36V Industry-Standard Operational Amplifiers

General Description

The ET85B1X series amplifiers are the industry-standard operational amplifiers which include single-channel (ET85B11) and dual-channel (ET85B12) and quad-channel (ET85B14) of high-voltage(36V) op-amps.These devices provide outstanding value for cost-sensitive applications, with features including low offset, common-mode input range to ground.

These series standard op-amps could simplify circuit design with enhanced features, such as unity-gain stability and lower quiescent current of 220 μA per amplifier(typical).

The ET85B11 single amplifier is available in a SOT23-5 package.

The ET85B12 dual amplifier is available in a SOP8/MSOP8 package.

The ET85B14 quad amplifier is available in a SOP14 packages.

Features

- Wide Supply: ±1.5 V to ±18 V, 3.0 V to 36 V
- Extended Temperature Range: -40°C to +125°C
- Offset Voltage: ±2 mV (typical)
- Offset Voltage Temperature Drift: 5μV/°C
- Input Common-Mode Voltage Range Includes Ground
- Large Voltage Gain: 85 dB (typical)
- Gain Bandwidth: 0.7 MHz
- Slew Rate: 0.3 V/μs
- Quiescent Current: 220 μA/ch (typical)

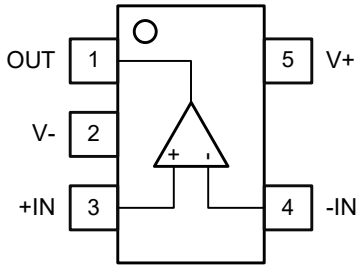
Applications

- Merchant Network and Server Power Supply Units
- Multi-function Printers
- Power Supplies and Mobile Chargers
- Motor Control: AC induction, BDC, BLDC and Stepper Moter.etc
- Indoor and Outdoor Air Conditioners
- Washers, Dryers, and Refrigerators
- AC Inverters, String Inverters, Central Inverters
- Electronic Point-of-sale Systems

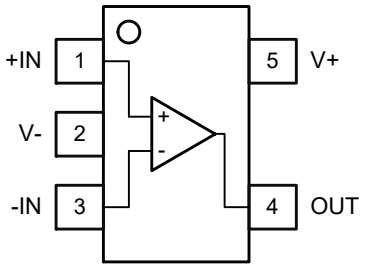
Device Information

Part No.	Package	Packing Option	MSL
ET85B11E / ET85B11EA	SOT23-5	Tape and Reel , 3K	3
ET85B12M	SOP8	Tape and Reel , 4K	3
ET85B12U	MSOP8	Tape and Reel , 4K	3
ET85B14M	SOP14	Tape and Reel , 4K	3

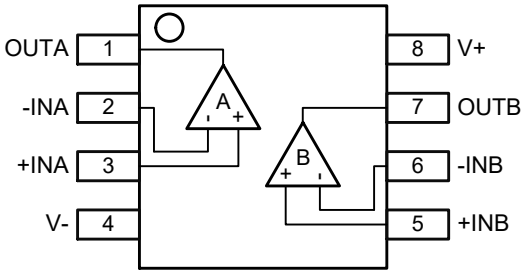
Pin Configuration



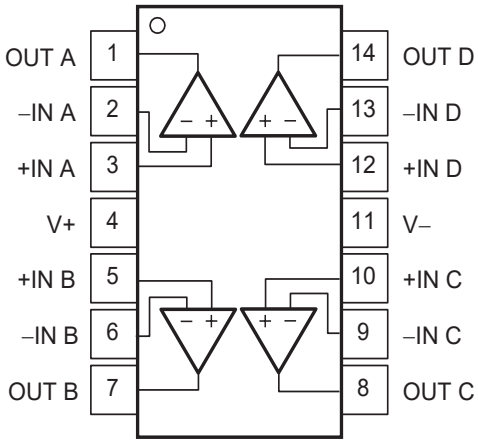
ET85B11EA



ET85B11E



ET85B12M/U



ET85B14M

Top View

Pin Function

Symbol	Descriptions
OUTx	Output
V-	Negative supply
+INx	Non-inverting input
-INx	Inverting input
V+	Positive supply

Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are only stress ratings, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions are not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

Symbol	Parameter	Value	Unit
V_S	Supply Voltage,V+ to V-	0 to 40	V
V_{IN}	Signal input terminals Voltage	($-V_S$) -0.3 to ($+V_S$) +0.3	V
I_{IN}	Signal input terminals Current	-10 to +10	mA
I_O	Output Short-Circuit Current	Continuous	
$T_{J(MAX)}$	Maximum Junction Temperature	+150	°C
T_{STG}	Storage Temperature	-65 to +150	°C
V_{ESD}	Human body model (HBM), per ANSI/ESDA/JEDECJS-001(1)	500	V
	Charged device model (CDM), per JEDEC specification JESD22-C101(2)	1000	V

Note1: JEDEC document JEP155 states that 500V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500V HBM is possible if necessary precautions are taken.

Note2: JEDEC document JEP157 states that 250V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250V CDM is possible if necessary precautions are taken.

Recommended Operating Conditions

Symbol	Parameter	Value	Unit
V_S	Supply Voltage: (V+) - (V-)	3(±1.5) to 36(±18)	V
T_A	Operating Temperature Range	-40 to +125	°C

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SOT23-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	220	°C/W
	MSOP8		180	°C/W
	SOP8		125	°C/W
	SOP14		108	°C/W

Electrical Characteristics

V_S = 5.0 V to 36 V, V_{CM} = V_{OUT} = V_S/2, and R_L = 10kΩ connected to V_S/2,T_A = 25°C,unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
OFFSET VOLTAGE						
V_{OS}	Input Offset Voltage	V_S = 5.0V to 30V, V_{CM} = 0		±2	±7	mV
		V_S = 5.0V to 30V, V_{CM} = 0 T_A = -40°C to +125°C			±10	
dV_{OS}/dT	V_{OS} vs Temperature	T_A = -40°C to +125°C		±5		µV/°C
PSRR	Power Supply Rejection Ratio	V_S = 3.0 to 30 V	60	100		dB
INPUT BIAS CURRENT						
I_B	Input Bias Current	V_{CM} = 0		±20	±200	nA
		V_{CM} = 0,T_A = -40°C to +125°C			±500	
I_{OS}	Input Offset Current	V_{CM} = 0		±5	±50	nA
		V_{CM} = 0,T_A = -40°C to +125°C			±150	
NOISE						
e_n	Input Voltage Noise Density	f = 1 kHz		40		nV/√Hz
INPUT VOLTAGE						
V_{CM}	Common-mode Voltage Range	V_S = 30V, T_A = -40°C to +125°C	-V_S		+V_S -2	V
CMRR	Common-mode Rejection Ratio	V_S = 30V, V_{CM} = 0V to (+V_S -2)	60	80		dB
OPEN-LOOP GAIN						
A_{OL}	Open-loop Voltage Gain	V_S = 15V, V_{OUT} = 1.0V to 11V, R_L > 2kΩ		85	100	dB
FREQUENCY RESPONSE						
GBP	Gain Bandwidth Product			0.7		MHz
SR	Slew Rate	V_S = 5 V, G = +1		0.3		V/µs

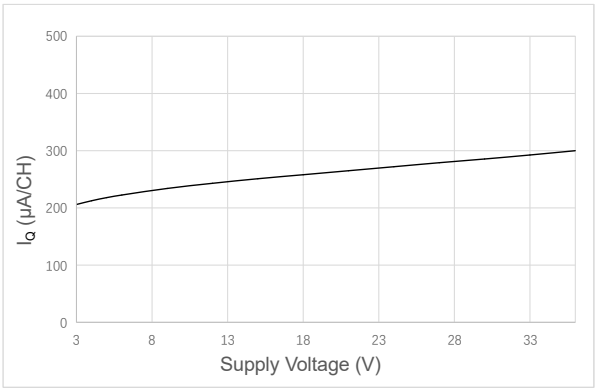
Electrical Characteristics (Continued)

V_S = 5 to 36 V, V_{CM} = V_{OUT} = V_S/2, and R_L = 10kΩ connected to V_S/2,T_A = 25°C,unless otherwise noted.

