



LM358

LINEAR INTEGRATED CIRCUIT

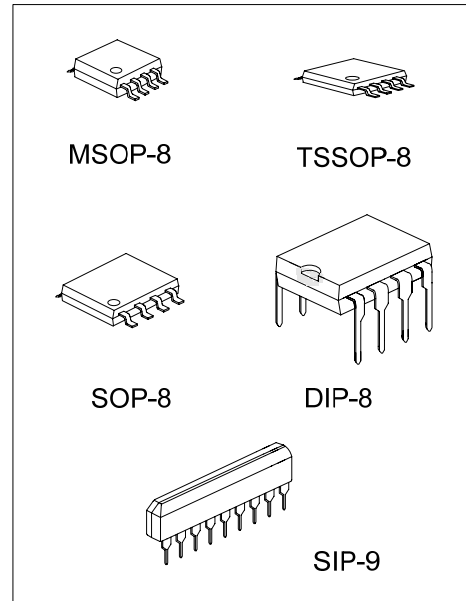
DUAL OPERATIONAL AMPLIFIER

DESCRIPTION

The UTC LM358 consists of two independent high gain, internally frequency compensated operational amplifier. It can be operated from a single power supply and also split power supplies.

FEATURES

- *Internally frequency compensated for unity gain.
- *Wide power supply range 3V - 32V.
- *Input common-mode voltage range include ground.
- *Large DC voltage gain.



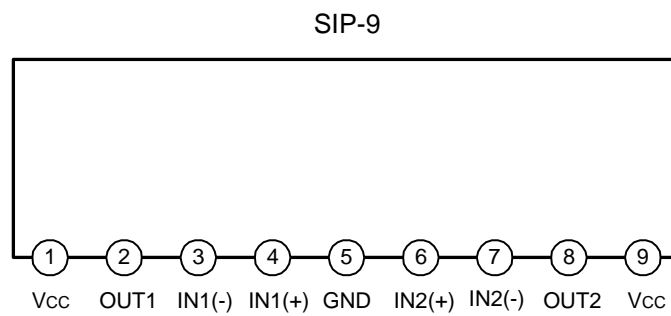
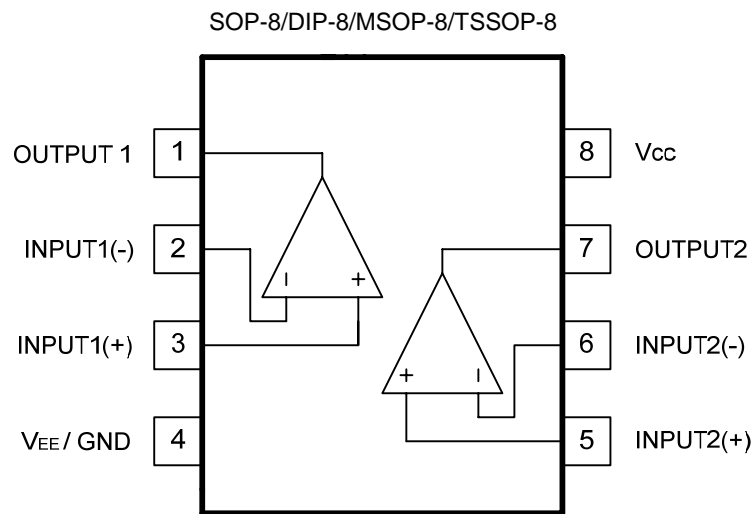
*Pb-free plating product number: LM358L

