1MHz, RRIO, CMOS Operational Amplifier

General Description

ET358 is low cost, voltage feedback amplifiers. The device can operate from 2.1V to 5.5V single supply, while consuming only 60μA quiescent current per Amplifier. It provides rail-to-rail input with a wide input common mode voltage range and rail-to-rail output voltage swing. This feature makes ET358 appropriate for buffering ASIC.

The ET358 offer a gain-bandwidth product of 1MHz and an ultra-low input bias current of 10pA. It is well suited for piezoelectric sensors, integrators and photodiode amplifiers.

The ET358 is designed into a wide range of applications, such as battery-powered instrumentation, safety monitoring, portable systems, and transducer interface circuits in low power systems.

It is available in SOP8/MSOP8 packages.

Features

- Low offset voltage: 5 mV (MAX)
- Ultra-Low Input Bias Current: 10 pA
- Unity-gain stable
- Gain-Bandwidth Product: 1 MHz
- Rail-to-rail input and output
- Supply Voltage Range: 2.1V to 5.5V
- Input Voltage Range: -0.1V to 5.6V with Vs=5.5V
- Low Supply Current: 60μA/Amplifier

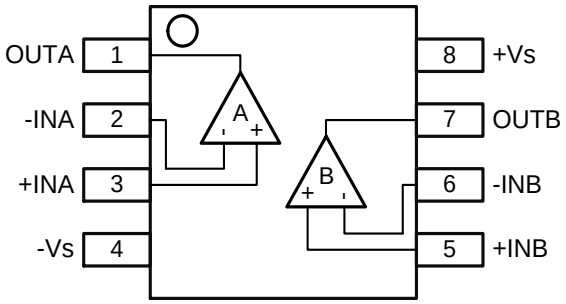
Applications

- ASIC Input or Output Amplifiers
- Piezoelectric Transducer Amplifiers
- Battery-Powered Equipment
- Portable Equipment
- Sensor Interfaces
- Medical Instrumentation
- Audio Outputs
- Smoke Detectors
- Notebook PCs

Device information

Part No.	Package	MSL
ET358M	SOP8	Level 3
ET358U	MSOP8	Level 3

Pin Configuration



Top View

Pin Function

Pin Number	Symbol	Descriptions
ET358		
1,7	OUT	Output
4	-Vs	Negative supply
3,5	+IN	Non-inverting input
2,6	-IN	Inverting input
8	+Vs	Positive supply

Functional Description

Rail-to-Rail Input

When ET358 work at the power supply between 2.1V and 5.5V, the input common mode voltage range is from ($-V_S$) - 0.1V to ($+V_S$) + 0.1V.

Rail-to-Rail Output

The ET358 support rail-to-rail output operation. In single power supply application, for example, when $+V_S$ = 5V, $-V_S$ = GND, 100kΩ load resistor is tied from OUT pin to $V_S/2$, the typical output swing range is from 0.005V to 4.997V.

Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

Parameter	Rating	Unit
Supply Voltage(+V_S) - (-V_S)	6	V
Common-mode Input Voltage	(-V_S)-0.3V to (+V_S)+0.3V	V
ESD (Human Body Model)	±4000	V
Storage Temperature Range	-65 to +150	°C
Junction Temperature Range	+150	°C
Operating Temperature Range	-40 to +125	°C

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SOP8	Thermal Characteristics, Thermal Resistance, Junction-to-Air	150	°C/W
	MSOP8		210	°C/W