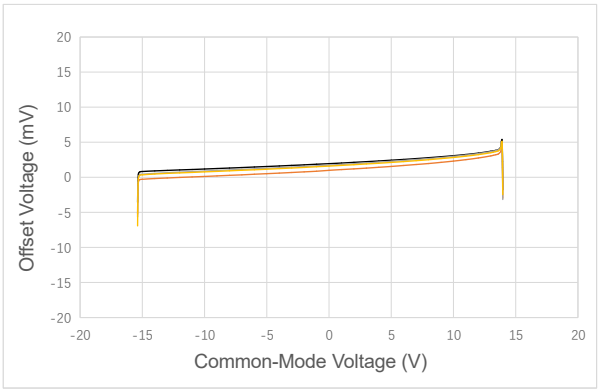
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
OUTPUT						
V_{OH}	High output voltage swing	V_S = 30V, R_L = 2kΩ, T_A = −40°C to +125°C			+V_S -4	V
		V_S = 30V, R_L = 10kΩ, T_A = −40°C to +125°C			+V_S -3	V
V_{OL}	Low output voltage swing	V_S = 5V, R_L = 10kΩ, T_A = −40°C to +125°C			-V_S +2	V
I_{SOURCE}	Out Source Current	V_S = 15V, V_{OUT} = 0V, V_{ID} = 1V	20	40		mA
		V_S = 15V, V_{OUT} = 0V,V_{ID} = 1V, T_A = −40°C to +125°C	10			
I_{SINK}	Out Sink Current	V_S = 15V, V_{OUT} = 0V, V_{ID} = 1V, T_A = −40°C to +125°C	5			mA
POWER SUPPLY						
V_S	Specified Voltage Range	T_A = −40°C to +125°C	3.0		36	V
I_Q	Quiescent Current per Amplifier	V_S = 5V		220	400	μA
		V_S = 30V		290	500	μA

Typical Characteristics

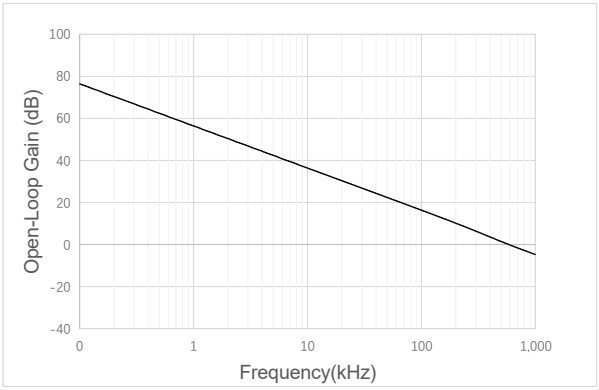
V_S = 5 to 36 V, V_{CM} = V_{OUT} = V_S/2, and R_L = 10kΩ connected to V_S/2, T_A = 25°C, unless otherwise noted.



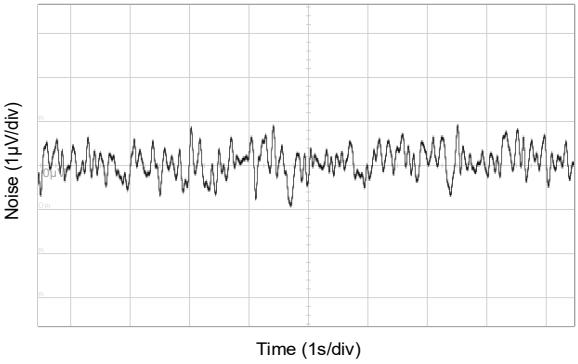
Quiescent Current vs Supply Voltage



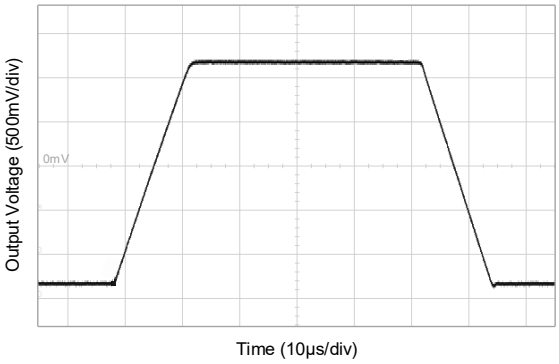
Offset Voltage vs Common-Mode Voltage(V_S = ±15V)