ORDERING INFORMATION

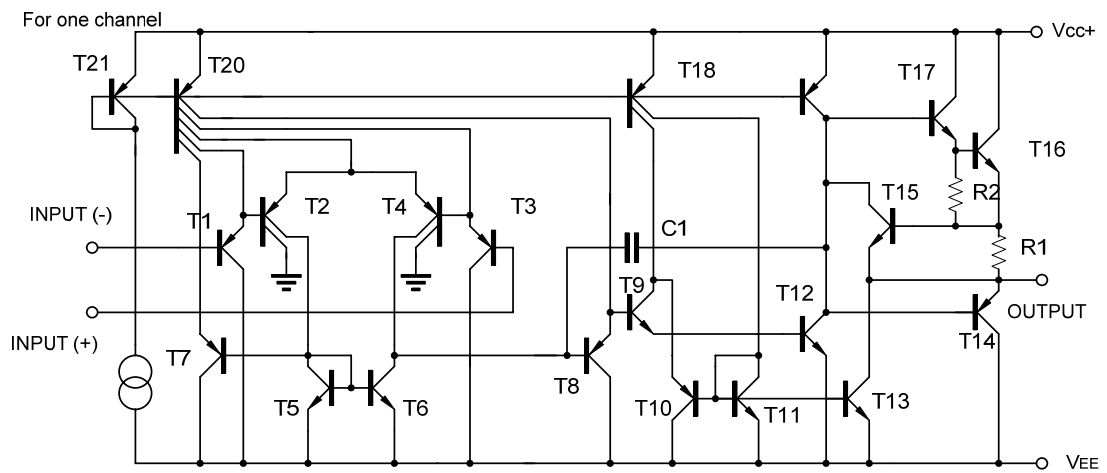
Ordering Number		Package	Packing
Normal	Lead Free Plating		
LM358-D08-T	LM358L-D08-T	DIP-8	Tube
LM358-G09-T	LM358L-G09-T	SIP-9	Tube
LM358-P08-R	LM358L-P08-R	TSSOP-8	Tape Reel
LM358-P08-T	LM358L-P08-T	TSSOP-8	Tube
LM358-S08-R	LM358L-S08-R	SOP-8	Tape Reel
LM358-S08-T	LM358L-S08-T	SOP-8	Tube
LM358-SM1-R	LM358L-SM1-R	MSOP-8	Tape Reel
LM358-SM1-T	LM358L-SM1-T	MSOP-8	Tube

<p>LM358L-D08-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) D08: DIP-8, G09: SIP-9, S08: SOP-8, SM1: MSOP-8, P08: TSSOP-8 (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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■ PIN DESCRIPTION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

