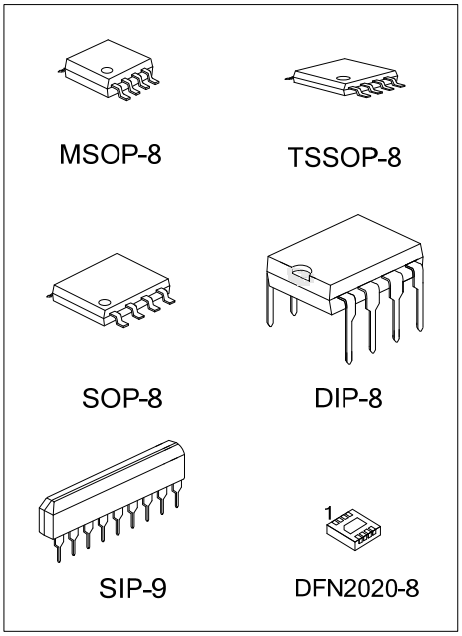
LM358B

LINEAR INTEGRATED CIRCUIT

DUAL OPERATIONAL AMPLIFIER



■ DESCRIPTION

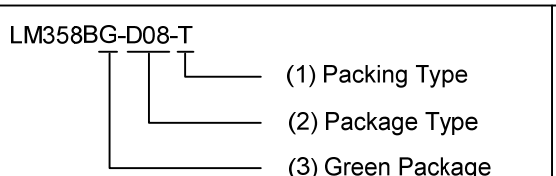
The UTC **LM358B** consists of two independent high gain, internally frequency compensated operational amplifier. It can be operated from a single power supply and also split power supplies.

■ FEATURES

*Internally frequency compensated for unity gain
*Wide power supply range 3V - 36V
*Input common-mode voltage range include ground
*Large DC voltage gain
*High ESD (2kV, HBM)

■ ORDERING INFORMATION

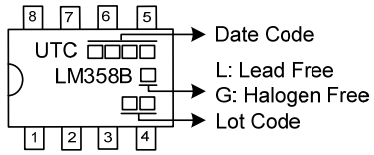
Ordering Number		Package	Packing
Lead Free	Halogen-Free		
LM358BL-D08-T	LM358BG-D08-T	DIP-8	Tube
LM358BL-L09-T	LM358BG-G09-T	SIP-9	Tube
LM358BL-P08-R	LM358BG-P08-R	TSSOP-8	Tape Reel
LM358BL-S08-R	LM358BG-S08-R	SOP-8	Tape Reel
LM358BL-SM1-R	LM358BG-SM1-R	MSOP-8	Tape Reel
LM358BL-K08-2020-R	LM358BG-K08-2020-R	DFN2020-8	Tape Reel



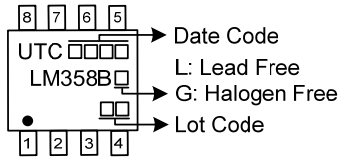
(1) T: Tube, R: Tape Reel
(2) D08: DIP-8, G09: SIP-9, S08: SOP-8, P08: TSSOP-8, SM1: MSOP-8, K08-2020: DFN2020-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