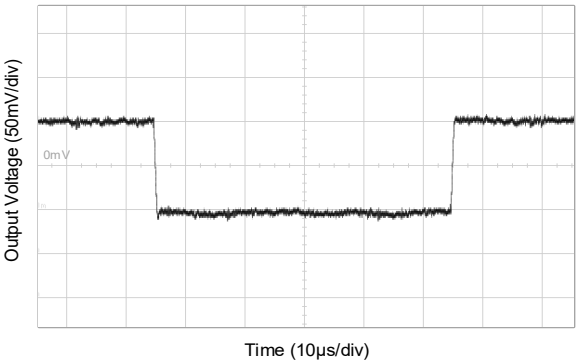
Open-Loop Gain vs Frequency



0.1 Hz to 10 Hz Noise



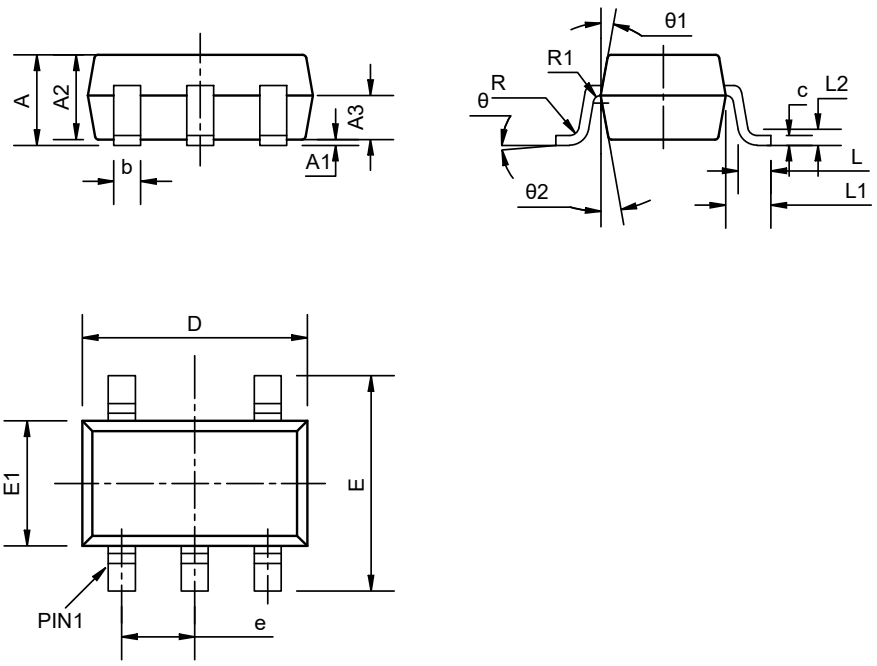
Large-Signal Step Response



Small-Signal Step Response(100 mV)