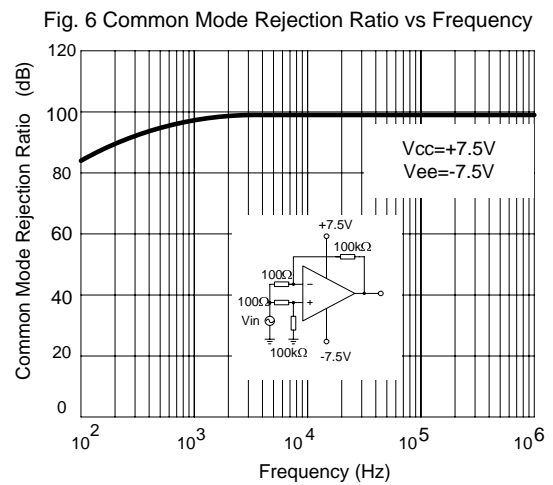
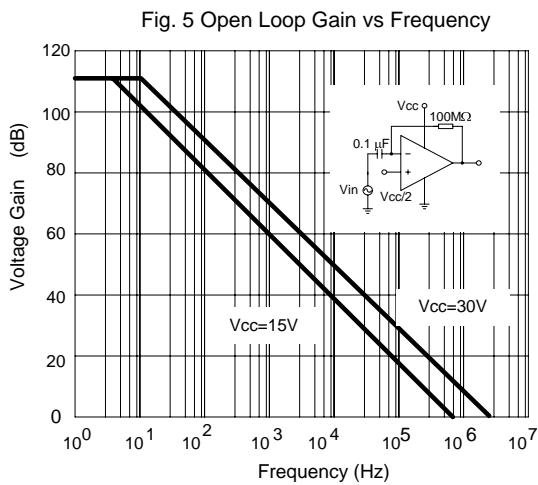
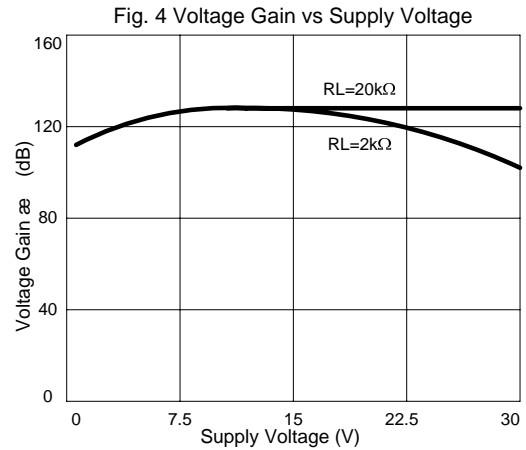
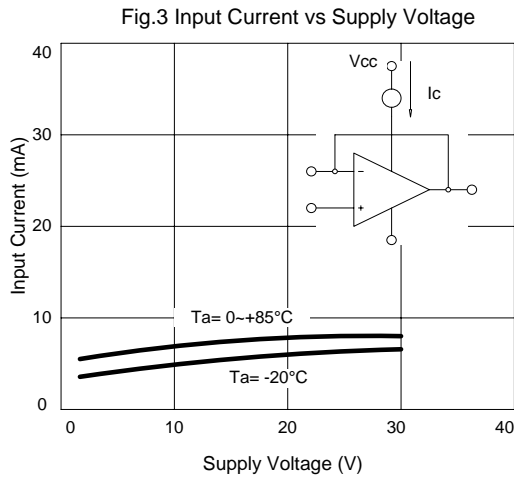
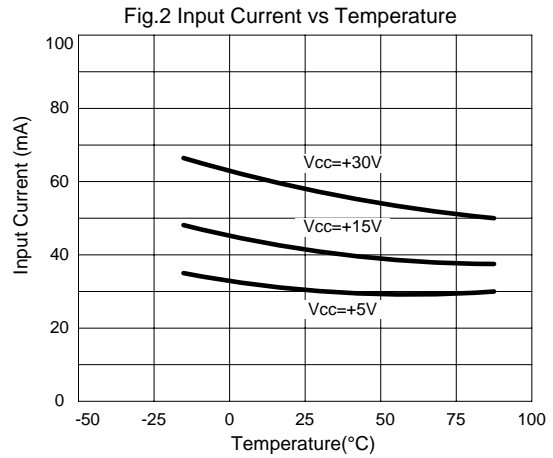
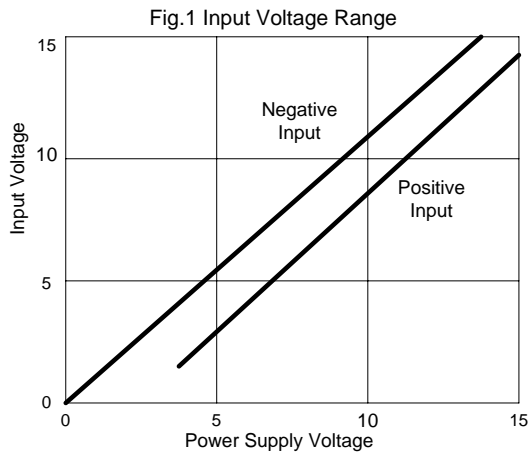
PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	± 16 or 32	V
Differential Input Voltage		$V_{I(DIFF)}$	± 32	V
Input Voltage		V_I	-0.3 ~ +32	V
Output Short to Ground			Continuous	
Power Dissipation	SIP-9	P_D	600	mW
	DIP-8		500	
	SOP-8		280	
	TSSOP-8/MSOP-8		200	
Junction Temperature		T_J	+125	$^{\circ}\text{C}$
Operating Temperature		T_{OPR}	0 ~ +70	$^{\circ}\text{C}$
Storage Temperature		T_{STG}	-65 ~ +150	$^{\circ}\text{C}$

