMP 1 Non-Inverting Input
4	V_{EE}	GND or Negative Supply Voltage Input
5	Input 2 (+)	OP-AMP 2 Non-Inverting Input
6	Input 2 (-)	OP-AMP 2 Inverting Input
7	Output 2	OP-AMP 2 Output.
8	V_{CC}	Supply Voltage Input

◈ Absolute Maximum Ratings (Ta = 25℃)

Parameter	Symbol	Limits	Unit
DC Supply Voltage	V_{CC}	36	V
Differential Input Voltage	V_{id}	36	V
Input Voltage	V_i	-0.3 to +36	V
Maximum Junction Temperature	Tj	150	℃
Operating Junction Temperature Range	T_{opr}	-40 ~ +85	℃
Thermal Resistance	R_{thja}	175	℃/ W
Storage Temperature Range	T_{stg}	-55 ~ +150	℃

◈ Electrical Characteristics (Ta = 25℃)

Parameter	Symbol	Min	Typ	Max	Unit
Total Supply Current, excluding current in the voltage reference Vcc = 5V, no load Tmin < Tamb < Tmax Vcc = 30V, no load Tmin < Tamb < Tmax	I_{CC}	- -	0.7 -	1.2 2.0	mA

◈ Electrical characteristics

[Independent OP-AMP 2]

(V_{CC}=+5V, V_{EE}=Ground, V_O=1.4V, T_A=25℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{io}	Ta = 25℃	-	1.0	4.0	mV
		Tmin. < Ta < Tmax	-	-	5.0	
Input Offset Voltage Drift	DV_{io}		-	7.0	-	uV/℃
Input Offset Current	I_{io}	Ta = 25℃	-	2.0	30	nA
		Tmin. < Ta < Tmax	-	-	50	
Input Bias Current	I_{ib}	Ta = 25℃	-	20	150	nA
		Tmin. < Ta < Tmax	-	-	200	
Large Signal Voltage Gain	A_{vd}	Vcc=15V, R_L=2K, Vo=1.4V to 11.4V	50	100	-	V/mV
		Tmin. < Ta < Tmax	25	-	-	
Supply Voltage Rejection Ratio	SVR	Vcc=5V to 30V	65	100	-	dB
Input Common Mode Voltage Range	V_{icm}	Vcc=30V [Note 1]	0	-	Vcc-1.5	V
		Tmin. < Ta < Tmax	0	-	Vcc-2.0	
Common Mode Rejection Ratio	CMR	Ta = 25℃	70	85	-	dB
		Tmin. < Ta < Tmax	60	-	-	
Output Source Current	Isource	Vcc=15V, Vo=2V, Vid=1V	20	40	-	mA
Short Circuit to Ground	I_O	Vcc=15V	-	40	60	mA
Output Sink Current	Isink	Vcc=15V, Vo=2V, Vid=-1V	10	20	-	mA
High Level Output Voltage	V_{OH}	Vcc=30V, R_L=10K	27	28	-	V
		Tmin. < Ta < Tmax	27	-	-	
Low Level Output Voltage	V_{OL}	RL=10K	-	5	20	mV
		Tmin. < Ta < Tmax	-	-	20	
Slew Rate at Unity Gain	SR	Vi=0.5Vto3V, Vcc=15V R_L=2K, C_L=100pF	0.2	0.4	-	V/us
Gain Bandwidth Product	GBP	Vcc=30V, R_L=2k, C_L=100pF, f=100kHz, Vin=10mV	0.5	0.9	-	MHz
Total Harmonic Distortion	THD	F=1kHz, Av=20dB, R_L=2k, Vcc=30V, C_L=100pF, Vo=$2V_{PP}$	-	0.02	-	%

Note 1 : The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is VCC -1.5V But either of both inputs can go to +36V without damage.