Package Dimension

SOT23-5

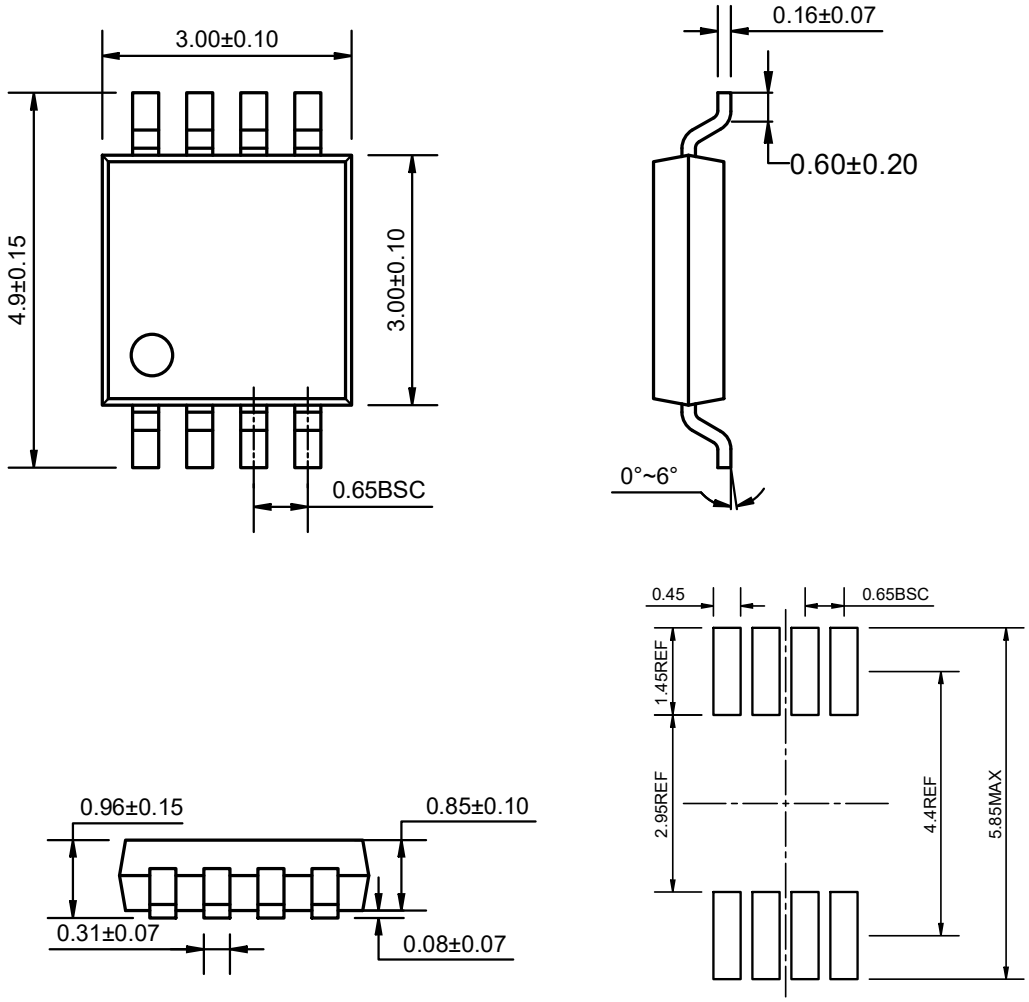


COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0	-	0.15
A2	1	1.1	1.2
A3	0.6	0.65	0.7
b	0.36	-	0.5
c	0.14	-	0.2
D	2.82	2.92	3.02
E	2.6	2.8	3
E1	1.5	1.6	1.7
e	0.9	0.95	1
L	0.35	0.45	0.6
L1	0.59REF		
L2	0.25BSC		
R	0.1	-	-
R1	0.1	-	0.2
θ	0°	-	8°
θ1	3°	5°	7°
θ2	6°	-	14°