Note Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ($V_{CC}=5.0\text{V}$, $V_{EE}=\text{GND}$, $T_a=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{I(OFF)}$	$V_{CM}=0\text{V}$ to $V_{CC}-1.5\text{V}$ $V_{O(P)}=1.4\text{V}$, $R_S=0\Omega$		2.9	7.0	mV
Input Common Mode Voltage	$V_{I(CM)}$	$V_{CC}=30\text{V}$	0		$V_{CC}-1.5$	V
Differential Input Voltage	$V_{I(DIFF)}$				V_{CC}	V
Output Voltage Swing	V_{OH}	$V_{CC}=30\text{V}$, $R_L=2\text{K}\Omega$	26			V
		$V_{CC}=30\text{V}$, $R_L=10\text{K}\Omega$	27	28		V
	V_{OL}	$V_{CC}=5\text{V}$, $R_L \geq 10\text{K}\Omega$		5	20	mV
Large Signal Voltage Gain	G_V	$V_{CC}=15\text{V}$, $R_L \geq 2\text{K}\Omega$ $V_{O(P)}=1\text{V} \sim 11\text{V}$	25	100		V/mV
Power Supply Current	I_{CC}	$R_L=\infty$, $V_{CC}=30\text{V}$		0.8	2.0	mA
		$R_L=\infty$, Full Temperature Range		0.5	1.2	mA
Input Offset Current	$I_{I(OFF)}$			5	50	nA
Input Bias Current	$I_{I(BIAS)}$			45	250	nA
Short Circuit Current to Ground	I_{SC}			40	60	mA
Output Current	I_{SOURCE}	$V_I(+)=1\text{V}$, $V_I(-)=0\text{V}$ $V_{CC}=15\text{V}$, $V_{O(P)}=2\text{V}$	10	30		mA
		$V_I(+)=0\text{V}$, $V_I(-)=1\text{V}$ $V_{CC}=15\text{V}$, $V_{O(P)}=2\text{V}$	10	15		mA
	I_{SINK}	$V_I(+)=0\text{V}$, $V_I(-)=1\text{V}$ $V_{CC}=15\text{V}$, $V_{O(P)}=200\text{mV}$	12	100		mA
Common Mode Rejection Ratio	CMRR		65	80		dB
Power Supply Rejection Ratio	PSRR		65	100		dB
Channel Separation	CS	$f=1\text{KHZ} \sim 20\text{KHZ}$		120		dB

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(Cont.)

Fig. 7 Voltage Follower Pulse Response

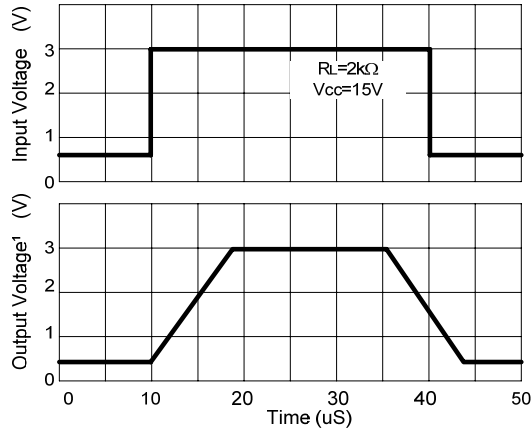


Fig. 8 Voltage Follower Response (Small Signal)