◈ Electrical characteristics

[Independent OP-AMP 1 with non-inverting input connected to the internal Vref]

(V_{CC}=+5V, V_{EE}=Ground, T_A=25℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{io}	Ta = 25℃	-	1.0	4.0	mV
		Tmin. < Ta < Tmax	-	-	5.0	
Input Offset Voltage Drift	DV_{io}	-	-	7.0	-	uV/℃
Input Bias Current (negative input)	I_{ib}	-	-	20	-	nA
Large Signal Voltage Gain	A_{vd}	Vcc=15V, R_L=2K, Vicm=0V	-	100	-	V/mV
Supply Voltage Rejection Ratio	SVR	Vcc=5V to 30V Vicm=0V	65	100	-	dB
Output Source Current	Isource	Vcc=15V, Vo=2V, Vid=1V	20	40	-	mA
Short Circuit to Ground	I_O	Vcc=15V	-	40	60	mA
Output Sink Current	Isink	Vcc=15V, Vo=2V, Vid=-1V	10	20	-	mA
High Level Output Voltage	V_{OH}	Vcc=30V, R_L=10K	27	28	-	V
		Tmin. < Ta < Tmax	27	-	-	
Low Level Output Voltage	V_{OL}	RL=10K	-	5	20	mV
		Tmin. < Ta < Tmax	-	-	20	
Slew Rate at Unity Gain	SR	Vi=0.5Vto2V, Vcc=15V R_L=2K, C_L=100pF	0.2	0.4	-	V/us
Gain Bandwidth Product	GBP	Vcc=30V, R_L=2k, C_L=100pF, f=100kHz, Vin=10mV	0.5	0.9	-	MHz
Total Harmonic Distortion	THD	F=1kHz, Av=20dB, R_L=2k, Vcc=30V, C_L=100pF, Vo=$2V_{PP}$	-	0.02	-	%

◈ Electrical characteristics

[Voltage Reference]

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Cathode Current	I_K	-	-	-	100	mA
Reference Input Voltage	V_{ref}	Ta = 25℃	2.475	2.500	2.525	V
		Tmin. < Ta < Tmax	2.450	2.500	2.550	
Reference Input Voltage Deviation Over Temperature Range	$\triangle V_{ref}$	$V_{KA}= V_{ref}$, I_K=10mA, Tmin. < Ta < Tmax	-	7	30	mV
Minimum Cathode Current for Regulation	Imin	$V_{KA}= V_{ref}$	-	0.5	1.0	mA
Dynamic Impedance [note 1]	$\|Z_{KA}\|$	$V_{KA}= V_{ref}$, I_K=1 to 100mA, f <1kHz	-	0.2	0.5	Ω

Note 1 : the dynamic impedance is defined as $|ZKA|=\triangle V_{KA}/\triangle I_K$