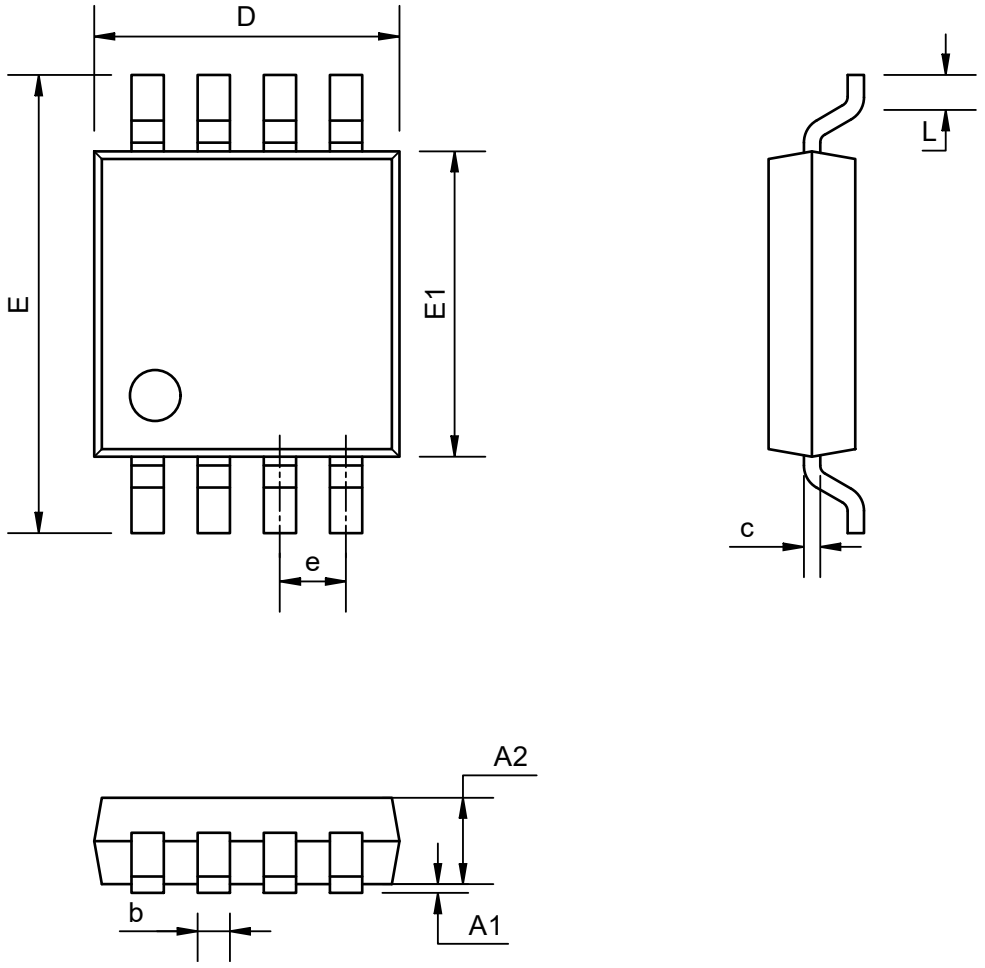
MSOP8



Recommended Land Pattern

Unit: mm

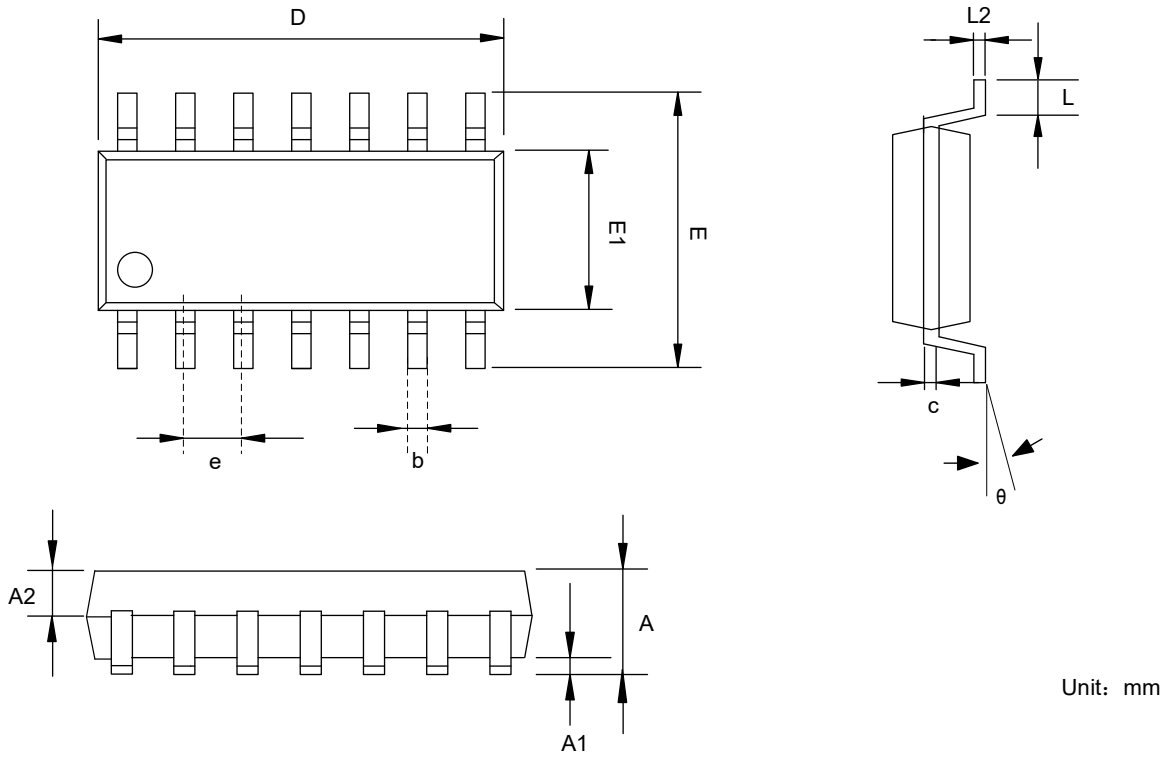
SOP8



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A1	0.15	—	0.22
A2	1.40	1.55	1.50
b		0.40 BSC	
c	0.20	—	0.25
D	4.85	4.90	4.95
E	5.99	6.04	6.09
E1	3.85	3.90	3.95
e		1.27 BSC	
