

Precision, Low-Noise Operational Amplifier

General Description

The ET852SXXX series consists of single and dual-channel amplifiers with extremely high precision, featuring ultra-low offset voltage, temperature drift, low input bias current, low noise, and low power consumption. It maintains output stability under capacitive loads of 50pF without external compensation. The amplifier includes a built-in 100Ω series input protection resistor, ensuring no phase inversion even when input signal levels exceed the power supply voltage by several volts.

The ET852SXXX series amplifiers are available in both SOP8 and MSOP8 packages. With a rated operating temperature range of -40°C to +125°C, this product meets the demands of harsh working environments.

The application of this product includes precision diode power measurement, voltage and current level setting, and level detection in optical and wireless transmission systems. Other applications include but are not limited to the following types of circuit power supply and portable instruments and control circuits: thermocouples, resistance temperature detectors, strain bridges, as well as sensor signal conditioning, precision filters, etc.

Features

- Ultra low voltage noise density: $2\text{nV}/\sqrt{\text{Hz}}$ (1kHz)
- Unit gain bandwidth product: 20MHz
- Dual power supply voltage: $\pm 2.25\text{V}$ to $\pm 15\text{V}$
- Quiescent current:
 - ET852S1XX: 2.8mA
 - ET852S2XX: 5.4mA
- CMRR: > 100dB (Min)
- PSRR: > 100dB (Min)
- Large signal voltage gain: > 120dB (Min)
- Unit gain stability
- No inversion
- The internal protection circuit supports input voltage higher than the power supply voltage
- Offset voltage:
 - ET852SXXA: 25μV (Max)
 - ET852SXXC: 150μV (Max)
- Offset voltage temperature drift: 0.3μV/°C
- Bias current: 30nA

ET852SXXX

Applications

- Wireless base station control circuit
- Optical network control circuit
- Thermocouple
- Resistance temperature detector
- Instruments and meters
- Precision filter
- Sensors and control circuits