◈ Typical application circuit

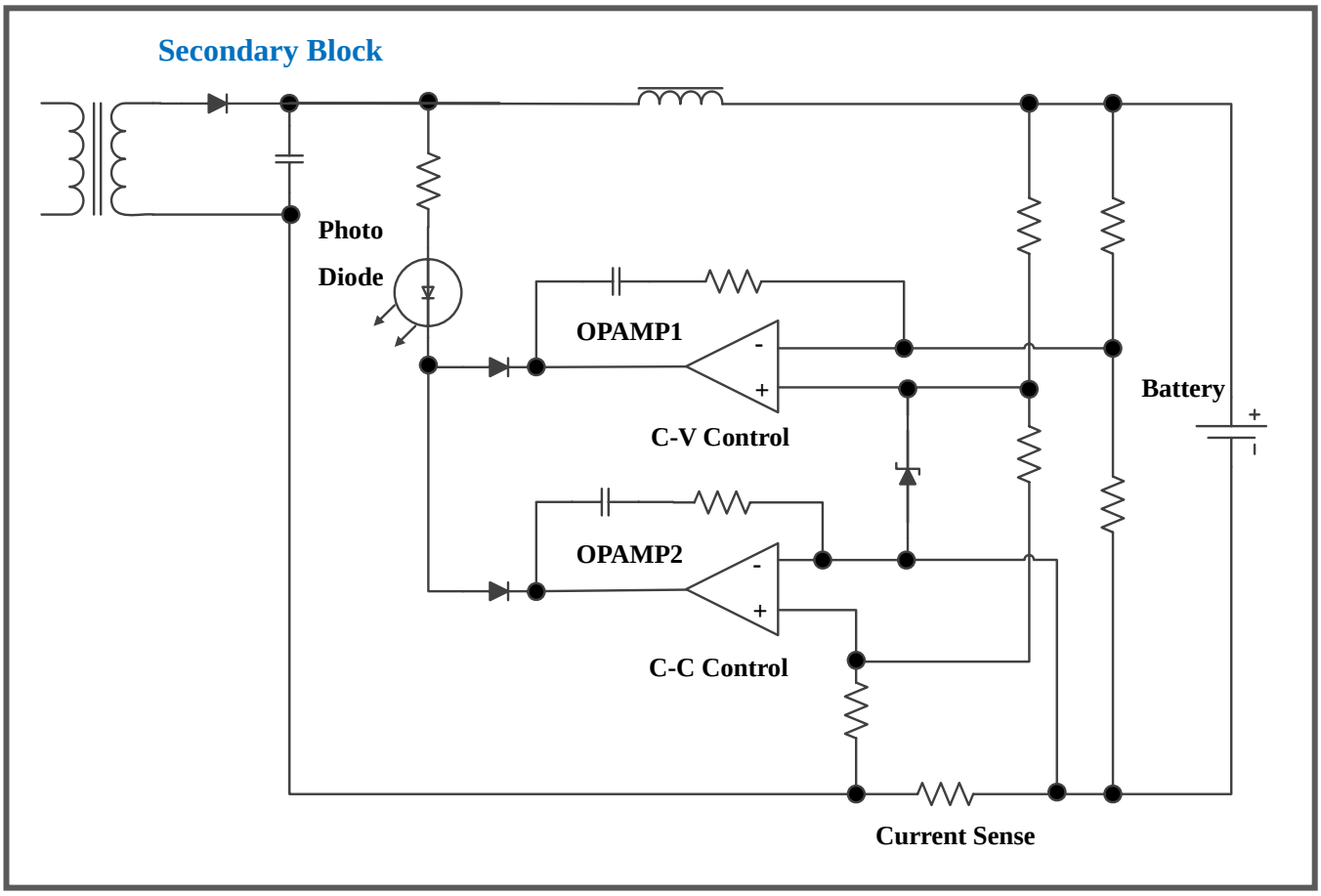


Fig.1 Reference Voltage vs. Ambient Temp.

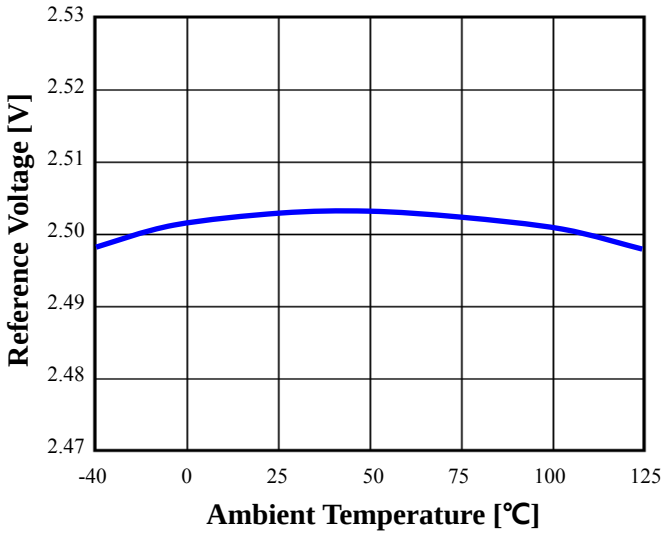


Fig.2 Supply Current vs. Ambient Temp.