L	0.50	0.60	0.70

SOP14



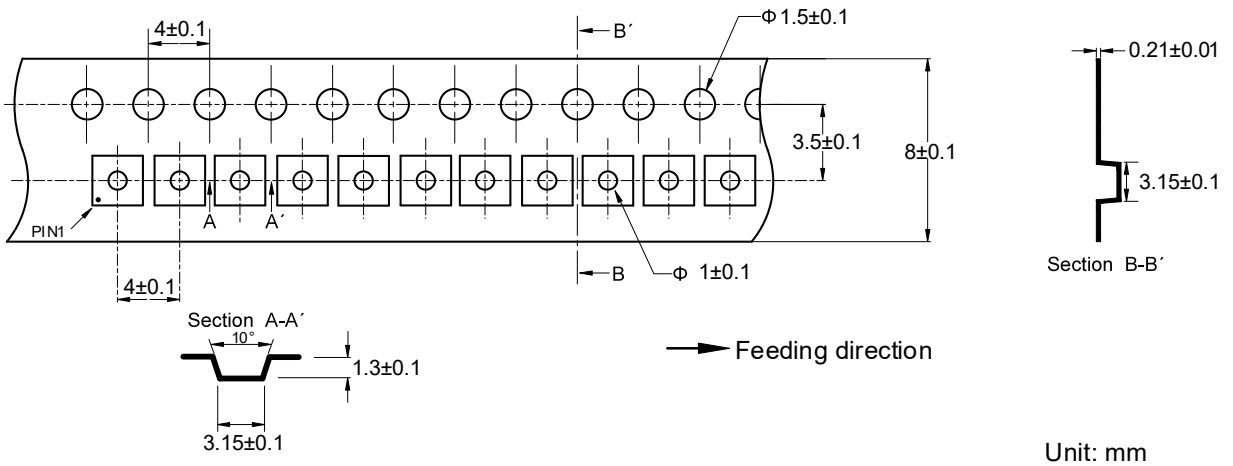
Unit：mm

COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

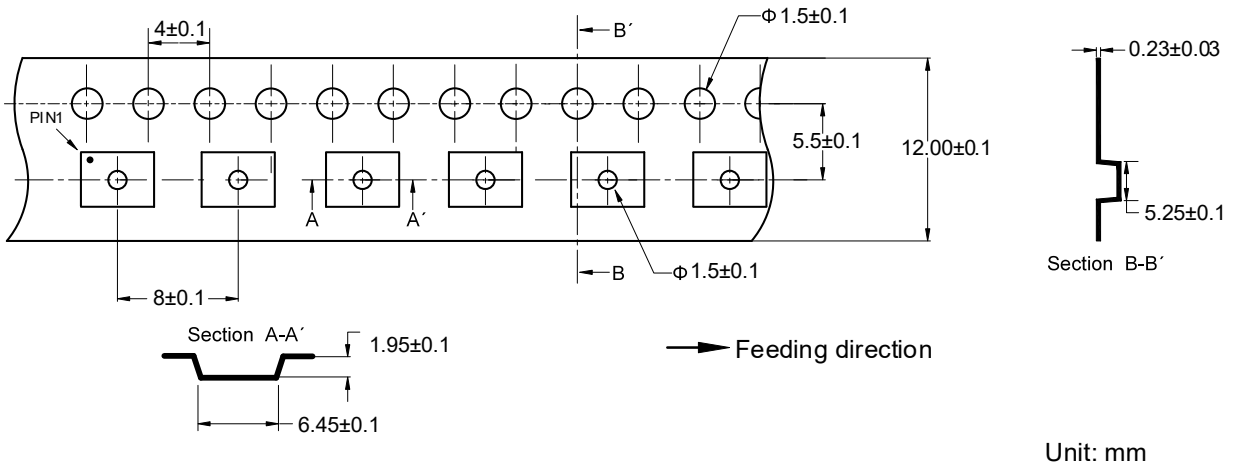
SYMBOL	MIN	MAX
A	1.4	1.5
A1	0.1	0.2
A2	0.65	0.75
e	1.27	
c	0.203	
D	8.48	8.58
E	6.05	6.25
E1	3.75	3.85
b	0.406	
L	0.4	0.7
L2	0.203	
θ	0°	8°