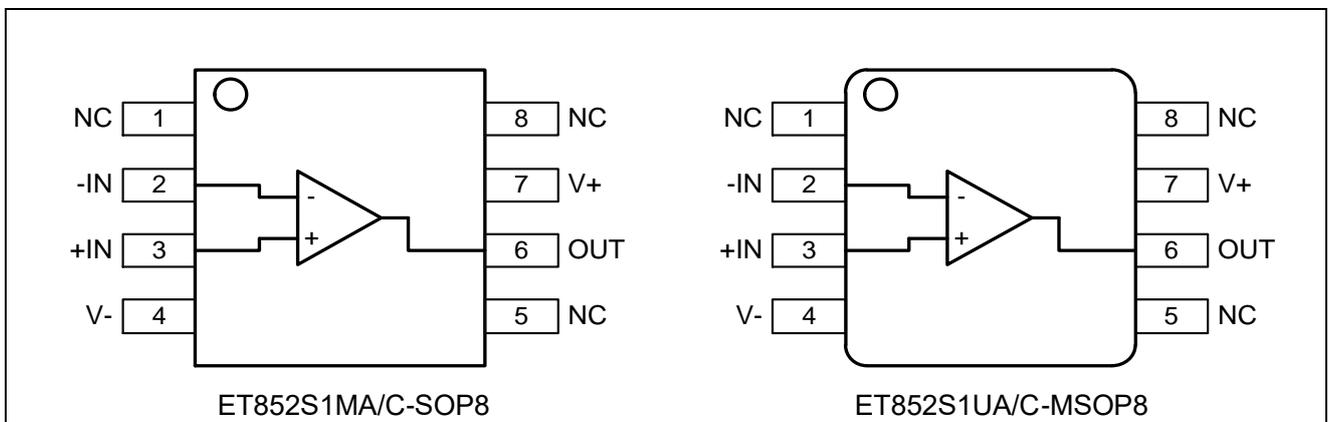
Device information

ET 852S X₁ X₂ X₃

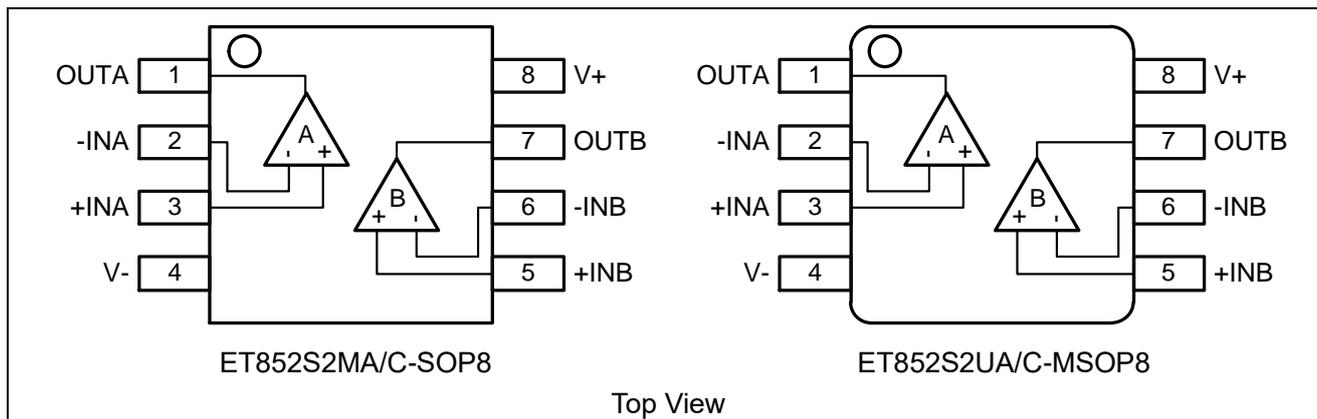
<u>X</u> ₁ Channel number		<u>X</u> ₂ Package		<u>X</u> ₃ Voltage range	
1	Single channel	M	SOP8	A	25 μ V (Max)
2	Dual channels	U	MSOP8	C	150 μ V (Max)

Part No.	Package	Packing Option	MSL
ET852S1MA	SOP8	Tape and reel, 3K	3
ET852S1MC	SOP8	Tape and reel, 3K	3
ET852S1UA	MSOP8	Tape and reel, 3K	3
ET852S1UC	MSOP8	Tape and reel, 3K	3
ET852S2MA	SOP8	Tape and reel, 3K	3
ET852S2MC	SOP8	Tape and reel, 3K	3
ET852S2UA	MSOP8	Tape and reel, 3K	3
ET852S2UC	MSOP8	Tape and reel, 3K	3

Pin Configuration



ET852SXXX



Pin Function

Symbol	Descriptions
OUTx	Output
V-	Negative supply
+INx	Non-inverting input
-INx	Inverting input
V+	Positive supply
NC	No connect

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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+) - (V-)	±2.25 to ±18	V
V _{IN}	Input Voltage	(-V _S) -0.5 to (+V _S) +0.5	V
T _J	Junction temperature	-65 to +150	°C
T _{STG}	Storage temperature	-65 to +150	°C
V _{ESD}	Human body model (HBM), per ANSI/ESDA/JEDECJS-001 ⁽¹⁾	2000	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-)	±2.25 to ±15	V
T _A	Operating Temperature Range	-40 to +125	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
R _{θJA}	Thermal Characteristics, Thermal Resistance, Junction-to-Air	122.2	°C/W

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Electrical Characteristics

$V_S = \pm 15\text{ V}$, $V_{CM} = 0\text{ V}$, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