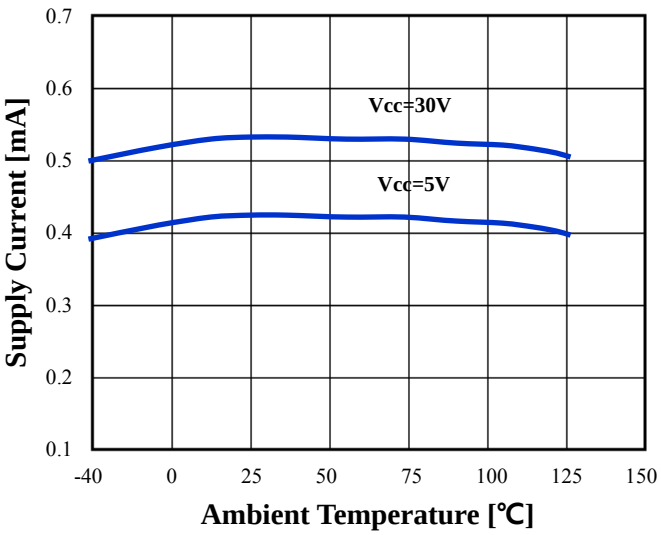


Fig.3 Reference Voltage vs. Cathode Current

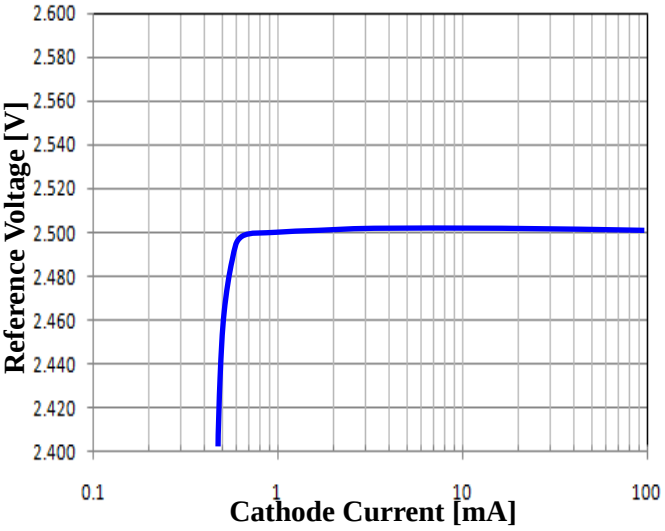


Fig.4 Input Bias Current vs. Ambient Temp.