Tape Information

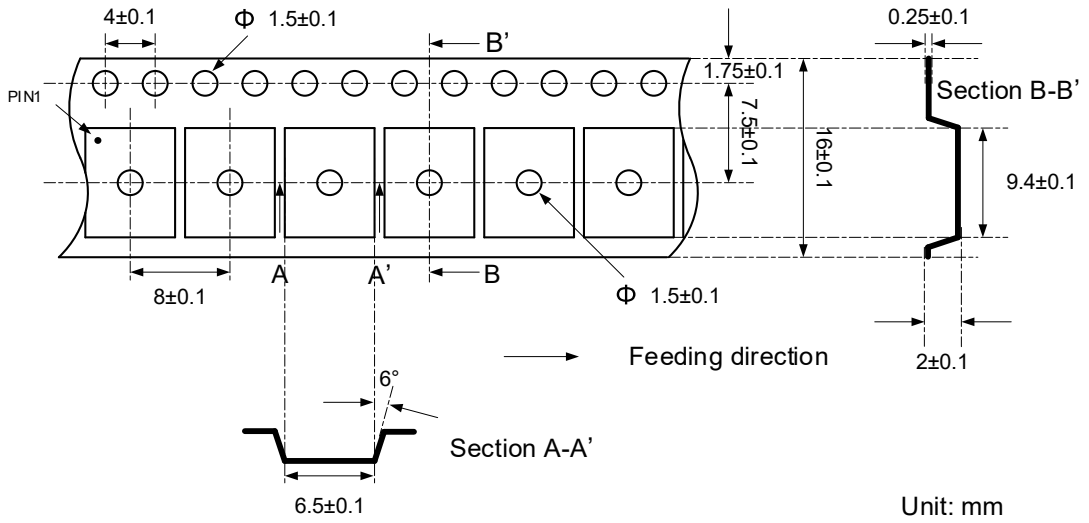
SOT23-5



SOP8

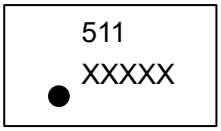


SOP14


4±0.1
Φ 1.5±0.1
B'
0.25±0.1
PIN1
1.75±0.1
7.5±0.1
16±0.1
Section B-B'
9.4±0.1
8±0.1
A
A'
B
Φ 1.5±0.1
Feeding direction
2±0.1
6°
Section A-A'
6.5±0.1
Unit: mm

Marking Information

SOT23-5

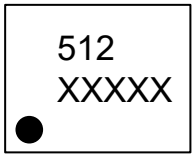


511 - Part Number

XXXXX - Tracking Number

Note：X (Tracking Number) is variable, according to the wafer lot number.

SOP8

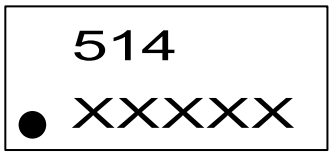


512 - Part Number

XXXXX - Tracking Number

Note：X (Tracking Number) is variable, according to the wafer lot number.

SOP14



514 - Part Number

XXXXX - Tracking Number

Note：X (Tracking Number) is variable, according to the wafer lot number.

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-03-07	Original Version	Jiangqp	Shibo	Liujy