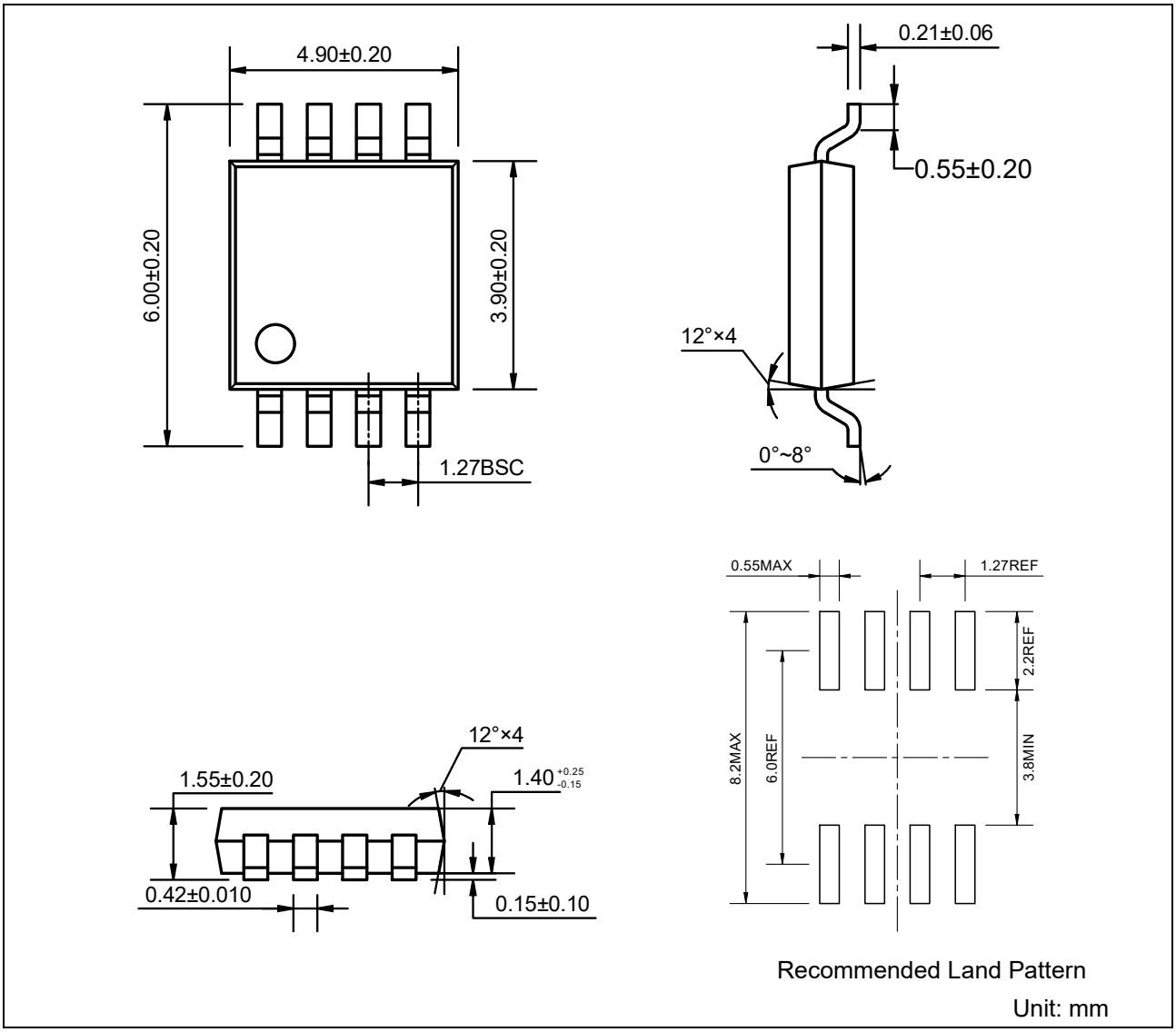
Electrical Characteristics

V_S = +5 V, R_L=100kΩ connected to V_S/2, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
V_{OS}	Input offset Voltage	V_{CM} = V_S/2		0.8	5	mV
I_B	Input Bias Current			10		pA
I_{OS}	Input Offset Current			10		pA
V_{CM}	Input Common Mode Voltage Range	V_S=5.5V	-0.1		5.6	V
CMRR	Common-Mode Rejection Ratio	V_S = 5.5 V, V_{CM}= -0.1V to 4V	62	70		dB
		V_S = 5.5 V, V_{CM} = –0.1 V to 5.6 V,	55	68		
A_{OL}	Open-Loop Voltage Gain	R_L=5kΩ, V_{OUT}=0.1V to 4.9V	70	80		dB
		R_L=100kΩ, V_{OUT}=0.035V to 4.965V	80	84		
$\Delta V_{OS}/\Delta T$	Input Offset Voltage Drift			2.7		μV/°C
OUTPUT CHARACTERISTICS						
V_{OH}	Output Voltage Swing from Rail	R_L=100kΩ	4.980	4.997		V
V_{OL}		R_L=100kΩ		5	20	mV
V_{OH}		R_L=10kΩ	4.970	4.992		V
V_{OL}		R_L=10kΩ		8	30	mV
I_{SOURSE}	Output Current	R_L=10Ω to V_S/2	60	85		mA
I_{SINK}			60	75		mA
POWER SUPPLY						
	Operating Voltage Range		2.1		5.5	V
PSRR	Power Supply Rejection Ratio	V_S=2.5V to 5.5V, V_{CM}=0.5V	60	82		dB
I_Q	Quiescent Current/Amplifier	V_S=5V, V_{CM}=2.5V		60	85	μA
DYNAMIC PERFORMANCE						
GBP	Gain-Bandwith Product			1		MHz
SR	Slew Rate	G=+1, 2 V Output Step		0.6		V/μs
t_S	Setting Time to 0.1%	G=+1, 2 V Output Step		5.3		μs
NOISE PERFORMANCE						
E_n	Input voltage noise (peak to peak)	f = 0.1 Hz to 10 Hz		6		μV_{PP}
e_n	Input Voltage Noise Density	f=1kHz		25		nV/√Hz
		f=10kHz		20		nV/√Hz