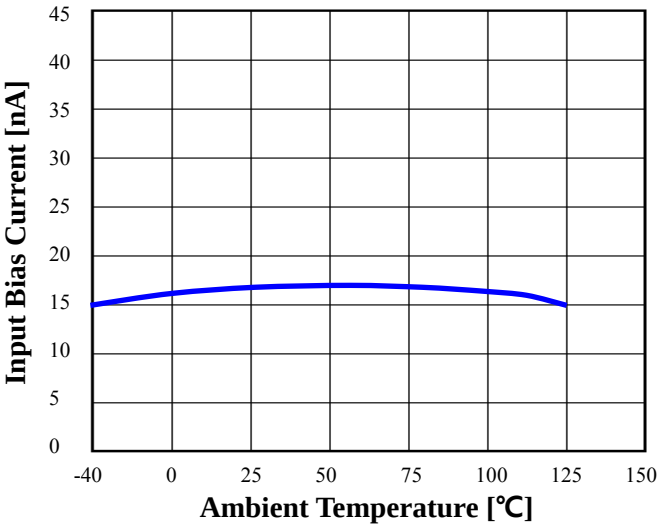


Fig.5 Output High Level vs. Vcc

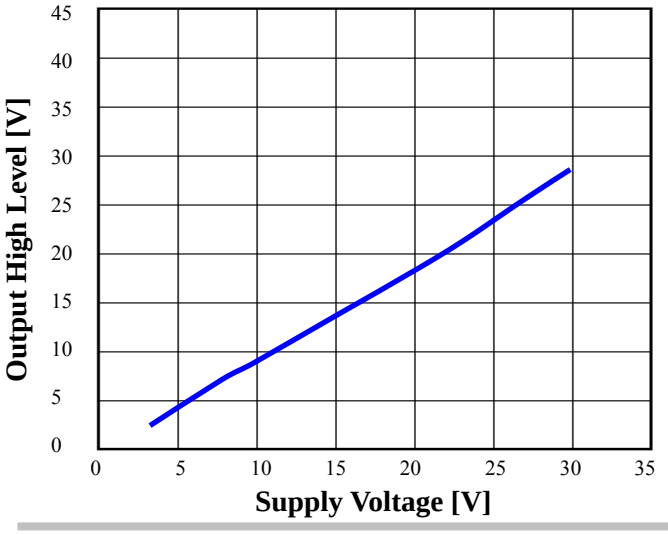
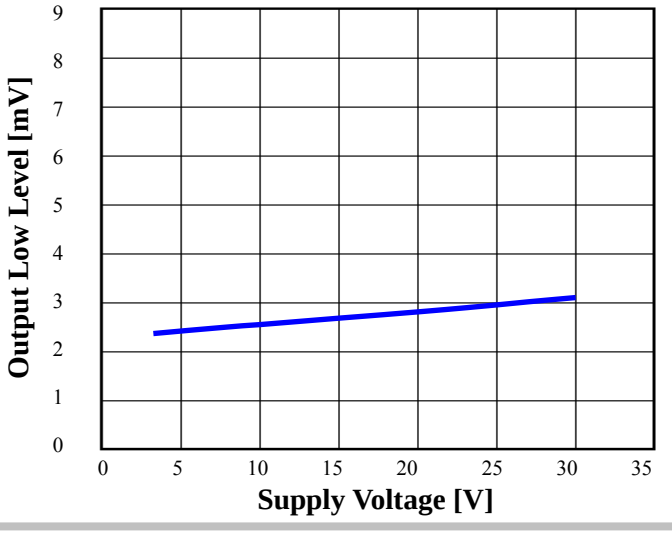
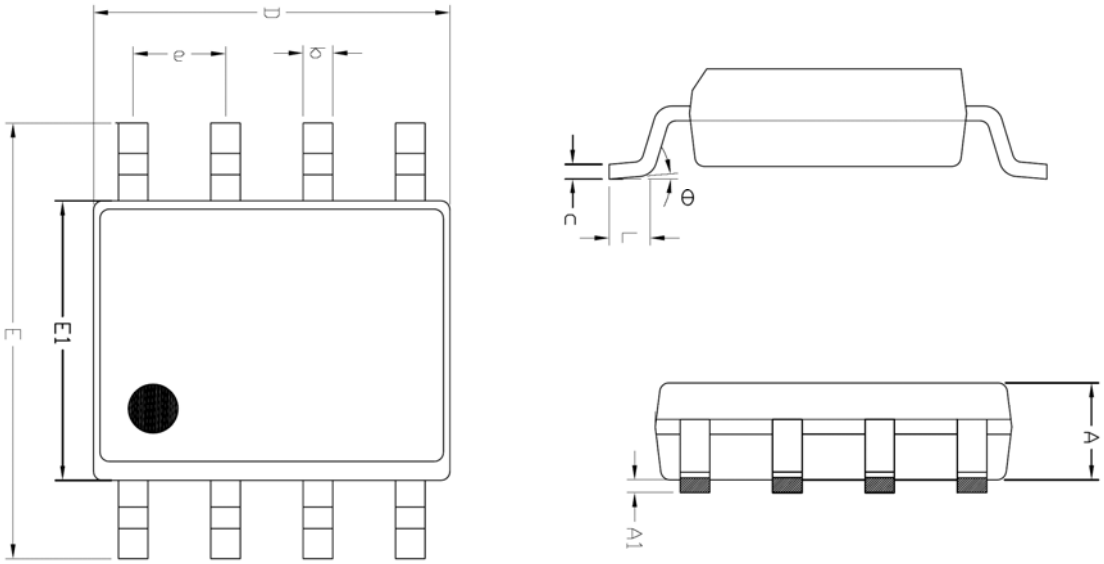