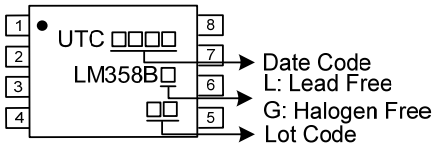
DIP-8



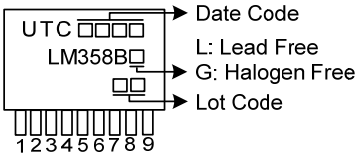
SOP-8/MSOP-8



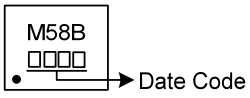
TSSOP-8



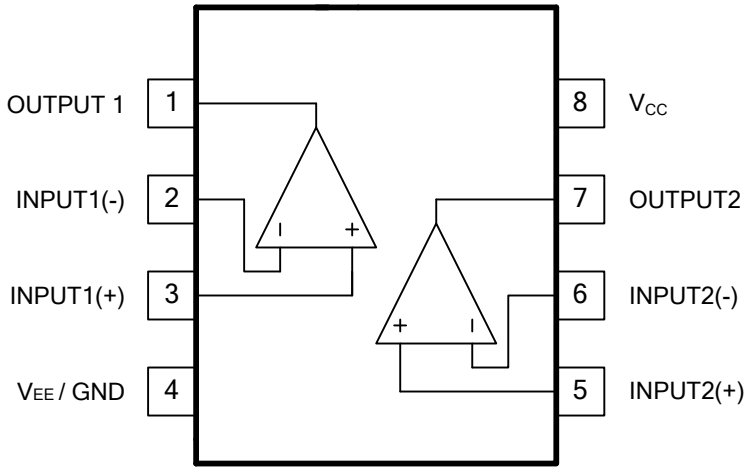
SIP-9



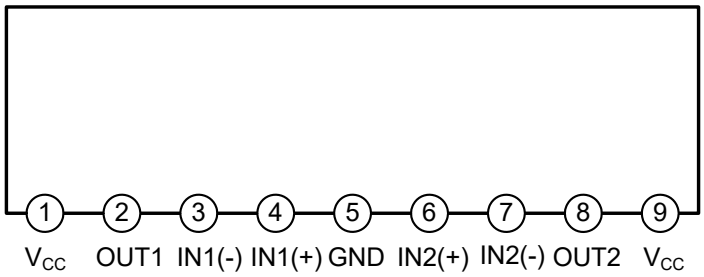
DFN2020-8



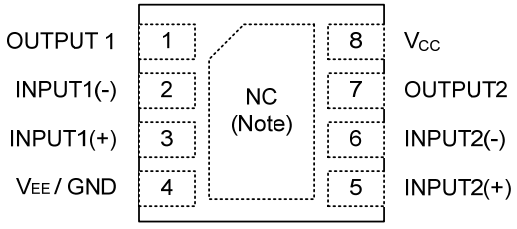
■ PIN DESCRIPTION



SOP-8/DIP-8/MSOP-8/TSSOP-8



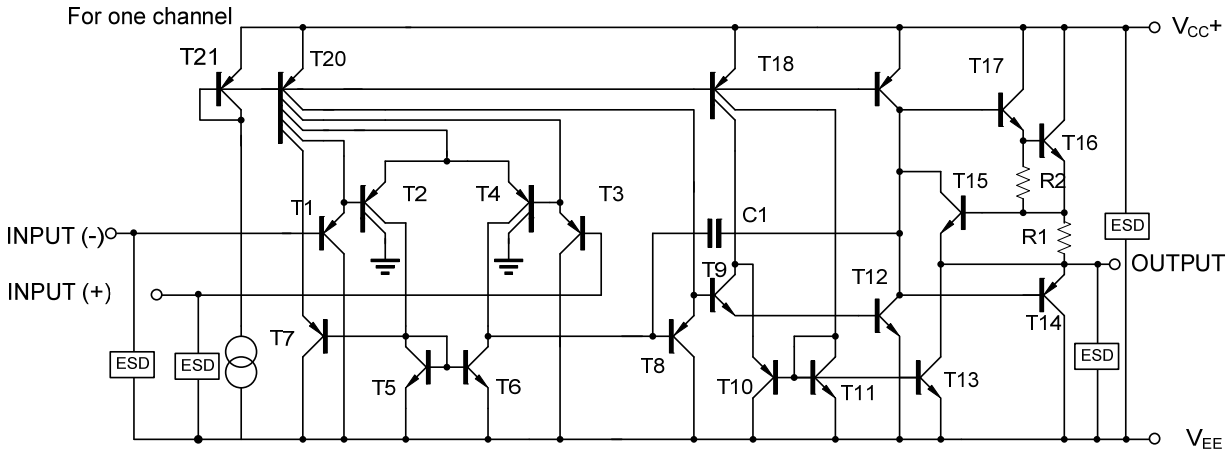
SIP-9



(Top View)
DFN2020-8

Note: No connect.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	±20 or 40	V
Differential Input Voltage		$V_{I(DIFF)}$	±32	V
Input Voltage		V_I	-0.3 ~ +40	V
Output Short to Ground			Continuous	
Power Dissipation	SIP-9	P_D	750	mW
	DIP-8		625	mW
	SOP-8		440	mW
	TSSOP-8		360	mW
	MSOP-8		300	mW
	DFN2020-8		830	mW
Electrostatic Discharge	Human-Body Model (HBM) Per JESD22-A114/115	$V_{(ESD)}$	2000	V
Junction Temperature		T_J	+150	°C
Operating Temperature (Note 2)		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Notes: 1. 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.
2. It is guarantee by design, not 100% be tested.