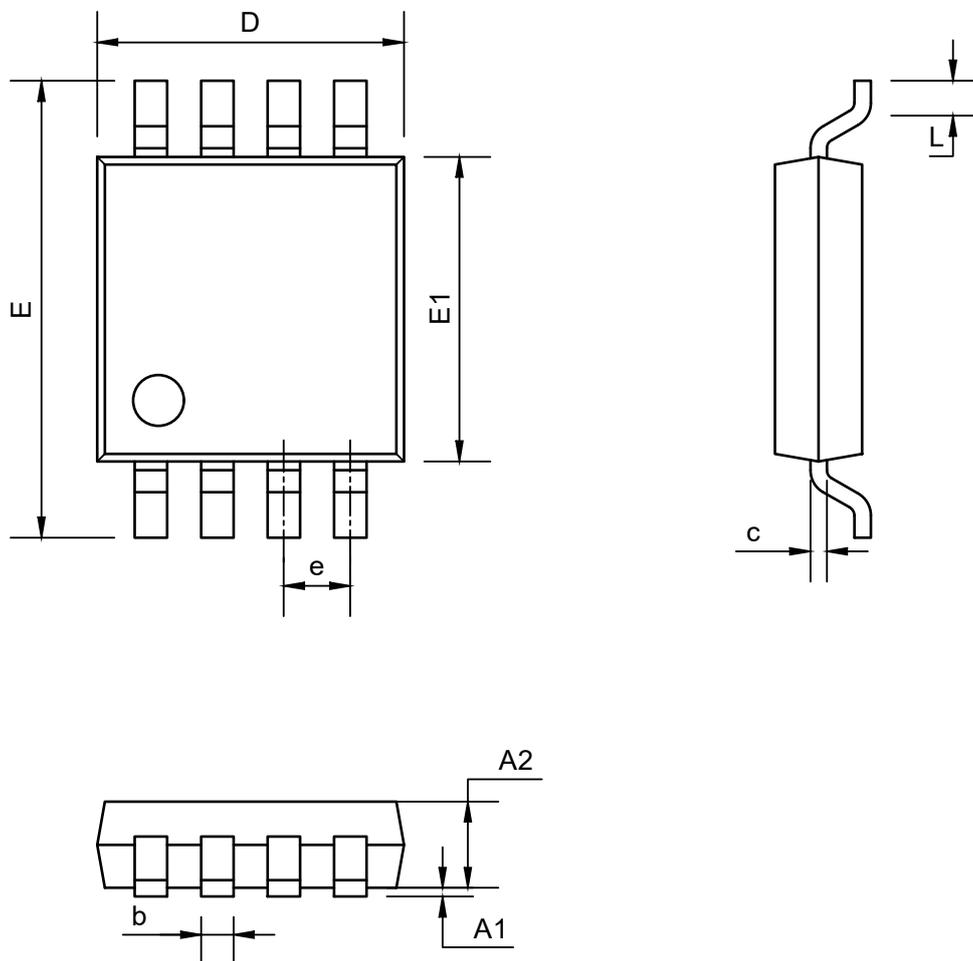
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
OFFSET VOLTAGE						
V_{OS}	Offset voltage(ET852SXXA)				± 25	μV
	Offset voltage(ET852SXXC)				± 150	
dV_{OS}/dT	Offset voltage vs temperature	$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		0.3		$\mu\text{V}/^\circ\text{C}$
PSRR	Power-supply rejection ratio	$V_S = \pm 2.5\text{ V}$ to $\pm 15\text{ V}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$	100	120		dB
INPUT BIAS CURRENT						
$I_B^{(3)}$	Input bias current			30		nA
$I_{OS}^{(3)}$	Offset current(ET852SXXA)			20		nA
	Offset current(ET852SXXC)			40		
NOISE						
e_n	Input voltage noise density	$f = 1\text{ kHz}$		2		$\text{nV}/\sqrt{\text{Hz}}$
INPUT VOLTAGE						
V_{CM}	Common-mode voltage range		$-V_S + 1.5$		$+V_S - 2$	V
CMRR	Common-mode rejection ratio	$V_{CM} = -13.5\text{ V}$ to $+13\text{ V}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$	100	120		dB
OPEN-LOOP GAIN						
A_{OL}	Open-loop voltage gain	$V_{OUT} = -13.5\text{ V}$ to 13 V , $R_L = 2\text{ k}\Omega$	1000	3000		V/mV
FREQUENCY RESPONSE						
GBP	Gain-bandwidth product	$R_L = 2\text{ k}\Omega$, $G=1$		20		MHz
SR	Slew rate	$R_L = 2\text{ k}\Omega$		12		V/ μs
THD+N	Total harmonic distortion + noise	$V_S = \pm 12\text{ V}$, $G = 1$, $V_{OUT} = 2\text{ V}_{rms}$, $R_L = 600\Omega$		-105		dB
OUTPUT						
V_{OH}	High output voltage swing	$\pm V_S = \pm 15\text{ V}$, $I_L = 1\text{ mA}$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$	+14	+14.7		V
V_{OL}	Low output voltage swing	$\pm V_S = \pm 15\text{ V}$, $I_L = 1\text{ mA}$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		-14.7	-14	V
I_{OUT}	Output Current	$V_{DROPOUT} < 1.2\text{ V}$		± 10		mA
I_{SC}	Short-circuit current		80		180	mA
POWER SUPPLY						
I_Q	ET852S1XX	$V_O=0\text{ V}$		2.8		mA
	ET852S2XX			5.4		

Note3: Guaranteed by design.