Fig.6 Output Low Level vs. Vcc

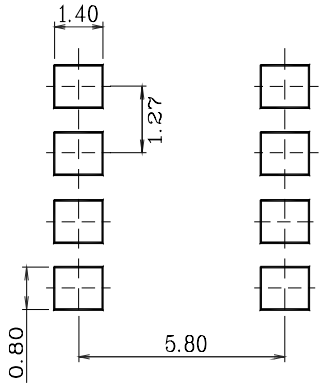


Outline Dimension (Unit : mm)

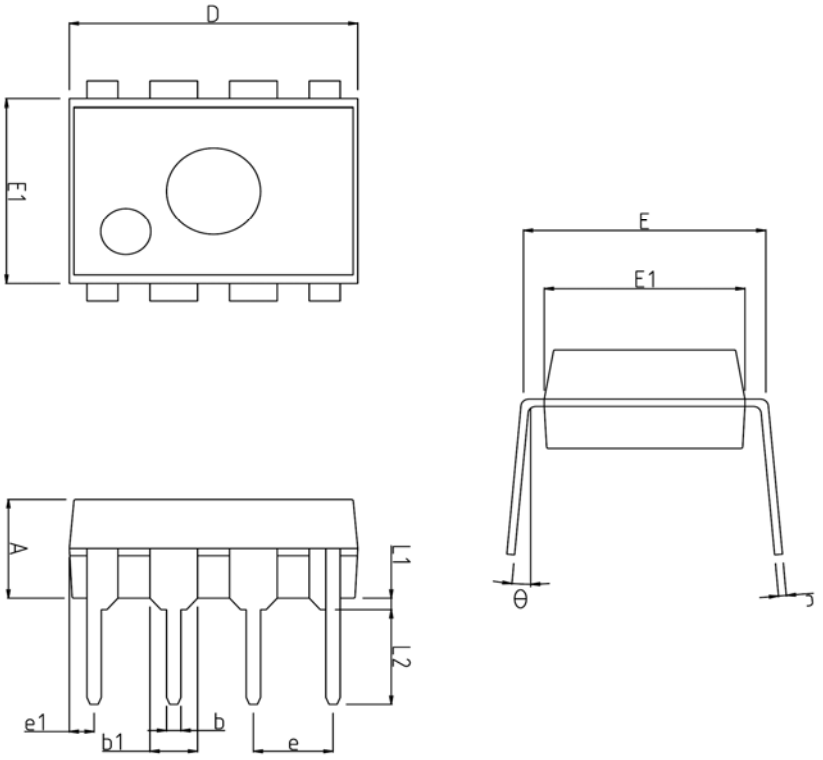


SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.245	—	1.445	
A1	0.125	0.175	0.275	
b	0.320	0.420	0.520	
c	0.170	0.220	0.270	
D	4.802	4.902	5.002	
E	5.870	6.020	6.170	
E1	3.761	3.861	3.961	
e	1.270 BSC			
L	0.462	0.562	0.662	
θ	0 °	—	8 °	

※ Recommend PCB solder land (Unit : mm)



Outline Dimension (Unit : mm)



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	3.20	3.40	3.60	
b	0.36	0.46	0.56	
b1	1.42	1.52	1.62	
c	0.20	0.25	0.35	
D	9.00	9.20	9.40	
E	7.37	7.62	7.87	
E1	6.20	6.40	6.60	
e	2.54 TYP			
e1	0.79 TYP			
L1	0.33	–	–	
L2	3.00	3.30	3.60	
θ	0°	–	15°	

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