Package Dimension

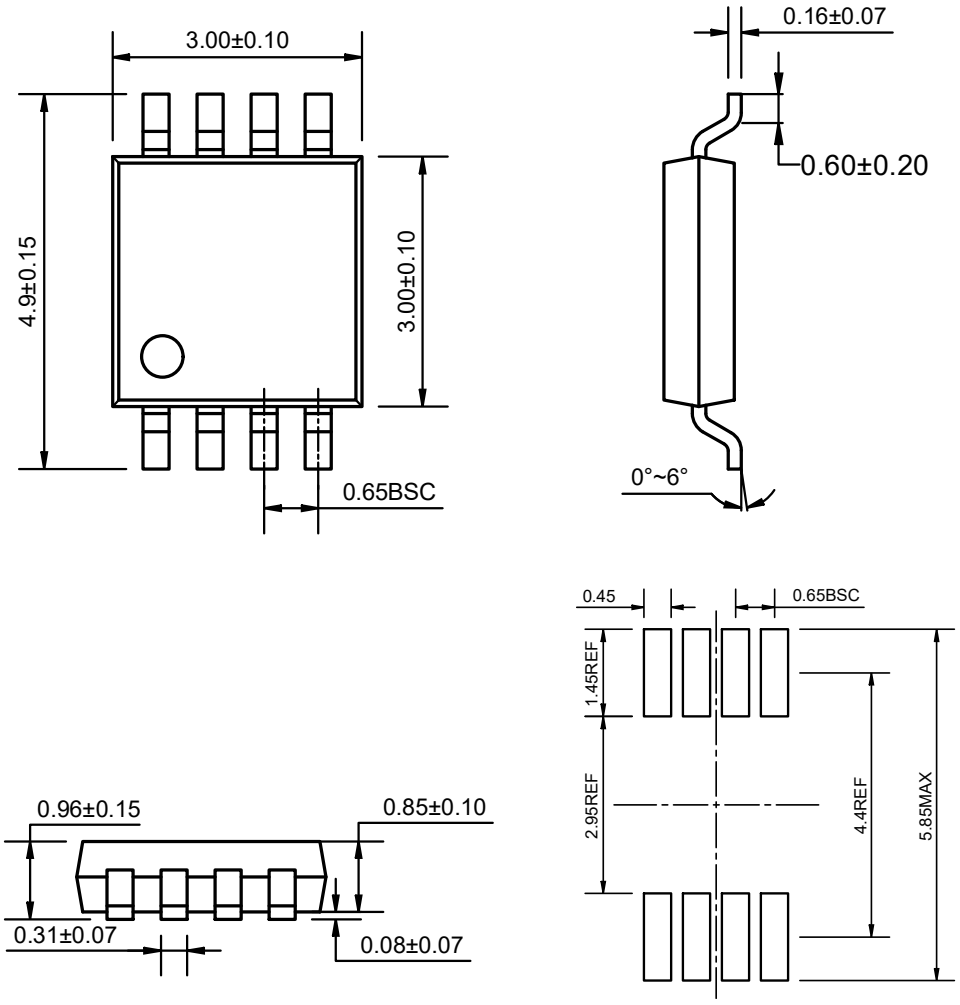
SOP8



Recommended Land Pattern

Unit: mm

MSOP8



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2024-01-31	Official version	Chenzx	Wanggp	Liujy
1.1	2024-12-03	Add I_Q test condition	Yinp	Chenh	Liujy