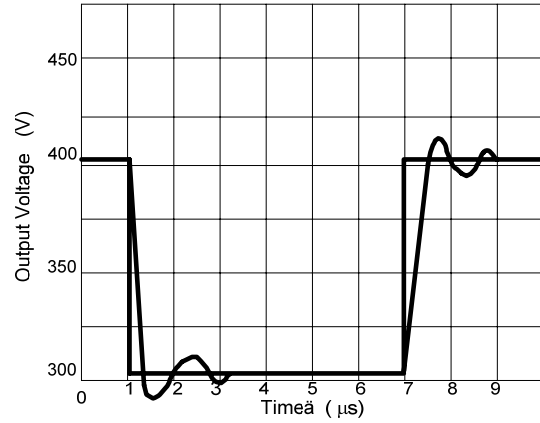


Fig. 9 Gain vs Large Signal Frequency

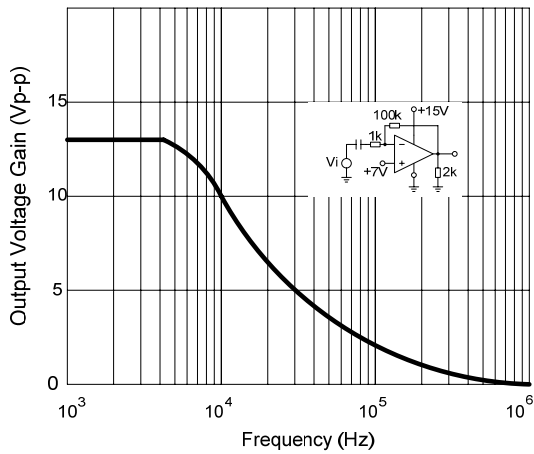


Fig. 10 Output Current Sinking vs Output Voltage

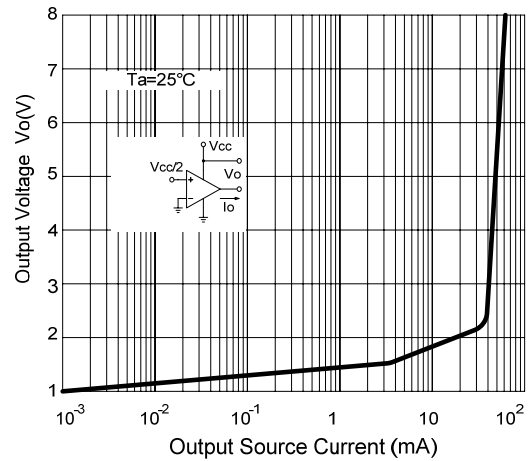


Fig. 11 Output Sink Current vs Output Voltage

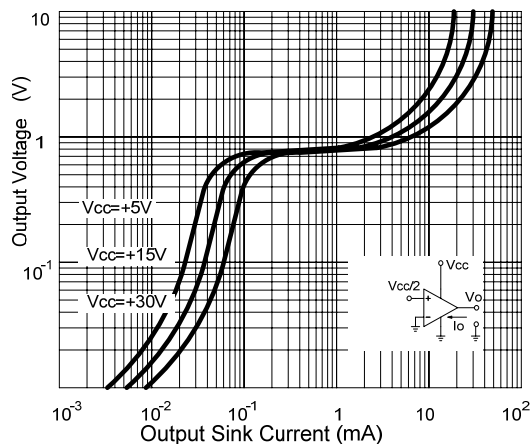
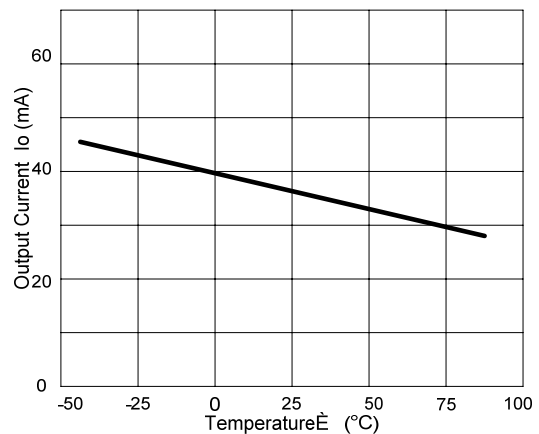


Fig. 12 Current Limiting vs Temperature



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