■ ELECTRICAL CHARACTERISTICS (V_{CC} - V_{EE} =5~36V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I_Q	R_L=∞, V_{CC}=5V T_A= Full Range		320	460	μA
		R_L=∞, V_{CC}=36V T_A= Full Range			800	μA
Power Supply Rejection Ratio	PSRR		95	100		dB
Input Offset Voltage	V_{OS}			1.0	3.0	mV
		T_A= Full Range			4.0	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$			8		μV/°C
Input Offset Current	I_{OS}			5	20	nA
		T_A= Full Range			30	nA
Input Offset Current Drift	$\Delta I_{OS}/\Delta T$			25		pA/°C
Input Bias Current	I_B			15	40	nA
		T_A= Full Range			60	nA
Input Common Mode Voltage	$V_{I(CM)}$	V_{CC}=3V~36V	0		V_{CC}-1.5	V
		V_{CC}=5V~36V, T_A= Full Range	0		V_{CC}-2.0	V
Common Mode Rejection Ratio	CMRR		80	100		dB
		T_A= Full Range	70			dB
Large Signal Voltage Gain	A_V	V_{CC}=15V, R_L≧10KΩ $V_{O(P)}$=1V ~ 11V	90	96		dB
		T_A= Full Range	86			dB
Output Voltage Swing	V_{OH}	I_O=50μA	V_{CC}-1.5	V_{CC}-1.4		V
		I_O=1mA	V_{CC}-1.6	V_{CC}-1.5		V
		I_O=5mA	V_{CC}-1.7	V_{CC}-1.6		V
	V_{OL}	I_O=50μA			150	mV
		I_O=1mA		0.75	1	V
Short Circuit Current	I_{SC}	V_{CC}=±10V, V_O=0V		50	70	mA

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Current	I_{SOURCE}	V_{CC}=15V, V_O= V_{EE}, V_I(+)=1V, V_I(-)=0V	20	50		mA
		T_A= Full Range	10			mA
	I_{SINK}	V_{CC}=15V, V_O= V_{CC} , V_I(+)=0V, V_I(-)=1V	10	40		mA
		T_A= Full Range	5			mA
		V_{CC}=15V, $V_{O(P)}$=200mV, V_I(+)=0V, V_I(-)=1V	60	135		μA
Slew Rate	SR			0.6		V/μs
Gain Bandwidth Product	GBW			1.1		MHz
Channel Separation	CS	f=1KHZ ~ 20KHZ		120		dB