ET852SXXX

Package Dimension

SOP8

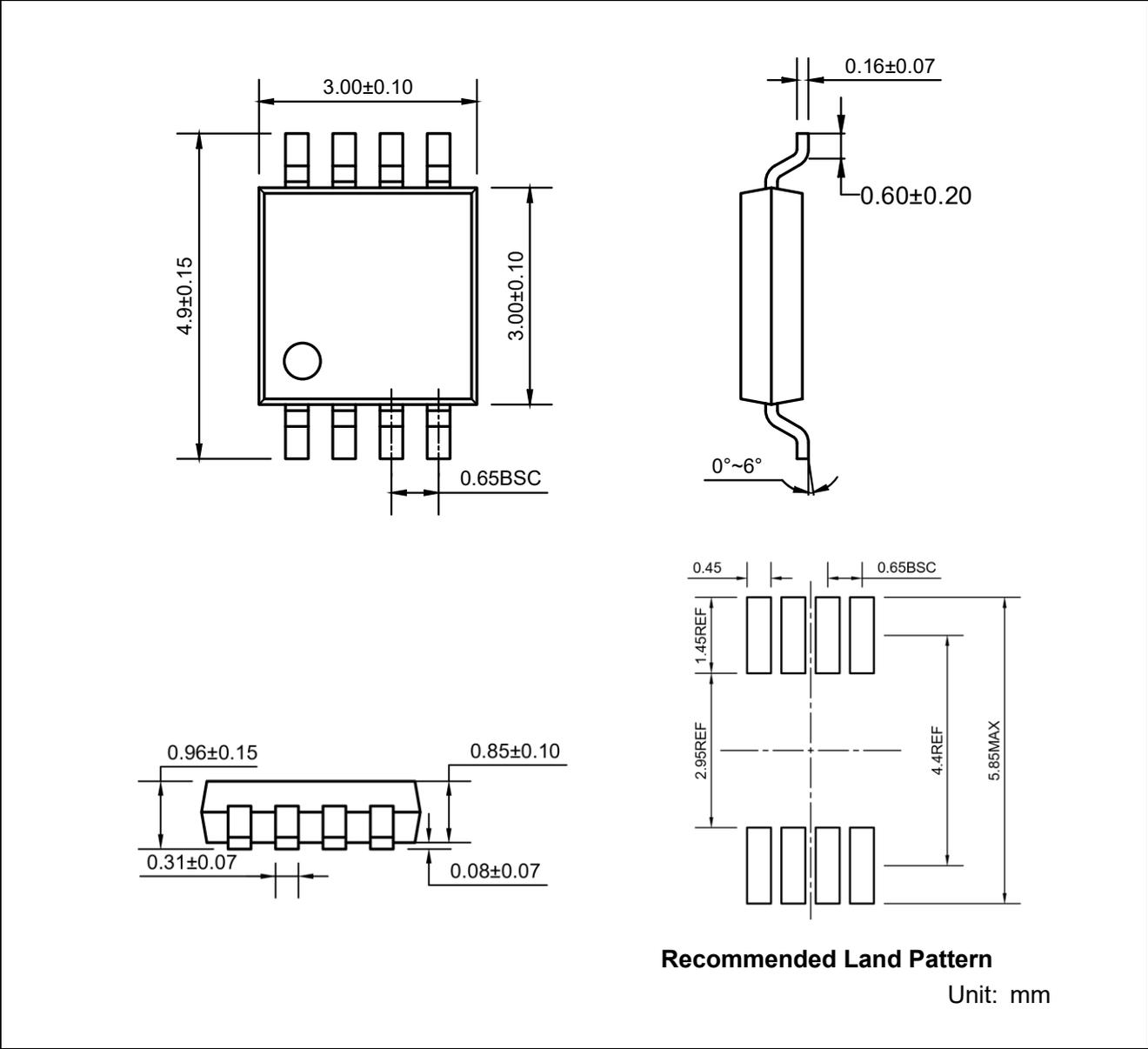


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A1	0.10	—	0.225
A2	1.30	1.40	1.50
b	0.39	—	0.47
c	0.20	—	0.24
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.50	—	0.80

ET852SXXX

MSOP8



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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2024-07-23	Preliminary Version	Jiangqp,Huyt	Shibo	Liujiy
1.1	2024-08-06	Update Electrical Characteristics	Huyt	Shibo	Liujiy
1.2	2026-01-23	Update Note	Huyt	Shibo	Liujiy