■ TYPICAL CHARACTERISTICS

Fig.1 Input Voltage Range

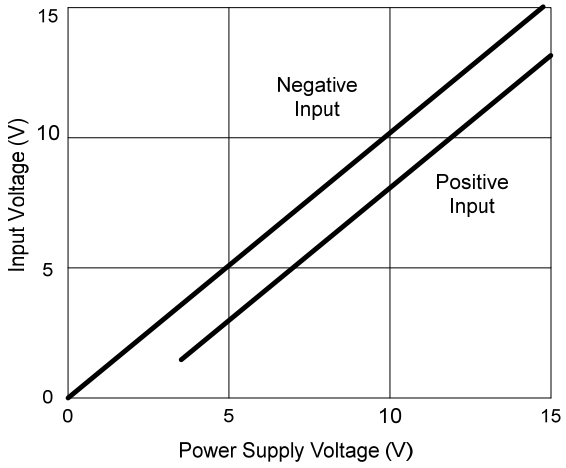


Fig. 2 Voltage Gain vs Supply Voltage

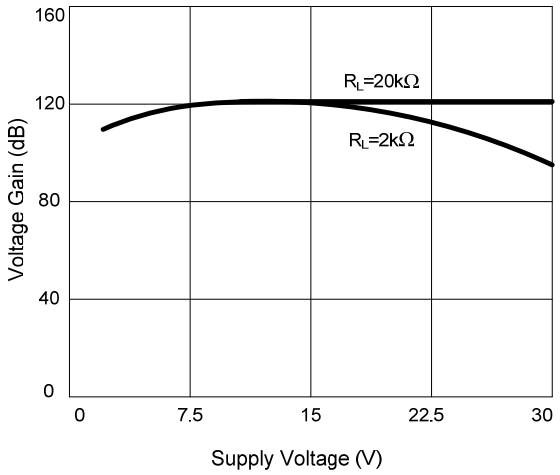


Fig. 3 Open Loop Gain vs Frequency

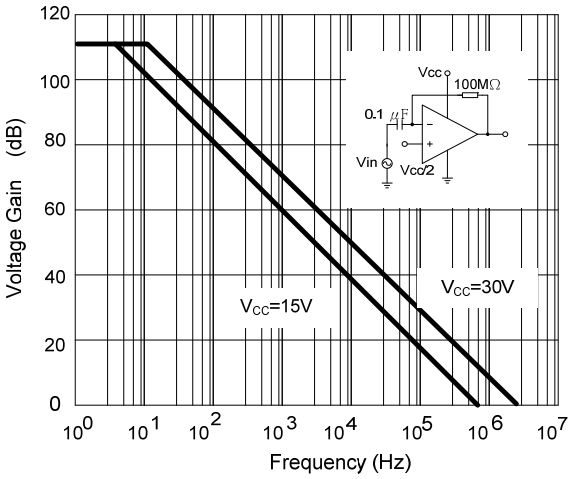


Fig. 4 Common Mode Rejection Ratio vs Frequency

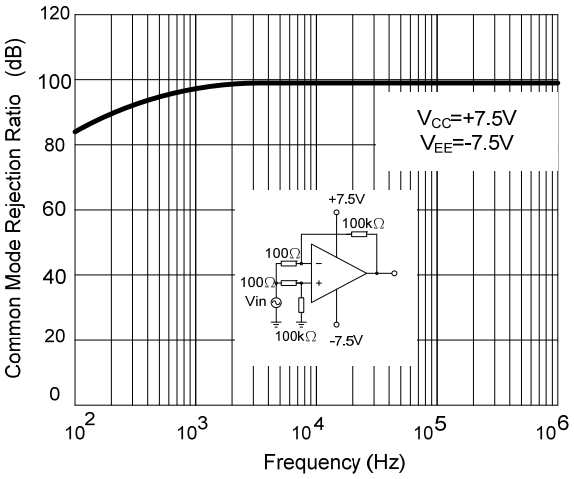


Fig. 5 Voltage Follower Response (Small Signal)

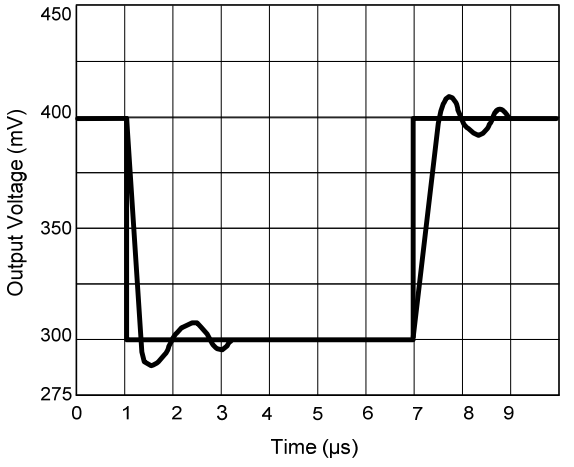
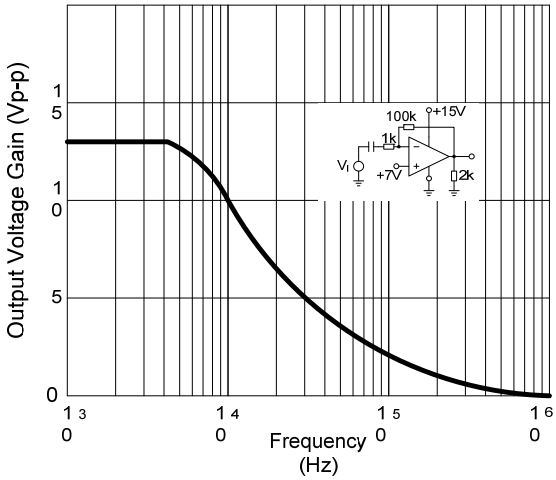


Fig. 6 Gain vs. Large Signal Frequency



■ TYPICAL CHARACTERISTICS (Cont.)

Fig. 7 Output Source Current vs Output Voltage

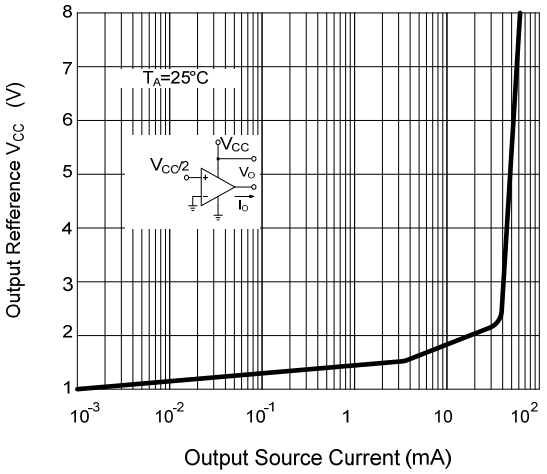


Fig. 8 Output Sink Current vs Output Voltage